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REGION

V

Remedial Planning Activities At Selected Uncontrolled Disposal Sites

U.S. EPA Contract No. 68-W8-0089

Roy F. Weston, Inc.
Dames & Moore
Engineers International, Inc.
Life Systems, Inc.
Hubbell, Roth & Clark, Inc.
Reid, Quebe, Allison, Wilcox & Associates, Inc.
Mary Sexton Associates

24P-2481

REMEDIAL DESIGN DATA COLLECTION REPORT FOR STOUGHTON CITY LANDFILL STOUGHTON, WISCONSIN

VOLUME I

June 1995

Prepared for:

U.S. Environmental Protection Agency
Emergency and Remedial Response Branch
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

This document was prepared in accordance with U.S. EPA Contract No. 68-W8-0089, WESTON Region V Alternative Remedial Contracting Strategy (ARCS).

Work Assignment No. 54-5NT2 Document Control No. 4500-54-ALDX

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77 West Jackson Boulevard
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U.S. EPA Contract No.: 68-W8-0089
Work Assignment No.: 54-5NT2
Document Control No.: 4500-54-ALDX

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JUN 15 1995
EMERG & REMEDIAL RESPONSE SECTION
BUR OF SOLID & HAZRD WASTE

Subject: Stoughton City Landfill
Groundwater Data Collection Report

Dear Mr. Hudak:

Roy F. Weston, Inc. (WESTON®) is pleased to submit a copy of the Data Collection Report for the groundwater component of the remedial design of the Stoughton City Landfill. The report consists of two volumes. Volume 1 presents the results from data collection activities associated with the characterization of groundwater, surface water, sediments, and geologic conditions around the landfill. Volume 2 presents the aquifer performance evaluation.

This report is being submitted for your review and comments, since this information will be used as the basis of design for the groundwater component of the remedial design. If you should have any questions regarding this submittal or the subject project, please contact us at (708) 918-4000.

Very truly yours,

ROY F. WESTON, INC.

William F. Karlovitz

William F. Karlovitz, P.E.
Site Manager

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WFK:DFG:amp
Enclosure

cc: P. Vogtman, Project Officer, U.S. EPA HSM-5J
B. Manzke, Contract Officer, U.S. EPA-MCC-10J
P. Kozol, WDNR (w/enclosure)

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

SECTION 1
INTRODUCTION

This report is Volume I of the Remedial Design (RD) Data Collection Report for the Stoughton City Landfill (SCL) site in Stoughton, Wisconsin. The RD Data Collection Report presents the predesign data collection activities associated with the groundwater remedial action. The RD Data Collection Report consists of two volumes: Volume I and Volume II. Volume I presents a background summary of key activities, and the rationale, protocols, and results of all predesign field activities (except the activities related to the aquifer pumping test). Volume II presents the field procedures, results, and supporting data analysis for the aquifer performance evaluation.

The predesign data collection activities were conducted during May 1994 to March 1995 according to the Remedial Design Work Plan Revision, dated 19 April 1994. The data presented in this report would support the design criteria for groundwater remedial action.

1.1 PREDESIGN INVESTIGATION OBJECTIVES FOR GROUNDWATER REMEDIATION

The predesign investigation was implemented to supplement the available technical data for the site to design the remedial "pump-and-treat" system. The objectives of the investigation were as follows:

- Delineate the extent of contaminated groundwater plume.
- Determine inorganic water quality for the plume area.
- Determine background water quality.

- Obtain geotechnical soil data for the plume area.
- Augment the RI geologic and hydrogeologic characterization for the plume area.
- Augment Remedial Investigation (RI) characterization of sediment and surface water.
- Evaluate treatability study options.

1.2 REPORT ORGANIZATION (VOLUME I OF RD DATA COLLECTION REPORT)

This report describes the predesign data collection activities related to the groundwater component of the remedial design. Section 2 of this report presents a background summary of key activities and a description of the proposed remedial action related to groundwater. Section 3 presents the rationale and protocols for the predesign activities. The predesign activities were grouped as preliminary tasks, sediment and surface water characterization tasks, groundwater characterization tasks, and engineering predesign tasks. Detailed descriptions of the field procedures were described in the Quality Assurance Project Plan (QAPP) submitted by WESTON on 27 April 1994. Section 4 presents the predesign investigation results, including characterization of the site geology, hydrogeology, and chemical constituents.

SECTION 2

BACKGROUND INFORMATION

This section presents a summary of key background activities and a description of the proposed remedial action related to groundwater.

The Stoughton City Landfill site is located in the northeast portion of the City of Stoughton, approximately 13 miles southeast of Madison, in Dane County, Wisconsin (Figure 2-1). The property containing the site encompasses approximately 27 acres and occupies portions of the west half of the southwest quarter and the southwest quarter of the northwest quarter of Section 4, Township 5 North, Range 11 East. A wetland area, located along the southeast portion of the present property boundary, was the initial area of waste disposal. Wetlands are also located in the north portion of the site, and west of the site along the Yahara River. The Yahara River is located west of the site and is within approximately 400 feet of the site at its closest distance. Existing site conditions are depicted in Figure 2-2.

The landfill operated from 1952 until it was officially closed in 1982. Between 1952 and 1969, the site was operated as an uncontrolled dump site. During this time, refuse was usually burned or covered by dirt. The site began operation as a state-licensed landfill in 1969. In 1977, the Wisconsin Department of Natural Resources (WDNR) required that the site be closed according to state regulations. Closure activities included construction of a trash transfer station, placement of cover material borrowed from agricultural areas, application of topsoil, and seeding. Closure work was performed according to WDNR regulations from 1978 to 1982. Only brick, rubble, and similar construction materials were accepted at the site during this period.

Common municipal waste and solid and liquid industrial wastes were disposed of at the site during its years of operation. Industrial sludge containing acetone, tetrahydrofuran, toluene, xylene, and other organic substances were disposed of at the site from 1954 until 1962. During this period, the liquid wastes were commonly poured over garbage and burned. It was also reported that some liquid wastes were poured down boreholes in the west-central portion of the landfill. (These boreholes had been drilled as part of field testing of drilling equipment.)

The site was placed on the National Priorities List (NPL) in June 1986. In March 1988, the two Potentially Responsible Parties (PRPs), Uniroyal Plastics, Inc., and the City of Stoughton, entered into an Administrative Order on Consent (AOC) with U.S. EPA and WDNR. This AOC required the completion of a remedial investigation and feasibility study (RI/FS).

2.1 SUMMARY OF KEY BACKGROUND INVESTIGATION ACTIVITIES

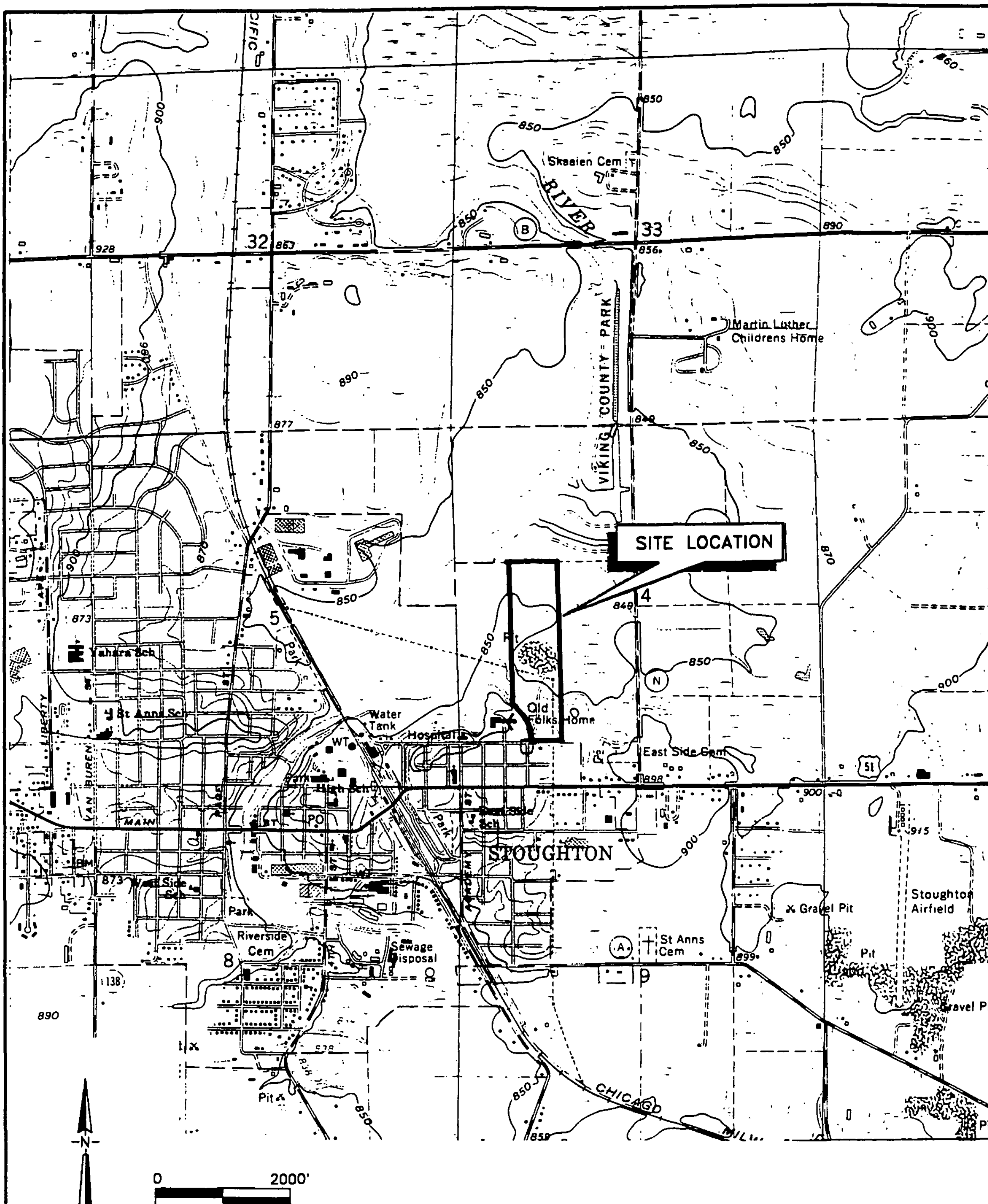
The RI/FS was performed by ENSR Consulting and Engineering, Westmont, Illinois. RI field activities began at the site in March 1989 and the majority of the RI was completed by September 1991. The RI activities and results are described in the "Final Remedial Investigation Report," dated 17 January 1991. Six shallow and deep monitoring well clusters (MW-1 through MW-6), were installed and sampled during the RI phase. The monitoring well locations are shown in Figure 2-2. The RI groundwater sampling results are summarized in Table 2-1. Tetrahydrofuran (THF) was detected above the Wisconsin enforcement standard in groundwater samples in monitoring wells on the western side of the landfill. Dichlorodifluoromethane (DCDFM) and trichlorofluoromethene (TCFM) were detected below the enforcement standards; however, DCDFM was detected close to the preventive action limit. DCDFM is also a breakdown product of TCFM. Therefore, the presence of DCDFM and TCFM also required further investigation. The FS is presented in the "Final Feasibility Study Report," dated 20 June 1991. A Record of Decision (ROD) was signed for the site in September 1991. The ROD presents the selected remedial action for the site.

Prior to issuance of the ROD, U.S. EPA requested that additional field work be performed by the PRPs for the purpose of further addressing the groundwater contaminants. This work was subsequently tasked by U.S. EPA to the Technical Enforcement Support (TES) X contractor because the PRPs refused to perform the work. Metcalf & Eddy, Inc. (M&E) was the primary TES X contractor to U.S. EPA. Jacobs Engineering Group Inc. (Jacobs), subcontractor to M&E with the TES X contract, performed the actual work. Based on the RI results, Jacobs conducted additional sampling on the west side of the landfill. Jacobs drilled four exploratory borings and installed eight monitoring wells (MW-3B, MW-7S, MW-7I, MW-8B, MW-9S, MW-9I, and MW-9B). The monitoring well locations are shown in Figure 2-2. Monitoring wells MW-3B, MW-7B, MW-8B, and MW-9B were installed in bedrock. Jacobs identified THF, DCDFM, and TCFM as the chemicals of concern in groundwater, and conducted two rounds of groundwater sampling. Tables 2-2 and 2-3 summarize the groundwater sampling results reported by Jacobs. Based these groundwater monitoring results, U.S. EPA decided that groundwater remediation is necessary at the site.

Roy F. Weston, Inc. (WESTON®) under the ARCS contract, was tasked by U.S. EPA to perform the Remedial Design/Remedial Action (RD/RA) at the site. Based on a review of the groundwater data, WESTON determined that additional predesign investigation is required prior to initiating groundwater remedial design.

2.2 PROPOSED GROUNDWATER REMEDIAL ACTION

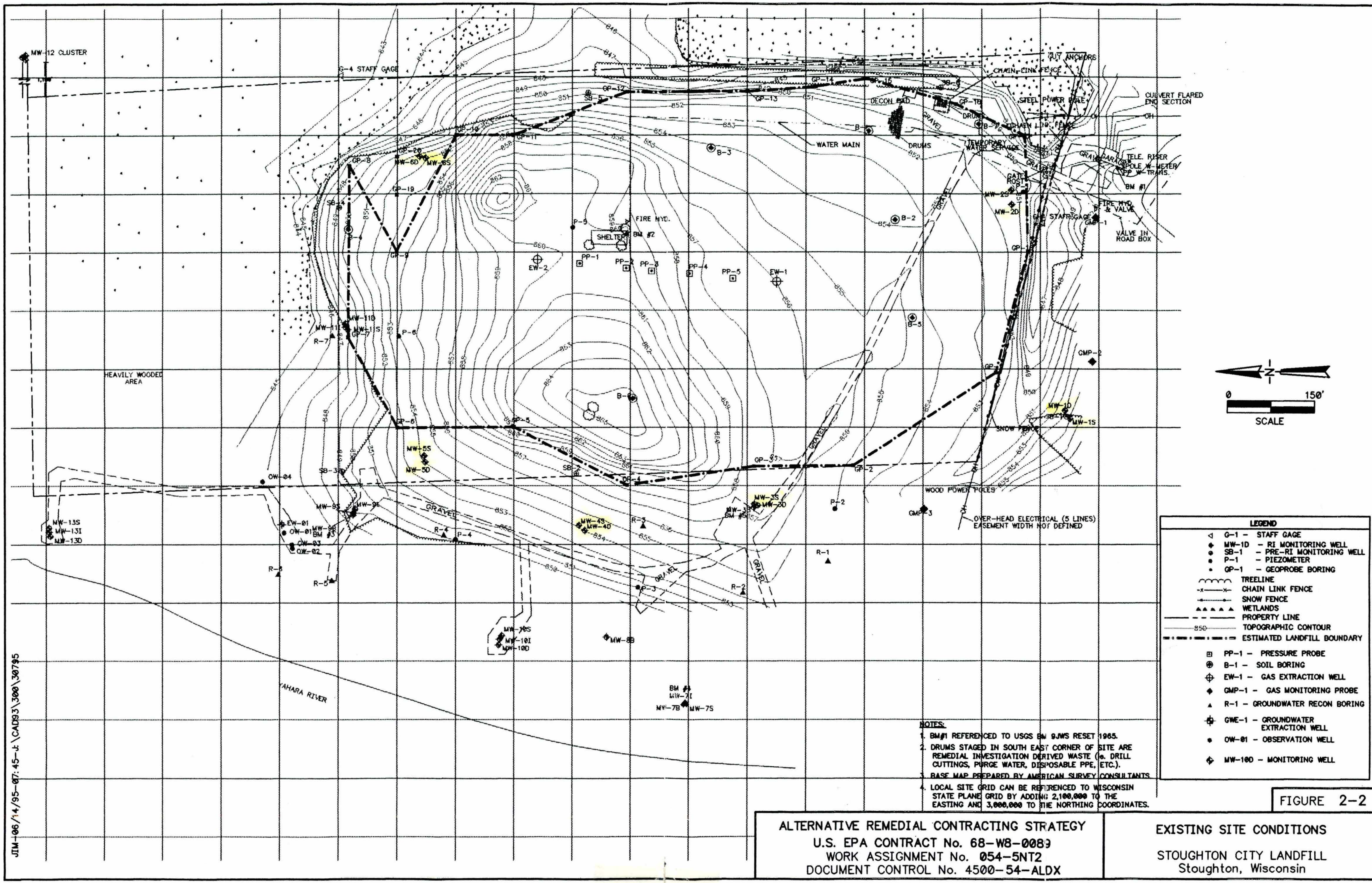
The proposed remedial action for the site is contained in the ROD and consists primarily of two remedial components: landfill and groundwater. The proposed groundwater remedial action in the ROD includes extraction and treatment of contaminated groundwater and subsequent discharge of the treated water to the nearby Yahara River. In addition, long-term groundwater monitoring will be performed to confirm the effectiveness of the selected remedial action. WESTON is also evaluating additional treatment and discharge options.



SOURCE: U.S.G.S. 7.5 Min. TOPOGRAPHIC MAP
STOUGHTON QUADRANGLE

FIGURE 2-1

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	SITE LOCATION MAP STOUGHTON LANDFILL SITE Stoughton, Wisconsin



MW-12 CLUSTER
G-4 STAFF GAGE
GUY ANCHORS
CHAIN LINK FENCE
CULVERT FLARED END SECTION
STEEL POWER POLE
DECON PAD
DRUMS
WATER MAIN
TEMPORARY WATER SERVICE
TELE. RISER
POLE W-METER
PP W-TRANS.
BM #1
FIRE HYD. & VALVE
VALVE IN ROAD BOX
STAFF GAGE
FIRE HYD.
SHELTER
BM #2
HEAVILY WOODED AREA
SNOW FENCE
WOOD POWER POLES
OVER-HEAD ELECTRICAL (5 LINES) EASEMENT WIDTH NOT DEFINED
GRAVEL
YAHARA RIVER
0 150'
SCALE
LEGEND
G-1 - STAFF GAGE
MW-1D - RI MONITORING WELL
SB-1 - PRE-RI MONITORING WELL
P-1 - PIEZOMETER
GP-1 - GEOPROBE BORING
TREELINE
CHAIN LINK FENCE
SNOW FENCE
WETLANDS
PROPERTY LINE
850 TOPOGRAPHIC CONTOUR
ESTIMATED LANDFILL BOUNDARY
PP-1 - PRESSURE PROBE
B-1 - SOIL BORING
EW-1 - GAS EXTRACTION WELL
GMP-1 - GAS MONITORING PROBE
R-1 - GROUNDWATER RECON BORING
GWE-1 - GROUNDWATER EXTRACTION WELL
OW-01 - OBSERVATION WELL
MW-10D - MONITORING WELL
NOTES:
1. BM#1 REFERENCED TO USGS BM 9JWS RESET 1965.
2. DRUMS STAGED IN SOUTH EAST CORNER OF SITE ARE REMEDIAL INVESTIGATION DERIVED WASTE (ie. DRILL CUTTINGS, PURGE WATER, DISPOSABLE PPE, ETC.).
3. BASE MAP PREPARED BY AMERICAN SURVEY CONSULTANTS
4. LOCAL SITE GRID CAN BE REFERENCED TO WISCONSIN STATE PLANE GRID BY ADDING 2,100,000 TO THE EASTING AND 3,000,000 TO THE NORTHING COORDINATES.
FIGURE 2-2
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX
EXISTING SITE CONDITIONS
STOUGHTON CITY LANDFILL
Stoughton, Wisconsin
JIM-06/14/95-07:45-L\CAD93\300\30795

Table 2-1

Summary of RI Groundwater Sampling Results
Stoughton City Landfill
Stoughton, Wisconsin

Parameter	Range of Concentrations (µg/L)	Wisconsin Groundwater Standard: Enforcement Standard (µg/L)	Wisconsin Groundwater Standard: Preventive Action Limit (µg/L)	Comments
Volatile Organics				
1,2-dichloroethene (cis and trans)	8.0	100	10(cis); 20(trans)	Meets state standards.
Xylenes (total)	1.0 J	620	124	Meets state standards.
Dichlorodifluoromethane (DCDFM)	16J - 240J	1,000	200	Maximum concentration detected close to preventive action limit. Needs further investigation.
Trichlorofluoromethane (TCFM)	6.4J - 24J	3,490	698	Meets state standards. However, DCDFM may be a breakdown product of TCFM. Needs further investigation.
Tetrahydrofuran (THF)	27 - 660J	50	10	Primary contaminant of concern.
Semivolatile Organics				
Benzoic Acid	2.0J	NE	NE	Not a carcinogen. Preliminary risk-based goal is 146,000 µg/L.
Bis(2-ethylhexyl)phthalate	2.0J - 44J	3	0.3	The results are estimated concentrations and this chemical is a common laboratory contaminant. The RI did not identify this as a chemical of concern.
Pentachlorophenol	3.0J	300	30	Meets state standards.
Pesticides/PCBs				
	--	NA	NA	No pesticides/PCBs were detected.

Notes:

1. Elevated concentrations of metals were detected in various monitoring wells during the RI. However, the RI or ROD did not identify metals being of concern.
2. Preliminary risk-based goal for benzoic acid was calculated using U.S. EPA Human Health Manual, "Part B: Development of Risk-Based Preliminary Remediation Goals."
3. NE - None established.
4. NA - Not Applicable.
5. J - Estimated Value.
6. Only parameters detected above CRQLs are reported here.

Table 2-2

Round 1 Groundwater Sampling Results
(Conducted by Jacobs, October 1993)
Stoughton City Landfill
Stoughton, Wisconsin
(All Concentrations in $\mu g/L$)

Location	Screen Interval (ft.)	Tetrahydrofuran	Dichlorodifluoromethane	Trichlorofluoromethane
MW-1S	5 - 15	ND	ND	ND
MW-1D	69 - 79	ND	ND	ND
MW-2S	5 - 15	ND	ND	ND
MW-2D	24 - 34	ND	ND	ND
MW-3S	7 - 17	ND	ND	ND
MS-3D	61 - 17	417	ND	ND
MW-3B	82 - 92	ND	ND	ND
MW-4S	5 - 15	ND	ND	ND
MW-4D	63 - 73	ND	ND	ND
MW-5S	5 - 15	ND	18	ND
MW-5D	65 - 75	ND	ND	3 J
MW-6S	4 - 14	ND	ND	ND
MW-6D	46 - 56	ND	ND	ND
MW-7S	6 - 12	ND	ND	ND
MW-7I	46 - 56	ND	ND	ND
MW-7B	71 - 81	ND	ND	ND
MW-8B	71 - 81	ND	ND	ND
MW-9S	18 - 28	42	357	2 J
MW-9I	34 - 44	94	315	24
MW-9B	71 - 81	ND	ND	7 J
Enforcement Standard (E.S.)		50	1,000	3,490
Preventive Action Limit (PAL)		10	200	698

J - Estimated.
Detection Limit - 10 $\mu g/L$.
ND - Nondetect.

Only tetrahydrafuran, didichlorodifluoromethane, and trichlorofluoromethane results are summarized here.

Table 2-3

Round 2 Groundwater Sampling Results
(Conducted by Jacobs, February - March 1994)
Stoughton City Landfill
Stoughton, Wisconsin
(All Concentrations in $\mu g/L$)

Location	Screen Interval (ft.)	Tetrahydrofuran	Dichlorodifluoromethane	Trichlorofluoromethane
MW-1S	5 - 15	ND	ND	ND
MW-1D	69 - 79	ND	ND	ND
MW-2S	5 - 15	ND	ND	ND
MW-2D	24 - 34	ND	ND	ND
MW-3S	7 - 17	9 J	ND	ND
MS-3D	61 - 17	300	ND	ND
MW-3B	82 - 92	ND	ND	ND
MW-4S	5 - 15	2 J	ND	ND
MW-4D	63 - 73	ND	ND	ND
MW-5S	5 - 15	ND	23	0.6 J
MW-5D	65 - 75	3 J	5 J	2 J
MW-6S	4 - 14	ND	ND	ND
MW-6D	46 - 56	ND	ND	ND
MW-7S	6 - 12	4 J	ND	ND
MW-7I	46 - 56	ND	ND	ND
MW-7B	71 - 81	ND	ND	ND
MW-8B	71 - 81	ND	ND	ND
MW-9S	18 - 28	150	450	ND
MW-9I	34 - 44	91	290	17
MW-9B	71 - 81	NA	NA	NA
Enforcement Standard (E.S.)		50	1,000	3,490
Preventive Action Limit (PAL)		10	200	698

J - Estimated value.
ND - Nondetect.
NA - Not analyzed.

Detection limit for tetrahydrofuran = 20 $\mu g/L$.
Detection limit for dichlorodifluoromethane, trichlorofluoromethane = 10 $\mu g/L$.
Only tetrahydrafuran, didichlorodifluoromethane, and trichlorofluoromethane results are summarized here.

SECTION 3

PREDESIGN ACTIVITIES

This section describes the predesign activities completed by WESTON to collect additional data for .groundwater remedial design. The scope of all predesign activities was in accordance with the Remedial Design Work Plan Revision dated 19 April 1994. The field protocols and sampling procedures were prepared in accordance with the Quality Assurance Project Plan (QAPP) Revision. The predesign field activities were completed in two phases. Predesign Phase I field activities consisted of sediment sampling, surface water sampling, reconnaissance borings investigation, inorganic water quality investigation, and installation of a background monitoring well cluster. The predesign Phase II field activities were based on the results of the Phase I field activities, and consisted of installation of additional monitoring wells, monitoring well sampling, installation of aquifer pump test wells and observation wells, aquifer pumping test, and evaluation of groundwater treatability study options.

3.1 PRELIMINARY TASKS

3.1.1 Health and Safety Plan Addendum

WESTON prepared a Health and Safety Plan (HASP) for the site activities based on the Statement of Work (SOW). However, the revised SOW (SOW #3) included additional predesign activities. WESTON prepared an addendum to the HASP to address sediment sampling, surface water sampling, reconnaissance borings investigation, monitoring well installation, and landfill predesign tasks. The addendum was prepared in accordance with the Occupational Safety and Health Administration (OSHA) regulations to ensure that all operations and equipment will comply with 29 CFR 1910.120 and other applicable portions of 29 CFR 1910 and 29 CFR 1926.

3.1.2 Quality Assurance Project Plan Revision

WESTON prepared a QAPP for the sampling activities based on the SOW. The QAPP was submitted to U.S. EPA on 27 April 1994. The QAPP was revised to address U.S. EPA's comments on the original QAPP and to address the additional predesign activities included in SOW #3. The revised QAPP was approved by U.S. EPA.

3.1.3 Procurement of Subcontractors for Predesign Activities

WESTON prepared a Request for Proposal (RFP) to solicit competitive cost proposals from three firms for predesign geotechnical services. The groundwater-related geotechnical services included reconnaissance borings for collection of groundwater samples, permanent groundwater monitoring and extraction well installation, and an aquifer pumping test. Burlington Environmental, Inc. (Burlington) was selected to perform these services.

3.1.4 Procurement of Laboratories for Predesign Activities

The laboratory analytical services for predesign Phase I activities (reconnaissance borings sampling and monitoring well sampling for inorganic water quality) were performed by U.S. EPA Contract Laboratory Program (CLP) laboratories. As of 31 June 1994, U.S. EPA discontinued analysis of the special analytical services (SAS) parameters through CLP. Therefore, the routine analytical services (RAS) parameters for predesign Phase II activities were analyzed by U.S. EPA CLP laboratories and the SAS parameters were analyzed by laboratories under subcontract to WESTON.

The SAS parameters for predesign Phase II activities included analyses of THF, DCDFM, TCFM (special VOCs), and water quality parameters. Envirosystems, Inc. (Envirosystems) of Columbia, Maryland, conducted analyses of special VOCs during the predesign Phase I investigation. Therefore, in order to maintain consistency, WESTON subcontracted Envirosystems to perform the analyses of special VOCs. For water quality parameters, WESTON prepared a RFP to solicit competitive cost proposals from three laboratories. ATEC Associates, Inc. (ATEC) of Indianapolis, Indiana, was selected to perform the water quality analysis. WESTON also performed a performance sample evaluation and laboratory audit prior to awarding the subcontract to ATEC. The list of laboratories used for the predesign activities is presented in Table 3-1.

3.1.5 Mobilization of Support Facilities

Mobilization of the support facilities included lining an existing gravel decontamination pad with Visqueen for equipment and personnel decontamination, hooking up City water to the site, and setting up trailer (rental truck) facilities. Burlington hired a subcontractor to clear small trees and brush, and construct a temporary access road to access reconnaissance boring locations and additional monitoring wells. The temporary access road was constructed of 10-foot-wide roadway geotextile fabric (minimum 10 ounces/square yard) overlain by coarse crushed limestone to an approximate depth of 4 to 6 inches.

3.2 SEDIMENT AND SURFACE WATER CHARACTERIZATION TASKS

This subsection describes the rationale for sediment and surface water sampling locations and analysis. The sampling procedures are also described. The analytical results are described in Subsection 4.1.

3.2.1 Sediment Sampling

During the predesign Phase I investigation, WESTON collected eight sediment samples to augment data collected during the RI. Two sediment samples (SL1-SD01-01 and SL1-SD02-01MSD) were collected from the drainage ditch along the southern boundary of the landfill. A field duplicate (SL1-SD01-01DP) was also collected at the SL1-SD01-01 location. Four sediment samples (SL1-SD03-01 through SL1-SD06-01) were collected from the wetlands east of the site. Two sediment samples (SL1-SD07-01 and SL1-SD08-01) were collected as background sediment samples from a wetland east of County Road N. The predesign Phase I and RI sediment sampling locations are shown in Figure 3-1. Table 2-1 presents the sediment sampling locations, sampling dates, type of analysis, CLP traffic report number, and name of the laboratory performing the analysis.

During the RI, sediment samples were collected from the wetlands east of the site. These samples were analyzed for THF, DCDFM, TCFM, and Target Compound List/Target Analyte List (TCL/TAL) parameters. According to the RI report, only a few total metals were detected in concentrations significantly above those in background sediment samples. Therefore, during this sampling effort, four sediment samples from the wetlands east of the site (SD03, SD04, SD05, and SD06) were analyzed only for total metals. During the RI, sediments from the drainage ditch along the southern boundary of the landfill were not characterized. Therefore, during this sampling effort, the sediment samples (SD01 and SD02) were analyzed for THF, DCDFM, TCFM, and TCL/TAL parameters. In order to characterize the background wetlands, the background sediment samples (SD07 and SD08) were analyzed for THF, DCDFM, TCFM, TCL/TAL parameters, pH, grain size, total organic carbon (TOC), total Kjeldahl nitrogen (TKN), and cation exchange capacity.

The sediment samples were collected using decontaminated stainless steel spoons and disposable scoops. The decontamination protocols outlined in the Field Sampling Plan (Appendix A of QAPP) were followed. The volatile aliquots were collected first as grab samples in order to minimize the loss of volatiles. Sample material was transferred as quickly as possible and placed directly into the appropriate volatile sample aliquot containers. Each volatile sample container was filled completely, packaging the sediment in the container as tightly as possible. The remainder of the sample material was homogenized in a stainless steel bowl and placed in appropriate remaining sample containers. The wetland sediments included some roots.

3.2.2 Surface Water Sampling

During the predesign Phase I investigation, WESTON collected six surface water samples. The objective of surface water sampling was to augment existing RI data and to evaluate the impact of the site on wetland water quality. The data will also be useful for evaluating the option of discharging treated water to the wetlands.

Four surface water samples (SL1-SW01-01 through SL1-SW04-01) were collected from the wetlands east of the site. A field duplicate (SL1-SW01-01DP) was also collected at SL1-SW01-01 location. Two surface water samples (SL1-SW05-01 and SL1-SW06-01) were collected as background surface water samples from wetlands east of County Road N. The surface water sampling locations were the same as the previously described sediment sampling location in wetlands. The predesign and RI surface water sampling locations are shown in Figure 3-1. Table 3-3 presents the surface water sampling locations, sampling dates, type of analysis, CLP traffic report number, and name of laboratory performing the analysis. The surface water samples were analyzed for water hardness and total metals (filtered and unfiltered).

The surface water depth in the wetlands varied from 8 to 14 inches. Surface water samples were collected by lowering a sample container by hand. One total metals sample at each location was field filtered using a vacuum pump connected to a disposable, sterile filtration unit containing a 0.45-micron filter. The total metal samples were preserved with nitric acid to pH less than 2, and hardness samples were preserved with 1 ml 1:1 sulfuric acid to pH less than 2.

3.3 GROUNDWATER CHARACTERIZATION TASKS

3.3.1 Reconnaissance Borings Investigation

The reconnaissance borings investigation consisted of seven reconnaissance borings (R01 through R07). Figure 2-2 shows the locations of the reconnaissance borings. During groundwater sampling conducted by Jacobs in October 1993, contamination was detected at the MW-3 and MW-9 locations. Therefore, reconnaissance borings R01 through R06 were drilled and sampled to define the extent of contamination around these locations. The reconnaissance boring R07 was drilled north of the landfill because no previous data exists for groundwater north of the landfill.

The drilling and sampling procedures were in general compliance with the protocols described in the Field Sampling Plan (FSP - Appendix A of the QAPP). Three different drilling methods were used during the reconnaissance borings investigation: hollow stem augers (HSA), lead screen augers (LSA), and direct mud rotary (DMR). The HSA drilling method was initially used to perform continuous split-spoon sampling and groundwater sampling. The groundwater samples were retrieved via a Hydropunch II sampler. When heaving sand problems were encountered during the HSA drilling method, drilling mud was used to minimize these problems. However, the drilling mud would circulate into the Hydropunch II groundwater sample. Therefore, the use of HSA with drilling mud was discontinued. The LSA drilling method was then used to perform continuous split-spoon sampling and groundwater sampling. The DMR drilling method was used to collect aquifer material samples. DMR is a very rapid drilling method and was well suited at the site for collection of aquifer material samples.

The soil description based on continuous split-spoon sampling was recorded on boring logs. The boring logs for the reconnaissance borings are provided in Appendix A. Following completion of the drilling, the boreholes were abandoned per Wisconsin Administrative Code (WAC) NR 141.25. The aquifer material sampling and groundwater sampling procedures are described below.

Aquifer Material Sampling

Aquifer material sampling was performed to evaluate the hydraulic properties of the aquifer. This information would be necessary for groundwater modeling during the design of the groundwater extraction system. Aquifer material samples were collected from reconnaissance borings R-1, R-4, and R-5. Three samples were collected from each boring: one sample each at shallow, intermediate, and deep depths. The samples were analyzed for geotechnical parameters (grain size, TOC, porosity, bulk density, and moisture content). Table 3-4 presents the sample locations, sample depths, drilling method, sampling dates, and shipment information for aquifer material sampling.

In order to obtain an undisturbed sample for density and porosity, a 2-inch acetate-lined tube was used with the split spoon to collect sample for these parameters. Following removal from the borehole, the tube was capped. Sample material for other geotechnical parameters was collected using a split spoon. Following removal from the borehole, the split-spoon sampler was opened on a polypropylene sheeting. Sample material from several places along the sample core at the depth of interest was removed using a disposable scoop. The material was placed into the assigned sample containers. All sample analyses for the aquifer soil boring samples were geotechnical; therefore, a specific order for filling the sample containers was not necessary. All reusable sampling equipment, including the split-spoon sampler, was decontaminated between each sample in accordance with procedures outlined in the QAPP and FSP.

Reconnaissance Borings Groundwater Sampling

As mentioned previously, the reconnaissance borings groundwater sampling was performed to define the extent of contamination. The results of this sampling were also used for the placement and installation of additional monitoring wells during predesign Phase II investigation.

Groundwater samples were collected from all reconnaissance borings (R-1 through R-7). Three samples were collected from each boring, except R-7. Only one sample was collected at R-7 because of poor water recovery. The samples were collected at shallow, intermediate, and deep depths. The samples were analyzed for THF, DCDFM, TCFM, and RAS VOAs. Table 3-5 presents the sample locations, sample depths, drilling method, sampling dates, type of analysis, and shipment information for reconnaissance borings groundwater sampling.

During the HSA drilling procedure, groundwater samples were retrieved via the Hydropunch II sampler in the following manner:

- The Hydropunch II was decontaminated between each sample collection in accordance with procedures outlined in the QAPP and FSP. The O-rings and drive cones are expendable, and new ones were used for each sample collection.

- The HASs were advanced to just above the desired sample depth.

- The Hydropunch II were advanced to the desired sample depth below the augers and beyond the mud zone.

- The Hydropunch II was then retrieved approximately 18 inches to raise the sample chamber off the expendable cone tip and allow groundwater to enter the sample chamber.

- A check valve retains the groundwater sample within the Hydropunch chamber as the sampler is retrieved from the borehole.

- The Hydropunch II was retrieved from the borehole and the groundwater sample was transferred directly to sample containers. The sample bottles were preserved with hydrochloric acid (HCl) prior to the addition of the sample.

During the LSA drilling procedure, groundwater samples were collected in the following manner:

- Drilling was performed with an HSA with an LSA section. The LSA was advanced to the desired sample depth so that the boring acts as a temporary monitoring well.

- A submersible pump was lowered down the hollow stem.

- One well volume (equal to the volume of water in the hollow stem) was purged.

- Samples were collected at low pumping rates (1 to 2 <1 minute) after the purging has been completed. Sample bottles were filled at an angle in order to limit splashing and bubbling. The sample bottles were preserved with HCL prior to the addition of the sample.

3.3.2 Inorganic Water Quality Investigation

Groundwater samples were collected to characterize the inorganic water quality of the area. During the predesign Phase I investigation, monitoring wells MW-3S, MW-3B, MW-7I, MW-7B, MW-9S, and MW-9I were sampled to characterize groundwater quality in the area of concern (plume area). During the predesign Phase II investigation, a background monitoring well cluster (MW-12S, MW-12I, and MW-12D) was installed. The details of the background monitoring well installation are presented in Subsection 3.3.3. Monitoring wells MW-12S, MW-12I, and MW-12D were sampled to characterize background groundwater quality.

The groundwater samples were analyzed for biochemical oxygen demand (BOD), chemical oxygen demand (COD), TOC, total dissolved solids (TDS), alkalinity, hardness, ammonia, bromide, color, fluoride, nitrate, and nitrite, TKN, total phosphorus, sulfate, sulfide, surfactants, total phenols, and RAS metals. Tables 3-6 and 3-7 present the sample collection and shipment report for predesign Phase I and Phase II inorganic groundwater quality sampling, respectively. The monitoring well sampling procedures are described below.

Monitoring Well Sampling Procedures

Monitoring wells were sampled using a submersible Grundfos pump utilizing very slow flow rate (0.2 to 2 L/min). Sampling equipment was decontaminated pursuant to protocols in the QAPP and FSP. Each sample was collected using the following methodology:

- The depth to the water level in the well and the total depth of the well was measured with an electrical sounding device (accuracy ±0.01 feet). The reference point for these depths was the top of the well riser pipe.

- The volume of standing water in the well was calculated. Volume of water in a 2-inch-diameter well (gallons) = length (feet) x 0.16 (gallons/foot).

- A submersible Grundfos pump was used for purging and sampling, and was decontaminated prior to being used in a well. Well purging was done at low flow rates (1.0 to 4.0 L/min) with the pump intake just above or within the screened interval. Field measurements of pH, temperature, conductivity, dissolved oxygen and turbidity were taken over time. Stabilization of these well purging parameters (±0.25 units for pH, ±1°C for temperature, ±10 percent for conductivity, ±0.1 mg/L for dissolved oxygen, and ±1 units for turbidity) indicate equilibrated conditions. Well purging continued until the turbidity decreased to 5 NTU or less, or until five purge volumes were removed.

- Samples were collected directly from the pump after the well purging was completed. Two inorganic samples for total metals analysis were collected at each monitoring well sample locations. One sample was field filtered via a vacuum pump. The vacuum pump was attached to sterilized disposable filter units with 0.45-micron filters. Both the filtered and unfiltered sample were submitted for analysis.

Table 3-8 presents the field parameters measured during inorganic groundwater quality sampling.

3.3.3 Installation of Additional Monitoring Wells

Additional monitoring wells were installed during the predesign Phase II investigation. A background monitoring well cluster consisting of shallow (MW-12S), intermediate (MW-12I), and deep (MW-12D) wells was installed. In addition, based on the results of reconnaissance borings groundwater sampling, three additional monitoring well clusters (MW-10, MW-11, and MW-13) were also installed. Each well cluster consisted of a shallow, intermediate, and deep well. Monitoring wells MW-11S, MW-11I, and MW-11D were installed north of the site to provide groundwater data north of the site. Monitoring well clusters MW-13 (MW-13S, MW-13I, and MW-13D) and MW-10 (MW-10S, MW-10I, and MW-10D) were installed to monitor the movement of the plume toward the Yahara River. The locations of the monitoring well clusters MW-10, MW-11, MW-12, and MW-13 are shown in Figure 2-2.

Continuous split-spoon sampling was performed during the monitoring well installation. The boring logs are presented in Appendix A. Well constructions were performed in accordance with WAC NR 141. The well materials consisted of 2-inch #304 stainless steel casing and screen. Screen lengths were 10 feet with 0.010-inch slots. Well construction is shown in Figure 3-2. The annular space seal consisted of a fine buffer sand below a bentonite-sand slurry. The surface seal consisted of granular bentonite. The wells were completed at the surface with 3-foot by 3-foot concrete pads and 6-inch steel protective casings. The well construction data and groundwater elevations are summarized in Table 3-9. Well development was performed according to WAC NR 141.21. Development was accomplished by removing at least 10 well volumes until the discharging water was free of sediment.

3.3.4 Round of Groundwater Sampling

One round of monitoring well sampling was conducted during the predesign Phase II investigation. The main objective of this round of groundwater sampling was to obtain groundwater data prior to the start of remedial activities. All monitoring wells were sampled and groundwater samples were analyzed for THF, DCDFM, TCFM, RAS VOAs, and RAS metals (unfiltered and filtered). Table 3-10 presents the sample number, sampling dates, type of analysis, and shipment information for monitoring well samples.

The monitoring well sampling procedures were the same as described in Subsection 3.3.2 for inorganic water sampling. Table 3-11 presents the field parameters measured during this round of monitoring well sampling. Samples were collected directly from the pump after the well purging was completed. The groundwater samples were collected in decreasing order of sensitivity of volatilizing organic contaminants: RAS VOAs, followed by special VOAs (THF, DCDFM, TCFM) and total metals. Sample bottles were filled at an angle in order to limit splashing and bubbling. VOA sample bottles were preserved with HCL prior to the addition of the sample. Two inorganic samples for metal analysis were collected at each monitoring well sample location. One sample was field filtered via a vacuum pump. The vacuum pump was attached to sterilized disposable filter units with 0.45 micron filters. Both the filtered and unfiltered samples were submitted for analysis.

3.4 ENGINEERING PREDESIGN TASKS

3.4.1 Aquifer Pumping Test

During the predesign Phase II investigation, WESTON conducted an aquifer pumping test to determine the hydraulic characteristics of the saturated zone downgradient of the landfill and within the plume area. Characterization of the aquifer hydraulic parameters is necessary to evaluate the design parameters of the groundwater extraction system.

The aquifer performance evaluation consisted of the following activities:

- Pre-test Activities:

  1) Installation of extraction (EW-1) and observation wells (OW-1, OW-2, OW-3, and OW-4).
  2) Pump installation and discharge lime setup.
  3) Data logger setup.
  4) Static water level monitoring.

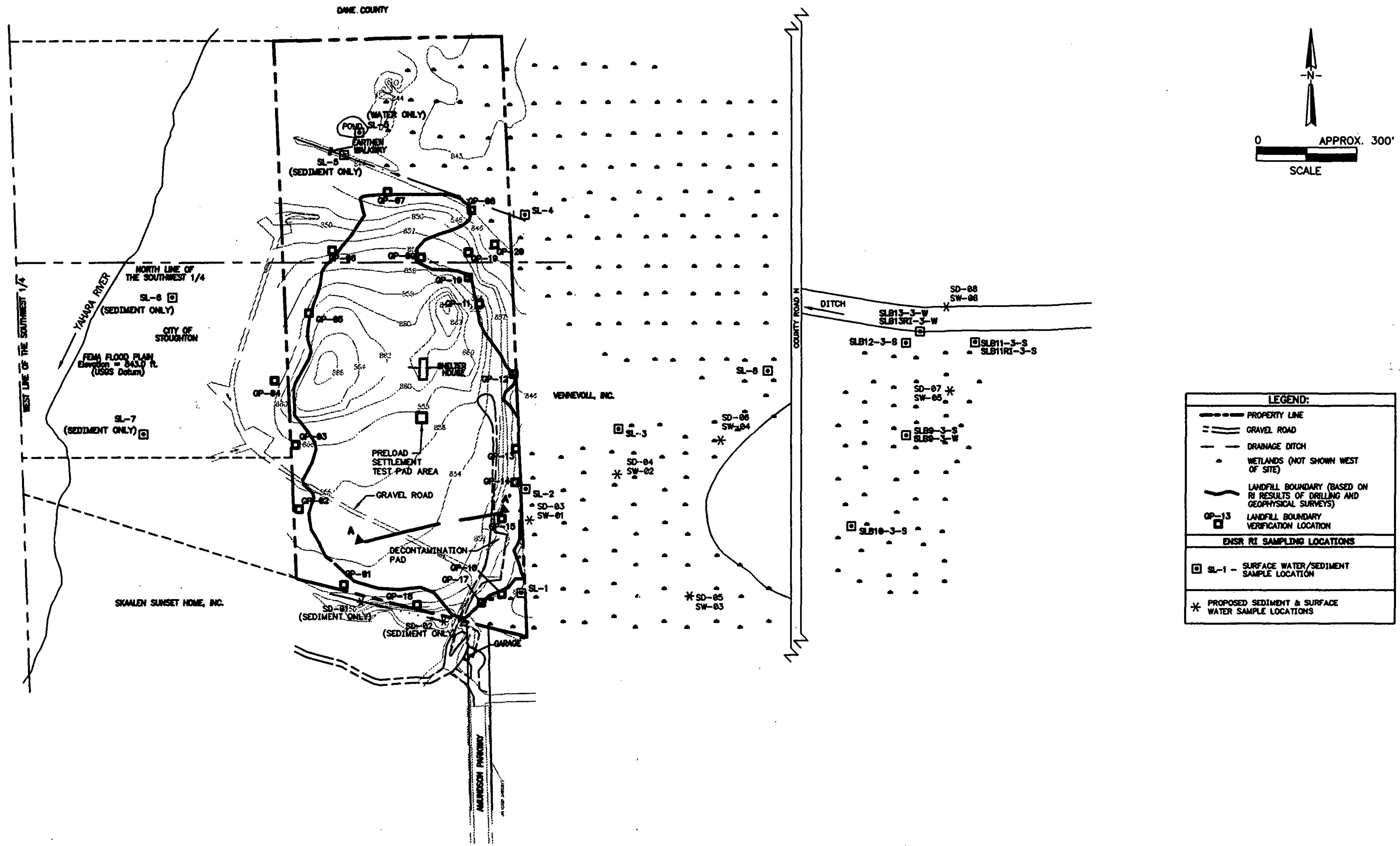
- Aquifer Test Activities:

  1) Step-drawdown (variable discharge rate) testing.
  2) Constant discharge rate 72-hour testing.
  3) Aquifer recovery monitoring.

The aquifer test was conducted at an extraction well if it was determined that the well could potentially be used as part of the permanent extraction system. Figure 2-2 shows the locations of extraction and observation wells. Field procedures, results, and supporting data analysis for the aquifer performance evaluation are presented in Volume II of this report.

3.4.2 Groundwater Treatability Study (POTW Sampling)

WESTON submitted a Groundwater Treatability Study Plan for Stoughton City Landfill site to U.S. EPA in June 1994. Treatability studies have not been conducted because the U.S. EPA is evaluating the feasibility of and requirements for discharge of extracted untreated groundwater to the POTW. U.S. EPA requested WESTON to collect water samples at the POTW during the aquifer pumping test, when the extracted water was discharged to the POTW. Prior to the test, WESTON collected water samples of the extracted groundwater (EW-1 and EW-2), and the influent (INF-1) and effluent (EFL-1) of the POTW. WESTON also collected influent (INF-2) and effluent (EFL-2) of the POTW during the aquifer pumping test. Table 3-12 presents the sample number, sampling dates, type of analysis, and name of the laboratory performing the analysis for POTW sampling. All the samples were grab samples.



NOTE: BASE MAP USED FROM ENSR REMEDIAL INVESTIGATION (RI) REPORT.

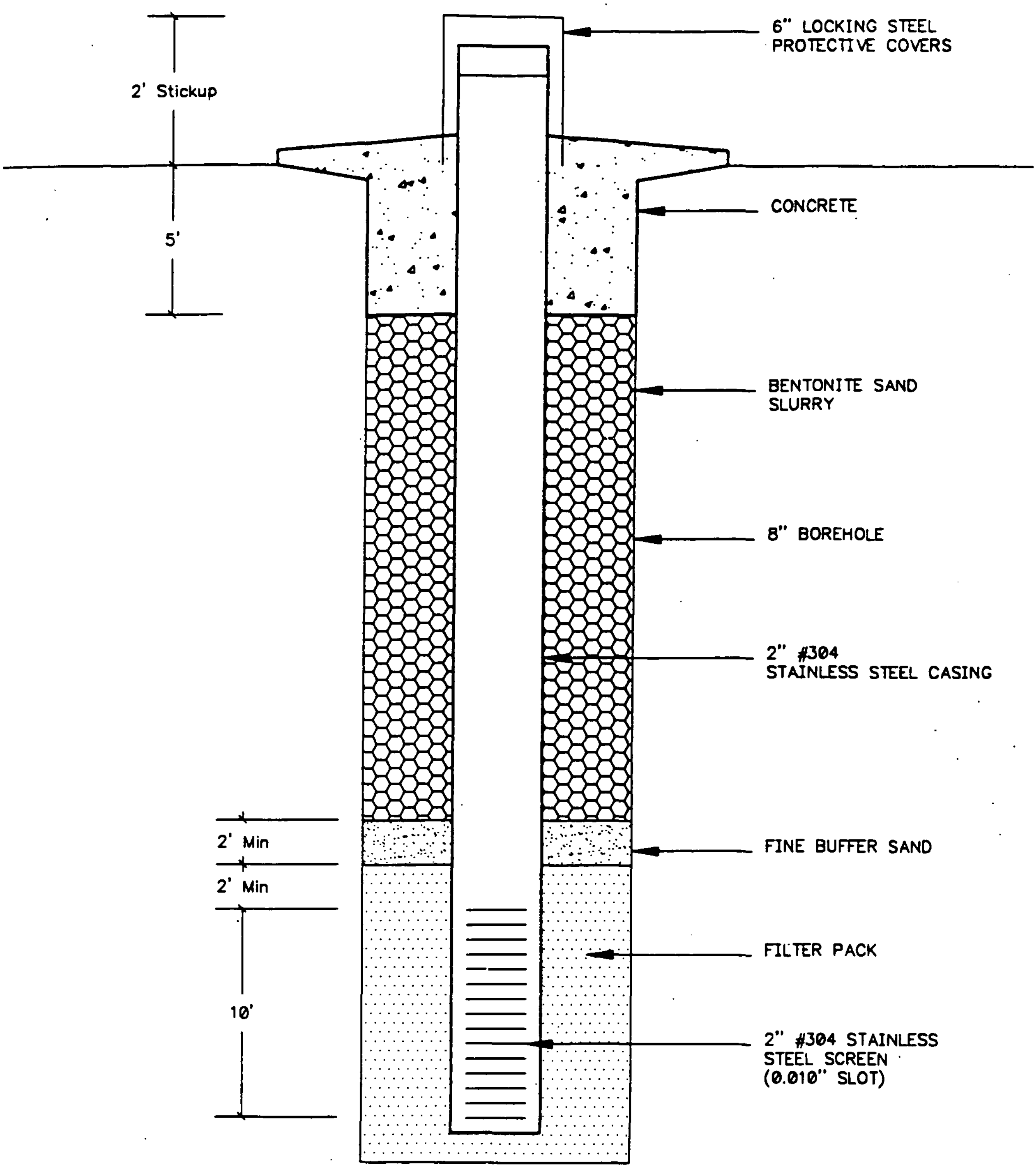
FIGURE 3-1

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

JIM-06/14/95-08:32-J:\CAD93\300\30695



NOT TO SCALE

FIGURE 3-2

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	MONITORING WELL CONSTRUCTION DETAIL STOUGHTON LANDFILL SITE Stoughton, Wisconsin

Table 3-1

List of Laboratories
Predesign Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Lab Title		Laboratory Name and Location
ABB	-	ABB Environmental Services, West Brook, ME
ARI	-	Analytical Resources, Inc., Seattle, WA
ATEC	-	ATEC Associates, Inc., Indianapolis, IN
ECOTEK	-	ECOTEK Laboratory Services, Inc., Atlanta, GA
Envirosystems	-	Envirosystems, Inc. Columbia, MD
ITMO	-	IT Saint Louis Laboratory, Earth City, MO
Keystone	-	Chester Labnet - Houston, Houston, TX
Skinner & Sherman	-	Skinner & Sherman, Waltham, MA
SVL	-	SVL Analytical, Inc., Kellogg, ID
SWOK	-	Southwest Labs of Oklahoma, Broken Arrow, OK
SWRI	-	Southwest Research Institute, San Antonio, TX
U.S. EPA CRL	-	U.S. EPA Central Region Laboratory, Chicago, IL

Table 3-2

Sediment Sample Collection and Shipment Report
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Field Sample Number	Sampling Date	Analysis	Traffic Report Number	Laboratory
SL1-SD01-01	5/25/94	THF, DCDFM, TCFM	8385-E-04-001	Envirosystems
		VOA, BNA, Pest./PCB	EZJ 01	ECOTEK
		Total Metals	MEYL 01	Skinner & Sherman
SL1-SD01-01DP	5/25/94	THF, DCDFM, TCFM	8385-E-04-002	Envirosystems
		VOA, BNA, Pest./PCB	EZJ 02	ECOTEK
		Total Metals	MEYL 02	Skinner & Sherman
SL1-SD02-01MSD	5/25/94	THF, DCDFM, TCFM	8385-E-04-003	Envirosystems
		VOA, BNA, Pest./PCB	EZJ 03	ECOTEK
		Total Metals	MEYL 03	Skinner & Sherman
SL1-SD03-01	5/21/94	Total Metals	MEYL 04	Skinner & Sherman
SL1-SD04-01	5/21/94	Total Metals	MEYL 05	Skinner & Sherman
SL1-SD05-01	5/21/94	Total Metals	MEYL 06	Skinner & Sherman
SL1-SD06-01	5/25/94	Total Metals	MEYL 07	Skinner & Sherman
SL1-SD06-01DP	5/25/94	Total Metals	MEYL 30	Skinner & Sherman
SL1-SD07-01	5/25/94	THF, DCDFM, TCFM	8385-E-04-004	Envirosystems
		VOA, BNA, Pest./PCB	EJZ 08	ECOTEK
		Total Metals	MEYL 08	Skinner & Sherman
		TOC, TKN, pH	8385-E-07-001	SWRI
		Grain size, CEC	94 ZG08S01	U.S. EPA CRL
SL1-SD08-01	5/25/94	THF, DCDFM, TCFM	8385-E-04-005	Envirosystems
		VOA, BNA, Pest./PCB	EJZ 09	ECOTEK
		Total Metals	MEYL 09	Skinner & Sherman
		TOC, TKN, pH	8385-E-07-002	SWRI
		Grain size, CEC	94 ZG08S02	U.S. EPA CRL
SL1-PWTB-01	5/25/94	THF, DCDFM, TCFM	8385-E-04-006	Envirosystems
		VOA	EZJ 39	ECOTEK

Sample Number Code:

SL1 - Stoughton City Landfill, Phase I
SD01 - Sediment Sample at Location 1
MSD - Matrix Spike Duplicate
PWTB - Pure Water Trip Blank
01 (last 2 digits) - First sample interval

Table 3-3

Surface Water Collection and Shipment Report
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Field Sample Number	Sampling Date	Analysis	Traffic Report Number	Laboratory
SL1-SW01-01(UF)	5/21/94	Hardness	8385-E-08-001	SWRI
		Total Metals	MEYL 73	Skinner & Sherman
SL1-SW01-01(F)	5/21/94	Total Metals	MEYL 10	Skinner & Sherman
SL1-SW01-01DP(UF)	5/21/94	Hardness	8385-E-08-002	SWRI
		Total Metals	MEYL 72	Skinner & Sherman
SL1-SW01-01DP(F)	5/21/94	Total Metals	MEYL 11	Skinner & Sherman
SL1-SW-FB01(UF)	5/25/94	Hardness	8385-E-08-003	SWRI
		Total Metals	MEYL 12	Skinner & Sherman
SL1-SW02-01MSD(UF)	5/21/94	Hardness	8385-E-08-004	SWRI
		Total Metals	MEYL 71	Skinner & Sherman
SL1-SW02-01MSD(F)	5/21/94	Total Metals	MEYL 13	Skinner & Sherman
SL1-SW03-01(UF)	5/21/94	Hardness	8385-E-08-005	SWRI
		Total Metals	MEYL 70	Skinner & Sherman
SL1-SW03-01(F)	5/21/94	Total Metals	MEYL 14	Skinner & Sherman
SL1-SW04-01(UF)	5/25/94	Hardness	8385-E-08-006	SWRI
		Total Metals	MEYL 69	Skinner & Sherman
SL1-SW04-01(F)	5/25/94	Total Metals	MEYL 15	Skinner & Sherman
SL1-SW05-01(UF)	5/25/94	Hardness	8385-E-08-007	SWRI
		Total Metals	MEYL 68	Skinner & Sherman
SL1-SW05-01(F)	5/25/94	Total Metals	MEYL 16	Skinner & Sherman
SL1-SW06-01(UF)	5/25/94	Hardness	8385-E-08-008	SWRI
		Total Metals	MEYL 67	Skinner & Sherman
SL1-SW06-01(F)	5/25/94	Total Metals	MEYL 17	Skinner & Sherman

<u>Sample Number Code:</u>

SL1 - Stoughton City Landfill, Phase I
SW01 - Surface Water Sample at Location 1
UF - Unfiltered
F - Filtered

MSD - Matrix Spike Duplicate
DP - Duplicate
FB01 - First Field Blank
01 (last two digits) - First sample interval

Table 3-4

Aquifer Material Geotechnical Sampling
Sample Location and Shipment
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Field Sample Number (Sample depth ft bgs)	Sampling Date (Drilling Method[1])	Analysis	Traffic Report Number	Laboratory
SL1-RB01-01 (9 - 14)	5/25/94 (LSA)	Grain size	94ZG08S03	U.S. EPA CRL
		TOC	8385-E-07-003	SWRI
		Porosity, bulk density, % moisture	8385-E-01-001	SWRI
SL1-RB01-02 (49 - 51)	5/25/94 (HSA)	Grain size	94ZG08S04	U.S. EPA CRL
		TOC	8385-E-07-004	SWRI
		Porosity, bulk density, % moisture	8385-E-01-002	SWRI
SL1-RB01-03 (65 - 70)	6/9/94 (LSA)	Grain size	94ZG08S11	U.S. EPA CRL
		TOC	8385-E-07-011	SWRI
		Porosity, bulk density, % moisture	8385-E-01-009	SWRI
SL1-RB04-01 (15 - 20)	5/31/94 (HSA)	Grain size	94ZG08S05	U.S. EPA CRL
		TOC	8385-E-07-005	SWRI
		Porosity, bulk density, % moisture	8385-E-01-003	SWRI
SL1-RB04-02 (50 - 55)	6/1/94 (MR)	Grain size	94ZG08S06	U.S. EPA CRL
		TOC	8385-E-07-006	SWRI
		Porosity, bulk density, % moisture	8385-E-01-004	SWRI
SL1-RB04-03 (65 - 70)	6/2/94 (MR)	Grain size	94ZG08S07	U.S. EPA CRL
		TOC	8385-E-07-007	SWRI
		Porosity, bulk density, % moisture	8385-E-01-005	SWRI
SL1-RB05-01 (35 - 37)	6/4/94 (LSA)	Grain size	94ZG08S08	U.S. EPA CRL
		TOC	8385-E-07-008	SWRI
		Porosity, bulk density, % moisture	8385-E-01-006	SWRI

Table 3-4

Aquifer Material Geotechnical Sampling
Sample Collection and Shipment
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Field Sample Number (Sample depth ft bgs)	Sampling Date (Drilling Method[1])	Analysis	Traffic Report Number	Laboratory
SL1-RB05-02 (50 - 52)	6/4/94 (LSA)	Grain size	94ZG08S09	U.S. EPA CRL
		TOC	8385-E-07-009	SWRI
		Porosity, bulk density, % moisture	8385-E-01-007	SWRI
SL1-RB05-03 (68 - 70)	6/5/94 (MR)	Grain size	94ZG08S10	U.S. EPA CRL
		TOC	8385-E-07-010	SWRI
		Porosity, bulk density, % moisture	8385-E-01-008	SWRI

[1] HSA - Hollow Stem Augering; LSA - Lead Screen Augering; MR - Mud Rotary.

Sample Number Code:

SL1 - Stoughton City Landfill, Phase I
RB01 - Reconnaissance boring R-1
02 (last two digits) - Second sample interval

Table 3-5

Reconnaissance Borings Groundwater Sample Collection and Shipment Report Predesign Phase I Investigation Stoughton City Landfill Stoughton, Wisconsin

Field Sample Number (Sample depth ft bgs)	Sampling Date (Drilling Method[1])	Analysis	Traffic Report Number	Laboratory
SL1-RW01-01	5/25/94	THF, DCDFM, TCFM	8385-E-04-011	Envirosystems
(14 - 16)	(HSA - Hydropunch)	RAS VOA	EZJ13	ECOTEK
SL1-RW01-02	5/26/94	THF, DCDFM, TCFM	8385-E-04-012	Envirosystems
(57 - 59)	(HSA - Hydropunch)	RAS VOA	EZJ14	ECOTEK
SL1-RW01-02DP	5/26/94	THF, DCDFM, TCFM	8385-E-04-013	Envirosystems
(57 - 59)	(HSA - Hydropunch)	RAS VOA	EZJ15	ECOTEK
SL1-RW01-03	6/9/94	THF, DCDFM, TCFM	8385-E-04-014	Envirosystems
(65 - 70)	(LSA)	RAS VOA	EZJ16	ABB
SL1-RW02-01	5/27/94	THF, DCDFM, TCFM	8385-E-04-015	Envirosystems
(15 - 17)	(HSA - Hydropunch)	RAS VOA	EZJ17	ECOTEK
SL1-RW02-02MSD	6/7/94	THF, DCDFM, TCFM	8385-E-04-016	Envirosystems
(40 - 45)	(LSA)	RAS VOA	EZJ18	ABB
SL1-RW02-03	6/7/94	THF, DCDFM, TCFM	8385-E-04-017	Envirosystems
(60 - 65)	(LSA)	RAS VOA	EZJ19	ABB
SL1-RW03-01	5/27/94	THF, DCDFM, TCFM	8385-E-04-018	Envirosystems
(16 - 18)	(HSA - Hydropunch)	RAS VOA	EZJ20	ECOTEK
SL1-RW03-02	6/8/94	THF, DCDFM, TCFM	8385-E-04-021	Envirosystems
(40 - 45)	(LSA)	RAS VOA	EZJ21	ABB
SL1-RW03-03	6/8/94	THF, DCDFM, TCFM	8385-E-04-022	Envirosystems
(60 - 65)	(LSA)	RAS VOA	EZJ22	ABB
SL1-RW04-01	5/31/94	THF, DCDFM, TCFM	8385-E-04-020	Envirosystems
(22 - 24)	(HSA - Hydropunch)	RAS VOA	EZJ24	ABB
SL1-RW04-02	6/8/94	THF, DCDFM, TCFM	8385-E-04-024	Envirosystems
(50 - 52)	(LSA)	RAS VOA	EZJ25	ABB
SL1-RW04-02DP	6/8/94	THF, DCDFM, TCFM	8385-E-04-025	Envirosystems
(50 - 52)	(LSA)	RAS VOA	EZJ26	ABB

Table 3-5

Reconnaissance Borings Groundwater Sample Collection and Shipment Report Predesign Phase I Investigation Stoughton City Landfill Stoughton, Wisconsin (Continued)

Field Sample Number (Sample depth ft bgs)	Sampling Date (Drilling Method[1])	Analysis	Traffic Report Number	Laboratory
SL1-RW04-03	6/8/94	THF, DCDFM, TCFM	8385-E-04-026	Envirosystems
(71 - 73)	(LSA)	RAS VOA	EZJ27	ABB
SL1-RW05-01	6/5/94	THF, DCDFM, TCFM	8385-E-04-027	Envirosystems
(9 - 14)	(LSA)	RAS VOA	EZJ28	ABB
SL1-RW05-02MSD	6/5/94	THF, DCDFM, TCFM	8385-E-04-028/028A	Envirosystems
(38 - 43)	(LSA)	RAS VOA	EZJ29	ABB
SL1-RW05-03	6/5/94	THF, DCDFM, TCFM	8385-E-04-029	Envirosystems
(60 - 65)	(LSA)	RAS VOA	EZJ30	ABB
SL1-RW06-01	6/6/94	THF, DCDFM, TCFM	8385-E-04-030	Envirosystems
(9 - 14)	(LSA)	RAS VOA	EZJ31	ABB
SL1-RW06-01DP	6/6/94	THF, DCDFM, TCFM	8385-E-04-031	Envirosystems
(9 - 14)	(LSA)	RAS VOA	EZJ32	ABB
SL1-RW06-02	6/6/94	THF, DCDFM, TCFM	8385-E-04-032	Envirosystems
(35 - 39)	(LSA)	RAS VOA	EZJ33	ABB
SL1-RW06-03	6/6/94	THF, DCDFM, TCFM	8385-E-04-033	Envirosystems
(64 - 69)	(LSA)	RAS VOA	EZJ34	ABB
SL1-RW07-02	6/9/94	THF, DCDFM, TCFM	8385-E-04-036	Envirosystems
(35 - 40)	(LSA)	RAS VOA	EZJ37	ABB
SL1-RW-FB01[2]	5/26/94	THF, DCDFM, TCFM	8385-E-04-010	Envirosystems
		RAS VOA	EZJ12	ECOTEK
SL1-RW-FB02[2]	6/7/94	THF, DCDFM, TCFM	8385-E-04-023	Envirosystems
		RAS VOA	EZJ23	ABB
SL1-RW-FB03[2]	6/6/94	THF, DCDFM, TCFM	8385-3-04-034	Envirosystems
		RAS VOA	EZJ35	ABB
SL1-PWTB-02[2]	5/26/94	THF, DCDFM, TCFM	8385-E-04-200	Envirosystems
		RAS VOA	EZJ43	ECOTEK

Table 3-5

Reconnaissance Borings Groundwater Sample Collection and Shipment Report Predesign Phase I Investigation Stoughton City Landfill Stoughton, Wisconsin (Continued)

Field Sample Number (Sample depth ft bgs)	Sampling Date (Drilling Method[1])	Analysis	Traffic Report Number	Laboratory
SL1-PWTB-03[2]	5/27/94	THF, DCDFM, TCFM	8385-E-04-019	Envirosystems
		RAS VOA	EZJ39	ECOTEK
SL1-PWTB-04[2]	6/1/94	THF, DCDFM, TCFM	8385-3-04-400	Envirosystems
		RAS VOA	EZJ44	ABB
SL1PWTB-05[2]	6/5/94	THF, DCDFM, TCFM	8385-E-04-038	Envirosystems
		RAS VOA	EZJ500	ABB
SL1-PWTB-06[2]	6/6/94	THF, DCDFM, TCFM	8385-E-04-039	Envirosystems
		RAS VOA	EZJ600	ABB
SL1-PWTB-07[2]	6/9/94	THF, DCDFM, TCFM	8385-E-04-040	Envirosystems
		RAS VOA	EZJ700	ABB
SL1-PWTB-08[2]	6/9/94	THF, DCDFM, TCFM	8385-E-04-041	Envirosystems
		RAS VOA	EZJ800	ABB

[1] HSA - Hollow Stem Augering; LSA - Lead Screen Augering
[2] No drilling or sample depth available.

<u>Sample Number Code:</u>

SL1 - Stoughton City Landfill, Phase I
RW01 - Groundwater sample from Reconnaissance boring R-1
02 (last two digits) - Second sample interval
DP - Duplicate
MSD - Matrix Spike Duplicate
FB02 - Second field blank
PTWB02 - Second pure water trip blank

Table 3-6

Inorganic Water Quality Sampling
Sample Collection and Shipment Report
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Field Sample Number	Sampling Date	Analysis	Traffic Report Number	Laboratory
SL1-MW-FB01(UF)	5/20/94	Sulfate, alkalinity, TDS, TSS, TOC, NH_3,COD, NO_3/NO_2,TP	22155/7943Q-02-001	SVL
		Sulfide, BOD, F, Br, Color, TKN, Surfactants, Phenol, Hardness	8385-E-08-009	SWRI
		Total Metals	MEYL 18	Skinner & Sherman
SL1-MW3S-01(UF)	5/20/94	Sulfate, alkalinity, TDS, TSS, TOC, NH_3,COD, NO_3/NO_2,TP	22155/7943Q-02-002	SVL
		Sulfide, BOD, F, Br, Color, TKN, Surfactants, Phenol, Hardness	8385-E-08-010	SWRI
		Total Metals	MEYL 19	Skinner & Sherman
SL1-MW3S-01(F)	5/20/94	Total Metals	MEYL 80	Skinner & Sherman
SL1-MW3S-01DP(UF)	5/20/94	Sulfate, alkalinity, TDS, TSS, TOC, NH_3,COD, NO_3/NO_2,TP	22155/7943Q-02-003	SVL
		Sulfide, BOD, F, Br, Color, TKN, Surfactants, Phenol, Hardness	8385-E-08-011	SWRI
		Total Metals	MEYL 20	Skinner & Sherman
SL1-MW3S-01DP(F)	5/20/94	Total Metals	MEYL 79	Skinner & Sherman
SL1-MW3B-01(UF)	5/20/94	Sulfate, alkalinity, TDS, TSS, TOC, NH_3,COD, NO_3/NO_2,TP	22155/7943Q-02-004	SVL
		Sulfide, BOD, F, Br, Color, TKN, Surfactants, Phenol, Hardness	8385-E-08-012	SWRI
		Total Metals	MEYL 21	Skinner & Sherman
SL1-MW3B-01(F)	5/20/94	Total Metals	MEYL 78	Skinner & Sherman
SL1-MW7I-01(UF)	5/23/94	Sulfate, alkalinity, TDS, TSS, TOC, NH_3,COD, NO_3/NO_2,TP	22155/7943Q-02-005	SVL
		Sulfide, BOD, F, Br, Color, TKN, Surfactants, Phenol, Hardness	8385-E-08-013	SWRI
		Total Metals	MEYL 22	Skinner & Sherman
SL1-MW7I-01(F)	5/23/94	Total Metals	MEYL 77	Skinner & Sherman

Table 3-6

Inorganic Water Quality Sampling Sample Collection and Shipment Report Predesign Phase I Investigation Stoughton City Landfill Stoughton, Wisconsin (Continued)

Field Sample Number	Sampling Date	Analysis	Traffic Report Number	Laboratory
SL1-MW7B-01(UF)	5/24/94	Sulfate, alkalinity, TDS, TSS, TOC, NH_3,COD, NO_3/NO_2,TP	22155/7943Q-02-006	SVL
		Sulfide, BOD, F, Br, Color, TKN, Surfactants, Phenol, Hardness	8385-E-08-014	SWRI
		Total Metals	MEYL 23	Skinner & Sherman
SL1-MW7B-01(F)	5/24/94	Total Metals	MEYL 76	Skinner & Sherman
SL1-MW9S-01(UF)	5/24/94	Sulfate, alkalinity, TDS, TSS, TOC, NH_3,COD, NO_3/NO_2,TP	22155/7943Q-02-007	SVL
		Sulfide, BOD, F, Br, Color, TKN, Surfactants, Phenol, Hardness	8385-E-08-015	SWRI
		Total Metals	MEYL 24	Skinner & Sherman
SL1-MW9S-01(F)	5/24/94	Total Metals	MEYL 75	Skinner & Sherman
SL1-MW9I-01(UF)	5/24/94	Sulfate, alkalinity, TDS, TSS, TOC, NH_3,COD, NO_3/NO_2,TP	22155/7943Q-02-008	SVL
		Sulfide, BOD, F, Br, Color, TKN, Surfactants, Phenol, Hardness	8385-E-08-016	SWRI
		Total Metals	MEYL 25	Skinner & Sherman
SL1-MW9I-01(F)	5/24/94	Total Metals	MEYL 74	Skinner & Sherman

Sample Number Code:

SL1 - Stoughton City Landfill, Predesign Phase I
MW7B - Monitoring Well 7B
01 (last two digits) - First sample interval
F - Filtered
UF - Unfiltered

Table 3-7

Background Inorganic Water Quality Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Field Sample Number	Sampling Date	Traffic Report	Laboratory
SL2-MW12D-01MSD	10/26/94	94ZG10-S01	ATEC
SL2-MW12I-01	10/26/94	94ZG10-S02	ATEC
SL2-MW12I-01DP	10/26/94	94ZG10-D02	ATEC
SL2-MW12S-01FB	10/26/94	94ZG10-S03	ATEC
SL2-MW12S-01	10/26/94	94ZG10-S04	ATEC

Note: The water quality parameters include BOD, fluoride, bromide, color, COD, TOC, TDS, TSS, alkalinity, hardness, ammonia, nitrate and nitrite as N, total kjeldahl nitrogen (TKN), total phosphorus as P, sulfate as SO_4, sulfide as S, surfactants and total phenols.

Sample Number Code:

SL2 - Stoughton City Landfill, Predesign Phase II
MW12D - Monitoring Well 12D
01 (last two digits) - First sample interval
MSD - Matrix Spike Duplicate
DP - Duplicate
FB - Field Blank

Table 3-8

Field Parameters
Inorganic Water Quality Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
SL1-MW3S-01	9.65	19.29	3	16	7.6	996	58.1	6.4
			5	16.5	7.7	1,046	227	5.9
			7	17	7.4	1,050	226	5.0
			9	16	7.6	986	68.0	4.6
SL1-MW3B	10.90	95.67	20	13.6	6.2	1,087	1.05	5.5
			21	17	6.7	1,044	1.29	5.3
			30	15	6.9	985	0.96	4.7
			45	14.5	7.1	983	0.88	6.1
			55	14.5	7.3	1,021	0.75	4.7
			65	16	7.3	1,046	0.86	3.8
SL1-MW7I	0.80	59.85	25	12	8.2	917	15.6	1.7
			35	14	7.8	922	4.05	3.3
			45	13	7.5	922	1.14	3.5

Table 3-8

Field Parameters
Inorganic Water Quality Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
SL1-MW7B	0.19	84.00	40	13.5	7.7	528	2.10	3.0
			50	13.5	7.4	524	1.84	3.7
			60	15	7.6	526	1.47	3.5
			70	13.5		521	0.77	4.2
SL1-MW9S	3.00	30.03	15	15.5	7.5	432	12.4	3.5
			20	16	7.8	432	7.03	2.2
			25	15	7.7	423	6.10	3.0
SL1-MW9I	2.88	47.20	20	13	7.6	466	3.63	2.4
			30	13.5	7.5	465	6.31	1.5
			40	13.5	7.9	463	2.00	1.4

Table 3-8

Field Parameters
Inorganic Water Quality Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-12D	0	73.9	35	10.9	7.38	0.63	321	4.4
			40	11.0	7.23	0.63	330	5.0
			45	11.0	7.14	0.63	506	5.0
			50	11.0	7.90	0.64	961	5.0
			55	11.0	7.05	0.64	508	5.0
			60	11.0	7.37	0.64	318	5.1
			65	11.0	7.19	0.64	101	4.9
MW-12I	0.25	5.61	25	11.6	7.28	0.52	276	2.2
			30	11.1	7.49	0.54	203	10.5
			35	11.1	7.26	0.53	131	8.4
			40	11.1	7.31	0.53	92.8	2.2
			45	11.1	7.21	0.52	72.3	2.1

Table 3-8

Field Parameters
Inorganic Water Quality Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-12S	9.1	17	6	13.6	7.13	1.02	48.90	2.6
			8	13.8	6.99	1.03	28.20	3.4
			10	13.9	6.79	1.03	15.30	2.8
			12	13.9	6.65	1.03	11.70	3.0
			14	14.0	6.81	1.03	8.73	3.5
			16	14.0	6.63	1.03	7.00	2.7

Table 3-9

Additional Monitoring Well Construction Data and Groundwater Elevations
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Nested Well Numbers	Well Screen Length (feet)	Elevations Top of Screen (feet)	Base of Screen (feet)	Midpoint of Screen (feet)	Screened Interval Geology (USCS)	Groundwater Elevation* Sept/Oct-94 (feet)
MW-10S	10.00	839.98	829.98	834.98	SP/ML/CH	842.70
MW-10I	10.00	816.06	806.06	811.06	SP/CH	> 850.79
MW-10B	10.00	768.64	758.64	763.64	LS	> 851.08
MW-11S	10.00	843.48	833.48	838.48	ML/CH	846.88
MW-11I	10.00	808.39	798.39	803.39	SP	847.89
MW-11D	10.00	762.58	752.58	757.58	LS	848.18
MW-12S	10.00	842.15	832.15	837.15	SC/SM/CH	844.57
MW-12I	10.00	802.99	792.99	797.99	SM/SP/GW	848.70
MW-12D	10.00	786.10	776.10	781.10	SP/SC	848.64
MW-13S	10.00	839.90	829.90	834.90	ML/SP	842.70
MW-13I	10.00	805.52	795.52	800.52	CH/SP	> 846.72
MW-13B	10.00	759.22	749.22	754.22	LS	> 846.22

* (>) values represent artesian well condtions. Elevations of the top of the inner casing were substituted for groundwater elevations for the artesian wells.

Table 3-10

Monitoring Well Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Field Sample Number	Sampling Date	Analysis	Traffic Report	Laboratory
SL2-MW1S-01	10/25/94	THF, DCDFM, TCFM	94ZG09-S19	Envirosystems
		RAS VOA	EZP 48	Keystone
		Total Metals (Unfiltered)	MEZA 65	ITMO
		Total Metals (Filtered)	MEZA 66	ITMO
SL2-MW1D-01	10/25/94	THF, DCDFM, TCFM	94ZG09-S20	Envirosystems
		RAS VOA	EZP 49	Keystone
		Total Metals (Unfiltered)	MEZA 67	ITMO
		Total Metals (Filtered)	MEZA 68	ITMO
SW2-MW2S-01	10/24/94	THF, DCDFM, TCFM	94ZG09-S17	Envirosystems
		RAS VOA	EZP 46	Keystone
		Total Metals (Unfiltered)	MEZA 61	ITMO
		Total Metals (Filtered)	MEZA 62	ITMO
L2-MW2S-01FB	10/24/94	THF, DCDFM, TCFM	94ZG09-R22	Envirosystems
		RAS VOA	EZP 51	Keystone
		Total Metals (Unfiltered)	MEZA 71	ITMO
		Total Metals (Filtered)	MEZA 72	ITMO
SL2-MW2D-01MSD	10/24/94	THF, DCDFM, TCFM	94ZG09-S18	Envirosystems
		RAS VOA	EZP 47	Keystone
		Total Metals (Unfiltered)	MEZA 63	ITMO
		Total Metals (Filtered)	MEZA 64	ITMO

Table 3-10

Monitoring Well Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Field Sample Number	Sampling Date	Analysis	Traffic Report	Laboratory
SL2-MW3S-01	9/29/94	THF, DCDFM, TCFM	94ZG09-S08	Envirosystems
		RAS VOA	EZP 36	ARI
		Total Metals (Unfiltered)	MEZA 41	SWOK
		Total Metals (Filtered)	MEZA 42	SWOK
SL2-MW3D-01	9/29/94	THF, DCDFM, TCFM	94ZG09-S09	Envirosystems
		RAS VOA	EZP 37	ARI
		Total Metals (Unfiltered)	MEZA 43	SWOK
		Total Metals (Filtered)	MEZA 44	SWOK
SL2-MW3B-01	9/29/94	THF, DCDFM, TCFM	94ZG09-S10	Envirosystems
		RAS VOA	EZP 38	ARI
		Total Metals (Unfiltered)	MEZA 45	SWOK
		Total Metals (Filtered)	MEZA 46	SWOK
SL2-MW4S-01	9/29/94	THF, DCDFM, TCFM	94ZG09-S11	Envirosystems
		RAS VOA	EZP 39	ARI
		Total Metals (Unfiltered)	MEZA 47	SWOK
		Total Metals (Filtered)	MEZA 48	SWOK
SL2-MW4D-01	9/29/94	THF, DCDFM, TCFM	94ZG09-S12	Envirosystems
		RAS VOA	EZP 40	ARI
		Total Metals (Unfiltered)	MEZA 49	SWOK
		Total Metals (Filtered)	MEZA 50	SWOK

Table 3-10

Monitoring Well Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Field Sample Number	Sampling Date	Analysis	Traffic Report	Laboratory
SL2-MW5S-01	9/29/94	THF, DCDFM, TCFM	94ZG09-S13	Envirosystems
		RAS VOA	EZP 41	ARI
		Total Metals, (Unfiltered)	MEZA 51	SWOK
		Total Metals (Filtered)	MEZA 52	SWOK
SL2-MW5D-01	9/29/94	THF, DCDFM, TCFM	94ZG09-S14	Envirosystems
		RAS VOA	EZP 42	ARI
		Total Metals (Unfiltered)	MEZA 53	SWOK
		Total Metals (Filtered)	MEZA 54	SWOK
SL2-MW6S-01	10/24/94	THF, DCDFM, TCFM	94ZG09-S15	Envirosystems
		RAS VOA	EZP 43	Keystone
		Total Metals (Unfiltered)	MEZA 55	ITMO
		Total Metals (Filtered)	MEZA 56	ITMO
SL2-MW6D-01	9/30/94	THF, DCDFM, TCFM	94ZG09-S16	Envirosystems
		RAS VOA	EZP 44	ARI
		Total Metals (Unfiltered)	MEZA 57	SWOK
		Total Metals (Filtered)	MEZA 58	SWOK
SL2-MW6D-01DP	9/30/94	THF, DCDFM, TCFM	94ZG09-D16	Envirosystems
		RAS VOA	EZP 45	ARI
		Total Metals (Unfiltered)	MEZA 59	SWOK
		Total Metals (Filtered)	MEZA 60	SWOK

Table 3-10

Monitoring Well Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Field Sample Number	Sampling Date	Analysis	Traffic Report	Laboratory
SL2-MW6D-01FB	9/30/94	THF, DCDFM, TCFM	94ZG09-R21	Envirosystems
		RAS VOA	EZP 50	ARI
		Total Metals (Unfiltered)	MEZA 69	SWOK
		Total Metals (Filtered)	MEZA 70	SWOK
SL2-MW7S-01	9/28/94	THF, DCDFM, TCFM	94ZG09-S04	Envirosystems
		RAS VOA	EZP 32	ARI
		Total Metals (Unfiltered)	MEZA 35	SWOK
		Total Metals (Filtered)	MEZA 36	SWOK
SL2-MW7B-01	9/28/94	THF, DCDFM, TCFM	94ZG09-S06	Envirosystems
		RAS VOA	EZP 34	ARI
		Total Metals (Unfiltered)	MEZA 39	SWOK
		Total Metals (Filtered)	MEZA 40	SWOK
SL2-MW7I-01	9/28/94	THF, DCDFM, TCFM	94ZG09-S05	Envirosystems
		RAS VOA	EZP 33	ARI
		Total Metals (Unfiltered)	MEZA 37	SWOK
		Total Metals (Filtered)	MEZA 38	SWOK
SL2-MW8B-01	9/29/94	THF, DCDFM, TCFM	94ZG09-S03	Envirosystems
		RAS VOA	EZP 31	ARI
		Total Metals (Unfiltered)	MEZA 33	SWOK
		Total Metals (Filtered)	MEZA 34	SWOK

Table 3-10

Monitoring Well Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Field Sample Number	Sampling Date	Analysis	Traffic Report	Laboratory
SL2-MW9S-01	9/27/94	THF, DCDFM, TCFM	94ZG09-S01	Envirosystems
		RAS VOA	EZP 28	ARI
		Total Metals (Unfiltered)	MEZA 27	SWOK
		Total Metals (Filtered)	MEZA 28	SWOK
SL2-MW9I-01	9/28/94	THF, DCDFM, TCFM	94ZG09-S02	Envirosystems
		RAS VOA	EZP 29	ARI
		Total Metals (Unfiltered)	MEZA 29	SWOK
		Total Metals (Filtered)	MEZA 30	SWOK
SL2-MW9I-01DP	9/28/94	THF, DCDFM, TCFM	94ZG09-D02	Envirosystems
		RAS VOA	EZP 30	ARI
		Total Metals (Unfiltered)	MEZA 31	SWOK
		Total Metals (Filtered)	MEZA 32	SWOK
SL2-MW10S-01	10/25/94	THF, DCDFM, TCFM	94ZG09-S24	Envirosytems
		RAS VOA	EZP 53	Keystone
		Total Metals (Unfiltered)	MEZA 73	ITMO
		Total Metals (Filtered)	MEZA 74	ITMO
SL2-MW10B-01	10/25/94	THF, DCDFM, TCFM	94ZG09-S26	Envirosystems
		RAS VOA	EZP 55	Keystone
		Total Metals (Unfiltered)	MEZA 77	ITMO
		Total Metals (Filtered)	MEZA 78	ITMO

Table 3-10

Monitoring Well Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Field Sample Number	Sampling Date	Analysis	Traffic Report	Laboratory
SL2-MW10I-01	10/25/94	THF, DCDFM, TCFM	94ZG09-S25	Envirosystems
		RAS VOA	EZP 54	Keystone
		Total Metals (Unfiltered)	MEZA 75	ITMO
		Total Metals (Filtered)	MEZA 76	ITMO
SL2-MW11S-01	10/26/94	THF, DCDFM, TCFM	94ZG09-S27	Envirosystems
		RAS VOA	EZP 56	Keystone
		Total Metals (Unfiltered)	MEZA 79	ITMO
		Total Metals (Filtered)	MEZA 80	ITMO
SL2-MW11B-01	10/25/94	THF, DCDFM, TCFM	94ZG09-S29	Envirosystems
		RAS VOA	EZP 58	Keystone
		Total Metals (Unfiltered)	MEZA 83	ITMO
		Total Metals (Filtered)	MEZA 84	ITMO
SL2-MW11I-01	10/25/94	THF, DCDFM, TCFM	94ZG09-S28	Envirosystems
		RAS VOA	EZP 57	Keystone
		Total Metals (Unfiltered)	MEZA 81	ITMO
		Total Metals (Filtered)	MEZA 82	ITMO
SL2-MW12S-01	10/26/94	THF, DCDFM, TCFM	94ZG09-S30	Envirosystems
		RAS VOA	EZP 59	Keystone
		Total Metals (Unfiltered)	MEZA 85	ITMO
		Total Metals (Filtered)	MEZA 86	ITMO

Table 3-10

Monitoring Well Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Field Sample Number	Sampling Date	Analysis	Traffic Report	Laboratory
SL2-MW12S-01FB	10/26/94	THF, DCDFM, TCFM	94ZG09-R38	Envirosystems
		RAS VOA	EZP 69	Keystone
		Total Metals (Unfiltered)	MEZR 27	ITMO
		Total Metals (Filtered)	MEZR 28	ITMO
SL2-MW12D-01MSD	10/26/94	THF, DCDFM, TCFM	94ZG09-S32	Envirosystems
		RAS VOA	EZP 61	Keystone
		Total Metals (Unfiltered)	MEZA 89	ITMO
		Total Metals (Filtered)	MEZA 90	ITMO
SL2-MW12I-01	10/26/94	THF, DCDFM, TCFM	94ZG09-S31	Envirosystems
		RAS VOA	EZP 60	Keystone
		Total Metals (Unfiltered)	MEZA 87	ITMO
		Total Metals (Filtered)	MEZA 88	ITMO
SL2-MW12I-01DP	10/26/94	THF, DCDFM, TCFM	94ZG09-D31	Envirosystems
		RAS VOA	EZP 68	Keystone
		Total Metals (Unfiltered)	MEZR 25	ITMO
		Total Metals (Filtered)	MEZR 26	ITMO
SL2-MW13S-01	10/26/94	THF, DCDFM, TCFM	94ZG09-S33	Envirosystems
		RAS VOA	EZP 62	Keystone
		Total Metals (Unfiltered)	MEZA 91	ITMO
		Total Metals (Filtered)	MEZA 92	ITMO

Table 3-10

Monitoring Well Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Field Sample Number	Sampling Date	Analysis	Traffic Report	Laboratory
SL2-MW13B-01	10/26/94	THF, DCDFM, TCFM	94ZG09-S35	Envirosystems
		RAS VOA	EZP 64	Keystone
		Total Metals (Unfiltered)	MEZA 95	ITMO
		Total Metals (Filtered)	MEZA 96	ITMO
SL2-MW13B-01DP	10/26/94	THF, DCDFM, TCFM	94ZG09-D35	Envirosystems
		RAS VOA	EZP 67	Keystone
		Total Metals (Unfiltered)	MEZR 23	ITMO
		Total Metals (Filtered)	MEZR 24	ITMO
SL2-MW13I-01	10/26/94	THF, DCDFM, TCFM	94ZG09-S34	Envirosystems
		RAS VOA	EZP 63	Keystone
		Total Metals (Unfiltered)	MEZA 93	ITMO
		Total Metals (Filtered)	MEZA 94	ITMO
SL2-EW01-01	10/21/94	THF, DCDFM, TCFM	94ZG09-S36	Envirosystems
		RAS VOA	EZP 65	Keystone
		Total Metals (Unfiltered)	MEZA 97	ITMO
		Total Metals (Filtered)	MEZA 98	ITMO
SL2-PWTB-01	9/28/94	THF, DCDFM, TCFM	94ZG09-R07	Envirosystems
		RAS VOA	EZP 35	ARI
SL2-PWTB-02	9/30/94	THF, DCDFM, TCFM	94ZG09-R23	Envirosystems
		RAS VOA	EZP 52	ARI

Table 3-10

Monitoring Well Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Field Sample Number	Sampling Date	Analysis	Traffic Report	Laboratory
SL2-PWTB-03	10/25/94	THF, DCDFM, TCFM	94ZG09-R37	Envirosystems
		RAS VOA	EZP 66	Keystone
SL2-PWTB-04	10/27/94	THF, DCDFM, TCFM	94ZG09-R39	Envirosystems
		RAS VOA	EZP 70	Keystone

Sample Number Code:

SL2 - Stoughton City Landfill, Predesign Phase II
MW1S - Monitoring Well 1S
01 (last two digits) - First sample interval
DP - Duplicate
MSD - Matrix Spike Duplicate
FB - Field blank
PWTB-03 - Third Pure Water Trip Blank

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (µs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-1D	6.58	80.0	33	9.8	6.14	1.43	2.33	3.8
			37	9.8	6.73	1.40	1.40	5.0
			40	9.8	7.14	1.40	1.68	5.8
			43	9.8	6.81	1.39	2.12	5.8
			46	9.8	6.94	1.39	2.61	5.9
MW-1S	9.7	17.4	4	10.8	6.69	0.93	81.9	4.3
			6	11.1	7.51	0.92	388	2.9
			7	10.9	7.29	0.91	378	3.5
			8	11.1	7.19	0.90	239	4.3
			9	11.1	7.10	0.88	134	5.3
			10	11.7	7.13	0.87	81.7	5.0
			11	11.1	7.15	0.87	75.8	5.2

Table 3-11

**Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)**

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-2S	8.72	17.8	5	10.8	8.90	1.15	3.02	1.6
			8	10.7	7.83	1.11	3.19	3.1
			9	10.8	8.07	1.10	1.62	2.9
MW-2D	5.52	36.7	14	8.1	8.67	0.68	6.48	1.8
			18	8.5	7.68	0.67	3.15	3.4
			23	8.9	8.43	0.67	2.36	3.1
			25	9.0	8.57	0.67	1.98	2.8
MW-3B	11.2	95.5	12	11.1	6.56	0.67	1.08	NM
			15	10.8	6.59	0.68	1.03	NM
			25	10.8	6.64	0.67	0.54	NM

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-3D	10.4	73.1	10	11.7	6.74	0.75	92.7	NM
			20	11.3	6.92	0.80	336	NM
			30	11.5	7.01	0.82	274	NM
			40	11.6	6.93	0.84	201	NM
			50	11.6	6.98	0.85	126	NM
MW-3S	10.6	19.3	2	15.4	6.70	0.68	203	NM
			4	15.4	6.62	0.69	835	NM
			6	15.2	6.65	0.69	279	NM
			8	15.2	6.65	0.68	77.7	NM
MW-4D	7.7	73.7	10	12.5	6.54	1.15	2.54	NM
			20	12.0	6.63	1.17	1.98	NM
			30	12.1	6.61	1.16	0.81	NM

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-4S	7.7	17.1	2	15.3	7.18	0.49	876	NM
			4	15.0	7.10	0.48	277	NM
			6	15.3	7.11	0.47	105	NM
			8	15.2	7.05	0.46	31.5	NM
MW-5D	2.47	84.3	13	12.7	6.92	0.77	372	NM
			26	12.9	6.82	0.77	125	NM
			39	12.8	6.84	0.77	40.2	NM
			52	12.6	6.82	0.78	6.70	NM
			63	12.8	6.89	0.77	4.52	NM

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (µs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-5S	7.81	16.7	1.5	16.6	6.98	0.55	1,000 +	NM
			4.0	15.5	6.95	0.55	1,000 +	NM
			6.0	15.1	6.91	0.54	134.0	NM
			8.0	14.9	6.89	0.54	26.2	NM
			10.0	15.6	6.91	0.53	20.0	NM
MW-6D	4.6	80.1	13	10.9	7.24	0.58	119	NM
			30	10.3	7.20	0.60	125	NM
			50	10.4	7.17	0.60	36.9	NM
			60	11.0	7.26	0.61	13.6	NM
MW-6S	5.2	15.1	5	11.0	7.51	0.71	630	28
			7	10.5	8.18	0.69	> 1,000	4
			11	10.2	8.29	0.68	746	3.5

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-7S	4.4	15.1	1.7	13.9	6.88	0.73	1,000 +	NM
			4	15.2	6.98	0.67	502	NM
			7	15.3	6.93	0.75	495	NM
MW-7I	1.0	59.8	10	11.6	7.21	0.60	15.0	NM
			20	11.6	7.22	0.60	7.99	NM
			30	11.6	7.24	0.60	2.3	NM
MW-7B	0.5	84.1	10	11.2	7.12	0.71	7.21	NM
			20	11.2	7.16	0.71	3.48	NM
MW-8B	2.5	84.3	13	12.2	6.75	0.67	4.32	NM
			20	11.9	6.94	0.67	3.78	NM
			30	11.9	6.99	0.67	3.78	NM

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-9S	2.85	30.1	4	13.0	6.39	0.62	246	NM
			8	13.5	7.38	0.60	1,000 +	NM
			15	12.0	7.48	0.60	79.7	NM
			25	12.1	7.50	.59	79.8	NM
MW-9I	2.9	47.9	7	11.7	7.53	0.64	4.18	NM
			14	11.6	7.51	0.64	1.75	NM
MW-10S	4.28	17	5	11.0	6.73	0.57	Over Range	10.9
			6	12.0	7.82	0.60	Over Range	4.8
			7	13.0	8.47	0.60	Over Range	3.6
			8	12.5	8.65	0.61	Over Range	3.7
			9	12.0	7.73	0.60	Over Range	4.1
			10	12.1	8.24	0.60	> 1,000	4.7
			12	12.2	8.58	0.60	952	4.1

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-10B	0	88	45	10.0	9.00	0.65	24.0	10.7
			50	9.9	9.37	0.65	16.9	5.3
			55	9.6	9.24	0.65	16.2	6.2
			65	9.6	9.09	0.65	13.6	5.9
MW-10I	0	40.4	20	9.8	8.75	0.76	> 1,000	3.5
			25	9.9	8.91	0.76	> 1,000	3.3
			30	9.9	8.89	0.76	> 1,000	3.3
			35	9.9	8.80	0.76	668	3.2

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-11B	2.9	98.5	45	10.7	8.97	0.58	375	8.5
			50	10.4	8.98	0.58	289	7.0
			55	10.5	9.08	0.58	135	--
			60	10.7	9.10	0.58	159	5.7
			65	10.7	9.17	0.57	237	5.8
			70	10.9	9.09	0.58	573	6.0
			75	10.8	9.02	0.58	287	6.8
MW-11I	2.9	52.4	25	10.2	9.13	0.63	53.2	6.9
			30	10.3	9.04	0.63	27.0	5.7
			35	10.3	9.05	0.63	26.0	6.5
			40	10.3	9.03	0.63	24.0	6.2

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-11S	9.3	17.7	6	11.4	7.43	0.59	949	3.2
			8	11.4	6.90	0.58	> 1,000	4.8
			11	11.5	6.94	0.58	> 1,000	3.8
			12	11.5	6.82	0.57	867	3.6
			15	11.4	7.09	0.57	232	3.4
MW-12D	0	73.5	35	10.9	7.38	0.63	321	4.4
			40	11.0	7.23	0.63	330	5.0
			45	11.0	7.14	0.63	506	5.0
			50	11.0	7.90	0.64	961	5.0
			55	11.0	7.05	0.64	508	5.0
			60	11.0	7.37	0.64	318	5.1
			65	11.0	7.19	0.64	101	4.9

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (µs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-12I	0.25	56.1	25	11.6	7.28	0.52	276	2.2
			30	11.1	7.49	0.54	203	10.5
			35	11.1	7.26	0.53	131	8.4
			40	11.1	7.31	0.53	92.8	2.2
			45	11.1	7.21	0.52	72.3	2.1
MW-12S	4.1	17	6	13.6	7.13	1.02	48.90	2.6
			8	13.8	6.99	1.03	28.20	3.4
			10	13.9	6.79	1.03	15.30	2.8
			12	13.9	6.65	1.03	11.70	3.0
			14	14.0	6.81	1.03	8.73	3.5
			16	14.0	6.63	1.03	7.00	2.7

Table 3-11

**Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)**

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-13B	0	97	50	10.2	7.05	0.55	> 1,000	3.9
			55	10.5	6.94	0.55	> 1,000	3.6
			60	10.6	7.47	0.55	> 1,000	3.7
			65	10.6	7.32	0.55	> 1,000	3.8
			70	10.6	7.39	0.55	> 1,000	3.6
			75	10.6	7.08	0.55	933	3.9
			80	10.6	7.16	0.55	778	3.7
MW-13S	4.0	16.8	6	11.6	7.67	0.53	> 1,000	3.7
			9	12.7	7.21	0.52	> 1,000	3.6
			10	12.6	7.52	0.53	> 1,000	4.5
			12	12.6	7.27	0.52	> 1,000	3.8
			13	12.6	7.21	0.53	> 1,000	3.2

Table 3-11

Field Parameters - Monitoring Well Sampling
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Monitoring Well No.	Depth of Water Table (ft.)	Total Depth (ft.)	Purged Volume (Gal.)	Temperature (°C)	pH	Conductivity (μs/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)
MW-13I	0	51.2	20	10.6	7.23	0.51	0.82	3.0
			25	10.7	7.31	0.51	0.30	2.8
			30	10.7	7.32	0.51	0.65	3.1

NM - Not measured.

Table 3-12

POTW Sampling
Sample Collection and Shipment Report
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Field Sample Number	Sample Description	Sampling Date	Analysis	Laboratory
INF-1	Influent of POTW before the pump test discharge	3/21/95	THF, DCDFM, TCFM, Lead, Nickel, Zinc, Mercury	Envirosystems
EFL-1	Effluent of POTW before the pump test discharge	3/21/95	THF, DCDFM, TCFM, Lead, Nickel, Zinc, Mercury	Envirosystems
EW-1	Extracted groundwater during the step test	3/22/95	THF, DCDFM, TCFM, Lead, Nickel, Zinc, Mercury	Envirosystems
EW-2	Extracted groundwater during the pump test	3/25/95	THF, DCDFM, TCFM, Lead, Nickel, Zinc, Mercury	Envirosystems
INF-2	Influent of POTW during the pump test discharge	3/25/95	THF, DCDFM, TCFM, Lead, Nickel, Zinc, Mercury	Envirosystems
EFL-2	Effluent of POTW during the pump test discharge	3/25/95	THF, DCDFM, TCFM, Lead, Nickel, Zinc, Mercury	Envirosystems
TB-1	Trip Blank	3/22/95	THF, DCDFM, TCFM	Envirosystems
Trip Blank	Trip Blank	3/25/95	THF, DCDFM, TCFM	Envirosystems

SECTION 4

PREDESIGN INVESTIGATION RESULTS

This section presents the results of the predesign investigation, which were used to characterize sediment and surface water, inorganic water quality, and site geology and hydrogeology. The groundwater sampling results were used to define the nature and extent of groundwater contamination. The results of POTW sampling are also presented.

4.1 SEDIMENT AND SURFACE WATER SAMPLING

The sediment and surface water sampling locations and procedures are described in detail in Subsection 3.2 in Volume I of this report. The sampling locations are shown in Figure 3-1.

Table 4-1 presents the sediment sampling results. The sediment samples (SD01 and SD02) from the drainage ditch along the southern boundary of the landfill were analyzed for special VOCs (THF, DCDFM, TCFM) and TCL/TAL parameters. Special VOCs were not detected in the sediment samples. Benzene and some pesticides were detected at very low concentrations in SD01 and SD02. Arsenic, iron and nickel were detected in SD01 and SD02 at concentrations higher than the background samples (SD07 and SD08). Arsenic concentrations in SD01 and SD02 ranged from 4.2 to 6.2 mg/kg. Iron concentrations in SD01 and SD02 ranged from 16,200 to 18,400 mg/kg. Nickel concentrations in SD01 and SD02 ranged from 27.1 to 29.8 mg/kg. Arsenic was also detected at an elevated concentration (7.2 mg/kg) in SD03 (collected in the wetlands on the eastern boundary of the landfill). Metal concentrations in other sediment samples (SD04, SD05 and SD06) were in the same range as background samples. Iron was detected at elevated concentration in

SD05 at 19,900 mg/kg. However, SD05 location is not expected to be impacted by leachate or surface water runoff from the landfill. Table 4-2 presents the surface water sampling results. The hardness in the surface water samples ranged from 384 to 472 mg/l as calcium carbonate. The hardness and metal results indicate that the surface water quality in the wetlands east of the site is in the same range as surface water quality in the background wetlands.

4.2 INORGANIC GROUNDWATER QUALITY

The inorganic groundwater quality sampling locations and procedures are described in detail in Subsection 3.3.2 of this volume. The monitoring well sampling locations are shown in Figure 2-2.

Table 4-3 presents the inorganic water quality results from groundwater samples west of the site. Table 4-4 presents the inorganic water quality results from the background monitoring wells. The metal results from the background monitoring wells are presented in Subsection 4.4. The inorganic water quality west of the site is in the same range as background inorganic water quality, which indicates that the inorganic water quality is not being impacted by the landfill. Iron, lead and manganese concentrations were higher in unfiltered samples as compared to filtered samples. This indicates that iron, lead and manganese in groundwater are mostly associated with suspended solids. These results were used in the evaluation of the groundwater treatment and discharge options.

4.3 GEOLOGY/HYDROGEOLOGY CHARACTERIZATION

The regional and local geologic and hydrogeologic data presented in this section represent a compilation and summary of data collected by WESTON specifically for preparation of this report, data collected during previous investigations and contained in previous reports (including the 17 January 1991 Final Remedial Investigation Report prepared by ENSR), and data published by the Wisconsin Geologic and Natural History Survey.

4.3.1 Regional Geology/Hydrogeology

The geology and hydrogeology of the Stoughton area have been most heavily influenced by fluvial and glacial processes. The preglacial Yahara River incised a deep bedrock valley that was subsequently buried during glaciation. As the glacier retreated, ice and drift were deposited in the river valley. The ablated portions of the glacier eventually melted, creating several large kettle lakes, including Lake Kegonsa, and the modern Yahara River valley.

The glacial and fluvial deposits have considerable permeability and transmissivity and are significant local water resources. The hydrogeology of the area is influenced by the properties of the unconsolidated sediments and by the Yahara River.

4.3.1.1 Physiography

The Stoughton area is located in the Central Lowlands Physiographic Province of the Interior Plains as defined by Fenneman (1938). The topography of this province is generally flat to gentle rolling and, in the Stoughton area, glacial features with moderate relief dominate local topography. Bedrock in this province has gentle dips that reflect the structural influence of regional scale basins and domes. Drainage patterns are generally dendritic and most rivers have gentle gradients and broad flood plains. The most notable regional physiographic feature is the Wisconsin Driftless Area, which is an area located west of Stoughton that has remained unglaciated (Shimer, 1972).

4.3.1.2 Overburden Geology

The surficial geology of the Stoughton area is characterized by Modern soils, Recent alluvial sediments, and Pleistocene glacial, glacio-lacustrine, and glacio-fluvial deposits. The thickness of overburden ranges from 0 feet where bedrock outcrops occur to over 200 feet in pre-glacial bedrock valleys. Modern soils are characterized by peat and muck in marsh areas and fine sands, silts, and clays elsewhere. The Recent alluvial sediments and Pleistocene glacial deposits consist mainly of sands and gravels, silty and sandy loams, and clays (Zaporozec, 1982).

4.3.1.3 Bedrock Geology and Structural Overview

The surficial deposits of the Stoughton area overlie an irregular erosional bedrock surface containing deep bedrock valleys (Ostrom, 1981). In the Stoughton Area, the most notable bedrock valley was created by the ancestral Yahara River, which was buried with ice and drift during glaciation.

The bedrock geology of the Stoughton area is characterized by the Ordovician and Cambrian clastic and carbonate rocks. The St. Peter Sandstone Formation and the Prairie du Chien Group (dolomite) represent the Ordovician Period in this area. The St. Peter Sandstone Formation is characterized by sandstone with some limestone, shale, and conglomerate. The Prairie du Chien Group is characterized by dolomite with some sandstone and shale. The thickness of the St. Peter Sandstone Formation and the Prairie du Chien Group is variable and, in deep bedrock valleys, both units may be eroded. In addition, the Prairie du Chien Group was significantly eroded prior to the deposition of the St. Peter Sandstone Formation. Therefore, the thickness of the St. Peter Sandstone Formation varies with the thickness of the Prairie du Chien Group and, in some places, the

St. Peter Sandstone Formation directly overlies Cambrian sedimentary rocks (Zaporozec, 1982).

The Cambrian clastic bedrock is characterized by sandstone with some dolomite and shale. Cambrian rocks have not been differentiated into formations. The Cambrian section is over 1,000 feet in thickness and is underlain by Precambrian igneous (granite, diorites) and metamorphic (gneiss) rocks of the lower Proterozoic or Upper Archean (Ostrom, 1981).

Sedimentary bedrock units were deposited in a shallow sea on the irregular and arched surface of Precambrian igneous and metamorphic rocks. The arch is a regional scale structure known as the Wisconsin Arch. Bedrock in the Stoughton area reflects the influence of the arch having gentle dips of 10 to 15 feet per mile to the south and southeast (Cline, 1965).

4.3.1.4 Groundwater Occurrence and Utilization

In the Stoughton area, both bedrock and unconsolidated glacial sediments are important sources of potable water. Sandstone bedrock units are the most productive bedrock aquifers while glacial outwash in buried bedrock valleys is the most productive unconsolidated sediment aquifer. The unconsolidated deposits and bedrock may function as a single aquifer where low permeability units are absent. Where separated by low permeability layers, the unconsolidated and bedrock water-bearing units behave as individual aquifers that produce moderate to large yields.

Adequate supplies of groundwater for domestic, livestock, municipal, and industrial uses are available from the Cambrian sandstones and, where present, from the St. Peter Sandstone Formation. Carbonate bedrock, such as the Prairie du Chien dolomite, is not considered an important aquifer in this area due to the variability of occurrence. However, sufficient domestic yields can be obtained where the unit is present. Other unconsolidated deposits, such as silt and clay units, are not considered important sources of groundwater. However, sufficient domestic yield can be obtained from wells completed less than 100 feet bgs in unconsolidated sediments, except in areas of till.

Groundwater is the principal source of potable water in Dane County (Cline, 1965). The City of Stoughton draws water from four municipal wells completed in Cambrian sandstones, including one municipal well located 3,000 feet west of the Stoughton City Landfill. Typical potable water wells in the area are constructed as open-borehole wells ranging from 30 feet to 1,137 feet. Groundwater has been determined to be calcium-magnesium-bicarbonate-type having locally elevated concentrations of iron and nitrate.

4.3.2 Site Geology/Hydrogeology

Characterization of the local geologic and hydrogeologic setting is based primarily upon data collected during the advancement of soil and monitoring well borings and during hydraulic characterization of the site. Additional data and information were obtained from reports detailing previous investigations, including the January 1991 Final RI Report. Geologic drilling logs for soil and well borings advanced by WESTON are contained in Appendix A. The geotechnical results of the aquifer material collected during the reconnaissance borings investigation are presented in Table 4-5. The grain size results are presented in Appendix B. Figure 2-2 shows the locations of all existing soil borings and monitoring wells at the Stoughton Landfill.

4.3.2.1 Site Stratigraphy

Three distinct stratigraphic units were encountered during drilling at the site: landfill materials, glacial deposits, and carbonate bedrock. Each stratigraphic unit is described in detail in the following sections. Stratigraphic relationships and distributions of units are presented in a series of cross sections. Figure 4-1 shows the locations and orientations of the cross-sections. The cross-sections are presented in Figures 4-2 through 4-6.

