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April 25, 1988
13076.28

Ms. Margaret Guerriero
Project Officer 5 HR 11
Region V, U.S. EPA
230 S. Dearborn Street
Chicago, IL 60604

Re: Technical Memorandum
Wausau Water Supply NPL Site

Dear Ms. Guerriero:

Warzyn is pleased to provide you with our Phase I Remedial Investigation Technical Memorandum for the Wausau Water Supply NPL site. The Technical Memorandum includes results of our Phase I Field Investigation and conclusions and recommendations for Phase II Work.

Please feel free to contact us if you have any questions.

Sincerely,

WARZYN ENGINEERING INC.

Craig S. Rawlinson

Craig S. Rawlinson
Project Hydrogeologist

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DLI/ndj/CSR
[ndj-104-82]

Enclosures: 11 Copies

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WARZYN

Technical
Memorandum
13076

Phase I Remedial Investigation
Wausau Water Supply NPL Site
Wausau, Wisconsin

Prepared for:

United States Environmental Protection Agency
Region V
Chicago, Illinois

Prepared by:

Warzyn Engineering Inc.
Madison, Wisconsin

April 1988

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Phase I Remedial Investigation
Wausau Water Supply NPL Site
Wausau, Wisconsin

April 1988

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PHASE I INVESTIGATION
TECHNICAL MEMORANDUM
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

I. INTRODUCTION

A. BACKGROUND

The City of Wausau is located along the Wisconsin River in north central Marathon County, Wisconsin. The City operates six ground water production wells, which provide water for approximately 33,000 residents. Five of the production wells are located on the north side of the City. Production well CW8 is located adjacent to the Wausau Municipal Airport, on the south side of the City. The water from Production Well CW8 contains high iron concentrations, therefore the well is used only during peak demand periods. Production wells CW6, CW7 and CW9 are located west of the Wisconsin River and are collectively referred to as the West Well Field. The West Well Field is located in a predominantly residential area. However, Marathon Electric Inc., a manufacturing facility, currently occupies a large area south of the West Well Field. Production Wells CW3 and CW4 are located on the east side of the Wisconsin River and are referred to as the East Well Field. The East Well Field is located in a predominantly industrial section of the City. Area businesses include: Marathon Box Company, Marathon Press Company, Wausau Chemical Company, Wausau Energy Company and Wergin Construction Company. Refer to Drawing 13076-B10 for the location of the northern municipal production wells and area businesses.

The six production wells are screened in an aquifer of glacial outwash and alluvial sand and gravel deposits adjacent to the Wisconsin River. This unconfined aquifer supplies nearly all potable, irrigation and industrial water to residents and industries in this portion of the Wisconsin River Valley. The aquifer formed when the ancestral Wisconsin River eroded a deep valley into the Precambrian aged igneous bedrock. This valley was widened by continental glaciation during the Pleistocene glacial epoch. When the glaciers retreated from north central Wisconsin, coarse outwash sand and gravel sediments were deposited within the valley. Continued erosion of the upland areas resulted in the deposition of additional fluvial sediments. Within the study area (see Drawing 13076-B10), the aquifer ranges from 0 to 160 feet thick and has an irregular base and lateral boundaries.

Volatile organic compounds (VOCs) were first discovered in Production Well CW4 in 1975 after the well had been placed in service during an extended dry spell. Analyses conducted at that time indicated tetrachloroethylene (PCE) and trichloroethylene (TCE) concentrations of approximately 1 ug/L (WDNR, 1975). Since Production Well CW4 was only used during peak demand periods, the PCE and TCE concentrations were not considered to pose a health risk. In 1982, the City discovered higher levels of VOCs in the City distribution system. Further analysis indicated Production Wells CW3, CW4 and CW6 were contaminated or became contaminated by volatile halogenated hydrocarbons (VHHs). Petroleum related compounds (primarily toluene) were also detected at relatively low levels ($<$ 25 ug/L) in Production Wells CW3 and CW4. In addition, trihalomethanes[1] (THMs) were detected in the distribution system but were attributed to chlorination in the water treatment process. In order to reduce the VHH concentrations, the City instituted a program where uncontaminated water from Production Wells CW9, and CW7 was blended with water from wells CW3, CW4 and CW6 to dilute the VHH concentrations to meet demand.

The City, with the support of the Wisconsin Department of Natural Resources (WDNR), made several attempts to mitigate the problem and locate the source. Monitoring wells were installed and sampled and an unsuccessful attempt was made to aerate the water by modifying treatment practices.

In 1983, the U.S EPA awarded the City of Wausau a Federal grant to help fund the design and installation of a packed tower VOC stripper in order to provide sufficient water of acceptable quality to City residents. As an interim measure in May 1984, the U.S. EPA installed a granular activated carbon (GAC)

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1 Note: Trihalomethanes (THMs) are also volatile halogenated hydrocarbons (VHHs) but will be treated separately for the sake of discussion. In this report, VHHs is used generically to refer to chlorinated ethene compounds, including: PCE, TCE, 1,2DCE, 1,1DCE and vinyl chloride.

treatment system on Production Well CW6. Air strippers were installed in the Summer and Fall of 1984 at the water treatment plant to treat water from CW3 and CW4. Subsequently, the GAC system was removed from service in October, 1984. The City has been blending treated water with well water from uncontaminated supply sources (Production Wells CW7 and CW9) to reduce VHH concentrations in the water supply distribution system.

Data indicate that prior to treatment (pre-July 1984), the water supply consistently contained trichloroethene (TCE) with concentrations ranging from detectable levels (> 1 ug/L) to 80 ug/L. Lower levels of tetrachloroethene (PCE) and 1,2-dichloroethene (DCE) were identified shortly after discovery of the contamination, probably before blending had reduced the levels of VHHs. Following installation of the packed tower VOC stripper treatment systems, the water supply distribution system has had relatively low levels of VHHs (generally <5 ug/L). These levels are dependent on continued effective operation of the treatment system, the influent VHH concentrations for each well, and continued use of the two uncontaminated wells (Production Wells CW7 and CW9).

Previous investigations have identified several potential point sources of VHH contamination in the vicinity of City production wells (refer to the list of References, pp. 65-66 for complete titles and dates of available reports). Becher-Hoppe Engineers, Inc. was contracted by the City of Wausau to conduct a remedial investigation in the vicinity of Production Well CW3. The study concentrated on the Wergin Construction Co. property, the former site of a City of Wausau maintenance garage. Foth & Van Dyke and Associates, Inc. performed a groundwater investigation at the Wausau Energy Company property in order to determine the effect of past bulk oil operations at the site. STS Consultants Ltd. have performed groundwater investigations at the Wausau Chemical Co. and instituted a groundwater extraction and treatment system to remediate effects of past VHH releases from their facility operations. Twin City Testing and Engineering Laboratory, Inc. conducted investigations in the East Well Field vicinity on behalf of the Wisconsin Department of Natural Resources (WDNR). Roy F. Weston Inc. conducted an investigation of both the East and West Well Fields as part of the U.S. EPA emergency response action.

CH_2M Hill Inc. was contracted by the WDNR to perform a hydrogeologic investigation of the abandoned City of Wausau landfill, located on property presently owned by Marathon Electric Company. RMT Inc., representing Marathon Electric, in conjunction with Geraghty & Miller, Inc., representing the City of Wausau, performed a hydrogeologic investigation to determine the source of TCE in the groundwater in the vicinity of City Production Well CW6. Geraghty & Miller Inc. also installed several wells in the East Well Field in order to investigate VHH contamination of Production Well CW3. As a result of these investigations, only Wausau Chemical has been identified as a source of VHH contamination of City Production Wells.

B. PURPOSE AND SCOPE

Groundwater investigations conducted to date have produced inconclusive results. Potential sources have been identified, but data gaps exist on source concentration, release rates, migration routes, aquifer characteristics, effect of river stage and groundwater pumping on flow direction, and velocity of groundwater and contaminants. Warzyn Engineering Inc. (Warzyn) was retained by the U.S. EPA to conduct a comprehensive RI/FS of the well field. A summary of available data, data needs and a detailed Work Scope was described in the Work Plan and the Quality Assurance Project Plan prepared by Warzyn in September 1987. The major objectives of Phase I Remedial Investigation (RI) as outlined in the Work Plan included:

- Identification of contaminant sources of VHHs identified at each well field;
- Determination of the nature and extent of impacts;
- Obtaining and evaluating data to determine aquifer characteristics;
- Obtaining and interpreting data to determine the effect of groundwater pumping and river stage on groundwater flow direction and velocity;
- Determination of probable fate of contaminants through time;
- Assessment of the dangers to public health associated with the contamination; and
- Identifying potential data gaps to be filled during Phase II field investigation.

This Technical Memorandum presents a summary of procedures and results of the RI activities performed in the Phase I (Subtasks 2.1.2 to 2.1.10 of the Work Plan) including:

2.1.2 Preliminary Model Development
Development of a preliminary model to assess groundwater flow and contaminant transport in the vicinity of the City Well Field.

2.1.3 Preparation for Site Investigation
The preparation for the site investigation consisted of construction of a decontamination pad and set up of on-site analytical equipment (GC).

2.1.4 Existing Well Sampling
Selected existing site monitoring wells were sampled and analyzed to provide information on site conditions prior to the beginning of the field investigation.

2.1.5. Soil Gas Survey
The soil gas survey was conducted to help identify potential source areas and to map the distribution of VHHs at the water table surface near potential source areas.

2.1.6 Monitoring Well Installation
Groundwater monitoring wells were installed to collect groundwater quality samples, groundwater levels and in-situ hydraulic conductivity data. Groundwater and soil samples were obtained during drilling to identify site geology and obtain preliminary information on the distribution of VHHs in the aquifer.

2.1.7 Surface Water and Sediment Sampling
Surface water and sediment samples were collected to assess potential impact on surface water bodies in the vicinity of the City Well Field.

2.1.8 Groundwater Sampling and Aquifer Testing
Groundwater samples were collected from existing and newly installed monitoring wells. The analytical results formed the basis for the RI and FS

evaluations, including source identification, extent of contamination, and the identification of remedial action alternatives.

2.1.9 Groundwater Level Monitoring

Groundwater level and river stage monitoring was conducted to determine changes in groundwater flow direction due to variations in pumping rates, river stages and groundwater recharge.

2.1.10 Location and Elevation Survey

A survey was conducted to determine the location and elevation of project monitoring and production wells.

This document also includes an interim site assessment based on the evaluation of data available from the Phase I investigation and presents recommendations for additional work to be conducted during the Phase II investigation.

II. FIELD INVESTIGATION METHODS

Phase I field investigation activities including: groundwater sampling, soil gas survey, drilling, monitoring well installation, groundwater sampling during drilling, surface water and sediment sampling, groundwater level monitoring, hydraulic conductivity testing and monitoring well location and elevation survey were conducted in substantial conformance with procedures presented in the Quality Assurance Project Plan (QAPP) and the site Sampling Plan prepared by Warzyn dated September 1987. Specific procedures used in the analysis of groundwater and soil gas samples for VOCs are presented in Appendix G of the QAPP. Minor modifications of procedure were made in the field based on acquisition of additional data or in response to site specific needs. Modification of specific procedures or the investigation approach were made in consultation with the U.S. EPA Project Officer. The subsequent sections describe these procedural modifications and present a discussion of alternative methods.

The Phase I field investigation consisted of several tasks which were conducted from August 1987 to January, 1988. An Industrial Survey of area businesses was conducted on August 6 and 7, 1987. Results of the Industrial Survey have been submitted to the U.S. EPA for comment. The final Industrial Survey report will be released as a separate document. Generally, the tasks were completed sequentially. However, the soil gas survey and drilling and installation of monitoring wells were conducted concurrently, in order to optimize the use of the field GC. Similarly, groundwater levels were often recorded prior to groundwater sampling, to optimize the use of field personnel.

A. SITE PREPARATION (Task 2.1.3)

In preparation for the field investigation program, a laboratory gas chromatograph (GC) was mobilized to the City of Wausau for the purpose of analysis of soil gas, groundwater and surface water for volatile organic compounds (VOCs). A site trailer was located at the City of Wausau Water treatment plant and was used as a base of operations for the project. The trailer housed the GC in one room and site operations headquarters and supplies in two separate rooms. A decontamination area for the drilling rig, associated tools and well construction materials was constructed adjacent to the trailer. The decontamination area consisted of a 40-foot by 50-foot polyurethane lined area that had been graded to drain into a trench sump containing two 55 gallon drums. Permission was obtained from the City of Wausau to pump decontamination water collected in the sump to a sanitary sewer manhole located near the pad.

A field GC equipped with a PID and Hall detector in series was shipped to the on-site trailer on Wednesday, October 7, 1987. The instrument was unpacked and assembled on October 7, 1987. The GC was allowed to equilibrate and preliminary injections were made on October 8, 1987 to determine system performance. Initial results indicated poor sensitivity and an unstable, noisy baseline. On October 9, 1987 additional adjustments were made and by late in the day the sensitivity began to increase while baseline noise decreased. The system was left to equilibrate over the weekend of October 10-11, 1987. On Monday, October 12 a calibration curve was analyzed. The curve was linear with sensitivity requirements met, indicating the system was stable and analysis could begin.

B. EXISTING WELL SAMPLING (ROUND I) (Task 2.1.4)

1. Purpose

In order to acquire updated information on the extent of VHH contamination, samples were collected from existing groundwater supply and selected groundwater monitoring wells during the period September 29 - October 6, 1987. Samples were collected from a total of 57 wells including:

- 5 municipal Production wells (CW3, CW4, CW6, CW7 and CW9);
- 1 private well (Wergin Construction Company);
- 13 existing monitoring wells installed by STS Consultants Ltd. for Wausau Chemical Company;
- 2 existing monitoring wells installed by CH_2M Hill at the abandoned city of Wausau landfill;
- 13 existing U.S. EPA monitoring wells installed by Roy F. Weston Inc.;

- 7 existing monitoring wells installed by RMT Inc. in the vicinity of Marathon Electric;
- 12 existing monitoring wells installed by Geraghty & Miller Inc. and Becher-Hoppe Engineers, Inc. for the City of Wausau; and
- 4 existing monitoring wells installed by Foth & Van Dyke and Associates, Inc. for Wausau Energy Inc.

Depths to water were measured prior to sampling with an electronic water level indicator, or a measuring tape attached to a sounding device. The water level indicator probe was rinsed with deionized water between water level measurements. The well integrity was evaluated through visual inspection and comparison of total well depths to as-built well information. Based on the well inspections, Monitoring Well WC-1 appears to have been damaged and requires repair before it can be sampled. Refer to Appendix H for observed water levels and a summary of well construction details.

2. Sample Collection Procedures

Prior to mobilization to the site, sampling pumps, tape measures, bottom loading bailers and stainless steel cable were decontaminated using a trisodium phosphate (TSP) wash and clear water rinse. Between wells, sampling equipment was decontaminated with a laboratory wash solution (Liquinox) followed by a rinse with deionized water.

A Johnson-Keck submersible pump was used to sample the existing monitoring wells. A packer was attached to the pump to sample piezometers. The pump was lowered to a depth of approximately five feet above the top of the piezometer screen and the packer inflated to seal the sampling zone. The sampling interval was then purged of at least three volumes of water in the isolated interval. The water level above the packer was monitored to determine if the the packer was effective in sealing off the water above the packer. Water level measurements recorded during purging indicated no evidence of packer leakage. The sample was then collected directly from the pump discharge. Purged groundwater was screened with a 10.2 eV HNu photoionization meter for detection of VOCs. Purge water from monitoring wells with historically high (>1000 ug/L) total VOC concentrations was discharged to the City sanitary sewer system. Purge water which indicated above background HNu readings was also discharged to the City sanitary sewer. Where practical, purge water from other monitoring wells was disposed in the City storm sewer system.

The Johnson-Keck pump was also used to sample most water table wells. The pump was lowered to a position about three to four feet above the bottom of the well to prevent potential damage to the pump by fine residual materials which might be present in the well. The well was then purged of at least three well volumes prior to sampling. Samples were collected directly from the pump discharge. Water table wells at the Wausau Chemical site (WC2, WC3B, WC4A, WC5A, WC6A and WC7A), could not be sampled with the Johnson-Keck pump due to screen obstructions. These wells were purged and sampled using a 1 inch diameter stainless steel bailer.

Temperature, specific electrical conductance, and pH were measured upon sample collection prior to sample filtration and preservation. Samples requiring filtration and preserving were prepared as outlined in Table 3 of the QAPP. Samples were shipped daily (on ice) to the laboratory designated by U.S. EPA's Contract Laboratory Program (CLP) for analysis of VOCs and general water chemistry parameters (see parameter list in Table 2 of the QAPP). VOC analyses were completed using the methods in Appendix D of the QAPP (low level GC/MS with 7 day turnaround) so that the rapid turnaround would allow use of data in the Phase I investigation.

C. SOIL GAS SAMPLING (Task 2.1.5)

1. Purpose

Soil gas sampling with on-site analysis of samples was conducted (151 sampling points vs 93 sampling points planned in the Work Plan) to help identify potential VOC source areas, and to potentially assist in locating the VOC plume present at the water table in the vicinity of source areas.

The soil gas survey conducted at various facilities/areas was based on the size and type of operation at the site, the results of the Industrial Survey, results of existing monitoring well sampling in the area, and results of the initial soil gas sampling. The facilities/areas investigated in the soil gas survey included those outlined in the Work Plan including:

- Marathon Box Company;
- Marathon Press Company;
- Wergin Construction Company;
- The C.M. St P. & P. Railroad and right of way;
- Wausau Energy Corp.;
- Wausau Chemical Company;
- Marathon Electric Inc.; and
- The two concentric rings of points around Well CW6, including Schofield Park, and Bos Creek potential fill Areas.

In addition to these areas, the following areas were surveyed:

- Camelot cleaners;
- ETCO Electric Company;
- Gorwitz Furs; and
- The former City landfill on Marathon Electric Property.

2. Sample Collection Procedures

The soil gas survey was performed on October 13-29, and November 10-11 in substantial conformance with the Sampling Plan.

The soil gas sampling vessels consisted of 250 mL cylinders fitted with teflon stopcocks at either end and a septa. The vessels were decontaminated prior to and between samples by purging with the ultra-pure helium gas used for the field GC carrier gas. Prior to use, each sampling tube was again purged with helium for a minimum of 30 seconds.

Sampling consisted of driving a rod to a depth of approximately 3 feet. The drive rod was removed from the ground and the sampling probe was inserted into the hole made by the drive rod to a depth of approximately 2.5 feet. A surface seal was obtained using an 8-inch diameter PVC cover plate attached to the sampling probe. One and one-half volumes of the sampling tube, probe and sample vial was purged using a calibrated air pump. The stopcocks on the sampling tube were closed and the air pump turned off. The sampling tube was wrapped in aluminum foil (to minimize photo-chemical alteration of the gas sample) and was stored on ice until analyzed. The drive rod was decontaminated by cleaning with a paper towel. The sampling probe and tubing was decontaminated by purging with several volumes of ambient air after each sample collection.

Duplicate and blank samples were also collected and analyzed every 10 samples. Blank samples were obtained by collecting an ambient air sample through the probe and tubing after decontamination.

D. FIELD ANALYTICAL METHODS FOR VOCS (as used by Task 2.1.5 and 2.1.6)
Field GC analytical methods for soil gas and water headspace samples were intended to provide detection and quantitation of the following compounds:

- Benzene
- Bromodichloromethane
- Bromoform
- Chloroform
- Chlorodibromomethane
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethene*
- 1,2-Dichloroethene*
- Ethyl Benzene
- Methylene Chloride
- Tetrachloroethene*
- Toluene*
- 1,1,1-Trichloroethane
- Trichloroethene*

*Target Compounds

Field analysis was performed according to the methods listed in Appendix F of the approved QAPP. A Varian 3400 model GC was used with photoionization and Hall Electrolytic Conductivity detectors (PID/HECD) in series. Each analytical run (one field day or less) included a standard sequence consisting of a 4-point standard curve for headspace target compounds (50, 10, 5, and 1 ug/L), a headspace blank of a 50 ug/L headspace non-target compound and 5 uL injections of both target and non-target compounds for soil gas. Every eleventh analysis thereafter and the last sample each day were continuing calibration standards. Continuing calibration standards were generally within

±10% of the original standard. However, the continuing calibration standards exceeded ±30% (limit approved in the QAPP) of the original standard on six occasions. In these instances, the groundwater analysis results were footnoted as being estimated values. Due to time constraints and field logistics (need to determine well screen locations) recalibration and reanalysis of samples was not performed. Duplicate analytical samples were analyzed on a 1 in 10 or fewer basis.

Water samples were collected in 40 mL vials with open screw-caps and teflon faced silicone septa. Water samples were collected so that no headspace remained in the vial. Soil gas samples were collected in 250 mL glass vessels. The samples were protected from sunlight, stored in coolers, and transported to the field laboratory as soon as practical.

When received by the field laboratory, soil gas bulbs were allowed to equilibrate to ambient air temperature. A 5 mL aliquot of sample was removed through the sampling septa and injected into the GC.

Just before analysis, water samples were uncapped and 10 mL of sample was removed from the vial. The vial was then recapped and placed in a 55°C water bath for 10 minutes for headspace equilibration. A 5 mL aliquot of headspace air was removed from the vial through the septa and injected into the GC. Headspace dilutions were made by bringing an aliquot of the sample to 40 mL with organic free-water in a new 40 mL vial and repeating the above procedure.

Concentrations of target headspace VOCs in water were calculated based on a linear regression obtained from the initial calibration curve. Non-target compound headspace results were calculated on the basis of a 1-point standard using the following equation:

$$\text{ug/L} = \frac{R(\text{samp})}{R(\text{Std})} \times C(\text{Std}) \times DF \qquad \text{(Equation 1)}$$

where: R(samp) = Response of parameter in sample (counts)
R(Std) = Response of parameter in standard (counts)
C(Std) = Concentrations of standard in ug/L
DF = Dilution Factor

Calculations of soil gas concentrations were performed according to the approved QAPP using two steps and the following equations:

$$ng(injected) = \frac{R(samp) \times ng(Std)}{R(std)} \qquad \text{(Equation 2)}$$

where: ng(injected) = Nanograms of compound injected
R(samp) = Response of compound in sample (area counts)
ng(Std) = Nanograms of standard injected
R(std) = Response of compound in standard (area counts)

$$ng/L = \frac{ng(injected) \times 1000\ mL/L}{Va} \qquad \text{(Equation 3)}$$

where: ng/L = Nanograms of compound per liter of soil gas
ng(injected) = Nanograms of compound injected from equation 1
Va = Volume of soil gas injected (mL)

Results for equation 2 where calculated at the end of the day on a summary page in the field laboratory notebook.

Sample results, standard conditions and notes were recorded in a bound log book. Field results of GC analyses were considered tentatively identified with estimated concentrations. Retention time order and detection limits for headspace and soil gas target and nontarget compounds are shown in Tables 1 through 4.

E. ON-SITE ANALYSIS OF SURFACE WATER SAMPLES (Supplemental to Work Plan)
Surface water samples were collected at 11 locations from October 14 to October 29, 1987. The on-site analysis of surface water samples was not identified as a specific task in the Remedial Investigation Work Plan, but was conducted to evaluate conditions not previously anticipated. Sample locations are presented on Drawing 13076-B11 and are summarized in Table 5.

1. Purpose
The discharge at Well CW6 was reportedly to a storm sewer which discharged to the Wisconsin River. During the field investigation it was found that the storm sewer discharged to Bos Creek. Water levels measured at well nests R2

and R3 indicated downward gradients in the vicinity of the creek. Therefore, Bos Creek was identified as a potential source of VOC contamination to the shallow aquifer. Surface water samples were collected from Bos Creek to determine if discharge from production well CW6 was affecting groundwater quality through induced recharge of surface water into the aquifer. The collection and analysis of surface water supplemented groundwater data collected from adjacent wells.

2. Sample Collection Procedures

Surface water samples were collected by slowly submerging a 40 mL VOA vial into the surface water body while standing on shore. The vial was then capped so that no headspace remained. Samples were transported to the on-site GC within 1 hour. Duplicate samples of stations SW09 and SW10 were collected and submitted to the CLP for verification of field GC results.

F. DRILLING AND MONITORING WELL INSTALLATION (Task 2.1.6)

The subsurface exploration and groundwater monitoring well installation program was conducted between October 12 and December 12, 1987. Drilling, soil sampling, monitoring well installation and groundwater sampling while drilling was performed by Wisconsin Test Drilling, Inc. (WTD) of Schofield, Wisconsin, under the supervision of Warzyn.

Warzyn field personnel recorded activities in log books, prepared boring logs, collected soil and groundwater samples during drilling, and acted as safety officers at their respective drilling rigs.

Twelve (12) monitoring wells were installed at eight (8) locations in the west well field area and eighteen (18) wells were installed at thirteen (13) locations in the east well field area. An additional six (6) shallow soil borings were conducted in the east well field area in order to obtain shallow soil and groundwater samples for field and laboratory VOC analysis. Monitoring well and boring well locations are presented in Drawing 13076-B11. Boring logs and well details are presented in Appendices B and C, respectively.

1. Purpose

Monitoring wells were installed to provide data on aquifer characteristics, groundwater quality and groundwater flow directions. The nested wells provide information on vertical groundwater gradients and water quality at depth in the aquifer. Well nests generally included a shallow water table well, installed in the upper aquifer, and a deep piezometer installed near the base of the aquifer. Well locations and depths were modified from planned locations outlined in the Work Plan based on results of Round 1 water quality analyses, field VOC analyses of soil gas and water samples collected during drilling, and results of the preliminary groundwater model. The well locations selected were agreed upon with the U.S. EPA Project Officer. Refer to Table 6 for summary of well location and depth rationale.

2. Drilling Equipment

WTD provided drilling rigs, (CME 45C, CME 750, CME 55, D 50 and Canterra CT 311), associated tools, rig operators and support personnel, steam cleaning equipment, soil sampling equipment, groundwater sampling drivepoint and riser, and well construction materials. WTD also provided two Brainard Kilman (BK) 1.7 inch hand pumps for groundwater sampling during drilling. Warzyn provided a Johnson-Keck submersible pump with packer for sampling groundwater in deep borings while drilling.

3. Drilling Methods

Drilling required the use of two methods. A 4-1/4 inch I.D. hollow stem auger was used to drill and install shallow water table monitoring wells. A 4-1/4 inch I.D. hollow stem auger with screened lead auger was also used to obtain soil and groundwater samples from shallow borings at locations E32, E33, E34, E35, E36, E37 and E38 (See Drawing 13076-B11).

Deep piezometers were installed using mud rotary methods. A bentonite drilling mud with no dispersing agents (Aquagel Gold Seal) was used to provide the viscosity needed to remove drill cuttings. Four inch I.D. casing was advanced in five foot increments to completion depths in borings E21, E22, E24, E25, E26, W50 and W55 using either a 4-7/8 or a 5-7/8 O.D. roller bit. Water quality analyses conducted during drilling suggested a need for a greater number of deep wells. Due to a shortage in the quantity of available temporary casing, several monitoring wells were drilled without driving casing to the boring completion depth. Borings E20, E27, E30, E31, W52, W53, W54, W56 and W57 were advanced using mud rotary drilling with casing advanced to the water table. Bentonite slurry was used to support the borehole and remove drill cuttings below the water table in these borings. In general, very little drilling fluid was lost to the formation during boring advancement. Well development provided substantial well yields with little or no turbidity. VOC analyses performed on samples obtained during well development indicated VOC concentrations consistent with results obtained from samples collected during drilling (refer to Appendix G).

Water used for drilling well E25 was obtained from the City water distribution system at the filtration plant. This water was analyzed by the field GC and was found to have elevated trihalomethane concentrations (chloroform 50.8 ug/L, see Appendix G results). Subsequently, water for steam cleaning and drilling was obtained from test well CW10. Field GC analysis of water collected from Well CW10 indicated no detectable VOCs (see Appendix G sample CW10). Well CW10 was welded shut prior to drilling well E27, therefore, well E27 was drilled using water from the City distribution system.

4. Soil Sampling

Split spoon soil samples were collected at drilling locations E20 through E31 and W50 through W57, using ASTM method D-1586 (Standard Penetration Test). Samples were generally collected at five foot intervals from the ground surface to a depth of 25 feet. Soil samples were collected at either 10 foot or 15 foot intervals from 25 feet to completion, depending on the proximity of previously sampled borings. Sampling was divided between the shallow and deep boring at each well nest location, as needed, to obtain a complete set of samples for that location. Boring E27 was drilled from ground surface to a depth of 89 feet without soil sampling and was sampled on a 15 foot interval from 89 feet to completion. With the exception of two contract laboratory soil samples collected from 29 to 32 feet, boring E21 was drilled unsampled from ground surface to 89 feet and was sampled on a 15 foot interval from 89 feet to completion depth. Soil samples were collected from auger cuttings at shallow borings E32 through E38. The auger cuttings provided a vertical composite of unsaturated zone soils. These samples were submitted for contract laboratory target compound analysis. Split spoon soil samples were also collected at discrete depth intervals at 12 locations. Refer to Table 7 for soil sample locations, analysis parameters and rationale. The samples were shipped and preserved according to Table 3 of the QAPP. Samples collected for VOC analyses were transferred immediately to the respective bottles without compositing. Grain size samples were also not composited in order to preserve soil texture. Soil samples collected for total organic carbon (TOC) analyses and Acid Base Neutral analyses were composited prior to placement in the sample bottle.

Soil samples recovered from the borings were visually classified in accordance with the United Soil Classification System (USCS). Classifications are preliminary pending results of the physical soil testing and are presented on boring logs in Appendix B. When weather conditions permitted, soil samples were screened for the presence of volatile organic compounds (VOCs) using an HNu photoionization detector (see Boring Logs in Appendix B for results). The HNu photoionization detector is capable of detecting compounds with an ionization potential below 10.2 eV. The instrument was calibrated daily using an HNu calibration gas. HNus were also used to screen drill cuttings for VOCs. Drill cuttings which yielded HNu readings over 1 ppm were contained in 55 gallon drums. The drums were labeled and cross-referenced to field notebooks. The drums are being retained adjacent to the site trailer.

5. Groundwater Sampling

Groundwater samples were generally collected for VOC analysis at 10 or 15 foot intervals below the water table at each monitoring well location. However, a few zones of fine grained soils with relatively low hydraulic conductivity were encountered, from which groundwater samples could not be obtained within a reasonable time period. Because a deep (> 100 feet) plume of VHH was suspected (due to the vertical distribution of contaminants in Monitoring Wells E30 and E31), groundwater samples were not obtained from borings E21 or E27 from depths shallower than 90 feet. However, a water table well (E21A) was installed adjacent to Monitoring Well E21 and was subsequently sampled during the Round 2 sampling event.

Groundwater samples were collected using a three-foot long section of two inch I.D. stainless steel well point attached to a galvanized steel riser pipe. The well point was driven into the base of the borehole so that the slots were exposed to the aquifer. Three casing volumes (or isolated interval) of groundwater were then purged using either a Brainard Kilman 1.7 inch O.D. hand pump or a Johnson-Keck submersible pump with packer. Water samples were collected, for on-site GC analysis, in VOA vials directly from the pump discharge. Several duplicates of these samples were also collected and sent to a CLP lab for verification purposes.

Shallow groundwater samples were obtained from borings E32, E33, E34, E35, E36 and E38 using a screened hollow stem auger which had been drilled several feet into the water table. The sample was collected using either a Brainard Kilman 1.7 inch O.D. hand pump or a stainless steel bailer. Prior to sample collection 3 to 5 casing volumes of water were removed from the auger.

6. Geophysical Logging

Several deep borings were gamma logged using a Mount Sopris 1000 C stratigraphic logger. Results of gamma logging were used to provide information on clay content of penetrated formations and to determine depth to bedrock. Results of the gamma logging were used in combination with the field water quality analyses of samples collected while drilling to optimize well screen location in the aquifer. Logging followed methods outlined in the manual in Appendix E of the QAPP.

7. Well Installation

Water table monitoring wells and piezometers were installed according to construction details contained in Appendix C and summarized in Appendix H. Wells were constructed using 2 inch I.D. flush joint, galvanized steel riser pipe, with No. 10 slot, flush joint, stainless steel screens. Wells screened at the water table were constructed with 10 foot screens. Wells screened at depth in the aquifer, were constructed with 5 foot screens with a 10 foot stainless steel riser pipe directly above the well screen. The annular space between the well and the borehole (sand pack) was backfilled with either No. 30 flint sand, caved formation, or a combination of both. The sand pack generally extended to a height of 3 to 5 feet above the well screen. In cases where the boring extended past the intended location of the screen interval by more than 3 feet, flint sand interbedded with bentonite pellets were used to backfill the borehole so the well screen could be placed at the desired depth in the aquifer. A 2 to 3 foot seal of bentonite pellets was installed above the sand pack of each well. In deep wells, a thick bentonite slurry was used to seal the annular space from the top of the pellet seal to the ground surface. A tremie pipe with lateral exit holes was set above the top of the pellet seal and pumped at a slow rate until the slurry began to run out the top of the auger or casing. Additional bentonite slurry was added as needed to compensate for removed casing. The shallow well annular space was also backfilled with a thick bentonite slurry which was installed from the surface using a pump hose. A surface seal of granular bentonite was installed in the upper 3 to 5 feet of borehole. A locked protective casing was then set into the surface seal. Locked flush mount protective casings were generally installed in driveways, parking lots, City right-of-ways and other highly traveled areas. Cement grout and bumper posts were placed around stick up protective casings adjacent to highly traveled areas. The well installation was completed by marking the protective casing with the well identification numbers.

All wells, with the exception of E28A, appear to function properly. E28A appears to have a slight kink in the screen and therefore must be sampled with a one-inch diameter bailer.

8. Well Development

Shallow wells were developed using either a bailer or a Brainard Kilman 1.7 inch O.D. hand pump. Deep wells were developed using either a Brainard Kilman 1.7 inch O.D. hand pump or a Johnson-Keck submersible pump with packer. Deep wells were surged with a two inch bailer prior to pumping. The pump was also periodically raised and lowered during development, so that the entire screened interval was developed. The well was pumped until a minimum of 10 well volumes had been extracted and the water became visually clear. pH and conductivity were measured at frequent time intervals during development of several wells. In general, changes in theses parameters indicated minimal change after the first two to three well volumes had been removed.

9. Decontamination

Decontamination of well screen, well riser, drive points, drill rig, casing, drill rod, drill bits and other tools consisted of steam cleaning at the decontamination pad. Each drill rig and tools was decontamination prior to start up and between holes. Brainard Kilman hand pumps were also steam cleaned between holes. The Johnson-Keck submersible pump was decontaminated by running Liquinox wash solution through and over the pump for several minutes. Deionized water was circulated through the pump and ran over the tubing for rinse. Water used for steam cleaning was obtained from city test well CW10.

G. GROUNDWATER SAMPLING (ROUND II) (Task 2.1.8)

1. Purpose

Round II groundwater samples were collected from 116 monitoring wells between November 30 and December 12 throughout both the east and west well field areas. Sample locations included the following:

- Five City Production wells (CW3, CW4, CW6, CW7, CW9);
- Two City test wells (Plum Dr. test well, Wilson Hurd test well);
- One private well (Wergin);
- Five Wausau Chemical Extraction Wells (EXW4, EXW5, EXW6, EXW7, EXW15);
- Wausau Chemical treatment system influent and effluent; and
- One hundred and one groundwater monitor wells.

The analytical results obtained from Round II sampling will provide additional data for the RI evaluation, including source identification, extent of contamination and determination of the mass of contaminants present in the aquifer. Results of Round II sampling were not available at the time this document was prepared but will be presented in the Remedial Investigation Report.

2. Sample Collection Procedures

Round II groundwater samples were collected according to procedures described for Round I sampling. Round II groundwater samples were analyzed for VOCs and general water chemistry parameters by a designated U.S. EPA Contract Laboratory Program (CLP) according to the special analytical services (SAS) methods specified in Appendix D of the approved QAPP. An additional 20 samples were analyzed for Hazardous Substance List (HSL) parameters by the CLP using Routine Analytical Services (RAS) methods outlined in Appendix B of the QAPP.

H. SURFACE WATER AND SEDIMENT SAMPLING (Task 2.1.7)

Surface water and sediment samples were collected at 7 locations on December 9, 1987. Sample locations are described in Table 8 and are shown on Drawing 13076-B11.

1. Purpose

Surface water and sediment samples were collected to assess potential affects of surface water discharges on the groundwater through induced recharge.

2. Sample Collection Procedures

Surface water samples were collected within a stainless steel cup prior to sediment sample collection. The cup was submerged slowly in the water body to minimize turbulence and potential for volatilization of VOCs. The sample was immediately transferred to a 40 ml VOA vial with minimal turbulence. Following surface water sample collection, sediment samples were collected using a stainless steel core barrel. The samples were composited in a stainless steel mixing bowl and were transferred to 8 oz VOA vials using a stainless steel spatula. The sediment samples were sealed in the VOC vials within 3 to 4 minutes of sample extraction. Ambient temperatures during sampling were below freezing, therefore minimizing potential for loss of volatiles. Sampling equipment was decontaminated with a TSP wash followed by a deionized water rinse after collection of each sample.

In order to maintain consistent analysis of field indicator parameters, pH, specific electrical conductivity and temperature of the surface water samples were measured at the site trailer within 1 hour of sample collection. By analyzing the samples at the site trailer, utilization of field personnel was maximized and consistency maintained, since the samples were analyzed by one operator using the same equipment for all analyses. Surface water samples undergoing metals analyses were filtered and preserved prior to shipment according to Table 3 of the QAPP. Surface water samples were shipped daily to designated CLP Laboratories for VOC and general water quality parameter analyses according to SAS procedures (see Appendix D of the QAPP for analytical methods). Sediment samples were also shipped daily to a designated CLP Laboratory for VOC analysis according to RAS procedures (see Appendix B in the QAPP for CLP target compound lists and required detection limits).

I. HYDRAULIC CONDUCTIVITY TESTING (Task 2.1.9)

1. Purpose

The purpose for conducting baildown tests in selected monitoring wells is to measure the in-situ saturated hydraulic conductivity of subsurface materials. Baildown tests methods were selected over laboratory tests because the field method tests a larger, less disturbed zone of the aquifer than laboratory testing methods.

The general procedure for a baildown test is to instantaneously change the hydraulic head within the well and measure the rate at which the water level in the well recovers to the static level. The hydraulic conductivity of the aquifer material is a function of the rate of water level recovery and the well geometry. Due to the effects of partial well penetration on the analytical solution, the location of the well screen with respect to the water table and the base of the aquifer must be considered. The configuration of a typical baildown test is illustrated in Figure A (Appendix I).

2. Test Methods

Piezometers were tested using air pressure to create a head within the well. The water level within the well fell until the total head within the well (water column plus air pressure) equaled the total head outside the well. The air pressure was instantaneously released, creating a low head within the well and subsequent water level recovery. A pressure transducer with an In-Situ Environmental Logger Model SE 1000B (Hermit Data Logger) was used to measure and record the water level recovery in the well.

A PVC air pressure manifold was fitted over the top of the well casing and a non-reactive fluorosilicate gel was used to create an air seal. An electric water level indicator and the pressure transducer were lowered into the well through a rubber gasket in the top of the device. The air space above the water column in the well was pressurized using breathing air (SCBA tank) or nitrogen until the water level dropped to the desired depth (indicated by the electric water level probe). Generally, the system was pressurized to 5 to 10 psi causing approximately 10 to 15 feet of drawdown. When the desired water level was attained, a 2-inch ball valve was opened to instantaneously release the air pressure. The data logger was started simultaneously with the release of pressure to measure the rate of water level recovery.

Hydraulic conductivity tests were conducted on water table wells by instantaneously removing a known volume of water from the well with a stainless steel bailer. Water level recovery was measured using a pressure transducer with data logger.

The hydraulic conductivity test data was reduced using the Bouwer and Rice Method, summarized in Appendix I.

J. LOCATION AND ELEVATION SURVEY (Task 2.1.10)

Monitoring wells installed by Warzyn and selected previously installed monitoring wells were surveyed by Warzyn from December 21 through December 29, 1987. A discrepancy of approximately 0.25 feet was discovered between the previous surveyed east well field monitoring well elevations and elevations determined during the present study. Therefore, the east well field monitoring wells, extraction wells and production wells were resurveyed on January 4 and 5, 1988. The west well field monitoring well elevations were generally within ±0.05 feet of the previous survey results.

Monitoring well and production well elevations were surveyed using U.S.G.S. Monument TT135FJH (Elevation 1202.571 feet MSL) located at Gilbert Park, as reference. Monitoring wells were surveyed for top of protective casing elevation, top of riser elevation and ground surface elevation. The vertical accuracy of the survey was approximately 0.01 feet. However, ground surface elevations were surveyed to ±0.1 feet due to surface irregularities. Monitoring well locations were determined by measuring distances and angles from existing features and structures. Monitoring well locations are shown on Drawing 13076-B11. Monitoring well elevations and construction details are summarized in Appendix H.

K. WATER LEVEL MONITORING (Task 2.1.9)

1. Purpose

Groundwater levels were measured at 3 different time periods during the course of the Phase I field investigation. Groundwater elevations were used to determine flow directions, and vertical and horizontal gradients. Variations in groundwater elevations between monitoring periods were used to assess aquifer response to river fluctuations and pumping variations.

2. Procedure

Water levels were measured and recorded during three time periods: October 5, 1987; December 10, 1987; and January 7-8, 1988. Water levels were measured using either a fiberglass tape with attached sounding device or an electronic water level indicator. On occasions when two different measuring devices were used to obtain groundwater levels, the instruments were first calibrated to a base station (well) and the response of one of the instruments was adjusted to be consistent with the other instrument.

III. RESULTS OF THE PHASE I FIELD INVESTIGATION

A. GEOLOGY

1. Bedrock Geology

The City of Wausau is located near the southern margin of the exposed Precambrian shield in Wisconsin. Wausau and the surrounding area is predominantly underlain by Early Proterozoic basaltic to rhyolitic metavolcanics which have been intruded by Early to Middle Proterozoic granitic plutons (La Berge and Meyers, 1983). Investigations in the vicinity of the Wausau Well field indicate a distinct break in bedrock lithology exists beneath the Wisconsin River. Based on available boring logs and on samples observed during this investigation, the East Well Field appears to be underlain by rhyolitic bedrock whereas, syenitic bedrock underlies the west well field area. The difference in bedrock lithology is supported by the observation that the bedrock surface in the vicinity of the West Well Field is much more irregular than the bedrock surface present below the east well field (refer to Drawing 13076-B12). The preglacial bedrock topography east of the Wisconsin River is chracteristic of a mature erosional landscape. It possesses a subtle, somewhat uniformly eroded bedrock surface with tributary valleys that tend to be broad and shallower than tributary valleys located west of the Wisconsin River. Bedrock ridges are generally wider and not as highly dissected as ridges on the west side of the Wisconsin River. The bedrock surface west of the Wisconsin River indicates considerably greater relief of bedrock topography suggesting a more youthful erosional landscape. This landscape appears to be a function of a more weathering resistent bedrock lithology than that present of the east side of the Wisconsin River.

Bedrock topography in the vicinity of the Wausau Well Field is obscured by glacial outwash and alluvial sediments ranging in thickness from 0 to 170 feet. Glacial outwash sediments were deposited in the Wisconsin River Valley as Late Wisconsinan Stage glaciers retreated from the Wausau area. The outwash deposits fill the Wisconsin River Valley to an elevation of approximately 1230 feet MSL. The bedrock topography underlying the outwash deposits is predominantly a function of preglacial drainage patterns. The preglacial drainage patterns are evident from the topography of the exposed bedrock above the glacial outwash terrace. The bedrock topographic map in the vicinity of the well field (Drawing 13076-B12) was developed using available boring logs and extrapolations of preglacial drainage based on exposed bedrock topography.

The bedrock surface contour map indicates the irregular nature of lateral and vertical aquifer boundaries in the vicinity of the City Well Fields. As previously stated, the bedrock surface west of the Wisconsin River tends to exhibit greater relief then the bedrock surface east of the Wisconsin River. The west bedrock surface is characterized by deeply incised tributary valleys, narrow ridges, and isolated bedrock highs. The West Well Field is located near the junction of a tributary valley and the main Wisconsin River Valley. This tributary valley extends from near the intersection of Campus Drive and Schofield Avenue and trends southeast. Boring W55 was performed during this investigation to determine whether a bedrock ridge, identified by a previous geophysical survey, was present. This well did not indicate the presence of the narrow northwest-southeast trending bedrock ridge between Production Well CW6 and Bos Creek. Therefore, it is unlikely that a bedrock ridge the size described by previous investigations (Weston, 1985; RMT, and Geraghty & Miller, 1987) exists.

A tributary valley also appears to be located in the southern portion of the East Well Field. This tributary valley extends from near the Intersection of Bridge St. and 13th Avenue and trends toward the west.

2. <u>Glacial Geology</u>

Glacial outwash deposits in the Wisconsin River Valley are generally very heterogeneous due to lateral channel migration and vertical bedload aggradation. While it is difficult to correlate specific depositional units in such a braided stream environment, it is possible to recognize general depositional trends. The distribution of glacial outwash sediments appears to be strongly controlled by the underlying bedrock topography. North of the City of Wausau Well Fields, the Wisconsin River Valley narrows to less than 1/2 mile wide. Glacial outwash sediments deposited in this portion of the Wisconsin river Valley are predominantly coarse sands and gravels that are often greater than 150 feet thick. As the Wisconsin River Valley widens toward the south the outwash deposits grade from coarse sand and gravels to fine to medium sands. The thickness of the glacial outwash deposits also decrease toward the south (Kendy, 1983).

Geologic cross-sections constructed through the well field area (Drawings 13076-B13 and 13076-B14) indicate the heterogeneous nature of the glacial outwash sediments. The correlation shown in cross-section should be considered preliminary until soil classifications can be reviewed using the grain-size analyses from the CLP lab. Cross-section AA' extends from boring E28A in the East Well Field across the Wisconsin River to Marathon Electric monitoring well nest R1S, R1D. Cross-section BB' is located on the west side of the Wisconsin River and extends from well nest C4S, C4D, south of the Marathon Electric foundry, to well nest GM4S, GM4D located north of the City's West Well Field. Refer to Drawing 13076-B11 for monitoring well and cross-section locations.

Cross-section AA' indicates a glacial outwash terrace that onlaps against the crystalline bedrock valley. The maximum elevation of this outwash terrace is approximately 1230 feet MSL. The outwash terrace is shown as predominantly composed of undifferentiated sand deposits. However, borings W52, W53, R1D and R4D indicate an apparently continuous sequence of deposits. This sequence consists of a fine sand unit overlying a thin gravel bed which is underlain by a fine to medium sand unit. The lower sand unit appears to pinch out against the bedrock surface beneath the Wisconsin River. The gravel layer is shown correlating to a basal gravel layer beneath the East Well Field. This soil correlation may be somewhat uncertain due to the relatively large distance between borings E27 and W53. The overlying fine sand unit grades toward the east into the undifferentiated fine to coarse sands. The bedrock surface beneath the East Well Field has weathered to a poorly sorted clayey residuum. This material is characterized by high silt and clay content and frequently contains angular feldspar fragments. The weathered bedrock can usually be distinguished from the overlying gravel deposits because it generally turns drilling fluids a burnt reddish color. A gray silty gravel material was encountered at the base of boring W53. This material may also be a weathering product of the bedrock surface or a relict till not removed during the glacial outwash scouring of the bedrock surface.

Cross-section AA' shows fill materials on both sides of the Wisconsin River Valley. The fill materials encountered in the east study area consist largely of granite cuttings from local quarry and stone cutting operations. Much of the fill placed in low lying areas surrounding the East Well Field reportedly dates back to the early to mid 1900's (see Industrial Survey, Appendix L). The fill materials were used to build up the river terrace prior to and during river front industrialization. Additional fill materials were observed west of Lake Wausau Granite and at Schofield Park on the west side of the Wisconsin River. Approximately five to ten feet of granite cuttings are filled into a former sand and gravel pit located beneath the Wergin Construction Company property. The former City of Wausau landfill occupies a sand and gravel pit located beneath the southern portion of Marathon Electric on the west bank of the Wisconsin River. The landfill ranges in thickness from approximately 35 feet near the river bank to a couple of feet thick at the former gravel pit's west excavation face. Refer to Drawing 13076-B10 for approximate landfill boundaries. The gravel pit was filled with unknown quantities of residential, commercial and industrial wastes. The Industrial Survey (Appendix L) provides more specific information on landfill filling practices.

Cross-section BB' roughly parallels the west bank of the Wisconsin River (refer to Drawing 13076-B11). With the exception of Bos Creek and the gravel pit located north of monitoring well GM4D, the surface topography is relatively flat. The outwash sand deposits shown are somewhat heterogeneous and frequently appear discontinuous at the scale of this cross-section. Where the sand deposits could not be differentiated the unit is referred to as "fine to coarse sand". The depositional sequence described in the western part of section AA' is less apparent. The gravel unit appears relatively continuous throughout the southern portion of the cross-section area and may extend along the bedrock surface to well GM4D, located north of the City Well Field. The gravel unit was not logged in boring R3D, however, the driller reported difficult drilling at the approximate elevation of the unit (RMT, 1986). The underlying "fine to coarse sand" unit apparently pinches out to the north, in the vicinity of well W52. The fine sand unit overlying the gravel appears to grade into undifferentiated sands toward the north.

The northern portion of the cross-section BB' indicates an increased abundance of coarse sand and gravel deposits. The coarser sediments are probably the result of the braided stream possessing higher depositional energy due to the narrow bedrock valley in the northern portion of the study area. Based on the extent of sand and gravel operations north of wells GM4S, GM4D the sand and gravel deposits appear relatively extensive throughout this area.

B. HYDROGEOLOGY

Groundwater flow in the vicinity of the City Well Fields is influenced by several factors including:

- bedrock topography;
- soil heterogeneities;
- variable production well pumpage;
- the presence and fluctuation of river and stream elevations;
- the hydraulic resistance of the stream and the river beds; and
- the rate and distribution of rainfall percolation recharging the aquifer.

Each of these factors play a role in the groundwater flow, contaminant flow and contaminant migration routes and velocities. Discussion of the dynamic relationships of these factors are beyond the scope of this document, except in so far as they are incorporated into the preliminary groundwater flow model. The following discussion on groundwater flow implicitly includes these factors into the observations on groundwater flow.

1. Groundwater Flow

Horizontal groundwater flow in the vicinity of the City Well Fields is shown in Drawing 13076-B15. The map was developed from groundwater elevations determined from water levels measured on January 7-8, 1988. Where possible, only water table wells have been used to construct the potentiometric contours. However, the lack of data in some areas has made it necessary to use wells screened below the water table surface. The inaccuracy associated with using these water levels should be minimal considering the relatively low vertical gradients compared to the potentiometric surface contour interval (0.5 feet to 1.0 feet). Although water table elevations were used at most locations to construct this map, it is strictly a potentiometric map, because the aquifer beneath the Wisconsin River and portions of Bos Creek are semi-confined by the potentially lower hydraulic conductivity river bed deposits. The map indicates pronounced cones of depression around the five active City production wells. However, Production Well CW9 appears to have been turned off prior to water level monitoring. Therefore, the water levels in CW9 and CW9 OBS (CW9 observation well) may be recovering. Each of the other wells appear to be pumping.

The combined cone of depression of the West Well Field extends asymmetrically away from the pumping wells. Presently, the southern extent of the cone of depression at the water table appears to be limited by Bos Creek, which acts as a recharge boundary. This is shown by the higher head within the Bos Creek pond north of Randolph Street (1191 feet) than in the surrounding water table (1186 to 1187 at well nests R-2 and R-3). The effectiveness of this recharge boundary is evident in potentiometric cross-section BB' (Drawing 13076-B17) and from the vertical gradients presented in Table 9. The potentiometric section shows the divide extends through the fine to coarse sand into the underlying fine sand. The section indicates there may be continuity of flow from south of Bos Creek to production well CW6 within the basal gravel deposit.

The recharge boundary effect of Bos Creek may be more pronounced since early 1986, when well CW6 began regularly discharging to the creek, substantially increasing the flow. Prior to 1986, the groundwater divide may have been located further south than its present location. Refer to Section IV - Groundwater Flow Model Results for additional discussion of this phenomenon.

The cone of depression around the West Well Field shown on the potentiometric map is relatively steep southwest of the well field, because the aquifer thins and eventually pinches out against the bedrock high located west of Bos Creek Drive. The northern extent of the cone of depression is also limited by the aquifer thinning against a bedrock high located approximately 1200 feet north of Production Well CW9. Based on on the observation that water levels in monitoring wells between the west production Well Field and the Wisconsin River are lower than the river, it appears that significant infiltration is induced from the Wisconsin River. However, the amount and rate of river recharge has not been estimated.

Groundwater elevations in the vicinity of the East Well Field indicate considerable pumpage at Production Well CW3 and somewhat lower pumpage at Production Well CW4. The zone of influence of the east well(s) encompasses a large part of the riverfront industrialized area in northern Wausau. The cones of depression from wells CW3 and CW4 are separated by a groundwater divide on this particular date. The presence and location of the groundwater divide is dependent on pumping rates and schedules of Production Wells CW3 and CW4. Based on water levels measured on January 7, the groundwater divide appears to extend from the central portion of the Wausau Chemical property to the northern portion of the Marathon Box property. Small cones of depression were observed or interpreted to be present around the groundwater extraction system at Wausau Chemical (reported to be pumping at approximately 100 gpm) and the well at Wergin (reported at approximately 60 gpm).

The combined cone(s) of depression from the East Well Field also appears to affect groundwater flow below and to the west of the Wisconsin River. This is shown by the continuity in the gradient from the east to the west side monitoring wells (e.g.,monitoring wells E21 and E27 to W53 and C3S). The affect of the East Well Field production well pumpage is also shown on the potentiometric contours shown on section AA' (Drawing 13076-B16). The potentiometric contours on section AA' indicate a relatively strong component of vertical flow (recharge) adjacent to the bedrock valley walls, especially on the west end of section AA'. This recharge may be the result of inflow of groundwater from bedrock fractures but more likely from infiltration of surface water runoff from the bedrock uplands. The potentiometric contours become increasingly vertical toward the east, indicating a higher component of horizontal groundwater flow. Monitoring Well Nests C4D, C4S and W53, W53A, located at Marathon Electric property, indicate very slight downward vertical gradients adjacent to the Wisconsin River. Below the Wisconsin River, the East Well Field production well pumpage has induced surface water recharge of the aquifer causing flow downward through the river bed and toward Production Well CW3. Deep groundwater flow remains predominantly eastward (horizontal) as indicated by the almost vertical equipotential lines. Potentiometric contours of the aquifer below the East Well Field indicate groundwater flow converging at Production Well CW3. Groundwater flowing at the base of the aquifer flows upward into the pumping well. Shallow groundwater flows downward to reach the screened section of the production well.

During the groundwater level monitoring period (January 7-8, 1988), the Wisconsin River was maintained at an elevation of approximately 1187.3 feet MSL. However, watertable monitoring wells adjacent to the River had much lower groundwater elevations than the River, indicating substantial head loss or resistance to flow through the river sediments. Monitoring Well E21A located approximately 25 feet east of the Wisconsin River had a groundwater elevation of approximately 1185.01, approximately 2.3 feet lower than the Wisconsin River. Water table Monitoring Wells C2S, C3S, C4S and C7S, located west of the Wisconsin River also had groundwater elevations considerably lower (0.90 to 0.70 feet) than the Wisconsin River indicating drawdown from the City Well Field had extended to the west side of the river. Refer to Appendix H for a summary of observed groundwater elevations. Potentiometric section AA' (Drawing 13076-B16) indicates the 1187.0 and 1186.5 potential contours are interpreted to be roughly parallel the river bed due to the head loss in the river sediments (actual head loss may be in a narrower zone than shown on section AA'). Below the river, the 1186.0 potential contour is extended nearly vertically, indicating predominantly horizontal groundwater flow at depth. Based on an aquifer thickness of approximately 140 feet and a river depth of approximately 20 feet, the Wisconsin River penetrates approximately 15% of the aquifer. The observed head loss in the river sediments combined with the relatively small penetration depth appear to support the idea of deep horizontal groundwater flow beneath the Wisconsin River.

2. Hydraulic Conductivity Results

Aquifer hydraulic conductivity was determined from baildown tests performed on nineteen monitoring wells. Duplicate analyses were performed at three monitoring wells in order to maintain quality control. The hydraulic conductivity test data was evaluated using a Fortran program developed for data reduction using the Bouwer and Rice Method (See Appendix I for description of method). Input parameters such as well diameter, penetration depth and aquifer thickness were determined from well construction details and boring logs from each test location. Hydraulic conductivity test data, recovery graphs, input parameters and results are shown in Appendix I. Test results and quality control analyses are summarized in Table 10.

Hydraulic conductivity values range from a low of 1.7×10^{-4} cm/s at Monitoring Well C4D to 8.1×10^{-2} cm/s at Monitoring Well E22. The boring log for Monitoring Well C4D describes the screened formation as fine sand. However, the baildown test results appear to indicate a somewhat less permeable formation or possible drilling mud exfiltration into the formation. Monitoring Well C4D was advanced using mud rotary drilling without driving casing. A bentonite drilling mud was used to keep the borehole open and to remove drilling cuttings. As a result, the actual aquifer hydraulic conductivity may be somewhat greater than indicated by the test at Well C4D. Similar drilling techniques were used at Monitoring Wells E20, E30 and W56. Therefore, hydraulic conductivity values determined from baildown tests performed on these wells may be lower than actual values. Monitoring well drilling methods are also presented in Table 10. Comparison of hydraulic conductivity values for Monitoring Wells E20 and E22, which are located approximately 150 feet apart and are apparently screened in the same unit, indicate a relatively large difference in hydraulic conductivity (8×10^{-2} vs 0.2×10^{-2} cm/s). This indicates that the hydraulic conductivity may vary over short distances due to subtle changes in soil or that drilling procedures used may have a strong influence on the results.

Results of duplicate hydraulic conductivity test performed on three wells are presented in Table 10. The average, difference and percent error are also presented in order to show the degree to which the tests could be replicated.

The percent error was calculated by dividing the difference of the two tests by the average. In general, the percent error ranged from approximately 1% in Monitoring Well W55 to almost 20% at Monitoring Well E20. This appears to be within the range of other variations as described above.

C. SOIL GAS RESULTS

1. West Study Area

Soil gas samples were collected at a total of 151 locations (64 East Well Field, 87 West Well Field). The West Well Field soil gas station locations are presented on Drawing 13076-B18. Soil gas stations SG1 through SG15 were located on an inner arc surrounding Production Well CW6. Soil gas stations SG16 through SG30 were located on an outer arc surrounding well CW6. The soil gas stations on each arc were located approximately 200 feet apart. Soil gas stations SG31 through SG57, SG101 through SG107, SG111 through SG125 and SG132 through SG143 were located at Marathon Electric.

Soil gas results are presented in Appendix D. No quantifiable volatile organic compounds (VOCs) concentrations were detected at soil gas stations located on either arc surrounding Production Well CW6 (stations SG1 through SG30). The "BMDL" PCE concentrations reported at stations SG21 through SG28 and in blank SB03, and the TCE concentration reported at station SG21 appear to be the result of a carryover error in the gas chromatograph from a water sample analyzed earlier in the same day. Repeated analyses conducted at soil gas stations SG21 and SG25 did not indicate detectable PCE or TCE concentrations. TCE was detected at concentrations below reportable limits at soil gas stations SG34 and SG50. The source of these soil gas detections is not known at this time. However, soil gas station SG50 is located adjacent to the service department of Marathon Electric where TCE was reportedly used to degrease wire used in manufacturing generators and motors (WDNR, 1982). Benzene was detected at concentrations below reportable limits at stations SG39, SG40 and SG43. These stations are located adjacent to a Marathon Electric employee parking lot and an underground fuel tank.

Elevated concentrations of TCE were detected at soil gas stations SG105, SG121, SG122, SG123, SG124, SG125, SG141 and SG142. These stations are located in a paved parking lot directly south of the Marathon Electric Assembly building shipping area (refer to Drawing 13076-B19 for results). The former City of Wausau landfill reportedly occupies a sand and gravel pit which was located beneath this parking lot. Based on interviews with former landfill employees, the limits of refuse of the former landfill encompasses the soil gas detection areas. The highest TCE soil gas readings appear to be concentrated near the north central portion of the former landfill. However, TCE was also detected at concentrations below reportable limits at stations SG136 and SG140, located at the southern and central portions of the former landfill, respectively.

In addition to TCE, several other volatile organic compounds (VOCs) including tetrachloroethene, 1,1-dichloroethene, toluene, benzene and 1,1,1-trichloroethane were detected in the soil gas within the former landfill boundary (Refer to Appendix D). In general, these compounds were present at concentrations below reportable limits.

2. East Study Area

Soil gas samples were collected at 64 locations throughout the east well field area. Investigated properties included: Marathon Box, Marathon Press, Wergin Construction, Camelot Cleaners, C.M. St. P. & P. Railroad, Wausau Chemical, Wausau Energy, Gorwitz Furs, and ETCO Electric. Soil gas station locations and PCE concentrations are shown in drawing 13076-B20. A summary of analytical results are presented in Appendix D.

Soil gas analyses indicate detectable concentrations of PCE at several locations including:

- The northwest portion of Marathon Box Co.;
- Camelot Cleaners;
- Wausau Energy;
- Marathon Press;
- ETCO Electric Co.;
- Gorwitz Furs;
- The City filtration plant; and
- Wausau Chemical.

The highest concentration of PCE in the soil gas was detected at station SG57, located near the south side of Wausau Chemical. Station SG57 is located next to the southwest corner of the impoundment structure, which surrounded the former solvent storage tanks. A documented release of approximately 900 gallons of PCE occurred in this area in December 1983. Due to instrument overrange, the PCE soil gas concentration at station SG57 was estimated at 4080 ug/L. The soil gas PCE concentrations appeared to abruptly decrease toward the north, south and west away from the former solvent storage area. A more gradual decrease in soil gas PCE concentrations was observed toward the east-northeast (refer to Drawing 13076-B20).

Elevated concentrations of PCE were also detected at soil gas stations SG118 and SG119. These stations are located near the north side of Wausau Chemical where a release of approximately 200 gallons of PCE reportedly occurred in February 1983 (Refer to Industrial Survey). Soil gas samples from stations SG92 and SG93 also indicated elevated concentrations of PCE. These stations are located near the intersection of E. Wausau Avenue and the C.M. St. P. & P. Railroad right-of-way, directly northeast of Wausau Chemical.

Relatively low PCE concentrations were detected in soil gas samples taken from several other facilities located in the vicinity of the East Well Field. PCE concentrations ranging from below the minimum reportable limit of 1.0 ug/L (BMDL) to 1.30 ug/L were detected at several soil gas stations located at the Marathon Press facility. In addition to the PCE soil gas concentrations shown in Drawing 13076-B20, TCE and bromodichloromethane were also detected at concentrations below minimum reportable limits (BMDL) at soil gas station SG76. Soil gas stations SG76 and SG77 are located along the south side of the Marathon Press north building. PCE was also detected at relatively low concentrations (<5.0 ug/L) at soil gas stations SG130 (Gorwitz Furs), SG131 (ETCO Electric), SG73 and SG74 (Wausau Energy), SG147 (Wergin Construction) and SG88 and SG100 (Camelot Cleaners). 1,1,-dichloroethene (1,1,-DCE) was detected at concentrations below minimum reportable limits at soil gas station SG88 (Camelot Cleaners).

3. Discussion of Soil Gas Results

Presently, the application of soil gas investigations in determining the extent of VOCs in groundwater is in a state of development. Several investigations (Marrin and Thompson 1987 and Kerfoot et.al., 1986) have indicated areal distribution of contaminants in soil gas correspond to contaminant distributions in watertable aquifers. However, most of these investigations were performed in arid climates such as the southwestern United States. In humid-temperate climates, precipitation tends to flush the vadose (unsaturated) zone more frequently, obscuring potential soil gas patterns. In addition, recharge of precipitation creates an upper surface of uncontaminated water so that the VOCs in the groundwater are not readily volatilized into the gaseous phase above the water table. The rate of volatilization may also be limited by the lower average temperature in the northern United States.

The distribution of volatile halogenated hydrocarbons (PCE and TCE) shown on Drawings 13076-B19 and 13076-B20 appears to be a function of several variables including: soil type, surface cover material, proximity to source area, soil moisture content, surface topography and/or depth to watertable, and Henry's Law Constant. The Henry's Law Constant describes a compound's ability to partition from a liquid phase to a gaseous phase. The Henry's Law Constant may be estimated from the aqueous solubility, vapor pressure and molecular weight of a compound. Table 11 shows the Henry's Law Constant for a variety of common solvents. Those compounds possessing the highest Henry's Law Constants tend to partition to the greatest extent into the gaseous phase and therefore are most readily detected by soil gas methods. For example, if PCE and trans-1,2-DCE were present in the soil at equal concentrations, the PCE may be present in the soil gas at concentrations considerably greater than those of trans-1,2-DCE.

Based on the preceding discussion, it is apparent that soil gas distribution of halogenated hydrocarbons does not always reflect the distribution of the volatile compounds in the watertable aquifer. Rather, the distribution of VOCs in the soil gas is a function of several influencing factors including: concentration of volatile compounds in the groundwater, depth to groundwater, presence of unsaturated zone contamination, nature of the surface cover, temperature, barometric pressure, Henry's Law constants and several other factors. Despite these influencing factors, analysis of the magnitude and distribution of soil gas detection points can be very useful in identifying potential source areas.

The TCE concentrations observed on the west side at soil gas stations SG105, SG121, SG122, SG123, SG124, SG125, SG141 and SG142 (Appendix D) probably indicate the presence of TCE contaminated soils or refuse materials within the landfill. The relatively large depth to the watertable (±30 feet) in the vicinity of the landfill make it unlikely the soil gas detections are solely the result of volatilization from contaminated groundwater beneath the area. The Marathon Electric parking lot, which presently covers much of the landfill, may have acted as a cap, limiting the release of TCE from the soil/refuse to the atmosphere and resulting in elevated concentrations of TCE in the gaseous phase below the pavement (refer to Drawing 13076-B19).

The distribution of PCE in soil gas in the vicinity of the East Well Field is somewhat more complicated. Theoretically, the relatively shallow depth to water (approximately 12 feet) should increase the likelihood that the detected soil gas concentrations would correspond to groundwater contamination. However, soil gas stations SG144, SG145 and SG146 do not indicate detectable PCE concentrations even though they are located directly adjacent to watertable Monitoring Well GM9S, which has a PCE concentration in excess of 5,000 ug/L (refer to Appendix G). However, based on the boring log of GM9S, it is possible that a relatively low permeability material may be present which hinders the migration of soil gas vapors from the watertable to the sample collection depth. The boring log for GM9S indicates approximately five feet of sand gravel and clay just above the watertable. Conversely, PCE concentrations at watertable Monitoring Well WC3B were 19 ug/L whereas soil gas PCE concentrations at station SG127 (approximately 15 feet north of WC3B) were 37.6 ug/L. Groundwater PCE concentrations in the vicinity of Monitoring Well WC3B have apparently been reduced by the groundwater extraction system operating directly west of well WC3B. The relatively high soil gas concentrations probably indicate remaining PCE contamination in the unsaturated zone. These observations appear to indicate that volatile halogenated hydrocarbons partition into the gaseous phase and are more readily detectable in soil gas when released from soils impacted by the compound rather than from a groundwater impact. However, the volatile organic compounds may be introduced to the vadose zone by either a surface release of the compound into the soils or by a sharp watertable drop which results in retention of the volatile compound by soils just above the watertable.

The distribution of PCE in soil gas in the vicinity of the East Well Field (see Drawing 13076-B20) appears to be the result of multiple releases. The relatively high soil gas concentrations present at the south end of the Wausau Chemical property may be the result of one or more PCE releases from the bulk solvent storage operations on the south side of Wausau Chemical. The southwest-northeast elongation of the soil gas distribution may be indicative of the present PCE concentrations at the watertable or may be a remnant in soils above the watertable. PCE was observed in the shallow aquifer east of the former solvent storage area at concentrations of nearly 1000 ug/L at boring E32 (refer to Occurrence of Total Chlorinated Ethenes section). The PCE distribution in the soil gas may also be the result of additional PCE releases northeast of the former solvent tank farm.

Whatever the source of PCE, the observed PCE distribution in the soil gas appears to be influenced by topographic variations. The southeastern portion of the 5.0 ug/L contour generally conforms to a steep topographic rise toward the east and southeast. The depth to water increases from approximately 12 feet at SG96 to approximately 30 feet at SG62, decreasing the soil gas concentration gradient in the unsaturated zone.

There are also several potential explanations for the observed PCE distribution in the soil gas at the north side of the Wausau Chemical property and at the C.M. St. P. & P. Railroad near E. Wausau Avenue. The observed PCE soil gas concentrations at SG118 and SG119 may be the result of the February 1983 release of approximately 200 gallons of PCE at the Wausau Chemical northwest loading dock area. Since Production Well CW3 has been pumped nearly continuously since 1983, the product probably migrated northeast toward Production Well CW3 (refer to Drawing 13076-B15 for potentiometric map). If the watertable was to fluctuate in response to variations in production well pumpage and/or changes in river elevation, the soils directly above the watertable could become periodically affected by the PCE in the groundwater. The resulting soil gas distribution could then appear as zones of residual PCE in the liquid and gas phase of the unsaturated zone along a flow line to the production well. This theory may be supported by the present PCE groundwater impact at Monitoring Well GM9S (refer to Occurrence of Total Chlorinated Ethenes in the Aquifer section) which lies along a flow line downgradient of the February 1983 PCE release and soil gas stations SG118, SG92 and SG93. An alternative hypothesis suggests the PCE detected at SG92 and SG93 is the result of a separate release event unrelated to the February 1983 PCE spill near the northwest loading dock of Wausau Chemical.

The relatively low PCE concentrations detected at SG88 and SG100 (Camelot Cleaners) may be the result of a single or several releases during the course of operation of the dry-cleaning establishment. Given the distance from production wells CW3 and CW4, the operating practices and the low concentration of PCE detected in the soil gas surrounding the facility, Camelot Cleaners is probably not a potential source area for the municipal well field contamination.

The relatively low level PCE concentrations detected from soil gas samples obtained at Marathon Press and from the north side of Wausau Energy may be the result of present or past groundwater PCE impacts from off-site sources and/or may be due to several small surface releases in the area. Eastward migration of PCE impacted groundwater from the Wausau Chemical releases may have resulted in residual contamination of soils in the vicinity of the water table at the Marathon Press and Wausau Energy facilities. However, Foth and Van Dyke (December, 1986) described slight PCE impact in shallow soils (depth of 2 to 3 feet) from borings performed along the north side of the facility. Due to the location with respect to the water table, this soil impact does not appear to have resulted from contaminated groundwater migration.

The PCE detected at SG130 and SG131 is probably the result of either sampling device carry-over error from SG129 or GC carry-over error from SG129.

D. SURFACE AND GROUNDWATER QUALITY

1. General Water Quality Parameters

Round 1 Groundwater samples were collected from existing wells on September 29 through October 7, 1987. The sample color, odor and turbidity were described immediately after sampling. The sample pH and specific conductance were also recorded immediately after sampling. Sample descriptions, pH measurements and specific conductance readings are presented in Appendix E. The sample nomenclature system is defined in the Site Sampling Plan, Appendix A of the Final QAPP, dated September, 1987. In general, the sample code consists of the sample location name (see Drawing 13076-B11) preceded by the code letters "WE" which refer to Wausau, U.S. EPA lead. The sample location is followed by a sampling event round number. The round number preceded by 9 indicates a duplicate sample.

The groundwater pH generally tended to range from neutral (7.0) to slightly acidic. However, a pH of 9.64 was recorded from the groundwater sample obtained from Monitoring Well MW1A. This pH is considerably higher than any other well, probably indicating calcium carbonate contamination by cement grout used in the well construction. Therefore, the reliability of samples from this well is questionable.

Specific conductance readings ranged from 140 µmho/cm at Monitoring Well W3A to 570 µmho/cm at Monitoring Well MW13. The specific conductance readings are generally low, indicating relatively low concentrations of dissolved solids in groundwater. The low dissolved solid concentrations are probably due to low aquifer residence times (rapid groundwater flow rates from recharge to discharge areas) or groundwater recharge from surface water bodies. In addition, aquifer materials are composed predominantly of relatively insoluble silicate sand, derived from glacial erosion and transport of igneous and metamorphic rock.

Results of Round 1 general water quality parameters analyses are presented in Appendix E. The analyzed parameters consisted of common anions and cations. Groundwater in the vicinity of the City Well Field can generally be described as calcium, magnesium-bicarbonate, chloride type water. The inorganic data was plotted on trilinear diagrams, however, the vertical partitioning of groundwater described by other investigations (RMT, and Geraghty & Miller, 1987) was not apparent. Further evaluation of these data will be conducted after receiving results of Round 2 analyses.

2. Occurrence of Total Chlorinated Ethenes in the Aquifer

The distribution of total chlorinated ethenes in the aquifer (Drawings 13076-B21, 13076-B22 and 13076-B23) is based on a combination of data obtained from contract laboratory VOC analyses of Round 1 groundwater samples (Appendix F) and field GC analyses of groundwater samples collected during drilling (Appendix G). In order to verify the field GC analyses of groundwater samples collected during drilling, thirty duplicate groundwater samples were submitted to the CLP for VOC analyses. Results of the contract laboratory analyses of groundwater samples collected during drilling are presented in Appendix G. A comparison of total chlorinated ethene concentration as determined by the Warzyn field GC and by the contract laboratory analyses is presented in Table 12 and shown graphically in Drawing 13076-A15. The contract laboratory analyses generally agree closely with the results of the field GC analyses. However, the field GC analyses of the high concentration samples (WE-GW55-115, WE-GE35-18, WE-GW53-125, and WE-GW53-85) tend to be consistently higher than contract laboratory results for these samples. The discrepancy probably results from estimation of field GC concentrations when the sample concentration was outside the linear range of the working standards. A second dilution was generally not made due to time constraints.