Landfill Waste and Fill Material

In the central portion of the site, the uppermost stratigraphic unit consists of fill material underlain by landfill wastes. The fill materials are characterized by silty clays to clayey silts containing secondary amounts of sand and gravel. These materials are loose where the silt and sand content is high and are compact where the clay content is high. The fill is typically brown to dark brown and contains scattered organic material (roots) near ground surface. Occasional waste was encountered in this material. The fill is only present in areas of the site that were utilized for refuse disposal. Where present, the thickness of the fill material varies from a few feet to 4.0 feet.

The fill material is underlain by landfill wastes to depths of 10 to 12 feet bgs. Landfill wastes are characterized by general refuse consisting of large amounts of household, industrial, and landscape wastes, including wood, paper, leather, plastic, scrap metal, glass, auto parts, cloth, grass clippings, and concrete. These wastes are mixed occasionally with sand, clay, and organic wastes. Where present, waste thickness ranged from a few feet to 9 feet. Cross sections B-B', C-C', and D-D' (Figures 4-3, 4-4, and 4-5, respectively) show various portions of the Stoughton LF where fill and waste were encountered (denoted as FILL on the cross sections).

Glacial Deposits: Outwash Deposits - Glacio-Fluvial/Glacio-Lacustrine Deposits

Underlying the fill and waste materials described above and the perimeter of the landfill are relatively permeable coarse-grained soils composed primarily of outwash sand and gravel and silty and sandy loam deposits. The petrology and stratigraphic relationships of these sediments are consistent with typical outwash deposits and the stratigraphic relationships of these units are illustrated in the cross-sections (Figures 4-2 through 4-6).

Deposits proximal to the Yahara River are characterized by single or multiple fining upwards sequences in which partial or whole sequences from gravel to clay are present. The most significant of the individual units are the thick clay layers (described below). The petrology and stratigraphic relationships of these sediments are consistent with glacio-fluvial and glacio-lacustrine depositional environments. Based upon the distribution of these sediments and the local geologic setting, the deposition of these sediments was likely influenced by both glacio-lacustrine and glacio-fluvial mechanisms.

The gravels ranged from very fine pebbles to 0.5- to 3.0-inch diameter boulders. The larger grain sizes are typically associated with deeper gravel units. Many of the individual gravel units display a fining upward sequence. The gravels range from very angular to well rounded and from poorly graded to well graded. The gravels typically contained medium fine- to fine-grained sand. Lithic fragments of limestone were encountered in gravel units overlying the bedrock surface. The thickness of these gravel units ranges from a few feet to over 50 feet. The USCS designation for these gravels is GW.

The sand and gravel units are described as fine- to medium-grained sands and fine to coarse pebbles that range from subangular to rounded. These units are typically brown, poorly to moderately sorted, dense, and contain secondary amounts of silt and clay. The thickness of these units range from a few feet to over 70 feet. The USCS designations for these units is SW and SP.

Sand units are described as light brown to brown, fine- to medium-grained sands proximal to the Yahara River and very fine- to medium-grained elsewhere. These units are typically poorly sorted proximal to the Yahara River and moderately to well-sorted elsewhere. The sands contain secondary amounts of silt and clay, as well as gravel. The thickness of these units ranges from a few feet to over 70 feet. The USCS designations for these units include SM, SP, and SC.

The silt and clay units range from brown to gray to olive gray and from medium to high plasticity. The units are typically tight, very well sorted, and moist. Locally, the units contain sand lenses and secondary amounts of sand. The thickness of the silt and clay units ranges from a few feet to 25 feet. The USCS designation is CL and CH for the clay and silt units, respectively. These units occur locally in sediments near the Yahara River and are not continuous across the study area. It is not known if these clay and silt deposits are present beneath the Yahara River. The distribution of these deposits is shown in the cross-sections (Figures 4-2 through 4-6).

<u>Bedrock</u>

Bedrock was encountered in deep borings between 70 and 80 feet bgs. Bedrock is characterized as a tan-yellow, micritic limestone that is slightly fractured and contains calcite nodules. This unit is described as a significant water producer, which likely reflects the fact that the majority of wells are constructed in the weathered zone and are in contact with unconsolidated sand and gravel units. Based upon the bedrock geology of the Stoughton area, this unit may represent either a carbonate subunit of the St. Peter Sandstone

Formation or the Prairie du Chien Group. Sufficient information is not available to determine the stratigraphy of the bedrock.

4.3.2.2 Groundwater Flow System

The primary surface water features of the area are the Yahara River west of the site and the wetlands north, south, and east of the site. Both the Yahara River and the wetlands appear to be regional groundwater discharge points. Due to the textures and variability of overburden sediments, groundwater has been divided into three zones. The first zone includes the shallow groundwater table and extends approximately 820 feet mean sea level (MSL). The second zone consists of an intermediate to deep aquifer between 820 feet MSL and the bedrock contact. The third water-bearing zone consists of the bedrock aquifer.

Twelve monitoring well nests and numerous single monitoring points were installed around the perimeter of the Stoughton landfill for the purpose of determining the physical and chemical properties of each water-bearing zone. Data collected from the wells has been used to determine groundwater elevations for each of the water-bearing units which, in turn, were used to develop potentiometric surface maps and to calculate hydraulic gradients for each of the water-bearing zones. These data are presented in the following subsections.

4.3.2.3 Groundwater Flow Direction and Hydraulic Gradients

<u>Groundwater Flow Direction</u>

Groundwater level measurements were taken for all on-site monitoring wells in August 1994 and September/October 1994 sampling periods. These measurements and monitoring well survey data were used to calculate groundwater elevations for the wells referenced in feet above MSL. Groundwater elevations for the August 1994 and the September/October 1994 sampling periods are shown in Table 4-6.

Groundwater flow directions are determined by measurement of the hydraulic heads (groundwater elevations) at various locations within the aquifer to generate a map of groundwater elevation contour lines (i.e., equipotential lines). Groundwater flow is perpendicular to and downgradient of the groundwater elevation contours.

Figure 4-7 represents the shallow groundwater table surface for August 1994. The figure shows mounded water table conditions beneath the landfill area with a radial flow pattern away from the landfill. Groundwater elevations in shallow monitoring wells range from 844.01 feet MSL to 848.51 feet MSL. Horizontal hydraulic gradients across the landfill in the shallow aquifer range from a minimum of 0.011 ft/ft near the southwest portion of the site to a high of 0.125 ft/ft near the central portion of the site with an approximate average of value of 0.036 ft/ft. Horizontal gradients near the central portion of the site are generally the highest, while horizontal gradients away from to the site are more shallow.

Figure 4-8 represents the potentiometric surface for groundwater from the intermediate and deep wells for August 1994. The figure shows groundwater highs in the northeast and southwest portion of the study area. Groundwater flow from the northeast portion of the site is toward the northwest, west, southeast, and south. Groundwater flow from the southwest portion of the site is toward the northwest, north, and northeast. Groundwater flow in the northwest portion of the study area is toward the north and northwest, while groundwater flow in the southeast portion of the site if toward the east and southeast. However, the general groundwater flow pattern is toward the northwest. Groundwater elevations in the intermediate to deep monitoring wells ranged from 848.33 feet MSL to 848.54 feet MSL in August 1994. Horizontal hydraulic gradients ranged from 0.008 ft/ft to

0.00026 ft/ft in the northeast portion of the site and 0.00067 ft/ft to 0.000235 ft/ft in the southwest portion of the site. In the northwest and southeast portions of the study area, horizontal hydraulic gradients range from 0.00008 ft/ft to 0.0005 ft/ft and from 0.00014 ft/ft to 0.0008 ft/ft, respectively. The approximate average horizontal hydraulic gradient for the intermediate and deep wells is 0.000872 ft/ft.

Figure 4-9 represents the potentiometric surface for data collected in September and October 1994 from the bedrock monitoring wells. The figure shows a general flow trend from the southwest, southeast, and northeast toward the west and northwest, in the direction of the Yahara River. The flow direction is generally consistent with that determined for the intermediate and deep wells. Groundwater elevations from the bedrock wells ranged from 848.18 feet MSL to over 851.08 feet MSL. Deep well horizontal hydraulic gradients ranged from 0.000102 ft/ft near the northwest portion of the site to 0.000909 ft/ft near the southwest portion of the site.

Groundwater Hydraulic Gradients

Monitoring well nests were installed at 12 locations along the perimeter of the site to define the chemical and hydraulic characteristics of various portions of the aquifer. Groundwater levels in intermediate and deep monitoring wells and in bedrock monitoring wells were greater than those observed in shallow monitoring wells during the same period. In addition, several wells exhibited artesian water levels (i.e., above ground surface), during the August and September/October 1994 sampling periods.

Vertical hydraulic gradients have been estimated for pairs of monitoring wells in the nests by dividing the difference in water level elevations of the well pair by the difference in the midpoint elevation of each well screen. The determination of upward or downward vertical hydraulic gradient is based upon relative groundwater elevations as measured in wells at the same location (i.e. nested wells) but with screens at differing elevations. Because gradient flows in the direction of decreasing head (lower groundwater elevation), a higher groundwater elevation in a shallow well as compared to a deeper well indicates a downward gradient; a higher groundwater elevation in the deeper well as compared to the shallow well indicates an upward gradient.

Where two monitoring wells are nested, one vertical hydraulic gradient was determined for the pair. Where three monitoring wells are nested, three vertical hydraulic gradients were determined. Table 4-7 summarizes vertical hydraulic gradient data for the Stoughton LF site using the August 1994 and the September/October 1994 groundwater elevation data. Vertical hydraulic gradients range from a 0.151 ft/ft downward to over 0.338 ft/ft upward. Ten well nests indicated an upward hydraulic gradient and four well nests indicated a downward hydraulic gradient based upon the August 1994 groundwater elevation data. Based upon the September/October 1994 data, 19 well nests indicated an upward hydraulic gradient while only five indicated a downward hydraulic gradient.

Vertical hydraulic gradients were determined between the shallow monitoring wells and the intermediate/deep monitoring wells using the data presented in Table 4-7. These data indicate a general upward hydraulic gradient between the deep wells and the shallow wells. Vertical hydraulic gradients between shallow and intermediate to deep well nests ranged from 0.002 ft/ft downward near monitoring well nests MW-3 and MW-4 to 0.151 ft/ft upward near monitoring well nest MW-2, using August 1994 groundwater measurements. The September/October 1994 groundwater measurements indicated vertical hydraulic gradients between the shallow and deep wells ranged from 0.122 ft/ft downward near monitoring well nest MW-3 to over 0.338 ft/ft upward near monitoring well nest MW-10.

Vertical hydraulic gradients were determined between the shallow monitoring wells and the bedrock monitoring wells using the data presented in Table 4-7. These data indicate a general upward hydraulic gradient between the bedrock wells and the shallow wells. Vertical hydraulic gradients between shallow and bedrock well nests ranged from 0.085 ft/ft downward to over 0.117 ft/ft upward using the September/October 1994 groundwater measurements. Vertical hydraulic gradients were determined between the intermediate/deep monitoring wells and the bedrock monitoring wells using data presented in Table 4-7. As shown in Table 4-7, the vertical hydraulic gradient between the intermediate to deep monitoring wells and the bedrock wells was consistently less than ±0.010 ft/ft. Based upon these data and field observations, these units appear to be hydraulically connected and behave as a single aquifer.

The vertical hydraulic gradient data and artesian water level conditions are consistent with local geology and field conditions. Groundwater flow directions based on water levels indicate general flow west to northwestward towards the Yahara River in the deep sand and gravel and bedrock monitoring zones. Shallow groundwater exhibits a mounded pattern with radial flow away from the center of the landfill. On the west side of the site, this flow is towards the Yahara River. This information combined with primarily vertical gradients (stronger proximal to the river) calculated indicates that both shallow and deep groundwater appear to discharge to the Yahara River. Artesian groundwater conditions were observed primarily at locations adjacent to the river where the lacustrine clay layer was present based on drilling. These artesian conditions are not uncommon in this type of environment. With strong vertical hydraulic gradients upward towards the river bed, the presence of locally confining or semi-confining clay layers will tend to block flow, and thereby increase hydraulic head pressures and produce a higher water level in wells screened beneath the clay.

4.3.2.4 Hydraulic Conductivity

Single well permeability (slug) tests were conducted on monitoring wells MW-1S through MW-6S and on monitoring wells MW-1D through MW-6D during the RI. These wells are completed in the sand and gravel aquifer with most constructed in sand, gravel, or sand and gravel units. The results of the RI slug tests are presented in Table 4-8. The results are consistent and indicate a mean radial hydraulic conductivity of 5.62×10^{-3} cm/sec for shallow wells and 5.70×10^{-3} for intermediate and deep wells, using a rising head test. The mean radial hydraulic conductivity for intermediate and deep wells using a falling head test method was also consistent.

Radial hydraulic conductivity was also calculated for the sand and gravel aquifer from the results of the aquifer performance test as a function of transmissivity and saturated aquifer thickness. These values ranged from 8.4×10^{-3} to 1.3×10^{-1} cm/sec with mean values of 2.8×10^{-2} to 3.1×10^{-2} cm/sec. Aquifer test values are slightly higher (approximately 1/2 order of magnitude). This is typical in that slug test values are more representative of the material directly adjacent to the well screen and typically underestimate the average radial hydraulic conductivity of the unit as a whole.

Vertical hydraulic conductivity was also calculated from data generated during the aquifer test. Vertical hydraulic conductivity values ranged from $4.9\text{x}10^{-7}$ to $3.4\text{x}10^{-2}$ cm/sec with average values of $1.2\text{x}10^{-3}$ to $4.3\text{x}10^{-3}$ cm/sec. These values are slightly lower than radial conductivity values as expected. Typically, vertical hydraulic conductivities are approximately an order of magnitude lower than radial conductivities in stratified deposits. Radial and vertical hydraulic conductivity values obtained from the aquifer test are described in detail in the Volume II of the RD Data Collection Report.

4.3.2.5 Groundwater Flow Velocities

Groundwater generally flows toward the northwest across the study area and has an upward vertical flow component towards the Yahara River. Hydraulic conductivity values have been estimated using RI single well permeability test (slug test) data and aquifer test data. Average linear velocities for groundwater can be estimated by combining Darcy's equation and the standard continuity equation of hydraulics into the following relationship:

$$V = \frac{Ki}{n}$$

where: V = velocity of (groundwater) flow (cm/sec)

K = coefficient of permeability (hydraulic conductivity, cm/sec)
i = Hydraulic gradient (horizontal or vertical, dimensionless)
n = Average effective porosity of the medium (percent)

Using the above relationship with calculated values of hydraulic conductivity derived from the aquifer test, horizontal and vertical gradient information, and values for porosity, groundwater flow velocities were calculated and are summarized on Table 4-8. Porosity values used are presented in Table 4-5.

Calculated horizontal groundwater flow velocities range from 0.04 to 55.5 feet/day with an average value of 1.2 ft/day. Vertical groundwater flow velocities range from 6.3×10^{-6} to 39.2 feet/day with an average of 0.3 ft/day.

4.4 NATURE AND EXTENT OF CONTAMINATION

During groundwater sampling conducted by Jacobs in October 1993 and March/April 1994, special VOCs (THF, DCDFM and TCFM) were detected at the western edge (MW-3, MW-5 and MW-9 locations) of the landfill. Only THF was detected above the enforcement standard (ES). DCDFM was detected below the ES but above the preventive action limit (PAL). TCFM was detected below the PAL. WESTON's objective during the predesign investigation was to delineate the extent of the THF, DCDFM and TCFM contamination.

In order to better delineate the extent of contamination, WESTON conducted a reconnaissance borings investigation during the predesign Phase I investigation. The details of this investigation are presented in Subsection 3.3.1 The results of reconnaissance borings groundwater sampling results are presented in Table 4-9. The reconnaissance borings groundwater sampling results for THF, DCDFM and TCFM are also shown in Figure 4-10. THF was detected above the ES (50 ug/l) in reconnaissance borings R-3, R-5 and R-6. THF was detected below the ES but above the PAL (10 ug/l) in reconnaissance boring R-4. THF was not detected in reconnaissance borings R-1, R-2 and R-7. The maximum detected concentration of THF in reconnaissance borings was 170 ug/l in R-5 at approximately 60 to 65 feet bgs. THF was detected in shallow, intermediate and deep samples. DCDFM was not detected above the ES (1000 ug/l) in reconnaissance borings. However, DCDFM was detected below the ES but above the PAL (200 ug/l) in reconnaissance boring R-4. DCDFM was detected below the PAL but above the detection limit in reconnaissance borings R-5 and R-6. DCDFM was not detected in reconnaissance borings R-1, R-2, R-3 and R-7. The maximum detected concentration of DCDFM in reconnaissance borings was 450 ug/l in R-4 at approximately 50 to 52 feet bgs. DCDFM was detected in shallow, intermediate, and deep samples. TCFM was not detected in the reconnaissance borings.

Thus, it was established that a groundwater plume of THF and DCDFM is moving towards the Yahara River.

In order to better monitor the movement of the plume, three additional monitoring wells (MW-10, MW-11 and MW-13) were installed during the predesign Phase II investigation. Details regarding the additional monitoring well installation are presented in Subsection 3.3.3. WESTON conducted a round of monitoring well sampling that consisted of sampling all the monitoring wells at the site. The details of this round of groundwater sampling are presented in Subsection 3.3.4. The monitoring well sampling results are presented in Table 4-10. The monitoring wells groundwater sampling results for THF, DCDFM and TCFM are also shown in Figure 4-10. THF was detected above the ES (50 ug/l) in monitoring wells MW-9S, MW-9I and EW-01. THF was detected below the ES but above the PAL (10 ug/l) in monitoring well MW-10I. The maximum detected concentration of THF in monitoring wells was 380 ug/l EW-01. DCDFM was not detected above the ES (1000 ug/l) in monitoring wells. However, DCDFM was detected below the ES but above the PAL (200 ug/l) in monitoring wells MW-9S, MW-9I and EW-01. DCDFM was detected below the PAL but above the detection limit (10 ug/l) in monitoring wells MW-5S, MW-5D and MW-10I. The maximum detected concentration of DCDFM in reconnaissance borings was 980 ug/l in EW-01. TCFM was not detected above the PAL in monitoring wells.

Thus, based on the results of reconnaissance groundwater sampling and monitoring well sampling, THF and DCDFM are chemicals of concern in groundwater. TCFM is not a chemical of concern in groundwater. The estimated areal extent of contamination and estimated concentration contours for THF and DCDFM are depicted in Figures 4-11 and 4-12, respectively. As shown in Figure 4-11, it appears that there are two THF plumes moving towards the Yahara River. The DCDFM plume is much smaller and is contained within the THF plume. The physical and chemical properties of THF and DCDFM are presented in Tables 4-11 and 4-12, respectively. THF is miscible in water and is not expected to significantly adsorb to soil. THF is not expected to biodegrade or volatilize readily in groundwater. DCDFM is very volatile and DCDFM concentrations in groundwater may reduce because of volatilization.

4.5 POTW SAMPLING

As part of the treatability study evaluation, WESTON collected water samples at the POTW during the aquifer pumping test to evaluate the feasibility of discharge of untreated groundwater to the POTW. The details of the samples are presented in Subsection 3.4.2. The results of the sampling are presented in Table 4-13. A grab water sample collected at the extraction well during the pump test indicated THF concentration of 220 ug/l and a DCDFM concentration of 200 ug/l. A grab sample at the POTW influent during the pump test indicated a THF concentration of 39 ug/l but DCDFM was not detected. It is estimated that THF concentrations were reduced because of dilution and DCDFM concentrations were reduced to below detection limits because of volatilization and dilution. A grab sample collected at the POTW effluent during the pump test indicated a THF concentration of 15 ug/l. This suggests that the reduction in THF concentrations at the POTW is primarily because of dilution. The THF concentrations were not reduced below the PAL of 10 ug/l. Therefore, discharge of untreated extracted groundwater at the POTW may not be a feasible option. The City of Stoughton will determine the feasibility of accepting the discharge of untreated extracted groundwater to the city sewage system. The results of grab sampling conducted at the POTW during the aquifer pumping test indicate that THF concentrations are above the PAL in the effluent. The POTW would need sufficient hydraulic capacity and the THF effluent discharge concentration could have to meet the discharge limits established by the Wisconsin Department of Natural Resources.

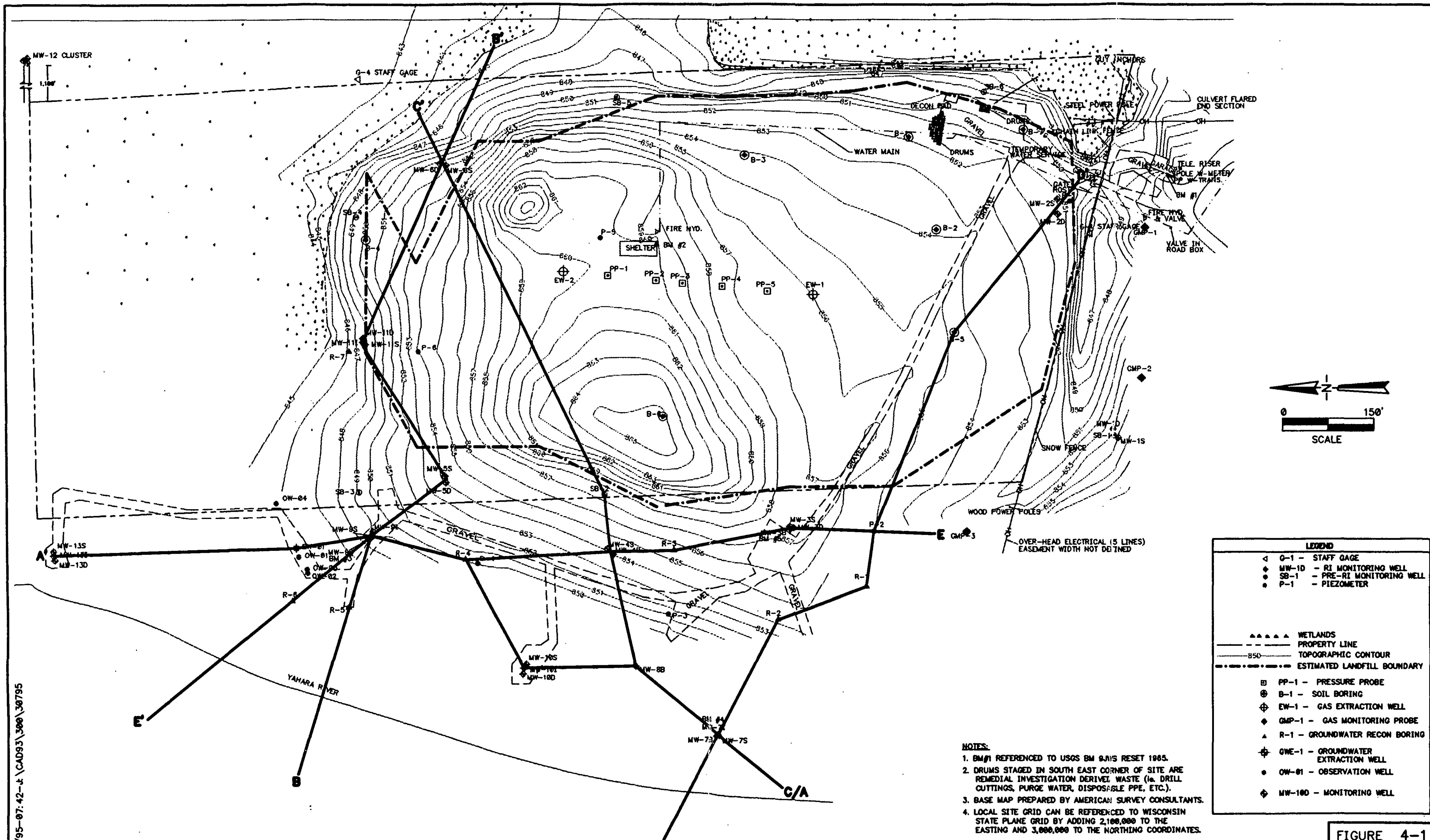


FIGURE 4-1

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

GEOLOGIC CROSS-SECTION LOCATIONS

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

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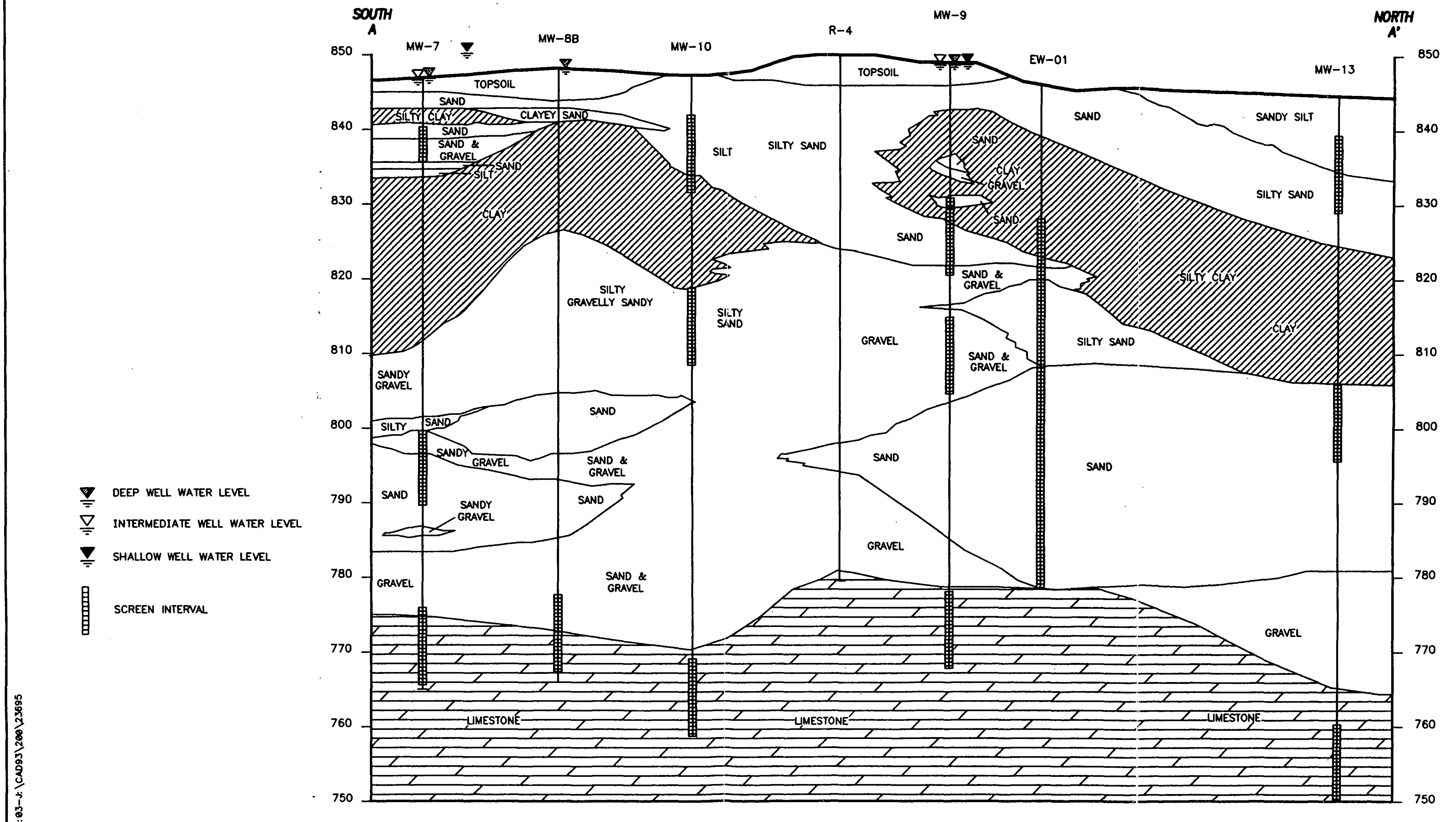

FIGURE 4-2

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

GENERALIZED CROSS-SECTION A – A'
STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

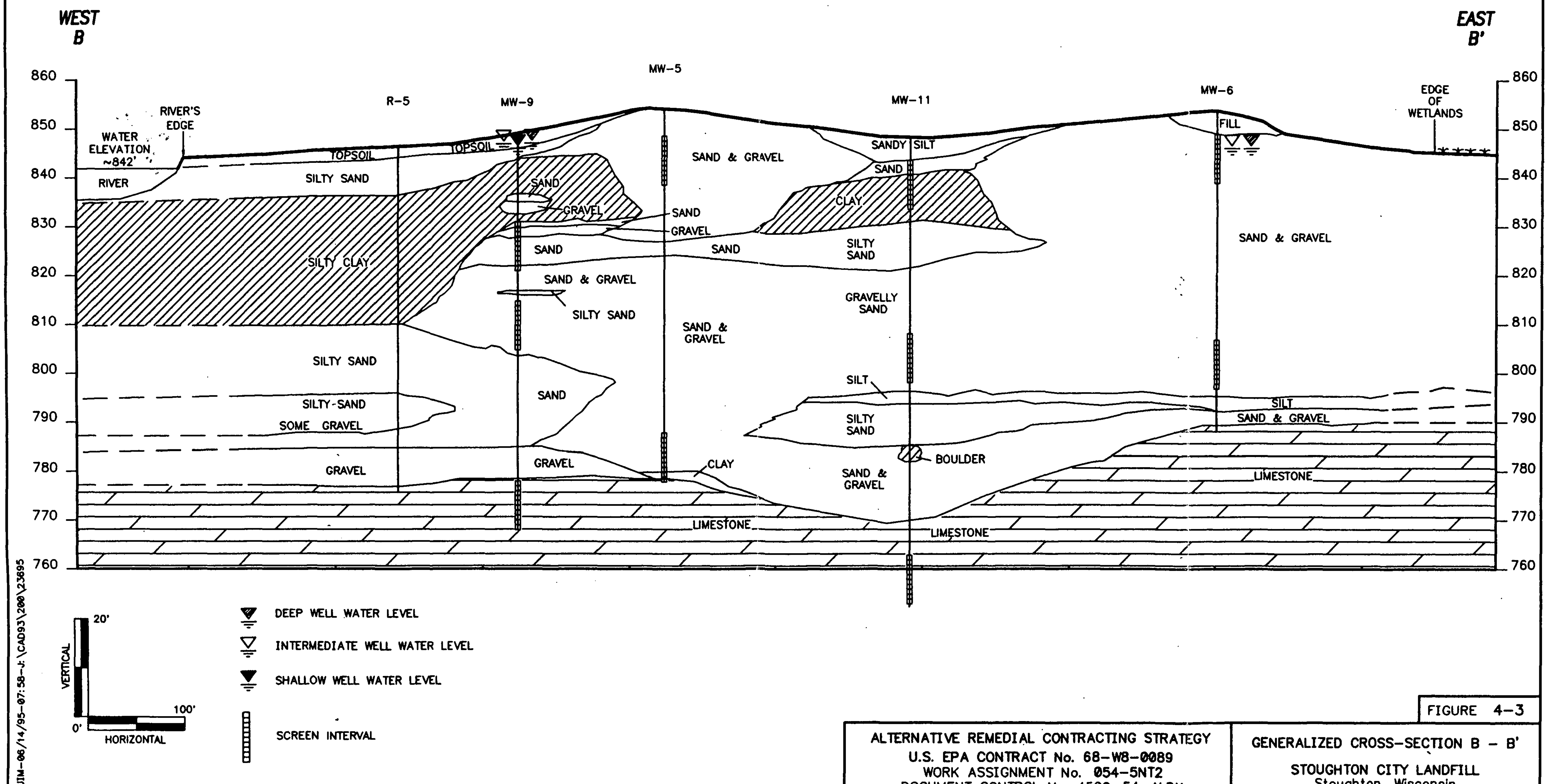

FIGURE 4-3

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

GENERALIZED CROSS-SECTION B - B'

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

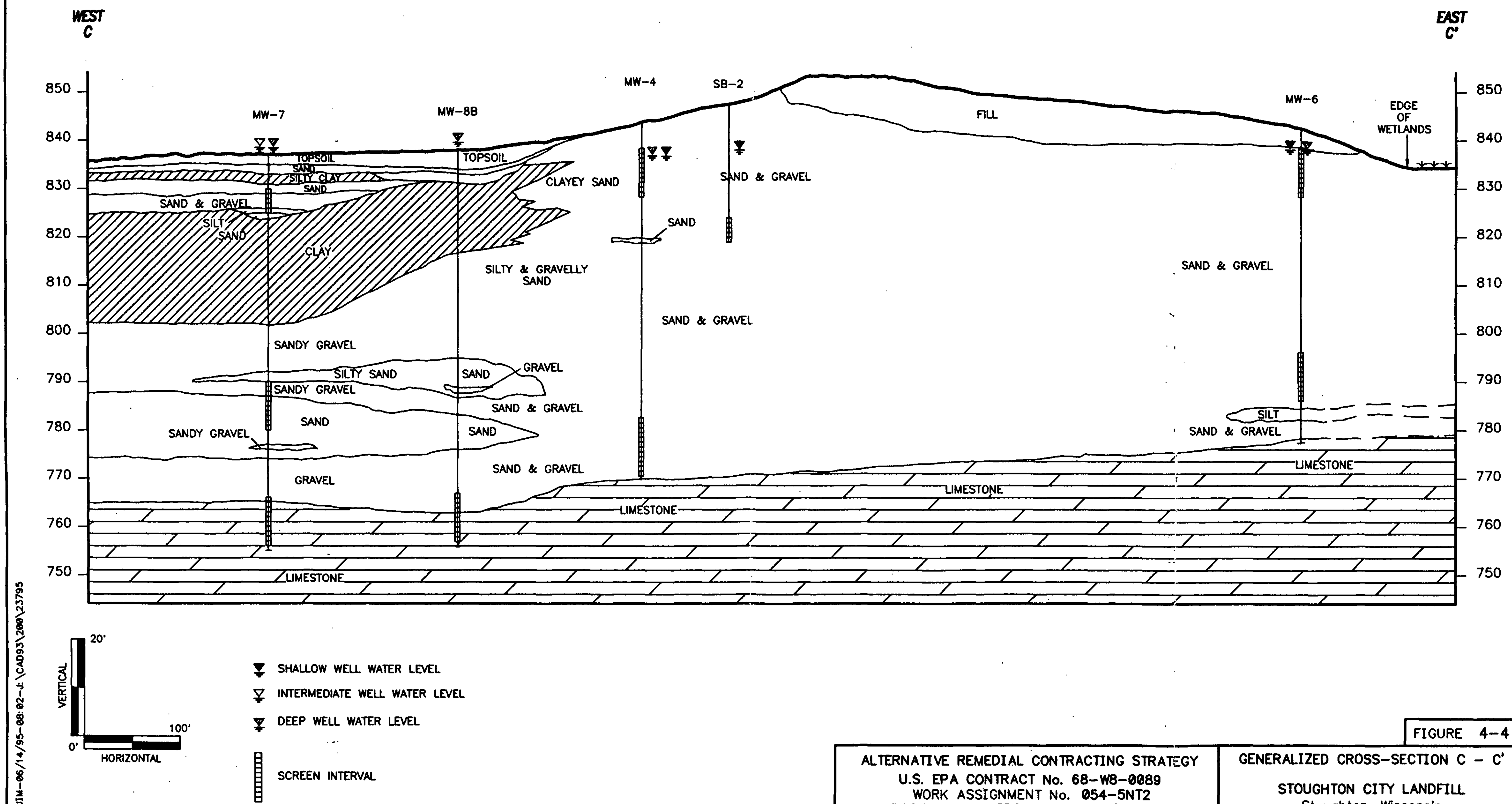

FIGURE 4-4

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	GENERALIZED CROSS-SECTION C - C' STOUGHTON CITY LANDFILL Stoughton, Wisconsin

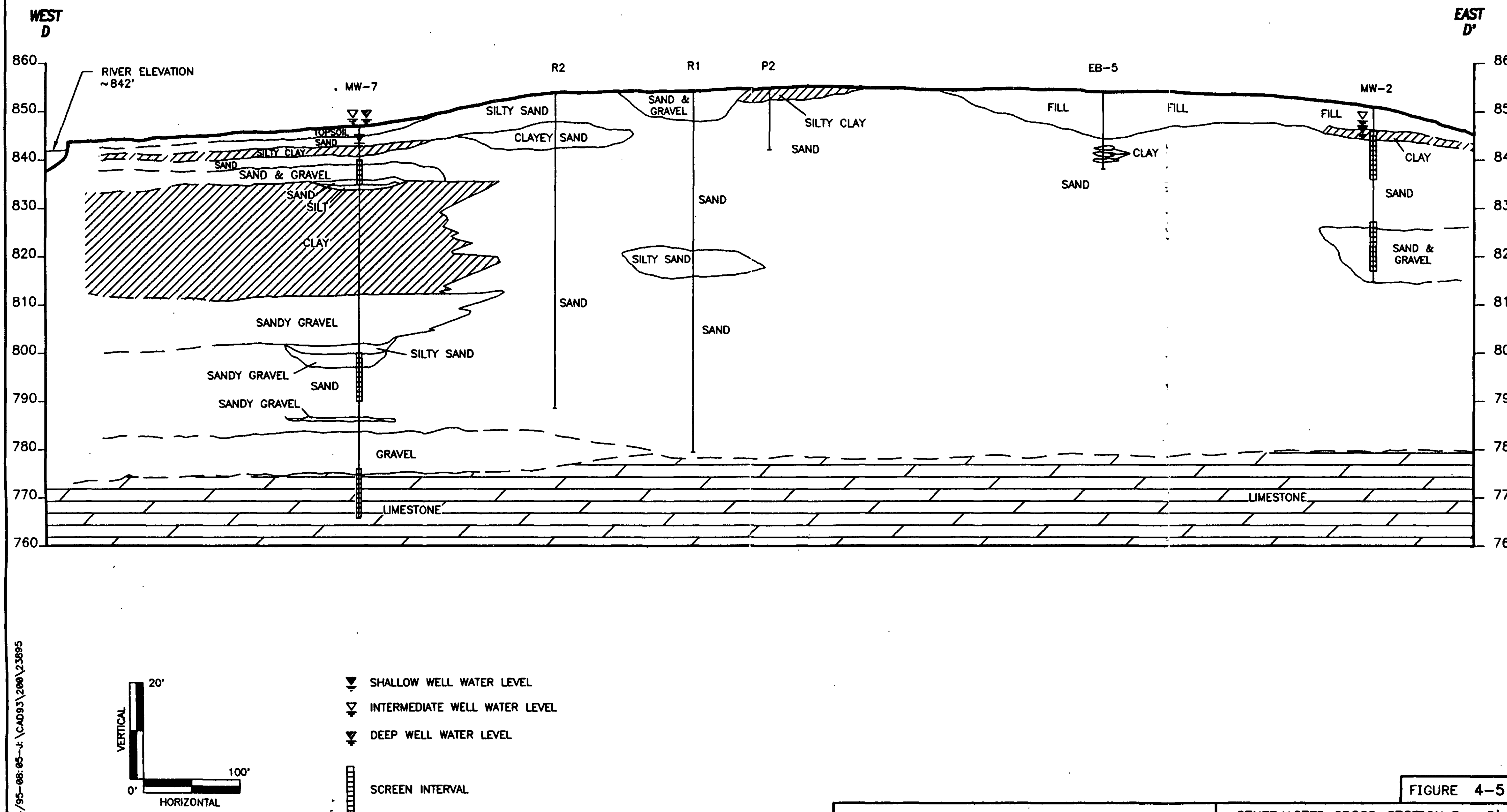

FIGURE 4-5

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

GENERALIZED CROSS-SECTION D - D'

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

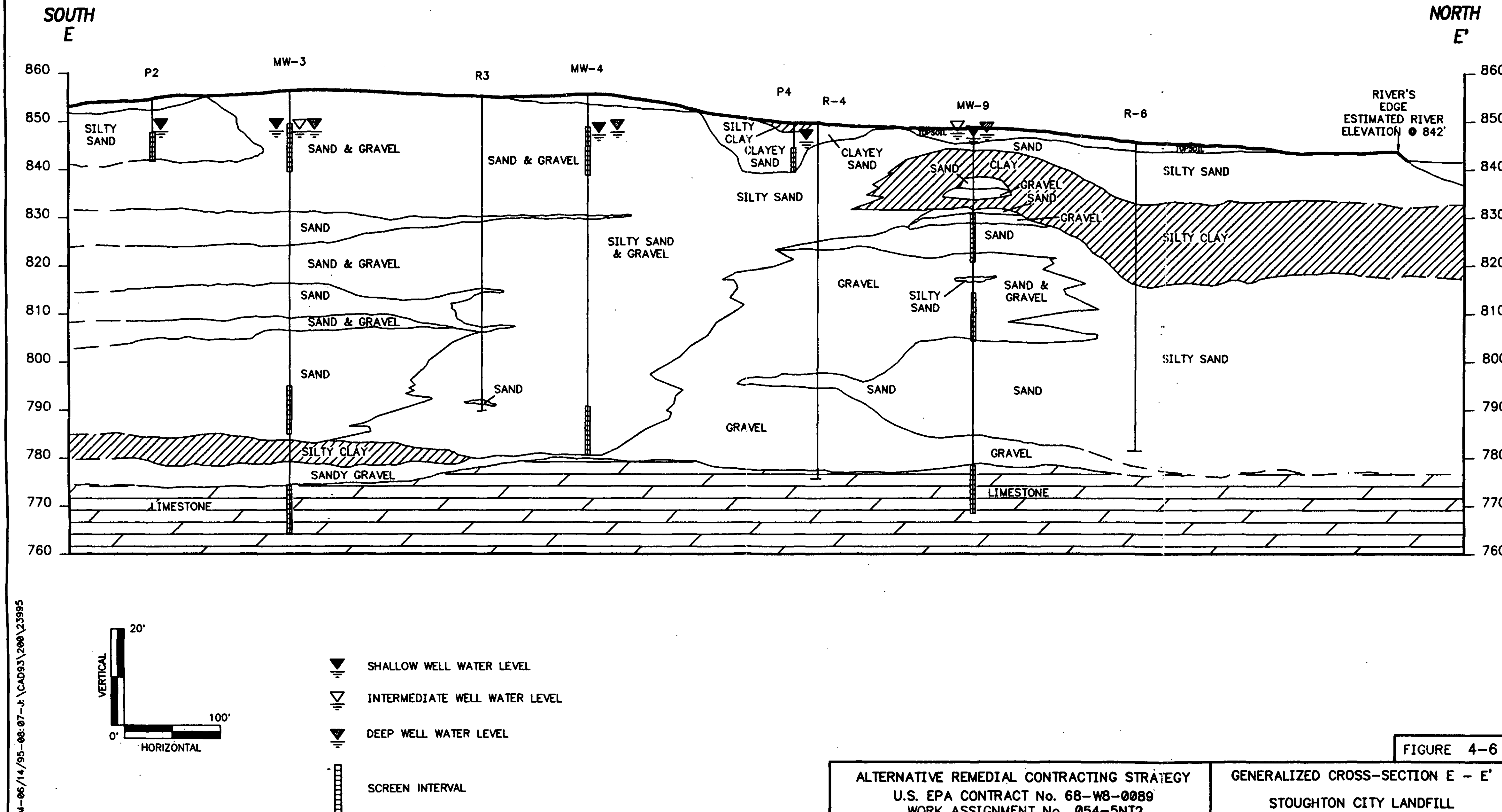

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FIGURE 4-6

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

GENERALIZED CROSS-SECTION E - E'

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

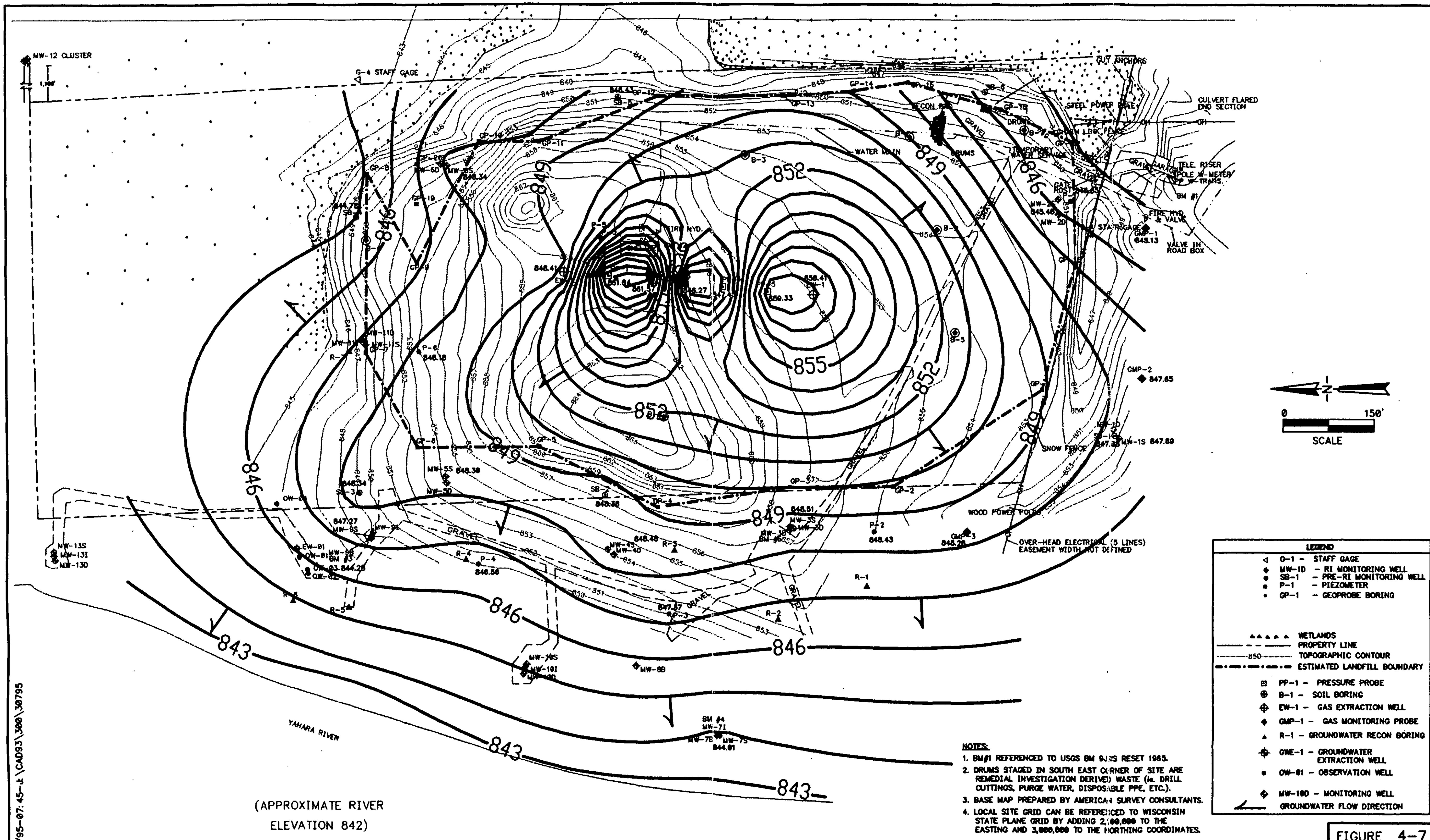


FIGURE 4-7

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

SHALLOW WATER TABLE CONTOUR MAP
AUGUST 1994
STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

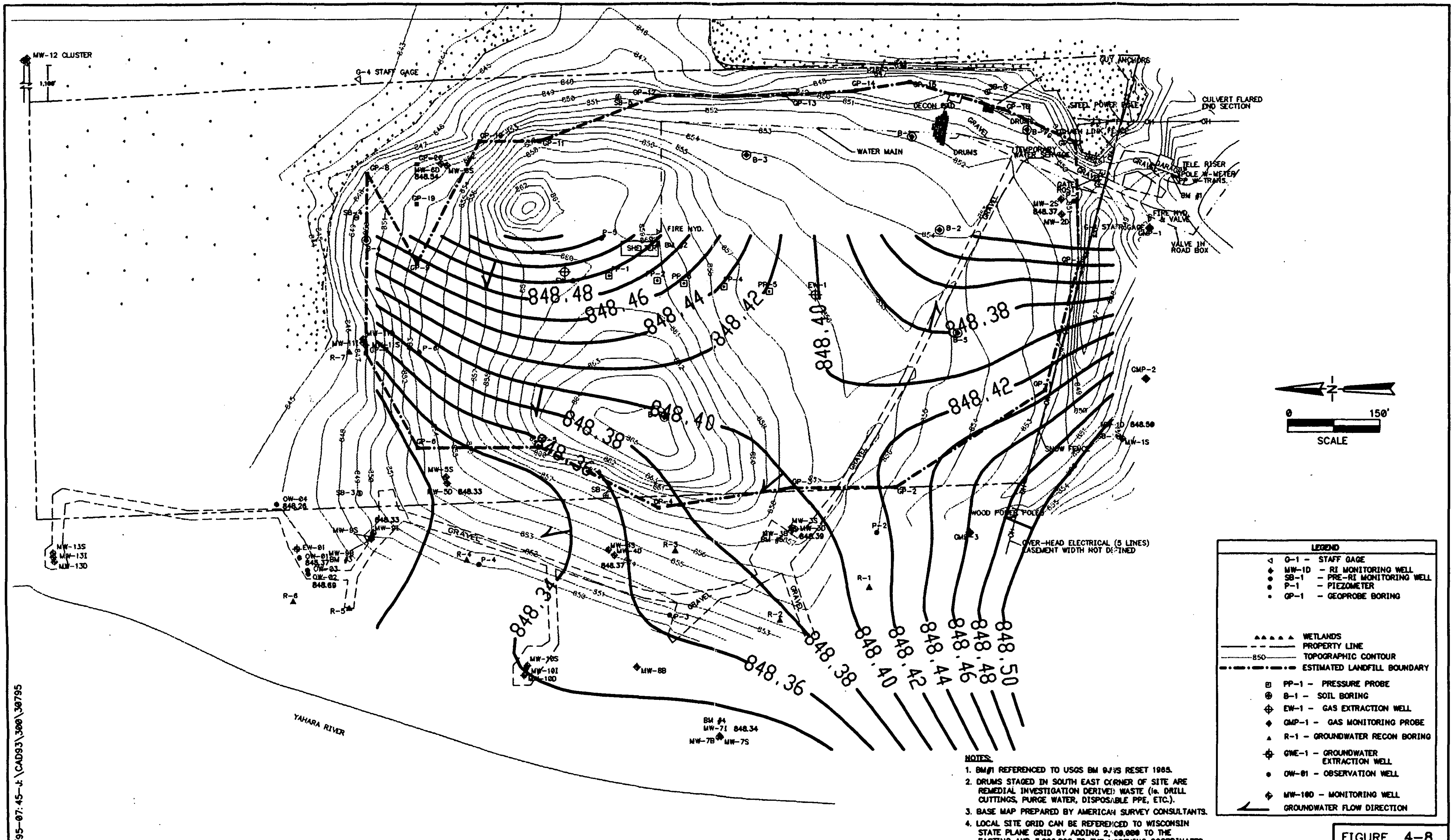
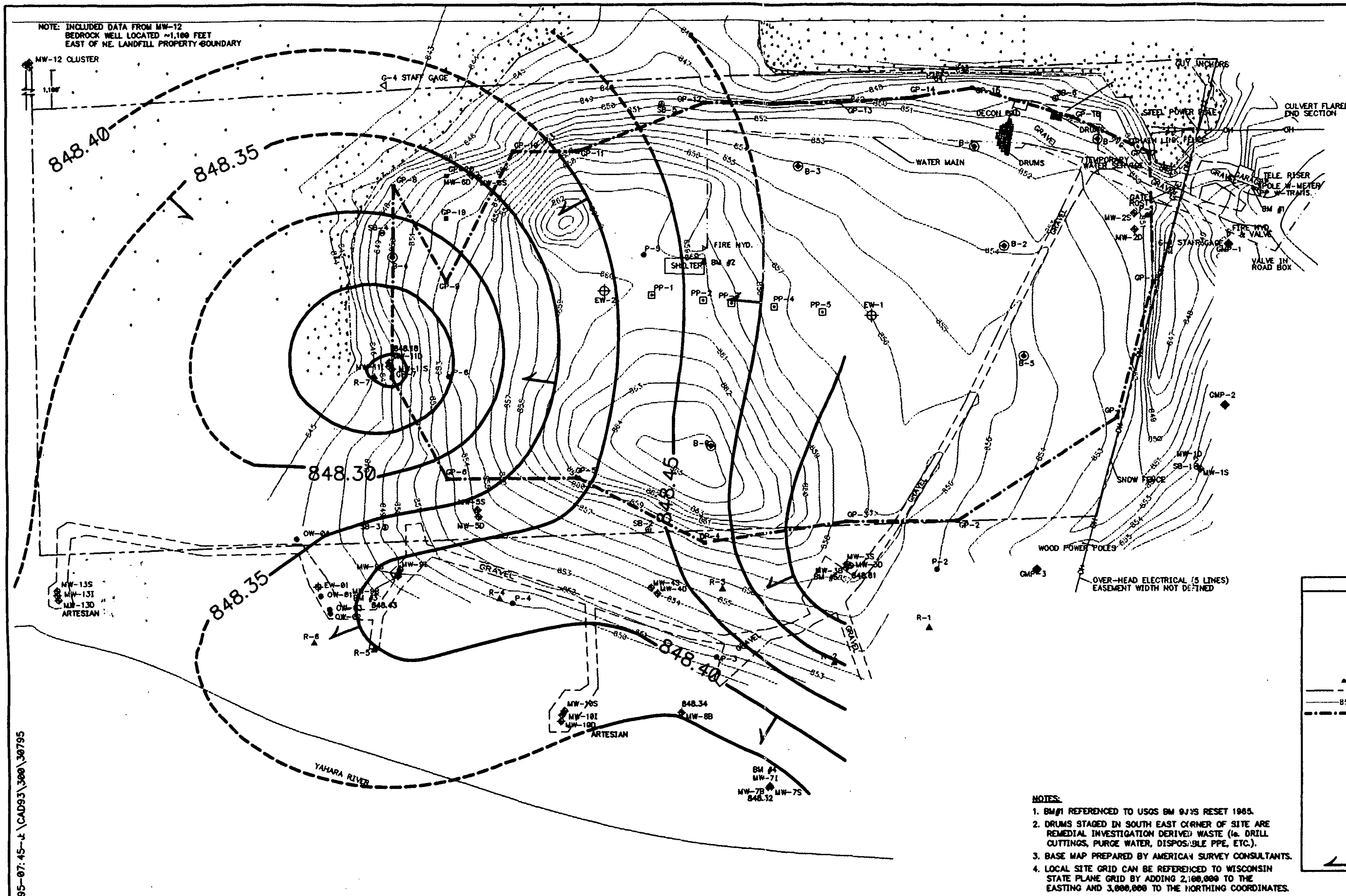


FIGURE 4-8

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

INTERMEDIATE ZONE POTENTIOMETRIC SURFACE CONTOUR MAP AUGUST 1994

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin



LEGEND

- ◁ G-1 – STAFF GAGE
- ◆ MW-1D – RI MONITORING WELL
- ● SB-1 – PRE-RI MONITORING WELL
- ● P-1 – PIEZOMETER
- • GP-1 – GEOPROBE BORING
- ▲▲▲▲▲ WETLANDS
- PROPERTY LINE
- 850 TOPOGRAPHIC CONTOUR
- ESTIMATED LANDFILL BOUNDARY
- ⊡ PP-1 – PRESSURE PROBE
- ⊕ B-1 – SOIL BORING
- ⌖ EW-1 – GAS EXTRACTION WELL
- ◆ GMP-1 – GAS MONITORING PROBE
- ▲ R-1 – GROUNDWATER RECON BORING
- ⌖ GWE-1 – GROUNDWATER EXTRACTION WELL
- ● OW-01 – OBSERVATION WELL
- ◆ MW-10D – MONITORING WELL
- GROUNDWATER FLOW DIRECTION

NOTES:

1. BM#1 REFERENCED TO USGS BM 9J?S RESET 1965.
2. DRUMS STAGED IN SOUTH EAST CORNER OF SITE ARE REMEDIAL INVESTIGATION DERIVED WASTE (ie. DRILL CUTTINGS, PURGE WATER, DISPOSABLE PPE, ETC.).
3. BASE MAP PREPARED BY AMERICAN SURVEY CONSULTANTS.
4. LOCAL SITE GRID CAN BE REFERENCED TO WISCONSIN STATE PLANE GRID BY ADDING 2,100,000 TO THE EASTING AND 3,000,000 TO THE NORTHING COORDINATES.

FIGURE 4-9

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	BEDROCK POTENTIOMETRIC SURFACE CONTOUR MAP SEPTEMBER/OCTOBER 1994 STOUGHTON CITY LANDFILL Stoughton, Wisconsin

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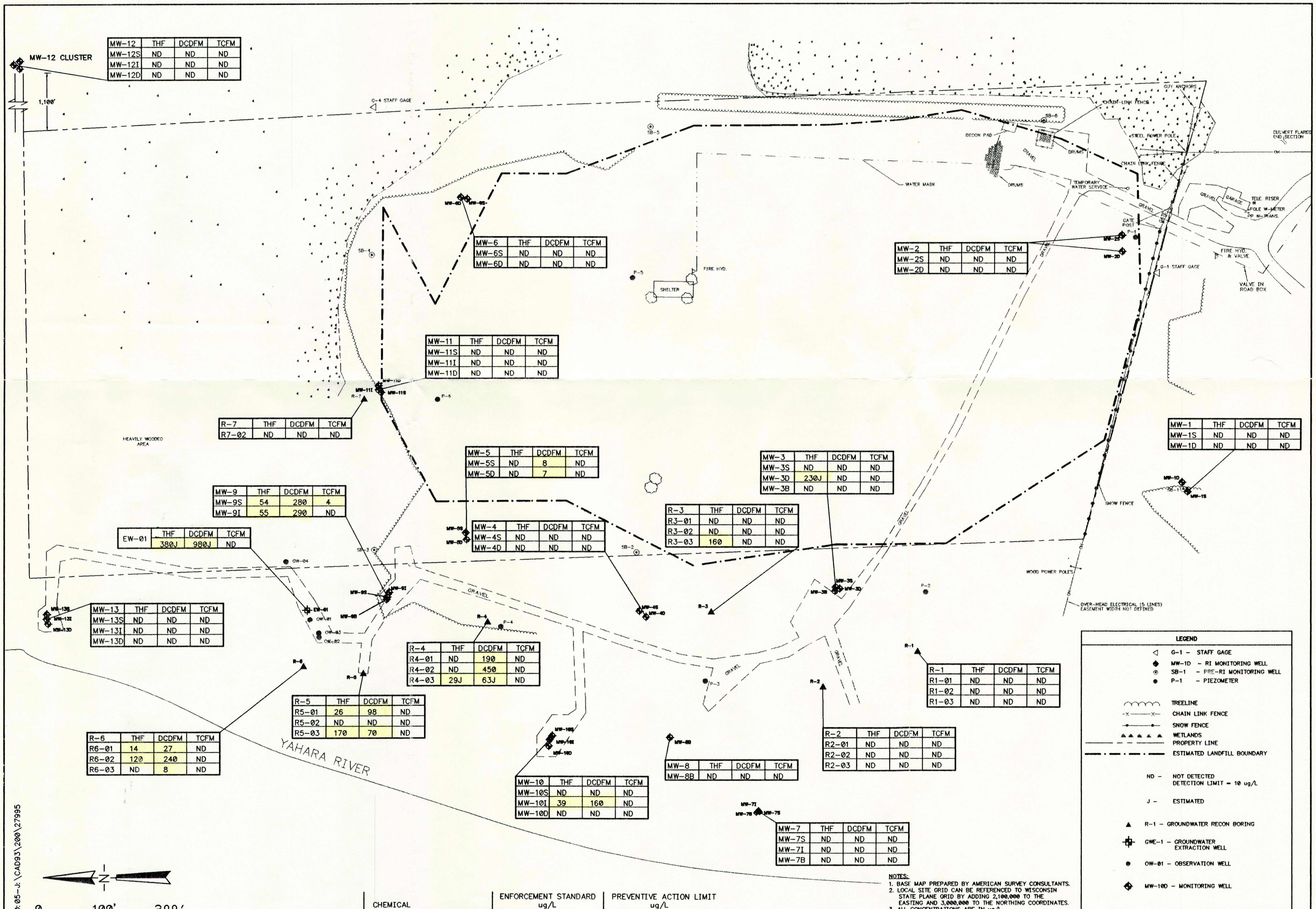

MW-12	THF	DCDFM	TCFM
MW-12S	ND	ND	ND
MW-12I	ND	ND	ND
MW-12D	ND	ND	ND

MW-6	THF	DCDFM	TCFM
MW-6S	ND	ND	ND
MW-6D	ND	ND	ND

MW-2	THF	DCDFM	TCFM
MW-2S	ND	ND	ND
MW-2D	ND	ND	ND

MW-11	THF	DCDFM	TCFM
MW-11S	ND	ND	ND
MW-11I	ND	ND	ND
MW-11D	ND	ND	ND

R-7	THF	DCDFM	TCFM
R7-02	ND	ND	ND

MW-1	THF	DCDFM	TCFM
MW-1S	ND	ND	ND
MW-1D	ND	ND	ND

MW-5	THF	DCDFM	TCFM
MW-5S	ND	8	ND
MW-5D	ND	7	ND

MW-3	THF	DCDFM	TCFM
MW-3S	ND	ND	ND
MW-3D	230J	ND	ND
MW-3B	ND	ND	ND

MW-9	THF	DCDFM	TCFM
MW-9S	54	280	4
MW-9I	55	290	ND

R-3	THF	DCDFM	TCFM
R3-01	ND	ND	ND
R3-02	ND	ND	ND
R3-03	160	ND	ND

EW-01	THF	DCDFM	TCFM
	380J	980J	ND

MW-4	THF	DCDFM	TCFM
MW-4S	ND	ND	ND
MW-4D	ND	ND	ND

MW-13	THF	DCDFM	TCFM
MW-13S	ND	ND	ND
MW-13I	ND	ND	ND
MW-13D	ND	ND	ND

R-4	THF	DCDFM	TCFM
R4-01	ND	190	ND
R4-02	ND	450	ND
R4-03	29J	63J	ND

R-1	THF	DCDFM	TCFM
R1-01	ND	ND	ND
R1-02	ND	ND	ND
R1-03	ND	ND	ND

R-5	THF	DCDFM	TCFM
R5-01	26	98	ND
R5-02	ND	ND	ND
R5-03	170	70	ND

R-6	THF	DCDFM	TCFM
R6-01	14	27	ND
R6-02	120	240	ND
R6-03	ND	8	ND

R-2	THF	DCDFM	TCFM
R2-01	ND	ND	ND
R2-02	ND	ND	ND
R2-03	ND	ND	ND

MW-8	THF	DCDFM	TCFM
MW-8B	ND	ND	ND

MW-10	THF	DCDFM	TCFM
MW-10S	ND	ND	ND
MW-10I	39	160	ND
MW-10D	ND	ND	ND

MW-7	THF	DCDFM	TCFM
MW-7S	ND	ND	ND
MW-7I	ND	ND	ND
MW-7B	ND	ND	ND

LEGEND

- G-1 – STAFF GAGE
- MW-1D – RI MONITORING WELL
- SB-1 – PRE-RI MONITORING WELL
- P-1 – PIEZOMETER
- TREELINE
- CHAIN LINK FENCE
- SNOW FENCE
- WETLANDS
- PROPERTY LINE
- ESTIMATED LANDFILL BOUNDARY
- ND – NOT DETECTED DETECTION LIMIT = 10 ug/L
- J – ESTIMATED
- R-1 – GROUNDWATER RECON BORING
- GWE-1 – GROUNDWATER EXTRACTION WELL
- OW-01 – OBSERVATION WELL
- MW-10D – MONITORING WELL

	CHEMICAL	ENFORCEMENT STANDARD ug/L	PREVENTIVE ACTION LIMIT ug/L
THF	TETRAHYDROFURON	50	10
DCDFM	DICHLORODIFLUOROMETHANE	1,000	200
TCFM	TRICHLOROFLUOROMETHANE	3,490	698

NOTES:
1. BASE MAP PREPARED BY AMERICAN SURVEY CONSULTANTS.
2. LOCAL SITE GRID CAN BE REFERENCED TO WISCONSIN STATE PLANE GRID BY ADDING 2,100,000 TO THE EASTING AND 3,000,000 TO THE NORTHING COORDINATES.
3. ALL CONCENTRATIONS ARE IN ug/L.

FIGURE 4-10

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

GROUNDWATER SAMPLING RESULTS FOR THF, DCDFM, AND TCFM
STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

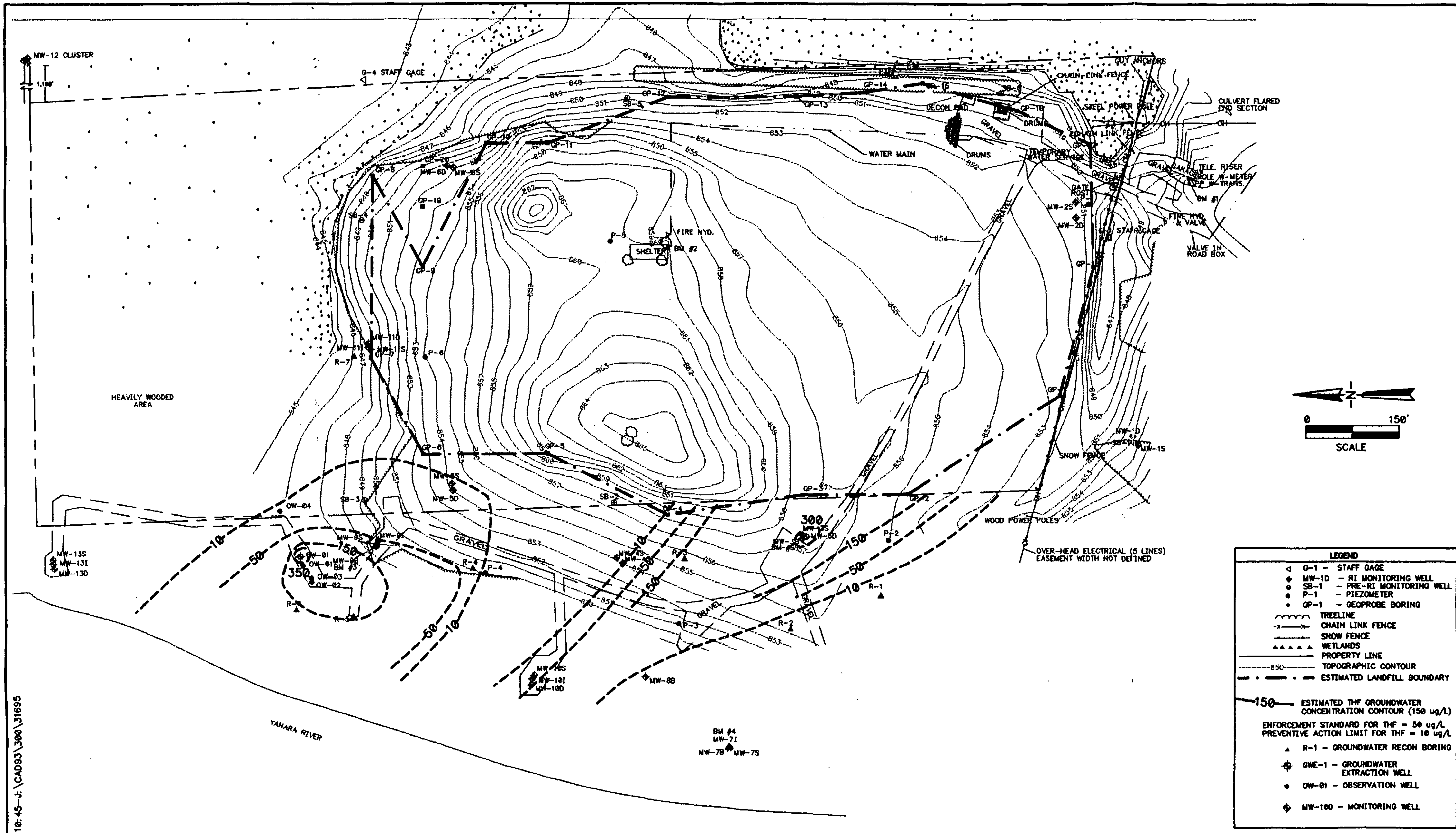

FIGURE 4-11

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

AREAL EXTENT OF THF CONTAMINATION IN THE GROUNDWATER

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

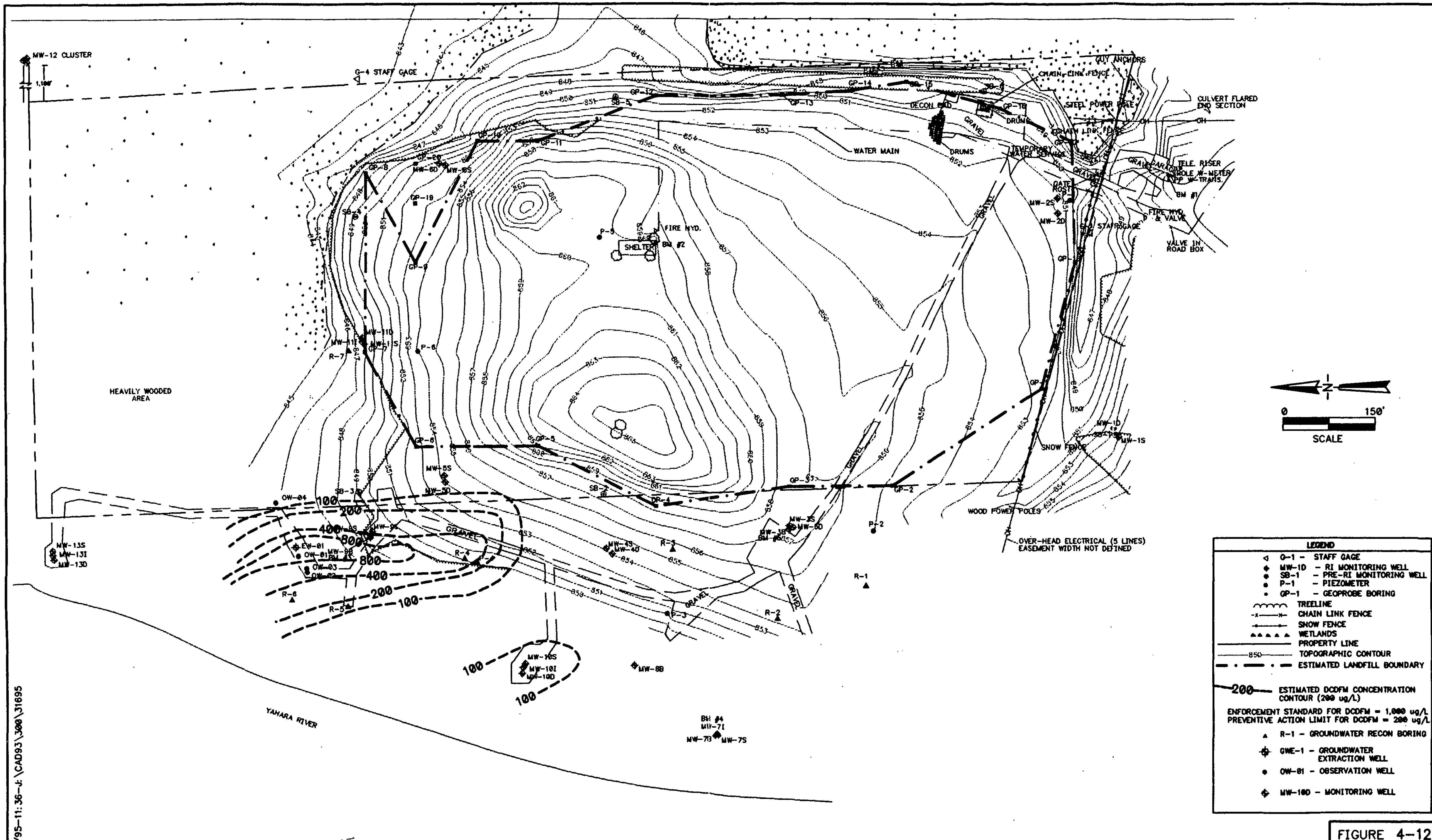

FIGURE 4-12

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

AREAL EXTENT OF DCDFM CONTAMINATION IN THE GROUNDWATER

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

Table 4-1

Sediment Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Analyte	Field Sample Number: SL1-									
	SD01-01	SD01-01DP	SD02-01MSD	SD03-01	SD04-01	SD05-01	SD06-01	SD6-01DP	SD07-01	SD08-01
Special VOCs (µg/kg)										
Dichlorodifluoromethane	23 U	24 U	15 U	—	—	—	—	—	32 UJ	22 U
Tetrahydrofuran	23 U	24 U	15 U	—	—	—	—	—	32 U	22 U
Trichlorofluoromethane	23 U	24 U	15 U	—	—	—	—	—	32 U	22 U
VOA (µg/kg)										
Chloromethane	14 UJ	19 UJ	22 UJ	—	—	—	—	—	38 UJ	7 U
Methylene chloride	41 BU	57 BU	58 BU	—	—	—	—	—	140 BU	71 BU
Benzene	2 J	4 J	5 J	—	—	—	—	—	38 U	7 J
Toluene	14 U	19 U	3 J	—	—	—	—	—	38 U	3 J
Acetone	79	120	22 U	—	—	—	—	—	38 U	100
Semivolatiles (µg/kg)										
Di-n-butylphthalate	440 BJU	630 U	1,500 BJU	—	—	—	—	—	1,300 BJU	660 BJU
bis(2-Ethylhexyl)phthalate	47 J	120 J	1,400 J	—	—	—	—	—	1,300 U	660 U
Phenanthrene	440 U	630 U	350 J	—	—	—	—	—	1,300 U	660 U
Anthracene	440 U	630 U	79 J	—	—	—	—	—	1,300 U	660 U
Fluoranthene	440 U	630 U	420 J	—	—	—	—	—	1,300 U	660 U
Pyrene	440 U	630 U	530 J	—	—	—	—	—	1,300 U	660 U
Chrysene	440 U	630 U	260 J	—	—	—	—	—	1,300 U	660 U
Benzo(b)fluoranthene	440 U	630 U	440 J	—	—	—	—	—	1,300 U	660 U
Benzo(a)pyrene	440 U	630 U	270 J	—	—	—	—	—	1,300 U	660 U

Table 4-1

Sediment Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Number: SL1-									
	SD01-01	SD01-01DP	SD02-01MSD	SD03-01	SD04-01	SD05-01	SD06-01	SD6-01DP	SD07-01	SD08-01
Pesticides/PCBs (μg/kg)										
Heptachlor	0.44 JP	0.70 JP	37 UJ	—	—	—	—	—	1.6 J	0.72 J
4,4′-DDE	2.9 J	9.9 J	150 J	—	—	—	—	—	13 UJ	6.6 UJ
Endrin	4.5 UJ	6.30 J	370 J	—	—	—	—	—	13 UJ	6.6 UJ
4,4′-DDD	0.34 J	0.99 J	350 J	—	—	—	—	—	13 UJ	6.6 UJ
4,4′-DDT	0.50 JP	1.4 J	74 UJ	—	—	—	—	—	3 J	6.6 UJ
Total Metals (mg/kg)										
Aluminum	12,500 J	12,800 J	4,990 J	7,580 J	11,500 J	11,200 J	8,760 J	8,690 J	8,130 J	8,830 J
Antimony	3.7 UJ	4.2 UJ	2.9 UJ	4.5 UJ	4.4 UJ	4.9 UJ	3.7 UJ	4.2 UJ	6.2 UJ	4.1 UJ
Arsenic	6.2	5.1	4.2	7.0	2.7 B	3.4 B	2.8 B	2.9 B	4.0 B	2.4 B
Barium	208	212	83.3	106	114	138	97.5	97.2	152	113
Beryllium	0.92 B	0.79 B	0.37 B	0.67 B	0.80 B	0.91 B	0.66 B	0.87 B	0.93 B	0.85 B
Cadmium	0.34 U	0.42 BJ	0.68 BJ	0.41 U	0.49 BJ	0.46 U	0.34 U	0.39 U	0.58 U	0.38 U
Calcium	9,300	8,830	29,700	9,400	18,600	12,100	12,700	12,000	14,300	7,860
Chromium	15.9	17.0	10.4	13.2	14.5	20.4	11.9	12.7	11.7	14.1
Cobalt	9.0 B	8.0 B	5.6 B	8.1 B	6.5 B	8.4 B	5.3 B	4.2 B	6.2 B	5.2 B
Copper	27.3	26.4	17.0	16.2	31.2	35.6	22.0	25.9	18.8	16.4
Iron	18,400	16,200	8,850	11,200	12,700	19,900	8,850	8,590	9,990	9,490
Lead	1.49	18.0	46.5	23.8	31.0	17.6	14.8	16.7	20.4	15.9

Table 4-1

Sediment Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Number: SL1-									
	SD01-01	SD01-01DP	SD02-01MSD	SD03-01	SD04-01	SD05-01	SD06-01	SD6-01DP	SD07-01	SD08-01
Total Metals (mg/kg) (cont.)										
Magnesium	4,650 J	4,370	17,300	3,820	5,150	4,710	5,630	5,170	3,970	3,620
Manganese	294 J	270 J	455 J	609 J	264 J	96.8 J	237 J	189 J	125 J	138 J
Mercury	0.08 B	0.09 U	0.07 U	0.10 U	0.11 U	0.11 U	0.09 U	0.11 U	0.15 U	0.10 U
Nickel	29.8	27.1	9.4 B	8.8 B	15.2 B	16.9 B	12.3 B	13.0 B	14.8 B	13.6 B
Potassium	401 B	430 B	657 B	988 B	469 B	434 B	388 B	357 B	448 B	642 B
Selenium	1.4 B	1.3 B	0.57 U	0.87 U	0.86 U	0.96 U	1.1 B	0.82 U	1.2 U	0.79 U
Silver	1.0 U	1.3 B	0.81 U	1.2 U	1.2 U	1.5 B	1.0 U	1.2 U	1.7 U	1.1 U
Sodium	168 B	165 B	253 B	112 B	127 B	182 B	119 B	121 B	412 B	115 B
Thallium	0.74 U	0.86 U	0.60 U	0.91 U	0.90 U	1.0 U	0.75 U	0.86 U	1.3 U	0.83 U
Vanadium	39.8	33.1	17.3	20.1 B	25.6	33.6	17.0 B	16.7 B	24.7 B	21.8
Zinc	62.5 E	66.6 E	64.0 E	61.4 E	68.7 E	63.9 E	39.3 E	41.3 E	47.1 E	46.5 E
Geotechnical Parameters										
pH, pH Units	—	—	—	—	—	—	—	—	7.24	7.13
Total Organic Carbon, % Carbon	—	—	—	—	—	—	—	—	6.88	6.50

Table 4-1

Sediment Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Number: SL1-									
	SD01-01	SD01-01DP	SD02-01MSD	SD03-01	SD04-01	SD05-01	SD06-01	SD6-01DP	SD07-01	SD08-01
Geotechnical Parameters (cont.)										
Total Kjeldahl Nitrogen (mg/kg)	—	—	—	—	—	—	—	—	14,300	4,080
CEC	—	—	—	—	—	—	—	—		

Only analytes detected in sediment samples are presented here. The sediment sample number code, collection and shipment information is provided in Table 3-2.

Organic Results Qualifiers:

U - Indicates that the compound was analyzed for, but not detected. The sample quantitation limit corrected for dilution and percent moisture is reported.
J - Indicates an estimated value. This flag is used either when estimating a concentration for a tentatively identified compound or when the data indicates the presence of a compound, but the result is less than the sample quantitation limit, but greater than zero. The flag is also used to indicate a reported result having an associated QC problem.
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
B - Indicates the analyte is detected in the associated blank as well as the sample.
P - Indicates a pesticide/Aroclor target analyte when there is a greater than 25% difference for the detected concentrations between the two GC columns. The lower of the two results is reported.
-- - Not analyzed.

Inorganic Results Qualifiers:

U - Indicates the material was analyzed, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J - Indicates the associated value is an estimated quantity.
UJ - Indicates the material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.
B - Indicates that the reported value is less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
E - Indicates the reported value is estimated because of the presence of interferences. An explanatory note shall be included under Comments on the Cover Page (if the problem supplies to all samples) or on the specific FORM I-IN (if it is an isolated problems).
-- - Not analyzed.

Table 4-2

Surface Water Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Analyte	Field Sample Numbers SL1-														
	SW01-01 (UF)	SW01-01 (F)	SW01-01DP (UF)	SW01-01DP (F)	SW02-01MSD (UF)	SW02-01MSD (F)	SW03-01 (UF)	SW03-01 (F)	SW04-01 (UF)	SW04-01 (F)	SW05-01 (UF)	SW05-01 (F)	SW06-01 (UF)	SW06-01 (F)	SW-FB01 (UF)
Hardness, mg/L as $CaCO_3$	448 J	—	472 J	—	444 J	—	388 J	—	392 J	—	504 J	—	384 J	—	5 UJ
Total Metals, $\mu g/L$															
Aluminum	20.9 U	22.0 BJ	28.6 B	45.1 BJ	23.9 BJ	57.7 BJ	27.8 BJ	20.9 U	42.1 BJ	22.6 BJ	2,010	20.9 U	79.7 BJ	25.2 BJ	20.9 U
Antimony	14.7 U	23.0 BJ	14.7 U	14.7	14.7 U	16.6 BJ	17.3 BJ	16.4 BJ	14.7 U	14.7 U	14.7 U	14.7 U	14.7 U	14.7 U	14.7 U
Arsenic	5.4 B	5.1 B	6.4 B	3.9 B	3.9 B	4.5 B	2.8 B	4.4 B	2.9 B	1.5 U	2.0 B	2.4 B	3.5 B	1.5 U	1.5 U
Barium	20.8 B	40.6 B	23.5 B	35.7 B	26.1 B	50.4 B	50.9 B	62.9 B	80.9 B	65.2 B	248	102 B	84.1 B	71.0 B	1.2 U
Beryllium	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.44 B	0.40 U	0.40 U	0.40 U
Cadmium	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 BJ	1.1 U	1.1 U	1.1 U	1.2 BJ	1.1 U	1.1 U	1.1 U
Calcium	85,600	80,400	86,800	84,200	72,500	73,800	71,800	71,600	69,800	69,400	145,000	82,700	79,300	66,800	176 U
Chromium	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 J	93.7
Cobalt	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Copper	3.6 U	4.8 BJ	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.7 BJ	4.0 BJ	4.4 BJ	11.5 BJ	3.6 U	3.6 U	4.4 BJ	3.6 U
Iron	1,070 J	46.0 BJ	1,170 J	31.7 BJ	515 J	158*	2,030 J	65.9 BJ	1,730 J	36.8 BJ	8,180	295*	990 J	24.6 B*	1,120
Lead	2.1 BJ	2.0 B	2.3 BJ	1.5 U	1.5 U	2.6 B	2.3 BJ	3.5	1.5 U	2.3 B	16.7	1.5 U	1.5 U	1.5 U	2.4 B
Magnesium	61,100	62,100	62,200	62,200	59,500	61,000	49,800	51,000	46,000	47,800	51,600	50,100	43,600	43,000	25.7 BJ
Manganese	1,520	967	1,590	997	824	713	523	154	4,150	1,270	1,920	745	1,740	254	40.1
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.25 J	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.23	0.20 U	0.20 U	0.20 U
Nickel	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	204
Potassium	8,300	8,440	8,320	8,460	11,100	11,400	2,240 B	2,190 B	3,840 B	3,880 B	4,930 B	2,560 B	2,630 B	1,340 B	87.3 BJ

Table 4-2

Surface Water Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL1-														
	SW01-01 (UF)	SW01-01 (F)	SW01-01DP (UF)	SW01-01DP (F)	SW02-01MSD (UF)	SW02-01MSD (F)	SW03-01 (UF)	SW03-01 (F)	SW04-01 (UF)	SW04-01 (F)	SW05-01 (UF)	SW05-01 (F)	SW06-01 (UF)	SW06-01 (F)	SW-FB01 (UF)
Selenium	2.1 U	2.1 U	2.1 J	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U
Silver	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U
Sodium	12,200	12,300	12,400	12,300	13,500	13,600	15,600	15,800	12,700	13,300	60,500	60,400	17,100	17,000	107 B
Thallium	2.2 U	2.5 BJ	2.2 U	3.0 BJ	2.2 U	2.5 BJ	2.2 U	2.6 BJ	2.2 U	3.6 BJ	2.2 U	3.1 BJ	2.2 U	2.8 BJ	2.2 U
Vanadium	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	6.4 B	2.2 U	2.2 U	2.2 U	2.2 U
Zinc	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	43.0	7.1 U	7.1 U	9.1 B	7.1 U

Note: The sample number code, collection and shipment information is provided in Table 3-3.

Results Qualifiers:

U - Indicates the material was analyzed, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J - Indicates the associated value is an estimated quantity.
B - Indicates that the reported value is less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
* - Indicates the duplicate analysis is not within control limits.
-- - Not analyzed.

Table 4-3

Inorganic Water Quality Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Analyte	Field Sample Numbers: SL1-														
	MW3S-01 (UF)	MW3S-01 (F)	MW3S-01DP (UF)	MW3S-01DP (F)	MW3B-01 (UF)	MW3B-01 (F)	MW7I-01 (UF)	MW7I-01 (F)	MW7B-01 (UF)	MW7B-01 (F)	MW9S-01 (UF)	MW9S-01 (F)	MW9I-01 (UF)	MW9I-01 (F)	MW-FB01 (UF)
Total Metals (μg/L)															
Aluminium	421	39.3 BJ	1,080	43.8 BJ	44.7 BJ	36.6 BJ	32.0 BJ	42.0 BJ	20.9 U	20.9 U	409	43.7 BJ	42.9 BJ	34.8 BJ	23.0 BJ
Antimony	14.7 U	14.7 U	18.0 BJ	14.7 U	17.2 BJ	19.0 BJ	17.6 BJ	20.5 BJ	14.7 U	19.9 BJ	24.2 BJ	14.7 U	21.5 BJ	14.7 U	14.7 U
Arsenic	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	2.1 B	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Barium	73.2 B	67.0 B	78.4 B	68.8 B	29.6 B	29.8 B	16.8 B	21.6 B	7.8 B	35.7 B	28.0 B	26.6 B	24.5 B	24.8 B	1.2 U
Beryllium	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
Cadmium	1.1 U	1.2 BJ	1.1 U	1.1 U	2.2 BJ	1.2 BJ	1.1 U	1.5 BJ	1.1 U	1.4 BJ	1.4 BJ	1.2 BJ	1.1 U	1.6 BJ	1.1 U
Calcium	82,300	79,100	87,900	78,500	83,700	82,200	76,800	74,700	85,000	88,500	70,800	56,900	69,300	68,600	176 U
Chromium	4.8 BJ	2.5 U	6.2 BJ	3.1 BJ	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	8.8 BJ	2.5 U	2.5 U	2.5 U	2.5 U
Cobalt	2.9 BJ	2.1 U	4.3 BJ	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	5.2 BJ	5.5 BJ	3.7 BJ	2.3 BJ	2.1 U
Copper	8.9 BJ	3.6 U	10.6 BJ	4.2 BJ	5.6 BJ	3.6 U	3.6 U	3.8 BJ	3.6 U	4.0 BJ	7.8 BJ	5.2 BJ	3.6 U	4.2 BJ	3.6 U
Iron	809 J	9.9 U	2,020 J	85.9 BJ	45.8 BJ	23.5 BJ	13.0 BJ	45.5 BJ	9.9 U	9.9 U	770 J	32.4 BJ	39.5 BJ	40.8 BJ	27.5 BJ
Lead	2.7 BJ	1.9 BJ	10.7 J	2.2 BJ	4.0 J	2.0 BJ	1.8 BJ	2.9 BJ	2.1 BJ	1.5 U	2.6 BJ	1.7 BJ	2.9 BJ	1.5 U	3.0 B
Magnesium	42,600	41,700	45,900	41,300	44,600	44,600	41,500	40,900	43,700	45,400	43,300	35,800	43,300	43,200	25.0 U
Manganese	45.7 J	6.6 BJ	115 J	7.1 BJ	1.3 BJ	2.1 BJ	11.6 BJ	13.1 BJ	0.90 U	0.90 U	482 J	441 J	279 J	283 J	0.90 U
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	6.5 U	19.6 B	14.8 B	6.5 U	6.5 U	6.5 U
Potassium	1,110 B	903 B	1,330 B	1,040 B	1,200 B	1,160 B	918 B	1,040 B	1,320 B	1,400 B	1,400 B	1,230 B	1,120 B	1,120 B	89.7 B
Selenium	2.1 U	2.1 U	2.1 U	2.2 B	2.1 U	2.1 U	2.3 B	2.1 B	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U	2.1 U

Table 4-3
Inorganic Water Quality Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers: SL1-														
	MW3S-01 (UF)	MW3S-01 (F)	MW3S-01DP (UF)	MW3S-01DP (F)	MW3B-01 (UF)	MW3B-01 (F)	MW7I-01 (UF)	MW7I-01 (F)	MW7B-01 (UF)	MW7B-01 (F)	MW9S-01 (UF)	MW9S-01 (F)	MW9I-01 (UF)	MW9I-01 (F)	MW-FB01 (UF)
Total Metals (μg/L) (cont.)															
Silver	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U
Sodium	18,700	18,700	17,600	17,400	7,450	7,490	3,180 B	3,260 B	10,300	10,700	23,800	23,800	11,700	11,700	276 BJ
Thallium	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Vanadium	2.2 U	2.2 U	4.0 B	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U	2.2 U
Zinc	7.1 U	7.1 U	7.1 U	7.7 B	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U	7.1 U
Inorganic Water Quality Parameters (μg/L)															
pH (pH units)	7.2	—	7.3	—	7.3	—	7.5	—	7.0	—	7.5	—	7.5	—	5.6
Alkalinity	352,000 J	—	360,000 J	—	309,000 J	—	301,000 J	—	297,000 J	—	275,000 J	—	285,000 J	—	3,100 J
Ammonia as Nitrogen	1,000 UJ	—	1,000 UJ	—	1,000 UJ	—	1,000 UJ	—	1,000 UJ	—	1,000 UJ	—	1,000 UJ	—	1,000 J
Total Organic Carbon	1,710	—	1,480	—	1,000 U	—	1,000 U	—	1,000 U	—	6,000	—	2,840	—	R
Chemical Oxygen Demand	R	—	R	—	R	—	R	—	R	—	R	—	R	—	R
Nitrate & Nitrite	460 J	—	450 J	—	10,400 J	—	3,300 J	—	9,180 J	—	100 UJ	—	100 UJ	—	100 UJ
Phosphorous	132 J	—	141 J	—	100 UJ	—	100 UJ	—	100 UJ	—	100 UJ	—	100 UJ	—	100 UJ
Total Dissolved Solids	388,000	—	369,000	—	387,000	—	360,000	—	434,000	—	312,000	—	366,000	—	16,000
Total Suspended Solids	10,200 J	—	35,600	—	100 U	—	100 U	—	1,600 J	—	1,900 J	—	1,500 J	—	5,900
Sulfate	35,400 J	—	32,300 J	—	28,000 J	—	25,800 J	—	29,100 J	—	831,000 J	—	26,500 J	—	2,413 J
BOD (mg/L O_2)	R	—	R	—	R	—	R	—	R	—	R	—	R	—	R
Bromide (mg/L)	2 U	—	2 U	—	2 U	—	2 U	—	2 U	—	2 U	—	2 U	—	2 U

Table 4-3
Inorganic Water Quality Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers: SL1-														
	MW3S-01 (UF)	MW3S-01 (F)	MW3S-01DP (UF)	MW3S-01DP (F)	MW3B-01 (UF)	MW3B-01 (F)	MW7I-01 (UF)	MW7I-01 (F)	MW7B-01 (UF)	MW7B-01 (F)	MW9S-01 (UF)	MW9S-01 (F)	MW9I-01 (UF)	MW9I-01 (F)	MW-FB01 (UF)
Inorganic Water Quality Parameters (μg/L) (cont.)															
Color (Color units)	25 U	---	25 U	---	25 U	---	25 U	---	25 U	---	25 U	---	25 U	---	25 U
Fluoride (mg/L)	0.1 U	---	0.1	---	0.1	---	0.1	---	0.1	---	0.16	---	0.13	---	0.1 U
Hardness (mg/L as $CaCO_3$)	364 J	---	380 J	---	386 J	---	360 J	---	392 J	---	280 J	---	356 J	---	5 UJ
Phenols (μg/L)	R	---	R	---	R	---	R	---	R	---	R	---	R	---	R
Sulfide (mg/LS)	1 U	---	1 U	---	1 U	---	1 U	---	1 U	---	1 U	---	1 U	---	1 U
Surfactants (μg/L AS)	25 U	---	25 U	---	25 U	---	25 U	---	25 U	---	25 U	---	25 U	---	25 U
Total Kjeldahl Nitrogen (mg/L N)	0.10 J	---	0.10 J	---	0.1 U	---	0.1 U	---	0.1 U	---	0.31 J	---	0.13 J	---	0.12

Note: The sample number code, collection and shipment information is provided in Table 3-6.

Results Qualifiers:

U - Indicates the material was analyzed, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J - Indicates the associated value is an estimated quantity.
B - Indicates that the reported value is less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
R - Indicates the data are unusable. (Note: The analyte may or may not be present).
-- - Not analyzed.

Table 4-4

Background Inorganic Water Quality Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Analyte	Field Sample Numbers SL2-				
	12S-01	12S-01FB	12D-01MSD	12I-01	12I-01DP
Inorganic Water Quality Parameters (mg/L)					
Alkalinity	640 J	< 2 J	310 J	720 J	280 J
Ammonia	< 0.1	0.1	< 0.1	0.1 J	0.3 J
Nitrate-Nitrite	< 0.1	< 0.1	12	< 0.1	< 0.1
Phosphorus	0.31	< 0.05	0.06	< 0.05	0.06
Sulfide	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Filterable Residue	620 J	< 20	420 J	260 J	290 J
Total Non-Filterable Residue	3 J	< 3	150 J	24 J	7.5 J
COD	29 J	< 5 J	26 J	250 J	210 J
Hardness	510 J	< 5	470 J	300 J	380 J
BOD	< 2 J	< 2 J	< 2 J	< 2 J	< 2 J
Fluoride	0.32	< 0.10	0.18	0.17	0.17
Bromide	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Color	5 units	0	5	0	0
TKN	0.3	< 0.1	< 0.1	< 0.1	< 0.1
Surfactants	< 25	< 25	< 25	< 25	< 25
Phenols	< 0.2 R	< 0.2 R	< 0.2 R	< 0.2 R	< 0.2 R
Sulfate	6 J	< 5 J	29	25	22
TOC (1)	< 2 J	< 2 J	< 2 J	99 J	98 J

Note: The metal results for background monitoring wells are presented in Table 4-4. The sample number code, collection and shipment information is provided in Table 3-7.

Results Qualifiers:

J - Indicates the associated value is an estimated quantity.
R - Indicates the data are unusable. (Note: The analyte may or may not be present).

Table 4-5

Geotechnical Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Parameter	Field Sample Number: SL1-								
	RB01-01	RB01-02	RB01-03	RB04-01	RB04-02	RB04-03	RB05-01	RB05-02	RB05-03
Total Organic Carbon, % Carbon	3.40	3.73	2.62 J	2.48	10.10	6.39	3.58	3.07	3.30
Porosity, Vv/v	0.75	0.69	0.76 J	0.76	0.44	0.83	0.69	0.74	0.75
Bulk Density, g/cm^3	1.60	1.32	1.60 J	1.72	1.38	1.48	1.36	1.56	1.53
% Moisture, % Wet	9.1	18.5	14.1	12.7	9.1	22.6	8.5	19.3	18.0

Table 4-6

Summary of Monitoring Well Construction Data and Groundwater Elevations
Stoughton Landfill
Stoughton, Wisconsin

Nested Well Numbers	Well Screen Length (feet)	Top of Screen (feet)	Elevations Base of Screen (feet)	Midpoint of Screen (feet)	Screened Interval Geology (USCS)	Groundwater Elevation Aug-94 (feet)	Groundwater Elevation* Sept/Oct-94 (feet)
MW-1S	10.00	850.07	840.07	845.07	SP	847.89	847.80
MW-1D	10.00	785.89	775.89	780.89	SP	848.50	849.23
MW-2S	10.00	846.30	836.30	841.30	FILL/CL/SP	845.48	845.44
MW-2D	10.00	827.13	817.13	822.13	SM/GC	848.37	848.28
MW-3S	10.00	849.51	839.51	844.51	GC/GM	848.51	855.00
MW-3D	10.00	796.04	786.04	791.04	SM/SP	848.39	848.47
MW-3B	10.00	774.63	764.63	769.63	LS	848.51	848.61
MW-4S	10.00	849.17	839.17	844.17	SP/GP	848.48	848.56
MW-4D	10.00	792.96	782.96	787.96	SP/GP	848.37	848.47
MW-5S	10.00	849.56	839.56	844.56	SP/GP	848.30	848.39
MW-5D	10.00	789.21	779.21	784.21	SP	848.33	853.56
MW-6S	10.00	848.47	838.47	843.47	SP/SC	846.56	848.39
MW-6D	10.00	802.19	792.19	797.19	SP	848.54	848.51
MW-7S	5.00	839.40	834.40	836.90	SW/GW/SP	844.01	845.17
MW-7I	10.00	799.63	789.63	794.63	SW/SP	848.34	848.47
MW-7B	10.00	774.88	764.88	769.88	LS	848.40	848.32
MW-9S	10.00	830.77	820.77	825.77	SP/GW	847.27	847.97
MW-9I	10.00	814.28	804.28	809.28	GW	848.33	848.52
MW-9B	10.00	778.01	768.01	773.01	LS	848.31	848.61

Table 4-6

Summary of Monitoring Well Construction Data and Groundwater Elevations
Stoughton Landfill
Stoughton, Wisconsin
(Continued)

Nested Well Numbers	Well Screen Length (feet)	Elevations Top of Screen (feet)	Elevations Base of Screen (feet)	Elevations Midpoint of Screen (feet)	Screened Interval Geology (USCS)	Groundwater Elevation Aug-94 (feet)	Groundwater Elevation* Sept/Oct-94 (feet)
MW-10S	10.00	839.98	829.98	834.98	SP/ML/CH	---	842.70
MW-10I	10.00	816.06	806.06	811.06	SP/CH	---	> 850.79
MW-10B	10.00	768.64	758.64	763.64	LS	---	> 851.08
MW-11S	10.00	843.48	833.48	838.48	ML/CH	---	846.88
MW-11I	10.00	808.39	798.39	803.39	SP	---	847.89
MW-11D	10.00	762.58	752.58	757.58	LS	---	848.18
MW-12S	10.00	842.15	832.15	837.15	SC/SM/CH	---	844.57
MW-12I	10.00	802.99	792.99	797.99	SM/SP/GW	---	848.70
MW-12D	10.00	786.10	776.10	781.10	SP/SC	---	848.64
MW-13S	10.00	839.90	829.90	834.90	ML/SP	---	842.70
MW-13I	10.00	805.52	795.52	800.52	CH/SP	---	> 846.72
MW-13B	10.00	759.22	749.22	754.22	LS	---	> 846.22

* (>) values represent artesian well conditions. Elevations of the top of the inner casing were used substituted for groundwater elevations for the artesian wells.

Table 4-7

Summary of Vertical Hydraulic Gradients
Stoughton Landfill
Stoughton, Wisconsin

Nested Well Numbers	Aug-94 Hydraulic Head Difference* (feet)	Aug-94 Screen Elevation Difference (feet)	Aug-94 Vertical Hydraulic Gradient**	Sept/Oct-94 Hydraulic Head Difference* (feet)	Sept/Oct-94 Screen Elevation Difference (feet)	Sept/Oct-94 Vertical Hydraulic Gradient**
Shallow & Intermediate/Deep Wells						
MW-1S/MW-1D	-0.61	64.18	-0.010	-1.43	64.18	-0.022
MW-2S/MW-2D	-2.89	19.17	-0.151	-2.84	19.17	-0.148
MW-3S/MW-3D	0.12	53.47	0.002	6.53	53.47	0.122
MW-4S/MW-4D	0.11	56.21	0.002	0.09	56.21	0.002
MW-5S/MW-5D	-0.03	60.35	0.000	-5.17	60.35	-0.086
MW-6S/MW-6D	-1.98	46.28	-0.043	-0.12	46.28	-0.003
MW-7S/MW-7I	-4.33	42.27	-0.102	-3.30	42.27	-0.078
MW-9S/MW-9I	-1.06	16.49	-0.064	-0.55	16.49	-0.033
MW-10S/MW-10I	---	23.92	---	> -8.09	23.92	> -0.338
MW-11S/MW-11I	---	35.09	---	-1.01	35.09	-0.029
MW-12S/MW-12I	---	39.16	---	-4.13	39.16	-0.105
MW-13S/MW-13I	---	34.38	---	> -4.02	34.38	> -0.117
		Average:	-0.046		Average:	> -0.070
Shallow & Bedrock Wells						
MW-3S/MW-3B	0.00	74.88	---	6.39	74.88	0.085
MW-7S/MW-7B	-4.39	67.02	-0.066	-3.15	67.02	-0.047
MW-9S/MW9B	-1.04	52.76	-0.020	-0.64	52.76	-0.012
MW-10S/MW-10B	---	71.34	---	> -8.38	71.34	> -0.117
MW-11S/MW-11D	---	80.90	---	-1.30	80.90	-0.016
MW-12S/MW-12B	---	56.05	---	-4.07	56.05	-0.073
MW-12I/MW-12B	---	16.89	---	0.06	16.89	0.004
MW-13S/MW-13B	---	80.68	---	> -3.52	80.68	> -0.044
		Average:	-0.043		Average:	> -0.027

Table 4-7

Summary of Vertical Hydraulic Gradients
Stoughton Landfill
Stoughton, Wisconsin
(Continued)

Nested Well Numbers	Aug-94 Hydraulic Head Difference* (feet)	Aug-94 Screen Elevation Difference (feet)	Aug-94 Vertical Hydraulic Gradient**	Sept/Oct-94 Hydraulic Head Difference* (feet)	Sept/Oct-94 Screen Elevation Difference (feet)	Sept/Oct-94 Vertical Hydraulic Gradient**
Intermediate/Deep & Bedrock Wells						
MW-3D/MW-3B	-0.12	21.41	-0.006	-0.14	21.41	-0.007
MW-7I/MW-7B	-0.06	24.75	-0.002	0.15	24.75	0.006
MW-9I/MW-9B	0.02	36.27	0.001	-0.09	36.27	-0.002
MW-10I/MW-10B	---	47.42	---	---	---	---
MW-11I/MW-11D	---	45.81	---	-0.29	45.81	-0.006
MW-13I/MW-13B	---	46.30	---	---	---	---
		Average:	-0.002		Average:	-0.002

* (>) values represent artesian well conditions. Elevations of the top of the inner casing were used substituted for groundwater elevations for the artesian wells.

** (+) values represent downward vertical hydraulic gradients, (-) values represent upward vertical hydraulic gradients.

Table 4-8

Summary of Groundwater Flow Velocities
Stoughton Landfill Site
Stoughton, Wisconsin

Horizontal Groundwater Flow Velocity			
Sand and Gravel Unit	Maximum Value	Minimum Value	Average Value
Hydraulic conductivity (cm/sec)	1.3×10^{-1}	8.4×10^{-3}	2.95×10^{-2}
Horizontal hydraulic gradient (ft/ft)	0.125	0.00008	0.01
Porosity (percent)	83	44	71
Groundwater flow velocity			
cm/sec	2.0×10^{-2}	1.5×10^{-5}	4.2×10^{-4}
ft/day	55.5	0.04	1.2
ft/year	20,258	14.6	438

Vertical Groundwater Flow Velocity			
Sand and Gravel Unit	Maximum Value	Minimum Value	Average Value
Hydraulic conductivity (cm/sec)	3.4×10^{-2}	4.9×10^{-7}	2.75×10^{-3}
Vertical hydraulic gradient (ft/ft)	0.338	0.002	0.03
Porosity (percent)	83	44	71
Groundwater flow velocity			
cm/sec	1.4×10^{-2}	2.2×10^{-9}	1.2×10^{-4}
ft/day	39.2	6.3×10^{-6}	0.3
ft/year	14,308	2.3×10^{-3}	120

Table 4-9

Reconnaissance Borings Groundwater Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Analyte	Field Sample Numbers SL1-											
	RW01-01	RW01-02	RW01-02DP	RW01-03	RW02-01	RW02-02MSD	RW02-03	RW03-01	RW03-02	RW03-03	RW04-01	RW04-02
Special VOCs (μg/L)												
Dichlorodifluoromethane	4 UJ	4 U	4 U	4 UJ	4 U	4 U	4 U	4 U	4 U	4 U	190	350
Tetrahydrofuran	4 U	4 U	4 U	4 UJ	4 U	4 U	4 U	4 U	4 U	160	20 U	100 U
Trichlorofluoromethane	4 UJ	4 U	4 U	4 UJ	4 U	4 U	4 U	4 U	4 U	20 U	20 U	100 U
RAS VOCs (μg/L)												
Vinyl Chloride	10 U	10 UJ	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 UJ	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	6 J	10 U
Trichloroethene	10 U	10 UJ	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	7 J	6 J
Tetrachloroethene	10 U	10 UJ	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	2 J	2 J
Toluene	10 U	10 UJ	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U
Chloroform	10 U	10 UJ	10 UJ	10 U	10 UJ	10 U	10 U	10 UJ	10 U	10 U	10 U	10 U

Table 4-9

Reconnaissance Borings Groundwater Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL1-									
	RW04-02DP	RW04-03	RW05-01	RW05-02MSD	RW05-03	RW06-01	RW06-01DP	RW06-02	RW06-03	RW07-02
Special VOCs ($\mu g/L$)										
Dichlorodifluoromethane	450	63 J	98	4 U	70	27	25	240	8	4 UJ
Tetrahydrofuran	100 U	29 J	26	6	170	13	14	120	4 U	10 UJ
Trichlorofluoromethane	100 U	4 UJ	4 U	4 U	20 U	4 U	4 U	20 U	20 U	4 U
RAS VOCs ($\mu g/L$)										
Vinyl Chloride	10 U	7 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	16	10 U	10 U	4 J	10 U	10 U	1 J	2 J	10 U
Trichloroethene	6 J	10 U	2 J	10 U	10 U	10 U	10 U	1 J	10 U	10 U
Tetrachloroethene	2 J	10 U	1 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	3 J	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10U	10 U

Table 4-9

Reconnaissance Borings Groundwater Sampling Results
Predesign Phase I Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL1-									
	RW-FB01	RW-FB02	RWFB-03	PWTB-02	PWTB-03	PWTB-04	PWTB-05	PWTB-06	PWTB-07	PWTB-08
Special VOCs (µg/L)										
Dichlorodifluoromethane	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 UJ	4 UJ
Tetrahydrofuran	4 U	10 U	4 U	4 U	4 U	4 U	4 U	4 U	4 UJ	10 UJ
Trichlorofluoromethane	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 UJ	4 U
RAS VOCs (µg/L)										
Vinyl Chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,2-Dichloroethene (total)	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Trichloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Tetrachloroethene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Toluene	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chloroform	4 J	4 J	4 J	10 U	10 U	10 U	4 J	4 J	4 J	4 J
Acetone	10 U	10 U	15	10 U	10 U	10 U	17	16	10 U	11

Note: Only analytes detected in reconnaisance boring groundwater samples are presented here. The sample number code, collection and shipment information is provided in Table 3-5.