Based on the specific types of compounds detected and the vertical and lateral distribution of these compounds, there appears to be at least three Chlorinated Ethene sources affecting the City Well Field. TCE is the predominant volatile organic compound detected at City Production Well CW6, although below minimum reportable limit (BMDL), concentrations of PCE and DCE have also been previously reported (Weston, 1985). The East Well Field (Production Wells CW3 and CW4) have indicated considerable PCE, TCE and DCE impacts at both wells. Production Well CW4 has indicated steadily decreasing concentrations of all three constituents since February 1984 (Weston, 1985). Production Well CW3 has indicated decreasing PCE and DCE concentration since the problem was discovered in early 1982. However, TCE concentrations at Production Well CW3 have remained relatively constant at concentrations ranging between 80 ug/L and 210 ug/L.

The areal distribution of Total Chlorinated Ethenes is presented in Drawing 13076-B21. The drawing indicates four distinct total chlorinated ethene plumes in the aquifer. These plumes were differentiated on the basis of chemical composition, vertical occurrence in the aquifer, and suspected source location. The specific plumes were also differentiated based on which production wells they affected.

Monitoring Wells W52, W53, W54, W55, C4D, R2D, and R4D appear to delineate a deep (greater than 100 feet) north-south trending TCE plume which has affected Production Well CW6. Based on the soil gas results (Drawing 13076-B19), and the vertical distribution of TCE in the aquifer (Drawing 13076-B23), the plume appears to be derived from a source located within the northern portion of the abandoned City landfill (property now owned by Marathon Electric).

Groundwater samples collected during drilling indicate Total Chlorinated Ethenes (predominantly TCE) vertically distributed throughout the aquifer in the vicinity of Monitoring Wells W53 and W54. The maximum Total Chlorinated Ethene concentration (2280 ug/L) in Monitoring Well W53 was observed at a depth of approximately 115 feet below surface. Monitoring Well W54 was drilled to a depth of 85 feet and encountered a maximum Total Chlorinated Ethene concentration of 404 ug/L. The Total Chlorinated Ethene concentration contours shown on Drawing 13076-B21 appear to be inconsistent with the highest concentration detected at Monitoring Well W54. This inconsistency is based on the assumption that maximum concentrations would be encountered in Monitoring Well W54 at depths ranging between 115 and 130 feet as encountered in Monitoring Wells W53 and R4D, respectively.

The vertical distribution of TCE below the northern portion of the former City landfill may be the result of slight downward vertical gradients. However, interviews of former landfill employees indicated that bulk liquid wastes were disposed in the landfill during its operational period (1948-1955). Refer to

Appendix L for Industrial Survey report. Reportedly, these liquids were dumped into the gravel pit and were not containerized. If TCE was present in these liquids, it is possible the concentrations may have exceeded the solubility limit of the compound, and therefore might have migrated downward as a non-aqueous phase liquid (NAPL), due to the gravity flow.

Isoconcentration section BB' (Drawing 13076-B23) indicates the TCE plume migration north toward City Production Well CW6. The plume was detected in concentrations in excess of 500 ug/L in Monitoring Wells W53, R4D, C2S, W52, R2D and W55. With the exception of C2S, all of these monitoring wells are screened at depths greater than 100 feet deep. During Round 1 sampling (October, 1987), Monitoring Well C2S had a TCE concentration of 1370 ug/L, possibly indicating northward migration of the shallow TCE impact detected in groundwater below the northern portion of the former City landfill (located approximately 300 feet south of Monitoring Well C2S). The abrupt discontinuity in the plume in the vicinity of Monitoring Well R3D appears to be the result of the cross-section line diverging from the zone of maximum TCE concentrations shown on Drawing 13076-B21 (refer to Drawing 13076-B11 for cross-section location). The abrupt discontinuity in the TCE concentrations in the vicinity of R3D may also be attributed to altered groundwater flow patterns caused by the additional recharge from Bos Creek as a result of Production Well CW6 being pumped to waste into the creek since February 1986. Based on Drawing 13076-B17, it is apparent Bos Creek presently acts as a significant recharge boundary. However, the recharge influence of Bos Creek was probably considerably less, prior to Production Well CW6 pumpage into the creek. Total Chlorinated Ethene concentrations substantially increase in the vicinity of Monitoring Well W55 (4320 ug/L) possibly indicating the release of TCE from the source area was greater in previous time periods and has since diminished.

TCE was observed in the shallow aquifer at Monitoring Wells R3S, R2S, W55A, W56A and MW4B. This plume is shown on Drawing 13076-B21 by the lightly screened contours between Bos Creek and Production Well CW6. A probable source of the TCE in this area is the pumping of TCE contaminated water from Production Well CW6 to waste into Bos Creek. Based on field GC analyses, surface water TCE concentrations within the creek range from 160 ug/L at the CW6 discharge to 108 ug/L at the ponded area north of Randolph Street (refer to Appendix G). TCE was not detected in surface water upstream of the CW6 discharge. Relatively strong downward vertical groundwater flow gradients at Monitoring Well nests R3 and R2 combined with elevated TCE levels at these wells strongly indicate the induced recharge of TCE impacted water into the aquifer. Once in the aquifer, the shallow TCE contaminated water appears to migrate north toward Production Well CW6 (refer to Drawing 13076-B23 for isoconcentration profile).

The distribution of TCE in Monitoring Wells E21, E27, E30, E31 and Production Well CW3 suggest eastward migration of TCE below the Wisconsin River, from the vicinity of the former City landfill (refer to Drawing 13076-B21). Isoconcentration section AA' (refer to Drawing 13076-B22) shows the east-west vertical distribution of TCE originating from the location of the former City landfill. The section indicates TCE vertically distributed throughout the aquifer in the vicinity of Monitoring Well W53. The maximum TCE concentrations in Monitoring Well W53 were observed at a depth of approximately 115 feet below surface. A portion of the TCE entering the deep aquifer below the landfill is shown to be induced to flow east by Production Well CW3. Where TCE concentrations are not available, such as below the Wisconsin River, the contours are inferred based on the potentiometric cross-section AA' (Drawing 13076-B16). The strong induced recharge from the Wisconsin River forces the TCE to flow along the base of the aquifer, where it is detected at Monitoring Well E27 at concentrations in excess of 500 ug/L. The TCE then appears to migrate toward Production Well CW3 along a flow line which extends just north of Monitoring Well E30. As the plume approaches Production Well CW3, groundwater flow converges, causing the contaminated groundwater to ascend to the screened interval. The apparent discontinuity of the 10 ug/L and 100 ug/L contours between Monitoring Well E27 and Production Well CW3 are the result of the cross-section line diverging slightly out from the apparent zone of maximum TCE concentrations.

The resulting TCE concentrations in Production Wells CW3 and CW6 is significantly less than the highest observed TCE concentrations in the surrounding aquifer due to dilution across the screened interval. The TCE contamination portion of the aquifer appears to be less than 20 feet thick and is laterally restricted to a relatively narrow flow path into the well. Whereas the pumping well produces water nearly equally from all sides of the 50 foot screened interval, resulting in a dilution factor that appears to range from 15 to 25 times less than the concentrations observed within the aquifer.

Drawing 13076-B21 also indicates substantial concentrations of total chlorinated ethenes (predominantly PCE) within the vicinity of the East Well Field. However, the concentrations in the vicinity of the East Well Field were consistently higher in the water table monitoring wells. Therefore, monitoring wells screened below the water table were not used in contouring the PCE distribution in the vicinity of the East Well Field. Monitoring Well FVD2 was also omitted because the chlorinated ethene concentrations were obscured by dilution due to high xylene concentrations.

The distribution of chlorinated ethenes (Drawing 13076-B21) appears to indicate three plumes within the East Well Field area, one from the west side landfill and two southwest of City well CW3. The two plumes southwest of CW3 are shown on Drawing 13076-B21 as two peaks but appear contiguous. These can be separated based on compounds present, as discussed below.

A plume composed predominantly of PCE was observed directly southwest of Well CW3, centered around Monitoring Well GM9S (Wergin Construction). Based on CLP analyses, the PCE concentration in this well is presently greater than 5,000 ug/L. Volatile organic compound analyses conducted by Geraghty & Miller Inc. in 1986 indicated a PCE concentration of 27.6 ug/L at this well. This increase in PCE concentration appears to indicate a slug of contamination is moving through this area toward Well CW3 rather than a continuous plume.

A second plume southwest of CW3 was observed in the vicinity of Monitoring Well WC2 (east of Wausau Chemical). The groundwater in this area contained total chloroethenes concentrations ranging up to 1,450 ug/L at Boring E32. Comparatively, the total chloroethenes in this vicinity is divided approximately equally between PCE, TCE and 1,2-DCE (refer to Appendix G). In addition, vinyl chloride was detected in Monitoring Wells E24A and WC6. The presence of these additional compounds separates this plume from that observed in the vicinity of GM9S. The presence of the lower chlorinated compounds indicates that a significant amount of degradation has occurred through reductive dehalogenation (Parsons et. al., 1984).

Based on the difference in plume composition and the difference in areal distribution, the two VHH impacts appear to be the result of separate release events. The distribution of PCE in the soil gas beneath the northern portion of Wausau Chemical and the location along a flow path downgradient from a documented release, indicate the impact in the vicinity of GM9S may have resulted from the February 1983 release of approximately 200 gallons of PCE at the north loading dock of Wausau Chemical. The southern chlorinated ethene plume may be the result of undocumented releases in the vicinity of the C.M. St. P & P Railroad, on the east side of Wausau Chemical or the result of eastward migration from one or more releases from the former bulk solvent storage tanks located on the south side of Wausau Chemical. A documented release of approximately 900 gallons of PCE occurred in the area during December 1983. In addition, PCE, TCE, 1,2-DCE, toluene and xylene were reportedly observed in soils and groundwater during the 1975 expansion of the City Water Treatment Plant, directly south of Wausau Chemical (WDNR 1983). Therefore, the observed VHH distributions in the groundwater (Drawing 13076-B21) may be the result of initial impact from these releases or may have been caused by precipitation flushing PCE from the soils in the vicinity of the source. The elevated soil gas concentrations (refer to Drawing 13076-B20) recorded in the vicinity of the former Bulk Solvent storage area appear to indicate a residual impact of PCE on soils in the vicinity of the south side of Wausau Chemical. This impact will be further investigated during the Phase II investigation.

Based on the potentiometric map shown in Drawing 13076-B15, a groundwater divide extends through the south central portion of Wausau Chemical in January 1988. Depending on city well pumpage and river levels this divide could disappear or shift considerably. Contaminants released in the vicinity of this groundwater divide could migrate toward the east resulting in a contaminant distribution similar to the one observed directly east of Wausau Chemical.

IV. PRELIMINARY GROUNDWATER MODELING

A. INTRODUCTION

Preliminary groundwater flow and contaminant transport modeling of the alluvial aquifer in the vicinity of the City of Wausau was conducted to provide an estimate of groundwater flow directions and the potential fate of contaminants introduced into the aquifer at known or potential source locations. Specific objectives of this preliminary modeling effort included:

- Identification of groundwater flow directions under variable pumping rates and river stages;
- Determination of the zones of capture of the municipal wells and identification of potential contaminant source areas within those zones of capture;
- Identification of the aquifer parameters (i.e., recharge, permeability, riverbed leakance) to which the simulated groundwater flow direction and velocity are most sensitive.

1. Available Data

Data available for use in development of the preliminary groundwater flow and contaminant transport model included field and laboratory data collected prior to the RI activities. This includes:

- Reports from previous hydrogeologic investigations of the contaminated well field (Weston, 1985; Geraghty & Miller Inc. and RMT, 1987; and Twin Cities Testing, 1986).
- Published and unpublished hydrogeologic reports (Kendy 1986, unpublished thesis - U.W.-Madison).
- Pumping records for the City of Wausau municipal wells, obtained from the Wausau Water and Sewage Utility (both to the water supply system and pumping to waste).
- Pumping records for the Wausau Chemical Company extraction well, obtained from the WDNR.
- Wisconsin River stage data obtained from the Wisconsin Valley Improvement Corporation (WVIC).

In addition to these available data, preliminary results obtained from the concurrent Phase I RI were incorporated as they became available. In particular, this includes the absence of a bedrock ridge south of Well CW6, the location of contaminant source areas and aquifer permeabilities.

2. Model Selection

The USGS modular 3-dimensional groundwater flow model (McDonald and Harbaugh, 1984) referred to as MODFLOW was selected for simulation of groundwater flow. The MODFLOW program was selected for its ability to represent the variety of hydrogeologic conditions encountered in the Wausau area. The flexibility of the MODFLOW code enables modeling of detailed areal variations in hydrogeologic conditions and can also incorporate variations in parameters in the vertical dimension, including uneven bedrock surfaces, variable saturated thicknesses and seepage through low permeability layers overlying the aquifer (i.e., the bed of the Wisconsin River). MODFLOW can simulate the area as a 2-dimensional (2-D) areal problem or can be upgraded to simulate the problem as a quasi 3-dimensional problem if the 2-D simulation appears inadequate.

The version of MODFLOW used in the study was modified by Warzyn to produce output files containing simulated head values and velocity vectors in a format usable by graphics software and for use in subsequent contaminant transport modeling.

The evaluation of potential source areas and contaminant migration to the municipal wells was performed using the transport portion of the "Random Walk" solute transport model (Prickett, et.al., 1981). This model approximates the solution of the contaminant transport equation using advection based on the MODFLOW generated velocity vectors and dispersion through a random process generator. The contaminant transport model described by Prickett was modified by Warzyn to allow direct use of the output from the MODFLOW groundwater flow model. These modifications include the ability to import site grid data files and the groundwater flow velocity vector files.

B. MODEL DEVELOPMENT

1. Hydrogeology

The primary aquifer in the vicinity of the City's Well Field consists of glacial outwash within a low permeability bedrock valley. The aquifer presence and thickness is controlled by the topography of the underlying Precambrian bedrock valley. Principal sources of water to the glacial aquifer, within the bedrock valley, appear to be from rainfall percolation within the valley, runoff from the bedrock hills and the Wisconsin River.

Under natural conditions the Wisconsin River would be a regional discharge area for groundwater flowing away from the bedrock highs. Comparison of river stage levels and water levels in monitoring wells adjacent to the river indicate that pumping from the City of Wausau municipal wells has resulted in induced infiltration from the river. This data also indicates considerable head loss (resistance to flow) in the river sediments. However, very little data is available on the geologic characteristics of the river bed sediments adjacent to the well fields. Generally, it can be assumed that finer grained sediments would be deposited toward the south, closer to the Wausau Dam. Coarser sediments can be expected upstream due to swifter currents. Sediments encountered during borings for the Bridge Street renovation (1984) range from fine to coarse grained sand (SP) to organic silts (OL). Refer to Appendix B for a description of soil samples obtained from Wisconsin Department of Transportation (DOT) borings. DOT soil boring locations are shown on Drawing 13076-B11.

Data from previous investigations and Phase I RI activities indicate variable pumping rates at the municipal wells and variable river stages have a strong influence on groundwater flow direction and probable contaminant migration routes. Bos Creek, on the west side of the river, has been shown to be a probable source of infiltration (recharge) to the aquifer between Marathon Electric and the West Well Field. The potential recharge rate appears to have increased after Well CW6 began pumping to waste to a storm sewer which discharges to Bos Creek at Burns Street. The additional recharge at Bos Creek appears to have decreased the radius of influence of the West Well Field at the water table. However, continuity of flow from the south to the north beneath Bos Creek may exist at depth.

2. Discretization and Model Setup

The groundwater flow model was set up initially as a single layer areal flow model to determine if adequate results could be obtained using the simpler 2-D solution. The model was run in the transient (time-variant) mode to allow simulation of variable pumping rates at the municipal wells and variations in river stage elevation.

The transient model, which was developed to simulate flow conditions from January 1976 to May 1987, has one month stress periods (in single time steps) with the exception of October 1986. A temporary one-week drop in the river stage elevation (1187.9 to approximately 1182) in October 1986 was simulated using two stress periods with several additional time steps within the stress periods. The smaller time steps were necessary to accurately simulate the rapid drop and recovery in the river stage elevation and the resultant effects in the aquifer.

The finite difference grid developed for the site model consists of 36 columns and 69 rows (2484 cells) and covers an area 16,100 feet east-west by 19,000 feet north-south. The grid configuration was governed by the following factors:

- The eastern and western limits of the grid extend beyond the bedrock highs that define the limits of the alluvial aquifer;
- The northern and southern limits of the grid were placed beyond the zone of expected influence of the City of Wausau municipal wells;
- Grid spacing was decreased (100 feet spacing) in the vicinity of the municipal wells to increase the numerical accuracy of the simulation of groundwater flow and contaminant migration in areas of increased flow velocities and to try to anticipate future simulation of potential remedial alternatives.

The central portion of the model grid, which covers the areas of concern including the east and west municipal well fields, is illustrated in Drawing 13076-24.

The selection of representative boundary conditions is important as they affect results computed in the interior of the grid. Boundary conditions specified for the Wausau model were either no-flow or head-dependent flow. No-flow boundaries were generally established where bedrock elevations exceed

1200 feet in elevation. This bedrock elevation appears to be approximately where the water table would intersect the bedrock or where the aquifer becomes too thin to model. No-flow boundaries were set along the east and west sides of the model where the alluvial aquifer interfaces with the relatively impermeable bedrock valley walls. To the north and south, head-dependent flow boundaries were established between the bedrock valley walls.

The Wisconsin River, which bisects the modeled area was simulated using the RIVER module in MODFLOW. Leakage through the river bed is computed at each river cell and is dependent on the constant head assigned to the river, the computed head in the aquifer beneath the river and the leakance of the river bed. This is defined as the vertical hydraulic conductivity of the river bed divided by the river bed thickness (K'/m'). Detailed stage data obtained from the WVIC was evaluated and several different river elevations were used at different time steps in the transient simulation. The river elevation was set at 1187.9 above the dam and 1161 below the dam from January 1976 for approximately 129 months until October 1986. The head was dropped to 1182 above the dam for one week and then raised to 1187.5 for the remainder of the simulation. Bos Creek was added to the model in February 1986 when City Well CW6 began pumping to waste. Prior to this time it is assumed that Bos Creek did not have sufficient flow to create a significant effect on the groundwater flow system. This needs to be evaluated further.

Detailed daily pumping records obtained from the Wausau Water and Sewage Utility were used to develop the pumping file used in MODFLOW. Monthly pumping volumes and an average monthly pumping rate (in cubic feet per second) were calculated for each municipal well for every month from January 1976 to May 1987. The monthly pumping rates were then used in the transient flow model. Additional pumping data for the Wausau Chemical Company extraction system was obtained from the WDNR. The City of Wausau also supplied additional data on the Wergin Construction pumping well which has been operated as a barrier well to protect Production Well CW3 since July 1982. This well was originally installed in September, 1980 to function as a heat pump well.

C. FLOW MODEL CALIBRATION

1. Calibration Data

The single layer flow model provides simulated heads which are representative of the potential across the entire thickness of the aquifer. In the absence of significant vertical gradients, the simulated heads generated by the calibrated model should be comparable to the water table elevations at the same locations.

Observed water level data at selected site monitor wells were plotted against time. Simulated head at corresponding locations were then plotted for each model calibration run in order to provide a basis for determining the ability of the model to simulate observed conditions.

2. Calibration Procedure

Flow model calibration proceeded through numerous iterations with variation of hydrogeologic input parameters for each run. The primary calibration parameters were aquifer hydraulic conductivity and the river bed conductance.

Significant changes in pumping rates at the municipal wells resulted in marked changes in water levels in site monitor wells and provided a good basis for making adjustments in aquifer hydraulic conductivity.

The drop in the river stage elevation in October 1986, also had a significant effect on observed water levels. The decrease in water levels in the aquifer provided a good basis of comparison for determining river bed leakance. The river bed leakance controls, in part, the magnitude of the drop in water levels in wells adjacent to the river and the rate of water level recovery in those wells after the river level returned to its normal stage.

3. Parameter Selection

The following discussion is a brief description of the procedures used to select the parameters used in the flow model.

Aquifer permeability was initially set at 1×10^{-3} ft/s for the entire aquifer. In order to obtain a better match at the selected calibration points, a variable permeability array was developed. The central portion of the study area, which encompasses the West Well Field and City Well CW3 was set at a higher permeability (5 x 10^{-3} ft/s) based in part on results of the pumping test conducted by Geraghty & Miller Inc. The high permeability window is set in the center of the relict river valley where surface water flow velocities during deposition may have been highest and the coarser grained material would have been the primary deposits. West and north of this high permeability window, permeabilities were decreased toward the bedrock highs that formed the sides of the former river valley. This was done in part to minimize problems with heads decreasing to elevations lower than the bedrock elevation (no-flow boundary) at a large number of nodes adjacent to the bedrock valley during certain time steps. The permeability of the aquifer to the east of the high permeability window was set at 1 x 10^{-3} ft/s. To the south, the permeability values were adjusted several times in an effort to match observed conditions in the vicinity of Well CW4. As discussed below, observed levels for Well WGS10 were always below simulated levels. Therefore, the permeability was reduced during calibration efforts. Discussion of the results will provide recommendations to resolve this issue. However, preliminary model results presented had permeabilities set at 1 x 10^{-3} ft/s to a point midway between Wells WGS9 and WGS10. South of that, the permeability was set at 5 x 10^{-4} ft/s.

Recharge was initially assumed to be 10 inches per year across the entire study area. The high permeability of the valley bottom deposits and the relatively flat topography in the valley would result in low runoff and high infiltration. Initial calibration runs resulted in difficulty matching points near the bedrock/aquifer interface. Runoff from the bedrock highs into the valley would result in increased recharge at the base of the bedrock highs. Therefore, recharge was increased to 30 inches per year in the cells at the base of the bedrock highs, with little change in head. Recharge values on the east and west edges of the aquifer were increased to 90 inches per year to increase flow velocities. Although this seems large, there was little change in the simulated water levels.

River bed leakance (K'/m') was varied during the course of the preliminary modeling efforts. The thickness of the river bed sediment was assumed to be

1 foot for all calibration runs. Initially the river bed conductivity was set at 1×10^{-3} ft/s. This resulted in reasonable matches in the vicinity of the West Well Field. Lower hydraulic conductivities resulted in reasonable matches in the vicinity of the East Well Field. The final preliminary model calibration run used river bed conductivities of 1×10^{-3} ft/s in the upper reaches of the river adjacent to the West Well Field, 1×10^{-4} ft/s for a short reach of the river where Bos Creek discharges to the river and 5×10^{-5} ft/s from Bos Creek to the southern end of the modeled area. Bos Creek was modeled using a bed conductivity of 1×10^{-5} ft/s. Although no independent measurements of the river bed conductivity are available, it can be argued that the narrower river adjacent to the West Well Field has higher river flow velocities and fewer fines deposited than the wider river adjacent to the East Well Field. In addition, it is expected that the thickness of the river bed may be greater closer to the dam due to slower flow and increased deposition of fines.

A detailed cell-by-cell description of all model input data, including calibration parameters is included in Appendix J.

4. Groundwater Flow Model Results

Transient head files from the final preliminary model calibration run were used to generate the observed versus simulated head plots contained in Appendix K. In general, simulated heads in the central portion of the study area appear to match well with the observed heads. This includes Wells MW1A, MW9, MW12, TCT44 and C2S. Deviations between the simulated and observed conditions occur only on the perimeter of the study area, with the exception of R2D.

Simulated heads at Well R2D, adjacent to Bos Creek, are lower than observed heads. Recharge of the aquifer from Bos Creek appears to be underestimated. Therefore, it appears that the hydraulic conductivity of the stream bed sediments in Bos Creek may be greater than was assumed.

North of the West Well Field, simulated heads at wells CW9-OBS and GM4D and the Plum Street test well are lower than observed head levels at those wells.

The presence of a sand and gravel operation on Campus Drive, in the vicinity of these wells, would likely result in increased recharge in this area due to ponding of surface water runoff in the sand and gravel pit. The increased recharge should increase the simulated head levels at the above mentioned wells.

Simulated heads at Well WGS10, adjacent to the Bridge Street bridge, are higher than observed levels. The magnitude of the difference (2 to 3 feet) appears to indicate that there may be a pumping well, in the vicinity of this well, that has not been incorporated into the model. Variations of river bed conductance and/or aquifer hydraulic conductivity will change the simulated head at this well but not likely to the degree necessary to obtain a reasonable match with observed head levels. Both possibilities will be evaluated in future analyses.

Groundwater head contour maps for two stress periods in the final preliminary calibration are shown in Drawings 13076-B25 and 13076-B26. The head contour map from September 1985 (Drawing 13076-B25) shows the zone of influence around the West Well Field extends south of Bos Creek to the Marathon Electric property. A groundwater divide created by pumping at the West Well Field and at City Wells CW3 and CW4 on the east side of the river, occurs within the vicinity of the Marathon Electric property and the former City of Wausau landfill. Flow from the vicinity of the former landfill on the west side of the river would occur toward wells CW6, CW7 and CW9 to the northeast and toward wells CW3 and CW4 to the southeast. Flow on the east side of the river is divided between Well CW3 and Well CW4 on this particular date. The divide, which is shown in the vicinity of Wausau Chemical, is quite variable depending on the pumping rates at Wells CW3 and CW4.

The head contour map from April 1987 generally shows an overall head distribution similar to the simulated heads in September 1985. In close proximity to the municipal wells, flow directions are somewhat different due to the variable pumping rates. One significant difference from the September 1985 map is that discharge of water pumped from Well CW6 to Bos Creek results in increased recharge in this area, creating a small mound.

This groundwater mounding may result in a barrier to flow between areas south of Bos Creek and the West Well Field.

D. CONTAMINANT TRANSPORT MODELING

1. Contaminant Transport Modeling Procedure

The purpose of the preliminary contaminant transport modeling was to determine the potential fate of contaminants introduced into the aquifer at known or potential contaminant source locations. Input parameters from the last preliminary groundwater flow model calibration run were used for the contaminant transport simulation. The contaminant transport simulation was run in the transient mode for the same time period as the groundwater flow model (January 1976 to May 1987). However, because the transport model requires equal length stress periods, no change in river stage in October 1986 was simulated. Due to the very short duration and rapid recovery this appears reasonable. No attempt was made to calibrate simulated concentrations with observed concentrations during the preliminary modeling effort. The contaminant transport model will be calibrated to VHH concentrations observed during the round II sampling event (November-December, 1987), during the Phase II investigation. The calibrated contaminant transport model will then be used to evaluate selected remedial actions during the Feasibility Study.

Soil gas sampling and groundwater sampling, conducted during the course of Phase I RI field activities, indicate the presence of potential sources at the former City of Wausau landfill, on the west side of the Wisconsin River and on Wausau Chemical Company property, on the east side of the river. Due to the lower level of calibration in the vicinity of Well CW4 (see discussion regarding Well WGS10) no transport results for the Wausau Chemical source are reported. For the purpose of the preliminary modeling, simulation of the landfill source was simplified by creating a constant source of one contaminant particle per day. The mass of the particles was set at one pound. Longitudinal dispersivity and transverse dispersivity were set at 20 and 10, respectively. The retardation factor was set at 1.0.

1. Results of Landfill Source Simulation

Drawing 13076-B27 shows the extent of contaminant migration from a source at the landfill at the end of the contaminant transport simulation (May 1987).

The simulation of a source in the vicinity of the former landfill indicates the contaminant plume diverges, with a portion of the plume moving to the northeast toward city well CW6 and a portion moving beneath the river to the east toward city well CW3. The simulation of both flow and transport indicates the river does not form a hydraulic barrier to contaminant migration. Based on this simulation, contaminants would reach city wells CW3 and CW6 approximately 5 and 6 years, respectively, after reaching the water table.

V. CONCLUSIONS

Based on the results of the Phase I investigation of the Wausau Water supply, the following conclusions were reached:

- Bedrock lithology below the East Well Field differs distinctly from the bedrock lithology underlying the West Well Field. The difference in bedrock weathering apparently causes a much more irregular surface below the West Well Field;
- Boring W55 did not confirm the presence of a high relief bedrock ridge between Production Well CW6 and Bos Creek as described by previous investigations (Weston, 1985 and RMT, Geraghty & Miller, 1987);
- Glacial outwash deposits fill the Wisconsin River Valley in the vicinity of the City well field, forming a terrace which has a maximum elevation of approximately 1230 feet MSL;
- The aquifer in the vicinity of the City well field appears wedge shaped in cross-section and ranges in thickness from 0 to 140 feet;
- The ancestral Wisconsin River bedrock valley narrows toward the north generally resulting in deposition of coarser sand and gravel sediments;
- The majority of the City well field is underlain by undifferentiated fine to coarse sand deposits. However, a relatively continuous sequence of fine sand overlying a thin gravel appears to extend beneath the central portion of the study area;
- Several fill areas exist along the Wisconsin River including the former City landfill which occupies a sand and gravel pit directly south of the Marathon Electric Assembly building, Schofield Park, beneath Wergin Construction and the river front area between Lemke Cheese and Lake Wausau Granite;
- Groundwater flow in the vicinity of the City Well Field is strongly influenced by: bedrock topography, soil heterogeneities, production well pumpage, stream and river elevations, and the stream and river bed hydraulic resistance;
- The radius of influence of the West Well Field at the water table extends at least as far south as Bos Creek and may have extended further south prior to Production Well CW6 being pumped to waste into the creek. The zone of influence at the base of the aquifer may presently extend considerably further south, possibly encompassing the northern portion of the former City of Wausau landfill;

- The cone of depression from the East Well Field extends across the Wisconsin River, resulting in groundwater flow from the vicinity of the west side landfill towards Well CW3;

- The hydraulic conductivity tests appear to be affected by well installation techniques as well as the geologic materials. The hydraulic conductivity values determined from the baildown tests range from 1.73×10^{-4} cm/s at Monitoring Well C4D to 8.17×10^{-2} at Monitoring Well E22. The average hydraulic conductivity of aquifer materials not influenced by drilling fluids is estimated by the baildown tests to be 3×10^{-2} cm/s;

- Relatively high concentrations of TCE were detected at soil gas stations SG105, SG121, SG123, SG124, SG125, SG141 and SG142 all of which appear to be located within or directly adjacent to the former City landfill;

- High concentrations of PCE and TCE (4080 and 244 ug/L, respectively) were detected from soil gas samples obtained from the south side of Wausau Chemical (SG57) near the location where 900 gallons of PCE was released in December, 1983. The PCE soil gas distribution appears to be preferentially elongated toward the east-northeast;

- Elevated concentrations of PCE were also detected from soil gas samples collected near the northwest loading dock of Wausau Chemical. A documented PCE release of approximately 200 gallons occurred in this area in February, 1983.

- The distribution of TCE in the aquifer south of Production Well CW6 appears to indicate two sources of contamination. The TCE plume in the deeper portion of the aquifer appears to originate in the vicinity of the former City landfill, located south of the Marathon Electric Assembly building. The shallow TCE plume appears to result from contaminated water from Production Well CW6 being pumped to waste into Bos Creek.

- The relatively continuous concentrations of TCE observed in Production Well CW3 since early 1982, appear to be the result of TCE migration from the area of the former City landfill, located on the west side of the Wisconsin River. The plume appears to have migrated under the river and into Well CW3.

- The distribution of total chlorinated ethenes at the water table, in the vicinity of the East Well Field indicate two chemically distinct contaminant plumes. The difference in chemistry and lateral extent of these plumes suggest either multiple sources or multiple releases from the same source.

Based on the results of the preliminary modeling the following observations and conclusions can be made about groundwater flow and contaminant migration in the vicinity of the City of Wausau municipal wells:

- A single layer finite-difference groundwater flow model can be used to accurately simulate most flow conditions in the study area.

- Preliminary calibration of the model indicates that river bed hydraulic conductivity and aquifer hydraulic conductivity are the primary input parameters affecting simulated heads.

- Preliminary modeling indicates a groundwater divide exists between the West Well Field (Wells CW6, CW7 and CW9) and the East Well Field (CW3 and CW4). The divide appears to bisect the former City of Wausau landfill.

- The two-dimensional groundwater flow model indicates that the zone of influence around the West Well Field extends south to the northern portion of the former City of Wausau landfill.

- Preliminary contaminant transport modeling indicates a source at the northern portion of the former City of Wausau landfill will result in contaminants reaching City Well CW3 in approximately 5 years and City Well CW6 in approximately 6 years.

- Discharge of water from well CW6 to Bos Creek creates a small groundwater mound which could potentially form a barrier between a contaminant source at the landfill and the West Well Field.

- Additional work is needed on the flow and transport models in the vicinity of Bos Creek to accurately simulate heads at Well R2D and Well CW4 to more accurately simulate flow and transport.

VI. RECOMMENDATIONS FOR PHASE II WORK

Based on information obtained, several data gaps were identified during Phase I. The following additional work is recommended during the Phase II investigation:

- Repair Monitoring Well WC-1 so that groundwater samples may be collected during the Phases II investigation. This well is necessary to evaluate the effectiveness of the Wausau Chemical extraction system.

- Perform volatile compound analyses on all thirty (30) monitoring wells installed during the Phase I investigation and approximately forty (40) selected pre-existing wells to obtain a second round of water quality results;

- Obtain and perform target compound list (TCL) analyses on approximately twenty (20) groundwater samples from suspected contamination source areas;

- Perform soil borings at potential source areas located at Wausau Chemical, C.M. St. P. & P. Railroad right-of-way, Wausau Energy, Marathon Electric, and the former City of Wausau landfill;

- Submit soil and groundwater samples from these borings for VOC and TCL analyses;

- Perform approximately 8 test pits in the former City landfill and obtain approximately 20 soil/refuse samples for analysis of TCL parameters. The test pits will be used to characterize the type and extent of waste disposed in the landfill in order to evaluate potential health risks;

- Perform soil gas extraction tests at the former City landfill and at the former Wausau Chemical bulk solvent storage area to evaluate the potential effect of soil vapor extraction as a remedial action;

- Perform flow measurements on Bos Creek in order to assist the groundwater flow model calibration and evaluation of conditions ior to discharge of Well CW6 to Bos Creek. The flow measurements will also be useful in assessing potential health risks as a result of surface water exposure;

- Obtain surface water samples from Bos Creek during the spring and summer in order to evaluate seasonal influences on the VOC carrying capacity of the creek;

- Monitor groundwater levels during the spring and summer in order to assess seasonal influences on groundwater flow; and

- Continue groundwater flow and transport modeling through final calibration in order to evaluate contaminant transport under hydraulic conditions prior to existing monitoring data and to evaluate potential remedial actions during the Feasibility Study.

Recommendations for Phase II investigation will be presented in more detail in the Phase II Work Plan.

REFERENCES

CH2M Hill, Central, February, 1986, Investigation of an Abandoned City of Wausau Landfill. Prepared for the Wisconsin Department of Natural Resources.

Foth & Van Dyke and Associates, Inc., June, 1986, Infield Conditions Report on the Impact of Incidental Petroleum Spillage at the Wausau Energy Corporation Site. Prepared for Wausau Energy Corporation.

Foth & Van Dyke and Associates, Inc., December, 1986, VOC Groundwater Investigation at the Former Wausau Energy Facility in Wausau, Wisconsin. Prepared for Wausau Energy Corporation.

Geraghty & Miller, Inc. and RMT, Inc., 1987, Hydrogeological Investigation of the Alluvial Aquifer Beneath City Well 6, Wausau, Wisconsin, 54 pp.

Kendy, E., 1986, Hydrogeology of the Wisconsin River Valley in Marathon County, Wisconsin, 218 pp.

Kerfoot, H.B., J.A. Kohout and E.N. Amnick, 1986, Detection and Measurement of Groundwater Contamination by Soil-Gas Measurement Proc. Conf. Hazardous Wastes and Hazardous Materials, Hazardous Materials Control Research Institute, Silver Spring, Maryland, pp. 22-36.

LaBerge, G.L. and P.E. Myers, 1983, Precambrian Geology of Marathon County, Wisconsin: WGNHS Info. Circ., no. 45, 88 pp.

Mackay D. and Shiu W.Y., 1981, A Critical Review of Henry's Law Constants for Chemicals of Environmental Interest. Journal of Physical Chemistry Reference Data, V. 10, No. 4, pp. 1175-1199.

Marrin, D.L. and G.M. Thompson, 1987, Gaseous Behavior of TCE Overlying a Contaminated Aquifer. Journal of Groundwater, V. 25, No. 1, pp. 21-27.

Marrin, D.L. and G.M. Thompson, 1987, Soil Gas Contaminant Investigations: A Dynamic Approach. Groundwater Monitoring Review V. 8 No. 3, pp 88-93.

Parsons, F., Wood, P.R. and DeMarco, J., 1984, Transformations of Tetrachloroethene and Trichloroethene in Microcosms and Groundwater, J. AWWA, February 1984, pp. 56-59.

STS Consultants Ltd., July, 1984, Subsurface Exploration and Testing Program to Evaluate Groundwater Quality, Wausau Chemical Facilities, Wausau, Wisconsin.

STS Consultants Ltd., April, 1985, Subsurface Exploration and Testing Program to Evaluate Groundwater Quality and Pre-Treatment Design Program at the Wausau Chemical Facility in Wausau, Wisconsin.

STS Consultants Ltd., September, 1986, Wausau Chemical Corporation Groundwater Extraction Program Interim Report.

STS Consultants Ltd., January, 1987, Wausau Chemical Corporation Groundwater Extraction Program Progress Report.

Twin City Testing Inc., August, 1985, Existing Conditions Report and Exploration Program, Wausau East Municipal Well Field, Wausau, Wisconsin.

Warzyn Engineering Inc., September 1987, Final Work Plan, Remedial Investigation/Feasibility Study, Wausau NPL Site, Wausau, Wisconsin.

Warzyn Engineering Inc., September 1987, Final Quality Assurance Project Plan, Remedial Investigation Feasibility Study, Wausau NPL Site, Wausau, Wisconsin.

Warzyn Engineering Inc. 1987, Industrial Survey, Wausau Water Supply NPL Site.

Weston, Inc., 1985, Hydrogeological Investigation of Volatile Organic Contamination in Wausau, Wisconsin, Municipal Wells: A report prepared for the U.S. Environmental Protection Agency by Weston-Sper Tech. Asst. Team, Region V, 66 pp.

Wisconsin Department of Natural Resources, (WDNR) 1982, Industrial Survey of Marathon Electric.

CSR/kam/KJQ/DLI/RWM
[kam-600-50]

TABLE 1

VOLATILE ORGANIC COMPOUND
RETENTION ORDER

Photo Ionization Detector

Parameter	Retention Time
1,1-Dichloroethene	4.24
Trans-1,2-Dichloroethene	4.98
Trichloroethene	7.23
Benzene	7.39
Tetrachloroethene	9.86
Toluene	10.81
Ethyl Benzene	13.84

Hall Detector

Parameter	Retention Time
Methylene Chloride	3.26
1,1-Dichloroethene	4.29
1,1-Dichlorothane	4.77
Trans-1,2-Dichloroethene	5.04
Chloroform	5.21
1,2-Dichloroethane	5.49
1,1,1-Trichloroethane	6.12
Bromodichloromethane	6.40
Trichloroethene	7.29
Chlorodibromomethane	7.58
Bromoform	8.76
Tetrachloroethene	9.91

13076.28
TEM/kam/CSR
[kam-600-50j]

TABLE 2

SOIL GAS ANALYSIS DETECTION LIMITS

Compound	Replicates	Mean(ng)	Deviation	Detection Limit(ng/L)
Toluene	3	4.16	0.044	1000
1,1-Dichloroethene	3	5.06	0.086	1000
Trans-1,2-Dichloroethene	3	4.95	0.021	1000
Trichloroethene	3	4.91	0.032	1000
Tetrachloroethene	3	4.21	0.219	1000
1,1,1-Trichloroethane	3	3.90	0.147	1000
Benzene	3	7.57	0.085	1000
Ethyl Benzene	3	6.08	0.301	1000
1,1-Dichloroethane	3	3.99	0.216	1000
Chloroform	3	4.02	0.132	1000
Methylene Chloride	3	3.65	0.788	1000
1,2-Dichloroethane	3	2.92	0.099	1000
Bromodichloromethane	3	4.92	0.093	1000
Chlorodibromomethane	3	8.77	0.180	2000
Bromoform	3	8.95	0.118	2000

13076.28
TEM/kam/CSR
[kam-600-50k]

TABLE 3

TARGET VOC DETECTION LIMITS
FOR WATER HEADSPACE

Compound	Replicates	Mean(1)	Standard Deviation	Method Detection Limit(2)
Toluene	7	2.49	0.208	0.65 ug/L
1,1-Dichloroethene	7	2.32	0.364	1.14 ug/L
Trans-1,2-Dichloroethene	7	2.08	0.332	1.04 ug/L
Trichloroethene	7	1.84	0.294	0.92 ug/L
Tetrachloroethene	7	2.38	0.310	0.97 ug/L

(1) Mean value for spike at 3 ug/L.

(2) Calculated D.L. according to Appendix A of EPA Test Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater.

13076.28
TEM/kam/CSR
[kam-600-501]

TABLE 4

OTHER VOC'S DETECTION LIMITS FOR WATER HEADSPACE

Compound	Replicates	Detection Limits
Benzene	3	2.0 ug/L
Ethyl Benzene	3	2.0 ug/L
1,1,1-Trichloroethene	3	1.0 ug/L
1,1-Dichloroethane	3	2.0 ug/L
Chloroform	3	2.0 ug/L
Methylene Chloride	3	5.0 ug/L
1,2-Dichloroethane	3	5.0 ug/L
Bromodichloromethane	3	5.0 ug/L
Chlorodibromomethane	3	25 ug/L
Bromoform	3	50 ug/L

13076.28
TEM/kam/CSR
[kam-600-50m]

TABLE 5

SURFACE WATER SAMPLE LOCATIONS
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Station	Date	Location
SW01	10-14-87	Bos Creek Pond Outfall West of Third Ave
SW02	10-14-87	Bos Creek Pond North of Randolph Street
SW03	10-14-87	Bos Creek at Schofield Park
SW04	10-14-87	Bos Creek at Culvert North of Burns Street
SW05	10-14-87	CW6 Discharge at Bos Creek
SW06	10-19-87	Bos Creek Southwest of 425 Burns Street
SW07	10-19-87	Storm Sewer Discharge East of Marathon Electric
SW08	10-26-87	Storm Sewer Discharge to Bos Creek at Randolph Street
SW09*	10-28-87	CW6 Discharge at Bos Creek
SW10*	10-28-87	Bos Creek Pond North of Randolph Street
SW10 Dup	10-28-87	Bos Creek Pond North of Randolph Street
SW11	10-29-87	Storm Sewer East of Old Landfill

Notes

* Sample submitted to Contract Laboratory for GC/MS verification.

13076.28
CSR/kam/CSR
[kam-600-50n]

TABLE 6

WELL LOCATION RATIONALE
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

WEST STUDY AREA

Well ID	Depth Drilled (feet)	Rational
W50	83	Monitor water quality and levels at intermediate depth at well nest R3S/R3D.
W51	41	Monitor groundwater quality and levels west (upgradient) of Marathon Electric.
W52*	152	Define vertical and lateral extent of groundwater impact along suspected groundwater transport route to Production Well CW6.
W52A*	36	Monitor groundwater levels between former City landfill and Bos Creek.
W53*	171	Monitor water quality and levels at depth south of Marathon Electric at the former City landfill.
W53A*	41	Monitor shallow groundwater quality and water levels beneath the former City landfill.
W54*	87	Monitor water quality and levels within the northern portion of the former City landfill.
W55	130	Monitor groundwater quality and levels between Production Well CW6 and Marathon Electric, evaluate the existence of a buried bedrock ridge suggested by previous investigations.
W55A	43	Monitor water levels adjacent to Production Well CW6.
W56	66.5	Monitor deep water quality and levels adjacent to fill areas along Bos Creek.
W56A	20	Monitor shallow water quality and levels adjacent to fill areas along Bos Creek.
W57	77.5	Monitor water quality at depth adjacent to MW-9, confirm existence of bedrock high.
TOTAL FOOTAGE DRILLED	948	

TABLE 6
(Continued)

EAST STUDY AREA

Well ID	Depth Drilled (feet)	Rational
E20	80.5	Monitor water quality and levels at intermediate depth between WW1 and GM8D.
E21*	133	Monitor groundwater quality and levels between former City of Wausau landfill and Production Well CW3.
E21A*	22	Monitor groundwater levels adjacent to Monitoring Well E21 and the Wisconsin River.
E22	96.5	Monitor groundwater quality and levels at depth at Wausau Energy.
E22A	22	Monitor shallow groundwater quality and levels at Wausau Energy.
E23A	21.5	Monitor shallow groundwater quality and levels north of Marathon Press.
E24	85.7	Monitor deep groundwater quality and levels at Marathon Box, east of Wausau Chemical.
E24A	35	Monitor shallow groundwater quality and levels at Marathon Box, east of Wausau Chemical.
E25	135	Monitor deep groundwater quality and levels southeast (upgradient) of Marathon Box.
E25A	37.5	Monitor shallow groundwater quality and levels southeast (upgradient) of Marathon Box.
E26	95	Monitor deep groundwater quality and levels between Wausau Chemical and Production Well CW3.
E26A	23	Monitor shallow water quality between Wausau Chemical and Production Well CW3.
E27*	136.5	Monitor deep water quality and levels between former City landfill and Production Well CW3.
E28A	37	Monitor water levels east of production wells to establish control on the flow system.
E29A	29	Monitor shallow groundwater quality and levels adjacent to GM5D, east of Production Well CW3.
E30*	133	Monitor deep water quality between former City landfill and Production Well CW3.

TABLE 6
(Continued)

EAST STUDY AREA

Well ID	Depth Drilled (feet)	Rational
E31*	135.5	Monitor deep water quality between former City landfill and Production Well CW3.
E32*	14	Obtain groundwater and soil sample east of Wausau Chemical at railroad right of way.
E33*	14	Obtain groundwater and soil sample east of Wausau Chemical at railroad right of way.
E34*	14	Obtain groundwater and soil sample northeast of Wausau Chemical at railroad right of way.
E35*	20	Obtain groundwater and soil sample adjacent to Wergin Construction.
E36*	17.5	Obtain groundwater and soil sample adjacent to Marathon Press drum storage area.
E37*	26	Monitor groundwater quality in vicinity of soil gas detection at Marathon Press.
E38*	18	Obtain groundwater and soil sample from west side of Marathon Press north building.
TOTAL FOOTAGE DRILLED	1381.2	

* Well or sampled boring location different from the location proposed in Work Plan.

13076.28
CSR/kam/CSR
[kam-600-50d]

TABLE 7

CONTRACT LABORATORY SOIL SAMPLE ANALYSIS RATIONALE
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Sample Number boring-depth-round	Analyzed Parameters	Rationale
WE-SW55A-35-01	VOCs, AB\N, grain size, natural organic content	Classify aquifer materials based on grain size and natural organic content. Determine if past migration of potentially contaminated groundwater had impacted aquifer materials.
WE-SE24-24-01	VOCs, AB\N, grain size, natural organic content	Analyze unsaturated zone soils to determine if groundwater impact in vicinity of W24A is the result of a source at Marathon Box.
WE-SSG18-01	VOCs, AB\N	Background surface soil sample
WE-SW57-10-01	VOCs, AB\N, grain size, natural organic content	Classify geologic materials, investigate possible fill materials adjacent to Bos Creek.
WE-SS01-01	VOCs, AB\N, grain size	Analyze unsaturated zone soils in the vicinity of potential VOC source area at Wausau Energy.
WE-SS02-01	VOCs, AB\N, grain size	Analyze unsaturated zone soil adjacent to an area where PCE was detected in soil gas samples (Camelot Cleaners).
WE-SS03-01 WE-SS03-90 (dup)	VOCs, AB\N, grain size	Analyze unsaturated zone soils in the vicinity of areas where TCE was detected in soil gas (former landfill).
WE-SE31-25-01	VOCs, AB\N, grain size	Classify geologic materials in the vicinity of CW3 and analyze unsaturated zone soils adjacent to C.M. St. P. & P. Railroad and Lemke Cheese.
WE-SW53A-20-01 WE-SW53A-40-01	VOCs, AB\N, grain size, natural organic content	Analyze soils beneath potential source area at former City Landfill.
WE-SW52-32-01	VOCs, AB\N, grain size, natural organic content	Analyze unsaturated zone soils at Marathon Electric.

TABLE 7
(Continued)

Sample Number boring-depth-round	Analyzed Parameters	Rationale
WE-SS04-01	VOCs, AB\N, grain size, natural organic content	Analyze soils in the vicinity of a leachate seep from the former City landfill.
WE-SS05-01 WE-SS05-91 (dup)	VOCs, AB\N, grain size	Analyze unsaturated soils in the vicinity of the former Wausau Chemical Bulk Solvent storage area.
WE-SE26A-14-01	VOCs, AB\N, grain size, natural organic content	Analyze soils unsaturated zone soils beneath the north side of Wausau Chemical.
WE-SS06-01	VOCs, AB\N, grain size, natural organic content	Analyze surficial soils adjacent to leachate seep from former City landfill.
WE-SS07-01	VOCs, AB\N, grain size, natural organic content	Analyze surficial soils in the vicinity of the former Marathon Electric hazardous waste storage area.
WE-SW54-5-01 WE-SW54-5-91 (dup) WE-SW54-20-01 WE-SW54-30-01	VOCs, AB\N, grain size, natural organic content	Obtain depth integrated soil samples in the vicinity of soil gas stations indicating TCE at the former City landfill.
WE-SE21-31-01	VOCs, AB\N, grain size, natural organic content	Investigate geologic characteristics of soil samples immediately adjacent to Wisconsin River. Obtain shallow aquifer soil samples in vicinity of Lake Wausau Granite.
WE-SE32-10-14-01 WE-SE33-10-14-01 WE-SE34-10-14-01	VOCs, AB\N, grain size, natural organic content	Obtain vertically composited soil samples from potential source area at C.M. St. P. & P. Railroad right-of-way east of Wausau Chemical.
WE-SE35-16	VOCs, AB\N, grain size, natural organic content	Investigate potential source of PCE in vicinity of Monitoring Well GN9S at Wergin Construction Company.
WE-SE36-16 WE-SE37-16 WE-SE38-16	VOCs, AB\N, grain size, natural organic content	Analyze unsaturated zone soils in vicinity of soil gas detection areas (PCE) at Marathon Pres.
WE-SDSB-01	VOCs	Soil blank for VOCs.

13076.28
CSR/kam/CSR
[kam-600-50o]

TABLE 8

SURFACE WATER SAMPLE LOCATIONS
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Station	Date	Location
•SW01 & SED01	12-09-87	East bank of the Wisconsin River, west of East Wausau Avenue;
•SW02 & SED02	12-09-87	East bank of the Wisconsin River, approximately 700 feet south of East Wausau Avenue;
•SW03 & SED03	12-09-87	West bank of the Wisconsin River east of the southeast corner of the Marathon Electric assembly building;
•SW04 & SED04	12-09-87	West bank of the Wisconsin river, due east of monitoring wells C4S and C4D;
•SW05 & SED05	12-09-87	North side of Bos Creek ponded area adjacent to Monitoring Well R2S, R2D;
•SW06 & SED06	12-09-87	Mouth of Bos Creek, approximately 40 feet south of boat launch at Schofield Park;
•SW07 & SED07	12-09-87	Bos Creek at Burns Street, upstream of well CW6 discharge;

13076.28
CSR/kam/CSR
[kam-600-50e]

TABLE 9

VERTICAL GRADIENTS
GROUNDWATER FLOW
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Well Nest	Date	Vertical Gradient	Direction
West Well Field			
C4S, C4D	01-08-88	2.6 E-04	Down
C2S, R4D	01-08-88	3.1 E-04	Down
W53, W53A	12-10-88	2.3 E-04	Down
R1S, R1D	01-08-88	2.2 E-03	Down
R2S, R2D	01-08-88	6.1 E-03	Down
R3S, RSD	01-08-88	8.4 E-03	Down
W52, W52A	01-08-88	4.1 E-03	Down
W55, W55A	01-08-88	3.2 E-03	Down
W9, W57	01-08-88	1.9 E-03	Down
GM4S, GM4D	01-08-88	2.8 E-04	Up
W3A, W3B	01-08-88	4.6 E-04	Down
W4A, W4C	01-08-88	0	--

Well Nest	Date	Vertical Gradient	Direction
East Well Field			
E21, E21A	01-07-88	4.5 E-04	Up
TCT44, E30	01-07-88	8.7 E-04	Up
E29A, GM5D	01-07-88	6.7 E-03	Up
E25A, E25	01-07-88	3.0 E-04	Up
WC3B, WC3	01-07-88	6.4 E-04	Up
WC7A, MW9A	01-07-88	9.9 E-04	Up
E24, E24A	01-07-88	7.2 E-04	Up
WW1, E20	01-07-88	5.9 E-04	Up
E26, E26A	01-07-88	6.4 E-04	Down

13076.28
CSR/kam/KJD
[kam-600-50p]

TABLE 10

SUMMARY OF HYDRAULIC CONDUCTIVITY TESTS
WAUSAU WATER SUPPLY NPL SITE

Well #	Method	Drilling (cm/sec)	Hydraulic Conductivity Difference	Average	Percent Error
C4S	HSA	0.137 x 10-1			
C4D	RB/DM No Case	0.173 x 10-3			
R3S	HSA	0.680 x 10-1			
R3D	RRA	0.858 x 10-2			
W55A	HSA	0.189 x 10-2			
W55	RB/DM	0.699 x 10-2			
W55 Rep	RB/DM	0.692 x 10-2	7.0×10^{-4}	6.99×10^{-2}	1%
E24A	HSA	0.290 x 10-1			
E24	RB/DM	0.252 x 10-1			
C2S	HSA	0.430 x 10-1			
E20	RB/DM No Case	0.170 x 10-2			
E20 Rep	RB/DM No Case	0.208 x 10-2	3.8×10^{-4}	1.94×10^{-2}	20%
E22	RB/DM	0.812 x 10-1			
E25	RB/DM	0.302 x 10-1			
E30	RB/DM No Case	0.144 x 10-2			
MW9A	RB/DM	0.456 x 10-1			
R2D	RRA/Casing	0.657 x 10-2			
W51A	HSA	0.103 x 10-1			
W56	RB/DM No Case	0.159 x 10-2			
W50	RB/DM	0.413 x 10-1			
W50 Rep	RB/DM	0.475 x 10-1	6.2×10^{-3}	0.444×10^{-1}	14%

Notes

RB/DM No Case - Rotary boring, drilling mud used to support borehole
RB/DM - Rotary boring, drilling mud with casing advanced
HSA - Hollow stem auger
RRA - Reverse air rotary

13076.28
CSR/kam/KJS
[kam-600-50q]

TABLE 11

HENRY'S LAW CONSTANTS FOR SOME COMMON INDUSTRIAL SOLVENTS AT 25 C AS DETERMINED BY THE METHOD DESCRIBED IN MACKAY AND SHIU (1981) AFTER MARRIN AND THOMPSON (1987)

	Henry's Law Constant*
trans-1,2-dichloroethylene	0.67
Methylene chloride	0.26
1,1,1-trichloroethane (TCA)	2.80
Trichloroethylene (TCE)	1.18
Carbon tetrachloride	1.59
Tetrachloroethylene (PCE)	2.30
Chloroform	0.38
1,1,2-trichlorotrifluoroethane (F-113)	15.00
n-hexane	170.00
Toluene	0.67

* Henry's law constants are given in units of $kPa.M^3/mol$

13076.28
CSR/kam/CSR
[kam-600-50f]

TABLE 12

COMPARISON OF CONTRACT LABORATORY
VS. FIELD GC RESULTS
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Locations	WARZYN Total Chlorinated Ethenes ug/L	CLP Total Chlorinated Ethenes ug/L
E21-132 Dup	1.98	3
E21-132	1.98	2
E24-40	1.43	3.8
E25-120	0	0.7
E25-154	0	0
E30-100	0	0
E32-Comp	6.51	7.6
E32-14	963.5	1450
E33-14	380.17	470
E34-14	73.5	60.6
E35-18	8200	5700
E36-16	20.88	22
E38-18	0	30
W52-100	30	34.7
W53-125	2038	1979
W54-85	54.8	80
W53-75	1532.3	1335.9
W55-60	1.36	0
W55-70	0	0
W55-80	0	0
W57-21	0	0
W55 Complete	4320	3200
SW09	152	82
SW10	87.1	70
W56-50	0	1
CW4	15.22	18.2
W55A	29.98	32.4
SB01	2.58	3
SB02	0	0
SB03	0	5

Refer to Drawing 13076-A11 for graphic comparison of field GC vs. Contract Lab Analyses.

13076.28
MCB/kam/CSR
[kam-600-50g]

TABLE 13

CROSS INDEX OF EXISTING WELL DESIGNATIONS
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

Well Identification Code Appearing On Log	Well Identification Code Appearing In This Report	Well Identification Code Appearing On Log	Well Identification Code Appearing In This Report
WEST STUDY AREA			
R1D	Same	WMW-1A	MW1A
R2D	Same	WMW-2A	MW2A
R3D	Same	WMW-3A	MW3A
R4D	Same	WMW-3B	MW3B
City Well #6	CW6	WMW-4A	MW4A
City Well #7	CW7	WMW-4B	MW4B
City Well #9	CW9	WMW-4C	MW4C
1S	C1S	WMW-5	MW5
B-2S	C2S	WMW-6	MW6
B-3S	C3S	WMW-7	MW7
B-4S	C4S	WMW-9	MW9
4D	C4D	GM-1S	GM1S
B-6D	C6S	GM-2S	GM2S
B-7S	C7S	GM-3S	GM3S
		GM-4S	GM4S
		GM-4D	GM4D
EAST STUDY AREA			
B1	WC1	MW11 (EPA 11)	MW11
B2	WC2	MW12 (EPA 12)	MW12
B3	WC3	MW13 (EPA 13)	MW13
B3A	WC3A	MW14 (EPA 14)	MW14
B3B	WC3B	TCT40	Same

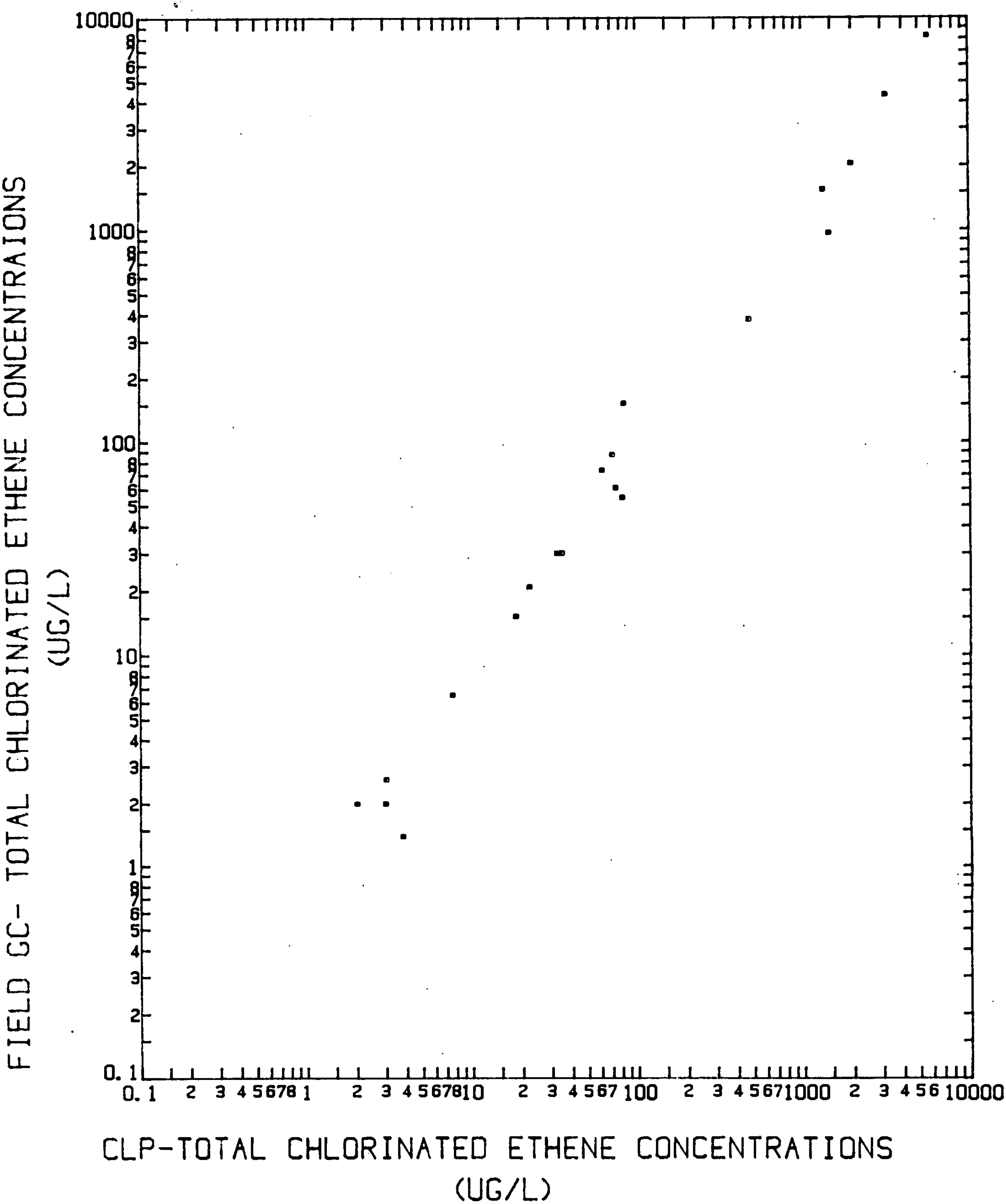
TABLE 13
(Continued)

Well Identification Code Appearing In This Report	Well Identification Code Appearing On Log
B3C	WC3C
B4	WC4
B4B	WC4B
B5	WC5
B5A	WC5A
B6	WC6
B6A	WC6A
B7	WC7
B7A	WC7A
MW1	WW1
MW2	WW2
MW3	WW3
MW4	WW4
MW5	WW5
MW6	WW6
MW7	WW7
MW7A (EPA 7A)	MW7A
MW8	Same
WGS9	Same
MW9A	Same
WGS10	Same
MW10A (EPA 10A)	MW10A
MW10B (EPA 10B)	MW10B

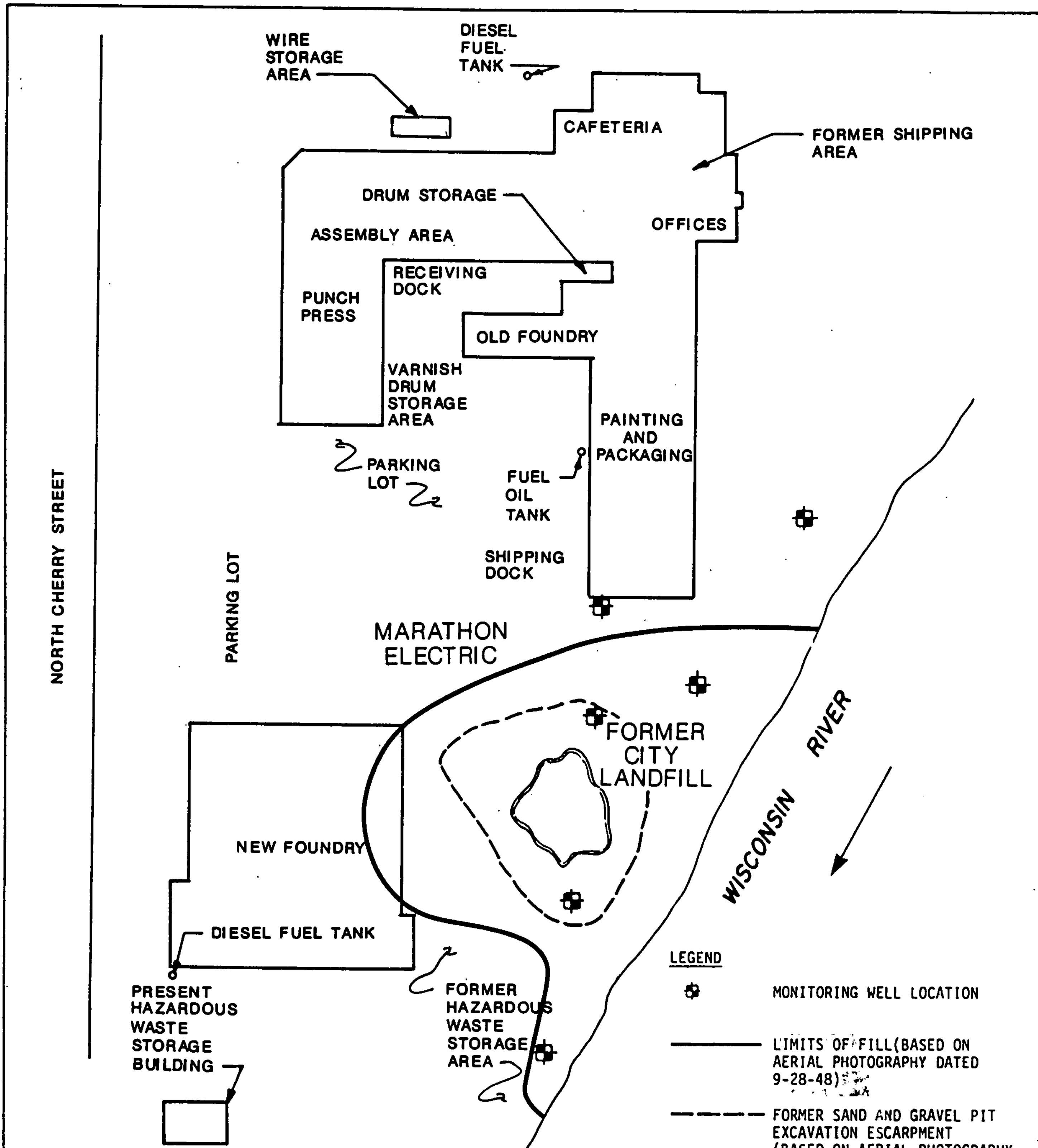
Well Identification Code Appearing In This Report	Well Identification Code Appearing On Log
TCT41	Same
TCT42	Same
TCT42	Same
TCT44	Same
FVD1	Same
FVD2	Same
FVD5	Same
FVD7	Same
GM5D	Same
GM6D	Same
GM7D	Same
GM8D	Same
GM9S	Same
Wergin	Same
City Well #3	CW3
City Well #4	CW4

13076.28
CSR/kam/CSR
[kam-600-50h]

TOTAL CHLORINATED ETHENE CONCENTRATIONS OF SAMPLES COLLECTED DURING DRILLING



			WARZYN	CLP LAB VOCS VS. FIELD GC MARATHON ELECTRIC AND ABANDONED CITY LANDFILL WAUSAU WATER SUPPLY NPL SITE WAUSAU, WISCONSIN
DWN	APP'D C80R	DATE 4-22-88	13076-A15	



NOTES

1. PLANT OPERATION LOCATIONS ARE BASED ON PLANT INSPECTION CONDUCTED ON AUGUST 7, 1987.
2. APPROXIMATE LIMITS OF LANDFILL WERE DETERMINED BASED ON AERIAL PHOTOTGRAPHY DATED 9-28-48. PHOTOGRAPHS OBTAINED FROM THE CITY OF WAUSAU DEPARTMENT OF ENGINEERING
3. BASED MAP DEVELOPED FROM U.S.G.S. 15 MINUTE QUADRANGLE MAPS WAUSAU EAST & WAUSAU WEST DATED 1963, PHOTOREVISED 1978.

DWN JC	APP'D C8R	DATE 4-22-88	13076-A16

WARZYN ENGINEERING INC

INDUSTRIAL SURVEY/REMEDIAL INVESTIGATION
MARATHON ELECTRIC AND
ABANDONED CITY LANDFILL
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

APPENDIX A

FIELD METHODS FOR EXPLORATION AND SOIL SAMPLING

FIELD METHODS
for
EXPLORATION AND SAMPLING SOILS

A. Boring Procedures Between Samples

The bore hole is extended downward, between samples, by a continuous flight auger, driven and washed-out casing, or rotary boring with drilling mud or water.

B. Standard Penetration Test and Split-Barrel Sampling of Soils (ASTM* Designation: D 1586)

This method consists of driving a 2" outside diameter split barrel sampler using a 140 pound weight falling freely through a distance of 30 inches. The sampler is first seated 6" into the material to be sampled and then driven 12". The number of blows required to drive the sampler the final 12" is recorded on the log of borings and known as the Standard Penetration Resistance. Recovered samples are first classified as to texture by the driller. Later, in the laboratory the driller's classification is reviewed by a soils engineer who examines each sample.

C. Thin-walled Tube Sampling of Soils (ASTM* Designation: D 1587)

This method consists of forcing a 2" or 3" outside diameter thin wall tube by hydraulic or other means into soils, usually cohesive types. Relatively undisturbed samples are recovered.

D. Soil Investigation and Sampling by Auger Borings (ASTM* Designation: D 1452)

This method consists of augering a hole and removing representative soil samples from the auger flight or bucket at 5'0" intervals or with each change in the substrata. Relatively disturbed samples are obtained and its use is therefore limited to situations where it is satisfactory to determine approximate subsurface profile.

E. Diamond Core Drilling for Site Investigation (ASTM* Designation: D 2113)

This method consists of advancing a hole in hard strata by rotating downward a single tube or double tube core barrel equipped with a cutting bit. Diamond, tungsten carbide, or other cutting agents may be used for the bit. Wash water is used to remove the cuttings. Normally a 2" O.D. by 1 3/8" I.D. coring bit is used unless otherwise noted. The rock or hard material recovered within the core barrel is examined in the field and laboratory. Cores are stored in partitioned boxes and the length of recovered material is expressed as a percentage of the actual distance penetrated.

*American Society for Testing and Materials, Philadelphia, Pennsylvania

LOG OF TEST BORING

General Notes

Descriptive Soil Classification

GRAIN SIZE TERMINOLOGY

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12″	Larger than 12″
Cobbles	3″ to 12″	3″ to 12″
Gravel: Coarse	¾″ to 3″	¾″ to 3″
Fine	4.76 mm to ¾″	#4 to ¾″
Sand: Coarse	2.00 mm to 4.76 mm	#10 to #4
Medium	0.42 mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm	#200 to #40
Silt	0.005 mm to 0.074 mm	Smaller than #200
Clay	Smaller than 0.005 mm	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

GENERAL TERMINOLOGY

Physical Characteristics
Color, moisture, grain shape, fineness, etc.
Major Constituents
Clay, silt, sand, gravel
Structure
Laminated, varved, fibrous, stratified, cemented, fissured, etc.
Geologic Origin
Glacial, alluvial, eolian, residual, etc.

RELATIVE DENSITY

Term	"N" Value
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

RELATIVE PROPORTIONS OF COHESIONLESS SOILS

Proportional Term	Defining Range By Percentage of Weight
Trace	0%- 5%
Little	5%-12%
Some	12%-35%
And	35%-50%

CONSISTENCY

Term	q_u-tons/sq. ft.
Very Soft	0.0 to 0.25
Soft	0.25 to 0.50
Medium	0.50 to 1.0
Stiff	1.0 to 2.0
Very Stiff	2.0 to 4.0
Hard	Over 4.0

ORGANIC CONTENT BY COMBUSTION METHOD

Soil Description	Loss on Ignition
Non Organic	Less than 4%
Organic Silt/Clay	4-12%
Sedimentary Peat	12-50%
Fibrous and Woody Peat	More than 50%

PLASTICITY

Term	Plastic Index
None to Slight	0-4
Slight	5-7
Medium	8-22
High to Very High	Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6″ pentrations of the 2″ split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30″ and is seated to a depth of 6″ before commencing the standard penetration test.

Symbols

DRILLING AND SAMPLING

CS—Continuous Sampling
RC—Rock Coring: Size AW, BW, NW, 2″ W
RQD—Rock Quality Designator
RB—Rock Bit
FT—Fish Tail
DC—Drove Casing
C—Casing: Size 2½″, NW, 4″, HW
CW—Clear Water
DM—Drilling Mud
HSA—Hollow Stem Auger
FA—Flight Auger
HA—Hand Auger
COA—Clean-Out Auger
SS—2″ Diameter Split-Barrel Sample
2ST—2″ Diameter Thin-Walled Tube Sample
3ST—3″ Diameter Thin-Walled Tube Sample
PT—3″ Diameter Piston Tube Sample
AS—Auger Sample
WS—Wash Sample
PTS—Peat Sample
PS—Pitcher Sample
NR—No Recovery
S—Sounding
PMT—Borehole Pressuremeter Test
VS—Vane Shear Test
WPT—Water Pressure Test

LABORATORY TESTS

q_p—Penetrometer Reading, tons/sq. ft.
q_u—Unconfined Strength, tons/sq. ft.
W—Moisture Content, %
LL—Liquid Limit, %
PL—Plastic Limit, %
SL—Shrinkage Limit, %
LI—Loss on Ignition, %
D—Dry Unit Weight, lbs./cu. ft.
pH—Measure of Soil Alkalinity or Acidity
FS—Free Swell, %

WATER LEVEL MEASUREMENT

▽—Water Level at time shown
NW—No Water Encountered
WD—While Drilling
BCR—Before Casing Removal
ACR—After Casing Removal
CW—Caved and Wet
CM—Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

UNIFIED SOIL CLASSIFICATION SYSTEM

COARSE-GRAINED SOILS

(More than half of material is larger than No. 200 seive size.)