Results Qualifiers:

U - Indicates that the compound was analyzed for, but not detected. The sample quantitation limit corrected for dilution and percent moisture is reported.
J - Indicates an estimated value. This flag is used either when estimating a concentration for a tentatively identified compound or when the data indicates the presence of a compound, but the result is less than the sample quantitation limit, but greater than zero. The flag is also used to indicate a reported result having an associated QC problem.
UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin

Analyte	Field Sample Numbers SL2-									
	MW1S-01		MW1D-01		MW2S-01		MW2S-01FB		MW2D-01MSD	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Special VOCs (μg/L)										
Dichlorodifluoromethane	4 UJ	–	4 UJ	–	4 UJ	–	4 UJ	–	4 UJ	–
Tetrahydrofuran	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Trichlorofluoromethane	4 U	–	4 U	–	4 U	–	4 U	–	4 U	–
RAS VOCs (μg/L)										
Vinyl Chloride	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Methylene Chloride	10 U	–	10 U	–	6 J	–	10 U	–	4 J	–
Acetone	10 U	–	10 U	–	10 U	–	10 BJU	–	10 U	–
1,2-Dichloroethene (Total)	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Trichloroethene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Benzene	10 U	–	10 U	–	4 J	–	10 U	–	10 U	–
Toluene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Ethylbenzene	10 U	–	10 U	–	290 D	–	10 U	–	10 U	–
Metals (μg/L)										
Aluminum	2050	43.8 B	34.8 B	33.1 B	47.7 B	24.9 U	24.9 U	24.9 U	24.9 U	25.5 B
Antimony	46.2 U	46.2 U	46.2 U	75.1	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW1S-01		MW1D-01		MW2S-01		MW2S-01FB		MW2D-01MSD	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (μg/L) (Cont.)										
Arsenic	22.5	15.5 J	2.1 BJ	2.0 U	2.0 U	7.8 BJ	2.0 U	2.0 U	6.5 BJ	6.0 BJ
Barium	259	245	74.1 B	73.3 B	288	273	0.78 BJ	0.79 BJ	97.9 B	96.7 B
Beryllium	0.80 BJ	0.80 BJ	0.37 BJ	0.51 BJ	0.80 BJ	0.73 BJ	0.35 BJ	0.20 U	0.79 BJ	0.79 BJ
Cadmium	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Calcium	143000	136000	82000	82900	164000	172000	366 B	221 BJ	86200	84700
Chromium	68.7	3.4 U	3.4 U	3.4 U	3.6 B	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U
Cobalt	5.6 B	6.1 B	3.2 U	3.2 U	4.7 BJ	4.4 BJ	3.2 U	3.2 U	3.2 U	5.6 BJ
Copper	31.5 J	18.2 BJ	11.5 BJ	8.5 BJ	20.2 BJ	11.6 BJ	6.0 BJ	3.3 BJ	12.4 BJ	12.7 BJ
Iron	8170	3030	696 J	352 J	18800	20400	87.8 B	420	1800 J	2200
Lead	2.0 BJ	1.0 BJ	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Magnesium	68400	64300	47800	48700	64500	67000	176 BJ	58.5 BJ	50800	51500
Manganese	1010	984	15.9	15.0	1960	2090	2.0 BJ	1.7 BJ	84.1	83.6
Mercury	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Nickel	51.0	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U
Potassium	6770	8500	1950 U	1950 U	13200	14900	1950 U	1950 U	2520 B	1950 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW1S-01		MW1D-01		MW2S-01		MW2S-01FB		MW2D-01MSD	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (μg/L) (Cont.)										
Selenium	5.0 J	2.0 U	2.3 BJ	2.0 U	2.0 U	2.6 BJ	2.0 U	2.0 U	2.0 U	2.1 BJ
Silver	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Sodium	8580	8710	207000	210000	21300	21900	167 BJ	185 BJ	10600	11300
Thallium	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Vanadium	25.8 BJ	19.9 BJ	12.2 BJ	13.8 BJ	22.1 BJ	21.0 BJ	3.1 U	3.1 U	14.4 BJ	11.6 BJ
Zinc	31.6	32.6 J	21.2 J	7.6 BJ	19.0 BJ	7.6 BJ	16.4 B	12.2 B	7.3 BJ	18.7 BJ
Cyanide	--	--	--	--	--	--	--	--	--	--

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW3S-01		MW3D-01		MW3B-01		MW4S-01		MW4D-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Special VOCs (μg/L)										
Dichlorodifluoromethane	4 U	--	4 U	--	4 U	--	4 U	--	4 U	--
Tetrahydrofuran	4 U	--	230 J	--	4 U	--	4 U	--	4 U	--
Trichlorofluoromethane	4 U	--	4 U	--	4 U	--	4 U	--	4 U	--
RAS VOCs (μg/L)										
Vinyl Chloride	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Methylene Chloride	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Acetone	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
1,2-Dichloroethene (Total)	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Trichloroethene	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Benzene	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Toluene	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Ethylbenzene	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Metals (μg/L)										
Aluminum	534	372	249	9.0 U	24.8 B	9.5 B	106 BJ	9.0 U	9.0 U	9.0 U
Antimony	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW3S-01		MW3D-01		MW3B-01		MW4S-01		MW4D-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (μg/L) (Cont.)										
Arsenic	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	9.6 B	9.8 B
Barium	101 B	94.7 B	99.6 B	88.5 B	35.8 B	33.9 B	57.6 B	54.9 B	74.8 B	65.8 B
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Calcium	104000 J	93000 J	110000 J	108000 J	95600 J	90600 J	66000	63300	148000	127000
Chromium	7.8 B	5.3 B	1.3 B	1.0 U	2.3 B	1.9 B	3.2 BJ	2.6 B	1.0 U	1.0 U
Cobalt	1.3 B	1.0 U	1.4 B	1.0 U	1.0 U	1.0 U	1.3 BJ	1.0 U	1.2 BJ	1.0 U
Copper	4.6 B	2.0 U	2.9 B	2.0 U	2.0 U	2.0 U	2.7 BJ	2.0 B	2.0 U	2.0 U
Iron	1040	140	7550	460	7.0 U	7.0 U	287 J	7.0 U	5860 J	3500
Lead	2.0 U	3.7	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Magnesium	54400 J	48300 J	76700 J	74600 J	51900 J	49200 J	31800	30600	92600	83600
Manganese	80.8 J	1.8 BJ	135 J	101 J	1.0 BJ	1.0 UJ	34.5 J	1.0 BJ	61.4	50.4
Mercury	0.21	0.20 U	0.20 U	0.24	0.22	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	3.0 B	1.9 B	5.1 B	2.1 B	1.0 U	1.0 U	1.6 BJ	1.0 U	2.5 BJ	1.0 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW3S-01		MW3D-01		MW3B-01		MW4S-01		MW4D-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (µg/L) (Cont.)										
Potassium	1190 BEJ	1060 BEJ	1690 BEJ	1600 BEJ	1020 BEJ	957 BEJ	694 BEJ	682 BEJ	2360 BEJ	2120 BEJ
Selenium	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Silver	1.0 U	1.1 B	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Sodium	16200 J	16300 J	12300 J	12400 J	7030 J	6640 J	4600 BEJ	5050 EJ	27500 EJ	25000 EJ
Thallium	6.0 U	6.0 B	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U
Vanadium	2.5 B	1.1 B	1.0 U	1.0 U	1.0 U	1.0 U	1.2 B	1.0 U	1.0 U	1.0 U
Zinc	37.9	11.5 B	14.8 B	10.5 B	58.5	33.2	17.8 BJ	34.0	17.0 BJ	10 BJ
Cyanide	–	–	–	–	–	–	–	–	–	–

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW5S-01		MW5D-01		MW6S-01		MW6D-01		MW6D-01DP	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Special VOCs (µg/L)										
Dichlorodifluoromethane	8	–	7	–	4 UJ	–	4 U	–	4 U	–
Tetrahydrofuran	4 U	–	4 U	–	10 U	–	4 U	–	4 U	–
Trichlorofluoromethane	4 U	–	4 U	–	4 U	–	4 U	–	4 U	–
RAS VOCs (µg/L)										
Vinyl Chloride	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Methylene Chloride	10 U	–	10 U	–	9 J	–	10 U	–	10 U	–
Acetone	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
1,2-Dichloroethene (Total)	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Trichloroethene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Benzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Toluene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Ethylbenzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Metals (µg/L)										
Aluminum	499	9.0 U	83.0 BJ	9.0 U	5450	31.7 B	9.0 U	9.0 U	32.6 BJ	9.0 U
Antimony	4.0 U	4.0 U	4.0 U	4.0 U	61.7	46.2 U	4.0 U	4.0 U	4.0 U	4.0 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW5S-01		MW5D-01		MW6S-01		MW6D-01		MW6D-01DP	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals ($\mu g/L$) (Cont.)										
Arsenic	6.0 U	6.0 U	6.0 U	6.0 U	3.8 BJ	2.0 U	6.0 U	6.0 U	6.0 U	6.0 U
Barium	77.8 B	71.2 B	46.6 B	45.4 B	87.2 B	47.4 B	32.7 B	30.2 B	31.0 B	30.8 B
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.1 BJ	0.51 BJ	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	1.0 U	1.0 U	1.0 U	1.0 U	3.7 U	3.7 U	1.0 U	1.0 U	1.0 U	1.0 U
Calcium	76900	70800	105000	100000	147000	94400	79500	72300	73600	76000
Chromium	3.8 BJ	2.1 B	2.3 BJ	1.0 U	18.5	3.4 U	2.2 BJ	1.7 B	2.3 BJ	1.6 B
Cobalt	2.1 BJ	1.1 BJ	1.0 U	1.0 U	9.3 BJ	3.2 U	1.0 U	1.0 U	1.0 BJ	1.0 U
Copper	6.9 BJ	2.3 B	2.9 BJ	14.2 B	76.6	13.7 BJ	2.0 U	2.0 U	2.0 U	2.0 U
Iron	1030 J	7.0 U	6110 J	95.6 BJ	9880	81.4 BJ	846	7.0 U	1150 J	7.0 U
Lead	2.0 U	2.0 U	2.0 U	2.0 U	3.8 J	0.80 U	2.0 U	2.0 U	2.0 U	2.0 U
Magnesium	38800	34800	62600	62900	75700	48600	49900	46500	48300	47700
Manganese	128	1.0 U	62.2	24.1	503	6.8 BJ	9.2 BJ	5.6 BJ	12.0 BJ	5.0 BJ
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	12.5 BJ	6.2 BJ	2.5 BJ	3.0 BJ	15.5 U	15.5 U	1.3 BJ	1.0 U	1.6 BJ	1.0 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW5S-01		MW5D-01		MW6S-01		MW6D-01		MW6D-01DP	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (µg/L) (Cont.)										
Potassium	791 BEJ	671 BEJ	2050 BEJ	2350 BEJ	3290 B	3020 B	1320 BEJ	1230 BEJ	1310 BEJ	1260 BEJ
Selenium	5.0 U	5.0 U	5.0 U	5.0 U	3.1 BJ	2.1 BJ	5.0 U	5.0 U	5.0 U	5.0 U
Silver	1.0 U	1.0 U	1.0 U	1.0 U	3.7 U	3.7 U	1.0 U	1.0 U	1.0 U	1.0 U
Sodium	13900 EJ	16600 EJ	13900 EJ	15200 EJ	5960	5730	4850 BEJ	4530 BEJ	4710 BEJ	4660 BEJ
Thallium	6.0 U	6.0 U	6.0 U	6.0 U	3.1 U	3.1 U	6.0 U	6.0 U	6.0 U	6.0 U
Vanadium	2.2 B	1.0 U	1.0 U	1.0 U	32.2 BJ	14.0 BJ	1.0 U	1.0 U	1.0 U	1.0 U
Zinc	16.0 BJ	4.7 BJ	15.7 BJ	10.9 BJ	45.8 J	7.3 BJ	5.6 BJ	6.0 BJ	4.0 BJ	4.8 BJ
Cyanide	--	--	--	--	--	--	--	--	--	--

Table 4-10

**Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)**

Analyte	Field Sample Numbers SL2-									
	MW6D-01FB		MW7S-01		MW7B-01		MW7I-01		MW8B-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Special VOCs (µg/L)										
Dichlorodifluoromethane	4 U	–	4 U	–	4 U	–	4 U	–	4 U	–
Tetrahydrofuran	4 U	–	4 U	–	4 U	–	4 U	–	4 U	–
Trichlorofluoromethane	4 U	–	4 U	–	4 U	–	4 U	–	4 U	–
RAS VOCs (µg/L)										
Vinyl Chloride	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Methylene Chloride	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Acetone	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
1,2-Dichloroethene (Total)	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Trichloroethene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Benzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Toluene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Ethylbenzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Metals (µg/L)										
Aluminum	10.4 BJ	9.0 U	896	24.6 B	18.7 B	9.0 U	9.0 U	16.4 B	12.5 B	9.0 U
Antimony	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW6D-01FB		MW7S-01		MW7B-01		MW7I-01		MW8B-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (µg/L) (Cont.)										
Arsenic	6.0 U	6.0 U	8.1 B	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U
Barium	1.0 U	1.0 U	93.3 B	74.6 B	38.2 B	38.9 B	26.1 B	24.2 B	38.2 B	34.9 B
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cadmium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Calcium	471 B	150 BJ	148000 J	104000 J	92200 J	93600 J	83700 J	77600 J	91000 J	80500 J
Chromium	37.0	1.0 U	6.3 B	1.0 U	5.9 B	1.8 B	1.0 U	1.0 U	8.7 B	3.5 B
Cobalt	2.9 B	1.1 B	4.1 B	2.6 B	1.1 B	1.0 U	1.0 U	1.0 U	1.1 B	1.0 U
Copper	15.0 B	2.0 U	18.3 B	3.0 B	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Iron	582	25.1 BJ	2480	7.0 U	75.4 B	7.0 U	7.0 U	7.0 U	35.5 B	7.0 U
Lead	2.0 U	2.0 U	2.4 B	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2..6 B	2.0 U
Magnesium	181 B	15.6 BJ	81200 J	56800 J	49800 J	50500 J	46100 J	42700 J	47400 J	43300 J
Manganese	9.4 B	2.2 B	1520 J	1260 J	6.1 BJ	1.7 BJ	19.1 J	16.7 J	3.3 BJ	1.2 BJ
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Nickel	96.3	5.8 B	15.7 B	9.5 B	6.3 B	6.6 B	1.0 U	1.0 U	5.8 B	1.0 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW6D-01FB		MW7S-01		MW7B-01		MW7I-01		MW8B-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (µg/L) (Cont.)										
Potassium	42.1 BEJ	32.3 BEJ	1480 BEJ	1150 BEJ	1050 BEJ	1070 BEJ	756 BEJ	697 BEJ	10400 EJ	12800 EJ
Selenium	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Silver	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Sodium	142 BEJ	134 BEJ	10600 J	8800 J	9120 J	9370 J	2830 BJ	2590 B	10700 J	10900 J
Thallium	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U
Vanadium	1.0 U	1.0 U	5.7 B	1.0 B	1.0 U	1.0 U	1.0 B	1.0 U	1.0 U	1.2 B
Zinc	13.2 B	6.3 BJ	40.7	32.5	30.1	53.7	20.5	23.1	2.4 B	2.6 B
Cyanide	--	--	--	--	--	--	--	--	--	--

Table 4-10

**Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)**

Analyte	Field Sample Numbers SL2-									
	MW9S-01		MW9I-01		MW9I-01DP		MW10S-01		MW10D-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Special VOCs (µg/L)										
Dichlorodifluoromethane	280	–	290	–	260	–	4 UJ	–	4 UJ	–
Tetrahydrofuran	54	–	55 EJ	–	40 U	–	10 U	–	10 U	–
Trichlorofluoromethane	4	–	4 UJ	–	40 U	–	4 U	–	4 U	–
RAS VOCs (µg/L)										
Vinyl Chloride	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Methylene Chloride	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Acetone	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
1,2-Dichloroethene (Total)	10 U	–	5 J	–	5 J	–	10 U	–	10 U	–
Trichloroethene	5 J	–	10 U	–	10 U	–	10 U	–	10 U	–
Benzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Toluene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Ethylbenzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Metals (µg/L)										
Aluminum	256	9.8 B	16.2 B	9.0 U	20.7 B	15.1 B	8100	29.8 B	188 B	24.9 U
Antimony	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	46.2 U	46.2 U	46.2 U	46.2 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW9S-01		MW9I-01		MW9I-01DP		MW10S-01		MW10D-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (µg/L) (Cont.)										
Arsenic	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	10.2 J	5.6 BJ	2.0 U	2.0 U
Barium	33.5 B	32.0 B	30.8 B	13.8 B	28.7 B	28.8 B	106 B	52.6 B	38.5 B	35.9 B
Beryllium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.2 BJ	0.65 BJ	0.80 BJ	0.80 BJ
Cadmium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.7 U	3.7 U	3.7 U	3.7 U
Calcium	66500 J	63000 J	79400 J	36000 J	74000 J	74700 J	132000	77300	89800	87400
Chromium	2.0 B	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	91.3	3.4 U	3.4 U	3.4 U
Cobalt	5.0 B	4.6 B	2.2 B	1.4 B	2.4 B	2.7 B	8.2 B	3.2 U	3.2 U	3.2 U
Copper	3.5 B	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	41.6 J	16.4 BJ	16.0 BJ	14.6 BJ
Iron	329	7.0 U	7.0 U	7.0 U	7.0 U	7.0 U	10800	46.6 BJ	293 J	259 J
Lead	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	5.7 J	0.80 U	0.80 U	0.80 U
Magnesium	43200 J	41400 J	50200 J	22500 J	46700 J	47300 J	78000	48100	47000	45900
Manganese	519 J	495 J	342 J	156 J	320 J	322 J	392	92.5	17.5	5.7 BJ
Mercury	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.21	0.10 U	0.10 U	0.10 U
Nickel	18.2 B	15.7 B	3.3 B	1.0 U	2.8 B	2.8 B	53.6	15.5 U	15.5 U	15.5 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW9S-01		MW9I-01		MW9I-01DP		MW10S-01		MW10D-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (μg/L)										
Potassium	1260 BEJ	1380 BEJ	1040 BEJ	398 BEJ	936 BEJ	942 BEJ	4040 B	1950 U	2180 B	1950 U
Selenium	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Silver	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	3.7 U	3.7 U	3.7 U	3.7 U
Sodium	19300 J	19200 J	10800 J	4510 BJ	10000 J	10100 J	11700	11700	10800	10900
Thallium	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	3.1 U	3.1 U	3.1 U	3.1 U
Vanadium	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	40.9 B	11.9 BJ	14.7 BJ	14.5 BJ
Zinc	15.8 B	28.5	4.7 B	2.4 B	2.7 B	5.8 B	43.6 J	16.1 BJ	18.4 BJ	15.3 BJ
Cyanide	--	--	--	--	--	--	--	--	--	--

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW10I-01		MW11S-01		MW11D-01		MW11I-01		MW12S-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Special VOCs (μg/L)										
Dichlorodifluoromethane	160 DJ	–	4 UJ	–	4 UJ	–	4 UJ	–	4 UJ	–
Tetrahydrofuran	39	–	10 U	–	10 U	–	10 U	–	10 U	–
Trichlorofluoromethane	4 U	–	4 U	–	4 U	–	4 U	–	4 U	–
RAS VOCs (μg/L)										
Vinyl Chloride	8 J	–	10 U	–	10 U	–	10 U	–	10 U	–
Methylene Chloride	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Acetone	10 U	–	10 U	–	10 U	–	10 U	–	28	–
1,2-Dichloroethene (Total)	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Trichloroethene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Benzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Toluene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Ethylbenzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	–
Metals (μg/L)										
Aluminum	5420	42.6 B	895	24.9 U	1420	24.9 U	178 B	27.1 B	70.2 B	74.5 B
Antimony	75.7	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW10I-01		MW11S-01		MW11D-01		MW11I-01		MW12S-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (µg/L) (Cont.)										
Arsenic	5.0 BJ	2.6 BJ	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	5.5 B	6.0 B
Barium	85.9 B	55.0 B	27.2 B	19.7 B	41.1 B	19.7 B	26.3 B	28.0 B	155 B	154 B
Beryllium	1.2 BJ	0.51 BJ	0.63 BJ	0.62 BJ	0.62 BJ	0.47 BJ	0.62 BJ	0.63 BJ	0.48 BJ	0.48 BJ
Cadmium	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Calcium	187000	107000	85100	76100	93100	69400	85500	86500	121000	119000
Chromium	42.2	3.4 U	18.4	3.4 U	9.7 B	3.4 U	4.9 B	3.4 U	3.4 U	3.4 U
Cobalt	10.1 B	6.7 B	3.2 U	3.2 U	3.4 B	3.2 U	3.2 B	3.2 U	10.3 BJ	13.2 BJ
Copper	37.0 J	12.8 BJ	15.5 BJ	11.1 BJ	20.3 BJ	11.4 BJ	13.3 BJ	14.7 BJ	13.6 BJ	11.8 BJ
Iron	9400	86.1 BJ	1480	63.1 BJ	2070	235	402	61.7 BJ	1690	1350
Lead	3.2 J	0.80 U	0.80 U	0.80 U	3.2	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Magnesium	101000	58400	46800	42300	53800	40900	45800	46200	60600	60000
Manganese	553	60.6	74.6	42.2	174	25.5	30.0	20.9	2820	2810
Mercury	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Nickel	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW10I-01		MW11S-01		MW11D-01		MW11I-01		MW12S-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (µg/L) (Cont.)										
Potassium	4590 B	3400 B	1950 U	1960 B	1950 U	1950 U	1950 U	1950 U	1950 U	1950 U
Selenium	2.0 U	2.0 U	2.8 BJ	2.0 U	2.6 BJ	3.1 BJ	2.9 BJ	2.9 BJ	5.1 J	3.2 BJ
Silver	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Sodium	14600	14600	4150 B	3920 B	11800	11500	4740 B	5000 B	79000	78300
Thallium	3.1 U	3.1 U	7.1 B	3.3 B	5.8 B	3.2 B	7.2 B	4.4 B	3.1 U	3.1 U
Vanadium	37.2 B	15.3 BJ	14.2 B	9.3 B	15.8 B	9.8 B	14.4 B	11.0 B	16.0 BJ	16.0 BJ
Zinc	34.6 J	9.1 BJ	18.5 B*J	12.3 B*J	26.1 *J	14.2 B*J	11.1 B*J	21.5 *J	18.7 B*J	32.9 *J
Cyanide	--	--	--	--	--	--	--	--	--	--

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW12S-01FB		MW12D-01MSD		MW12I-01		MW12I-01DP		MW13S-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Special VOCs (μg/L)										
Dichlorodifluoromethane	4 UJ	--	4 UJ	--	4 UJ	--	4 UJ	--	4 UJ	--
Tetrahydrofuran	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Trichlorofluoromethane	4 U	--	4 U	--	4 U	--	4 U	--	4 U	--
RAS VOCs (μg/L)										
Vinyl Chloride	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Methylene Chloride	3 J	--	10 U	--	10 U	--	10 U	--	10 U	--
Acetone	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
1,2-Dichloroethene (Total)	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Trichloroethene	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Benzene	41	--	10 U	--	10 U	--	10 U	--	10 U	--
Toluene	5 J	--	10 U	--	10 U	--	10 U	--	10 U	--
Ethylbenzene	10 U	--	10 U	--	10 U	--	10 U	--	10 U	--
Metals (μg/L)										
Aluminum	43.2 BJ	61.5 BJ	144 B	61.2 BJ	206	24.9 U	108 B	32.5 B	19500	24.9 U
Antimony	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U	46.2 U	64.2	46.2 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW12S-01FB		MW12D-01MSD		MW12I-01		MW12I-01DP		MW13S-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (µg/L) (Cont.)										
Arsenic	2.0 U	2.0 U	2.0 U	2.0 U	5.2 B	4.3 B	6.0 B	4.5 B	9.0 B	2.0 U
Barium	1.0 BJ	2.4 BJ	38.6 B	36.1 B	98.0 B	97.7 B	94.9 B	96.3 B	165 B	41.6 B
Beryllium	0.20 U	0.20 U	0.49 BJ	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	2.5 B	0.62 BJ
Cadmium	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Calcium	624 B	287 BJ	87600	81000	60800	60800	59900	59900	367000	60900
Chromium	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	153	3.4 U
Cobalt	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	22.1 B	3.2 U
Copper	5.5 BJ	6.7 BJ	13.3 BJ	11.7 BJ	9.6 BJ	8.1 BJ	12.9 BJ	10.8 BJ	95.1	15.9 B
Iron	78.1 B*J	177 *J	278	202 *J	576	249	502	321	33700	333
Lead	0.80 U	1.2 BJ	1.4 BJ	1.4 BJ	0.80 U	1.0 BJ	0.95 BJ	1.7 BJ	16.3	0.80 U
Magnesium	316 BJ	181 BJ	46500	43600	41700	41300	40800	40700	203000	37200
Manganese	2.6 BJ	3.6 BJ	72.4	55.3	86.1	78.5	87.7	75.6	1210	22.9
Mercury	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Nickel	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	95.7	15.5 U

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-									
	MW12S-01FB		MW12D-01MSD		MW12I-01		MW12I-01DP		MW13S-01	
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered
Metals (μg/L) (Cont.)										
Potassium	1950 U	1950 U	1950 U	1950 U	1950 U	1950 U	1950 U	1950 U	6490	1950 U
Selenium	2.3 BJ	2.0 U	4.4 BJ	2.0 U	3.1 BJ	2.0 U	2.9 BJ	3.5 BJ	3.6 BJ	2.7 BJ
Silver	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U
Sodium	383 BJ	298 BJ	5590	5280	4960 B	4770 B	5140	4730 B	7150	5510
Thallium	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Vanadium	3.1 U	3.1 U	13.2 BJ	12.5 BJ	9.3 BJ	10.4 BJ	10.7 BJ	10.8 BJ	93.2	10.7 B
Zinc	51.9 J	19.0 BJ	44.0 *J	31.0 J	53.1 *J	14.2 B*J	22.0 *J	34.7 *J	91.8 *J	15.6 B*J
Cyanide	–	–	–	–		–	–	–	–	–

Table 4-10

**Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)**

Analyte	Field Sample Numbers SL2-											
	MW13D-01		MW13D-01DP		MW13I-01		EW01-01		PTWB-01	PWTB-02	PWTB-03	PWTB-04
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered				
Special VOCs (µg/L)												
Dichlorodifluoromethane	4 UJ	–	4 UJ	–	4 UJ	–	980 DJ	–	4 U	4 U	4 UJ	4 UJ
Tetrahydrofuran	10 U	–	10 U	–	10 U	–	380 EJ	–	4 U	4 U	10 U	10 U
Trichlorofluoromethane	4 U	–	4 U	–	4 U	–	8 J	–	4 U	4 U	4 U	4 U
RAS VOCs (µg/L)												
Vinyl Chloride	10 U	–	10 U	–	10 U	–	10 U	–	10 U	10 U	10 U	10 U
Methylene Chloride	10 U	–	10 U	–	10 U	–	10 U	–	10 U	10 U	10 U	10 U
Acetone	10 U	–	10 U	–	10 U	–	10 BJU	–	10 U	10 U	10 BJU	10 U
1,2-Dichloroethene (Total)	10 U	–	10 U	–	10 U	–	18	–	10 U	10 U	10 U	10 U
Trichloroethene	10 U	–	10 U	–	10 U	–	3 J	–	10 U	10 U	10 U	10 U
Benzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	10 U	10 U	10 U
Toluene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	10 U	10 U	10 U
Ethylbenzene	10 U	–	10 U	–	10 U	–	10 U	–	10 U	10 U	10 U	10 U
Metals (µg/L)												
Aluminum	3930	24.9 U	3200	40.9 B	24.9 U	24.9 U	175 B	24.9 U	–	–	–	–
Antimony	57.4 B	46.2 U	46.2 U	46.2 U	54.8 B	46.2 U	59.2 B	46.2 U	–	–	–	–

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-											
	MW13D-01		MW13D-01DP		MW13I-01		EW01-01		PTWB-01	PWTB-02	PWTB-03	PWTB-04
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered				
Metals (µg/L) (Cont.)												
Arsenic	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.4 BJ	2.0 U	--	--	--	--
Barium	59.8 B	24.3 B	57.4 B	24.2 B	44.2 B	43.2 B	32.5 B	30.1 B	--	--	--	--
Beryllium	1.1 BJ	0.32 BJ	1.1 BJ	0.32 BJ	0.47 BJ	0.47 BJ	0.79 BJ	0.51 BJ	--	--	--	--
Cadmium	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	--	--	--	--
Calcium	124000	66300	123000	65000	62100	60100	90400	84600	--	--	--	--
Chromium	15.0	3.4 U	12.3	3.4 U	3.4 U	3.4 U	3.4 U	3.4 U	--	--	--	--
Cobalt	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	3.2 U	--	--	--	--
Copper	29.1	11.6 BJ	26.8	9.0 BJ	13.4 BJ	11.4 BJ	16.7 BJ	10.9 BJ	--	--	--	--
Iron	6260	385 *J	5880	116 J	168	123 J	334 J	211 J	--	--	--	--
Lead	6.6	0.80 U	6.4	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	--	--	--	--
Magnesium	65500	35500	65000	35200	43100	41400	51100	48800	--	--	--	--
Manganese	453	36.0	440	35.3	28.4	27.5	121	105	--	--	--	--
Mercury	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	--	--	--	--
Nickel	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	15.5 U	--	--	--	--
Potassium	1950 U	1950 U	1950 U	1950 U	1980 B	1950 U	3920 B	2190 B	--	--	--	--

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Analyte	Field Sample Numbers SL2-											
	MW13D-01		MW13D-01DP		MW13I-01		EW01-01		PTWB-01	PWTB-02	PWTB-03	PWTB-04
	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered				
Metals (µg/L) (Cont.)												
Selenium	2.2 BJ	5.0 BJ	3.9 BJ	4.9 BJ	2.7 BJ	4.1 BJ	2.0 U	2.0 U	–	–	–	–
Silver	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	3.7 U	–	–	–	–
Sodium	9860	9230	9790	8840	4280 B	4140 B	14200	14700	–	–	–	–
Thallium	3.1 U	3.4 BJ	3.1 U	3.1 U	3.1 U	4.6 BJ	3.1 U	3.1 U	–	–	–	–
Vanadium	21.9 B	10.3 B	20.9 B	10.5 BJ	9.6 B	11.2 B	16.8 BJ	14.4 BJ	–	–	–	–
Zinc	42.2 *J	30.7 J	39.3 *J	17.2 B*J	18.0 B*J	36.4 *J	15.3 BJ	9.1 BJ	–	–	–	–
Cyanide	–	–	–	–	–	–	–	–	–	–	–	–

Table 4-10

Monitoring Well Sampling Results
Predesign Phase II Investigation
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Organic Data Qualifiers:

U - Indicates that the compound was analyzed for, but not detected. The sample quantitation limit corrected for dilution and percent moisture is reported.
J - Indicates an estimated value. This flag is used either when estimating a concentration for a tentatively identified compound or when the data indicates the presence of a compound,, but the result is less than the sample quantitation limit, but greater than zero. This flag is also used to indicate a reported result having an associated QC problem.
B - Indicates the analyte is detected in the associated blank as well as the sample.
E - Indicates compounds whose concentrations exceed the calibration range of the instrument.
D - Indicates an identified compound in an analysis has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.
– - Not analyzed.

Inorganic Data Qualifiers:

U - Indicates the material was analyzed, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J - Indicates the associated value is an estimated quantity.
B - Indicates that the reported value is less than the Contract Required Detection Limit (CRDL), but greater than or equal to the Instrument Detection Limit (IDL).
* - Indicates the duplicate analysis is not within control limits.
– - Not analyzed.

Table 4-11

Chemical and Physical Properties of THF
Stoughton City Landfill
Stoughton, Wisconsin

CAS Registry Number	109-99-9
Empirical Formula	C_4H_8O
Molecular Weight	72.12
Appearance and Odor	Colorless liquid with an ehter-like odor
Boiling Point	67°C
Melting Point	-108.5°C
Specific Density	0.8892 at 4°C
Water Solubility	Miscilbe
Solubility in Organics	Soluble in alcohols, ketones, esters, ethers, and hydrocarbons
Vapor Pressure	145 mm Hg at 20°C
Henry's Law Constant	7.06×10^{-5} atm-m^3/mol at 25°C;
Ionization Potential	9.54 eV
Log Kow (Kow is n-octanol/water partition coefficient	0.46

Table 4-12

Chemical and Physical Properties of DCDFM
Stoughton City Landfill
Stoughton, Wisconsin

Common Name	Freon 12
CAS Registry Number	75-71-8
Empirical Formula	CL_2F_2
Molecular Weight	120.9
Appearance and Odor	Colorless liquid or gas with an ethereal odor
Boiling Point	-29.8°C
Melting Point	-158°C
Specific Density	1.75 at 4°C
Water Solubility	280 mg/L at 25°C
Solubility in Organics	Soluble in acetic acid, acetone, cloroform, ether, and ethanol
Vapor Pressure	4,250 mm Hg at 25°C
Henry's Law Constant	0.425 atm-m^3/mol at 25°C;
Ionization Potential	11.97 eV
Log Koc (Koc is adsorption coefficient)	2.56
Log Kow (Kow is n-octanol/water partition coefficient	2.16

Table 4-13

POTW Sampling Results
Stoughton City Landfill
Stoughton, Wisconsin

Analyte	Field Sample Number							
	INF-1	EFL-1	EW-1 (Step Test)	EW-1 (Pump Test)	INF-2	EFL-2	TB-1	Trip Blank
Special VOCs (μg/L)								
Dichlorodifluoromethane	4 U	4 U	280 D	200	4 U	4 U	4 U	4 U
Tetrahydrofuran	10 UJ	10 UJ	170 D	220 J	39 J	15 J	10 UJ	10 UJ
Trichlorofluoromethane	4 UJ	4 UJ	10	40 U	4 U	4 U	4 UJ	4 U
Metals (μg/L)								
Lead	7.2	3.0 U	3.3	3.0 U	3.2	3.0 U	NA	NA
Nickel	40 U	40 U	40 U	40 U	40 U	40 U	NA	NA
Zinc	88	29	27	20 U	77	34	NA	NA
Mercury	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA

Note: The sample number code, collection and shipment information is provided in Table 3-12.

Results Qualifiers:

U - Indicates that the compound was analyzed for, but not detected. The sample quantitation limit corrected for dilution and percent moisture is reported.

D - Indicates an identified compound in an analysis has been diluted. This flag alerts the data user to any differences between the concentrations reported in the two analyses.

J - Indicates an estimated value. This flag is used either when estimating a concentration for a tentatively identified compound or when the data indicates the presence of a compound, but the result is less than the sample quantitation limit, but greater than zero. The flag is also used to indicate a reported result having an associated QC problem.

UJ - The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

SECTION 5
CONCLUSIONS

The following conclusions are based on the predesign investigation for groundwater component at the Stoughton City Landfill site:

- The landfill has not significantly impacted the sediments and surface water quality of the wetlands east of the site. However, arsenic was detected at concentrations higher than the background in sediments at the southeastern boundary of the landfill. Arsenic, iron and nickel were also detected at concentrations higher than the background in sediments in the drainage ditch along the southern boundary of the landfill.

- The inorganic groundwater quality west of the site is in the same range as background inorganic groundwater quality east of the site. Iron, lead and manganese in groundwater are mostly associated with suspended solids.

- Three distinct stratigraphic units exist at the site: landfill materials, glacial deposits, and carbonate bedrock. The thickness of landfill waste and fill material varies from 10 to 15 feet bgs. The glacial deposits are relatively permeable coarse-grained soils composed primarily of outwash sand and gravel, and silty and sandy loam deposits. The thickness of these units range from a few feet to over 70 feet bgs. Bedrock was encountered in deep borings between 70 and 80 feet bgs.

- Shallow groundwater below the landfill flows radially. Regional groundwater generally flows toward the northwest across the study area and has an upward vertical flow gradient component towards the Yahara River. The average horizontal and vertical groundwater velocities are estimated to be 1.2 ft/day and 0.3 ft/day, respectively.

- Based on the aquifer pumping test evaluation (Volume II), the average transmissivity values of the sand and gravel aquifer range from 4,179 to 4,197 square feet per day. Thus, the sand and gravel aquifer is a moderately transmissive aquifer capable of producing significant amounts of water. A recharge boundary is present approximately 100 feet east from the Yahara River.

- The chemicals of concern in groundwater are tetrahydrofuran (THF) and dichlorodifluoromethane (DCDFM). It appears that there are two plumes originating from the landfill and moving in the northwest direction towards the Yahara River. The results of the capture zone analysis (Volume II) indicate that three extraction wells pumping at a combined extraction rate of 285 gpm would capture the THF and DCDFM plumes.

- Based on grab sampling conducted at the POTW during the aquifer pumping test, it appears that there is not a significant degradation of THF during the POTW treatment processes.

APPENDIX A

BORING LOGS

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 4	R-1

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
5/25/94	5/26/94	Burlington	4.25 HSA	8"	NA	74.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
W. Niemann	NA		9.00'/' 5/25/94

Located approximately 160' southeast of MW3 nest.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	SS	14	14 25 25 25		4			SW	4–6	**SAND AND GRAVEL**: fine to medium sand; poorly sorted; coarse gravel; trace silt; dense to very dense; dry to slighty moist; light brown.	Hnu=0, CGI=0
2	SS	24	6 8 10 15		9		∇	SP	9–11	**SAND**: fine to medium grained; little gravel and silt; dense; wet; brown. Collected SL1-RW01-01 for TOC, grain size, porosity, etc. analysis.	Hnu=0, CGI=0
3	SS	20	6 8 18 24		14			SP	14–16	**SAND**: fine to medium grained; moderately well sorted; some gravel in thin lenses; dense; wet; brown. Collected SL1-RW01-01(H2O) from 14' pH=7.8 Cond.=1071 s DO=84%, 7.5 mg/L Temp=19 C TDS= 544 mg/L	Hnu=0, CGI=0
4	SS	6	4 6 18 19		19			SP	19–21	**SAND**: fine to medium; well sorted; little to no gravel or silt; wet; brown.	Hnu=0, CGI=0

*ASTM D1586 ST = SHELBY TUBE
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					22						
					23						
5	SS	0	3 14 21 24		24					No recovery.	
					25						
					26						
					27						
					28						
6	SS	24	4 15 16 15		29			SP		**SAND**: fine to medium; moderately well sorted; little to no gravel or silt; wet; brown.	
					30						Hnu=0, CGI=0
					31						
					32						
					33						
7	SS	24	WOR 4 3 5		34			SM		**SILTY SAND**: very fine to medium grained; poorly sorted; loose; wet ; brown.	
					35						
					36						
					37						
					38						
8	SS	12			39			SP		**SAND**: very fine to medium grained; little silt; wet; brown.	
					40						Hnu=0, CGI=0
					41						
					42						
					43						
					44						

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SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
9	SS		23 34/2"		45			SP		**SAND**: very fine to medium grained; some fine gravel; wet; brown.	Hnu=0, CGI=0
					46						
					47						
					48						
10	SS		4 10 21 24		49			SP		**SAND**: very fine to fine; very well sorted; trace to little silt; dense; wet; brown. Collected SL1-RW01-02 for TOC, grain size, porosity, etc. analysis. ↑ RBφ1-φ2	0
					50						
					51						
					52						
					53						
					54						
					55						
					56						
					57					Collected SL1-RW01-02(H2O) from 57'. pH=7.9 Cond=1073 S DO= 33%, 3.9 mg/L Temp=9 C TDS=936 mg/L	
					58						
11	SS		7 8 8 3		59			SP		**SAND**: very fine to medium; some fine gravel; trace silt; wet; medium dense; brown.	Hnu=0, CGI=0
					60						
					61						
					62						
					63						
					64						
					65						
					66						
					67						

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D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
OT = OTHER

GEOLOGIC DRILL LOG

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					68						
					69						
					70						
					71						
					72					collected sample	
					73						
12	SS	0			74					No recovery. Attempted H2O sam. End of boring at 74.0'	

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS OT = OTHER

GEOLOGIC DRILL LOG

WESTON

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 3	R-2

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
5/27/94	6/7/94	Burlington	4.25 HSA	8"	NA	65.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
W. Niemann	NA		5.00'/' 5/27/94

Approximately 180' east of MW3 nest.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	CT				0			SM		**SILTY SAND**: very fine to medium grained; loose; brown; slightly moist; becoming less silty near bottom of interval.	
					3						Hnu=0, CGI=0
					5		▽				
2	SS	24	3 6 6 6		7			SC		**CLAYEY SAND**: some silt; loose; wet; brown.	Hnu=0, CGI=0
3	SS	24	3 4 5 2		9			SC		As above.	Hnu=0, CGI=0
4	SS	6	2 3 6 7		11			SC SP		As above. **SAND**: very fine; very well sorted; medium dense; wet; brown.	Hnu=0, CGI=0
	OT				15					Collected SL1-RW02-01(H2O). Not enough volume to measure field parameters.	
					20					As above.	

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS OT = OTHER

![WESTON]

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	2 of 3	R-2

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					22						
					23						
					24						
					25						
					26						
					27						
					28						
					29						
					30					As above.	
					31						
					32						
					33						
					34						
					35						
					36						
					37						
					38						
					39						
	OT				40					As above. Collected SL1-RW02-02 from 40 to 45' using lead screen auger techniques.	
					41						
					42						
					43						
					44						

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					45						
					46						
					47						
					48						
					49						
					50					As above.	
					51						
					52						
					53						
					54						
					55						
					56						
					57						
					58						
					59						
	OT				60					<u>SAND</u>: fine grained with some gravel; trace silt; saturated. Collected SL1-RW02-03 from 60 to 65' using lead screen auger techniques.	
					61						
					62						
					63						
					64						
					65					End of boring at 65.0'	

*ASTM D1586
SS = SPLIT SPOON   ST = SHELBY TUBE
C = CORE   CS = CONTINUOUS SAMPLER
D = DENNISON   CT = CUTTINGS   OT = OTHER

WESTON

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 3	R-3

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
5/27/94	6/8/94	Burlington	4.25 HSA	8"	NA	65.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
W. Niemann	NA		5.00'/' 5/27/94

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	CT							SW		**SAND AND GRAVEL**: very fine to coarse; very poorly sorted; gravel up to 2-3" in diameter; wet; brown.	
					1						
					2						
					3						Hnu=0, CGI=0
					4						
					5		∇				
2	CT							SW			
					6						
					7						
					8						Hnu=0, CGI=0
					9						
					10						
3	CT							SW			Hnu=0, CGI=0
					11						
					12						
					13						
					14						
					15					Getting into cobbles mixed with sand and gravel.	
					16						
4	OT									Collected SL1-RW03-01(H2O). pH=7.8 Cond=908 S DO=62%, 6.5 mg/L Temp=15.1 C TDS=4.55 mg/L	Hnu=0, CGI=0.
					17						
					18						
					19						
					20						

*ASTM D1586 ST = SHELBY TUBE
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS OT = OTHER

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

 HOLE NO. R-3

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					22						
					23						
					24						
					25					As above; out of cobbles.	
					26						
					27						
					28						
					29						
					30					As above.	
					31						
					32						
					33						
					34						
					35						
					36						
					37						
					38						
					39						
	OT				40					As above. Collected lead screen auger sample from 40-45'.	Hnu=0, CGI=0
					41						
					42						
					43						
					44						

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE CS = CONTINUOUS SAMPLER
D = DENNISON C = CORE CT = CUTTINGS OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					45						
					46						
					47						
					48						
					49						
					50						
					51						
					52						
					53						
					54						
					55						
					56						
					57						
					58						
					59						
	OT				60					As above. Collected lead screen auger sample from 60-65'	
					61						
					62						
					63						
					64						
					65					End of boring at 65.0'	

*ASTM D1586 ST = SHELBY TUBE
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS OT = OTHER

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 4	R-4

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
5/31/94	6/2/94	Burlington	4.25 HSA	8"	NA	73.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
D. Hayes	NA		7.00'/' 6/2/94

Approximately 160' south of MW9

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	CT				0			SC		CLAYEY SAND: brown; soft to loose; slightly moist; very fine grained; increasing sand content at bottom.	
2	CT				5			SM		SILTY SAND: brown; loose; wet; very fine grained; with occasional cobbles.	Hnu=0, CGI=0
					7		▽				
3	CT				10			SM		As above.	Hnu=0, CGI=0
4	CT				15			SM		As above.	Hnu=0, CGI=0
					20						Hnu=0, CGI=0

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS OT = OTHER

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
5	SS	8	7 10					SM		**SILTY SAND**: no gravel; loose; wet; very fine grained; brown. Collected SL1-RW04-01.	
6	OT				22					Collected SL1-RW04-01(H2O) at 22'. pH=8.29 TDS=127 mg/L Cond=373 S Temp=17.1 C	
					23						
					24						
					25						
					26			GW		**GRAVEL**: <1" angular to subrounded; poorly sorted; wet; brown.	
					27						
					28						
					29						
7	SS	8	2 2 4 12		30			GW		As above.	Hnu=0, CGI=0
					31						
					32						
					33						
					34						
					35						
					36						
					37						
					38						
					39						
8	SS	12	5 7 7 10		40			GW		As above.	Hnu=0, CGI=0
					41						
					42						
					43						
					44						

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SS = SPLIT SPOON
D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
OT = OTHER

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					45						Hnu=0, CGI=0
					46						
					47						
					48						
					49						
9	SS	12	9 10 20 23		50			GW		As above. Bottom 2" medium grained sand with no gravel; wet. Collected SL1-RW04-02.	Hnu=0, CGI=0
					51						
					52						
					53						
					54						
					55						
					56						
					57						
					58						
10	SS	14	1 1 1 13		59			GW		**GRAVEL**: angular to subangular; moderately sorted; brown; avg. diameter is 1/2"; occasional 1.5" cobble.	
					60						Hnu=0, CGI=0
					61						
					62						
					63						
					64						
					65						
					66						
					67						

*ASTM D1586 | ST = SHELBY TUBE | SS = SPLIT SPOON | C = CORE | CS = CONTINUOUS SAMPLER | D = DENNISON | CT = CUTTINGS | OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					68						
					69						
					70						Hnu=0, CGI=0
11	SS	14	1 1 1 50		71			GW		As above. Blow descriptions indicates sample may be mostly fill. 50 blow counts indicates bedrock. Collected SL1-RW04-03.	
					72						
					73					End of boring at 73.0'	

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS OT = OTHER

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 4	R-5

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
6/3/94	6/3/94	Burlington	4.25 HSA	8"	NA	70.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
D. Hayes	NA		6.00'/' 6/3/94

Approximately 170' west of MW9

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	CT				0			SM		**SANDY LOAM**: moist; black; very fine grained sand; loose.	
					2					**SILTY SAND**: poorly sorted; moist; brown; loose to soft; with gravel 1/8-1/4" in diameter.	
2	CT				5			SM		As above.	Hnu=0, CGI=0
					6		▽				
3	SS	17	6 11 13 14		10			CL		**SILTY CLAY**: moist; brown; firm.	Hnu=0, CGI=0
4	CT				15			CL		As above; wet.	Hnu=0, CGI=0
5	SS		4 8	▷	20			CL		As above.	Hnu=0, CGI=0

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SS = SPLIT SPOON
D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
			11 13		22						
6	CT				25			CL		As above.	
7	SS	17	4 5 16 23		30			CL		As above.	Hnu=0, CGI=0
8	SS	22	5 20 20 26		35			SM		**SILTY SAND**:wet; brown; firm; very fine grained. Collected SL1-RW05-01.	
9	SS	22	6 15 16 35		40			SM		As above with occassional subrounded cobbles.	Hnu=0, CGI=0
					44						

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					45						Hnu=0, CGI=0
10	SS	17	8 3 10 13		50			SM	50–52	**SILTY SAND**: wet; firm; very fine to medium grained sand; occasional gravel 1/8" to 1/4" in diameter; tan. Collected SL1-RW05-02. Switched to mud rotary due to heaving sands.	Hnu=0, CGI=0
11	SS	17	6 8 50 50		60			SM	60–62	**SAND**:wet; medium grained to fine grained; loose; sharp contact.	Hnu=0, CGI=0
					61			GW		**GRAVEL**: poorly sorted; subrounded; subangular; 1 1/8" in diameter. Collected SL1-RW05-03 from 60 to 62'.	

Depth scale: 45–67

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					68						
12	SS	3	6 50		69			GW		As above for .5' then bedrock.	
					70					End of boring at 70.0'	Hnu=0, CGI=0

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 3	R-6

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
6/6/94	6/6/94	Burlington	4.25 HSA	8"	NA	64.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
D. Hayes	NA		6.00'/' 6/6/94

Approximately 140' north on north fork of new road.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	CT				0			SM		SANDY LOAM: moist; black; very fine grained sand; loose.	
					2					SILTY SAND: poorly sorted; moist; brown; loose; soft; with scattered; gravel (1/8-1/4" dia.)	
2	CT				5		▽ (6)	SM	5–9	As above. Collected SL1-RW06-01 and SL1-RW06-01(DP).	
3	CT				10			SM	10–13	As above.	
					13					SILTY CLAY: moist; brown; firm.	
4	CT				15			CL	15	As above.	
5	CT				20			CL	20	As above.	

*ASTM D1586 ST = SHELBY TUBE
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					22						
					23						
					24						
6	CT				25			CL		As above.	
					26						
					27						
					28						
					29						
7	CT				30			SM		<u>SILTY SAND</u>: wet; brown; loose; very fine grained.	
					31						
					32						
					33						
					34						
8	CT				35			SM		As above. Collected SL1-RW06-02.	
					36						
					37						
					38						
					39						
9	CT				40			SM		As above.	
					41						
					42						
					43						
					44						

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D = DENNISON CT = CUTTINGS OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
10	CT				45			SM		As above.	
					46						
					47						
					48						
					49						
11	CT				50			SM		As above.	
					51						
					52						
					53						
					54						
12	CT				55			SM		As above.	
					56						
					57						
					58						
					59						
13	CT				60			SM		As above. Collected SL1-RW06-03.	
					61						
					62						
					63						
					64					End of boring at 64.0'	

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 3	R-7

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
6/9/94	6/9/94	Burlington	4.25 HSA	8"	NA	60.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
J. Ososkie	NA		/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					0					TOPSOIL	
					1						
					2					SILTY CLAY	
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					10					As above.	
					11						
					12						
					13						
					14						
					15					As above.	
					16						
					17						
					18						
					19						
					20					As above.	

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D = DENNISON CT = CUTTINGS OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					22						
					23						
					24						
					25					As above.	
					26						
					27						
					28						
					29						
					30						
					31						
					32						
					33						
					34						
					35					Collected a sample RW07-02 at 35 feet D.O= 0%, 0.0 mg/L Cond= 924 us TDS= 483 mg/L T= 11.8 C pH= 8.07	
					36						
					37						
					38						
					39						
					40					As above.	
					41						
					42						
					43						
					44						

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D = DENNISON   C = CORE   CS = CONTINUOUS SAMPLER
CT = CUTTINGS   OT = OTHER

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

PAGE NO. 3 of 3 | HOLE NO. R-7

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					45					As above.	
					46						
					47						
					48						
					49						
					50					As above.	
					51						
					52						
					53						
					54						
					55					As above.	
					56						
					57						
					58						
					59					Encountered boulders at 60 feet; auger refusal.	
					60					End of boring at 60.0'	

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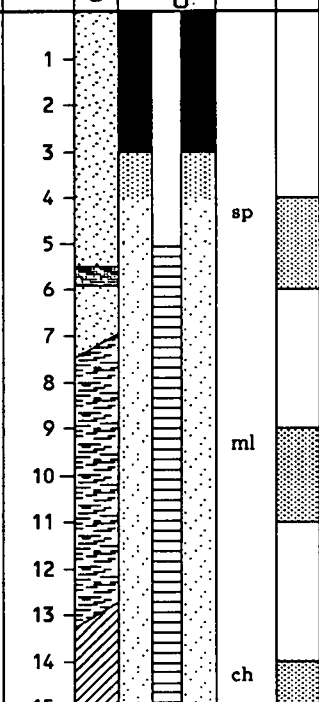
GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 1	MW-10S

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/3/94	10/3/94	Burlington	4.25" I.D. HSA	8"	2" S.S.	15.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					0–15		Please see geological log of MW-10D for stratigraphy.	
1	SS	22	1 8 6 13		4	sp		
2	SS	24	3 4 4 5		9	ml		
3	SS	12	3 6		14	ch		
					15		End of Boring at 15'.	



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SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 2	MW-10I

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
9/27/94	9/28/94	Burlington	4.25" I.D. HSA	8"	2" S.S.	38.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1		Please see geological log of MW-10D for stratigraphy.	
					2			
					3			
					4			
1	SS	22	1 8 6 13		5	sp		
					6			
					7			
					8			
2	SS	24	3 4 4 5		9	ml		
					10			
					11			
					12			
					13			
3	SS	24	3 6 7 9		14	ch		
					15			
					16			
					17			
					18			
4	SS	24	3 6 8 12		19	ch		
					20			
					21			
					22			
					23			
5	SS	20	2 5 7 7		24	ch		
					25			
					26			
					27			

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D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS BA = BUCKET AUG.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	16	16 3 2 2		29–31			sp			
7	SS	6	62/6"		34–36			sp			
					38					End of Boring at 38'.	

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 3	MW-10D

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
9/25/94	9/27/94	Burlington	6.25" I.D. HSA	10"	2" S.S.	88.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	22	1 8 6 13		4–6	sp	**SAND**: fine to medium; some coarse sand; moderately well sorted; dense; saturated; brown	SP = 0
							SANDY SILT: very fine sand; no plasticity; stiff saturated; brown	
							SAND: fine to medium; some coarse sand; moderately well sorted; dense; saturated; brown	
2	SS	24	3 4 4 5		9–11	ml	**SILT**: little very fine sand; stiff; moderately low plasticity; trace clay; saturated; gray-brown; Cu = 1.25 tsf	SP = 0
3	SS	24	3 6 7 9		14–16	ch	**SILTY CLAY**: trace very fine sand concentrated along planes which fracture horizontally; stiff; high plasticity; wet to saturated; gray-brown; Cu = 2.75 tsf Gray	SP = 0
4	SS	24	3 6 8 12		19–21	ch	As above; Cu = 3.25 tsf	SP = 0
5	SS	20	2 5 7 7		24–26	ch	As above; Cu = 2.5 tsf; saturated	SP = 0

DEPTH: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

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CT = CUTTINGS BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	2 of 3	MW-10D

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	16	16 3 2 2		29–31	sp	SILTY SAND: little fine to medium, subrounded pebbles; very fine to fine sand; moderately well sorted; loose; saturated; reddish-brown; shattered limestone shards	SP = 0
7	SS	6	62/6"		34–36	sp	As above 2" limestone shard	SP = 0
8	SS	20	25 20 36 42		39–41	sw	As above GRAVELLY, SANDY SILT: no plasticity; very fine to fine sand; fine to coarse, subangular pebbles; hard; wet; brown; Cu = 3.5 tsf	SP = 0
9	SS	12	3 3 6 11		44–46	sw	SAND AND GRAVEL: little silt; moderately poorly sorted; fine to coarse sand and gravel; medium dense; saturated; brown	SP = 0
10	SS	0	2 8 26 39		49–51	sw	As above	

Depth scale: 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58

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GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

HOLE NO. MW-10D

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					59						
					60						
					61						
					62						
					63						
					64						
					65						
					66						
					67						
					68						
					69						
					70						
					71						
					72						
					73						
					74						
					75						
					76					**LIMESTONE**: bedrock; some fractures; saturated; tan-yellow Switch to 5 7/8" tricone rotary drilling	
					77						
					78						
					79						
					80						
					81						
					82						
					83						
					84						
					85						
					86						
					87						
					88					End of Boring at 88'.	

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D = DENNISON ST = SHELBY TUBE CT = CUTTINGS BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 1	MW-11S

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
9/24/94	9/24/94	Burlington	4.25" I.D. HSA	8"	2" S.S.	15.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					0–15		Please see geological log of MW-11D for stratigraphy.	
1	SS	12	2 2 3 4		4	ml		
2	SS	16	3 2 4 5		9	ch		
3	SS	18	3 4 4		14	ch		
					15		End of Boring at 15'.	

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D = DENNISON ST = SHELBY TUBE CT = CUTTINGS BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 2	MW-11I

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
9/23/94	9/24/94	Burlington	4.25" I.D. HSA	8"	2" S.S.	50.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
										Please see geological log of MW-11D for stratigraphy.	
1	SS	12	2 2 3 4		4			ml			
2	SS	16	3 2 4 5		9			ch			
3	SS	24	3 4 4 5		14			ch			
4	SS	12	3 4 8 11		19			sw			
5	SS	2	50/2"		23						
6	SS	16	3 3 5 6		24			sw			

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

PAGE NO. 2 of 2 | HOLE NO. MW-11I

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
7	SS	18	4 9 10 8		29–31	sp		
8	SS	6	1 1 3 11		36–38	sp		
9	SS	14	5 6 20 15		41–43	sp		
10	SS	3	6 16 12 10		46–48	sp		
					50		End of Boring at 50'.	

Depth scale: 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50

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C = CORE
CT = CUTTINGS
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GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 4	MW-11D

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
9/20/94	9/23/94	Burlington	6.25" I.D. HSA	10"	2" S.S.	95.50'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	12	2 2 3 4		4	ml	**SANDY SILT**: little clay; moderate plasticity; moderately stiff; moist; gray; Cu = 0.75 tsf	
					5		**SAND**: little silt; trace fine to medium, subangular pebbles; moderately well sorted; dense; wet; gray-brown	SP = 0
2	SS	16	3 2 4 5		9	ch	**CLAY**: very high plasticity; stiff; wet to saturated; reddish-brown; Cu = 1.25 tsf	SP = 0
3	SS	24	3 4 4 5		14	ch	**SILTY CLAY**: very high plasticity; stiff; wet to saturated; brown; Cu = 1.5 tsf	SP = 0
4	SS	12	3 4 8 11		19	sw	**SILTY SAND**: very fine to fine sand; some fine to medium, subangular pebbles; dense; moderately poorly sorted; saturated; gray	SP = 0
5	SS	2	50/2"		23		**LIMESTONE**: shattered gray-yellow shards	
6	SS	16	3 3 5 6		24	sw	**SILTY SAND**: some fine to medium, subangular to angular pebbles; dense; moderately poorly sorted; very fine to fine sand; saturated; brown	SP = 0

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
7	SS	18	4 9 10 8		29–31	sp	**SAND**: some fine to medium, subangular to subrounded pebbles; fine to coarse sand; dense; moderately sorted; saturated; brown	SP = 0
8	SS	6	1 1 3 11		36–38	sp	As above; very fine to fine sand; some medium sand	SP = 0
9	SS	14	5 6 20 15		41–43	sp	As above; little silt; very dense 1" black sand seam	SP = 0
10	SS	3	6 16 12 10		46–48	sp	As above	SP = 0
11	SS	12	12 19 31 44		51–53	sp	**SAND**: very fine; some silt; very well sorted; contains orange varves; oxidized; dense; saturated; brown **SILT**: no plasticity; little very fine sand; stiff; saturated; brown; Cu = 2.25 tsf	SP = 0
12	SS	18	2 2 2 2		56–58	sw	**SILTY SAND**: some fine to coarse pebbles; poorly sorted; loose; saturated; brown	SP = 0

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SS = SPLIT SPOON, ST = SHELBY TUBE, C = CORE, CS = CONTINUOUS SAMPLER, D = DENNISON, CT = CUTTINGS, BA = BUCKET AUG.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
13	SS	16	2 3 3 75/3"		61	sw	As above	
14	SS	3	100/5"		63		**LIMESTONE**: fine sand in limestone matrix; tan-brown Switch to 5 7/8" tricone bit drilling	
					65		**SILTY, GRAVELLY SAND**: very fine to medium sand; fine to very coarse pebbles and cobbles; poorly sorted; dense; saturated; brown	
					78		**LIMESTONE**: bedrock; tan-brown mottled; saturated; some weathering Switch to diamond-bit coring	
15	C				81			

Depth scale: 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89

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D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					90						
					91						
					92						
					93						
					94						
					95						
										End of Boring at 95.5'.	

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C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 1	MW-12S

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
6/22/94	6/22/94	Burlington	4.25 HSA	8"	2"	17.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

9.5 feet east and 1.5 feet north of MW-12D. Stratigraphy from MW-12D samples.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	NOTES
1	CT				0	SC	**CLAYEY SAND**: tan; moist; sand is medium grained and subangular; poorly sorted; plastic; trace of fine subrounded gravel.	
2	SS	15	2 2 3 7		4	SC	**SAND**: with some silt and clay; nonplastic; saturated; fine to medium grained; subrounded to rounded; tan. **CLAY**: black at top changing to light blue gray; little plant debris; soft; plastic; moist. **CLAYEY SAND**: light blue gray; fine grained; subangular; moderately plastic.	Hnu=0, CGI=0
3	SS	15	6 8 9 9		9	SM	**SAND**: with some silt; saturated; medium dense; tan; medium to coarse grained; subangular to subrounded; fairly well sorted; nonplastic; trace of very coarse rounded sand.	Hnu=0, CGI=0
4	SS	15	4 6 9 11		14	CH	**CLAY**: tan; very well sorted; plastic; firm; moist.	

End of boring at 17'.

WESTON

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 3	MW-12I

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
6/21/94	6/22/94	Burlington	4.25 HSA	8"	2"	56.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

5 feet east and 5 feet south of MW-12D. Stratigraphy from MW-12D sampling.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	NOTES
1	CT				0	SC	**CLAYEY SAND**: tan; moist; sand is medium grained and subangular; poorly sorted; plastic; trace of fine subrounded gravel.	
2	SS	15	2 2 3 7		4	SC	**SAND**: with some silt and clay; nonplastic; saturated; fine to medium grained; subrounded to rounded; tan. **CLAY**: black at top changing to light blue gray; little plant debris; soft; plastic; moist. **CLAYEY SAND**: light blue gray; fine grained; subangular; moderately plastic.	Hnu=0, CGI=0
3	SS	15	6 8 9 9		9	SM	**SAND**: with some silt; saturated; medium dense; tan; medium to coarse grained; subangular to subrounded; fairly well sorted; nonplastic; trace of very coarse rounded sand.	Hnu=0, CGI=0
4	SS	15	4 6 9 11		14	CH	**CLAY**: tan; very well sorted; plastic; firm; moist.	
5	SS	18	1 2 4 2		19	CH	**CLAY**: as above; at 20' there is a 6" lense of clay with very coarse sand sized clay nodules (rip up clasts?); this lense is much softer, saturated and highly plastic.	Hnu=0, CGI=0

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS OT = OTHER

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	NOTES
6	SS	18	2 2 6 6		24	CH	CLAY: tan to gray; tight; plastic; very well sorted; moist.	
7	SS	20	3 3 4 4		29	CH	CLAY: as above; thin (<1/16") thick very fine grained sand lenses.	
					33			Hnu=0, CGI=0
8	SS	24	3 6 6 7		34	CH	CLAY: as above; some very fine grained sand in bottom of spoon.	
9	SS	24	2 6 6 9		36	CH	CLAY: as above; bottom 2" of sample is clay with some sand and gravel; saturated.	
10	SS	24	2 3 7 8		38	CH SM	CLAY AND SAND: interbedded; beds are approx. 4" thick; clay is as above; sand beds range from very fine grained with some silt to medium to very coarse grained with little silt.	

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SS = SPLIT SPOON ST = SHELBY TUBE C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
11	SS	24	WOR 1 3 6		45 46 47 48			SM		**SAND**: medium grained; subangular; tan; with little silt; fairly well sorted; increasing clay and silt content with depth; becoming poorly sorted with depth; sand size ranges from very fine to very coarse grained.	
12	SS	8	WOR WOR 6 7		49 50 51 52 53			SP		**SAND**: very fine to medium grained; saturated; may be slough.	
13	SS	10	10 10 12 11		54 55 56			GW		**SAND AND GRAVEL**: sand is fine to very coarse grained, subangular to subrounded; and gravel is medium grained, subrounded to subangular; very poorly sorted; increase in grain size with depth.	
										End of boring at 56'.	

WESTON

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 4	MW-12D

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
6/19/94	6/19/94	Burlington	4.25 HSA	8"	2" SS	77.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER · DATE MEASURED
J. Force			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	NOTES
1	CT				0–1	SC	**CLAYEY SAND**: tan; moist; sand is medium grained and subangular; poorly sorted; plastic; trace of fine subrounded gravel.	
2	SS	15	2 2 3 7		4–6	SC	**SAND**: with some silt and clay; nonplastic; saturated; fine to medium grained; subrounded to rounded; tan. **CLAY**: black at top changing to light blue gray; little plant debris; soft; plastic; moist. **CLAYEY SAND**: light blue gray; fine grained; subangular; moderately plastic.	Hnu=0, CGI=0
3	SS	15	6 8 9 9		9–11	SM	**SAND**: with some silt; saturated; medium dense; tan; medium to coarse grained; subangular to subrounded; fairly well sorted; nonplastic; trace of very coarse rounded sand.	Hnu=0, CGI=0
4	SS	15	4 6 9 11		14–16	CH	**CLAY**: tan; very well sorted; plastic; firm; moist.	
5	SS	18	1 2 4 2		19–21	CH	**CLAY**: as above; at 20' there is a 6" lense of clay with very coarse sand sized clay nodules (rip up clasts?); this lense is much softer, saturated and highly plastic.	Hnu=0, CGI=0

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SS = SPLIT SPOON   C = CORE   CS = CONTINUOUS SAMPLER
D = DENNISON   CT = CUTTINGS   OT = OTHER

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					22						
					23						
6	SS	18	2 2 6 6		24			CH		**CLAY**: tan to gray; tight; plastic; very well sorted; moist.	
					25–28						
7	SS	20	3 3 4 4		29			CH		**CLAY**: as above; thin (<1/16") thick very fine grained sand lenses.	
					30–32						
					33						Hnu=0, CGI=0
8	SS	24	3 6 6 7		34			CH		**CLAY**: as above; some very fine grained sand in bottom of spoon.	
9	SS	24	2 6 6 9		36			CH		**CLAY**: as above; bottom 2" of sample is clay with some sand and gravel; saturated.	
10	SS	24	2 3 7 8		38			CH SM		**CLAY AND SAND**: interbedded; beds are approx. 4" thick; clay is as above; sand beds range from very fine grained with some silt to medium to very coarse grained with little silt.	
					39–44						

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OT = OTHER

WESTON

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	3 of 4	MW-12D

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
11	SS	24	WOR 1 3 6		45			SM		**SAND**: medium grained; subangular; tan; with little silt; fairly well sorted; increasing clay and silt content with depth; becoming poorly sorted with depth; sand size ranges from very fine to very coarse grained.	
12	SS	8	WOR WOR 6 7		49			SP		**SAND**: very fine to medium grained; saturated; may be slough.	
13	SS	10	10 10 12 11		54			GW		**SAND AND GRAVEL**: sand is fine to very coarse grained, subangular to subrounded; and gravel is medium grained, subrounded to subangular; very poorly sorted; increase in grain size with depth.	
14	SS	12	4 11 8 8		59			SP		**SAND**: medium to very coarse grained; trace fine gravel; subangular; fairly well sorted; at 60' interbedded clay and sand; beds are very thin (<1/4" thick).	
15	SS	24	4 6 8 9		64			SP SC		**SAND**: medium grained; saturated; fairly well sorted; then at 65' sandy clay: fine grained sand; plastic; moist; red tan; trace of subrounded gravel.	

Depth scale: 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67

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SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					68						
16	SS	12	2 6 20 27		69 70 71			SC		**SANDY CLAY**: as above; little angular gravel; fine grained sized; mostly limestone.	
					72 73						
17	SS	8	25 50/2"		74 75 76 77			GW		**SAND AND GRAVEL**: medium to fine grained sized sand; fine angular gravel; poorly sorted; increasing grain size with depth. **LIMESTONE**: broken clasts; tan; micritic; trace of small calcite nodules; clasts are approx. 1" in diameter.	
										End of boring at 77'.	

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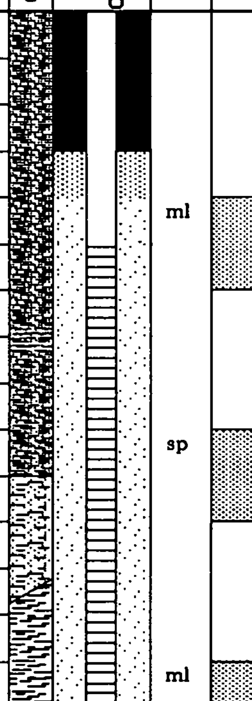
GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 1	MW-13S

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/7/94	10/7/94	Burlington	4.25" I.D. HSA	8"	2" S.S.	15.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'



SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1		Please see geological log of MW-13D for stratigraphy.	
					2			
					3			
1	SS	20	2 3 3 6		4	ml		
					5			
					6			
					7			
					8			
2	SS	24	3 4 6 4		9	sp		
					10			
					11			
					12			
					13			
3	SS	12	3 3		14	ml		
					15		End of Boring at 15'.	

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BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 2	MW-13I

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/6/94	10/7/94	Burlington	4.25" I.D. HSA	8"	2" S.S.	48.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1					Please see geological log of MW-13D for stratigraphy.	
					2						
					3						
1	SS	20	2 3 3 6		4			ml			
					5						
					6						
					7						
					8						
2	SS	24	3 4 6 4		9			sp			
					10						
					11						
					12						
					13						
3	SS	24	3 3 3 4		14			ml			
					15						
					16						
					17						
					18						
4	SS	22	3 3 4 5		19			ml			
					20			ch			
					21						
					22						
					23						
5	SS	24	3 5 7 7		24			ch			
					25						
					26						
					27						

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SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					29			
6	SS	24	3 3 5 7		29–31	ch		
7	SS	24	3 6 7 10		34–36	ch		
8	SS	22	wr		39–41	sp		
9	SS	16	3 3 5 4		44–46	sp		
					48		End of Boring at 48'.	

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 4	MW-13D

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/4/94	10/6/94	Burlington	6.25" I.D. HSA	10"	2" S.S.	94.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	20	2 3 3 6		4	ml	**SANDY SILT**: very fine sand; very low plasticity; stiff; wet to saturated; brown; Cu = 2.0 tsf	SP = 0
2	SS	24	3 4 6 4		9	sp	As above	SP = 0
					10		**SILTY SAND**: very fine sand; well sorted; saturated; brown	
3	SS	24	3 3 3 4		14	ml	**SILT**: little very fine sand; very low plasticity; stiff; saturated; brown-tan; Cu = 2.25 tsf no sand	SP = 0
4	SS	22	3 3 4 5		19	ml	As above	SP = 0
					20	ch	**CLAY**: little silt; high plasticity; very stiff; saturated; tan-brown; Cu = 3.25 tsf	
5	SS	24	3 5 7 7		24	ch	As above; Cu = 2.5 tsf	SP = 0

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SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	24	3 3 5 7		29–31	ch	As above; Cu = 3.0 tsf	SP = 0
7	SS	24	3 6 7 10		34–36	ch	As above; trace very fine sand; Cu = 2.5 tsf	SP = 0
8	SS	22	wr		39–41	sp	**SAND**: medium to coarse; little fine sand; little fine to medium, subrounded to rounded pebbles; moderately well sorted; loose; saturated; brown	SP = 0
9	SS	16	3 3 5 4		44–46	sp	As above	

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GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					59–63						
					63–79					Gravel and small cobbles encountered during drilling	
					79–89					**LIMESTONE**: bedrock; tan-yellow; saturated; slightly fractured Switch to 5 7/8" tricone rotary drilling.	

Depth scale: 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89

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SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					90						
					91						
					92						
					93						
					94					End of Boring at 94'.	

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GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 3	EW-01

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/8/94	10/10/94	Burlington	8.25" I.D. HSA	12"	6" S.S.	67.10'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	24	4 5 7 11		4–6	sp	SAND: little silt; some fine to coarse pebbles; moderately sorted; medium dense; saturated; brown	
2	SS	24	3 4 5 5		9–11	ch	SILTY CLAY: high plasticity; stiff; saturated; brown; Cu = 2.0 tsf	
3	SS	20	3 3 4 5		14–16	ch	As above; less silt; Cu = 3.0 tsf	
4		20	2 4 5 11		19–21	ch	As above Little fine sand	
5	SS	6	4 50/3"		24–26	ch	SAND: moderately well sorted; fine to medium; saturated; brown SILTY CLAY: little fine to medium sand; high plasticity; stiff; saturated; brown Shattered limestone shards	

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BA = BUCKET AUG.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	24	2 4 3 14		29–31	sp	**SILTY SAND**: very fine to fine sand; little fine to medium pebbles; little clay; moderately well sorted; loose; saturated; light brown	
7	SS	12	2 4 3 8		34–36	sp	As above; little less silt	
8	SS	12	2 6 19 36		39–41	sp	**SAND**: fine to medium; little fine to medium pebbles; trace silt; well sorted; medium dense; saturated; brown; coarse, angular pebbles in spoon shoe	
9	SS	6	8 18 23 24		49–51	sp	As above; dense	

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SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
10	SS	20	8 24 59 60		59–67			sp		As above; extremely dense; some fine to coarse pebbles	
11	SS	0	50/1"		67			ls		**LIMESTONE**: shards in sample; saturated; tan-yellow End of Boring at 67'.	

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BA =BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 2	OW-01

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/11/94	10/11/94	Burlington	4.25" I.D. HSA	8"	2" PVC	44.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

Approximately 15' south of EW-01.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	20	4 6 6 8		4–6	sp	SAND: fine to very coarse; moderately sorted; medium dense; saturated; brown	
					5.4–8		SAND: very fine to fine; well sorted; saturated; brown Oxidized orange	
2	SS	24	3 4 7 9		9–11	ch	SILTY CLAY: high plasticity; wet to saturated; stiff; gray-brown; Cu = 2.75 tsf	
3	SS	24	2 4 5 8		14–16	ch	As above; Cu = 3.0 tsf	
4	SS	24	3 3 5 5		19–21	ch	As above; firm	
5	SS	22	3 3 4 5		24–26	ch	As above; some very fine to fine sand; more silt; sandy-gravelly zone to 24.4'; Cu = 2.25 tsf	

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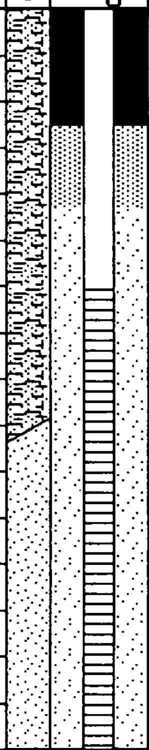
GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: **Stoughton Landfill, Stoughton, Wisconsin**



SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	24	2 3 2 3		29–31	sp	**SILTY SAND**: very fine to fine sand; well sorted; trace medium sand; trace very coarse pebbles; loose; saturated; brown	
7	SS	24	3 3 10 11		34–36	sp	As above; medium dense	
8	SS	20	3 6 4 8		39–41	sp	**SAND**: fine to coarse; trace silt; little fine to medium pebbles; moderately well sorted; medium dense; saturated; brown	
					44		End of Boring at 44'.	

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BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 2	OW-02

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/11/94	10/12/94	Burlington	4.25" I.D. HSA	8"	2" PVC	41.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

Approximately 40' south of EW-01.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1			
					2			
					3			
1	SS	20	6 9 10 10		4–6	sp	**SAND**: fine to medium; trace silt; little coarse sand; moderately well sorted; dense; saturated; brown	
					7			
					8			
2	SS	22	4 4 6 6		9–11	ch	**SILTY CLAY**: trace fine sand to 10'; high plasticity; stiff; saturated; brown-gray; Cu = 3.0 tsf	
					12			
					13			
3	SS	24	3 4 5 6		14–16	ch	As above; Cu = 3.0 tsf Cu = 1.5 tsf	
					17			
					18			
4	SS	18	3 4 6 8		19–21	ch	As above; Cu = 2.25 tsf	
					22			
					23			
5	SS	16	5 46 18 15		24–26	ch	As above **SILTY SAND AND GRAVEL**: fine to medium sand; fine to coarse, subrounded to angular pebbles; poorly sorted; very dense; saturated; gray	
					27			

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C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	20	3 6 11 6		29–31	sw	**SILTY SAND**: very fine to fine; medium dense; well sorted; saturated; brown	
7	SS	22	10 14 21 28		34–36	sp	As above; less silt; little fine to medium, rounded to subangular pebbles; dense	
8	SS	20	9 17 14 20		39–41	sp	**SAND**: fine to medium; trace silt; well sorted; saturated; brown	
						sw	**SAND AND GRAVEL**: fine to medium sand; fine to coarse, subrounded to subangular pebbles; moderately poorly sorted; dense; saturated; brown	
					41		End of Boring at 41'.	

*ASTM D1586
SS = SPLIT SPOON
D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 1	OW-03

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/12/94	10/12/94	Burlington	4.25" I.D. HSA	8"	2" PVC	10.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

Approximately 45' south of EW-01.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					0–10		Please see geological log of OW-02 for stratigraphy.	
1	SS	20	6 9 10 10		4–6	sp		
2	SS	12	4 4		9–10	ch		
					10		End of Boring at 10'.	

*ASTM D1586
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON ST = SHELBY TUBE CT = CUTTINGS BA = BUCKET AUG.

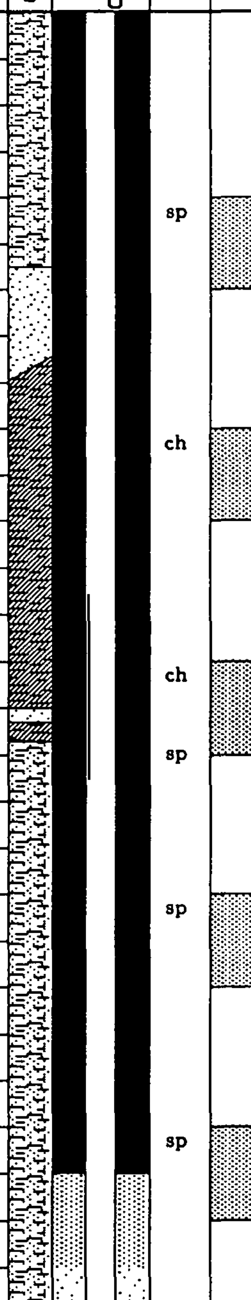
GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 2	OW-04

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/8/94	10/8/94	Burlington	4.25" I.D. HSA	8"	2" PVC	41.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

Approximately 80' north of EW-01.



SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1			
					2			
					3			
1	SS	22	4 7 9 8		4 5	sp	**SILTY SAND**: fine to coarse; medium dense; moderately sorted; saturated; tan	SP = 0
					6 7		**SAND**: fine to medium; well sorted; saturated; orange-brown; oxidized	
					8			
2	SS	24	3 3 3 4		9 10	ch	**SILTY CLAY**: moderately high plasticity; firm; saturated; gray-brown; Cu = 2.0 tsf	SP = 0
					11			
					12			
					13			
3	SS	18	2 6 5 6		14	ch	As above; stiff; Cu = 2.0 tsf	SP = 0
					15		Sand seam; very well sorted; medium sand; blue-gray	
					16 17	sp	**SILTY SAND**: very fine to fine sand; moderately well sorted; little medium pebbles; little clay; saturated; light tan-orange	
					18			
4	SS	4	6 5 7 16		19 20	sp	As above; some very coarse pebbles; medium dense	
					21			
					22			
					23			
5	SS	24	1 1 2 4		24 25	sp	As above; loose	
					26			
					27			

*ASTM D1586 ST = SHELBY TUBE
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

PAGE NO. 2 of 2 | HOLE NO. OW-04

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	24	1 2 2 3		29–31	sp	As above	
7	SS	24	3 10 24 19		34–36	sp	As above; dense few more pebbles and limestone shards	
8	SS	24	9 4 2 6		39–41	sp	As above; loose	
					41		End of Boring at 41'.	

APPENDIX B

GRAIN SIZE RESULTS

4500-54 — AJPK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 CENTRAL REGIONAL LABORATORY

536 SOUTH CLARK STREET

CHICAGO, ILLINOIS 60605

RECEIVED
SEP 12 1994

Date: SEP 07 1994

Subject: Review of Region 5 Data for STOUGHTON CITY LANDFILL

From: Charles T. Elly, Director Chuck E. Elly
Region 5 Central Regional Laboratory

To: WESTON

Attached are the results for STOUGHTON CITY LANDFILL
CRL request number 940098
for analyses for Particle Size and Cation Exchange Capacity(CEC).
Results are reported for sample designations: 94ZG08S01, 94ZG08S02, 94ZG08S03, 94ZG08S04, 94ZG08S05, 94ZG08S06, 94ZG08S07, 94ZG08S08, 94ZG08S09, and 94ZG08S10

Results Status:
( ) Acceptable for Use:
(X) Data Qualified, but Acceptable for use: Particle Size and CEC
( ) Data Unacceptable for Use:

(X) Sewer Disposal Criteria Met;

All the remaining samples should be disposed of in a drum.

Comments on Data Quality by Reviewer:

The SAS required that the samples should be analyzed within 14 days of collection. This was exceeded. A centrifuge needed to do the CEC was not available. This caused a delay in the analyses for CEC. Use the data with caution. The results are acceptable for use.

Comments by Laboratory Director or Quality Control Coordinator:

Francis A. Awunnga

Team Leader and Date (X) Reviewed ( ) Unreviewed

James H. Adams, Jr. 9/7/94

Section Chief and Date (✓) Reviewed ( ) Unreviewed

James H. Adams, Jr. 9/7/94

QC Coordinator and Date (✓) Reviewed ( ) Unreviewed

Sylvia Griffin SEP 07 1994

Data Management Coordinator and Date Received

Date Transmitted SEP 07 1994

Please sign and date this form below and return it with any comments to:

Sylvia Griffin
Data Management Coordinator
Region 5 Central Regional Laboratory
SL - 10C

Received by and Date

Comments:

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

(2)

DATA SET # 940098 SAMPLE # 94ZGΦ85Φ1

A. Original Wet Weight of Sample:________g Dish Id: 2

B. Weight of Dried Sample Washed through # 200 Sieve:________g

C. Weight of Sample Recovered from Washing through # 200 Sieve:________g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = ________%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.000	??
4	646.1	646.1	0.000	??
10	526.4	526.4	0.000	??
16	510.9	510.7	0.000	??
28	474.8	474.2	0.000	??
50	458.8	456.2	0.000	??
100	430.7	425.4	0.000	??
200	500.8	497.1	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	490.1	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Arvanya
7/7/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S01 (2)

A. Original Wet Weight of Sample: 103.442 g Dish Id: 2

B. Weight of Dried Sample Washed through # 200 Sieve: 36.122 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 13.297 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 6.76 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.4	526.4	0.00	0.00
16	510.9	510.7	0.20	1.61
28	474.8	474.2	0.60	4.84
50	458.8	456.2	2.60	20.97
100	430.7	425.4	5.30	42.74
200	500.8	497.1	3.70	29.84
SIEVE TOTALS			12.40	100.00
BOTTOM PLATE	490.1	489.1	1.00	0.00
		TOTALS	13.40	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S01 (2)

A. Original Wet Weight of Sample: 103.442 g Dish Id: 2

B. Weight of Dried Sample Washed through # 200 Sieve: 36.122 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 13.297 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 6.76 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.4	526.4	0.00	0.00
16	510.9	510.7	0.20	1.61
28	474.8	474.2	0.60	4.84
50	458.8	456.2	2.60	20.97
100	430.7	425.4	5.30	42.74
200	500.8	497.1	3.70	29.84
SIEVE TOTALS			12.40	100.00

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S02 (3)

A. Original Wet Weight of Sample: ________ g Dish Id: ______

B. Weight of Dried Sample Washed through # 200 Sieve: ________ g

C. Weight of Sample Recovered from Washing through # 200 Sieve: ________ g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = ________ %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	646.0	645.4	0.000	??
4	646.3	646.1	0.000	??
10	527.0	526.5	0.000	??
16	511.5	510.9	0.000	??
28	477.1	474.3	0.000	??
50	466.2	456.2	0.000	??
100	~~443~~ FAA 442.8	425.3	0.000	??
200	502.9	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	490.1	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Arvanga
~~7/1/984~~ 7/1/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098   SAMPLE # 94ZG08S02 (3)

A. Original Wet Weight of Sample: 168.545 g   Dish Id: 3

B. Weight of Dried Sample Washed through # 200 Sieve: 73.885 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 38.960 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 2.82%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	646.0	645.4	0.60	1.58
4	646.3	646.1	0.20	0.53
10	527.0	526.5	0.50	1.32
16	511.5	510.9	0.60	1.58
28	477.1	474.3	2.80	7.39
50	466.2	456.2	10.00	26.39
100	442.8	425.3	17.50	46.17
200	502.9	497.2	5.70	15.04
SIEVE TOTALS			37.90	100.00
BOTTOM PLATE	490.1	489.1	1.00	0.00
		TOTALS	38.90	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098   SAMPLE # 94ZG08S02 (3)

A. Original Wet Weight of Sample: 168.545 g   Dish Id: 3

B. Weight of Dried Sample Washed through # 200 Sieve: 73.885 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 38.960 g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = 2.82 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	646.0	645.4	0.60	1.58
4	646.3	646.1	0.20	0.53
10	527.0	526.5	0.50	1.32
16	511.5	510.9	0.60	1.58
28	477.1	474.3	2.80	7.39
50	466.2	456.2	10.00	26.39
100	442.8	425.3	17.50	46.17
200	502.9	497.2	5.70	15.04
SIEVE TOTALS			37.90	100.00

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08503 (16)

A. Original Wet Weight of Sample:________g Dish Id: 16

B. Weight of Dried Sample Washed through # 200 Sieve:________g

C. Weight of Sample Recovered from Washing through # 200 Sieve:________g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = ________%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	650.0	645.4	0.000	??
4	647.4	646.1	0.000	??
10	527.1	526.5	0.000	??
16	511.2	510.9	0.000	??
28	475.0	474.3	0.000	??
50	463.8	456.2	0.000	??
100	446.8	425.3	0.000	??
200	511.5	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	490.1	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. [illegible]
7/1/98

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S03 (16)

A. Original Wet Weight of Sample: 108.140 g Dish Id: 16

B. Weight of Dried Sample Washed through # 200 Sieve: 92.620 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 52.478 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 3.04 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	650.0	645.4	4.60	9.04
4	647.4	646.1	1.30	2.55
10	527.1	526.5	0.60	1.18
16	511.2	510.9	0.30	0.59
28	475.0	474.3	0.70	1.38
50	463.8	456.2	7.60	14.93
100	446.8	425.3	21.50	42.24
200	511.5	497.2	14.30	28.09
SIEVE TOTALS			50.90	100.00
BOTTOM PLATE	490.1	489.1	1.00	0.00
		TOTALS	51.90	

Francis A. Arraya
8/30/94

CENTRAL REGIONAL LABORATORY
GRAIN SI-ZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S03 (16)

A. Original Wet Weight of Sample: 108.140 g Dish Id: 16

B. Weight of Dried Sample Washed through # 200 Sieve: 92.620 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 52.478 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 3.04 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	650.0	645.4	4.60	9.04
4	647.4	646.1	1.30	2.55
10	527.1	526.5	0.60	1.18
16	511.2	510.9	0.30	0.59
28	475.0	474.3	0.70	1.38
50	463.8	456.2	7.60	14.93
100	446.8	425.3	21.50	42.24
200	511.5	497.2	14.30	28.09
SIEVE TOTALS			50.90	100.00

Francis A. Awanya
8/30/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 946098 SAMPLE # 94ZG08S03
DUPLICATE

①

A. Original Wet Weight of Sample:________g Dish Id: 1

B. Weight of Dried Sample Washed through # 200 Sieve:________g

C. Weight of Sample Recovered from Washing through # 200 Sieve:________g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = ________%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.000	??
4	646.1	646.1	0.000	??
10	527.2	526.5	0.000	??
16	511.6	510.9	0.000	??
28	475.4	474.3	0.000	??
50	465.1	456.2	0.000	??
100	452.1	425.3	0.000	??
200	516.5	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	490.8	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Arroyo
7/1/98

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 9400098 SAMPLE # 94ZG08S03-DUPLICATE (1)

A. Original Wet Weight of Sample: 109.030 g Dish Id: 1

B. Weight of Dried Sample Washed through # 200 Sieve: 93.050 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 59.992 g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = 4.16 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	527.2	526.5	0.70	1.22
16	511.6	510.9	0.70	1.22
28	475.4	474.3	1.10	1.91
50	465.1	456.2	8.90	15.48
100	452.1	425.3	26.80	46.61
200	516.5	497.2	19.30	33.57
SIEVE TOTALS			57.50	100.01
BOTTOM PLATE	490.8	489.1	1.70	0.00
		TOTALS	59.20	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 9400098 SAMPLE # 94ZG08S03-DUPLICATE (1)

A. Original Wet Weight of Sample: 109.030 g Dish Id: 1

B. Weight of Dried Sample Washed through # 200 Sieve: 93.050 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 59.992 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 4.16 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	527.2	526.5	0.70	1.22
16	511.6	510.9	0.70	1.22
28	475.4	474.3	1.10	1.91
50	465.1	456.2	8.90	15.48
100	452.1	425.3	26.80	46.61
200	516.5	497.2	19.30	33.57
SIEVE TOTALS			57.50	100.01

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08504 (6)

A. Original Wet Weight of Sample: ________g Dish Id: ______

B. Weight of Dried Sample Washed through # 200 Sieve: ________g

C. Weight of Sample Recovered from Washing through # 200 Sieve: ________g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = ________%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.000	??
4	646.1	646.1	0.000	??
10	526.5	526.5	0.000	??
16	510.9	510.9	0.000	??
28	474.4	474.3	0.000	??
50	457.8	456.2	0.000	??
100	478.6	425.3	0.000	??
200	533.0	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	490.9	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Arriaga
7/1/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098   SAMPLE # 94ZG08S04 (6)

A. Original Wet Weight of Sample: 123.164 g   Dish Id: 6

B. Weight of Dried Sample Washed through # 200 Sieve: 99.684 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 92.980 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 2.36%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.5	526.5	0.00	0.00
16	510.9	510.9	0.00	0.00
28	474.4	474.3	0.10	0.11
50	457.8	456.2	1.60	1.76
100	478.6	425.3	53.30	58.70
200	533.0	497.2	35.80	39.43
SIEVE TOTALS			90.80	100.00
BOTTOM PLATE	490.9	489.1	1.80	0.00
		TOTALS	92.60	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S04 (6)

A. Original Wet Weight of Sample: 123.164 g Dish Id: 6

B. Weight of Dried Sample Washed through # 200 Sieve: 99.684 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 92.980 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 2.36%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.5	526.5	0.00	0.00
16	510.9	510.9	0.00	0.00
28	474.4	474.3	0.10	0.11
50	457.8	456.2	1.60	1.76
100	478.6	425.3	53.30	58.70
200	533.0	497.2	35.80	39.43
SIEVE TOTALS			90.80	100.00

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZGØ65Ø5 (10)

A. Original Wet Weight of Sample:________g Dish Id: 10

B. Weight of Dried Sample Washed through # 200 Sieve:________g

C. Weight of Sample Recovered from Washing through # 200 Sieve:________g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = ________%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.000	??
4	646.4	646.1	0.000	??
10	536.5	526.5	0.000	??
16	517.1	510.9	0.000	??
28	480.2	474.3	0.000	??
50	473.3	456.2	0.000	??
100	473.2	425.3	0.000	??
200	524.3	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	490.0	489.1	0.000	0.00
		TOTALS	0.000	

7/1/94
Francis A. Aicangel

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG06S05 (10)

A. Original Wet Weight of Sample: 148.277 g Dish Id: 10

B. Weight of Dried Sample Washed through # 200 Sieve: 125.907 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 115.767 g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = 1.12 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.4	646.1	0.30	0.26
10	536.5	526.5	10.00	8.73
16	517.1	510.9	6.20	5.41
28	480.2	474.3	5.90	5.15
50	473.3	456.2	17.10	14.93
100	473.2	425.3	47.90	41.83
200	524.3	497.2	27.10	23.67
SIEVE TOTALS			114.50	99.98
BOTTOM PLATE	490.0	489.1	0.90	0.00
		TOTALS	115.40	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098   SAMPLE # 94ZG06S05 (10)

A. Original Wet Weight of Sample: 148.277 g   Dish Id: 10

B. Weight of Dried Sample Washed through # 200 Sieve: 125.907 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 115.767 g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = 1.12 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.4	646.1	0.30	0.26
10	536.5	526.5	10.00	8.73
16	517.1	510.9	6.20	5.41
28	480.2	474.3	5.90	5.15
50	473.3	456.2	17.10	14.93
100	473.2	425.3	47.90	41.83
200	524.3	497.2	27.10	23.67
SIEVE TOTALS			114.50	99.98

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098   SAMPLE # 94ZG08506(7)
94ZG08506 (7)

A. Original Wet Weight of Sample:________g   Dish Id: 7

B. Weight of Dried Sample Washed through # 200 Sieve:________g

C. Weight of Sample Recovered from Washing through # 200 Sieve:________g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = ________%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	658.8	645.4	0.000	??
4	678.3	646.1	0.000	??
10	561.2	526.5	0.000	??
16	524.6	510.9	0.000	??
28	483.8	474.3	0.000	??
50	463.0	456.2	0.000	??
100	430.3	425.3	0.000	??
200	498.8	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	489.2	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Arvanza
7/1/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S06 (7)

A. Original Wet Weight of Sample: 150.822 g Dish Id:______

B. Weight of Dried Sample Washed through # 200 Sieve: 123.772 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 117.647 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 0.60%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	658.8	645.4	13.40	11.46
4	678.3	646.1	32.20	27.54
10	561.2	526.5	34.70	29.68
16	524.6	510.9	13.70	11.72
28	483.8	474.3	9.50	8.13
50	463.0	456.2	6.80	5.82
100	430.3	425.3	5.00	4.28
200	498.8	497.2	1.60	1.37
SIEVE TOTALS			116.90	100.00
BOTTOM PLATE	489.2	489.1	0.10	0.00
		TOTALS	117.00	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098   SAMPLE # 94ZG08S06 (7)

A. Original Wet Weight of Sample: 150.822 g   Dish Id: ______

B. Weight of Dried Sample Washed through # 200 Sieve: 123.772 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 117.647 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 0.60%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	658.8	645.4	13.40	11.46
4	678.3	646.1	32.20	27.54
10	561.2	526.5	34.70	29.68
16	524.6	510.9	13.70	11.72
28	483.8	474.3	9.50	8.13
50	463.0	456.2	6.80	5.82
100	430.3	425.3	5.00	4.28
200	498.8	497.2	1.60	1.37
SIEVE TOTALS			116.90	100.00

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 94C098 SAMPLE # 94ZG08S07 (5)

A. Original Wet Weight of Sample: ________ g Dish Id: (5)

B. Weight of Dried Sample Washed through # 200 Sieve: ________ g

C. Weight of Sample Recovered from Washing through # 200 Sieve: ________ g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = ________ %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.000	??
4	648.2	646.1	0.000	??
10	574.6	526.5	0.000	??
16	535.9	510.9	0.000	??
28	479.5	474.3	0.000	??
50	459.6	456.2	0.000	??
100	430.1	425.3	0.000	??
200	498.8	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	489.1	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Arvaye
7/1/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940089 SAMPLE # 94ZG08S07 (5)

A. Original Wet Weight of Sample: 118.251 g Dish Id: 5

B. Weight of Dried Sample Washed through # 200 Sieve: 96.161 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 90.754 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - SIEVE\ TOTAL)*100}{B}$ = ~~0.05%~~ 0 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	648.2	646.1	2.10	2.31
10	574.6	526.5	48.10	52.97
16	535.9	510.3	25.60	28.19
28	479.5	474.3	5.20	5.73
50	459.6	456.2	3.40	3.74
100	430.1	425.3	4.80	5.29
200	498.8	497.2	1.60	1.76
SIEVE TOTALS			90.80	99.99
BOTTOM PLATE	489.1	489.1	0.00	0.00
		TOTALS	90.80	

Francis A. Awanya
8/30/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940089　　　　SAMPLE # 94ZG08S07 (5)

A. Original Wet Weight of Sample: 118.251 g　　　Dish Id: 5

B. Weight of Dried Sample Washed through # 200 Sieve: 96.161 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 90.754 g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = 0 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	648.2	646.1	2.10	2.31
10	574.6	526.5	48.10	52.97
16	535.9	510.3	25.60	28.19
28	479.5	474.3	5.20	5.73
50	459.6	456.2	3.40	3.74
100	430.1	425.3	4.80	5.29
200	498.8	497.2	1.60	1.76
SIEVE TOTALS			90.80	99.99
BOTTOM PLATE	489.1	489.1	0.00	0.00

TOTALS	90.80

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940089 SAMPLE # 94ZG08S07 (5)

A. Original Wet Weight of Sample: 118.251 g Dish Id: 5

B. Weight of Dried Sample Washed through # 200 Sieve: 96.161 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 90.754 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 0 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	648.2	646.1	2.10	2.31
10	574.6	526.5	48.10	52.97
16	535.9	510.3	25.60	28.19
28	479.5	474.3	5.20	5.73
50	459.6	456.2	3.40	3.74
100	430.1	425.3	4.80	5.29
200	498.8	497.2	1.60	1.76
SIEVE TOTALS			90.80	99.99

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 943G08508 (15)

A. Original Wet Weight of Sample: ________ g Dish Id: 15

B. Weight of Dried Sample Washed through # 200 Sieve: ________ g

C. Weight of Sample Recovered from Washing through # 200 Sieve: ________ g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = ________ %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	694.5	645.4	0.000	?? (Rock)
4	655.3	646.1	0.000	??
10	533.9	526.5	0.000	??
16	513.5	510.9	0.000	??
28	478.2	474.3	0.000	??
50	469.4	456.2	0.000	??
100	452.6	425.3	0.000	??
200	510.5	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	489.8	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Aranya
7/1/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S08 (15)

A. Original Wet Weight of Sample: 213.517 g Dish Id: 15

B. Weight of Dried Sample Washed through # 200 Sieve: 197.747 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 126.732 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 0.55 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	694.5	645.4	49.10	38.97
4	655.3	646.1	9.20	7.30
10	533.9	526.5	7.40	5.87
16	513.5	510.9	2.60	2.06
28	478.2	474.3	3.90	3.10
50	469.4	456.2	13.20	10.48
100	452.6	425.3	27.30	21.67
200	510.5	497.2	13.30	10.56
SIEVE TOTALS			126.00	100.01
BOTTOM PLATE	489.8	489.1	0.70	0.00

TOTALS	126.70

Francis A. Arroyo
8/30/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S08 (15)

A. Original Wet Weight of Sample: 213.517 g Dish Id: 15

B. Weight of Dried Sample Washed through # 200 Sieve: 197.747 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 126.732 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 0.55 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	694.5	645.4	49.10	38.97
4	655.3	646.1	9.20	7.30
10	533.9	526.5	7.40	5.87
16	513.5	510.9	2.60	2.06
28	478.2	474.3	3.90	3.10
50	469.4	456.2	13.20	10.48
100	452.6	425.3	27.30	21.67
200	510.5	497.2	13.30	10.56
SIEVE TOTALS			126.00	100.01

Francis A. Arvanya
8/30/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94~~ZG~~98509 (22)

A. Original Wet Weight of Sample:________g Dish Id: 22

B. Weight of Dried Sample Washed through # 200 Sieve:________g

C. Weight of Sample Recovered from Washing through # 200 Sieve:________g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = ________%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.000	??
4	646.1	646.1	0.000	??
10	526.7	526.5	0.000	??
16	512.4	510.9	0.000	??
28	484.4	474.3	0.000	??
50	489.1	456.2	0.000	??
100	473.6	425.3	0.000	??
200	512.3	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	489.6	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Aranya
7/1/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098   SAMPLE # 940ZG08S09 (22)

A. Original Wet Weight of Sample: 139.363 g   Dish Id: 22

B. Weight of Dried Sample Washed through # 200 Sieve 208.66 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 108.868 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 0.73 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.7	526.5	0.20	0.19
16	512.4	510.9	1.50	1.39
28	484.4	474.3	10.10	9.34
50	489.1	456.2	32.90	30.43
100	473.6	425.3	48.30	44.68
200	512.3	497.2	15.10	13.97
SIEVE TOTALS			108.10	100.00
BOTTOM PLATE	489.6	489.1	0.50	0.00
		TOTALS	108.60	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 940ZG08S09 (22)

A. Original Wet Weight of Sample: 139.363 g Dish Id: 22

B. Weight of Dried Sample Washed through # 200 Sieve 208.66 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 108.868 g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = 0.73 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.7	526.5	0.20	0.19
16	512.4	510.9	1.50	1.39
28	484.4	474.3	10.10	9.34
50	489.1	456.2	32.90	30.43
100	473.6	425.3	48.30	44.68
200	512.3	497.2	15.10	13.97
SIEVE TOTALS			108.10	100.00

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08510 (19)

A. Original Wet Weight of Sample: ________ g Dish Id: 19

B. Weight of Dried Sample Washed through # 200 Sieve: ________ g

C. Weight of Sample Recovered from Washing through # 200 Sieve: ________ g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = ________ %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.1	645.4	0.000	??
4	646.2	646.1	0.000	??
10	526.7	526.5	0.000	??
16	510.9	510.9	0.000	??
28	479.3	474.3	0.000	??
50	515.4	456.2	0.000	??
100	473.8	425.3	0.000	??
200	505.6	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	489.3	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Arvanza
7/1/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S10 (19)

A. Original Wet Weight of Sample: 148.763 g Dish Id: 19

B. Weight of Dried Sample Washed through # 200 Sieve: 130.913 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 121.827 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - SIEVE\ TOTAL)*100}{B}$ = 0.57%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.1	645.4	-0.30	-0.25
4	646.2	646.1	0.10	0.08
10	526.7	526.5	0.20	0.17
16	510.9	510.9	0.00	0.00
28	479.3	474.3	5.00	4.13
50	515.4	456.2	59.20	48.89
100	473.8	425.3	48.50	40.05
200	505.6	497.2	8.40	6.94
SIEVE TOTALS			121.10	100.01
BOTTOM PLATE	489.3	489.1	0.20	0.00
		TOTALS	121.30	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S10 (19)

A. Original Wet Weight of Sample: 148.763 g Dish Id: 19

B. Weight of Dried Sample Washed through # 200 Sieve: 130.913 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 121.827 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL}) * 100}{B}$ = 0.57 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.1	645.4	-0.30	-0.25
4	646.2	646.1	0.10	0.08
10	526.7	526.5	0.20	0.17
16	510.9	510.9	0.00	0.00
28	479.3	474.3	5.00	4.13
50	515.4	456.2	59.20	48.89
100	473.8	425.3	48.50	40.05
200	505.6	497.2	8.40	6.94
SIEVE TOTALS			121.10	100.01

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08510 (12)
DUPLICATE

A. Original Wet Weight of Sample:________g Dish Id: 12

B. Weight of Dried Sample Washed through # 200 Sieve:________g

C. Weight of Sample Recovered from Washing through # 200 Sieve:________g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = ________%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.000	??
4	646.1	646.1	0.000	??
10	526.6	526.5	0.000	??
16	510.9	510.9	0.000	??
28	476.3	474.3	0.000	??
50	488.1	456.2	0.000	??
100	504.0	425.3	0.000	??
200	498.7	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	489.1	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Arango
7/1/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S10-DUPLICATE (12)

A. Original Wet Weight of Sample: 137.151 g Dish Id: 12

B. Weight of Dried Sample Washed through # 200 Sieve: 114.951 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 114.092 g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = 0.09 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.6	526.5	0.10	0.09
16	510.9	510.9	0.00	0.00
28	476.3	474.3	2.00	1.75
50	488.1	456.2	31.90	27.93
100	504.0	425.3	78.70	68.91
200	498.7	497.2	1.50	1.31
SIEVE TOTALS			114.20	99.99
BOTTOM PLATE	489.1	489.1	0.00	0.00
		TOTALS	114.20	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S10-DUPLICATE (12)

A. Original Wet Weight of Sample: 137.151 g Dish Id: 12

B. Weight of Dried Sample Washed through # 200 Sieve: 114.951 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 114.092 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 0.09 %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.6	526.5	0.10	0.09
16	510.9	510.9	0.00	0.00
28	476.3	474.3	2.00	1.75
50	488.1	456.2	31.90	27.93
100	504.0	425.3	78.70	68.91
200	498.7	497.2	1.50	1.31
SIEVE TOTALS			114.20	99.99

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08511 13

A. Original Wet Weight of Sample: ________ g Dish Id: 13

B. Weight of Dried Sample Washed through # 200 Sieve: ________ g

C. Weight of Sample Recovered from Washing through # 200 Sieve: ________ g

D. % of Sample Passed # 200 Sieve = $\frac{\text{(B - SIEVE TOTAL)*100}}{\text{B}}$ = ________ %

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.000	??
4	646.1	646.1	0.000	??
10	526.5	526.5	0.000	??
16	~~510.8~~ VCR 510.8	~~510.8~~ 510.9	0.000	??
28	474.2	474.3	0.000	??
50	456.9	456.2	0.000	??
100	514.9	425.3	0.000	??
200	519.6	497.2	0.000	??
		SIEVE TOTALS	0.000	0.00
BOTTOM PLATE	489.3	489.1	0.000	0.00
		TOTALS	0.000	

Francis A. Arango
7/1/94

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S11 (13)

A. Original Wet Weight of Sample: 137.280 g Dish Id: 13

B. Weight of Dried Sample Washed through # 200 Sieve: 113.320 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 112.622 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 0.09%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.5	526.5	0.00	0.00
16	510.8	510.9	-0.10	-0.09
28	474.2	474.3	-0.10	-0.09
50	456.9	456.2	0.70	0.62
100	514.9	425.3	89.60	79.64
200	519.6	497.2	22.40	19.91
SIEVE TOTALS			112.50	99.99
BOTTOM PLATE	489.3	489.1	0.20	0.00
		TOTALS	112.70	

CENTRAL REGIONAL LABORATORY
GRAIN SIZING ANALYSIS

DATA SET # 940098 SAMPLE # 94ZG08S11 (13)

A. Original Wet Weight of Sample: 137.280 g Dish Id: 13

B. Weight of Dried Sample Washed through # 200 Sieve: 113.320 g

C. Weight of Sample Recovered from Washing through # 200 Sieve: 112.622 g

D. % of Sample Passed # 200 Sieve = $\frac{(B - \text{SIEVE TOTAL})*100}{B}$ = 0.09%

SIEVE #	SIEVED SAMPLE WT (G)	SIEVE TARE WT (G)	RETAINED WT (G)	% SAMPLE RETAINED
3/8	645.4	645.4	0.00	0.00
4	646.1	646.1	0.00	0.00
10	526.5	526.5	0.00	0.00
16	510.8	510.9	-0.10	-0.09
28	474.2	474.3	-0.10	-0.09
50	456.9	456.2	0.70	0.62
100	514.9	425.3	89.60	79.64
200	519.6	497.2	22.40	19.91
SIEVE TOTALS			112.50	99.99

RR/SF/STOUGHTON/RPTS / 33005950

[redacted]

REGION

V

Remedial Planning Activities At Selected Uncontrolled Disposal Sites

U.S. EPA Contract No. 68-W8-0089

Roy F. Weston, Inc.
Dames & Moore
Engineers International, Inc.
Life Systems, Inc.
Hubbell, Roth & Clark, Inc.
Reid, Quebe, Allison, Wilcox & Associates, Inc.
Mary Sexton Associates

4P-2481

REMEDIAL DESIGN DATA COLLECTION REPORT FOR STOUGHTON CITY LANDFILL STOUGHTON, WISCONSIN

VOLUME II

June 1995

Prepared for:

U.S. Environmental Protection Agency
Emergency and Remedial Response Branch
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

This document was prepared in accordance with U.S. EPA Contract No. 68-W8-0089, WESTON Region V Alternative Remedial Contracting Strategy (ARCS).

Work Assignment No. 54-5NT2 Document Control No. 4500-54-ALDX

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

SECTION 1
INTRODUCTION

This report is Volume II of the Remedial Design (RD) Data Collection Report for the Stoughton City Landfill (SCL) site in Stoughton, Wisconsin. The RD Data Collection Report presents the predesign data collection activities associated with the groundwater remedial action. The RD Data Collection Report consists of two volumes: Volume I and Volume II. Volume I presents a background summary of key activities, and the rationale, procedures, and results of all predesign field activities except the activities related to the aquifer pumping test. Volume II presents the field procedures, results, and supporting data analysis for the aquifer performance evaluation.

The aquifer performance evaluation was conducted to determine the hydraulic characteristics of the saturated zone downgradient of the waste disposal area and within an apparent contaminant plume. Characterization of the aquifer hydraulic parameters is necessary in order to evaluate the design parameters of the selected remedial action, which includes a groundwater extraction system. Based on available information, the aquifer test was located in an area where it was determined that the extraction well could potentially be used as part of a permanent extraction well during groundwater removal. A site map is shown in Figure 1-1.

The aquifer performance evaluation was conducted in accordance with the predesign activities outlined in the Remedial Design Work Plan Revision dated 19 April 1994. This document is prepared as a supplement to, and is incorporated into, the Data Collection Report (30% Groundwater Design) document (Volume I).

Aquifer performance evaluation activities were carried out concurrent with other predesign activities, including sediment and surface water characterization, groundwater contaminant characterization, and exploratory borings in the landfill. The results discussed in this document are intended for use with the results of other activities for the design of a groundwater extraction system that will contain and remove the identified lateral extent of contaminants. An evaluation of the geologic/hydrogeologic characteristics of the study area is provided in the Data Collection Report (Volume I). A representative geologic cross section of the aquifer test area is shown in Figure 1-2.

Section 2 of this report contains information regarding aquifer test design and implementation. Section 3 summarizes the results of the aquifer test data analysis. Supporting documentation and raw data are included in Appendices A through E.