Major division	Group symbol	Typical names
GRAVELS More than half of coarse fraction larger than No. 4 sieve size	**Clean Gravels** (Little or no fines)	
	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
	Gravels with Fines (Appreciable amount of fines)	
	GM $^{d}_{u}$	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
SANDS More than half of coarse fraction smaller than No. 4 sieve size	**Clean Sands** (Little or no fines)	
	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with Fines (Appreciable amount of fines)	
	SM $^{d}_{u}$	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures

LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} X D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} X D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for SW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

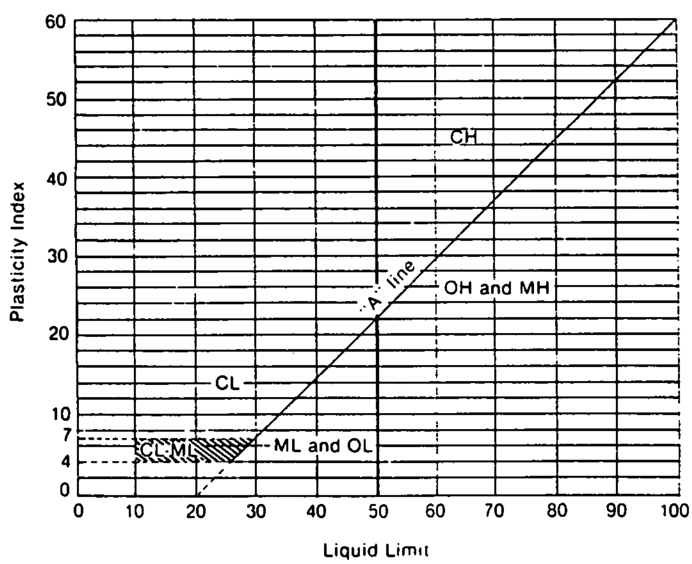
- Less than 5 per cent .... GW, GP, SW, SP
- More than 12 per cent .... GM, GC, SM, SC
- 5 to 12 per cent .... Borderline cases requiring dual symbols

FINE-GRAINED SOILS

(More than half of material is smaller than No. 200 sieve.)

Major division	Group symbol	Typical names
SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit greater than 50%	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

PLASTICITY CHART



For classification of fine-grained soils and fine fraction of coarse-grained soils.

Atterberg Limits plotting in hatched area are borderline classifications requiring use of dual symbols.

Equation of A-line: PI = 0.73 (LL - 20)

APPENDIX B

BORING LOGS

B.1

WARZYN PERFORMED BORING LOGS

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-20
Surface Elevation 1197.2
Job No. 13076.25
Sheet 1 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Medium Dense to Very Dense Brown Fine to Coarse SAND, Little to Some Fine Gravel and Silt (SP)					
1			M	34	5				0.0		
2		12	M	113	10				0.0		
3		12	W	54	15				0.0		
4		6	W	26	20				0.0		51.9
5		6	W	13	25				0.0		
					30						
6		6	W	24	35				0.0		11.3
					40						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 13.0
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/23/87 End 10/27/87
Crew Chief JW Rig D-50
Drilling Method 3 1/4" HSA 0-4.5', 5 7/8" RB/DM 4.5-79.5'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-20

Surface Elevation 1197.2

Job No. 13076.25

Sheet 2 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45	Medium Dense to Very Dense, Brown Fine to Coarse SAND, Little to Some Fine Gravel and Silt (SP)					
7	■	6	W	60	50				0.0		ND
					55						
					60						
8	■	3	W	42	65	Grades Fine to Medium SAND, Little Silt, Trace Fine Gravel near 64' (SP)			0.0		ND
					70						
					75						
9	■		W	54	80				0.0		ND
					85	End Boring at 80.5'					

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-21
Surface Elevation 1195.2
Job No. 13076.25
Sheet 1 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

Sample No.	T	Recovery " R=%	Moisture	N	Depth	Visual Classification and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–14	Earth Drilled to 29' FILL: Granite Cuttings					
					14	Dense Brown Fine to Coarse SAND, Trace to Little Fine Gravel (SP) Visual Description based on Cuttings and Drilling Action					
1A		6	W	78					0.0		
1B		18	W	76	30				0.0		
						Contract Lab Soil Sample WE-SE21-31-01					
					35	Earth Drilled to 89'					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 14.0
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/11/87 End 11/14/87
Crew Chief MK Rig
Drilling Method RB/DM 0-132'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-21
Surface Elevation 1195.2
Job No. 13076.25
Sheet 2 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45	Fine to Coarse SAND with Trace to Little Gravel Based on Drilling Action and Cuttings Earth Drilled to 89'					
					50						
					55						
					60						
					65						
					70						
					75						
					80						
					85						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-21
Surface Elevation 1195.2
Job No. 13076.25
Sheet 3 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth Drilled to 89'					
2	■	12	W	16	90	Medium Dense to Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Trace Silt (SP)			0.0		1.05
3	■	18	W	113	105				0.0		BMDL
4	■	12	W	110	120				0.0		ND
					125	Probable GRAVEL, Based on Drilling Action and Cuttings Contract Lab Water Sample and Duplicate WE-GE21-133-01, WE-GE21-133-91					

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-21

Surface Elevation 1195.2

Job No. 13076.25

Sheet 4 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Probable GRAVEL, Basd on Drilling Action and Cuttings					1.98
					135	Weathered BEDROCK at 132' Based on Drilling Action and Drilling Mud Color Change					
						End Boring at 133'					
					140						
					145						
					150						
					155						
					160						
					165						
					170						
					175						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-21A
Surface Elevation 1195.5
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–13.9	Earth Drilled to 22.0'. Visual description based on cuttings. Reddish Brown SAND & GRAVEL with Chips of Granite (FILL)					
					13.9–22	Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel (SP) Visual Description based on Cuttings and Drilling Action					
					22	End Boring at 22'					

WATER LEVEL OBSERVATIONS

While Drilling ▽ ____
Upon Completion of Drilling ▼ ____
Time After Drilling ____
Depth to Water ____
Depth to Cave in ____

GENERAL NOTES

Start 11/13/87 End 11/13/87
Crew Chief MK Rig CME 750
Drilling Method HSA 0-22'

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-22A

Surface Elevation 1196.4

Job No. 13076.25

Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–22	Earth Drilled to 22.0' Refer to Boring Log E-22 for Soil Classification from 0-22.0'					
					22	End Boring at 22'					

WATER LEVEL OBSERVATIONS

While Drilling

Upon Completion of Drilling

Time After Drilling

Depth to Water

Depth to Cave in

GENERAL NOTES

Start 11/13/87 End 11/13/87

Crew Chief MK Rig CME 750

Drilling Method HSA 0-22'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-22
Surface Elevation 1196.1
Job No. 13076.25
Sheet 1 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

No.	T	Recovery " R=%	Moisture	N	Depth	Visual Classification and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–4	FILL: Foundry Sand					
1		18	M	25	4–5.5	Medium Dense to Very Dense, Brown Fine to Coarse SAND, Little to Some Fine Gravel, Trace Silt (SP)			0.0		
2		18	M	30					0.0		
3		18	W	68					0.0		
4		12	W	22					0.0		12.2
5		12	M	23					0.0		
6		12	W	16					0.0		ND

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/12/87 End 10/13/87
Crew Chief JW Rig D-50
Drilling Method FA 0-5'; RB/DM 5-95'

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-22
Surface Elevation 1196.1
Job No. 13076.25
Sheet 2 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45	Medium Dense to Very Dense, Brown Fine to Coarse SAND, Little to Some Fine Gravel, Trace Silt (SP)					
7		14	W	36					0.0		ND
					50						
					55						
					60						
8		12	W	70					0.0		ND
					65						
					70						
					75						
9		1	W	100 /3"					0.0		ND
					80						
					85						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-22
Surface Elevation 1196.1
Job No. 13076.25
Sheet 3 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					90	Medium Dense to Very Dense Brown Fine to Coarse SAND, Little to Some Fine Gravel, Trace Silt (SP)					
10		12	W	79	95				0.0		ND
						End Boring at 96.5'					
					100						
					105						
					110						
					115						
					120						
					125						
					130						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-23A

Surface Elevation 1198.2

Job No. 13076.25

Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0	Loose, Black Organic SILT (OL)					
1		18	M	16		Stiff Reddish Brown Fine Sandy CLAY (CL)	(1.25)		0.2		
					5	Very Dense, Brown Medium to Coarse SAND, Little Fine Gravel, Trace Silt (SP)					
2		18	M	73					0.2		
					10						
3		8	M/W	36					0.2		
					15						
4		10	W	22					0.2		
					20						41.1
						End Boring at 21.4'					
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 14.7

Upon Completion of Drilling ▼

Time After Drilling

Depth to Water

Depth to Cave in

GENERAL NOTES

Start 10/30/87 End 10/30/87

Crew Chief LE Rig CME 750

Drilling Method 4 1/4" HSA 0-21.4'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS
Location: Wausau, Wisconsin

Boring No. E-24A
Surface Elevation 1209.0
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						FILL: Sand and Gravel			0.4		
1		12	M	30					0.4		
2		0		100		Medium to Very Dense, Brown Fine to Coarse SAND, Little to Some Fine Gravel, Trace Silt (SP)					
3		4	M	91					0.3		
4		0	M	47					0.3		
5		10	M	26							
6		8	W	23					0.4		
											400.1
7		16	W	12					0.5		
					35	End Boring at 35'					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 24.1
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/13/87 End 10/13/87
Crew Chief LE Rig CME 45
Drilling Method 4 1/4" HSA 0-35'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-24
Surface Elevation 1208.5
Job No. 13076.25
Sheet 1 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Monotox	Field VOC Water
					0–35	Earth Drilled to 24.0' Refer to Boring Log E-24A for Soil Description and Classification from 0-35.0'					
					35–40	Medium Dense to Very Dense, Brown Fine to Coarse SAND, Little to Some Fine Gravel, Trace Silt (SP)					
1			W	32					0.0		1.43

WATER LEVEL OBSERVATIONS

While Drilling ∇ 24.0
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/14/87 End 10/19/87
Crew Chief JW Rig D-50
Drilling Method 5 7/8" RB/DM 0-70'; 3 7/8" RB/DM 70-85.7'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-24
Surface Elevation 1208.5
Job No. 13076.25
Sheet 2 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Contract Lab Water Sample WE-GE24-40-01					
					45	Medium Dense to Very Dense, Brown Fine to Coarse SAND, Little to Some Fine Gravel, Trace Silt (SP)					
2		12	W	78					0.0		
					50						
											1.25
					55						
3		12	W	46	60						
					65						
4		9	W	69	70						BMDL
					75						
					80						
					85						

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-24

Surface Elevation 1208.5

Job No. 13076.25

Sheet 3 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						End Boring at 85.7'					
					90	*Medium Dense to Very Dense, Brown Fine to Coarse SAND, Little to Some Gravel, Trace Silt (SP)					
					95						
					100						
					105						
					110						
					115						
					120						
					125						
					130						

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-25
Surface Elevation 1211.7
Job No. 13076.25
Sheet 1 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Medium Dense to Very Dense, Brown Medium to Coarse SAND, Little Fine Gravel (SP)					
1	■	18	M	72	5				0.2		
2	■	18	M	156	10				0.2		
3	■	12	M	144	15				0.6		
4	■	8	M	80	20	Grades to Trace Fine Gravel near 19'			0.3		
5	■	10	W	85	25	Grades to Little Fine Gravel near 25'			0.6		
6	■	0		71	30	No Sample Recovery					BMDL
7	■	6	W	36	35				0.4		
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 25.0
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/12/87 End 10/20/87
Crew Chief LL Rig CME 750
Drilling Method RB/DM 0-154'

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-25

Surface Elevation 1211.7

Job No. 13076.25

Sheet 2 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
8		3	W	19	45	Medium Dense to Very Dense, Brown Medium to Coarse SAND, Little Fine Gravel (SP)			0.8		BMDL
					50						
9		6	W	31	55				0.3		ND
					60						
10		6	W	44	65				0.6		
					70						
11		5	W	47	75				0.4		ND
					80						
12		13	W	87	85	1" Layer of Fine Gravel near 84.5'			0.4		

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-25
Surface Elevation 1211.7
Job No. 13076.25
Sheet 3 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					90	Medium Dense to Very Dense, Brown Medium to Coarse SAND, Little Fine Gravel (SP)					ND
13		10	W	94	95				0.8		
					100						
14		8	W	86	105				0.6		ND
					110						
15		0		128	115	No Sample Recovery					
					120	Contract Lab Water Sample and Duplicate taken at 120', WE-GE25-120-01, WE-GE-120-91					
16		0		48	125	No Sample Recovery					
					130						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No.: E-25
Surface Elevation: 1211.7
Job No.: 13076.25
Sheet 4 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Probable 12" Gravel Layer near 130' Based on Drilling Action and Cuttings					
17	■	0		70	135	No Sample Recovery					BMDL
					140	Very Dense, Reddish Brown Clayey GRAVEL (GC) (Possible Cobbles based on Drilling Action)					
18	■	1	W	130	145						
					150	Contract Lab Water Sample at 154' WE-GE25-01					
19	■	1	M	192	155				0.2		BMDL
						End Boring at 154'					
					160	Probable Bedrock at 154', based on split spoon refusal, drilling action, and drilling mud color change.					
					165						
					170						
					175						

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LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-25A

Surface Elevation 1211.7

Job No. 13076.25

Sheet 1 of 1

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth Drilled to 37.5' Refer to Boring Log E-25 for Description and Classification from 0-37.5'					
					37.5	End Boring at 37.5'					

WATER LEVEL OBSERVATIONS

While Drilling ∇ 27.9

Upon Completion of Drilling

Time After Drilling 1/4 hr

Depth to Water 27.35'

Depth to Cave in

GENERAL NOTES

Start 10/22/87 End 10/22/87

Crew Chief LL Rig CME 750

Drilling Method 4 1/4" HSA 0-37.5'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No.: E-26
Surface Elevation: 1196.7
Job No.: 13076.25
Sheet 1 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–33.5	Earth Drilled to 33.5', Refer to Boring Log E-26A for Soil Description and Classification from 0-33.5'					
1			W	22	33.5	Medium Dense, Brown Fine GRAVEL, Little Medium Sand (GP)					ND

WATER LEVEL OBSERVATIONS

While Drilling ▽
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/9/87 End 11/9/87
Crew Chief MK Rig CME 750
Drilling Method 3 7/8" RB/DM 0-96'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 2M
Surface Elevation 1196.8
Job No. 13076.25
Sheet 3 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					90	Note: Soil samples were obtained by Wisconsin Dept. of Transportation in September, 1984. Soil descriptions were checked against samples by Warzyn Engineering November, 1987					
					95						
					100						
					105						
					110						
					115						
					120						
					125						
					130						

WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS
Location: Wausau, Wisconsin

Boring No. DOT 3M
Surface Elevation 1207.9
Job No. 13076.25
Sheet 1 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–1	GRAVEL (Fill)					
					1–7.5	Loose, Brown Medium SAND, Trace Silt (SP)					
1		12	M	6	5						
					7.5–23	Very Dense to Dense, Brown SAND & GRAVEL (SP-GP)					
2		12	M	60	10						
3		12	M	35	15						
4		12	M	34	20						
					23–40	Firm, Brown Fine to Coarse SAND, Trace Gravel (SP)					
5		6	M	22	25						
6		12	W	20	30						
7		12	W	14	35						

WATER LEVEL OBSERVATIONS

While Drilling ▽
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 9/11/84 End 9/11/84
Crew Chief M Rig VII
Drilling Method

.WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 3M
Surface Elevation 1207.9
Job No. 13076.25
Sheet 2 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
8		14	W	18		Firm, Brown Fine to Coarse SAND, Trace Gravel (SP)					
9		12	W	26	45						
10		12	W	32	50						

End Boring at 52'

Note: Soil samples were obtained by Wisconsin Dept. of Transportation in September, 1984. Soil descriptions were checked against samples by Warzyn Engineering November, 1987

Depth scale: 45, 50, 55, 60, 65, 70, 75, 80, 85

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project Wausau, WI NPL Site RI/FS

Location Wausau, Wisconsin

Boring No. DOT 4M
Surface Elevation 1187.8
Job No. 13076.25
Sheet 1 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–11	WATER					
					11–23	Loose, Dark Gray Fine SAND, Trace of Wood & Silt (SP)					
1		6	W	9	15						
2		0	W	11	20						
					23–30	Firm, Gray Medium Coarse SAND, Little Gravel (SP)					
3		12	W	11	25						
4		16	W	7	30	Loose, Gray Medium SAND, Trace of Gravel and Silt (SP)					
5		18	W	44	35	Dense, Gray Medium SAND, Trace of Silt (SP)					
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 9/17/84 End 9/17/84
Crew Chief M Rig I
Drilling Method

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 4M
Surface Elevation 1187.8
Job No. 13076.25
Sheet 2 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
6		18	W	31		Dense, Gray Medium SAND, Trace of Silt (SP)					
						Firm, Brown Fine to Coarse SAND, Trace of Gravel & Silt (SP)					
7		18	W	17	45						
8		18	W	17	50						
9		20	W	23	55						
10		22	W	17	60						
11		24	W	26	65	Firm to Very Dense, Brown Fine to Coarse SAND, Little Gravel, Trace Silt (SP)					
12		24	W	58	70						
13		24	W	22	75						
14		24	W	25	80	Dense, Brown Fine to Medium SAND (SP)					
					85						

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 4M
Surface Elevation 1187.8
Job No. 13076.25
Sheet 3 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Dense, Brown Fine to Medium SAND (SP)					
15		24	W	31	90						
					95						
16		24	W	65	100						
						End Boring at 102'					
					105	Note: Soil samples were obtained by Wisconsin Dept. of Transportation in September, 1984. Soil descriptions were checked against samples by Warzyn Engineering November, 1987					
					110						
					115						
					120						
					125						
					130						

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 5M
Surface Elevation 1187.8
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						WATER					
1		24	W	1	5	Brownish Gray Organic SILT (OL)					
2		24	W	2		Gray and Black Alternating Layers of Fine Silty SAND and PEAT, Trace Wood (SM-PT)					
3		24	W	8	10						
4		18	W	20		Firm, Gray SAND & GRAVEL, Trace Silt, Some Organics (SP)					
						End Boring at 13'					

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40

Note: Soil samples were obtained by Wisconsin Dept. of Transportation in September, 1984. Soil descriptions were checked against samples by Warzyn Engineering November, 1987

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 9/18/84 End 9/18/84
Crew Chief M Rig VII
Drilling Method

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-26
Surface Elevation 1196.7
Job No. 13076.25
Sheet 2 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45	Medium Dense, Brown Fine GRAVEL, Little Medium Sand (GP)					
2	■		W	52	50	Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Trace Silt (SP)					ND
					55						
					60						
3	■		W	61	65						ND
					70						
					75						
4	■		W	104	80						ND
					85						

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No.: E-26
Surface Elevation: 1196.7
Job No.: 13076.25
Sheet 3 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					90	Very Dense Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Trace Silt (SP)					
5	■		W	54	95						
					100	End Boring at 96'					
					105						
					110						
					115						
					120						
					125						
					130						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-26A
Surface Elevation 1196.6
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0	Medium Dense to Very Dense, Brown Fine to Coarse SAND, Little to Some Gravel (SP)					
1			M	34	5						
2			M	53	10	Collected Contract Lab Soil Sample from 11.5 to 14' WE-SE26A-14-01					
3			W	24	15						
4			W	8	20	Loose Brown Fine GRAVEL, Little Medium Sand (GP)					
					23	End Boring at 23'					

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/6/87 End 11/6/87
Crew Chief PD Rig CME 750
Drilling Method 4 1/4" HSA 0-23'

WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-27
Surface Elevation 1196.3
Job No. 13076.25
Sheet 1 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0	Earth Drilled to 89' Approximately 15' of Granitic Fill Based on Drilling Action and Cuttings (FILL)					
					12 ▽						
					15	Fine to Coarse SAND with Some Gravel (Based on Drilling Action and Cuttings) (SP)					
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 12.0
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/30/87 End 11/30/87
Crew Chief JW Rig D-50
Drilling Method RB/DM
0-139.5'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-27
Surface Elevation 1196.3
Job No. 13076.25
Sheet 2 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth Drilled to 89'					
					45	Fine to Coarse SAND with Some Gravel (Based on Drilling Action and Cuttings)					
					50						
					55						
					60						
					65						
					70						
					75						
					80						
					85						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-27
Surface Elevation 1196.3
Job No. 13076.25
Sheet 3 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
1		7	W	67					0.0		ND
					90	Medium Dense to Very Dense, Brown Fine to Medium SAND, Little Fine Gravel (SP)					
					95						
					100						
2		12	W	86					0.0		
					105						
					110						
					115						BMDL
					120						
3		8	W	146					0.0		BMDL
					125						
4		2	W	156					0.0		
					130						

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-27
Surface Elevation 1196.3
Job No. 13076.25
Sheet 4 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Very Dense, Reddish Brown Fine to Coarse GRAVEL (GP) Drove Stone						
					135	Drilling Mud Color Change to Dark Reddish Brown at 135' Probable Weathered Bedrock						532.0
					140	End Boring at 139.5'						
					145							
					150							
					155							
					160							
					165							
					170							
					175							

WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-28A
Surface Elevation 1212.1
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0	8" TOPSOIL			0.3		
						Medium Dense to Dense Brown Fine to Coarse SAND, Little to Some Fine Gravel, Little Silt (SP)					
1		14	M	48	5				0.4		
2		12	M	24	10				0.3		
3		0		47	15	No Sample Recovery			0.3		
4		5	M	34	20				0.3		
5		5	M	45	25				0.3		
					27.8 ▽						
6		3	W	17	35				0.3		
					40	End Boring at 37'					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 27.8
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/13/87 End 10/13/87
Crew Chief LE Rig CME 45C
Drilling Method 4 1/4" HSA 0-37'

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-29A
Surface Elevation 1200.8
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–1	Loose, Brown Organic SILT (OL) (Topsoil)					
					1–6	FILL: Sand, Fine Gravel and Clay					
1		6	M	7							
					6–29	Very Dense to Medium Dense, Brown Medium to Coarse SAND, Little to Some Fine to Coarse Gravel (SP)					
2		6	M	61							
3		2	M/W	100/6"							
					15	Split Spoon Refusal due to Probable 12" Coarse Gravel Layer near 15.0'					
4		4	W	47							
5			W	21							
					29	End Boring at 29'					

WATER LEVEL OBSERVATIONS

While Drilling 19.1
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/23/87 End 10/23/87
Crew Chief LE Rig CME 750
Drilling Method 4 1/4" HSA 0-29'

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-30
Surface Elevation 1202.1
Job No. 13076.25
Sheet 1 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0	Sand, Gravel and Fragments of Granite (FILL)					
1		18	M	40					0.0		
					5	Dense to Very Dense Fine to Coarse SAND with GRAVEL (SP-GP)					
2		4	M	100/6"					0.0		
					10						
3		12	M	99					0.0		
					15						
4		0	M	32					0.0		
					20	Medium to Very Dense, Brown Fine to Medium SAND, Trace to Little Fine Gravel, Trace Silt (SP)					
5		12	M/W	53					0.0		BMDL
					25						
					30						
					35						
6		12	W	12					0.0		ND
					40						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 20.0
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/28/87 End 10/30/87
Crew Chief JW Rig D-50
Drilling Method FA 0-4'
5 7/8" RB/DM 4-134'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-30
Surface Elevation 1202.1
Job No. 13076.25
Sheet 2 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45	Medium to Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Trace Silt (SP)					
					50	Medium Dense to Very Dense Brown Fine to Medium SAND, Trace Fine Gravel, Trace Silt (SP)					
7		8	W	57					0.0		ND
					55						
					60						
					65						
8		6	W	79					0.0		ND
					70						
					75						
9		8	W	75					0.0		ND
					80						
					85						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-30
Surface Elevation 1202.1
Job No. 13076.25
Sheet 3 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

No.	T	Recovery " R=%	Moisture	N	Depth	Visual Classification and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
10		8	W	64	90	Medium to Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Trace Silt (SP)			0.0		BMDL
					95						
11		8	W	69	100	Obtained Contract Lab Water Sample WE-GE30-100-01 at 100'			0.0		ND
					105						
12		6	W	114	110				0.0		BMDL
					115	Very Dense, Brown Fine to Coarse SAND with Some Coarse Gravel (SP)					
13		12	W	92	120				1.5		ND
					125						
14		6	W	100	130				1.0		

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-30
Surface Elevation 1202.1
Job No. 13076.25
Sheet 4 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
				/18"		Very Dense, SAND & GRAVEL (SP-GP)					
15	■	0	W	150					1.0		6.62
				/12"							
					135	End Boring at 134.0'					
					140						
					145						
					150						
					155						
					160						
					165						
					170						
					175						

WARZYN ENGINEERING INC.

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LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-31
Surface Elevation 1201.6
Job No. 13076.25
Sheet 1 of 4

Sample No.	T	Recovery " R=%	Moisture	N	Depth	Visual Classification and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Monotox	Field VOC Water
					0	FILL: Sand and Gravel					
1	■		M	71	5						
2	■		M	78	10						
3	■		M	100 /6"	15						
4	■		M	60	20						
5	■		W	86	25	Contract Lab Soil Sample obtained at 25', WE-SE31-25					ND
					27	Medium Dense to Very Dense, Brown Medium to Coarse SAND, Little to Some Gravel, Trace Silt (SP)					
6	■		W	21	40						ND

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/2/87 End 11/5/87
Crew Chief LE Rig CME 750
Drilling Method 3 7/8" RB/DM 0-136'

WARZYN
ENGINEERING INC.

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-31
Surface Elevation 1201.6
Job No. 13076.25
Sheet 2 of 4

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45	Medium Dense to Very Dense, Brown Medium to Coarse SAND, Little to Some Gravel, Trace Silt (SP)					
					50						
7			W	53							ND
					55						
					60						
					65						
8			W	40							ND
					70						
					75						
9			W	76							ND
					80						
					85						

WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS
Location: Wausau, Wisconsin

Boring No. E-31
Surface Elevation 1201.6
Job No. 13076.25
Sheet 3 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
10			W	145	90	Medium Dense to Very Dense, Brown Medium to Coarse SAND, Little to Some Gravel, Trace Silt (SP)					ND
					95						
11			W	80	100						ND
					105	Medium Dense to Very Dense, Brown Fine to Medium SAND, Trace Gravel (SP)					
12			W	92	110						ND
					115						
13			W	86	120						ND
					125	Very Dense GRAVEL with Sand (GP)					
14			W	97	130						ND

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-31
Surface Elevation 1201.6
Job No. 13076.25
Sheet 4 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
15			W	100/2"	135	Probable Bedrock at 135' (Based on Drilling Action and Split Spoon Refusal)					4.3
						End Boring at 136'					

Depth scale: 135, 140, 145, 150, 155, 160, 165, 170, 175

WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS
Location: Wausau, Wisconsin

Boring No.: E-32
Surface Elevation:
Job No.: 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth Drilled to 14', Visual Description based on Cuttings					
						FILL: Reddish Brown Sand and Gravel					
					10	Contract Lab Soil Sample obtained from 10-14'; WE-SE32-14-01					
						Contract Lab Groundwater Sample obtained at 14' WE-GE32-14-01					963.0
						End Boring at 14'					

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/12/87 End 11/12/87
Crew Chief MK Rig CME 750
Drilling Method 4 1/4" HSA 0-14'

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-33
Surface Elevation
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE: No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth Drilled to 14'. Visual Description based on Cuttings					
						FILL: Reddish Brown Sand and Gravel					
					5						
					10	Contract Lab Soil Sample obtained at 10' to 14' WE-SE33-14-01					
						Groundwater Sample obtained at 14' WE-GE33-14-01					380.0
					15						
						End Boring at 14'					
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ___
Upon Completion of Drilling ___
Time After Drilling ___
Depth to Water ___
Depth to Cave in ___

GENERAL NOTES

Start 11/12/87 End 11/12/87
Crew Chief MK Rig CME 750
Drilling Method 4 1/4" HSA 0-14'

WARZYN

ENGINEERING INC.

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No.: E-34
Surface Elevation:
Job No.: 13076.25
Sheet 1 of 1

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–14	Earth Drilled to 14'. Visual Description based on Cuttings FILL: Reddish Brown Sand and Gravel Contract Lab Soil Sample obtained from 10-14', WE-SE33-14-01 Groundwater Sample obtained at 14' WE-GE34-14-01					73.5
						End Boring at 14'					

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/12/87 End 11/12/87
Crew Chief MK Rig CME 750
Drilling Method 4 1/4" HSA 0-14'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-35
Surface Elevation
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE: No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth Drilled to 20'. Visual Description based on Cuttings					
						Brown Sand, Gravel and Cobbles (FILL)					
					5						
					10						
						Contract Lab Soil Sample taken from 13.0 to 16.0', WE-SE35-16-01					
					15						
						Contract Lab Groundwater Sample obtained at 18', WE-GE35-18-01					8200.0
					20	End Boring at 20'					
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/12/87 End 11/12/87
Crew Chief MK Rig CME 750
Drilling Method 4 1/4" HSA 0-20'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-36
Surface Elevation
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0	Earth Drilled to 17.5'. Visual Description based on Cuttings. Brown Sand and Gravel					
					10	Contract Lab Soil Sample obtained from 10-13', WE-SE36-13-01					
					15						20.9
					16	Contract Lab Groundwater Sample obtained at 16', WE-GE36-16-01					
					17.5	End Boring at 17.5'					

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/12/87 End 11/12/87
Crew Chief MK Rig CME 750
Drilling Method 4 1/4" HSA 0-17.5'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. E-37
Surface Elevation 1198.3
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE: No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES: qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–26	Earth Drilled to 26.0'. Visual Description based on Cuttings Brown SAND and GRAVEL					
					15	Contract Lab Soil Sample obtained from 14-16', WE-SE37-16-01					
					26	End Boring at 26'					

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/12/87 End 11/12/87
Crew Chief MK Rig CME 750
Drilling Method 4 1/4" HSA 0-26'

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project Wausau, WI NPL Site RI/FS

Location Wausau, Wisconsin

Boring No. E-38

Surface Elevation

Job No. 13076.25

Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth Drilled to 18.0'. Visual Description Based on Cuttings Brown SAND and GRAVEL					
					5						
					10						
					15	Contract Lab Soil Sample obtained from 14-16', WE-SE38-16-01					
						Contract Lab Groundwater Sample obtained at 18', WE-GE38-18-01					BMDL
					20						
						End Boring at 18'					
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling

Upon Completion of Drilling

Time After Drilling

Depth to Water

Depth to Cave in

GENERAL NOTES

Start 11/13/87 End 11/13/87

Crew Chief MK Rig CME 750

Drilling Method 4 1/4" HSA 0-18'

WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-50
Surface Elevation 1213.3
Job No. 13076.25
Sheet 1 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						TOPSOIL					
						FILL: Sand, Gravel and Clay					
1		12	M	75							
					5	Medium Dense to Very Dense, Brown Medium to Coarse SAND, Little to Some Fine Gravel (SP)					
2		8	M	31					1.2		
					10						
3		8	M	50					0.0		
					15	Grades to Coarse Sand near 15'					
4		4	M	53					0.0		
					20						
5		4	M/W	67					0.0		
					25						
					30	Medium Dense, Brown, Fine to Coarse SAND, Trace Silt (SP)					
						Grades More Coarse and More Dense					
6		5	W	22							50.8
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling 25.0
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/26/87 End 10/27/87
Crew Chief LE Rig CME 750
Drilling Method RB/DM 0-85'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-50
Surface Elevation 1213.3
Job No. 13076.25
Sheet 2 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Monotox	Field VOC Water
7		8	W	52	45	Medium to Very Dense, Brown Medium to Coarse SAND, Little to Some Fine Gravel (SP)					38.6
					50						
8		8	W	40	55						29.3
					60						
9		6	W	30	65						BMDL
					70						
10		8	W	45	75						BMDL
					80						
11		10	W	23	85	Grades to Fine to Medium Sand, Trace Fine Gravel, Trace Silt					ND

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-50
Surface Elevation 1213.3
Job No. 13076.25
Sheet 3 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						End Boring at 85'					
					90						
					95						
					100						
					105						
					110						
					115						
					120						
					125						
					130						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-51A
Surface Elevation 1222.2
Job No. 13076.25
Sheet 1 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Dark Brown Organic SILT (Topsoil) (OL)					
						Loose to Medium Dense, Brown Fine to Coarse SAND, Little to Some Gravel, Trace Silt (SP)					
1	■	14	M	22	5				0.3		
2	■	9	M	9	10				0.0		
3	■	8	M	7	15						
4	■	12	M	17	20						
5	■	9	M	25	25				0.1		
					30						
6	■	10	W	15	35				0.0		
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 34.2
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/15/87 End 10/15/87
Crew Chief LE Rig CME 45C
Drilling Method 4 1/4" HSA
0-45'

WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-51A
Surface Elevation 1222.2
Job No. 13076.25
Sheet 2 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
7		20	W	26	45	Loose to Medium Dense, Brown Fine to Coarse SAND, Little to Some Gravel, Trace Silt (SP)			0.0		
						End Boring at 45'					

Depth scale: 45, 50, 55, 60, 65, 70, 75, 80, 85

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-52
Surface Elevation 1216.5
Job No. 13076.25
Sheet 1 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Gray to Brown Sandy SILT (Topsoil)					
1		12	M	21	5	Medium to Very Dense, Brown Medium to Coarse SAND, Trace Gravel (SP)			0.0		
2		12	M	39	10				0.0		
3		12	M	39	15				0.0		
4		4	M	83	20	Very Dense, Brown Fine to Coarse SAND and GRAVEL (SP-GP)			0.0		
5		6	M	72	25	Dense to Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Trace Silt (SP)			0.0		
6A		6	M	23	30				0.0		
6B		12				Contract Lab Soil Sample obtained at 32.0', WE-SW52-32-01			0.0		
6C		8			35				0.0		
7		8	M	31	40				0.0		ND

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/2/87 End 11/10/87
Crew Chief MP Rig Canterra
Drilling Method 4 1/4" HSA 0-5', 5 7/8" RB/DM 5-152'

WARZYN ENGINEERING INC.

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-52
Surface Elevation 1216.5
Job No. 13076.25
Sheet 2 of 4

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45	Medium to Very Dense, Brown Fine to Coarse SAND, Little to Some Fine Gravel (SP)					
8		8	W	44	50				0.0		ND
9		8	W	21	55–60				0.0		ND
10		8	W	42	65–70				0.0		BMDL
11		12	W	81	75–80				0.0		BMDL
					85						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-52

Surface Elevation 1216.5

Job No. 13076.25

Sheet 3 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
12		6	W	79	90	Medium to Very Dense, Brown Fine to Coarse SAND, Little Silt (SP)			0.0		BMDL
					95						
13		6	W	103				30.0	0.2		30.0
					100	Water sample taken for Contract Lab at 100', WE-GW52-100					
					105						
14		6	W	165	110	Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel (SP)		71.8	0.0		71.8
					115						
15		12	W	150	120				0.2		653.0
					125						
					130						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-52

Surface Elevation 1216.5

Job No. 13076.25

Sheet 4 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth drilled from 131.0' to 152.0', Fine to Coarse Sand, Based on Cuttings and Drilling Action		30.4			
					135						
					140						
						Probable GRAVEL Layer from 143' to 150' Based on Drilling Action					
					145						
					150						
						Probable SAND Layer Based on Drilling Action					
						End Boring at 152.0'					
					155						
					160						
					165						
					170						
					175						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-52A
Surface Elevation 1216.8
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE: No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES: qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0–36	Earth Drilled to 36.0', Refer to Boring Log W-52 for Description and Classification from 0 to 36'					
					36	End Boring at 36'					

WATER LEVEL OBSERVATIONS

While Drilling ▽
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/12/87 End 11/12/87
Crew Chief MK Rig CME 750
Drilling Method 4 1/4" HSA 0-36'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-53A
Surface Elevation 1217.6
Job No. 13076.25
Sheet 1 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						6" Bituminous Asphalt					
						FILL: Concrete, Bricks, Miscellaneous Rubble					
1		6	M	7							
					5						
2		1	M	110							
					10						
3		3	M	57							
					15	Dense to Very Dense, Brown Medium to Coarse SAND, Little Fine Gravel, Trace Silt (SP)					
4		12	M	32							
					20	Contract Lab Soil Sample obtained at 20', WE-SW53A-20-01					
5		18	M/W	50							
					25						
					30						
6		18	W	96							
					35						
						Contract Lab Soil Sample obtained at 40', WE-SW53A-40-01					49.0
7		24	W	205	40						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 30.9
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/2/87 End 11/2/87
Crew Chief JW Rig D-50
Drilling Method 4 1/4" HSA 0-41.3'

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-53A

Surface Elevation 1217.6

Job No. 13076.25

Sheet 2 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45	End Boring at 41.3'					
					50						
					55						
					60						
					65						
					70						
					75						
					80						
					85						

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-53
Surface Elevation 1217.5
Job No. 13076.25
Sheet 1 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth Drilled to 43.5' Refer to Boring Lot W-53A for Soil Description and Classification from 0-43.5'.					
					5						
					10						
					15						
					20						
					25						
					30 ▽						
					35						33.4
					40						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 30.0
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/2/87 End 11/2/87
Crew Chief JW Rig D-50
Drilling Method 5 7/8" RB/DM 0-171.5'

WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-53
Surface Elevation 1217.5
Job No. 13076.25

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Monotox	Field VOC Water
1		6	W	31							
					45	Medium to Very Dense, Brown Fine to Coarse Sand, Trace to Little Fine Gravel, Trace of Silt (SP)					
					50						
2		6	W	29							142.0
					55						
					60						
3		4	W	50							790.0
					65						
					70						
4		8	W	125							1532.0
					75	Contract Lab Groundwater Sample obtained at 75', WE-GW53-75-01					
					80	Very Dense Brown Fine to Medium SAND, Little Silt (SP)					
5		6	W	100							1320.0
					85						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-53
Surface Elevation 1217.5
Job No. 13076.25
Sheet 3 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Very Dense Brown Fine to Medium SAND, Little Silt (SP)					
					90						
6	■	8	W	239							2116.0
					95						
					100	Very Dense, Fine Brown SAND, Trace to Little Silt (SP)					
7	■	8	W	130							
					105						
					110						
8	■	6	W	92							2280.0
					115						
					120						
9	■	10	W	124							2038.0
					125	Contract Lab Groundwater Sample obtained at 125', WE-GW53-125-01					
					130						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-53
Surface Elevation 1217.5
Job No. 13076.25
Sheet 4 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
10		6	W	130 /6"	135	Very Dense, Brown Fine to Medium SAND, Little Silt (SP)					60.9
					140	Probable GRAVEL Layer from 137 to 142', Based on Drilling Action and Cuttings					
11		13	W	102	145	Very Dense Brown Fine to Medium SAND, Little Silt (SP)					393.0
					150						
12		6	W	162	155						112.0
					160	Lost approximately 150 gal of drilling mud near 162'					
13		3	W	100 /3"	165	Silty GRAVEL (GM) Possible fraction rock zone near 162' (Based on Drilling Action, Split Spoon Sample and Lost Circulation Difficult Drilling Encountered from 162 to 171.5'					
					170						
					175	End Boring at 171.5'					

WARZYN ENGINEERING INC.

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS
Location: Wausau, Wisconsin

Boring No. W-54
Surface Elevation 1216.9
Job No. 13076.25
Sheet 1 of 3

SAMPLE / SOIL PROPERTIES

No.	Recovery " R=%	Moisture	N	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
1	14	M	47			0.4		
2	1	M	20			0.4		
3	12	M	16			0.4		
4	3	M	6					
5	12	M	61			0.2		
6	12	M	66			0.2		
7	8	M	42			0.2		
8	6	W	77					
9	12	W	82					
								396.0

VISUAL CLASSIFICATION and Remarks

6" Bituminous Asphalt

FILL: Foundry Sand, Slag, Concrete, Bricks and Miscellaneous Rubble

Sample and Duplicate WE-SW54-5-01, We-SW54-5-91

Loose, Brown Silty Fine to Medium SAND, Little Fine Gravel (SM)

Dense to Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Trace Silt (SP)
Contract Lab Soil Sample WE-SW54-20-01

Lost approximately 150 gal of drilling mud from 17 to 34'

Contract Lab soil sample WE-SW54-30-01

Depth: 5, 10, 15, 20, 25, 30, 35, 40

WATER LEVEL OBSERVATIONS

While Drilling ▽ 30.0
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 11/11/87 End 11/12/87
Crew Chief JW Rig D-50
Drilling Method HSA 0-5' 5 7/8" RB/DM 5-87.5'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-54
Surface Elevation 1216.9
Job No. 13076.25
Sheet 2 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Monotox	Field VOC Water
10		16	W	72	45	Dense Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Trace Silt (SP)			0.3		313.0
					50						
11		10	W	37	55				0.6		48.9
					60						
12		8	W	42	65				0.4		228.3
					70						
13		7	W	76	75				0.2		132.3
					80						
14		7	W	40	85				0.6		67.6

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-54

Surface Elevation 1216.9

Job No. 13076.25

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Trace Silt (SP) Contract Lab Groundwater Sample obtained from 85', WE-GE54-85-01					
					90						
						End Boring at 87.5'					
					95						
					100						
					105						
					110						
					115						
					120						
					125						
					130						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-55A
Surface Elevation 1218.0
Job No. 13076.25
Sheet 1 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Dark Brown Silty TOPSOIL					
						Loose to Medium Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Little Silt (SP)					
1		12	M	29	5						
2		4	M	26	10						
3		0		54	15	No Sample Recovery					
4		12	M	19	20						
5		14	M	22	25						
6		14	M	11	30						
7		12	W	8	35	Contract Lab Soil Samples obtained from 35', WE-SW55A-35-01					
					40						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 32.8
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/15/87 End 10/15/87
Crew Chief LB Rig CME 45
Drilling Method 4 1/4" HSA 0-41.5'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-55A

Surface Elevation 1218.0

Job No. 13076.25

Sheet 2 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
8		18	W	34		Loose to Medium Dense Brown Fine to Coarse SAND, Trace to Little Fine Gravel, Little Silt (SP)					30.0
					45						
						End Boring at 43'					
					50						
					55						
					60						
					65						
					70						
					75						
					80						
					85						

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project Wausau, WI NPL Site RI/FS

Location Wausau, Wisconsin

Boring No. W-55
Surface Elevation 1217.9
Job No. 13076.25
Sheet 1 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Earth Drilled to 48.5', Refer to Boring Log W-55A for Description and Classification from 0 to 48.5'					
					5						
					10						
					15						
					20						
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/19/87 End 10/29/87
Crew Chief DZ Rig CME 55
Drilling Method 4 1/4" HSA 0-11'; RB/DM 11-128.5'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-55
Surface Elevation 1217.9
Job No. 13076.25
Sheet 2 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45						
9			W	46	50	Dense to Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel and Silt (SP)			0.2		35.9
					55						
10			W	64	60	Contract Lab Groundwater Sample obtained at 60', WE-GW55-60-01			0.0		1.86
					65						
11			W	67	70	Contract Lab Groundwater Sample obtained at 70', WE-GW55-70-01			0.0		ND
					75						
12			W	165/9"	80	Contract Lab Groundwater Sample obtained at 80', WE-GW55-80-01			0.0		ND
					85						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-55
Surface Elevation 1217.9
Job No. 13076.25
Sheet 3 of 4

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
13			W	128	90	Dense to Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel and Silt (SP)			0.0		BMDL
					95						
14			W	140	100				0.0		75.0
					105						
15			W	98	110				4.0		3989.0
					115						
16		0		147	120	6" Layer of Silty Fine Sand near 119.5'			1.0		620.0
					125						
17			W	76	130						

WARZYN

ENGINEERING INC.

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-55

Surface Elevation 1217.9

Job No. 13076.25

Sheet 4 of 4

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						End Boring at 130.0'					
					135						
					140						
					145						
					150						
					155						
					160						
					165						
					170						
					175						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-56A
Surface Elevation 1198.8
Job No. 13076.25
Sheet 1 of 1

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0	Dark Brown Organic SILT (Topsoil) (OL)					
						Loose, Dark Brown Fine to Medium SAND, Little Silt, Trace to Little Fine Gravel (SP-SM)					
1		8	M	5					0.1		
					5						
						Medium Dense to Dense, Dark Brown Fine to Coarse SAND and GRAVEL (SP)					
2		5	W	30					0.1		
					10						
						Grades Little to Some Fine Gravel near 13.5'					
3		6	W	27					0.1		
					15						
4		4	W	13					0.1		
					20	End Boring at 20'					
					25						
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS

While Drilling ∇ 9.5
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/15/87 End 10/15/87
Crew Chief LE Rig CME 45C
Drilling Method 4 1/4" HSA 0-20'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-56
Surface Elevation 1198.9
Job No. 13076.25
Sheet 1 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Monotox	Field VOC Water
					0–20	Earth Drilled to 23.0', Refer to Boring Log W-56A for Soil Description and Classification from 0 to 20'					
					20	Dense to Very Dense, Brown Fine to Coarse SAND, Trace Fine Gravel (SP)					
1		13	W	39					0.0		
2		6	W	51					0.0		5.4
3		15	W	100					0.0		

WATER LEVEL OBSERVATIONS

While Drilling ▽ 9.0
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/19/87 End 10/20/87
Crew Chief JW Rig D-50
Drilling Method 5 7/8" RB/DM 0-65.5'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-56
Surface Elevation 1198.9
Job No. 13076.25
Sheet 2 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	T	Recovery " R=%	Moisture	N	Depth		qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Dense to Very Dense, Brown Fine to Coarse SAND, Trace Fine Gravel (SP)					
					45						
4		12	W	73					0.0		BMDL
					50	Contract Lab Groundwater Sample taken at 50', WE-GW56-50-01					
					55						
5		12	W	51							ND
					60						
6A		6			65	Probable Bedrock at 65.5' Based on Drilling Action and Split Spoon Sample					
6B		6									
						End Boring at 66.5'					
					70						
					75						
					80						
					85						

WARZYN ENGINEERING INC.

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-57
Surface Elevation 1202.1
Job No. 13076.25
Sheet 1 of 2

SAMPLE / VISUAL CLASSIFICATION and Remarks / SOIL PROPERTIES

No.	T	Recovery " R=%	Moisture	N	Depth	Visual Classification and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Monotox	Field VOC Water
						Very Dense, Brown Fine to Coarse SAND, Trace to Little Fine Gravel (SP)					
1		12	M	62	5				0.0		
						Contract Lab Soil Sample WE-SW57-10-01					
2		6	M	111	10				1.0		
3		4	M	131					2.0		
4		12	M	109					3.5		
					15	Loose, Brown Fine to Coarse SAND, Trace to Little Fine Gravel (SP)					
5		6	W	10	20				1.5		ND
						Contract Lab Groundwater Sample taken at 21', WE-GW57-21-01					
6		6	W	11	25				1.8		
7		2	W	2	30				1.8		ND
					35						
8		4	W	2	40				1.1		BMDL

WATER LEVEL OBSERVATIONS

While Drilling ▽ 18.5
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 10/21/87 End 10/21/87
Crew Chief JW Rig D-50
Drilling Method RB/DM 0-77.5'

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. W-57
Surface Elevation 1202.1
Job No. 13076.25
Sheet 2 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					45	Loose, Brown Fine to Coarse SAND, Trace to Little Fine Gravel (SP)					
9		9	W	9					0.8		BMDL
					50	Very Dense, Brown Fine SAND, Little Silt (SP-SM)					
					55						
10		0	W	146					1.5		ND
					60						
					65						
11		12	W	84					0.0		ND
					70						
					75	Probable Syenite Bedrock near 75.0', Based on Drilling Action and Split Spoon Sample			0.0		
12		2	W	100 /7"							
					80	End Boring at 77.5'					
					85						

B.2

DEPARTMENT OF TRANSPORTATION BORING LOGS

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 1
Surface Elevation 1188.1
Job No. 13076.25
Sheet 1 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Air					
						WATER					
1		4	W	0	5	Very Loose Gray Organic SILT, (OL) Layer of Wood					
2		10	W	4	10	Loose Gray Silty SAND (SM) with Trace Gravel and Layer of Peat (PT)					
						Dense, Gray Silty SAND, Little Gravel (SM)					
3		12	W	30	15						
4		0	-	30	20						
						Firm, Brown Fine to Coarse SAND, Trace of Gravel (SP)					
5		6	W	22	25						
6		8	W	15	30						
7		6	W	34	35	Grading to Fine to Medium Sand (SM) at 35'					
						Dense, Brown/Gray Weathered Granite					
					40						

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 9/4/84 End 9/5/84
Crew Chief K Rig 6
Drilling Method

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 1
Surface Elevation 1188.1
Job No. 13076.25

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
8		18	W	35		Dense, Brown/Gray Weathered Granite					
						Very Dense, Brown Weathered Granite NQ Core 46.0 to 49.5' RQD 66%					
9		6	W	95/6.5"	45						
					50	End Boring at 49.5'					

Note: Soil samples were obtained by Wisconsin Dept. of Transportation in September, 1984. Soil descriptions were checked against samples by Warzyn Engineering November, 1987.

Depth scale: 45, 50, 55, 60, 65, 70, 75, 80, 85

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS
Location: Wausau, Wisconsin

Boring No. DOT 1M
Surface Elevation 1191.8
Job No. 13076.25
Sheet 1 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Brown TOPSOIL					
						Very Loose, Dark Brown SILT (ML)					
1		10	M	10	5						
						Firm, Brown SAND & GRAVEL, Trace SILT (SP)					
2		24	W	11	10						
						Firm, Gray Fine to Medium SAND, Trace Gravel (SP)					
3		12	W	10	15						
					20	Loose, Brown Fine to Coarse SAND, Trace Gravel (SP)					
4		14	W	7							
					25	Firm, Brown Fine to Coarse SAND, Trace Gravel (SP)					
5		12	W	15							
					30						
6		12	W	11							
					35						
7		12	W	11							
					40						

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 9/4/84 End 9/4/84
Crew Chief Rig
Drilling Method

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 1M
Surface Elevation 1191.8
Job No. 13076.25
Sheet 2 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
8		12	W	15		Firm, Brown Fine to Coarse SAND, Trace Gravel (SP)					
					45						
9		16	W	11							
					50						
10		18	W	19							
					55	Firm, Brown Fine SAND, Trace Silt (SP)					
11		18	W	21							
					60	Firm, Brown Fine to Coarse SAND (SP)					
12		18	W	21							
					65						
13		14	W	47		Dense, Brown Fine to Medium SAND, Trace Gravel, Little Silt (SP-SM)					
					70						
14		18	W	15							
					75	Dense, Brown Medium SAND (SP)					
15		18	W	30							
					80	Dense, Brown Fine to Medium Sand (SP)					
16		18	W	33							
					85						

WARZYN

ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 1M
Surface Elevation 1191.8
Job No. 13076.25
Sheet 3 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
						Dense, Brown Fine to Medium SAND (SP)					
17		10	W	19	90						
					95						
18		18	W	24	100						
					105	End Boring at 102.5'					
						Note: Soil samples were obtained by Wisconsin Dept. of Transportation in September, 1984. Soil descriptions were checked against samples by Warzyn Engineering November, 1987					
					110						
					115						
					120						
					125						
					130						

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 2
Surface Elevation 1187.8
Job No. 13076.25
Sheet 1 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Monotox	Field VOC Water
						Air					
						Water					
1		8	W	8		Loose Gray/Brown Fine to Coarse SAND Some Gravel, Trace of Wood (SP)					
2		4	W	14							
3		8	W	8							
						Firm, Gray Medium to Coarse SAND, Trace of Gravel, Trace of Silt (SP)					
4		18	W	12							
5		16	W	19							

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40

WATER LEVEL OBSERVATIONS

While Drilling
Upon Completion of Drilling
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 9/6/84 End 9/6/84
Crew Chief K Rig 6
Drilling Method

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

Boring No. DOT 2
Surface Elevation 1187.8
Job No. 13076.25
Sheet 2 of 2

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
6		12	W	11		Firm, Gray Mediumto Coarse SAND, Trace of Gravel, Trace of Silt (SP)					
7		3	W	12	45						
						Dense, Brown Fine to Coarse SAND, Trace Silt, Little Gravel (SP)					
8		18	W	31	50						
9		18	W	31	55						
						Dense, Brown Medium to Coarse SAND, Trace of Gravel and Silt (SP)					
10		13	W	80 /7"	60	Very Dense, Brown SAND & GRAVEL, Much Silt (GM)					
						Dense, Brown/Gray Weathered Granite					
11		0	-	80 /2"	65	End Boring at 65'					
					70						
					75						
					80						
					85						

Note: Soil samples were obtained by Wisconsin Dept. of Transportation in September, 1984. Soil descriptions were checked against samples by Warzyn Engineering November, 1987

WARZYN ENGINEERING INC.

LOG OF TEST BORING

Project Wausau, WI NPL Site RI/FS

Location Wausau, Wisconsin

Boring No. DOT 2M
Surface Elevation 1196.8
Job No. 13076.25
Sheet 1 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
					0	Firm Brown SAND, Some Gravel (SP)					
					12.5	Firm Gray Fine to Coarse SAND, Trace Gravel (SP)					
1		14	W	22	15						
2		16	W	12	20						
					23.5	Loose, Brown Fine to Coarse SAND (SP)					
3		12	W	8	25						
					28	Firm, Brown Fine to Coarse SAND, Trace Gravel (SP)					
4		14	W	15	30						
5		12	W	12	35						

WATER LEVEL OBSERVATIONS

While Drilling ▽
Upon Completion of Drilling ▼
Time After Drilling
Depth to Water
Depth to Cave in

GENERAL NOTES

Start 9/6/84 End 9/6/84
Crew Chief M Rig VII
Drilling Method

WARZYN
ENGINEERING INC.

LOG OF TEST BORING

Project: Wausau, WI NPL Site RI/FS

Location: Wausau, Wisconsin

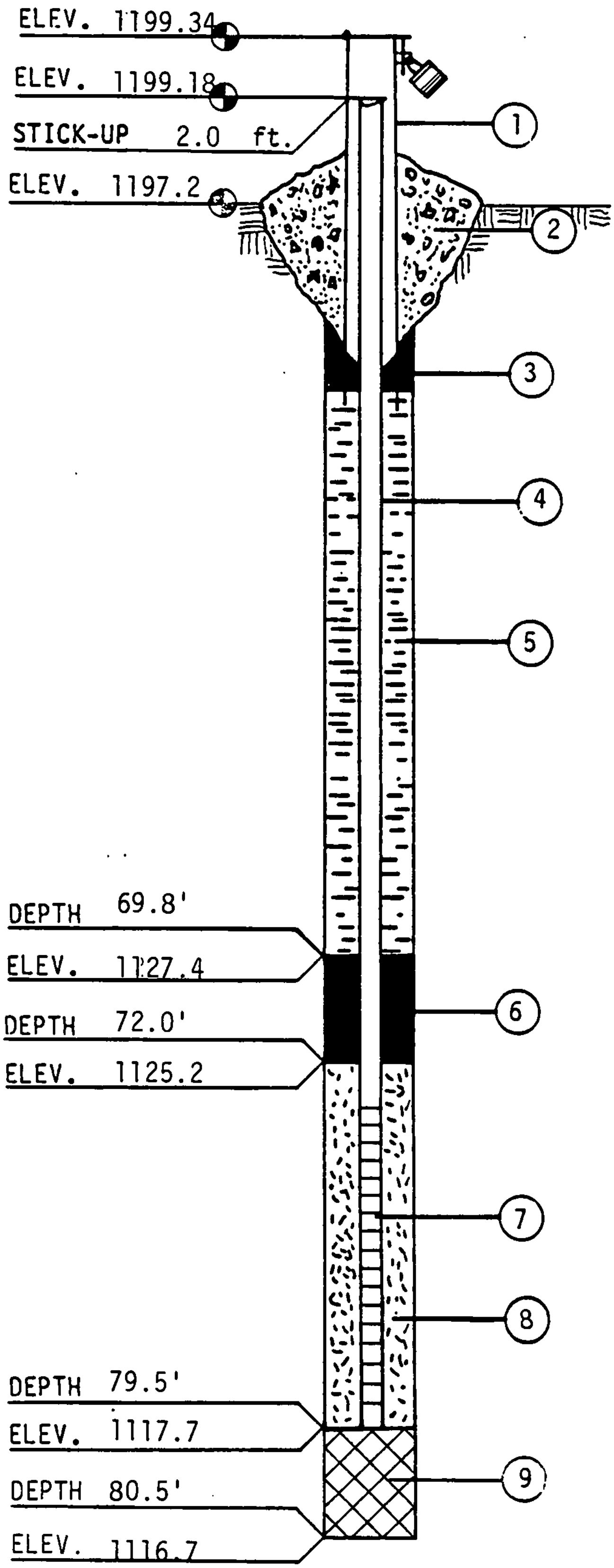
Boring No. DOT 2M
Surface Elevation 1196.8
Job No. 13076.25
Sheet 2 of 3

ONE SCIENCE COURT · P.O. BOX 5385, MADISON, WIS. 53705 · TEL.(608) 273-0440

SAMPLE No.	T	Recovery " R=%	Moisture	N	Depth	VISUAL CLASSIFICATION and Remarks	qu ( )P.P. TSF	Field VOC Soil	HNu	Mono-tox	Field VOC Water
6		16	W	16		Firm, Brown Fine to Coarse SAND, Trace Gravel (SP)					
7		18	W	20	45						
8		16	W	17	50						
9		18	W	16	55						
10		18	W	18	60						
						Dense, Brown Fine SAND (SP)					
11		12	W	33	65						
12		14	W	36	70						
						Dense, Brown Fine to Coarse SAND (SP)					
13		12	W	33	75						
14		14	W	32	80						
						End Boring at 82'					
					85						

APPENDIX C

WELL CONSTRUCTION DETAILS



MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-20

DATE 10/27/87

CHIEF/UNIT JW/D-50

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. CONCRETE SEAL YES NO

3. TYPE OF SURFACE SEAL (IF INSTALLED)

   Bentonite Pellets

4. SOLID PIPE TYPE 10' Stainless Riser ~~Galvanized & Stainless Steel~~*

   SOLID PIPE LENGTH 66.5 ft.

   JOINT TYPE SLIP/GLUED THREADED

5. TYPE OF BACKFILL Bentonite Grout

   HOW INSTALLED TREMIE FROM SURFACE

6. TYPE OF LOWER SEAL (IF INSTALLED)

   Bentonite Pellets

7. SCREEN TYPE Stainless Steel

   SCREEN LENGTH 5.0'

   SLOT-SIZE 0.010" LENGTH 5.0 ft.

   SCREEN DIAMETER 2.0 in.

8. TYPE OF BACKFILL AROUND SCREEN

   No. 30 Flint Sand

9. TYPE OF BACKFILL Natural

10. DRILLING METHOD RB/DM

11. ADDITIVES USED (IF ANY)

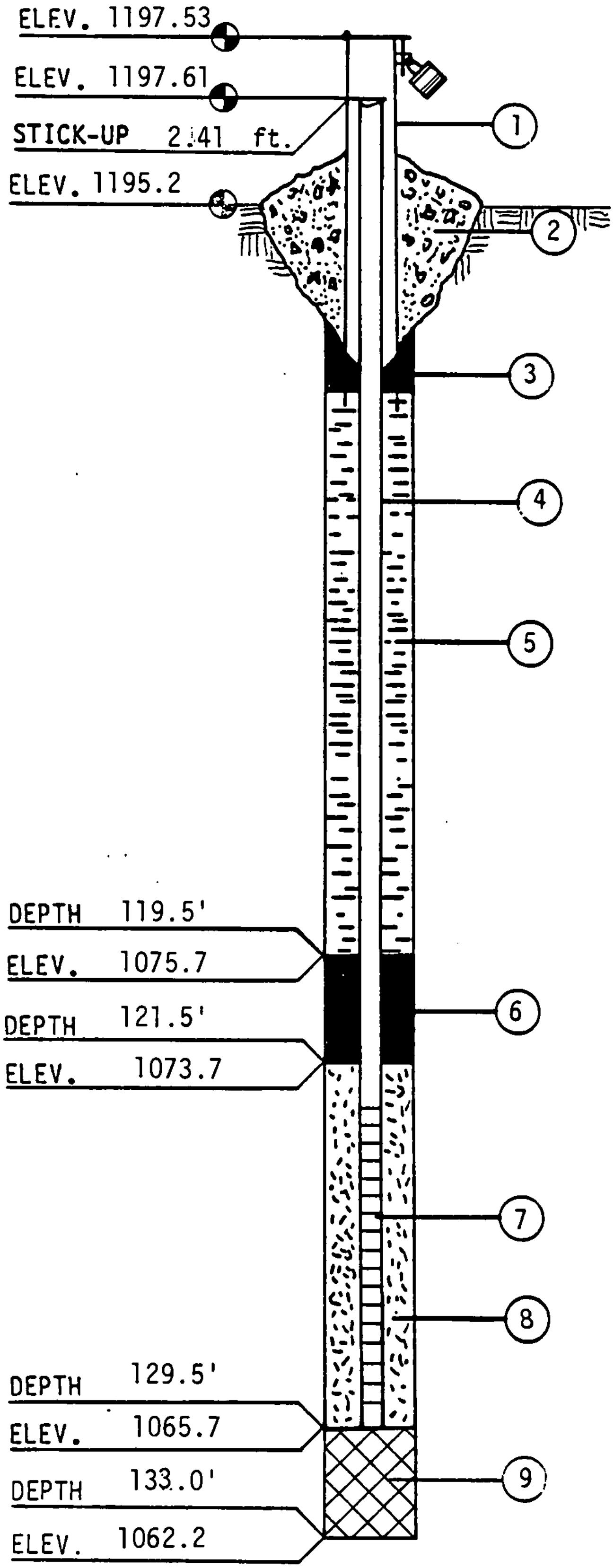
    None

*Note: 10' of Stainless Steel Riser above screen

WATER LEVEL ________ DATE ________

*ALL DEPTHS MEASURED FROM GROUND SURFACE.

WARZYN ENGINEERING INC



MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-21

DATE 11/14/87

CHIEF/UNIT MP/Canterra

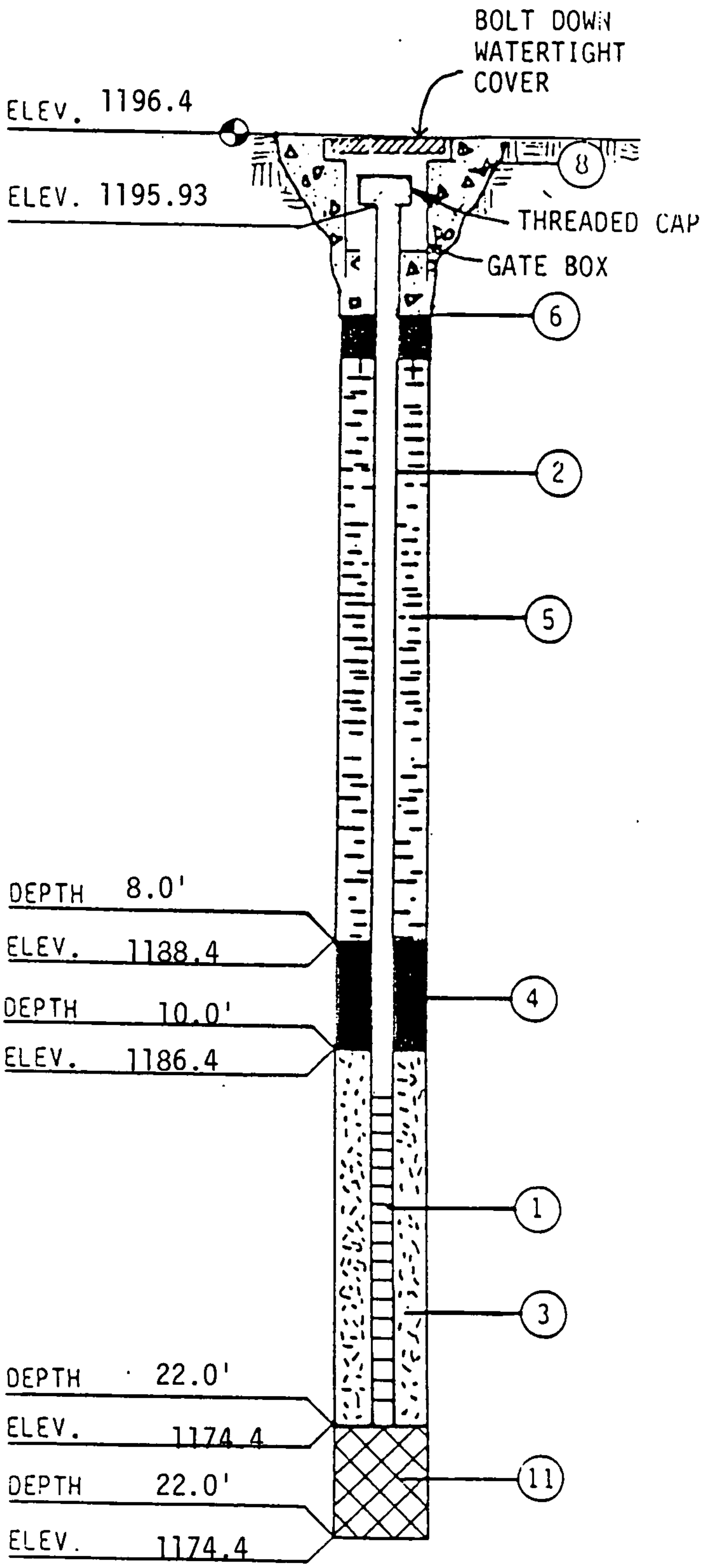
1. PROTECTIVE CASING YES NO
   LOCKING YES NO
2. CONCRETE SEAL YES NO
3. TYPE OF SURFACE SEAL (IF INSTALLED)
   Granular Bentonite
4. SOLID PIPE TYPE Galvanized
   SOLID PIPE LENGTH 126.4 ft.
   JOINT TYPE SLIP/GLUED THREADED
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED TREMIE
   FROM SURFACE
6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets
7. SCREEN TYPE Stainless Steel
   SCREEN LENGTH 5.5'
   SLOT-SIZE 0.010" LENGTH 5.0 ft.
   SCREEN DIAMETER 2.0 in.
8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand
9. TYPE OF BACKFILL No. 30 Flint
10. DRILLING METHOD RB/DM
11. ADDITIVES USED (IF ANY)
   None

Note: 20' of 4" steel casing was lost during removal & may be partially obstructing the well screen.

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.