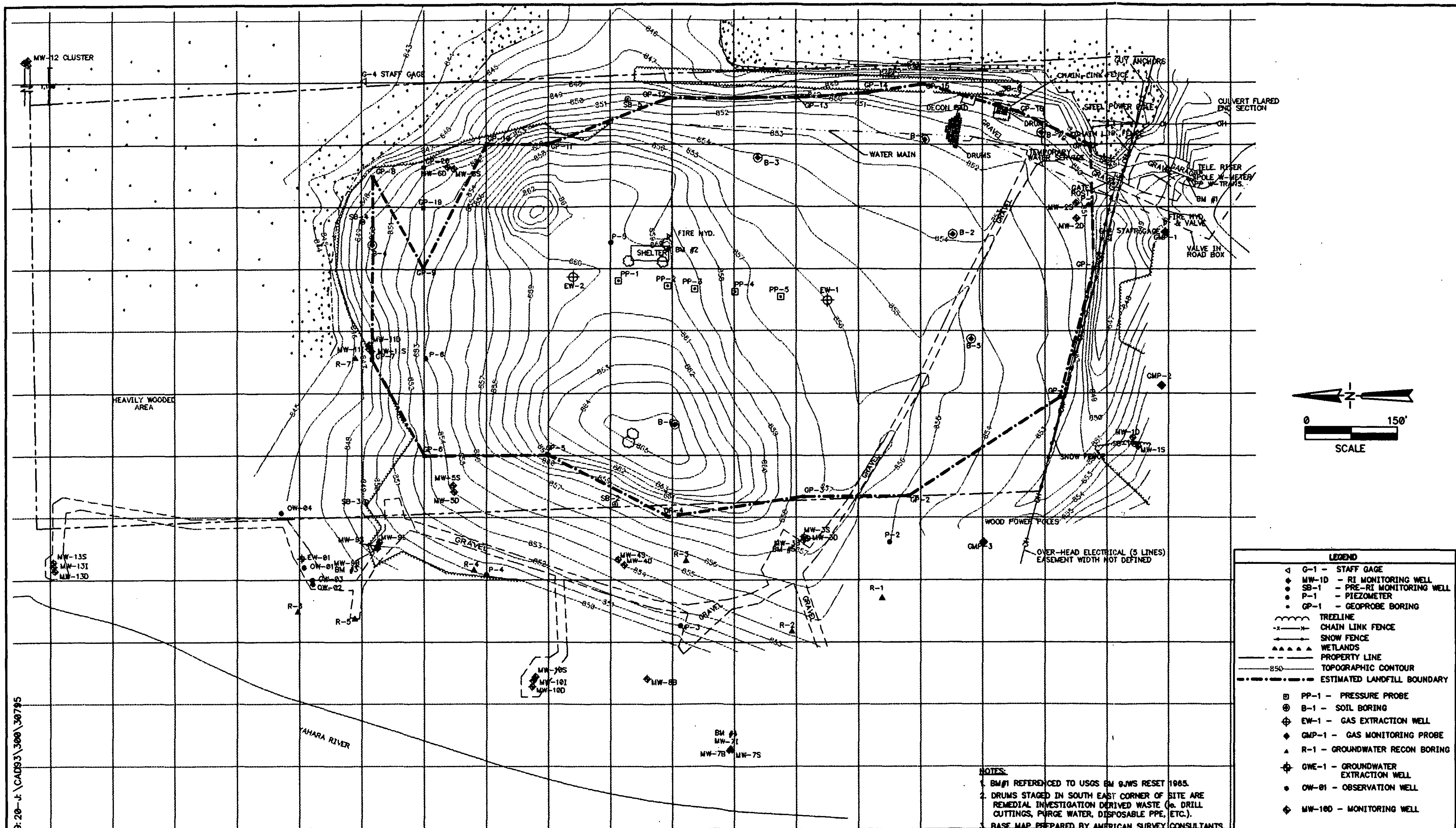


FIGURE 1-1

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

EXISTING SITE CONDITIONS

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

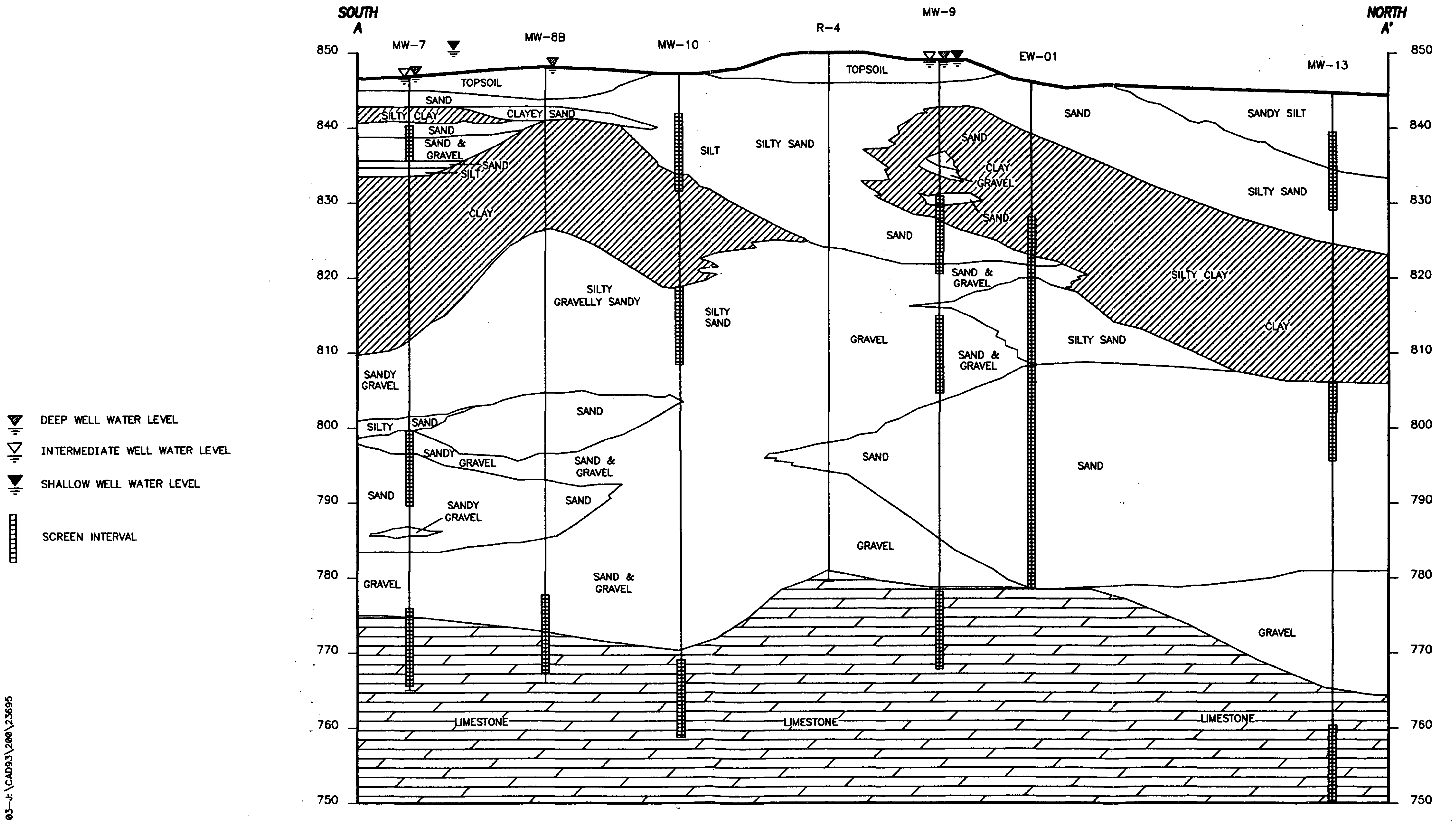


FIGURE 1-2

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

REPRESENTATIVE CROSS-SECTION

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

SECTION 2
AQUIFER TEST DESIGN AND IMPLEMENTATION

Aquifer performance evaluation activities were performed in accordance with the approved Remedial Design Work Plan Revision (19 April 1994). Site conditions necessitated slight modifications to the methods and procedures utilized. The aquifer performance evaluation consisted of the following activities:

- Pre-test Activities:
  1) Installation of the extraction and observation wells.
  2) Pump installation and discharge line setup.
  3) Data logger setup.
  4) Static water level monitoring.

- Aquifer Test Activities:
  1) Step-drawdown (variable discharge rate) testing.
  2) Constant discharge rate 72-hour testing.
  3) Aquifer recovery monitoring.

Additional activities carried out concurrent with the activities above included periodic monitoring of atmospheric pressure and sampling of discharged groundwater both at the extraction point and at the Stoughton Publicly-Owned Treatment Works (POTW) at various intervals. The results of this groundwater and influent/effluent sampling are discussed in Volume I of the Data Collection Report.

Table 2-1 summarizes the chronology of events associated with the aquifer performance evaluation.

2.1 AQUIFER TEST DESIGN AND LAYOUT

The aquifer test extraction and observation wells are located in the northwest portion of the site between the landfill boundary and the Yahara River. This location was selected based on the results of groundwater sampling and analysis, which indicated the presence of contaminants of concern within an apparent groundwater plume emanating from the landfill in this direction. A discussion of the groundwater analytical results and the conclusions regarding the nature and extent of contamination is presented in Volume I of the Data Collection Report.

The aquifer test involved the extraction of groundwater from one well (EW-01) and monitoring of groundwater levels at the following nine observation points:

- OW-1, OW-2, OW-3, and OW-4.
- MW-9S, MW-9I, and MW-9B.
- MW-6S and MW-6D.

Figure 2-1 shows the aquifer test layout and Table 2-2 summarizes the observation well depths and respective distances to the extraction well, as well as relevant well construction details. Boring logs for each of the above wells are included in Appendix A.

OW-1 through OW-4 were installed in conjunction with the extraction well and are all within 80 feet of the extraction well location. These wells were installed specifically to monitor the effects of pumping within proximity to the extraction well. OW-1, OW-2, and OW-4 were installed to intermediate depths below the potential clay confining unit and within the aquifer at depths corresponding to the approximate pump depth setting in the extraction well.

OW-3 was screened above the clay layer to evaluate whether leakage from the overlying layer was a significant component to groundwater flow.

Monitoring wells MW-9S, MW-9I, and MW-9B were installed previously during followup Remedial Investigation (RI) activities conducted by Jacobs Engineering. The wells are located approximately 125 feet from the extraction well location. These wells were selected due to their proximity to the extraction well and the slightly different geologic conditions present at that location. MW-9B represents the only well screened in the limestone bedrock within acceptable distance of the extraction well to monitor the potential effects of pumping on that unit.

Monitoring wells MW-6S and MW-6D are located on the northeast side of the landfill site approximately 673 feet from the extraction well. These locations were monitored at the request of U.S. EPA to evaluate whether pumping in the area of the contaminant plume could have a potential effect on the mounded groundwater conditions present underlying the landfill and, in turn, any effect on wetland water levels north and east of the site.

The duration of the aquifer test was scheduled for 72 hours to allow observation of early time data (when the most significant changes in drawdown occur) and late time data as the aquifer approached steady-state conditions. The 72-hour time frame was also selected in order to more fully stress the aquifer, given the apparently variable geologic/hydrogeologic conditions present and limited flow rate used.

Preliminary flow rates were estimated using RI data for apparent hydraulic conductivity derived during the RI using slug tests. Based on predicted drawdown calculations using RI data, the pumping rate was estimated to be approximately 50 to 75 gallons per minute (gpm). Preliminary modeling indicated these extraction rates would result in minimal drawdown of the water table in the vicinity of the aquifer test, although sufficient for data analysis. The final extraction rate was intended to be based on the results of the step-rate drawdown test. An additional extraction rate restriction that was considered was that the intended discharge point (City of Stoughton lift station) was limited to a maximum sustained flow of 75 gpm.

2.2 PRE-TEST ACTIVITIES

The following subsections describe the pre-test activities conducted relative the aquifer performance evaluation test and setup.

2.2.1 Extraction Well and Observation Well Installation

The design of the aquifer test included the installation of one groundwater extraction well and four observation wells located in the immediate vicinity of the extraction well. These wells were installed during October 1994.

The extraction well was constructed of 6-inch stainless steel casing and screen materials so that the well could be used as a permanent extraction well in future remedial action. With this in mind, the well was installed in the approximate center of the contaminant plume as determined using available information. The well was installed with a 50-foot well screen set from approximately 17 to 67 feet bgs to fully penetrate the sand and gravel aquifer at that location. Well screen material was continuous wire-wrap type 304 stainless steel with 0.020-inch slot openings.

Observation wells OW-1 through OW-4 were installed at pre-selected radial distances from the extraction well to monitor the effects of pumping on the aquifer. Each well was constructed of 2-inch diameter PVC casing and screen materials. Screens in OW-1, OW-2, and OW-4 were 10 feet long and consisted of 0.010-inch continuous slot material set at depths of 35 to 45 feet bgs. OW-3 was set shallow at a depth of 10 feet bgs and consisted of 5-foot PVC screen (0.010-slot).

Wells were installed using standard hollow-stem auger (HSA) rotary drilling equipment. Each borehole was sampled using split-spoon samples in accordance with ASTM D-1586 at 5-foot intervals or as the field geologist deemed necessary to adequately characterize the subsurface stratigraphy. Following installation, each well was developed by removing a minimum of 5 to 10 well volumes of water and monitoring field parameters for stabilization in accordance with the approved work plan.

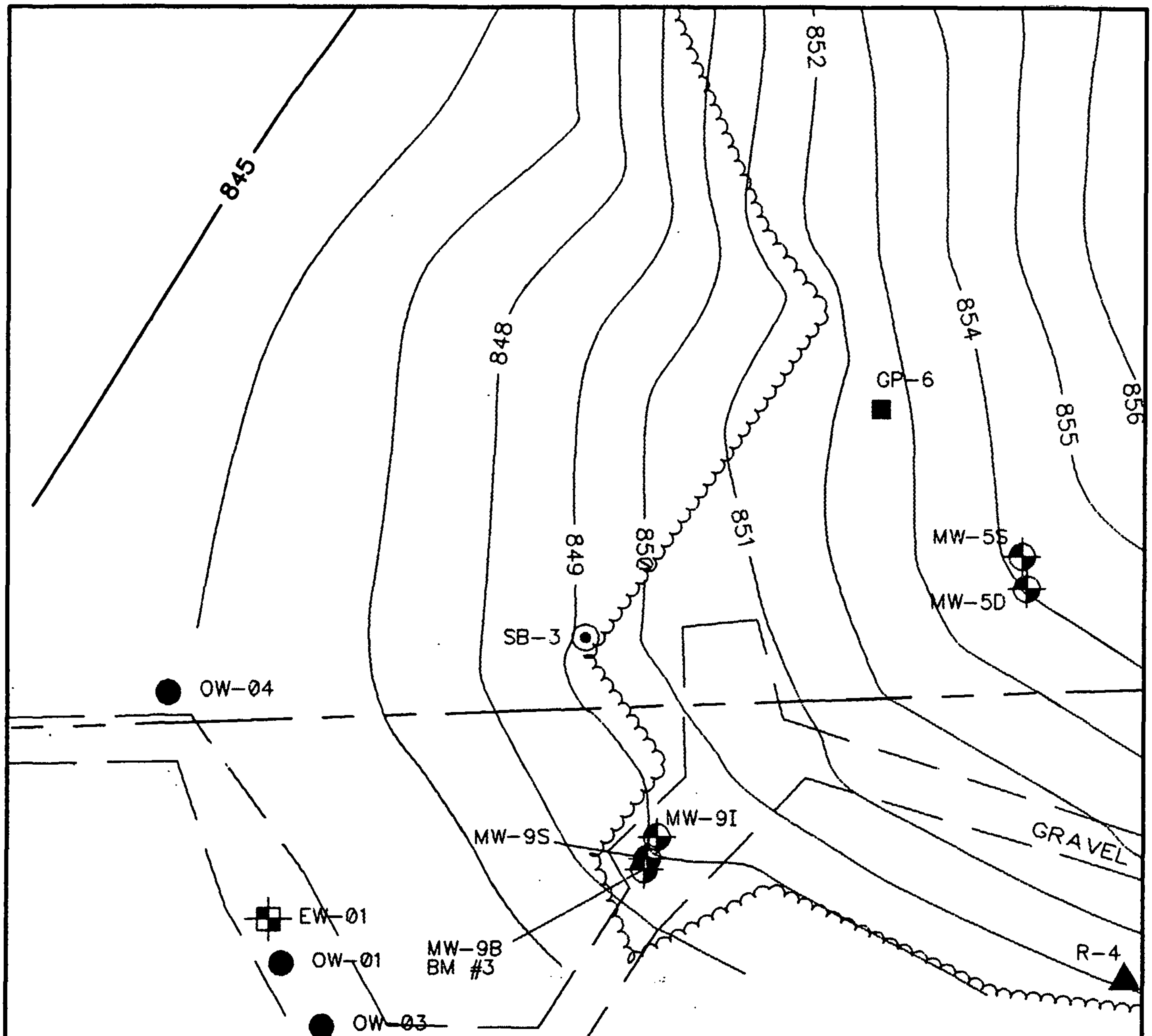
2.2.2 Pump Installation and Discharge Line Setup

To accommodate the varying flow rates specified for both the step drawdown test and constant rate test, a 5-horsepower electric submersible pump was installed in the extraction well (EW-01). The pump intake was set at a depth of 47 feet, which is the approximate midpoint of the extraction well screened interval. A second submersible pump was also mobilized to the site as a backup measure.

Because the aquifer test was located in an area where the presence of contaminated groundwater was known, the method of discharge was chosen carefully. To avoid discharge of contaminated groundwater to the Yahara River or to the ground surface (which may have affected the aquifer test results), it was decided to discharge contaminated groundwater to the City of Stoughton sewer collection system tributary to its wastewater treatment plant (WWTP).

The groundwater discharge point for the aquifer test consisted of a storm water lift station located approximately 2,100 feet from the extraction well. Four-inch diameter PVC discharge pipe was laid out and connected along the access road for a distance of 1,600 feet. The remaining 500 feet of discharge line was reduced to 3-inch diameter PVC pipe, which extended to the lift station. The smaller diameter pipe was used to facilitate crossing the residential street between the site and the lift station. Ramps were built and installed with the necessary traffic barriers, and the lift station access doors were chained and locked as a safety precaution.

Several measurement devices and auxiliary backup devices were installed where the discharge pipe exited the extraction well. Two flow meters were installed in the line to measure both instantaneous flow and total groundwater flow through the pipe. A direct-reading (gpm) McCrometer type flowmeter was installed that indicated accurate flow measurements above approximately 40 gpm. A totalizer meter was also installed, which could be used to calculate both instantaneous flow rate and total flow throughout the tests. A bypass line was also constructed which contained an in-line booster pump that could be activated in the event that the submersible pump experienced problems overcoming the hydraulic head and friction loss requirements of moving the extracted water from the well to the discharge point.



AQUIFER TEST WELLS	DISTANCE FROM EW-1 (ft)
OW-1	15
OW-2	45
OW-3	39
OW-4	80
MW-9S	124
MW-9I	124
MW-9B	123
* MW-6S	672
* MW-6D	673

* LOCATION NOT DEPICTED THIS FIGURE

FIGURE 2-1

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

AQUIFER TEST LAYOUT

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

Table 2-1

Summary of Aquifer Test Events
Stoughton City Landfill
Stoughton, Wisconsin

Event	Time Period
Extraction and observation well installation	October 1994
Static water level monitoring	20 through 22 March 1995
Barometric pressure monitoring	20 through 25 March 1995
Step drawdown test	22 March 1995
72-Hour aquifer test	22 through 24 March 1995
Recovery monitoring	24 March 1995

Table 2-2

Summary of Observation Well Data
Stoughton City Landfill
Stoughton, Wisconsin

Well	Total Depth bgs (ft)	Aquifer	Screened Interval from Top of Aquifer	Aquifer Thickness (ft)	Radial Distance from EW-1 (ft)	Depth to Water (bgs)	Well Diameter (in.)
OW-1	44	Sand and gravel	7-17	40	15	0*	2
OW-2	39	Sand and gravel	7-17	42	45	0*	2
OW-3	10	Shallow clay unit	5-10	10	39	0*	2
OW-4	39	Sand and gravel	14-24	52	80	0.47	2
MW-9S	28	Sand and gravel	0-10	52	124	0.30	2
MW-9I	44	Sand and gravel	16-26	52	124	0.63	2
MW-9B	81	Limestone	71-81	81	123	0.70	2
EW-1	67	Sand and gravel	0-41	41	NA	0*	6

*Measured water levels are actually above ground surface (artesian conditions).
NA - Not applicable.

SECTION 3
AQUIFER TEST DATA ANALYSIS

Based on boring logs and water levels observations from piezometers and monitoring wells throughout the site, a series of conceptual hydrogeologic models were developed to analyze the aquifer test data. As discussed in Volume I of the Data Collection Report (Volume I) and shown in cross section figures, a clay layer is present in the vicinity of the extraction well. However, this clay layer is not present at all locations within the realm of the aquifer test. Monitoring wells screened below the clay layer indicate measured static water levels above the clay layer, and in some cases above the ground surface indicating artesian conditions. This is indicative of a confined aquifer system. However, WESTON also noted at some drilling locations that the clay layer was observed to be very thin or absent, with water levels found within the sand unit. This would suggest semi-confined or unconfined conditions. The location of the extraction well and observation wells OW-1 through OW-4 was in an area where the clay layer was present. Approximately 125 feet to the east, in the vicinity of the MW-9S,I,B well cluster, the clay layer was observed either to be less than 5 feet thick or absent altogether. The contaminant plume is therefore located in a transitional area between potentially confined and semi-confined/unconfined conditions. Depending on the seasonal water level variations, the aquifer in this area may display the characteristics of several aquifer types.

The following subsections present the results of the various components of the aquifer performance evaluation, including an evaluation of static water levels, atmospheric pressure, step-drawdown test, 72-hour constant rate test, and recovery monitoring.

3.1 STATIC WATER LEVELS AND BAROMETRIC PRESSURE MONITORING RESULTS

The initial step in analyzing the aquifer test results was to evaluate the static water level data obtained prior to pumping in EW-01. Water levels were recorded for a period of approximately 2 days (2,400 minutes) prior to initiation of the step test. Static water level data are shown on Figures 3-1 and 3-2. Raw data are provided in Appendix B.

Very little change was noted in static water levels at the observation points prior to the test. Static water levels remained relatively constant throughout the monitoring period. Some minor variations or trends were noted in MW-9S and OW-3, which are both screened in shallow aquifer zones. MW-9S exhibited water level fluctuations over a narrow range throughout the monitoring period; however, the overall change was negligible.

A trend of gradually rising water levels was observed in OW-3, with an overall net increase of approximately 0.3 foot during the monitoring period. OW-3 is screened above the clay layer described earlier and, as such, may be more influenced by atmospheric variables such as barometric pressure or precipitation, or a gradual rise in river bank storage elevation due to precipitation within the drainage basin.

Given the stable static water levels monitored in the aquifer test wells screened in the same unit as the extraction well, no corrections to drawdown data observed during the test were performed.

Barometric pressure was also monitored throughout the aquifer test activities. The results of these measurements are portrayed on Figure 3-3 as a plot of barometric pressure (inches of mercury) vs time. Barometric pressure was observed to fluctuate within a relatively narrow window of approximately 29.5 to 29.9 during testing activities. This indicates that a moderately low pressure system was present in the area throughout the test, and is consistent with observed weather conditions during the test, which consisted typically of cloudy conditions with short periods of drizzle and rain. No significant rain events were observed during the 72-hour aquifer test or recovery period.

3.2 STEP DRAWDOWN TEST

A step drawdown test was conducted at pumping rates of 20, 40, 60, and 80 gpm to evaluate extraction well performance and select the appropriate discharge rate for the 72-hour test that would provide maximum drawdown with minimum inefficiency due to well loss variables. During each pumping step, drawdown was plotted for the extraction well on semi-log paper to determine a well loss coefficient. It became apparent during each pumping step that the extrapolated well loss coefficient was very low, indicating the extraction well was properly designed and developed, and could produce a much greater flow rate than the maximum step pumped (80 gpm) without significant well loss or turbulent flow.

Based on these results, the maximum sustained flow rate specified by the City (75 gpm) was selected for the constant discharge test to stress the aquifer as much as possible to induce the maximum drawdown in the observation wells. Step drawdown raw data information is provided in Appendix B.

3.3 72-HOUR CONSTANT RATE TEST ANALYSIS RATIONALE

The drawdown data from the 72-hour constant discharge test were evaluated to determine the primary hydraulic parameters of transmissivity (T), storage coefficient (S), and hydraulic conductivity (K). Where individual methods allowed, values of specific yield, anisotropy, and beta (leakage factor) were also determined.

Aquifer test data analysis was initiated using four conceptual models based on the site geology and observed water levels as follows:

- Theis (1935) model - Although this model applies primarily to confined aquifer conditions, this method is applicable to early time data (Driscoll, 1986) before the effects of leakage from an overlying confining layer or recharge from an apparent constant head boundary are observed.

- Hantush (1964) model - This model assumes leaky confined (semi-confined) conditions with water released from storage and partially penetrating observation wells. The type curves for this model closely resemble the data curves generated from the majority of the observation wells.

- Neuman (1975) model - This model assumes unconfined aquifer conditions.

- Hantush (1959) Image Method - This is an inflection point method useful for evaluating aquifer parameters in the vicinity of a single recharge boundary and locating the approximate distance of the recharge boundary from the extraction well when it may not necessarily correspond to the observed river bank.

For each observation well, water levels were plotted as a function of time on both semi-log and log-log graphs. These graphs are depicted in Figures 3-4 through 3-7. Aquifer test raw data are contained in Appendix B.

A comparison of the time-drawdown plots for each observation well to that of the type curves for each of the four conceptual models indicates that the aquifer does not completely respond in the manner of a simple, idealized (Theis) aquifer. The early time data appears to conform to this model; however, the drawdown curves deviate or appear to flatten at times ranging from less than 1 minute to approximately 10 minutes. This deviation (or decrease in the rate of drawdown) from the Theis type curve indicates leakage or recharge from a potential confining or semi-confining layer, or the presence of constant head aquifer boundary within the extent of the pumping well cone of depression. This response was observed in observation wells OW-1, OW-2, and OW-4, as well as the extraction well (EW-1).

The leakage or boundary conditions described above are plausible given the site geologic/hydrogeologic conditions. Soil boring characterization of the site in the vicinity of the pumping and observation wells indicates a thick clay layer present from depths ranging from just below the ground surface to approximately 25 feet. In addition, the Yahara River, a potential constant head recharge boundary, is present approximately 200 feet west of the extraction well. Based on the observations above, OW-1, OW-2, and OW-4 drawdown data were analyzed according to the methods of Theis (1935) and Hantush (1964) using primarily the early time data before the effects of recharge were encountered. To evaluate the effects of recharge and determine the relative position of the recharge boundary, data from OW-2 and OW-4 were also analyzed using the inflection point method of Hantush (1959).

OW-3, which is screened within and above the saturated clay layer present in the area, was installed to evaluate whether the clay unit acted as a potential confining layer (no response to pumping), semi-confining layer (delayed response), or had no effect on the aquifer (instantaneous response). The time-drawdown plot for this well indicate slight fluctuation of water levels, although sustained drawdown is not apparent until approximately 1,000 minutes into the test. At this point, a marked increase in drawdown was observed. This indicates that pumping in the aquifer below the clay layer was sufficient enough to induce an effect (leakage) in the clay unit. This is important in that it verifies the clay layer is extensive enough to act locally as a semi-confining layer that transmits groundwater to the sand and gravel aquifer through vertical leakage. Aquifer analysis was not performed on the data from this well, due to the very late time response and lack of a definable drawdown curve.

Observation wells MW-9S, MW-9I, and MW-9B exhibited slightly different time-drawdown characteristics than those described above. MW-9S, which is screened directly under the clay layer, displayed drawdown that appeared to follow the characteristic Theis type curve for early time (less than 10 minutes). At approximately 10 minutes, the drawdown reversed and the water level rose slightly. At approximately 100 minutes into the test, drawdown began to increase again and continued to generally increase with slight fluctuations throughout the remainder of the test. The observed early water level rise consisted of less than 0.1 feet and may have been due to a slight fluctuation of the water table due to atmospheric conditions. The overall shape of the curve, however, still reflects a semi-confined aquifer condition. Based on these observations, the drawdown data was analyzed using the Theis (1935) and Hantush (1964) methods using primarily the early time data before the effects of leakage were observed.

MW-9I, which is screened in sand and gravel deposits in an area where the overlying clay layer is thin to absent, displayed a time-drawdown curve that more closely resembled that of an unconfined aquifer with delayed yield. While the curve is similar to that of the OW wells (semi-confined), the lack of a confining clay layer and greater distance to the apparent recharge boundary (Yahara River) indicates that unconfined aquifer conditions likely dominate flow at this location. The drawdown data was analyzed using the Neuman (1975) method using both early and late time data to evaluate aquifer response throughout the test.

MW-9B, screened in the dolomite bedrock, was monitored to evaluate the effect of pumping on the shallow bedrock aquifer. The response to pumping indicated that drawdown was induced almost instantaneously, although the amount was very small (approximately 0.1 feet). This indicates the bedrock unit (at least the shallow weathered portion) is hydraulically connected to the overlying sand and gravel aquifer. The shape of the time-drawdown curve indicates early time data similar to the Theis type curve; however, as experienced at MW-9S, drawdown was observed to reverse and water levels rose at approximately 100 minutes into the test. This trend continued throughout the remainder of the test and through the recovery period, with slight fluctuations. Due to this response, only the early time data was used for analysis using both the Theis (1935) and Neuman (1975) methods. The Neuman method was selected due to the relatively thick sequence of overlying sand and gravel in direct hydraulic connection with the shallow bedrock, and because the shallow clay layer appears to be relatively thin or absent in the area.

Monitoring wells MW-6S and MW-6D, located on the east side of the site approximately 673 feet from the pumping well, were also monitored for drawdown during the aquifer test. Although this location is not within the theoretical pumping well influence at the prescribed pumping rate (75 gpm), monitoring was performed to evaluate whether any changes occurred that may impact the shape or groundwater flow directions in the apparent mounded configuration of the shallow groundwater table, which may, in turn, effect the wetland. As seen in Figure 3-6, water levels in these two wells remained relatively constant throughout the test indicating the effects of pumping did not extend this far. Based on these observations, no analyses were performed for these wells.

In addition to the above methods used to evaluate aquifer parameters at each respective monitoring point, the distance-drawdown method was also utilized to calculate aquifer parameters as a function of distance from the extraction well. This method determines results that can be characterized as average values for the area of the aquifer under influence by pumping.

Aquifer test analysis was completed with the aid the computer code AQUIX-4 Version 1.1 (EnviroTools, Ltd.; IGWMC, 1993). AQUIX-4 is a forward and inverse modeling program used to calculate transmissivity, storage coefficient, leakage factor, and anisotropy. Forward modeling allows the calculation of synthetic model curves and inverse modeling allows the parameters to be selected which best fit the data.

Aquifer test analyses using the Hantush (1959) Image and distance-drawdown methods were performed by manually plotting the data and using measured slope and intercept (straight-line) methods to calculate aquifer parameters.

3.3.1 72-Hour Constant Rate Test Results

Analysis of drawdown data was performed as described in the preceding subsection. The following subsections summarize the results of analysis at discrete monitoring points, as well as average values for the aquifer in the vicinity of the test. In addition, a discussion of the effects of the potential leakage and boundary conditions is presented. Aquifer test plots, including curve-matching and straight-time method graphs, are contained in Appendix C.

Transmissivity

Transmissivity is a measure of the amount of water that can be transmitted horizontally by the full saturated thickness of the aquifer, and as such, is defined as the product of the hydraulic conductivity and the aquifer thickness. The calculated results for transmissivity using the various methods discussed previously are summarized in Table 3-1.

Calculated transmissivity values for discrete well locations in the sand and gravel aquifer ranged from 1,018 to 5,590 ft^2/day (7,615 to 41,816 gpd/ft) using primarily early time data. Where multiple methods were applied to data from a single well, the results generally corresponded. The higher transmissivity values were obtained from the shallow and intermediate wells at the MW-9 location when compared to the OW wells. This is probably due to the greater saturated thickness of the sand and gravel in this area and the fact that the clay layer is thin or absent. The late time data from MW-9I yielded an anomalous transmissivity value of 12,668 ft^2/day (94,763 gpd/ft). The overall mean transmissivity value for discrete monitoring points was calculated to be 4,192 ft^2/day (31,358 gpd/ft).

Using the distance-drawdown method to calculate transmissivity as a function of distance from the extraction well at specified time intervals yielded results ranging from 3,330 to 4,524 ft^2/day (24,905 to 33,846 gpd/ft). The mean transmissivity value using this method was 4,197 ft^2/day (31,399 gpd/ft) and closely corresponds to the mean value for discrete well locations.

Transmissivity values calculated for the single well (MW-9B) screened in the limestone bedrock indicated values ranging from 40,799 to 46,227 ft^2/day (305,198 to 345,802 gpd/ft). While these values appear high compared to the overlying sand and gravel aquifer, they may represent secondary flow through fractures, bedding planes, or solution cavities characteristic of the shallow weathered zone of the formation where the well is screened.

Storage Coefficient

The storage coefficient represents the volume of water that a permeable unit will absorb or release from storage per unit surface area per unit change in head. In confined aquifers, this water is absorbed or released by compressibility of the mineral skeleton and the pore water throughout the entire thickness of the unit. Confined aquifers generally have storage coefficient of 0.005 or less (Fetter, 1988). In unconfined aquifers, the level of saturation rises and falls with changes in the amount of water in storage. As the water level falls (such as during a pump test), water drains from the pore spaces. Typical storage coefficient values for unconfined aquifers range from 0.02 to 0.3 (Fetter, 1988). Semi-confined aquifers can be expected to fall within a wider range that incorporates characteristics of both sets of values. Calculated storage coefficient values are summarized in Table 3-2.

Storage coefficient values calculated from discrete monitoring points ranged from 0.000379 to 0.023, indicating a wide range is present. In general, the lower values calculated were associated with analysis using the Theis (1935) and Hantush (1964) models using early time data. These models assume confined or semi-confined conditions, and as such, the values correspond well with the selected analytical method. The higher values were associated with the Hantush (1959) inflection point method, which is utilized primarily to evaluate boundary conditions (the model assumes confined or unconfined conditions).

Storage coefficient results from distance-drawdown data indicate increasing values with time from 0.0016 at the beginning of the test to 0.341 near the end of the test. This trend may indicate that as the aquifer is pumped and the radius of influence increases away from the area where the clay layer is present, the overall response of the saturated unit may be that of an unconfined aquifer or that storage is increased as river water is pulled into the drawdown area.

Hydraulic Conductivity

Radial (horizontal) hydraulic conductivity values represent the rate at which water can move through a permeable medium. These values were calculated using the following expression:

$$K = \frac{T}{b}$$

Where: T is the aquifer transmissivity.
b is the saturated thickness of the aquifer.

Aquifer transmissivity data were summarized previously in Table 3-1, and aquifer thickness was summarized on Table 2-2. Calculated radial hydraulic conductivity values are summarized on Table 3-3.

Calculated radial hydraulic conductivity values for discrete well locations in the sand and gravel aquifer ranged from 25.4 to 243.6 ft/day (9.0×10^{-3} to 8.6×10^{-2} cm/sec). Where multiple methods were applied to data from a single well, the results generally corresponded. The higher hydraulic conductivity values were obtained from the shallow and intermediate wells at the MW-9 location when compared to the OW wells. This is consistent with the greater saturated thickness of the sand and gravel in this area and the fact that the clay layer is thin or absent. The overall mean radial hydraulic conductivity value for discrete monitoring points was calculated to be 83.6 ft/day (2.95×10^{-2} cm/sec).

Using the distance-drawdown method to calculate hydraulic conductivity as a function of distance from the extraction well at specified time intervals yielded results ranging from 64.8 to 94.2 ft/day (2.3×10^{-2} to 3.3×10^{-2} cm/sec). The mean hydraulic conductivity value using this method was 80.1 ft/day (2.8×10^{-2} cm/sec) and closely corresponds to the mean value for discrete well locations. These values are consistent with the geologic materials underlying the site and published values for hydraulic conductivity.

Radial hydraulic conductivity values calculated for the single well screened in the limestone bedrock indicated values ranging from 503.7 to 570.7 ft/day (1.8×10^{-1} to 2.0×10^{-1} cm/sec). While these values appear high compared to the overlying sand and gravel aquifer, they may represent secondary flow through fractures, bedding planes, or solution cavities characteristic of the shallow weathered zone of the formation where the well is screened.

Additional parameters calculated during aquifer test analysis using the various methods included anisotropy and beta, which are summarized in Table 3-4.

Anisotropy values calculated using the Hantush (1964) and Neuman (1975) models represent the ratio of radial hydraulic conductivity to vertical hydraulic conductivity within the aquifer according the following expression:

$$a = \sqrt{\frac{K_z}{K_r}}$$

Where: K_z is the vertical hydraulic conductivity.
K_r is the radial hydraulic conductivity.

The vertical hydraulic conductivity at various well locations was calculated using the values previously calculated for radial hydraulic conductivity (Table 3-3) and solving for K_z. These values are summarized in Table 3-5.

Vertical hydraulic conductivity values for the sand and gravel aquifer ranged from 0.7 to 51.6 ft/day (2.6×10^{-4} to 1.8×10^{-2} cm/sec) with a mean value of 22.6 ft/day (4.3×10^{-3} cm/sec). Vertical hydraulic conductivity values are generally in the range of an order of magnitude smaller than horizontal hydraulic conductivities, which is consistent with the remainder of the data.

Beta values calculated using the Hantush (1964) model represent the leakage factor of the confining or semi-confining layer; in this case, the overlying saturated clay layer. Using the beta value, the hydraulic conductivity of the confining or semi-confining layer can be calculated according to the following expression:

$$\beta = \sqrt{\frac{r^2 K'}{T b'}}$$

Where: r is the radius of observation (distance from EW-1).
K' is the hydraulic conductivity of the confining layer.
T is the transmissivity of the aquifer.
b' is the saturated thickness of the confining layer.

The hydraulic conductivity of the clay layer was calculated using known and previously calculated values of r, b', and T, and solving for K'. These values are summarized in Table 3-6.

Hydraulic conductivity values for the semi-confining clay layer present in the area of the aquifer test ranged from 0.43 to 49.9 ft/day (1.5×10^{-4} to 1.7×10^{-2} cm/sec). The mean values of this range were calculated to be 14.4 ft/day (1.9×10^{-3} cm/sec). The calculated values for hydraulic conductivity of the clay semi-confining layer based on the leakage factor are only approximately an order of magnitude smaller than the aquifer itself. This indicates that the clay layer is only slightly confining and capable of transmitting large amounts of water through it to the underlying aquifer. These results are also an indication that the clay unit, being discontinuous in areal extent, does not significantly effect the hydraulic characteristics of the sand and gravel aquifer over a large area and that the reduced drawdown effects observed during the test are caused primarily by a recharge boundary condition.

Evaluation of Boundary Conditions

As discussed earlier, the presence of the Yahara River within 200 feet of the groundwater extraction well would indicate that a constant-head or recharge boundary condition exists at the site. The location of this boundary will have particular significance for the proper placement of final groundwater extraction wells. If the wells are placed too close to the boundary and the downgradient flow stagnation point intercepts or exceeds the location of the boundary, excessive amounts of clean river water may be drawn into the treatment system, thereby reducing the effectiveness of the treatment technology.

The preliminary evaluation of the drawdown data indicated that the drawdown curves were flatter than normal, indicating leakage and/or recharge effects are present. These effects result in less drawdown observed in wells closer to the recharge boundary. Additionally, the location of boundaries need not necessarily correspond to obvious geographic locations. Because of this, the approximate location of the anticipated recharge boundary was evaluated using the Hantush (1959) inflection point method, which is valid for single line sources (i.e., rivers, streams) that penetrate both confined and unconfined aquifers. Additional assumptions that must be satisfied are that the recharge boundary have a constant water level and that flow to the well is in unsteady state. These conditions are satisfied in that no significant rain events were noted during the test that could have effected that river water level, and steady-state conditions were not achieved during the relatively short (72 hours) aquifer test.

The analysis was performed on OW-2 and OW-4, which (geographically) are the nearest observation wells to the Yahara River that exhibited clear indications of recharge effects. OW-1 was not used due to its proximity to the pumping well. The results of this analysis indicated the location of the constant-head recharge boundary range from approximately 71 feet (OW-2) to 108 feet (OW-4) from the extraction well along a line perpendicular to the river. These results indicate that the boundary effects are encountered closer to the extraction well than the actual geographic river bank.

3.4 RECOVERY TEST ANALYSIS RATIONALE

Recovery data were collected and analyzed to confirm the results of the pumping drawdown data. The aquifer test recovery period lasted approximately 30 minutes, at which time the extraction well had completely recovered to pre-test conditions and the observation wells had also nearly completely recovered. Recovery is defined as the difference between the measured water level in an observation well at a given time after pumping stops and the level to which the water would have dropped to if pumping had continued (Driscoll, 1986). When defined this way, the degree of water level recovery at any time after the end of the pumping period is theoretically identical to the drawdown during the same time during the pumping period. As a result, the same analytical models used for the analysis of pumping data are valid for the recovery data analysis. Residual drawdown graphs for the observation wells are shown on Figure 3-8.

The Hantush (1964) model was used to analyze the recovery data from OW-1, OW-2, OW-4, and MW-9S, each of which behaved in a manner consistent with semi-confined aquifer conditions during the constant discharge rate test. Monitoring well MW-9I recovery data were analyzed using the Neuman (1975) method for unconfined aquifers consistent with the pumping data analysis.

In addition to the methods described above, data from each of the observation wells (as well as the groundwater extraction well recovery data) were also analyzed using the Jacob (1946) straight-line method, a computational slope and intercept method.

Recovery data were not analyzed for MW-9B due to the continued decreasing water levels observed throughout the recovery period. Similarly, no water level change was observed in OW-3 during the recovery period, and therefore, data analysis is not possible.

3.4.1 Recovery Test Results

Analysis of recovery data was performed as described in the preceding subsection. The following subsections summarize the results of analysis at discrete monitoring points. In addition, a discussion of the effects of the potential leakage and boundary conditions is presented. Recovery test data plots including curve-matching and straight-line method graphs are contained in Appendix D.

Transmissivity

The calculated results for transmissivity using the various methods discussed previously are summarized in Table 3-7.

Calculated transmissivity values for discrete well locations ranged from 958 to 15,195 ft^2/day (7,166 to 113,666 gpd/ft). Where multiple methods were applied to data from a single well, the results generated using the Jacob (1946) method were generally higher but within the same order of magnitude. Similar to the constant discharge test, the higher transmissivity values were obtained from the shallow and intermediate wells at the MW-9 location when compared to the OW wells. This is again attributed to the greater saturated thickness of the sand and gravel in this area and the fact that the clay layer is thin or absent. The extraction well (EW-1) yielded an anomalous transmissivity value of 15,195 ft^2/day (113,666 gpd/ft). However, it should be noted that some of the observed rapid recovery may have been due in part to water draining back into the well from the pump discharge line behind the cutoff valve and/or the effects of the recharge boundary (which may cause the well to recover more rapidly than expected since it has a significantly larger casing diameter and fully penetrates the aquifer). The overall mean transmissivity value for discrete monitoring points was calculated to be 4,179 ft^2/day (31,261 gpd/ft). This mean value closely corresponds to the data calculated from the constant discharge test.

Storage Coefficient

Calculated recovery test storage coefficient values are summarized in Table 3-8. Storage coefficient values calculated from discrete monitoring points ranged from 0.00041 to 0.0021. This range of values is consistent with the results of the constant discharge test

Storage coefficient values were not calculated using the Jacob (1946) method. Inspection of the straight-line graphs during calculation of transmissivity data indicates that the interpolated zero drawdown point occurs at a time ratio (t/t') point of greater than two. This indicates that the curve has been displaced by recharge and calculated values of storage coefficient may not be representative of actual conditions.

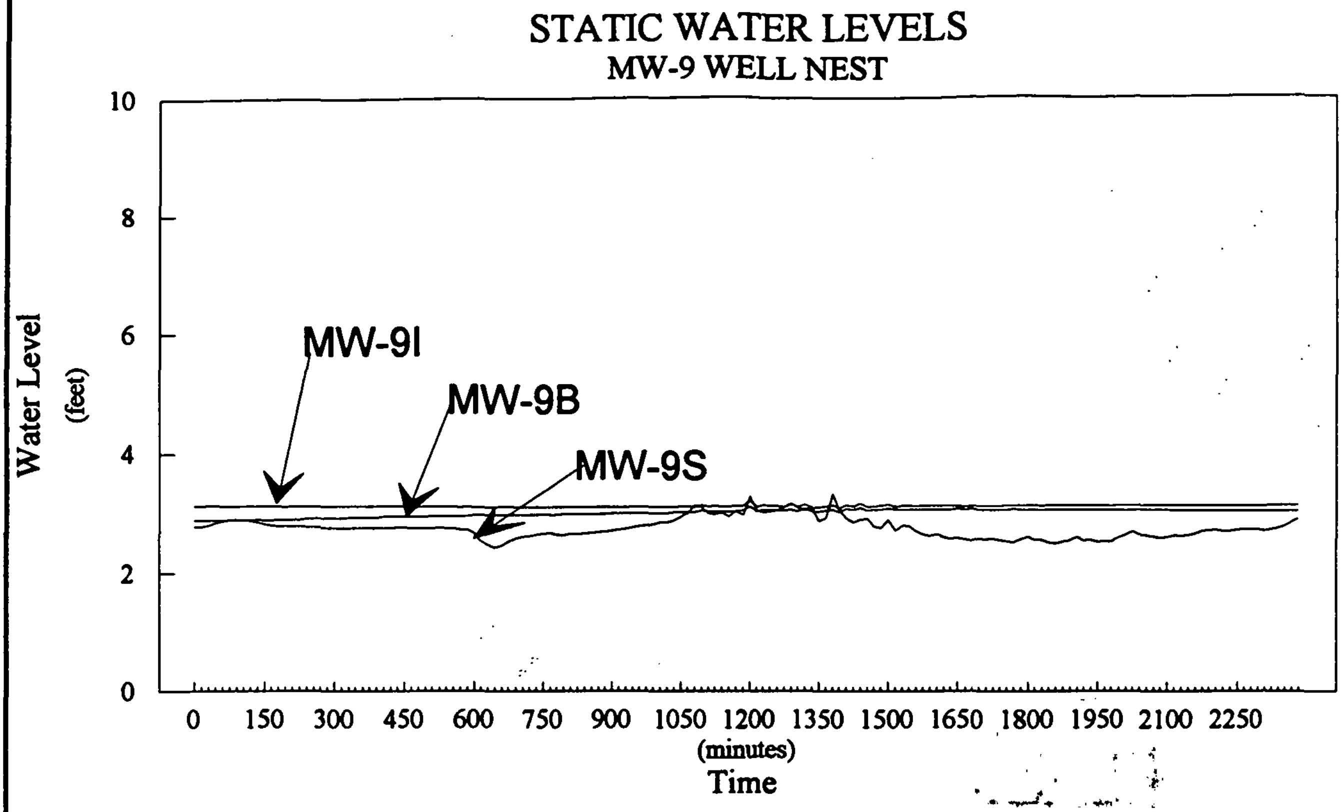
Hydraulic Conductivity

Calculated recovery test radial hydraulic conductivity values are provided in Table 3-7. These values for discrete well locations in the sand and gravel aquifer ranged from 24 to 371 ft/day (8.4×10^{-3} to 1.3×10^{-1} cm/sec). Where multiple methods were applied to data from a single well, the results generally corresponded. The higher hydraulic conductivity values were obtained from the shallow and intermediate wells at the MW-9 location when compared to the OW wells and are consistent with the greater saturated thickness of the aquifer in this area and the fact that the clay layer is thin or absent. The highest value was obtained for the extraction well. The overall mean radial hydraulic conductivity value for discrete monitoring points was calculated to be 86.6 ft/day (3.1×10^{-2} cm/sec).

Additional parameters calculated during recovery test analysis using the various methods included anisotropy and beta, which are summarized in Table 3-8. Anisotropy values calculated using the Hantush (1964) and Neuman (1975) models represent the ratio of radial hydraulic conductivity to vertical hydraulic conductivity within the aquifer as described previously. Using the values previously calculated for radial hydraulic conductivity (Table 3-7) and solving for K_v, the vertical hydraulic conductivity at various well locations was calculated. These values are summarized in Table 3-9. Vertical hydraulic conductivity values calculated from recovery test data ranged from 0.0014 to 102 ft/day (4.9×10^{-7} to 3.4×10^{-2} cm/sec). The mean value calculated from this range are 4.4 ft/day (1.2×10^{-3} cm/sec). These values are consistent with those calculated for the constant discharge test and are approximately one order of magnitude smaller than horizontal hydraulic conductivity results, which is typical of unconsolidated formation aquifers.

Beta values calculated using the Hantush (1964) model represent the leakage factor of the confining or semi-confining layer; in this case, the overlying saturated clay layer. Using the beta value, the hydraulic conductivity of the confining or semi-confining layer can be calculated as described previously. Using known and previously calculated values of r, b', and T, and solving for K', the hydraulic conductivity of the clay layer was calculated. These values are summarized in Table 3-10.

Hydraulic conductivity values calculated from recovery test data for the semi-confining clay layer present in the area of the aquifer test ranged from 1.1 to 68.9 ft/day (3.9×10^{-4} to 2.4×10^{-2} cm/sec). The mean value of this range were calculated to be 15.5 ft/day (2.2×10^{-3} cm/sec). The calculated values for hydraulic conductivity of the clay semi-confining layer based on the leakage factor are consistent with that calculated for the constant discharge test data for which the same conclusions can be drawn, namely, that the potential hydraulic effects of the clay semi-confining layer are secondary to the effects of recharge from the river in the vicinity of the aquifer test.



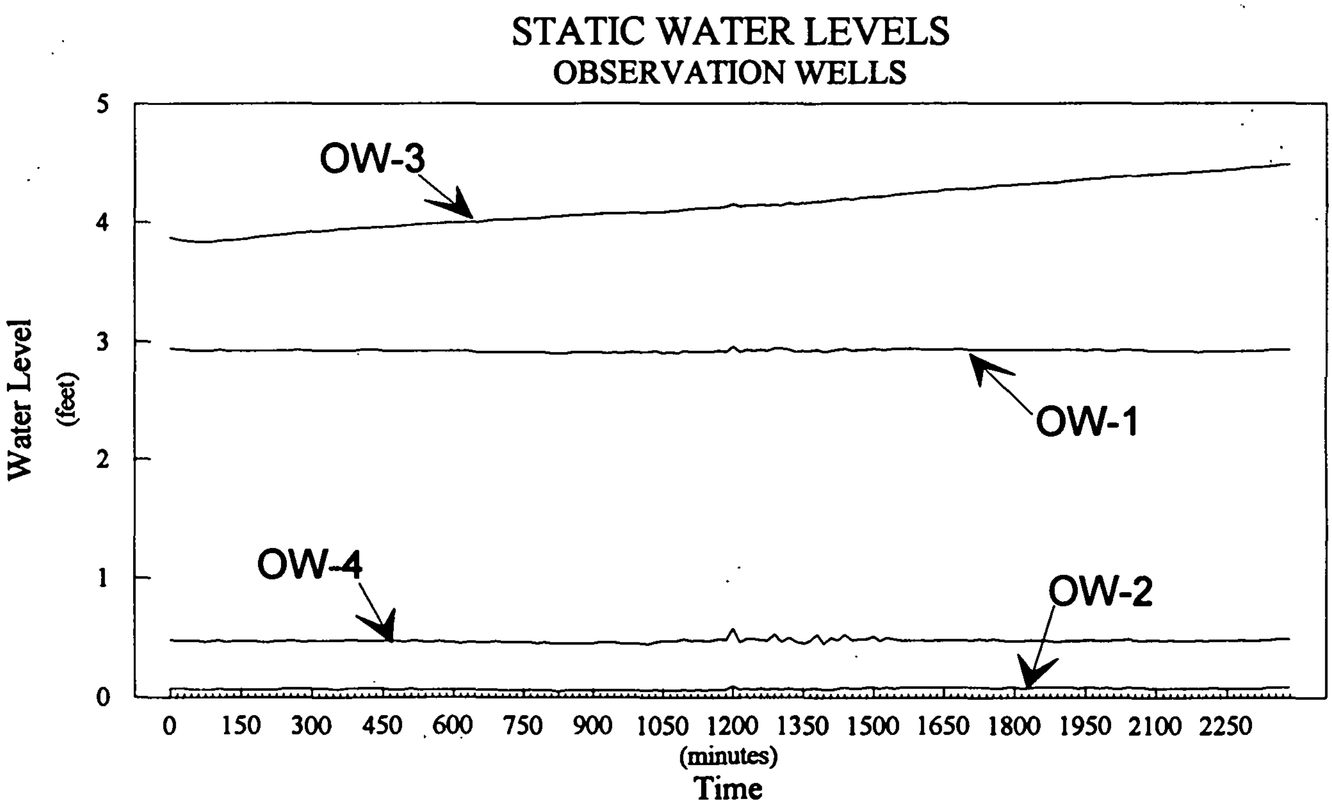


FIGURE 3-1

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	STATIC WATER LEVEL DATA MW9 AND OW WELLS STOUGHTON CITY LANDFILL Stoughton, Wisconsin

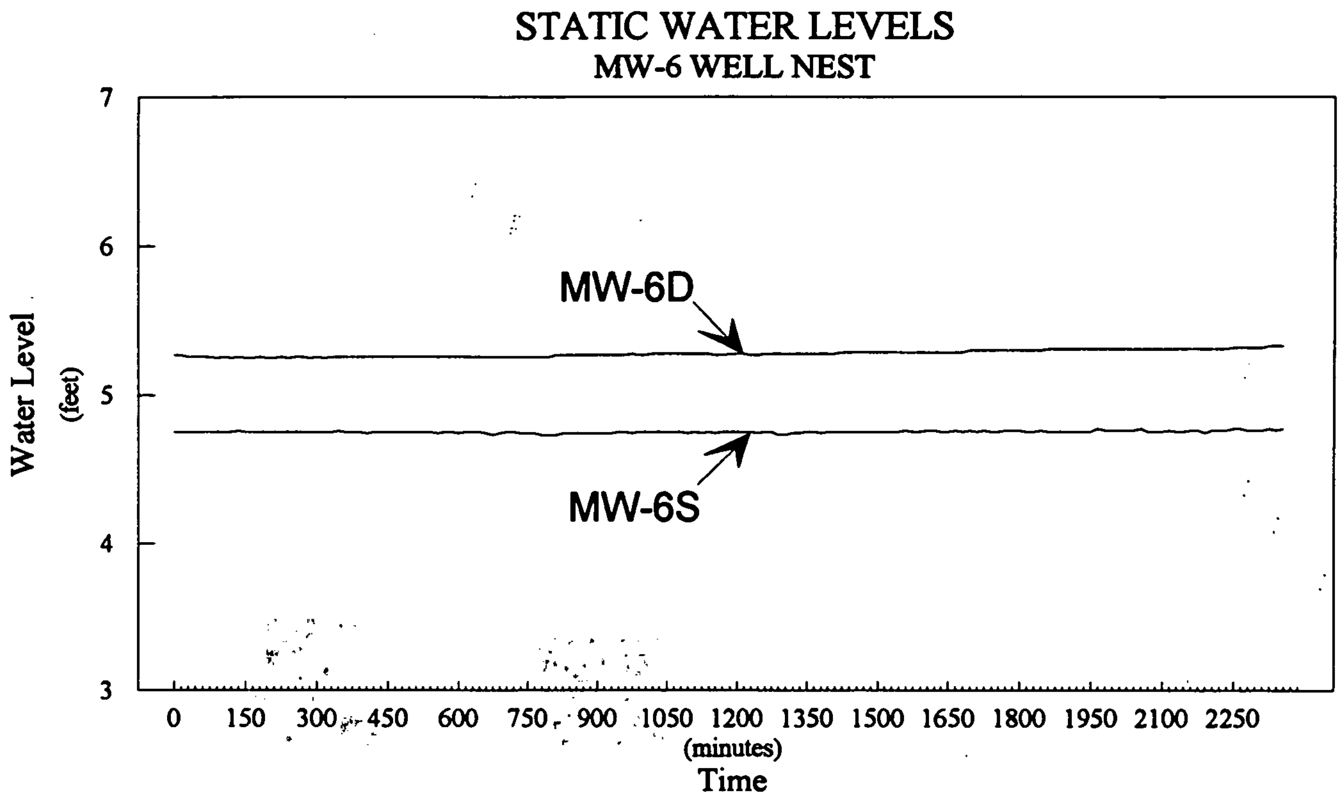


FIGURE 3-2

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

STATIC WATER LEVEL DATA MW6 WELLS

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

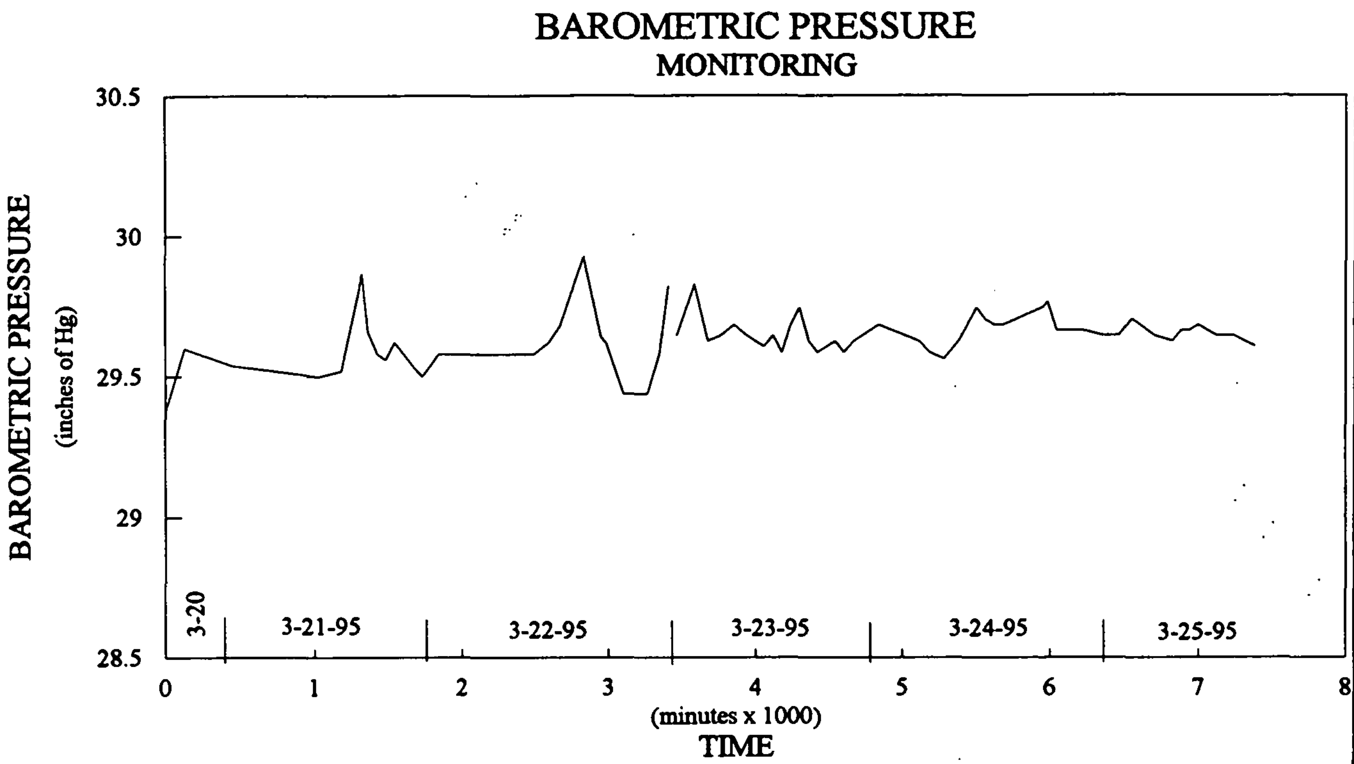
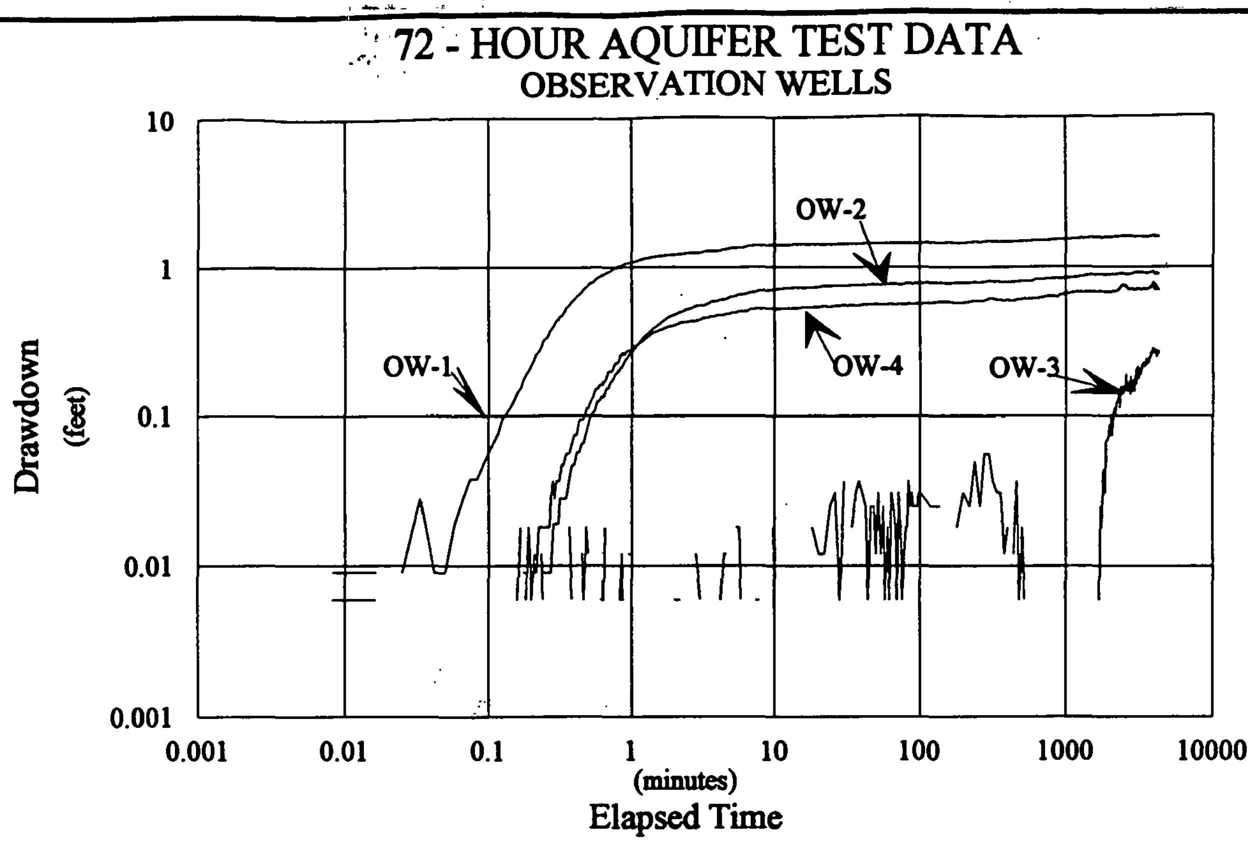
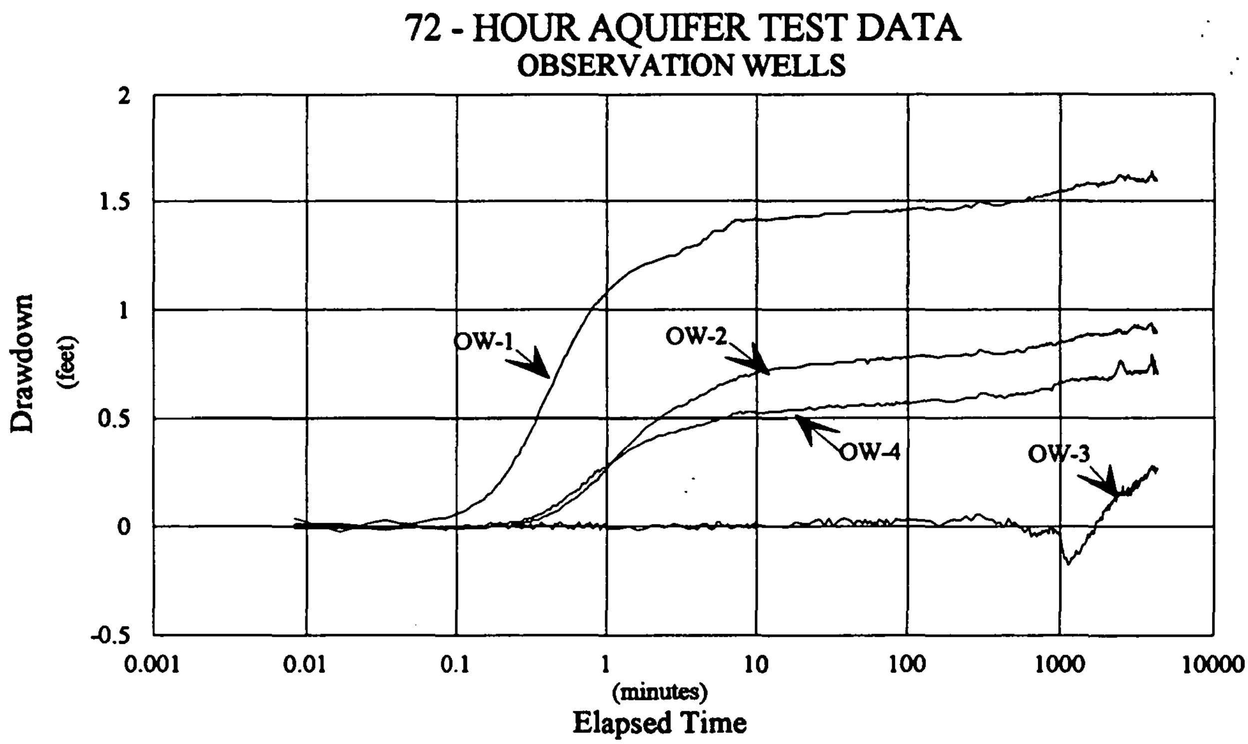


FIGURE 3-3

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	BAROMETRIC PRESSURE DATA STOUGHTON CITY LANDFILL Stoughton, Wisconsin



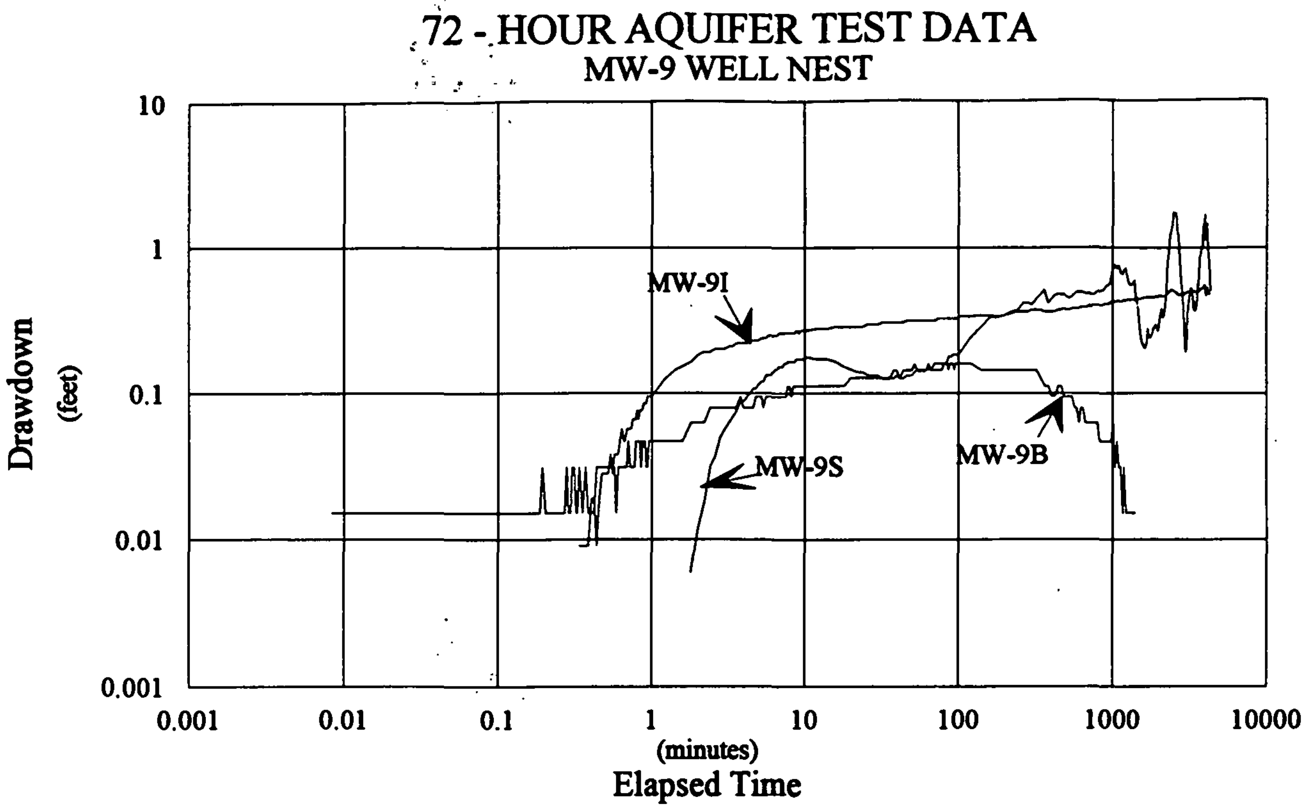
LOG-LOG PLOT



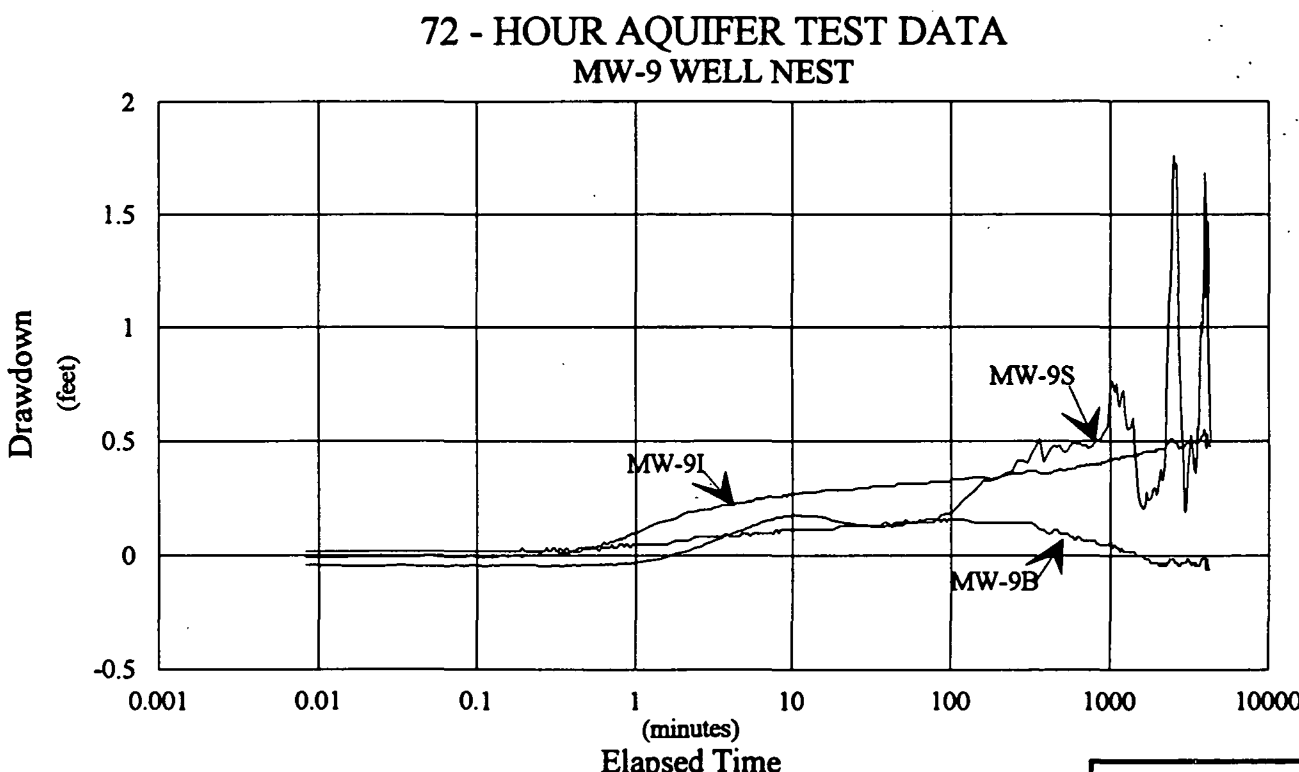
SEMI-LOG PLOT

FIGURE 3-4

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	TIME-DRAWDOWN GRAPHS OW WELLS STOUGHTON CITY LANDFILL Stoughton, Wisconsin



LOG - LOG PLOT

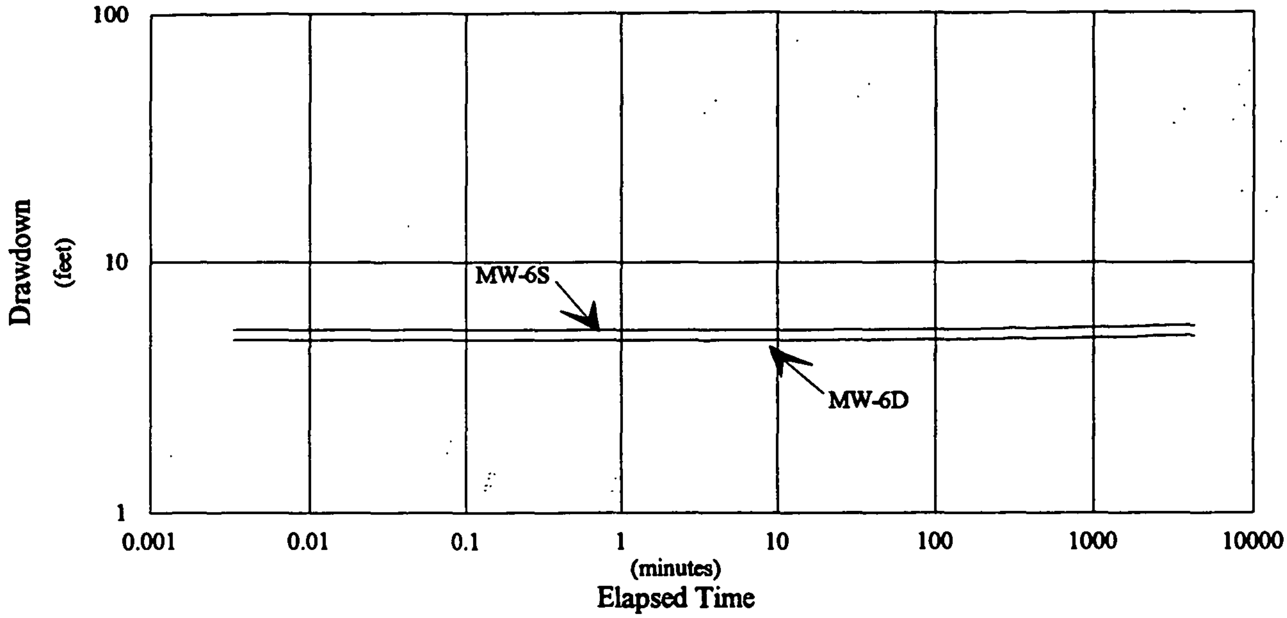


SEMI-LOG PLOT

FIGURE 3-5

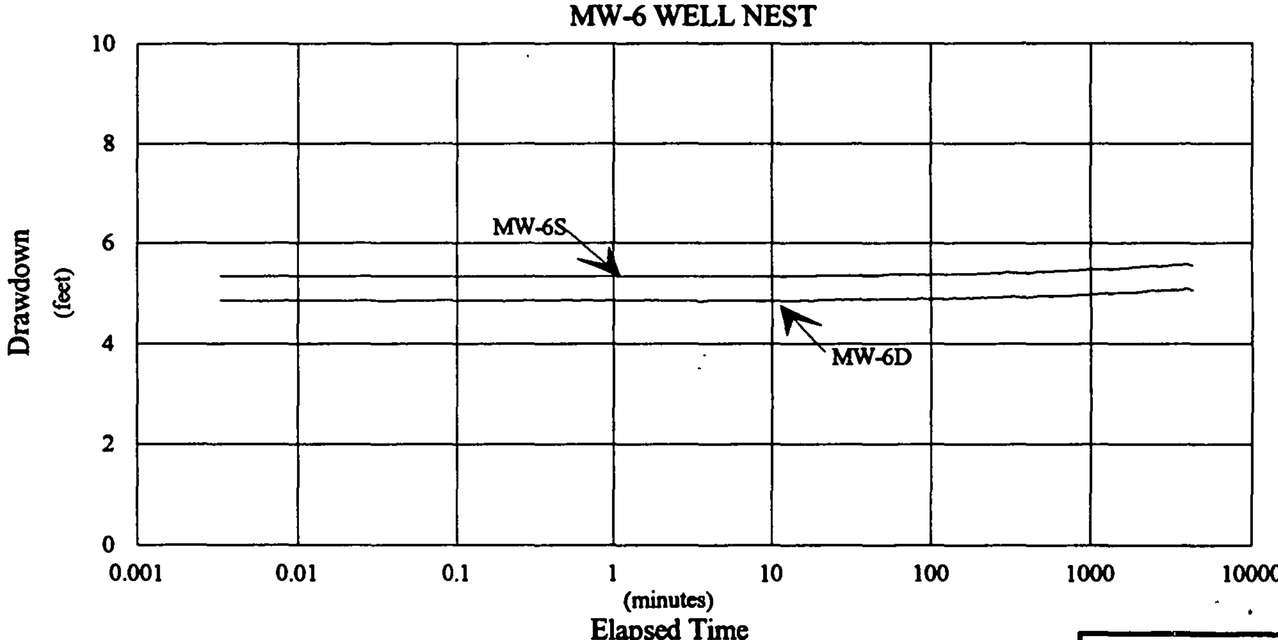
ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	TIME-DRAWDOWN GRAPHS MW9 WELLS STOUGHTON CITY LANDFILL Stoughton, Wisconsin

72 - HOUR AQUIFER TEST DATA
MW6 WELL NEST



LOG-LOG PLOT

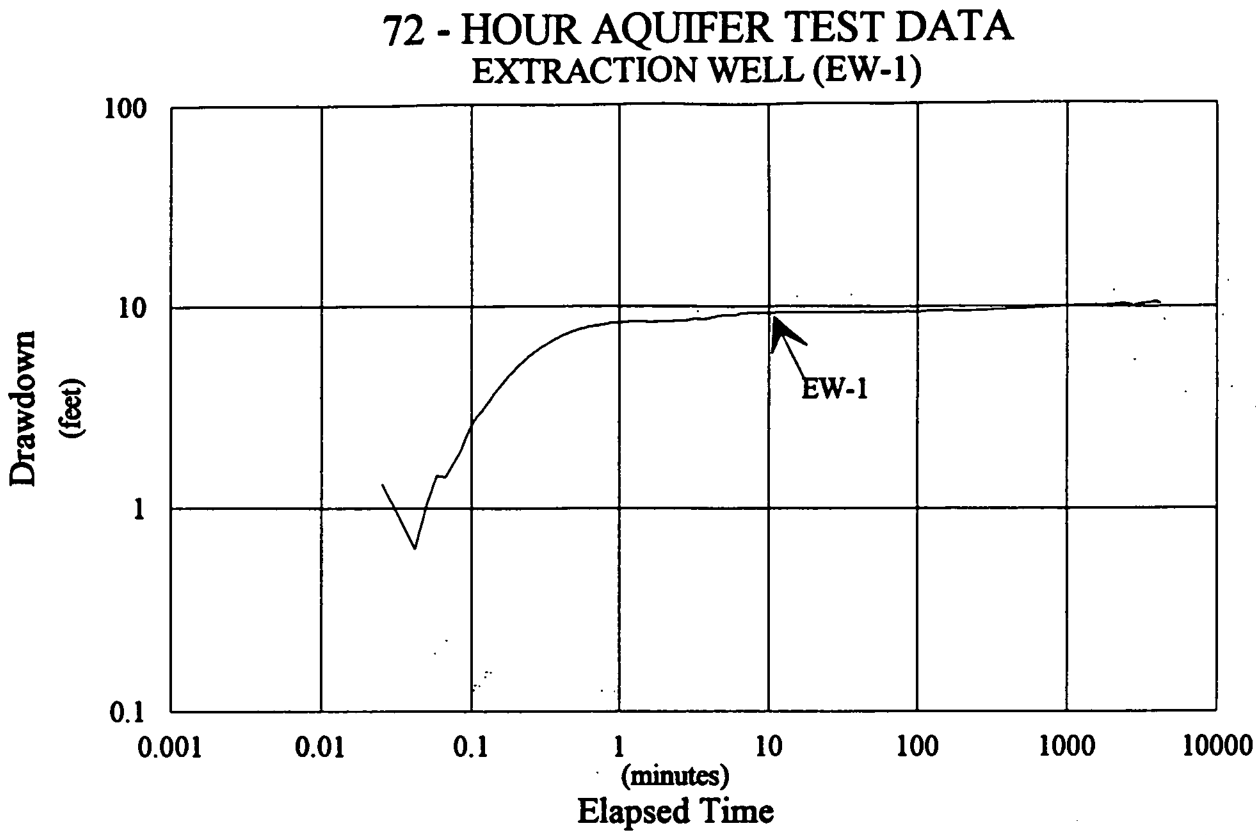
72-HOUR AQUIFER TEST DATA
MW-6 WELL NEST



SEMI-LOG PLOT

FIGURE 3-6

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	TIME-DRAWDOWN GRAPHS MW6 WELLS STOUGHTON CITY LANDFILL Stoughton, Wisconsin



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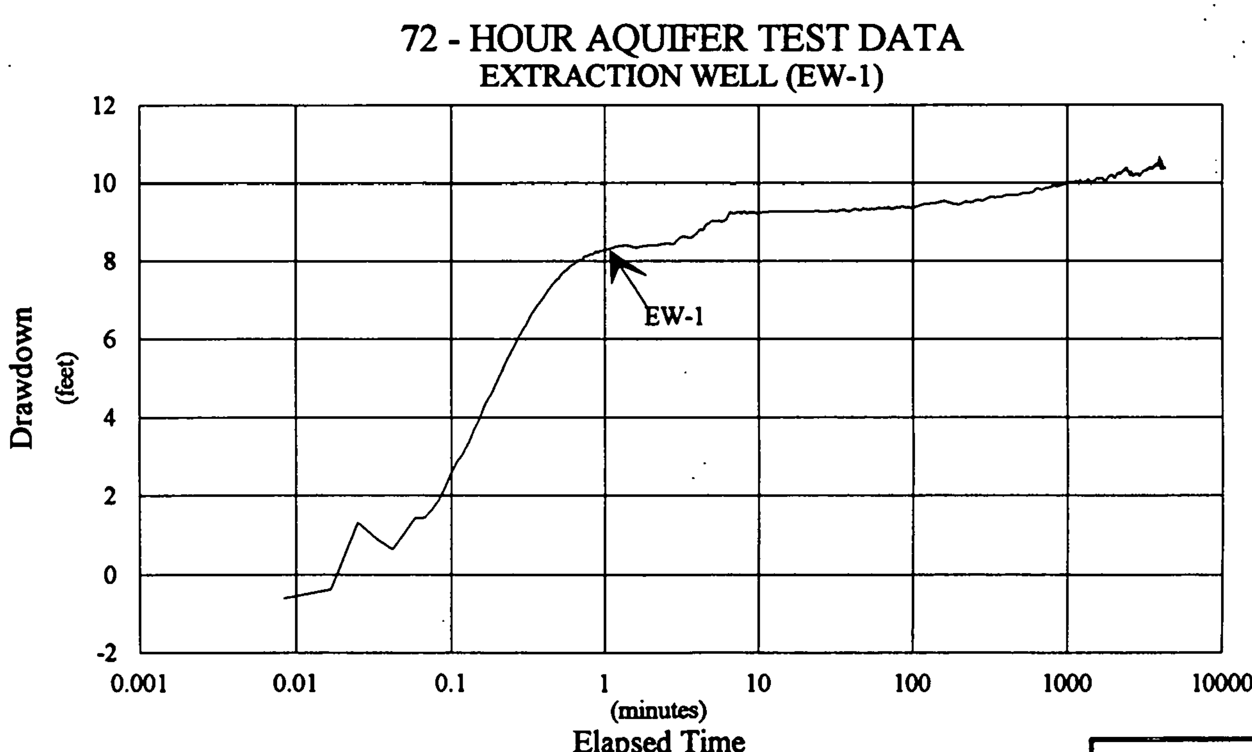
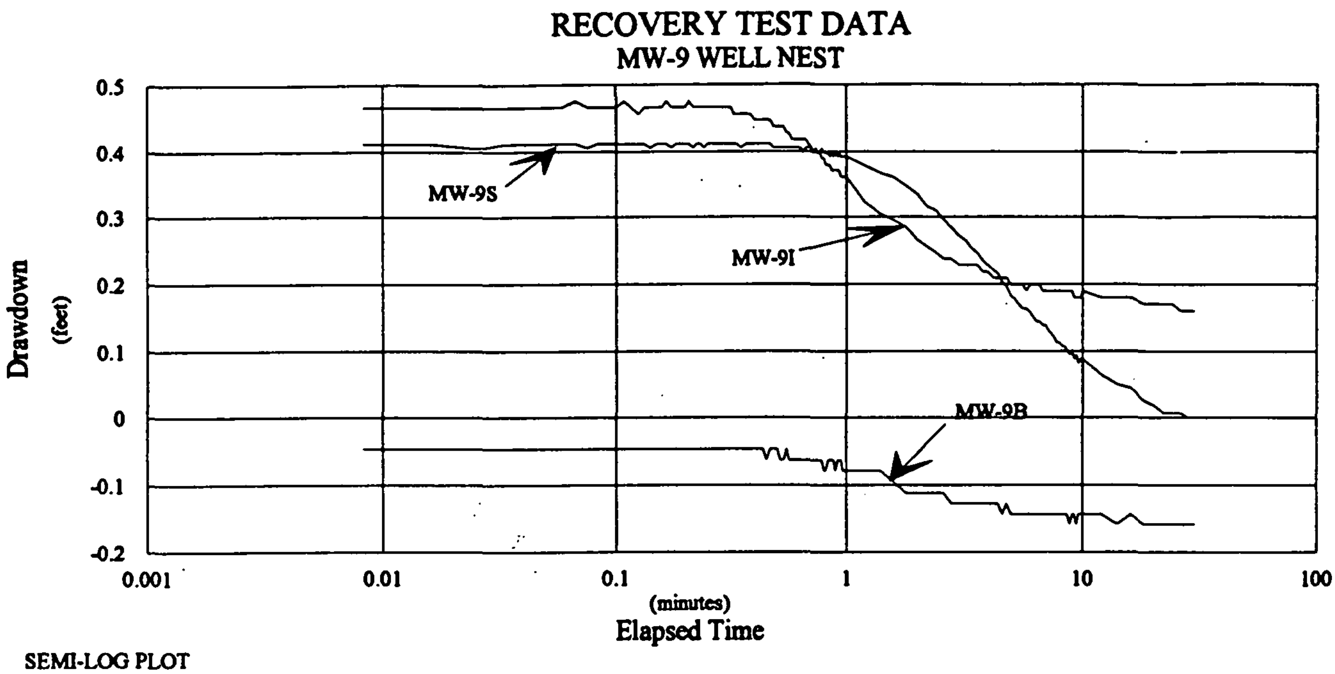


SEMI-LOG PLOT

FIGURE 3-7

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	TIME-DRAWDOWN GRAPHS EXTRACTION WELL STOUGHTON CITY LANDFILL Stoughton, Wisconsin



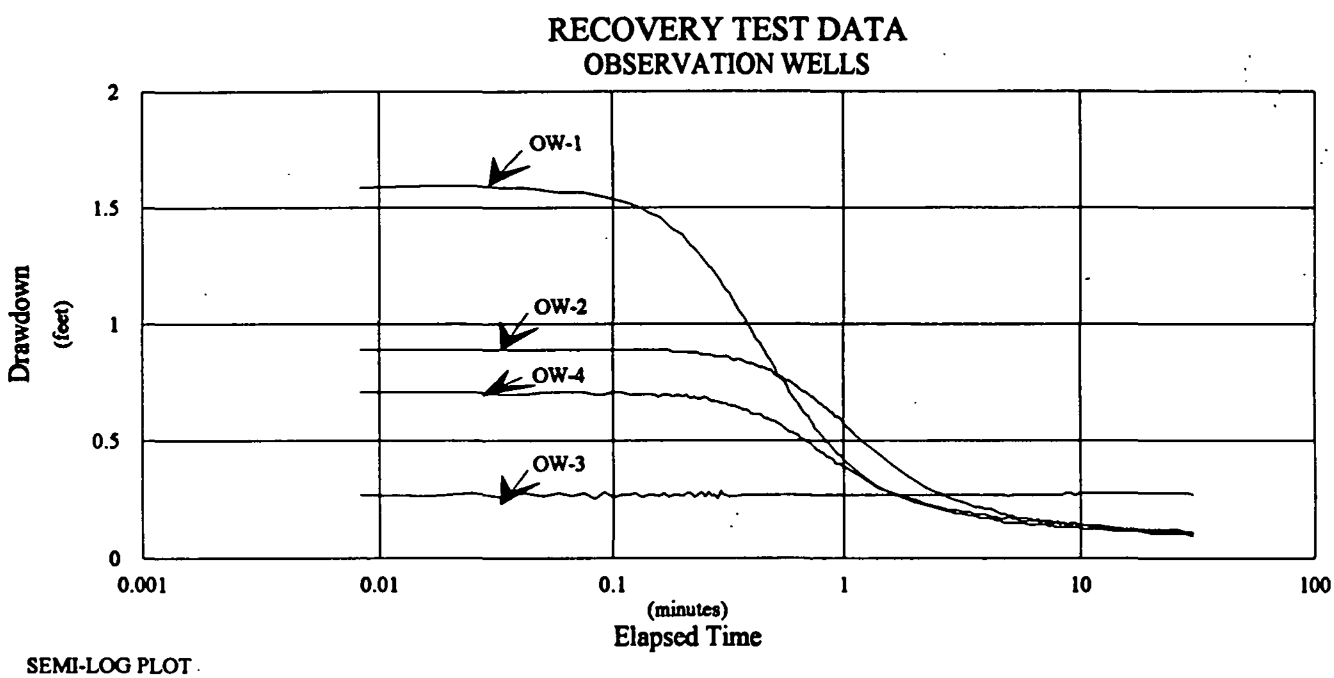


FIGURE 3-8

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY U.S. EPA CONTRACT No. 68-W8-0089 WORK ASSIGNMENT No. 054-5NT2 DOCUMENT CONTROL No. 4500-54-ALDX	RISIDUAL DRAWDOWN GRAPHS MW9 AND OW WELLS STOUGHTON CITY LANDFILL Stoughton, Wisconsin

Table 3-1

72-Hour Aquifer Test Transmissivity Results
Stoughton City Landfill
Stoughton, Wisconsin

Observation Well	Theis, 1935		Hantush, 1964		Neuman, 1975		Hantush, 1959	
	ft²/day	gpd/ft	ft²/day	gpd/ft	ft²/day	gpd/ft	ft²/day	gpd/ft
OW-1	1,109	8,296	1,018	7,615	NA	NA	NA	NA
OW-2	1,963	14,684	1,617	12,096	NA	NA	2,304	17,235
OW-4	2,317	17,332	1,653	12,365	NA	NA	3,916	29,293
MW-9S	5,449	40,761	5,590	41,816	NA	NA	NA	NA
MW-9I	NA	NA	NA	NA	4,285[1]	32,054[1]	NA	NA
					12,668[2]	94,763[2]		
MW-9B	46,227	345,802	NA	NA	40,799	305,198	NA	NA
Arithematic Mean[3]	2,710	20,272	2,470	18,477	8,476	63,404	3,110	23,264
Overall Arithematic Mean[3]	4,192 ft²/day or 31,358 gpd/ft							

Distance-Drawdown Method	T = 10 Minutes		T = 100 Minutes		T = 1,000 Minutes		T = 4,000 Minutes	
	ft²/day	gpd/ft	ft²/day	gpd/ft	ft²/day	gpd/ft	ft²/day	gpd/ft
Transmissivity	3,330	24,905	4,524	33,846	4,524	33,846	4,411	33,000
Arithematic Mean	4,197 ft²/day or 31,399 gpd/ft							

[1]Early time data. [2]Late time data. [3]Excludes MW-9B. NA - Not analyzed.

Table 3-2

72-Hour Aquifer Test Storage Coefficient Results
Stoughton City Landfill
Stoughton, Wisconsin

Well	Theis, 1935	Hantush, 1964	Neuman, 1975	Hantush, 1959
OW-1	0.00283	0.00249	NA	NA
OW-2	0.00159	0.00136	NA	0.023
OW-4	0.00049	0.000379	NA	0.015
MW-9S	0.00179	0.00173	NA	NA
MW-9I	NA	NA	0.00114[2]	NA
			0.00058[1]	NA
MW-9B	0.0075	NA	0.00042	NA
Geometric mean[3]	0.00196	0.00122	0.0008	0.019
Overall geometric mean[3]	0.0024			

Distance-Drawdown Method	T = 10 Minutes	T = 100 Minutes	T = 1,000 Minutes	T = 4,000 Minutes
Storage coefficient	0.0016	0.016	0.0875	0.341
Geometric mean	0.029			

[1]Early time data [2]Late time data. [3]Excludes MW-9B.

Table 3-3

72-Hour Aquifer Test Hydraulic Conductivity (Horizontal) Results
Stoughton City Landfill
Stoughton, Wisconsin

Well	Aquifer-Saturated Thickness (ft)	Theis, 1935		Hantush, 1964		Neuman, 1975		Hantush, 1959	
		ft/day	cm/sec	ft/day	cm/sec	ft/day	cm/sec	ft/day	cm/sec
OW-1	40	27.7	9.8×10^{-3}	25.4	9.0×10^{-3}	NA	NA	NA	NA
OW-2	42	46.7	1.6×10^{-2}	38.5	1.4×10^{-2}	NA	NA	54.8	1.9×10^{-2}
OW-4	52	44.6	1.6×10^{-2}	31.8	1.1×10^{-2}	NA	NA	75.3	2.6×10^{-2}
MW-9S	52	104.8	3.7×10^{-2}	107.5	3.4×10^{-2}	NA	NA	NA	NA
MW-9I	52	NA	NA	NA	NA	82.4[1] 243.6[2]	2.9×10^{-2}[1] 8.6×10^{-2}[2]	NA	NA
MW-9B	81	570.7	2.0×10^{-1}	NA	NA	503.7	1.8×10^{-1}	NA	NA
Arithematic Mean[3]		55.6	2.0×10^{-2}	50.8	1.8×10^{-2}	163	5.8×10^{-2}	65.1	2.2×10^{-2}
Overall arithematic Mean[3]		83.6 ft/day or 2.95×10^{-2} cm/sec							

Distance Drawdown Method	Average[3] Thickness (ft)	T = 10 Minutes		T = 100 Minutes		T = 1,000 Minutes		T = 4,000 Minutes	
		ft/day	cm/sec	ft/day	cm/sec	ft/day	cm/sec	ft/day	cm/sec
	48	69.4	2.4×10^{-2}	94.2	3.3×10^{-2}	94.2	3.3×10^{-2}	64.8	2.3×10^{-2}
Arithematic mean		80.1 ft/day or 2.8×10^{-2} cm/sec							

[1]Early time data. [2]Late time data. [3]Excludes MW-9B.

Table 3-4

72-Hour Aquifer Test Miscellaneous Parameters Results
Stoughton City Landfill
Stoughton, Wisconsin

Observation Well	Anistropy Ratio		Beta Leakage Factor
	Hantush, 1964	Neuman, 1975	
OW-1	0.550	NA	0.730
OW-2	0.970	NA	0.830
OW-4	2.41	NA	1.06
MW-9S	0.5	NA	0.305
MW-9I	NA	0.170[1]	NA
	NA	0.0552[2]	NA
MW-9B	NA	0.0243	NA

[1]Early time data. [2]Late time data.

Table 3-5

72-Hour Aquifer Test Hydraulic Conductivity (Vertical) Results
Stoughton City Landfill
Stoughton, Wisconsin

Observation Well	Method	Radial Hydraulic Cond.		Anisotropy Ratio	Vertical Hydraulic Cond.	
		ft/day	cm/sec		ft/day	cm/sec
OW-1	Theis, 1935	27.7	9.8×10^{-3}	0.55	8.4	3.0×10^{-3}
	Hantush, 1964	25.4	9.0×10^{-3}	0.55	7.7	2.7×10^{-3}
OW-2	Theis, 1935	46.7	1.6×10^{-2}	0.97	43.9	1.5×10^{-2}
	Hantush, 1964	38.5	1.4×10^{-2}	0.97	36.2	1.3×10^{-2}
	Hantush, 1959	54.8	1.9×10^{-2}	0.97	51.6	1.8×10^{-2}
OW-4	Theis, 1935	44.6	1.6×10^{-2}	2.41	259	9.1×10^{-2}
	Hantush, 1964	31.8	1.1×10^{-2}	2.41	184.7	6.5×10^{-2}
	Hantush, 1959	75.3	2.6×10^{-2}	2.41	437.3	1.5×10^{-1}
MW-9S	Theis, 1935	104.8	3.7×10^{-2}	0.5	26.2	9.2×10^{-3}
	Hantush, 1964	107.5	3.4×10^{-2}	0.5	26.8	9.5×10^{-3}
MW-9I (early time)	Neuman, 1975	82.4	2.9×10^{-2}	0.17	2.4	8.4×10^{-4}
(late time)	Neuman, 1975	243.6	8.6×10^{-2}	0.0552	0.7	2.6×10^{-4}
MW-9B	Neuman, 1975	503.7	1.8×10^{-1}	0.0243	0.3	1.0×10^{-4}
	Theis, 1935	570.7	2.0×10^{-1}	0.0243	0.3	1.2×10^{-4}
Arithematic mean (exluding OW-4 and MW-9B)					22.6	
Geometric mean (excluding OW-4 and MW-9B)						4.3×10^{-3}

Table 3-6

72-Hour Aquifer Test — Hydraulic Conductivity of Semi-Confining Layer
Stoughton City Landfill
Stoughton, Wisconsin

Observation Well	Method	Transmissivity (ft^2/day)	Thickness of Clay Layer (ft)	Beta Ratio	Radial Distance (ft)	Hydraulic Cond. Clay Layer	
						ft/day	cm/sec
OW-1	Theis, 1935	1,109	19	0.73	15	49.9	$1.7x10^{-2}$
	Hantush, 1964	1,018	19	0.73	15	45.8	$1.6x10^{-2}$
OW-2	Theis, 1935	1,963	18	0.83	45	12	$4.2x10^{-3}$
	Hantush, 1964	1,617	18	0.83	45	9.9	$3.5x10^{-3}$
	Hantush, 1959	2,304	18	0.83	45	14.1	$4.9x10^{-3}$
OW-4	Theis, 1935	2,317	8	1.06	80	3.25	$1.1x10^{-3}$
	Hantush, 1964	1,653	8	1.06	80	2.3	$8.2x10^{-4}$
	Hantush, 1959	3,916	8	1.06	80	5.5	$1.9x10^{-3}$
MW-9S	Theis, 1935	5,449	13	0.305	124	0.43	$1.5x10^{-4}$
	Hantush, 1964	5,590	1.3	0.305	124	0.44	$1.6x10^{-4}$
Arithematic mean						14.4	
Geometric mean							$1.9x10^{-3}$

Table 3-7

Recovery Test Transmissivity and Hydraulic Conductivity (Horizontal) Results
Stoughton City Landfill
Stoughton, Wisconsin

Observation Wells	Transmissivity					
	Jacob, 1946		Hantush, 1964		Neuman, 1975	
	ft²/day	gpd/ft	ft²/day	gpd/ft	ft²/day	gpd/ft
OW-1	1,714	12,821	958	7,166	NA	NA
OW-2	3,356	25,104	1,296	9,695	NA	NA
OW-4	4,475	33,475	1,705	12,754	NA	NA
MW-9S	7,319	54,749	2,652	19,838	NA	NA
MW-9I	8,945	66,913	NA	NA	4,050	30,296
MW-9B	NA	NA	NA	NA	NA	NA
EW-1	15,195	113,666	NA	NA	NA	NA
Arithematic mean	6,834	51,121	1,652	12,357	4,050	30,296
Overall arithematic mean	4,179 ft²day or 31,261 gpd/ft					

Table 3-7

Recovery Test Transmissivity and Hydraulic Conductivity (Horizontal) Results
Stoughton City Landfill
Stoughton, Wisconsin
(Continued)

Well	Aquifer Thickness (ft)	Hydraulic Conductivity (Horizontal)					
		Jacob, 1946		Hantush, 1964		Neuman, 1975	
		ft/day	cm/sec	ft/day	cm/sec	ft/day	cm/sec
OW-1	40	42.8	1.5×10^{-2}	24	8.4×10^{-3}	NA	NA
OW-2	42	79.9	2.8×10^{-2}	30.8	1.1×10^{-2}	NA	NA
OW-4	52	86.1	3.0×10^{-2}	32.8	1.2×10^{-2}	NA	NA
MW-9S	52	140.8	4.9×10^{-2}	51	1.8×10^{-2}	NA	NA
MW-9I	52	163.4	5.8×10^{-2}	NA	NA	77.9	2.7×10^{-2}
MW-9B	81	NA	NA	NA	NA	NA	NA
EW-1	41	371	1.3×10^{-1}	NA	NA	NA	NA
Arithematic mean		147.3	5.2×10^{-2}	34.6	1.2×10^{-2}	77.9	2.7×10^{-2}
Overall arithematic mean	8.6 ft/day or 3.1×10^{-2} cm/sec						

Table 3-8

Recovery Test Miscellaneous Parameters Results
Stoughton City Landfill
Stoughton, Wisconsin

Well	Storage Coefficient		Anisotropy		Beta (Leakage Factor)
	Hantush, 1964	Neuman, 1975	Hantush, 1964	Neuman, 1975	
OW-1	0.0021	NA	0.0075	NA	0.69
OW-2	0.0011	NA	0.964	NA	0.876
OW-4	0.00036	NA	0.760	NA	0.848
MW-9S	0.001	NA	0.851	NA	0.919
MW-9I	0.00048	0.00041	0.181	0.157	0.57

Table 3-9

Recovery Test Hydraulic Conductivity (Vertical) Results
Stoughton City Landfill
Stoughton, Wisconsin

Observation Well	Method	Radial Hydraulic Conductivity		Anisotropy Ratio	Vertical Hydraulic Conductivity	
		ft/day	cm/sec		ft/day	cm/sec
OW-1	Jacob, 1946	42.8	1.5×10^{-2}	0.0075	2.4×10^{-3}	8.5×10^{-7}
	Hantush, 1964	24	8.4×10^{-3}	0.0075	1.4×10^{-3}	4.9×10^{-7}
OW-2	Jacob, 1946	79.9	2.8×10^{-2}	0.964	74.2	2.6×10^{-2}
	Hantush, 1964	30.8	1.1×10^{-2}	0.964	28.6	1.0×10^{-2}
OW-4	Jacob, 1946	86.1	3.0×10^{-2}	0.760	49.7	1.8×10^{-2}
	Hantush, 1964	32.8	1.2×10^{-2}	0.760	18.9	6.7×10^{-3}
MW-9S	Jacob, 1946	140.8	4.9×10^{-2}	0.851	102	3.4×10^{-2}
	Hantush, 1964	51	1.8×10^{-2}	0.851	36.9	1.3×10^{-2}
MW-9I	Jacob, 1946	163.4	5.8×10^{-2}	0.181*	5.35	1.9×10^{-3}
	Neuman, 1975	77.9	2.7×10^{-2}	0.157	1.9	6.8×10^{-4}
Arithematic mean					4.4	
Geometric mean						1.2×10^{-3}

*Value derived from Hantush Method (1964).

Table 3-10

Recovery Test — Hydraulic Conductivity of Semi-Confining Layer
Stoughton City Landfill
Stoughton, Wisconsin

Observation Well	Method	Transmissivity (ft^2/day)	Thickness of Clay Layer (ft)	Beta Ratio	Radial Distance (ft)	Hydraulic Cond. Clay Layer	
						ft/day	cm/sec
OW-1	Jacob, 1946	17.4	19	0.69	15	68.9	$2.4x10^{-2}$
	Hantush, 1964	958	19	0.69	15	38.5	$1.3x10^{-2}$
OW-2	Jacob, 1946	3,356	18	0.876	45	22.9	$8.1x10^{-3}$
	Hantush, 1964	1,296	18	0.876	45	8.8	$3.1x10^{-3}$
OW-4	Jacob, 1946	4,475	8	0.848	80	4	$1.4x10^{-3}$
	Hantush, 1964	1,705	8	0.848	80	1.5	$5.4x10^{-4}$
MW-9S	Jacob, 1946	7,319	13	0.919	124	5.2	$1.8x10^{-3}$
	Hantush, 1964	2,652	13	0.919	124	1.9	$6.7x10^{-4}$
MW-9I	Jacob, 1946	8,945	13	0.57	124	2.4	$8.6x10^{-4}$
	Neuman, 1975	4,050	13	0.57	124	1.1	$3.9x10^{-4}$
Arithematic mean						15.5	
Geometric mean							$2.2x10^{-3}$

SECTION 4
CAPTURE ZONE ANALYSIS

A groundwater capture zone analysis was carried out for the Stoughton Landfill site in order to predict the aquifer response to various pumping scenarios. The goal of this exercise was to determine the approximate pumping rates, numbers, and locations of groundwater extraction wells necessary to contain the groundwater contaminant plume emanating from the site in order to achieve remedial objectives. This section contains the background and methods used in evaluating groundwater extraction scenarios, the application of the models, and a summary of the results.

4.1 ANALYTICAL MODELS

The areal distribution of drawdown was calculated using the flow model CAPZONE (Ohio State University, 1991). CAPZONE is an analytical flow model used to construct groundwater flow models of two-dimensional flow systems characterized by isotropic and homogeneous confined, leaky confined, or unconfined flow conditions. Computed drawdowns are then superimposed on site (non-uniform) water level data. The computed head data are then used as input data for particle-tracking models.

Computed head output data were used as input to the particle-tracking model GWPATH (Shafer, 1992). GWPATH is a groundwater pathline and traveltime analysis program that computes the two-dimensional, steady-state velocity field at the intersections or regularly spaced grids using distributions of hydraulic head, hydraulic conductivity, and effective porosity. Travel-time related capture zones are computed by placing a series of particles around the perimeter of a pumping well and tracking their reverse pathlines for a specified time period. The loci of pathline endpoints defines the capture zone of the well at the specified pumping rate.

The combination of these two programs was selected for their ability to handle slightly more complex problems than simple analytical programs without going to the expense and effort of performing complex three-dimensional numerical simulations. CAPZONE combined with GWPATH has the capability to handle the following groundwater flow conditions applicable to the Stoughton Landfill Site:

- Two dimensional flow system - Although there are vertical components to groundwater flow at the site, radial flow can be assumed given fully penetrating groundwater extraction wells. This is an appropriate and simplifying assumption necessary to avoid going to three dimensional numerical simulations at this time.

- Isotropic and homogeneous aquifers - Isotropic and homogeneous aquifers rarely, if at all, exist in nature. This assumption is limited to the areal extent of the discretized grid and is also necessary for semi-analytical models.

- Leakage across overlying confining layers - The results of the aquifer test indicate that this phenomena is present locally where the clay confining layer is present. However, the results of the aquifer test and soils characterization indicate that the aquifer as a whole does not behave in this manner.

- Simple boundary conditions - The aquifer test indicated the presence of a constant head recharge boundary (Yahara River) in close proximity to the extraction well. This effect can be accounted from in this model using image well theory.

- Non-uniform regional flow field - Based on the apparent mounded groundwater surface in the vicinity of the site with radial groundwater flow directions, actual head data was used in the computation of drawdown.

- Display of predicted equipotential lines - This is a feature used to graphically display the results of the impact of pumping various extraction scenarios on the actual potentiometric surface.

- Calculation of traveltime-related pathlines from wells - This feature is used to predict and delineate groundwater capture zones.

4.2 PRELIMINARY MODEL CALIBRATION

Prior to using the above described models for the simulation of traveltime related capture zones, the model was calibrated to actual drawdown conditions observed during the aquifer test. This was done by entering aquifer test derived hydraulic parameters, calculating drawdown on grid scaled to encompass the aquifer test area, and comparing or obtaining a best-fit match of calculated drawdown compared to actual drawdown in each observation well screened in the sand and gravel aquifer at the completion of three days of pumping.

A close match was obtained between predicted and observed drawdown conditions using the following values:

- Transmissivity - 30,000 gpd/ft.
- Storage coefficient - 0.002
- Saturated aquifer thickness - 65 to 70 feet.
- Aquifer type - unconfined.

The transmissivity value is very close to the overall mean values computed by the 72-hour aquifer and recovery test data reduction methods of 31,261 to 31,399 gpd/ft. Similarly, the storage coefficient value is consistent with aquifer test results. The aquifer saturated thickness of 65 to 70 feet represents an average thickness from several drilling locations in the vicinity of the aquifer test. The assumption of an unconfined aquifer is made based on the overall response of the aquifer and an evaluation of the stratigraphy based on drilling results. The above summarized values were subsequently used as input parameters to the simulation runs.

Drawdown data were compared at OW-1, OW-2, OW-4, MW-9S, and MW-9I well locations. The percent difference ranged from 0.08% to 2.8% for OW-1, OW-2, and OW-4; and 12.8% to 15.9% for MW-9S and MW-9I. It is noted that water levels were observed to fluctuate over a wide range during the last 1/2 day of the test in the MW-9 wells, and in general, the predicted drawdown values still fall within the observed range.

The results of the aquifer calibration data are contained in Appendix E.

4.3 DEVELOPMENT OF THE POTENTIOMETRIC SURFACE

The Theis analytical solution was applied in the CAPZONE model by superposition to a pre-determined, representative, site potentiometric surface. The site potentiometric surface was prepared and contoured from static groundwater elevation data collected in August 1994 as depicted in Volume I of the Data Collection Report. This contoured surface is representative of the current groundwater surface configuration. For the purpose of this analysis, a 1,400 by 1,800 foot grid was established over the site with the contaminant plume areas preferentially positioned in the grid to consider downgradient scenarios relative to the site. Calculated drawdowns were then subtracted from the gridded water level contour data at each grid node to arrive at a combined surface that represents how the site potentiometric surface would appear at a specific time after pumping begins in the extraction wells.

4.4 BOUNDARY CONDITIONS

As stated earlier, a constant head recharge boundary (Yahara River) exists at the site. The presence of this effect greatly influences the optimal locations of proposed groundwater extraction wells for if they are located to close to the boundary, and the downgradient extent of the capture zone intersects the boundary, river water will be drawn into the extraction system, thereby, reducing it effectiveness. Proper simulation of the boundary conditions is therefore necessary. Boundary conditions are accounted for in the model using the method of images to mathematically simulate the hydraulic response of the flow system to these boundaries.

For this model, an image well (simulated as an injection well) was placed an equal distance away from the boundary, but on the opposite side of the boundary. The pumping, or injection rate, is assigned as a negative value equal to that of the pumping well. As a result, the effects of the hydraulic boundary are simulated on the potentiometric surface. This was done for each extraction well simulated.

4.5 MODEL RESULTS

The model was carried out using various pumping scenarios including various numbers of wells, locations, and groundwater extraction rates. The results of each modeling run where then compared to the dimensions of the contaminant plume depicted in Figure 4-1 of the Data Collection report to evaluate whether adequate containment of the contaminated groundwater was achieved. Locations were also chosen to minimize to amount of groundwater drawn in from downgradient locations due to the apparent recharge effect of the Yahara River. Inevitably, this meant moving extraction well locations eastward towards the landfill with the exception of the existing extraction well (EW-1) used for the aquifer test.

Optimal results were obtained using a three well extraction system with a combined groundwater extraction rate of approximately 285 gpm due to the width of the plume. The results of this analysis are depicted on Figure 4-2.

Two extraction wells are interpolated to be necessary to contain the northern finger of the plume. The northernmost well is the existing extraction (EW-1) discharging at a rate of 40 gpm. Immediately south of that is a proposed extraction well discharging at a rate of 125 gpm. Note that pathlines for the existing well (EW-1) extend westward even at this low rate indicating that a portion of the extracted water from this well will likely originate from the Yahara River.

The southern finger of the plume becomes somewhat narrower in extent as it migrates northwestward. Because of this, one extraction well is able to contain the downgradient extent with a discharge of 80 gpm.

The above described pumping scenario is based on a mathematical simulation using average or mean input values for specified hydraulic parameters. These values are based on the overall results of the aquifer testing and geologic characterization. The values are, however, noted to vary over the ranges specified in Section 3, and as such, some variation in the actual capture zone dimensions will occur.

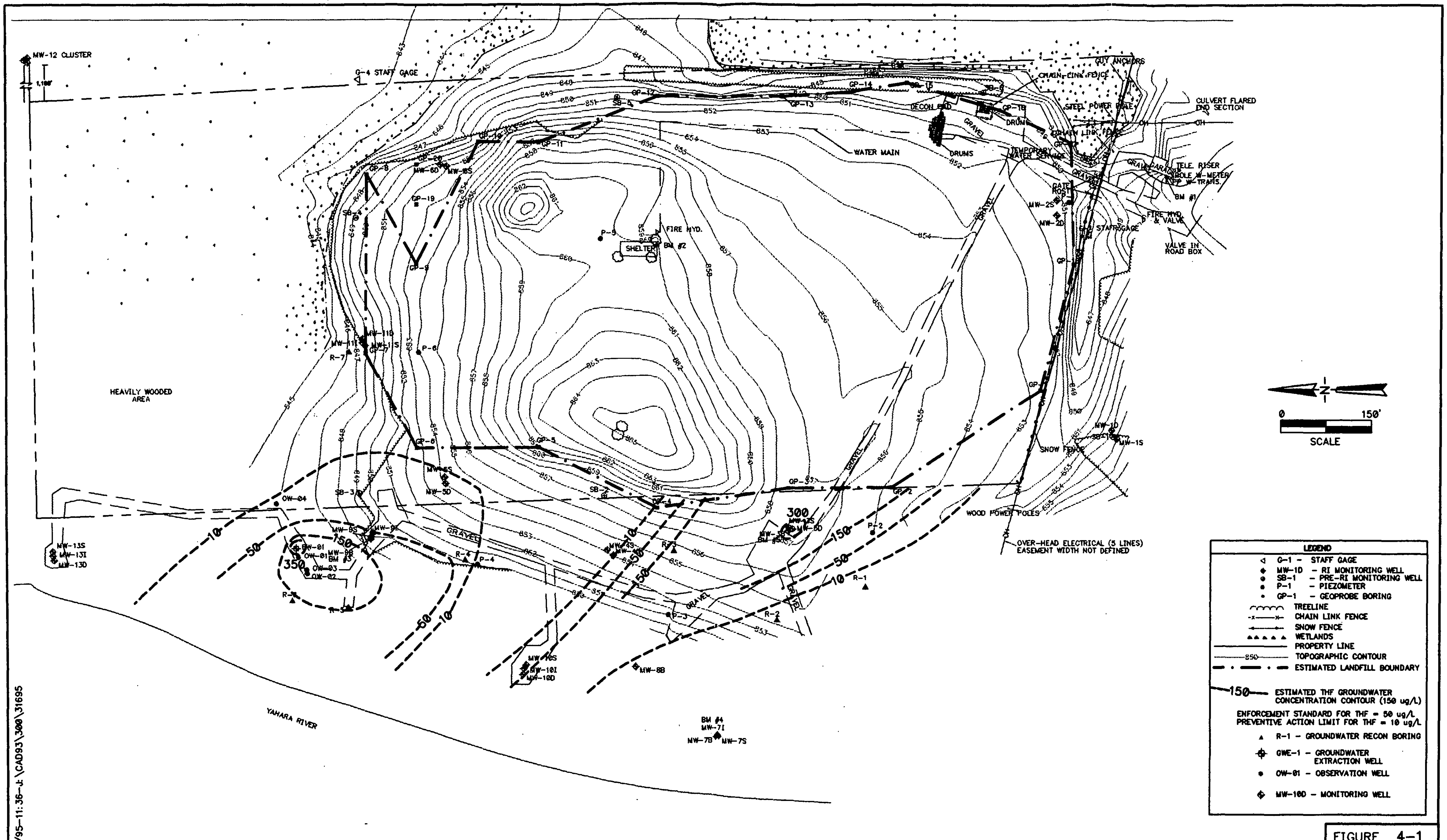


FIGURE 4-1

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

AREAL EXTENT OF THF CONTAMINATION IN THE GROUNDWATER

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

JIM-06/14/95-11:36-ц\CAD93\300\31695

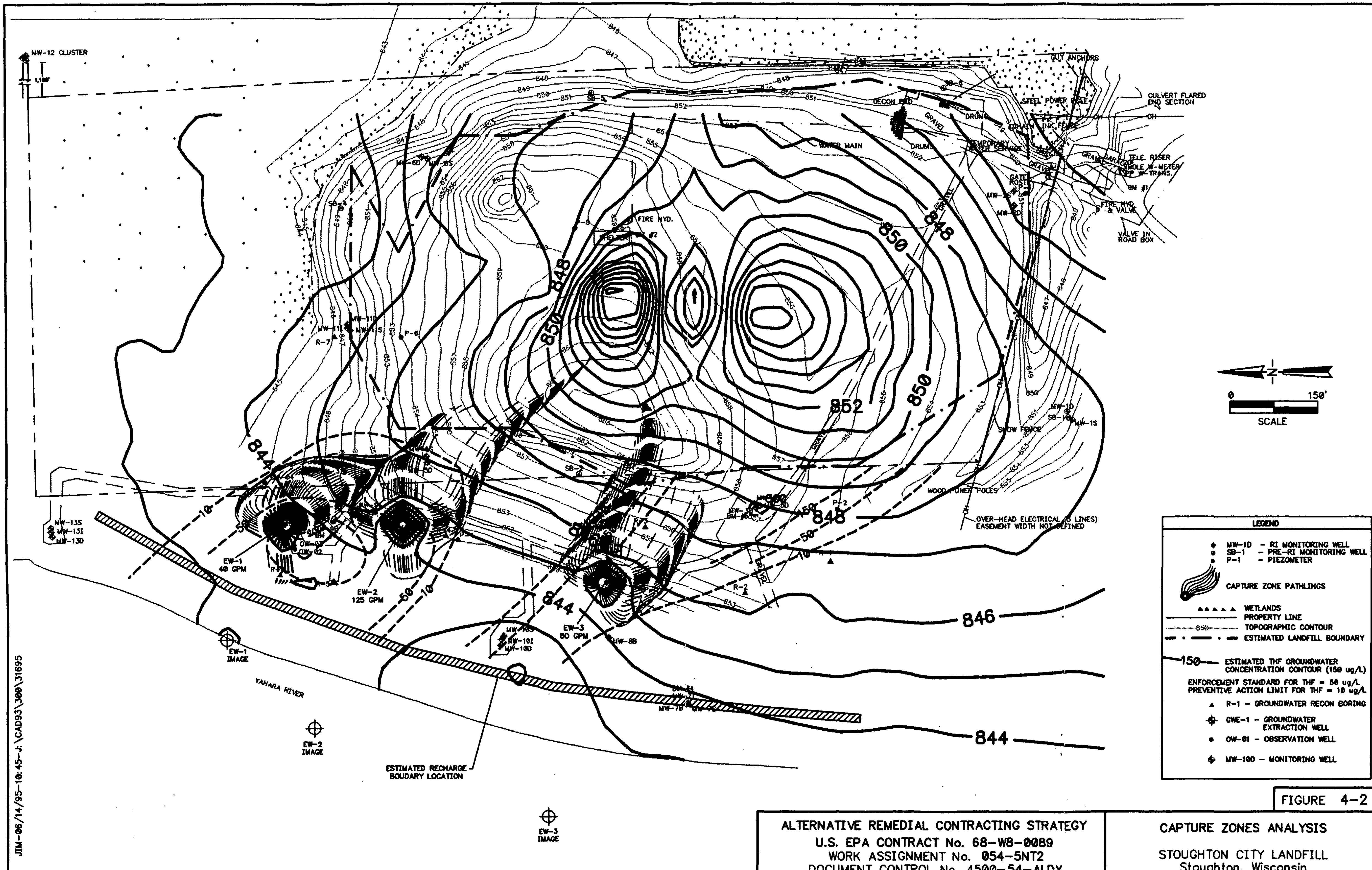


FIGURE 4-2

ALTERNATIVE REMEDIAL CONTRACTING STRATEGY
U.S. EPA CONTRACT No. 68-W8-0089
WORK ASSIGNMENT No. 054-5NT2
DOCUMENT CONTROL No. 4500-54-ALDX

CAPTURE ZONES ANALYSIS

STOUGHTON CITY LANDFILL
Stoughton, Wisconsin

SECTION 5

SUMMARY AND CONCLUSIONS

An aquifer performance evaluation was performed at the Stoughton City Landfill site in Stoughton, Wisconsin during March 1995. This evaluation was performed to determine aquifer hydraulic parameters necessary to determine the design specifications of a groundwater extraction system. The aquifer test was located on the northwest portion of the site between the landfill boundary and the Yahara River. The location is within the limits of an apparent groundwater contaminant plume emanating from the site.

The geology of the aquifer test area is characterized primarily of stratified glacio-fluvial and glacio-lacustrine deposits of sand and gravel extending to the bedrock surface at an average depth of 65 to 70 feet. Shallow bedrock consists of weathered limestone. A large saturated clay layer ranging in thickness from approximately 8 to 25 feet is also present within the sand and gravel aquifer, however, it is discontinuous in areal extent. The clay layer is present proximal to the Yahara River but is generally thin to absent elsewhere. Groundwater levels in the area of the test range from approximately 1 foot bgs to 3 feet above ground surface (artesian conditions).

The aquifer performance evaluation consisted of pumping a groundwater extraction well at a constant rate of 75 gpm for a period of 72 hours and monitoring the effects in nine observation well locations at various distances and depths. Aquifer performance evaluation activities included the monitoring of static water levels and barometric pressure, a step-drawdown test, a constant discharge rate test, and aquifer recovery monitoring at the conclusion of the test. Extracted groundwater was discharged to a City of Stoughton lift station approximately 2,100 feet from the extraction well.

Aquifer test data analysis was performed using several models based on the complexity of the geology/hydrogeology and observed responses to pumping which indicated aquifer conditions ranging from semi-confined to unconfined, as well as, indications of leakage and apparent recharge boundary conditions.

Aquifer performance evaluation results are summarized as follows:

Sand and Gravel Aquifer

- Transmissivity values ranged from 958 to 15,195 ft^2/day (7,166 to 113,666 gpd/ft). Average values for the 72-hour aquifer test and recovery test were 4,179 and 4,197 ft^2/day, (31,261 and 31,399 gpd/ft), respectively.

- Storage coefficient values ranged from 0.000379 to 0.341, with an overall geometric mean of 0.0024.

- Radial hydraulic conductivity values for the aquifer ranged from 24 to 371 ft/day (8.4×10^{-3} to 1.3×10^{-1} cm/sec). Average radial hydraulic conductivity for the 72-hour aquifer and recovery test were 80.1 and 86.6 ft/day (2.8×10^{-2} and 3.1×10^{-2} cm/sec), respectively.

- Vertical hydraulic conductivity values calculated from anisotropy ratios ranged from 0.0014 to 102 ft/day (4.9×10^{-7} to 3.4×10^{-2} cm/sec) with average values from the 72-hour aquifer and recovery test were 4.4 and 22.6 ft/day (1.2×10^{-3} and 4.3×10^{-3} cm/sec), respectively.

- Hydraulic conductivities values of the saturated clay layer calculated using leakage factor ratios ranged from 0.43 to 68.9 ft/day (1.5×10^{-4} to 2.4×10^{-2} cm/sec) with average values of 15 ft/day (1.9×10^{-3} to 2.2×10^{-3} cm/sec).

The results summarized above are consistent with the geologic/hydrogeologic characterization of the site and published values for this type of aquifer and indicate that the aquifer is a moderately transmissive aquifer capable of producing significant amounts of water varying primarily with thickness. In the immediate vicinity of saturated clay layer (adjacent to the river), the aquifer behaves primarily as a semi-confined unit with leakage. However, in all cases, the effects of recharge are significant due to the proximity to the Yahara River. However, due to the discontinuous nature of the clay later, the aquifer can be considered unconfined across the site.

Bedrock Aquifer

- Transmissivity values ranged from 40,799 to 46,227 ft^2/day (305,198 to 345,802 gpd/ft) with an average value of approximately 4,185 ft^2/day (31,231 gpd/ft).
- Storage coefficient values ranged from 0.00042 to 0.0075.
- Radial hydraulic conductivity values for the bedrock aquifer ranged from 503.7 to 570.7 ft/day (1.8×10^{-1} to 2.0×10^{-1} cm/sec).

The results summarized above indicate the shallow bedrock aquifer is a highly transmissive unit, however, it should be noted that flow through the shallow portions of this unit may be due to secondary mechanisms such as fractures, bedding planes, or solution cavities, and as such, may not be consistent throughout the site or at greater depths. The immediate drawdown response to pumping in the extraction well indicates this unit is in direct hydraulic connection with the overlying sand and gravel aquifer.

Boundary Conditions

The presence of the Yahara River within 200 feet of the groundwater extraction well indicated a effects of a constant-head recharge boundary could be expected during the test.

As expected, an evaluation of the data generated during the test indicated that the drawdown curves were flatter than normal indicating leakage and/or recharge effects are present. The location of the recharge boundary was evaluated using an inflection point method valid for single line source recharge boundaries in both confined and unconfined aquifers. The results of this analysis indicate the recharge boundary is present at distances ranging from 71 to 108 feet along a line from the extraction well perpendicular to the river. These distances are approximately 100 feet closer than the geographic location of the river bank. These results are of particular significance in that it will have an impact on the final location of groundwater extraction wells in the area which will have to be located so that the downgradient stagnation point does not, or minimally, intercepts the boundary to prevent excessive amounts of clean river water from entering the system and reducing the overall effectiveness.

Capture Zone

The results of the capture zone analysis (using values obtained from the aquifer performance evaluation) indicate that a combined groundwater extraction rate of approximately 285 gpm will capture the width of the plumes using a three-well configuration.

SECTION 6

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APPENDIX A

BORING LOGS

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 3	EW-01

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/8/94	10/10/94	Burlington	8.25" I.D. HSA	12"	6" S.S.	67.10'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	24	4 5 7 11		4–6	sp	SAND: little silt; some fine to coarse pebbles; moderately sorted; medium dense; saturated; brown	
2	SS	24	3 4 5 5		9–11	ch	SILTY CLAY: high plasticity; stiff; saturated; brown; Cu = 2.0 tsf	
3	SS	20	3 3 4 5		14–16	ch	As above; less silt; Cu = 3.0 tsf	
4		20	2 4 5 11		19–21	ch	As above Little fine sand	
5	SS	6	4 50/3"		24–26	ch	SAND: moderately well sorted; fine to medium; saturated; brown SILTY CLAY: little fine to medium sand; high plasticity; stiff; saturated; brown Shattered limestone shards	

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	24	2 4 3 14		29–31	sp	29–31	**SILTY SAND**: very fine to fine sand; little fine to medium pebbles; little clay; moderately well sorted; loose; saturated; light brown	
7	SS	12	2 4 3 8		34–36	sp	34–36	As above; little less silt	
8	SS	12	2 6 19 36		39–41	sp	39–41	**SAND**: fine to medium; little fine to medium pebbles; trace silt; well sorted; medium dense; saturated; brown; coarse, angular pebbles in spoon shoe	
9	SS	6	8 18 23 24		49–51	sp	49–51	As above; dense	

Depth scale: 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
10	SS	20	8 24 59 60		59			sp		As above; extremely dense; some fine to coarse pebbles	
					60						
					61						
					62						
					63						
					64						
					65						
					66						
11	SS	0	50/1"		67			ls		**LIMESTONE**: shards in sample; saturated; tan-yellow	
										End of Boring at 67'.	

*ASTM D1586
SS = SPLIT SPOON
D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 2	OW-01

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/11/94	10/11/94	Burlington	4.25" I.D. HSA	8"	2" PVC	44.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

Approximately 15' south of EW-01.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	20	4 6 6 8		4	sp	**SAND**: fine to very coarse; moderately sorted; medium dense; saturated; brown	
					5.5		**SAND**: very fine to fine; well sorted; saturated; brown Oxidized orange	
2	SS	24	3 4 7 9		9	ch	**SILTY CLAY**: high plasticity; wet to saturated; stiff; gray-brown; Cu = 2.75 tsf	
3	SS	24	2 4 5 8		14	ch	As above; Cu = 3.0 tsf	
4	SS	24	3 3 5 5		19	ch	As above; firm	
5	SS	22	3 3 4 5		24	ch	As above; some very fine to fine sand; more silt; sandy-gravelly zone to 24.4'; Cu = 2.25 tsf	

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE
C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	24	2 3 2 3		29–31	sp	**SILTY SAND**: very fine to fine sand; well sorted; trace medium sand; trace very coarse pebbles; loose; saturated; brown	
7	SS	24	3 3 10 11		34–36	sp	As above; medium dense	
8	SS	20	3 6 4 8		39–41	sp	**SAND**: fine to coarse; trace silt; little fine to medium pebbles; moderately well sorted; medium dense; saturated; brown	
					44		End of Boring at 44'.	

GEOLOGIC DRILL LOG

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/11/94	10/12/94	Burlington	4.25" I.D. HSA	8"	2" PVC	41.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

Approximately 40' south of EW-01.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
1	SS	20	6 9 10 10		4–6	sp	**SAND**: fine to medium; trace silt; little coarse sand; moderately well sorted; dense; saturated; brown	
2	SS	22	4 4 6 6		9–11	ch	**SILTY CLAY**: trace fine sand to 10'; high plasticity; stiff; saturated; brown-gray; Cu = 3.0 tsf	
3	SS	24	3 4 5 6		14–16	ch	As above; Cu = 3.0 tsf Cu = 1.5 tsf	
4	SS	18	3 4 6 8		19–21	ch	As above; Cu = 2.25 tsf	
5	SS	16	5 46 18 15		24–26	ch	As above **SILTY SAND AND GRAVEL**: fine to medium sand; fine to coarse, subrounded to angular pebbles; poorly sorted; very dense; saturated; gray	

Depth scale: 1–27

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	CLASS-IFICATION	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	20	3 6 11 6		29–31	sw	**SILTY SAND**: very fine to fine; medium dense; well sorted; saturated; brown	
7	SS	22	10 14 21 28		34–36	sp	As above; less silt; little fine to medium, rounded to subangular pebbles; dense	
8	SS	20	9 17 14 20		39–40	sp	**SAND**: fine to medium; trace silt; well sorted; saturated; brown	
					40–41	sw	**SAND AND GRAVEL**: fine to medium sand; fine to coarse, subrounded to subangular pebbles; moderately poorly sorted; dense; saturated; brown	

End of Boring at 41'.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 1	OW-03

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/12/94	10/12/94	Burlington	4.25" I.D. HSA	8"	2" PVC	10.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

Approximately 45' south of EW-01.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
										Please see geological log of OW-02 for stratigraphy.	
					1						
					2						
					3						
					4						
1	SS	20	6 9 10 10		5			sp			
					6						
					7						
					8						
					9						
2	SS	12	4 4		10			ch		End of Boring at 10'.	

*ASTM D1586
SS = SPLIT SPOON
D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Stoughton Landfill, Stoughton, Wisconsin	1 of 2	OW-04

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
10/8/94	10/8/94	Burlington	4.25" I.D. HSA	8"	2" PVC	41.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
B. Sedgwick			/'

Approximately 80' north of EW-01.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
					1						
					2						
					3						
1	SS	22	4 7 9 8		4			sp		SILTY SAND: fine to coarse; medium dense; moderately sorted; saturated; tan	SP = 0
					5						
					6					SAND: fine to medium; well sorted; saturated; orange-brown; oxidized	
					7						
					8						
2	SS	24	3 3 3 4		9			ch		SILTY CLAY: moderately high plasticity; firm; saturated; gray-brown; Cu = 2.0 tsf	SP = 0
					10						
					11						
					12						
					13						
3	SS	18	2 6 5 6		14			ch		As above; stiff; Cu = 2.0 tsf	SP = 0
					15					Sand seam; very well sorted; medium sand; blue-gray	
					16			sp		SILTY SAND: very fine to fine sand; moderately well sorted; little medium pebbles; little clay; saturated; light tan-orange	
					17						
					18						
4	SS	4	6 5 7 16		19			sp		As above; some very coarse pebbles; medium dense	
					20						
					21						
					22						
					23						
5	SS	24	1 1 2 4		24			sp		As above; loose	
					25						
					26						
					27						

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Stoughton Landfill, Stoughton, Wisconsin

PAGE NO. 2 of 2 | HOLE NO. OW-04

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	Hnu readings (in units) BZ: Breathing Zone BH: Borehole SP: Sample HS: Headspace
6	SS	24	1 2 2 3		29			sp		As above	
					30						
					31						
					32						
					33						
7	SS	24	3 10 24 19		34			sp		As above; dense	
					35						
					36					few more pebbles and limestone shards	
					37						
					38						
8	SS	24	9 4 2 6		39			sp		As above; loose	
					40						
					41					End of Boring at 41'.	

*ASTM D1586 ST = SHELBY TUBE
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

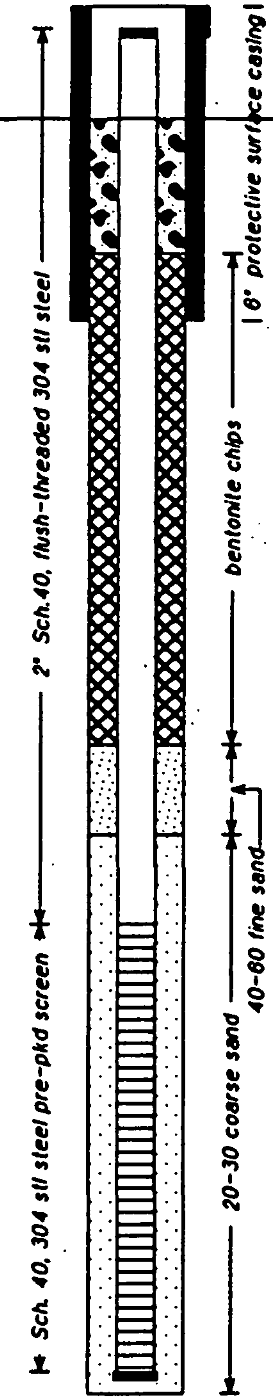
JACOBS ENGINEERING GROUP, INC
CHICAGO ENVIRONMENTAL

BORING NUMBER MW-9S
DATE DRILLED 8/4/933
DRILL COMPANY Exploration Technology Inc.
DRILL METHOD 8" OD Hollow Stem Auger
SURFACE ELEVATION 848.98 Feet MSLD

CLIENT U.S. EPA
PROJECT Stoughton City Landfill
GEOLOGIST Jeff Bale

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/FT.	PID (ppm) 0 150	GRAPHIC LOG	SOIL CLASS	DESCRIPTION AND REMARKS
							Topsoil, dark, organic with clay, low plasticity
						SW	Gravelly snad, well graded
5						SP	Sand, medium, poorly graded
						CL	Gravelly/Sandy clay, medium plasticity
						CH	Clay, light brown/gray, plastic
10						CL	Gravelly/Sandy clay, medium plasticity
						SP	Sand, medium, poorly graded
						GW	Gravel to 1.5cm, well graded, subangular
15	⊠	MW9-S-18				GC	Clayey gravel to 1.0cm, subangular
						SC	Clayey sand, coarse, poorly graded
						GW	Gravel to 2.5cm, well graded with sand
20						SP	Sand, fine-medium, poorly graded, moist
						SP	Sand, fine, poorly graded
25						GW	Sandy gravel, well graded, producing water
30							*Boring terminated at 28'6"*

WELL DIAGRAM



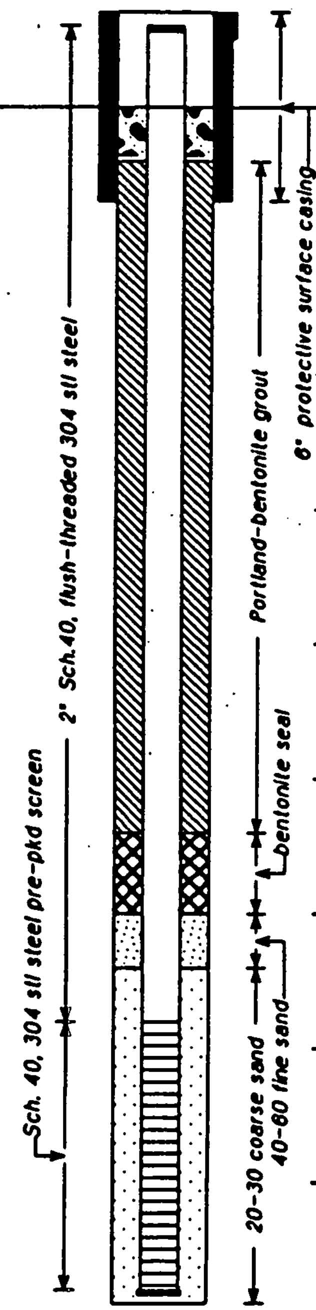
JACOBS ENGINEERING GROUP, INC
CHICAGO ENVIRONMENTAL

BORING NUMBER MW-91
DATE DRILLED 8/5/933
DRILL COMPANY Exploration Technology Inc.
DRILL METHOD 8" OD Hollow Stem Auger
SURFACE ELEVATION 849.18 Feet MSLD

CLIENT U.S. EPA
PROJECT Stoughton City Landfill
GEOLOGIST Jeff Bale

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/FT.	PID (ppm) 0 150	GRAPHIC LOG	SOIL CLASS	DESCRIPTION AND REMARKS
							Topsoil, dark, organic with clay, low plasticity
						SW	Gravelly snad, well graded
5						SP	Sand, medium, poorly graded
						CL	Gravelly/Sandy clay, medium plasticity
						CH	Clay, light brown/gray, plastic
10						CL	Gravelly/Sandy clay, medium plasticity
						SP	Sand, medium, poorly graded
						GW	Gravel to 1.5cm, well graded, subangular
15						GC	Clayey gravel to 1.0cm, subangular
						SC	Clayey sand, coarse, poorly graded
						GW	Gravel to 2.5cm, well graded with sand
20						SP	Sand, fine-medium, poorly graded, moist
						SP	Sand, fine, poorly graded
25						GW	Sandy gravel, well graded, producing water
30						SM	Silty sand, very fine with trace sand, coarse and gravel
35						GW	Sandy gravel, well graded, producing significant water
40							
45						SP	Sand, very fine, poorly graded, wet with fines
							Boring terminated at 44'6"
50							

WELL DIAGRAM



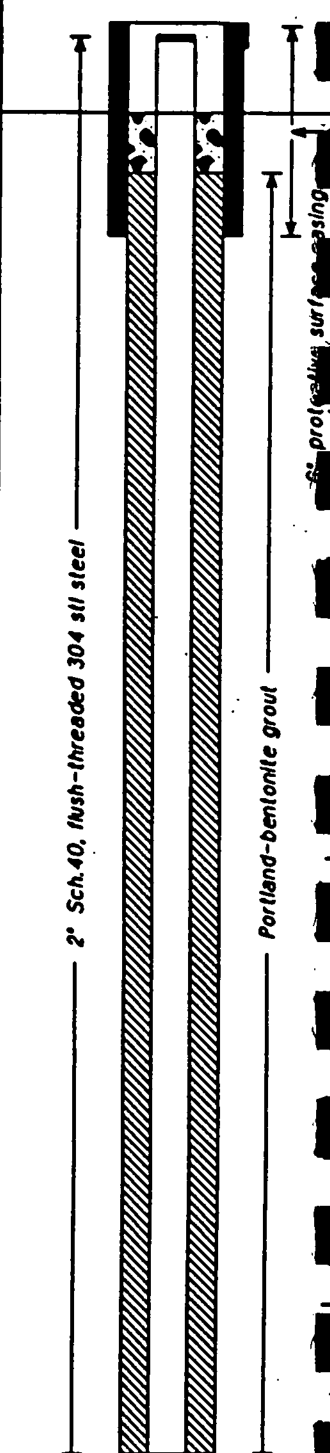
JOB NUMBER: C05030

JACOBS ENGINEERING GROUP, INC
CHICAGO ENVIRONMENTAL

BORING NUMBER: MW-9B (EB-4)
DATE DRILLED: 7/21/93 through 7/29/93
DRILL COMPANY: Exploration Technology Inc.
DRILL METHOD: Dual Wall Reverse Circulation (6" OD)
SURFACE ELEVATION: 848.88 Feet MSLD
CLIENT: U.S. EPA
PROJECT: Stoughton City Landfill
GEOLOGIST: Jeff Bale

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/FT.	PID (ppm) 0 150	SOIL CLASS	DESCRIPTION AND REMARKS
						Topsoil, dark, organic with clay, low plasticity
					SW	Gravelly sand, well graded
					SP	Sand, medium, poorly graded
5					CL	Gravelly/Sandy clay, medium plasticity
					CH	Clay, light brown/gray, plastic
					CL	Gravelly/Sandy clay, medium plasticity
10	☒	NO RECOV			SP	Sand, medium, poorly graded
					GW	Gravel to 1.5cm, well graded, subangular
15					GC	Clayey gravel to 1.0cm, subangular
					SC	Clayey sand, coarse, poorly graded
					GW	Gravel to 2.5cm, well graded with sand
20					SP	Sand, fine-medium, poorly graded, moist
					SP	Sand, fine, poorly graded
25	☒	SL-EB4-26			GW	Sandy gravel, well graded, producing water
30					SM	Silty sand, very fine with trace sand, coarse and gravel
35					GW	Sandy gravel, well graded, producing significant water
40	☒	SL-EB4-42				
45					SP	

WELL DIAGRAM

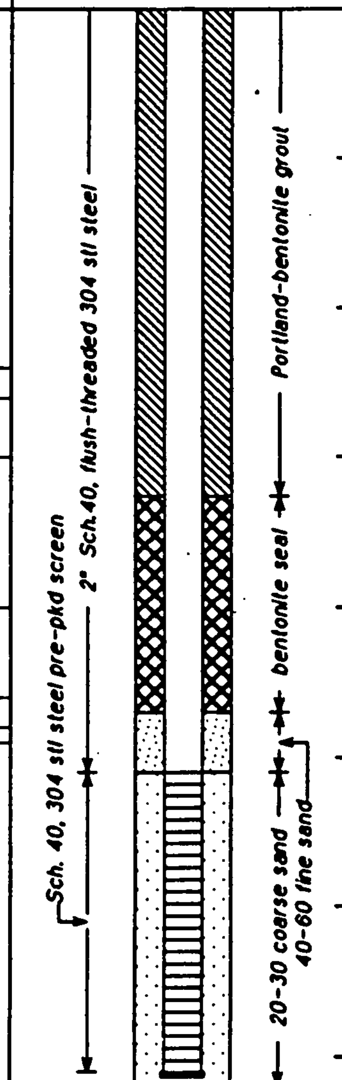


JACOBS ENGINEERING GROUP, INC
CHICAGO ENVIRONMENTAL

BORING NUMBER: MW-9B (EB-4)
DATE DRILLED: 7/21/93 through 7/29/93
DRILL COMPANY: Exploration Technology Inc.
DRILL METHOD: Dual Wall Reverse Circulation (6" OD)
SURFACE ELEVATION: 848.88 Feet MSLD
CLIENT: U.S. EPA
PROJECT: Stoughton City Landfill
GEOLOGIST: Jeff Bale

DEPTH feet	SAMPLE	SAMP. NO.	BLOWS/FT.	PID (ppm) 0 150	SOIL CLASS	DESCRIPTION AND REMARKS
45–57					SP	Sand, very fine, poorly graded, wet with fines
57–58					SP	Same as above with trace gravel, well graded
58–60					SP	Same as above
60–65					SP	Sand, fine, poorly graded, wet
65–68					GW	Gravel, well graded, with sand, medium-coarse
68–69					GP	Gravel, poorly graded with sand, fine-coarse limestone fragments
69–70					SP	Sand, medium-coarse with small limestone fragments, producing minor water
70–81	⊠	SL-EB4-71			LS	Limestone bedrock, tan, producing steady water
81						*Boring terminated at 81'*

WELL DIAGRAM



APPENDIX B

HERMIT DATA LOGGER RAW FILES

APPENDIX B

HERMIT DATA LOGGER RAW FILES

SE-2000 FILES 0W-1 THRU 0W-4, MW9S, I, B, EW-1)

TEST 0: STEP 0 - STATIC WATER LEVELS

TEST 1: STEP 0 - 20 GPM STEP TEST
STEP 1 - 40 GPM STEP TEST
STEP 2 - 60 GPM STEP TEST
STEP 3 - 80 GPM STEP TEST
STEP 4 - STEP TEST RECOVERY

TEST 2: STEP 0 - 72-HOUR TEST
STEP 1 - RECOVERY

SE-1000 FILES (MWGS, D)

TEST 0: STATIC WATER LEVELS

TEST 1: 20 GPM STEP TEST

TEST 2: 40 GPM STEP TEST

TEST 3: 72-HOUR TEST

SE2000
Environmental Logger
03/27 13:13

Unit# 2 Test 0

Setups:	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7
Type	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)
Mode	TOC	TOC	TOC	TOC	TOC	TOC	TOC
I.D.	MW9I	MW9S	MW9B	OW2	OW3	OW1	OW4
Reference	3.130	2.780	2.860	0.080	3.870	2.940	0.470
SG	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Linearity	0.281	0.149	0.105	0.113	0.138	0.119	0.110
Scale factor	29.873	19.928	50.266	30.159	20.042	30.180	29.757
Offset	0.024	0.032	-0.309	-0.014	0.080	-0.166	0.003
Delay mSEC	50.000	50.000	50.000	50.000	50.000	50.000	50.000

Step 0 03/20 15:13:29

Elapsed Time	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7
0.0000	3.120	2.773	2.875	0.080	3.870	2.940	0.479
15.0000	3.120	2.773	2.875	0.080	3.857	2.930	0.470
30.0000	3.130	2.792	2.875	0.080	3.844	2.930	0.470
45.0000	3.130	2.836	2.875	0.070	3.838	2.920	0.470
60.0000	3.120	2.855	2.875	0.070	3.832	2.920	0.470
75.0000	3.120	2.887	2.875	0.070	3.832	2.920	0.460
90.0000	3.120	2.893	2.875	0.070	3.832	2.920	0.470
105.000	3.120	2.893	2.875	0.080	3.844	2.930	0.479
120.000	3.120	2.868	2.875	0.070	3.851	2.920	0.460
135.000	3.120	2.849	2.891	0.070	3.851	2.920	0.470
150.000	3.120	2.811	2.875	0.070	3.857	2.920	0.470
165.000	3.120	2.798	2.875	0.070	3.863	2.920	0.470
180.000	3.120	2.786	2.891	0.070	3.870	2.920	0.470
195.000	3.110	2.786	2.891	0.070	3.876	2.920	0.460
210.000	3.120	2.786	2.891	0.070	3.882	2.920	0.460
225.000	3.120	2.780	2.891	0.070	3.888	2.920	0.470
240.000	3.120	2.773	2.907	0.080	3.895	2.920	0.470
255.000	3.120	2.767	2.907	0.080	3.901	2.920	0.479
270.000	3.120	2.761	2.907	0.080	3.907	2.930	0.470
285.000	3.120	2.754	2.907	0.080	3.907	2.920	0.460

300.000	3.120	2.748	2.907	0.080	3.920	2.920	0.470
315.000	3.120	2.754	2.907	0.080	3.920	2.920	0.470
330.000	3.120	2.754	2.923	0.080	3.926	2.920	0.470
345.000	3.120	2.754	2.923	0.070	3.933	2.920	0.470
360.000	3.120	2.748	2.923	0.070	3.939	2.920	0.470
375.000	3.120	2.748	2.923	0.080	3.939	2.920	0.479
390.000	3.120	2.748	2.923	0.080	3.945	2.920	0.479
405.000	3.120	2.748	2.939	0.080	3.952	2.930	0.470
420.000	3.120	2.754	2.939	0.080	3.952	2.930	0.470
435.000	3.120	2.761	2.939	0.080	3.958	2.930	0.470
450.000	3.120	2.761	2.939	0.080	3.958	2.920	0.470
465.000	3.120	2.748	2.939	0.070	3.964	2.920	0.470
480.000	3.110	2.748	2.939	0.070	3.964	2.920	0.470
495.000	3.120	2.754	2.939	0.070	3.971	2.920	0.460
510.000	3.120	2.754	2.955	0.080	3.977	2.920	0.470
525.000	3.120	2.761	2.955	0.070	3.983	2.920	0.470
540.000	3.120	2.754	2.955	0.070	3.983	2.920	0.460
555.000	3.120	2.748	2.955	0.070	3.990	2.920	0.460
570.000	3.110	2.723	2.955	0.070	3.990	2.920	0.470
585.000	3.120	2.723	2.955	0.070	3.996	2.920	0.460
600.000	3.110	2.659	2.971	0.070	3.996	2.920	0.460
615.000	3.110	2.539	2.971	0.070	3.996	2.920	0.451
630.000	3.110	2.476	2.971	0.070	4.002	2.920	0.460
645.000	3.110	2.431	2.971	0.070	4.002	2.911	0.460
660.000	3.120	2.463	2.971	0.070	4.009	2.911	0.460
675.000	3.120	2.526	2.971	0.070	4.015	2.911	0.460
690.000	3.110	2.577	2.971	0.070	4.021	2.911	0.470
705.000	3.110	2.609	2.971	0.060	4.021	2.911	0.460
720.000	3.110	2.621	2.971	0.060	4.021	2.911	0.460
735.000	3.110	2.640	2.971	0.060	4.028	2.911	0.460
750.000	3.110	2.659	2.987	0.060	4.028	2.911	0.460
765.000	3.110	2.672	2.971	0.070	4.034	2.911	0.460
780.000	3.110	2.640	2.971	0.060	4.034	2.911	0.451
795.000	3.110	2.634	2.987	0.060	4.040	2.911	0.460
810.000	3.110	2.659	2.987	0.060	4.047	2.901	0.451
825.000	3.110	2.653	2.987	0.051	4.047	2.901	0.451
840.000	3.110	2.666	2.987	0.060	4.053	2.901	0.451
855.000	3.110	2.672	2.987	0.060	4.059	2.911	0.451
870.000	3.110	2.685	2.987	0.060	4.059	2.911	0.451
885.000	3.110	2.691	2.987	0.060	4.065	2.911	0.451
900.000	3.110	2.704	3.003	0.060	4.065	2.911	0.451
915.000	3.110	2.723	3.003	0.060	4.072	2.911	0.460
930.000	3.110	2.742	3.003	0.060	4.078	2.901	0.460
945.000	3.110	2.761	3.003	0.060	4.078	2.911	0.460
960.000	3.110	2.780	3.003	0.060	4.072	2.901	0.451
975.000	3.110	2.792	3.003	0.060	4.078	2.911	0.451

990.000	3.110	2.817	3.003	0.060	4.078	2.911	0.451
1005.00	3.110	2.843	3.003	0.060	4.078	2.911	0.451
1020.00	3.110	2.849	3.003	0.060	4.084	2.911	0.441
1035.00	3.110	2.874	3.018	0.070	4.084	2.920	0.460
1050.00	3.120	2.950	3.018	0.060	4.084	2.901	0.470
1065.00	3.120	2.995	3.018	0.060	4.091	2.911	0.470
1080.00	3.110	3.134	3.018	0.060	4.091	2.901	0.470
1095.00	3.139	3.102	3.050	0.070	4.103	2.920	0.488
1110.00	3.120	2.995	3.034	0.060	4.110	2.911	0.470
1125.00	3.130	2.988	3.034	0.070	4.116	2.911	0.479
1140.00	3.120	3.020	3.034	0.060	4.116	2.911	0.470
1155.00	3.120	2.944	3.034	0.070	4.122	2.911	0.470
1170.00	3.130	3.039	3.034	0.070	4.122	2.920	0.488
1185.00	3.130	2.963	3.050	0.070	4.129	2.911	0.479
1200.00	3.215	3.286	3.114	0.099	4.154	2.959	0.573
1215.00	3.101	3.052	3.034	0.070	4.129	2.911	0.460
1230.00	3.139	3.020	3.066	0.080	4.141	2.930	0.488
1245.00	3.130	3.033	3.050	0.070	4.141	2.920	0.488
1260.00	3.130	3.045	3.050	0.080	4.148	2.930	0.479
1275.00	3.110	3.109	3.050	0.070	4.141	2.920	0.470
1290.00	3.158	3.166	3.066	0.080	4.148	2.940	0.526
1305.00	3.101	3.090	3.034	0.070	4.141	2.940	0.460
1320.00	3.149	3.045	3.082	0.080	4.160	2.930	0.498
1335.00	3.091	3.102	3.034	0.070	4.148	2.911	0.460
1350.00	3.101	2.868	3.034	0.070	4.160	2.920	0.451
1365.00	3.120	2.919	3.050	0.080	4.167	2.920	0.470
1380.00	3.139	3.330	3.066	0.080	4.173	2.930	0.526
1395.00	3.082	3.058	3.018	0.070	4.173	2.911	0.441
1410.00	3.139	2.925	3.082	0.070	4.186	2.920	0.498
1425.00	3.120	2.849	3.066	0.080	4.192	2.930	0.479
1440.00	3.168	2.906	3.098	0.089	4.198	2.940	0.526
1455.00	3.110	2.912	3.050	0.080	4.192	2.920	0.479
1470.00	3.120	2.780	3.066	0.080	4.205	2.930	0.488
1485.00	3.130	2.748	3.066	0.089	4.211	2.930	0.488
1500.00	3.149	2.887	3.082	0.089	4.217	2.940	0.507
1515.00	3.110	2.704	3.066	0.080	4.217	2.930	0.470
1530.00	3.130	2.792	3.066	0.089	4.224	2.930	0.498
1545.00	3.130	2.786	3.066	0.080	4.230	2.940	0.488
1560.00	3.120	2.691	3.066	0.089	4.236	2.940	0.479
1575.00	3.130	2.640	3.066	0.089	4.242	2.940	0.479
1590.00	3.130	2.621	3.066	0.089	4.249	2.940	0.479
1605.00	3.130	2.653	3.066	0.089	4.255	2.930	0.479
1620.00	3.130	2.602	3.066	0.089	4.261	2.930	0.470
1635.00	3.130	2.583	3.066	0.089	4.261	2.930	0.479
1650.00	3.130	2.590	3.082	0.089	4.274	2.930	0.479
1665.00	3.120	2.564	3.066	0.089	4.274	2.930	0.479

1680.00	3.130	2.545	3.082	0.089	4.280	2.940	0.479
1695.00	3.130	2.577	3.066	0.089	4.280	2.930	0.479
1710.00	3.130	2.564	3.066	0.089	4.287	2.930	0.479
1725.00	3.130	2.583	3.066	0.089	4.293	2.930	0.488
1740.00	3.130	2.558	3.066	0.089	4.299	2.930	0.479
1755.00	3.139	2.533	3.066	0.080	4.306	2.930	0.488
1770.00	3.139	2.514	3.082	0.080	4.312	2.930	0.479
1785.00	3.139	2.564	3.066	0.089	4.312	2.930	0.470
1800.00	3.139	2.609	3.066	0.089	4.318	2.930	0.470
1815.00	3.139	2.558	3.066	0.080	4.325	2.930	0.470
1830.00	3.130	2.552	3.066	0.080	4.325	2.930	0.479
1845.00	3.139	2.507	3.066	0.089	4.331	2.930	0.479
1860.00	3.139	2.495	3.066	0.089	4.337	2.930	0.479
1875.00	3.139	2.520	3.066	0.089	4.337	2.930	0.470
1890.00	3.139	2.545	3.066	0.089	4.337	2.930	0.460
1905.00	3.139	2.609	3.066	0.089	4.344	2.930	0.470
1920.00	3.139	2.545	3.066	0.089	4.350	2.930	0.470
1935.00	3.139	2.552	3.066	0.080	4.356	2.930	0.470
1950.00	3.139	2.526	3.066	0.089	4.363	2.920	0.479
1965.00	3.139	2.533	3.066	0.089	4.369	2.930	0.479
1980.00	3.130	2.526	3.066	0.080	4.369	2.930	0.470
1995.00	3.139	2.596	3.066	0.089	4.375	2.920	0.470
2010.00	3.139	2.647	3.050	0.080	4.382	2.920	0.479
2025.00	3.139	2.691	3.066	0.080	4.382	2.930	0.479
2040.00	3.139	2.640	3.066	0.089	4.388	2.930	0.488
2055.00	3.139	2.628	3.066	0.089	4.388	2.930	0.479
2070.00	3.139	2.609	3.066	0.089	4.394	2.930	0.470
2085.00	3.139	2.590	3.066	0.080	4.400	2.920	0.479
2100.00	3.139	2.602	3.066	0.080	4.400	2.920	0.479
2115.00	3.139	2.628	3.050	0.080	4.407	2.920	0.470
2130.00	3.139	2.615	3.050	0.080	4.413	2.920	0.479
2145.00	3.139	2.628	3.050	0.080	4.413	2.920	0.470
2160.00	3.139	2.659	3.050	0.080	4.413	2.920	0.470
2175.00	3.139	2.704	3.050	0.080	4.419	2.920	0.470
2190.00	3.139	2.716	3.050	0.080	4.419	2.911	0.479
2205.00	3.139	2.723	3.050	0.080	4.426	2.920	0.470
2220.00	3.139	2.710	3.050	0.089	4.432	2.920	0.479
2235.00	3.139	2.710	3.050	0.080	4.432	2.920	0.479
2250.00	3.139	2.723	3.050	0.080	4.445	2.920	0.479
2265.00	3.139	2.742	3.050	0.080	4.445	2.920	0.479
2280.00	3.139	2.735	3.050	0.080	4.451	2.920	0.479
2295.00	3.139	2.742	3.050	0.080	4.457	2.920	0.479
2310.00	3.139	2.716	3.050	0.080	4.464	2.920	0.470
2325.00	3.149	2.742	3.050	0.080	4.464	2.920	0.479
2340.00	3.149	2.761	3.050	0.089	4.470	2.930	0.479
2355.00	3.149	2.792	3.050	0.089	4.476	2.930	0.488

2370.00	3.149	2.862	3.050	0.089	4.483	2.930	0.488
2385.00	3.149	2.925	3.050	0.089	4.483	2.930	0.488

SE2000
Environmental Logger
03/27 13:30

Unit# 2 Test 1

Setups:	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
Type	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)
Mode	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC
I.D.	MW9I	MW9S	MW9B	OW2	OW3	OW1	OW4	EW1
Reference	3.130	2.780	2.860	0.080	3.870	2.940	0.470	0.000
SG	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Linearity	0.281	0.149	0.105	0.113	0.138	0.119	0.110	0.074
Scale factor	29.873	19.928	50.266	30.159	20.042	30.180	29.757	50.363
Offset	0.024	0.032	-0.309	-0.014	0.080	-0.166	0.003	-0.237
Delay mSEC	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000

Step 0 03/22 08:38:33

Elapsed Time	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
0.0000	3.130	3.375	3.003	0.089	4.502	3.006	0.507	3.586
0.0083	3.130	3.368	3.018	0.089	4.489	2.987	0.517	1.158
0.0166	3.130	3.375	3.018	0.099	4.502	2.968	0.517	1.444
0.0250	3.120	3.375	3.018	0.099	4.502	2.978	0.517	1.951
0.0333	3.120	3.375	3.018	0.089	4.521	2.997	0.517	2.681
0.0416	3.130	3.368	3.018	0.099	4.508	3.016	0.517	3.252
0.0500	3.130	3.375	3.018	0.099	4.489	3.035	0.517	3.713
0.0583	3.120	3.368	3.034	0.099	4.502	3.044	0.517	4.315
0.0666	3.130	3.368	3.018	0.099	4.502	3.064	0.517	4.760
0.0750	3.130	3.375	3.034	0.099	4.527	3.073	0.517	4.950
0.0833	3.130	3.375	3.034	0.089	4.489	3.092	0.517	4.934
0.0916	3.130	3.375	3.034	0.099	4.508	3.102	0.526	4.680
0.1000	3.130	3.375	3.018	0.099	4.483	3.121	0.517	3.697
0.1083	3.130	3.375	3.034	0.099	4.489	3.130	0.526	4.791
0.1166	3.130	3.375	3.034	0.099	4.502	3.159	0.517	5.442
0.1250	3.130	3.368	3.018	0.099	4.495	3.169	0.526	5.283
0.1333	3.130	3.375	3.018	0.099	4.495	3.197	0.535	5.093
0.1416	3.130	3.375	3.034	0.099	4.521	3.207	0.535	5.680

0.1500	3.130	3.381	3.034	0.108	4.527	3.226	0.535	4.918
0.1583	3.139	3.368	3.034	0.099	4.514	3.245	0.554	5.347
0.1666	3.139	3.375	3.034	0.108	4.514	3.254	0.554	4.966
0.1750	3.130	3.375	3.034	0.118	4.508	3.264	0.554	5.125
0.1833	3.139	3.375	3.034	0.108	4.495	3.293	0.564	5.299
0.1916	3.139	3.375	3.034	0.118	4.514	3.302	0.564	5.410
0.2000	3.139	3.375	3.018	0.137	4.495	3.321	0.573	5.537
0.2083	3.139	3.375	3.034	0.137	4.483	3.340	0.573	5.632
0.2166	3.130	3.375	3.034	0.146	4.502	3.350	0.573	5.791
0.2250	3.139	3.375	3.034	0.146	4.483	3.359	0.573	5.807
0.2333	3.139	3.375	3.034	0.146	4.508	3.369	0.573	5.807
0.2416	3.139	3.375	3.034	0.156	4.502	3.388	0.582	5.855
0.2500	3.139	3.375	3.034	0.156	4.489	3.398	0.582	6.013
0.2583	3.139	3.375	3.034	0.156	4.489	3.407	0.592	5.696
0.2666	3.139	3.375	3.034	0.156	4.508	3.417	0.592	5.855
0.2750	3.139	3.381	3.034	0.156	4.489	3.436	0.592	5.775
0.2833	3.149	3.381	3.034	0.156	4.489	3.436	0.601	5.664
0.2916	3.149	3.375	3.034	0.156	4.514	3.445	0.601	5.680
0.3000	3.149	3.375	3.034	0.165	4.514	3.464	0.601	5.601
0.3083	3.149	3.381	3.034	0.165	4.508	3.464	0.601	5.426
0.3166	3.149	3.375	3.034	0.165	4.502	3.474	0.611	5.363
0.3250	3.139	3.381	3.034	0.165	4.502	3.474	0.611	5.331
0.3333	3.149	3.381	3.034	0.165	4.495	3.484	0.620	5.188
0.3500	3.149	3.375	3.034	0.165	4.514	3.503	0.620	5.045
0.3666	3.149	3.381	3.034	0.185	4.527	3.512	0.620	4.839
0.3833	3.149	3.381	3.034	0.175	4.489	3.522	0.629	4.807
0.4000	3.158	3.375	3.034	0.185	4.502	3.522	0.620	4.665
0.4166	3.158	3.375	3.034	0.185	4.489	3.522	0.629	4.601
0.4333	3.158	3.381	3.050	0.194	4.521	3.522	0.629	4.569
0.4500	3.168	3.381	3.034	0.185	4.495	3.522	0.639	4.490
0.4666	3.168	3.381	3.034	0.204	4.502	3.531	0.639	4.427
0.4833	3.168	3.381	3.050	0.204	4.489	3.522	0.639	4.427
0.5000	3.158	3.381	3.034	0.213	4.502	3.522	0.629	4.395
0.5166	3.168	3.381	3.034	0.213	4.521	3.522	0.629	4.379
0.5333	3.168	3.381	3.034	0.213	4.508	3.522	0.639	4.458
0.5500	3.168	3.381	3.034	0.213	4.489	3.522	0.639	4.427
0.5666	3.177	3.381	3.050	0.223	4.502	3.522	0.648	4.427
0.5833	3.177	3.381	3.050	0.223	4.502	3.522	0.648	4.474
0.6000	3.177	3.381	3.050	0.223	4.502	3.522	0.648	4.490
0.6166	3.187	3.387	3.050	0.232	4.495	3.522	0.658	4.490
0.6333	3.187	3.381	3.034	0.232	4.521	3.522	0.667	4.474
0.6500	3.187	3.387	3.050	0.232	4.514	3.522	0.658	4.490
0.6666	3.187	3.381	3.050	0.242	4.502	3.531	0.658	4.506
0.6833	3.187	3.381	3.050	0.242	4.489	3.531	0.658	4.522
0.7000	3.187	3.387	3.050	0.251	4.521	3.531	0.658	4.538
0.7166	3.187	3.387	3.050	0.242	4.502	3.531	0.658	4.506

0.7333	3.187	3.387	3.050	0.251	4.502	3.531	0.658	4.538
0.7500	3.187	3.387	3.050	0.251	4.489	3.531	0.667	4.553
0.7666	3.196	3.387	3.050	0.261	4.527	3.541	0.676	4.601
0.7833	3.196	3.387	3.050	0.251	4.502	3.541	0.667	4.585
0.8000	3.196	3.387	3.050	0.261	4.502	3.541	0.676	4.569
0.8166	3.196	3.394	3.050	0.251	4.489	3.541	0.676	4.553
0.8333	3.196	3.387	3.050	0.261	4.527	3.541	0.676	4.569
0.8500	3.196	3.387	3.050	0.270	4.489	3.550	0.686	4.585
0.8666	3.196	3.387	3.050	0.270	4.502	3.550	0.686	4.617
0.8833	3.196	3.387	3.050	0.270	4.489	3.541	0.676	4.601
0.9000	3.206	3.394	3.050	0.280	4.527	3.550	0.686	4.569
0.9166	3.206	3.387	3.050	0.270	4.489	3.550	0.686	4.617
0.9333	3.206	3.394	3.050	0.280	4.514	3.550	0.676	4.569
0.9500	3.206	3.394	3.050	0.280	4.508	3.550	0.695	4.569
0.9666	3.206	3.394	3.050	0.280	4.508	3.550	0.686	4.569
0.9833	3.206	3.394	3.050	0.280	4.483	3.560	0.695	4.538
1.0000	3.206	3.394	3.050	0.280	4.508	3.560	0.695	4.538
1.2000	3.215	3.400	3.050	0.299	4.527	3.569	0.714	5.172
1.4000	3.234	3.413	3.050	0.337	4.521	3.779	0.742	6.029
1.6000	3.244	3.419	3.050	0.375	4.508	3.674	0.770	4.252
1.8000	3.244	3.425	3.066	0.375	4.489	3.569	0.761	3.776
2.0000	3.244	3.432	3.050	0.366	4.495	3.512	0.733	3.601
2.2000	3.244	3.438	3.066	0.356	4.495	3.484	0.723	3.522
2.4000	3.234	3.444	3.066	0.356	4.502	3.474	0.723	3.522
2.6000	3.234	3.444	3.066	0.347	4.483	3.455	0.723	3.459
2.8000	3.225	3.457	3.066	0.347	4.502	3.455	0.714	3.506
3.0000	3.234	3.457	3.066	0.347	4.521	3.445	0.714	3.475
3.2000	3.234	3.469	3.066	0.337	4.521	3.455	0.714	3.475
3.4000	3.234	3.469	3.066	0.337	4.508	3.445	0.714	3.475
3.6000	3.234	3.476	3.066	0.337	4.521	3.445	0.714	3.490
3.8000	3.234	3.476	3.066	0.337	4.514	3.445	0.723	3.459
4.0000	3.234	3.476	3.050	0.328	4.489	3.445	0.714	3.332
4.2000	3.225	3.476	3.050	0.337	4.527	3.417	0.705	2.999
4.4000	3.234	3.482	3.050	0.328	4.495	3.388	0.705	2.840
4.6000	3.225	3.482	3.050	0.318	4.514	3.369	0.695	2.745
4.8000	3.225	3.488	3.066	0.318	4.508	3.359	0.686	2.761
5.0000	3.215	3.495	3.050	0.318	4.521	3.350	0.686	2.745
5.2000	3.215	3.495	3.066	0.309	4.495	3.350	0.676	2.697
5.4000	3.215	3.495	3.050	0.299	4.521	3.340	0.686	2.665
5.6000	3.215	3.495	3.066	0.299	4.508	3.340	0.676	2.697
5.8000	3.215	3.501	3.050	0.299	4.495	3.340	0.676	2.665
6.0000	3.215	3.501	3.050	0.299	4.521	3.340	0.676	2.665
6.2000	3.215	3.507	3.066	0.299	4.489	3.340	0.676	2.649
6.4000	3.215	3.501	3.066	0.290	4.514	3.340	0.676	2.649
6.6000	3.215	3.507	3.066	0.299	4.502	3.340	0.676	2.634
6.8000	3.225	3.507	3.066	0.290	4.508	3.331	0.676	2.634

7.0000	3.215	3.507	3.066	0.290	4.489	3.331	0.676	2.649
7.2000	3.215	3.507	3.050	0.290	4.514	3.331	0.667	2.634
7.4000	3.215	3.514	3.050	0.290	4.502	3.331	0.676	2.634
7.6000	3.215	3.514	3.050	0.290	4.508	3.331	0.667	2.634
7.8000	3.215	3.514	3.050	0.290	4.502	3.331	0.676	2.649
8.0000	3.215	3.514	3.050	0.280	4.489	3.331	0.676	2.602
8.2000	3.215	3.514	3.050	0.290	4.489	3.321	0.667	2.618
8.4000	3.206	3.507	3.050	0.290	4.508	3.331	0.667	2.602
8.6000	3.206	3.514	3.050	0.290	4.514	3.331	0.667	2.602
8.8000	3.206	3.514	3.050	0.290	4.508	3.331	0.667	2.602
9.0000	3.206	3.514	3.050	0.290	4.495	3.321	0.667	2.602
9.2000	3.206	3.514	3.050	0.290	4.489	3.331	0.667	2.602
9.4000	3.206	3.514	3.050	0.290	4.521	3.331	0.667	2.570
9.6000	3.206	3.514	3.050	0.290	4.514	3.331	0.667	2.586
9.8000	3.196	3.514	3.050	0.290	4.514	3.321	0.658	2.586
10.0000	3.215	3.520	3.066	0.299	4.508	3.321	0.667	2.586
12.0000	3.215	3.533	3.066	0.290	4.508	3.321	0.667	2.602
14.0000	3.215	3.539	3.050	0.290	4.514	3.321	0.667	2.586
16.0000	3.206	3.533	3.050	0.290	4.502	3.331	0.667	2.570
18.0000	3.215	3.545	3.066	0.290	4.495	3.321	0.667	2.586
20.0000	3.225	3.564	3.066	0.290	4.502	3.331	0.667	2.602
22.0000	3.215	3.577	3.050	0.299	4.514	3.331	0.667	2.602
24.0000	3.225	3.583	3.066	0.290	4.527	3.331	0.676	2.602
26.0000	3.215	3.583	3.066	0.290	4.483	3.331	0.667	2.602
28.0000	3.215	3.590	3.066	0.290	4.502	3.331	0.676	2.586
30.0000	3.215	3.590	3.066	0.280	4.521	3.331	0.667	2.570
32.0000	3.215	3.590	3.066	0.290	4.521	3.331	0.676	2.602
34.0000	3.215	3.590	3.066	0.299	4.502	3.331	0.667	2.570
36.0000	3.215	3.602	3.066	0.299	4.502	3.331	0.676	2.602
38.0000	3.215	3.590	3.066	0.299	4.521	3.331	0.676	2.602
40.0000	3.215	3.571	3.066	0.290	4.514	3.321	0.667	2.586
42.0000	3.215	3.577	3.082	0.299	4.508	3.331	0.667	2.538
44.0000	3.225	3.596	3.082	0.299	4.508	3.331	0.667	2.570
46.0000	3.225	3.609	3.066	0.290	4.521	3.331	0.676	2.570
48.0000	3.225	3.621	3.082	0.290	4.521	3.331	0.686	2.586
50.0000	3.225	3.628	3.066	0.290	4.508	3.331	0.667	2.586
52.0000	3.215	3.615	3.066	0.299	4.527	3.321	0.667	2.602
54.0000	3.225	3.628	3.082	0.309	4.514	3.340	0.686	2.523
56.0000	3.215	3.628	3.066	0.299	4.514	3.331	0.667	2.554
58.0000	3.215	3.615	3.082	0.299	4.521	3.331	0.667	2.570
60.0000	3.215	3.621	3.082	0.299	4.514	3.340	0.676	2.570
62.0000	3.225	3.628	3.082	0.299	4.514	3.340	0.686	2.570
64.0000	3.215	3.621	3.082	0.299	4.508	3.331	0.676	2.538
66.0000	3.215	3.615	3.082	0.309	4.514	3.340	0.686	2.538
68.0000	3.234	3.640	3.098	0.309	4.527	3.350	0.695	2.602
70.0000	3.225	3.659	3.082	0.299	4.521	3.340	0.686	2.634

72.0000	3.215	3.640	3.082	0.299	4.502	3.340	0.676	2.554
74.0000	3.215	3.621	3.082	0.299	4.502	3.331	0.676	2.538
76.0000	3.215	3.596	3.082	0.309	4.508	3.340	0.676	2.523
78.0000	3.225	3.590	3.098	0.309	4.508	3.340	0.686	2.507
80.0000	3.234	3.628	3.082	0.309	4.508	3.340	0.695	2.570
82.0000	3.234	3.666	3.098	0.309	4.521	3.340	0.695	2.586
84.0000	3.215	3.647	3.082	0.309	4.514	3.331	0.686	2.554
86.0000	3.225	3.640	3.098	0.299	4.514	3.340	0.686	2.586
88.0000	3.225	3.640	3.082	0.309	4.521	3.340	0.686	2.586
90.0000	3.215	3.640	3.082	0.299	4.514	3.331	0.676	2.538
92.0000	3.234	3.628	3.082	0.309	4.514	3.350	0.686	2.538
94.0000	3.225	3.628	3.082	0.309	4.527	3.340	0.686	2.570
96.0000	3.225	3.634	3.098	0.309	4.521	3.340	0.686	2.554
98.0000	3.225	3.653	3.098	0.309	4.521	3.350	0.695	2.570
100.000	3.234	3.672	3.098	0.309	4.533	3.340	0.705	2.602
120.000	3.225	3.761	3.082	0.299	4.540	3.350	0.695	2.538

SE2000
Environmental Logger
03/27 13:49

Unit# 2 Test 1

Setups: INPUT 1 INPUT 2 INPUT 3 INPUT 4 INPUT 5 INPUT 6 INPUT 7 INPUT 8

Setups:	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
Type	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)
Mode	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC
I.D.	MW9I	MW9S	MW9B	OW2	OW3	OW1	OW4	EW1
Reference	3.130	2.780	2.860	0.080	3.870	2.940	0.470	0.000
SG	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Linearity	0.281	0.149	0.105	0.113	0.138	0.119	0.110	0.074
Scale factor	29.873	19.928	50.266	30.159	20.042	30.180	29.757	50.363
Offset	0.024	0.032	-0.309	-0.014	0.080	-0.166	0.003	-0.237
Delay mSEC	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000

Step 1 03/22 10:39:31

Elapsed Time	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
0.0000	3.234	3.780	3.098	0.309	4.514	3.359	0.714	2.554
0.0083	3.234	3.780	3.098	0.299	4.514	3.350	0.705	2.570
0.0166	3.225	3.773	3.098	0.299	4.527	3.350	0.705	2.538
0.0250	3.225	3.773	3.098	0.299	4.533	3.350	0.714	2.554
0.0333	3.225	3.773	3.098	0.309	4.521	3.350	0.705	2.554
0.0416	3.225	3.780	3.098	0.299	4.514	3.350	0.705	2.538
0.0500	3.234	3.773	3.098	0.299	4.514	3.359	0.705	2.570
0.0583	3.234	3.773	3.098	0.299	4.533	3.359	0.714	2.554
0.0666	3.234	3.773	3.098	0.299	4.533	3.350	0.705	2.554
0.0750	3.225	3.780	3.098	0.299	4.514	3.350	0.714	2.570
0.0833	3.234	3.780	3.098	0.299	4.521	3.359	0.695	2.634
0.0916	3.225	3.780	3.098	0.299	4.527	3.359	0.714	2.602
0.1000	3.234	3.780	3.098	0.299	4.533	3.350	0.705	2.602
0.1083	3.234	3.780	3.098	0.309	4.533	3.359	0.705	2.634
0.1166	3.234	3.780	3.098	0.299	4.514	3.350	0.714	2.665
0.1250	3.225	3.773	3.098	0.309	4.521	3.350	0.714	2.665
0.1333	3.225	3.780	3.098	0.299	4.533	3.359	0.714	2.713
0.1416	3.234	3.780	3.098	0.299	4.533	3.359	0.705	2.776

0.1500	3.225	3.780	3.098	0.299	4.533	3.359	0.705	2.808
0.1583	3.234	3.780	3.098	0.299	4.521	3.359	0.705	2.840
0.1666	3.225	3.773	3.098	0.309	4.514	3.359	0.714	2.872
0.1750	3.225	3.773	3.098	0.299	4.527	3.359	0.714	2.935
0.1833	3.234	3.780	3.098	0.299	4.533	3.369	0.705	3.030
0.1916	3.225	3.773	3.098	0.299	4.527	3.369	0.705	3.078
0.2000	3.225	3.773	3.098	0.299	4.508	3.369	0.705	3.094
0.2083	3.225	3.780	3.114	0.309	4.514	3.369	0.714	3.125
0.2166	3.234	3.780	3.114	0.309	4.527	3.379	0.705	3.205
0.2250	3.234	3.780	3.114	0.309	4.533	3.379	0.705	3.237
0.2333	3.234	3.780	3.098	0.309	4.533	3.379	0.714	3.332
0.2416	3.234	3.780	3.098	0.299	4.521	3.379	0.705	3.363
0.2500	3.234	3.773	3.098	0.299	4.521	3.379	0.705	3.411
0.2583	3.225	3.773	3.098	0.299	4.521	3.388	0.705	3.459
0.2666	3.225	3.780	3.098	0.299	4.514	3.388	0.705	3.522
0.2750	3.234	3.780	3.098	0.309	4.514	3.388	0.714	3.554
0.2833	3.225	3.773	3.114	0.299	4.514	3.398	0.705	3.617
0.2916	3.234	3.780	3.098	0.299	4.527	3.398	0.705	3.601
0.3000	3.225	3.773	3.098	0.309	4.533	3.398	0.714	3.665
0.3083	3.225	3.773	3.098	0.309	4.514	3.407	0.705	3.697
0.3166	3.225	3.773	3.098	0.299	4.514	3.407	0.714	3.760
0.3250	3.234	3.773	3.098	0.299	4.527	3.407	0.714	3.808
0.3333	3.234	3.780	3.098	0.299	4.527	3.417	0.714	3.839
0.3500	3.234	3.780	3.098	0.309	4.527	3.417	0.714	3.966
0.3666	3.234	3.773	3.098	0.299	4.514	3.436	0.714	4.046
0.3833	3.234	3.773	3.098	0.309	4.527	3.436	0.723	4.157
0.4000	3.225	3.780	3.098	0.299	4.521	3.445	0.723	4.236
0.4166	3.225	3.773	3.098	0.309	4.514	3.455	0.723	4.347
0.4333	3.234	3.773	3.098	0.309	4.521	3.474	0.723	4.427
0.4500	3.225	3.780	3.098	0.299	4.533	3.484	0.723	4.490
0.4666	3.225	3.780	3.098	0.309	4.521	3.484	0.723	4.538
0.4833	3.234	3.773	3.098	0.309	4.521	3.493	0.723	4.601
0.5000	3.234	3.773	3.098	0.309	4.533	3.512	0.733	4.680
0.5166	3.234	3.773	3.098	0.318	4.527	3.512	0.723	4.728
0.5333	3.225	3.780	3.098	0.318	4.514	3.531	0.733	4.791
0.5500	3.234	3.773	3.098	0.309	4.521	3.531	0.733	4.839
0.5666	3.234	3.780	3.098	0.318	4.533	3.550	0.733	4.855
0.5833	3.234	3.780	3.098	0.318	4.514	3.550	0.742	4.871
0.6000	3.234	3.773	3.098	0.318	4.514	3.560	0.742	4.934
0.6166	3.234	3.780	3.098	0.328	4.527	3.569	0.742	4.934
0.6333	3.234	3.780	3.098	0.328	4.533	3.579	0.742	4.966
0.6500	3.234	3.780	3.098	0.328	4.521	3.579	0.742	5.014
0.6666	3.234	3.773	3.098	0.328	4.521	3.589	0.742	5.014
0.6833	3.234	3.780	3.098	0.328	4.533	3.598	0.752	5.014
0.7000	3.234	3.780	3.098	0.337	4.527	3.608	0.752	5.077
0.7166	3.234	3.780	3.098	0.337	4.527	3.608	0.752	5.061

0.7333	3.244	3.780	3.098	0.347	4.521	3.617	0.761	5.029
0.7500	3.234	3.780	3.098	0.337	4.533	3.627	0.752	5.029
0.7666	3.244	3.780	3.098	0.347	4.514	3.627	0.752	5.045
0.7833	3.244	3.773	3.098	0.347	4.521	3.627	0.761	5.014
0.8000	3.244	3.780	3.098	0.347	4.540	3.636	0.770	4.966
0.8166	3.244	3.773	3.098	0.356	4.521	3.636	0.761	4.950
0.8333	3.244	3.780	3.098	0.356	4.527	3.636	0.761	4.934
0.8500	3.244	3.780	3.098	0.347	4.533	3.636	0.770	4.903
0.8666	3.244	3.780	3.098	0.356	4.508	3.646	0.770	4.887
0.8833	3.253	3.780	3.098	0.356	4.527	3.646	0.770	4.871
0.9000	3.253	3.786	3.098	0.366	4.533	3.646	0.780	4.871
0.9166	3.253	3.786	3.098	0.356	4.514	3.646	0.780	4.839
0.9333	3.244	3.780	3.098	0.366	4.521	3.646	0.780	4.855
0.9500	3.253	3.780	3.114	0.366	4.540	3.646	0.789	4.791
0.9666	3.244	3.786	3.098	0.375	4.533	3.655	0.780	4.791
0.9833	3.253	3.786	3.098	0.375	4.514	3.655	0.780	4.791
1.0000	3.253	3.786	3.114	0.375	4.540	3.655	0.789	4.760
1.2000	3.263	3.786	3.098	0.395	4.533	3.655	0.799	4.665
1.4000	3.272	3.792	3.114	0.404	4.533	3.655	0.799	4.665
1.6000	3.272	3.792	3.098	0.414	4.514	3.655	0.808	4.665
1.8000	3.263	3.792	3.098	0.423	4.521	3.655	0.799	4.680
2.0000	3.272	3.799	3.098	0.423	4.521	3.655	0.808	4.649
2.2000	3.272	3.799	3.098	0.423	4.514	3.665	0.808	4.855
2.4000	3.272	3.805	3.114	0.442	4.514	3.684	0.808	4.966
2.6000	3.282	3.811	3.098	0.433	4.521	3.684	0.827	4.728
2.8000	3.272	3.818	3.098	0.442	4.521	3.684	0.817	5.029
3.0000	3.282	3.818	3.114	0.452	4.521	3.703	0.817	5.093
3.2000	3.282	3.824	3.114	0.452	4.514	3.713	0.827	5.172
3.4000	3.282	3.830	3.114	0.452	4.533	3.722	0.836	5.204
3.6000	3.291	3.830	3.114	0.461	4.527	3.732	0.836	5.204
3.8000	3.282	3.837	3.114	0.471	4.514	3.722	0.836	5.156
4.0000	3.291	3.843	3.114	0.471	4.521	3.722	0.846	5.156
4.2000	3.291	3.856	3.114	0.471	4.533	3.732	0.846	5.125
4.4000	3.301	3.856	3.114	0.480	4.533	3.732	0.846	5.125
4.6000	3.301	3.862	3.114	0.480	4.540	3.732	0.846	5.141
4.8000	3.291	3.868	3.130	0.480	4.521	3.732	0.846	5.125
5.0000	3.301	3.868	3.130	0.480	4.533	3.741	0.855	5.156
5.2000	3.291	3.875	3.114	0.480	4.540	3.732	0.846	5.109
5.4000	3.291	3.875	3.114	0.480	4.521	3.732	0.855	5.093
5.6000	3.291	3.875	3.114	0.480	4.527	3.722	0.846	5.093
5.8000	3.301	3.881	3.114	0.480	4.514	3.732	0.846	5.093
6.0000	3.291	3.881	3.130	0.480	4.514	3.732	0.846	5.093
6.2000	3.291	3.881	3.114	0.480	4.514	3.732	0.855	5.093
6.4000	3.291	3.887	3.114	0.490	4.508	3.722	0.855	5.077
6.6000	3.291	3.887	3.114	0.490	4.514	3.722	0.846	5.061
6.8000	3.291	3.881	3.114	0.480	4.527	3.732	0.846	5.014

7.0000	3.291	3.887	3.130	0.480	4.514	3.722	0.846	5.077
7.2000	3.291	3.887	3.130	0.480	4.527	3.732	0.846	5.029
7.4000	3.291	3.887	3.114	0.480	4.527	3.732	0.855	5.061
7.6000	3.291	3.887	3.114	0.490	4.527	3.732	0.846	5.029
7.8000	3.291	3.887	3.114	0.490	4.527	3.732	0.846	5.014
8.0000	3.291	3.887	3.114	0.490	4.527	3.732	0.846	5.061
8.2000	3.291	3.887	3.114	0.490	4.521	3.741	0.855	5.045
8.4000	3.291	3.894	3.114	0.490	4.533	3.741	0.855	5.029
8.6000	3.291	3.894	3.114	0.490	4.514	3.732	0.846	5.014
8.8000	3.291	3.894	3.130	0.490	4.527	3.741	0.855	5.029
9.0000	3.291	3.894	3.130	0.490	4.521	3.741	0.846	5.029
9.2000	3.301	3.894	3.114	0.500	4.514	3.741	0.855	5.029
9.4000	3.291	3.894	3.130	0.500	4.533	3.732	0.846	5.077
9.6000	3.291	3.894	3.130	0.500	4.521	3.741	0.855	5.029
9.8000	3.291	3.900	3.130	0.500	4.540	3.741	0.855	5.045
10.0000	3.301	3.900	3.130	0.509	4.527	3.741	0.855	5.029
12.0000	3.301	3.913	3.130	0.509	4.527	3.741	0.846	5.077
14.0000	3.301	3.913	3.114	0.509	4.533	3.741	0.846	5.029
16.0000	3.310	3.925	3.130	0.509	4.540	3.741	0.855	5.045
18.0000	3.310	3.938	3.130	0.509	4.527	3.741	0.855	5.061
20.0000	3.310	3.957	3.130	0.509	4.527	3.732	0.855	5.029
22.0000	3.301	3.938	3.130	0.519	4.540	3.751	0.855	5.188
24.0000	3.320	3.950	3.130	0.509	4.533	3.741	0.846	4.982
26.0000	3.310	3.957	3.130	0.509	4.540	3.741	0.855	5.014
28.0000	3.301	3.944	3.130	0.519	4.527	3.751	0.855	5.014
30.0000	3.310	3.950	3.130	0.509	4.540	3.741	0.846	5.045
32.0000	3.301	3.944	3.130	0.509	4.521	3.741	0.855	5.014
34.0000	3.310	3.938	3.130	0.519	4.527	3.751	0.855	5.014
36.0000	3.320	3.925	3.146	0.519	4.546	3.751	0.855	5.014
38.0000	3.310	3.900	3.130	0.519	4.546	3.751	0.846	5.029
40.0000	3.329	3.963	3.146	0.519	4.540	3.751	0.874	5.061
42.0000	3.320	3.988	3.146	0.519	4.527	3.751	0.864	5.045
44.0000	3.310	3.969	3.130	0.519	4.527	3.751	0.864	5.045
46.0000	3.310	3.950	3.130	0.509	4.540	3.751	0.855	5.045
48.0000	3.320	3.957	3.146	0.519	4.533	3.751	0.855	5.029
50.0000	3.329	3.995	3.146	0.519	4.540	3.751	0.864	5.093
52.0000	3.320	4.020	3.146	0.519	4.546	3.751	0.874	5.109
54.0000	3.310	4.007	3.130	0.509	4.527	3.751	0.864	5.061
56.0000	3.320	4.014	3.146	0.519	4.533	3.751	0.855	5.045
58.0000	3.301	4.001	3.146	0.509	4.533	3.751	0.855	5.045
60.0000	3.301	3.976	3.130	0.519	4.527	3.751	0.864	5.061
62.0000	3.310	3.963	3.130	0.519	4.521	3.751	0.846	5.029
64.0000	3.320	3.976	3.146	0.519	4.540	3.751	0.864	5.045
66.0000	3.329	4.020	3.161	0.519	4.521	3.751	0.864	5.077
68.0000	3.320	4.026	3.146	0.519	4.521	3.751	0.864	5.061
70.0000	3.320	4.014	3.146	0.509	4.527	3.751	0.855	5.045

72.0000	3.320	4.020	3.146	0.519	4.521	3.751	0.855	5.045
74.0000	3.310	4.014	3.130	0.519	4.533	3.751	0.855	5.061
76.0000	3.320	4.020	3.130	0.509	4.521	3.751	0.864	5.045
78.0000	3.320	4.039	3.146	0.519	4.533	3.760	0.874	5.077
80.0000	3.310	4.020	3.130	0.509	4.521	3.751	0.864	5.045
82.0000	3.301	3.988	3.130	0.509	4.521	3.751	0.864	5.029
84.0000	3.320	3.995	3.146	0.509	4.514	3.760	0.874	5.045
86.0000	3.310	4.001	3.146	0.509	4.540	3.760	0.864	5.045
88.0000	3.320	4.007	3.146	0.519	4.533	3.751	0.874	5.045
90.0000	3.310	3.995	3.130	0.519	4.533	3.751	0.864	5.029
92.0000	3.320	4.007	3.146	0.519	4.521	3.760	0.874	5.029
94.0000	3.320	4.014	3.146	0.519	4.521	3.760	0.874	4.998
96.0000	3.320	4.020	3.146	0.519	4.527	3.760	0.874	5.061
98.0000	3.310	4.007	3.146	0.519	4.527	3.760	0.874	5.029
100.000	3.301	3.988	3.130	0.509	4.533	3.751	0.864	5.061
120.000	3.310	3.875	3.114	0.519	4.540	3.751	0.836	4.998

SE2000
Environmental Logger
03/27 14:04

Unit# 2 Test 1

Setups:	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
Type	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)
Mode	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC
I.D.	MW9I	MW9S	MW9B	OW2	OW3	OW1	OW4	EW1
Reference	3.130	2.780	2.860	0.080	3.870	2.940	0.470	0.000
SG	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Linearity	0.281	0.149	0.105	0.113	0.138	0.119	0.110	0.074
Scale factor	29.873	19.928	50.266	30.159	20.042	30.180	29.757	50.363
Offset	0.024	0.032	-0.309	-0.014	0.080	-0.166	0.003	-0.237
Delay mSEC	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000

Step 2 03/22 12:39:59

Elapsed Time	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
0.0000	3.310	3.862	3.130	0.509	4.514	3.760	0.864	4.982
0.0083	3.310	3.868	3.130	0.509	4.533	3.760	0.855	5.014
0.0166	3.301	3.862	3.146	0.519	4.527	3.760	0.846	5.014
0.0250	3.310	3.868	3.146	0.509	4.527	3.760	0.855	5.125
0.0333	3.310	3.868	3.146	0.509	4.527	3.760	0.864	5.061
0.0416	3.320	3.881	3.161	0.528	4.521	3.760	0.855	5.093
0.0500	3.329	3.881	3.161	0.528	4.527	3.770	0.855	5.172
0.0583	3.310	3.868	3.146	0.509	4.540	3.770	0.855	5.172
0.0666	3.310	3.868	3.130	0.509	4.546	3.770	0.855	5.283
0.0750	3.310	3.868	3.146	0.519	4.527	3.760	0.855	5.347
0.0833	3.310	3.868	3.146	0.509	4.514	3.760	0.855	5.426
0.0916	3.310	3.868	3.146	0.509	4.527	3.770	0.855	5.474
0.1000	3.310	3.868	3.146	0.509	4.514	3.760	0.855	5.585
0.1083	3.310	3.868	3.146	0.509	4.514	3.760	0.846	5.648
0.1166	3.310	3.868	3.146	0.519	4.527	3.770	0.846	5.743
0.1250	3.320	3.875	3.146	0.519	4.514	3.779	0.846	5.791
0.1333	3.310	3.868	3.146	0.519	4.514	3.779	0.855	5.918
0.1416	3.310	3.868	3.146	0.519	4.540	3.789	0.846	5.997

0.1500	3.310	3.868	3.146	0.509	4.527	3.789	0.855	6.061
0.1583	3.310	3.868	3.146	0.519	4.533	3.799	0.855	6.108
0.1666	3.320	3.868	3.146	0.519	4.546	3.799	0.855	6.219
0.1750	3.310	3.868	3.146	0.519	4.527	3.799	0.855	6.235
0.1833	3.310	3.875	3.146	0.519	4.533	3.808	0.855	6.299
0.1916	3.320	3.875	3.146	0.519	4.546	3.818	0.855	6.394
0.2000	3.310	3.875	3.146	0.519	4.527	3.818	0.855	6.426
0.2083	3.310	3.868	3.146	0.519	4.527	3.818	0.855	6.442
0.2166	3.310	3.868	3.146	0.519	4.540	3.827	0.864	6.505
0.2250	3.320	3.875	3.161	0.519	4.533	3.827	0.855	6.569
0.2333	3.310	3.875	3.146	0.519	4.540	3.837	0.855	6.537
0.2416	3.320	3.875	3.146	0.519	4.533	3.837	0.855	6.632
0.2500	3.310	3.875	3.146	0.519	4.527	3.846	0.855	6.680
0.2583	3.310	3.868	3.146	0.519	4.514	3.846	0.855	6.711
0.2666	3.310	3.875	3.146	0.519	4.521	3.856	0.855	6.743
0.2750	3.310	3.875	3.146	0.528	4.521	3.856	0.855	6.727
0.2833	3.310	3.875	3.161	0.519	4.508	3.865	0.864	6.743
0.2916	3.310	3.875	3.146	0.528	4.521	3.865	0.874	6.806
0.3000	3.320	3.875	3.146	0.528	4.514	3.875	0.864	6.806
0.3083	3.320	3.875	3.146	0.519	4.514	3.875	0.864	6.854
0.3166	3.310	3.875	3.146	0.528	4.514	3.884	0.864	6.870
0.3250	3.320	3.875	3.146	0.528	4.514	3.875	0.874	6.902
0.3333	3.320	3.875	3.146	0.528	4.508	3.894	0.874	6.886
0.3500	3.320	3.875	3.146	0.528	4.533	3.903	0.874	6.902
0.3666	3.320	3.875	3.146	0.528	4.527	3.913	0.874	6.965
0.3833	3.320	3.875	3.146	0.528	4.540	3.913	0.883	6.981
0.4000	3.310	3.875	3.146	0.528	4.533	3.932	0.874	6.933
0.4166	3.320	3.875	3.146	0.528	4.533	3.942	0.874	6.949
0.4333	3.310	3.875	3.146	0.538	4.533	3.932	0.883	6.965
0.4500	3.320	3.875	3.146	0.538	4.514	3.951	0.883	6.933
0.4666	3.320	3.875	3.161	0.538	4.527	3.951	0.883	6.918
0.4833	3.320	3.875	3.146	0.538	4.533	3.970	0.893	6.918
0.5000	3.320	3.875	3.146	0.547	4.546	3.970	0.893	6.902
0.5166	3.320	3.875	3.146	0.547	4.527	3.970	0.902	6.918
0.5333	3.320	3.875	3.146	0.547	4.527	3.970	0.893	6.918
0.5500	3.320	3.875	3.146	0.547	4.533	3.970	0.902	6.902
0.5666	3.320	3.875	3.146	0.547	4.521	3.980	0.902	6.918
0.5833	3.320	3.875	3.146	0.547	4.521	3.980	0.902	6.902
0.6000	3.329	3.875	3.161	0.547	4.514	3.980	0.902	6.918
0.6166	3.329	3.875	3.146	0.557	4.514	3.989	0.902	6.902
0.6333	3.339	3.881	3.161	0.566	4.540	3.999	0.911	6.918
0.6500	3.339	3.881	3.161	0.566	4.540	3.999	0.911	6.902
0.6666	3.329	3.875	3.161	0.557	4.546	3.989	0.911	6.886
0.6833	3.329	3.875	3.146	0.557	4.521	3.999	0.911	6.870
0.7000	3.329	3.875	3.161	0.566	4.521	3.989	0.921	6.870
0.7166	3.329	3.875	3.146	0.566	4.514	3.989	0.921	6.902

0.7333	3.339	3.875	3.161	0.566	4.514	3.999	0.921	6.854
0.7500	3.329	3.875	3.146	0.566	4.540	3.999	0.921	6.870
0.7666	3.329	3.881	3.161	0.566	4.540	4.008	0.921	6.822
0.7833	3.329	3.875	3.146	0.566	4.540	3.999	0.921	6.854
0.8000	3.329	3.875	3.146	0.566	4.514	3.999	0.921	6.822
0.8166	3.329	3.881	3.161	0.576	4.521	3.999	0.921	6.854
0.8333	3.339	3.875	3.146	0.566	4.521	3.989	0.921	6.822
0.8500	3.339	3.881	3.161	0.576	4.533	4.008	0.921	6.854
0.8666	3.339	3.875	3.146	0.576	4.540	3.999	0.921	6.838
0.8833	3.339	3.881	3.161	0.576	4.533	4.008	0.930	6.822
0.9000	3.339	3.875	3.146	0.576	4.546	3.999	0.930	6.822
0.9166	3.339	3.875	3.146	0.576	4.514	3.989	0.921	6.806
0.9333	3.339	3.881	3.146	0.576	4.521	4.008	0.921	6.838
0.9500	3.339	3.881	3.146	0.576	4.514	3.999	0.921	6.854
0.9666	3.329	3.881	3.161	0.585	4.521	4.008	0.930	6.838
0.9833	3.339	3.875	3.161	0.585	4.527	4.008	0.930	6.854
1.0000	3.339	3.881	3.146	0.585	4.521	4.008	0.930	6.870
1.2000	3.339	3.881	3.146	0.595	4.514	4.008	0.930	6.854
1.4000	3.348	3.881	3.146	0.605	4.508	4.018	0.940	6.886
1.6000	3.339	3.881	3.146	0.605	4.514	4.018	0.940	6.902
1.8000	3.348	3.881	3.146	0.614	4.508	4.018	0.949	6.933
2.0000	3.348	3.887	3.161	0.624	4.508	4.028	0.958	7.076
2.2000	3.358	3.894	3.161	0.624	4.514	4.047	0.958	7.108
2.4000	3.358	3.894	3.161	0.633	4.533	4.047	0.958	6.997
2.6000	3.358	3.900	3.146	0.624	4.502	4.047	0.958	7.029
2.8000	3.358	3.900	3.161	0.624	4.514	4.047	0.968	7.013
3.0000	3.358	3.900	3.161	0.633	4.521	4.047	0.968	7.013
3.2000	3.367	3.900	3.161	0.643	4.540	4.056	0.968	7.013
3.4000	3.367	3.906	3.161	0.643	4.514	4.047	0.968	7.060
3.6000	3.358	3.906	3.161	0.652	4.540	4.056	0.968	7.029
3.8000	3.367	3.906	3.161	0.652	4.521	4.066	0.968	7.060
4.0000	3.367	3.906	3.146	0.652	4.527	4.056	0.968	7.076
4.2000	3.367	3.913	3.161	0.652	4.546	4.066	0.968	7.013
4.4000	3.367	3.919	3.161	0.652	4.521	4.066	0.977	7.076
4.6000	3.367	3.919	3.161	0.652	4.533	4.075	0.977	7.267
4.8000	3.367	3.919	3.161	0.662	4.521	4.085	0.977	7.298
5.0000	3.367	3.925	3.161	0.662	4.533	4.094	0.987	7.314
5.2000	3.367	3.919	3.161	0.662	4.540	4.104	0.977	7.330
5.4000	3.367	3.925	3.161	0.671	4.514	4.094	0.996	7.346
5.6000	3.377	3.931	3.161	0.671	4.514	4.104	0.987	7.314
5.8000	3.377	3.931	3.161	0.671	4.508	4.104	0.996	7.362
6.0000	3.377	3.931	3.161	0.671	4.533	4.113	0.987	7.346
6.2000	3.377	3.938	3.177	0.681	4.514	4.104	0.996	7.330
6.4000	3.377	3.931	3.161	0.681	4.521	4.113	0.996	7.314
6.6000	3.377	3.938	3.161	0.690	4.521	4.113	0.987	7.362
6.8000	3.377	3.938	3.161	0.690	4.521	4.104	0.987	7.346

7.0000	3.377	3.944	3.177	0.681	4.514	4.123	0.996	7.362
7.2000	3.386	3.944	3.177	0.690	4.521	4.123	0.987	7.346
7.4000	3.386	3.944	3.177	0.690	4.546	4.123	0.996	7.346
7.6000	3.386	3.950	3.177	0.690	4.546	4.123	1.005	7.346
7.8000	3.386	3.950	3.177	0.700	4.533	4.123	0.996	7.330
8.0000	3.386	3.950	3.177	0.690	4.527	4.123	1.005	7.346
8.2000	3.377	3.944	3.177	0.690	4.540	4.123	0.996	7.378
8.4000	3.377	3.938	3.161	0.690	4.514	4.123	0.996	7.362
8.6000	3.367	3.931	3.161	0.690	4.508	4.113	0.987	7.346
8.8000	3.367	3.931	3.161	0.690	4.508	4.123	0.987	7.362
9.0000	3.367	3.931	3.161	0.690	4.514	4.104	0.987	7.346
9.2000	3.377	3.925	3.161	0.681	4.502	4.113	0.987	7.346
9.4000	3.367	3.919	3.161	0.681	4.527	4.113	0.987	7.346
9.6000	3.358	3.913	3.161	0.690	4.521	4.113	0.987	7.330
9.8000	3.367	3.913	3.161	0.681	4.514	4.113	0.987	7.330
10.0000	3.377	3.913	3.177	0.700	4.527	4.113	0.977	7.346
12.0000	3.386	3.913	3.161	0.700	4.546	4.113	0.996	7.362
14.0000	3.386	3.906	3.161	0.710	4.514	4.123	0.996	7.314
16.0000	3.386	3.925	3.177	0.700	4.533	4.113	0.996	7.362
18.0000	3.386	3.906	3.161	0.700	4.521	4.123	0.977	7.346
20.0000	3.386	3.894	3.161	0.700	4.527	4.133	0.987	7.362
22.0000	3.386	3.881	3.161	0.710	4.527	4.123	0.987	7.314
24.0000	3.377	3.875	3.161	0.700	4.521	4.123	0.987	7.267
26.0000	3.396	3.875	3.177	0.710	4.533	4.133	0.996	7.282
28.0000	3.386	3.862	3.177	0.710	4.521	4.133	0.987	7.330
30.0000	3.396	3.849	3.177	0.719	4.540	4.133	0.996	7.282
32.0000	3.386	3.811	3.177	0.719	4.527	4.133	0.996	7.267
34.0000	3.367	3.767	3.161	0.710	4.514	4.123	0.977	7.298
36.0000	3.396	3.786	3.177	0.719	4.514	4.142	0.996	7.330
38.0000	3.396	3.786	3.177	0.729	4.552	4.133	0.996	7.346
40.0000	3.396	3.792	3.177	0.710	4.508	4.133	0.996	7.346
42.0000	3.406	3.818	3.193	0.719	4.533	4.133	0.996	7.346
44.0000	3.396	3.818	3.177	0.719	4.514	4.133	0.996	7.330
46.0000	3.396	3.792	3.177	0.719	4.508	4.133	0.987	7.330
48.0000	3.386	3.773	3.177	0.719	4.521	4.133	0.987	7.314
50.0000	3.406	3.792	3.193	0.729	4.552	4.142	1.005	7.346
52.0000	3.406	3.805	3.193	0.729	4.533	4.142	0.996	7.330
54.0000	3.386	3.767	3.177	0.719	4.514	4.133	0.987	7.314
56.0000	3.406	3.761	3.193	0.729	4.521	4.142	0.996	7.378
58.0000	3.406	3.754	3.193	0.729	4.521	4.142	0.996	7.314
60.0000	3.396	3.748	3.177	0.729	4.514	4.152	0.996	7.362
62.0000	3.415	3.767	3.193	0.729	4.514	4.142	1.015	7.378
64.0000	3.406	3.767	3.193	0.729	4.521	4.133	1.005	7.362
66.0000	3.406	3.773	3.193	0.729	4.527	4.142	1.005	7.362
68.0000	3.415	3.773	3.193	0.729	4.521	4.142	1.005	7.394
70.0000	3.406	3.761	3.177	0.729	4.514	4.142	1.005	7.378

72.0000	3.396	3.742	3.177	0.729	4.527	4.142	1.005	7.394
74.0000	3.425	3.761	3.209	0.738	4.546	4.152	1.024	7.457
76.0000	3.406	3.786	3.193	0.729	4.521	4.142	1.015	7.425
78.0000	3.406	3.780	3.193	0.729	4.521	4.142	1.005	7.409
80.0000	3.406	3.767	3.209	0.729	4.514	4.142	1.005	7.362
82.0000	3.406	3.754	3.193	0.729	4.514	4.142	1.005	7.362
84.0000	3.415	3.773	3.193	0.729	4.527	4.142	1.005	7.394
86.0000	3.406	3.754	3.193	0.729	4.521	4.142	0.987	7.394
88.0000	3.377	3.691	3.177	0.719	4.508	4.133	0.987	7.409
90.0000	3.386	3.628	3.177	0.719	4.527	4.133	0.977	7.362
92.0000	3.386	3.590	3.177	0.729	4.514	4.142	0.987	7.330
94.0000	3.396	3.577	3.193	0.729	4.533	4.142	0.987	7.314
96.0000	3.396	3.552	3.177	0.729	4.552	4.142	0.996	7.330
98.0000	3.406	3.552	3.193	0.729	4.533	4.142	1.005	7.330
100.000	3.406	3.558	3.193	0.738	4.533	4.142	1.005	7.378
120.000	3.406	3.501	3.193	0.738	4.527	4.152	1.005	7.362

SE2000
Environmental Logger
03/27 14:14

Unit# 2 Test 1

Setups: INPUT 1 INPUT 2 INPUT 3 INPUT 4 INPUT 5 INPUT 6 INPUT 7 INPUT 8

Setups:	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
Type	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)
Mode	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC
I.D.	MW9I	MW9S	MW9B	OW2	OW3	OW1	OW4	EW1
Reference	3.130	2.780	2.860	0.080	3.870	2.940	0.470	0.000
SG	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Linearity	0.281	0.149	0.105	0.113	0.138	0.119	0.110	0.074
Scale factor	29.873	19.928	50.266	30.159	20.042	30.180	29.757	50.363
Offset	0.024	0.032	-0.309	-0.014	0.080	-0.166	0.003	-0.237
Delay mSEC	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000

Step 3 03/22 14:40:31

Elapsed Time	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
0.0000	3.396	3.488	3.177	0.729	4.527	4.152	1.005	7.378
0.0083	3.396	3.495	3.193	0.729	4.540	4.152	1.005	7.473
0.0166	3.396	3.495	3.193	0.738	4.546	4.161	1.005	7.457
0.0250	3.396	3.495	3.193	0.729	4.533	4.152	1.005	7.425
0.0333	3.406	3.488	3.193	0.729	4.533	4.161	1.005	7.441
0.0416	3.396	3.488	3.209	0.738	4.552	4.161	1.005	7.505
0.0500	3.396	3.488	3.193	0.738	4.533	4.161	0.996	7.568
0.0583	3.396	3.488	3.209	0.738	4.533	4.161	1.005	7.600
0.0666	3.406	3.488	3.209	0.738	4.559	4.161	1.005	7.616
0.0750	3.396	3.488	3.209	0.729	4.533	4.161	1.015	7.600
0.0833	3.406	3.488	3.209	0.738	4.540	4.161	1.005	7.727
0.0916	3.406	3.495	3.209	0.738	4.540	4.171	1.005	7.711
0.1000	3.396	3.488	3.209	0.729	4.521	4.171	1.015	7.743
0.1083	3.406	3.488	3.209	0.738	4.540	4.161	1.015	7.838
0.1166	3.406	3.488	3.209	0.738	4.514	4.171	1.005	7.885
0.1250	3.406	3.495	3.209	0.738	4.514	4.171	1.005	7.901
0.1333	3.406	3.495	3.209	0.738	4.533	4.180	1.005	7.949
0.1416	3.406	3.495	3.209	0.738	4.514	4.171	1.005	7.981

0.1500	3.406	3.488	3.209	0.738	4.514	4.180	1.015	7.981
0.1583	3.396	3.495	3.193	0.738	4.533	4.180	1.005	8.028
0.1666	3.406	3.488	3.209	0.738	4.514	4.180	1.005	8.076
0.1750	3.406	3.488	3.209	0.738	4.508	4.180	1.005	8.107
0.1833	3.406	3.488	3.193	0.738	4.533	4.190	1.005	8.139
0.1916	3.396	3.488	3.209	0.738	4.514	4.190	1.005	8.139
0.2000	3.406	3.495	3.209	0.738	4.514	4.190	1.005	8.234
0.2083	3.406	3.488	3.209	0.738	4.533	4.190	1.005	8.234
0.2166	3.406	3.495	3.209	0.738	4.514	4.199	1.005	8.282
0.2250	3.396	3.495	3.193	0.738	4.514	4.199	1.005	8.330
0.2333	3.406	3.488	3.209	0.738	4.527	4.209	1.005	8.330
0.2416	3.396	3.488	3.193	0.738	4.514	4.199	1.005	8.393
0.2500	3.396	3.488	3.209	0.738	4.527	4.209	1.005	8.425
0.2583	3.396	3.488	3.209	0.738	4.527	4.209	1.005	8.456
0.2666	3.396	3.488	3.209	0.738	4.527	4.218	1.005	8.488
0.2750	3.406	3.488	3.209	0.738	4.552	4.218	1.005	8.520
0.2833	3.396	3.488	3.209	0.738	4.533	4.228	1.015	8.520
0.2916	3.396	3.488	3.193	0.738	4.533	4.228	1.005	8.568
0.3000	3.406	3.488	3.209	0.738	4.546	4.228	1.015	8.583
0.3083	3.406	3.495	3.209	0.738	4.533	4.238	1.005	8.615
0.3166	3.406	3.488	3.193	0.748	4.540	4.228	1.005	8.631
0.3250	3.406	3.488	3.209	0.738	4.552	4.238	1.015	8.679
0.3333	3.396	3.488	3.193	0.738	4.533	4.247	1.015	8.710
0.3500	3.396	3.488	3.209	0.748	4.540	4.247	1.015	8.742
0.3666	3.406	3.488	3.209	0.738	4.546	4.257	1.015	8.774
0.3833	3.406	3.488	3.209	0.738	4.514	4.266	1.015	8.806
0.4000	3.396	3.488	3.209	0.748	4.521	4.266	1.015	8.837
0.4166	3.406	3.488	3.209	0.748	4.533	4.276	1.015	8.901
0.4333	3.406	3.488	3.209	0.748	4.521	4.276	1.024	8.901
0.4500	3.406	3.488	3.209	0.757	4.508	4.285	1.024	8.964
0.4666	3.406	3.488	3.209	0.748	4.527	4.295	1.024	8.996
0.4833	3.406	3.488	3.209	0.748	4.527	4.304	1.024	9.028
0.5000	3.406	3.488	3.193	0.748	4.514	4.304	1.024	9.059
0.5166	3.406	3.488	3.209	0.757	4.527	4.314	1.034	9.075
0.5333	3.406	3.488	3.209	0.757	4.546	4.314	1.024	9.091
0.5500	3.406	3.488	3.209	0.757	4.527	4.323	1.024	9.091
0.5666	3.406	3.488	3.209	0.757	4.527	4.323	1.024	9.123
0.5833	3.406	3.488	3.209	0.757	4.552	4.323	1.034	9.123
0.6000	3.406	3.488	3.193	0.757	4.540	4.333	1.034	9.123
0.6166	3.406	3.488	3.193	0.757	4.533	4.343	1.034	9.139
0.6333	3.406	3.488	3.193	0.767	4.527	4.343	1.034	9.139
0.6500	3.406	3.488	3.209	0.767	4.533	4.343	1.043	9.139
0.6666	3.406	3.488	3.193	0.767	4.521	4.352	1.034	9.139
0.6833	3.406	3.488	3.209	0.767	4.514	4.352	1.043	9.170
0.7000	3.406	3.488	3.209	0.767	4.527	4.352	1.034	9.155
0.7166	3.415	3.482	3.209	0.767	4.546	4.362	1.034	9.186

0.7333	3.406	3.482	3.209	0.767	4.521	4.371	1.043	9.155
0.7500	3.406	3.482	3.209	0.776	4.533	4.371	1.043	9.155
0.7666	3.415	3.482	3.209	0.767	4.546	4.371	1.034	9.170
0.7833	3.415	3.488	3.209	0.776	4.527	4.371	1.043	9.170
0.8000	3.415	3.482	3.209	0.776	4.533	4.381	1.052	9.186
0.8166	3.415	3.488	3.209	0.776	4.540	4.381	1.043	9.186
0.8333	3.415	3.488	3.193	0.776	4.540	4.381	1.043	9.155
0.8500	3.415	3.482	3.193	0.776	4.514	4.381	1.052	9.186
0.8666	3.415	3.482	3.209	0.786	4.514	4.381	1.043	9.186
0.8833	3.415	3.482	3.209	0.786	4.527	4.390	1.052	9.186
0.9000	3.415	3.482	3.209	0.786	4.527	4.381	1.052	9.234
0.9166	3.415	3.482	3.209	0.786	4.527	4.390	1.052	9.218
0.9333	3.425	3.482	3.209	0.786	4.533	4.390	1.062	9.202
0.9500	3.425	3.482	3.209	0.796	4.552	4.400	1.062	9.202
0.9666	3.425	3.482	3.209	0.786	4.540	4.390	1.062	9.218
0.9833	3.415	3.482	3.209	0.796	4.521	4.390	1.062	9.250
1.0000	3.415	3.482	3.209	0.796	4.527	4.400	1.052	9.186
1.2000	3.425	3.482	3.193	0.805	4.533	4.409	1.062	9.234
1.4000	3.425	3.482	3.193	0.815	4.521	4.419	1.081	9.266
1.6000	3.444	3.482	3.209	0.834	4.521	4.419	1.090	9.281
1.8000	3.444	3.488	3.209	0.834	4.527	4.428	1.090	9.329
2.0000	3.444	3.495	3.209	0.843	4.546	4.438	1.090	9.456
2.2000	3.453	3.495	3.225	0.853	4.521	4.447	1.100	9.488
2.4000	3.453	3.501	3.225	0.862	4.527	4.457	1.109	9.535
2.6000	3.453	3.507	3.225	0.862	4.514	4.467	1.118	9.535
2.8000	3.463	3.514	3.225	0.872	4.552	4.476	1.118	9.599
3.0000	3.453	3.514	3.225	0.872	4.533	4.486	1.118	9.615
3.2000	3.463	3.520	3.209	0.872	4.540	4.486	1.118	9.583
3.4000	3.463	3.526	3.225	0.881	4.559	4.486	1.118	9.567
3.6000	3.472	3.526	3.225	0.881	4.533	4.495	1.128	9.599
3.8000	3.472	3.533	3.225	0.881	4.521	4.495	1.128	9.646
4.0000	3.472	3.539	3.225	0.891	4.514	4.495	1.137	9.710
4.2000	3.472	3.545	3.225	0.891	4.540	4.514	1.147	9.757
4.4000	3.472	3.539	3.225	0.891	4.546	4.514	1.137	9.726
4.6000	3.472	3.545	3.225	0.901	4.514	4.524	1.137	9.742
4.8000	3.472	3.552	3.225	0.901	4.508	4.524	1.147	9.757
5.0000	3.472	3.545	3.225	0.910	4.533	4.524	1.147	9.742
5.2000	3.472	3.552	3.225	0.901	4.508	4.524	1.147	9.789
5.4000	3.463	3.545	3.225	0.901	4.521	4.524	1.137	9.789
5.6000	3.472	3.545	3.209	0.910	4.540	4.524	1.147	9.726
5.8000	3.472	3.552	3.225	0.920	4.552	4.524	1.147	9.789
6.0000	3.472	3.558	3.225	0.920	4.533	4.533	1.156	9.773
6.2000	3.472	3.564	3.225	0.920	4.521	4.524	1.147	9.789
6.4000	3.482	3.564	3.225	0.920	4.533	4.533	1.147	9.742
6.6000	3.472	3.564	3.225	0.920	4.540	4.533	1.156	9.757
6.8000	3.472	3.564	3.225	0.920	4.540	4.533	1.156	9.773

7.0000	3.472	3.558	3.225	0.910	4.521	4.533	1.147	9.805
7.2000	3.472	3.564	3.225	0.920	4.521	4.533	1.156	9.821
7.4000	3.472	3.564	3.225	0.920	4.527	4.533	1.147	9.821
7.6000	3.482	3.571	3.225	0.920	4.552	4.533	1.156	9.821
7.8000	3.472	3.571	3.225	0.920	4.540	4.543	1.147	9.837
8.0000	3.482	3.577	3.225	0.920	4.533	4.533	1.156	9.853
8.2000	3.482	3.583	3.225	0.929	4.514	4.543	1.156	9.837
8.4000	3.482	3.583	3.241	0.929	4.527	4.533	1.156	9.837
8.6000	3.482	3.583	3.225	0.920	4.521	4.533	1.156	9.853
8.8000	3.482	3.590	3.241	0.920	4.514	4.533	1.156	9.884
9.0000	3.482	3.590	3.241	0.929	4.527	4.543	1.156	9.868
9.2000	3.482	3.583	3.241	0.929	4.546	4.533	1.156	9.821
9.4000	3.482	3.583	3.225	0.920	4.540	4.533	1.156	9.837
9.6000	3.472	3.577	3.225	0.920	4.508	4.533	1.156	9.853
9.8000	3.482	3.583	3.225	0.920	4.527	4.543	1.156	9.853
10.0000	3.482	3.590	3.241	0.929	4.521	4.533	1.156	9.821
12.0000	3.482	3.583	3.225	0.939	4.521	4.533	1.156	9.821
14.0000	3.482	3.577	3.225	0.939	4.533	4.533	1.156	9.837
16.0000	3.491	3.571	3.225	0.939	4.540	4.533	1.156	9.868
18.0000	3.482	3.558	3.225	0.939	4.527	4.533	1.156	9.853
20.0000	3.491	3.545	3.241	0.948	4.546	4.533	1.156	9.853
22.0000	3.491	3.552	3.225	0.948	4.521	4.543	1.165	9.868
24.0000	3.482	3.539	3.225	0.948	4.533	4.543	1.156	9.837
26.0000	3.491	3.539	3.241	0.948	4.533	4.543	1.165	9.837
28.0000	3.491	3.520	3.241	0.948	4.521	4.543	1.147	9.868
30.0000	3.491	3.501	3.241	0.948	4.546	4.543	1.156	9.837
32.0000	3.482	3.482	3.225	0.939	4.540	4.533	1.156	9.853
34.0000	3.501	3.488	3.241	0.948	4.533	4.543	1.165	9.868
36.0000	3.463	3.432	3.209	0.939	4.533	4.533	1.128	9.868
38.0000	3.463	3.343	3.209	0.939	4.540	4.533	1.118	9.853
40.0000	3.491	3.337	3.241	0.948	4.540	4.543	1.147	9.837
42.0000	3.510	3.356	3.241	0.958	4.559	4.543	1.165	9.853
44.0000	3.501	3.381	3.257	0.958	4.552	4.552	1.165	9.868
46.0000	3.501	3.400	3.241	0.958	4.540	4.552	1.165	9.884
48.0000	3.510	3.432	3.241	0.958	4.527	4.562	1.184	9.932
50.0000	3.510	3.444	3.241	0.958	4.546	4.552	1.175	9.948
52.0000	3.510	3.463	3.241	0.958	4.527	4.562	1.175	9.916
54.0000	3.510	3.469	3.257	0.958	4.546	4.552	1.175	9.964
56.0000	3.501	3.457	3.241	0.958	4.521	4.552	1.175	9.948
58.0000	3.501	3.438	3.241	0.958	4.565	4.552	1.156	9.948
60.0000	3.501	3.413	3.241	0.958	4.533	4.552	1.156	9.948
62.0000	3.501	3.387	3.241	0.958	4.540	4.552	1.156	9.964
64.0000	3.501	3.381	3.241	0.967	4.559	4.552	1.156	9.948
66.0000	3.501	3.362	3.241	0.958	4.527	4.562	1.156	9.932
68.0000	3.501	3.330	3.241	0.967	4.546	4.552	1.156	9.932
70.0000	3.491	3.305	3.241	0.958	4.540	4.552	1.147	9.932