WARZYN
ENGINEERING INC



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MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-22A

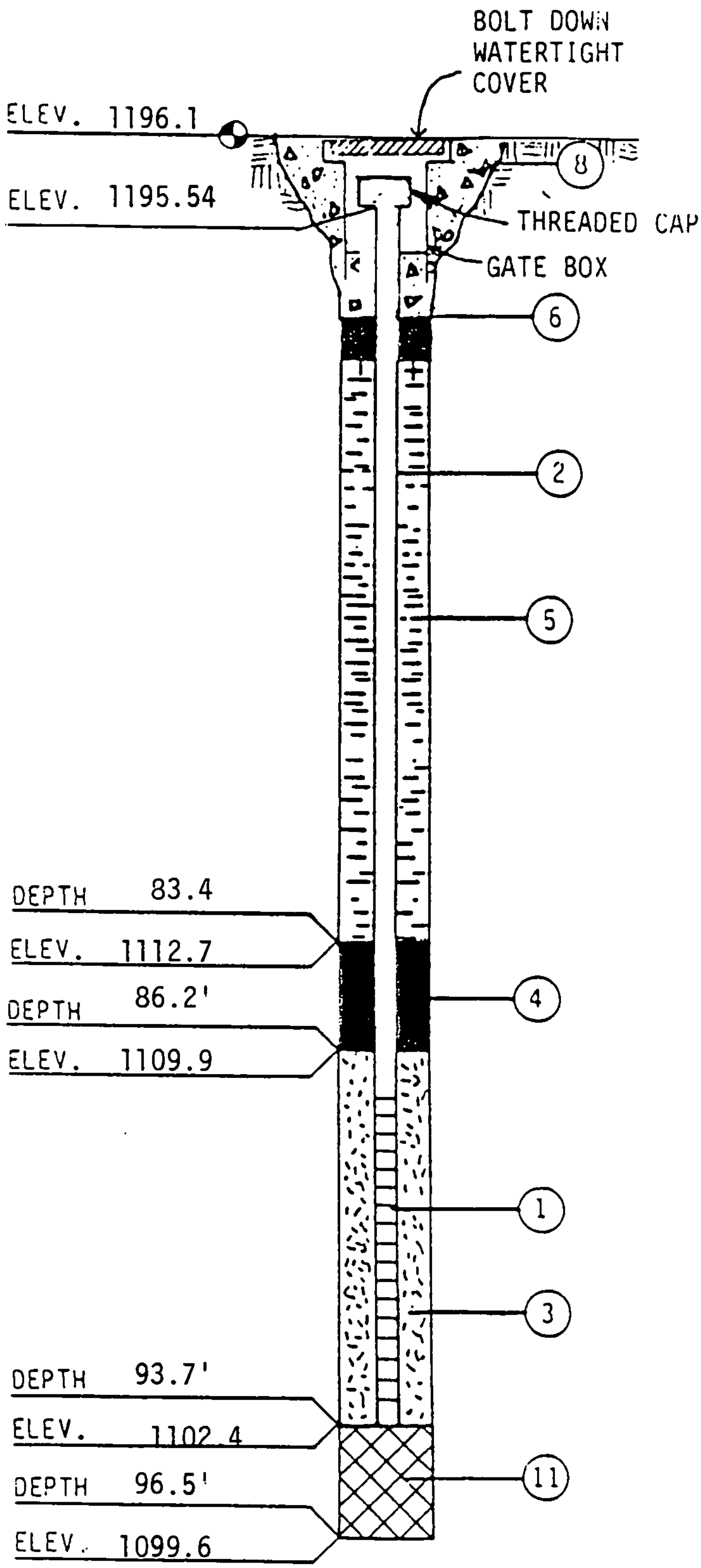
DATE 11/13/87

CHIEF/UNIT MK/CME 750

1. SCREEN TYPE Stainless Steel
   SLOTTED LENGTH 10' ft.
   SLOT SIZE 0.010"
   SCREEN DIAMETER 2.0 in.
2. SOLID PIPE TYPE Galvanized
   SOLID PIPE LENGTH 12 ft.
   JOINT TYPE SLIP/GLUED THREADED
3. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand
4. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED - TREMIE
   FROM SURFACE
6. TYPE OF SURFACE SEAL (IF INSTALLED)
   Granular Bentonite
7. PROTECTIVE CASING YES NO
   LOCKING YES NO
8. CONCRETE SEAL YES NO
9. DRILLING METHOD HSA
10. ADDITIVES USED (IF ANY)
    None
11. TYPE OF BACKFILL None

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-22

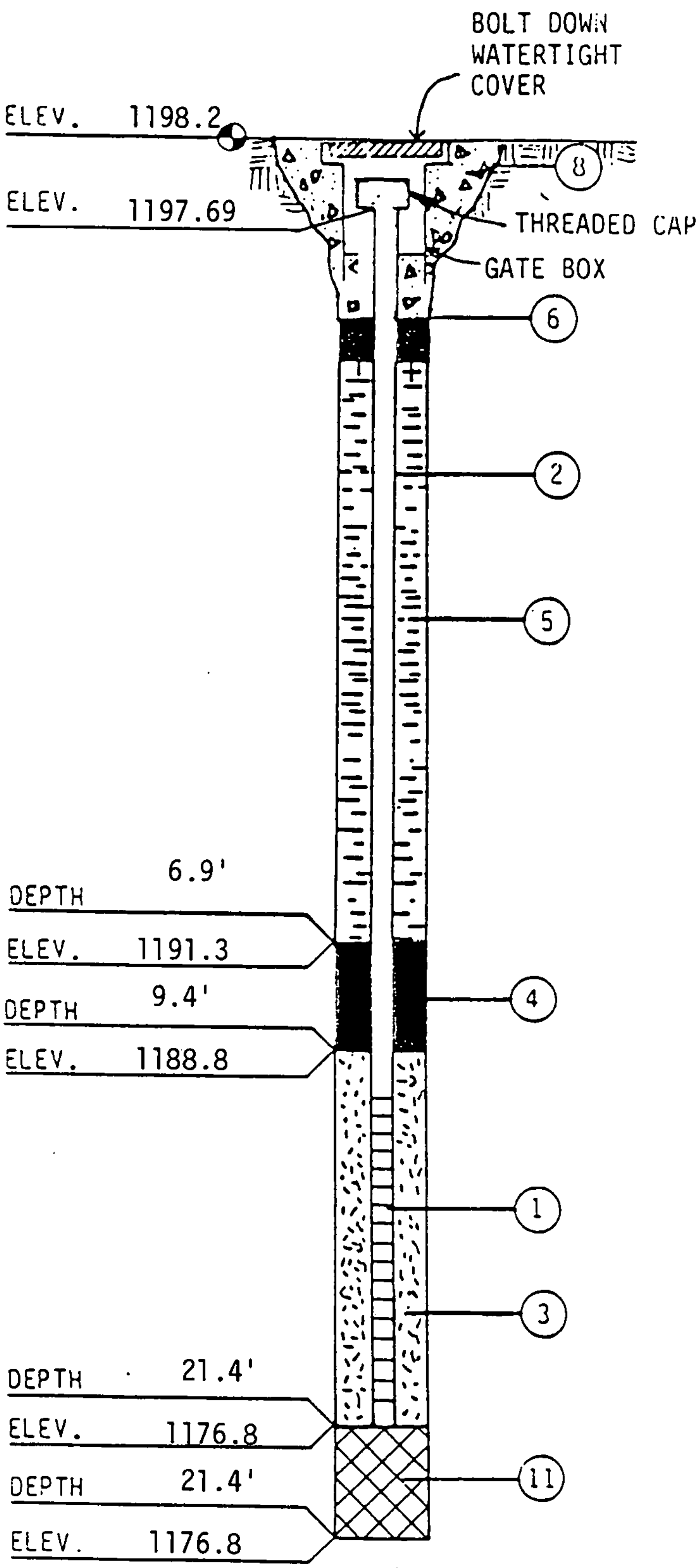
DATE 10/14/87

CHIEF/UNIT JW/D-50

1. SCREEN TYPE Stainless Steel
   SLOTTED LENGTH 5.0' ft.
   SLOT SIZE 0.010"
   SCREEN DIAMETER 2.0 in.
2. SOLID PIPE TYPE Galvanized
   SOLID PIPE LENGTH 88.7 ft.
   JOINT TYPE SLIP/GLUED THREADED
3. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand
4. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED TREMIE
   FROM SURFACE
6. TYPE OF SURFACE SEAL (IF INSTALLED)
   Granular Bentonite
7. PROTECTIVE CASING YES NO
   LOCKING YES NO
8. CONCRETE SEAL YES NO
9. DRILLING METHOD RB/DM
10. ADDITIVES USED (IF ANY)
    None
11. TYPE OF BACKFILL Natural Sand

WATER LEVEL ________ DATE ________

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



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MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-23A

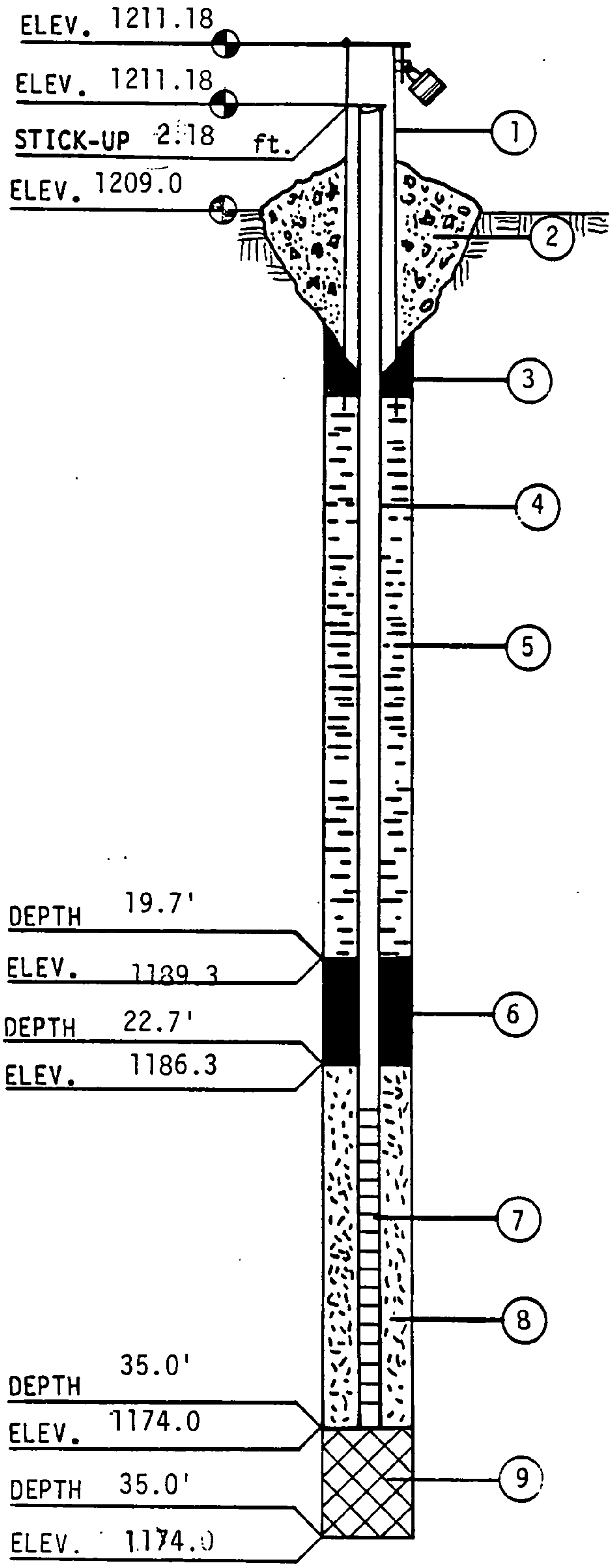
DATE 10/30/87

CHIEF/UNIT LE/CME 750

1. SCREEN TYPE Stainless Steel
   SLOTTED LENGTH 10.9 ft.
   SLOT SIZE 0.010"
   SCREEN DIAMETER 2.0 in.
2. SOLID PIPE TYPE Galvanized
   SOLID PIPE LENGTH 10.5 ft.
   JOINT TYPE SLIP/GLUED THREADED
3. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand
4. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets
5. TYPE OF BACKFILL Bentonite Powder & Water
   HOW INSTALLED - ~~TREMIE~~
   FROM SURFACE
6. TYPE OF SURFACE SEAL (IF INSTALLED)
   Granular Bentonite
7. PROTECTIVE CASING YES NO
   LOCKING YES NO
8. CONCRETE SEAL YES NO
9. DRILLING METHOD HSA
10. ADDITIVES USED (IF ANY)
    None
11. TYPE OF BACKFILL None

WATER LEVEL ________ DATE ________

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-24A

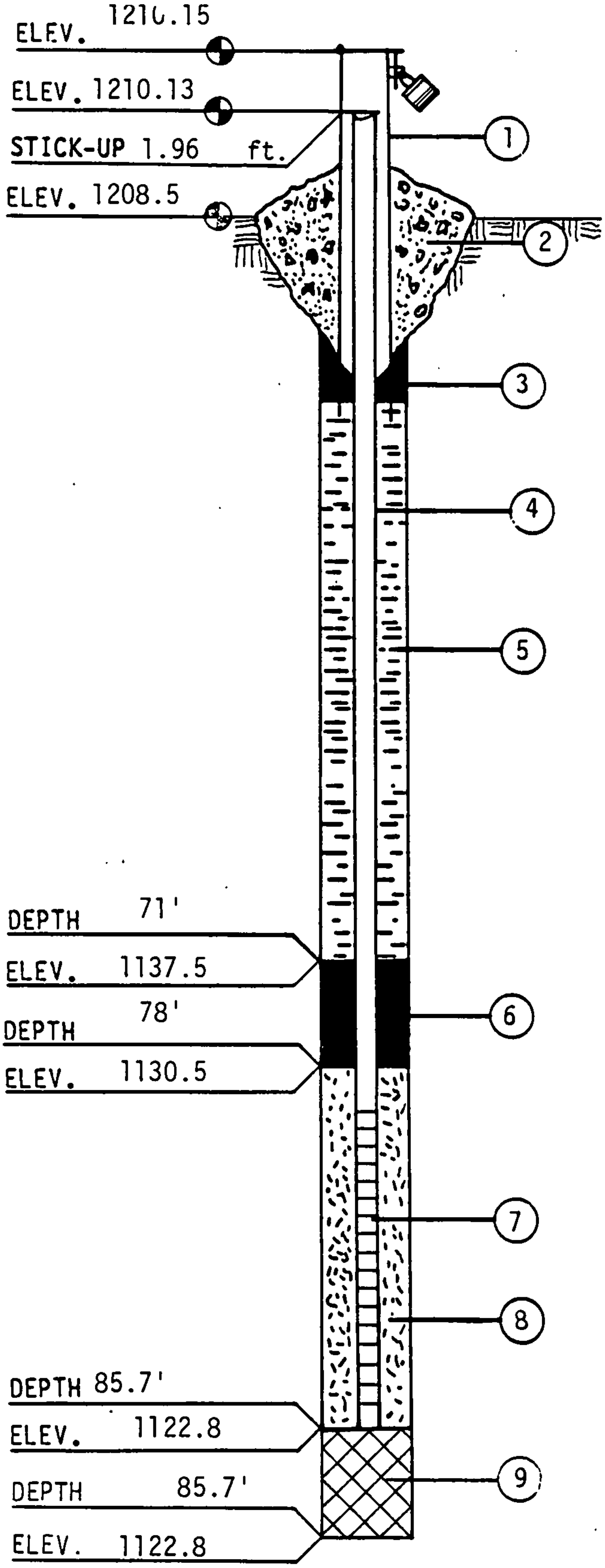
DATE 10/13/87

CHIEF/UNIT LE/CME 45C

1. PROTECTIVE CASING YES NO
   LOCKING YES NO
2. CONCRETE SEAL YES NO
3. TYPE OF SURFACE SEAL (IF INSTALLED) Bentonite Pellets
4. SOLID PIPE TYPE Galvanized
   SOLID PIPE LENGTH 27.2 ft.
   JOINT TYPE SLIP/GLUED THREADED
5. TYPE OF BACKFILL Bentonite-Cement Grout
   HOW INSTALLED - ~~TREMIE~~ FROM SURFACE
6. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Pellets
7. SCREEN TYPE Stainless Steel
   SCREEN LENGTH 10'
   SLOT-SIZE 0.010" LENGTH 9.5 ft.
   SCREEN DIAMETER 2.0 in.
8. TYPE OF BACKFILL AROUND SCREEN No. 30 Flint Sand
9. TYPE OF BACKFILL None
10. DRILLING METHOD HSA
11. ADDITIVES USED (IF ANY) None -

WATER LEVEL ____________ DATE ____________

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



Note: 10' of stainless steel riser above screen

WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-24

DATE 10/19/87

CHIEF/UNIT JW/D-50

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. CONCRETE SEAL YES NO

3. TYPE OF SURFACE SEAL (IF INSTALLED)
   Bentonite Pellets

4. SOLID PIPE TYPE Galvanized & Stainless Steel*

   SOLID PIPE LENGTH 82.3 ft.

   JOINT TYPE SLIP/GLUED THREADED
   w/Teflon Tape on Joints

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE FROM SURFACE

6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

7. SCREEN TYPE Stainless Steel

   SCREEN LENGTH 5.0'

   SLOT-SIZE 0.010" LENGTH 5.0 ft.

   SCREEN DIAMETER 2.0 in.

8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

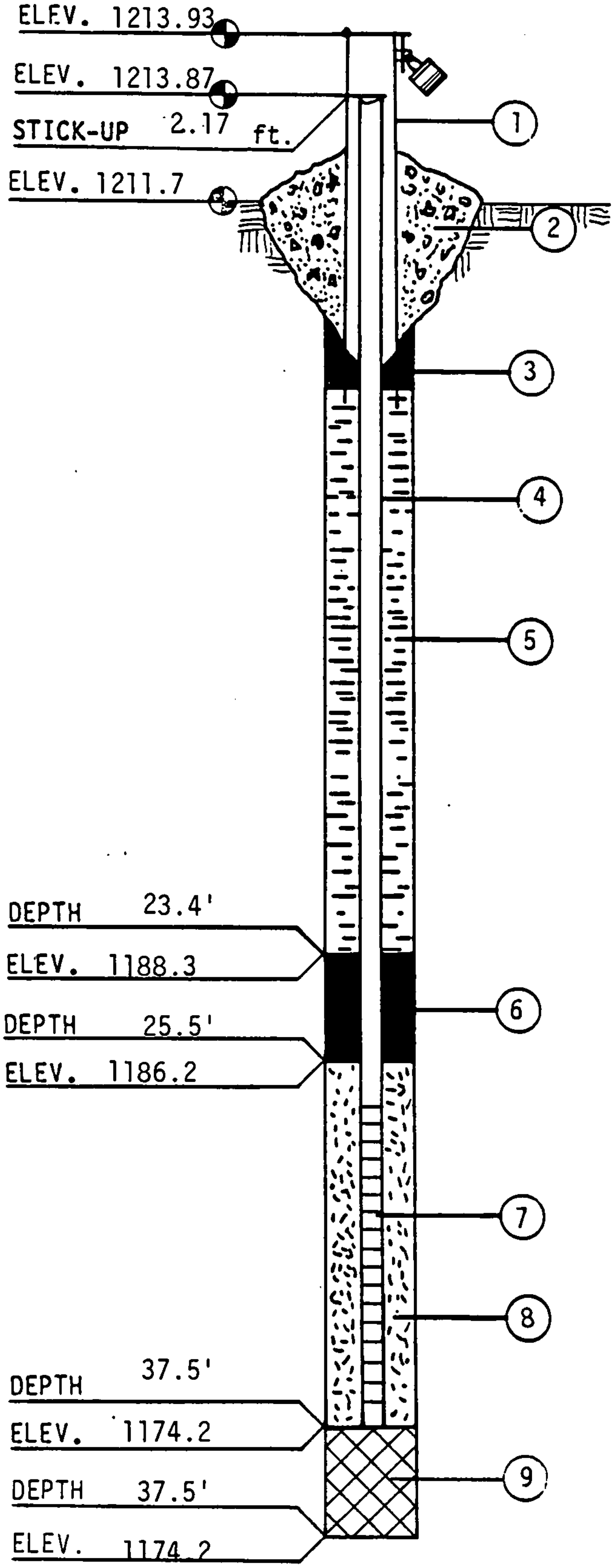
9. TYPE OF BACKFILL None

10. DRILLING METHOD RB/DM

11. ADDITIVES USED (IF ANY)
    None

WATER LEVEL ________ DATE ________

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-25A

DATE 10/22/87

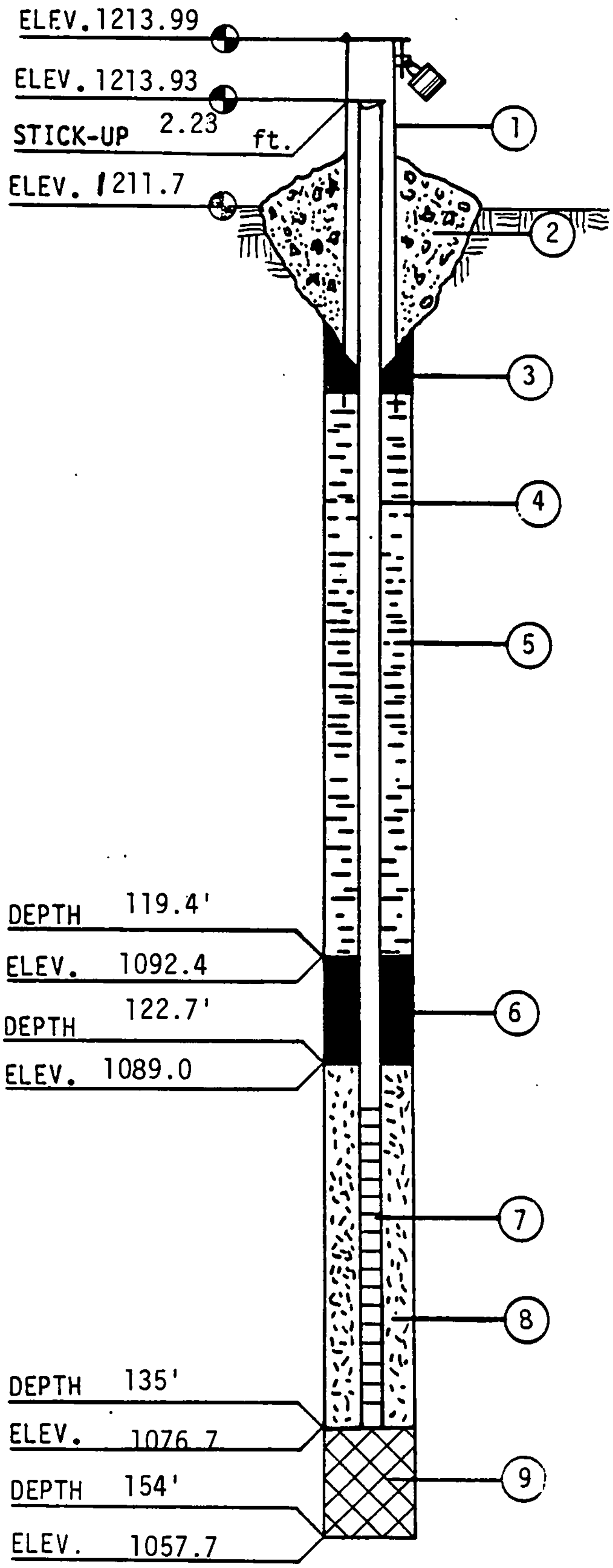
CHIEF/UNIT LE/CME 750

1. PROTECTIVE CASING YES NO
   LOCKING YES NO
2. CONCRETE SEAL YES NO
3. TYPE OF SURFACE SEAL (IF INSTALLED)
   Bentonite Pellets
4. SOLID PIPE TYPE Galvanized Steel
   SOLID PIPE LENGTH 29.2 ft.
   JOINT TYPE SLIP/GLUED THREADED
   w/Teflon Tape on Joints
5. TYPE OF BACKFILL Bentonite Slrry
   HOW INSTALLED - TREMIE
   FROM SURFACE
6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets
7. SCREEN TYPE Stainless Steel
   SCREEN LENGTH 10.5'
   SLOT-SIZE 0.010" LENGTH 10 ft.
   SCREEN DIAMETER 2.0 in.
8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand
9. TYPE OF BACKFILL None
10. DRILLING METHOD HSA
11. ADDITIVES USED (IF ANY)
    None

WATER LEVEL 27.35' DATE 10/22/87

*ALL DEPTHS MEASURED FROM GROUND SURFACE.

WARZYN
ENGINEERING INC



WARZYN
ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-25

DATE 10/21/87

CHIEF/UNIT LE/CME 750

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. CONCRETE SEAL YES NO

3. TYPE OF SURFACE SEAL (IF INSTALLED)
   Granular Bentonite & Bentonite Pellets

4. SOLID PIPE TYPE Galvanized & Stainless Steel*

   SOLID PIPE LENGTH 131.7 ft.

   JOINT TYPE SLIP/GLUED THREADED
   w/Teflon Tape on Joints

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED TREMIE ~~FROM SURFACE~~

6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

7. SCREEN TYPE Stainless Steel

   SCREEN LENGTH 5.5'

   SLOT-SIZE 0.010" LENGTH 5.0 ft.

   SCREEN DIAMETER 2.0 in.

8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

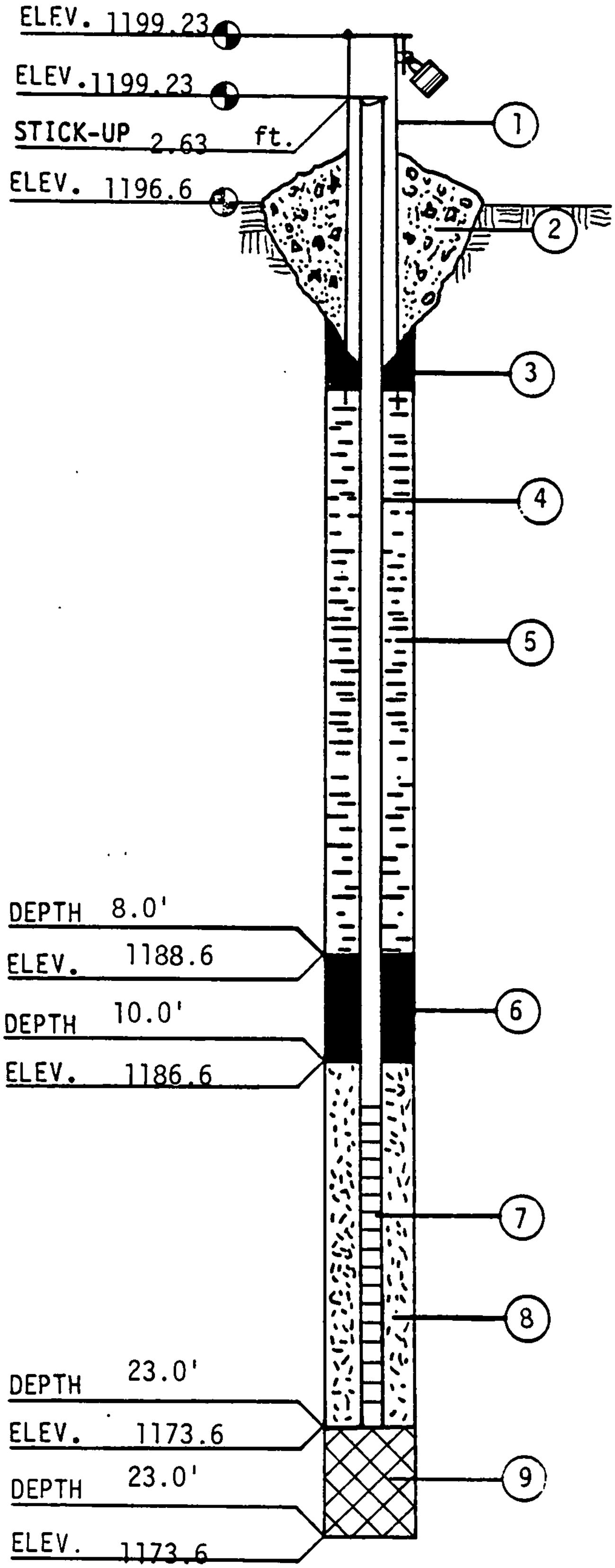
9. TYPE OF BACKFILL Sand & Bentonite Pellets

10. DRILLING METHOD RB/DM/Water

11. ADDITIVES USED (IF ANY)
    None

WATER LEVEL 27.51 DATE 10/22/87

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN
ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-26A

DATE 11/6/87

CHIEF/UNIT MK/CME 750

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. CONCRETE SEAL YES NO

3. TYPE OF SURFACE SEAL (IF INSTALLED)
   Granular Bentonite

4. SOLID PIPE TYPE Galvanized

   SOLID PIPE LENGTH 15.6 ft.

   JOINT TYPE SLIP/GLUED THREADED

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE
   FROM SURFACE

6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

7. SCREEN TYPE Stainless

   SCREEN LENGTH 10.0'

   SLOT-SIZE 0.010" LENGTH 10 ft.

   SCREEN DIAMETER 2.0 in.

8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

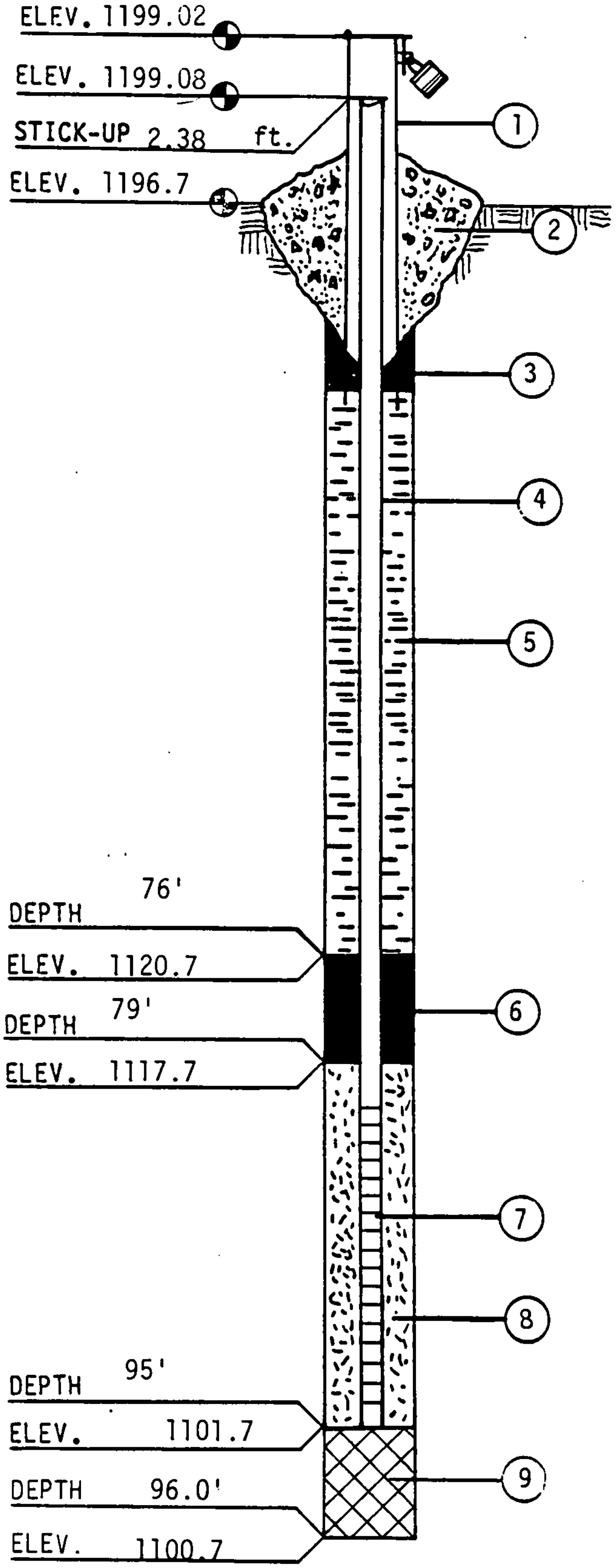
9. TYPE OF BACKFILL None

10. DRILLING METHOD HSA 4 1/4"

11. ADDITIVES USED (IF ANY)
    None

WATER LEVEL - DATE

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN
ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-26

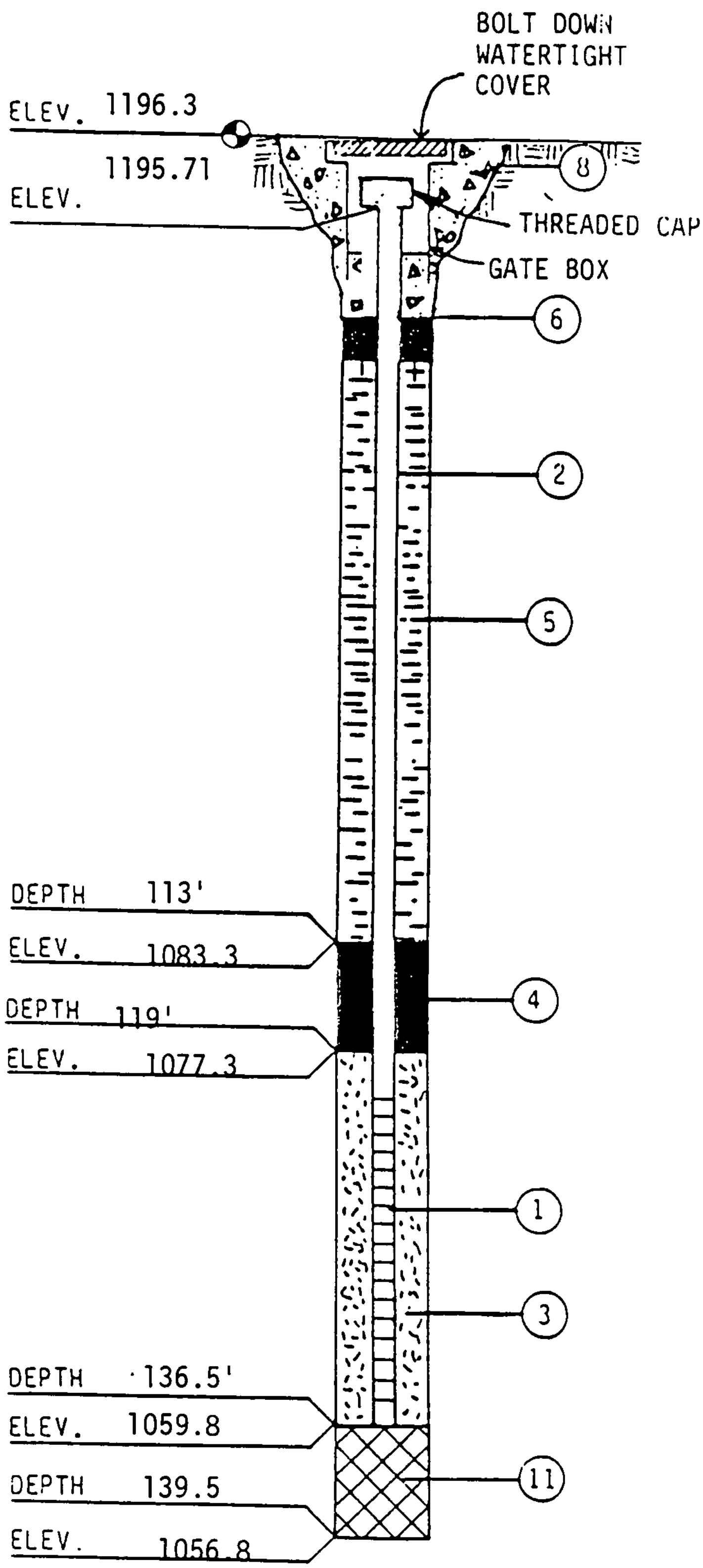
DATE 11/11/87

CHIEF/UNIT MK/CME 750

1. PROTECTIVE CASING YES NO
   LOCKING YES NO
2. CONCRETE SEAL YES NO
3. TYPE OF SURFACE SEAL (IF INSTALLED)
   None
4. SOLID PIPE TYPE Galvanized & Stainless Steel*
   SOLID PIPE LENGTH 91 ft.
   JOINT TYPE SLIP/GLUED THREADED
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED - TREMIE
   FROM SURFACE
6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets
7. SCREEN TYPE Stainless Steel
   SCREEN LENGTH 5'
   SLOT-SIZE 0.010" LENGTH 5.0 ft.
   SCREEN DIAMETER 2.0 in.
8. TYPE OF BACKFILL AROUND SCREEN
   Natural Sand
9. TYPE OF BACKFILL Natural
10. DRILLING METHOD RB/DM
11. ADDITIVES USED (IF ANY)
    None

WATER LEVEL - DATE

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-27

DATE 12/12/87

CHIEF/UNIT PD/D-50

1. SCREEN TYPE Stainless

   SLOTTED LENGTH 5.0 ft.

   SLOT SIZE 0.010"

   SCREEN DIAMETER 2.0 in.

2. SOLID PIPE TYPE Galvanized

   SOLID PIPE LENGTH 131 ft.

   JOINT TYPE SLIP/GLUED/THREADED

3. TYPE OF BACKFILL AROUND SCREEN

   #30 Flint Sand

4. TYPE OF LOWER SEAL (IF INSTALLED)

   Bentonite Pellets

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE

   FROM SURFACE

6. TYPE OF SURFACE SEAL (IF INSTALLED)

   Granular Bentonite

7. PROTECTIVE CASING YES NO

   LOCKING YES NO

8. CONCRETE SEAL YES NO

9. DRILLING METHOD RB/DM

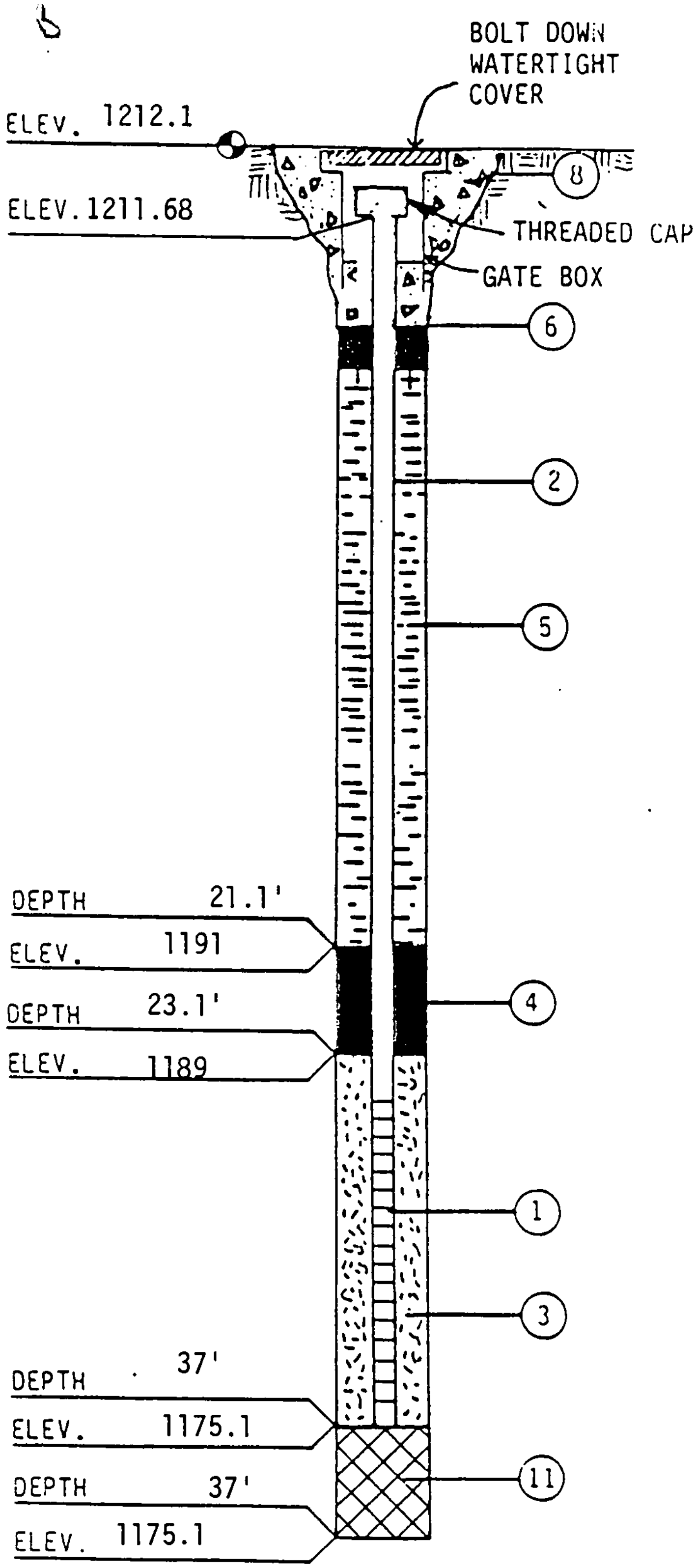
10. ADDITIVES USED (IF ANY)

    None

11. TYPE OF BACKFILL #30 Flint Sand

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-28A

DATE 10/13/87

CHIEF/UNIT LE/CME 45

1. SCREEN TYPE Stainless Steel

   SLOTTED LENGTH 9.5 ft.

   SLOT SIZE 0.010"

   SCREEN DIAMETER 2.0 in.

2. SOLID PIPE TYPE Galvanized

   SOLID PIPE LENGTH 27 ft.

   JOINT TYPE SLIP/GLUED THREADED

3. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

4. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE
   FROM SURFACE

6. TYPE OF SURFACE SEAL (IF INSTALLED)
   Bentonite Pellets/Concrete

7. PROTECTIVE CASING YES NO

   LOCKING YES NO

8. CONCRETE SEAL YES NO

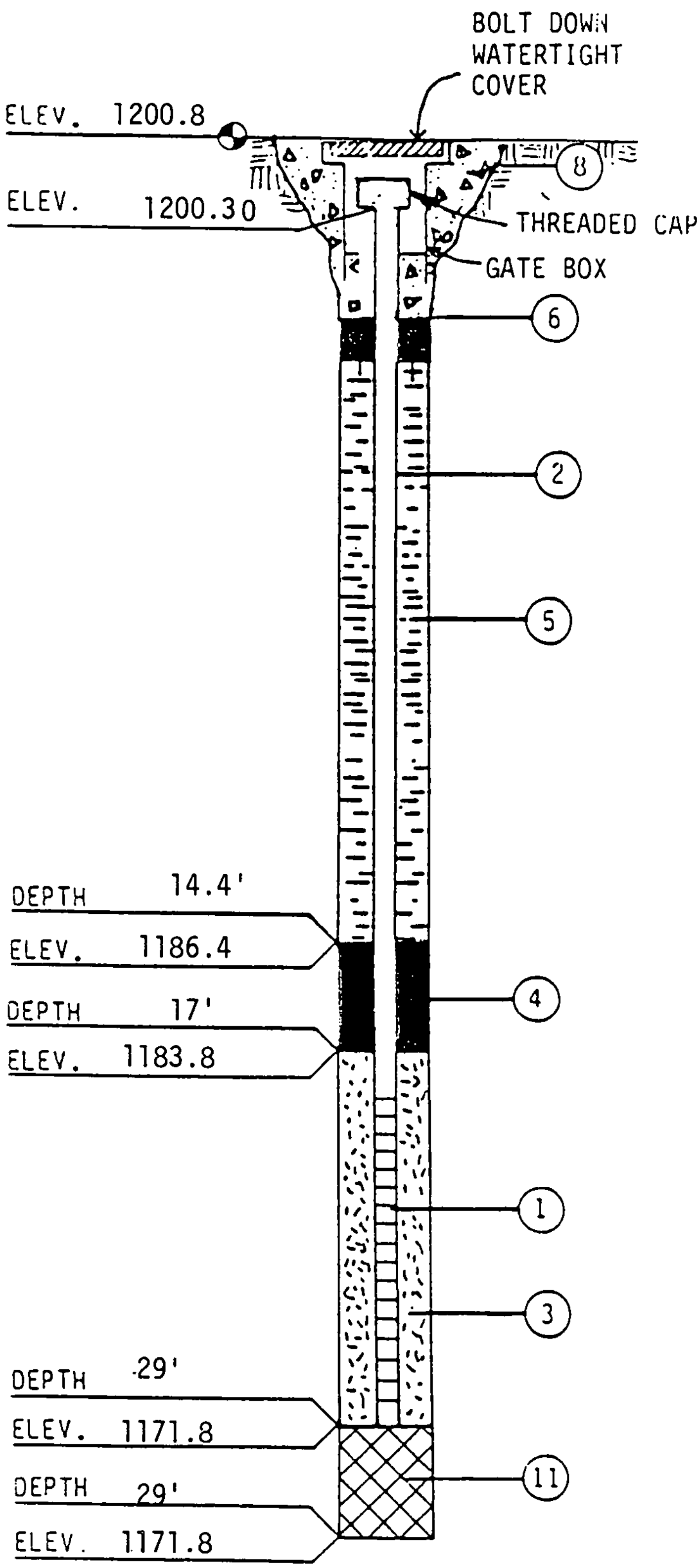
9. DRILLING METHOD HSA

10. ADDITIVES USED (IF ANY)
    None

11. TYPE OF BACKFILL None

WATER LEVEL 27.23' DATE 10/15/87

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-29A

DATE 10/23/87

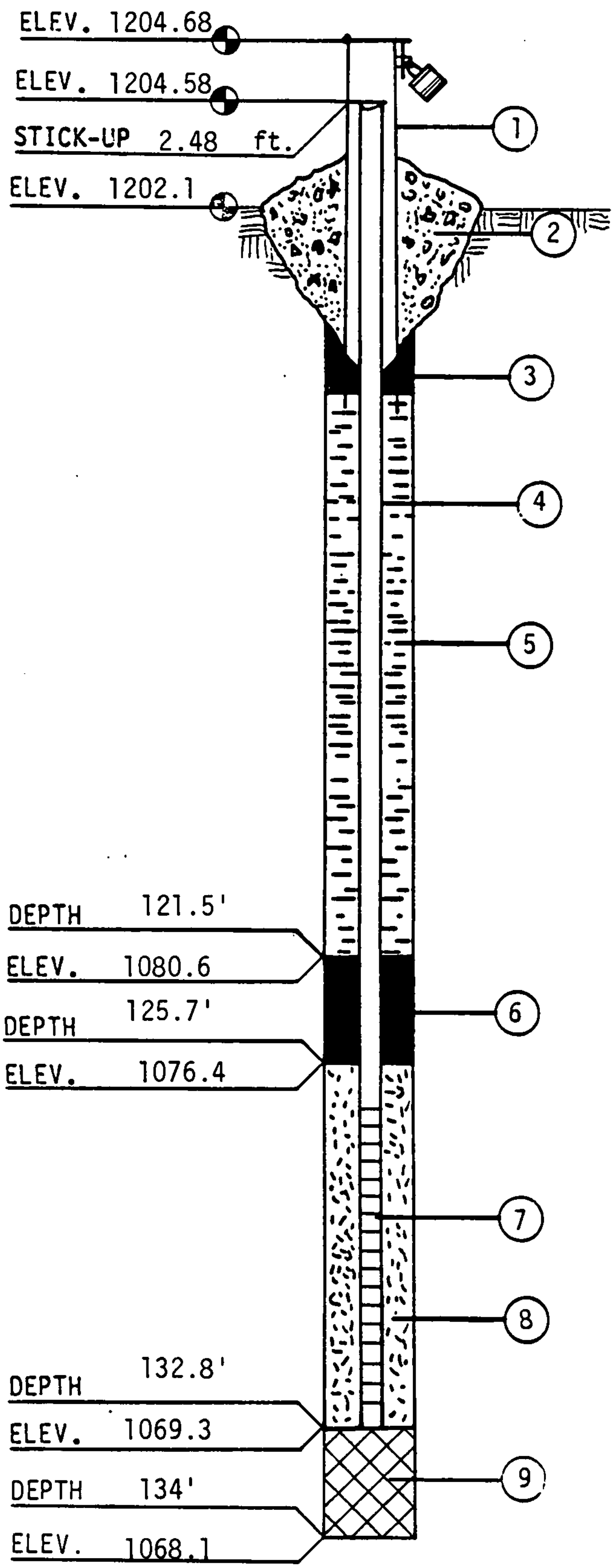
CHIEF/UNIT LF/CME 750

1. SCREEN TYPE Stainless Steel
   SLOTTED LENGTH 10 ft.
   SLOT SIZE 0.010"
   SCREEN DIAMETER 2.0 in.
2. SOLID PIPE TYPE Galvanized
   SOLID PIPE LENGTH 18.1 ft.
   JOINT TYPE SLIP/GLUED THREADED
3. TYPE OF BACKFILL AROUND SCREEN No. 30 Flint Sand
4. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Pellets
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED - TREMIE FROM SURFACE
6. TYPE OF SURFACE SEAL (IF INSTALLED) Granular & Pellet Bentonite
7. PROTECTIVE CASING YES NO
   LOCKING YES NO
8. CONCRETE SEAL YES NO
9. DRILLING METHOD HSA
10. ADDITIVES USED (IF ANY) None
11. TYPE OF BACKFILL None

WATER LEVEL 19.12 DATE 10/23/87

*ALL DEPTHS MEASURED FROM GROUND SURFACE.

WARZYN ENGINEERING INC



*Note: 10' of stainless steel riser above the screen.

WARZYN
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MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.26

BORING/WELL NO. E-30

DATE 10/30/87

CHIEF/UNIT JW/D50

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. CONCRETE SEAL YES NO

3. TYPE OF SURFACE SEAL (IF INSTALLED)
   Bentonite Pellets

4. SOLID PIPE TYPE Stainless/Galvanized Steel*

   SOLID PIPE LENGTH 130.3 ft.

   JOINT TYPE SLIP/GLUED THREADED
   w/Teflon Taped on Joints

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE
   FROM SURFACE

6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

7. SCREEN TYPE Stainless Steel

   SCREEN LENGTH 5.0'

   SLOT-SIZE 0.010" LENGTH 5.0 ft.

   SCREEN DIAMETER 2.0 in.

8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

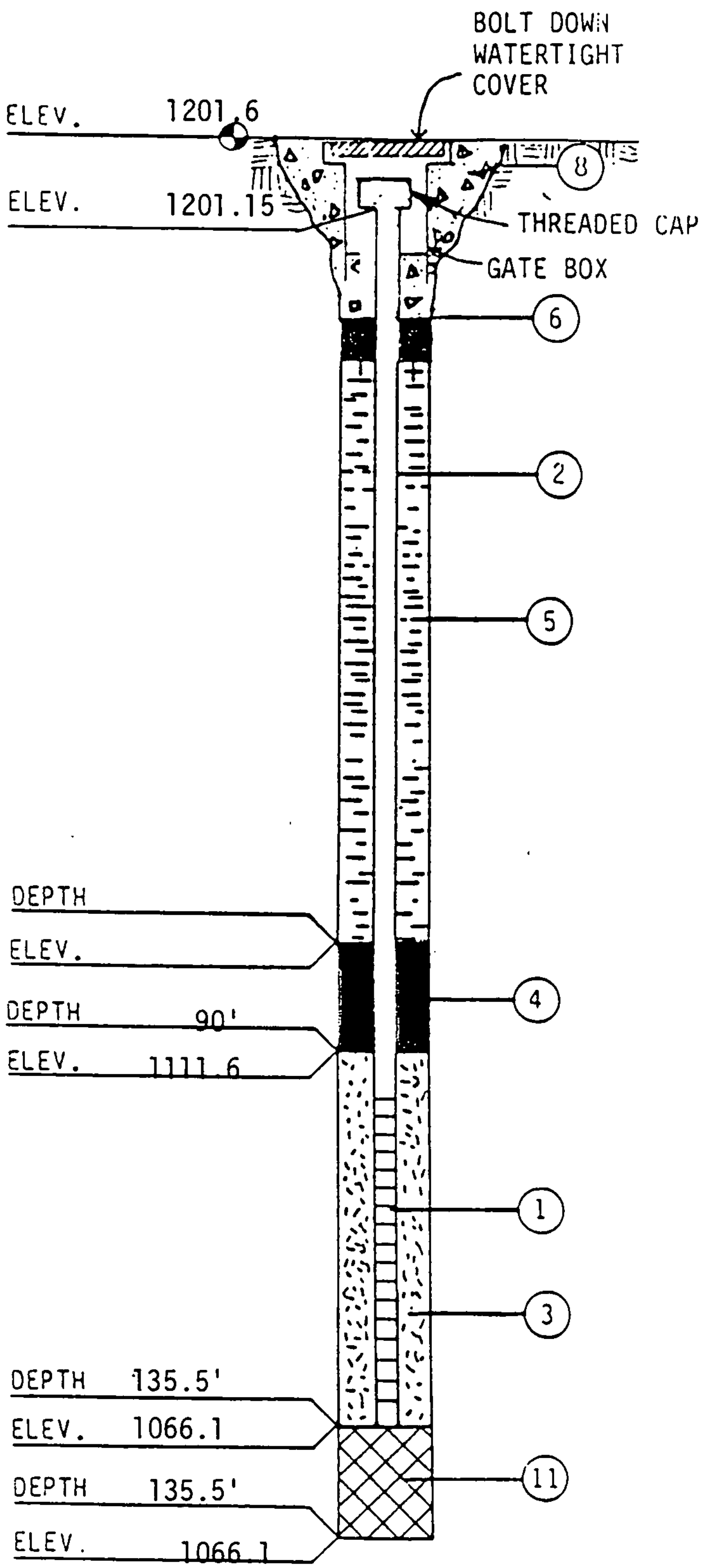
9. TYPE OF BACKFILL - Natural

10. DRILLING METHOD RB/DM

11. ADDITIVES USED (IF ANY)
   - None

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-31

DATE 11/5/87

CHIEF/UNIT LE/CME 750

1. SCREEN TYPE Stainless Steel

   SLOTTED LENGTH 5.0 ft.

   SLOT SIZE 0.010"

   SCREEN DIAMETER 2.0 in.

2. SOLID PIPE TYPE Galvanized & Stainless Steel

   SOLID PIPE LENGTH 129.5 ft.

   JOINT TYPE SLIP/GLUED THREADED

3. TYPE OF BACKFILL AROUND SCREEN Natural Sand

4. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Slurry

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED TREMIE FROM SURFACE

6. TYPE OF SURFACE SEAL (IF INSTALLED) Granular Bentonite

7. PROTECTIVE CASING YES NO

   LOCKING YES NO

8. CONCRETE SEAL YES NO

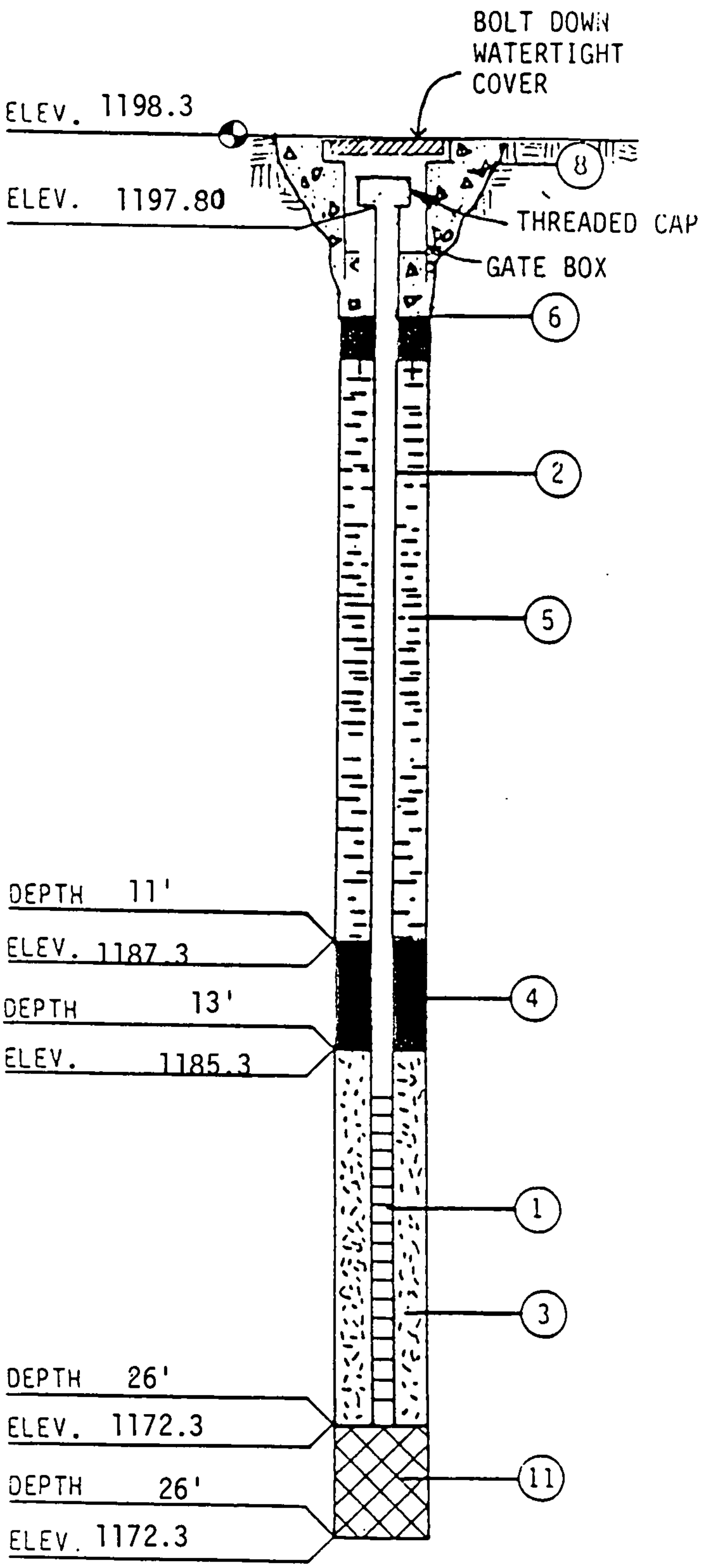
9. DRILLING METHOD RB/DM

10. ADDITIVES USED (IF ANY) None

11. TYPE OF BACKFILL

WATER LEVEL ________ DATE ________

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. F-37A

DATE 11/12/87

CHIEF/UNIT MK/CME 750

1. SCREEN TYPE Stainless Steel

   SLOTTED LENGTH 10 ft.

   SLOT SIZE 0.010"

   SCREEN DIAMETER 2.0 in.

2. SOLID PIPE TYPE Galvanized

   SOLID PIPE LENGTH 15.5 ft.

   JOINT TYPE SLIP/GLUED THREADED

3. TYPE OF BACKFILL AROUND SCREEN No. 30 Flint Sand

4. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Pellets

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE
   FROM SURFACE

6. TYPE OF SURFACE SEAL (IF INSTALLED) Granular Bentonite

7. PROTECTIVE CASING YES NO

   LOCKING YES NO

8. CONCRETE SEAL YES NO

9. DRILLING METHOD HSA

10. ADDITIVES USED (IF ANY) None

11. TYPE OF BACKFILL None

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.

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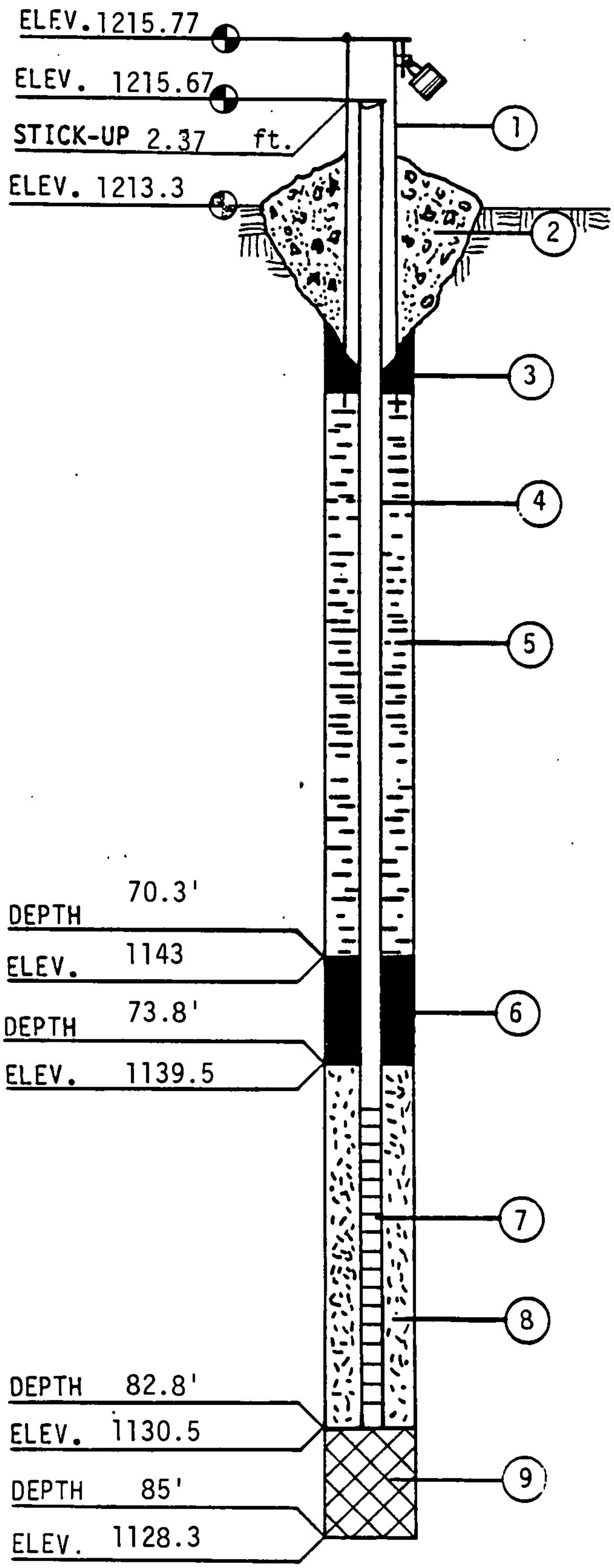

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MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-50

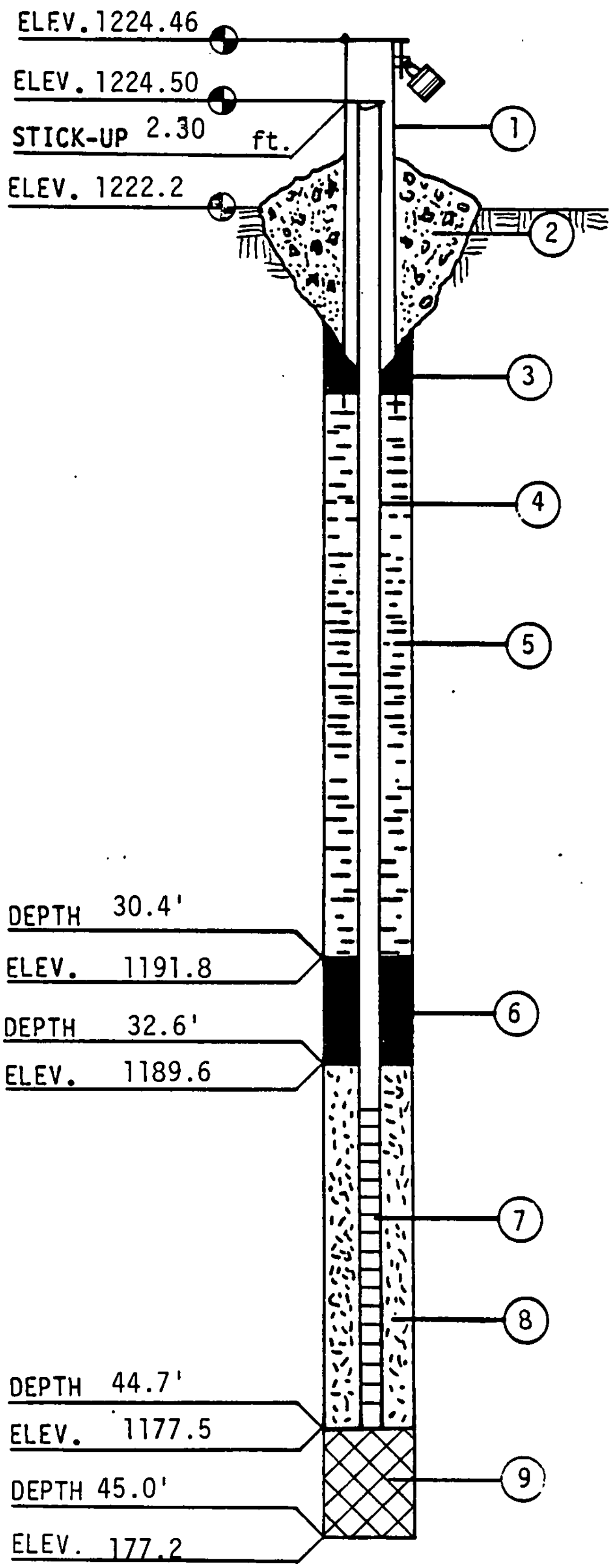
DATE 10/29/87

CHIEF/UNIT LE/CME 750

1. PROTECTIVE CASING YES NO
   LOCKING YES NO
2. CONCRETE SEAL YES NO
3. TYPE OF SURFACE SEAL (IF INSTALLED)
   Granular/Bentonite Pellets
4. SOLID PIPE TYPE *Galvanized/Stainless Steel
   SOLID PIPE LENGTH 81.9 ft.
   JOINT TYPE SLIP/GLUED THREADED
   w/Teflon Tape on Joints
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED TREMIE
   ~~FROM~~ SURFACE
6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets
7. SCREEN TYPE Stainless Steel
   SCREEN LENGTH 5.5'
   SLOT-SIZE 0.010" LENGTH 5.0 ft.
   SCREEN DIAMETER 2.0 in.
8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand
9. TYPE OF BACKFILL Natural Cave-in
10. DRILLING METHOD RB/DM/Water
11. ADDITIVES USED (IF ANY)
    None

WATER LEVEL ________ DATE ________

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



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MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-51A

DATE 10/15/87

CHIEF/UNIT LE/CME 45C

1. PROTECTIVE CASING YES NO (YES circled)

   LOCKING YES NO (YES circled)

2. CONCRETE SEAL YES NO (NO circled)

3. TYPE OF SURFACE SEAL (IF INSTALLED) Bentonite Pellets

4. SOLID PIPE TYPE Galvanized

   SOLID PIPE LENGTH 37.2 ft.

   JOINT TYPE SLIP/GLUED THREADED (THREADED circled)

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE FROM SURFACE (FROM SURFACE circled)

6. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Pellets

7. SCREEN TYPE Stainless Steel

   SCREEN LENGTH 10'

   SLOT-SIZE 0.010" LENGTH 9.5 ft.

   SCREEN DIAMETER 2.0 in.

8. TYPE OF BACKFILL AROUND SCREEN No. 30 Flint Sand

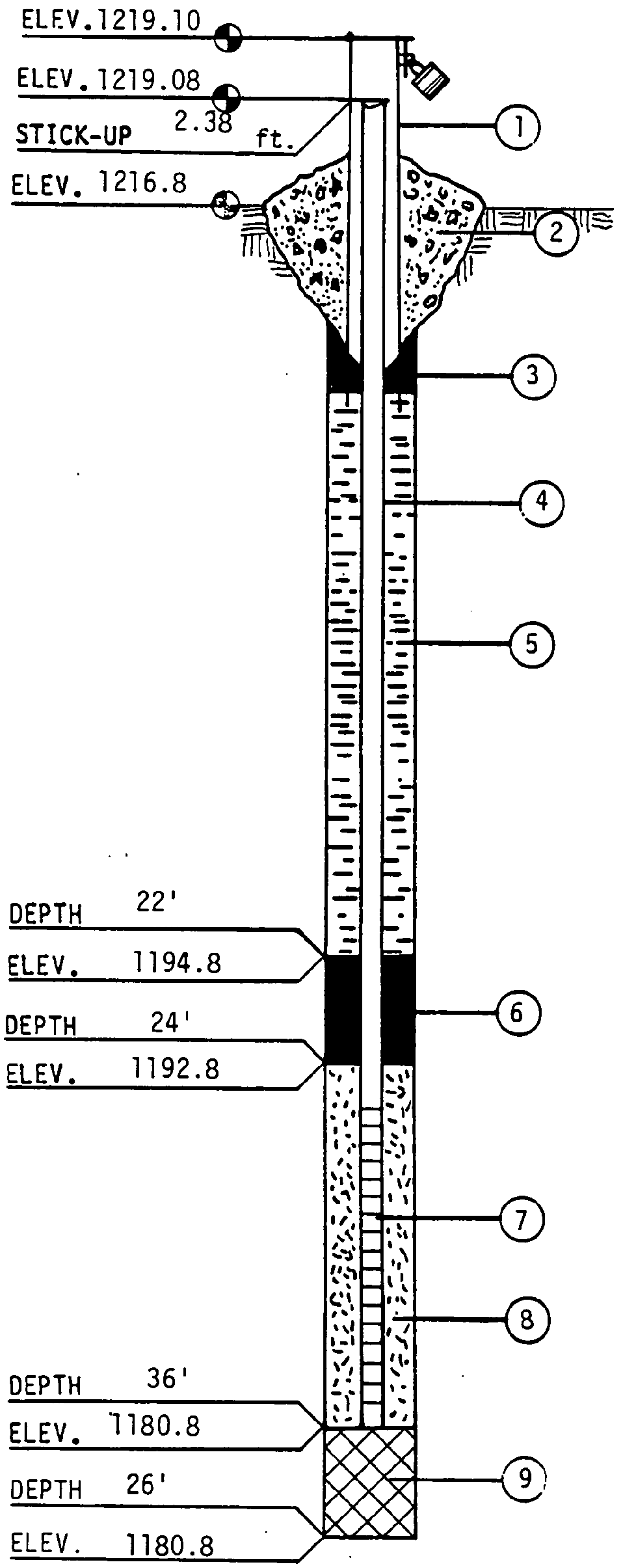
9. TYPE OF BACKFILL Natural Sand

10. DRILLING METHOD HSA

11. ADDITIVES USED (IF ANY) None

WATER LEVEL 34.2' DATE 10/15/87

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-52A

DATE 11/12/87

CHIEF/UNIT MK/CME 750

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. CONCRETE SEAL YES NO

3. TYPE OF SURFACE SEAL (IF INSTALLED)
   None

4. SOLID PIPE TYPE Galvanized

   SOLID PIPE LENGTH 28.3 ft.

   JOINT TYPE SLIP/GLUED THREADED

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE
   FROM SURFACE

6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

7. SCREEN TYPE Stainless Steel

   SCREEN LENGTH 10'

   SLOT-SIZE 0.010" LENGTH 10 ft.

   SCREEN DIAMETER 2.0 in.

8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

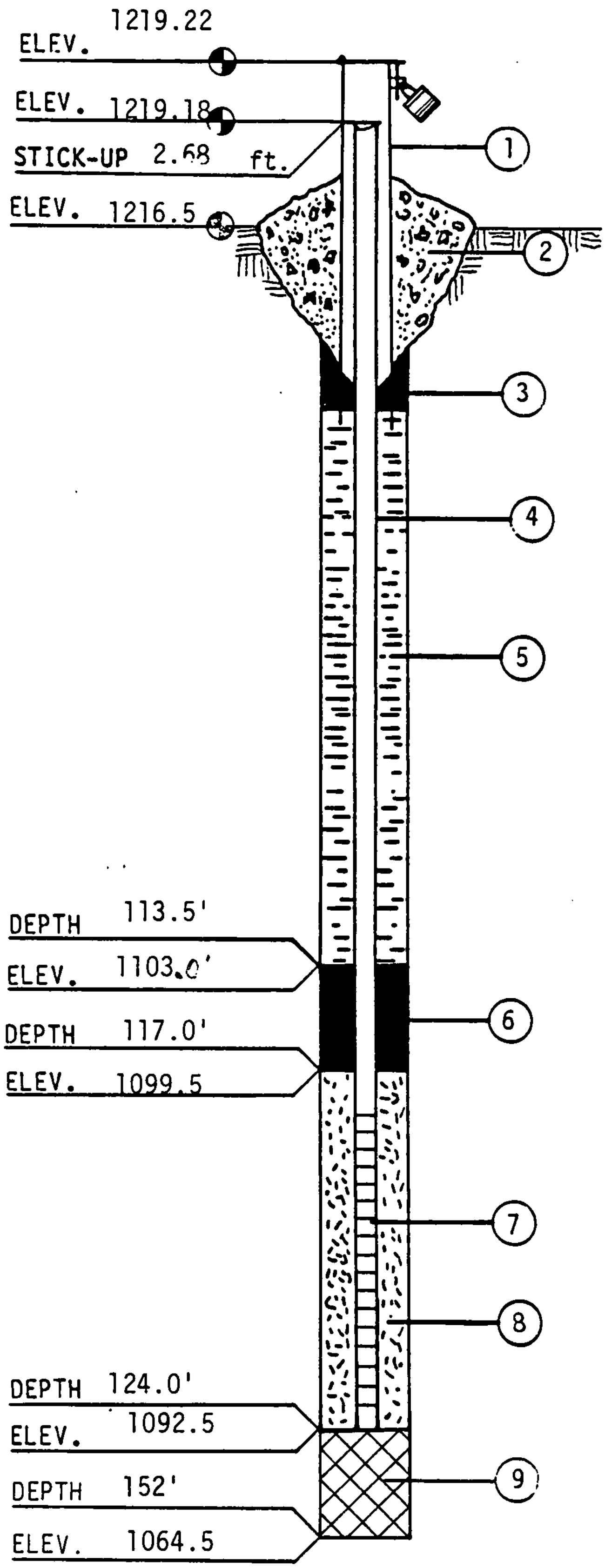
9. TYPE OF BACKFILL -

10. DRILLING METHOD HSA

11. ADDITIVES USED (IF ANY)
   -

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-52

DATE 11/10/87

CHIEF/UNIT MP/Canterra

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. CONCRETE SEAL YES NO

3. TYPE OF SURFACE SEAL (IF INSTALLED)
   Granular Bentonite & Pellets

4. SOLID PIPE TYPE Galvanized & Stainless Steel*

   SOLID PIPE LENGTH 121.7 ft.

   JOINT TYPE SLIP/GLUED THREADED
   w/Teflon Tape on Joints

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED ~~TREMIE~~ FROM SURFACE

6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

7. SCREEN TYPE Stainless Steel

   SCREEN LENGTH 5.0'

   SLOT-SIZE 0.010" LENGTH 4.5 ft.

   SCREEN DIAMETER 2.0 in.

8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

9. TYPE OF BACKFILL No. 30 Flint Sand & ~~Bentonite Pellts~~

10. DRILLING METHOD RB/DM

11. ADDITIVES USED (IF ANY)
   -

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.

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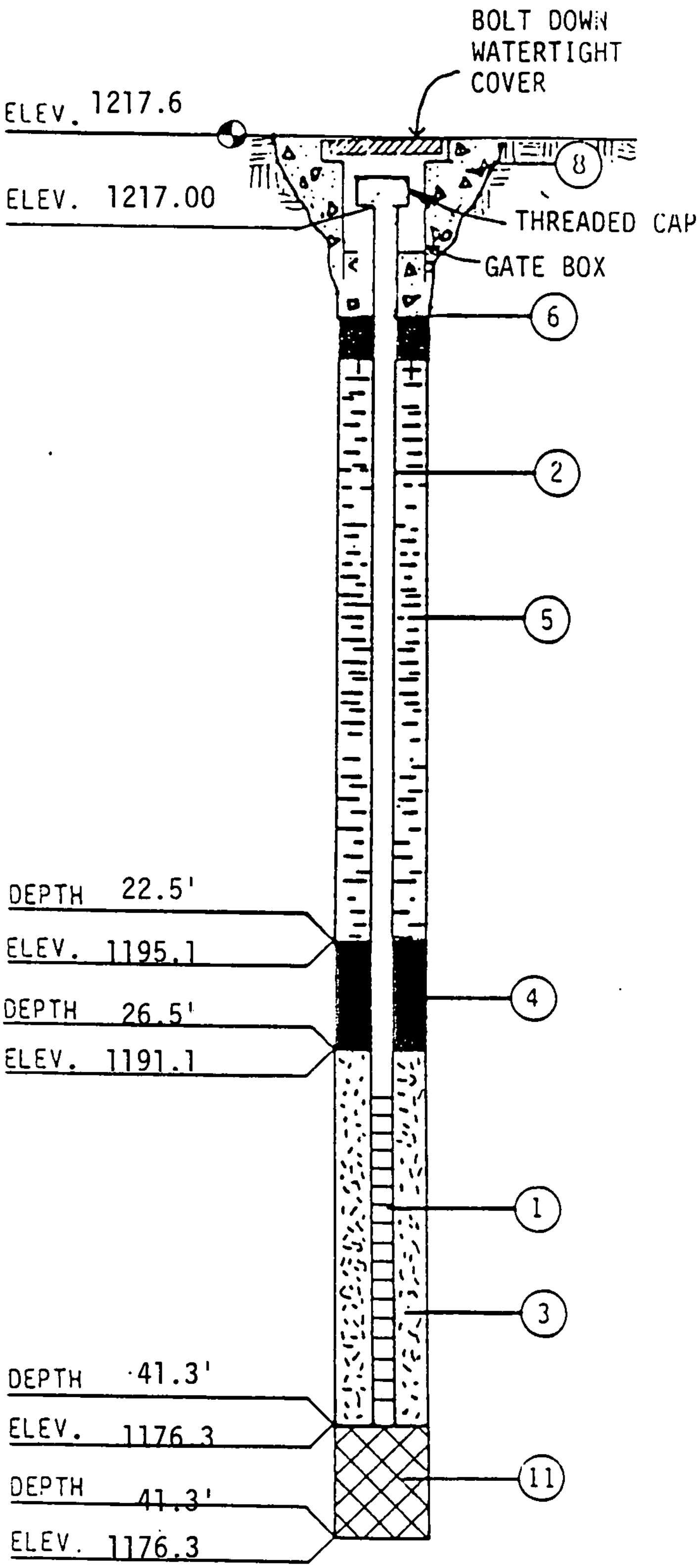

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MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-53A

DATE 11/2/87

CHIEF/UNIT JW/D50

1. SCREEN TYPE Stainless Steel

   SLOTTED LENGTH 10 ft.

   SLOT SIZE 0.010"

   SCREEN DIAMETER 2.0 in.

2. SOLID PIPE TYPE Galvanized

   SOLID PIPE LENGTH 30.2 ft.

   JOINT TYPE SLIP/GLUED THREADED

3. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

4. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE
   FROM SURFACE

6. TYPE OF SURFACE SEAL (IF INSTALLED)
   Granular Bentonite

7. PROTECTIVE CASING YES NO

   LOCKING YES NO

8. CONCRETE SEAL YES NO

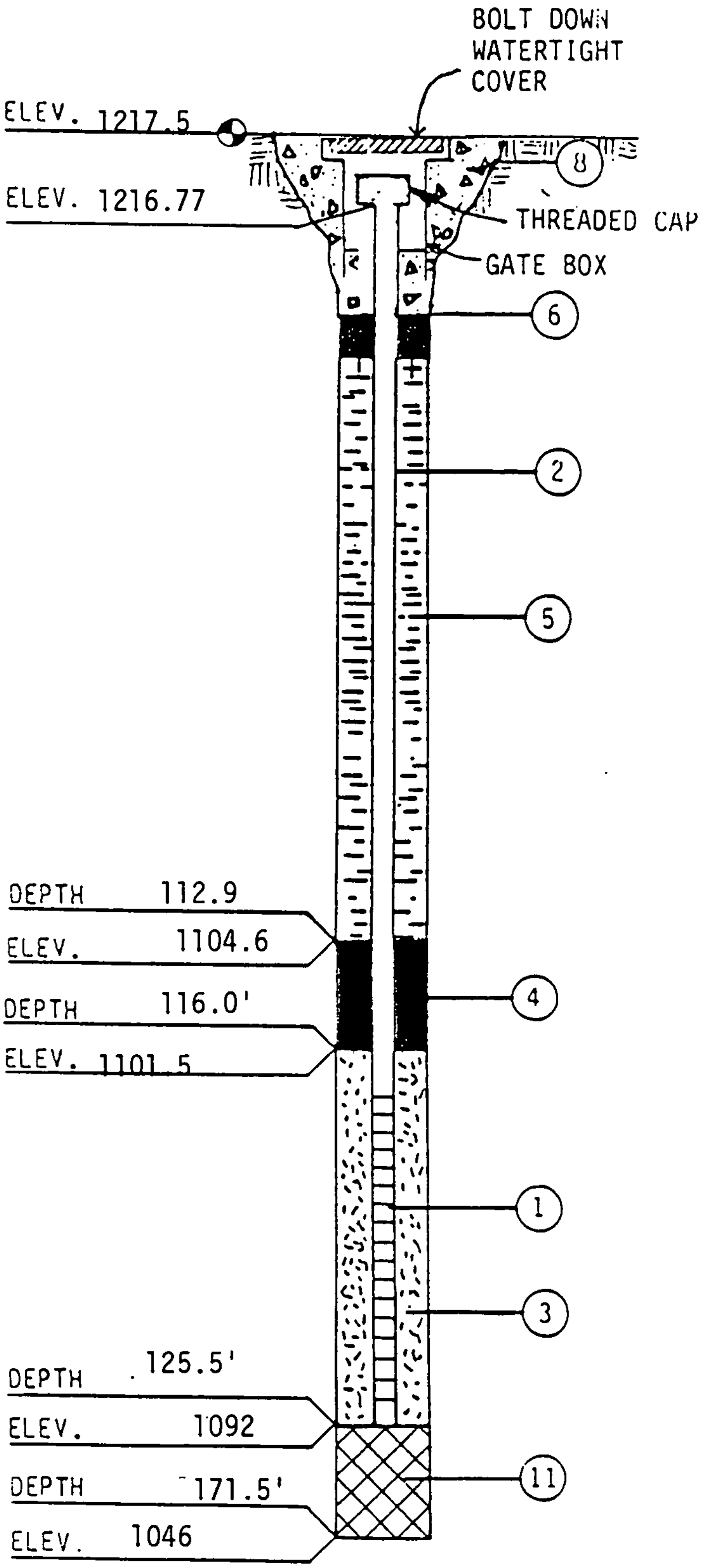
9. DRILLING METHOD HSA

10. ADDITIVES USED (IF ANY)
    None

11. TYPE OF BACKFILL None

WATER LEVEL ________ DATE ________

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-53

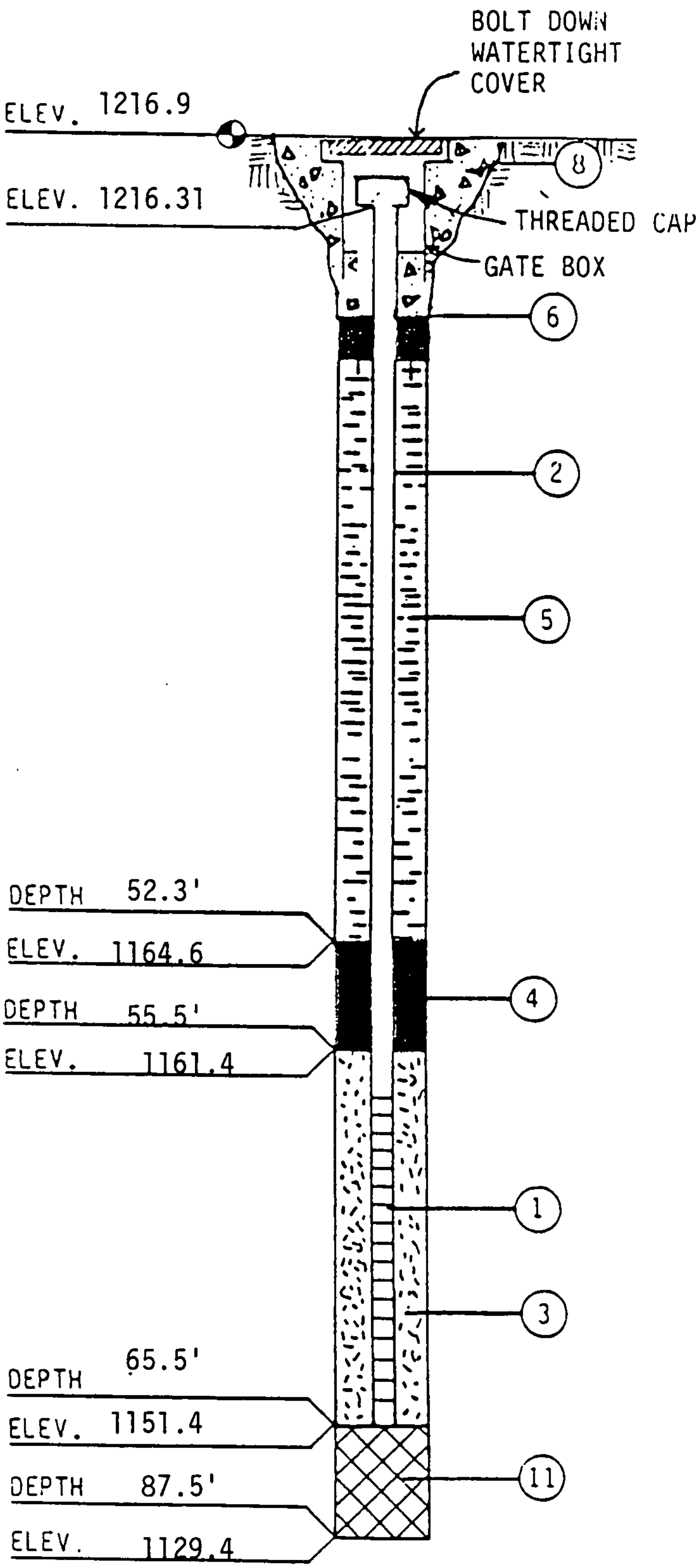
DATE 11/1/87

CHIEF/UNIT JW/D50

1. SCREEN TYPE Stainless Steel
   SLOTTED LENGTH 4.5 ft.
   SLOT SIZE 0.010"
   SCREEN DIAMETER 2.0 in.
2. SOLID PIPE TYPE Galvanized & 10' of ~~Stainless~~
   SOLID PIPE LENGTH 119.8 ft.
   JOINT TYPE SLIP/GLUED THREADED
3. TYPE OF BACKFILL AROUND SCREEN No. 30 Flint Sand
4. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Pellets
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED - TREMIE FROM SURFACE
6. TYPE OF SURFACE SEAL (IF INSTALLED) Granular Bentonite
7. PROTECTIVE CASING YES NO
   LOCKING YES NO
8. CONCRETE SEAL YES NO
9. DRILLING METHOD RB/DM
10. ADDITIVES USED (IF ANY) None
11. TYPE OF BACKFILL Natural Sand, #30 Flint Sand ~~& Bentonite Pellets~~

WATER LEVEL - DATE

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-54

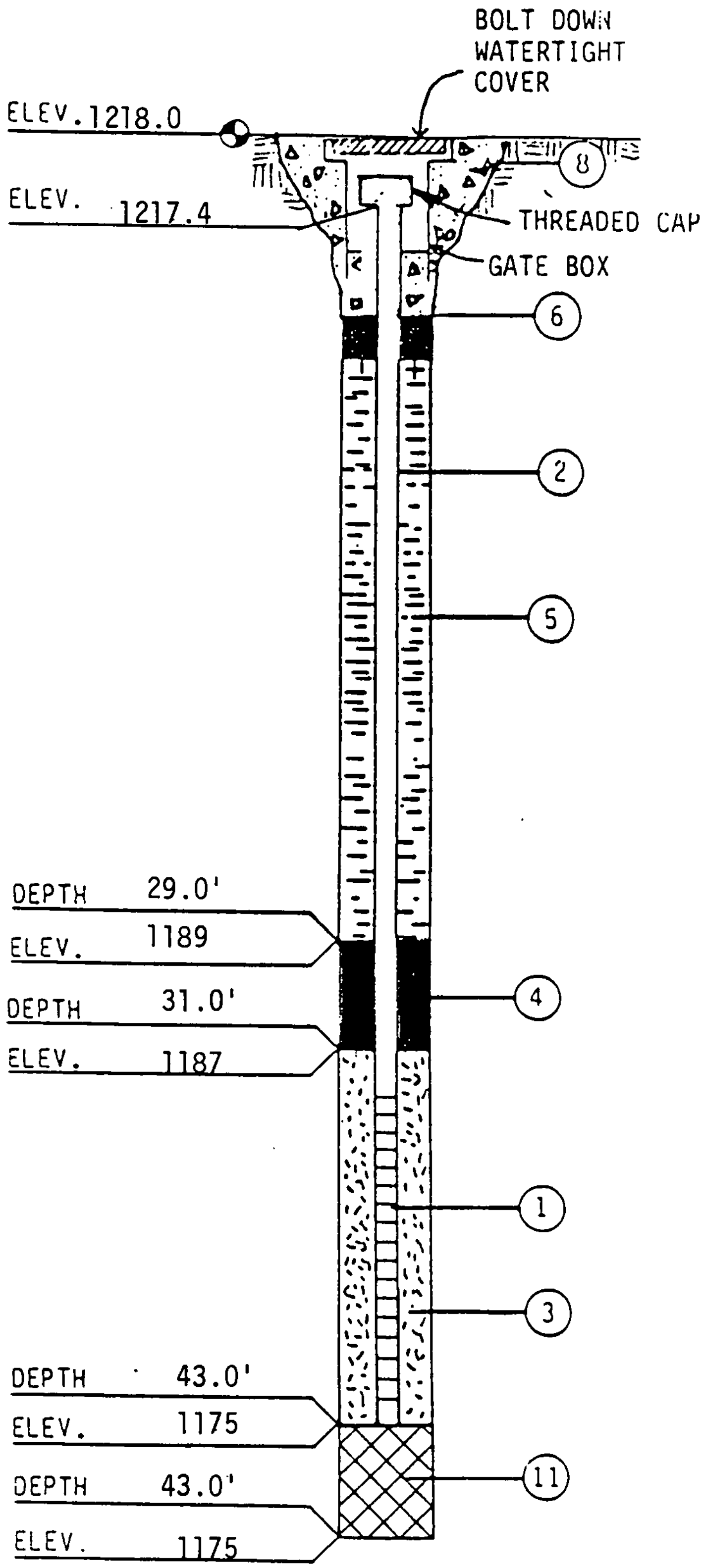
DATE 11/12/87

CHIEF/UNIT JW/D50

1. SCREEN TYPE Stainless Steel
   SLOTTED LENGTH 4.5 ft.
   SLOT SIZE 0.010"
   SCREEN DIAMETER 2.0 in.
2. SOLID PIPE TYPE Galvanized & Stainless Steel
   SOLID PIPE LENGTH 59.9 ft.
   JOINT TYPE SLIP/GLUED THREADED
3. TYPE OF BACKFILL AROUND SCREEN No. 30 Flint Sand
4. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Pellets
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED - TREMIE FROM SURFACE
6. TYPE OF SURFACE SEAL (IF INSTALLED) Bentonite Powder
7. PROTECTIVE CASING YES NO
   LOCKING YES NO
8. CONCRETE SEAL YES NO
9. DRILLING METHOD HSA & RB/DM
10. ADDITIVES USED (IF ANY) None
11. TYPE OF BACKFILL Natural Sand, #30 Flint Sand & Bentonite Pellets

WATER LEVEL ________ DATE ________

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-55A

DATE 10/5/87

CHIEF/UNIT LE/CME-45C

1. SCREEN TYPE Stainless

   SLOTTED LENGTH 9.5 ft.

   SLOT SIZE 0.010"

   SCREEN DIAMETER 2.0 in.

2. SOLID PIPE TYPE Galvanized

   SOLID PIPE LENGTH 32.4 ft.

   JOINT TYPE SLIP/GLUED THREADED

3. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

4. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE
   FROM SURFACE

6. TYPE OF SURFACE SEAL (IF INSTALLED)
   Bentonite Pellets

7. PROTECTIVE CASING YES NO

   LOCKING YES NO

8. CONCRETE SEAL YES NO

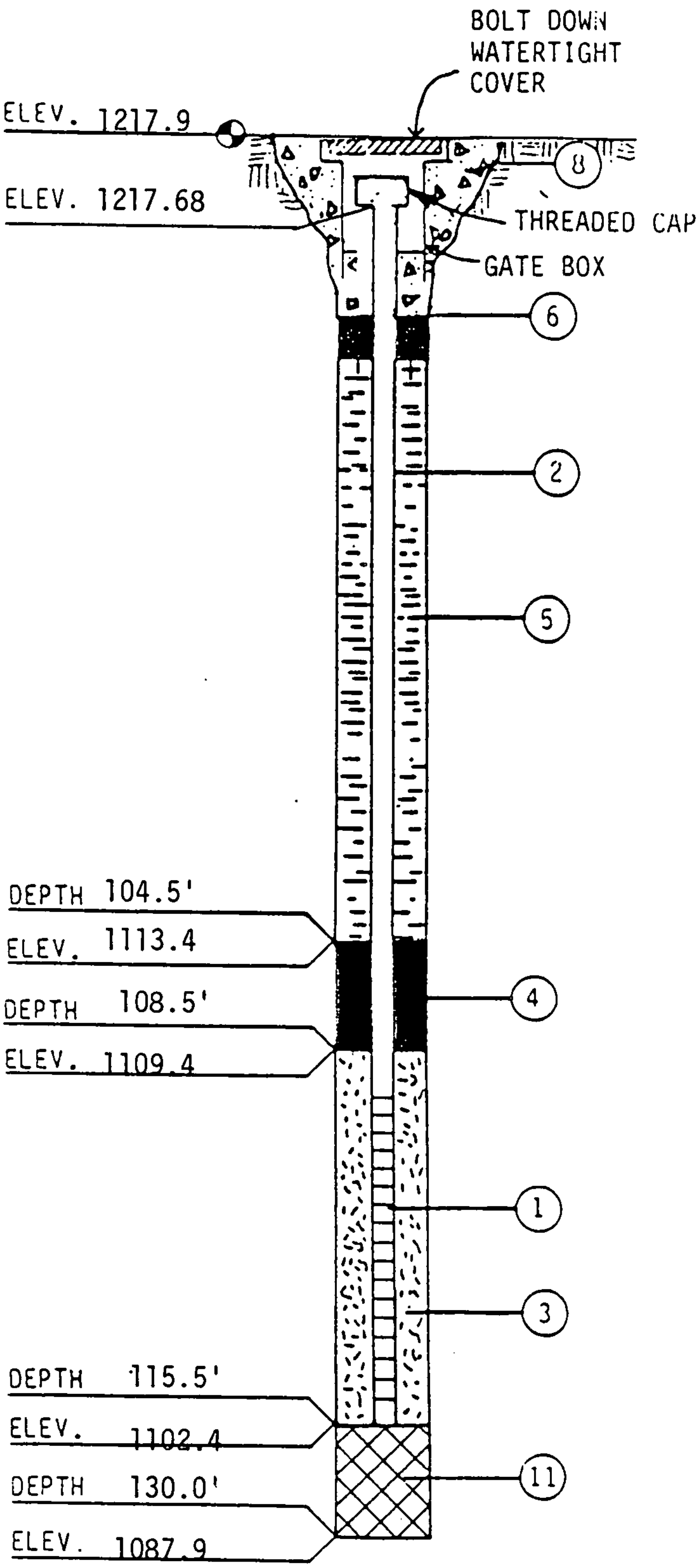
9. DRILLING METHOD HSA

10. ADDITIVES USED (IF ANY)
    -

11. TYPE OF BACKFILL -

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

Note: 10' of stainless steel riser above screen.

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-55

DATE 10/29/87

CHIEF/UNIT MP/D-50

1. SCREEN TYPE Stainless Steel

   SLOTTED LENGTH 5.0 ft.

   SLOT SIZE 0.010"

   SCREEN DIAMETER 2.0 in.

2. SOLID PIPE TYPE 2" Galvanized & Stainless Steel*

   SOLID PIPE LENGTH 110.3 ft.

   JOINT TYPE SLIP/GLUED, THREADED

3. TYPE OF BACKFILL AROUND SCREEN Natural Sand

4. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Pellets

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED - TREMIE FROM SURFACE

6. TYPE OF SURFACE SEAL (IF INSTALLED) Bentonite Slurry

7. PROTECTIVE CASING YES NO

   LOCKING YES NO

8. CONCRETE SEAL YES NO

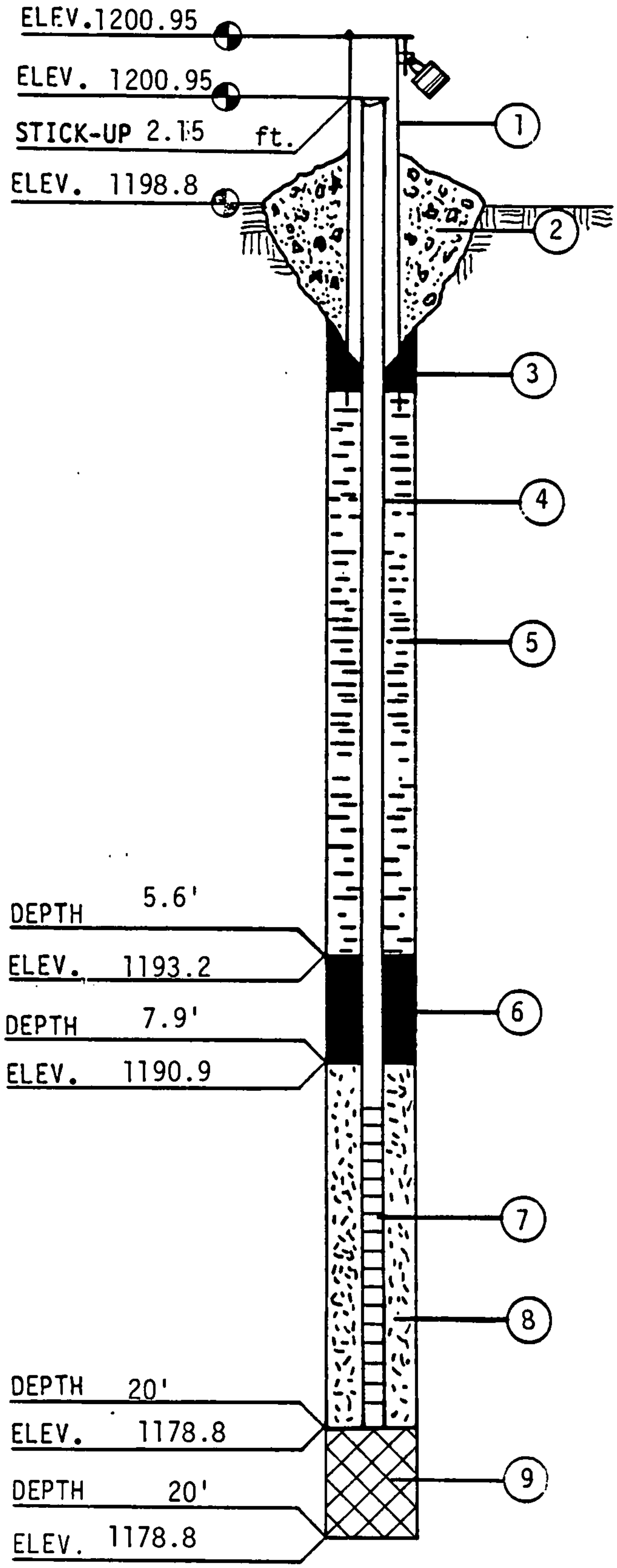
9. DRILLING METHOD RB/DM

10. ADDITIVES USED (IF ANY) -

11. TYPE OF BACKFILL Natural Sand

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-56A

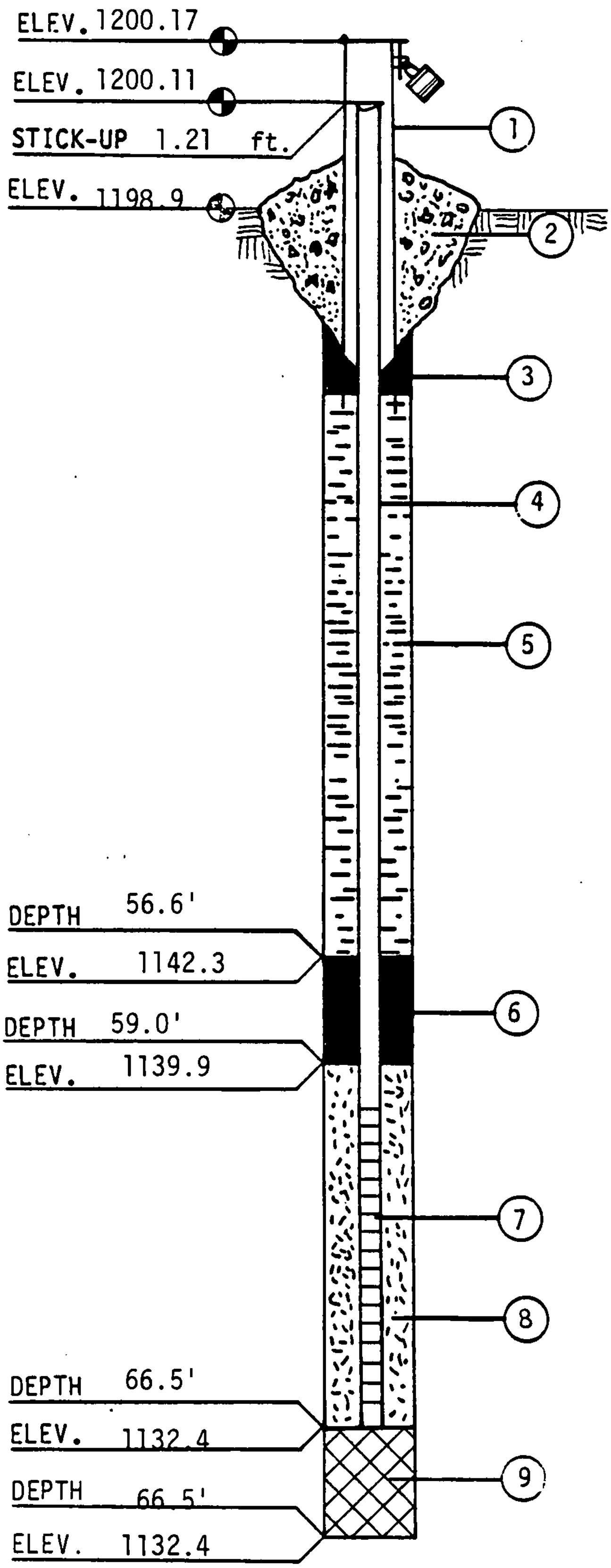
DATE 10/15/87

CHIEF/UNIT LE/CME 45C

1. PROTECTIVE CASING YES NO
   LOCKING YES NO
2. CONCRETE SEAL YES NO
3. TYPE OF SURFACE SEAL (IF INSTALLED) Bentonite Pellets
4. SOLID PIPE TYPE Galvanized
   SOLID PIPE LENGTH 12.2 ft.
   JOINT TYPE SLIP/GLUED THREADED
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED - TREMIE FROM SURFACE
6. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Pellets
7. SCREEN TYPE Stainless Steel
   SCREEN LENGTH 10'
   SLOT-SIZE 0.010" LENGTH 9.5 ft.
   SCREEN DIAMETER 2.0 in.
8. TYPE OF BACKFILL AROUND SCREEN No. 30 Flint Sand
9. TYPE OF BACKFILL None
10. DRILLING METHOD HSA
11. ADDITIVES USED (IF ANY) None

WATER LEVEL 8.7' DATE 10/15/87

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-56

DATE 10/20/87

CHIEF/UNIT JW/D-50

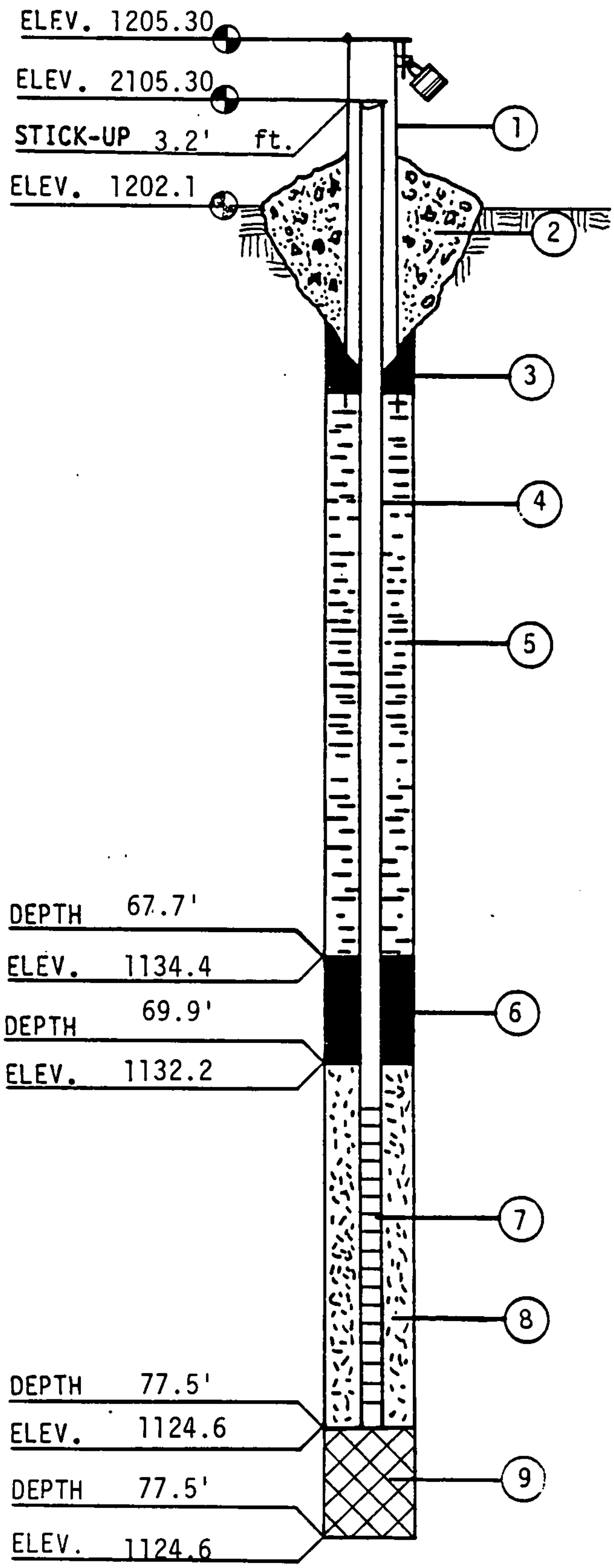
1. PROTECTIVE CASING YES NO
   LOCKING YES NO
2. CONCRETE SEAL YES NO
3. TYPE OF SURFACE SEAL (IF INSTALLED) Bentonite Pellets
4. SOLID PIPE TYPE Galvanized & Stainless Steel*
   SOLID PIPE LENGTH 62.7 ft.
   JOINT TYPE SLIP/GLUED THREADED w/Teflon Tape at joints
5. TYPE OF BACKFILL Bentonite Slurry
   HOW INSTALLED - TREMIE FROM SURFACE
6. TYPE OF LOWER SEAL (IF INSTALLED) Bentonite Pellets
7. SCREEN TYPE Stainless Steel
   SCREEN LENGTH 5.0'
   SLOT-SIZE 0.010" LENGTH 5.0 ft.
   SCREEN DIAMETER 2.0 in.
8. TYPE OF BACKFILL AROUND SCREEN No. 30 Flint Sand
9. TYPE OF BACKFILL None
10. DRILLING METHOD RB/DM
11. ADDITIVES USED (IF ANY) None

*Note: 10' of Stainless Steel Riser above Screen.

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.

WARZYN ENGINEERING INC



WARZYN ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. W-57

DATE 10/22/87

CHIEF/UNIT JW/D-50

1. PROTECTIVE CASING YES NO

   LOCKING YES NO

2. CONCRETE SEAL YES NO

3. TYPE OF SURFACE SEAL (IF INSTALLED)
   Bentonite Pellets

4. SOLID PIPE TYPE Stainless/Galvanized Steel

   SOLID PIPE LENGTH 75.7 ft.

   JOINT TYPE SLIP/GLUED THREADED
   w/Teflon Tape on Joints

5. TYPE OF BACKFILL Bentonite Slurry

   HOW INSTALLED TREMIE FROM SURFACE

6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets

7. SCREEN TYPE Stainless Steel

   SCREEN LENGTH 5.0'

   SLOT-SIZE 0.010" LENGTH 4.5 ft.

   SCREEN DIAMETER 2.0 in.

8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand

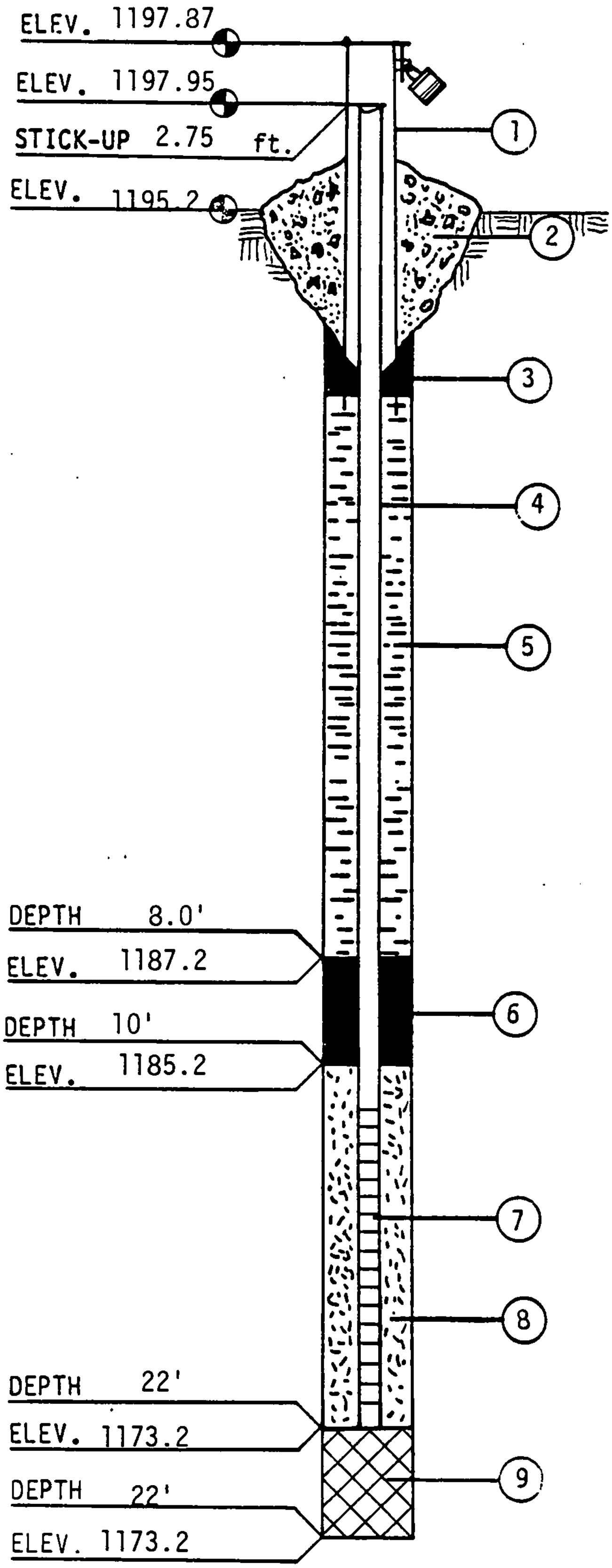
9. TYPE OF BACKFILL None

10. DRILLING METHOD RB/DM

11. ADDITIVES USED (IF ANY)
    None

WATER LEVEL - DATE

*ALL DEPTHS MEASURED FROM GROUND SURFACE.



WARZYN
ENGINEERING INC

MONITORING WELL CONSTRUCTION INFORMATION

JOB NO. 13076.25

BORING/WELL NO. E-21A

DATE 11/13/87

CHIEF/UNIT MK/CME 750

1. PROTECTIVE CASING YES NO
   LOCKING YES NO
2. CONCRETE SEAL YES NO
3. TYPE OF SURFACE SEAL (IF INSTALLED)
   - Granular Bentonite
4. SOLID PIPE TYPE Galvanized
   SOLID PIPE LENGTH 12 ft.
   JOINT TYPE SLIP/GLUED THREADED
5. TYPE OF BACKFILL Bentonite
   HOW INSTALLED - ~~TREMIE~~ FROM SURFACE
6. TYPE OF LOWER SEAL (IF INSTALLED)
   Bentonite Pellets
7. SCREEN TYPE Stainless Steel
   SCREEN LENGTH 10'
   SLOT-SIZE 0.010" LENGTH 10 ft.
   SCREEN DIAMETER 2.0 in.
8. TYPE OF BACKFILL AROUND SCREEN
   No. 30 Flint Sand
9. TYPE OF BACKFILL None
10. DRILLING METHOD HSA
11. ADDITIVES USED (IF ANY)
    None

WATER LEVEL ______ DATE ______

*ALL DEPTHS MEASURED FROM GROUND SURFACE.

APPENDIX D

SOIL GAS INVESTIGATION RESULTS

WAUSAU NPL RI/FS

TARGET SOIL GAS ANALYSES

	TOLUENE ng/L	1,1 DCE ng/L	1,2-DCE ng/L	TCE ng/L	PCE ng/L	BENZENE ng/L	ETH-BENZENE ng/L	MECL2 ng/L	1,1DCA ng/L	CHCL3 ng/L	1,2DCA ng/L	1,1,1TCA ng/L	BRCL2CH ng/L	CLBR2CH ng/L	BROMOFORM ng/L	TOTAL CHLOR ETHENES ng/L	TOTAL VOCS ng/L
DETECTION LIMIT (ng/L)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	2000	2000	1000	1000
LOCATIONS																	
10-13-87																	
SG1																	
SG2																	
SG3																	
SG4																	
SG5																	
SB1																	
10-14-87																	
SG6																	
SG7																	
SG8																	
SG9																	
SG9 DUP																	
SG10																	
SG11																	
SG12																	
SG13																	
SG14																	
SG15																	
SG16																	
SG17																	
SG18																	
SG19																	
SG20																	
SB2																	
10-15-87																	
SG21				BMDL	BMDL											BMDL	BMDL
SG22					BMDL											BMDL	BMDL
SG23					BMDL											BMDL	BMDL
SG24					BMDL											BMDL	BMDL
SG25					BMDL											BMDL	BMDL
SG26					BMDL											BMDL	BMDL
SG27					BMDL											BMDL	BMDL
SG28					BMDL											BMDL	BMDL
SB3 (1)					BMDL											BMDL	BMDL
SG29																	
SG30																	
SG31																	
SG32																	
SG33																	
SG33																	
SG34				BMDL												BMDL	BMDL
SG35																	
SB36																	
10-16-87																	
SG21REPEAT																	
SG21REPEAT																	
SG25REPEAT																	
SG37																	
SG37DUP																	
SB04																	

WAUSAU NPL RI/FS

TARGET SOIL GAS ANALYSES

	TOLUENE ng/L	1,1 DCE ng/L	1,2-DCE ng/L	TCE ng/L	PCE ng/L	BENZENE ng/L	ETH-BENZENE ng/L	MECL2 ng/L	1,1DCA ng/L	CHCL3 ng/L	1,2DCA ng/L	1,1,1TCA ng/L	BRCL2CH ng/L	CLBR2CH ng/L	BROMOFORM ng/L	TOTAL CHLOR ETHENES ng/L	TOTAL VOCS ng/L
DETECTION LIMIT (ng/L)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	2000	2000	1000	1000
LOCATIONS																	
S638																	
S639						BMDL											BMDL
S640						BMDL											BMDL
S641																	
S642																	
S643						BMDL											BMDL
S644																	
S645																	
S646																	
S647																	
S648																	
S649												BMDL					
10-19-87																	
S650				BMDL													
S651																	
S652																	
S653																	
S654																	
S655																	
S656																	
10-20-87																	
S657	OVERANGE ESTIMATED VALUE		BMDL	244000	4080000							2580				4324000	4324000
	S658-S663 WERE RERUN DUE TO CARRY OVER CONTAMINATION FROM S657																
SB05	GROSS PCE CONTAMINATION																
10-21-87																	
S658REP																	
S659REP																	
S660REP																	
S661REP																	
S662REP						BMDL											BMDL
S663REP																	
S663DUPREP																	
S664					5300											5300	5300
S665					BMDL											BMDL	BMDL
S666																	
S667																	
SB06					BMDL											BMDL	BMDL
S668																	
S669																	
S670	1244																1244
S671																	
S672																	
S673					BMDL											BMDL	BMDL
S674					2340											2340	2340
S674DUP					3000											3000	3000
SB07++					BMDL											BMDL	BMDL
10-22-87																	
S675					BMDL											BMDL	BMDL
S676					BMDL							BMDL				BMDL	BMDL
S677				BMDL	1294								BMDL			1294	1294
S677DUP				BMDL	1324								BMDL			1324	1324

WAUSAU NPL RI/FS

TARGET SOIL GAS ANALYSES

	TOLUENE ng/L	1,1 DCE ng/L	1,2-DCE ng/L	TCE ng/L	PCE ng/L	BENZENE ng/L	ETH-BENZENE ng/L	MECL2 ng/L	1,1DCA ng/L	CHCL3 ng/L	1,2DCA ng/L	1,1,1TCA ng/L	BRCL2CH ng/L	CLBR2CH ng/L	BROMOFORM ng/L	TOTAL CHLOR ETHENES ng/L	TOTAL VOCS ng/L
DETECTION LIMIT (ng/L)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	2000	2000	1000	1000
LOCATIONS																	
S678																	
S679																	
S680																	
S681					BMDL											BMDL	BMDL
S682					BMDL											BMDL	BMDL
S683																	
S684																	
S685																	
S808																	
10-23-87																	
S686					BMDL											BMDL	BMDL
S687					BMDL											BMDL	BMDL
S668		BMDL			1606											1606	1606
S689																	
S690																	
S691																	
S692					6320							BMDL				6320	6320
S693					4600											4600	4600
S693DUP					3940											3940	3940
S694					5280											5280	5280
S695					12960											12960	12960
S696					8440											8440	8440
S809					BMDL											BMDL	BMDL
S697					BMDL											BMDL	BMDL
S698					BMDL											BMDL	BMDL
S699					2660											2660	2660
10-26-87																	
S6100					BMDL											BMDL	BMDL
S6101				1004												1004	1004
S6102																	
S6103				BMDL												BMDL	BMDL
10-27-87																	
S6104																	
S6105				82000	BMDL											82000	82000
S6106				BMDL												BMDL	BMDL
S6107																	
S6107DUP																	
S610																	
S6108																	
S6109																	
10-28-87																	
S6110																	
S6111																	
S6112																	
S6113	5260																
S6113DUP	6120																6120
S6114																	
S6115				BMDL												BMDL	BMDL
S811																	
S6116																	
S6117																	

WAUSAU NPL RI/FS

TARGET SOIL GAS ANALYSES

	TOLUENE ng/L	1,1 DCE ng/L	1,2-DCE ng/L	TCE ng/L	PCE ng/L	BENZENE ng/L	ETH-BENZENE ng/L	MECL2 ng/L	1,1DCA ng/L	CHCL3 ng/L	1,2DCA ng/L	1,1,1TCA mg/L	BRCL2CH ng/L	CLBR2CH ng/L	BROMOFORM ng/L	TOTAL CHLOR ETHENES ng/L	TOTAL VOCS ng/L
DETECTION LIMIT (ng/L)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	2000	2000	1000	1000
LOCATIONS																	
S6118					8060											8060	6060
S6119					BMDL											BMDL	BMDL
S6120					BMDL											BMDL	BMDL
S6121	2060		1320	5800												7120	9180
S6122				4880												4880	4880
66123				2260												2260	2260
10-29-87																	
S6124				12640												12640	12640
S6125			BMDL	63600	BMDL											63600	63600
S6126				BMDL	BMDL											BMDL	BMDL
S6127				BMDL	37600											37600	37600
S6128				BMDL	8240											8240	6240
SB					BMDL											BMDL	BMDL
S6129				11000	39600											50600	50600
S6129 DUP#				3900	24200											28100	28100
S6130					BMDL											BMDL	BMDL
S6131					BMDL											BMDL	BMDL
11-10-87																	
S6132																	
SS133																	
S6134																	
S6135						3580											3580
S6136				BMDL												BMDL	BMDL
SS137												BMDL					BMDL
S6138																	
S6139					BMDL											BMDL	BMDL
S6140				BMDL												BMDL	BMDL
S6141				65800	BMDL							<BMDL				65800	65800
S6142				11000	BMDL											11000	11000
S6143				BMDL												BMDL	BMDL
S6143DUP																	
11-11-87																	
S6144																	
S6144DUP												BMDL					BMDL
S6145																	
S6146																	
S6147					BMDL											BMDL	BMDL
S6148																	
S6149																	
S6150	COULD NOT DRIVE SOIL GAS PROBE																
S6151																	

NOTES
* S616, S616, S619 CONTAINED UNIDENTIFIED COMPOUND PEAK IN PID CHROMATOGRAM
BMDL BELOW MINIMUM REPORTABLE DETECTION LIMIT
++ SB07 RAN USING BOMB FROM S657
# DILUTED 1:50
S621,S622,S623,S624,S625,S626,S627,S628,SB3 CONTAIN PCE CARRY OVER FROM WATER SAMPLE ANALYZED EARLIER ON SAME DAY

APPENDIX E

RESULTS OF ROUND 1 SAMPLE DESCRIPTIONS AND GENERAL WATER QUALITY PARAMETER ANALYSES

WAUSAU NPL
WEST SIDE
ROUND 1 (SEPT. - OCT. 1987)

Well #	pH	Conductivty at 25°	Odor	Color	Turbidity
C2S	6.25	388	None	Clear	None
C4D	5.84	342	None	Clear	Slight
W1A	9.64	227	None	Clear	Slight
W3A	6.95	140	None	Clear	None
W3B	7.27	146	None	Clear	None
W4A	5.88	347	None	Clear	Slight
W4B	6.43	238	None	Clear	None
W4C	6.17	227	None	Clear	None
W7	6.70	350	None	Clear	None
W9	6.15	285	None	Clear	None
R1S	6.30	271	None	Clear	None
R1D	5.85	283	None	Clear	Slight
R1D dup	5.90	283	None	Clear	Slight
R2S	6.54	171	None	Lt. brown	None
R2D	6.38	277	None	Lt. brown	Slight
R3S	6.26	200	None	Clear	None
R3D	6.46	257	None	Clear	None
R4D	6.05	338	None	Lt. brown	Moderate
GM1S	6.16	157	None	Lt. brown	Slight
GM1S dup	6.23	157	None	Lt. brown	Slight
GM4S	6.12	173	None	Lt. brown	Moderate
GM4D	6.81	185	None	Clear	None
GM4D dup	6.79	188	None	Clear	None
PDTW	6.52	230	None	Clear	None
Pumping Wells					
CW6	6.80	166	None	Clear	None
CW7	7.00	144	None	Clear	None
CW9	6.73	166	None	Clear	None

WAUSAU NPL
EAST WELLS
ROUND 1 (SEPT. - OCT. 1987)

Well #	pH	Conductivty at 25°	Odor	Color	Turbidity
WC1			No sample was obstructed at 5'		
WC2	6.84	220	None	Brown	Moderate
WC3	6.85	301	None	Clear	None
WC3A	7.17	113	Sulfur	Clear	None
WC3B	7.17	159	None	Lt. brown	Slight
WC3C	6.76	116	Sulfur	Clear	None
WC4	6.70	152	Metallic	Clear	Slight
WC4 dup	6.74	155	Metallic	Clear	Slight
WC4A	6.67	170	Musty	Brown	Moderate
WC5	6.79	154	None	Clear	None
WC5A	6.46	197	None	Lt. brown	Slight
WC6	7.02	136	None	Lt. brown	Slight
WC6A	6.89	210	Chemical	Brown	Moderate
WC7	6.95	158	None	Clear	None
WC7A	7.26	223	Sulfur	Brown	Very
MW7A	6.95	171	None	Clear	None
MW10A	6.42	483	None	Clear	Slight
MW10B	7.03	318	None	Clear	None
MW10B dup	7.04	318	None	Clear	None
MW11	6.23	280	None	Clear	None
MW13	6.68	570	None	Clear	None
WW5	5.96	500	None	Lt. brown	Moderate
WW6	6.81	166	None	Lt. gray	Slight
WW7	6.34	320	None	Clear	None
WW7 dup	6.43	320	None	Clear	None
FVD1	6.23	210	Fuel oil	Clear	Slight

WAUSAU NPL
EAST WELLS
ROUND 1 (SEPT. - OCT. 1987)
(Continued)

Well #	pH	Conductivty at 25°	Odor	Color	Turbidity
FVD2	6.16	210	Fuel oil	Dk. brown	Very
FVD5	6.17	256	Fuel oil	Clear	None
FVD7	5.98	246	Musty	Lt. brown	Slight
FVD7 dup	5.98	246			
GM5D	6.47	340	None	Clear	Slight
GM6D	6.72	267	None	Clear	Slight
GM7D	6.52	407	None	Clear	None
GM8D	6.92	145	None	Clear	Moderate
GM9S	6.28	392	None	Clear	None
Pumping Wells					
CW3	6.80	225	None	Clear	None
CW4	---	---	None	Clear	None
Wergin	6.88	151	None	Rusty	Moderate
Blanks					
SB01	6.23	<10	None	Clear	None
SB02	6.93	<10	None	Clear	None
SB03	7.00	<10	None	Clear	None
SB04	6.00	<10	None	Clear	None
SB05	6.95	<10	None	Clear	None
SB06	7.60	<10	None	Clear	None

SGW2/kam/CSR
[kam-400-50c]

WARZYN

WARZYN ENGINEERING INC. • ONE SCIENCE COURT • UNIVERSITY RESEARCH PARK • P.O. BOX 5385 • MADISON, WISCONSIN 53705 • (608) 273-0440

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 2-16-88

COMPOUND (MG/L)	WE-GGM4S-01 09/29/87	WE-GGM4D-01 09/29/87	WE-GPDTW-01 09/29/87	WE-GW7-01 09/29/87	WE-GW3B-01 09/29/87	WE-GW3A-01 09/29/87	WE-GW1A-01 09/29/87
CALCIUM	10.32	22.58	23.22	25.74	14.94	16.22	47.29
POTASSIUM	0.48 J	0.46 J	0.57 J	4.86 J	0.44 J	1.14 J	1.40 J
MAGNESIUM	3.32	7.97	9.85	8.06	5.76	2.88	1.25
SODIUM	3.32	3.23	5.97	18.95	3.65	3.63	3.36
IRON	0.13 B	0.05 B	0.18 B	0.09 B	0.08 B	0.09 B	0.05 B
CHLORIDE	4.20	3.60	3.10	79.00	6.00	5.60	5.50
TOTAL ORGANIC CARBON	2.50 J	2.00	2.00 UJ	2.00 UJ	4.40 J	6.00 J	2.00 UJ
TOTAL KJELDAHL NITROGEN	0.10	0.20	0.10 U	0.10	0.20	0.70	0.10
SULFATE	7.70	5.00 U	13.00	21.00	13.00	5.00 U	5.00
ALKALINITY	40.00	92.00	106.00	34.00	54.00	64.00	71.00
NITRATE + NITRITE NITROGEN	0.10 U	0.10 U	1.00	1.70	0.10 U	0.10 U	0.10 U
AMMONIA NITROGEN	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.40	0.10 U

U = ANALYZED, BUT NOT DETECTED.
J = ESTIMATED VALUE.
B = COMPOUND ALSO DETECTED IN BLANK.

WARZYN

WARZYN ENGINEERING INC. • ONE SCIENCE COURT • UNIVERSITY RESEARCH PARK • P.O. BOX 5385 • MADISON, WISCONSIN 53705 • (608) 273-0440

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 2-16-88

COMPOUND (MG/L)	WE-GGM1S-01 09/29/87	WE-GW4B-01 09/29/87	WE-GW4A-01 09/29/87	WE-GW4A-01 09/29/87	WE-SB01-01 09/29/87	WE-GC4D-01 09/29/87	WE-GGM1S-91 09/29/87
CALCIUM	15.51	20.39	13.95	31.28	0.25	31.75	14.07
POTASSIUM	5.14 J	2.25 J	1.57 J	0.77 J	0.01 J	1.14 J	5.11 J
MAGNESIUM	3.97	5.70	3.33	11.48	0.04	8.19	3.73
SODIUM	3.16	11.99	16.31	11.26	0.28	9.37	3.14
IRON	0.05 B	0.18 B	0.07 B	0.29 B	0.05 B	0.05 B	0.05 B
CHLORIDE	5.30	36.00	48.00	51.00	0.50 U	33.00	5.40
TOTAL ORGANIC CARBON	2.00 UJ	2.00 UJ	2.00 UJ	2.00 UJ	2.00 UJ	2.00 UJ	2.00 UJ
TOTAL KJELDAHL NITROGEN	0.20	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.20
SULFATE	13.00	15.00	10.00	14.00	5.00 U	30.00	14.00
ALKALINITY	40.00	39.00	28.00	88.00	2.30	45.00	39.00
NITRATE + NITRITE NITROGEN	2.50	0.70	0.70	0.20	0.10 U	9.20	2.50
AMMONIA NITROGEN	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U

U = ANALYZED, BUT NOT DETECTED.
J = ESTIMATED VALUE.
B = COMPOUND ALSO DETECTED IN BLANK.

WARZYN

WARZYN ENGINEERING INC. • ONE SCIENCE COURT • UNIVERSITY RESEARCH PARK • P.O. BOX 5385 • MADISON, WISCONSIN 53705 • (608) 273-0440

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 2-16-88

COMPOUND (MG/L)	WE-GR1D-01 09/30/87	WE-GR1S-01 09/30/87	WE-GGM5D-01 09/30/87	WE-GGM6D-01 09/30/87	WE-GGM9S-01 09/30/87	WE-GMW11-01 09/30/87	WE-SB03-01 09/30/87
CALCIUM	23.78	19.72	34.73	26.32	20.05	28.19	0.22
POTASSIUM	1.18 J	6.78 J	0.73 J	0.67 J	4.75 J	3.08 J	0.01 UJ
MAGNESIUM	7.45	6.22	13.98	10.57	3.94	7.25	0.03
SODIUM	10.15	13.54	6.82	5.74	46.29	14.61	0.22
IRON	0.05 B	0.05 B	0.10 B	0.06 B	0.05 B	5.23 B	0.05 B
CHLORIDE	25.00	69.00	79.00	54.00	68.00	69.00	0.50 U
TOTAL ORGANIC CARBON	2.00 UJ	2.00 UJ	2.00 UJ	2.00 UJ	2.10 J	2.00 UJ	2.00 UJ
TOTAL KJELDAHL NITROGEN	0.10 J	0.30 J	0.20 J	0.10 UJ	0.30 J	0.30 J	0.10 UJ
SULFATE	29.00	30.00	31.00	23.00	31.00	27.00	5.00 U
ALKALINITY	39.00	47.00	50.00	43.00	45.00	27.00	2.40
NITRATE + NITRITE NITROGEN	6.80	4.20	1.20	0.70	1.90	1.00	0.10 U
AMMONIA NITROGEN	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10	0.10 U

U = ANALYZED, BUT NOT DETECTED.
J = ESTIMATED VALUE.
B = COMPOUND ALSO DETECTED IN BLANK.

WARZYN

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: OAW APP'D: CSR
DATE ISSUED: 2-18-88

COMPOUND (MG/L)	WE-GW9-01 09/30/87	WE-GR3D-01 09/30/87	WE-GR3S-01 09/30/87	WE-GGM8D-01 09/30/87	WE-GGM7D-01 09/30/87	WE-GWW7-01 09/30/87	WE-GCW3-01 09/30/87
CALCIUM	16.37	22.06	16.31	13.97	46.29	33.56	20.97
POTASSIUM	1.48 J	0.69 J	2.38 J	0.48 J	0.72 J	2.10 J	1.29 J
MAGNESIUM	6.73	9.18	4.58	4.82	19.60	6.30	5.87
SODIUM	15.08	7.06	9.68	3.43	6.93	13.00	8.42
IRON	15.04 B	0.10 B	2.09 B	0.18 B	0.14 B	0.05 B	1.58 B
CHLORIDE	56.00	33.00	26.00	39.00	49.00	67.00	23.00
TOTAL ORGANIC CARBON	2.00 UJ	2.00 UJ	5.80 J	4.50 J	2.00 UJ	2.00 J	3.30 J
TOTAL KJELDAHL NITROGEN	0.30 J	0.20 J	0.60 J	0.20 J	0.10 J	0.20 J	0.70 J
SULFATE	21.00	24.00	11.00	5.70	53.00	14.00	13.00
ALKALINITY	27.00	36.00	55.00	65.00	126.00	62.00	71.00
NITRATE + NITRITE NITROGEN	0.10 U	0.80	0.10 U	0.10 U	0.10 U	0.20	0.60
AMMONIA NITROGEN	0.10	0.10 U	0.10 U	0.10	0.10	0.10 U	0.40

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 2-16-88

COMPOUND (MG/L)	WE-GR1D-91 09/30/87	WE-SB02-01 09/30/87	WE-GCW6-10 09/30/87	WE-GCW7-01 09/30/87	WE-GCW9-10 09/30/87	WE-GMW7A-01 09/30/87	WE-GMW13-01 10/01/87
CALCIUM	23.36	0.21	16.00	14.44	16.04	20.40	47.09
POTASSIUM	1.24 J	0.01 UJ	0.90 J	0.68 J	0.68 J	0.54 J	4.57
MAGNESIUM	7.43	0.03	5.49	4.91	5.53	6.33	10.44
SODIUM	10.59	0.22	5.35	3.75	6.88	3.48	27.44
IRON	0.05 B	0.05 B	1.04 B	0.47 B	0.28 B	0.06 B	9.06
CHLORIDE	41.00	0.50 U	29.00	6.60	8.70	6.90	127.00
TOTAL ORGANIC CARBON	2.00 UJ	2.00 UJ	2.60 J	3.00 J	2.00 UJ	2.00 UJ	2.10
TOTAL KJELDAHL NITROGEN	0.10 J	0.10 UJ	0.30 J	0.30	0.10	0.10	2.30
SULFATE	28.00	5.00 U	7.70	8.00	14.00	11.00	26.00
ALKALINITY	39.00	2.00 U	59.00	59.00	60.00	74.00	87.00
NITRATE + NITRITE NITROGEN	6.40	0.10 U	0.20	0.10 U	0.70	0.10 U	0.10 U
AMMONIA NITROGEN	0.10 U	0.10 U	0.10 U	0.10	0.10 U	0.10 U	2.00

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: DAW APP'D: CSR
DATE ISSUED: 2-16-88

COMPOUND (MG/L)	WE-GMW13-01 10/01/87	WE-GWW7-91 09/30/87	WE-GMW10A-01 10/01/87	WE-GMW10B-01 10/01/87	WE-GC2S-01 10/01/87	WE-GR4D-01 10/01/87	WE-GR2S-01 10/01/87
CALCIUM	47.09	32.94	49.84	30.91	38.26	23.07	15.70
POTASSIUM	4.57 J	2.14 J	3.61 J	1.44 J	1.30 J	1.48 J	2.16 J
MAGNESIUM	10.44	6.26	10.60	8.61	9.34	14.27	4.82
SODIUM	27.44	13.33	12.88	3.66	14.55	11.58	5.40
IRON	9.06 B	0.08 B	1.79 B	7.77 B	0.09 B	0.07 B	0.21 B
CHLORIDE	127.00	59.00	93.00	46.00	60.00	64.00	15.00
TOTAL ORGANIC CARBON	2.10 J	2.00 UJ	2.00 UJ	5.00 J	2.00 UJ	2.00 UJ	2.00 UJ
TOTAL KJELDAHL NITROGEN	2.30	0.20	0.20	1.00	0.20	0.30	0.20
SULFATE	26.00	15.00	24.00	16.00	22.00	33.00	8.70
ALKALINITY	87.00	64.00	84.00	97.00	48.00	41.00	53.00
NITRATE + NITRITE NITROGEN	0.10 U	0.20	0.80	0.10 U	11.00	2.80	0.20
AMMONIA NITROGEN	2.00	0.10 U	0.10 U	0.80	0.10 U	0.10 U	0.10

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: CMW APP'D: CSR
DATE ISSUED: 2-16-88

COMPOUND (MG/L)	WE-6R2D-01 10/01/87	WE-6FVD2-01 10/01/87	WE-6FVD1-01 10/01/87	WE-6MVD5-01 10/01/87	WE-6MW10B-01 10/01/87	WE-SB04-01 10/01/87	WE-6FVD7-01 10/01/87
CALCIUM	23.80	19.02	18.44	21.39	31.65	0.22	27.02
POTASSIUM	0.85 J	2.21 J	1.97 J	1.99 J	1.44 J	0.01 UJ	3.44 J
MAGNESIUM	11.22	3.09	3.69	3.28	8.77	0.04	4.46
SODIUM	6.34	5.37	5.13	5.60	3.63	0.30	9.36
IRON	0.06 B	23.07 B	15.41 B	26.58 B	7.70 B	0.07 B	0.06 B
CHLORIDE	47.00	15.00	16.00	29.00	44.00	0.50 U	11.00
TOTAL ORGANIC CARBON	2.00 UJ	20.00 J	4.10 J	5.60 J	5.00 J	2.00 UJ	3.80 J
TOTAL KJELDAHL NITROGEN	0.10 U	5.10	0.80	0.60	1.10	0.10 U	0.50
SULFATE	33.00	17.00	14.00	23.00	16.00	5.00 U	45.00
ALKALINITY	48.00	46.00	73.00	77.00	96.00	2.00 U	58.00
NITRATE + NITRITE NITROGEN	0.10 U	0.10	0.10	0.10 U	0.10 U	0.10 U	1.40
AMMONIA NITROGEN	0.10 U	0.70	0.30	0.40	0.80	0.10 U	0.10 U

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: BAW APP'D: CSR
DATE ISSUED: 2-16-88

COMPOUND (MG/L)	WE-GFVD7-91 10/01/87	WE-SB05-01 10/01/87	WE-GWW6-01 10/01/87	WE-GWERG-01 10/01/87	WE-GWW5-01 10/06/87	WE-GWC4-01 10/06/87	WE-GWC4A-01 10/06/87
CALCIUM	26.66	0.23	16.19	16.77	32.40	14.07	13.93
POTASSIUM	3.45 J	0.01 UJ	1.65 J	0.73 J	1.59 J	0.77 J	1.04 J
MAGNESIUM	4.43	0.03	3.87	4.56	9.03	3.36	5.16
SODIUM	9.18	0.28	3.80	3.16	42.46	4.44	7.93
IRON	0.06 B	0.05 B	0.55 B	0.25 B	0.05 B	8.36 B	7.91 B
CHLORIDE	8.90	0.50 U	6.40	6.40	127.00	10.00	13.00
TOTAL ORGANIC CARBON	4.00 J	2.00 UJ	6.90 J	7.90 J	2.00 UJ	6.60 J	5.00 J
TOTAL KJELDAHL NITROGEN	0.30	0.10 U	0.90	1.00	0.50	1.30	0.50
SULFATE	45.00	5.00 U	8.20	6.70	31.00	11.00	12.00
ALKALINITY	57.00	2.40	67.00	73.00	32.00	61.00	61.00
NITRATE + NITRITE NITROGEN	1.30	0.10 U	0.10 U	0.10 U	6.10	0.10 U	0.10 U
AMMONIA NITROGEN	0.10 U	0.10 U	0.60	0.20	0.10 U	1.00	0.20

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 2-16-88

COMPOUND (MG/L)	WE-GWC7-01 10/06/87	WE-GWC7A-01 10/06/87	WE-GWC3C-01 10/06/87	WE-GWC3-01 10/06/87	WE-GWC3A-01 10/06/87	WE-GWC2-01 10/07/87	WE-GWC5-01 10/07/87
CALCIUM	14.65	32.01	11.33	35.13	11.43	10.13	15.47
POTASSIUM	0.87 J	1.24 J	0.79 J	0.82 J	0.91 J	1.24 J	1.19 J
MAGNESIUM	4.35	4.57	2.80	13.68	2.45	2.78	3.16
SODIUM	3.86	8.26	3.56	12.23	3.15	9.00	4.03
IRON	9.43 B	3.04 B	5.88 B	0.17 B	6.14 B	18.87 B	3.96 B
CHLORIDE	11.00	17.00	4.70	46.00	4.00	12.00	6.40
TOTAL ORGANIC CARBON	7.00 J	8.50 J	6.00 J	2.00 UJ	6.60 J	12.00 J	7.20 J
TOTAL KJELDAHL NITROGEN	1.60	2.10	1.10	0.10	1.10	1.90	1.20
SULFATE	11.00	5.00 U	11.00	35.00	9.40	6.30	6.80
ALKALINITY	61.00	136.00	46.00	106.00	52.00	61.00	69.00
NITRATE + NITRITE NITROGEN	0.10 U	0.10 U	0.10 U	0.50	0.10 U	0.20	0.10 U
AMMONIA NITROGEN	1.00	1.10	0.80	0.10 U	0.90	1.00	1.20

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
INORGANIC RESULTS

CK'D: DAW APP'D: CSR
DATE ISSUED: 2-16-88

COMPOUND (MG/L)	WE-GWC5A-01 10/07/87	WE-GWC3B-01 10/07/87	WE-GWC6-01 10/07/87	WE-GWC6A-01 10/07/87	WE-GWC4-91 10/07/87	WE-SB06-01 10/07/87
CALCIUM	12.76	10.39	10.09	16.04	14.14	0.19
POTASSIUM	1.02 J	0.91 J	0.70 J	1.89 J	0.78 J	0.01 UJ
MAGNESIUM	4.57	2.44	1.97	3.23	3.38	0.03
SODIUM	4.72	4.40	3.57	7.76	4.38	0.17
IRON	16.02 B	9.02 B	7.66 B	16.72 B	8.60 B	0.11 B
CHLORIDE	9.20	6.60	5.90	9.70	10.00	0.50 U
TOTAL ORGANIC CARBON	9.50 J	10.00 J	9.40 J	12.00 J	6.00 J	2.00 UJ
TOTAL KJELDAHL NITROGEN	1.50	1.90	1.20	1.10	1.20	0.10 U
SULFATE	15.00	13.00	13.00	13.00	11.00	5.00 U
ALKALINITY	62.00	48.00	43.00	72.00	60.00	2.00 U
NITRATE + NITRITE NITROGEN	0.10	0.10	0.10 U	0.10 U	0.10 U	0.10 U
AMMONIA NITROGEN	0.90	0.90	1.00	0.60	1.10	0.10 U

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APPENDIX F

RESULTS OF ROUND 1
VOLATILE ORGANIC COMPOUND ANALYSES

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-GGM4D-01 09/29/87	WE-GPDTW-01 09/29/87	WE-GW7-01 09/29/87	WE-GW3B-01 09/29/87	WE-GW3A-01 09/29/87	WE-GW1A-01 09/29/87	WE-GGM1S-01 09/29/87
CHLOROMETHANE	10.0							
BROMOMETHANE	10.0							
VINYL CHLORIDE	10.0							
CHLOROETHANE	1.5							
METHYLENE CHLORIDE	1.0							
ACETONE	7.5	UJ 5	UJ 5	UJ 5	UJ 8	UJ 5	UJ 6	UJ 4
CARBON DISULFIDE	3.0							
1, 1-DICHLOROETHENE	1.5							
1, 1-DICHLOROETHANE	1.5							
TRANS-1, 2-DICHLOROETHENE	1.5							
CHLOROFORM	1.5							
1, 2-DICHLOROETHANE	1.5							
2-BUTANONE	50.0							
1, 1, 1-TRICHLOROETHANE	1.5							
CARBON TETRACHLORIDE	1.5							
VINYL ACETATE	15.0							
BROMODICHLOROMETHANE	1.5							
1, 2-DICHLOROPROPANE	1.5							
TRANS-1, 3-DICHLOROPROPENE	1.0							
TRICHLOROETHENE	1.5							
DIBROMOCHLOROMETHANE	1.5							
1, 1, 2-TRICHLOROETHANE	1.5							
BENZENE	1.5							
cis-1, 3-DICHLOROPROPENE	2.0							
2-CHLOROETHYLVINYLETHER	1.5							
BROMOFORM	1.5							
4-METHYL-2-PENTANONE	3.0							
2-HEXANONE	50.0							
TETRACHLOROETHENE	3.0							
TOLUENE	1.5						2	
CHLOROBENZENE	1.5							
ETHYLBENZENE	1.5							
STYRENE	1.0							
TOTAL XYLENES	2.5							
ACROLEIN	150.0							
ACRYLONITRILE	150.0							

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LOCATION: WAUSAU, WISCONSIN
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ORGANIC RESULTS

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COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-GW4B-01 09/29/87	WE-GW4C-01 09/29/87	WE-GW4A-10 09/29/87	WE-SB01-01 09/29/87	WE-GC40-01 09/29/87	WE-GGM1S-91 09/29/87	WE-TB01-01 09/29/87
CHLOROMETHANE	10.0							
BROMOMETHANE	10.0							
VINYL CHLORIDE	10.0							
CHLOROETHANE	1.5							
METHYLENE CHLORIDE	1.0	2		2	UJ 4	UJ 1	UJ 1	UJ 3
ACETONE	7.5	UJ 9	UJ 3	UJ 8				
CARBON DISULFIDE	3.0							
1, 1-DICHLOROETHENE	1.5							
1, 1-DICHLOROETHANE	1.5							
TRANS-1, 2-DICHLOROETHENE	1.5					9		
CHLOROFORM	1.5				J 1			7
1, 2-DICHLOROETHANE	1.5							
2-BUTANONE	50.0							
1, 1, 1-TRICHLOROETHANE	1.5							
CARBON TETRACHLORIDE	1.5							
VINYL ACETATE	15.0							
BROMODICHLOROMETHANE	1.5							
1, 2-DICHLOROPROPANE	1.5							
TRANS-1, 3-DICHLOROPROPENE	1.0							
TRICHLOROETHENE	1.5	J 1				34		
DIBROMOCHLOROMETHANE	1.5							
1, 1, 2-TRICHLOROETHANE	1.5							
BENZENE	1.5							
cis-1, 3-DICHLOROPROPENE	2.0							
2-CHLOROETHYLVINYLETHER	1.5							
BROMOFORM	1.5							
4-METHYL-2-PENTANONE	3.0							
2-HEXANONE	50.0							
TETRACHLOROETHENE	3.0							
TOLUENE	1.5	3	J 1	J 1	J 1	J 1		2
CHLOROBENZENE	1.5							
ETHYLBENZENE	1.5							
STYRENE	1.0							
TOTAL XYLENES	2.5							
ACROLEIN	150.0							
ACRYLONITRILE	150.0							

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-GR1D-01 09/30/87	WE-GR1S-01 09/30/87	WE-GGM5D-01 09/30/87	WE-GGM6D-01 09/30/87	WE-GGM9S-01(2) 09/30/87	WE-GMW11-01 09/30/87
CHLOROMETHANE	10.0						
BROMOMETHANE	10.0						
VINYL CHLORIDE	10.0						
CHLOROETHANE	1.5						
METHYLENE CHLORIDE	1.0	UJ 2	UJ 3	UJ 2	UJ 1	UJ 200	UJ 3
ACETONE	7.5		J 7		J 6		
CARBON DISULFIDE	3.0						
1, 1-DICHLOROETHENE	1.5						
1, 1-DICHLOROETHANE	1.5						
TRANS-1, 2-DICHLOROETHENE	1.5				J 1		
CHLOROFORM	1.5						
1, 2-DICHLOROETHANE	1.5						
2-BUTANONE	50.0						
1, 1, 1-TRICHLOROETHANE	1.5						
CARBON TETRACHLORIDE	1.5						
VINYL ACETATE	15.0						
BROMODICHLOROMETHANE	1.5						
1, 2-DICHLOROPROPANE	1.5						
TRANS-1, 3-DICHLOROPROPENE	1.0						
TRICHLOROETHENE	1.5			10	2		J 1
DIBROMOCHLOROMETHANE	1.5						
1, 1, 2-TRICHLOROETHANE	1.5						
BENZENE	1.5						
cis-1, 3-DICHLOROPROPENE	2.0						
2-CHLOROETHYLVINYLETHER	1.5						
BROMOFORM	1.5						
4-METHYL-2-PENTANONE	3.0						
2-HEXANONE	50.0						
TETRACHLOROETHENE	3.0					J 2440	16
TOLUENE	1.5		4				5
CHLOROBENZENE	1.5						
ETHYLBENZENE	1.5						
STYRENE	1.0						
TOTAL XYLENES	2.5						
ACROLEIN	150.0						
ACRYLONITRILE	150.0						

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-SB03-01 09/30/87	WE-GW9-01 09/30/87	WE-GR3D-01 09/30/87	WE-GR3S-01 09/30/87	WE-GGM8D-01 09/30/87	WE-GGM7D-01 09/30/87
CHLOROMETHANE	10.0						
BROMOMETHANE	10.0						
VINYL CHLORIDE	10.0						
CHLOROETHANE	1.5						
METHYLENE CHLORIDE	1.0	UJ 2	UJ 2	UJ 2	UJ 1	UJ 1	UJ 2
ACETONE	7.5						
CARBON DISULFIDE	3.0						
1, 1-DICHLOROETHENE	1.5						
1, 1-DICHLOROETHANE	1.5						
TRANS-1, 2-DICHLOROETHENE	1.5				2		5
CHLOROFORM	1.5	16					
1, 2-DICHLOROETHANE	1.5						
2-BUTANONE	50.0						
1, 1, 1-TRICHLOROETHANE	1.5						
CARBON TETRACHLORIDE	1.5						
VINYL ACETATE	15.0						
BROMODICHLOROMETHANE	1.5						
1, 2-DICHLOROPROPANE	1.5						
TRANS-1, 3-DICHLOROPROPENE	1.0						
TRICHLOROETHENE	1.5			7	J 33		5
DIBROMOCHLOROMETHANE	1.5						
1, 1, 2-TRICHLOROETHANE	1.5						
BENZENE	1.5						
cis-1, 3-DICHLOROPROPENE	2.0						
2-CHLOROETHYLVINYLETHER	1.5						
BROMOFORM	1.5						
4-METHYL-2-PENTANONE	3.0						
2-HEXANONE	50.0						
TETRACHLOROETHENE	3.0	2					2
TOLUENE	1.5	2					
CHLOROBENZENE	1.5						
ETHYLBENZENE	1.5						
STYRENE	1.0						
TOTAL XYLENES	2.5						
ACROLEIN	150.0						
ACRYLONITRILE	150.0						

WARZYN

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: VAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-GWW7-01 09/30/87	WE-GCW3-01 09/30/87	WE-GR1D-91 09/30/87	WE-SB02-01 09/30/87	WE-GCW6-10 09/30/87	WE-GCW7-01 09/30/87
CHLOROMETHANE	10.0						
BROMOMETHANE	10.0						
VINYL CHLORIDE	10.0						
CHLOROETHANE	1.5						
METHYLENE CHLORIDE	1.0	UJ 4	UJ 6	UJ 5	UJ 2	UJ 2	UJ 3
ACETONE	7.5		J 16		UJ 6		UJ 9
CARBON DISULFIDE	3.0						
1, 1-DICHLOROETHENE	1.5						
1, 1-DICHLOROETHANE	1.5						
TRANS-1, 2-DICHLOROETHENE	1.5	3	6				
CHLOROFORM	1.5			J 1	J 25		
1, 2-DICHLOROETHANE	1.5						
2-BUTANONE	50.0						
1, 1, 1-TRICHLOROETHANE	1.5						
CARBON TETRACHLORIDE	1.5						
VINYL ACETATE	15.0						
BROMODICHLOROMETHANE	1.5						
1, 2-DICHLOROPROPANE	1.5						
TRANS-1, 3-DICHLOROPROPENE	1.0						
TRICHLOROETHENE	1.5	5	J 69			J 116	
DIBROMOCHLOROMETHANE	1.5						
1, 1, 2-TRICHLOROETHANE	1.5						
BENZENE	1.5						
cis-1, 3-DICHLOROPROPENE	2.0						
2-CHLOROETHYLVINYLETHER	1.5						
BROMOFORM	1.5						
4-METHYL-2-PENTANONE	3.0						
2-HEXANONE	50.0						
TETRACHLOROETHENE	3.0	55	10				
TOLUENE	1.5		4	3	J 1	2	
CHLOROBENZENE	1.5						
ETHYLBENZENE	1.5						
STYRENE	1.0						
TOTAL XYLENES	2.5						
ACROLEIN	150.0						
ACRYLONITRILE	150.0						

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-GCW9-01 09/30/87	WE-TB02-01 09/30/87	WE-GMW13-01 10/01/87	WE-GWW7-91 09/30/87	WE-GMW10A-01 10/01/87	WE-GMW10B-01 10/01/87
CHLOROMETHANE	10.0						
BROMOMETHANE	10.0						
VINYL CHLORIDE	10.0						
CHLOROETHANE	1.5						
METHYLENE CHLORIDE	1.0	UJ 4	UJ 2	UJ 1	UJ 2	UJ 4	UJ 4
ACETONE	7.5	UJ 13		UJ 4	UJ 20		
CARBON DISULFIDE	3.0						
1, 1-DICHLOROETHENE	1.5						
1, 1-DICHLOROETHANE	1.5						
TRANS-1, 2-DICHLOROETHENE	1.5				3		96
CHLOROFORM	1.5		J 28				
1, 2-DICHLOROETHANE	1.5						
2-BUTANONE	50.0						
1, 1, 1-TRICHLOROETHANE	1.5						
CARBON TETRACHLORIDE	1.5						
VINYL ACETATE	15.0						
BROMODICHLOROMETHANE	1.5		J 1				
1, 2-DICHLOROPROPANE	1.5						
TRANS-1, 3-DICHLOROPROPENE	1.0						
TRICHLOROETHENE	1.5			J 1	6		10
DIBROMOCHLOROMETHANE	1.5						
1, 1, 2-TRICHLOROETHANE	1.5						
BENZENE	1.5						
cis-1, 3-DICHLOROPROPENE	2.0						
2-CHLOROETHYLVINYLETHER	1.5						
BROMOFORM	1.5						
4-METHYL-2-PENTANONE	3.0						
2-HEXANONE	50.0						
TETRACHLOROETHENE	3.0			4	J 37	2	J 33
TOLUENE	1.5	5	2	J 1		4	3
CHLOROBENZENE	1.5						
ETHYLBENZENE	1.5						
STYRENE	1.0						
TOTAL XYLENES	2.5						
ACROLEIN	150.0						
ACRYLONITRILE	150.0						