72.0000	3.491	3.280	3.241	0.958	4.533	4.552	1.147	9.932
74.0000	3.501	3.261	3.241	0.967	4.546	4.562	1.156	9.916
76.0000	3.501	3.248	3.241	0.967	4.546	4.552	1.156	9.916
78.0000	3.501	3.248	3.241	0.967	4.540	4.562	1.156	9.932
80.0000	3.501	3.235	3.241	0.967	4.552	4.562	1.156	9.948
82.0000	3.501	3.242	3.241	0.967	4.533	4.562	1.156	9.948
84.0000	3.501	3.242	3.241	0.967	4.533	4.562	1.156	9.916
86.0000	3.510	3.248	3.257	0.967	4.546	4.562	1.165	9.964
88.0000	3.510	3.254	3.257	0.967	4.546	4.562	1.165	9.932
90.0000	3.510	3.254	3.257	0.967	4.552	4.562	1.165	9.932
92.0000	3.510	3.261	3.257	0.958	4.540	4.381	1.147	7.013
94.0000	3.415	3.216	3.225	0.700	4.533	4.104	0.977	7.219
96.0000	3.406	3.166	3.225	0.690	4.540	4.409	1.024	9.710
98.0000	3.501	3.204	3.241	0.929	4.533	4.552	1.147	9.853
100.000	3.510	3.242	3.257	0.958	4.552	4.562	1.165	9.868
120.000	3.501	3.273	3.241	0.939	4.552	4.447	1.128	9.043

SE2000
Environmental Logger
03/27 14:31

Unit# 2 Test 1

Setups:	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
Type	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)
Mode	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC
I.D.	MW9I	MW9S	MW9B	OW2	OW3	OW1	OW4	EW1
Reference	3.130	2.780	2.860	0.080	3.870	2.940	0.470	0.000
SG	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Linearity	0.281	0.149	0.105	0.113	0.138	0.119	0.110	0.074
Scale factor	29.873	19.928	50.266	30.159	20.042	30.180	29.757	50.363
Offset	0.024	0.032	-0.309	-0.014	0.080	-0.166	0.003	-0.237
Delay mSEC	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000

Step 4 03/22 16:40:44

Elapsed Time	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
0.0000	3.491	3.267	3.241	0.920	4.546	4.428	1.137	7.917
0.0083	3.501	3.267	3.257	0.929	4.533	4.428	1.137	7.584
0.0166	3.501	3.267	3.257	0.920	4.540	4.419	1.137	7.267
0.0250	3.491	3.267	3.257	0.920	4.540	4.409	1.128	6.965
0.0333	3.491	3.261	3.257	0.929	4.540	4.409	1.128	6.695
0.0416	3.491	3.267	3.257	0.920	4.540	4.400	1.137	6.410
0.0500	3.491	3.267	3.257	0.920	4.533	4.390	1.128	6.156
0.0583	3.491	3.267	3.257	0.920	4.540	4.381	1.128	5.918
0.0666	3.491	3.261	3.257	0.920	4.540	4.371	1.128	5.680
0.0750	3.491	3.267	3.257	0.929	4.533	4.352	1.118	5.458
0.0833	3.491	3.267	3.257	0.920	4.546	4.343	1.128	5.236
0.0916	3.491	3.267	3.257	0.920	4.533	4.333	1.118	5.029
0.1000	3.501	3.267	3.257	0.920	4.546	4.314	1.118	4.839
0.1083	3.491	3.267	3.257	0.920	4.533	4.295	1.118	4.649
0.1166	3.501	3.267	3.257	0.920	4.533	4.285	1.118	4.474
0.1250	3.501	3.267	3.257	0.920	4.521	4.266	1.128	4.300
0.1333	3.491	3.267	3.257	0.920	4.527	4.257	1.118	4.141
0.1416	3.501	3.267	3.257	0.910	4.533	4.238	1.118	3.966

0.1500	3.491	3.267	3.257	0.910	4.533	4.218	1.109	3.792
0.1583	3.491	3.267	3.257	0.920	4.540	4.199	1.118	3.649
0.1666	3.491	3.267	3.257	0.910	4.546	4.190	1.109	3.522
0.1750	3.491	3.267	3.257	0.910	4.533	4.161	1.118	3.395
0.1833	3.491	3.267	3.257	0.910	4.540	4.142	1.109	3.268
0.1916	3.491	3.267	3.257	0.910	4.540	4.133	1.109	3.157
0.2000	3.491	3.261	3.257	0.910	4.540	4.113	1.100	3.046
0.2083	3.491	3.273	3.257	0.910	4.533	4.094	1.100	2.935
0.2166	3.491	3.267	3.257	0.901	4.540	4.075	1.090	2.840
0.2250	3.491	3.267	3.257	0.901	4.533	4.066	1.090	2.729
0.2333	3.482	3.267	3.257	0.901	4.546	4.037	1.100	2.649
0.2416	3.491	3.267	3.257	0.891	4.540	4.028	1.090	2.554
0.2500	3.482	3.267	3.257	0.891	4.527	4.008	1.090	2.459
0.2583	3.482	3.267	3.257	0.881	4.552	3.989	1.081	2.380
0.2666	3.482	3.267	3.257	0.881	4.552	3.970	1.081	2.300
0.2750	3.482	3.261	3.257	0.881	4.533	3.961	1.081	2.221
0.2833	3.491	3.267	3.257	0.891	4.540	3.942	1.081	2.158
0.2916	3.491	3.261	3.257	0.881	4.533	3.923	1.081	2.078
0.3000	3.482	3.261	3.257	0.881	4.540	3.903	1.071	2.015
0.3083	3.482	3.267	3.257	0.881	4.540	3.894	1.062	1.951
0.3166	3.482	3.267	3.257	0.872	4.521	3.875	1.062	1.888
0.3250	3.482	3.261	3.257	0.872	4.546	3.875	1.062	1.824
0.3333	3.482	3.261	3.257	0.872	4.540	3.846	1.052	1.761
0.3500	3.482	3.261	3.257	0.862	4.552	3.827	1.052	1.666
0.3666	3.472	3.267	3.257	0.862	4.546	3.799	1.043	1.555
0.3833	3.472	3.267	3.257	0.853	4.546	3.770	1.034	1.475
0.4000	3.463	3.267	3.257	0.843	4.540	3.751	1.034	1.380
0.4166	3.472	3.261	3.257	0.843	4.540	3.722	1.024	1.317
0.4333	3.463	3.267	3.257	0.824	4.540	3.694	1.015	1.237
0.4500	3.463	3.261	3.257	0.815	4.546	3.674	1.005	1.174
0.4666	3.453	3.267	3.257	0.815	4.540	3.655	0.996	1.110
0.4833	3.463	3.267	3.241	0.805	4.540	3.636	0.987	1.047
0.5000	3.453	3.261	3.241	0.796	4.540	3.617	0.987	0.999
0.5166	3.453	3.261	3.257	0.796	4.546	3.598	0.977	0.936
0.5333	3.444	3.261	3.241	0.786	4.540	3.589	0.977	0.888
0.5500	3.444	3.261	3.241	0.776	4.540	3.569	0.968	0.856
0.5666	3.444	3.261	3.241	0.767	4.546	3.550	0.958	0.809
0.5833	3.444	3.261	3.241	0.767	4.540	3.531	0.949	0.777
0.6000	3.434	3.261	3.257	0.748	4.546	3.522	0.949	0.745
0.6166	3.434	3.261	3.241	0.748	4.540	3.512	0.940	0.714
0.6333	3.434	3.261	3.241	0.738	4.540	3.493	0.930	0.682
0.6500	3.434	3.261	3.241	0.738	4.540	3.484	0.921	0.650
0.6666	3.425	3.261	3.241	0.729	4.540	3.474	0.921	0.618
0.6833	3.425	3.254	3.241	0.719	4.540	3.455	0.911	0.587
0.7000	3.425	3.254	3.241	0.710	4.540	3.445	0.911	0.571
0.7166	3.425	3.254	3.241	0.700	4.540	3.436	0.902	0.555

0.7333	3.415	3.254	3.241	0.700	4.540	3.426	0.893	0.523
0.7500	3.415	3.248	3.241	0.690	4.540	3.417	0.883	0.507
0.7666	3.415	3.254	3.241	0.681	4.540	3.407	0.883	0.491
0.7833	3.415	3.254	3.241	0.671	4.540	3.398	0.883	0.476
0.8000	3.406	3.254	3.241	0.671	4.540	3.388	0.874	0.460
0.8166	3.406	3.248	3.241	0.662	4.540	3.379	0.874	0.444
0.8333	3.406	3.248	3.241	0.652	4.540	3.379	0.855	0.428
0.8500	3.406	3.248	3.225	0.652	4.546	3.369	0.864	0.412
0.8666	3.396	3.254	3.241	0.643	4.546	3.359	0.855	0.396
0.8833	3.396	3.248	3.241	0.643	4.540	3.350	0.846	0.396
0.9000	3.386	3.248	3.241	0.633	4.540	3.350	0.846	0.380
0.9166	3.396	3.248	3.225	0.624	4.546	3.340	0.846	0.364
0.9333	3.386	3.248	3.225	0.614	4.546	3.340	0.836	0.364
0.9500	3.377	3.248	3.225	0.614	4.540	3.331	0.836	0.349
0.9666	3.386	3.248	3.225	0.605	4.540	3.321	0.827	0.333
0.9833	3.377	3.242	3.225	0.605	4.540	3.312	0.827	0.333
1.0000	3.377	3.248	3.241	0.595	4.540	3.312	0.817	0.317
1.2000	3.348	3.229	3.225	0.528	4.540	3.254	0.770	0.238
1.4000	3.329	3.223	3.209	0.480	4.540	3.216	0.752	0.190
1.6000	3.320	3.210	3.209	0.433	4.546	3.197	0.723	0.158
1.8000	3.310	3.191	3.209	0.404	4.540	3.169	0.714	0.126
2.0000	3.301	3.178	3.193	0.385	4.540	3.159	0.695	0.111
2.2000	3.291	3.166	3.193	0.366	4.546	3.149	0.686	0.095
2.4000	3.282	3.159	3.193	0.347	4.540	3.140	0.676	0.095
2.6000	3.272	3.147	3.193	0.328	4.540	3.130	0.667	0.079
2.8000	3.272	3.134	3.193	0.318	4.540	3.121	0.658	0.079
3.0000	3.263	3.121	3.193	0.309	4.533	3.111	0.658	0.063
3.2000	3.253	3.109	3.177	0.299	4.540	3.111	0.658	0.063
3.4000	3.253	3.102	3.177	0.290	4.540	3.111	0.648	0.047
3.6000	3.253	3.090	3.177	0.290	4.540	3.102	0.639	0.047
3.8000	3.244	3.083	3.177	0.280	4.540	3.111	0.639	0.047
4.0000	3.253	3.071	3.177	0.270	4.540	3.102	0.639	0.047
4.2000	3.244	3.071	3.177	0.270	4.540	3.102	0.639	0.031
4.4000	3.244	3.058	3.177	0.261	4.540	3.092	0.639	0.031
4.6000	3.244	3.052	3.177	0.251	4.540	3.092	0.639	0.031
4.8000	3.244	3.039	3.177	0.261	4.540	3.092	0.620	0.031
5.0000	3.244	3.039	3.177	0.251	4.540	3.092	0.629	0.031
5.2000	3.234	3.033	3.161	0.242	4.540	3.083	0.629	0.031
5.4000	3.234	3.026	3.177	0.251	4.540	3.083	0.629	0.015
5.6000	3.234	3.026	3.177	0.242	4.540	3.083	0.629	0.015
5.8000	3.244	3.020	3.161	0.242	4.540	3.083	0.629	0.015
6.0000	3.234	3.014	3.177	0.242	4.540	3.083	0.620	0.015
6.2000	3.234	3.014	3.177	0.232	4.540	3.083	0.629	0.015
6.4000	3.234	3.007	3.177	0.232	4.540	3.073	0.620	0.015
6.6000	3.234	3.001	3.161	0.232	4.540	3.073	0.620	0.015
6.8000	3.234	3.001	3.177	0.223	4.540	3.073	0.620	0.015

7.0000	3.225	2.995	3.161	0.232	4.540	3.073	0.620	0.015
7.2000	3.225	2.995	3.161	0.223	4.540	3.073	0.611	0.015
7.4000	3.225	2.988	3.161	0.223	4.540	3.073	0.611	0.000
7.6000	3.234	2.982	3.161	0.223	4.540	3.073	0.611	0.015
7.8000	3.225	2.988	3.161	0.223	4.540	3.064	0.620	0.000
8.0000	3.225	2.982	3.161	0.213	4.540	3.064	0.611	0.000
8.2000	3.225	2.982	3.161	0.223	4.540	3.064	0.611	0.000
8.4000	3.225	2.976	3.161	0.223	4.540	3.064	0.601	0.000
8.6000	3.225	2.976	3.161	0.213	4.540	3.064	0.601	0.000
8.8000	3.225	2.976	3.161	0.213	4.540	3.064	0.611	0.000
9.0000	3.215	2.969	3.161	0.213	4.540	3.064	0.611	0.000
9.2000	3.225	2.969	3.161	0.204	4.540	3.064	0.601	0.000
9.4000	3.215	2.969	3.161	0.204	4.540	3.064	0.601	0.000
9.6000	3.215	2.969	3.161	0.204	4.533	3.064	0.611	0.000
9.8000	3.215	2.963	3.161	0.204	4.540	3.064	0.611	0.000
10.0000	3.225	2.969	3.161	0.213	4.540	3.064	0.592	0.000
12.0000	3.225	2.957	3.161	0.204	4.546	3.054	0.601	0.000
14.0000	3.215	2.950	3.146	0.194	4.540	3.044	0.592	0.000
16.0000	3.215	2.944	3.146	0.194	4.546	3.044	0.592	-0.015
18.0000	3.215	2.938	3.146	0.185	4.540	3.044	0.592	-0.015
20.0000	3.215	2.931	3.146	0.185	4.540	3.035	0.582	-0.015
22.0000	3.206	2.925	3.146	0.185	4.546	3.035	0.582	-0.015
24.0000	3.206	2.912	3.146	0.175	4.546	3.035	0.582	-0.015
26.0000	3.206	2.912	3.146	0.175	4.546	3.035	0.573	-0.015
28.0000	3.206	2.900	3.146	0.175	4.546	3.035	0.573	-0.031
30.0000	3.196	2.893	3.146	0.175	4.546	3.025	0.573	-0.031

SE2000
Environmental Logger
03/27 14:47

Unit# 2 Test 2

Setups: INPUT 1 INPUT 2 INPUT 3 INPUT 4 INPUT 5 INPUT 6 INPUT 7 INPUT 8

Setups	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
Type	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)
Mode	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC
I.D.	MW9I	MW9S	MW9B	OW2	OW3	OW1	OW4	EW1
Reference	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SG	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Linearity	0.281	0.149	0.105	0.113	0.138	0.119	0.110	0.074
Scale factor	29.873	19.928	50.266	30.159	20.042	30.180	29.757	50.363
Offset	0.024	0.032	-0.309	-0.014	0.080	-0.166	0.003	-0.237
Delay mSEC	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000

Step 0 03/22 17:29:42

Elapsed Time	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
0.0000	-0.009	-0.044	0.000	-0.009	-0.006	0.009	0.000	0.460
0.0083	-0.009	-0.044	0.015	-0.009	0.006	0.038	0.009	-0.618
0.0166	-0.009	-0.050	0.015	-0.009	0.006	-0.028	0.009	-0.380
0.0250	-0.009	-0.050	0.015	-0.009	0.000	0.009	0.000	1.317
0.0333	-0.009	-0.044	0.015	-0.019	-0.012	0.028	0.000	0.888
0.0416	-0.009	-0.050	0.015	-0.009	-0.012	0.009	0.000	0.634
0.0500	0.000	-0.050	0.015	-0.009	0.012	0.009	0.000	1.063
0.0583	-0.009	-0.050	0.015	0.000	-0.012	0.019	0.000	1.444
0.0666	-0.009	-0.050	0.015	-0.009	-0.012	0.028	0.000	1.428
0.0750	-0.009	-0.044	0.015	-0.009	-0.006	0.038	0.000	1.666
0.0833	-0.009	-0.050	0.015	-0.009	-0.018	0.038	0.000	1.904
0.0916	0.000	-0.044	0.015	-0.009	0.000	0.047	0.000	2.253
0.1000	-0.009	-0.044	0.015	-0.009	-0.006	0.057	0.000	2.602
0.1083	-0.009	-0.050	0.015	-0.009	-0.012	0.066	0.000	2.856
0.1166	-0.009	-0.050	0.015	-0.009	0.012	0.076	0.009	3.030
0.1250	-0.009	-0.044	0.015	0.000	-0.012	0.095	0.000	3.237
0.1333	-0.009	-0.050	0.015	-0.009	0.000	0.104	0.000	3.459
0.1416	0.000	-0.044	0.015	-0.009	0.006	0.114	0.000	3.713

0.1500	0.000	-0.044	0.015	-0.009	0.000	0.124	0.000	3.919
0.1583	-0.009	-0.044	0.015	-0.009	0.006	0.143	0.000	4.141
0.1666	0.000	-0.044	0.015	0.000	0.018	0.152	0.000	4.347
0.1750	0.000	-0.044	0.015	0.000	0.000	0.171	0.009	4.522
0.1833	0.000	-0.044	0.015	0.000	0.006	0.190	0.009	4.649
0.1916	-0.009	-0.044	0.031	0.000	0.018	0.200	0.000	4.807
0.2000	0.000	-0.044	0.015	0.000	0.006	0.219	0.009	4.966
0.2083	0.000	-0.044	0.015	0.000	0.012	0.238	0.009	5.125
0.2166	0.000	-0.044	0.015	0.000	-0.012	0.257	0.009	5.252
0.2250	0.000	-0.044	0.015	0.000	-0.006	0.267	0.018	5.410
0.2333	0.000	-0.044	0.015	0.000	0.012	0.286	0.018	5.521
0.2416	0.000	-0.050	0.015	0.009	0.006	0.314	0.018	5.648
0.2500	0.009	-0.050	0.015	0.009	-0.006	0.324	0.018	5.743
0.2583	0.000	-0.050	0.015	0.009	0.006	0.334	0.018	5.855
0.2666	0.000	-0.050	0.015	0.009	-0.012	0.362	0.018	5.966
0.2750	0.000	-0.050	0.031	0.009	-0.006	0.372	0.028	6.061
0.2833	0.000	-0.050	0.015	0.019	0.006	0.391	0.037	6.140
0.2916	0.000	-0.050	0.015	0.019	-0.006	0.410	0.028	6.235
0.3000	0.000	-0.044	0.031	0.019	0.000	0.429	0.037	6.315
0.3083	0.000	-0.044	0.031	0.019	0.012	0.439	0.037	6.378
0.3166	0.000	-0.050	0.015	0.028	-0.012	0.458	0.037	6.473
0.3250	0.000	-0.044	0.015	0.028	-0.012	0.467	0.047	6.569
0.3333	0.009	-0.050	0.031	0.028	0.006	0.486	0.047	6.616
0.3500	0.009	-0.050	0.015	0.028	0.000	0.524	0.056	6.775
0.3666	0.009	-0.044	0.031	0.038	0.018	0.553	0.056	6.870
0.3833	0.009	-0.050	0.015	0.047	0.006	0.582	0.065	6.965
0.4000	0.019	-0.044	0.015	0.047	0.000	0.601	0.075	7.076
0.4166	0.019	-0.044	0.015	0.057	0.000	0.629	0.075	7.187
0.4333	0.009	-0.050	0.031	0.057	-0.018	0.649	0.094	7.282
0.4500	0.019	-0.044	0.031	0.066	0.012	0.677	0.094	7.362
0.4666	0.028	-0.044	0.031	0.066	0.006	0.706	0.094	7.441
0.4833	0.028	-0.044	0.031	0.076	0.018	0.725	0.112	7.520
0.5000	0.028	-0.044	0.031	0.085	0.012	0.744	0.112	7.536
0.5166	0.028	-0.044	0.031	0.095	0.000	0.773	0.122	7.616
0.5333	0.038	-0.044	0.031	0.105	0.006	0.782	0.131	7.695
0.5500	0.028	-0.044	0.031	0.105	-0.012	0.801	0.141	7.743
0.5666	0.038	-0.044	0.031	0.114	-0.006	0.820	0.150	7.774
0.5833	0.038	-0.044	0.015	0.124	-0.006	0.839	0.150	7.822
0.6000	0.038	-0.037	0.031	0.124	-0.018	0.858	0.159	7.869
0.6166	0.047	-0.044	0.031	0.133	0.006	0.868	0.159	7.901
0.6333	0.057	-0.044	0.031	0.133	0.006	0.887	0.169	7.917
0.6500	0.047	-0.037	0.031	0.143	0.018	0.897	0.169	7.949
0.6666	0.047	-0.044	0.031	0.152	-0.006	0.916	0.178	7.996
0.6833	0.057	-0.037	0.031	0.152	-0.006	0.925	0.197	8.028
0.7000	0.057	-0.037	0.047	0.162	-0.012	0.935	0.197	8.012
0.7166	0.057	-0.044	0.031	0.171	0.000	0.944	0.197	8.012

0.7333	0.057	-0.044	0.031	0.171	0.012	0.963	0.197	8.092
0.7500	0.066	-0.044	0.031	0.181	0.000	0.973	0.216	8.123
0.7666	0.066	-0.037	0.031	0.190	0.018	0.983	0.225	8.107
0.7833	0.066	-0.037	0.047	0.190	0.000	0.992	0.225	8.123
0.8000	0.076	-0.037	0.047	0.200	-0.012	0.992	0.225	8.171
0.8166	0.066	-0.037	0.047	0.200	-0.012	1.011	0.235	8.171
0.8333	0.076	-0.037	0.047	0.210	0.006	1.021	0.253	8.155
0.8500	0.076	-0.037	0.031	0.210	0.012	1.021	0.253	8.203
0.8666	0.076	-0.031	0.047	0.219	0.006	1.030	0.263	8.250
0.8833	0.085	-0.037	0.047	0.229	0.006	1.040	0.253	8.250
0.9000	0.085	-0.037	0.047	0.238	-0.018	1.049	0.263	8.219
0.9166	0.085	-0.037	0.031	0.238	-0.006	1.049	0.263	8.234
0.9333	0.095	-0.037	0.031	0.248	0.000	1.059	0.272	8.282
0.9500	0.095	-0.031	0.047	0.257	0.012	1.059	0.272	8.266
0.9666	0.095	-0.037	0.047	0.257	0.012	1.068	0.272	8.266
0.9833	0.095	-0.031	0.047	0.267	-0.006	1.068	0.272	8.282
1.0000	0.095	-0.031	0.047	0.267	-0.012	1.078	0.282	8.282
1.2000	0.123	-0.025	0.047	0.334	-0.012	1.135	0.319	8.377
1.4000	0.142	-0.018	0.047	0.381	0.000	1.173	0.357	8.409
1.6000	0.152	-0.006	0.047	0.420	-0.018	1.193	0.376	8.345
1.8000	0.161	0.006	0.063	0.458	-0.012	1.212	0.394	8.393
2.0000	0.180	0.012	0.063	0.477	0.006	1.221	0.404	8.409
2.2000	0.190	0.018	0.063	0.496	0.006	1.231	0.423	8.409
2.4000	0.190	0.031	0.079	0.515	-0.006	1.240	0.423	8.441
2.6000	0.199	0.037	0.079	0.525	0.000	1.250	0.432	8.457
2.8000	0.199	0.050	0.079	0.544	0.012	1.250	0.432	8.425
3.0000	0.199	0.056	0.079	0.553	0.006	1.259	0.441	8.552
3.2000	0.209	0.063	0.079	0.553	0.000	1.278	0.451	8.631
3.4000	0.209	0.069	0.079	0.563	-0.012	1.288	0.451	8.615
3.6000	0.218	0.075	0.079	0.582	-0.012	1.288	0.460	8.583
3.8000	0.218	0.088	0.095	0.582	-0.006	1.298	0.460	8.631
4.0000	0.218	0.088	0.079	0.591	-0.018	1.298	0.470	8.726
4.2000	0.218	0.094	0.079	0.601	0.006	1.307	0.470	8.821
4.4000	0.228	0.101	0.079	0.601	0.012	1.326	0.470	8.806
4.6000	0.228	0.107	0.079	0.610	0.012	1.326	0.479	8.948
4.8000	0.228	0.107	0.095	0.620	-0.012	1.345	0.479	8.964
5.0000	0.228	0.113	0.095	0.630	-0.018	1.355	0.488	9.044
5.2000	0.237	0.120	0.095	0.630	-0.012	1.364	0.488	9.028
5.4000	0.237	0.120	0.079	0.639	0.018	1.364	0.488	9.028
5.6000	0.237	0.132	0.095	0.649	0.018	1.364	0.498	9.044
5.8000	0.247	0.132	0.095	0.649	0.006	1.364	0.498	9.012
6.0000	0.247	0.132	0.095	0.649	0.000	1.364	0.498	9.028
6.2000	0.247	0.139	0.095	0.658	0.000	1.374	0.498	9.075
6.4000	0.247	0.145	0.095	0.658	0.012	1.383	0.498	9.186
6.6000	0.247	0.145	0.095	0.668	-0.012	1.393	0.507	9.266
6.8000	0.256	0.151	0.095	0.668	-0.012	1.402	0.517	9.234

7.0000	0.256	0.151	0.095	0.677	-0.006	1.402	0.517	9.234
7.2000	0.256	0.151	0.095	0.668	-0.006	1.412	0.517	9.250
7.4000	0.256	0.158	0.095	0.677	0.006	1.412	0.517	9.281
7.6000	0.256	0.158	0.095	0.687	0.006	1.412	0.526	9.281
7.8000	0.256	0.164	0.111	0.687	0.006	1.412	0.526	9.202
8.0000	0.256	0.164	0.111	0.687	-0.006	1.402	0.517	9.266
8.2000	0.256	0.164	0.095	0.687	-0.006	1.402	0.517	9.297
8.4000	0.256	0.164	0.111	0.696	-0.006	1.412	0.526	9.234
8.6000	0.256	0.164	0.111	0.687	0.012	1.412	0.526	9.234
8.8000	0.266	0.170	0.111	0.687	-0.012	1.412	0.526	9.266
9.0000	0.266	0.170	0.111	0.687	-0.006	1.412	0.526	9.250
9.2000	0.256	0.170	0.111	0.696	-0.006	1.412	0.526	9.250
9.4000	0.266	0.170	0.111	0.696	0.012	1.412	0.526	9.266
9.6000	0.266	0.170	0.111	0.696	-0.012	1.412	0.526	9.250
9.8000	0.266	0.170	0.111	0.706	0.018	1.422	0.517	9.234
10.0000	0.266	0.177	0.111	0.706	0.006	1.412	0.517	9.250
12.0000	0.276	0.170	0.111	0.716	0.000	1.412	0.526	9.266
14.0000	0.276	0.170	0.111	0.725	0.000	1.422	0.526	9.281
16.0000	0.285	0.164	0.111	0.725	-0.006	1.422	0.535	9.266
18.0000	0.285	0.151	0.111	0.725	0.018	1.431	0.535	9.281
20.0000	0.285	0.145	0.127	0.735	0.012	1.431	0.535	9.281
22.0000	0.285	0.139	0.127	0.744	0.012	1.431	0.545	9.281
24.0000	0.285	0.139	0.127	0.744	0.025	1.431	0.535	9.297
26.0000	0.295	0.132	0.127	0.744	0.031	1.431	0.545	9.281
28.0000	0.295	0.132	0.127	0.744	0.006	1.441	0.545	9.266
30.0000	0.295	0.132	0.127	0.744	0.037	1.441	0.554	9.313
32.0000	0.304	0.126	0.127	0.744	0.000	1.441	0.545	9.281
34.0000	0.304	0.126	0.127	0.754	0.018	1.441	0.554	9.313
36.0000	0.304	0.126	0.127	0.754	0.031	1.441	0.545	9.329
38.0000	0.304	0.126	0.143	0.754	0.037	1.441	0.545	9.281
40.0000	0.304	0.132	0.143	0.754	0.031	1.441	0.554	9.297
42.0000	0.304	0.126	0.127	0.754	0.025	1.450	0.554	9.345
44.0000	0.304	0.126	0.143	0.754	0.006	1.450	0.554	9.345
46.0000	0.314	0.132	0.143	0.763	0.025	1.450	0.554	9.297
48.0000	0.314	0.132	0.143	0.763	0.025	1.450	0.554	9.361
50.0000	0.314	0.132	0.143	0.763	0.012	1.450	0.564	9.345
52.0000	0.314	0.139	0.158	0.763	0.031	1.450	0.554	9.313
54.0000	0.314	0.145	0.143	0.744	0.012	1.450	0.554	9.361
56.0000	0.314	0.139	0.143	0.763	0.025	1.450	0.554	9.329
58.0000	0.314	0.145	0.143	0.763	0.006	1.450	0.554	9.345
60.0000	0.314	0.139	0.143	0.763	0.018	1.450	0.554	9.377
62.0000	0.314	0.145	0.143	0.763	0.006	1.450	0.564	9.361
64.0000	0.314	0.145	0.158	0.773	0.031	1.450	0.564	9.361
66.0000	0.314	0.145	0.143	0.763	0.025	1.450	0.554	9.377
68.0000	0.314	0.151	0.143	0.773	0.018	1.450	0.554	9.345
70.0000	0.314	0.158	0.143	0.763	0.006	1.450	0.554	9.408

72.0000	0.314	0.158	0.143	0.763	0.031	1.460	0.564	9.345
74.0000	0.323	0.158	0.143	0.763	0.018	1.450	0.564	9.361
76.0000	0.323	0.158	0.143	0.763	0.006	1.450	0.554	9.345
78.0000	0.323	0.158	0.143	0.763	0.012	1.450	0.564	9.393
80.0000	0.323	0.158	0.158	0.773	0.018	1.450	0.554	9.393
82.0000	0.323	0.158	0.158	0.773	0.018	1.450	0.554	9.361
84.0000	0.323	0.164	0.158	0.773	0.037	1.460	0.573	9.408
86.0000	0.323	0.177	0.143	0.773	0.025	1.460	0.564	9.408
88.0000	0.323	0.177	0.158	0.773	0.031	1.450	0.564	9.408
90.0000	0.323	0.177	0.158	0.763	0.025	1.450	0.564	9.377
92.0000	0.323	0.183	0.158	0.773	0.025	1.460	0.564	9.377
94.0000	0.323	0.183	0.143	0.773	0.025	1.460	0.564	9.408
96.0000	0.323	0.183	0.158	0.773	0.025	1.460	0.573	9.377
98.0000	0.323	0.183	0.158	0.773	0.031	1.460	0.564	9.361
100.000	0.333	0.183	0.158	0.773	0.031	1.460	0.564	9.377
120.000	0.333	0.240	0.158	0.782	0.025	1.469	0.573	9.472
140.000	0.342	0.284	0.143	0.782	0.025	1.460	0.582	9.488
160.000	0.342	0.329	0.143	0.773	0.000	1.469	0.582	9.551
180.000	0.333	0.329	0.143	0.782	0.018	1.460	0.573	9.488
200.000	0.342	0.341	0.143	0.782	0.031	1.460	0.573	9.456
220.000	0.352	0.360	0.143	0.782	0.025	1.469	0.582	9.535
240.000	0.361	0.367	0.143	0.792	0.050	1.479	0.592	9.504
260.000	0.361	0.417	0.143	0.782	0.025	1.469	0.592	9.583
280.000	0.361	0.417	0.143	0.792	0.056	1.488	0.592	9.551
300.000	0.371	0.405	0.143	0.811	0.056	1.498	0.611	9.599
320.000	0.371	0.449	0.143	0.801	0.037	1.488	0.611	9.662
340.000	0.371	0.474	0.127	0.801	0.031	1.488	0.601	9.631
360.000	0.361	0.512	0.111	0.792	0.031	1.479	0.601	9.646
380.000	0.361	0.411	0.111	0.792	0.012	1.479	0.592	9.646
400.000	0.361	0.443	0.095	0.792	0.018	1.479	0.601	9.694
420.000	0.361	0.468	0.095	0.792	-0.006	1.479	0.592	9.710
440.000	0.371	0.481	0.111	0.792	0.012	1.488	0.592	9.710
460.000	0.371	0.474	0.111	0.801	0.037	1.488	0.601	9.694
480.000	0.380	0.481	0.095	0.801	0.006	1.498	0.601	9.710
500.000	0.371	0.462	0.095	0.801	0.018	1.498	0.601	9.726
520.000	0.371	0.449	0.095	0.811	0.006	1.498	0.611	9.742
540.000	0.380	0.462	0.095	0.801	-0.006	1.498	0.601	9.757
560.000	0.380	0.481	0.079	0.801	-0.012	1.498	0.611	9.757
580.000	0.380	0.493	0.079	0.801	-0.031	1.498	0.601	9.773
600.000	0.380	0.493	0.063	0.811	-0.018	1.507	0.611	9.773
620.000	0.390	0.487	0.079	0.821	-0.006	1.517	0.611	9.853
640.000	0.390	0.493	0.079	0.821	-0.050	1.507	0.611	9.868
660.000	0.390	0.481	0.063	0.821	-0.037	1.507	0.611	9.853
680.000	0.390	0.481	0.063	0.821	-0.031	1.517	0.620	9.821
700.000	0.399	0.487	0.063	0.821	-0.050	1.517	0.620	9.868
720.000	0.390	0.468	0.063	0.821	-0.031	1.517	0.620	9.884

740.000	0.399	0.474	0.063	0.830	-0.044	1.517	0.630	9.868
760.000	0.399	0.474	0.063	0.830	-0.018	1.517	0.630	9.916
780.000	0.399	0.487	0.063	0.830	-0.031	1.527	0.630	9.884
800.000	0.399	0.493	0.063	0.830	-0.018	1.527	0.630	9.948
820.000	0.399	0.500	0.047	0.840	-0.018	1.527	0.630	9.948
840.000	0.399	0.506	0.047	0.830	-0.037	1.527	0.630	9.916
860.000	0.399	0.506	0.047	0.840	0.000	1.527	0.630	9.916
880.000	0.409	0.519	0.047	0.840	0.000	1.536	0.620	9.916
900.000	0.409	0.538	0.047	0.830	-0.037	1.536	0.639	9.964
920.000	0.409	0.544	0.047	0.830	-0.012	1.536	0.648	9.948
940.000	0.409	0.550	0.047	0.830	-0.018	1.536	0.648	9.995
960.000	0.418	0.569	0.047	0.840	-0.037	1.546	0.648	9.980
980.000	0.418	0.639	0.047	0.840	-0.031	1.546	0.658	9.995
1000.00	0.428	0.734	0.063	0.840	-0.050	1.546	0.667	10.027
1030.00	0.418	0.759	0.031	0.849	-0.101	1.546	0.658	9.995
1060.00	0.428	0.715	0.047	0.840	-0.151	1.546	0.658	10.011
1090.00	0.428	0.753	0.031	0.849	-0.145	1.546	0.667	9.980
1120.00	0.418	0.658	0.031	0.849	-0.183	1.555	0.667	10.043
1150.00	0.428	0.651	0.015	0.849	-0.176	1.555	0.667	10.043
1180.00	0.437	0.702	0.031	0.859	-0.145	1.555	0.677	9.964
1210.00	0.428	0.721	0.015	0.849	-0.151	1.555	0.677	10.075
1240.00	0.437	0.626	0.015	0.859	-0.139	1.565	0.667	9.980
1270.00	0.437	0.563	0.015	0.868	-0.113	1.574	0.677	10.027
1300.00	0.437	0.550	0.015	0.868	-0.126	1.574	0.667	10.027
1330.00	0.437	0.557	0.015	0.868	-0.132	1.565	0.667	9.995
1360.00	0.437	0.569	0.015	0.878	-0.113	1.574	0.677	10.091
1390.00	0.437	0.601	0.015	0.868	-0.088	1.574	0.677	10.027
1420.00	0.447	0.449	0.015	0.878	-0.088	1.574	0.677	9.964
1450.00	0.447	0.405	0.000	0.878	-0.082	1.574	0.677	10.043
1480.00	0.437	0.316	0.000	0.878	-0.063	1.584	0.667	10.043
1510.00	0.447	0.259	0.000	0.887	-0.037	1.584	0.677	10.075
1540.00	0.447	0.221	0.000	0.887	-0.050	1.584	0.686	10.122
1570.00	0.447	0.215	0.000	0.878	-0.031	1.584	0.677	10.075
1600.00	0.456	0.202	0.000	0.887	-0.018	1.584	0.686	10.122
1630.00	0.456	0.208	-0.015	0.878	-0.037	1.584	0.677	10.091
1660.00	0.456	0.227	-0.015	0.887	-0.025	1.584	0.686	10.122
1690.00	0.456	0.278	-0.015	0.887	0.006	1.584	0.677	10.091
1720.00	0.456	0.246	-0.015	0.887	0.025	1.584	0.686	10.043
1750.00	0.456	0.240	-0.015	0.887	0.018	1.565	0.677	10.027
1780.00	0.456	0.246	-0.031	0.887	0.025	1.574	0.677	10.075
1810.00	0.456	0.253	-0.031	0.878	0.044	1.584	0.677	10.138
1840.00	0.456	0.278	-0.031	0.878	0.031	1.574	0.677	10.138
1870.00	0.456	0.291	-0.031	0.878	0.031	1.584	0.686	10.170
1900.00	0.456	0.297	-0.031	0.887	0.069	1.593	0.677	10.202
1930.00	0.466	0.291	-0.031	0.878	0.069	1.574	0.677	10.154
1960.00	0.456	0.265	-0.031	0.887	0.075	1.584	0.677	10.186

1990.00	0.466	0.272	-0.031	0.887	0.088	1.584	0.677	10.122
2020.00	0.466	0.322	-0.047	0.878	0.075	1.584	0.667	10.091
2050.00	0.466	0.360	-0.031	0.887	0.101	1.584	0.677	10.170
2080.00	0.466	0.379	-0.047	0.887	0.075	1.584	0.686	10.233
2110.00	0.466	0.329	-0.047	0.887	0.101	1.584	0.677	10.202
2140.00	0.466	0.329	-0.031	0.887	0.113	1.593	0.677	10.249
2170.00	0.466	0.360	-0.047	0.887	0.101	1.593	0.686	10.265
2200.00	0.466	0.405	-0.047	0.887	0.120	1.584	0.686	10.202
2230.00	0.475	0.493	-0.031	0.897	0.126	1.593	0.686	10.249
2260.00	0.485	0.658	-0.047	0.897	0.126	1.593	0.695	10.297
2290.00	0.485	0.803	-0.031	0.897	0.145	1.593	0.695	10.281
2320.00	0.494	0.943	-0.031	0.887	0.113	1.603	0.714	10.344
2350.00	0.494	1.088	-0.015	0.906	0.151	1.603	0.724	10.313
2380.00	0.513	1.208	-0.015	0.897	0.158	1.612	0.733	10.392
2410.00	0.504	1.297	-0.015	0.906	0.139	1.622	0.752	10.392
2440.00	0.504	1.398	-0.015	0.906	0.151	1.622	0.752	10.297
2470.00	0.513	1.620	-0.015	0.906	0.158	1.622	0.761	10.297
2500.00	0.504	1.759	-0.015	0.897	0.145	1.612	0.752	10.249
2530.00	0.494	1.702	-0.031	0.887	0.164	1.612	0.742	10.170
2560.00	0.494	1.721	-0.031	0.887	0.189	1.612	0.752	10.217
2590.00	0.494	1.721	-0.031	0.887	0.145	1.612	0.733	10.297
2620.00	0.494	1.512	-0.031	0.887	0.145	1.612	0.733	10.170
2650.00	0.475	1.348	-0.047	0.897	0.158	1.593	0.714	10.154
2680.00	0.475	1.227	-0.047	0.887	0.151	1.612	0.714	10.202
2710.00	0.466	0.993	-0.047	0.887	0.170	1.612	0.695	10.186
2740.00	0.475	0.829	-0.047	0.887	0.139	1.612	0.705	10.217
2770.00	0.475	0.689	-0.031	0.897	0.183	1.622	0.705	10.233
2800.00	0.475	0.576	-0.031	0.897	0.145	1.622	0.705	10.202
2830.00	0.475	0.525	-0.031	0.897	0.145	1.603	0.714	10.249
2860.00	0.475	0.455	-0.031	0.906	0.170	1.603	0.705	10.170
2890.00	0.475	0.373	-0.031	0.906	0.176	1.603	0.705	10.186
2920.00	0.475	0.215	-0.031	0.906	0.145	1.603	0.695	10.154
2950.00	0.485	0.189	-0.031	0.916	0.176	1.603	0.695	10.186
2980.00	0.485	0.202	-0.031	0.916	0.202	1.603	0.705	10.233
3010.00	0.494	0.253	-0.015	0.916	0.164	1.603	0.714	10.233
3040.00	0.494	0.348	-0.015	0.926	0.202	1.603	0.705	10.249
3070.00	0.494	0.386	-0.015	0.926	0.208	1.603	0.705	10.281
3100.00	0.494	0.424	-0.015	0.916	0.214	1.593	0.714	10.281
3130.00	0.494	0.449	-0.031	0.916	0.176	1.593	0.705	10.313
3160.00	0.494	0.487	-0.031	0.916	0.183	1.603	0.714	10.329
3190.00	0.504	0.525	-0.031	0.926	0.195	1.603	0.714	10.313
3220.00	0.494	0.525	-0.047	0.916	0.208	1.593	0.705	10.281
3250.00	0.494	0.487	-0.031	0.916	0.189	1.593	0.705	10.344
3280.00	0.494	0.455	-0.031	0.916	0.214	1.593	0.695	10.360
3310.00	0.494	0.436	-0.031	0.916	0.221	1.593	0.705	10.329
3340.00	0.494	0.373	-0.031	0.916	0.227	1.593	0.714	10.392

3370.00	0.504	0.424	-0.047	0.916	0.214	1.603	0.714	10.392
3400.00	0.494	0.367	-0.031	0.906	0.221	1.593	0.705	10.376
3430.00	0.494	0.360	-0.031	0.916	0.214	1.603	0.714	10.408
3460.00	0.494	0.386	-0.047	0.906	0.221	1.593	0.705	10.344
3490.00	0.494	0.392	-0.047	0.906	0.240	1.593	0.714	10.376
3520.00	0.504	0.462	-0.047	0.906	0.227	1.593	0.705	10.376
3550.00	0.494	0.563	-0.047	0.906	0.221	1.584	0.705	10.344
3580.00	0.494	0.544	-0.047	0.906	0.227	1.593	0.705	10.392
3610.00	0.494	0.576	-0.047	0.906	0.240	1.593	0.714	10.424
3640.00	0.504	0.633	-0.047	0.906	0.227	1.593	0.714	10.408
3670.00	0.513	0.841	-0.031	0.916	0.246	1.603	0.714	10.455
3700.00	0.504	0.886	-0.031	0.916	0.246	1.593	0.724	10.440
3730.00	0.513	0.898	-0.031	0.916	0.246	1.603	0.724	10.424
3760.00	0.523	1.019	-0.015	0.926	0.265	1.612	0.733	10.487
3790.00	0.523	1.006	-0.015	0.926	0.259	1.612	0.742	10.424
3820.00	0.523	0.974	-0.015	0.926	0.271	1.612	0.742	10.440
3850.00	0.532	1.057	-0.015	0.926	0.265	1.622	0.742	10.487
3880.00	0.532	1.449	-0.015	0.926	0.284	1.622	0.752	10.598
3910.00	0.552	1.468	0.000	0.935	0.278	1.641	0.789	10.662
3940.00	0.552	1.683	0.000	0.935	0.278	1.641	0.789	10.582
3970.00	0.532	1.506	-0.015	0.916	0.265	1.622	0.771	10.455
4000.00	0.475	1.132	-0.063	0.897	0.265	1.603	0.695	10.329
4030.00	0.466	1.455	-0.063	0.887	0.265	1.603	0.714	10.487
4060.00	0.475	1.373	-0.063	0.887	0.278	1.593	0.714	10.360
4090.00	0.532	1.468	-0.015	0.916	0.259	1.612	0.761	10.551
4120.00	0.485	1.240	-0.063	0.897	0.246	1.603	0.714	10.392
4150.00	0.494	1.006	-0.047	0.906	0.271	1.603	0.714	10.408
4180.00	0.485	0.898	-0.063	0.897	0.259	1.603	0.724	10.360
4210.00	0.485	0.772	-0.063	0.887	0.265	1.593	0.705	10.360
4240.00	0.475	0.639	-0.063	0.897	0.265	1.593	0.714	10.360
4270.00	0.475	0.601	-0.063	0.897	0.271	1.593	0.695	10.392
4300.00	0.475	0.493	-0.063	0.897	0.271	1.593	0.705	10.344

SE2000
Environmental Logger
03/27 15:14

Unit# 2 Test 2

Setups: INPUT 1 INPUT 2 INPUT 3 INPUT 4 INPUT 5 INPUT 6 INPUT 7 INPUT 8

Setups:	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
Type	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)	Level (F)
Mode	TOC	TOC	TOC	TOC	TOC	TOC	TOC	TOC
I.D.	MW9I	MW9S	MW9B	OW2	OW3	OW1	OW4	EW1
Reference	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SG	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Linearity	0.281	0.149	0.105	0.113	0.138	0.119	0.110	0.074
Scale factor	29.873	19.928	50.266	30.159	20.042	30.180	29.757	50.363
Offset	0.024	0.032	-0.309	-0.014	0.080	-0.166	0.003	-0.237
Delay mSEC	50.000	50.000	50.000	50.000	50.000	50.000	50.000	50.000

Step 1 03/25 17:31:03

Elapsed Time	INPUT 1	INPUT 2	INPUT 3	INPUT 4	INPUT 5	INPUT 6	INPUT 7	INPUT 8
0.0000	0.475	0.411	-0.063	0.878	0.284	1.593	0.705	9.297
0.0083	0.466	0.411	-0.047	0.887	0.271	1.584	0.705	10.011
0.0166	0.466	0.411	-0.047	0.887	0.265	1.593	0.705	9.900
0.0250	0.466	0.405	-0.047	0.887	0.278	1.593	0.705	9.710
0.0333	0.466	0.411	-0.047	0.887	0.259	1.584	0.695	9.504
0.0416	0.466	0.411	-0.047	0.887	0.278	1.584	0.695	9.266
0.0500	0.466	0.411	-0.047	0.887	0.265	1.574	0.705	8.996
0.0583	0.466	0.411	-0.047	0.887	0.278	1.565	0.705	8.758
0.0666	0.475	0.411	-0.047	0.887	0.265	1.565	0.705	8.298
0.0750	0.466	0.405	-0.047	0.887	0.278	1.565	0.705	8.028
0.0833	0.466	0.411	-0.047	0.887	0.252	1.555	0.695	8.187
0.0916	0.466	0.411	-0.047	0.887	0.284	1.546	0.695	7.743
0.1000	0.466	0.411	-0.047	0.887	0.259	1.536	0.705	7.330
0.1083	0.475	0.411	-0.047	0.887	0.271	1.527	0.705	7.171
0.1166	0.466	0.411	-0.047	0.887	0.271	1.517	0.695	6.902
0.1250	0.456	0.411	-0.047	0.887	0.278	1.507	0.695	6.600
0.1333	0.466	0.411	-0.047	0.887	0.259	1.498	0.695	6.378
0.1416	0.466	0.405	-0.047	0.887	0.271	1.479	0.695	6.172

0.1500	0.466	0.411	-0.047	0.887	0.271	1.469	0.695	5.934
0.1583	0.466	0.411	-0.047	0.887	0.265	1.460	0.686	5.712
0.1666	0.475	0.411	-0.047	0.887	0.278	1.441	0.695	5.505
0.1750	0.466	0.405	-0.047	0.887	0.259	1.422	0.695	5.315
0.1833	0.466	0.411	-0.047	0.878	0.271	1.402	0.686	5.125
0.1916	0.466	0.411	-0.047	0.878	0.271	1.393	0.695	4.950
0.2000	0.466	0.411	-0.047	0.878	0.265	1.383	0.686	4.776
0.2083	0.475	0.411	-0.047	0.878	0.278	1.355	0.695	4.601
0.2166	0.466	0.405	-0.047	0.878	0.278	1.336	0.677	4.458
0.2250	0.466	0.411	-0.047	0.878	0.259	1.326	0.686	4.300
0.2333	0.466	0.411	-0.047	0.878	0.271	1.307	0.677	4.157
0.2416	0.466	0.405	-0.047	0.868	0.284	1.288	0.677	3.998
0.2500	0.466	0.411	-0.047	0.868	0.259	1.269	0.686	3.839
0.2583	0.466	0.411	-0.047	0.868	0.284	1.250	0.677	3.713
0.2666	0.466	0.411	-0.047	0.868	0.265	1.240	0.667	3.586
0.2750	0.466	0.411	-0.047	0.859	0.271	1.221	0.667	3.475
0.2833	0.466	0.411	-0.047	0.859	0.252	1.202	0.667	3.363
0.2916	0.466	0.411	-0.047	0.859	0.290	1.183	0.658	3.252
0.3000	0.466	0.411	-0.047	0.859	0.271	1.164	0.658	3.141
0.3083	0.466	0.411	-0.047	0.859	0.271	1.145	0.658	3.046
0.3166	0.466	0.411	-0.047	0.859	0.259	1.135	0.648	2.951
0.3250	0.456	0.411	-0.047	0.849	0.265	1.116	0.648	2.856
0.3333	0.456	0.411	-0.047	0.840	0.265	1.097	0.648	2.776
0.3500	0.456	0.405	-0.047	0.849	0.265	1.059	0.639	2.602
0.3666	0.456	0.411	-0.047	0.840	0.271	1.030	0.630	2.459
0.3833	0.456	0.411	-0.047	0.830	0.271	1.002	0.630	2.316
0.4000	0.447	0.411	-0.047	0.830	0.271	0.973	0.611	2.173
0.4166	0.447	0.411	-0.047	0.821	0.271	0.935	0.611	2.078
0.4333	0.447	0.411	-0.047	0.811	0.271	0.916	0.611	1.935
0.4500	0.447	0.411	-0.063	0.811	0.271	0.887	0.592	1.840
0.4666	0.447	0.411	-0.047	0.801	0.271	0.858	0.592	1.745
0.4833	0.437	0.405	-0.047	0.801	0.271	0.839	0.582	1.650
0.5000	0.437	0.405	-0.047	0.782	0.271	0.811	0.582	1.570
0.5166	0.437	0.405	-0.063	0.773	0.271	0.782	0.573	1.491
0.5333	0.437	0.405	-0.063	0.773	0.271	0.763	0.564	1.412
0.5500	0.428	0.405	-0.047	0.763	0.271	0.754	0.554	1.348
0.5666	0.428	0.405	-0.063	0.754	0.271	0.734	0.545	1.285
0.5833	0.418	0.405	-0.063	0.754	0.271	0.706	0.535	1.221
0.6000	0.418	0.405	-0.063	0.744	0.271	0.687	0.535	1.174
0.6166	0.418	0.405	-0.063	0.735	0.271	0.668	0.526	1.126
0.6333	0.418	0.405	-0.063	0.725	0.271	0.658	0.526	1.079
0.6500	0.418	0.398	-0.063	0.716	0.271	0.639	0.507	1.031
0.6666	0.418	0.405	-0.063	0.706	0.271	0.620	0.507	0.983
0.6833	0.409	0.405	-0.063	0.706	0.271	0.610	0.498	0.952
0.7000	0.409	0.405	-0.063	0.696	0.271	0.601	0.488	0.904
0.7166	0.399	0.398	-0.063	0.687	0.271	0.582	0.488	0.872

0.7333	0.399	0.405	-0.063	0.687	0.271	0.572	0.479	0.841
0.7500	0.399	0.398	-0.063	0.677	0.271	0.553	0.470	0.809
0.7666	0.399	0.398	-0.063	0.668	0.271	0.544	0.460	0.777
0.7833	0.390	0.405	-0.063	0.658	0.271	0.534	0.460	0.761
0.8000	0.390	0.398	-0.079	0.658	0.271	0.524	0.451	0.729
0.8166	0.380	0.398	-0.079	0.649	0.271	0.515	0.451	0.714
0.8333	0.380	0.398	-0.063	0.639	0.271	0.496	0.441	0.682
0.8500	0.380	0.392	-0.063	0.639	0.271	0.496	0.432	0.666
0.8666	0.371	0.398	-0.063	0.630	0.271	0.486	0.432	0.650
0.8833	0.371	0.392	-0.063	0.620	0.271	0.477	0.423	0.618
0.9000	0.371	0.398	-0.079	0.620	0.271	0.467	0.423	0.602
0.9166	0.371	0.392	-0.063	0.601	0.271	0.458	0.404	0.602
0.9333	0.371	0.398	-0.063	0.601	0.271	0.448	0.404	0.571
0.9500	0.361	0.392	-0.063	0.601	0.271	0.439	0.404	0.571
0.9666	0.361	0.392	-0.079	0.591	0.271	0.439	0.404	0.555
0.9833	0.361	0.392	-0.079	0.582	0.271	0.429	0.394	0.539
1.0000	0.361	0.392	-0.079	0.572	0.271	0.419	0.394	0.523
1.2000	0.323	0.379	-0.079	0.496	0.271	0.353	0.347	0.412
1.4000	0.304	0.367	-0.079	0.448	0.271	0.305	0.300	0.349
1.6000	0.295	0.360	-0.095	0.400	0.271	0.276	0.282	0.301
1.8000	0.285	0.348	-0.111	0.362	0.271	0.257	0.263	0.285
2.0000	0.266	0.335	-0.111	0.334	0.271	0.238	0.253	0.253
2.2000	0.256	0.316	-0.111	0.305	0.271	0.229	0.235	0.238
2.4000	0.247	0.310	-0.111	0.286	0.271	0.219	0.225	0.222
2.6000	0.237	0.297	-0.111	0.276	0.271	0.209	0.216	0.222
2.8000	0.237	0.284	-0.127	0.257	0.271	0.200	0.206	0.206
3.0000	0.228	0.272	-0.127	0.248	0.271	0.190	0.206	0.206
3.2000	0.228	0.265	-0.127	0.238	0.271	0.190	0.197	0.190
3.4000	0.228	0.253	-0.127	0.229	0.271	0.181	0.197	0.190
3.6000	0.228	0.246	-0.127	0.219	0.271	0.181	0.188	0.190
3.8000	0.218	0.234	-0.127	0.219	0.271	0.171	0.188	0.174
4.0000	0.218	0.227	-0.127	0.210	0.271	0.171	0.188	0.174
4.2000	0.209	0.221	-0.127	0.210	0.271	0.171	0.178	0.174
4.4000	0.209	0.215	-0.127	0.200	0.271	0.162	0.178	0.174
4.6000	0.209	0.202	-0.143	0.190	0.271	0.162	0.169	0.158
4.8000	0.209	0.196	-0.127	0.190	0.271	0.152	0.169	0.158
5.0000	0.199	0.183	-0.143	0.181	0.265	0.152	0.178	0.158
5.2000	0.199	0.177	-0.143	0.181	0.271	0.152	0.169	0.158
5.4000	0.199	0.170	-0.143	0.171	0.271	0.152	0.169	0.142
5.6000	0.199	0.164	-0.143	0.171	0.271	0.152	0.159	0.142
5.8000	0.190	0.164	-0.143	0.171	0.271	0.152	0.159	0.142
6.0000	0.199	0.158	-0.143	0.171	0.271	0.143	0.159	0.142
6.2000	0.199	0.151	-0.143	0.162	0.271	0.143	0.169	0.142
6.4000	0.199	0.145	-0.143	0.162	0.271	0.143	0.159	0.142
6.6000	0.199	0.145	-0.143	0.162	0.271	0.143	0.169	0.142
6.8000	0.190	0.139	-0.143	0.152	0.271	0.143	0.159	0.126

7.0000	0.190	0.139	-0.143	0.162	0.271	0.143	0.159	0.142
7.2000	0.190	0.132	-0.143	0.152	0.271	0.143	0.159	0.126
7.4000	0.190	0.126	-0.143	0.152	0.271	0.133	0.159	0.126
7.6000	0.190	0.120	-0.143	0.152	0.271	0.143	0.159	0.126
7.8000	0.190	0.113	-0.143	0.152	0.271	0.133	0.150	0.126
8.0000	0.190	0.113	-0.143	0.152	0.271	0.133	0.159	0.126
8.2000	0.190	0.107	-0.143	0.143	0.271	0.133	0.150	0.126
8.4000	0.190	0.107	-0.143	0.152	0.271	0.133	0.150	0.126
8.6000	0.190	0.101	-0.143	0.143	0.278	0.133	0.150	0.126
8.8000	0.190	0.094	-0.158	0.143	0.278	0.133	0.141	0.111
9.0000	0.190	0.101	-0.143	0.143	0.278	0.133	0.150	0.111
9.2000	0.180	0.088	-0.143	0.143	0.278	0.133	0.150	0.111
9.4000	0.180	0.094	-0.158	0.152	0.271	0.133	0.150	0.111
9.6000	0.180	0.082	-0.143	0.143	0.271	0.133	0.150	0.111
9.8000	0.180	0.088	-0.143	0.143	0.278	0.133	0.141	0.111
10.0000	0.190	0.088	-0.143	0.143	0.278	0.124	0.141	0.111
12.0000	0.180	0.063	-0.143	0.133	0.278	0.124	0.141	0.095
14.0000	0.180	0.050	-0.158	0.124	0.278	0.114	0.131	0.095
16.0000	0.180	0.044	-0.143	0.124	0.278	0.114	0.122	0.095
18.0000	0.171	0.025	-0.158	0.124	0.278	0.114	0.122	0.095
20.0000	0.171	0.018	-0.158	0.114	0.278	0.104	0.122	0.079
22.0000	0.171	0.006	-0.158	0.114	0.278	0.104	0.122	0.079
24.0000	0.171	0.006	-0.158	0.114	0.278	0.104	0.122	0.079
26.0000	0.161	0.006	-0.158	0.114	0.278	0.104	0.122	0.079
28.0000	0.161	0.000	-0.158	0.105	0.278	0.104	0.112	0.079
30.0000	0.161	0.000	-0.158	0.105	0.271	0.095	0.112	0.079

SE1000B
Environmental Logger
03/27 16:23

Unit# 00902 Test# 3

INPUT 2: Level (F) TOC

Reference 4.75
Scale factor 30.18
Offset 0.00

Step# 0 03/22 17:00

Elapsed Time	Value
0.0000	4.86
0.0033	4.86
0.0066	4.85
0.0099	4.86
0.0133	4.86
0.0166	4.86
0.0200	4.85
0.0233	4.86
0.0266	4.86
0.0300	4.86
0.0333	4.85
0.0500	4.86
0.0666	4.86
0.0833	4.87
0.1000	4.86
0.1166	4.86
0.1333	4.86
0.1500	4.86
0.1666	4.86
0.1833	4.86
0.2000	4.85
0.2166	4.86
0.2333	4.86
0.2500	4.85
0.2666	4.86
0.2833	4.86
0.3000	4.86
0.3166	4.86
0.3333	4.86

0.4167	4.86
0.5000	4.87
0.5833	4.86
0.6667	4.87
0.7500	4.86
0.8333	4.85
0.9167	4.87
1.0000	4.86
1.0833	4.86
1.1667	4.86
1.2500	4.86
1.3333	4.86
1.4166	4.86
1.5000	4.86
1.5833	4.87
1.6667	4.87
1.7500	4.86
1.8333	4.87
1.9167	4.86
2.0000	4.86
2.5000	4.85
3.0000	4.86
3.5000	4.84
4.0000	4.86
4.5000	4.86
5.0000	4.86
5.5000	4.86
6.0000	4.86
6.5000	4.86
7.0000	4.86
7.5000	4.86
8.0000	4.85
8.5000	4.85
9.0000	4.85
9.5000	4.86
10.0000	4.85
12.0000	4.86
14.0000	4.85
16.0000	4.86
18.0000	4.85
20.0000	4.87
22.0000	4.87
24.0000	4.87
26.0000	4.88
28.0000	4.87
30.0000	4.88

32.0000	4.87
34.0000	4.88
36.0000	4.88
38.0000	4.87
40.0000	4.88
42.0000	4.89
44.0000	4.89
46.0000	4.88
48.0000	4.88
50.0000	4.89
52.0000	4.88
54.0000	4.89
56.0000	4.89
58.0000	4.88
60.0000	4.89
62.0000	4.89
64.0000	4.89
66.0000	4.89
68.0000	4.89
70.0000	4.89
72.0000	4.90
74.0000	4.89
76.0000	4.89
78.0000	4.88
80.0000	4.89
82.0000	4.89
84.0000	4.90
86.0000	4.90
88.0000	4.91
90.0000	4.90
92.0000	4.89
94.0000	4.89
96.0000	4.89
98.0000	4.89
100.000	4.89
110.000	4.90
120.000	4.89
130.000	4.90
140.000	4.91
150.000	4.90
160.000	4.90
170.000	4.91
180.000	4.90
190.000	4.91
200.000	4.91
210.000	4.92

220.000	4.91
230.000	4.92
240.000	4.92
250.000	4.93
260.000	4.92
270.000	4.93
280.000	4.93
290.000	4.94
300.000	4.94
310.000	4.94
320.000	4.94
330.000	4.95
340.000	4.94
350.000	4.94
360.000	4.93
370.000	4.92
380.000	4.92
390.000	4.93
400.000	4.93
410.000	4.93
420.000	4.94
430.000	4.93
440.000	4.94
450.000	4.94
460.000	4.95
470.000	4.95
480.000	4.95
490.000	4.95
500.000	4.95
510.000	4.95
520.000	4.95
530.000	4.95
540.000	4.95
550.000	4.95
560.000	4.94
570.000	4.95
580.000	4.94
590.000	4.95
600.000	4.95
610.000	4.95
620.000	4.95
630.000	4.95
640.000	4.95
650.000	4.95
660.000	4.96
670.000	4.95

680.000	4.95
690.000	4.95
700.000	4.95
710.000	4.95
720.000	4.95
730.000	4.95
740.000	4.95
750.000	4.96
760.000	4.95
770.000	4.95
780.000	4.96
790.000	4.96
800.000	4.97
810.000	4.96
820.000	4.96
830.000	4.97
840.000	4.96
850.000	4.97
860.000	4.97
870.000	4.97
880.000	4.97
890.000	4.97
900.000	4.98
910.000	4.97
920.000	4.97
930.000	4.97
940.000	4.98
950.000	4.98
960.000	4.98
970.000	4.97
980.000	4.97
990.000	4.97
1000.00	4.99
1030.00	4.99
1060.00	4.99
1090.00	4.99
1120.00	5.00
1150.00	4.99
1180.00	4.99
1210.00	4.99
1240.00	5.01
1270.00	5.00
1300.00	5.00
1330.00	5.00
1360.00	4.99
1390.00	5.01

1420.00	5.01
1450.00	5.02
1480.00	5.02
1510.00	5.02
1540.00	5.02
1570.00	5.02
1600.00	5.02
1630.00	5.02
1660.00	5.02
1690.00	5.01
1720.00	5.01
1750.00	5.01
1780.00	5.02
1810.00	5.02
1840.00	5.02
1870.00	5.02
1900.00	5.02
1930.00	5.03
1960.00	5.02
1990.00	5.03
2020.00	5.03
2050.00	5.02
2080.00	5.04
2110.00	5.04
2140.00	5.05
2170.00	5.03
2200.00	5.03
2230.00	5.05
2260.00	5.06
2290.00	5.05
2320.00	5.05
2350.00	5.06
2380.00	5.06
2410.00	5.06
2440.00	5.07
2470.00	5.06
2500.00	5.06
2530.00	5.05
2560.00	5.05
2590.00	5.06
2620.00	5.06
2650.00	5.05
2680.00	5.05
2710.00	5.06
2740.00	5.06
2770.00	5.05

2800.00	5.06
2830.00	5.05
2860.00	5.07
2890.00	5.07
2920.00	5.08
2950.00	5.06
2980.00	5.06
3010.00	5.07
3040.00	5.06
3070.00	5.07
3100.00	5.07
3130.00	5.07
3160.00	5.08
3190.00	5.08
3220.00	5.07
3250.00	5.07
3280.00	5.08
3310.00	5.07
3340.00	5.07
3370.00	5.08
3400.00	5.07
3430.00	5.06
3460.00	5.07
3490.00	5.06
3520.00	5.06
3550.00	5.08
3580.00	5.08
3610.00	5.08
3640.00	5.08
3670.00	5.08
3700.00	5.08
3730.00	5.08
3760.00	5.09
3790.00	5.09
3820.00	5.10
3850.00	5.10
3880.00	5.11
3910.00	5.10
3940.00	5.10
3970.00	5.09
4000.00	5.09
4030.00	5.09
4060.00	5.09
4090.00	5.09
4120.00	5.08
4150.00	5.08

4180.00	5.08
4210.00	5.06
4240.00	5.07
4270.00	5.08
4300.00	5.07
4330.00	5.07
4360.00	5.06

SE1000B
Environmental Logger
03/27 16:18

Unit# 00902 Test# 3

INPUT 1: Level (F) TOC

Reference 5.28
Scale factor 19.99
Offset 0.00

Step# 0 03/22 17:00

Elapsed Time	Value
0.0000	5.34
0.0033	5.34
0.0066	5.34
0.0099	5.34
0.0133	5.34
0.0166	5.34
0.0200	5.34
0.0233	5.34
0.0266	5.34
0.0300	5.34
0.0333	5.34
0.0500	5.34
0.0666	5.34
0.0833	5.34
0.1000	5.34
0.1166	5.34
0.1333	5.34
0.1500	5.34
0.1666	5.34
0.1833	5.34
0.2000	5.34
0.2166	5.34
0.2333	5.34
0.2500	5.34
0.2666	5.34
0.2833	5.34
0.3000	5.34
0.3166	5.34
0.3333	5.34

0.4167	5.34
0.5000	5.34
0.5833	5.34
0.6667	5.34
0.7500	5.34
0.8333	5.34
0.9167	5.34
1.0000	5.34
1.0833	5.34
1.1667	5.34
1.2500	5.34
1.3333	5.34
1.4166	5.34
1.5000	5.34
1.5833	5.34
1.6667	5.34
1.7500	5.34
1.8333	5.34
1.9167	5.34
2.0000	5.34
2.5000	5.34
3.0000	5.34
3.5000	5.34
4.0000	5.34
4.5000	5.34
5.0000	5.34
5.5000	5.34
6.0000	5.34
6.5000	5.34
7.0000	5.34
7.5000	5.33
8.0000	5.34
8.5000	5.34
9.0000	5.34
9.5000	5.33
10.0000	5.34
12.0000	5.34
14.0000	5.34
16.0000	5.34
18.0000	5.34
20.0000	5.35
22.0000	5.35
24.0000	5.36
26.0000	5.36
28.0000	5.36
30.0000	5.36

32.0000	5.36
34.0000	5.36
36.0000	5.36
38.0000	5.36
40.0000	5.36
42.0000	5.36
44.0000	5.36
46.0000	5.36
48.0000	5.36
50.0000	5.37
52.0000	5.37
54.0000	5.38
56.0000	5.38
58.0000	5.38
60.0000	5.38
62.0000	5.38
64.0000	5.37
66.0000	5.38
68.0000	5.38
70.0000	5.38
72.0000	5.38
74.0000	5.38
76.0000	5.38
78.0000	5.38
80.0000	5.38
82.0000	5.37
84.0000	5.37
86.0000	5.38
88.0000	5.38
90.0000	5.38
92.0000	5.37
94.0000	5.37
96.0000	5.37
98.0000	5.38
100.000	5.38
110.000	5.38
120.000	5.38
130.000	5.38
140.000	5.38
150.000	5.39
160.000	5.38
170.000	5.38
180.000	5.38
190.000	5.38
200.000	5.40
210.000	5.40

220.000	5.40
230.000	5.40
240.000	5.41
250.000	5.41
260.000	5.41
270.000	5.40
280.000	5.41
290.000	5.42
300.000	5.43
310.000	5.43
320.000	5.42
330.000	5.41
340.000	5.42
350.000	5.41
360.000	5.41
370.000	5.41
380.000	5.40
390.000	5.41
400.000	5.41
410.000	5.41
420.000	5.41
430.000	5.41
440.000	5.42
450.000	5.42
460.000	5.43
470.000	5.43
480.000	5.43
490.000	5.43
500.000	5.43
510.000	5.43
520.000	5.43
530.000	5.43
540.000	5.43
550.000	5.43
560.000	5.43
570.000	5.43
580.000	5.43
590.000	5.43
600.000	5.44
610.000	5.44
620.000	5.45
630.000	5.45
640.000	5.45
650.000	5.45
660.000	5.45
670.000	5.45

680.000	5.45
690.000	5.45
700.000	5.45
710.000	5.45
720.000	5.45
730.000	5.46
740.000	5.46
750.000	5.46
760.000	5.44
770.000	5.46
780.000	5.46
790.000	5.46
800.000	5.46
810.000	5.46
820.000	5.46
830.000	5.46
840.000	5.46
850.000	5.46
860.000	5.47
870.000	5.47
880.000	5.47
890.000	5.47
900.000	5.47
910.000	5.47
920.000	5.47
930.000	5.47
940.000	5.47
950.000	5.48
960.000	5.48
970.000	5.48
980.000	5.48
990.000	5.48
1000.00	5.48
1030.00	5.48
1060.00	5.48
1090.00	5.48
1120.00	5.49
1150.00	5.49
1180.00	5.48
1210.00	5.48
1240.00	5.48
1270.00	5.49
1300.00	5.49
1330.00	5.49
1360.00	5.49
1390.00	5.49

1420.00	5.49
1450.00	5.49
1480.00	5.49
1510.00	5.50
1540.00	5.50
1570.00	5.50
1600.00	5.50
1630.00	5.50
1660.00	5.50
1690.00	5.50
1720.00	5.50
1750.00	5.51
1780.00	5.51
1810.00	5.51
1840.00	5.52
1870.00	5.52
1900.00	5.52
1930.00	5.52
1960.00	5.52
1990.00	5.52
2020.00	5.52
2050.00	5.52
2080.00	5.53
2110.00	5.53
2140.00	5.53
2170.00	5.53
2200.00	5.53
2230.00	5.53
2260.00	5.54
2290.00	5.54
2320.00	5.54
2350.00	5.55
2380.00	5.56
2410.00	5.55
2440.00	5.55
2470.00	5.55
2500.00	5.55
2530.00	5.55
2560.00	5.55
2590.00	5.53
2620.00	5.54
2650.00	5.54
2680.00	5.54
2710.00	5.54
2740.00	5.54
2770.00	5.54

2800.00	5.55
2830.00	5.55
2860.00	5.55
2890.00	5.55
2920.00	5.55
2950.00	5.55
2980.00	5.55
3010.00	5.55
3040.00	5.55
3070.00	5.55
3100.00	5.56
3130.00	5.56
3160.00	5.56
3190.00	5.56
3220.00	5.56
3250.00	5.56
3280.00	5.56
3310.00	5.57
3340.00	5.57
3370.00	5.57
3400.00	5.57
3430.00	5.57
3460.00	5.57
3490.00	5.57
3520.00	5.57
3550.00	5.56
3580.00	5.57
3610.00	5.57
3640.00	5.57
3670.00	5.58
3700.00	5.58
3730.00	5.58
3760.00	5.58
3790.00	5.59
3820.00	5.58
3850.00	5.59
3880.00	5.59
3910.00	5.60
3940.00	5.59
3970.00	5.57
4000.00	5.57
4030.00	5.57
4060.00	5.57
4090.00	5.57
4120.00	5.57
4150.00	5.56

4180.00	5.57
4210.00	5.56
4240.00	5.56
4270.00	5.56
4300.00	5.56
4330.00	5.56
4360.00	5.54

SE1000B
Environmental Logger
03/27 16:05

Unit# 00902 Test# 2

INPUT 1: Level (F) TOC

Reference 5.28
Scale factor 19.99
Offset 0.00

Step# 0 03/22 14:19

Elapsed Time	Value
0.0000	5.33
0.0033	5.33
0.0066	5.33
0.0099	5.33
0.0133	5.33
0.0166	5.33
0.0200	5.33
0.0233	5.33
0.0266	5.33
0.0300	5.33
0.0333	5.33
0.0500	5.33
0.0666	5.33
0.0833	5.33
0.1000	5.33
0.1166	5.33
0.1333	5.33
0.1500	5.33
0.1666	5.33
0.1833	5.33
0.2000	5.33
0.2166	5.33
0.2333	5.33
0.2500	5.33
0.2666	5.33
0.2833	5.33
0.3000	5.33
0.3166	5.33
0.3333	5.33

0.4167	5.33
0.5000	5.33
0.5833	5.33
0.6667	5.33
0.7500	5.33
0.8333	5.33
0.9167	5.33
1.0000	5.33
1.0833	5.33
1.1667	5.33
1.2500	5.33
1.3333	5.33
1.4166	5.33
1.5000	5.33
1.5833	5.33
1.6667	5.33
1.7500	5.33
1.8333	5.33
1.9167	5.32
2.0000	5.33
2.5000	5.33
3.0000	5.33
3.5000	5.33
4.0000	5.33
4.5000	5.33
5.0000	5.33
5.5000	5.33
6.0000	5.33
6.5000	5.33
7.0000	5.33
7.5000	5.33
8.0000	5.33
8.5000	5.33
9.0000	5.33
9.5000	5.33
10.0000	5.34
12.0000	5.34
14.0000	5.33
16.0000	5.34
18.0000	5.34
20.0000	5.34
22.0000	5.34
24.0000	5.34
26.0000	5.34
28.0000	5.34
30.0000	5.34

32.0000	5.34
34.0000	5.34
36.0000	5.34
38.0000	5.34
40.0000	5.34
42.0000	5.34
44.0000	5.34
46.0000	5.34
48.0000	5.34
50.0000	5.35
52.0000	5.34
54.0000	5.35
56.0000	5.35
58.0000	5.35
60.0000	5.35
62.0000	5.35
64.0000	5.35
66.0000	5.35
68.0000	5.35
70.0000	5.35
72.0000	5.35
74.0000	5.35
76.0000	5.35
78.0000	5.36
80.0000	5.36
82.0000	5.35
84.0000	5.35
86.0000	5.35
88.0000	5.36
90.0000	5.36
92.0000	5.36
94.0000	5.36
96.0000	5.36
98.0000	5.36
100.000	5.36
110.000	5.36
120.000	5.36
130.000	5.36
140.000	5.35
150.000	5.34

SE1000B
Environmental Logger
03/27 16:07

Unit# 00902 Test# 2

INPUT 2: Level (F) TOC

Reference 4.75
Scale factor 30.18
Offset 0.00

Step# 0 03/22 14:19

Elapsed Time	Value
0.0000	4.85
0.0033	4.84
0.0066	4.84
0.0099	4.84
0.0133	4.85
0.0166	4.84
0.0200	4.85
0.0233	4.85
0.0266	4.85
0.0300	4.84
0.0333	4.85
0.0500	4.85
0.0666	4.85
0.0833	4.85
0.1000	4.85
0.1166	4.85
0.1333	4.85
0.1500	4.86
0.1666	4.85
0.1833	4.85
0.2000	4.85
0.2166	4.86
0.2333	4.85
0.2500	4.86
0.2666	4.85
0.2833	4.86
0.3000	4.86
0.3166	4.85
0.3333	4.85

0.4167	4.85
0.5000	4.84
0.5833	4.85
0.6667	4.85
0.7500	4.85
0.8333	4.85
0.9167	4.85
1.0000	4.85
1.0833	4.85
1.1667	4.85
1.2500	4.86
1.3333	4.85
1.4166	4.86
1.5000	4.86
1.5833	4.86
1.6667	4.86
1.7500	4.85
1.8333	4.85
1.9167	4.85
2.0000	4.86
2.5000	4.84
3.0000	4.85
3.5000	4.86
4.0000	4.86
4.5000	4.86
5.0000	4.86
5.5000	4.86
6.0000	4.86
6.5000	4.86
7.0000	4.85
7.5000	4.86
8.0000	4.86
8.5000	4.86
9.0000	4.86
9.5000	4.86
10.0000	4.87
12.0000	4.85
14.0000	4.86
16.0000	4.85
18.0000	4.85
20.0000	4.86
22.0000	4.86
24.0000	4.86
26.0000	4.86
28.0000	4.86
30.0000	4.86

32.0000	4.87
34.0000	4.86
36.0000	4.87
38.0000	4.86
40.0000	4.85
42.0000	4.86
44.0000	4.87
46.0000	4.87
48.0000	4.87
50.0000	4.87
52.0000	4.87
54.0000	4.86
56.0000	4.87
58.0000	4.88
60.0000	4.88
62.0000	4.88
64.0000	4.87
66.0000	4.87
68.0000	4.86
70.0000	4.87
72.0000	4.87
74.0000	4.87
76.0000	4.86
78.0000	4.87
80.0000	4.89
82.0000	4.88
84.0000	4.88
86.0000	4.87
88.0000	4.88
90.0000	4.87
92.0000	4.87
94.0000	4.88
96.0000	4.88
98.0000	4.88
100.000	4.87
110.000	4.88
120.000	4.90
130.000	4.86
140.000	4.86
150.000	4.85

SE1000B
Environmental Logger
03/27 15:58

Unit# 00902 Test# 1

INPUT 1: Level (F) TOC

Reference 5.28
Scale factor 19.99
Offset 0.00

Step# 0 03/22 08:19

Elapsed Time	Value
0.0000	5.28
0.0033	5.28
0.0066	5.28
0.0099	5.28
0.0133	5.28
0.0166	5.28
0.0200	5.28
0.0233	5.28
0.0266	5.28
0.0300	5.28
0.0333	5.28
0.0500	5.29
0.0666	5.28
0.0833	5.29
0.1000	5.29
0.1166	5.28
0.1333	5.29
0.1500	5.29
0.1666	5.29
0.1833	5.29
0.2000	5.28
0.2166	5.29
0.2333	5.28
0.2500	5.28
0.2666	5.28
0.2833	5.28
0.3000	5.28
0.3166	5.28
0.3333	5.28

0.4167	5.28
0.5000	5.28
0.5833	5.28
0.6667	5.29
0.7500	5.28
0.8333	5.28
0.9167	5.28
1.0000	5.28
1.0833	5.28
1.1667	5.29
1.2500	5.28
1.3333	5.28
1.4166	5.28
1.5000	5.29
1.5833	5.29
1.6667	5.29
1.7500	5.29
1.8333	5.29
1.9167	5.29
2.0000	5.28
2.5000	5.29
3.0000	5.28
3.5000	5.28
4.0000	5.29
4.5000	5.29
5.0000	5.29
5.5000	5.29
6.0000	5.29
6.5000	5.29
7.0000	5.29
7.5000	5.29
8.0000	5.29
8.5000	5.29
9.0000	5.28
9.5000	5.29
10.0000	5.29
12.0000	5.28
14.0000	5.28
16.0000	5.29
18.0000	5.29
20.0000	5.29
22.0000	5.29
24.0000	5.29
26.0000	5.28
28.0000	5.28
30.0000	5.29

32.0000	5.29
34.0000	5.29
36.0000	5.28
38.0000	5.28
40.0000	5.29
42.0000	5.28
44.0000	5.28
46.0000	5.29
48.0000	5.29
50.0000	5.29
52.0000	5.29
54.0000	5.29
56.0000	5.29
58.0000	5.29
60.0000	5.29
62.0000	5.29
64.0000	5.29
66.0000	5.29
68.0000	5.29
70.0000	5.29
72.0000	5.28
74.0000	5.29
76.0000	5.29
78.0000	5.29
80.0000	5.29
82.0000	5.30
84.0000	5.29
86.0000	5.29
88.0000	5.29
90.0000	5.29
92.0000	5.29
94.0000	5.29
96.0000	5.29
98.0000	5.30
100.000	5.30
110.000	5.30

SE1000B
Environmental Logger
03/27 16:00

Unit# 00902 Test# 1

INPUT 2: Level (F) TOC

Reference	4.75
Scale factor	30.18
Offset	0.00

Step# 0 03/22 08:19

Elapsed Time	Value
0.0000	4.77
0.0033	4.77
0.0066	4.77
0.0099	4.77
0.0133	4.77
0.0166	4.78
0.0200	4.77
0.0233	4.78
0.0266	4.78
0.0300	4.78
0.0333	4.78
0.0500	4.78
0.0666	4.78
0.0833	4.78
0.1000	4.78
0.1166	4.79
0.1333	4.78
0.1500	4.78
0.1666	4.78
0.1833	4.78
0.2000	4.78
0.2166	4.78
0.2333	4.78
0.2500	4.78
0.2666	4.78
0.2833	4.78
0.3000	4.79
0.3166	4.78
0.3333	4.79

0.4167	4.79
0.5000	4.78
0.5833	4.78
0.6667	4.78
0.7500	4.78
0.8333	4.78
0.9167	4.77
1.0000	4.78
1.0833	4.78
1.1667	4.78
1.2500	4.78
1.3333	4.78
1.4166	4.78
1.5000	4.78
1.5833	4.78
1.6667	4.78
1.7500	4.79
1.8333	4.78
1.9167	4.78
2.0000	4.78
2.5000	4.78
3.0000	4.78
3.5000	4.78
4.0000	4.78
4.5000	4.79
5.0000	4.78
5.5000	4.78
6.0000	4.78
6.5000	4.78
7.0000	4.78
7.5000	4.79
8.0000	4.78
8.5000	4.79
9.0000	4.78
9.5000	4.79
10.0000	4.79
12.0000	4.78
14.0000	4.78
16.0000	4.79
18.0000	4.79
20.0000	4.78
22.0000	4.78
24.0000	4.78
26.0000	4.79
28.0000	4.79
30.0000	4.78

32.0000	4.78
34.0000	4.78
36.0000	4.78
38.0000	4.79
40.0000	4.79
42.0000	4.79
44.0000	4.78
46.0000	4.79
48.0000	4.79
50.0000	4.79
52.0000	4.79
54.0000	4.79
56.0000	4.79
58.0000	4.80
60.0000	4.79
62.0000	4.79
64.0000	4.79
66.0000	4.79
68.0000	4.79
70.0000	4.80
72.0000	4.79
74.0000	4.79
76.0000	4.80
78.0000	4.80
80.0000	4.79
82.0000	4.79
84.0000	4.80
86.0000	4.80
88.0000	4.79
90.0000	4.80
92.0000	4.79
94.0000	4.80
96.0000	4.79
98.0000	4.79
100.000	4.80
110.000	4.80

SE1000B
Environmental Logger
03/27 15:45

Unit# 00902 Test# 0

INPUT 1: Level (F) TOC

Reference 5.28
Scale factor 19.99
Offset 0.00

Step# 0 03/20 15:48

Elapsed Time	Value
0.0000	5.27
15.0000	5.27
30.0000	5.26
45.0000	5.26
60.0000	5.26
75.0000	5.26
90.0000	5.25
105.000	5.26
120.000	5.25
135.000	5.26
150.000	5.25
165.000	5.25
180.000	5.26
195.000	5.25
210.000	5.25
225.000	5.26
240.000	5.25
255.000	5.26
270.000	5.26
285.000	5.25
300.000	5.26
315.000	5.25
330.000	5.26
345.000	5.26
360.000	5.26
375.000	5.26
390.000	5.26
405.000	5.26
420.000	5.26

435.000	5.26
450.000	5.26
465.000	5.26
480.000	5.26
495.000	5.26
510.000	5.26
525.000	5.26
540.000	5.26
555.000	5.26
570.000	5.26
585.000	5.26
600.000	5.26
615.000	5.26
630.000	5.26
645.000	5.26
660.000	5.26
675.000	5.26
690.000	5.26
705.000	5.26
720.000	5.26
735.000	5.26
750.000	5.26
765.000	5.26
780.000	5.26
795.000	5.26
810.000	5.27
825.000	5.27
840.000	5.27
855.000	5.27
870.000	5.27
885.000	5.27
900.000	5.27
915.000	5.27
930.000	5.27
945.000	5.27
960.000	5.27
975.000	5.28
990.000	5.27
1005.00	5.27
1020.00	5.28
1035.00	5.28
1050.00	5.28
1065.00	5.28
1080.00	5.28
1095.00	5.28
1110.00	5.28

1125.00	5.28
1140.00	5.28
1155.00	5.27
1170.00	5.27
1185.00	5.28
1200.00	5.28
1215.00	5.28
1230.00	5.27
1245.00	5.27
1260.00	5.28
1275.00	5.28
1290.00	5.28
1305.00	5.28
1320.00	5.28
1335.00	5.28
1350.00	5.28
1365.00	5.28
1380.00	5.28
1395.00	5.28
1410.00	5.28
1425.00	5.29
1440.00	5.29
1455.00	5.29
1470.00	5.29
1485.00	5.29
1500.00	5.29
1515.00	5.29
1530.00	5.29
1545.00	5.29
1560.00	5.29
1575.00	5.29
1590.00	5.29
1605.00	5.29
1620.00	5.29
1635.00	5.29
1650.00	5.29
1665.00	5.29
1680.00	5.29
1695.00	5.30
1710.00	5.30
1725.00	5.30
1740.00	5.30
1755.00	5.30
1770.00	5.30
1785.00	5.30
1800.00	5.30

1815.00	5.30
1830.00	5.30
1845.00	5.30
1860.00	5.31
1875.00	5.31
1890.00	5.31
1905.00	5.31
1920.00	5.31
1935.00	5.31
1950.00	5.31
1965.00	5.31
1980.00	5.31
1995.00	5.31
2010.00	5.31
2025.00	5.31
2040.00	5.31
2055.00	5.31
2070.00	5.31
2085.00	5.31
2100.00	5.31
2115.00	5.31
2130.00	5.31
2145.00	5.31
2160.00	5.31
2175.00	5.31
2190.00	5.31
2205.00	5.31
2220.00	5.31
2235.00	5.31
2250.00	5.32
2265.00	5.32
2280.00	5.32
2295.00	5.32
2310.00	5.32
2325.00	5.33
2340.00	5.33
2355.00	5.33

SE1000B
Environmental Logger
03/27 15:39

Unit# 00902 Test# 0

INPUT 2: Level (F) TOC

Reference 4.75
Scale factor 30.18
Offset 0.00

Step# 0 03/20 15:48

Elapsed Time	Value
0.0000	4.75
15.0000	4.75
30.0000	4.75
45.0000	4.75
60.0000	4.75
75.0000	4.75
90.0000	4.75
105.000	4.75
120.000	4.75
135.000	4.76
150.000	4.75
165.000	4.75
180.000	4.75
195.000	4.75
210.000	4.75
225.000	4.75
240.000	4.75
255.000	4.75
270.000	4.75
285.000	4.75
300.000	4.75
315.000	4.75
330.000	4.75
345.000	4.76
360.000	4.75
375.000	4.75
390.000	4.75
405.000	4.74
420.000	4.75

435.000	4.75
450.000	4.75
465.000	4.75
480.000	4.75
495.000	4.75
510.000	4.75
525.000	4.75
540.000	4.75
555.000	4.74
570.000	4.75
585.000	4.75
600.000	4.74
615.000	4.75
630.000	4.75
645.000	4.75
660.000	4.74
675.000	4.73
690.000	4.74
705.000	4.75
720.000	4.75
735.000	4.74
750.000	4.74
765.000	4.74
780.000	4.73
795.000	4.73
810.000	4.73
825.000	4.74
840.000	4.74
855.000	4.74
870.000	4.74
885.000	4.74
900.000	4.74
915.000	4.74
930.000	4.74
945.000	4.75
960.000	4.75
975.000	4.74
990.000	4.75
1005.00	4.75
1020.00	4.75
1035.00	4.75
1050.00	4.75
1065.00	4.75
1080.00	4.75
1095.00	4.74
1110.00	4.75

1125.00	4.74
1140.00	4.75
1155.00	4.74
1170.00	4.75
1185.00	4.75
1200.00	4.75
1215.00	4.75
1230.00	4.75
1245.00	4.74
1260.00	4.75
1275.00	4.75
1290.00	4.73
1305.00	4.73
1320.00	4.74
1335.00	4.74
1350.00	4.75
1365.00	4.75
1380.00	4.74
1395.00	4.75
1410.00	4.75
1425.00	4.75
1440.00	4.75
1455.00	4.75
1470.00	4.75
1485.00	4.75
1500.00	4.75
1515.00	4.75
1530.00	4.75
1545.00	4.75
1560.00	4.76
1575.00	4.75
1590.00	4.75
1605.00	4.76
1620.00	4.76
1635.00	4.75
1650.00	4.75
1665.00	4.76
1680.00	4.75
1695.00	4.76
1710.00	4.75
1725.00	4.76
1740.00	4.75
1755.00	4.75
1770.00	4.76
1785.00	4.76
1800.00	4.76

1815.00	4.75
1830.00	4.75
1845.00	4.76
1860.00	4.75
1875.00	4.75
1890.00	4.75
1905.00	4.75
1920.00	4.75
1935.00	4.75
1950.00	4.75
1965.00	4.77
1980.00	4.76
1995.00	4.76
2010.00	4.76
2025.00	4.76
2040.00	4.76
2055.00	4.77
2070.00	4.75
2085.00	4.75
2100.00	4.75
2115.00	4.76
2130.00	4.75
2145.00	4.75
2160.00	4.76
2175.00	4.76
2190.00	4.74
2205.00	4.76
2220.00	4.76
2235.00	4.76
2250.00	4.77
2265.00	4.77
2280.00	4.76
2295.00	4.76
2310.00	4.76
2325.00	4.77
2340.00	4.76
2355.00	4.77

APPENDIX C

AQUIFER TEST DATA PLOTS

C.1 AQUIX CURVE MATCHING GRAPHS
C.2 DISTANCE — DRAWDOWN GRAPHS
C.3 HANTUSH IMAGE METHOD GRAPHS

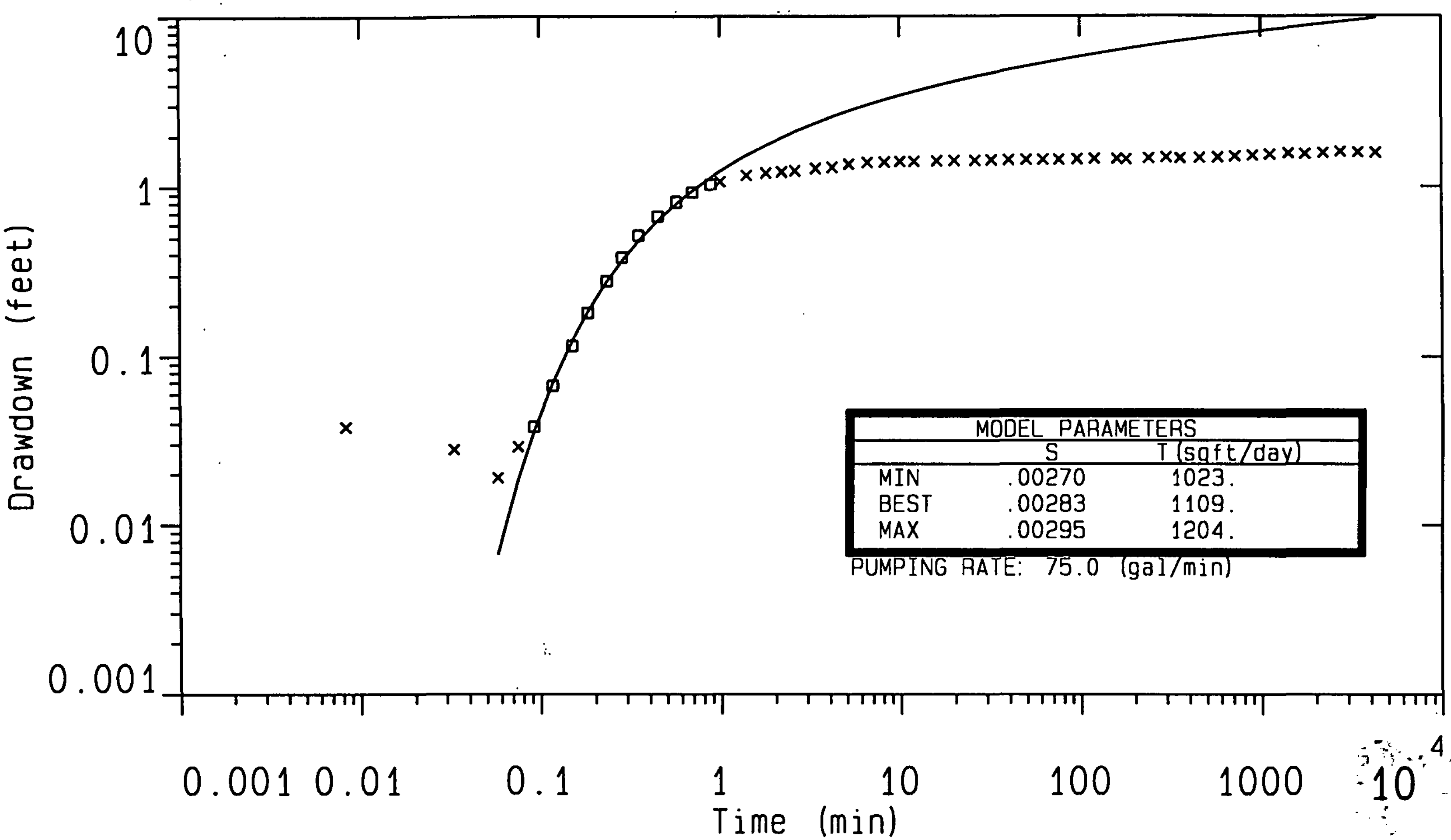


Plate: 1

for: US EPA

by: IGWMC

Aquifer: Outwash

Thickness: 40.0 Depth: 44.0 feet

Screen: Base: 41.0 Top: 0.00 feet

Distance: 15.0 feet Pumping well: EW-01

Aquifer Test

Stoughton, Landfill

Dane County

Date: 22-MAR-95

Well No.: OW-1

DATA SET: 72HR-OW1

```
     CLIENT: US EPA                              DATE: 22-MAR-95
   LOCATION: Stoughton, Landfill             WELL NO.: OW-1
     COUNTY: Dane County                    FLOW RATE:    75.00 gal/min
    PROJECT: Aquifer Test                  WELL DEPTH:    44.00 feet
    AQUIFER: Outwash                        THICKNESS:    40.00 feet
WATER TABLE:       0.00 feet
PUMPING WELL No: EW-01        RADIUS FROM PUMPED WELL:    15.00 feet
          RADIUS OF WELL CASING:      1.000 in
       The following depths are from top of Aquifer:
   PUMPING WELL: SCREENED FROM     0.00 TO    41.00 feet
OBSERVATION WELL: SCREENED FROM    7.00 TO    17.00 feet
```

FITTING ERROR: 5.478 PERCENT

Theis, 1935: Confined Aquifer

MODEL PARAMETERS:

```
STORAGE COEF:  2.830E-03 TRANSM:  1109.607 sqft/day
                 FREE                FREE
```

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	2.707E-03	2.830E-03	2.953E-03
TRANSM:	1023.548	1109.607	1204.650

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	FIT (%)
2.953E-03	1199.321	6.54964
2.707E-03	1023.548	6.60291
2.929E-03	1204.650	6.56234
2.739E-03	1027.267	6.47893

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0083	0.0380	1.000E-20	
2	0.0330	0.0280	2.764E-04	
3	0.0580	0.0190	0.00667	
4	0.0750	0.0290	0.0184	
5	0.0920	0.0380	0.0361	4.90
6	0.117	0.0670	0.0702	-4.78
7	0.150	0.115	0.124	-8.07
8	0.183	0.181	0.183	-1.29
9	0.233	0.277	0.275	0.687
10	0.283	0.382	0.364	4.47
11	0.350	0.515	0.478	7.05
12	0.450	0.668	0.632	5.26
13	0.567	0.811	0.791	2.42
14	0.700	0.926	0.948	-2.37
15	0.883	1.03	1.13	-9.83
16	1.00	1.06	1.23	
17	1.40	1.16	1.52	
18	1.80	1.20	1.75	
19	2.20	1.22	1.94	
20	2.60	1.24	2.09	
21	3.40	1.27	2.35	
22	4.20	1.29	2.56	
23	5.20	1.35	2.77	
24	6.60	1.38	3.01	
25	8.20	1.39	3.23	
26	10.00	1.40	3.43	
27	12.00	1.40	3.61	
28	16.00	1.41	3.90	
29	20.00	1.42	4.13	
30	26.00	1.42	4.40	
31	32.00	1.43	4.61	
32	40.00	1.43	4.84	
33	50.00	1.44	5.07	
34	62.00	1.44	5.29	
35	76.00	1.44	5.50	
36	96.00	1.45	5.74	
37	120.0	1.46	5.97	
38	160.0	1.46	6.27	
39	180.0	1.45	6.39	
40	240.0	1.47	6.69	
41	300.0	1.48	6.92	
42	360.0	1.47	7.11	
43	460.0	1.47	7.36	
44	580.0	1.48	7.60	
45	720.0	1.50	7.82	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
46	900.0	1.52	8.05	
47	1120.0	1.54	8.28	
48	1420.0	1.56	8.52	
49	1750.0	1.55	8.74	
50	2200.0	1.57	8.98	
51	2740.0	1.60	9.20	
52	3430.0	1.59	9.43	
53	4300.0	1.58	9.67	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00	
T	0.00	1.00
	S	T

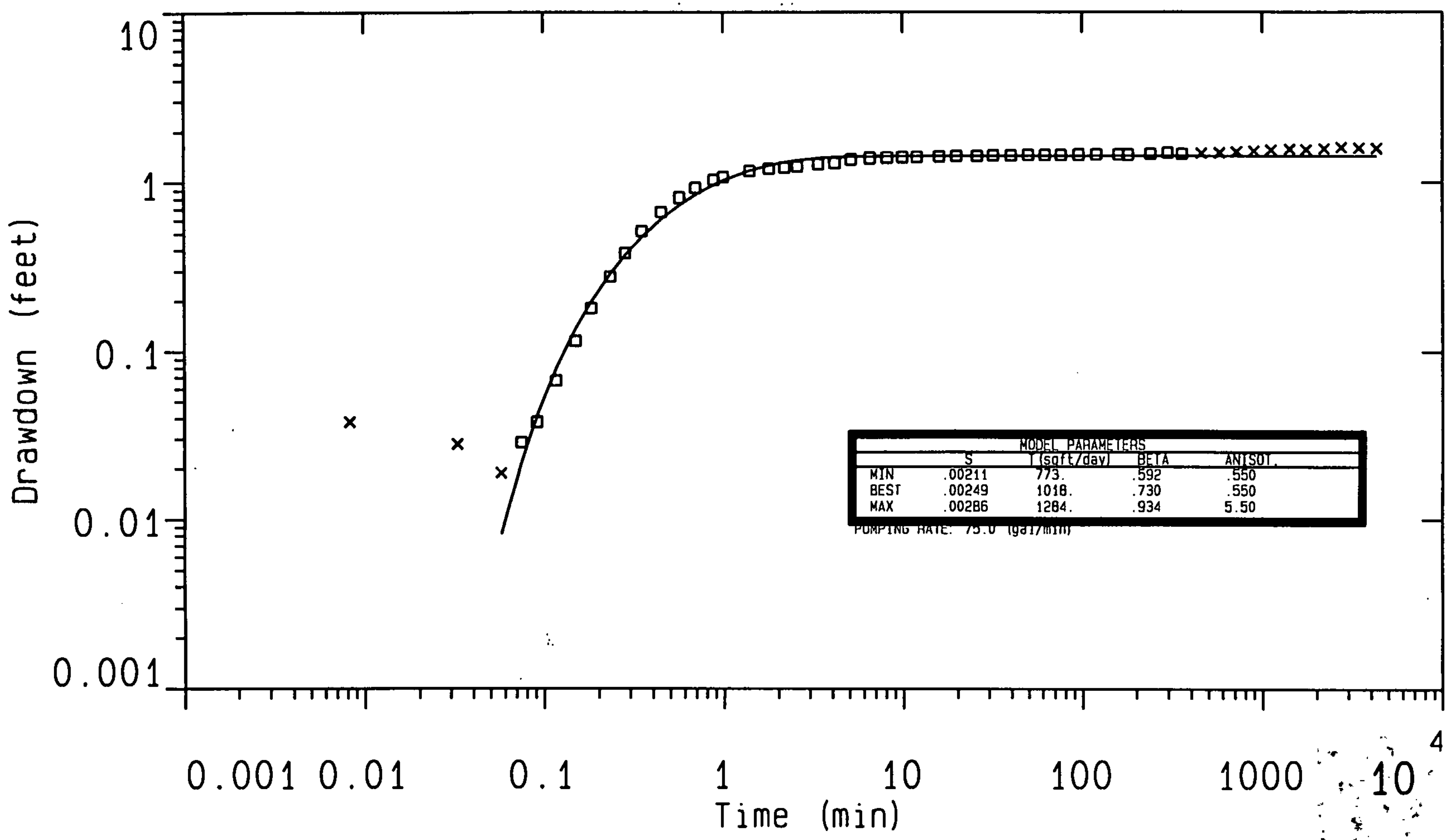


Plate: 1

for: US EPA	Aquifer Test
by: IGWMC	Stoughton, Landfill Dane County
Aquifer: Outwash Thickness: 40.0 Depth: 44.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 15.0 feet Pumping well: EW-01	Date: 22-MAR-95 Well No.: OW-1

DATA SET: 72HR-OW1

CLIENT:	US EPA	DATE:	22-MAR-95
LOCATION:	Stoughton, Landfill	WELL NO.:	OW-1
COUNTY:	Dane County	FLOW RATE:	75.00 gal/min
PROJECT:	Aquifer Test	WELL DEPTH:	44.00 feet
AQUIFER:	Outwash	THICKNESS:	40.00 feet
WATER TABLE:	0.00 feet		
PUMPING WELL No:	EW-01	RADIUS FROM PUMPED WELL:	15.00 feet

RADIUS OF WELL CASING: 1.000 in

The following depths are from top of Aquifer:

PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet

OBSERVATION WELL: SCREENED FROM 7.00 TO 17.00 feet

FITTING ERROR: 8.047 PERCENT

Hantush, 1964: Par. Pen. Confined Leaky Aquifer

MODEL PARAMETERS:

STORAGE COEF: 2.494E-03 FREE TRANSM: 1018.065 sqft/day FREE BETA: 0.72976 FREE

ANISOTROPY [SQRT(Kz/Kr)]: 0.55000 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	2.117E-03	2.494E-03	2.863E-03
TRANSM:	772.746	1018.065	1284.850
BETA:	0.592	0.730	0.934
ANISOTR.:	0.550	0.550	5.500

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	BETA	ANISOTR.	FIT (%)
2.863E-03	1284.850	0.59249	0.550	9.552
2.117E-03	772.746	0.93410	0.550	9.618

2.756E-03	1221.678	0.62062	0.550	8.926
2.256E-03	848.388	0.85810	0.550	8.849
2.236E-03	835.805	0.87572	0.550	9.053
2.781E-03	1240.069	0.60814	0.550	8.991
2.494E-03	1018.065	0.72976	5.500	8.047
2.494E-03	1018.065	0.72976	0.550	8.047

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0083	0.0380	1.336E-06	
2	0.0330	0.0280	3.669E-04	
3	0.0580	0.0190	0.00825	
4	0.0750	0.0290	0.0219	24.41
5	0.0920	0.0380	0.0420	-10.59
6	0.117	0.0670	0.0794	-18.58
7	0.150	0.115	0.136	-18.93
8	0.183	0.181	0.197	-9.00
9	0.233	0.277	0.287	-3.84
10	0.283	0.382	0.372	2.38
11	0.350	0.515	0.475	7.65
12	0.450	0.668	0.607	9.11
13	0.567	0.811	0.731	9.75
14	0.700	0.926	0.845	8.70
15	0.883	1.03	0.965	6.40
16	1.00	1.06	1.02	4.08
17	1.40	1.16	1.16	-0.504
18	1.80	1.20	1.25	-4.38
19	2.20	1.22	1.30	-7.17
20	2.60	1.24	1.34	-8.32
21	3.40	1.27	1.38	-8.12
22	4.20	1.29	1.40	-7.92
23	5.20	1.35	1.41	-4.12
24	6.60	1.38	1.41	-2.32
25	8.20	1.39	1.41	-1.79
26	10.00	1.40	1.41	-1.10
27	12.00	1.40	1.41	-1.11
28	16.00	1.41	1.41	-0.401
29	20.00	1.42	1.41	0.234
30	26.00	1.42	1.41	0.234
31	32.00	1.43	1.41	0.930
32	40.00	1.43	1.41	0.930
33	50.00	1.44	1.41	1.54

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
34	62.00	1.44	1.41	1.54
35	76.00	1.44	1.41	1.54
36	96.00	1.45	1.41	2.22
37	120.0	1.46	1.41	2.83
38	160.0	1.46	1.41	2.83
39	180.0	1.45	1.41	2.22
40	240.0	1.47	1.41	3.49
41	300.0	1.48	1.41	4.72
42	360.0	1.47	1.41	3.49
43	460.0	1.47	1.41	
44	580.0	1.48	1.41	
45	720.0	1.50	1.41	
46	900.0	1.52	1.41	
47	1120.0	1.54	1.41	
48	1420.0	1.56	1.41	
49	1750.0	1.55	1.41	
50	2200.0	1.57	1.41	
51	2740.0	1.60	1.41	
52	3430.0	1.59	1.41	
53	4300.0	1.58	1.41	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

	S	T	B	A
S	1.00			
T	0.00	1.00		
B	0.00	0.00	1.00	
A	0.00	0.00	0.00	0.00

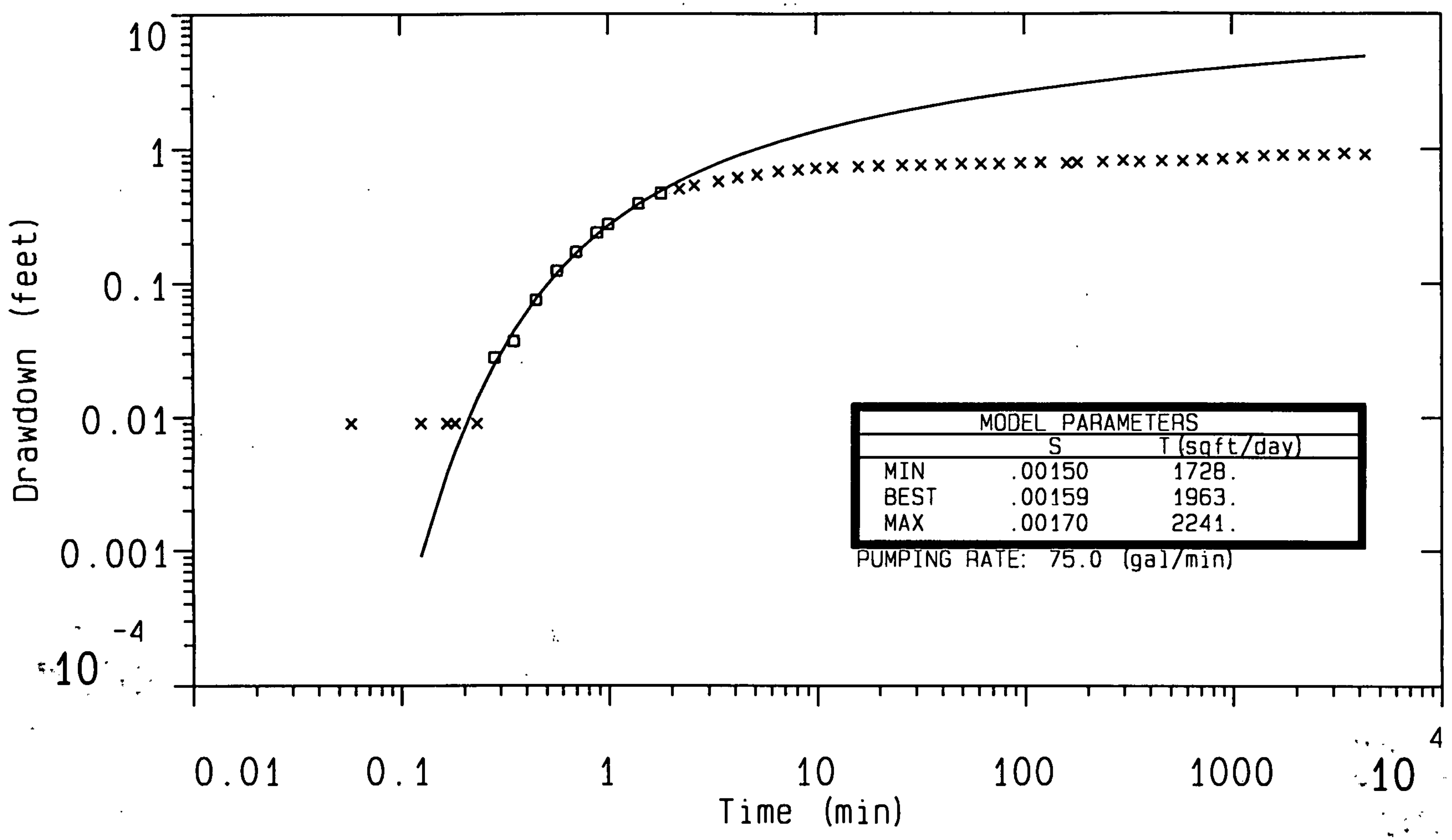


Plate: 1

for: US EPA

by: IGWMC

Aquifer: Outwash

Thickness: 42.0 Depth: 39.0 feet

Screen: Base: 41.0 Top: 0.00 feet

Distance: 45.0 feet Pumping well: EW-01

Aquifer Test

Stoughton, Landfill

Dane County

Date: 22-MAR-95

Well No.: OW-2

DATA SET: 72HR-OW2

CLIENT: US EPA
LOCATION: Stoughton, Landfill
COUNTY: Dane County
PROJECT: Aquifer Test
AQUIFER: Outwash
WATER TABLE: 0.00 feet
PUMPING WELL No: EW-01