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-GC2S-01(3) 10/01/87	WE-GR4D-01 10/01/87	WE-GR4D-01(1) 10/01/87	WE-GR2S-01 10/01/87	WE-GR2D-01(2) 10/01/87	WE-GFVD2-01(2) 10/01/87
CHLOROMETHANE	10.0						
BROMOMETHANE	10.0						
VINYL CHLORIDE	10.0						
CHLOROETHANE	1.5						
METHYLENE CHLORIDE	1.0	UJ 270	UJ 2	UJ 170	UJ 1	UJ 190	UJ 220
ACETONE	7.5	UJ 3000			UJ 9		UJ 2010
CARBON DISULFIDE	3.0						
1, 1-DICHLOROETHENE	1.5						
1, 1-DICHLOROETHANE	1.5						
TRANS-1, 2-DICHLOROETHENE	1.5		198	169	J 1		
CHLOROFORM	1.5		J 1				
1, 2-DICHLOROETHANE	1.5						
2-BUTANONE	50.0						
1, 1, 1-TRICHLOROETHANE	1.5						
CARBON TETRACHLORIDE	1.5						
VINYL ACETATE	15.0						
BROMODICHLOROMETHANE	1.5						
1, 2-DICHLOROPROPANE	1.5						
TRANS-1, 3-DICHLOROPROPENE	1.0						
TRICHLOROETHENE	1.5	1370	388	870	J 54	1020	
DIBROMOCHLOROMETHANE	1.5						
1, 1, 2-TRICHLOROETHANE	1.5						
BENZENE	1.5						250
cis-1, 3-DICHLOROPROPENE	2.0						
2-CHLOROETHYLVINYLETHER	1.5						
BROMOFORM	1.5						
4-METHYL-2-PENTANONE	3.0						
2-HEXANONE	50.0						
TETRACHLOROETHENE	3.0		5				
TOLUENE	1.5				J 1		
CHLOROBENZENE	1.5						
ETHYLBENZENE	1.5						
STYRENE	1.0						
TOTAL XYLENES	2.5						790
ACROLEIN	150.0						
ACRYLONITRILE	150.0						

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-GFVD1-01 10/01/87	WE-GMV05-01 10/01/87	WE-GMW10B-01 10/01/87	WE-SB04-01 10/01/87	WE-GFV07-01 10/01/87	WE-GFVD7-91 10/01/87
CHLOROMETHANE	10.0						
BROMOMETHANE	10.0						
VINYL CHLORIDE	10.0						
CHLOROETHANE	1.5						
METHYLENE CHLORIDE	1.0	UJ 3	UJ 2	UJ 3	UJ 4	UJ 3	UJ 2
ACETONE	7.5		J 3070	UJ 20			
CARBON DISULFIDE	3.0						
1, 1-DICHLOROETHENE	1.5						
1, 1-DICHLOROETHANE	1.5						
TRANS-1, 2-DICHLOROETHENE	1.5			J 86			
CHLOROFORM	1.5				J 22		
1, 2-DICHLOROETHANE	1.5						
2-BUTANONE	50.0						
1, 1, 1-TRICHLOROETHANE	1.5					3	3
CARBON TETRACHLORIDE	1.5						
VINYL ACETATE	15.0						
BROMODICHLOROMETHANE	1.5						
1, 2-DICHLOROPROPANE	1.5						
TRANS-1, 3-DICHLOROPROPENE	1.0						
TRICHLOROETHENE	1.5	2		14	2	19	18
DIBROMOCHLOROMETHANE	1.5						
1, 1, 2-TRICHLOROETHANE	1.5						
BENZENE	1.5	18					
cis-1, 3-DICHLOROPROPENE	2.0						
2-CHLOROETHYLVINYLETHER	1.5						
BROMOFORM	1.5						
4-METHYL-2-PENTANONE	3.0						
2-HEXANONE	50.0						
TETRACHLOROETHENE	3.0	J 23	19	J 40		J 94	J 90
TOLUENE	1.5			3	J 1	3	
CHLOROBENZENE	1.5						
ETHYLBENZENE	1.5						
STYRENE	1.0						
TOTAL XYLENES	2.5	16	J 319				
ACROLEIN	150.0						
ACRYLONITRILE	150.0						

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PROJECT: WAUSAU NPL
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ORGANIC RESULTS

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COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-SB05-01 10/01/87	WE-TB03-01 10/01/87	WE-GWW6-01 10/01/87	WE-GWERG-01 10/01/87	WE-GWW5-01 10/01/87	WE-GWC4-01 10/06/87
CHLOROMETHANE	10.0						
BROMOMETHANE	10.0						
VINYL CHLORIDE	10.0						
CHLOROETHANE	1.5						
METHYLENE CHLORIDE	1.0	UJ 2	UJ 2	UJ 2	UJ 2	UJ 2	UJ 2
ACETONE	7.5			UJ 23		UJ 7	UJ 14
CARBON DISULFIDE	3.0						
1, 1-DICHLOROETHENE	1.5						
1, 1-DICHLOROETHANE	1.5						
TRANS-1, 2-DICHLOROETHENE	1.5			J 1			
CHLOROFORM	1.5	19	J 24			6	
1, 2-DICHLOROETHANE	1.5						
2-BUTANONE	50.0						
1, 1, 1-TRICHLOROETHANE	1.5						
CARBON TETRACHLORIDE	1.5						
VINYL ACETATE	15.0						
BROMODICHLOROMETHANE	1.5	J 1	J 1				
1, 2-DICHLOROPROPANE	1.5						
TRANS-1, 3-DICHLOROPROPENE	1.0						
TRICHLOROETHENE	1.5			J 1		J 1	
DIBROMOCHLOROMETHANE	1.5						
1, 1, 2-TRICHLOROETHANE	1.5						
BENZENE	1.5						
cis-1, 3-DICHLOROPROPENE	2.0						
2-CHLOROETHYLVINYLETHER	1.5						
BROMOFORM	1.5						
4-METHYL-2-PENTANONE	3.0						
2-HEXANONE	50.0						
TETRACHLOROETHENE	3.0			2			
TOLUENE	1.5	3	2	2		J 1	
CHLOROBENZENE	1.5						
ETHYLBENZENE	1.5						
STYRENE	1.0						
TOTAL XYLENES	2.5						
ACROLEIN	150.0						
ACRYLONITRILE	150.0						

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-GWC4A-01 10/01/87	WE-GWC7-01 10/06/87	WE-GWC7A-01 10/06/87	WE-GWC3C-01 10/06/87	WE-GWC3-01 10/06/87	WE-GWC3A-01 10/06/87
CHLOROMETHANE	10.0						
BROMOMETHANE	10.0						
VINYL CHLORIDE	10.0						
CHLOROETHANE	1.5						
METHYLENE CHLORIDE	1.0	UJ 1	UJ 2	UJ 1	UJ 2	UJ 1	UJ 1
ACETONE	7.5	UJ 9	UJ 12		UJ 1	UJ 27	UJ 22
CARBON DISULFIDE	3.0						
1, 1-DICHLOROETHENE	1.5						
1, 1-DICHLOROETHANE	1.5						
TRANS-1, 2-DICHLOROETHENE	1.5						
CHLOROFORM	1.5						
1, 2-DICHLOROETHANE	1.5						
2-BUTANONE	50.0						
1, 1, 1-TRICHLOROETHANE	1.5						
CARBON TETRACHLORIDE	1.5						
VINYL ACETATE	15.0						
BROMODICHLOROMETHANE	1.5						
1, 2-DICHLOROPROPANE	1.5						
TRANS-1, 3-DICHLOROPROPENE	1.0						
TRICHLOROETHENE	1.5						
DIBROMOCHLOROMETHANE	1.5						
1, 1, 2-TRICHLOROETHANE	1.5						
BENZENE	1.5						
cis-1, 3-DICHLOROPROPENE	2.0						
2-CHLOROETHYLVINYLETHER	1.5						
BROMOFORM	1.5						
4-METHYL-2-PENTANONE	3.0						
2-HEXANONE	50.0						
TETRACHLOROETHENE	3.0						
TOLUENE	1.5		J 1		UJ 1		
CHLOROBENZENE	1.5						
ETHYLBENZENE	1.5						
STYRENE	1.0						
TOTAL XYLENES	2.5						
ACROLEIN	150.0						
ACRYLONITRILE	150.0						

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-GWC2-01(2) 10/07/87	WE-GWC5-01 10/07/87	WE-GWC5A-01(1) 10/07/87	WE-GWC3B-01 10/07/87	WE-GWC6-01 10/07/87	WE-GWC6A-01 10/07/87
CHLOROMETHANE	10.0						
BROMOMETHANE	10.0						
VINYL CHLORIDE	10.0						J 4
CHLOROETHANE	1.5						
METHYLENE CHLORIDE	1.0			UJ 11	UJ 1	UJ 1	UJ 1
ACETONE	7.5	UJ 480	UJ 1	UJ 47	UJ 9	UJ 6	UJ 8
CARBON DISULFIDE	3.0						
1, 1-DICHLOROETHENE	1.5						
1, 1-DICHLOROETHANE	1.5						
TRANS-1, 2-DICHLOROETHENE	1.5	384			4		40
CHLOROFORM	1.5						
1, 2-DICHLOROETHANE	1.5						
2-BUTANONE	50.0						
1, 1, 1-TRICHLOROETHANE	1.5						
CARBON TETRACHLORIDE	1.5						
VINYL ACETATE	15.0						
BROMODICHLOROMETHANE	1.5						
1, 2-DICHLOROPROPANE	1.5						
TRANS-1, 3-DICHLOROPROPENE	1.0						
TRICHLOROETHENE	1.5	180			4		9
DIBROMOCHLOROMETHANE	1.5						
1, 1, 2-TRICHLOROETHANE	1.5						
BENZENE	1.5						
cis-1, 3-DICHLOROPROPENE	2.0						
2-CHLOROETHYLVINYLETHER	1.5						
BROMOFORM	1.5						
4-METHYL-2-PENTANONE	3.0						
2-HEXANONE	50.0						
TETRACHLOROETHENE	3.0	226		191	19		3
TOLUENE	1.5		J 1				
CHLOROBENZENE	1.5						
ETHYLBENZENE	1.5						
STYRENE	1.0						
TOTAL XYLENES	2.5						
ACROLEIN	150.0						
ACRYLONITRILE	150.0						

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

COMPOUND	REPORTABLE DETECTION LIMIT (UG/L)	WE-6WC4-91 10/01/87	WE-SB06-01 10/07/87	WE-TB04-01 10/10/87	WE-CWDS-01 10/10/87
CHLOROMETHANE	10.0				
BROMOMETHANE	10.0				
VINYL CHLORIDE	10.0				
CHLOROETHANE	1.5				
METHYLENE CHLORIDE	1.0	UJ 2			UJ 1
ACETONE	7.5	UJ 21	UJ 4	UJ 1	UJ 1
CARBON DISULFIDE	3.0			UJ 15	
1, 1-DICHLOROETHENE	1.5				
1, 1-DICHLOROETHANE	1.5				
TRANS-1, 2-DICHLOROETHENE	1.5				
CHLOROFORM	1.5		15		J 56
1, 2-DICHLOROETHANE	1.5				
2-BUTANONE	50.0				
1, 1, 1-TRICHLOROETHANE	1.5				
CARBON TETRACHLORIDE	1.5				
VINYL ACETATE	15.0				
BROMODICHLOROMETHANE	1.5				4
1, 2-DICHLOROPROPANE	1.5				
TRANS-1, 3-DICHLOROPROPENE	1.0				
TRICHLOROETHENE	1.5				
DIBROMOCHLOROMETHANE	1.5				
1, 1, 2-TRICHLOROETHANE	1.5				
BENZENE	1.5				
cis-1, 3-DICHLOROPROPENE	2.0				
2-CHLOROETHYLVINYLETHER	1.5				
BROMOFORM	1.5				
4-METHYL-2-PENTANONE	3.0				
2-HEXANONE	50.0				
TETRACHLOROETHENE	3.0				
TOLUENE	1.5	J 1	J 1		J 1
CHLOROBENZENE	1.5				
ETHYLBENZENE	1.5				
STYRENE	1.0				
TOTAL XYLENES	2.5				
ACROLEIN	150.0				
ACRYLONITRILE	150.0				

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PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.23
ORGANIC RESULTS

CK'D: CAW APP'D: CSR
DATE ISSUED: 1-28-88

(1) ANALYSIS PERFORMED ON A 1:10 DILUTION.
(2) ANALYSIS PERFORMED ON A 1:100 DILUTION.
(3) ANALYSIS PERFORMED ON A 1:200 DILUTION.

U = ANALYZED, BUT NOT DETECTED.
J = ESTIMATED VALUE.
B = COMPOUND ALSO DETECTED IN BLANK.

APPENDIX G

RESULTS OF FIELD GAS CHROMATOGRAPH AND CONTRACT LABORATORY ANALYSES OF GROUNDWATER SAMPLES COLLECTED DURING DRILLING

G.1

CLP LAB RESULTS
VOC SAMPLES COLLECTED DURING DRILLING

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
ORGANIC RESULTS

CK'D: CAW APP'D: RDF
DATE ISSUED: 2-16-88

COMPOUND	SW LAB DETECTION LIMIT (UG/L)	ENSECO DETECTION LIMIT (UG/L)	SW LAB WE-GE21-133 11/13/87	SW LAB WE-GE21-133-9 11/13/87	SW LAB WE-GE24-40 10/15/87	SW LAB WE-GE25-120 10/15/87	SW LAB WE-GE25-120-9 10/15/87
CHLOROMETHANE	1.0	5.0					
BROMOMETHANE	1.0	5.0					
VINYL CHLORIDE	1.0	5.0			18.0		
CHLOROETHANE	1.0	1.0					
METHYLENE CHLORIDE	1.0	5.0			0.6 /J		0.5 /J
ACETONE	1.0	10.0		30.0			
CARBON DISULFIDE	1.0	1.0					
1,1-DICHLOROETHENE	1.0	1.0					
1,1-DICHLOROETHANE	1.0	1.0					
TRANS-1, 2-DICHLOROETHENE	1.0	1.0			3.8		
CHLOROFORM	1.0	1.0	0.7 B/UJ	0.7 B/UJ		6.4	5.0
1,2-DICHLOROETHANE	1.0	1.0					
2-BUTANONE	1.0	10.0					
1,1,1-TRICHLOROETHANE	1.0	1.0					
CARBON TETRACHLORIDE	1.0	1.0					
VINYL ACETATE	1.0	10.0					
BROMODICHLOROMETHANE	1.0	1.0					
1,2-DICHLOROPROPANE	1.0	1.0					
TRANS-1,3-DICHLOROPROPENE	1.0	1.0					
TRICHLOROETHENE	1.0	1.0	3.0	2.0		0.7 /J	0.6 /J
DIBROMOCHLOROMETHANE	1.0	1.0					
1,1,2-TRICHLOROETHANE	1.0	1.0					
BENZENE	1.0	1.0					
cis-1,3-DICHLOROPROPENE	1.0	1.0					
2-CHLOROETHYLVINYLETHER	1.0	10.0					
BROMOFORM	1.0	1.0					
4-METHYL-2-PENTANONE	1.0	10.0					
2-HEXANONE	1.0	10.0					
TETRACHLOROETHENE	1.0	1.0					
1,1,2,2-TETRACHLOROETHANE	1.0	1.0					
TOLUENE	1.0	1.0	3.0	3.0	2.0	1.4	1.6
CHLOROBENZENE	1.0	1.0					
ETHYLBENZENE	1.0	1.0					
STYRENE	1.0	1.0					
TOTAL XYLENES	1.0	1.0	0.9 J/J	2.0 J/			
CHLORINATED ETHENES TOTAL:			3.0	2.0	3.8	0.7	0.6

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
ORGANIC RESULTS

CK'D: DAW APP'D: KDF
DATE ISSUED: 2-16-88

COMPOUND	SW LAB DETECTION LIMIT (UG/L)	ENSECO DETECTION LIMIT (UG/L)	ENSECO WE-GE25-154 10/20/87	ENSECO WE-GE30-100 10/28/87	SW LAB WE-GE30-133 11/04/87	SW LAB WE-GE32-14 11/12/87	SW LAB WE-GE33-14 11/12/87
CHLOROMETHANE	1.0	5.0	5.0 J				
BROMOMETHANE	1.0	5.0					
VINYL CHLORIDE	1.0	5.0	5.0 J				
CHLOROETHANE	1.0	1.0	1.0 J				
METHYLENE CHLORIDE	1.0	5.0	1.0 J/J		1.0		
ACETONE	1.0	10.0	10.0 J	10.0 B			
CARBON DISULFIDE	1.0	1.0	1.0 J				
1,1-DICHLOROETHENE	1.0	1.0					
1,1-DICHLOROETHANE	1.0	1.0					
TRANS-1, 2-DICHLOROETHENE	1.0	1.0				330.0	
CHLOROFORM	1.0	1.0				20.0 B/UJ	10.0 B/UJ
1,2-DICHLOROETHANE	1.0	1.0					
2-BUTANONE	1.0	10.0					
1,1,1-TRICHLOROETHANE	1.0	1.0					
CARBON TETRACHLORIDE	1.0	1.0					
VINYL ACETATE	1.0	10.0					
BROMODICHLOROMETHANE	1.0	1.0					
1,2-DICHLOROPROPANE	1.0	1.0					
TRANS-1,3-DICHLOROPROPENE	1.0	1.0					
TRICHLOROETHENE	1.0	1.0			7.6	270.0	
DIBROMOCHLOROMETHANE	1.0	1.0					
1,1,2-TRICHLOROETHANE	1.0	1.0					
BENZENE	1.0	1.0					
cis-1,3-DICHLOROPROPENE	1.0	1.0					
2-CHLOROETHYLVINYLETHER	1.0	10.0					
BROMOFORM	1.0	1.0					
4-METHYL-2-PENTANONE	1.0	10.0					
2-HEXANONE	1.0	10.0					
TETRACHLOROETHENE	1.0	1.0				850.0	470.0
1,1,2,2-TETRACHLOROETHANE	1.0	1.0					
TOLUENE	1.0	1.0	2.0	3.0	2.4		
CHLOROBENZENE	1.0	1.0					
ETHYLBENZENE	1.0	1.0					
STYRENE	1.0	1.0					
TOTAL XYLENES	1.0	1.0					
CHLORINATED ETHENES TOTAL:					7.6	1450.0	470.0

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
ORGANIC RESULTS

CK'D: CAW APP'D: KDF
DATE ISSUED: 2-16-88

COMPOUND	SW LAB DETECTION LIMIT (UG/L)	ENSECO DETECTION LIMIT (UG/L)	SW LAB WE-GE34-14 11/12/87	SW LAB WE-GW35-18 11/12/87	SW LAB WE-GE36-16 11/12/87	SW LAB WE-GE38-18 11/13/87	SW LAB WE-GW52-100 11/05/87
CHLOROMETHANE	1.0	5.0					
BROMOMETHANE	1.0	5.0					
VINYL CHLORIDE	1.0	5.0					
CHLOROETHANE	1.0	1.0					
METHYLENE CHLORIDE	1.0	5.0		130.0 /UJ			0.6 /J
ACETONE	1.0	10.0					
CARBON DISULFIDE	1.0	1.0					
1,1-DICHLOROETHENE	1.0	1.0					
1,1-DICHLOROETHANE	1.0	1.0					
TRANS-1, 2-DICHLOROETHENE	1.0	1.0					2.7
CHLOROFORM	1.0	1.0	0.6 B/UJ	210.0 B/UJ	0.4 B/UJ	0.3 B/UJ	
1,2-DICHLOROETHANE	1.0	1.0					
2-BUTANONE	1.0	10.0					
1,1,1-TRICHLOROETHANE	1.0	1.0	2.0		2.0	0.5	
CARBON TETRACHLORIDE	1.0	1.0					
VINYL ACETATE	1.0	10.0					
BROMODICHLOROMETHANE	1.0	1.0					
1,2-DICHLOROPROPANE	1.0	1.0					
TRANS-1,3-DICHLOROPROPENE	1.0	1.0					
TRICHLOROETHENE	1.0	1.0	0.6 /J		2.0		32.0
DIBROMOCHLOROMETHANE	1.0	1.0					
1,1,2-TRICHLOROETHANE	1.0	1.0					
BENZENE	1.0	1.0					
cis-1,3-DICHLOROPROPENE	1.0	1.0					
2-CHLOROETHYLVINYLETHER	1.0	10.0					
BROMOFORM	1.0	1.0					
4-METHYL-2-PENTANONE	1.0	10.0					
2-HEXANONE	1.0	10.0					
TETRACHLOROETHENE	1.0	1.0	60.0	5700.0	20.0	30.0	
1,1,2,2-TETRACHLOROETHANE	1.0	1.0					
TOLUENE	1.0	1.0			1.0		0.7
CHLOROBENZENE	1.0	1.0					
ETHYLBENZENE	1.0	1.0					
STYRENE	1.0	1.0					
TOTAL XYLENES	1.0	1.0					
CHLORINATED ETHENES TOTAL:			60.6	5700.0	22.0	30.0	34.7

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
ORGANIC RESULTS

CK'D: BAW APP'D: KDF
DATE ISSUED: 2-16-88

COMPOUND	SW LAB DETECTION LIMIT (UG/L)	ENSECO DETECTION LIMIT (UG/L)	SW LAB WE-GW53-75 11/03/87	SW LAB WE-GW53-125 11/05/87	SW LAB WE-GE54-85 11/12/87	ENSECO WE-GW55-60 10/20/87	ENSECO WE-GW55-70 10/20/87
CHLOROMETHANE	1.0	5.0				5.0 J	5.0 J
BROMOMETHANE	1.0	5.0					
VINYL CHLORIDE	1.0	5.0				5.0 J	5.0 J
CHLOROETHANE	1.0	1.0				1.0 J	1.0 J
METHYLENE CHLORIDE	1.0	5.0		0.7 /J		5.0 J	2.0 J
ACETONE	1.0	10.0				10.0 J	10.0 J
CARBON DISULFIDE	1.0	1.0				1.0 J	1.0 J
1,1-DICHLOROETHENE	1.0	1.0	0.8 /J				
1,1-DICHLOROETHANE	1.0	1.0	6.3				
TRANS-1, 2-DICHLOROETHENE	1.0	1.0	76.0	641.0 /D	30.0		
CHLOROFORM	1.0	1.0	0.8 /J	2.2	0.2 B/UJ		
1,2-DICHLOROETHANE	1.0	1.0					
2-BUTANONE	1.0	10.0					5.0 R/J
1,1,1-TRICHLOROETHANE	1.0	1.0	14.0				
CARBON TETRACHLORIDE	1.0	1.0					
VINYL ACETATE	1.0	10.0					
BROMODICHLOROMETHANE	1.0	1.0					
1,2-DICHLOROPROPANE	1.0	1.0					
TRANS-1,3-DICHLOROPROPENE	1.0	1.0					
TRICHLOROETHENE	1.0	1.0	1256.0	1330.0 /D	30.0		
DIBROMOCHLOROMETHANE	1.0	1.0					
1,1,2-TRICHLOROETHANE	1.0	1.0		4.6			
BENZENE	1.0	1.0					
cis-1,3-DICHLOROPROPENE	1.0	1.0					
2-CHLOROETHYLVINYLETHER	1.0	10.0					
BROMOFORM	1.0	1.0					
4-METHYL-2-PENTANONE	1.0	10.0					
2-HEXANONE	1.0	10.0					
TETRACHLOROETHENE	1.0	1.0	3.1	8.0	20.0		
1,1,2,2-TETRACHLOROETHANE	1.0	1.0					
TOLUENE	1.0	1.0	3.7	0.8 /J	5.0	4.0	5.0
CHLOROBENZENE	1.0	1.0					
ETHYLBENZENE	1.0	1.0					
STYRENE	1.0	1.0					
TOTAL XYLENES	1.0	1.0	1.2			2.0	3.0
CHLORINATED ETHENES TOTAL:			1335.9	1979.0	80.0		

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
ORGANIC RESULTS

CK'D: CMN APP'D: KCF
DATE ISSUED: 2-16-88

COMPOUND	SW LAB DETECTION LIMIT (UG/L)	ENSECO DETECTION LIMIT (UG/L)	ENSECO WE-GW55-80 10/20/87	ENSECO WE-GW55-115 10/29/87	SW LAB WE-GW55A-43 10/15/87	ENSECO WE-GW56-50 10/20/87	ENSECO WE-GW57-21 10/20/87
CHLOROMETHANE	1.0	5.0	5.0 J			5.0 J	5.0 J
BROMOMETHANE	1.0	5.0					
VINYL CHLORIDE	1.0	5.0	5.0 J			5.0 J	5.0 J
CHLOROETHANE	1.0	1.0	1.0 J			1.0 J	1.0 J
METHYLENE CHLORIDE	1.0	5.0	5.0 J			5.0 J	5.0 J
ACETONE	1.0	10.0	9.0 J/J	150.0 B/		10.0 J	10.0 J
CARBON DISULFIDE	1.0	1.0	1.0 J			1.0 J	1.0 J
1,1-DICHLOROETHENE	1.0	1.0					
1,1-DICHLOROETHANE	1.0	1.0					
TRANS-1, 2-DICHLOROETHENE	1.0	1.0			5.4		
CHLOROFORM	1.0	1.0					
1,2-DICHLOROETHANE	1.0	1.0					
2-BUTANONE	1.0	10.0	2.0 R/J			2.0 R/J	1.0 R/J
1,1,1-TRICHLOROETHANE	1.0	1.0					
CARBON TETRACHLORIDE	1.0	1.0					
VINYL ACETATE	1.0	10.0					
BROMODICHLOROMETHANE	1.0	1.0					
1,2-DICHLOROPROPANE	1.0	1.0					
TRANS-1,3-DICHLOROPROPENE	1.0	1.0					
TRICHLOROETHENE	1.0	1.0		3200.0	27.0		
DIBROMOCHLOROMETHANE	1.0	1.0					
1,1,2-TRICHLOROETHANE	1.0	1.0					
BENZENE	1.0	1.0					
cis-1,3-DICHLOROPROPENE	1.0	1.0					
2-CHLOROETHYLVINYLETHER	1.0	10.0					
BROMOFORM	1.0	1.0					
4-METHYL-2-PENTANONE	1.0	10.0					
2-HEXANONE	1.0	10.0					
TETRACHLOROETHENE	1.0	1.0					
1,1,2,2-TETRACHLOROETHANE	1.0	1.0					
TOLUENE	1.0	1.0	4.0		0.8 /J		2.0
CHLOROBENZENE	1.0	1.0					
ETHYLBENZENE	1.0	1.0					
STYRENE	1.0	1.0					
TOTAL XYLENES	1.0	1.0					
CHLORINATED ETHENES TOTAL:				3200.0	32.4	1.0	

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
ORGANIC RESULTS

CK'D: CAW APP'D: KDF
DATE ISSUED: 2-16-88

COMPOUND	SW LAB DETECTION LIMIT (UG/L)	ENSECO DETECTION LIMIT (UG/L)	ENSECO WE-SB01 10/29/87	SW LAB WE-SB02 11/04/87	SW LAB WE-SB03 11/12/87	ENSECO WE-SW09 10/28/87	ENSECO WE-SW10 10/28/87
CHLOROMETHANE	1.0	5.0					
BROMOMETHANE	1.0	5.0					
VINYL CHLORIDE	1.0	5.0					
CHLOROETHANE	1.0	1.0					
METHYLENE CHLORIDE	1.0	5.0			0.6		
ACETONE	1.0	10.0	6.0 B/J			20.0 B	20.0 B
CARBON DISULFIDE	1.0	1.0					
1,1-DICHLOROETHENE	1.0	1.0					
1,1-DICHLOROETHANE	1.0	1.0					
TRANS-1, 2-DICHLOROETHENE	1.0	1.0					
CHLOROFORM	1.0	1.0			0.2 U/J		
1,2-DICHLOROETHANE	1.0	1.0					
2-BUTANONE	1.0	10.0	3.0 R/J			2.0 R/J	20.0 R/U
1,1,1-TRICHLOROETHANE	1.0	1.0					
CARBON TETRACHLORIDE	1.0	1.0					
VINYL ACETATE	1.0	10.0					
BROMODICHLOROMETHANE	1.0	1.0					
1,2-DICHLOROPROPANE	1.0	1.0			3.0		
TRANS-1,3-DICHLOROPROPENE	1.0	1.0					
TRICHLOROETHENE	1.0	1.0	3.0		3.0	82.0	70.0
DIBROMOCHLOROMETHANE	1.0	1.0					
1,1,2-TRICHLOROETHANE	1.0	1.0					
BENZENE	1.0	1.0					
cis-1,3-DICHLOROPROPENE	1.0	1.0					
2-CHLOROETHYLVINYLETHER	1.0	10.0					
BROMOFORM	1.0	1.0					
4-METHYL-2-PENTANONE	1.0	10.0					
2-HEXANONE	1.0	10.0					
TETRACHLOROETHENE	1.0	1.0			2.0		
1,1,2,2-TETRACHLOROETHANE	1.0	1.0					
TOLUENE	1.0	1.0	3.0	3.2	3.0	2.0	
CHLOROBENZENE	1.0	1.0					
ETHYLBENZENE	1.0	1.0					
STYRENE	1.0	1.0					
TOTAL XYLENES	1.0	1.0					
CHLORINATED ETHENES TOTAL:			3.0		5.0	82.0	70.0

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
ORGANIC RESULTS

CK'D: JAW APP'D: KOF
DATE ISSUED: 2-16-88

COMPOUND	SW LAB DETECTION LIMIT (UG/L)	ENSECO DETECTION LIMIT (UG/L)	SW LAB WE-GCW4-130 10/15/87	ENSECO W55-01 10/29/87
CHLOROMETHANE	1.0	5.0		
BROMOMETHANE	1.0	5.0		
VINYL CHLORIDE	1.0	5.0		
CHLOROETHANE	1.0	1.0		
METHYLENE CHLORIDE	1.0	5.0		
ACETONE	1.0	10.0		150.0 B
CARBON DISULFIDE	1.0	1.0		
1,1-DICHLOROETHENE	1.0	1.0		
1,1-DICHLOROETHANE	1.0	1.0		
TRANS-1, 2-DICHLOROETHENE	1.0	1.0	3.4	
CHLOROFORM	1.0	1.0		
1,2-DICHLOROETHANE	1.0	1.0		
2-BUTANONE	1.0	10.0		1000.0 R
1,1,1-TRICHLOROETHANE	1.0	1.0		
CARBON TETRACHLORIDE	1.0	1.0		
VINYL ACETATE	1.0	10.0		
BROMODICHLOROMETHANE	1.0	1.0		
1,2-DICHLOROPROPANE	1.0	1.0		
TRANS-1,3-DICHLOROPROPENE	1.0	1.0		
TRICHLOROETHENE	1.0	1.0	14.0	
DIBROMOCHLOROMETHANE	1.0	1.0		
1,1,2-TRICHLOROETHANE	1.0	1.0		3200.0
BENZENE	1.0	1.0		
cis-1,3-DICHLOROPROPENE	1.0	1.0		
2-CHLOROETHYLVINYLETHER	1.0	10.0		
BROMOFORM	1.0	1.0		
4-METHYL-2-PENTANONE	1.0	10.0		
2-HEXANONE	1.0	10.0		
TETRACHLOROETHENE	1.0	1.0	0.8 J/	
1,1,2,2-TETRACHLOROETHANE	1.0	1.0		
TOLUENE	1.0	1.0	1.5	
CHLOROBENZENE	1.0	1.0		
ETHYLBENZENE	1.0	1.0		
STYRENE	1.0	1.0		
TOTAL XYLENES	1.0	1.0		
CHLORINATED ETHENES TOTAL:			18.2	

PROJECT: WAUSAU NPL
LOCATION: WAUSAU, WISCONSIN
C#: 13076.30
ORGANIC RESULTS

CK'D: CAW APP'D: KDF
DATE ISSUED: 2-16-88

QUALIFIER INFORMATION:

U = ANALYZED, BUT NOT DETECTED.
J = ESTIMATED VALUE.
B = COMPOUND ALSO DETECTED IN BLANK.
R = UNUSUABLE DATA
D = SAMPLE WAS DILUTED.
__/__: WARZYN DATA VALIDATION QUALIFIER / LABORATORY QUALIFIER

G.2

FIELD GC
VOC SAMPLES COLLECTED DURING DRILLING

WAUSAU NPL SITE
WATER SAMPLING AND
VOC ANALYSIS DURING DRILLING

	DILUTION FACTOR	DEPTH (FEET)	DATE COLLECTED	TOLUENE UG/L	1,1 DCE UG/L	1,2-DCE UG/L	TCE UG/L	PCE UG/L	BENZENE UG/L	ETH-BENZENE UG/L	MECL2 UG/L	1,1DCA UG/L	CHCL3 UG/L	1,2DCA UG/L	1,1,1TCA UG/L	BRCL2CH UG/L	CLBR2CH UG/L	BROMOFORM UG/L
DETECTION LIMIT				1.0	1.0	1.0	1.0	1.0	2.0	2.0	5.0	2.0	2.0	5.0	1.0	5.0	25.0	50.0
WELL #																		
E20		21	10-26-87	BMDL(B)		1.75	7.39	42.8							BMDL			
E20		35	10-26-87	BMDL(B)		BMDL	3.41	7.88										
E20		51	10-27-87	BMDL(B)														
E20 DUP		51	10-27-87	BMDL(B)														
E20		66	10-27-87	BMDL(B)														
E20		COMPLETED	11-3-87	BMDL(B)														
E21		91	11-12-87	BMDL(B)				1.05 (1)										
E21		107	11-12-87					BMDL (1)										
E21		122	11-13-87	BMDL(B)														
E21 DUP		122	11-13-87	BMDL(B)														
E21		132	11-13-87	BMDL(B)			1.98	BMDL										
E21		COMPLETED	12-2-87			BMDL	23.7											
E22(2)		20	10-13-87	12.0(B)	BMDL(B)		BMDL	11.7			BMDL(B)							
E22(2) DUP		20	10-13-87	12.8(B)	BMDL(B)		BMDL	12.2										
E22		36	10-13-87	BMDL(B)	BMDL(B)						BMDL(B)							
E22		50	10-13-87	BMDL(B)														
E22		65	10-14-87	BMDL(B)														
E22		79	10-13-87	BMDL(B)														
E22		COMPLETED	10-16-87	2.16(B)									2.08*					
E23A(2)		COMPLETED	10-30-87	BMDL(B)			3.53	37.6	3.9									
E24A		25-35	10-15-87	BMDL(B)	1.93	13.7	75.5*	293*							BMDL			
E24A DUP		25-35	10-15-87	BMDL(B)	2.42	15.6	78.1*	304*							BMDL			
E24		40	10-15-87	BMDL(B)		1.43	BMDL	BMDL										
E24		55	10-15-87	BMDL(B)			1.25	BMDL										
E24		73	10-15-87	BMDL(B)			BMDL	BMDL										
E24		COMPLETED	11-4-87	BMDL(B)			BMDL	BMDL										
E25		32	10-13-87	BMDL(B)				BMDL										
E25		45	10-13-87	BMDL(B)			BMDL											
E25		60	10-13-87	BMDL(B)														
E25		75	10-13-87	BMDL(B)														
E25		90	10-14-87	BMDL(B)														
E25		105	10-14-87	BMDL(B)														
E25 DUP		105	10-14-87	BMDL(B)														
E25		120	10-15-87	BMDL(B)			BMDL						4.78(B)					
E25		135	10-16-87	1.97(B)			BMDL											
E25		154	10-20-87	BMDL(B)			BMDL	BMDL										
E25		COMPLETED	11-3-87															
E25A		COMPLETED	10-26-87	BMDL(B)			BMDL	BMDL										
E26A		COMPLETED	11-9-87	12.2(B)														

WAUSAU NPL SITE
WATER SAMPLING AND
VOC ANALYSIS DURING DRILLING

	DILUTION FACTOR	DEPTH - (FEET)	DATE COLLECTED	TOLUENE UG/L	1,1 DCE UG/L	1,2-DCE UG/L	TCE UG/L	PCE UG/L	BENZENE UG/L	ETH-BENZENE UG/L	MECL2 UG/L	1,1DCA UG/L	CHCL3 UG/L	1,2DCA UG/L	1,1,1TCA UG/L	BRCL2CH UG/L	CLBR2CH UG/L	BROMOFORM UG/L
DETECTION LIMIT				1.0	1.0	1.0	1.0	1.0	2.0	2.0	5.0	2.0	2.0	5.0	1.0	5.0	25.0	50.0
E26A DUP		COMPLETED	11-9-87	28.1(B)														
E26A		COMPLETED	11-12-87	17.2(B)														
E26		35	11-9-87	BMDL(B)														
E26		50	11-9-87															
E26		65	11-10-87	BMDL(B)														
E26		80	11-10-87	1.10(B)														
E26		COMPLETED	11-12-87	BMDL(B)														
E27		90	12-2-87	BMDL									6.19					
E27		115	12-2-87	BMDL			BMDL	BMDL					63.9*					
E27		125	12-2-87	1.92			BMDL		BMDL	BMDL			48.7					
E27 (4)		COMPLETED	12-12-87	BMDL		90.7	440	1.49			BMDL		BMDL		BMDL			
E28		COMPLETED	10-16-87	2.22(B)									BMLD					
E28DUP		COMPLETED	10-16-87	BMDL(B)				BMDL										
E29A		COMPLETED	11-12-87	BMDL(B)														
E29A DUP		COMPLETED	11-12-87	BMDL(B)														
E30		26	10-28-87	9.10(B)			BMDL		BMDL(B)	7.58								
E30		41	10-28-87	BMDL(B)														
E30		56	10-28-87	BMDL(B)														
E30		71	10-29-87	BMDL(B)														
E30		81	10-29-87	BMDL(B)														
E30		91	10-29-87	BMDL(B)			BMDL											
E30		101	10-29-87	BMDL(B)														
E30		111	10-29-87	BMDL(B)			BMDL								BMDL			
E30		121	10-30-87	BMDL(B)														
E30 DUP		121	10-30-87	BMDL(B)														
E30		COMPLETED 132	11-2-87	BMDL(B)			5.34											
E30 DUP		132	11-2-87	BMDL(B)			5.51											
E30		COMPLETED	11-4-87	BMDL(B)			6.51											
E30 DUP		COMPLETED	11-4-87	BMDL(B)			6.62											
E31		28	11-2-87	BMDL(B)														
E31		40	11-2-87	BMDL(B)														
E31		55	11-3-87	BMDL(B)														
E31		70	11-3-87	BMDL(B)														
E31		80	11-3-87	BMDL(B)														
E31		90	11-4-87	BMDL(B)														
E31		100	11-4-87	BMDL(B)														
E31		110	11-4-87	BMDL(B)														
E31		120	11-4-87	BMDL(B)														
E31 DUP		120	11-4-87	BMDL(B)														
E31		130	11-4-87	BMDL(B)														

WAUSAU NPL SITE
WATER SAMPLING AND
VOC ANALYSIS DURING DRILLING

	DILUTION FACTOR	DEPTH (FEET)	DATE COLLECTED	TOLUENE UG/L	1,1 DCE UG/L	1,2-DCE UG/L	TCE UG/L	PCE UG/L	BENZENE UG/L	ETH-BENZENE UG/L	MECL2 UG/L	1,1DCA UG/L	CHCL3 UG/L	1,2DCA UG/L	1,1,1TCA UG/L	BRCL2CH UG/L	CLBR2CH UG/L	BROMOFORM UG/L
DETECTION LIMIT				1.0	1.0	1.0	1.0	1.0	2.0	2.0	5.0	2.0	2.0	5.0	1.0	5.0	25.0	50.0
E31		COMPLETED	11-10-87	BMDL(B)		BMDL	3.87	1.35										
E31 DUP		COMPLETED	11-10-87	BMDL(B)			2.28	1.28										
E32		14	11-12-87		1.49	164*	292*	506*							2.21			
E33	200	14	11-12-87															
E33		14	11-12-87	BMDL(B)		1.3	2.87	376*										
E34	100	14	11-12-87															
E34		14	11-12-87	4.43(B)			BMDL	73.5										
E35	40	18	11-12-87	BMDL(B)			BMDL	8200*										
E36		16	11-13-87	BMDL(B)			1.68	19.2							BMDL			
E37		COMPLETED	11-13-87	BMDL(B)			2.94	17.8	13.8									
E38	40	18	11-13-87	BMDL(B)				BMDL										
W50		35	10-27-87	BMDL(B)		2.21	48.6											
W50		45	10-27-87	BMDL(B)		9.63	29											
W50		55	10-27-87	BMDL(B)		11	18.3											
W50		65	10-28-87	BMDL(B)			BMDL											
W50		65DUP	10-28-87	BMDL(B)			BMDL											
W50		75	10-28-87	BMDL(B)			BMDL											
W50		85	10-28-87	BMDL(B)														
W50		COMPLETED	11-4-87	<1.0			BMDL											
W51A		COMPLETED	10-16-87	BMDL(B)									6.66					
W52		41	11-3-87	<1.0														
W52		52	11-4-87	<1.0														
W52		61	11-4-87	BMDL(B)														
W52		71	11-4-87	<1.0			BMDL											
W52		81	11-5-87	<1.0			BMDL											
W52		81 DUP	11-5-87	<1.0			BMDL											
W52		91	11-5-87	<1.0			BMDL											
W52		101	11-5-87	<1.0			30											
W52	40	111	11-6-87	BMDL(B)			71.8											
W52	40	121	11-9-87	BMDL(B)			653											
W52	40	131	11-9-87	BMDL(B)			BMDL											
W52		131	11-9-87	BMDL(B)			30.4											
W53A		COMPLETED	11-2-87	BMDL(B)			47.8											
W53A DUP		COMPLETED	11-2-87	BMDL(B)			50.2											
W53		35	11-3-87	BMDL(B)		1.74	31.7					3.02			3.02			

WAUSAU NPL SITE
WATER SAMPLING AND
VOC ANALYSIS DURING DRILLING

	DILUTION FACTOR	DEPTH (FEET)	DATE COLLECTED	TOLUENE UG/L	1,1 DCE UG/L	1,2-DCE UG/L	TCE UG/L	PCE UG/L	BENZENE UG/L	ETH-BENZENE UG/L	MECL2 UG/L	1,1DCA UG/L	CHCL3 UG/L	1,2DCA UG/L	1,1,1TCA UG/L	BRCL2CH UG/L	CLBR2CH UG/L	BROMOFORM UG/L
DETECTION LIMIT				1.0	1.0	1.0	1.0	1.0	2.0	2.0	5.0	2.0	2.0	5.0	1.0	5.0	25.0	50.0
W53		55	11-3-87		6.18	102*	33.6	BMDL			BMDL	51.5		BMDL	134			
W53		65	11-3-87		BMDL	56.5*	732*	1.63				13.5			19.3			
W53	40	75	11-4-87	BMDL(B)		52.3	1480											
W53	40	85	11-4-87	BMDL(B)			1320											
W53	40	95	11-4-87	BMDL(B)		156	1960	BMDL										
W53		105	11-4-87	COULD NOT RECOVER SAMPLE, DENSE FINE SAND														
W53	40	115	11-4-87	BMDL(B)		430	1850	BMDL										
W53	40	125	11-5-87	BMDL(B)		338	1700	BMDL										
W53	40	135	11-5-87	BMDL(B)			BMDL											
W53		135	11-5-87	BMDL(B)		8.82	52.1	BMDL										
W53		145	11-5-87	BMDL(B)		69.7*	323*	BMDL							BMDL			
W53		155	11-6-87	BMDL(B)		13.3	99.1*	BMDL										
W53		COMPLETED 125	11-13-87	BMDL(B)	<40	223	1220	BMDL	<80	<80	<200	<80	<80					
W54		35	11-11-87			3.09	365*	20.1							1.23			
W54 DUP		35	11-11-87			8.76	375*	20.2							1.55			
W54	40	45	11-12-87	BMDL(B)			313	BMDL										
W54	40	55	11-12-87	BMDL(B)			48.9	BMDL										
W54		65	11-12-87			6.49	193*	28.8							1.11			
W54	40	75	11-12-87	BMDL(B)			75.6	56.7										
W54		85	11-12-87		BMDL	12.8	31.7*	23.1*				BMDL			5.94			
W55A		COMPLETED	10-15-87	BMDL(B)		1.68	28.3											
W55		50	10-20-87	BMDL(B)		BMDL	35.9											
W55		60	10-20-87	BMDL(B)			BMDL	1.36										
W55		70	10-21-87	BMDL(B)														
W55		80	10-21-87	BMDL(B)														
W55		90	10-22-87	BMDL(B)			BMDL											
W55		100	10-22-87	6.90(B)		5.29	69.6*											
W55		100DUP	10-22-87	1.00(B)		3.98	70.0*											
W55	40	110	10-26-87	BMDL(B)			3980	BMDL										
W55		120	10-27-87		1.42	18.6	600*	BMDL										
W55	40	COMPLETED	10-29-87	BMDL(B)			4320*											
W56A		COMPLETED	10-16-87	BMDL(B)			1.58											
W56		31.5	10-19-87	3.77(B)			5.38											
W56		40	10-19-87		TIGHT SAND, NO SAMPLE OBTAINED													
W56		50	10-20-87	BMDL(B)				BMDL(1)										
W56		60	10-20-87	BMDL(B)														
W56		COMPLETED	10-28-87	BMDL(B)														
W57		21	10-21-87	BMDL(B)														
W57		32	10-21-87	BMDL(B)														
W57 DUP		32	10-21-87	BMDL(B)														
W57		41	10-21-87	BMDL(B)			BMDL											
W57 DUP		41	10-21-87	BMDL(B)			BMDL											

WAUSAU NPL SITE
WATER SAMPLING AND
VOC ANALYSIS DURING DRILLING

	DILUTION FACTOR	DEPTH (FEET)	DATE COLLECTED	TOLUENE UG/L	1,1 DCE UG/L	1,2-DCE US/L	TCE UG/L	PCE UG/L	BENZENE UG/L	ETH-BENZENE UG/L	MECL2 UG/L	1,1DCA UG/L	CHCL3 UG/L	1,2DCA UG/L	1,1,1TCA UG/L	BRCL2CH UG/L	CLBR2CH UG/L	BROMOFORM UG/L
DETECTION LIMIT				1.0	1.0	1.0	1.0	1.0	2.0	2.0	5.0	2.0	2.0	5.0	1.0	5.0	25.0	50.0
W57		51	10-22-87	BMDL(B)			BMDL											
W57		61	10-22-87	BMDL(B)														
W57		71	10-22-87	BMDL(B)														
W57		COMPLETED	10-30-87	BMDL(B)				BMDL(3)										
BLK H20			10-13-87	1.53	BMDL						2.3		3.1					
WATER TRUCK 1			10-13-87	BMDL(B)			BMDL	BMDL					52.9(B)			BMDL		
WATER TRUCK 2			10-13-87	BMDL(B)			BMDL						51.5(B)			BMDL		
SW01			10-14-87	BMDL(B)														
SW02			10-15-87	BMDL(B)		BMDL	108*	2.91										
SW03			10-15-87	BMDL(B)		BMDL	79.2*	1.33										
SW04			10-15-87	BMDL(B)			BMDL						BMDL(B)					
SW05			10-15-87	BMDL(B)			160*											
SW06			10-19-87	BMDL(B)			108*											
SW07(2)			10-20-87	3.01(B)					BMDL				20.3					
SW08			10-26-87	BMDL(B)				BMDL										
SW09			10-28-87	2.67(B)			152*											
SW10			10-28-87	BMDL(B)			87.1*											
SW10DUP			10-28-87	BMDL(B)			85.4*											
SW11			10-29-87	BMDL(B)									15.8					
CITY WATER SYSTEM			10-14-87	2.5(B)			BMDL						50.8(B)			BMDL		
BLK WATER			10-14-87	2									3.5					
BLK WATER			10-15-87	BMDL									BMDL					
BLK WATER			10-19-87	BMDL														
BLK WATER			10-20-87	BMDL														
BLANK WATER			11-2-87	BMDL														
BLANK WATER			11-3-87	BMDL														
BLANK WATER			11-4-87	BMDL														
BLANK WATER			11-5-87	BMDL	BMDL													
BLANK WATER			11-6-87	BMDL														
BLANK WATER			11-9-87	BMDL														
BLANK WATER			11-10-87	BMDL		BMDL									BMDL			
BLANK WATER			11-11-87	BMDL											BMDL			
BLANK WATER			11-12-87	BMDL														
BLANK WATER			11-13-87	BMDL														
S. BLANK1 KECK			10-29-87	BMDL(B)			2.58											
S. BLANK2 KECK			10-30-87	BMDL(B)														
S. BLANK3 KECK			11-4-87	BMDL(B)														
S. BLANK4 KECK			11-9-87	BMDL(B)			BMDL											
S. BLANK5 KECK			11-13-87	BMDL(B)														
S. BLANK6 KECK (4)			12-12-87	BMDL(B)		BMDL	BMDL	BMDL			BMDL							
WATER TRUCK			10-22-87	BMDL(B)														
WATER TRUCK			10-23-87	BMDL(B)														
WATER TRUCK DUP			10-23-87	BMDL(B)														
WATER TRUCK			10-28-87	BMDL(B)														
WATER TRUCK			11-2-87	BMDL(B)														

WAUSAU NPL SITE
WATER SAMPLING AND
VOC ANALYSIS DURING DRILLING

	DILUTION FACTOR	DEPTH (FEET)	DATE COLLECTED	TOLUENE UG/L	1,1 DCE UG/L	1,2-DCE UG/L	TCE UG/L	PCE UG/L	BENZENE UG/L	ETH-BENZENE UG/L	MECL2 UG/L	1,1DCA UG/L	CHCL3 UG/L	1,2DCA UG/L	1,1,1TCA UG/L	BRCL2CH UG/L	CLBR2CH UG/L	BROMOFORM UG/L
DETECTION LIMIT				1.0	1.0	1.0	1.0	1.0	2.0	2.0	5.0	2.0	2.0	5.0	1.0	5.0	25.0	50.0
CW10			10-16-97							BMDL								
MW7A			10-19-87	BMDL(B)			BMDL	1.09										
MW7ADUP			10-19-87	BMDL(B)			BMDL	1.15										
CW4			10-30-87			BMDL	1.42	13.8										
WILSON HURD			10-30-87	BMDL														
BOT. H2O "CLEAR"			10-16-87	BMDL			BMDL						22.4					

NOTES
* DENOTES ESTIMATED VALUE
BMDL-DETECTED BUT BELOW MINIMUM REPORTABLE DETECTION LIMIT
COMPLETED-WELL INSTALLED, SEE APPENDIX C FOR CONSTRUCTION DETAIL (DEPTH, ETC.)
B-FOUND IN BLANK
(1) POSSIBLE CARRY OVER ERROR
(2) CONTAINED UNIDENTIFIED PEAKS IN CHROMATOGRAM
(3) POSSIBLE SAMPLING DEVICE CONTAMINATION
(4) ANALYZED BY WARZYN LAB IN MADISON

APPENDIX H

SUMMARY OF MONITORING WELL CONSTRUCTION DETAILS AND OBSERVED GROUNDWATER ELEVATIONS

MONITORING WELL CONSTRUCTION DETAILS AND WATER LEVELS
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

WELL ID	TOP OF RISER ELEVATION (FEET MSL)	TOP OF STEEL CASING ELEVATION (FEET MSL)	GROUND SURFACE ELEVATION (FEET MSL)	WELL DEPTH FROM TOP OF RISER	LENGTH OF SCREEN (FEET)	SCREEN INTERVAL (FEET MSL)	COMMENTS	OCTOBER 5,1987 DEPTH TO WATER (FEET)	OCTOBER 5,1987 WATER TABLE ELEV (FEET MSL)	DECEMBER 10,1987 DEPTH TO WATER (FEET)	DECEMBER 10,1987 WATER TABLE ELEV (FEET MSL)	JANUARY 7, 1988 DEPTH TO WATER (FEET)	JANUARY 7, 1988 WATER TABLE ELEV (FEET MSL)
			EAST WELL FIELD										
CW3	1204.08	1202.31		92.00	40.00	1152.64-1112.64	PUMPING	42.00	1162.08	17.00	1187.08	43.00	1161.08
CW4	1198.25		1198.19	130.00	40.00	1108.25-1068.25		-	-	Not Pumping	-	PUMPING	-
HURD	1199.79		1198.70	100.00	20.00	1119.52-1099.52		-	-	13.50	1186.29	14.15	1185.64
WERGIN	1201.09			50			PUMPING	41.43	1159.66	-	-	PUMPING	-
WC1	1197.22	1197.36	1195.30	23.00	10.00	1183.97-1173.97		12.28	1184.94	12.16	1185.06	13.27	1183.95
WC2	1198.22	1198.24	1196.10	24.00	10.00	1183.93-1173.93		13.19	1185.03	13.18	1185.04	14.32	1183.90
WC3	1198.37	1198.41	1196.60	161.00	3.00	1040.11-1037.11		13.17	1185.20	13.19	1185.18	14.47	1183.90
WC3A	1198.00	1198.04	1196.40	65.00	3.00	1135.76-1132.76		12.90	1185.10	12.98	1185.02	14.12	1183.88
WC3B	1198.15	1198.19	1196.90	24.00	10.00	1183.89-1173.89		12.90	1185.25	13.28	1184.87	14.34	1183.81
WC3C	1198.62	1198.76	1196.90	29.00	10.00	1179.37-1169.37		13.64	1184.98	13.75	1184.87	14.79	1183.83
WC4	1196.86	1196.88	1195.00	60.00	3.00	1139.58-1136.58		11.44	1185.42	11.46	1185.40	12.58	1184.28
WC4A	1196.69	1196.75	1195.00	30.00	10.00	1176.41-1166.41		11.28	1185.41	11.34	1185.35	12.42	1184.27
WC5	1196.73	1196.75	1195.00	70.00	3.00	1129.49-1126.49		11.88	1184.85	11.59	1185.14	12.69	1184.04
WC5A	1196.75	1196.85	1194.70	30.00	10.00	1176.52-1166.52		11.91	1184.84	11.59	1185.16	12.72	1184.03
WC6	1198.25	1198.25	1196.50	70	3.00	1131.01-1128.01		12.97	1185.28	13.23	1185.02	14.86	1183.39
WC6A	1198.73	1198.69	1196.90	30.00	10.00	1178.50-1168.50		13.44	1185.29	13.69	1185.04	15.34	1183.39
WC7	1197.06	1197.12	1195.10	60.00	3.00	1139.82-1136.82		11.25	1185.81	11.92	1185.14	13.40	1183.66
WC7A	1196.88	1196.94	1194.90	30.00	10.00	1176.63-1166.63		11.42	1185.46	11.76	1185.12	13.27	1183.61
MW8	1198.96	none	1198.20	23.50	10.00	1185.20-1175.20		13.62	1185.34	13.77	1185.19	15.14	1183.82
WCI1	1199.40	1199.62	1196.80	26.50	10.00	1182.90-1172.90		14.67	1184.73	14.70	1184.70	16.04	1183.36
WCI2	1199.72	none		26.50	10.00	1183.10-1173.10		14.72	1185.00	14.76	1184.96	16.09	1183.63
WCI3	1199.90	1200.13	1197.20	26.50	10.00	1183.40-1173.40		15.06	1184.84	15.12	1184.78	PUMPING	-
WCI4	1202.25	none		26.50	10.00	1185.50-1175.50	PUMPING	-	-	-	-	PUMPING	-
WCI5	1203.39	none		26.50	10.00	1186.70-1176.70	PUMPING	21.20	1182.19	20.43	1182.96	PUMPING	-
WCI6	1200.14	none		26.50	10.00	1183.40-1173.40	PUMPING	15.16	1184.98	15.21	1184.93	16.61	1183.53
WCI7	1202.47	none		27.50	10.00	1184.60-1174.60	PUMPING	20.24	1182.23	20.73	1181.74	PUMPING	-
WCI8	1202.04	none		26.50	10.00	1185.30-1175.30	PUMPING	18.65	1183.39	17.14	1184.90	18.34	1183.70
WCI9	1199.25	none		26.50	10.00	1182.50-1172.50		14.22	1185.03	14.23	1185.02	15.48	1183.77
WCI10	1203.29	1203.29	1200.10	26.50	10.00	1186.60-1176.60	PUMPING	18.26	1185.03	18.26	1185.03	19.46	1183.83
WCI11	1203.73	none		26.50	10.00	1187.00-1177.00		-	-	-	-	19.92	1183.81
WCI12	1199.79	1199.81	1196.80	26.50	10.00	1183.10-1173.10		14.68	1185.11	14.72	1185.07	15.96	1183.83
WCI13	1199.52	none		26.70	10.00	1182.60-1172.60		14.33	1185.19	14.38	1185.14	15.60	1183.92
WCI14	1199.46	none		26.70	10.00	1182.50-1172.50		14.22	1185.24	14.28	1185.18	15.52	1183.94
WCI15	1199.20	none		26.50	10.00	1182.50-1172.50		14.33	1184.87	14.06	1185.14	15.26	1183.94
MW7A	1201.28	1201.34	1199.10	69.50	10.00	1141.58-1131.58		18.39	1182.89	17.26	1184.02	17.91	1183.37
MW9A	1197.10	1197.10	1195.00	141.00	10	1065.68-1055.68		11.32	1185.78	11.79	1185.31	13.38	1183.72
MW10A	1206.94	1206.98	1204.60	76.50	10.00	1140.20-1130.20		21.85	1185.09	22.20	1184.74	22.80	1184.14
MW10B	1206.80	1206.86	1204.70	35.00	10.00	1181.55-1171.55		21.70	1185.10	22.04	1184.76	22.69	1184.11
MW11*	1210.15			35	10	1184.90-1174.90		25.28	1184.87	25.58	1184.57		-
MW12	1200.08	COULD NOT LOCATE		70.0	20.00	1150.08-1130.08	CANT FIND	-	-	-	-	-	-
MW13*	1211.34	1211.42	1211.40	45.00	10.00	1176.09-1155.09		26.35	1184.99	26.66	1184.68	27.28	1184.06
MW14	1198.21	1198.26	1198.30	45	10.00	1162.97-1152.97		16.01	1182.20	14.00	1184.21	14.74	1183.47

MONITORING WELL CONSTRUCTION DETAILS AND WATER LEVELS
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

WELL ID	TOP OF RISER ELEVATION (FEET MSL)	TOP OF STEEL CASING ELEVATION (FEET MSL)	GROUND SURFACE ELEVATION (FEET MSL)	WELL DEPTH FROM TOP OF RISER	LENGTH OF SCREEN (FEET)	SCREEN INTERVAL (FEET MSL)	COMMENTS	OCTOBER 5,1987 DEPTH TO WATER (FEET)	OCTOBER 5,1987 WATER TABLE ELEV (FEET MSL)	DECEMBER 10,1987 DEPTH TO WATER (FEET)	DECEMBER 10,1987 WATER TABLE ELEV (FEET MSL)	JANUARY 7, 1988 DEPTH TO WATER (FEET)	JANUARY 7, 1988 WATER TABLE ELEV (FEET MSL)
WW1	1198.61	1198.73	1197.30	40.00	5.00	1153.37-1158.37		14.79	1183.82	13.48	1185.13	14.91	1183.70
WW2	1203.26	1203.38	1202.00	40.00	5.00	1158.02-1163.02		19.59	1183.67	17.81	1185.45	19.31	1183.95
WW3	1201.90	1202.06	1200.70	40.00	5.00	1156.66-1161.55		19.06	1182.84	16.55	1185.35	18.09	1183.81
WW4	1202.31	1202.41	1200.90	40.00	5.00	1167.11-1162.11		19.35	1182.96	17.22	1185.09	18.82	1183.49
WW5	1210.33	1210.43	1208.30	37.00	5.00	1178.05-1173.05		26.72	1183.61	25.48	1184.85	26.83	1183.50
WW6	1200.64	1200.96	1199.20	41.00	5.00	1164.42-1159.42		17.73	1182.91	16.04	1184.60	17.61	1183.03
WW7	1200.86	1201.08	1199.20	48.00	5.00	1157.63-1152.63		18.04	1182.82	15.96	1184.90	17.63	1183.23
TCT1(40)	1204.55	1204.75	1202.00	72.10	5.00	1137.25-1132.25		-	-	-	-	20.82	1183.73
TCT2(41)	1203.54	1203.68	1200.70	22.10	15.00	1196.19-1181.19		19.56	1183.98	18.30	1185.24	19.96	1183.58
TCT3(42)	1201.66	NONE	1200.40	54.00	5.00	1152.43-1147.43		19.57	1182.09	16.40	1185.26	18.02	1183.64
TCT4(43)	1203.23	1203.35	1201.70	23.80	15.00	1194.17-1179.17		20.35	1182.88	17.69	1185.54	19.20	1184.03
TCT5(44)	1204.45	1204.57	1202.30	23.00	15.00	1196.21-1181.21		-	-	18.81	1185.64	20.22	1184.23
FVD1	1199.70	1199.74	1197.60	22.00	10.00	1187.70-1177.70		15.39	1184.31	14.74	1184.96	15.94	1183.76
FVD2	1199.27	1199.35	1197.30	20.00	10.00	1189.27-1179.27		14.90	1184.37	14.30	1184.97	15.48	1183.79
FVD5	1198.88	1198.92	1196.90	20.50	10.00	1188.35-1178.35		14.61	1184.27	13.88	1185.00	15.13	1183.75
FVD7	1198.59	1198.73	1196.90	18.50	10.00	1189.77-1179.77		14.68	1183.91	13.54	1185.05	14.94	1183.65
GM5D	1200.38	1200.90	1200.90	114.00	10.00	1096.21-1086.21		17.79	1182.59	15.31	1185.07	16.97	1183.41
GM6D	1198.78	1199.06	1199.10	126.00	10.00	1082.46-1072.46		15.86	1182.92	13.64	1185.14	15.26	1183.52
GM7D	1198.77	1199.21	1199.20	123.00	10.00	1085.54-1075.54		15.39	1183.38	13.79	1184.98	15.25	1183.52
GM8D*	1196.18			122.50	10.00	1083.43-1073.43		12.53	1183.65	11.08	1185.10	12.54	1183.64
GM9S	1198.94	1199.23	1199.20	20.00	10.00	1188.67-1178.67		15.60	1183.34	13.82	1185.12	15.38	1183.56
E20	1199.18	1199.34	1197.20	79.50	5.00	1122.70-1117.70				14.02	1185.16	15.46	1183.72
E21	1197.61	1197.53	1195.20	129.50	5.00	1071.20-1065.70				11.57	1186.04	12.55	1185.06
E21A	1197.95	1197.87	1195.20	22.00	10.00	1183.20-1173.20				11.93	1186.02	12.94	1185.01
E22	1195.54	1196.08	1196.10	93.70	5.00	1107.40-1102.40				10.47	1185.07	11.76	1183.78
E22A	1195.93	1196.43	1196.40	22.00	10.00	1184.40-1174.40				10.87	1185.06	12.10	1183.83
E23A	1197.69	1198.15	1198.20	21.40	10.00	1186.80-1176.80				12.80	1184.89	14.24	1183.45
E24	1210.13	1210.15	1208.50	85.70	5.00	1127.80-1122.80				25.26	1184.87	26.13	1184.00
E24A	1211.18	1211.18	1209.00	35.00	10.00	1184.00-1174.00				26.36	1184.82	27.22	1183.96
E25	1213.93	1213.99	1211.70	135.00	5.00	1081.70-1076.70				29.34	1184.59	29.79	1184.14
E25A	1213.87	1213.93	1211.70	37.50	10.00	1184.20-1174.20				29.28	1184.59	29.76	1184.11
E26	1199.08	1199.02	1196.70	95.00	5.00	1106.70-1101.70				13.76	1185.32	14.91	1184.17
E26A	1199.23	1199.23	1196.60	23.00	10.00	1183.60-1173.60				13.88	1185.35	15.01	1184.22
E27	1195.71	1196.31	1196.30	136.50	5.00	1064.80-1059.80				-	-	10.57	1185.14
E28A	1211.68	1212.14	1212.10	37.00	10.00	1185.10-1175.10				26.49	1185.19	27.66	1184.02
E29A	1200.30	1200.80	1200.80	29.00	10.00	1181.80-1171.80				15.20	1185.10	16.94	1183.36
E30	1204.58	1204.68	1202.10	132.80	5.00	1074.30-1069.30				18.99	1185.59	20.25	1184.33
E31	1201.15	1201.65	1201.60	135.50	5.00	1071.10-1066.10				15.72	1185.43	17.43	1183.72
E37A	1197.80	1198.28	1198.30	26.00	10.00	1182.30-1172.30				12.95	1184.85	14.34	1183.46

MONITORING WELL CONSTRUCTION DETAILS AND WATER LEVELS
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

WELL ID	TOP OF RISER ELEVATION (FEET MSL)	TOP OF STEEL CASING ELEVATION (FEET MSL)	GROUND SURFACE ELEVATION (FEET MSL)	WELL DEPTH FROM TOP OF RISER	LENGTH OF SCREEN (FEET)	SCREEN INTERVAL (FEET MSL)	COMMENTS	OCTOBER 5,1987 DEPTH TO WATER (FEET)	OCTOBER 5,1987 WATER TABLE ELEV (FEET MSL)	DECEMBER 10,1987 DEPTH TO WATER (FEET)	DECEMBER 10,1987 WATER TABLE ELEV (FEET MSL)	JANUARY 7, 1988 DEPTH TO WATER (FEET)	JANUARY 7, 1988 WATER TABLE ELEV (FEET MSL)
						WEST WELL FIELD							
CW6	1220.02		1220.02	100.00	38.50	1120.02-1158.52	PUMPING	60.58	1159.44	43.00	1177.02	60.00	1160.02
CW7	1223.63		1223.63	100.00	39.00	1123.63-1162.63	PUMPING	64.23	1159.40	65.00	1158.63	64.00	1159.63
CW9	1224.56		1224.56	100.00	60.00	1124.56-1184.56	PUMPING	62.00	1162.56	59.00	1165.56	43.00	1181.56
CW9OBS	1224.40	1224.40	1222.30	78.00				41.10	1183.30			40.29	1184.11
CW10			1215.05							SEALED	-	SEALED	-
C1S	1223.69		1220.98	29.90	15.00	1206.08-1191.08		30.72	1192.97	>32.01	1223.69	29.95	1193.74
C2S	1219.24	1219.36	1216.30	37.90	15.00	1193.34-1178.34		32.21	1187.03	32.46	1186.78	32.65	1186.59
C3S	1220.24	1220.52	1217.60	38.90	15.00	1193.51-1178.51		33.20	1187.04	33.54	1186.70	33.84	1186.40
C4S	1216.84	1216.94	1214.30	32.20	15.00	1197.06-1182.06		29.84	1187.00	30.19	1186.65	30.50	1186.34
C4D	1216.32	1216.56	1214.20	104.20	5.00	1114.84-1109.84		29.36	1186.96	29.66	1186.66	30.02	1186.30
C6S	1221.69		1219.32	39.50	15.00	1194.82-1179.82		34.50	1187.19	34.94	1186.75	35.13	1186.56
C7S	1221.00	1221.12	1218.20	36.00	15.00	1197.26-1182.26		33.91	1187.09	34.29	1186.71	34.40	1186.60
W1A	1215.79	1215.93	1214.21	130.00	8.00	1092.21-1084.21		30.05	1185.74	30.48	1185.31	30.03	1185.76
W3A	1223.26		1221.11	140.00	10.00	1091.11-1081.11		38.43	1184.83	38.98	1184.28	38.34	1184.92
W3B	1223.53		1221.17	74.70	10.00	1156.27-1146.27		38.62	1184.91	39.15	1184.38	38.58	1184.95
W4A	1215.22	1215.52	1215.50	100.00	10.00	1125.59-1115.59		32.72	1182.50	32.59	1182.63	31.37	1183.85
W4B	1215.58	1215.62	1215.60	60.5	10.00	1165.18-1155.18		32.82	1182.76	32.99	1182.59	31.79	1183.79
W4C	1215.34	1215.39	1215.40	40.00	10.00	1185.69-1175.69		32.44	1182.90	32.70	1182.64	31.49	1183.85
W5	1219.22		1219.08	45.00	10.00	1184.28-1174.28		36.42	1182.80	36.92	1182.30	-	-
W6	1218.93		1218.93	45.00	10.00	1184.00-1174.00	OBSTRUCTED		-			-	-
W7	1219.10		1219.10	45.00	10.00	1184.06-1174.06		37.10	1182.00	37.52	1181.58	-	-
W8	1217.55		1217.55									-	-
W9	1201.91	1201.97	1202.00	50.00				18.29	1183.62	20.64	1181.27	17.46	1184.45
PLUM ST	1215.85			95.00				26.47	1189.38	26.74	1189.11	26.00	1189.85
R1S	1222.13	1222.19	1220.10	40.50	10.00	1189.51-1179.51		34.35	1187.78	34.92	1187.21	34.97	1187.16
R1D	1222.39	1222.41	1220.10	121.00	10.00	1109.16-1099.16		34.85	1187.54	35.41	1186.98	35.43	1186.96
R2S	1209.88	1209.96	1208.10	28.00	10.00	1190.05-1180.05		22.44	1187.44	23.28	1186.60	23.05	1186.83
R2D	1209.58	1209.82	1207.90	135.00	10.00	1082.69-1072.69		23.21	1186.37	23.60	1185.98	23.41	1186.17
R3S	1215.29	1215.35	1212.80	32.00	10.00	1190.79-1180.79		27.29	1188.00	28.00	1187.29	28.07	1187.22
R3D	1215.53	1215.57	1213.10	136.00	10.00	1087.09-1077.09		28.90	1186.63	29.24	1186.29	29.18	1186.35
R4D	1219.24	1219.28	1216.00	133.00	10.00	1093.05-1083.05		32.25	1186.99	32.51	1186.73	32.72	1186.52
GM1S	1216.07	1216.11	1214.30	37.00	10	1167.42-1157.42		30.23	1185.84	30.80	1185.27	30.16	1185.91
GM2S	1211.91		1212.30	34.00	10.00	1188.79-1178.79		26.03	1185.88	26.52	1185.39	26.12	1185.79
GM3S	1214.72		1215.10	37.00	10.00	1188.10-1178.10		28.20	1186.52	28.52	1186.20	28.21	1186.51
GM4S	1216.13		1214.30	36.00	10.00	1188.31-1178.31		30.06	1186.07	30.62	1185.51	30.02	1186.11
GM4D	1216.46		1214.50	145.00	10.00	1079.52-1069.52		30.34	1186.12	30.42	1186.04	30.32	1186.14
W50	1215.67	1215.77	1213.30	82.80	5.00	1135.50-1130.50				29.07	1186.60	29.00	1186.67
W51A	1224.50	1224.46	1222.20	44.70	10.00	1187.50-1177.50				37.10	1187.40	37.22	1187.28
W52	1219.18	1219.22	1216.50	124.00	5.00	1097.50-1092.50				32.23	1186.95	32.74	1186.44
W52A	1219.08	1219.10	1216.80	36.00	10.00	1190.80-1180.80				32.70	1186.38	32.27	1186.81
W53	1216.77	1217.53	1217.50	125.50	5.00	1097.00-1092.00				30.10	1186.67	-	-

MONITORING WELL CONSTRUCTION DETAILS AND WATER LEVELS
WAUSAU WATER SUPPLY NPL SITE
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WELL ID	TOP OF RISER ELEVATION (FEET MSL)	TOP OF STEEL CASING ELEVATION (FEET MSL)	GROUND SURFACE ELEVATION (FEET MSL)	WELL DEPTH FROM TOP OF RISER	LENGTH OF SCREEN (FEET)	SCREEN INTERVAL (FEET MSL)	COMMENTS	OCTOBER 5,1987 DEPTH TO WATER (FEET)	OCTOBER 5,1987 WATER TABLE ELEV (FEET MSL)	DECEMBER 10,1987 DEPTH TO WATER (FEET)	DECEMBER 10,1987 WATER TABLE ELEV (FEET MSL)	JANUARY 7, 1988 DEPTH TO WATER (FEET)	JANUARY 7, 1988 WATER TABLE ELEV (FEET MSL)
W53A	1217.00	1217.62	1217.60	41.30	10.00	1186.30-1176.30				30.31	1166.69	-	-
W54	1216.31	1216.87	1216.90	65.50	5.00	1156.40-1151.40				24.71	1191.60	29.85	1186.46
W55	1217.68	1217.93	1217.90	115.50	5.00	1107.40-1102.40				32.78	1184.90	32.14	1185.54
W55A	1217.40	1217.98	1218.00	43.00	10.00	1185.00-1175.00				31.88	1185.52	31.62	1185.78
W56	1200.11	1200.17	1198.90	66.50	5.00	1137.40-1132.40				14.49	1185.62	14.11	1186.00
W56A	1200.95	1200.95	1198.80	20.00	10.00	1188.80-1178.80				11.76	1189.19	11.91	1189.04
W57	1205.30	1205.30	1202.10	77.50	5.00	1129.60-1124.60				21.98	1183.32	20.91	1184.39
SG1	1189.39	1189.30										FROZEN	-
SG2	1193.34	1193.34										2.02	1191.32

* CORRECTED BY ADDING 0.25 TO RMT SURVEYED TOP OF CASING ELEVATION
- WATER LEVEL NOT RECORDED

APPENDIX I

HYDRAULIC CONDUCTIVITY TEST METHODS AND RESULTS

BAILDOWN HYDRAULIC CONDUCTIVITY TEST METHODS AND RESULTS

The purpose of the baildown tests conducted on the site is to measure in-situ saturated hydraulic conductivity of subsurface materials. Baildown tests measure the saturated hydraulic conductivity of undisturbed, in-place aquifer material, whereas laboratory tests require removal of a sample from its natural environment.

The general procedure for a baildown test is to instantaneously remove a measured volume of water from the well as rapidly as possible, by bailing or pumping, and measure the rate at which the water in the well returns to its static level. The hydraulic conductivity of the aquifer material is a function of the rate of water level rise and the well geometry. In permeable aquifer material, the location of the well screen with respect to the water table and the base of the aquifer are important. The configuration of a typical baildown test is illustrated in Figure A.

DATA REDUCTION

Several methods are available to interpret the water level versus time data that are obtained from a baildown test. These include Hvorslev (1951), NAVFAC (1971), Papadopulos, et al. (1973), and Bouwer and Rice (1976). The first three references use an analytical solution to a well fully penetrating a confined aquifer. The method by Bouwer and Rice utilizes an analog model of both fully and partially penetrating wells to aid in solution of the modified Thiem equation. The Bouwer and Rice method was selected because of its ability to incorporate the effects on recovery rate due to a partially penetrating well.

The Bouwer and Rice method is based on solution of a modified Thiem equation for radial flow to a pumped well as shown in Equation 1.

$$Q = 2 \quad (KLy)/(\ln(R_e/r_w)) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where:

Q = flow into the well (L^3/T)

K = hydraulic conductivity of the aquifer (L/T)

L = open length of open interval in the well (L)

y = difference between the water level in the well and the equilibrium level in the aquifer (L)

R_e = radius of influence of the well (L)

r_w = effective well radius (L)

In a single well test, the value of R_e is unknown. Values of R_e, in terms of the $\ln(R_e/r_w)$ were determined by Bower and Rice (1976) with an electric analog model of a homogeneous isotropic aquifer. The analog model was used to analyze the effects of the aquifer and well geometry. Results of the study for a partially penetrating well is shown in Equation 2 using Equation 3 to determine the value of $\ln(R_e/r_w)$.

$$K = \frac{r_c^2 \ln(R_e/r_w)}{2L} \quad \frac{1}{t} \quad \ln \quad \frac{y_o}{y_t} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

Where:

r_c = radius of the well casing (L)

t = time (T)

y_o, y_t = difference between the water level in the well and the equilibrium level in the aquifer at times o and t

$$\ln(R_e/r_w) = \quad 1.1/\ln(Hr_w) + \frac{A+B \ln(D-H)/r_w)}{L/r_w} \quad ^{-1} \quad \ldots\ldots \quad (3)$$

Where:

A,B = constants obtained from Figure B

H = depth to the bottom of the screen from the water table

D = thickness of the aquifer

As noted by Bouwer and Rice, a semilog plot of y_0/y_t versus time (t) (on the linear scale) should yield a straight line.

A FORTRAN program was developed by WEI to reduce the baildown field test data. The program allows for skewed data points and outliers to be deleted from the time-drawdown plot, and the remaining data points are then matched to a linear least square fit.

Input data for each test is listed in the following pages. Output from the test analysis follows the input data. Results of the tests are summarized and discussed in the text.

REFERENCES CITED

Bouwer, H. and Rice, R.C., 1976, A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. Water Resources Research, Vol. 12, No. 3, p. 423-428.

Hvorslev, M.J., 1951, Time Lag and Soil Permeability in Groundwater Observations. U.S. Army Corps of Engineers, Waterways Exp. Sta. Bull 36, Vicksburg, MS.

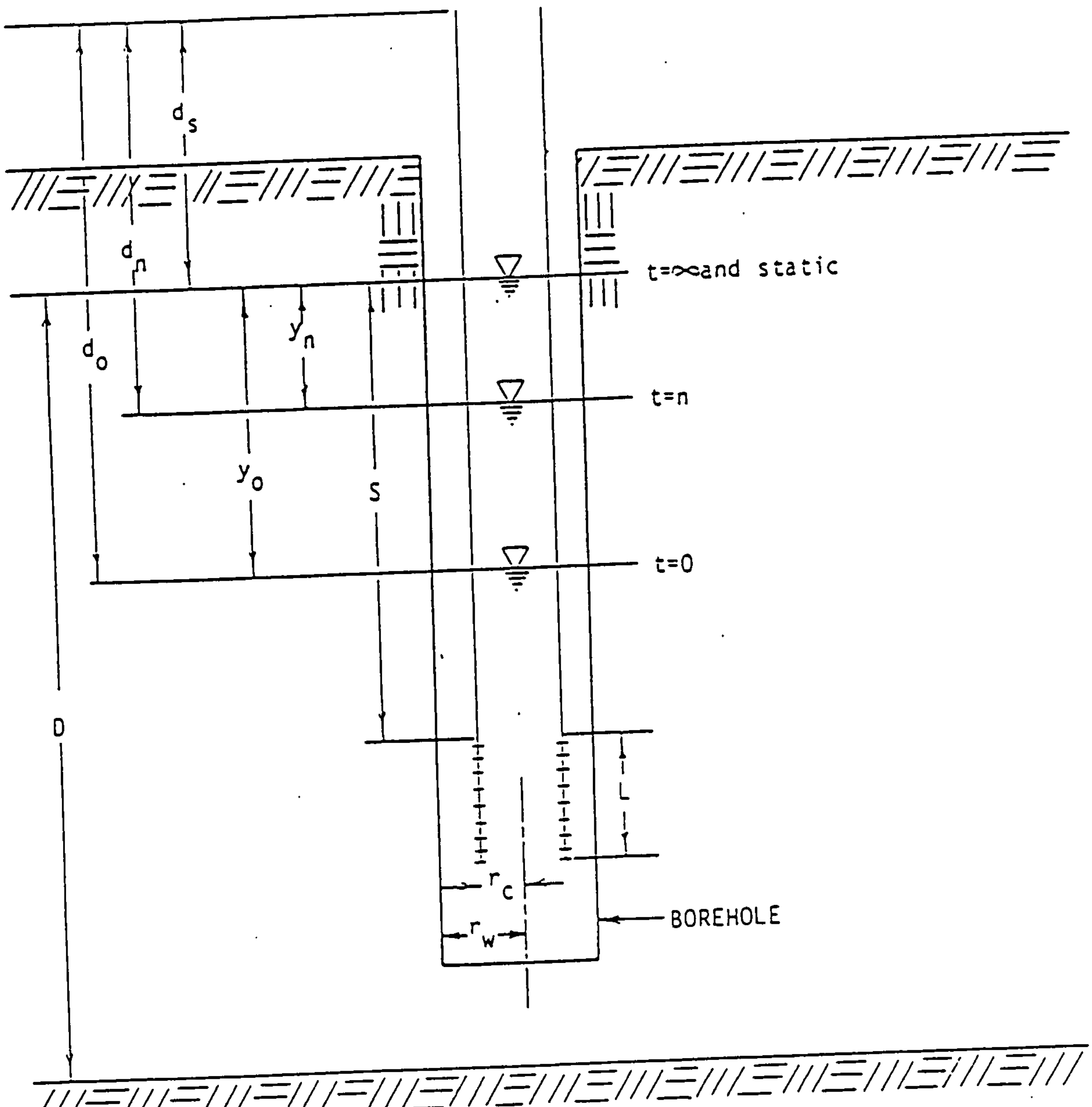
Papadopulos, S.S., Bredehoeft, J.D., and Cooper, H.H., Jr., 1973, On the Analysis of 'Slug Test' Data. Water Resources Research, Vol. 9, No. 4., p. 1087-1089.

United States Department of the Navy, Design Manual: Soil Mechanics, Foundations, and Earth Structures, NAVFAK DM-F, March 1971, p. 7-4-9.

MMM/cac/KJQ
[cac-53-49]

FIGURE A

BAILDOWN TEST CONFIGURATION



d_s - DEPTH TO STATIC LEVEL

d_o - DEPTH TO WATER AT t=0

d_n - DEPTH TO WATER AT t=n

y_o - RELATIVE DRAWDOWN AT t=0 $(d_o - d_s)$

y_n - RELATIVE DRAWDOWN AT t=n $(d_n - d_s)$

S - DEPTH TO TOP OF SCREEN BELOW WATER TABLE

D - AQUIFER THICKNESS

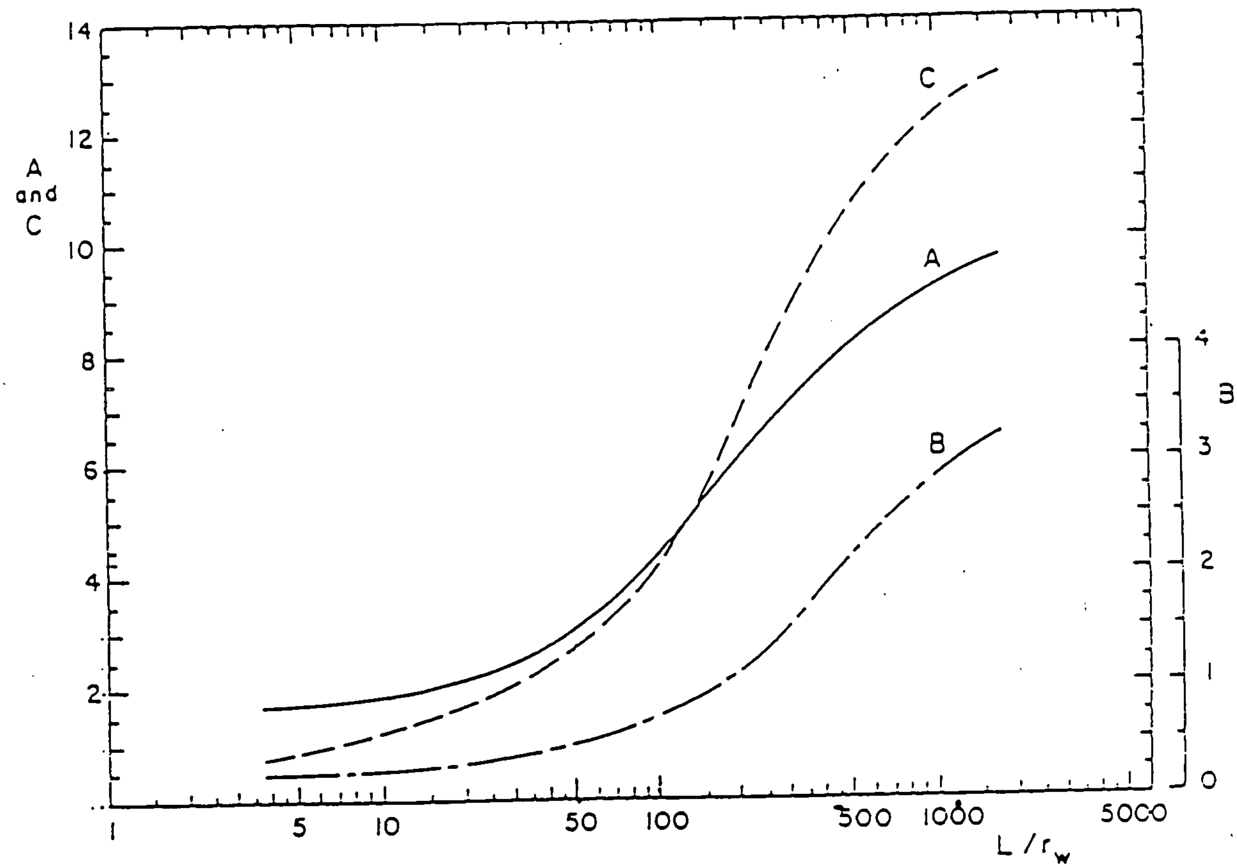


FIGURE B - Curves relating A, B and C to L/r_w
(from Bouwer and Rice, 1976).

SE1000B
Environmental Logger
11/05 18:45

Unit# 00168 Test# 1

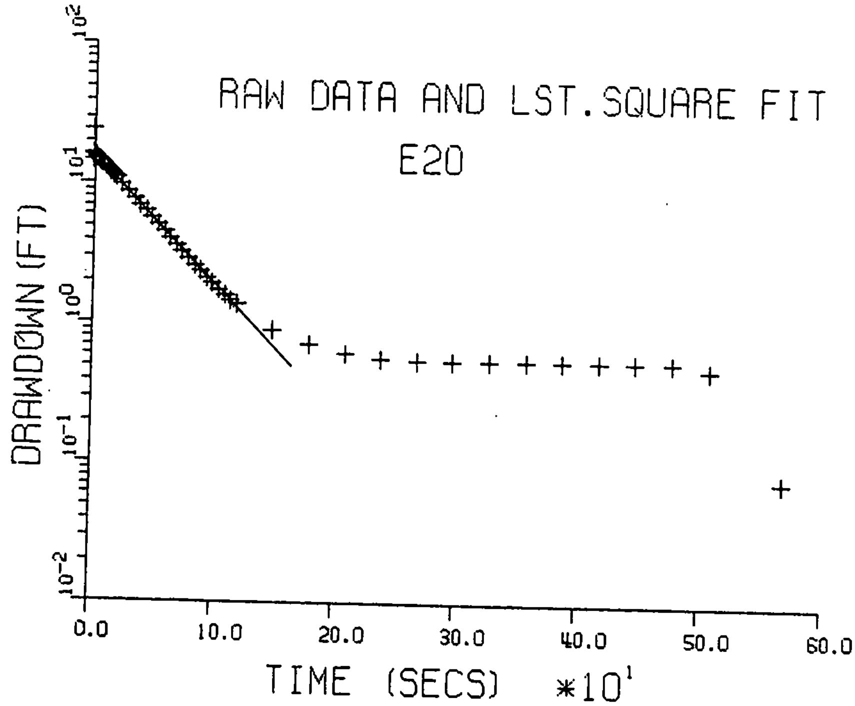
INPUT 1: Level (F) TOC

Reference	18.43
Scale factor	50.48
Offset	0.00

Step# 0 11/05 16:29

Elapsed Time	Value
0.0000	- 59.28
0.0033	- 59.27
0.0066	- 59.25
0.0099	- 59.23
0.0133	- 59.22
0.0166	- 48.19
0.0200	- 31.64
0.0233	- 32.94
0.0266	- 41.57
0.0300	- 39.65
0.0333	- 40.12
0.0500	- 40.39
0.0666	- 40.65
0.0833	- 40.87
0.1000	- 41.13
0.1166	- 41.35
0.1333	- 41.57
0.1500	- 41.81
0.1666	- 42.04
0.1833	- 42.28
0.2000	- 42.48
0.2166	- 42.69
0.2333	- 42.91
0.2500	- 43.10
0.2666	- 43.31
0.2833	- 43.52
0.3000	- 43.71
0.3166	- 43.92
0.3333	- 44.11
0.4167	- 45.06
0.5000	- 45.93
0.5833	- 46.72
0.6667	- 47.46
0.7500	- 48.12
0.8333	- 48.75
0.9167	- 49.30
1.0000	- 49.81
1.0833	- 50.26
1.1667	- 50.67
1.2500	- 51.06
1.3333	- 51.39
1.4166	- 51.70
1.5000	- 51.97
1.5033	- 52.21
1.6667	- 52.43
1.7500	- 52.62
1.8333	- 52.79
1.9167	- 52.95
2.0000	- 53.10
2.5000	- 53.67
3.0000	- 53.97
3.5000	- 54.12
4.0000	- 54.20
4.5000	- 54.25
5.0000	- 54.26
5.5000	- 54.26
6.0000	- 54.28
6.5000	- 54.28
7.0000	- 54.28
7.5000	- 54.28
8.0000	- 54.28
8.5000	- 54.28
9.0000	- 54.20
9.5000	- 54.28
10.0000	- 54.29
12.0000	- 54.28

END



@@

W A R Z Y N E N G I N E E R I N G . I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR E20 COR

@@

EFFECTIVE WELL DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN LENGTH	=	5.000	FEET
WELL PENETRATION DEPTH	=	62.080	FEET
AQUIFER THICKNESS	=	119.560	FEET
STATIC WATER LEVEL	=	18.430	FEET
AQUIFER CONDUCTIVITY IS	=	.170E-02	CM/SEC
	OR	.362E+02	GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.599E+01	CM*CM/SEC
	OR	.416E+04	GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .000E+00 SECONDS

END TIME IS = .100E+03 SECONDS

SE1000B
Environmental Logger
11/05 18:44

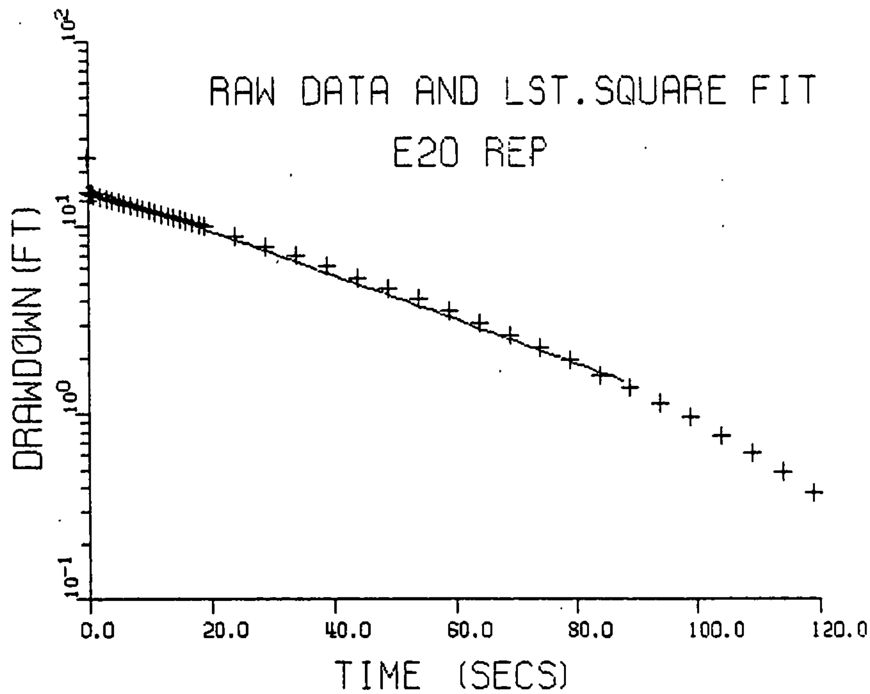
Unit# 00168 Test# 2

INPUT 1: Level (F) TOC

Reference	18.43
Scale factor	50.48
Offset	0.00

Step# 0 11/05 17:20

Elapsed Time	Value
0.0000	14.23
0.0033	14.44
0.0066	21.28
0.0099	40.02
0.0133	42.40
0.0166	32.50
0.0200	34.12
0.0233	33.73
0.0266	33.66
0.0300	33.58
0.0333	33.50
0.0500	33.15
0.0666	32.82
0.0833	32.50
0.1000	32.21
0.1166	31.91
0.1333	31.64
0.1500	31.35
0.1666	31.08
0.1833	30.81
0.2000	30.55
0.2166	30.28
0.2333	30.03
0.2500	29.77
0.2666	29.52
0.2833	29.28
0.3000	29.02
0.3166	28.80
0.3333	28.56
0.4167	27.43
0.5000	26.41
0.5833	25.47
0.6667	24.63
0.7500	23.86
0.8333	23.17
0.9167	22.57
1.0000	22.01
1.0833	21.53
1.1667	21.10
1.2500	20.72
1.3333	20.39
1.4166	20.08
1.5000	19.83
1.5833	19.59
1.6667	19.40
1.7500	19.21
1.8333	19.06
1.9167	18.92
2.0000	18.81
2.5000	18.35
3.0000	18.15
3.5000	18.06
4.0000	18.01
4.5000	17.99
5.0000	17.99
5.5000	17.98
6.0000	17.98
6.5000	17.98
7.0000	17.98
7.5000	17.98
8.0000	17.98
8.5000	17.93
9.0000	17.42
9.5000	17.50
10.0000	90.13
12.0000	90.13



@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR E20 REP

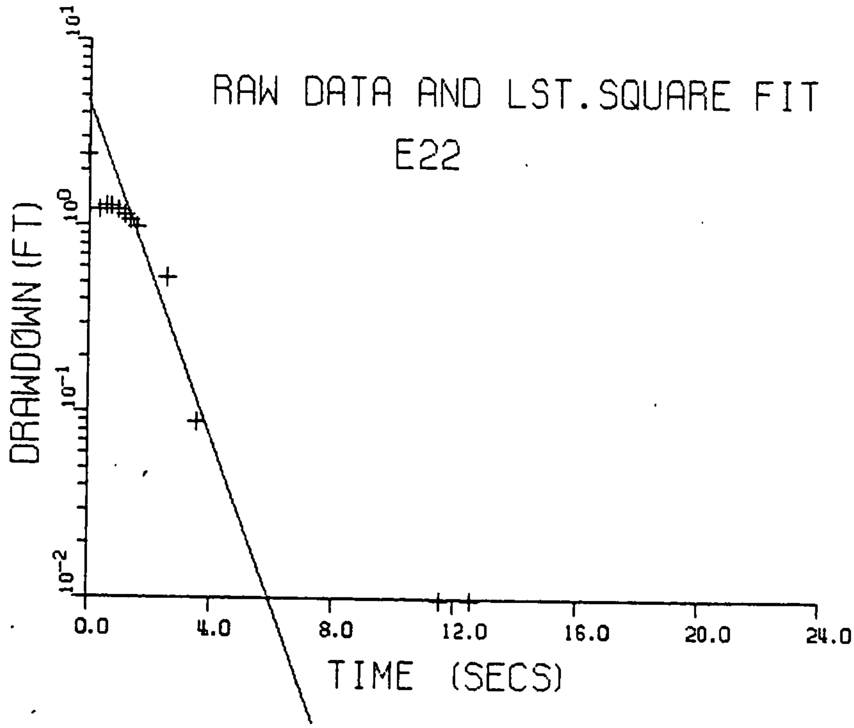
@@

EFFECTIVE WELL DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN LENGTH	=	5.000	FEET
WELL PENETRATION DEPTH	=	62.080	FEET
AQUIFER THICKNESS	=	119.560	FEET
STATIC WATER LEVEL	=	18.430	FEET
AQUIFER CONDUCTIVITY IS	=	.208E-02	CM/SEC
	OR	.440E+02	GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.757E+01	CM*CM/SEC
	OR	.526E+04	GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :

START TIME IS	=	.000E+00	SECONDS
END TIME IS	=	.100E+03	SECONDS



SE1000B
Environmental Logger
11/06 14:28

Unit# 00168 Test# 4

INPUT 1: Level (F) TOC

Reference	11.74
Scale factor	50.48
Offset	0.00

Step# 0 11/06 10:40

Elapsed Time	Value
0.0000	11.74
0.0033	12.15
0.0066	14.17
0.0099	11.53
0.0133	12.98
0.0166	13.03
0.0200	13.04
0.0233	12.99
0.0266	12.90
0.0300	12.82
0.0333	12.74
0.0500	12.28
0.0666	11.83
0.0833	11.58
0.1000	11.46
0.1166	11.48
0.1333	11.53
0.1500	11.62
0.1566	11.69
0.1833	11.74
0.2000	11.75
0.2166	11.75
0.2333	11.74
0.2500	11.72
0.2666	11.72
0.2833	11.70
0.3000	11.70
0.3166	11.70
0.3333	11.70
0.4167	11.72
0.5000	11.72
0.5333	11.70
0.6667	11.70
0.7500	11.70
0.8333	11.72
0.9167	11.72
1.0000	11.70
1.0833	11.70
1.1667	11.70
1.2500	11.70
1.3333	11.70
1.4166	11.70
1.5000	11.70
1.5833	11.70
1.6667	11.70
1.7500	11.70
1.8333	11.70
1.9167	11.70
2.0000	11.70
2.5000	11.70
3.0000	11.70
3.5000	11.70
4.0000	11.70
4.5000	11.70
5.0000	11.70
5.5000	11.70
6.0000	11.70
6.5000	11.70
7.0000	11.70
7.5000	11.70
8.0000	11.70
8.5000	11.70
9.0000	11.70
9.5000	11.70
10.0000	11.70

END

@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N, W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR E22

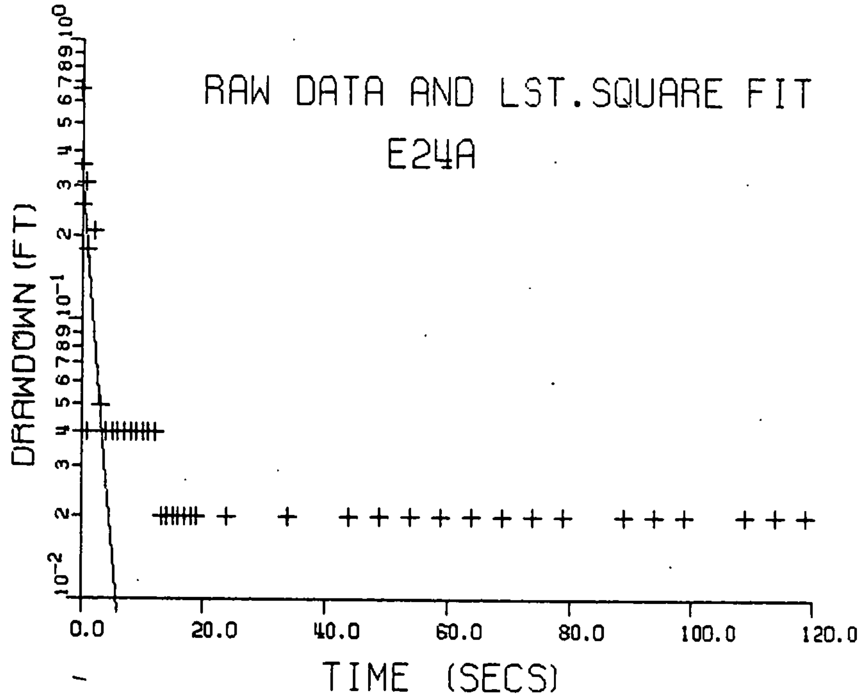
@@

EFFECTIVE WELL DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN LENGTH	=	5.000	FEET
WELL PENETRATION DEPTH	=	84.760	FEET
AQUIFER THICKNESS	=	118.250	FEET
STATIC WATER LEVEL	=	11.740	FEET
AQUIFER CONDUCTIVITY IS	=	.812E-01	CM/SEC
	OR	.172E+04	GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.293E+03	CM*CM/SEC
	OR	.203E+06	GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .120E+01 SECONDS

END TIME IS = .400E+01 SECONDS



SE1000B
Environmental Logger
11/06 14:27

Unit# 00168 Test# 5

INPUT 1: Level (F) TOC

Reference	26.78
Scale factor	50.48
Offset	0.00

Step# 0 11/06 11:10

Elapsed Time	Value
0.0000	25.93
0.0033	25.95
0.0066	25.95
0.0099	26.15
0.0133	26.58
0.0166	26.17
0.0200	26.27
0.0233	25.61
0.0266	26.22
0.0300	26.09
0.0333	25.95
0.0500	26.12
0.0666	25.96
0.0833	25.95
0.1000	25.95
0.1166	25.95
0.1333	25.95
0.1500	25.95
0.1666	25.95
0.1833	25.95
0.2000	25.95
0.2166	25.95
0.2333	25.93
0.2500	25.93
0.2666	25.93
0.2833	25.93
0.3000	25.93
0.3166	25.93
0.3333	25.93
0.4167	25.93
0.5000	25.91
0.5833	25.93
0.6667	25.91
0.7500	25.93
0.8333	25.93
0.9167	25.93
1.0000	25.93
1.0833	25.93
1.1667	25.93
1.2500	25.93
1.3333	25.93
1.4166	25.91
1.5000	25.93
1.5833	25.93
1.6667	25.93
1.7500	25.91
1.8333	25.93
1.9167	25.93
2.0000	25.93
2.5000	25.91
3.0000	25.91
3.5000	25.91
4.0000	25.91
4.5000	25.91
5.0000	25.91
5.5000	25.91
6.0000	25.91
6.5000	25.91
7.0000	25.91
7.5000	25.91
8.0000	25.91
8.5000	25.91
9.0000	25.91
9.5000	[illegible]
10.0000	[illegible]

END

@@@

W A R Z Y N   E N G I N E E R I N G , I N C.

M A D I S O N.   W I S C O N S I N.

B A I L   D O W N   A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR E24A

@@@

EFFECTIVE WELL DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN LENGTH = 10.000 FEET

WELL PENETRATION DEPTH = 11.270 FEET

AQUIFER THICKNESS = 114.400 FEET

STATIC WATER LEVEL = 25.910 FEET

AQUIFER CONDUCTIVITY IS = .290E-01 CM/SEC

OR .614E+03 GAL/FT/FT/DAY

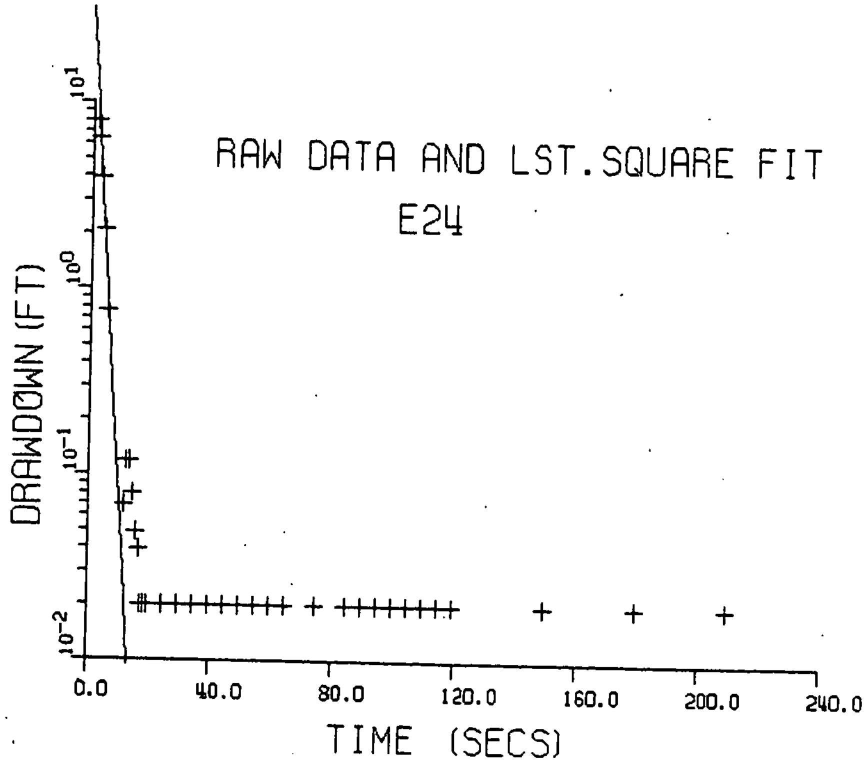
AQUIFER TRANSMISSIVITY IS = .101E+03 CM*CM/SEC

OR .702E+05 GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .150E+01 SECONDS

END TIME IS = .500E+01 SECONDS



SE1000B
Environmental Logger
11/06 14:25

Unit# 00168 Test# 6

INPUT 1: Level (F) TOC

Reference 28.57
Scale factor 50.48
Offset 0.00

Step# 0 11/06 11:33

Elapsed Time	Value
0.0000	27.66
0.0033	27.66
0.0066	27.66
0.0099	27.66
0.0133	27.64
0.0166	28.52
0.0200	31.13
0.0233	33.19
0.0266	34.57
0.0300	35.37
0.0333	35.69
0.0500	34.08
0.0666	31.59
0.0833	29.74
0.1000	28.39
0.1166	27.56
0.1333	27.21
0.1500	27.21
0.1666	27.37
0.1833	27.56
0.2000	27.69
0.2166	27.74
0.2333	27.74
0.2500	27.70
0.2666	27.67
0.2833	27.66
0.3000	27.64
0.3166	27.64
0.3333	27.64
0.4167	27.64
0.5000	27.64
0.5833	27.64
0.6667	27.64
0.7500	27.64
0.8333	27.64
0.9167	27.64
1.0000	27.64
1.0833	27.64
1.1567	27.62
1.2500	27.64
1.3333	27.62
1.4166	27.64
1.5000	27.64
1.5833	27.64
1.6667	27.64
1.7500	27.64
1.8333	27.64
1.9167	27.64
2.0000	27.64
2.5000	27.64
3.0000	27.64
3.5000	27.64

@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR E24

@@

EFFECTIVE WELL DIAMETER	=	2.000 INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000 INCHES
EFFECTIVE SCREEN LENGTH	=	5.000 FEET
WELL PENETRATION DEPTH	=	59.700 FEET
AQUIFER THICKNESS	=	114.400 FEET
STATIC WATER LEVEL	=	27.620 FEET
AQUIFER CONDUCTIVITY IS	=	.252E-01 CM/SEC
	OR	.534E+03 GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.879E+02 CM*CM/SEC
	OR	.611E+05 GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .195E+01 SECONDS

END TIME IS = .160E+02 SECONDS

SE10008
Environmental Logger
11/05 18:46

Unit# 00168 Test# 0

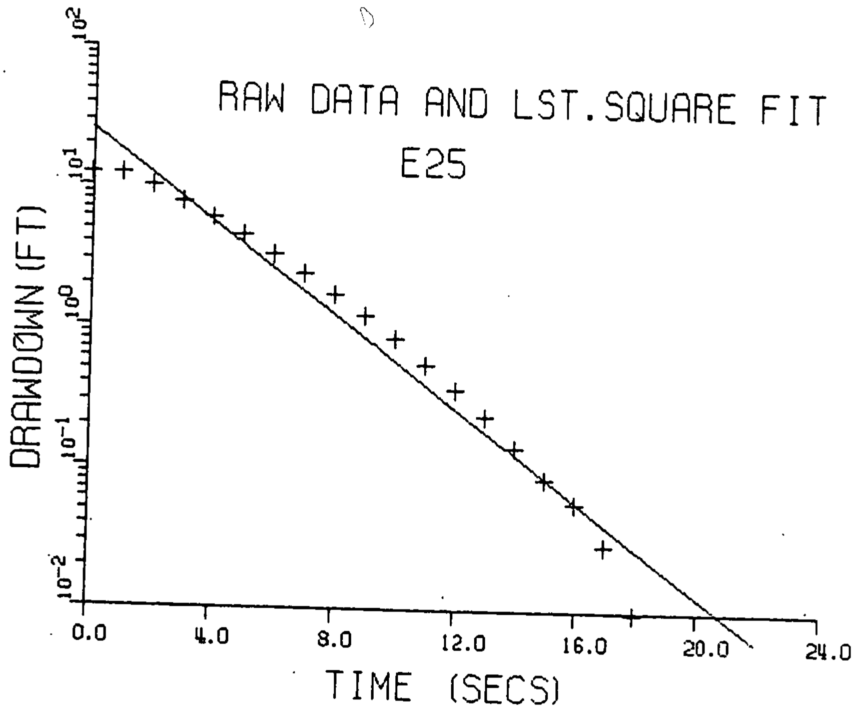
INPUT 1: Level (F) TOC

Reference	29.61
Scale factor	50.48
Offset	, 0.00

Step# 0 11/05 14:49

Elapsed Time	Value
0.0000	29.91
0.0033	29.91
0.0066	29.91
0.0099	29.91
0.0133	29.91
0.0166	29.91
0.0200	32.28
0.0233	36.78
0.0266	39.47
0.0300	41.14
0.0333	42.20
0.0500	42.18
0.0666	39.85
0.0833	37.61
0.1000	35.74
0.1166	34.24
0.1333	33.03
0.1500	32.11
0.1666	31.39
0.1833	30.86
0.2000	30.47
0.2166	30.18
0.2333	29.99
0.2500	29.86
0.2666	29.76
0.2833	29.70
0.3000	29.67
0.3166	29.64
0.3333	29.62
0.4167	29.5[illegible]
0.5000	29.57
0.5833	29.57
0.6667	29.57
0.7500	29.57
0.8333	29.56
0.9167	29.56
1.0000	29.56
1.0833	29.56
1.1667	29.57
1.2500	29.56
1.3333	29.57
1.4166	29.56
1.5000	29.56
1.5833	29.56
1.6667	29.57
1.7500	29.56
1.8333	29.57
1.9167	29.56
2.0000	29.56
2.5000	29.57
3.0000	29.57
3.5000	29.57
4.0000	29.57
4.5000	29.59
5.0000	29.57
5.5000	29.59
6.0000	29.59
6.5000	29.59
7.0000	29.59
7.5000	29.59
8.0000	29.59
8.5000	29.59
9.0000	29.61
9.5000	29.61
10.0000	29.59

END



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W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N, W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR E25

@@

EFFECTIVE WELL DIAMETER	=	2.000 INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000 INCHES
EFFECTIVE SCREEN LENGTH	=	5.000 FEET
WELL PENETRATION DEPTH	=	107.700 FEET
AQUIFER THICKNESS	=	130.000 FEET
STATIC WATER LEVEL	=	29.610 FEET
AQUIFER CONDUCTIVITY IS	=	.302E-01 CM/SEC
	OR	.640E+03 GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.120E+03 CM*CM/SEC
	OR	.832E+05 GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :

START TIME IS = .000E+00 SECONDS

END TIME IS = .180E+02 SECONDS

SE1000B
Environmental Logger
11/05 12:56

Unit# 00168 Test# 5

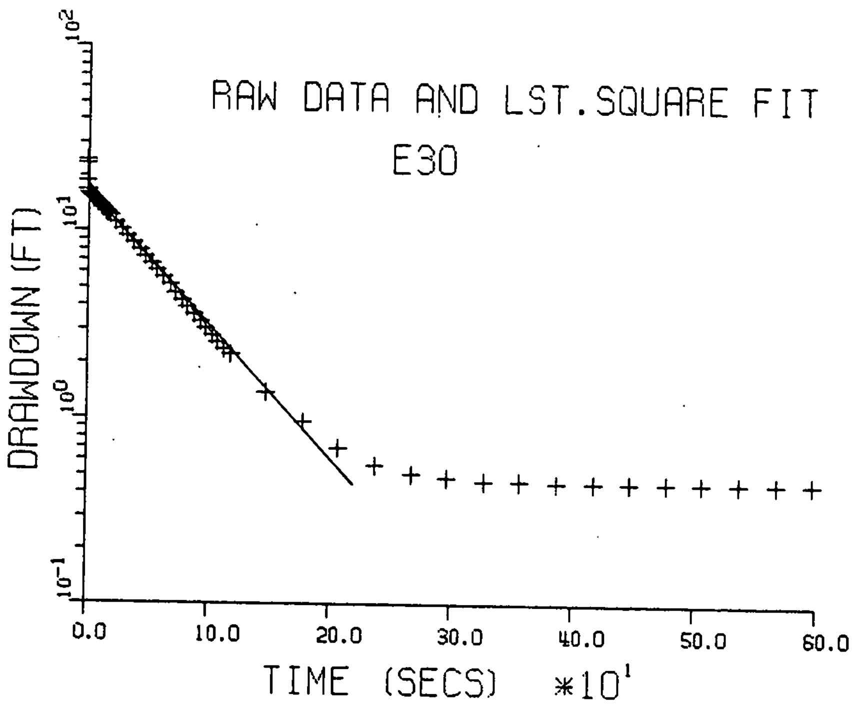
INPUT 1: Level (F) TOC

Reference 20.57
Scale factor 50.48
Offset 0.00

Step# 0 11/05 07:35

Elapsed Time	Value
0.0000	20.88
0.0033	20.88
0.0066	20.90
0.0099	25.44
0.0133	29.12
0.0166	38.72
0.0200	45.00
0.0233	43.98
0.0266	39.61
0.0300	37.64
0.0333	37.48
0.0500	36.85
0.0666	36.60
0.0833	36.34
0.1000	36.09
0.1166	35.80
0.1333	35.56
0.1500	35.32
0.1666	35.10
0.1833	34.88
0.2000	34.62
0.2166	34.43
0.2333	34.19
0.2500	33.99
0.2666	33.75
0.2833	33.54
0.3000	33.35
0.3166	33.14
0.3333	32.92
0.4167	31.95
0.5000	31.04
0.5833	30.18
0.6667	29.40
0.7500	28.66
0.8333	27.99
0.9167	27.39
1.0000	26.81
1.0833	26.29
1.1667	25.81
1.2500	25.36
1.3333	24.96
1.4166	24.60
1.5000	24.26
1.5833	23.96
1.6667	23.67
1.7500	23.43
1.8333	23.19
1.9167	22.99
2.0000	22.80
2.5000	21.98
3.0000	21.54
3.5000	21.28
4.0000	21.15
4.5000	21.09
5.0000	21.06
5.5000	21.04
6.0000	21.04
6.5000	21.03
7.0000	21.03
7.5000	21.03
8.0000	21.03
8.5000	21.03
9.0000	21.03
9.5000	21.03
10.0000	21.03

END



@@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR E30

@@@

EFFECTIVE WELL DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN LENGTH = 5.000 FEET

WELL PENETRATION DEPTH = 114.800 FEET

AQUIFER THICKNESS = 117.000 FEET

STATIC WATER LEVEL = 20.570 FEET

AQUIFER CONDUCTIVITY IS = .144E-02 CM/SEC

OR .305E+02 GAL/FT/FT/DAY

AQUIFER TRANSMISSIVITY IS = .514E+01 CM*CM/SEC

OR .357E+04 GAL/FT/DAY

###

CENSORED DATA END POINTS ARE :
START TIME IS = .100E+01 SECONDS

END TIME IS = .180E+02 SECONDS

SE1000B
Environmental Logger
12/03 15:24

Unit# 00168 Test# 1

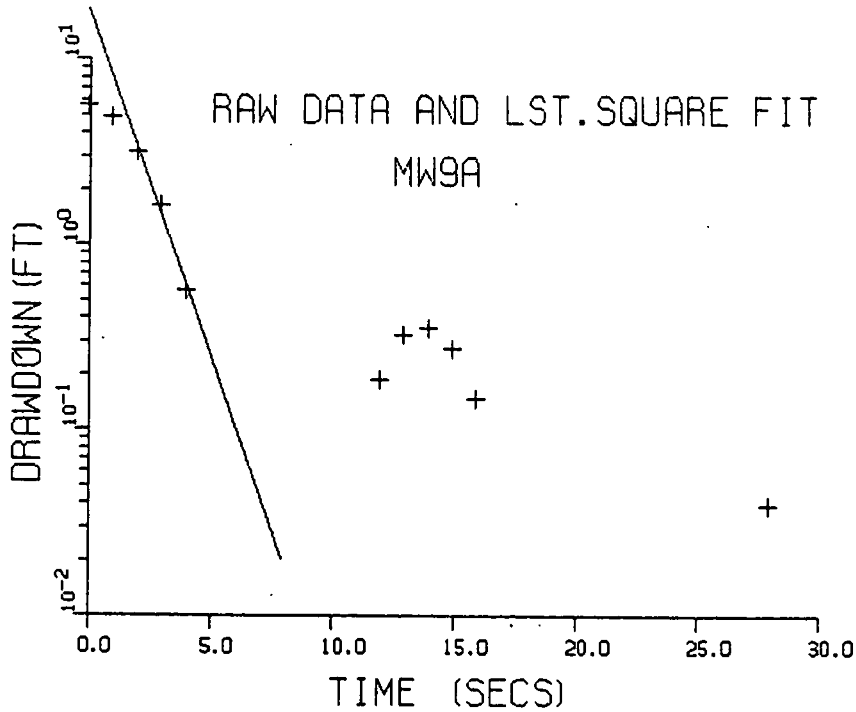
INPUT 1: Level (F) TOC

Reference 14.21
Scale factor 50.48
Offset 0.00

Step# 0 12/03 07:23

Elapsed Time	Value
0.0000	14.19
0.0033	14.17
0.0066	14.17
0.0099	16.95
0.0133	17.54
0.0166	18.17
0.0200	18.76
0.0233	19.26
0.0266	19.64
0.0300	19.86
0.0333	19.93
0.0500	19.16
0.0666	17.41
0.0833	15.89
0.1000	14.79
0.1166	13.98
0.1333	13.49
0.1500	13.28
0.1666	13.30
0.1833	13.52
0.2000	13.82
0.2166	14.14
0.2333	14.40
0.2500	14.54
0.2666	14.57
0.2833	14.49
0.3000	14.36
0.3166	14.21
0.3333	14.08
0.4167	14.09
0.5000	14.25
0.5833	14.11
0.6667	14.19
0.7500	14.17
0.8333	14.16
0.9167	14.17
1.0000	14.17
1.0833	14.17
1.1667	14.17
1.2500	14.17
1.3333	14.17
1.4166	14.17
1.5000	14.17
1.5833	14.17
1.6667	14.17
1.7500	14.17
1.8333	14.17
1.9167	14.17
2.0000	14.17
2.5000	14.17
3.0000	14.17
3.5000	14.16
4.0000	14.16
4.5000	14.16
5.0000	14.16
5.5000	14.16
6.0000	14.16
6.5000	14.14
7.0000	14.14
7.5000	14.14
8.0000	14.14
8.5000	14.14
9.0000	14.13
9.5000	14.13
10.0000	14.13
12.0000	14.11
14.0000	14.11
16.0000	14.09
18.0000	14.09
20.0000	14.08
22.0000	14.08

END



@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N, W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR MW9A

@@

EFFECTIVE WELL DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN LENGTH = 10.000 FEET

WELL PENETRATION DEPTH = 127.500 FEET

AQUIFER THICKNESS = 128.800 FEET

STATIC WATER LEVEL = 13.280 FEET

AQUIFER CONDUCTIVITY IS = .457E-01 CM/SEC

OR .968E+03 GAL/FT/FT/DAY

AQUIFER TRANSMISSIVITY IS = .179E+03 CM*CM/SEC

OR .125E+06 GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .000E+00 SECONDS

END TIME IS = .810E+01 SECONDS

SE1000B
Environmental Logger
11/05 12:58

Unit# 00168 Test# 3

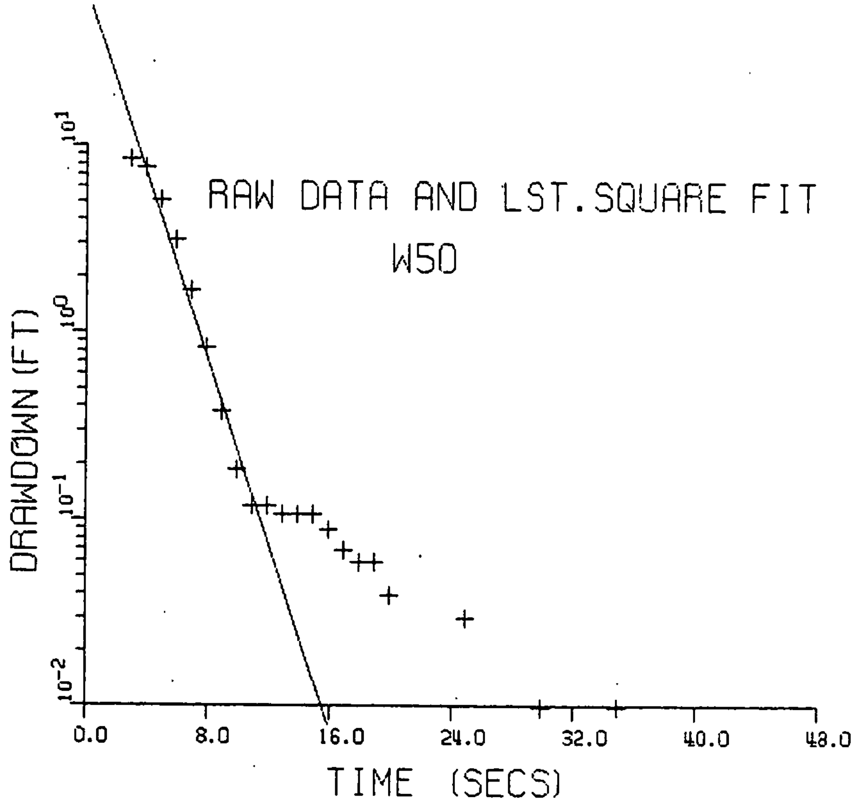
INPUT 1: Level (F) TOC

Reference 16.75
Scale factor 50.48
Offset 0.00

Step# 0 11/04 16:21

Elapsed Time	Value
0.0000	- 47.22
0.0033	- 47.24
0.0066	- 47.24
0.0099	- 47.25
0.0133	- 47.24
0.0166	- 45.34
0.0200	- 41.58
0.0233	- 39.01
0.0266	- 37.55
0.0300	- 36.93
0.0333	- 36.88
0.0500	- 39.51
0.0666	- 42.15
0.0833	- 44.15
0.1000	- 45.52
0.1166	- 46.35
0.1333	- 46.79
0.1500	- 46.98
0.1666	- 47.05
0.1833	- 47.06
0.2000	- 47.06
0.2166	- 47.08
0.2333	- 47.10
0.2500	- 47.11
0.2666	- 47.13
0.2833	- 47.13
0.3000	- 47.14
0.3166	- 47.14
0.3333	- 47.16
0.4167	- 47.18
0.5000	- 47.19
0.5833	- 47.21
0.6667	- 47.21
0.7500	- 47.21
0.8333	- 47.21
0.9167	- 47.21
1.0000	- 47.21
1.0833	- 47.21
1.1667	- 47.22
1.2500	- 47.22
1.3333	- 47.22
1.4166	- 47.22
1.5000	- 47.22
1.5833	- 47.21
1.6667	- 47.21
1.7500	- 47.22
1.8333	- 47.22
1.9167	- 47.22
2.0000	- 47.22
2.5000	- 47.22
3.0000	- 47.22
3.5000	- 47.22
4.0000	- 47.21
4.5000	- 47.21
5.0000	- 47.21
5.5000	- 47.22
6.0000	- 47.22
6.5000	- 47.21
7.0000	- 47.21
7.5000	- 47.21
8.0000	- 47.21
8.5000	- 47.21
9.0000	- 47.21
9.5000	- 47.21
10.0000	- 47.21

END



@@@

W A R Z Y N   E N G I N E E R I N G , I N C.

M A D I S O N.   W I S C O N S I N.

B A I L   D O W N   A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR W50 COR

@@@

EFFECTIVE WELL DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN LENGTH	=	5.500	FEET
WELL PENETRATION DEPTH	=	55.600	FEET
AQUIFER THICKNESS	=	107.800	FEET
STATIC WATER LEVEL	=	29.550	FEET
AQUIFER CONDUCTIVITY IS	=	.413E-01	CM/SEC
	OR	.875E+03	GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.136E+03	CM*CM/SEC
	OR	.943E+05	GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .100E+01 SECONDS

END TIME IS = .800E+01 SECONDS

SE1000B
Environmental Logger
11/05 12:59

Unit# 00168 Test# 2

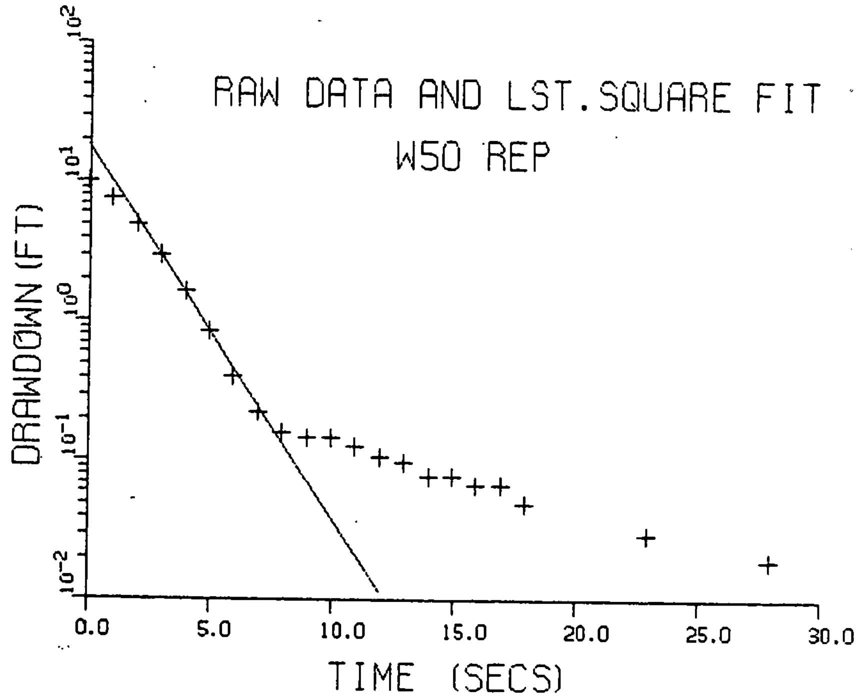
INPUT 1: Level (F) TOC

Reference 29.55
Scale factor 50.48
Offset 0.00

Step# 0 11/04 16:01

Elapsed Time	Value
0.0000	29.48
0.0033	29.48
0.0066	29.48
0.0099	29.48
0.0133	29.48
0.0166	29.48
0.0200	29.48
0.0233	29.48
0.0266	29.48
0.0300	29.48
0.0333	29.48
0.0500	38.15
0.0666	37.28
0.0833	34.73
0.1000	32.68
0.1166	31.27
0.1333	30.39
0.1500	29.93
0.1666	29.74
0.1833	29.67
0.2000	29.67
0.2166	29.66
0.2333	29.66
0.2500	29.66
0.2666	29.64
0.2833	29.62
0.3000	29.61
0.3166	29.61
0.3333	29.59
0.4167	29.58
0.5000	29.56
0.5833	29.56
0.6667	29.55
0.7500	29.55
0.8333	29.55
0.9167	29.55
1.0000	29.55
1.0833	29.53
1.1667	29.53
1.2500	29.53
1.3333	29.53
1.4166	29.55
1.5000	29.55
1.5833	29.55
1.6667	29.55
1.7500	29.55
1.8333	29.55
1.9167	29.55
2.0000	29.55
2.5000	29.55
3.0000	29.53
3.5000	29.53
4.0000	29.53
4.5000	29.55
5.0000	29.55
5.5000	29.55
6.0000	29.55
6.5000	29.55
7.0000	29.55
7.5000	29.55
8.0000	29.53
8.5000	29.53
9.0000	29.55
9.5000	29.53
10.0000	29.53
12.0000	29.55
14.0000	29.55
16.0000	29.55

END



@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR W50 REP

@@

EFFECTIVE WELL DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN LENGTH = 5.500 FEET

WELL PENETRATION DEPTH = 55.600 FEET

AQUIFER THICKNESS = 107.800 FEET

STATIC WATER LEVEL = 29.550 FEET

AQUIFER CONDUCTIVITY IS = .475E-01 CM/SEC

OR .101E+04 GAL/FT/FT/DAY

AQUIFER TRANSMISSIVITY IS = .156E+03 CM*CM/SEC

OR .108E+06 GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .200E+01 SECONDS

END TIME IS = .800E+01 SECONDS

SE1000B
Environmental Logger
11/05 12:52

Unit# 00168 Test# 9

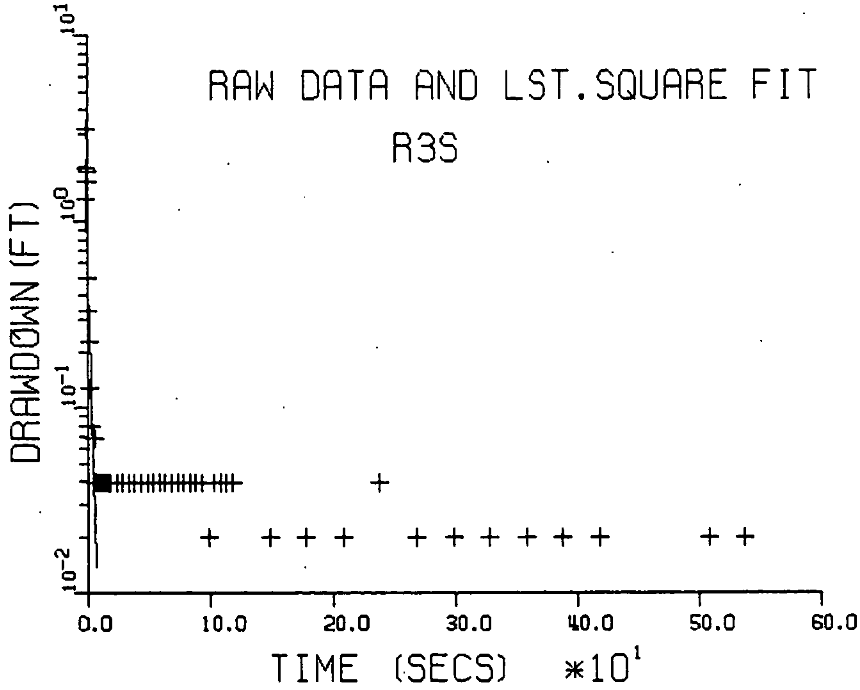
INPUT 1: Level (F) TOC

Reference	27.75
Scale factor	50.48
Offset	0.00

Step# 0 11/05 10:30

Elapsed Time	Value
0.0000	27.78
0.0033	27.95
0.0066	30.18
0.0099	30.84
0.0133	29.59
0.0166	28.97
0.0200	29.29
0.0233	29.51
0.0266	29.31
0.0300	28.14
0.0333	27.97
0.0500	27.86
0.0666	27.76
0.0833	27.71
0.1000	27.70
0.1166	27.70
0.1333	27.67
0.1500	27.67
0.1666	27.67
0.1833	27.67
0.2000	27.67
0.2166	27.67
0.2333	27.67
0.2500	27.67
0.2666	27.67
0.2833	27.67
0.3000	27.67
0.3166	27.67
0.3333	27.67
0.4167	27.67
0.5000	27.67
0.5833	27.67
0.6667	27.67
0.7500	27.67
0.8333	27.67
0.9167	27.67
1.0000	27.67
1.0833	27.67
1.1667	27.67
1.2500	27.67
1.3333	27.67
1.4166	27.67
1.5000	27.67
1.5833	27.67
1.6667	27.65
1.7500	27.67
1.8333	27.67
1.9167	27.67
2.0000	27.67
2.5000	27.65
3.0000	27.65
3.5000	27.65
4.0000	27.67
4.5000	27.65
5.0000	27.65
5.5000	27.65
6.0000	27.65
6.5000	27.65
7.0000	27.65
7.5000	27.63
8.0000	27.63
8.5000	27.65
9.0000	27.65
9.5000	27.63
10.0000	27.63

END



@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR R3S

@@

EFFECTIVE WELL DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN LENGTH	=	6.970	FEET
WELL PENETRATION DEPTH	=	6.970	FEET
AQUIFER THICKNESS	=	110.000	FEET
STATIC WATER LEVEL	=	27.750	FEET
AQUIFER CONDUCTIVITY IS	=	.680E-01	CM/SEC
	OR	.144E+04	GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.228E+03	CM*CM/SEC
	OR	.158E+06	GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :

START TIME IS	=	.000E+00	SECONDS
END TIME IS	=	.000E+00	SECONDS

SE1000B
Environmental Logger
12/03 15:25

Unit# 00168 Test# 0

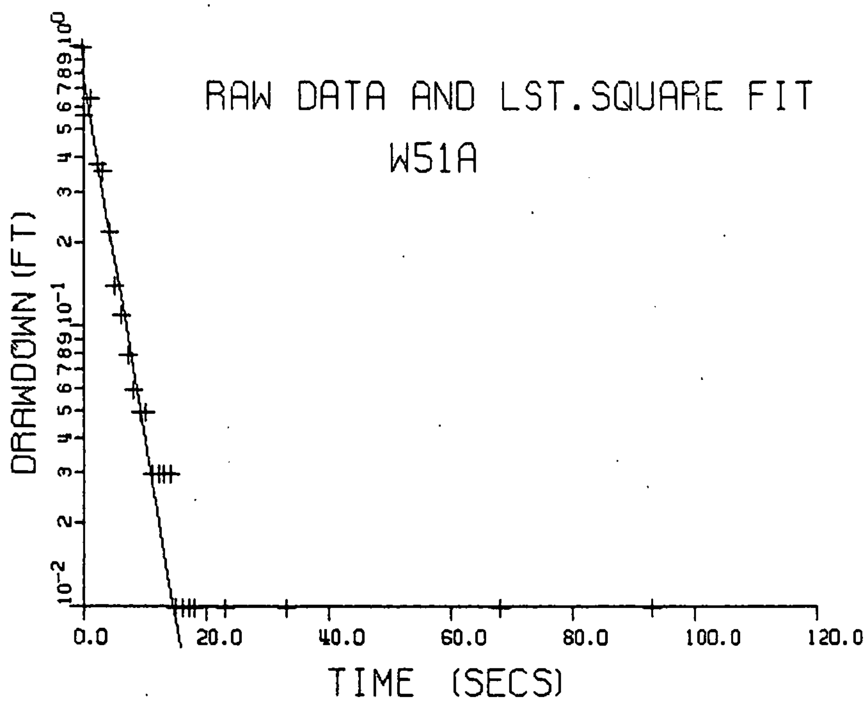
INPUT 1: Level (F) TOC

Reference 37.00
Scale factor 50.48
Offset 0.00

Step# 0 12/02 08:14

Elapsed Time	Value
0.0000	35.85
0.0033	35.86
0.0066	35.86
0.0099	35.86
0.0133	35.86
0.0166	36.21
0.0200	36.15
0.0233	35.77
0.0266	36.85
0.0300	36.42
0.0333	35.72
0.0500	36.50
0.0666	36.23
0.0833	36.21
0.1000	36.07
0.1166	35.99
0.1333	35.96
0.1500	35.93
0.1666	35.91
0.1833	35.90
0.2000	35.90
0.2166	35.88
0.2333	35.88
0.2500	35.88
0.2666	35.88
0.2833	35.86
0.3000	35.86
0.3166	35.86
0.3333	35.86
0.4167	35.86
0.5000	35.85
0.5833	35.86
0.6667	35.85
0.7500	35.85
0.8333	35.85
0.9167	35.85
1.0000	35.85
1.0833	35.85
1.1667	35.86
1.2500	35.85
1.3333	35.85
1.4166	35.85
1.5000	35.85
1.5833	35.86
1.6667	35.85
1.7500	35.85
1.8333	35.85
1.9167	35.85
2.0000	35.85
2.5000	35.85
3.0000	35.85
3.5000	35.85
4.0000	35.85
4.5000	35.85
5.0000	35.85
5.5000	35.85
6.0000	35.85
6.5000	35.85
7.0000	35.85
7.5000	35.85
8.0000	35.85
8.5000	35.85
9.0000	53.95
9.5000	53.95
10.0000	53.95

END



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W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR W51

@@

EFFECTIVE WELL DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN LENGTH	=	10.000	FEET
WELL PENETRATION DEPTH	=	10.000	FEET
AQUIFER THICKNESS	=	29.200	FEET
STATIC WATER LEVEL	=	35.850	FEET
AQUIFER CONDUCTIVITY IS	=	.103E-01	CM/SEC
	OR	.218E+03	GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.914E+01	CM*CM/SEC
	OR	.636E+04	GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .000E+00 SECONDS

END TIME IS = .120E+02 SECONDS

SE1000B
Environmental Logger
11/05 12:57

Unit# 00168 Test# 4

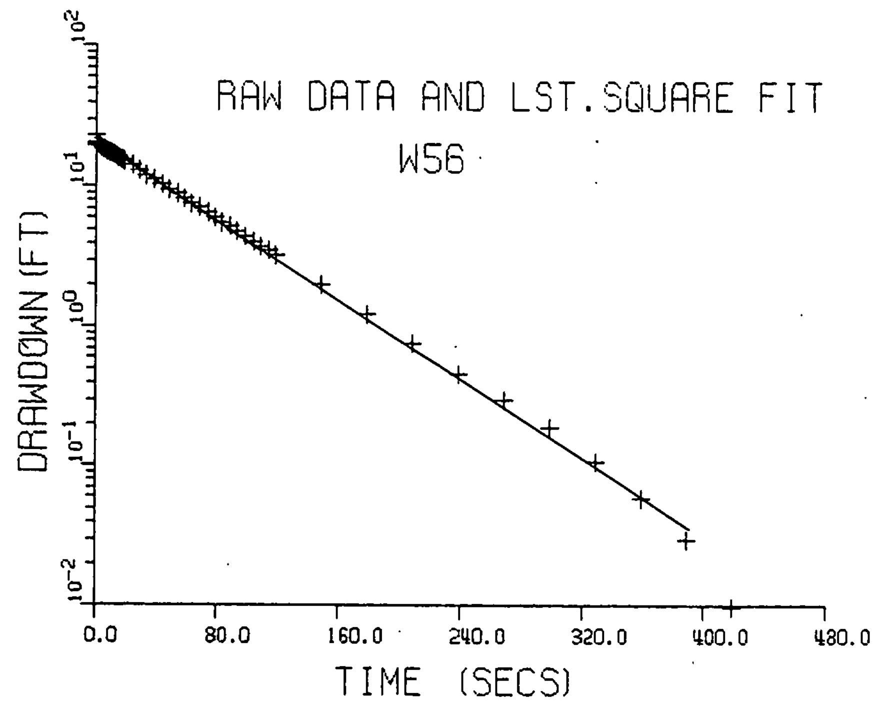
INPUT 1: Level (F) TOC

Reference	16.75
Scale factor	50.48
Offset	0.00

Step# 0 11/04 17:09

Elapsed Time	Value
0.0000	14.19
0.0033	14.19
0.0066	14.26
0.0099	40.06
0.0133	36.73
0.0166	37.35
0.0200	37.40
0.0233	36.96
0.0266	37.07
0.0300	36.96
0.0333	36.84
0.0500	36.54
0.0666	36.22
0.0833	35.94
0.1000	35.65
0.1166	35.36
0.1333	35.09
0.1500	34.82
0.1666	34.55
0.1833	34.29
0.2000	34.04
0.2166	33.78
0.2333	33.53
0.2500	33.29
0.2666	33.05
0.2833	32.81
0.3000	32.59
0.3166	32.35
0.3333	32.13
0.4167	31.03
0.5000	30.02
0.5833	29.07
0.6667	28.19
0.7500	27.36
0.8333	26.58
0.9167	25.86
1.0000	25.19
1.0833	24.57
1.1667	24.00
1.2500	23.46
1.3333	22.95
1.4166	22.48
1.5000	22.04
1.5833	21.64
1.6667	21.27
1.7500	20.92
1.8333	20.60
1.9167	20.32
2.0000	20.03
2.5000	18.79
3.0000	18.00
3.5000	17.53
4.0000	17.22
4.5000	17.05
5.0000	16.94
5.5000	16.86
6.0000	16.81
6.5000	16.78
7.0000	16.76
7.5000	16.75
8.0000	16.73
8.5000	16.73
9.0000	16.73
9.5000	16.73
10.0000	16.73

END



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W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N, W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY :	CSR
DATA ANALYZED BY :	CSR
BAIL DOWN PARAMETERS FOR	W56

@@@

EFFECTIVE WELL DIAMETER	=	2.000 INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000 INCHES
EFFECTIVE SCREEN LENGTH	=	5.000 FEET
WELL PENETRATION DEPTH	=	55.500 FEET
AQUIFER THICKNESS	=	55.500 FEET
STATIC WATER LEVEL	=	16.750 FEET
AQUIFER CONDUCTIVITY IS	=	.159E-02 CM/SEC
	OR	.336E+02 GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.268E+01 CM*CM/SEC
	OR	.187E+04 GAL/FT/DAY

###

CENSORED DATA END POINTS ARE :

START TIME IS	=	.000E+00 SECONDS
END TIME IS	=	.500E+03 SECONDS

SE1000B
Environmental Logger
11/05 12:53

Unit# 00168 Test# 8

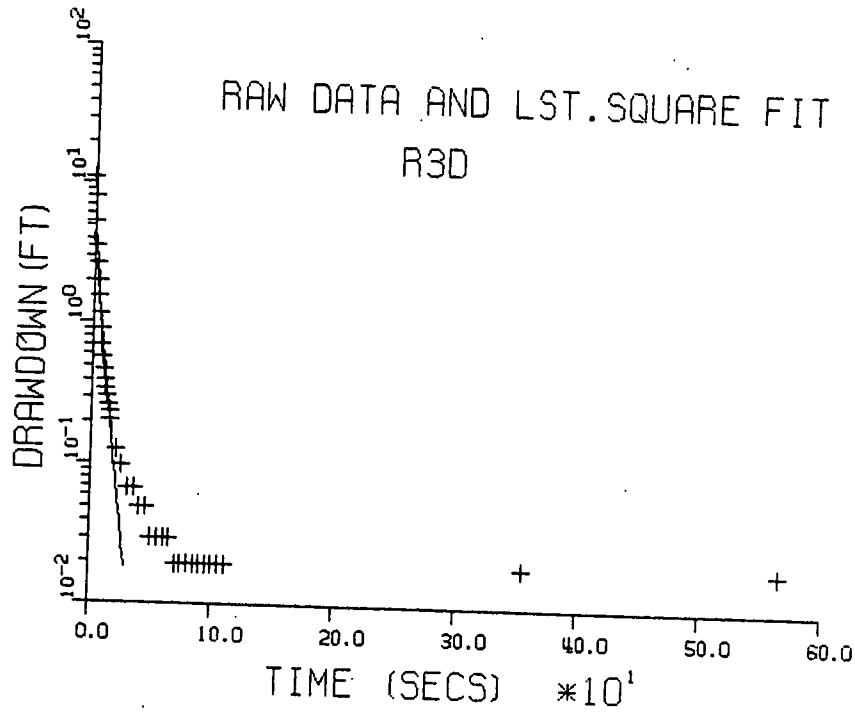
INPUT 1: Level (F) TOC

Reference 29.00
Scale factor 50.48
Offset 0.00

Step# 0 11/05 10:00

Elapsed Time	Value
0.0000	28.12
0.0033	28.12
0.0066	28.12
0.0099	28.39
0.0133	29.68
0.0166	31.21
0.0200	32.79
0.0233	34.35
0.0266	35.86
0.0300	37.30
0.0333	38.38
0.0500	39.28
0.0666	36.41
0.0833	33.55
0.1000	31.78
0.1166	30.88
0.1333	30.24
0.1500	29.76
0.1666	29.38
0.1833	29.11
0.2000	28.90
0.2166	28.76
0.2333	28.66
0.2500	28.58
0.2666	28.53
0.2833	28.49
0.3000	28.45
0.3166	28.42
0.3333	28.39
0.4167	28.31
0.5000	28.28
0.5833	28.25
0.6667	28.25
0.7500	28.23
0.8333	28.23
0.9167	28.21
1.0000	28.21
1.0833	28.21
1.1667	28.21
1.2500	28.20
1.3333	28.20
1.4166	28.20
1.5000	28.20
1.5833	28.20
1.6667	28.20
1.7500	28.20
1.8333	28.20
1.9167	28.20
2.0000	28.18
2.5000	28.18
3.0000	28.18
3.5000	28.18
4.0000	28.18
4.5000	28.18
5.0000	28.18
5.5000	28.18
6.0000	28.20
6.5000	28.18
7.0000	28.18
7.5000	28.18
8.0000	28.18
8.5000	28.18
9.0000	28.18
9.5000	28.20
10.0000	28.18

END



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W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR R3D

@@

EFFECTIVE WELL DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN LENGTH = 10.000 FEET

WELL PENETRATION DEPTH = 110.000 FEET

AQUIFER THICKNESS = 110.000 FEET

STATIC WATER LEVEL = 28.180 FEET

AQUIFER CONDUCTIVITY IS = .858E-02 CM/SEC

OR .182E+03 GAL/FT/FT/DAY

AQUIFER TRANSMISSIVITY IS = .288E+02 CM*CM/SEC

OR .200E+05 GAL/FT/DAY

###

CENSORED DATA END POINTS ARE :
START TIME IS = .300E+01 SECONDS

END TIME IS = .300E+02 SECONDS

SE1000B
Environmental Logger
11/05 12:55

Unit# 00168 Test# 6

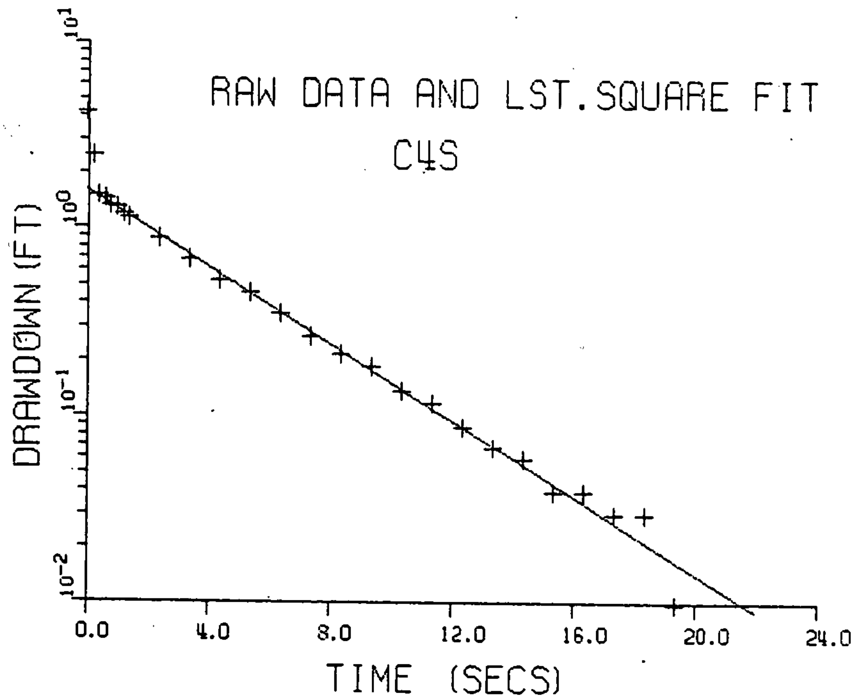
INPUT 1: Level (F) TOC

Reference 30.00
Scale factor 50.48
Offset 0.00

Step# 0 11/05 09:01

Elapsed Time	Value
0.0000	29.98
0.0033	30.00
0.0066	34.09
0.0099	34.27
0.0133	32.48
0.0166	31.54
0.0200	31.48
0.0233	31.35
0.0266	31.32
0.0300	31.21
0.0333	31.16
0.0500	30.89
0.0666	30.70
0.0833	30.54
0.1000	30.46
0.1166	30.36
0.1333	30.27
0.1500	30.22
0.1666	30.19
0.1833	30.14
0.2000	30.12
0.2166	30.09
0.2333	30.07
0.2500	30.06
0.2666	30.04
0.2833	30.04
0.3000	30.03
0.3166	30.03
0.3333	30.01
0.4167	30.00
0.5000	30.00
0.5833	29.98
0.6667	29.98
0.7500	29.98
0.8333	29.98
0.9167	29.98
1.0000	29.98
1.0833	29.98
1.1667	29.98
1.2500	29.98
1.3333	29.96
1.4166	29.98
1.5000	29.98
1.5833	29.98
1.6667	29.98
1.7500	29.98
1.8333	29.98
1.9167	29.98
2.0000	29.98
2.5000	29.96
3.0000	29.96
3.5000	29.96
4.0000	29.96
4.5000	29.96
5.0000	29.96
5.5000	29.96
6.0000	29.96
6.5000	29.96
7.0000	29.96
7.5000	29.96
8.0000	29.96
8.5000	29.96
9.0000	29.96
9.5000	29.96
10.0000	29.96

END



@@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR C4S

@@@

EFFECTIVE WELL DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN LENGTH = 4.740 FEET