DATE: 22-MAR-95
WELL NO.: OW-2
FLOW RATE: 75.00 gal/min
WELL DEPTH: 39.00 feet
THICKNESS: 42.00 feet
RADIUS FROM PUMPED WELL: 45.00 feet
RADIUS OF WELL CASING: 1.000 in

The following depths are from top of Aquifer:
PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet
OBSERVATION WELL: SCREENED FROM 7.00 TO 17.00 feet

FITTING ERROR: 7.619 PERCENT

Theis, 1935: Confined Aquifer

MODEL PARAMETERS:

STORAGE COEF: 1.598E-03 FREE
TRANSM: 1963.468 sqft/day FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	1.499E-03	1.598E-03	1.701E-03
TRANSM:	1728.854	1963.468	2241.738

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	FIT (%)
1.701E-03	2218.760	8.99919
1.499E-03	1735.426	9.00056
1.690E-03	2241.738	9.17210
1.513E-03	1728.854	9.19033

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0580	0.00900	1.895E-06	
2	0.125	0.00900	9.048E-04	
3	0.167	0.00900	0.00382	
4	0.183	0.00900	0.00562	
5	0.233	0.00900	0.0136	
6	0.283	0.0280	0.0250	10.67
7	0.350	0.0370	0.0439	-18.66
8	0.450	0.0750	0.0768	-2.50
9	0.567	0.123	0.118	3.59
10	0.700	0.171	0.166	2.60
11	0.883	0.238	0.230	3.25
12	1.00	0.276	0.268	2.57
13	1.40	0.390	0.387	0.590
14	1.80	0.467	0.488	-4.62
15	2.20	0.505	0.575	
16	2.60	0.534	0.651	
17	3.40	0.572	0.779	
18	4.20	0.610	0.885	
19	5.20	0.639	0.994	
20	6.60	0.677	1.12	
21	8.20	0.696	1.23	
22	10.00	0.715	1.34	
23	12.00	0.725	1.44	
24	16.00	0.734	1.60	
25	20.00	0.744	1.73	
26	26.00	0.753	1.88	
27	32.00	0.753	2.00	
28	40.00	0.763	2.12	
29	50.00	0.772	2.25	
30	62.00	0.772	2.38	
31	76.00	0.772	2.50	
32	96.00	0.782	2.63	
33	120.0	0.791	2.76	
34	160.0	0.782	2.93	
35	180.0	0.791	3.00	
36	240.0	0.801	3.16	
37	300.0	0.820	3.29	
38	360.0	0.801	3.40	
39	460.0	0.810	3.54	
40	580.0	0.810	3.68	
41	720.0	0.830	3.80	
42	900.0	0.839	3.93	
43	1120.0	0.858	4.06	
44	1420.0	0.887	4.20	
45	1750.0	0.896	4.32	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
46	2200.0	0.896	4.45	
47	2740.0	0.896	4.58	
48	3430.0	0.925	4.71	
49	4300.0	0.906	4.85	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00	
T	0.00	1.00
	S	T

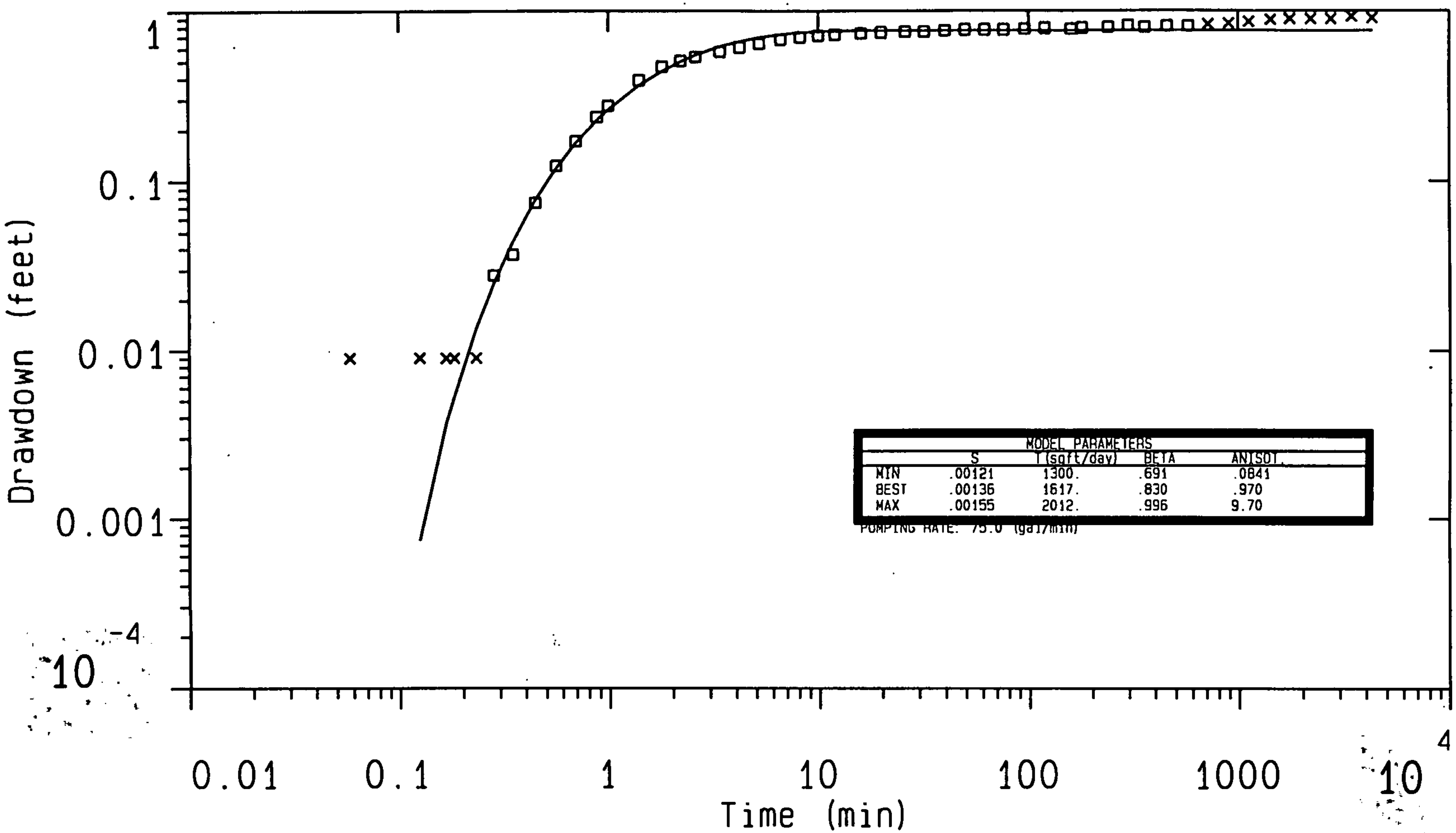


Plate: 1

for: US EPA	Aquifer Test
by: IGWMC	Stoughton, Landfill Dane County
Aquifer: Outwash Thickness: 42.0 Depth: 39.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 45.0 feet Pumping well: EW-01	Date: 22-MAR-95 Well No.: OW-2

DATA SET: 72HR-OW2

CLIENT:	US EPA	DATE:	22-MAR-95
LOCATION:	Stoughton, Landfill	WELL NO.:	OW-2
COUNTY:	Dane County	FLOW RATE:	75.00 gal/min
PROJECT:	Aquifer Test	WELL DEPTH:	39.00 feet
AQUIFER:	Outwash	THICKNESS:	42.00 feet
WATER TABLE:	0.00 feet		
PUMPING WELL No:	EW-01	RADIUS FROM PUMPED WELL:	45.00 feet

RADIUS OF WELL CASING: 1.000 in

The following depths are from top of Aquifer:

PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet

OBSERVATION WELL: SCREENED FROM 7.00 TO 17.00 feet

FITTING ERROR: 5.891 PERCENT

Hantush, 1964: Par. Pen. Confined Leaky Aquifer

MODEL PARAMETERS:

STORAGE COEF: 1.368E-03 FREE TRANSM: 1617.376 sqft/day FREE BETA: 0.82964 FREE

ANISOTROPY [SQRT(Kz/Kr)]: 0.97048 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	1.210E-03	1.368E-03	1.551E-03
TRANSM:	1300.217	1617.376	2011.899
BETA:	0.691	0.830	0.996
ANISOTR.:	0.084	0.970	9.705

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	BETA	ANISOTR.	FIT (%)
1.551E-03	1969.868	0.71050	8.185	7.086
1.210E-03	1333.573	0.96554	0.120	7.004

1.506E-03	1940.851	0.71611	1.314	6.629
1.244E-03	1347.813	0.96117	0.717	6.558
1.224E-03	1300.217	0.99557	1.116	6.949
1.530E-03	2011.899	0.69137	0.844	6.877
1.397E-03	1627.183	0.83120	9.705	6.096
1.339E-03	1607.023	0.82799	0.084	7.051

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0580	0.00900	1.000E-20	
2	0.125	0.00900	7.451E-04	
3	0.167	0.00900	0.00371	
4	0.183	0.00900	0.00535	
5	0.233	0.00900	0.0135	
6	0.283	0.0280	0.0251	10.32
7	0.350	0.0370	0.0442	-19.54
8	0.450	0.0750	0.0780	-4.00
9	0.567	0.123	0.119	2.75
10	0.700	0.171	0.166	2.48
11	0.883	0.238	0.226	4.73
12	1.00	0.276	0.262	5.06
13	1.40	0.390	0.363	6.84
14	1.80	0.467	0.440	5.61
15	2.20	0.505	0.500	0.876
16	2.60	0.534	0.547	-2.51
17	3.40	0.572	0.614	-7.48
18	4.20	0.610	0.658	-8.02
19	5.20	0.639	0.695	-8.77
20	6.60	0.677	0.724	-7.04
21	8.20	0.696	0.742	-6.73
22	10.00	0.715	0.753	-5.37
23	12.00	0.725	0.759	-4.71
24	16.00	0.734	0.763	-4.01
25	20.00	0.744	0.764	-2.76
26	26.00	0.753	0.764	-1.58
27	32.00	0.753	0.764	-1.58
28	40.00	0.763	0.764	-0.257
29	50.00	0.772	0.764	0.911
30	62.00	0.772	0.764	0.911
31	76.00	0.772	0.764	0.911
32	96.00	0.782	0.764	2.17
33	120.0	0.791	0.764	3.29

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
34	160.0	0.782	0.764	2.17
35	180.0	0.791	0.764	3.29
36	240.0	0.801	0.764	4.49
37	300.0	0.820	0.764	6.71
38	360.0	0.801	0.764	4.49
39	460.0	0.810	0.764	5.56
40	580.0	0.810	0.764	5.56
41	720.0	0.830	0.764	
42	900.0	0.839	0.764	
43	1120.0	0.858	0.764	
44	1420.0	0.887	0.764	
45	1750.0	0.896	0.764	
46	2200.0	0.896	0.764	
47	2740.0	0.896	0.764	
48	3430.0	0.925	0.764	
49	4300.0	0.906	0.764	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00			
T	0.00	1.00		
B	0.00	0.00	1.00	
A	-0.01	0.00	0.00	0.03
	S	T	B	A

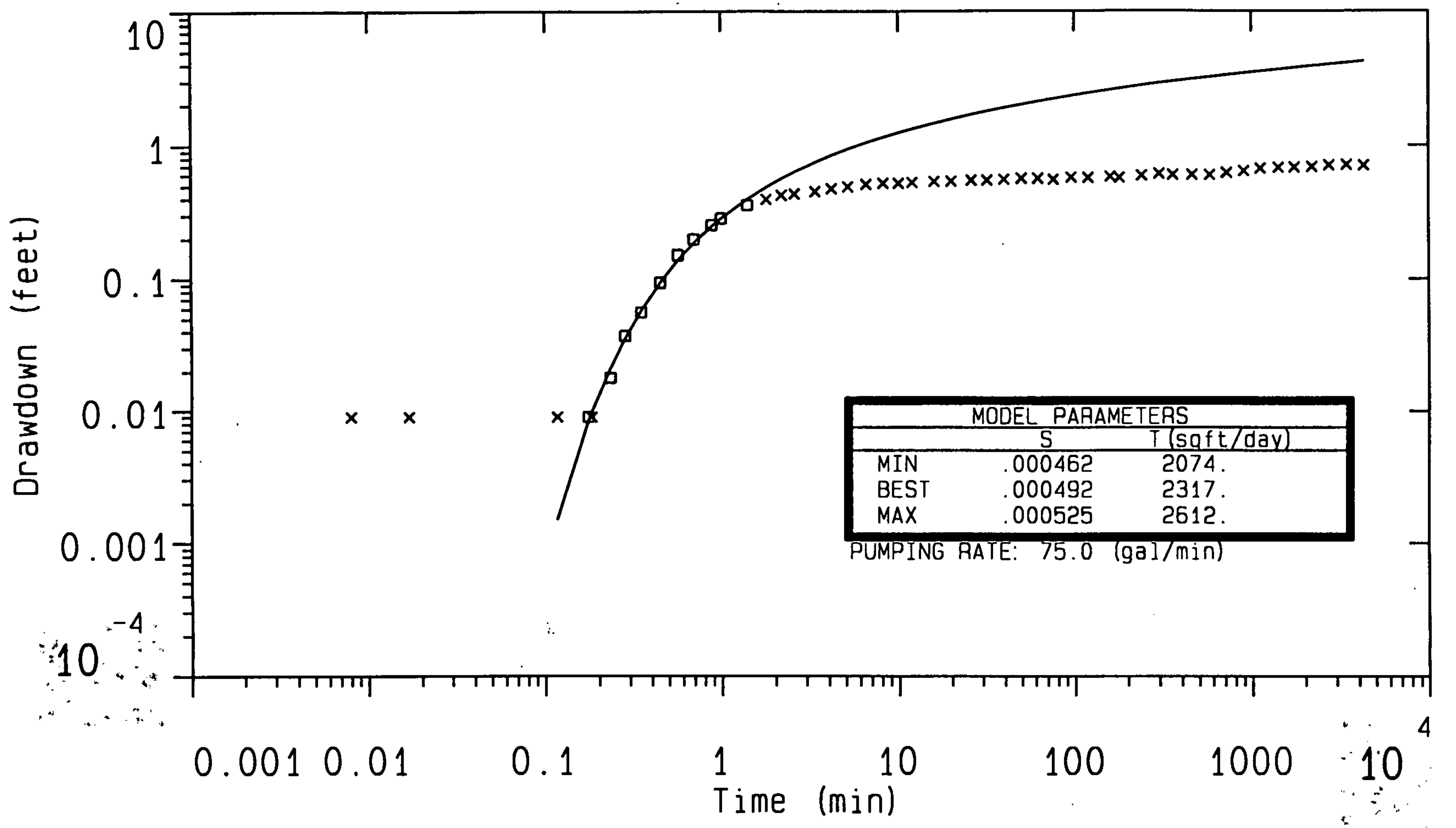


Plate: 1

for: US EPA	Aquifer Test
by: IGWMC	Stoughton, Landfill Dane County
Aquifer: Outwash Thickness: 52.0 Depth: 39.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 80.0 feet Pumping well: EW-01	Date: 22-MAR-95 Well No.: OW-4

DATA SET: 72HR-OW4

CLIENT: US EPA DATE: 22-MAR-95
LOCATION: Stoughton, Landfill WELL NO.: OW-4
COUNTY: Dane County FLOW RATE: 75.00 gal/min
PROJECT: Aquifer Test WELL DEPTH: 39.00 feet
AQUIFER: Outwash THICKNESS: 52.00 feet
WATER TABLE: 0.47 feet
PUMPING WELL No: EW-01 RADIUS FROM PUMPED WELL: 80.00 feet
RADIUS OF WELL CASING: 1.000 in
The following depths are from top of Aquifer:
PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet
OBSERVATION WELL: SCREENED FROM 14.00 TO 24.00 feet

FITTING ERROR: 7.656 PERCENT

Theis, 1935: Confined Aquifer

MODEL PARAMETERS:

STORAGE COEF: 4.921E-04 FREE TRANSM: 2317.577 sqft/day FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	4.618E-04	4.921E-04	5.255E-04
TRANSM:	2074.479	2317.577	2612.861

EQUIVALENT MODELS:

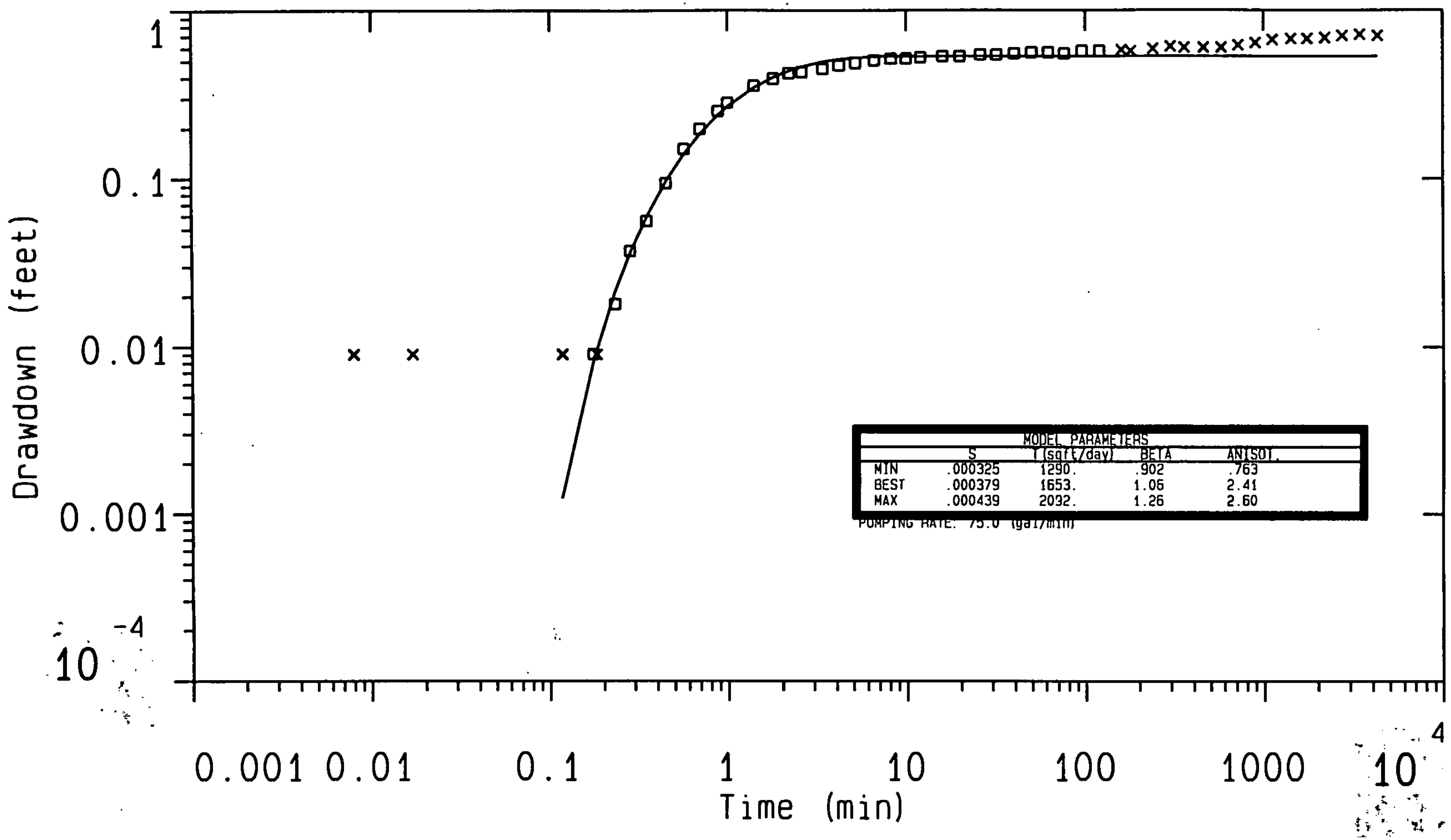
STORAGE	TRANSMISSIVITY (sqft/day)	FIT (%)
5.255E-04	2599.392	9.13113
4.618E-04	2074.479	9.03606
5.227E-04	2612.861	9.29416
4.658E-04	2078.188	9.11750

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	0.00900	1.000E-20	
2	0.0170	0.00900	1.000E-20	
3	0.117	0.00900	0.00150	
4	0.175	0.00900	0.00839	6.83
5	0.183	0.00900	0.00982	
6	0.233	0.0180	0.0210	-17.14
7	0.283	0.0370	0.0354	4.23
8	0.350	0.0560	0.0576	-2.98
9	0.450	0.0940	0.0939	0.0790
10	0.567	0.150	0.137	8.45
11	0.700	0.197	0.185	5.97
12	0.883	0.253	0.246	2.43
13	1.00	0.282	0.283	-0.490
14	1.40	0.357	0.393	-10.16
15	1.80	0.394	0.484	
16	2.20	0.423	0.562	
17	2.60	0.432	0.629	
18	3.40	0.451	0.741	
19	4.20	0.470	0.833	
20	5.20	0.488	0.928	
21	6.60	0.507	1.03	
22	8.20	0.517	1.13	
23	10.00	0.517	1.23	
24	12.00	0.526	1.31	
25	16.00	0.535	1.45	
26	20.00	0.535	1.56	
27	26.00	0.545	1.68	
28	32.00	0.545	1.78	
29	40.00	0.554	1.89	
30	50.00	0.564	2.00	
31	62.00	0.564	2.11	
32	76.00	0.554	2.21	
33	96.00	0.573	2.32	
34	120.0	0.573	2.43	
35	160.0	0.582	2.57	
36	180.0	0.573	2.63	
37	240.0	0.592	2.77	
38	300.0	0.611	2.88	
39	360.0	0.601	2.97	
40	460.0	0.601	3.10	
41	580.0	0.601	3.21	
42	720.0	0.620	3.32	
43	900.0	0.639	3.43	
44	1120.0	0.667	3.53	
45	1420.0	0.677	3.65	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
46	1750.0	0.677	3.76	
47	2200.0	0.686	3.87	
48	2740.0	0.705	3.98	
49	3430.0	0.714	4.09	
50	4300.0	0.705	4.20	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

	S	T
S	1.00	
T	0.00	1.00



	S	T (sqft/day)	BETA	ANISOT.
MIN	.000325	1290.	.902	.763
BEST	.000379	1653.	1.06	2.41
MAX	.000439	2032.	1.26	2.60

Plate: 1

for: US EPA	Aquifer Test
by: IGWMC	Stoughton, Landfill Dane County
Aquifer: Outwash Thickness: 52.0 Depth: 39.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 80.0 feet Pumping well: EW-01	Date: 22-MAR-95 Well No.: OW-4

DATA SET: 72HR-OW4

CLIENT:	US EPA	DATE:	22-MAR-95
LOCATION:	Stoughton, Landfill	WELL NO.:	OW-4
COUNTY:	Dane County	FLOW RATE:	75.00 gal/min
PROJECT:	Aquifer Test	WELL DEPTH:	39.00 feet
AQUIFER:	Outwash	THICKNESS:	52.00 feet
WATER TABLE:	0.47 feet		
PUMPING WELL No:	EW-01	RADIUS FROM PUMPED WELL:	80.00 feet

RADIUS OF WELL CASING: 1.000 in

The following depths are from top of Aquifer:

PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet

OBSERVATION WELL: SCREENED FROM 14.00 TO 24.00 feet

FITTING ERROR: 6.178 PERCENT

Hantush, 1964: Par. Pen. Confined Leaky Aquifer

MODEL PARAMETERS:

STORAGE COEF: 3.793E-04 FREE TRANSM: 1652.965 sqft/day FREE BETA: 1.06194 FREE

ANISOTROPY [SQRT(Kz/Kr)]: 2.41289 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	3.250E-04	3.793E-04	4.395E-04
TRANSM:	1290.709	1652.965	2092.329
BETA:	0.902	1.062	1.260
ANISOTR.:	0.763	2.413	2.600

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	BETA	ANISOTR.	FIT (%)
4.395E-04	2092.329	0.90224	2.297	7.460
3.250E-04	1290.709	1.26002	2.541	7.471

4.233E-04	1983.558	0.93689	2.267	6.970
3.398E-04	1377.471	1.20367	2.568	6.988
3.318E-04	1325.343	1.24172	2.600	7.432
4.364E-04	2082.943	0.90157	2.232	7.357
3.793E-04	1652.965	1.06194	2.413	6.181
3.794E-04	1654.263	1.06137	0.763	6.622

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	0.00900	7.240E-08	
2	0.0170	0.00900	1.000E-20	
3	0.117	0.00900	0.00124	
4	0.175	0.00900	0.00813	9.70
5	0.183	0.00900	0.00950	
6	0.233	0.0180	0.0211	-17.55
7	0.283	0.0370	0.0362	1.93
8	0.350	0.0560	0.0593	-5.94
9	0.450	0.0940	0.0967	-2.89
10	0.567	0.150	0.139	7.00
11	0.700	0.197	0.184	6.24
12	0.883	0.253	0.238	5.71
13	1.00	0.282	0.268	4.84
14	1.40	0.357	0.347	2.68
15	1.80	0.394	0.400	-1.73
16	2.20	0.423	0.437	-3.49
17	2.60	0.432	0.463	-7.31
18	3.40	0.451	0.495	-9.88
19	4.20	0.470	0.512	-9.04
20	5.20	0.488	0.523	-7.27
21	6.60	0.507	0.530	-4.58
22	8.20	0.517	0.533	-3.10
23	10.00	0.517	0.534	-3.31
24	12.00	0.526	0.534	-1.61
25	16.00	0.535	0.534	0.0646
26	20.00	0.535	0.534	0.0626
27	26.00	0.545	0.534	1.89
28	32.00	0.545	0.534	1.89
29	40.00	0.554	0.534	3.48
30	50.00	0.564	0.534	5.20
31	62.00	0.564	0.534	5.20
32	76.00	0.554	0.534	3.48
33	96.00	0.573	0.534	6.68

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
34	120.0	0.573	0.534	6.68
35	160.0	0.582	0.534	
36	180.0	0.573	0.534	
37	240.0	0.592	0.534	
38	300.0	0.611	0.534	
39	360.0	0.601	0.534	
40	460.0	0.601	0.534	
41	580.0	0.601	0.534	
42	720.0	0.620	0.534	
43	900.0	0.639	0.534	
44	1120.0	0.667	0.534	
45	1420.0	0.677	0.534	
46	1750.0	0.677	0.534	
47	2200.0	0.686	0.534	
48	2740.0	0.705	0.534	
49	3430.0	0.714	0.534	
50	4300.0	0.705	0.534	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00			
T	0.00	1.00		
B	0.00	0.00	1.00	
A	0.00	0.00	0.00	0.00
	S	T	B	A

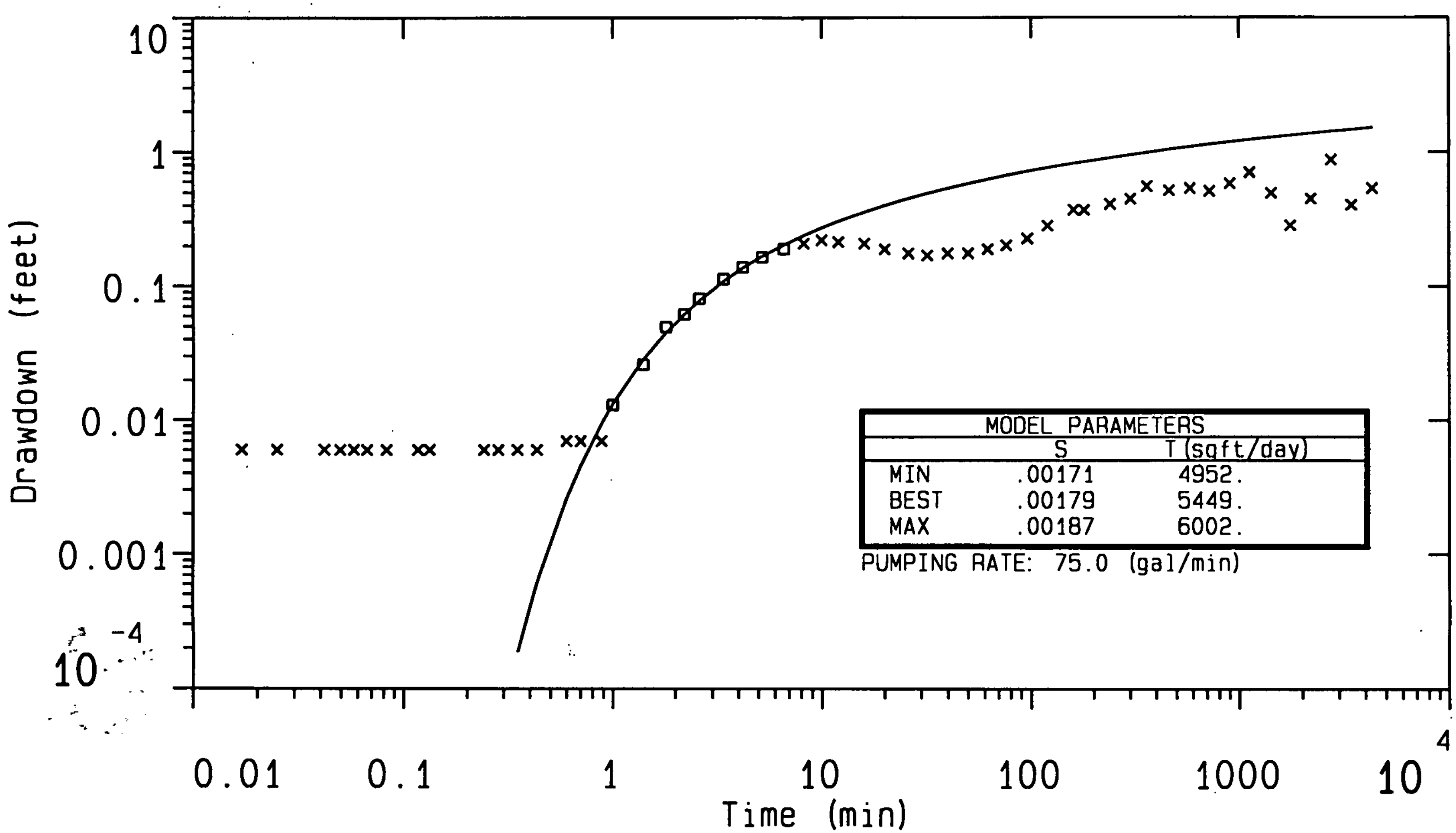


Plate: 1

for: US EPA

by: IGWMC

Aquifer: Outwash

Thickness: 52.0 Depth: 28.0 feet

Screen: Base: 41.0 Top: 0.00 feet

Distance: 124. feet Pumping well: EW-01

Aquifer Test

Stoughton, Landfill

Dane County

Date: 22-MAR-95 Well No.: MW-9S

DATA SET: 72HRMW9S

CLIENT: US EPA
LOCATION: Stoughton, Landfill
COUNTY: Dane County
PROJECT: Aquifer Test
AQUIFER: Outwash
WATER TABLE: 0.30 feet
PUMPING WELL No: EW-01

DATE: 22-MAR-95
WELL NO.: MW-9S
FLOW RATE: 75.00 gal/min
WELL DEPTH: 28.00 feet
THICKNESS: 52.00 feet
RADIUS FROM PUMPED WELL: 124.00 feet

RADIUS OF WELL CASING: 1.000 in

The following depths are from top of Aquifer:

PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet
OBSERVATION WELL: SCREENED FROM 0.00 TO 10.00 feet

FITTING ERROR: 5.576 PERCENT

Theis, 1935: Confined Aquifer

MODEL PARAMETERS:

STORAGE COEF: 1.796E-03 FREE
TRANSM: 5449.360 sqft/day FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	1.714E-03	1.796E-03	1.873E-03
TRANSM:	4951.905	5449.360	6001.764

EQUIVALENT MODELS:

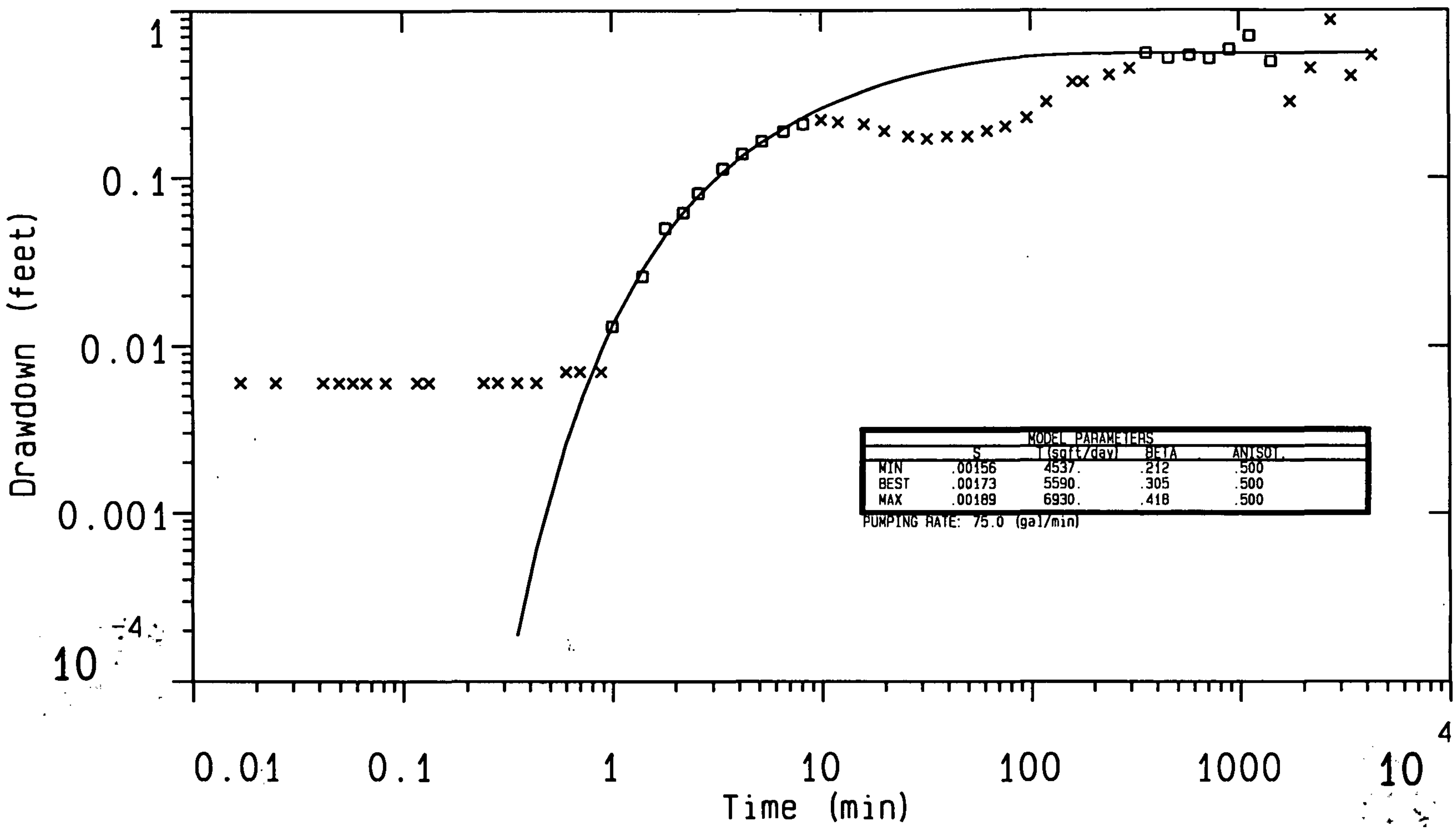
STORAGE	TRANSMISSIVITY (sqft/day)	FIT (%)
1.873E-03	5933.751	6.58573
1.714E-03	4951.905	6.77909
1.858E-03	6001.764	6.65625
1.740E-03	4974.562	6.60095

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0170	0.00600	1.000E-20	
2	0.0250	0.00600	1.000E-20	
3	0.0420	0.00600	0.0109	
4	0.0500	0.00600	7.787E-05	
5	0.0580	0.00600	6.082E-07	
6	0.0670	0.00600	6.318E-09	
7	0.0830	0.00600	2.203E-10	
8	0.117	0.00600	2.149E-09	
9	0.133	0.00600	1.582E-08	
10	0.242	0.00600	1.325E-05	
11	0.283	0.00600	4.545E-05	
12	0.350	0.00600	1.883E-04	
13	0.433	0.00600	6.142E-04	
14	0.600	0.00700	0.00261	
15	0.700	0.00700	0.00456	
16	0.883	0.00700	0.00939	
17	1.00	0.0130	0.0131	-1.11
18	1.40	0.0260	0.0283	-9.01
19	1.80	0.0500	0.0451	9.80
20	2.20	0.0620	0.0619	0.0565
21	2.60	0.0810	0.0783	3.27
22	3.40	0.113	0.108	3.66
23	4.20	0.138	0.136	1.25
24	5.20	0.164	0.166	-1.61
25	6.60	0.189	0.203	-7.59
26	8.20	0.208	0.238	
27	10.00	0.221	0.273	
28	12.00	0.214	0.305	
29	16.00	0.208	0.358	
30	20.00	0.189	0.400	
31	26.00	0.176	0.451	
32	32.00	0.170	0.492	
33	40.00	0.176	0.537	
34	50.00	0.176	0.582	
35	62.00	0.189	0.626	
36	76.00	0.202	0.667	
37	96.00	0.227	0.715	
38	120.0	0.284	0.762	
39	160.0	0.373	0.821	
40	180.0	0.373	0.846	
41	240.0	0.411	0.906	
42	300.0	0.449	0.952	
43	360.0	0.556	0.991	
44	460.0	0.518	1.04	
45	580.0	0.537	1.09	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
46	720.0	0.512	1.13	
47	900.0	0.582	1.18	
48	1120.0	0.702	1.22	
49	1420.0	0.493	1.27	
50	1750.0	0.284	1.32	
51	2200.0	0.449	1.37	
52	2740.0	0.873	1.41	
53	3430.0	0.404	1.46	
54	4300.0	0.537	1.51	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00	
T	0.00	1.00
	S	T



MODEL PARAMETERS	S	T (sqft/day)	BETA	ANISOT.
MIN	.00156	4537.	.212	.500
BEST	.00173	5590.	.305	.500
MAX	.00189	6930.	.418	.500

PUMPING RATE: 75.0 (gal/min)

Plate: 1

for: US EPA	Aquifer Test
by: IGWMC	Stoughton, Landfill Dane County
Aquifer: Outwash Thickness: 52.0 Depth: 28.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 124. feet Pumping well: EW-01	Date: 22-MAR-95 Well No.: MW-9S

DATA SET: 72HRMW9S

CLIENT: US EPA
LOCATION: Stoughton, Landfill
COUNTY: Dane County
PROJECT: Aquifer Test
AQUIFER: Outwash
WATER TABLE: 0.30 feet
PUMPING WELL No: EW-01

DATE: 22-MAR-95
WELL NO.: MW-9S
FLOW RATE: 75.00 gal/min
WELL DEPTH: 28.00 feet
THICKNESS: 52.00 feet

RADIUS FROM PUMPED WELL: 124.00 feet
RADIUS OF WELL CASING: 1.000 in
The following depths are from top of Aquifer:
PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet
OBSERVATION WELL: SCREENED FROM 0.00 TO 10.00 feet

FITTING ERROR: 8.603 PERCENT

Hantush, 1964: Par. Pen. Confined Leaky Aquifer

MODEL PARAMETERS:

STORAGE COEF: 1.732E-03 FREE
TRANSM: 5590.183 sqft/day FREE
BETA: 0.30546 FREE
ANISOTROPY [SQRT(Kz/Kr)]: 0.50000 FIXED

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	1.560E-03	1.732E-03	1.895E-03
TRANSM:	4536.845	5590.183	6930.329
BETA:	0.212	0.305	0.419
ANISOTR.:	0.500	0.500	0.500

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	BETA	ANISOTR.	FIT (%)
1.895E-03	6691.007	0.23287	0.500	10.273
1.560E-03	4536.845	0.41863	0.500	10.415

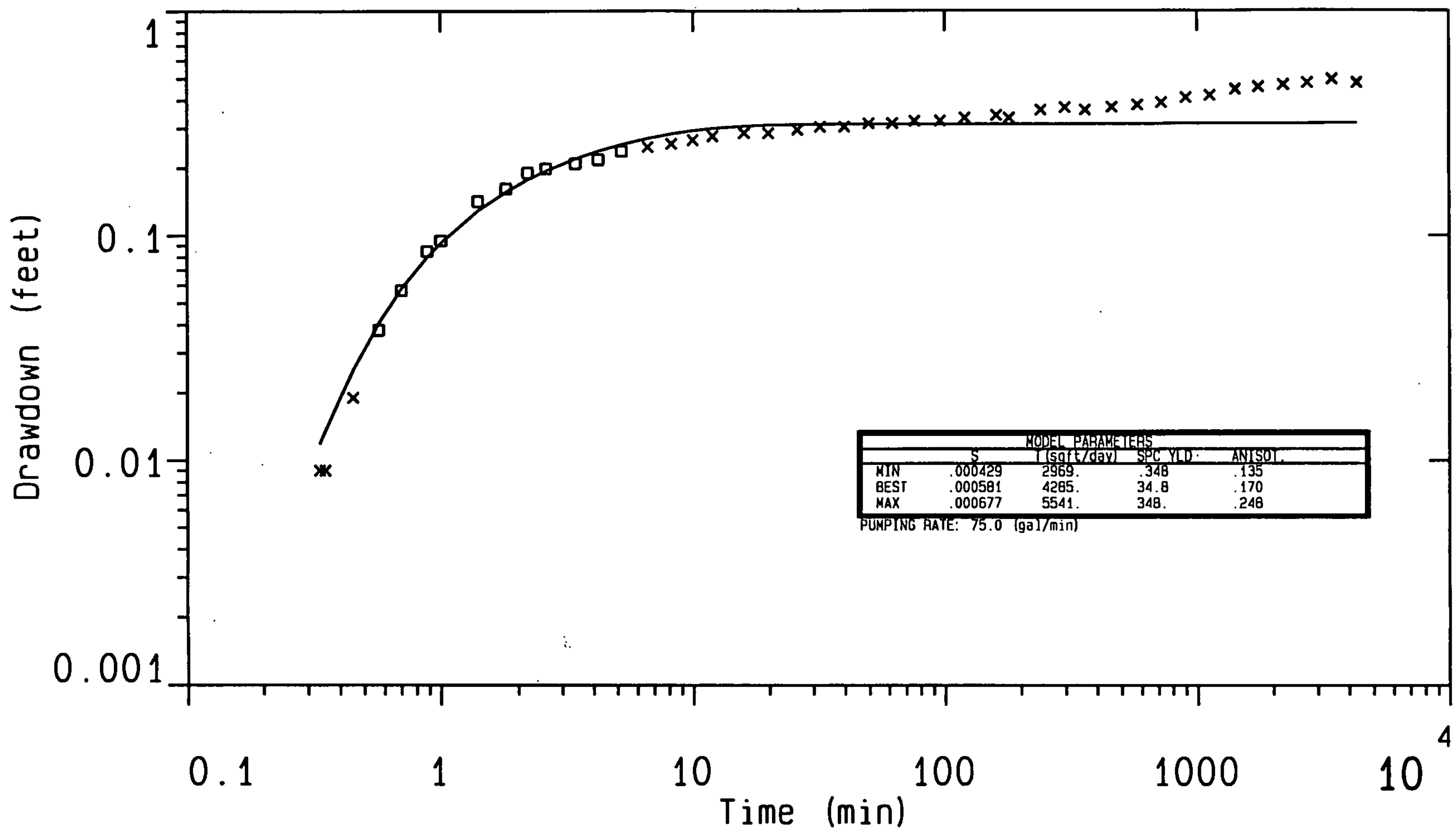
1.854E-03	6708.220	0.23303	0.500	10.052
1.618E-03	4658.486	0.40040	0.500	10.078
1.662E-03	5020.675	0.36656	0.500	9.209
1.879E-03	6930.329	0.21213	0.500	10.491

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0170	0.00600	2.054E-09	
2	0.0250	0.00600	1.000E-20	
3	0.0420	0.00600	2.473E-08	
4	0.0500	0.00600	1.000E-20	
5	0.0580	0.00600	1.000E-20	
6	0.0670	0.00600	1.000E-20	
7	0.0830	0.00600	3.950E-07	
8	0.117	0.00600	1.000E-20	
9	0.133	0.00600	1.000E-20	
10	0.242	0.00600	1.886E-05	
11	0.283	0.00600	4.151E-05	
12	0.350	0.00600	1.871E-04	
13	0.433	0.00600	6.122E-04	
14	0.600	0.00700	0.00259	
15	0.700	0.00700	0.00454	
16	0.883	0.00700	0.00931	
17	1.00	0.0130	0.0131	-1.41
18	1.40	0.0260	0.0284	-9.27
19	1.80	0.0500	0.0452	9.42
20	2.20	0.0620	0.0619	0.0141
21	2.60	0.0810	0.0782	3.43
22	3.40	0.113	0.107	4.68
23	4.20	0.138	0.133	2.94
24	5.20	0.164	0.162	1.05
25	6.60	0.189	0.196	-3.72
26	8.20	0.208	0.227	-9.52
27	10.00	0.221	0.257	
28	12.00	0.214	0.285	
29	16.00	0.208	0.328	
30	20.00	0.189	0.360	
31	26.00	0.176	0.397	
32	32.00	0.170	0.424	
33	40.00	0.176	0.451	
34	50.00	0.176	0.475	
35	62.00	0.189	0.495	
36	76.00	0.202	0.511	
37	96.00	0.227	0.525	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
38	120.0	0.284	0.536	
39	160.0	0.373	0.545	
40	180.0	0.373	0.547	
41	240.0	0.411	0.551	
42	300.0	0.449	0.552	
43	360.0	0.556	0.552	0.577
44	460.0	0.518	0.553	-6.75
45	580.0	0.537	0.553	-2.98
46	720.0	0.512	0.553	-8.01
47	900.0	0.582	0.553	4.97
48	1120.0	0.702	0.553	21.21
49	1420.0	0.493	0.553	-12.18
50	1750.0	0.284	0.553	
51	2200.0	0.449	0.553	
52	2740.0	0.873	0.553	
53	3430.0	0.404	0.553	
54	4300.0	0.537	0.553	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00			
T	0.00	1.00		
B	0.00	0.00	1.00	
A *	0.00	0.00	0.00	0.00
	S	T	B	A



MODEL PARAMETERS

	S	T (sqft/day)	SPC YLD	ANISOT.
MIN	.000429	2969.	.348	.135
BEST	.000581	4285.	34.8	.170
MAX	.000677	5541.	348.	.248

PUMPING RATE: 75.0 (gal/min)

Plate: 1

for: US EPA	Aquifer Test
by: IGWMC	Stoughton Landfill Dane County
Aquifer: Outwash Thickness: 52.0 Depth: 44.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 124. feet Pumping well: EW-01	Date: 22-MAR-95 Well No.: MW-9I

DATA SET: 72HRMW9I

CLIENT: US EPA
LOCATION: Stoughton Landfill
COUNTY: Dane County
PROJECT: Aquifer Test
AQUIFER: Outwash
WATER TABLE: 0.63 feet
PUMPING WELL No: EW-01

DATE: 22-MAR-95
WELL NO.: MW-9I
FLOW RATE: 75.00 gal/min
WELL DEPTH: 44.00 feet
THICKNESS: 52.00 feet
RADIUS FROM PUMPED WELL: 124.00 feet

RADIUS OF WELL CASING: 1.000 in

The following depths are from top of Aquifer:

PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet
OBSERVATION WELL: SCREENED FROM 16.00 TO 26.00 feet

FITTING ERROR: 6.192 PERCENT

Neuman, 1975: Par. Pen. Unconfined Aquifer

MODEL PARAMETERS:

STORAGE COEF: 5.814E-04 FREE
TRANSM: 4285.414 sqft/day FREE
ANISOTROPY [SQRT(Kz/Kr)]: 0.17010 FREE
SPECIFIC YIELD: 3.479E+01 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	4.289E-04	5.814E-04	6.769E-04
TRANSM:	2969.625	4285.414	5541.527
SPC. YIELD:	0.348	34.785	347.852
ANISOTR.:	0.136	0.170	0.249

EQUIVALENT MODELS:

STORAGE	TRANSMISS. (sqft/day)	SPC. YIELD	ANISOTR.	FIT (%)
6.769E-04	5147.997	34.78524	0.141	7.039

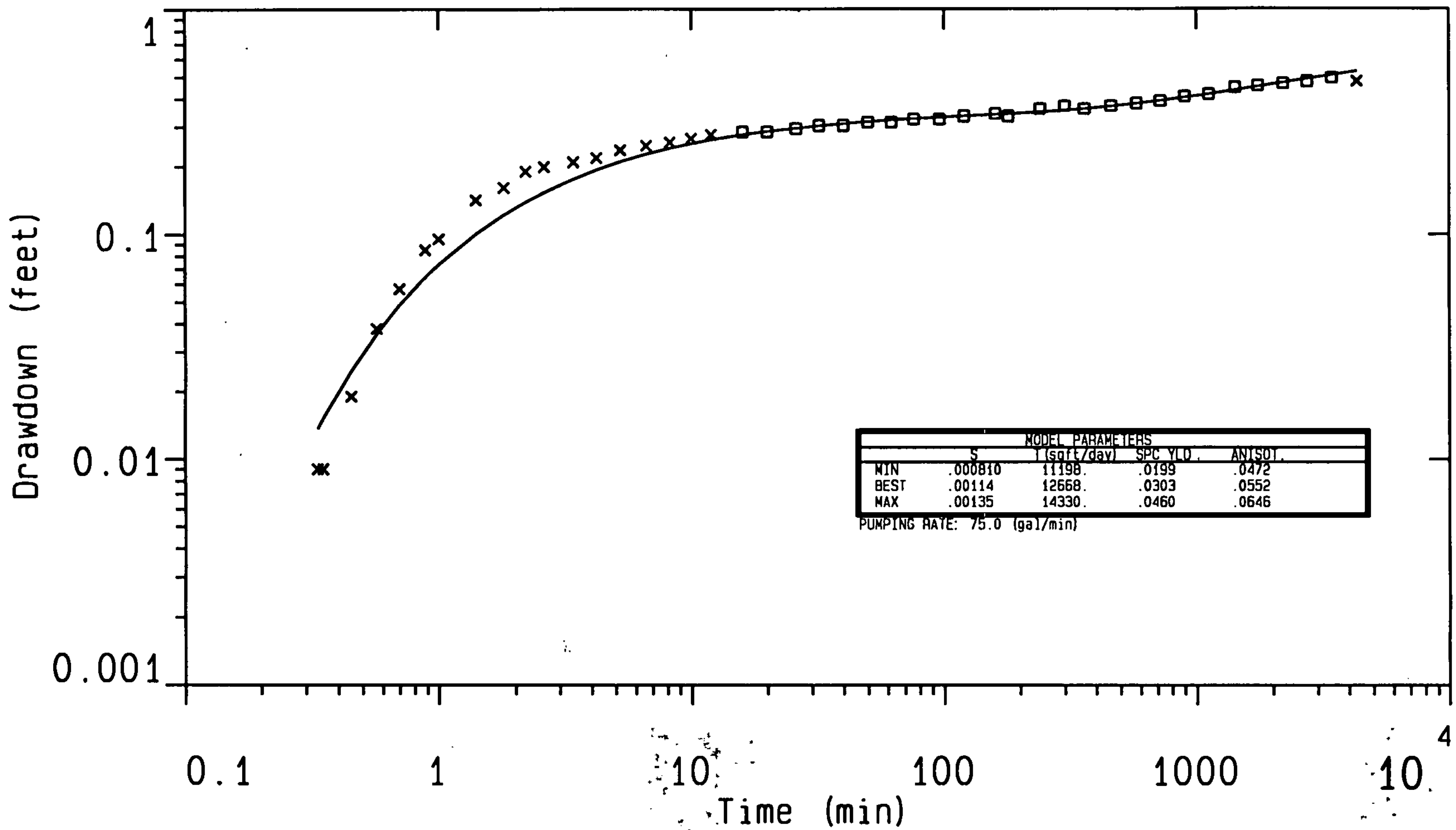
4.289E-04	2969.625	34.78523	0.249	7.262
6.676E-04	5541.527	34.78521	0.140	6.964
5.063E-04	3314.027	34.78527	0.207	7.334
5.814E-04	4285.400	347.85242	0.170	6.192
5.814E-04	4285.441	0.34785	0.170	6.202
5.020E-04	3507.832	34.78521	0.213	7.486
6.734E-04	5235.362	34.78527	0.136	6.674

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.333	0.00900	0.0118	
2	0.350	0.00900	0.0134	
3	0.450	0.0190	0.0252	
4	0.567	0.0380	0.0407	-7.13
5	0.700	0.0570	0.0579	-1.66
6	0.883	0.0850	0.0799	5.94
7	1.00	0.0950	0.0926	2.44
8	1.40	0.142	0.128	9.17
9	1.80	0.161	0.156	2.99
10	2.20	0.190	0.177	6.78
11	2.60	0.199	0.193	2.53
12	3.40	0.209	0.219	-4.86
13	4.20	0.218	0.237	-8.95
14	5.20	0.237	0.254	-7.25
15	6.60	0.247	0.270	
16	8.20	0.256	0.283	
17	10.00	0.266	0.292	
18	12.00	0.276	0.298	
19	16.00	0.285	0.306	
20	20.00	0.285	0.309	
21	26.00	0.295	0.311	
22	32.00	0.304	0.312	
23	40.00	0.304	0.312	
24	50.00	0.314	0.312	
25	62.00	0.314	0.312	
26	76.00	0.323	0.312	
27	96.00	0.323	0.312	
28	120.0	0.333	0.312	
29	160.0	0.342	0.312	
30	180.0	0.333	0.312	
31	240.0	0.361	0.312	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
32	300.0	0.371	0.312	
33	360.0	0.361	0.312	
34	460.0	0.371	0.312	
35	580.0	0.380	0.313	
36	720.0	0.390	0.313	
37	900.0	0.409	0.313	
38	1120.0	0.418	0.313	
39	1420.0	0.447	0.313	
40	1750.0	0.456	0.313	
41	2200.0	0.466	0.314	
42	2740.0	0.475	0.314	
43	3430.0	0.494	0.315	
44	4300.0	0.475	0.315	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	0.78			
T	-0.26	0.52		
B	0.00	0.00	0.00	
A	0.27	0.37	0.00	0.59
	S	T	B	A



MODEL PARAMETERS				
	S	T (sqft/day)	SPC YLD.	ANISOT.
MIN	.000810	11198.	.0199	.0472
BEST	.00114	12668.	.0303	.0552
MAX	.00135	14330.	.0460	.0646

PUMPING RATE: 75.0 (gal/min)

Plate: 1

for: US EPA

by: IGWMC

Aquifer: Outwash

Thickness: 52.0 Depth: 44.0 feet

Screen: Base: 41.0 Top: 0.00 feet

Distance: 124. feet Pumping well: EW-01

Aquifer Test

Stoughton Landfill
Dane County

Date: 22-MAR-95

Well No.: MW-9I

DATA SET: 72HRMW9I

CLIENT: US EPA
LOCATION: Stoughton Landfill
COUNTY: Dane County
PROJECT: Aquifer Test
AQUIFER: Outwash
WATER TABLE: 0.63 feet
PUMPING WELL No: EW-01
RADIUS OF WELL CASING: 1.000 in

DATE: 22-MAR-95
WELL NO.: MW-9I
FLOW RATE: 75.00 gal/min
WELL DEPTH: 44.00 feet
THICKNESS: 52.00 feet
RADIUS FROM PUMPED WELL: 124.00 feet

The following depths are from top of Aquifer:
PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet
OBSERVATION WELL: SCREENED FROM 16.00 TO 26.00 feet

FITTING ERROR: 1.906 PERCENT

Neuman, 1975: Par. Pen. Unconfined Aquifer

MODEL PARAMETERS:

STORAGE COEF: 1.141E-03 FREE
TRANSM: 12668.094 sqft/day FREE
ANISOTROPY [SQRT(Kz/Kr)]: 0.05522 FREE
SPECIFIC YIELD: 3.029E-02 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	8.102E-04	1.141E-03	1.355E-03
TRANSM:	11198.594	12668.094	14330.425
SPC. YIELD:	0.020	0.030	0.046
ANISOTR.:	0.047	0.055	0.065

EQUIVALENT MODELS:

STORAGE	TRANSMISS. (sqft/day)	SPC. YIELD	ANISOTR.	FIT (%)
1.355E-03	12382.345	0.03335	0.056	2.037

8.102E-04	13259.526	0.02498	0.054	2.035
1.078E-03	14130.165	0.02162	0.048	1.954
1.209E-03	11357.306	0.04243	0.064	2.122
1.247E-03	11198.594	0.04599	0.065	2.172
1.045E-03	14330.425	0.01994	0.047	1.948
1.166E-03	11568.491	0.03969	0.063	2.097
1.117E-03	13872.215	0.02311	0.049	1.897

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.333	0.00900	0.0136	
2	0.350	0.00900	0.0151	
3	0.450	0.0190	0.0245	
4	0.567	0.0380	0.0361	
5	0.700	0.0570	0.0485	
6	0.883	0.0850	0.0641	
7	1.00	0.0950	0.0732	
8	1.40	0.142	0.100	
9	1.80	0.161	0.121	
10	2.20	0.190	0.138	
11	2.60	0.199	0.153	
12	3.40	0.209	0.176	
13	4.20	0.218	0.193	
14	5.20	0.237	0.209	
15	6.60	0.247	0.226	
16	8.20	0.256	0.241	
17	10.00	0.266	0.252	
18	12.00	0.276	0.262	
19	16.00	0.285	0.276	2.98
20	20.00	0.285	0.285	-0.334
21	26.00	0.295	0.295	-0.303
22	32.00	0.304	0.302	0.367
23	40.00	0.304	0.309	-1.85
24	50.00	0.314	0.315	-0.505
25	62.00	0.314	0.320	-2.11
26	76.00	0.323	0.324	-0.591
27	96.00	0.323	0.329	-1.96
28	120.0	0.333	0.333	-0.117
29	160.0	0.342	0.338	0.938
30	180.0	0.333	0.341	-2.46
31	240.0	0.361	0.347	3.62

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
32	300.0	0.371	0.354	4.52
33	360.0	0.361	0.360	0.226
34	460.0	0.371	0.369	0.390
35	580.0	0.380	0.379	0.0121
36	720.0	0.390	0.391	-0.277
37	900.0	0.409	0.404	1.21
38	1120.0	0.418	0.418	-0.0344
39	1420.0	0.447	0.434	2.69
40	1750.0	0.456	0.450	1.11
41	2200.0	0.466	0.469	-0.724
42	2740.0	0.475	0.487	-2.72
43	3430.0	0.494	0.507	-2.74
44	4300.0	0.475	0.527	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	0.73			
T	0.04	0.93		
B	-0.15	0.22	0.27	
A	-0.02	0.09	-0.27	0.87
	S	T	B	A

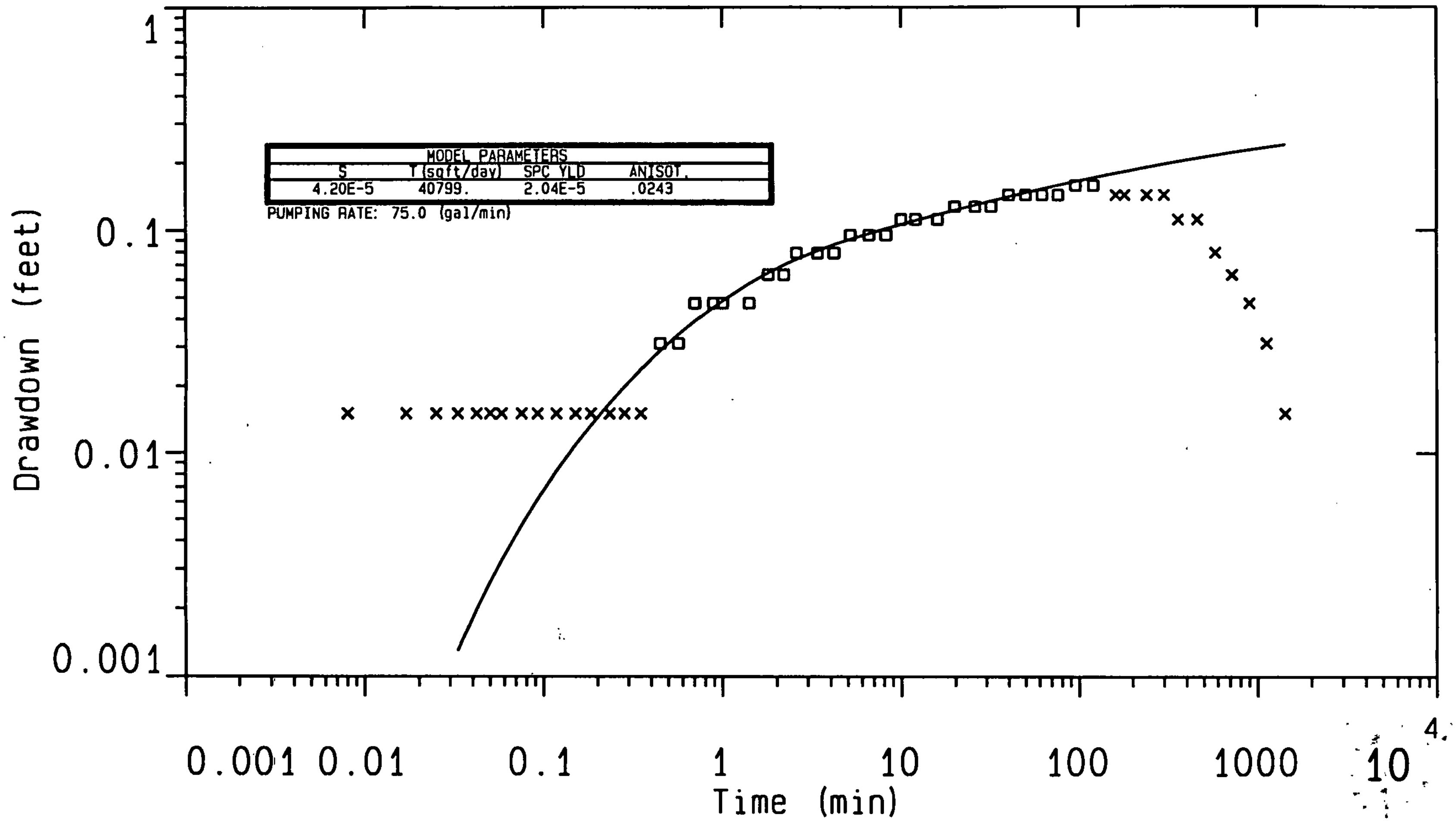


Plate: 1

for: US EPA	Aquifer Test
by: IGWMC	Stoughton, Landfill Dane County
Aquifer: Limestome Bedrock Thickness: 81.0 Depth: 81.0 feet Screen: Base: 67.0 Top: 18.0 feet Distance: 123. feet Pumping well: EW-01	Date: 22-MAR-95 Well No.: MW-9B

DATA SET: 72HRMW9B

CLIENT: US EPA
LOCATION: Stoughton, Landfill
COUNTY: Dane County
PROJECT: Aquifer Test
AQUIFER: Limestome Bedrock
WATER TABLE: 0.70 feet
DATE: 22-MAR-95
WELL NO.: MW-9B
FLOW RATE: 75.00 gal/min
WELL DEPTH: 81.00 feet
THICKNESS: 81.00 feet
PUMPING WELL No: EW-01 RADIUS FROM PUMPED WELL: 123.00 feet
RADIUS OF WELL CASING: 1.000 in
The following depths are from top of Aquifer:
PUMPING WELL: SCREENED FROM 18.00 TO 67.00 feet
OBSERVATION WELL: SCREENED FROM 71.00 TO 81.00 feet

FITTING ERROR: 7.959 PERCENT

Neuman, 1975: Par. Pen. Unconfined Aquifer

MODEL PARAMETERS:

STORAGE COEF: 4.199E-05 TRANSM: 40799.766 sqft/day
FREE FREE
ANISOTROPY [SQRT(Kz/Kr)]: 0.02437
FREE
SPECIFIC YIELD: 2.048E-05
FREE

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	0.0150	1.000E-20	
2	0.0170	0.0150	3.431E-04	
3	0.0250	0.0150	7.859E-04	
4	0.0330	0.0150	0.00130	
5	0.0420	0.0150	0.00197	
6	0.0500	0.0150	0.00262	
7	0.0580	0.0150	0.00328	
8	0.0750	0.0150	0.00471	
9	0.0920	0.0150	0.00614	
10	0.117	0.0150	0.00818	
11	0.150	0.0150	0.0107	
12	0.183	0.0150	0.0132	
13	0.233	0.0150	0.0167	
14	0.283	0.0150	0.0198	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
15	0.350	0.0150	0.0237	
16	0.450	0.0310	0.0288	7.00
17	0.567	0.0310	0.0340	-9.75
18	0.700	0.0470	0.0391	16.79
19	0.883	0.0470	0.0450	4.17
20	1.00	0.0470	0.0483	-2.84
21	1.40	0.0470	0.0574	-22.32
22	1.80	0.0630	0.0643	-2.18
23	2.20	0.0630	0.0697	-10.74
24	2.60	0.0790	0.0741	6.12
25	3.40	0.0790	0.0809	-2.41
26	4.20	0.0790	0.0860	-8.87
27	5.20	0.0950	0.0909	4.27
28	6.60	0.0950	0.0963	-1.43
29	8.20	0.0950	0.101	-6.56
30	10.00	0.111	0.105	4.71
31	12.00	0.111	0.110	0.895
32	16.00	0.111	0.116	-5.34
33	20.00	0.127	0.122	3.55
34	26.00	0.127	0.129	-1.75
35	32.00	0.127	0.134	-6.02
36	40.00	0.143	0.140	1.67
37	50.00	0.143	0.146	-2.52
38	62.00	0.143	0.152	-6.62
39	76.00	0.143	0.158	-10.51
40	96.00	0.158	0.164	-4.09
41	120.0	0.158	0.170	-7.99
42	160.0	0.143	0.178	
43	180.0	0.143	0.181	
44	240.0	0.143	0.189	
45	300.0	0.143	0.196	
46	360.0	0.111	0.201	
47	460.0	0.111	0.208	
48	580.0	0.0790	0.214	
49	720.0	0.0630	0.220	
50	900.0	0.0470	0.226	
51	1120.0	0.0310	0.233	
52	1420.0	0.0150	0.239	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	0.15			
T	0.13	0.24		
B	0.01	0.03	0.00	
A	-0.16	-0.12	-0.01	0.18
	S	T	B	A

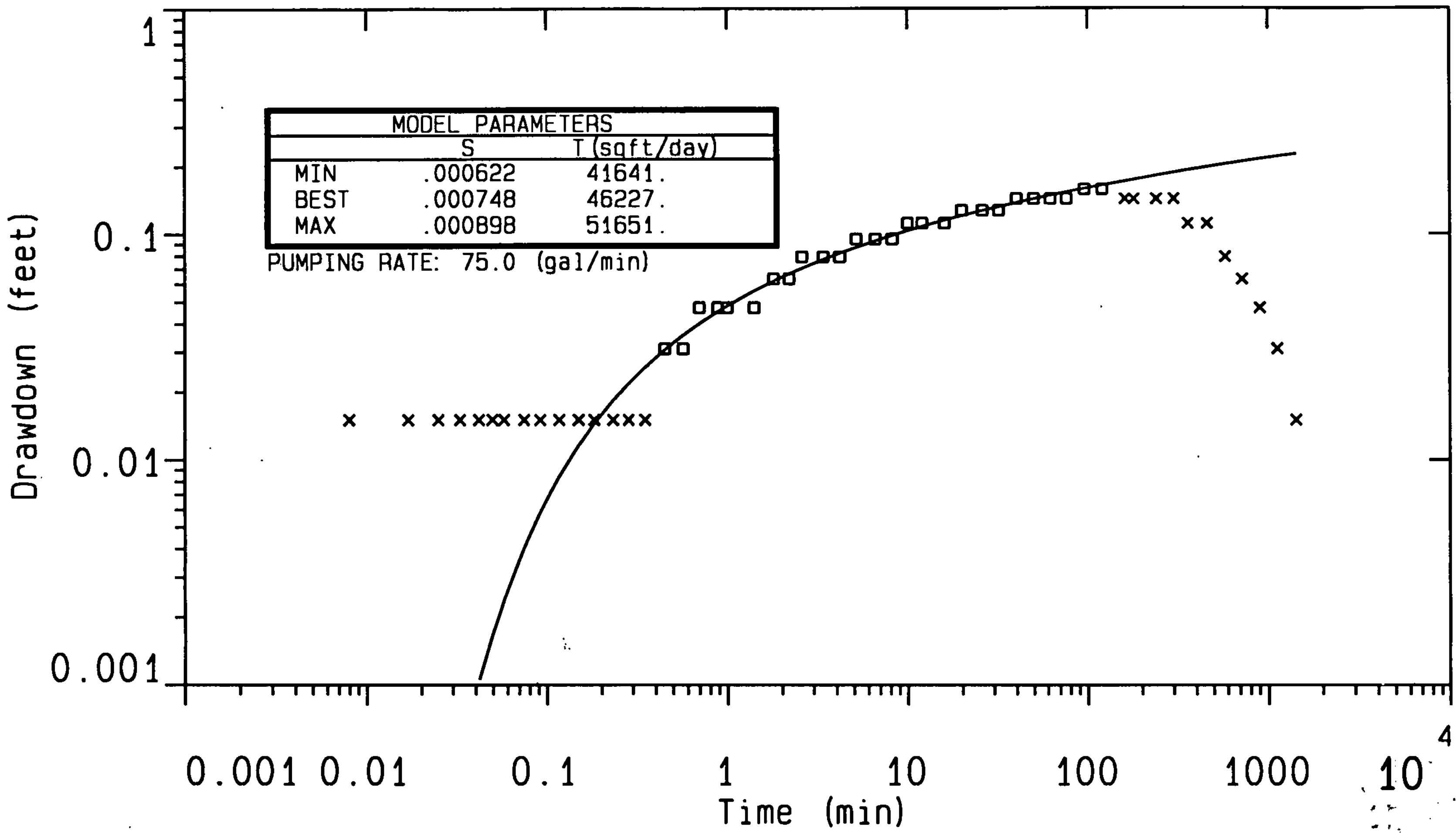


Plate: 1

for: US EPA	Aquifer Test
by: IGWMC	Stoughton, Landfill Dane County
Aquifer: Limestome Bedrock Thickness: 81.0 Depth: 81.0 feet Screen: Base: 67.0 Top: 18.0 feet Distance: 123. feet Pumping well: EW-01	Date: 22-MAR-95 Well No.: MW-9B

DATA SET: 72HRMW9B

CLIENT:	US EPA	DATE:	22-MAR-95
LOCATION:	Stoughton, Landfill	WELL NO.:	MW-9B
COUNTY:	Dane County	FLOW RATE:	75.00 gal/min
PROJECT:	Aquifer Test	WELL DEPTH:	81.00 feet
AQUIFER:	Limestone Bedrock	THICKNESS:	81.00 feet

WATER TABLE: 0.70 feet
PUMPING WELL No: EW-01 RADIUS FROM PUMPED WELL: 123.00 feet
RADIUS OF WELL CASING: 1.000 in
The following depths are from top of Aquifer:
PUMPING WELL: SCREENED FROM 18.00 TO 67.00 feet
OBSERVATION WELL: SCREENED FROM 71.00 TO 81.00 feet

FITTING ERROR: 7.155 PERCENT

Theis, 1935: Confined Aquifer

MODEL PARAMETERS:

STORAGE COEF: 7.483E-04 TRANSM: 46226.941 sqft/day
FREE FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	6.223E-04	7.483E-04	8.979E-04
TRANSM:	41641.363	46226.941	51651.660

EQUIVALENT MODELS:

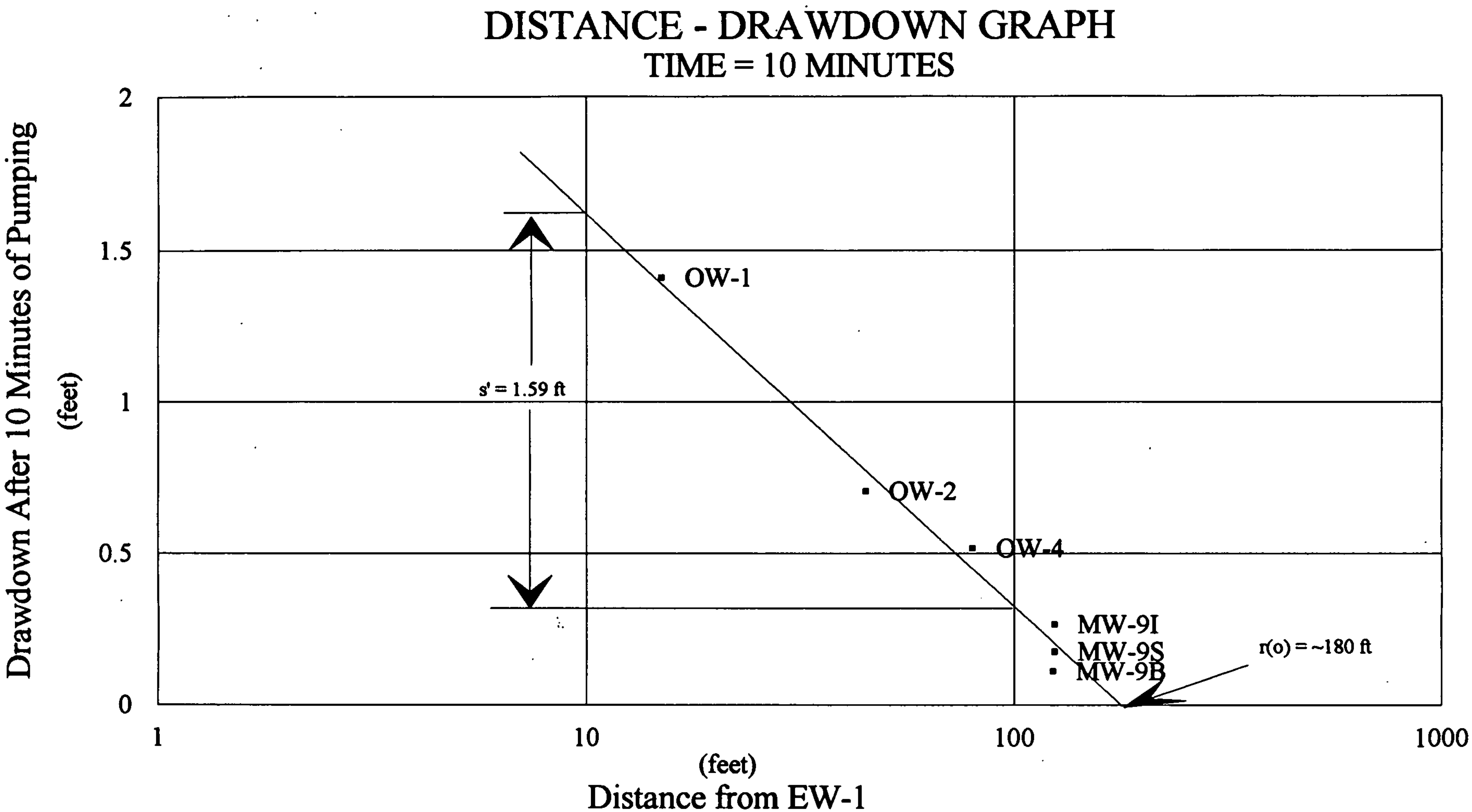
STORAGE	TRANSMISSIVITY (sqft/day)	FIT (%)
8.979E-04	43092.586	8.32139
6.235E-04	49589.277	8.01046
6.223E-04	51651.660	8.67771
8.900E-04	41641.363	8.65148

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	0.0150	3.397E-08	
2	0.0170	0.0150	2.290E-05	
3	0.0250	0.0150	1.672E-04	
4	0.0330	0.0150	4.934E-04	
5	0.0420	0.0150	0.00106	
6	0.0500	0.0150	0.00169	
7	0.0580	0.0150	0.00241	
8	0.0750	0.0150	0.00408	
9	0.0920	0.0150	0.00584	
10	0.117	0.0150	0.00838	
11	0.150	0.0150	0.0115	
12	0.183	0.0150	0.0144	
13	0.233	0.0150	0.0183	
14	0.283	0.0150	0.0217	
15	0.350	0.0150	0.0257	
16	0.450	0.0310	0.0307	0.875
17	0.567	0.0310	0.0355	-14.64
18	0.700	0.0470	0.0400	14.72
19	0.883	0.0470	0.0452	3.77
20	1.00	0.0470	0.0480	-2.19
21	1.40	0.0470	0.0557	-18.66
22	1.80	0.0630	0.0616	2.11
23	2.20	0.0630	0.0664	-5.43
24	2.60	0.0790	0.0704	10.86
25	3.40	0.0790	0.0768	2.69
26	4.20	0.0790	0.0819	-3.78
27	5.20	0.0950	0.0871	8.22
28	6.60	0.0950	0.0930	2.10
29	8.20	0.0950	0.0983	-3.49
30	10.00	0.111	0.103	7.03
31	12.00	0.111	0.107	2.99
32	16.00	0.111	0.114	-3.38
33	20.00	0.127	0.120	5.30
34	26.00	0.127	0.126	0.201
35	32.00	0.127	0.131	-3.83
36	40.00	0.143	0.137	3.92
37	50.00	0.143	0.142	0.0605
38	62.00	0.143	0.148	-3.66
39	76.00	0.143	0.153	-7.18
40	96.00	0.158	0.159	-0.672
41	120.0	0.158	0.164	-4.17
42	160.0	0.143	0.171	
43	180.0	0.143	0.174	
44	240.0	0.143	0.181	
45	300.0	0.143	0.187	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
46	360.0	0.111	0.191	
47	460.0	0.111	0.197	
48	580.0	0.0790	0.203	
49	720.0	0.0630	0.208	
50	900.0	0.0470	0.214	
51	1120.0	0.0310	0.219	
52	1420.0	0.0150	0.225	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00	
T	0.00	1.00
	S	T

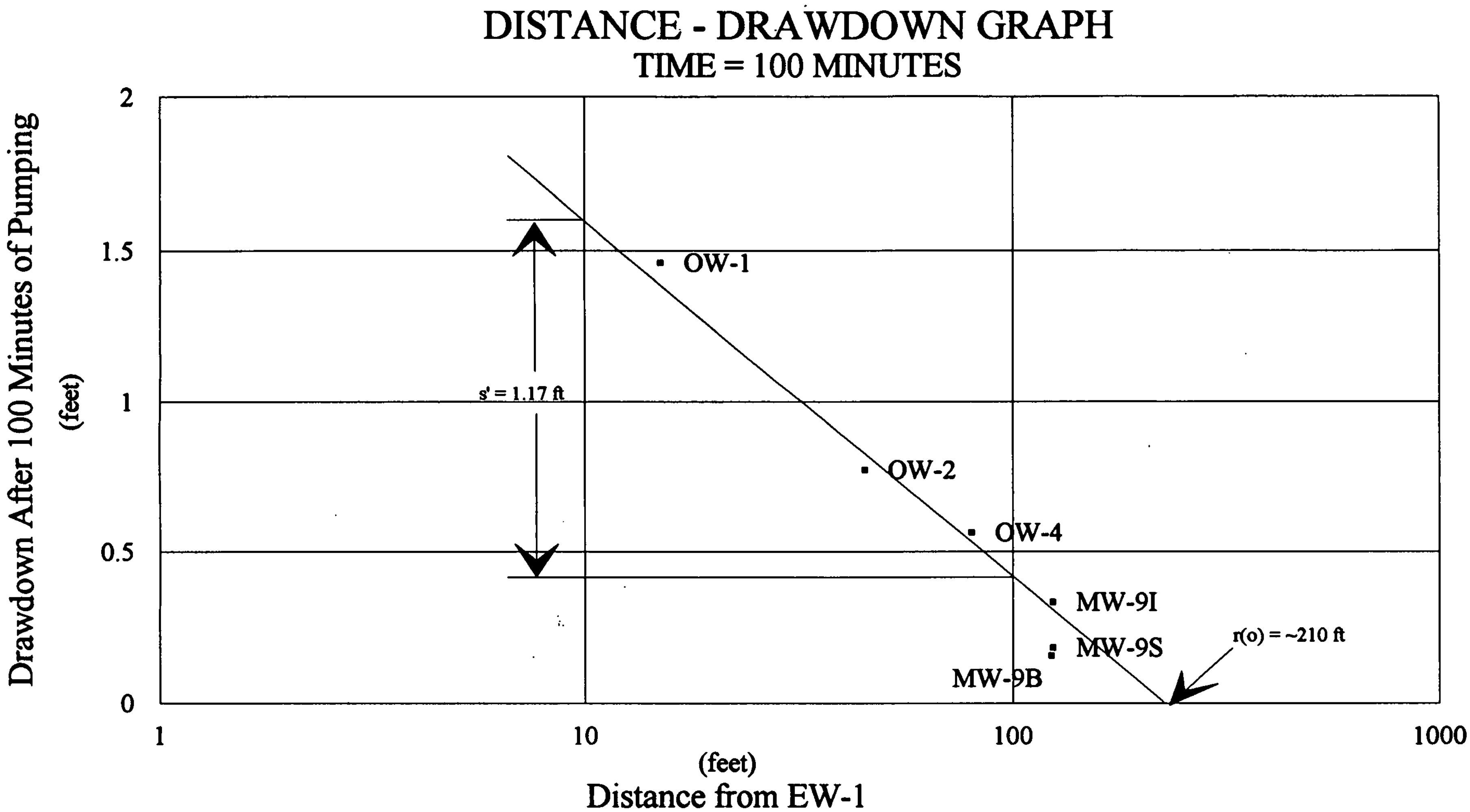


T = 528 Q / s'
T = 528 (75 gpm) / 1.59 ft
T = 24905 gpd/ft
T = 3330 sq ft/day

S = 0.3 T t / r(o)^2
S = 0.3 (24905 gpd/ft) (0.007 day) / 180 ft ^2
S = 0.0016

Where:

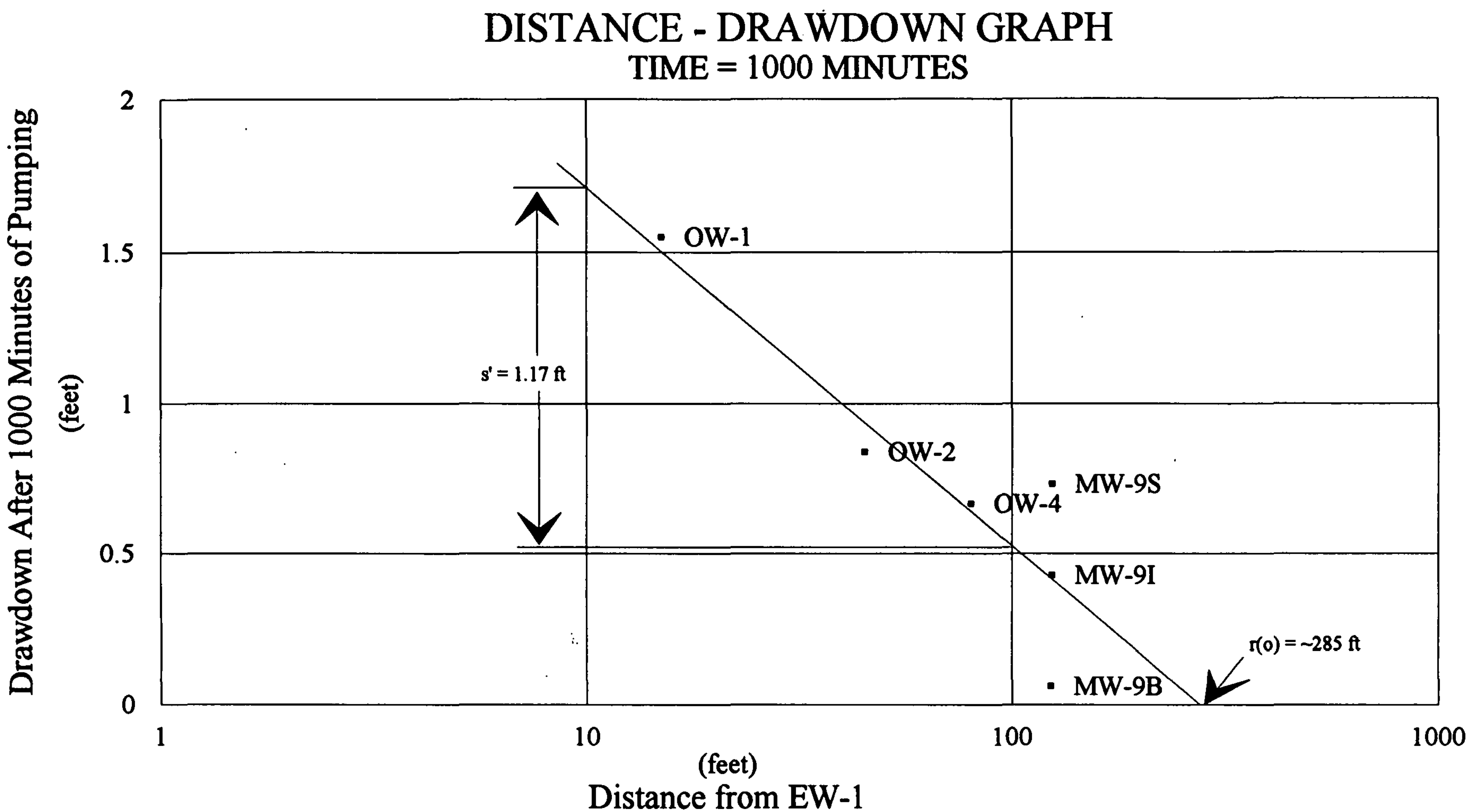
T = transmissivity (gpd/ft)
S = coefficient of storage (dimensionless)
Q = pumping rate = 75 gpm
s' = slope of distance-drawdown graph between 1 log cycle = 1.59 ft
t = time since pumping started (days) = 0.007 days
r(o) = intercept of extended straight line at zero drawdown (ft) = ~180 ft



T = 528 Q / s'
T = 528 (75 gpm) / 1.17 ft
T = 33846 gpd/ft
T = 4524 sq ft/day

S = 0.3 T t / r(o)^2
S = 0.3 (33846 gpd/ft) (0.07 day) / 210 ft ^2
S = 0.016

Where:
T = transmissivity (gpd/ft)
S = coefficient of storage (dimensionless)
Q = pumping rate = 75 gpm
s' = slope of distance-drawdown graph between 1 log cycle = 1.17 ft
t = time since pumping started (days) = 0.07 days
r(o) = intercept of extended straight line at zero drawdown (ft) = ~210 ft

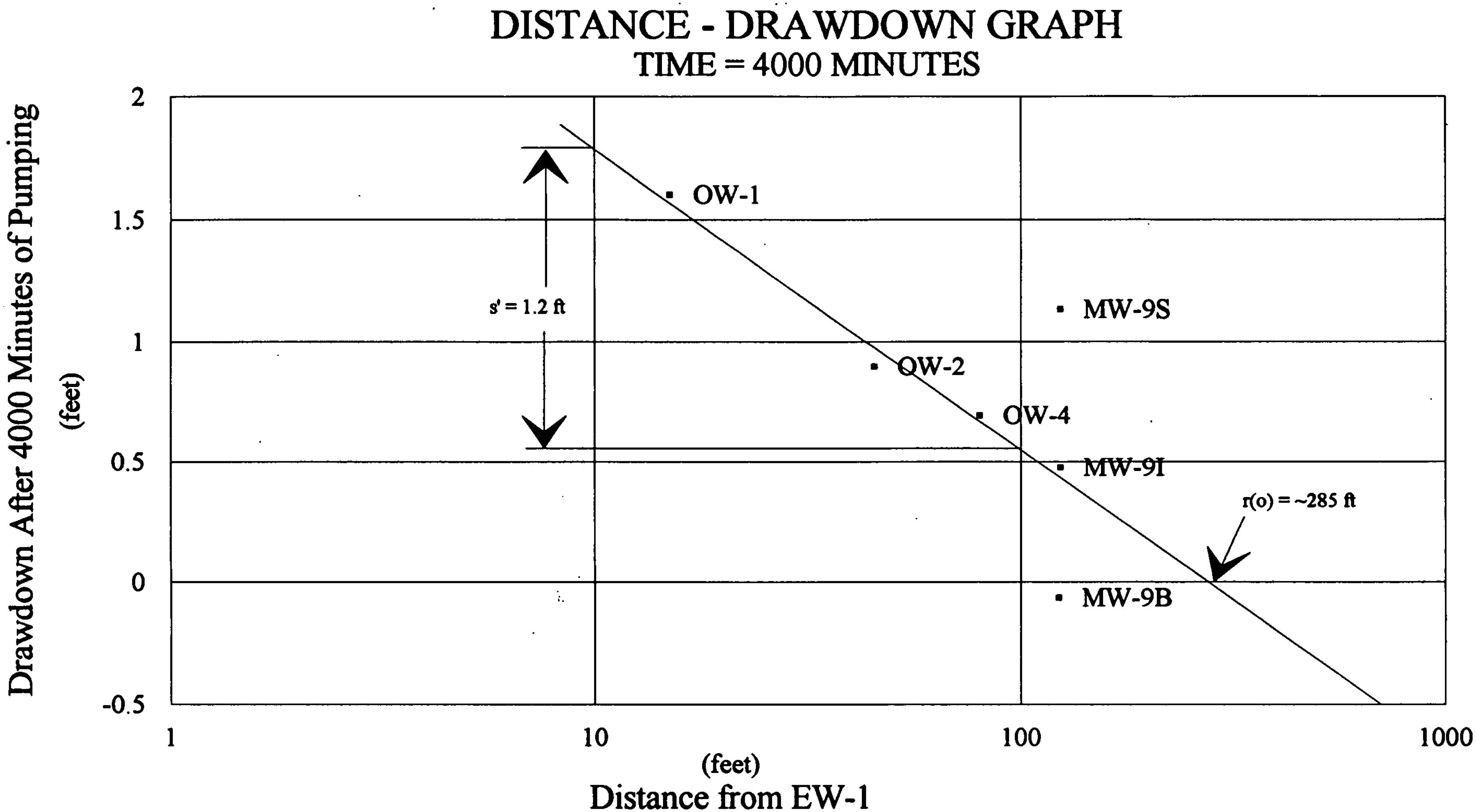


T = 528 Q / s'
T = 528 (75 gpm) / 1.17 ft
T = 33846 gpd/ft
T = 4524 sq ft/day

S = 0.3 T t / r(o)^2
S = 0.3 (33846 gpd/ft) (0.7 day) / 285 ft ^2
S = 0.0875

Where:

T = transmissivity (gpd/ft)
S = coefficient of storage (dimensionless)
Q = pumping rate = 75 gpm
s' = slope of distance-drawdown graph between 1 log cycle = 1.17 ft
t = time since pumping started (days) = 0.7 days
r(o) = intercept of extended straight line at zero drawdown (ft) = ~285 ft



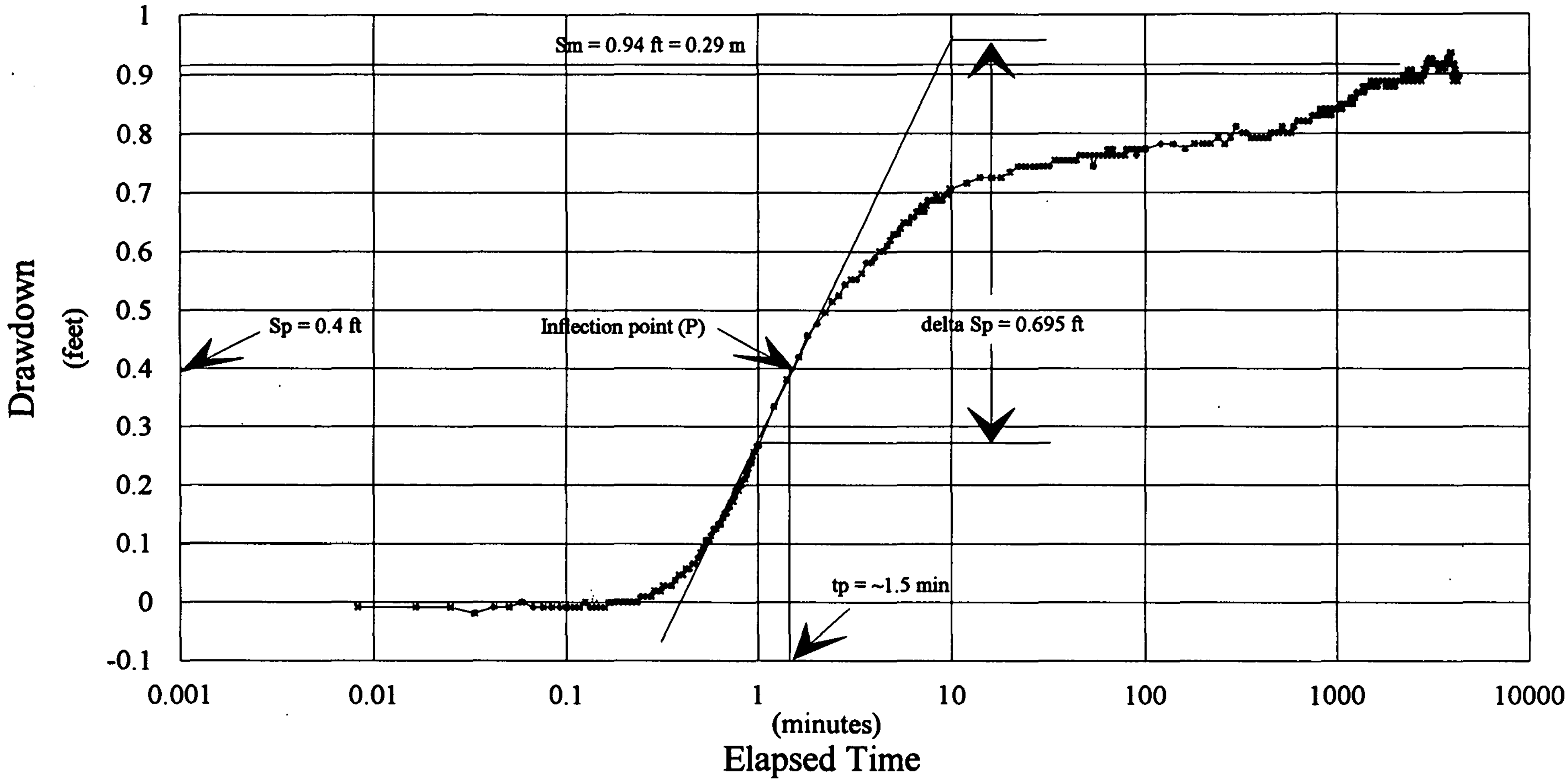
T = 528 Q / s'
T = 528 (75 gpm) / 1.2 ft
T = 33000 gpd/ft
T = 4411 sq ft/day

S = 0.3 T t / r(o)^2
S = 0.3 (33000 gpd/ft) (2.8 day) / 285 ft ^2
S = 0.341

Where:

T = transmissivity (gpd/ft)
S = coefficient of storage (dimensionless)
Q = pumping rate = 75 gpm
s' = slope of distance-drawdown graph between 1 log cycle = 1.2 ft
t = time since pumping started (days) = 2.8 days
r(o) = intercept of extended straight line at zero drawdown (ft) = ~285 ft

HANTUSH IMAGE METHOD
WELL OW-2



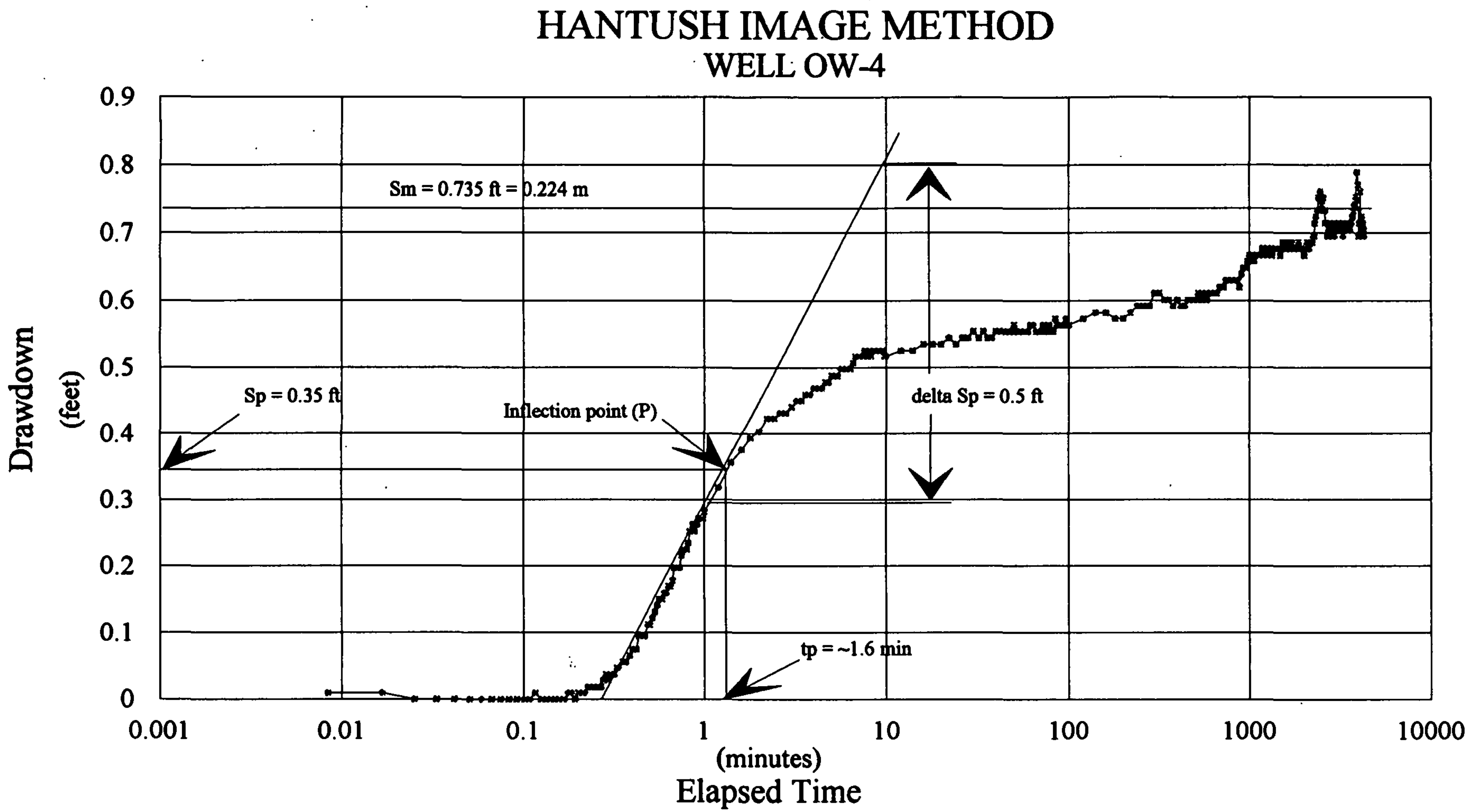
T = Q ln(B) / Sm 2 pie
T = (408.8 m^3/day) ln(2.6) / (0.29 m)(2)(3.14)
T = 214 sq m/day
T = 2304 sq ft/day

Sp = Q W(Up,fB) / 4 pie T
Sp = 408.8 m^3day)(0.796) / (4)(3.14)(214 m^2/day)
Sp = 0.12 m = 0.4 ft

S = Up 4 T tp / r^2
S = (0.332)(4)(214 m^2/day)(1.6 min) / (13.72m)(1440)
S = 0.023

4z^2 - 4xz - r^2 (B^2-1) = 0
4z (z-x) = 11664
z = 71 ft

Where:
B = 2.6 (from tables)
Up = .332 (from tables)
W(Up,fB) = 0.796 (from tables)
Sm = max. extrapolated drawdown = 0.94 ft = 0.
Q = pumping rate = 75 gpm = 408.8 m^3/day
delta Sp = drawdown diff. per log cycle = 0.695 f
x = coordinate distance of OW from EW-1 = 30 f
z = distance (ft) from EW-1 to recharge boundary



T = Q ln(B) / Sm 2 pie
T = (408.8 m^3/day) ln(3.5) / (0.224 m)(2)(3.14)
T = 363 sq m/day
T = 3916 sq ft/day

Sp = Q W(Up,fB) / 4 pie T
Sp = 408.8 m^3day)(1.18) / (4)(3.14)(363 m^2/day)
Sp = 0.106 m = 0.35 ft

S = Up 4 T tp / r^2
S = (0.223)(4)(363 m^2/day)(1.6 min) / (24.4m)(1440)
S = 0.015

4z^2 - 4xz - r^2 (B^2-1) = 0
4z (z-x) = 72000
z = ~108 ft

Where:
B = 3.5 (from tables)
Up = .223 (from tables)
W(Up,fB) = 0.1.18 (from tables)
Sm = max. extrapolated drawdown = 0.735 ft = 0
Q = pumping rate = 75 gpm = 408.8 m^3/day
delta Sp = drawdown diff. per log cycle = 0.5 ft
x = coordinate distance of OW from EW-1 = -60
z = distance (ft) from EW-1 to recharge boundary

APPENDIX D

D.1 AQUIX CURVE MATCHING GRAPHS
D.2 JACOB STRAIGHT-LINE GRAPHS

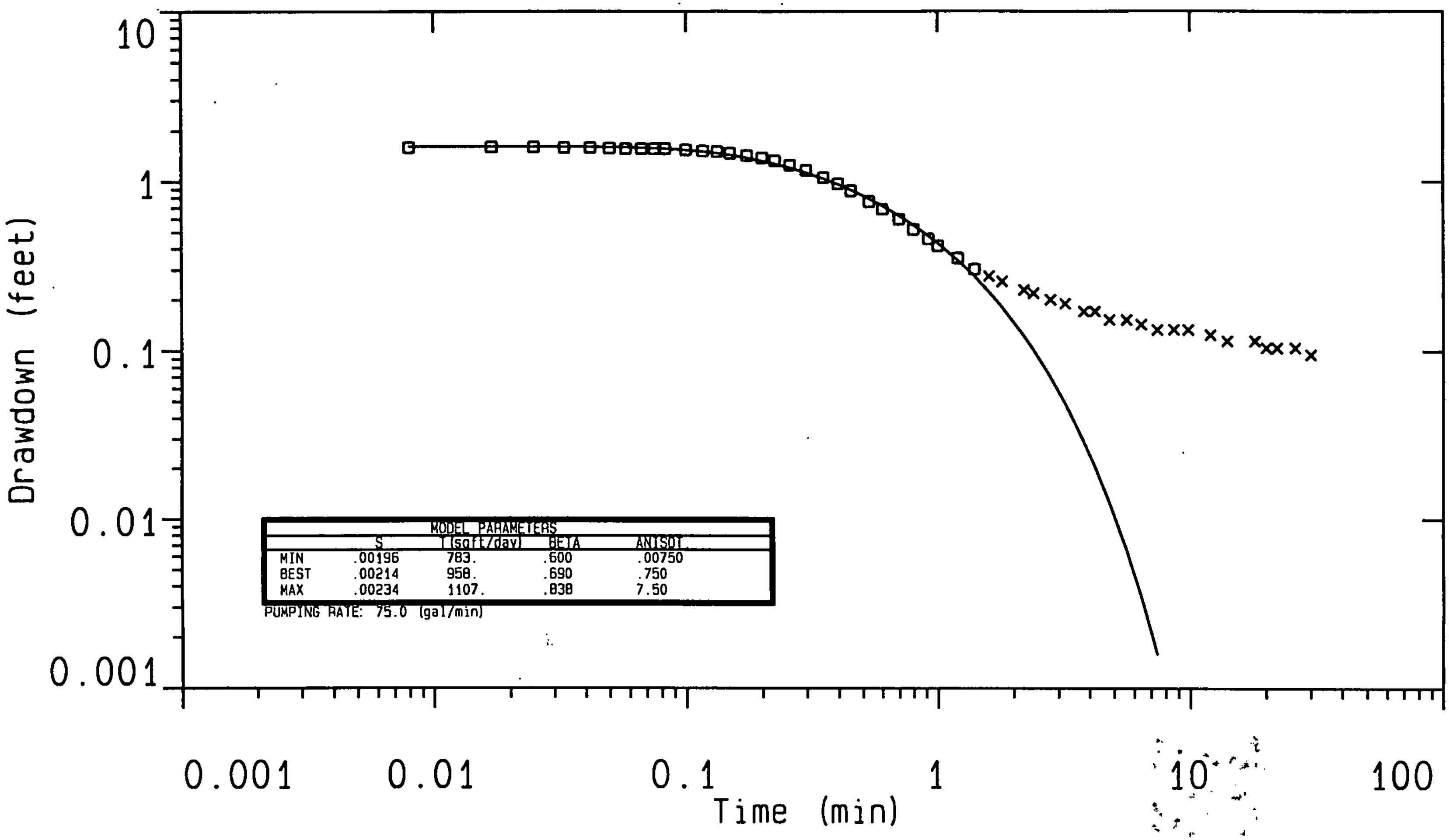


Plate: 1

for: US EPA

by: IGWMC

Aquifer: Outwash

Thickness: 40.0 Depth: 44.0 feet

Screen: Base: 41.0 Top: 0.00 feet

Distance: 15.0 feet Pumping well: EW-01

Pump Test Recovery Data

Stoughton Landfill
Dane County

Date: 25-MAR-95

Well No.: OW-1

DATA SET: OW-1 REC

CLIENT:	US EPA	DATE:	25-MAR-95
LOCATION:	Stoughton Landfill	WELL NO.:	OW-1
COUNTY:	Dane County	FLOW RATE:	75.00 gal/min
PROJECT:	Pump Test Recovery Data	WELL DEPTH:	44.00 feet
AQUIFER:	Outwash	THICKNESS:	40.00 feet
WATER TABLE:	0.00 feet	DURATION OF PUMPING:	4300.00 min
PUMPING WELL No:	EW-01	RADIUS FROM PUMPED WELL:	15.00 feet

RADIUS OF WELL CASING: 1.000 in

The following depths are from top of Aquifer:

PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet

OBSERVATION WELL: SCREENED FROM 7.00 TO 17.00 feet

FITTING ERROR: 3.446 PERCENT

Hantush, 1964: Par. Pen. Confined Leaky Aquifer

MODEL PARAMETERS:

STORAGE COEF: 2.142E-03 FREE   TRANSM: 957.890 sqft/day FREE   BETA: 0.69011 FREE

ANISOTROPY [SQRT(Kz/Kr)]: 0.75000 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	1.965E-03	2.142E-03	2.347E-03
TRANSM:	783.153	957.890	1107.564
BETA:	0.600	0.690	0.838
ANISOTR.:	0.008	0.750	7.500

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	BETA	ANISOTR.	FIT (%)
2.347E-03	869.097	0.77259	0.750	4.198
1.965E-03	1050.331	0.62013	0.750	4.135

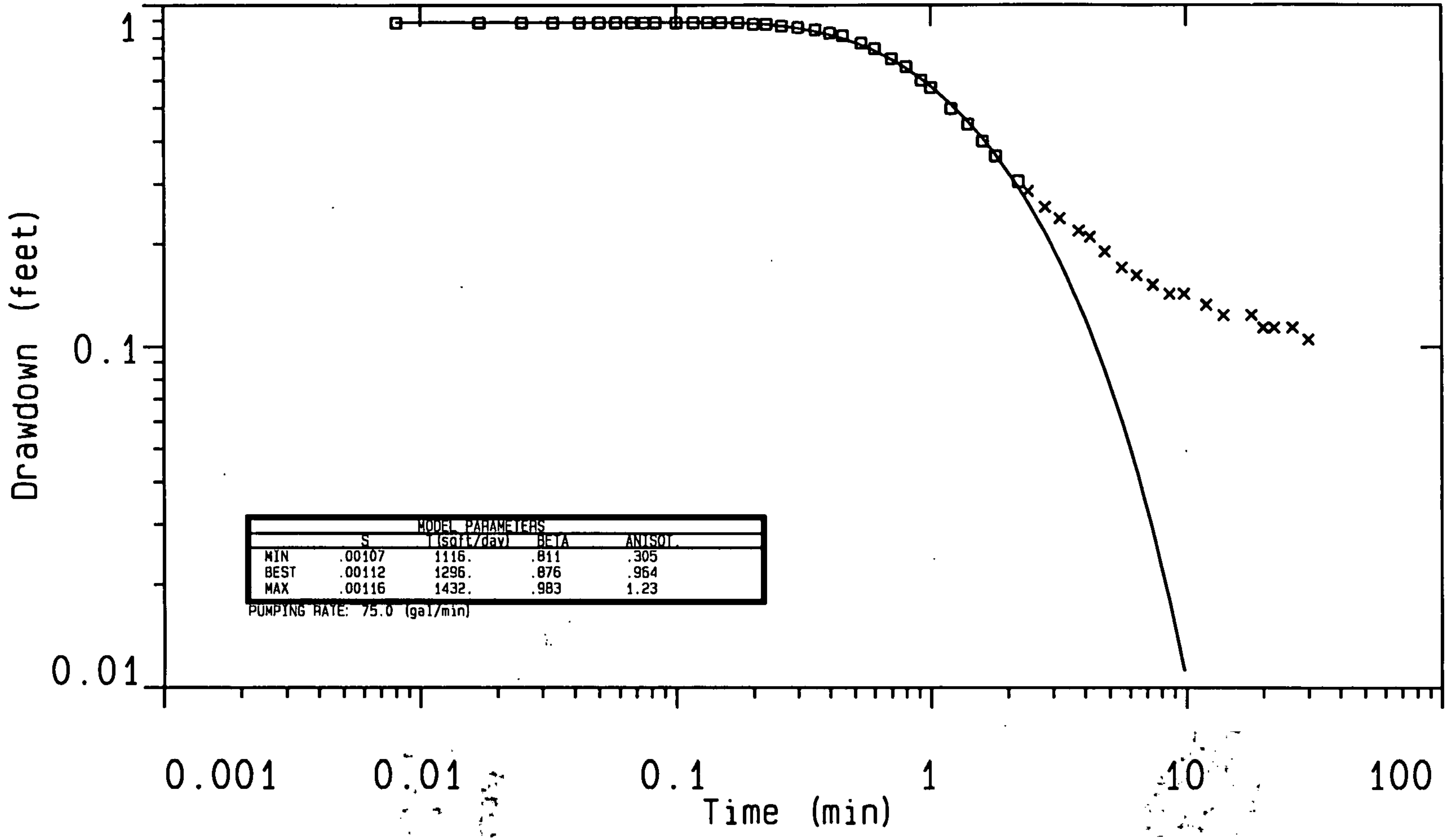
2.049E-03	1107.564	0.60010	0.750	4.187
2.278E-03	783.153	0.83774	0.750	4.163
2.293E-03	796.260	0.82813	0.750	4.136
2.070E-03	1050.621	0.62998	0.750	3.718
2.142E-03	957.890	0.69011	7.500	3.446
2.142E-03	957.890	0.69011	0.008	3.446

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	1.58	1.60	-1.35
2	0.0170	1.59	1.60	-0.782
3	0.0250	1.59	1.60	-0.774
4	0.0330	1.58	1.60	-1.31
5	0.0420	1.58	1.60	-1.16
6	0.0500	1.57	1.59	-1.57
7	0.0580	1.56	1.59	-1.77
8	0.0670	1.56	1.58	-1.17
9	0.0750	1.56	1.57	-0.559
10	0.0830	1.55	1.56	-0.474
11	0.100	1.53	1.53	0.191
12	0.117	1.51	1.50	1.09
13	0.133	1.49	1.46	2.02
14	0.150	1.46	1.43	2.58
15	0.175	1.42	1.37	3.19
16	0.200	1.38	1.32	4.31
17	0.225	1.32	1.27	4.13
18	0.258	1.25	1.20	3.60
19	0.300	1.16	1.12	3.19
20	0.350	1.05	1.04	1.62
21	0.400	0.973	0.964	0.866
22	0.450	0.887	0.894	-0.895
23	0.533	0.763	0.793	-4.03
24	0.600	0.687	0.722	-5.22
25	0.700	0.601	0.631	-5.11
26	0.800	0.524	0.555	-5.92
27	0.917	0.458	0.479	-4.77
28	1.00	0.419	0.434	-3.62
29	1.20	0.353	0.344	2.52
30	1.40	0.305	0.275	9.61
31	1.60	0.276	0.222	
32	1.80	0.257	0.181	
33	2.20	0.229	0.122	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
34	2.40	0.219	0.100	
35	2.80	0.200	0.0696	
36	3.20	0.190	0.0485	
37	3.80	0.171	0.0287	
38	4.20	0.171	0.0204	
39	4.80	0.152	0.0124	
40	5.60	0.152	0.00656	
41	6.40	0.143	0.00346	
42	7.40	0.133	0.00157	
43	8.60	0.133	6.317E-04	
44	9.80	0.133	2.583E-04	
45	12.00	0.124	4.659E-05	
46	14.00	0.114	6.772E-06	
47	18.00	0.114	1.169E-06	
48	20.00	0.104	9.302E-07	
49	22.00	0.104	5.726E-07	
50	26.00	0.104	9.578E-08	
51	30.00	0.0950	1.000E-20	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00			
T	0.00	1.00		
B	0.00	0.00	1.00	
A	0.00	0.00	0.00	0.00
	S	T	B	A



MODEL PARAMETERS				
	S	T (sqft/day)	BETA	ANISOT.
MIN	.00107	1116.	.811	.305
BEST	.00112	1296.	.876	.964
MAX	.00116	1432.	.983	1.23

PUMPING RATE: 75.0 (gal/min)

Plate: 1

for: US EPA	Pump Test Recovery Data
by: IGWMC	Stoughton Landfill Dane County
Aquifer: Outwash Thickness: 42.0 Depth: 39.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 45.0 feet Pumping well: EW-01	Date: 25-MAR-95 | Well No.: OW-2

DATA SET: OW-2REC

CLIENT: US EPA
LOCATION: Stoughton Landfill
COUNTY: Dane County
PROJECT: Pump Test Recovery Data
AQUIFER: Outwash
WATER TABLE: 0.08 feet
PUMPING WELL No: EW-01

DATE: 25-MAR-95
WELL NO.: OW-2
FLOW RATE: 75.00 gal/min
WELL DEPTH: 39.00 feet
THICKNESS: 42.00 feet
DURATION OF PUMPING: 4300.00 min
RADIUS FROM PUMPED WELL: 45.00 feet

RADIUS OF WELL CASING: 1.000 in
The following depths are from top of Aquifer:
PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet
OBSERVATION WELL: SCREENED FROM 7.00 TO 17.00 feet

FITTING ERROR: 1.190 PERCENT

Hantush, 1964: Par. Pen. Confined Leaky Aquifer

MODEL PARAMETERS:

STORAGE COEF: 1.122E-03 FREE
TRANSM: 1296.848 sqft/day FREE
BETA: 0.87616 FREE
ANISOTROPY [SQRT(Kz/Kr)]: 0.96448 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	1.077E-03	1.122E-03	1.162E-03
TRANSM:	1116.142	1296.848	1432.898
BETA:	0.811	0.876	0.983
ANISOTR.:	0.305	0.964	1.230

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	BETA	ANISOTR.	FIT (%)
1.162E-03	1391.675	0.83379	1.230	1.406
1.077E-03	1192.651	0.92925	0.722	1.420

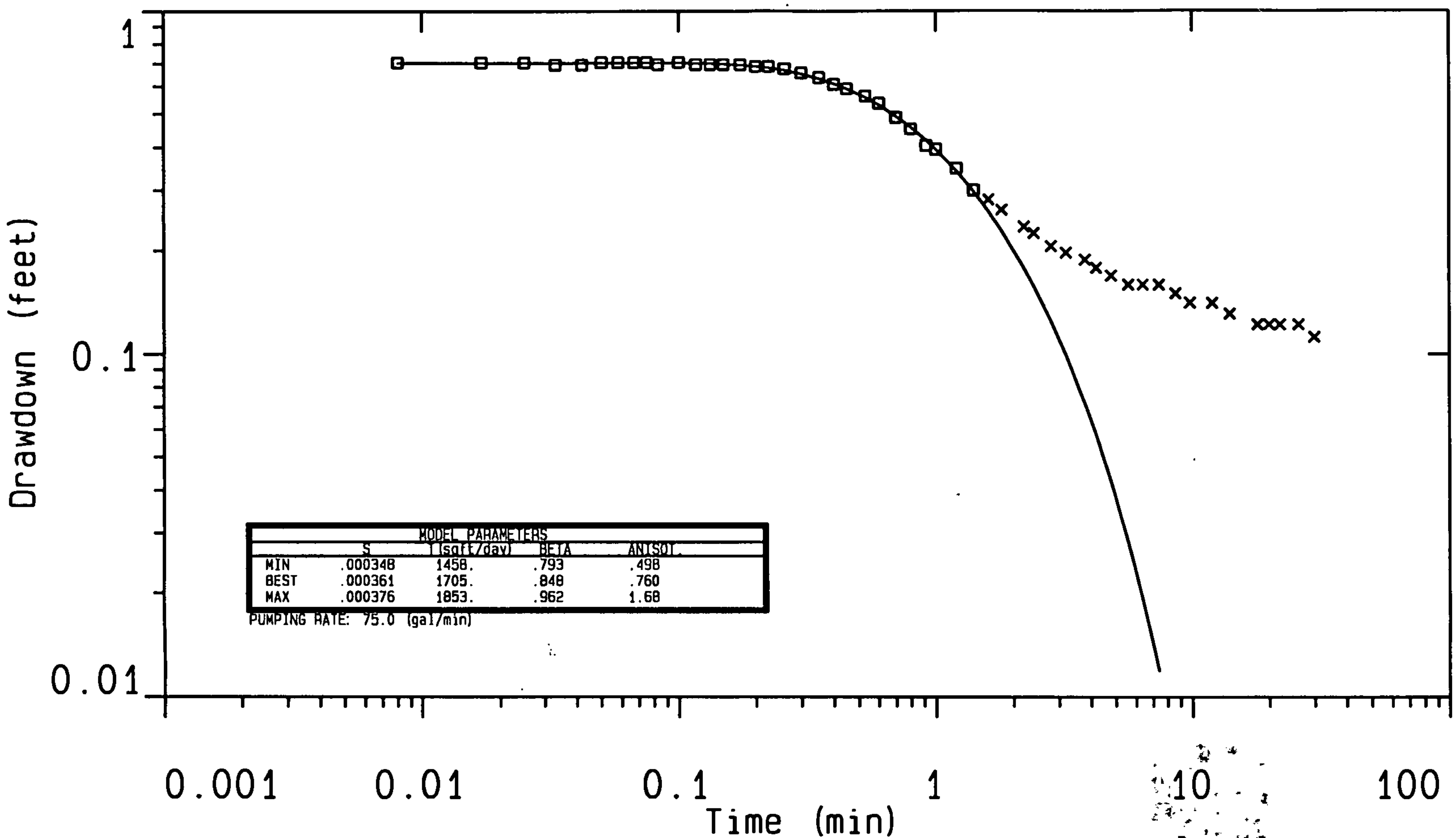
1.142E-03	1431.544	0.81216	0.936	1.434
1.093E-03	1116.142	0.98313	1.009	1.443
1.097E-03	1124.153	0.97848	1.053	1.428
1.141E-03	1432.898	0.81114	0.907	1.430
1.122E-03	1296.848	0.87616	0.964	1.194
1.112E-03	1302.983	0.86974	0.305	1.416

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	0.887	0.889	-0.318
2	0.0170	0.887	0.889	-0.318
3	0.0250	0.887	0.889	-0.318
4	0.0330	0.887	0.889	-0.318
5	0.0420	0.887	0.889	-0.318
6	0.0500	0.887	0.889	-0.318
7	0.0580	0.887	0.889	-0.318
8	0.0670	0.887	0.889	-0.317
9	0.0750	0.887	0.889	-0.316
10	0.0830	0.887	0.889	-0.311
11	0.100	0.887	0.889	-0.290
12	0.117	0.887	0.889	-0.257
13	0.133	0.887	0.888	-0.183
14	0.150	0.887	0.887	-0.0407
15	0.175	0.887	0.884	0.252
16	0.200	0.878	0.881	-0.369
17	0.225	0.878	0.876	0.200
18	0.258	0.868	0.867	0.0165
19	0.300	0.859	0.855	0.402
20	0.350	0.849	0.838	1.27
21	0.400	0.830	0.818	1.39
22	0.450	0.811	0.797	1.61
23	0.533	0.773	0.762	1.31
24	0.600	0.744	0.733	1.36
25	0.700	0.696	0.691	0.642
26	0.800	0.658	0.651	1.00
27	0.917	0.601	0.606	-0.983
28	1.00	0.572	0.577	-0.910
29	1.20	0.496	0.512	-3.29
30	1.40	0.448	0.456	-1.79
31	1.60	0.400	0.406	-1.73
32	1.80	0.362	0.364	-0.565
33	2.20	0.305	0.293	3.73

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
34	2.40	0.286	0.264	
35	2.80	0.257	0.216	
36	3.20	0.238	0.177	
37	3.80	0.219	0.133	
38	4.20	0.210	0.111	
39	4.80	0.190	0.0852	
40	5.60	0.171	0.0602	
41	6.40	0.162	0.0431	
42	7.40	0.152	0.0287	
43	8.60	0.143	0.0178	
44	9.80	0.143	0.0112	
45	12.00	0.133	0.00492	
46	14.00	0.124	0.00239	
47	18.00	0.124	5.608E-04	
48	20.00	0.114	2.729E-04	
49	22.00	0.114	1.342E-04	
50	26.00	0.114	3.511E-05	
51	30.00	0.105	9.245E-06	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00			
T	0.00	0.99		
B	0.00	0.01	0.99	
A	-0.01	0.00	-0.01	0.00
	S	T	B	A



MODEL PARAMETERS				
	S	T(sqft/day)	BETA	ANISOT.
MIN	.000348	1458.	.793	.498
BEST	.000361	1705.	.848	.760
MAX	.000376	1853.	.962	1.68

PUMPING RATE: 75.0 (gal/min)

Plate: 1

for: US EPA	Pump Test Recovery Data
by: IGWMC	Stoughton Landfill Dane County
Aquifer: Outwash Thickness: 52.0 Depth: 39.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 80.0 feet Pumping well: EW-01	Date: 25-MAR-95 / Well No.: OW-4

DATA SET: OW-4 REC

CLIENT: US EPA
DATE: 25-MAR-95
LOCATION: Stoughton Landfill
WELL NO.: OW-4
COUNTY: Dane County
FLOW RATE: 75.00 gal/min
PROJECT: Pump Test Recovery Data
WELL DEPTH: 39.00 feet
AQUIFER: Outwash
THICKNESS: 52.00 feet
WATER TABLE: 0.47 feet
DURATION OF PUMPING: 4300.00 min
PUMPING WELL No: EW-01
RADIUS FROM PUMPED WELL: 80.00 feet
RADIUS OF WELL CASING: 1.000 in
The following depths are from top of Aquifer:
PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet
OBSERVATION WELL: SCREENED FROM 14.00 TO 24.00 feet

FITTING ERROR: 0.991 PERCENT

Hantush, 1964: Par. Pen. Confined Leaky Aquifer

MODEL PARAMETERS:

STORAGE COEF: 3.615E-04 FREE
TRANSM: 1705.331 sqft/day FREE
BETA: 0.84800 FREE
ANISOTROPY [SQRT(Kz/Kr)]: 0.76012 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	3.481E-04	3.615E-04	3.765E-04
TRANSM:	1458.322	1705.331	1853.873
BETA:	0.793	0.848	0.962
ANISOTR.:	0.498	0.760	1.684

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	BETA	ANISOTR.	FIT (%)
3.765E-04	1783.906	0.82546	1.197	1.181
3.481E-04	1635.307	0.86953	0.498	1.195

3.666E-04	1853.873	0.79297	0.658	1.177
3.521E-04	1458.322	0.96159	0.996	1.197
3.551E-04	1477.594	0.95311	1.094	1.177
3.651E-04	1845.675	0.79505	0.622	1.196
3.714E-04	1659.018	0.87606	1.684	1.208
3.568E-04	1728.302	0.83469	0.516	1.199

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	0.705	0.702	0.308
2	0.0170	0.705	0.702	0.308
3	0.0250	0.705	0.702	0.308
4	0.0330	0.695	0.702	-1.12
5	0.0420	0.695	0.702	-1.12
6	0.0500	0.705	0.702	0.309
7	0.0580	0.705	0.702	0.311
8	0.0670	0.705	0.702	0.316
9	0.0750	0.705	0.702	0.322
10	0.0830	0.695	0.702	-1.09
11	0.100	0.705	0.702	0.424
12	0.117	0.695	0.701	-0.878
13	0.133	0.695	0.699	-0.668
14	0.150	0.695	0.697	-0.326
15	0.175	0.695	0.692	0.326
16	0.200	0.686	0.687	-0.168
17	0.225	0.686	0.680	0.857
18	0.258	0.677	0.669	1.15
19	0.300	0.658	0.654	0.605
20	0.350	0.639	0.634	0.754
21	0.400	0.611	0.613	-0.338
22	0.450	0.592	0.591	0.0209
23	0.533	0.564	0.557	1.18
24	0.600	0.535	0.530	0.921
25	0.700	0.488	0.491	-0.747
26	0.800	0.451	0.456	-1.18
27	0.917	0.404	0.418	-3.60
28	1.00	0.394	0.393	0.0170
29	1.20	0.347	0.341	1.57
30	1.40	0.300	0.297	0.835
31	1.60	0.282	0.260	
32	1.80	0.263	0.228	
33	2.20	0.235	0.177	

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
34	2.40	0.225	0.157	
35	2.80	0.206	0.124	
36	3.20	0.197	0.0990	
37	3.80	0.188	0.0712	
38	4.20	0.178	0.0576	
39	4.80	0.169	0.0422	
40	5.60	0.159	0.0281	
41	6.40	0.159	0.0190	
42	7.40	0.159	0.0118	
43	8.60	0.150	0.00683	
44	9.80	0.141	0.00395	
45	12.00	0.141	0.00149	
46	14.00	0.131	6.360E-04	
47	18.00	0.122	1.134E-04	
48	20.00	0.122	4.524E-05	
49	22.00	0.122	1.729E-05	
50	26.00	0.122	3.460E-06	
51	30.00	0.112	1.493E-06	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

	S	T	B	A
S	1.00			
T	0.00	0.98		
B	0.00	0.02	0.99	
A	-0.03	0.03	-0.04	0.01

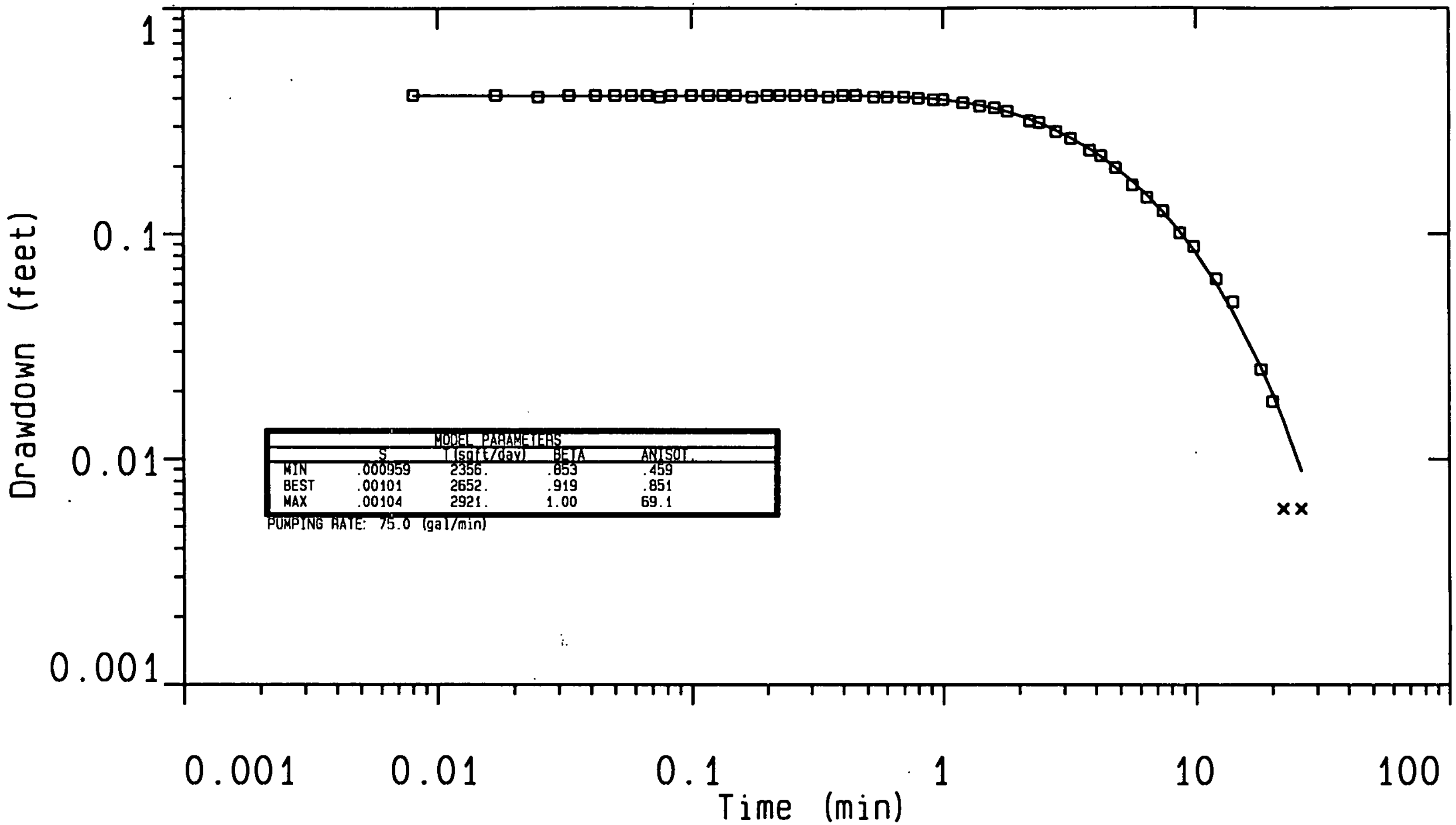


Plate: 1

for: US EPA	Pump Test Recovery Data
by: IGWMC	Stoughton Landfill Dane County
Aquifer: Outwash Thickness: 52.0 Depth: 28.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 124. feet Pumping well: EW-01	Date: 25-MAR-95 / Well No.: MW-9S

DATA SET: MW9SREC

CLIENT: US EPA
LOCATION: Stoughton Landfill
COUNTY: Dane County
PROJECT: Pump Test Recovery Data
AQUIFER: Outwash
WATER TABLE: 0.30 feet
PUMPING WELL No: EW-01

DATE: 25-MAR-95
WELL NO.: MW-9S
FLOW RATE: 75.00 gal/min
WELL DEPTH: 28.00 feet
THICKNESS: 52.00 feet
DURATION OF PUMPING: 4300.00 min
RADIUS FROM PUMPED WELL: 124.00 feet

RADIUS OF WELL CASING: 1.000 in
The following depths are from top of Aquifer:
PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet
OBSERVATION WELL: SCREENED FROM 0.00 TO 10.00 feet

FITTING ERROR: 2.322 PERCENT

Hantush, 1964: Par. Pen. Confined Leaky Aquifer

MODEL PARAMETERS:

STORAGE COEF: 1.010E-03 FREE
TRANSM: 2652.135 sqft/day FREE
BETA: 0.91854 FREE
ANISOTROPY [SQRT(Kz/Kr)]: 0.85110 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	9.594E-04	1.010E-03	1.049E-03
TRANSM:	2356.613	2652.135	2920.983
BETA:	0.853	0.919	1.006
ANISOTR.:	0.459	0.851	69.075

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	BETA	ANISOTR.	FIT (%)
1.049E-03	2560.395	0.95335	1.349	2.781
9.594E-04	2780.374	0.87384	0.459	2.806

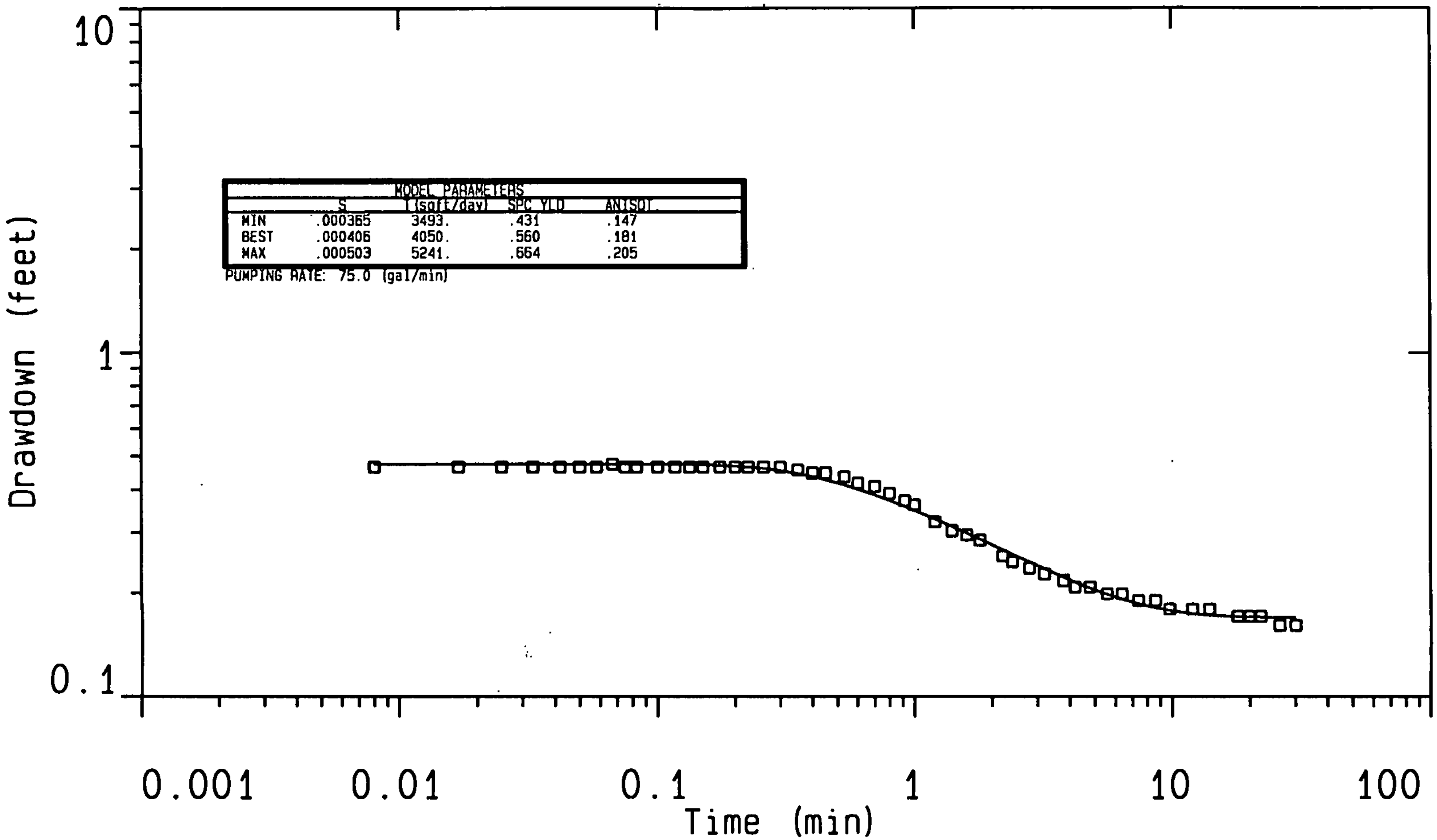
9.956E-04	2920.983	0.85330	0.733	2.794
1.027E-03	2356.613	1.00519	1.023	2.802
1.033E-03	2360.947	1.00621	1.129	2.824
9.911E-04	2909.317	0.85426	0.680	2.752
1.049E-03	2569.725	0.95379	69.075	2.785
1.005E-03	2663.119	0.91402	0.479	2.534

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	0.411	0.409	0.485
2	0.0170	0.411	0.409	0.485
3	0.0250	0.405	0.409	-0.988
4	0.0330	0.411	0.409	0.485
5	0.0420	0.411	0.409	0.485
6	0.0500	0.411	0.409	0.486
7	0.0580	0.411	0.409	0.486
8	0.0670	0.411	0.409	0.485
9	0.0750	0.405	0.409	-0.988
10	0.0830	0.411	0.409	0.485
11	0.100	0.411	0.409	0.485
12	0.117	0.411	0.409	0.486
13	0.133	0.411	0.409	0.486
14	0.150	0.411	0.409	0.486
15	0.175	0.405	0.409	-0.988
16	0.200	0.411	0.409	0.486
17	0.225	0.411	0.409	0.487
18	0.258	0.411	0.408	0.489
19	0.300	0.411	0.408	0.494
20	0.350	0.405	0.408	-0.953
21	0.400	0.411	0.408	0.569
22	0.450	0.411	0.408	0.635
23	0.533	0.405	0.407	-0.626
24	0.600	0.405	0.406	-0.328
25	0.700	0.405	0.403	0.260
26	0.800	0.398	0.400	-0.735
27	0.917	0.392	0.396	-1.08
28	1.00	0.392	0.392	-0.106
29	1.20	0.379	0.382	-0.848
30	1.40	0.367	0.370	-1.02
31	1.60	0.360	0.358	0.425
32	1.80	0.348	0.346	0.555
33	2.20	0.316	0.321	-1.75

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
34	2.40	0.310	0.309	0.141
35	2.80	0.284	0.286	-0.953
36	3.20	0.265	0.265	-0.241
37	3.80	0.234	0.237	-1.29
38	4.20	0.221	0.219	0.502
39	4.80	0.196	0.196	-0.439
40	5.60	0.164	0.170	-3.96
41	6.40	0.145	0.148	-2.23
42	7.40	0.126	0.125	0.782
43	8.60	0.101	0.102	-1.55
44	9.80	0.0880	0.0847	3.71
45	12.00	0.0630	0.0603	4.15
46	14.00	0.0500	0.0449	10.20
47	18.00	0.0250	0.0255	-2.15
48	20.00	0.0180	0.0194	-7.91
49	22.00	0.00600	0.0148	
50	26.00	0.00600	0.00881	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	1.00			
T	0.00	1.00		
B	0.00	0.00	1.00	
A	-0.01	0.01	-0.01	0.01
	S	T	B	A



MODEL PARAMETERS	S	T (sqft/day)	SPC YLD	ANISOT.
MIN	.000365	3493.	.431	.147
BEST	.000406	4050.	.560	.181
MAX	.000503	5241.	.664	.205

PUMPING RATE: 75.0 (gal/min)

Plate: 1

for: US EPA	Pump Test Recovery Data
by: IGWMC	Stoughton Landfill Dane County
Aquifer: Outwash Thickness: 52.0 Depth: 44.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 124. feet Pumping well: EW-01	Date: 25-MAR-95 — Well No.: MW-9I

DATA SET: MW9IREC

CLIENT:	US EPA	DATE:	25-MAR-95
LOCATION:	Stoughton Landfill	WELL NO.:	MW-9I
COUNTY:	Dane County	FLOW RATE:	75.00 gal/min
PROJECT:	Pump Test Recovery Data	WELL DEPTH:	44.00 feet
AQUIFER:	Outwash	THICKNESS:	52.00 feet
WATER TABLE:	0.63 feet	DURATION OF PUMPING:	4300.00 min
PUMPING WELL No:	EW-01	RADIUS FROM PUMPED WELL:	124.00 feet

RADIUS OF WELL CASING: 1.000 in

The following depths are from top of Aquifer:

PUMPING WELL: SCREENED FROM 0.00 TO 41.00 feet

OBSERVATION WELL: SCREENED FROM 16.00 TO 26.00 feet

FITTING ERROR: 2.958 PERCENT

Neuman, 1975: Par. Pen. Unconfined Aquifer

MODEL PARAMETERS:

STORAGE COEF: 4.066E-04 FREE TRANSM: 4050.796 sqft/day FREE

ANISOTROPY [SQRT(Kz/Kr)]: 0.18094 FREE

SPECIFIC YIELD: 5.601E-01 FREE

PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	3.654E-04	4.066E-04	5.032E-04
TRANSM:	3493.445	4050.796	5241.224
SPC. YIELD:	0.432	0.560	0.664
ANISOTR.:	0.148	0.181	0.205

EQUIVALENT MODELS:

STORAGE	TRANSMISS. (sqft/day)	SPC. YIELD	ANISOTR.	FIT (%)
5.032E-04	5241.224	0.43162	0.148	3.585

3.654E-04	3561.183	0.63810	0.200	3.106
4.302E-04	4664.361	0.47692	0.161	3.134
3.842E-04	3517.942	0.65787	0.203	2.985
3.872E-04	3531.093	0.65717	0.203	2.992
4.269E-04	4646.990	0.47743	0.161	3.135
3.843E-04	3493.445	0.66415	0.205	3.030
4.301E-04	4697.069	0.47241	0.160	3.159

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	0.466	0.474	-1.82
2	0.0170	0.466	0.474	-1.82
3	0.0250	0.466	0.474	-1.82
4	0.0330	0.466	0.474	-1.82
5	0.0420	0.466	0.474	-1.82
6	0.0500	0.466	0.474	-1.82
7	0.0580	0.466	0.474	-1.82
8	0.0670	0.475	0.474	0.104
9	0.0750	0.466	0.474	-1.82
10	0.0830	0.466	0.474	-1.81
11	0.100	0.466	0.474	-1.77
12	0.117	0.466	0.473	-1.69
13	0.133	0.466	0.473	-1.57
14	0.150	0.466	0.472	-1.38
15	0.175	0.466	0.470	-0.986
16	0.200	0.466	0.468	-0.467
17	0.225	0.466	0.465	0.168
18	0.258	0.466	0.460	1.15
19	0.300	0.466	0.453	2.58
20	0.350	0.456	0.445	2.32
21	0.400	0.447	0.436	2.35
22	0.450	0.447	0.427	4.36
23	0.533	0.437	0.412	5.51
24	0.600	0.418	0.401	3.87
25	0.700	0.409	0.386	5.51
26	0.800	0.390	0.372	4.49
27	0.917	0.371	0.357	3.53
28	1.00	0.361	0.348	3.44
29	1.20	0.323	0.329	-1.87
30	1.40	0.304	0.312	-2.88
31	1.60	0.295	0.298	-1.34

No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
32	1.80	0.285	0.287	-0.777
33	2.20	0.256	0.268	-4.70
34	2.40	0.247	0.260	-5.27
35	2.80	0.237	0.246	-4.02
36	3.20	0.228	0.235	-3.35
37	3.80	0.218	0.222	-2.10
38	4.20	0.209	0.215	-3.17
39	4.80	0.209	0.207	0.859
40	5.60	0.199	0.198	0.212
41	6.40	0.199	0.192	3.47
42	7.40	0.190	0.186	1.96
43	8.60	0.190	0.181	4.53
44	9.80	0.180	0.177	1.13
45	12.00	0.180	0.174	3.19
46	14.00	0.180	0.172	4.22
47	18.00	0.171	0.170	0.223
48	20.00	0.171	0.170	0.429
49	22.00	0.171	0.170	0.568
50	26.00	0.161	0.169	-5.42
51	30.00	0.161	0.169	-5.34

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

S	0.94			
T	-0.07	0.82		
B	0.07	0.21	0.76	
A	0.06	0.15	-0.17	0.87
	S	T	B	A

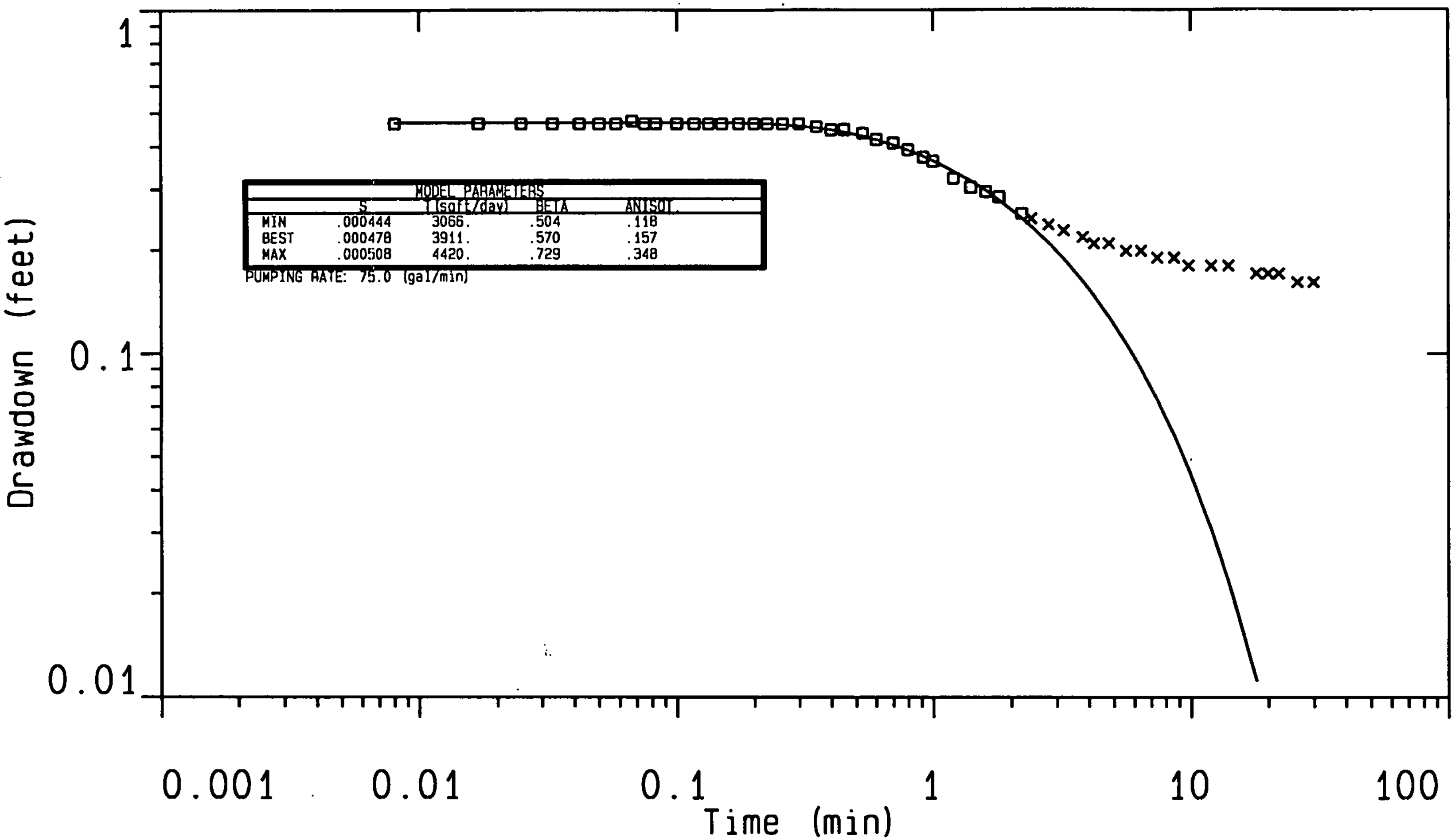


Plate: 1

for: US EPA	Pump Test Recovery Data
by: IGWMC	Stoughton Landfill Dane County
Aquifer: Outwash Thickness: 52.0 Depth: 44.0 feet Screen: Base: 41.0 Top: 0.00 feet Distance: 124. feet Pumping well: EW-01	Date: 25-MAR-95 Well No.: MW-9I

DATA SET: MW9IREC

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      CLIENT: US EPA                                    DATE: 25-MAR-95
    LOCATION: Stoughton Landfill                   WELL NO.: MW-9I
      COUNTY: Dane County                         FLOW RATE:    75.00 gal/min
     PROJECT: Pump Test Recovery Data            WELL DEPTH:    44.00 feet
     AQUIFER: Outwash                             THICKNESS:    52.00 feet
 WATER TABLE:     0.63 feet             DURATION OF PUMPING:  4300.00 min
 PUMPING WELL No: EW-01             RADIUS FROM PUMPED WELL:   124.00 feet
              RADIUS OF WELL CASING:      1.000 in
          The following depths are from top of Aquifer:
 PUMPING WELL: SCREENED FROM     0.00 TO     41.00 feet
OBSERVATION WELL: SCREENED FROM    16.00 TO     26.00 feet
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FITTING ERROR: 1.543 PERCENT

Hantush, 1964: Par. Pen. Confined Leaky Aquifer

MODEL PARAMETERS:

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 STORAGE COEF:  4.779E-04 TRANSM:  3911.050 sqft/day  BETA:    0.57021
                  FREE                FREE                        FREE
       ANISOTROPY [SQRT(Kz/Kr)]:     0.15703
                                      FREE
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PARAMETER BOUNDS FROM EQUIVALENCE ANALYSIS

	MINIMUM	BEST	MAXIMUM
STORAGE:	4.444E-04	4.779E-04	5.085E-04
TRANSM:	3066.785	3911.050	4420.126
BETA:	0.504	0.570	0.729
ANISOTR.:	0.118	0.157	0.348

EQUIVALENT MODELS:

STORAGE	TRANSMISSIVITY (sqft/day)	BETA	ANISOTR.	FIT (%)
5.085E-04	3955.861	0.56552	0.118	1.848
4.444E-04	3859.342	0.57574	0.219	1.859

4.788E-04	4420.126	0.50400	0.179	1.733
4.769E-04	3460.604	0.64513	0.138	1.637
4.765E-04	3066.785	0.72933	0.123	1.863
4.786E-04	4416.704	0.50419	0.177	1.723
4.585E-04	4358.123	0.51476	0.348	1.847
4.839E-04	3785.607	0.58806	0.124	1.873

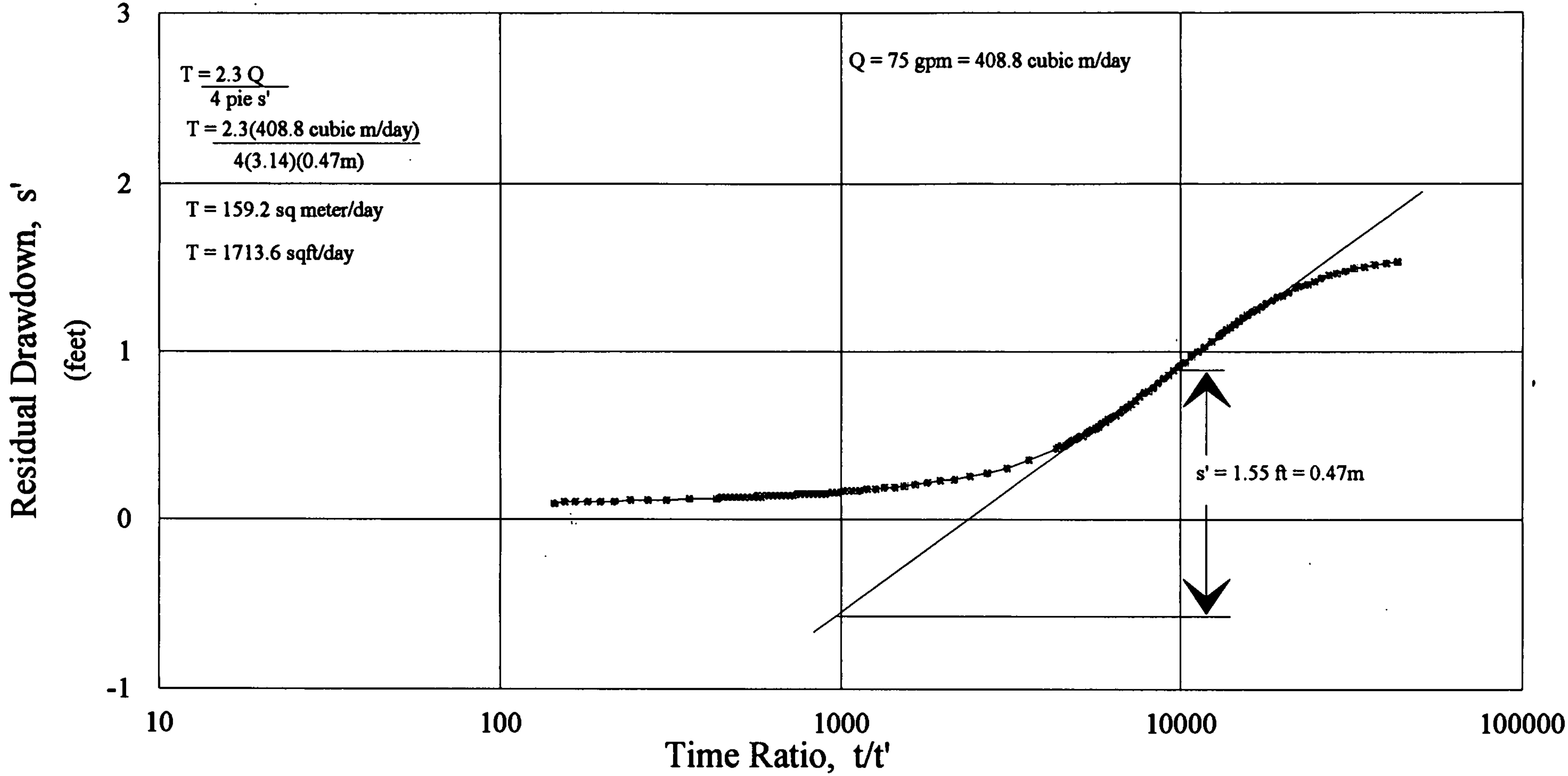
No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
1	0.0080	0.466	0.469	-0.747
2	0.0170	0.466	0.469	-0.747
3	0.0250	0.466	0.469	-0.747
4	0.0330	0.466	0.469	-0.747
5	0.0420	0.466	0.469	-0.747
6	0.0500	0.466	0.469	-0.747
7	0.0580	0.466	0.469	-0.747
8	0.0670	0.475	0.469	1.16
9	0.0750	0.466	0.469	-0.746
10	0.0830	0.466	0.469	-0.744
11	0.100	0.466	0.469	-0.733
12	0.117	0.466	0.469	-0.717
13	0.133	0.466	0.469	-0.677
14	0.150	0.466	0.468	-0.596
15	0.175	0.466	0.467	-0.428
16	0.200	0.466	0.466	-0.194
17	0.225	0.466	0.465	0.146
18	0.258	0.466	0.462	0.726
19	0.300	0.466	0.458	1.58
20	0.350	0.456	0.452	0.686
21	0.400	0.447	0.446	0.152
22	0.450	0.447	0.439	1.68
23	0.533	0.437	0.427	2.14
24	0.600	0.418	0.417	0.0553
25	0.700	0.409	0.403	1.40
26	0.800	0.390	0.389	0.183
27	0.917	0.371	0.373	-0.675
28	1.00	0.361	0.362	-0.490
29	1.20	0.323	0.338	-4.90
30	1.40	0.304	0.317	-4.33
31	1.60	0.295	0.297	-0.814
32	1.80	0.285	0.279	1.93
33	2.20	0.256	0.248	3.05

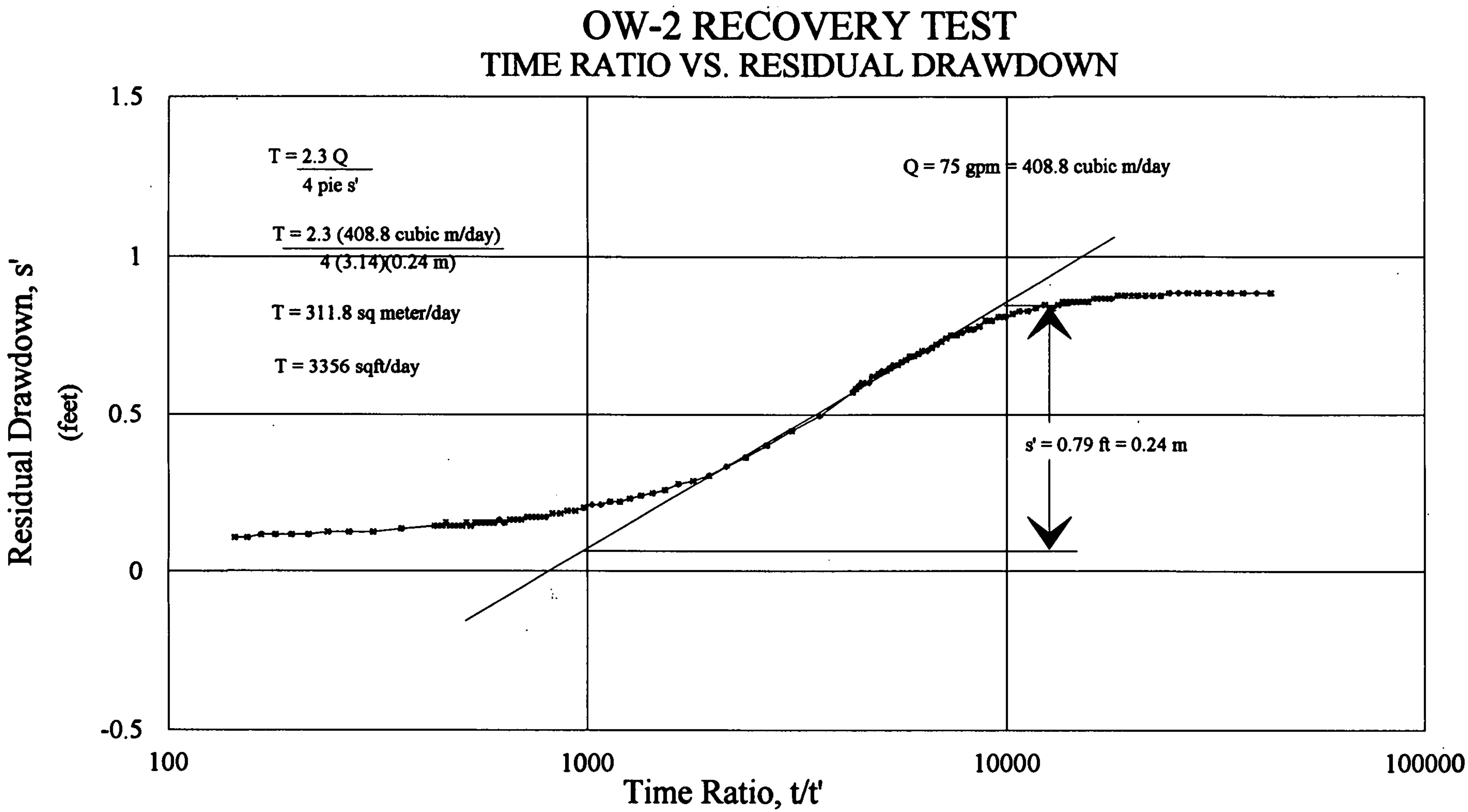
No.	TIME (min)	DRAWDOWN (feet) DATA	SYNTHETIC	DIFFERENCE (percent)
34	2.40	0.247	0.234	
35	2.80	0.237	0.209	
36	3.20	0.228	0.188	
37	3.80	0.218	0.162	
38	4.20	0.209	0.147	
39	4.80	0.209	0.127	
40	5.60	0.199	0.106	
41	6.40	0.199	0.0898	
42	7.40	0.190	0.0730	
43	8.60	0.190	0.0575	
44	9.80	0.180	0.0457	
45	12.00	0.180	0.0306	
46	14.00	0.180	0.0216	
47	18.00	0.171	0.0111	
48	20.00	0.171	0.00808	
49	22.00	0.171	0.00590	
50	26.00	0.161	0.00319	
51	30.00	0.161	0.00177	

PARAMETER RESOLUTION MATRIX:
"*" INDICATES FIXED PARAMETER

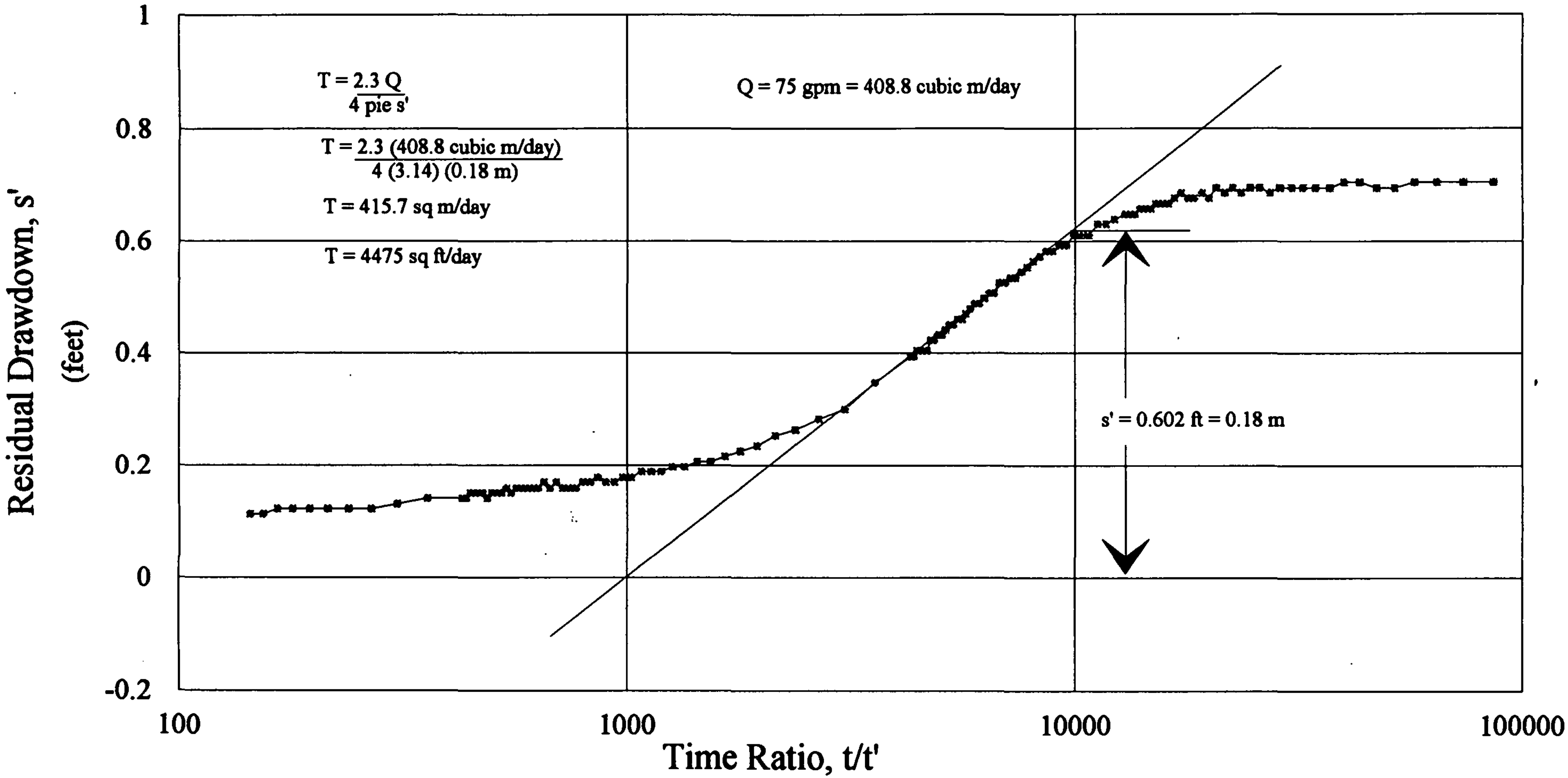
S	0.99			
T	0.00	0.88		
B	0.00	0.12	0.88	
A	0.05	-0.13	0.12	0.08
	S	T	B	A

OW-1 RECOVERY TEST
TIME RATIO VS. RESIDUAL DRAWDOWN

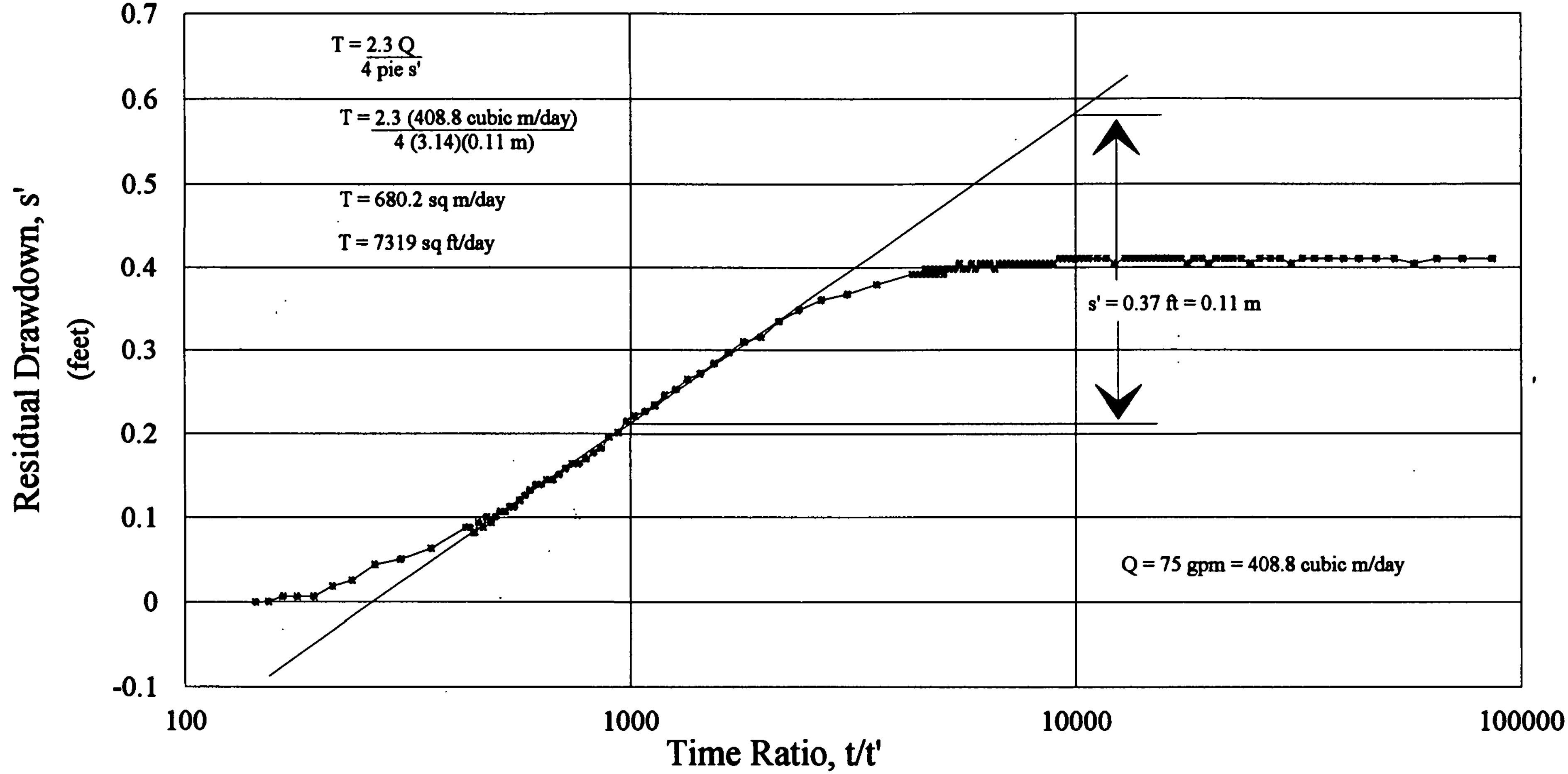



OW-2 RECOVERY TEST
TIME RATIO VS. RESIDUAL DRAWDOWN
T = 2.3 Q / 4 pie s'
T = 2.3 (408.8 cubic m/day) / 4 (3.14)(0.24 m)
T = 311.8 sq meter/day
T = 3356 sqft/day
Q = 75 gpm = 408.8 cubic m/day
s' = 0.79 ft = 0.24 m
Residual Drawdown, s' (feet)
Time Ratio, t/t'
1.5
1
0.5
0
-0.5
100
1000
10000
100000

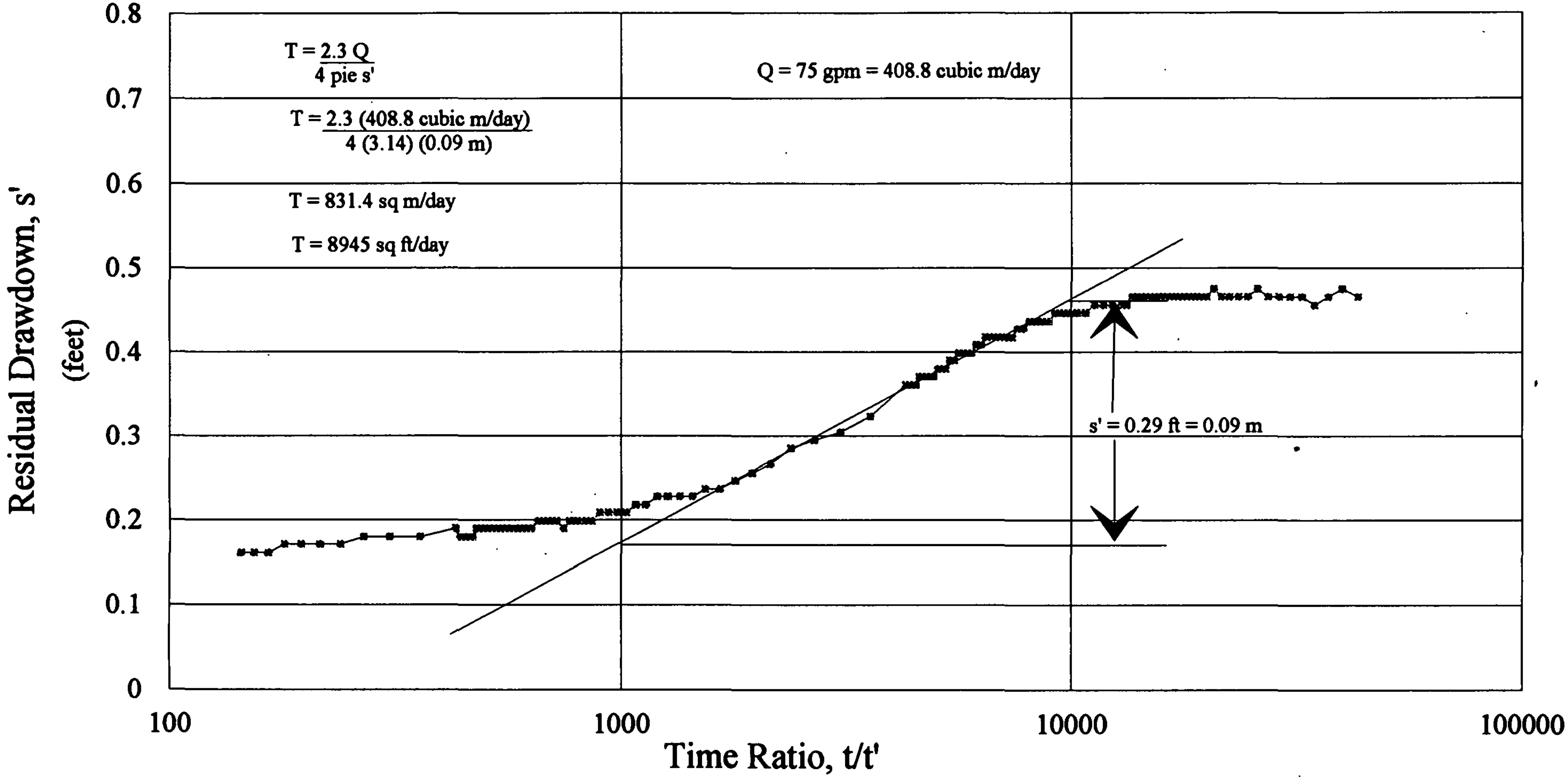
OW-4 RECOVERY TEST
TIME RATIO VS. RESIDUAL DRAWDOWN

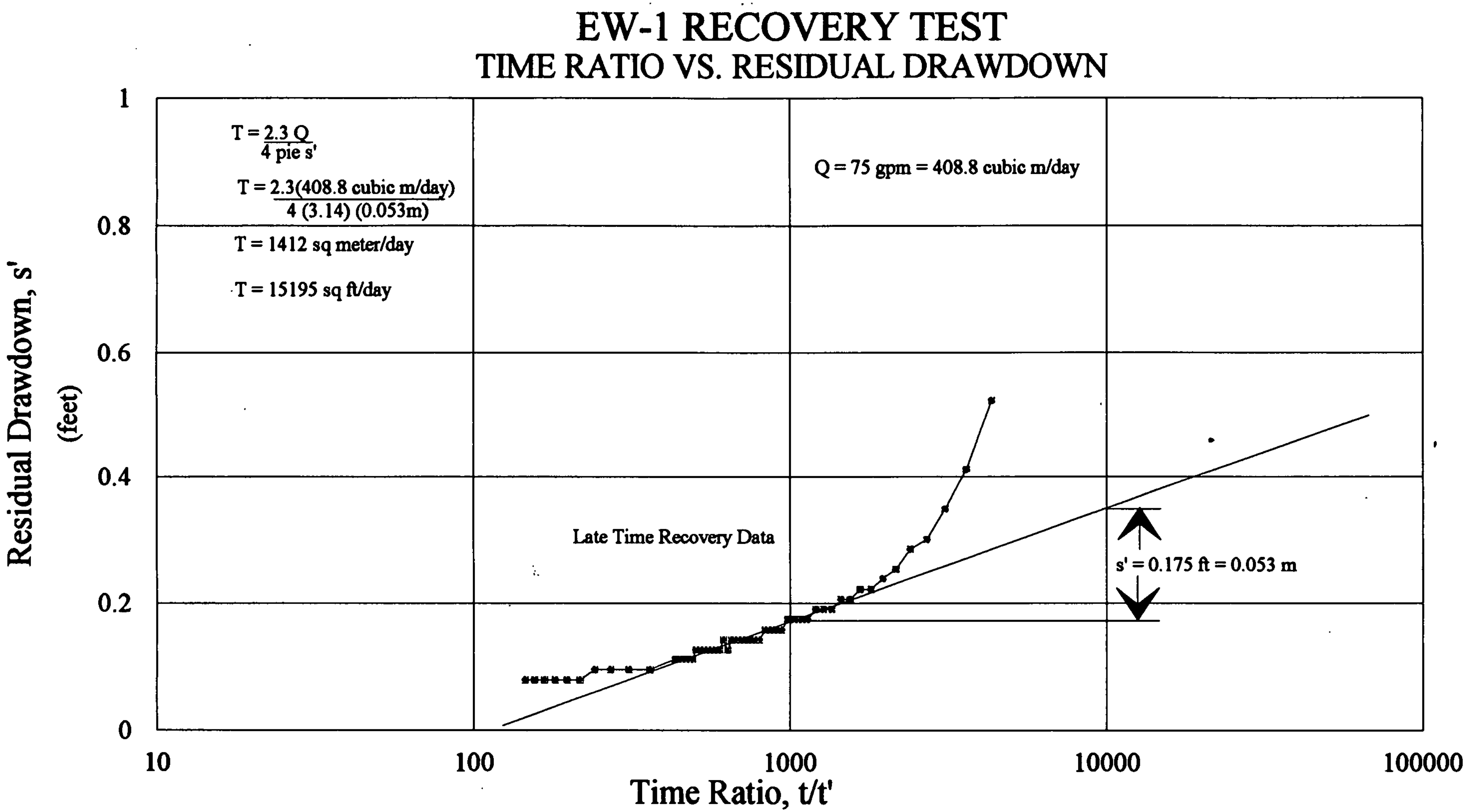


MW-9S RECOVERY TEST
TIME RATIO VS. RESIDUAL DRAWDOWN



MW-9I RECOVERY TEST
TIME RATIO VS. RESIDUAL DRAWDOWN




EW-1 RECOVERY TEST
TIME RATIO VS. RESIDUAL DRAWDOWN
T = 2.3 Q / 4 pie s'
T = 2.3(408.8 cubic m/day) / 4 (3.14) (0.053m)
T = 1412 sq meter/day
T = 15195 sq ft/day
Q = 75 gpm = 408.8 cubic m/day
Late Time Recovery Data
s' = 0.175 ft = 0.053 m
Residual Drawdown, s' (feet)
Time Ratio, t/t'
0
0.2
0.4
0.6
0.8
1
10
100
1000
10000
100000

APPENDIX E

CAPZONE AQUIFER TEST CALIBRATION DATA

```
****************************** CAPZONE ****************************** PAGE 1

   CALCULATION OF DRAWDOWN IN A HOMOGENEOUS, ISOTROPIC FULLY CONFINED,
    LEAKY CONFINED, OR UNCONFINED AQUIFER WITH OPTIONAL SUPERPOSITION
                      OF REGIONAL WATER LEVELS

------------------------------------------------------------------------
AQUIFER TEST CALIBRATION RUN
------------------------------------------------------------------------



******************************* INPUT DATA *******************************

                AQUIFER TYPE = UNCONFINED
              TRANSMISSIVITY =    30000[gpd/ft]
         STORAGE COEFFICIENT = 0.002000
  SATURATED AQUIFER THICKNESS =  65.0[ft]



WELL NO. 1

                           X-COORDINATE =  155 [ft]
                           Y-COORDINATE =  280 [ft]
                 PUMPING/INJECTION RATE =  108000 [gpd]
  TIME SINCE START OF PUMPING/INJECTION =  3 [day]

WELL NO. 2

                           X-COORDINATE = -25 [ft]
                           Y-COORDINATE =  386 [ft]
                 PUMPING/INJECTION RATE = -108000 [gpd]
  TIME SINCE START OF PUMPING/INJECTION =  3 [day]
```

---------------------------- RESULTS CONTINUED [ft]----------------------------
^ Y-direction
|
+ ---> X-direction

	90	95	100	105	110	115
65	0.2727	0.2791	0.2854	0.2915	0.2975	0.3032
60	0.2679	0.2742	0.2803	0.2862	0.2919	0.2975
55	0.2634	0.2694	0.2753	0.2810	0.2865	0.2919
50	0.2590	0.2648	0.2704	0.2760	0.2813	0.2865
45	0.2547	0.2603	0.2658	0.2711	0.2763	0.2813
40	0.2505	0.2559	0.2612	0.2664	0.2714	0.2763
35	0.2465	0.2517	0.2569	0.2619	0.2667	0.2714
30	0.2426	0.2476	0.2526	0.2575	0.2622	0.2667
25	0.2388	0.2437	0.2485	0.2532	0.2578	0.2622
20	0.2351	0.2398	0.2445	0.2491	0.2535	0.2578
15	0.2315	0.2361	0.2406	0.2450	0.2493	0.2535
10	0.2280	0.2325	0.2369	0.2411	0.2453	0.2494
5	0.2246	0.2289	0.2332	0.2374	0.2414	0.2454
0	0.2213	0.2255	0.2297	0.2337	0.2376	0.2415

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft]----------------------------
^ Y-direction
|
+ ---> X-direction

	90	95	100	105	110	115
135	0.3581	0.3698	0.3811	0.3921	0.4027	0.4129
130	0.3505	0.3616	0.3725	0.3829	0.3930	0.4027
125	0.3432	0.3538	0.3641	0.3741	0.3838	0.3930
120	0.3362	0.3463	0.3561	0.3657	0.3749	0.3837
115	0.3294	0.3390	0.3484	0.3576	0.3664	0.3748
110	0.3228	0.3320	0.3410	0.3498	0.3582	0.3663
105	0.3164	0.3253	0.3339	0.3423	0.3503	0.3581
100	0.3103	0.3188	0.3270	0.3351	0.3428	0.3503
95	0.3044	0.3125	0.3204	0.3281	0.3356	0.3428
90	0.2986	0.3065	0.3141	0.3215	0.3286	0.3355
85	0.2931	0.3006	0.3079	0.3150	0.3219	0.3286
80	0.2877	0.2950	0.3020	0.3088	0.3155	0.3219
75	0.2825	0.2895	0.2963	0.3029	0.3093	0.3154
70	0.2775	0.2842	0.2908	0.2971	0.3033	0.3092

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft]----------------------------
^ Y-direction
|
+ ---> X-direction

	90	95	100	105	110	115
205	0.4949	0.5214	0.5476	0.5734	0.5986	0.6230
200	0.4834	0.5082	0.5326	0.5565	0.5799	0.6024
195	0.4721	0.4952	0.5180	0.5403	0.5620	0.5829
190	0.4610	0.4827	0.5040	0.5248	0.5450	0.5643
185	0.4501	0.4705	0.4904	0.5099	0.5287	0.5468
180	0.4396	0.4587	0.4774	0.4956	0.5132	0.5301

175	0.4293	0.4473	0.4649	0.4820	0.4985	0.5143
170	0.4193	0.4363	0.4528	0.4689	0.4844	0.4993
165	0.4096	0.4256	0.4413	0.4564	0.4711	0.4851
160	0.4003	0.4154	0.4302	0.4445	0.4583	0.4715
155	0.3913	0.4056	0.4195	0.4331	0.4461	0.4586
150	0.3825	0.3961	0.4093	0.4222	0.4345	0.4464
145	0.3741	0.3870	0.3995	0.4117	0.4234	0.4347
140	0.3660	0.3782	0.3901	0.4017	0.4128	0.4235

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ---------------------------

^ Y-direction
|
+ ---> X-direction

	90	95	100	105	110	115
275	0.5803	0.6401	0.7040	0.7727	0.8472	0.9288
270	0.5872	0.6456	0.7079	0.7746	0.8466	0.9251
265	0.5909	0.6474	0.7073	0.7713	0.8398	0.9137
260	0.5915	0.6457	0.7029	0.7635	0.8278	0.8963
255	0.5894	0.6410	0.6951	0.7519	0.8117	0.8744
250	0.5850	0.6338	0.6846	0.7376	0.7926	0.8496
245	0.5787	0.6246	0.6721	0.7211	0.7716	0.8232
240	0.5708	0.6138	0.6580	0.7033	0.7494	0.7960
235	0.5616	0.6018	0.6429	0.6846	0.7267	0.7689
230	0.5515	0.5891	0.6271	0.6655	0.7040	0.7422
225	0.5408	0.5758	0.6110	0.6464	0.6816	0.7163
220	0.5296	0.5622	0.5949	0.6275	0.6597	0.6913
215	0.5181	0.5485	0.5788	0.6089	0.6386	0.6674
210	0.5065	0.5349	0.5630	0.5909	0.6182	0.6446

OW-2

FINAL PUMP TEST READING
0.897

% DIFFERENCE 0.08

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ---------------------------

^ Y-direction
|
+ ---> X-direction

	90	95	100	105	110	115
345	0.2265	0.2703	0.3134	0.3555	0.3963	0.4358
340	0.2572	0.3024	0.3470	0.3908	0.4336	0.4752
335	0.2885	0.3352	0.3815	0.4272	0.4722	0.5161
330	0.3201	0.3683	0.4164	0.4644	0.5119	0.5585
325	0.3515	0.4015	0.4517	0.5020	0.5523	0.6022
320	0.3827	0.4344	0.4868	0.5398	0.5932	0.6468
315	0.4131	0.4666	0.5213	0.5771	0.6341	0.6918
310	0.4423	0.4976	0.5547	0.6135	0.6741	0.7364
305	0.4699	0.5270	0.5863	0.6481	0.7124	0.7796
300	0.4956	0.5541	0.6155	0.6800	0.7481	0.8201
295	0.5187	0.5785	0.6416	0.7085	0.7799	0.8564
290	0.5390	0.5996	0.6640	0.7327	0.8066	0.8868
285	0.5562	0.6171	0.6820	0.7517	0.8271	0.9096
280	0.5700	0.6306	0.6954	0.7651	0.8408	0.9238

Press Space Bar To Continue

----------------------------- RESULTS CONTINUED [ft] -----------------------------

^ Y-direction
|
+ ---> X-direction

	90	95	100	105	110	115
370	0.0869	0.1255	0.1627	0.1985	0.2328	0.2654
365	0.1124	0.1520	0.1902	0.2270	0.2623	0.2960
360	0.1393	0.1798	0.2190	0.2569	0.2934	0.3283
355	0.1673	0.2089	0.2493	0.2884	0.3262	0.3624
350	0.1964	0.2391	0.2807	0.3213	0.3605	0.3982

Press Space Bar To Continue

----------------------------- RESULTS CONTINUED [ft] -----------------------------

^ Y-direction
|
+ ---> X-direction

	120	125	130	135	140	145
65	0.3088	0.3141	0.3192	0.3240	0.3286	0.3330
60	0.3028	0.3080	0.3129	0.3176	0.3221	0.3263
55	0.2971	0.3021	0.3068	0.3114	0.3157	0.3199
50	0.2915	0.2964	0.3010	0.3054	0.3096	0.3136
45	0.2862	0.2908	0.2953	0.2996	0.3037	0.3076
40	0.2810	0.2855	0.2899	0.2941	0.2981	0.3019
35	0.2760	0.2804	0.2846	0.2887	0.2926	0.2963
30	0.2712	0.2754	0.2795	0.2835	0.2873	0.2909
25	0.2665	0.2706	0.2746	0.2785	0.2821	0.2857
20	0.2620	0.2660	0.2699	0.2736	0.2772	0.2806
15	0.2576	0.2615	0.2653	0.2689	0.2724	0.2757
10	0.2533	0.2571	0.2608	0.2643	0.2677	0.2710
5	0.2492	0.2529	0.2565	0.2599	0.2632	0.2664
0	0.2452	0.2488	0.2523	0.2556	0.2589	0.2620

Press Space Bar To Continue

----------------------------- RESULTS CONTINUED [ft] -----------------------------

^ Y-direction
|
+ ---> X-direction

	120	125	130	135	140	145
135	0.4226	0.4318	0.4404	0.4485	0.4560	0.4629
130	0.4120	0.4208	0.4290	0.4368	0.4440	0.4506
125	0.4019	0.4103	0.4182	0.4256	0.4325	0.4389
120	0.3922	0.4002	0.4078	0.4150	0.4216	0.4278
115	0.3829	0.3906	0.3979	0.4048	0.4112	0.4172
110	0.3741	0.3815	0.3885	0.3951	0.4013	0.4070
105	0.3656	0.3727	0.3794	0.3858	0.3918	0.3973
100	0.3574	0.3643	0.3708	0.3769	0.3827	0.3881

95	0.3496	0.3562	0.3625	0.3684	0.3740	0.3792
90	0.3421	0.3485	0.3545	0.3602	0.3656	0.3707
85	0.3349	0.3411	0.3469	0.3524	0.3576	0.3625
80	0.3280	0.3339	0.3395	0.3449	0.3499	0.3547
75	0.3214	0.3271	0.3325	0.3377	0.3426	0.3472
70	0.3149	0.3204	0.3257	0.3307	0.3355	0.3399

Press Space Bar To Continue

RESULTS CONTINUED [ft]

Y-direction

+ ---> X-direction

	120	125	130	135	140	145
205	0.6463	0.6682	0.6886	0.7071	0.7235	0.7376
200	0.6239	0.6441	0.6628	0.6799	0.6950	0.7081
195	0.6027	0.6214	0.6387	0.6545	0.6686	0.6809
190	0.5828	0.6001	0.6162	0.6309	0.6441	0.6556
185	0.5640	0.5801	0.5951	0.6089	0.6212	0.6321
180	0.5462	0.5613	0.5753	0.5882	0.5998	0.6101
175	0.5294	0.5435	0.5567	0.5688	0.5798	0.5895
170	0.5135	0.5268	0.5392	0.5506	0.5610	0.5703
165	0.4984	0.5109	0.5227	0.5335	0.5433	0.5522
160	0.4841	0.4960	0.5070	0.5173	0.5267	0.5351
155	0.4705	0.4818	0.4923	0.5020	0.5109	0.5190
150	0.4576	0.4683	0.4783	0.4876	0.4961	0.5038
145	0.4454	0.4555	0.4650	0.4739	0.4820	0.4895
140	0.4337	0.4434	0.4524	0.4609	0.4687	0.4758

Press Space Bar To Continue

RESULTS CONTINUED [ft]

Y-direction

+ ---> X-direction

	120	125	130	135	140	145
275	1.0194	1.1215	1.2392	1.3786	1.5500	1.7707
270	1.0113	1.1071	1.2150	1.3380	1.4788	1.6364
265	0.9938	1.0809	1.1760	1.2793	1.3890	1.4978
260	0.9692	1.0468	1.1288	1.2138	1.2985	1.3761
255	0.9401	1.0083	1.0782	1.1481	1.2145	1.2725
250	0.9083	0.9680	1.0277	1.0856	1.1389	1.1842
245	0.8755	0.9278	0.9790	1.0275	1.0714	1.1080
240	0.8427	0.8886	0.9329	0.9742	1.0111	1.0417
235	0.8106	0.8512	0.8898	0.9255	0.9570	0.9833
230	0.7796	0.8157	0.8497	0.8809	0.9084	0.9313
225	0.7500	0.7823	0.8125	0.8401	0.8644	0.8847
220	0.7218	0.7509	0.7780	0.8027	0.8244	0.8427
215	0.6952	0.7215	0.7460	0.7682	0.7879	0.8045
210	0.6700	0.6940	0.7163	0.7365	0.7544	0.7696

$\boxed{\text{OW-1}}$

FINAL PUMP TEST READING 1.593

% DIFFERENCE 2.8

Press Space Bar To Continue

RESULTS CONTINUED [ft]

Y-direction

|
+ ---> X-direction

	120	125	130	135	140	145
345	0.4736	0.5094	0.5428	0.5735	0.6011	0.6252
340	0.5151	0.5530	0.5885	0.6211	0.6502	0.6756
335	0.5586	0.5991	0.6371	0.6720	0.7033	0.7302
330	0.6040	0.6476	0.6888	0.7268	0.7607	0.7896
325	0.6512	0.6987	0.7439	0.7857	0.8231	0.8548
320	0.7000	0.7522	0.8023	0.8491	0.8912	0.9267
315	0.7499	0.8076	0.8640	0.9174	0.9658	1.0069
310	0.8000	0.8645	0.9286	0.9907	1.0480	1.0970
305	0.8494	0.9216	0.9953	1.0686	1.1384	1.1996
300	0.8964	0.9772	1.0621	1.1500	1.2374	1.3175
295	0.9390	1.0285	1.1259	1.2314	1.3431	1.4538
290	0.9747	1.0721	1.1815	1.3059	1.4481	1.6070
285	1.0010	1.1040	1.2224	1.3625	1.5346	1.7560
280	1.0162	1.1209	1.2425	1.3887	1.5740	1.8308

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft]----------------------------

^ Y-direction
|
+ ---> X-direction

	120	125	130	135	140	145
370	0.2964	0.3255	0.3528	0.3780	0.4012	0.4222
365	0.3280	0.3581	0.3862	0.4122	0.4360	0.4573
360	0.3614	0.3926	0.4218	0.4487	0.4731	0.4950
355	0.3968	0.4293	0.4596	0.4875	0.5128	0.5353
350	0.4342	0.4682	0.4999	0.5291	0.5554	0.5786

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft]----------------------------

^ Y-direction
|
+ ---> X-direction

	150	155	160	165	170	175
65	0.3371	0.3409	0.3445	0.3478	0.3509	0.3537
60	0.3303	0.3340	0.3375	0.3408	0.3438	0.3465
55	0.3237	0.3274	0.3308	0.3340	0.3370	0.3397
50	0.3174	0.3210	0.3243	0.3275	0.3304	0.3330
45	0.3113	0.3148	0.3181	0.3212	0.3240	0.3266
40	0.3055	0.3089	0.3121	0.3151	0.3179	0.3205
35	0.2998	0.3031	0.3062	0.3092	0.3119	0.3145
30	0.2943	0.2976	0.3006	0.3035	0.3062	0.3087
25	0.2890	0.2922	0.2952	0.2980	0.3007	0.3031
20	0.2839	0.2870	0.2899	0.2927	0.2953	0.2977

15	0.2789	0.2820	0.2848	0.2875	0.2901	0.2925
10	0.2741	0.2771	0.2799	0.2826	0.2851	0.2874
5	0.2695	0.2724	0.2751	0.2777	0.2802	0.2825
0	0.2650	0.2678	0.2705	0.2731	0.2755	0.2778

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ----------------------------

Y-direction

|

---> X-direction

	150	155	160	165	170	175
135	0.4691	0.4747	0.4797	0.4840	0.4876	0.4906
130	0.4566	0.4621	0.4669	0.4711	0.4748	0.4778
125	0.4448	0.4500	0.4548	0.4589	0.4625	0.4655
120	0.4334	0.4386	0.4432	0.4473	0.4508	0.4539
115	0.4226	0.4276	0.4321	0.4361	0.4397	0.4427
110	0.4123	0.4172	0.4216	0.4255	0.4290	0.4320
105	0.4025	0.4072	0.4115	0.4154	0.4188	0.4218
100	0.3931	0.3977	0.4019	0.4057	0.4091	0.4120
95	0.3840	0.3885	0.3926	0.3964	0.3997	0.4027
90	0.3754	0.3798	0.3838	0.3874	0.3907	0.3937
85	0.3671	0.3714	0.3753	0.3789	0.3821	0.3850
80	0.3592	0.3633	0.3671	0.3706	0.3738	0.3767
75	0.3515	0.3555	0.3593	0.3627	0.3659	0.3687
70	0.3442	0.3481	0.3518	0.3551	0.3582	0.3611

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ----------------------------

Y-direction

|

---> X-direction

	150	155	160	165	170	175
205	0.7492	0.7583	0.7647	0.7684	0.7697	0.7687
200	0.7191	0.7277	0.7341	0.7381	0.7400	0.7397
195	0.6912	0.6995	0.7058	0.7101	0.7123	0.7128
190	0.6654	0.6734	0.6796	0.6840	0.6866	0.6876
185	0.6414	0.6491	0.6552	0.6597	0.6626	0.6640
180	0.6190	0.6264	0.6324	0.6369	0.6401	0.6418
175	0.5980	0.6052	0.6111	0.6157	0.6189	0.6210
170	0.5784	0.5853	0.5911	0.5957	0.5991	0.6014
165	0.5600	0.5667	0.5723	0.5769	0.5804	0.5829
160	0.5426	0.5491	0.5546	0.5592	0.5628	0.5654
155	0.5262	0.5326	0.5380	0.5425	0.5461	0.5488
150	0.5108	0.5169	0.5222	0.5267	0.5303	0.5331
145	0.4962	0.5021	0.5073	0.5117	0.5153	0.5182
140	0.4823	0.4881	0.4931	0.4975	0.5011	0.5041

$\boxed{\text{MW-9S}}$

FINAL PUMP TEST READING
0.493

% DIFF 12.8

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ----------------------------

Y-direction

|

---> X-direction

	150	155	160	165	170	175
275	2.0598	2.2820	2.0823	1.8157	1.6173	1.4684
270	1.7895	1.8680	1.8114	1.6802	1.5445	1.4256
265	1.5876	1.6301	1.6090	1.5405	1.4530	1.3647
260	1.4355	1.4642	1.4563	1.4177	1.3609	1.2969
255	1.3155	1.3375	1.3358	1.3131	1.2753	1.2291
250	1.2175	1.2356	1.2372	1.2236	1.1981	1.1644
245	1.1352	1.1508	1.1544	1.1465	1.1290	1.1043
240	1.0646	1.0786	1.0833	1.0791	1.0671	1.0489
235	1.0031	1.0159	1.0213	1.0196	1.0116	0.9982
230	0.9489	0.9607	0.9666	0.9667	0.9615	0.9516
225	0.9006	0.9117	0.9178	0.9192	0.9160	0.9089
220	0.8572	0.8676	0.8739	0.8762	0.8746	0.8696
215	0.8178	0.8278	0.8341	0.8371	0.8367	0.8333
210	0.7820	0.7915	0.7979	0.8013	0.8019	0.7998

Press Space Bar To Continue

--------------------------- RESULTS CONTINUED [ft] ---------------------------

^ Y-direction
|
+ ---> X-direction

	150	155	160	165	170	175
370	0.4409	0.4574	0.4716	0.4837	0.4936	0.5015
365	0.4763	0.4928	0.5069	0.5185	0.5278	0.5349
360	0.5142	0.5308	0.5446	0.5557	0.5643	0.5705
355	0.5549	0.5715	0.5850	0.5956	0.6033	0.6083
350	0.5986	0.6152	0.6284	0.6383	0.6449	0.6486

Press Space Bar To Continue

--------------------------- RESULTS CONTINUED [ft] ---------------------------

^ Y-direction
|
+ ---> X-direction

	180	185	190	195	200	205
65	0.3562	0.3584	0.3604	0.3621	0.3636	0.3648
60	0.3490	0.3513	0.3533	0.3550	0.3565	0.3578
55	0.3421	0.3443	0.3463	0.3481	0.3496	0.3509
50	0.3355	0.3377	0.3397	0.3414	0.3430	0.3443
45	0.3290	0.3312	0.3332	0.3350	0.3366	0.3379
40	0.3228	0.3250	0.3270	0.3288	0.3303	0.3317
35	0.3168	0.3190	0.3210	0.3227	0.3243	0.3257
30	0.3110	0.3132	0.3151	0.3169	0.3185	0.3199
25	0.3054	0.3075	0.3095	0.3112	0.3128	0.3143
20	0.3000	0.3021	0.3040	0.3058	0.3074	0.3088
15	0.2947	0.2968	0.2987	0.3005	0.3021	0.3035
10	0.2896	0.2917	0.2936	0.2953	0.2969	0.2983
5	0.2847	0.2867	0.2886	0.2903	0.2919	0.2933

0	0.2799	0.2819	0.2838	0.2855	0.2871	0.2885

Press Space Bar To Continue

-------------------------- RESULTS CONTINUED [ft] ----------------------------

^ Y-direction
|
+ ---> X-direction

	180	185	190	195	200	205
135	0.4930	0.4947	0.4958	0.4964	0.4965	0.4960
130	0.4802	0.4820	0.4833	0.4841	0.4844	0.4841
125	0.4680	0.4700	0.4714	0.4723	0.4727	0.4727
120	0.4564	0.4584	0.4599	0.4610	0.4616	0.4618
115	0.4453	0.4473	0.4490	0.4501	0.4509	0.4512
110	0.4346	0.4367	0.4384	0.4397	0.4406	0.4411
105	0.4244	0.4266	0.4284	0.4297	0.4307	0.4313
100	0.4146	0.4168	0.4187	0.4201	0.4212	0.4219
95	0.4053	0.4075	0.4094	0.4109	0.4120	0.4129
90	0.3963	0.3985	0.4004	0.4020	0.4032	0.4041
85	0.3876	0.3899	0.3918	0.3934	0.3947	0.3957
80	0.3793	0.3816	0.3835	0.3852	0.3865	0.3876
75	0.3713	0.3736	0.3755	0.3772	0.3786	0.3797
70	0.3636	0.3658	0.3678	0.3695	0.3710	0.3722

Press Space Bar To Continue

-------------------------- RESULTS CONTINUED [ft] ----------------------------

^ Y-direction
|
+ ---> X-direction

	240	245	250	255	260	265
65	0.3671	0.3666	0.3660	0.3652	0.3642	0.3630
60	0.3606	0.3602	0.3597	0.3590	0.3581	0.3571
55	0.3542	0.3540	0.3535	0.3529	0.3522	0.3513
50	0.3481	0.3479	0.3476	0.3471	0.3464	0.3456
45	0.3421	0.3420	0.3417	0.3413	0.3408	0.3401
40	0.3363	0.3362	0.3361	0.3357	0.3353	0.3347
35	0.3306	0.3306	0.3305	0.3303	0.3299	0.3294
30	0.3251	0.3252	0.3251	0.3250	0.3247	0.3243
25	0.3197	0.3199	0.3199	0.3198	0.3196	0.3193
20	0.3145	0.3147	0.3148	0.3148	0.3146	0.3143
15	0.3094	0.3096	0.3098	0.3098	0.3097	0.3095
10	0.3044	0.3047	0.3049	0.3050	0.3050	0.3049
5	0.2996	0.3000	0.3002	0.3003	0.3004	0.3003
0	0.2949	0.2953	0.2956	0.2958	0.2958	0.2958

Press Space Bar To Continue

-------------------------- RESULTS CONTINUED [ft] ----------------------------

^ Y-direction
|
+ ---> X-direction

	270	275	280	285	290	295
370	0.4457	0.4393	0.4329	0.4265	0.4202	0.4140

------------------------------ RESULTS CONTINUED [ft] ------------------------------

^ Y-direction
|
+ ---> X-direction

	180	185	190	195	200	205
205	0.7655	0.7603	0.7535	0.7453	0.7359	0.7256
200	0.7376	0.7337	0.7282	0.7214	0.7134	0.7046
195	0.7115	0.7085	0.7042	0.6986	0.6919	0.6843
190	0.6870	0.6849	0.6815	0.6769	0.6713	0.6648
185	0.6639	0.6626	0.6600	0.6563	0.6516	0.6460
180	0.6423	0.6415	0.6396	0.6366	0.6327	0.6280
175	0.6218	0.6216	0.6202	0.6179	0.6147	0.6108
170	0.6025	0.6027	0.6019	0.6001	0.5976	0.5942
165	0.5843	0.5848	0.5844	0.5832	0.5811	0.5784
160	0.5670	0.5679	0.5678	0.5670	0.5654	0.5632
155	0.5507	0.5517	0.5520	0.5516	0.5504	0.5486
150	0.5351	0.5364	0.5370	0.5368	0.5360	0.5346
145	0.5204	0.5218	0.5226	0.5228	0.5223	0.5212
140	0.5063	0.5079	0.5089	0.5093	0.5091	0.5084

Press Space Bar To Continue

MW-9 I

FINAL PUMP TEST READING
0.475

% DIFF 15.9

------------------------------ RESULTS CONTINUED [ft] ------------------------------

^ Y-direction
|
+ ---> X-direction

	180	185	190	195	200	205
275	1.3514	1.2562	1.1764	1.1082	1.0489	0.9967
270	1.3245	1.2384	1.1643	1.0999	1.0432	0.9928
265	1.2827	1.2088	1.1429	1.0840	1.0313	0.9837
260	1.2327	1.1714	1.1145	1.0621	1.0142	0.9703
255	1.1794	1.1296	1.0815	1.0358	0.9931	0.9532
250	1.1262	1.0861	1.0460	1.0067	0.9691	0.9334
245	1.0749	1.0427	1.0094	0.9761	0.9433	0.9116
240	1.0262	1.0005	0.9730	0.9448	0.9164	0.8885
235	0.9806	0.9600	0.9374	0.9135	0.8892	0.8647
230	0.9380	0.9215	0.9029	0.8829	0.8620	0.8407
225	0.8984	0.8852	0.8699	0.8531	0.8352	0.8167
220	0.8616	0.8510	0.8385	0.8244	0.8091	0.7931
215	0.8273	0.8189	0.8086	0.7968	0.7838	0.7699
210	0.7953	0.7887	0.7803	0.7705	0.7594	0.7474

Press Space Bar To Continue

------------------------------ RESULTS CONTINUED [ft] ------------------------------

^ Y-direction
|
+ ---> X-direction

	180	185	190	195	200	205
345	0.6908	0.6874	0.6818	0.6744	0.6657	0.6558
340	0.7345	0.7286	0.7205	0.7105	0.6992	0.6870
335	0.7811	0.7722	0.7609	0.7480	0.7338	0.7188
330	0.8306	0.8181	0.8032	0.7867	0.7692	0.7511
325	0.8833	0.8663	0.8470	0.8265	0.8052	0.7837
320	0.9392	0.9167	0.8923	0.8669	0.8414	0.8161

315	0.9984	0.9691	0.9385	0.9076	0.8773	0.8479
310	1.0604	1.0227	0.9849	0.9479	0.9123	0.8786
305	1.1243	1.0766	1.0304	0.9866	0.9456	0.9074
300	1.1885	1.1289	1.0735	1.0226	0.9761	0.9335
295	1.2495	1.1768	1.1121	1.0543	1.0026	0.9561
290	1.3023	1.2170	1.1438	1.0801	1.0241	0.9744
285	1.3403	1.2455	1.1661	1.0983	1.0393	0.9875
280	1.3576	1.2589	1.1772	1.1078	1.0477	0.9950

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ---------------------------

^ Y-direction
|
---> X-direction

	180	185	190	195	200	205
370	0.5074	0.5116	0.5141	0.5152	0.5150	0.5137
365	0.5399	0.5430	0.5444	0.5443	0.5428	0.5401
360	0.5744	0.5762	0.5763	0.5747	0.5717	0.5676
355	0.6109	0.6113	0.6097	0.6065	0.6019	0.5961
350	0.6496	0.6483	0.6449	0.6397	0.6332	0.6255

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ---------------------------

^ Y-direction
|
---> X-direction

	210	215	220	225	230	235
65	0.3658	0.3666	0.3671	0.3674	0.3675	0.3674
60	0.3588	0.3596	0.3602	0.3606	0.3608	0.3608
55	0.3520	0.3529	0.3535	0.3540	0.3543	0.3544
50	0.3454	0.3464	0.3471	0.3476	0.3479	0.3481
45	0.3391	0.3400	0.3408	0.3414	0.3418	0.3420
40	0.3329	0.3339	0.3347	0.3354	0.3358	0.3361
35	0.3269	0.3280	0.3288	0.3295	0.3300	0.3304
30	0.3211	0.3222	0.3231	0.3238	0.3244	0.3248
25	0.3155	0.3166	0.3175	0.3183	0.3189	0.3194
20	0.3101	0.3112	0.3121	0.3129	0.3136	0.3141
15	0.3048	0.3059	0.3069	0.3077	0.3084	0.3089
10	0.2996	0.3008	0.3018	0.3026	0.3034	0.3039
5	0.2946	0.2958	0.2968	0.2977	0.2985	0.2991
0	0.2898	0.2910	0.2920	0.2929	0.2937	0.2943

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft]----------------------------
^ Y-direction
|
+ ---> X-direction

	210	215	220	225	230	235
135	0.4950	0.4936	0.4918	0.4896	0.4871	0.4842
130	0.4834	0.4823	0.4808	0.4789	0.4767	0.4741
125	0.4723	0.4714	0.4702	0.4686	0.4666	0.4644
120	0.4615	0.4609	0.4599	0.4585	0.4569	0.4549
115	0.4512	0.4507	0.4500	0.4488	0.4474	0.4457
110	0.4412	0.4409	0.4404	0.4395	0.4383	0.4368
105	0.4316	0.4315	0.4311	0.4304	0.4294	0.4281
100	0.4223	0.4224	0.4221	0.4216	0.4208	0.4197
95	0.4134	0.4136	0.4135	0.4131	0.4125	0.4116
90	0.4047	0.4051	0.4051	0.4049	0.4044	0.4036
85	0.3964	0.3968	0.3970	0.3969	0.3965	0.3960
80	0.3884	0.3889	0.3892	0.3892	0.3890	0.3885
75	0.3806	0.3812	0.3816	0.3817	0.3816	0.3813
70	0.3731	0.3738	0.3742	0.3744	0.3745	0.3742

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft]----------------------------
^ Y-direction
|
+ ---> X-direction

	210	215	220	225	230	235
205	0.7145	0.7029	0.6909	0.6787	0.6663	0.6538
200	0.6949	0.6847	0.6740	0.6630	0.6518	0.6404
195	0.6759	0.6669	0.6574	0.6475	0.6374	0.6271
190	0.6575	0.6496	0.6412	0.6323	0.6232	0.6138
185	0.6397	0.6328	0.6253	0.6175	0.6092	0.6008
180	0.6226	0.6165	0.6100	0.6029	0.5956	0.5879
175	0.6061	0.6008	0.5950	0.5888	0.5822	0.5752
170	0.5903	0.5857	0.5806	0.5750	0.5691	0.5628
165	0.5750	0.5710	0.5666	0.5617	0.5564	0.5507
160	0.5603	0.5569	0.5530	0.5487	0.5440	0.5389
155	0.5462	0.5433	0.5399	0.5361	0.5319	0.5273
150	0.5327	0.5302	0.5273	0.5239	0.5202	0.5161
145	0.5196	0.5176	0.5150	0.5121	0.5088	0.5052
140	0.5071	0.5054	0.5032	0.5007	0.4978	0.4945

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft]----------------------------
^ Y-direction
|
+ ---> X-direction

	210	215	220	225	230	235
275	0.9502	0.9085	0.8707	0.8363	0.8048	0.7758
270	0.9476	0.9069	0.8699	0.8360	0.8050	0.7763
265	0.9407	0.9016	0.8659	0.8330	0.8027	0.7747
260	0.9300	0.8931	0.8590	0.8275	0.7983	0.7712
255	0.9161	0.8816	0.8496	0.8197	0.7918	0.7658
250	0.8996	0.8678	0.8380	0.8099	0.7835	0.7588
245	0.8812	0.8522	0.8246	0.7985	0.7737	0.7503
240	0.8613	0.8351	0.8098	0.7857	0.7626	0.7406

235	0.8406	0.8169	0.7940	0.7718	0.7504	0.7299
230	0.8193	0.7982	0.7774	0.7571	0.7374	0.7184
225	0.7979	0.7790	0.7603	0.7419	0.7238	0.7062
220	0.7766	0.7598	0.7430	0.7262	0.7097	0.6935
215	0.7555	0.7406	0.7255	0.7104	0.6953	0.6805
210	0.7348	0.7216	0.7081	0.6945	0.6808	0.6672

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft] ----------------------------

Y-direction
|
+ ---> X-direction

	210	215	220	225	230	235
345	0.6452	0.6340	0.6224	0.6106	0.5988	0.5869
340	0.6740	0.6607	0.6471	0.6335	0.6200	0.6066
335	0.7033	0.6876	0.6719	0.6564	0.6410	0.6261
330	0.7328	0.7146	0.6966	0.6789	0.6618	0.6452
325	0.7623	0.7413	0.7209	0.7011	0.6820	0.6637
320	0.7914	0.7675	0.7445	0.7225	0.7015	0.6815
315	0.8197	0.7928	0.7672	0.7430	0.7201	0.6984
310	0.8467	0.8168	0.7886	0.7622	0.7374	0.7141
305	0.8719	0.8389	0.8083	0.7798	0.7533	0.7285
300	0.8946	0.8588	0.8259	0.7955	0.7674	0.7412
295	0.9141	0.8759	0.8410	0.8090	0.7795	0.7522
290	0.9298	0.8897	0.8533	0.8200	0.7895	0.7613
285	0.9413	0.8999	0.8624	0.8283	0.7971	0.7683
280	0.9481	0.9062	0.8682	0.8337	0.8022	0.7732

$\boxed{\text{OW-4}}$

FINAL PUMP TEST READING
0.705

% DIFF 2.1

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft] ----------------------------

Y-direction
|
+ ---> X-direction

	210	215	220	225	230	235
370	0.5113	0.5081	0.5042	0.4997	0.4946	0.4892
365	0.5365	0.5320	0.5268	0.5211	0.5149	0.5084
360	0.5625	0.5566	0.5500	0.5430	0.5355	0.5278
355	0.5893	0.5818	0.5737	0.5652	0.5564	0.5474
350	0.6169	0.6076	0.5979	0.5878	0.5775	0.5672

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft] ----------------------------

Y-direction

|
+ ---> X-direction

	240	245	250	255	260	265
65	0.3671	0.3666	0.3660	0.3652	0.3642	0.3630
60	0.3606	0.3602	0.3597	0.3590	0.3581	0.3571
55	0.3542	0.3540	0.3535	0.3529	0.3522	0.3513
50	0.3481	0.3479	0.3476	0.3471	0.3464	0.3456
45	0.3421	0.3420	0.3417	0.3413	0.3408	0.3401
40	0.3363	0.3362	0.3361	0.3357	0.3353	0.3347
35	0.3306	0.3306	0.3305	0.3303	0.3299	0.3294
30	0.3251	0.3252	0.3251	0.3250	0.3247	0.3243
25	0.3197	0.3199	0.3199	0.3198	0.3196	0.3193
20	0.3145	0.3147	0.3148	0.3148	0.3146	0.3143
15	0.3094	0.3096	0.3098	0.3098	0.3097	0.3095
10	0.3044	0.3047	0.3049	0.3050	0.3050	0.3049
5	0.2996	0.3000	0.3002	0.3003	0.3004	0.3003
0	0.2949	0.2953	0.2956	0.2958	0.2958	0.2958

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft] ----------------------------

^ Y-direction
|
+ ---> X-direction

	240	245	250	255	260	265
135	0.4810	0.4776	0.4739	0.4701	0.4661	0.4619
130	0.4713	0.4682	0.4649	0.4614	0.4577	0.4538
125	0.4619	0.4591	0.4561	0.4529	0.4495	0.4459
120	0.4527	0.4502	0.4475	0.4446	0.4415	0.4382
115	0.4437	0.4415	0.4391	0.4364	0.4336	0.4306
110	0.4351	0.4331	0.4309	0.4285	0.4259	0.4232
105	0.4266	0.4249	0.4229	0.4207	0.4184	0.4159
100	0.4184	0.4169	0.4151	0.4132	0.4110	0.4087
95	0.4104	0.4091	0.4075	0.4058	0.4038	0.4017
90	0.4027	0.4015	0.4001	0.3986	0.3968	0.3949
85	0.3952	0.3941	0.3929	0.3915	0.3900	0.3882
80	0.3878	0.3870	0.3859	0.3847	0.3833	0.3817
75	0.3807	0.3800	0.3791	0.3780	0.3768	0.3754
70	0.3738	0.3732	0.3725	0.3715	0.3704	0.3691

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft] ----------------------------

^ Y-direction
|
+ ---> X-direction

	240	245	250	255	260	265
205	0.6414	0.6291	0.6170	0.6050	0.5933	0.5818
200	0.6291	0.6177	0.6064	0.5953	0.5843	0.5735
195	0.6167	0.6062	0.5958	0.5854	0.5752	0.5650
190	0.6043	0.5947	0.5851	0.5755	0.5659	0.5564
185	0.5921	0.5833	0.5744	0.5655	0.5566	0.5477
180	0.5800	0.5719	0.5637	0.5555	0.5472	0.5389
175	0.5680	0.5607	0.5532	0.5455	0.5378	0.5301
170	0.5563	0.5496	0.5427	0.5356	0.5285	0.5213
165	0.5448	0.5387	0.5323	0.5259	0.5193	0.5126
160	0.5335	0.5279	0.5221	0.5162	0.5101	0.5039

155	0.5225	0.5174	0.5121	0.5066	0.5010	0.4953
150	0.5117	0.5071	0.5023	0.4973	0.4921	0.4868
145	0.5012	0.4970	0.4926	0.4880	0.4832	0.4783
140	0.4910	0.4872	0.4832	0.4790	0.4746	0.4700

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ----------------------------

Y-direction

---> X-direction

	240	245	250	255	260	265
275	0.7490	0.7242	0.7010	0.6794	0.6592	0.6402
270	0.7498	0.7251	0.7022	0.6807	0.6606	0.6416
265	0.7487	0.7245	0.7018	0.6806	0.6607	0.6420
260	0.7459	0.7222	0.7001	0.6793	0.6597	0.6413
255	0.7414	0.7185	0.6970	0.6767	0.6576	0.6396
250	0.7354	0.7134	0.6927	0.6731	0.6545	0.6369
245	0.7281	0.7071	0.6872	0.6683	0.6504	0.6334
240	0.7197	0.6997	0.6808	0.6627	0.6454	0.6290
235	0.7102	0.6914	0.6734	0.6562	0.6397	0.6239
230	0.7000	0.6823	0.6653	0.6489	0.6332	0.6181
225	0.6891	0.6725	0.6565	0.6410	0.6261	0.6117
220	0.6776	0.6622	0.6472	0.6326	0.6185	0.6048
215	0.6658	0.6515	0.6374	0.6237	0.6104	0.5975
210	0.6537	0.6404	0.6273	0.6145	0.6020	0.5898

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ----------------------------

Y-direction

---> X-direction

	240	245	250	255	260	265
345	0.5752	0.5636	0.5523	0.5411	0.5303	0.5197
340	0.5935	0.5806	0.5681	0.5559	0.5441	0.5326
335	0.6115	0.5973	0.5836	0.5704	0.5576	0.5452
330	0.6291	0.6136	0.5987	0.5844	0.5706	0.5574
325	0.6461	0.6293	0.6132	0.5978	0.5831	0.5690
320	0.6625	0.6443	0.6270	0.6106	0.5949	0.5800
315	0.6779	0.6584	0.6401	0.6226	0.6061	0.5904
310	0.6922	0.6716	0.6521	0.6338	0.6164	0.6000
305	0.7053	0.6835	0.6631	0.6439	0.6258	0.6087
300	0.7169	0.6942	0.6729	0.6530	0.6342	0.6165
295	0.7270	0.7034	0.6814	0.6609	0.6416	0.6234
290	0.7353	0.7111	0.6886	0.6675	0.6478	0.6292
285	0.7418	0.7171	0.6942	0.6728	0.6528	0.6340
280	0.7464	0.7215	0.6984	0.6768	0.6566	0.6376

Press Space Bar To Continue

------------------------- RESULTS CONTINUED [ft] ----------------------------

Y-direction

---> X-direction

	240	245	250	255	260	265
370	0.4835	0.4775	0.4713	0.4650	0.4586	0.4522
365	0.5016	0.4946	0.4875	0.4803	0.4731	0.4658
360	0.5199	0.5118	0.5037	0.4956	0.4875	0.4795
355	0.5383	0.5291	0.5200	0.5109	0.5019	0.4930
350	0.5568	0.5464	0.5362	0.5261	0.5162	0.5065

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft] ----------------------------

^ Y-direction
|
+ ---> X-direction

	270	275	280	285	290	295
65	0.3618	0.3604	0.3589	0.3572	0.3555	0.3537
60	0.3560	0.3547	0.3533	0.3518	0.3502	0.3485
55	0.3503	0.3491	0.3479	0.3465	0.3450	0.3434
50	0.3447	0.3437	0.3425	0.3413	0.3399	0.3385
45	0.3393	0.3384	0.3373	0.3362	0.3349	0.3336
40	0.3340	0.3332	0.3322	0.3312	0.3300	0.3288
35	0.3288	0.3281	0.3272	0.3263	0.3252	0.3241
30	0.3237	0.3231	0.3223	0.3215	0.3205	0.3195
25	0.3188	0.3182	0.3176	0.3168	0.3159	0.3150
20	0.3140	0.3135	0.3129	0.3122	0.3114	0.3105
15	0.3092	0.3088	0.3083	0.3077	0.3070	0.3062
10	0.3046	0.3043	0.3038	0.3033	0.3026	0.3019
5	0.3001	0.2998	0.2994	0.2990	0.2984	0.2977
0	0.2957	0.2955	0.2951	0.2947	0.2942	0.2936

Press Space Bar To Continue

---------------------------- RESULTS CONTINUED [ft] ----------------------------

^ Y-direction
|
+ ---> X-direction

	270	275	280	285	290	295
135	0.4575	0.4531	0.4486	0.4440	0.4393	0.4346
130	0.4498	0.4457	0.4415	0.4372	0.4328	0.4284
125	0.4422	0.4384	0.4345	0.4305	0.4264	0.4222
120	0.4348	0.4312	0.4276	0.4238	0.4200	0.4161
115	0.4274	0.4242	0.4208			