WELL PENETRATION DEPTH = 4.740 FEET

AQUIFER THICKNESS = 130.000 FEET

STATIC WATER LEVEL = 30.000 FEET

AQUIFER CONDUCTIVITY IS = .137E-01 CM/SEC

OR .290E+03 GAL/FT/FT/DAY

AQUIFER TRANSMISSIVITY IS = .542E+02 CM*CM/SEC

OR .376E+05 GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .600E+00 SECONDS

END TIME IS = .200E+02 SECONDS

SE1000B
Environmental Logger
11/05 12:54

Unit# 00168 Test# 7

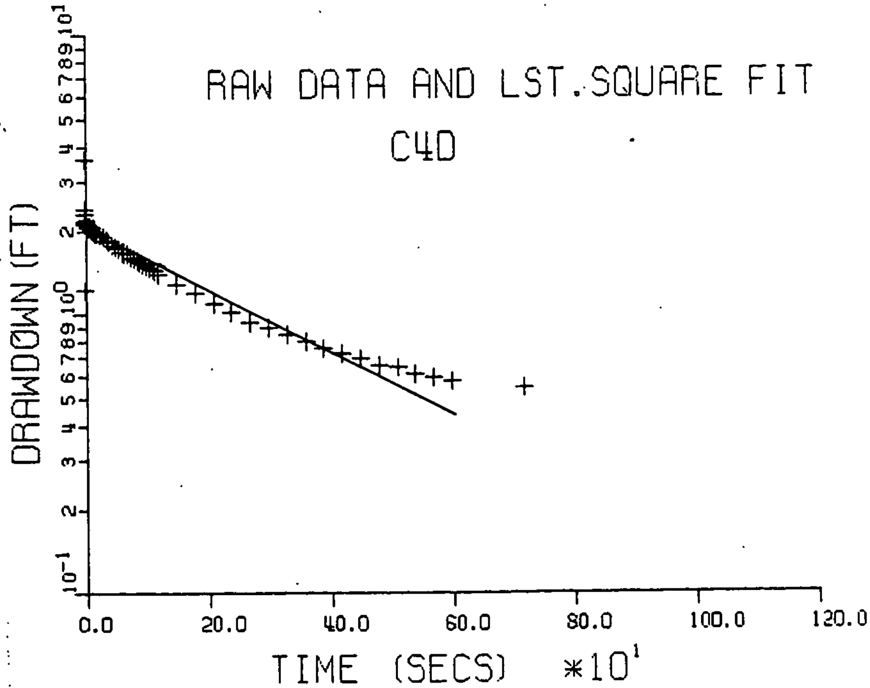
INPUT 1: Level (F) TOC

Reference	39.81
Scale factor	50.48
Offset	0.00

Step# 0 11/05 09:23

Elapsed Time	Value
0.0000	43.44
0.0033	41.05
0.0066	42.21
0.0099	42.12
0.0133	41.94
0.0166	42.00
0.0200	41.97
0.0233	42.00
0.0266	42.02
0.0300	41.99
0.0333	41.97
0.0500	41.97
0.0666	41.94
0.0833	41.88
0.1000	41.89
0.1166	41.89
0.1333	41.88
0.1500	41.88
0.1666	41.86
0.1833	41.86
0.2000	41.85
0.2166	41.83
0.2333	41.83
0.2500	41.81
0.2666	41.81
0.2833	41.80
0.3000	41.80
0.3166	41.80
0.3333	41.78
0.4167	41.75
0.5000	41.72
0.5833	41.67
0.6667	41.64
0.7500	41.61
0.8333	41.57
0.9167	41.54
1.0000	41.51
1.0833	41.49
1.1667	41.48
1.2500	41.43
1.3333	41.41
1.4166	41.38
1.5000	41.37
1.5833	41.34
1.6667	41.32
1.7500	41.30
1.8333	41.27
1.9167	41.26
2.0000	41.22
2.5000	41.11
3.0000	41.02
3.5000	40.92
4.0000	40.84
4.5000	40.76
5.0000	40.71
5.5000	40.67
6.0000	40.62
6.5000	40.57
7.0000	40.54
7.5000	40.51
8.0000	40.47
8.5000	40.46
9.0000	40.43
9.5000	40.41
10.0000	40.39
12.0000	40.36

END



@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR C4D

@@

EFFECTIVE WELL DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN LENGTH	=	5.000	FEET
WELL PENETRATION DEPTH	=	75.000	FEET
AQUIFER THICKNESS	=	130.000	FEET
STATIC WATER LEVEL	=	39.810	FEET
AQUIFER CONDUCTIVITY IS	=	.173E-03	CM/SEC
	OR	.367E+01	GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.687E+00	CM*CM/SEC
	OR	.478E+03	GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .200E+01 SECONDS

END TIME IS = .800E+03 SECONDS

SE1000B
Environmental Logger
11/06 14:35

Unit# 00168 Test# 2

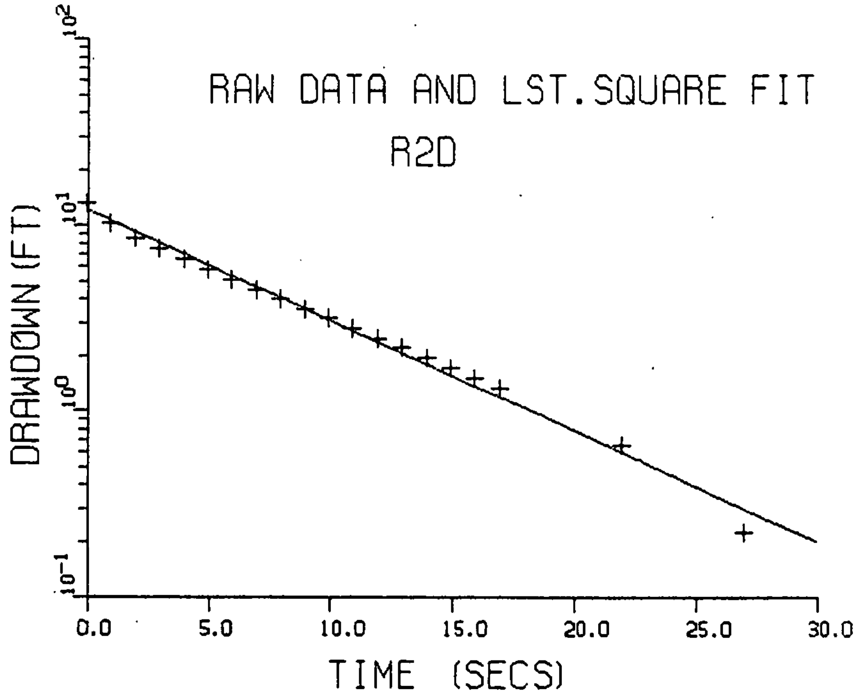
INPUT 1: Level (F) TOC

Reference 23.42
Scale factor 50.48
Offset 0.00

Step# 0 11/06 08:48

Elapsed Time	Value
0.0000	23.53
0.0033	23.53
0.0066	23.53
0.0099	23.53
0.0133	23.53
0.0166	23.53
0.0200	23.53
0.0233	23.56
0.0266	25.50
0.0300	29.23
0.0333	32.64
0.0500	36.92
0.0666	33.95
0.0833	32.10
0.1000	30.95
0.1166	30.05
0.1333	29.28
0.1500	28.60
0.1666	28.01
0.1833	27.48
0.2000	27.03
0.2166	26.62
0.2333	26.25
0.2500	25.93
0.2666	25.65
0.2833	25.38
0.3000	25.15
0.3166	24.96
0.3333	24.77
0.4167	24.08
0.5000	23.65
0.5833	23.38
0.6667	23.22
0.7500	23.14
0.8333	23.10
0.9167	23.06
1.0000	23.05
1.0833	23.05
1.1667	23.03
1.2500	23.03
1.3333	23.03
1.4166	23.02
1.5000	23.02
1.5833	23.03
1.6667	23.02
1.7500	23.03
1.8333	23.02
1.9167	23.02
2.0000	23.02
2.5000	23.02
3.0000	23.02
3.5000	23.02
4.0000	23.02
4.5000	23.02
5.0000	23.02
5.5000	23.02
6.0000	23.00
6.5000	23.02
7.0000	23.02
7.5000	23.02
8.0000	23.00
8.5000	23.02
9.0000	23.00
9.5000	23.02
10.0000	23.02
12.0000	23.02
14.0000	23.02

END



@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N, W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR R2D

@@

EFFECTIVE WELL DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN LENGTH	=	10.000	FEET
WELL PENETRATION DEPTH	=	113.600	FEET
AQUIFER THICKNESS	=	119.500	FEET
STATIC WATER LEVEL	=	23.420	FEET
AQUIFER CONDUCTIVITY IS	=	.657E-02	CM/SEC
	OR	.139E+03	GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.239E+02	CM*CM/SEC
	OR	.166E+05	GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .300E+01 SECONDS

END TIME IS = .300E+02 SECONDS

SE1000B
Environmental Logger
12/03 15:23

Unit# 00168 Test# 2

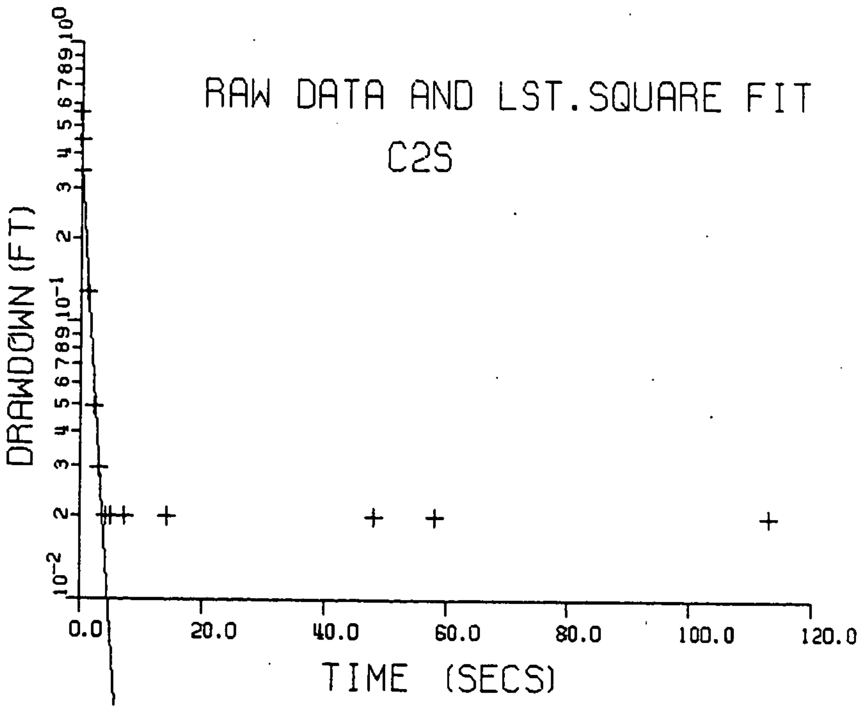
INPUT 1: Level (F) TOC

Reference	32.71
Scale factor	50.48
Offset	0.00

Step# 0 12/03 09:32

Elapsed Time	Value
0.0000	32.69
0.0033	32.71
0.0066	33.10
0.0099	33.07
0.0133	32.88
0.0166	32.69
0.0200	32.93
0.0233	33.22
0.0266	33.26
0.0300	33.14
0.0333	33.04
0.0500	32.82
0.0666	32.74
0.0833	32.72
0.1000	32.71
0.1166	32.71
0.1333	32.69
0.1500	32.71
0.1666	32.69
0.1833	32.69
0.2000	32.69
0.2166	32.69
0.2333	32.69
0.2500	32.69
0.2666	32.71
0.2833	32.69
0.3000	32.69
0.3166	32.69
0.3333	32.69
0.4167	32.69
0.5000	32.69
0.5833	32.69
0.6667	32.69
0.7500	32.69
0.8333	32.71
0.9167	32.69
1.0000	32.71
1.0833	32.69
1.1667	32.69
1.2500	32.69
1.3333	32.69
1.4166	32.69
1.5000	32.69
1.5833	32.69
1.6667	32.69
1.7500	32.69
1.8333	32.69
1.9167	32.71
2.0000	32.69
2.5000	32.69
3.0000	32.69
3.5000	32.69
4.0000	32.69
4.5000	47.59
5.0000	47.59
5.5000	47.59
6.0000	47.59
6.5000	47.59
7.0000	47.59
7.5000	47.59
8.0000	47.59
8.5000	47.59
9.0000	47.59
9.5000	47.59
10.0000	47.59

END



@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N, W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR C2S

@@

EFFECTIVE WELL DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN LENGTH = 5.200 FEET

WELL PENETRATION DEPTH = 5.200 FEET

AQUIFER THICKNESS = 117.310 FEET

STATIC WATER LEVEL = 32.690 FEET

AQUIFER CONDUCTIVITY IS = .430E-01 CM/SEC

OR .911E+03 GAL/FT/FT/DAY

AQUIFER TRANSMISSIVITY IS = .154E+03 CM*CM/SEC

OR .107E+06 GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .000E+00 SECONDS

END TIME IS = .500E+01 SECONDS

SE1000B
Environmental Logger
11/05 13:01

Unit# 00168 Test# 0

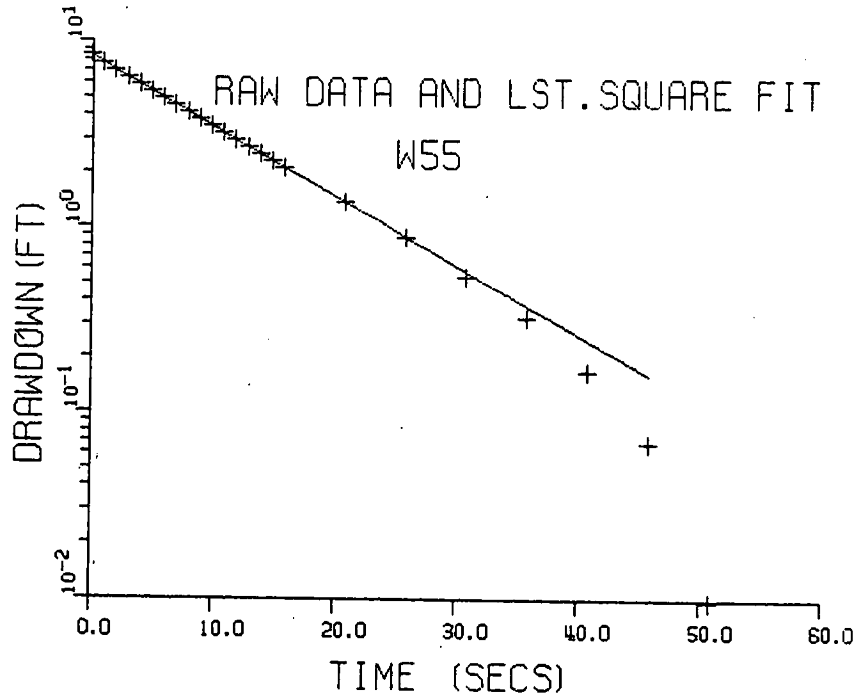
INPUT 1: Level (F) TOC

Reference 32.21
Scale factor 50.48
Offset 0.00

Step# 0 11/04 09:42

Elapsed Time	Value
0.0000	32.91
0.0033	32.81
0.0066	32.72
0.0099	32.62
0.0133	32.54
0.0166	32.46
0.0200	32.36
0.0233	32.28
0.0266	32.19
0.0300	32.09
0.0333	32.00
0.0500	33.27
0.0666	40.76
0.0833	40.01
0.1000	39.35
0.1166	38.77
0.1333	38.21
0.1500	37.72
0.1666	37.27
0.1833	36.86
0.2000	36.48
0.2166	36.14
0.2333	35.82
0.2500	35.52
0.2666	35.27
0.2833	35.01
0.3000	34.79
0.3166	34.56
0.3333	34.37
0.4167	33.61
0.5000	33.10
0.5833	32.76
0.6667	32.54
0.7500	32.38
0.8333	32.28
0.9167	32.22
1.0000	32.17
1.0833	32.14
1.1667	32.13
1.2500	32.11
1.3333	32.09
1.4166	32.09
1.5000	32.08
1.5833	32.08
1.6667	32.08
1.7500	32.08
1.8333	32.08
1.9167	32.08
2.0000	32.08
2.5000	32.08
3.0000	32.08
3.5000	32.06
4.0000	32.06
4.5000	32.06
5.0000	32.06
5.5000	32.06
6.0000	32.06
6.5000	32.06
7.0000	32.06
7.5000	32.06
8.0000	32.06
8.5000	32.06
9.0000	32.06
9.5000	32.06
10.0000	32.06

END



@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N, W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR W55

@@

EFFECTIVE WELL DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN LENGTH = 5.000 FEET

WELL PENETRATION DEPTH = 83.300 FEET

AQUIFER THICKNESS = 97.600 FEET

STATIC WATER LEVEL = 32.210 FEET

AQUIFER CONDUCTIVITY IS = .699E-02 CM/SEC

OR .151E+03 GAL/FT/FT/DAY

AQUIFER TRANSMISSIVITY IS = .198E+02 CM*CM/SEC

OR .137E+05 GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .300E+01 SECONDS

END TIME IS = .300E+02 SECONDS

SE1000B
Environmental Logger
11/05 13:00

Unit# 00168 Test# 1

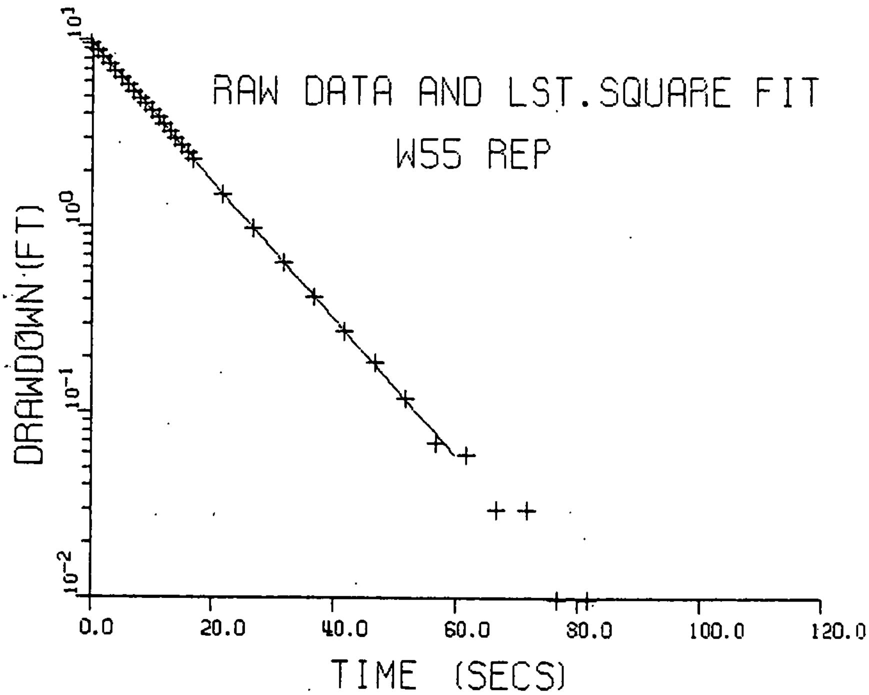
INPUT 1: Level (F) TOC

Reference	32.21
Scale factor	50.48
Offset	0.00

Step# 0 11/04 10:19

Elapsed Time	Value
0.0000	31.17
0.0033	31.17
0.0066	31.17
0.0099	31.18
0.0133	31.18
0.0166	31.20
0.0200	31.18
0.0233	31.18
0.0266	31.18
0.0300	35.97
0.0333	40.91
0.0500	42.09
0.0666	41.24
0.0833	40.51
0.1000	39.82
0.1166	39.20
0.1333	38.63
0.1500	38.12
0.1666	37.64
0.1833	37.21
0.2000	36.81
0.2166	36.44
0.2333	36.09
0.2500	35.79
0.2666	35.50
0.2833	35.23
0.3000	34.98
0.3166	34.76
0.3333	34.55
0.4167	33.75
0.5000	33.21
0.5833	32.86
0.6667	32.64
0.7500	32.49
0.8333	32.40
0.9167	32.33
1.0000	32.28
1.0833	32.27
1.1667	32.24
1.2500	32.24
1.3333	32.22
1.4166	32.22
1.5000	32.21
1.5833	32.21
1.6667	32.21
1.7500	32.21
1.8333	32.21
1.9167	32.21
2.0000	32.21
2.5000	32.21
3.0000	32.21
3.5000	32.21
4.0000	32.21
4.5000	32.21
5.0000	32.19
5.5000	32.21
6.0000	32.21
6.5000	32.21
7.0000	32.21
7.5000	32.21
8.0000	32.21
8.5000	32.21
9.0000	32.21
9.5000	32.21
10.0000	32.21

END



@@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR W55 REP

@@@

EFFECTIVE WELL DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN DIAMETER = 2.000 INCHES

EFFECTIVE SCREEN LENGTH = 5.000 FEET

WELL PENETRATION DEPTH = 83.300 FEET

AQUIFER THICKNESS = 97.600 FEET

STATIC WATER LEVEL = 32.210 FEET

AQUIFER CONDUCTIVITY IS = .692E-02 CM/SEC

OR .147E+03 GAL/FT/FT/DAY

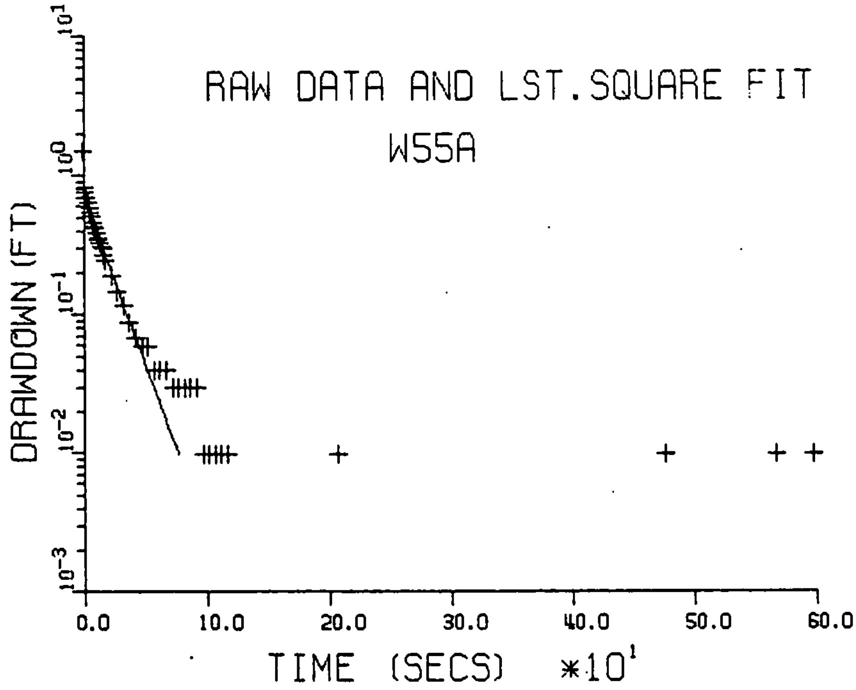
AQUIFER TRANSMISSIVITY IS = .206E+02 CM*CM/SEC

OR .143E+05 GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .290E+01 SECONDS

END TIME IS = .600E+02 SECONDS



SE10008
Environmental Logger
11/06 14:36

Unit# 00168 Test# 0

INPUT 1: Level (F) TOC

Reference 32.40
Scale factor 50.48
Offset 0.00

Step# 0 11/06 07:50

Elapsed Time	Value
0.0000	32.24
0.0033	31.93
0.0066	32.08
0.0099	32.76
0.0133	31.60
0.0166	32.25
0.0200	32.06
0.0233	32.46
0.0266	32.38
0.0300	32.25
0.0333	33.93
0.0500	33.24
0.0666	33.18
0.0833	33.11
0.1000	33.06
0.1166	33.00
0.1333	32.95
0.1500	32.92
0.1666	32.87
0.1833	32.84
0.2000	32.83
0.2166	32.79
0.2333	32.76
0.2500	32.75
0.2666	32.73
0.2833	32.71
0.3000	32.70
0.3166	32.67
0.3333	32.65
0.4167	32.59
0.5000	32.55
0.5833	32.52
0.6667	32.49
0.7500	32.47
0.8333	32.46
0.9167	32.46
1.0000	32.44
1.0833	32.44
1.1667	32.44
1.2500	32.43
1.3333	32.43
1.4166	32.43
1.5000	32.43
1.5833	32.43
1.6667	32.41
1.7500	32.41
1.8333	32.41
1.9167	32.41
2.0000	32.41
2.5000	32.40
3.0000	32.40
3.5000	32.41
4.0000	32.40
4.5000	32.40
5.0000	32.40
5.5000	32.40
6.0000	32.40
6.5000	32.40
7.0000	32.40
7.5000	32.40
8.0000	32.41
8.5000	32.40
9.0000	32.40
9.5000	32.41
10.0000	32.41

END

@@

W A R Z Y N E N G I N E E R I N G , I N C.

M A D I S O N. W I S C O N S I N.

B A I L D O W N A N A L Y S I S

DATA OBTAINED BY : CSR

DATA ANALYZED BY : CSR

BAIL DOWN PARAMETERS FOR W55A

@@

EFFECTIVE WELL DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN DIAMETER	=	2.000	INCHES
EFFECTIVE SCREEN LENGTH	=	10.000	FEET
WELL PENETRATION DEPTH	=	10.000	FEET
AQUIFER THICKNESS	=	97.600	FEET
STATIC WATER LEVEL	=	32.400	FEET
AQUIFER CONDUCTIVITY IS	=	.189E-02	CM/SEC
	OR	.402E+02	GAL/FT/FT/DAY
AQUIFER TRANSMISSIVITY IS	=	.524E+01	CM*CM/SEC
	OR	.365E+04	GAL/FT/DAY

##

CENSORED DATA END POINTS ARE :
START TIME IS = .200E+01 SECONDS

END TIME IS = .500E+02 SECONDS

APPENDIX J

GROUNDWATER MODEL INPUT PARAMETERS

```
                    U.S. GEOLOGICAL SURVEY MODULAR FINITE-DIFFERENCE GROUND-WATER MODEL

 run at 10:53:58   on  9-FEB-88

 Wausau - transient, 1 layer,                                                    pumps on
    1 LAYERS        69 ROWS        36 COLUMNS
 138 STRESS PERIOD(S) IN SIMULATION
 MODEL TIME UNIT IS SECONDS
 input file list
 block.dat
 pump76.dat
 river44.dat
 rech-nw-peri.dat
 sip.dat
 output.dat
 nodal.dat
 velcty.dat
 I/O UNITS:
 ELEMENT OF IUNIT:  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
         I/O UNIT:  7  8  0  9  0  0  0 10 11  0  0 12 13 14  0  0  0  0  0  0  0  0  0  0
 BAS1 -- BASIC MODEL PACKAGE, VERSION 1, 12/08/83 INPUT READ FROM UNIT  5
 ARRAYS RHS AND BUFF WILL SHARE MEMORY.
 START HEAD WILL NOT BE SAVED -- DRAWDOWN CANNOT BE CALCULATED
  19981 ELEMENTS IN X ARRAY ARE USED BY BAS
  19981 ELEMENTS OF X ARRAY USED OUT OF 200000
 BCF1 -- BLOCK-CENTERED FLOW PACKAGE, VERSION 1, 12/08/83 INPUT READ FROM UNIT  7
 TRANSIENT SIMULATION
      LAYER  AQUIFER TYPE
      -------------------
         1          1
   7453 ELEMENTS IN X ARRAY ARE USED BY BCF
  27434 ELEMENTS OF X ARRAY USED OUT OF 200000
 WEL1 -- WELL PACKAGE, VERSION 1, 12/08/83 INPUT READ FROM  8
 MAXIMUM OF    8 WELLS
     32 ELEMENTS IN X ARRAY ARE USED FOR WELLS
  27466 ELEMENTS OF X ARRAY USED OUT OF 200000
 RCH1 -- RECHARGE PACKAGE, VERSION 1, 12/08/83 INPUT READ FROM UNIT 10
 OPTION 1 -- RECHARGE TO TOP LAYER
   2484 ELEMENTS OF X ARRAY USED FOR RECHARGE
  29950 ELEMENTS OF X ARRAY USED OUT OF 200000
 RIV1 -- RIVER PACKAGE, VERSION 1,  12/08/83 INPUT READ FROM UNIT  9
 MAXIMUM OF  366 RIVER NODES
 CELL-BY-CELL FLOWS WILL BE PRINTED
   2196 ELEMENTS IN X ARRAY ARE USED FOR RIVERS
  32146 ELEMENTS OF X ARRAY USED OUT OF 200000
 SIP1 -- STRONGLY IMPLICIT PROCEDURE SOLUTION PACKAGE, VERSION 1, 12/08/83 INPUT READ FROM UNIT 11
 MAXIMUM OF 100 ITERATIONS ALLOWED FOR CLOSURE
  5 ITERATION PARAMETERS
  10341 ELEMENTS IN X ARRAY ARE USED BY SIP
  42487 ELEMENTS OF X ARRAY USED OUT OF 200000
 Wausau - transient, 1 layer,                                                    pumps on


                                  BOUNDARY ARRAY FOR LAYER  1 WILL BE READ ON UNIT 25 USING FORMAT:            (36I3)
                          ------------------------------------------------------------------------------------------------

       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 28 29 30 31 32 33 34 35 36
 .......................................................................................................................
   1   0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  1  1  1  1  1  1  1  1  1  1  0  0  0
   2   0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  1  1  1  1  1  1  1  1  1  1  1  1  0  0  0
```

3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
15	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
16	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
17	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
18	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
19	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
20	0	1	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
21	0	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
22	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
23	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
24	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
25	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
26	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
27	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
28	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
29	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
30	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
31	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
32	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
33	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
34	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
35	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
36	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
37	0	0	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
38	0	0	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
39	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
40	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
41	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
42	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
43	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
44	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
45	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
46	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
47	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
48	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
49	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
50	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
51	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
52	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
53	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
54	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
55	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
56	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
57	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
58	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0
59	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
60	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
61	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
62	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
63	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0

64	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
65	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
66	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
67	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
68	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0
69	0	0	1	1	1	1	1.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0

AQUIFER HEAD WILL BE SET TO 1230.0 AT ALL NO-FLOW NODES (IBOUND=0).

INITIAL HEAD FOR LAYER 1 WILL BE READ ON UNIT 26 USING FORMAT: (10f8.0)

	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	28	29	30
	31	32	33	34	35	36									
1	1265.1	1290.1	1290.1	1290.1	1251.4	1230.1	1230.1	1230.1	1230.1	1230.1	1230.1	1230.1	1230.1	1218.9	1221.8
	1223.2	1222.3	1224.0	1222.7	1215.9	1208.4	1187.9	1187.9	1187.9	1187.9	1187.9	1187.9	1187.9	1187.9	1187.9
	1187.9	1188.4	1188.8	1221.9	1288.7	1290.1									
2	1230.1	1290.1	1290.1	1290.1	1230.1	1230.1	1230.1	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1
	1190.1	1190.1	1190.1	1190.1	1180.2	1175.1	1188.0	1187.9	1187.9	1187.9	1187.9	1187.9	1187.9	1187.9	1187.9
	1187.9	1187.9	1188.2	1217.8	1288.1	1390.1									
3	1238.9	1230.1	1253.0	1230.1	1230.1	1230.1	1230.1	1230.1	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1
	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1	1200.1	1190.1	1190.1	1180.1	1187.9	1187.9
	1187.9	1187.9	1188.1	1188.3	1251.1	1290.1									
4	1471.7	1434.9	1384.0	1332.7	1292.2	1263.6	1249.6	1242.2	1238.0	1234.8	1232.6	1230.9	1229.2	1227.6	1226.0
	1224.1	1222.0	1219.4	1215.8	1209.2	1198.0	1189.8	1189.0	1188.9	1188.7	1188.6	1188.4	1188.1	1188.0	1187.9
	1187.9	1187.9	1188.0	1188.0	1200.1	1279.6									
5	1471.5	1434.1	1379.6	1321.6	1270.2	1234.5	1223.8	1217.6	1214.0	1211.2	1209.3	1207.8	1206.5	1205.1	1203.8
	1202.5	1201.0	1199.4	1197.4	1195.0	1191.7	1188.9	1187.9	1187.8	1187.7	1187.6	1187.5	1187.5	1187.6	1187.8
	1187.9	1187.9	1187.9	1187.9	1226.2	1252.7									
6	1471.4	1433.2	1374.5	1306.6	1251.3	1222.0	1211.0	1204.8	1201.4	1198.9	1197.3	1196.2	1195.1	1194.2	1193.3
	1192.4	1191.5	1190.7	1189.8	1188.8	1187.4	1186.5	1186.5	1186.6	1186.6	1186.7	1186.8	1186.9	1187.2	1187.6
	1187.9	1187.9	1187.9	1202.3	1239.2	1230.6									
7	1471.4	1432.6	1369.7	1296.5	1245.2	1217.2	1204.3	1197.6	1194.6	1192.5	1191.2	1190.2	1189.4	1188.7	1188.0
	1187.4	1186.8	1186.5	1186.3	1186.1	1186.0	1186.0	1186.0	1186.1	1186.2	1186.3	1186.4	1186.6	1186.9	1187.3
	1187.9	1187.9	1187.9	1230.0	1248.3	1234.1									
8	1471.3	1432.2	1366.6	1293.8	1242.9	1214.5	1202.1	1194.0	1192.0	1190.4	1189.2	1188.4	1187.7	1187.1	1186.6
	1186.3	1186.1	1185.9	1185.8	1185.7	1185.7	1185.7	1185.7	1185.8	1185.9	1185.9	1186.1	1186.3	1186.6	1187.2
	1187.9	1187.9	1187.9	1220.7	1241.2	1240.7									
9	1471.3	1431.8	1364.0	1292.3	1241.5	1212.6	1199.0	1192.7	1190.8	1189.3	1188.1	1187.3	1186.8	1186.4	1186.2
	1186.0	1185.8	1185.7	1185.6	1185.5	1185.4	1185.4	1185.4	1185.4	1185.5	1185.6	1185.7	1185.9	1186.4	1187.1
	1187.9	1187.9	1187.9	1244.5	1243.0	1249.1									
10	1471.3	1431.6	1362.0	1291.6	1240.8	1211.0	1195.9	1192.1	1190.0	1188.3	1187.0	1186.7	1186.4	1186.1	1185.9
	1185.8	1185.6	1185.5	1185.4	1185.3	1185.3	1185.2	1185.2	1185.2	1185.2	1185.3	1185.5	1185.6	1186.2	1187.0
	1187.9	1187.9	1187.9	1256.8	1247.7	1265.9									
11	1471.3	1431.4	1360.3	1291.4	1240.5	1210.0	1195.2	1191.6	1189.6	1187.9	1186.8	1186.5	1186.3	1186.0	1185.8
	1185.7	1185.6	1185.5	1185.4	1185.3	1185.2	1185.1	1185.1	1185.1	1185.2	1185.2	1185.4	1185.5	1186.1	1187.0
	1187.9	1187.9	1211.2	1253.0	1245.3	1272.6									
12	1471.3	1431.3	1358.5	1291.5	1240.4	1209.5	1194.2	1191.0	1189.2	1187.6	1186.7	1186.5	1186.2	1186.0	1185.7
	1185.7	1185.6	1185.5	1185.4	1185.3	1185.1	1185.0	1185.0	1185.0	1185.0	1185.1	1185.3	1185.5	1186.0	1187.0
	1187.9	1187.9	1201.0	1268.9	1244.8	1262.6									
13	1471.2	1431.2	1356.7	1292.0	1240.4	1209.0	1193.3	1190.4	1188.8	1187.4	1186.6	1186.4	1186.2	1186.0	1185.8
	1185.7	1185.6	1185.5	1185.3	1185.2	1185.0	1184.9	1184.8	1184.8	1184.9	1185.0	1185.2	1185.4	1186.0	1187.0
	1187.9	1187.9	1240.9	1280.5	1247.7	1285.3									
14	1471.2	1431.2	1354.8	1292.9	1240.4	1208.8	1192.2	1189.8	1188.4	1187.2	1186.4	1186.3	1186.1	1186.0	1185.8
	1185.7	1185.6	1185.4	1185.3	1185.1	1184.9	1184.7	1184.5	1184.4	1184.6	1184.9	1185.1	1185.4	1186.0	1187.1
	1187.9	1187.9	1250.2	1271.9	1259.5	1281.5									
15	1242.7	1230.1	1352.7	1294.2	1240.5	1208.7	1188.5	1189.1	1188.1	1187.1	1186.4	1186.3	1186.1	1186.0	1185.8
	1185.7	1185.6	1185.4	1185.3	1185.1	1184.9	1184.6	1184.2	1183.8	1184.3	1184.7	1185.1	1185.4	1186.0	1187.3

	1187.9	1187.9	1262.7	1257.9	1255.5	1277.6									
16	1247.6	1230.1	1351.0	1296.0	1240.5	1208.9	1188.9	1188.6	1187.8	1187.0	1186.4	1186.3	1186.1	1186.0	1185.8
	1185.7	1185.6	1185.4	1185.3	1185.1	1184.9	1184.5	1183.8	1182.4	1183.9	1184.6	1185.1	1185.4	1186.2	1187.6
	1187.9	1187.9	1259.0	1260.3	1274.0	1330.9									
17	1245.9	1230.1	1349.5	1298.3	1208.4	1209.5	1188.8	1188.3	1187.7	1187.0	1186.4	1186.3	1186.2	1186.0	1185.9
	1185.7	1185.6	1185.4	1185.3	1185.2	1185.0	1184.7	1184.4	1184.0	1184.5	1184.9	1185.2	1185.5	1186.3	1187.7
	1187.9	1188.0	1262.3	1269.2	1284.5	1340.5									
18	1250.1	1230.1	1348.4	1300.1	1225.9	1222.8	1188.8	1188.3	1187.8	1187.2	1186.5	1186.3	1186.2	1186.0	1185.9
	1185.7	1185.5	1185.4	1185.4	1185.3	1185.2	1185.0	1184.9	1184.8	1184.9	1185.2	1185.4	1185.7	1186.4	1187.8
	1187.9	1188.0	1274.1	1278.0	1287.4	1349.1									
19	1250.1	1230.1	1347.6	1301.3	1214.3	1224.7	1188.8	1188.4	1187.9	1187.6	1186.6	1186.4	1186.3	1186.1	1185.9
	1185.7	1185.5	1185.4	1185.4	1185.4	1185.4	1185.3	1185.3	1185.3	1185.3	1185.5	1185.7	1185.9	1186.6	1187.8
	1187.9	1206.5	1255.8	1273.5	1281.6	1359.5									
20	1243.9	1230.1	1347.1	1302.1	1208.6	1226.5	1228.3	1188.6	1188.0	1187.4	1186.7	1186.5	1186.4	1186.2	1185.9
	1185.6	1185.2	1185.4	1185.5	1185.6	1185.6	1185.6	1185.6	1185.6	1185.7	1185.8	1185.9	1186.1	1186.8	1187.9
	1187.9	1210.3	1267.9	1268.1	1281.4	1368.9									
21	1242.3	1230.1	1346.9	1302.5	1224.2	1230.1	1189.9	1188.9	1188.2	1187.4	1186.8	1186.7	1186.5	1186.3	1186.0
	1185.5	1184.5	1185.3	1185.6	1185.7	1185.8	1185.8	1185.9	1185.9	1186.0	1186.1	1186.2	1186.4	1187.2	1187.9
	1187.9	1207.5	1284.5	1268.8	1277.9	1390.1									
22	1244.1	1230.1	1222.7	1223.1	1222.0	1230.1	1190.0	1189.2	1188.5	1187.7	1187.0	1186.9	1186.7	1186.5	1186.3
	1186.0	1185.6	1185.8	1185.9	1186.0	1186.1	1186.1	1186.1	1186.2	1186.2	1186.3	1186.5	1186.7	1187.6	1187.9
	1187.9	1220.4	1287.4	1270.1	1292.8	1390.1									
23	1236.6	1230.1	1230.1	1228.9	1230.1	1224.5	1190.3	1189.9	1189.3	1188.2	1187.4	1187.2	1187.0	1186.9	1186.7
	1186.5	1186.3	1186.3	1186.3	1186.4	1186.4	1186.4	1186.5	1186.5	1186.6	1186.7	1186.9	1187.1	1187.8	1187.9
	1187.9	1228.6	1276.0	1268.4	1358.0	1390.1									
24	1238.7	1230.1	1230.1	1230.1	1230.1	1228.7	1190.7	1190.8	1191.7	1189.0	1187.9	1187.7	1187.5	1187.3	1187.1
	1187.0	1186.9	1186.8	1186.8	1186.7	1186.7	1186.8	1186.8	1186.9	1187.0	1187.1	1187.3	1187.6	1187.9	1187.9
	1187.9	1219.5	1254.4	1277.6	1359.6	1390.1									
25	1230.1	1230.1	1230.1	1230.1	1230.1	1229.8	1190.8	1191.2	1191.8	1189.6	1188.4	1188.2	1187.9	1187.7	1187.6
	1187.4	1187.3	1187.2	1187.2	1187.1	1187.1	1187.1	1187.2	1187.2	1187.3	1187.5	1187.7	1187.8	1187.9	1187.9
	1188.0	1227.8	1278.7	1278.8	1345.1	1390.1									
26	1230.1	1230.1	1230.1	1230.1	1222.7	1214.7	1190.5	1190.8	1191.1	1190.8	1189.1	1188.7	1188.5	1188.2	1188.0
	1187.9	1187.8	1187.7	1187.6	1187.5	1187.5	1187.5	1187.5	1187.6	1187.6	1187.7	1187.7	1187.8	1187.8	1187.8
	1192.0	1237.7	1274.3	1290.1	1375.7	1390.1									
27	1240.7	1230.1	1230.1	1230.1	1225.5	1194.7	1189.6	1189.8	1189.8	1189.6	1189.3	1188.9	1188.6	1188.4	1188.2
	1188.1	1187.9	1187.9	1187.8	1187.7	1187.7	1187.7	1187.7	1187.7	1187.7	1187.7	1187.7	1187.7	1187.7	1187.9
	1217.4	1247.9	1280.3	1290.1	1390.1	1390.1									
28	1246.6	1230.1	1230.1	1222.3	1216.2	1189.2	1189.3	1189.3	1189.2	1189.1	1189.0	1188.8	1188.6	1188.4	1188.2
	1188.1	1188.0	1187.9	1187.8	1187.8	1187.7	1187.7	1187.7	1187.7	1187.6	1187.6	1187.6	1187.6	1187.6	1187.7
	1229.7	1275.6	1290.1	1290.1	1390.1	1390.1									
29	1250.1	1214.3	1230.1	1219.1	1223.4	1189.0	1189.0	1188.9	1188.8	1188.6	1188.5	1188.4	1188.3	1188.2	1188.1
	1188.0	1187.9	1187.9	1187.8	1187.8	1187.7	1187.7	1187.6	1187.6	1187.5	1187.5	1187.5	1187.4	1187.4	1197.9
	1238.8	1282.8	1290.1	1290.1	1346.4	1390.1									
30	1250.1	1208.2	1230.1	1215.9	1211.3	1188.9	1188.7	1188.6	1188.5	1188.3	1188.2	1188.2	1188.1	1188.0	1188.0
	1187.9	1187.8	1187.8	1187.7	1187.7	1187.6	1187.5	1187.5	1187.4	1187.4	1187.3	1187.3	1187.3	1187.3	1187.3
	1232.1	1277.0	1275.1	1290.1	1358.7	1390.1									
31	1250.1	1207.5	1225.3	1230.1	1221.5	1188.8	1188.5	1188.4	1188.2	1188.1	1188.0	1188.0	1187.9	1187.9	1187.8
	1187.8	1187.7	1187.6	1187.6	1187.5	1187.4	1187.3	1187.2	1187.2	1187.1	1187.1	1187.1	1187.0	1187.1	1187.2
	1241.8	1259.9	1273.0	1290.1	1349.5	1390.1									
32	1250.1	1200.1	1223.3	1230.1	1228.6	1188.7	1188.3	1188.1	1188.0	1187.9	1187.8	1187.8	1187.8	1187.7	1187.7
	1187.6	1187.5	1187.4	1187.3	1187.2	1187.0	1186.9	1186.9	1186.8	1186.8	1186.7	1186.7	1186.7	1186.8	1186.9
	1221.1	1238.7	1262.1	1290.1	1290.1	1390.1									
33	1250.1	1200.1	1212.6	1230.1	1230.1	1188.5	1188.2	1188.0	1187.9	1187.8	1187.7	1187.7	1187.6	1187.5	1187.5
	1187.3	1187.2	1187.1	1186.9	1186.7	1186.6	1186.4	1186.3	1186.3	1186.3	1186.3	1186.4	1186.4	1186.4	1186.5
	1200.1	1213.4	1261.8	1290.1	1290.1	1390.1									
34	1250.1	1200.1	1203.9	1223.0	1230.1	1188.4	1188.1	1187.9	1187.8	1187.7	1187.6	1187.5	1187.5	1187.4	1187.3
	1187.1	1187.0	1186.8	1186.6	1186.4	1186.2	1185.9	1185.4	1185.7	1185.9	1186.0	1186.1	1186.1	1186.2	1186.3
	1200.1	1220.4	1267.5	1290.1	1290.1	1390.1									
35	1250.1	1200.1	1203.5	1226.1	1222.1	1188.3	1188.0	1187.9	1187.8	1187.6	1187.5	1187.4	1187.3	1187.2	1187.1
	1186.9	1186.7	1186.5	1186.4	1186.2	1186.0	1185.9	1185.8	1185.8	1185.8	1185.9	1185.9	1186.0	1186.0	1186.2
	1204.3	1240.9	1279.4	1290.1	1290.1	1365.0									

36	1250.1	1200.1	1194.0	1213.0	1216.9	1188.3	1188.0	1187.9	1187.8	1187.6	1187.4	1187.3	1187.2	1187.0	1186.9
	1186.7	1186.5	1186.3	1186.1	1186.0	1185.8	1185.8	1185.7	1185.7	1185.7	1185.8	1185.8	1185.9	1185.9	1186.1
	1203.0	1240.1	1281.2	1265.8	1290.1	1374.4									
37	1250.1	1200.1	1190.4	1204.4	1184.2	1188.2	1188.0	1187.9	1187.8	1187.5	1187.3	1187.2	1187.1	1186.9	1186.8
	1186.5	1186.3	1186.1	1185.9	1185.7	1185.6	1185.6	1185.6	1185.6	1185.6	1185.7	1185.7	1185.8	1185.9	1186.0
	1206.5	1247.4	1279.8	1268.2	1290.1	1366.5									
38	1250.1	1204.1	1190.4	1193.3	1188.7	1188.3	1188.0	1187.9	1187.7	1187.5	1187.3	1187.2	1187.1	1186.9	1186.7
	1186.4	1186.1	1185.8	1185.5	1185.3	1185.3	1185.3	1185.4	1185.5	1185.6	1185.6	1185.7	1185.7	1185.9	1186.0
	1201.3	1242.7	1274.5	1253.6	1290.1	1367.6									
39	1246.0	1204.3	1190.3	1189.4	1188.7	1188.3	1188.0	1187.9	1187.7	1187.5	1187.3	1187.2	1187.0	1186.9	1186.6
	1186.4	1186.0	1185.7	1185.2	1184.8	1184.9	1185.2	1185.3	1185.4	1185.5	1185.6	1185.7	1185.7	1185.9	1186.0
	1201.8	1239.1	1268.8	1275.8	1290.1	1359.6									
40	1248.9	1200.1	1190.3	1189.4	1188.7	1188.3	1188.0	1187.9	1187.8	1187.5	1187.3	1187.2	1187.1	1186.9	1186.6
	1186.3	1186.0	1185.5	1184.8	1183.7	1184.6	1185.0	1185.2	1185.4	1185.5	1185.6	1185.7	1185.7	1185.9	1186.1
	1207.7	1244.2	1255.9	1266.5	1290.1	1362.5									
41	1248.9	1200.1	1190.3	1189.4	1188.7	1188.3	1188.0	1187.9	1187.8	1187.6	1187.5	1187.3	1187.2	1186.9	1186.7
	1186.4	1186.0	1185.6	1185.1	1184.6	1184.8	1185.1	1185.3	1185.5	1185.6	1185.6	1185.7	1185.8	1185.9	1186.1
	1208.1	1227.2	1243.1	1240.9	1290.1	1365.4									
42	1247.9	1200.1	1190.2	1189.3	1188.7	1188.3	1188.1	1187.9	1187.8	1187.7	1187.6	1187.5	1187.3	1187.0	1186.8
	1186.5	1186.2	1185.9	1185.6	1185.4	1185.4	1185.4	1185.5	1185.6	1185.7	1185.8	1185.8	1185.9	1186.0	1186.2
	1204.4	1221.7	1240.2	1249.6	1290.1	1369.0									
43	1245.7	1200.1	1190.2	1189.3	1188.7	1188.3	1188.1	1187.9	1187.8	1187.8	1187.7	1187.5	1187.4	1187.1	1186.9
	1186.6	1186.4	1186.2	1186.0	1185.9	1185.8	1185.8	1185.8	1185.8	1185.9	1185.9	1186.0	1186.1	1186.2	1186.3
	1208.3	1201.5	1234.9	1242.4	1290.1	1376.7									
44	1243.2	1200.1	1190.1	1189.3	1188.7	1188.3	1188.1	1187.9	1187.9	1187.8	1187.7	1187.5	1187.3	1187.1	1186.9
	1186.8	1186.6	1186.4	1186.3	1186.2	1186.1	1186.1	1186.1	1186.1	1186.1	1186.1	1186.2	1186.3	1186.4	1186.5
	1187.4	1205.0	1232.8	1244.7	1290.1	1335.7									
45	1257.5	1200.1	1190.1	1189.2	1188.7	1188.3	1188.1	1187.9	1187.9	1187.8	1187.7	1187.5	1187.3	1187.1	1186.9
	1186.8	1186.7	1186.6	1186.5	1186.4	1186.4	1186.3	1186.3	1186.3	1186.3	1186.4	1186.4	1186.5	1186.6	1186.7
	1187.2	1203.8	1237.4	1264.1	1285.5	1347.4									
46	1263.5	1200.1	1190.1	1189.2	1188.7	1188.3	1188.1	1187.9	1187.9	1187.8	1187.6	1187.5	1187.2	1187.0	1186.9
	1186.8	1186.7	1186.7	1186.6	1186.6	1186.5	1186.5	1186.5	1186.5	1186.5	1186.5	1186.6	1186.6	1186.7	1186.9
	1187.2	1200.9	1239.5	1277.0	1281.5	1315.3									
47	1268.1	1206.9	1190.0	1189.2	1188.7	1188.3	1188.1	1188.0	1187.9	1187.7	1187.6	1187.4	1187.0	1186.8	1186.7
	1186.7	1186.7	1186.7	1186.7	1186.7	1186.6	1186.6	1186.6	1186.6	1186.7	1186.7	1186.7	1186.8	1186.8	1187.0
	1187.2	1201.1	1237.0	1272.8	1282.2	1284.1									
48	1270.8	1205.9	1190.0	1189.2	1188.6	1188.3	1188.1	1188.0	1187.9	1187.7	1187.5	1187.3	1186.8	1186.4	1186.5
	1186.6	1186.7	1186.7	1186.7	1186.7	1186.7	1186.7	1186.7	1186.7	1186.8	1186.8	1186.8	1186.8	1186.9	1187.0
	1187.3	1201.4	1239.6	1282.1	1282.7	1278.5									
49	1275.1	1205.0	1190.0	1189.1	1188.6	1188.3	1188.1	1188.0	1187.9	1187.7	1187.5	1187.2	1186.6	1185.5	1186.3
	1186.6	1186.7	1186.8	1186.8	1186.8	1186.8	1186.8	1186.8	1186.8	1186.8	1186.9	1186.9	1186.9	1187.0	1187.1
	1187.3	1206.4	1242.1	1279.2	1268.8	1285.7									
50	1277.5	1204.1	1190.0	1189.1	1188.6	1188.3	1188.1	1188.0	1187.9	1187.7	1187.6	1187.3	1186.9	1186.5	1186.6
	1186.7	1186.8	1186.8	1186.9	1186.9	1186.9	1186.9	1186.9	1186.9	1186.9	1186.9	1186.9	1187.0	1187.0	1187.1
	1187.3	1211.4	1242.7	1271.2	1273.6	1265.7									
51	1266.2	1203.1	1190.0	1189.1	1188.6	1188.3	1188.1	1188.0	1187.9	1187.8	1187.6	1187.4	1187.2	1186.9	1186.9
	1186.9	1186.9	1186.9	1186.9	1186.9	1187.0	1187.0	1187.0	1187.0	1187.0	1187.0	1187.0	1187.0	1187.1	1187.2
	1187.4	1204.5	1242.9	1257.1	1278.4	1261.7									
52	1276.0	1202.0	1190.0	1189.1	1188.6	1188.3	1188.1	1188.0	1187.9	1187.8	1187.7	1187.6	1187.4	1187.2	1187.1
	1187.1	1187.1	1187.1	1187.1	1187.1	1187.0	1187.0	1187.0	1187.0	1187.1	1187.1	1187.1	1187.1	1187.2	1187.2
	1187.4	1206.5	1241.7	1258.0	1284.7	1243.6									
53	1277.2	1204.1	1190.0	1189.0	1188.6	1188.3	1188.1	1188.0	1187.9	1187.8	1187.8	1187.7	1187.6	1187.4	1187.3
	1187.3	1187.2	1187.2	1187.2	1187.2	1187.1	1187.1	1187.1	1187.1	1187.1	1187.1	1187.2	1187.2	1187.2	1187.3
	1187.4	1211.2	1243.2	1254.6	1264.8	1234.8									
54	1280.1	1213.8	1190.0	1189.0	1188.6	1188.3	1188.1	1188.0	1187.9	1187.9	1187.8	1187.8	1187.7	1187.6	1187.5
	1187.4	1187.4	1187.3	1187.3	1187.3	1187.2	1187.2	1187.2	1187.2	1187.2	1187.2	1187.2	1187.2	1187.3	1187.3
	1187.4	1203.6	1231.7	1246.0	1242.7	1235.2									
55	1284.8	1231.3	1190.0	1188.9	1188.5	1188.3	1188.1	1188.0	1187.9	1187.9	1187.9	1187.8	1187.8	1187.7	1187.6
	1187.5	1187.5	1187.4	1187.4	1187.3	1187.3	1187.3	1187.3	1187.3	1187.3	1187.2	1187.2	1187.3	1187.3	1187.4
	1187.5	1188.0	1214.3	1238.3	1234.3	1273.6									
56	1290.1	1237.0	1190.1	1188.8	1188.4	1188.2	1188.1	1188.0	1187.9	1187.9	1187.9	1187.8	1187.8	1187.7	1187.6

	1187.6	1187.5	1187.4	1187.4	1187.4	1187.3	1187.3	1187.3	1187.3	1187.2	1187.2	1187.2	1187.2	1187.3	1187.3
	1187.5	1188.0	1211.1	1240.3	1236.3	1275.7									
57	1290.1	1247.2	1190.4	1188.7	1188.3	1188.1	1188.0	1187.9	1187.9	1187.9	1187.8	1187.8	1187.7	1187.6	1187.6
	1187.5	1187.4	1187.4	1187.3	1187.3	1187.2	1187.2	1187.2	1187.2	1187.1	1187.1	1187.1	1187.1	1187.2	1187.2
	1187.4	1188.0	1205.4	1247.9	1254.1	1279.8									
58	1275.8	1283.0	1221.7	1188.5	1188.1	1188.0	1187.9	1187.9	1187.9	1187.8	1187.7	1187.6	1187.5	1187.4	1187.3
	1187.2	1187.2	1187.1	1187.0	1187.0	1186.9	1186.9	1186.9	1186.8	1186.8	1186.8	1186.8	1186.8	1186.8	1186.9
	1187.1	1189.0	1216.6	1273.9	1324.6	1309.2									
59	1237.1	1290.1	1248.0	1188.4	1187.8	1187.9	1187.8	1187.8	1187.7	1187.6	1187.4	1187.2	1187.1	1186.9	1186.8
	1186.7	1186.5	1186.4	1186.3	1186.2	1186.2	1186.1	1186.1	1186.0	1186.0	1186.0	1186.0	1186.0	1186.0	1186.1
	1186.5	1204.4	1243.0	1281.8	1371.9	1385.6									
60	1237.5	1283.0	1267.4	1208.0	1186.9	1187.6	1187.6	1187.4	1187.4	1187.3	1186.9	1186.6	1186.3	1186.0	1185.7
	1185.5	1185.3	1185.2	1185.0	1184.9	1184.8	1184.7	1184.7	1184.6	1184.6	1184.6	1184.5	1184.6	1184.6	1184.7
	1194.4	1217.2	1249.1	1322.7	1390.1	1390.1									
61	1234.9	1270.1	1290.1	1200.3	1185.1	1187.1	1187.1	1186.4	1186.1	1185.7	1185.2	1184.8	1184.5	1184.2	1183.9
	1183.7	1183.5	1183.3	1183.1	1183.0	1182.9	1182.9	1182.8	1182.8	1182.7	1182.7	1182.7	1182.7	1182.9	1183.1
	1184.2	1223.9	1251.4	1290.1	1347.9	1390.1									
62	1241.2	1241.3	1271.1	1206.4	1182.6	1186.4	1186.4	1184.9	1184.1	1183.6	1183.1	1182.8	1182.5	1182.3	1182.0
	1181.8	1181.7	1181.5	1181.4	1181.3	1181.2	1181.2	1181.1	1181.1	1181.1	1181.1	1181.1	1181.1	1181.1	1181.5
	1186.2	1222.2	1239.3	1276.6	1348.4	1386.1									
63	1206.7	1239.0	1237.2	1206.6	1179.4	1185.4	1185.3	1183.0	1182.1	1181.4	1181.0	1180.8	1180.5	1180.3	1180.1
	1180.0	1179.8	1179.7	1179.6	1179.6	1179.5	1179.5	1179.4	1179.4	1179.4	1179.4	1179.4	1179.4	1179.5	1179.9
	1195.7	1221.1	1238.8	1279.8	1326.2	1363.2									
64	1200.1	1227.7	1217.7	1166.0	1174.7	1182.1	1181.5	1179.8	1179.1	1178.7	1178.4	1178.3	1178.1	1178.0	1177.9
	1177.8	1177.8	1177.7	1177.7	1177.6	1177.6	1177.5	1177.5	1177.5	1177.5	1177.5	1177.4	1177.5	1177.5	1177.6
	1196.7	1214.2	1245.3	1282.0	1271.8	1339.8									
65	1200.1	1215.5	1200.9	1164.0	1167.4	1168.7	1174.1	1175.0	1175.3	1175.4	1175.5	1175.5	1175.5	1175.5	1175.5
	1175.5	1175.5	1175.5	1175.5	1175.5	1175.5	1175.5	1175.5	1175.5	1175.5	1175.5	1175.5	1175.5	1175.4	1175.2
	1199.6	1200.1	1236.0	1267.9	1286.5	1280.6									
66	1200.1	1203.9	1180.4	1163.1	1163.1	1165.7	1168.9	1170.5	1171.2	1171.7	1172.0	1172.2	1172.3	1172.5	1172.6
	1172.7	1172.8	1172.9	1173.0	1173.0	1173.1	1173.1	1173.2	1173.2	1173.2	1173.2	1173.2	1173.2	1173.1	1172.9
	1189.8	1200.1	1233.7	1276.3	1265.7	1286.3									
67	1200.1	1180.4	1163.2	1162.4	1161.4	1161.9	1163.4	1165.4	1166.4	1167.1	1167.6	1167.9	1168.2	1168.5	1168.7
	1169.0	1169.2	1169.4	1169.6	1169.7	1169.8	1169.9	1170.0	1170.1	1170.2	1170.2	1170.3	1170.3	1170.4	1170.3
	1173.6	1196.2	1216.3	1236.1	1230.5	1258.1									
68	1200.1	1166.3	1162.9	1162.1	1161.4	1161.4	1162.0	1162.5	1162.9	1163.2	1163.4	1163.6	1163.8	1164.1	1164.4
	1164.8	1165.3	1165.6	1166.0	1166.3	1166.5	1166.7	1166.9	1167.1	1167.2	1167.4	1167.5	1167.7	1167.8	1167.9
	1167.9	1186.1	1200.1	1238.2	1263.4	1290.1									
69	1169.3	1150.1	1162.8	1162.1	1161.6	1161.4	1161.4	1161.5	1161.8	1161.9	1162.0	1162.1	1162.1	1162.1	1162.2
	1162.4	1162.9	1163.3	1163.8	1164.2	1164.5	1164.8	1165.1	1165.3	1165.6	1165.8	1166.0	1166.2	1166.4	1166.7
	1167.0	1169.2	1210.6	1231.8	1279.5	1335.4									

HEAD PRINT FORMAT IS FORMAT NUMBER -3   DRAWDOWN PRINT FORMAT IS FORMAT NUMBER -3
HEADS WILL BE SAVED ON UNIT 21   DRAWDOWNS WILL BE SAVED ON UNIT 0
OUTPUT CONTROL IS SPECIFIED EVERY TIME STEP

COLUMN TO ROW ANISOTROPY = 1.000000

DELR WILL BE READ ON UNIT 7 USING FORMAT: (10f8.0)

2100.0	1400.0	1200.0	800.00	600.00	400.00	300.00	200.00	150.00	150.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	150.00	150.00	200.00	300.00
400.00	600.00	800.00	1200.0	1600.0	1800.0				

DELC WILL BE READ ON UNIT 7 USING FORMAT: (10f8.0)

1800.0	1200.0	800.00	600.00	400.00	300.00	200.00	150.00	150.00	100.00
100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
100.00	100.00	150.00	150.00	200.00	300.00	200.00	200.00	200.00	200.00
200.00	300.00	200.00	200.00	200.00	150.00	150.00	100.00	100.00	100.00
100.00	150.00	150.00	200.00	150.00	150.00	100.00	100.00	100.00	100.00
100.00	150.00	150.00	200.00	300.00	300.00	400.00	600.00	600.00	600.00
400.00	300.00	300.00	300.00	300.00	400.00	600.00	700.00	800.00	

PRIMARY STORAGE COEF = 0.2500000 FOR LAYER 1

HYD. COND. ALONG ROWS FOR LAYER 1 WILL BE READ ON UNIT 27 USING FORMAT: (36f4.0)

	1 11 21 31	2 12 22 32	3 13 23 33	4 14 24 34	5 15 25 35	6 16 26 36	7 17 27	8 18 28	9 19 29	10 20 30
1	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05
	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05
	1.0000E-05	1.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
2	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05
	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05
	1.0000E-05	1.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
3	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05
	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05
	1.0000E-05	1.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
4	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05
	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05
	1.0000E-05	1.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
5	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05
	3.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05	3.0000E-05
	3.0000E-05	1.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
6	1.0000E-05	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	1.0000E-04	1.0000E-04	1.0000E-04	1.0000E-04
	1.0000E-04	1.0000E-04	1.0000E-04	1.0000E-04	1.0000E-04	1.0000E-04	1.0000E-04	1.0000E-04	1.0000E-04	1.0000E-04
	1.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
7	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04
	5.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04	5.0000E-04
	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
8	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
9	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
10	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
11	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03

	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
27	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
28	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
29	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
30	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
31	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
32	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
33	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
34	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
35	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
36	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
37	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
38	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
39	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
40	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
41	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				

	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
12	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
13	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
14	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
15	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
16	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
17	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
18	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
19	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
20	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
21	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
22	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
23	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
24	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
25	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
26	1.0000E-05	1.0000E-05	1.0000E-05	3.0000E-05	1.0000E-04	5.0000E-04	5.0000E-04	1.0000E-03	1.0000E-03	1.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03
	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	5.0000E-03	1.0000E-03	1.0000E-03

42	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
43	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
44	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
45	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
46	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
47	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
48	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
49	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
50	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
51	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
52	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
53	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
54	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
55	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
56	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
57	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03

1	1265.0	1290.0	1290.0	1290.0	1251.3	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1218.8	1221.7
	1223.1	1222.2	1223.9	1222.6	1215.8	1208.3	1170.0	1170.0	1170.0	1170.0	1170.0	1170.0	1170.0	1165.5	1169.2
	1146.3	1164.5	1158.7	1221.8	1288.6	1290.0									
2	1230.0	1290.0	1290.0	1290.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0
	1230.0	1230.0	1230.0	1230.0	1200.0	1170.0	1150.0	1150.0	1150.0	1150.0	1150.0	1150.0	1150.0	1138.6	1129.6
	1100.0	1100.0	1124.1	1217.7	1288.0	1390.0									
3	1238.8	1230.0	1252.9	1220.0	1220.0	1220.0	1220.0	1220.0	1220.0	1220.0	1220.0	1220.0	1220.0	1230.0	1230.0
	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1200.0	1200.0	1175.0	1150.0	1125.0	1100.0	1100.0
	1100.0	1100.0	1116.9	1166.3	1251.0	1290.0									
4	1200.0	1200.0	1200.0	1200.0	1200.0	1200.0	1215.0	1215.0	1220.0	1225.0	1220.0	1220.0	1220.0	1230.0	1230.0
	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1230.0	1180.0	1180.0	1180.0	1180.0	1145.9	1121.1
	1108.3	1100.0	1100.0	1128.5	1200.0	1279.5									
5	1200.0	1200.0	1200.0	1190.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0
	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0	1175.0	1150.0	1125.0	1090.0	1090.0
	1090.0	1090.0	1108.0	1177.8	1226.1	1252.6									
6	1200.0	1200.0	1200.0	1190.0	1180.0	1160.0	1160.0	1175.0	1175.0	1180.0	1180.0	1180.0	1180.0	1180.0	1180.0
	1180.0	1180.0	1180.0	1175.0	1175.0	1175.0	1164.9	1154.0	1150.0	1135.0	1135.0	1125.0	1100.0	1085.0	1075.0
	1060.0	1060.0	1140.0	1202.2	1239.1	1230.5									
7	1200.0	1200.0	1200.0	1200.0	1190.0	1145.0	1135.0	1135.0	1135.0	1140.0	1150.0	1150.0	1150.0	1150.0	1150.0
	1150.0	1150.0	1150.0	1140.0	1140.0	1135.0	1125.0	1125.0	1115.0	1115.0	1110.0	1100.0	1085.0	1075.0	1062.0
	1050.0	1060.0	1140.0	1229.9	1248.2	1234.0									
8	1200.0	1202.2	1200.0	1200.0	1200.0	1140.0	1130.0	1125.0	1120.0	1120.8	1120.0	1120.0	1120.0	1115.0	1115.0
	1115.0	1115.0	1115.0	1115.0	1110.0	1110.0	1110.0	1100.0	1100.0	1095.0	1095.0	1085.0	1075.0	1062.0	1050.0
	1048.0	1080.0	1175.0	1220.6	1241.1	1240.6									
9	1200.0	1203.6	1200.0	1200.0	1200.0	1140.0	1130.0	1120.0	1115.0	1115.1	1110.0	1110.0	1110.0	1100.0	1100.0
	1100.0	1100.0	1100.0	1100.0	1100.0	1095.0	1095.0	1095.0	1090.0	1085.0	1080.0	1070.0	1058.0	1050.0	1047.0
	1047.0	1090.0	1180.0	1244.4	1242.9	1249.0									
10	1200.0	1200.0	1200.0	1200.0	1200.0	1150.0	1135.0	1110.0	1105.0	1100.0	1100.0	1100.0	1095.0	1095.0	1095.0
	1095.0	1095.0	1090.0	1090.0	1090.0	1090.0	1090.0	1090.0	1075.0	1075.0	1070.0	1060.0	1050.0	1047.0	1045.0
	1047.0	1095.0	1190.0	1256.7	1247.6	1265.8									
11	1200.0	1200.0	1200.0	1200.0	1200.0	1150.0	1135.0	1125.0	1115.0	1110.0	1105.0	1100.0	1095.0	1095.0	1095.0
	1095.0	1090.0	1085.0	1085.0	1085.0	1085.0	1085.0	1080.0	1070.0	1065.0	1060.0	1050.0	1049.0	1047.0	1045.0
	1047.0	1100.0	1230.0	1252.9	1245.2	1272.5									
12	1200.0	1200.0	1200.0	1200.0	1200.0	1155.0	1140.0	1130.0	1120.0	1115.0	1110.0	1100.0	1095.0	1095.0	1095.0
	1090.0	1090.0	1090.0	1080.0	1080.0	1080.0	1080.0	1065.0	1060.0	1055.0	1052.0	1049.0	1047.0	1045.0	1043.0
	1047.0	1110.0	1230.0	1268.8	1244.7	1262.5									
13	1200.0	1200.0	1200.0	1200.0	1200.0	1165.0	1150.0	1140.0	1130.0	1125.0	1120.0	1110.0	1100.0	1095.0	1095.0
	1095.0	1090.0	1090.0	1080.0	1065.0	1065.0	1062.0	1060.0	1057.0	1055.0	1051.0	1049.0	1046.0	1043.0	1040.0
	1048.0	1125.0	1230.0	1280.4	1247.6	1285.2									
14	1200.0	1200.0	1200.0	1200.0	1200.0	1175.0	1165.0	1145.0	1135.0	1130.7	1125.0	1115.0	1105.0	1100.0	1095.0
	1095.0	1095.0	1090.0	1070.0	1065.0	1063.0	1061.0	1060.0	1055.0	1053.0	1050.0	1048.0	1046.0	1040.0	1040.0
	1046.0	1150.0	1230.0	1271.8	1259.4	1281.4									
15	1242.6	1230.0	1201.6	1207.2	1212.1	1190.0	1175.0	1155.0	1145.0	1135.4	1125.0	1115.0	1110.0	1100.0	1095.0
	1095.0	1095.0	1085.0	1075.0	1073.0	1070.0	1065.0	1060.0	1055.0	1051.0	1049.0	1047.0	1045.0	1040.0	1040.0
	1047.0	1150.0	1230.0	1257.8	1255.4	1277.5									
16	1247.5	1230.0	1205.3	1205.2	1200.0	1200.0	1180.0	1165.0	1150.0	1135.2	1130.0	1125.0	1115.0	1110.0	1100.0
	1095.0	1095.0	1085.0	1075.0	1073.0	1070.0	1060.0	1056.0	1052.0	1050.0	1048.0	1046.0	1044.0	1040.0	1040.0
	1049.0	1230.0	1258.9	1260.2	1273.9	1330.8									
17	1245.8	1230.0	1209.1	1204.9	1208.3	1210.0	1190.0	1175.0	1150.0	1135.4	1130.0	1120.0	1115.0	1110.0	1100.0
	1095.0	1095.0	1085.0	1075.0	1071.0	1065.0	1060.0	1055.0	1053.0	1050.0	1048.0	1045.0	1040.0	1040.0	1042.0
	1055.0	1220.0	1262.2	1269.1	1284.4	1340.4									
18	1250.0	1230.0	1207.5	1203.6	1225.8	1220.0	1200.0	1180.0	1165.0	1140.7	1135.0	1130.0	1120.0	1110.0	1105.0
	1095.0	1095.0	1090.0	1075.0	1072.0	1068.0	1062.0	1055.0	1052.0	1049.0	1047.0	1043.0	1040.0	1040.0	1044.0
	1060.0	1220.0	1274.0	1277.9	1287.3	1349.0									
19	1250.0	1230.0	1211.3	1202.4	1214.2	1230.0	1200.0	1180.0	1160.0	1140.0	1135.0	1130.0	1120.0	1115.0	1105.0
	1095.0	1095.0	1090.0	1075.0	1072.0	1065.0	1060.0	1055.0	1052.0	1049.0	1047.0	1043.0	1040.0	1040.0	1047.0
	1090.0	1230.0	1255.7	1273.4	1281.5	1359.4									
20	1243.8	1230.0	1215.0	1207.3	1208.5	1230.0	1230.0	1180.0	1160.0	1140.2	1135.0	1125.0	1120.0	1110.0	1100.0
	1095.0	1095.0	1090.0	1075.0	1071.0	1067.0	1060.0	1055.0	1051.0	1048.0	1044.0	1040.0	1040.0	1043.0	1047.0
	1100.0	1230.0	1267.8	1268.0	1281.3	1368.8									
21	1242.2	1230.0	1218.8	1215.8	1224.1	1230.0	1220.0	1180.0	1150.0	1140.5	1130.0	1125.0	1115.0	1105.0	1100.0

	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
58	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
59	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
60	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
61	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
62	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
63	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
64	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
65	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
66	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
67	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
68	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				
69	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03
	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03	1.0000E-03				

BOTTOM FOR LAYER 1 WILL BE READ ON UNIT 28 USING FORMAT: (10f8.0)

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	28	29	30
31	32	33	34	35	36									

	1095.0	1090.0	1085.0	1075.0	1070.0	1065.0	1058.0	1052.0	1050.0	1048.0	1044.0	1040.0	1040.0	1043.0	1048.0
	1125.0	1230.0	1284.4	1268.7	1277.8	1390.0									
22	1244.0	1230.0	1222.6	1223.0	1221.9	1230.0	1215.0	1175.0	1150.0	1135.8	1125.0	1120.0	1115.0	1110.0	1100.0
	1095.0	1090.0	1085.0	1073.0	1070.0	1065.0	1057.0	1052.0	1049.0	1047.0	1044.0	1040.0	1040.0	1044.0	1049.0
	1150.0	1230.0	1287.3	1270.0	1292.7	1390.0									
23	1236.5	1230.0	1230.0	1228.8	1230.0	1225.0	1200.0	1170.0	1150.0	1135.5	1125.0	1120.0	1115.0	1105.0	1095.0
	1095.0	1090.0	1078.0	1070.0	1065.0	1060.0	1052.0	1049.0	1048.0	1046.0	1043.0	1040.0	1040.0	1046.0	1075.0
	1160.0	1230.0	1275.9	1268.3	1357.9	1390.0									
24	1238.6	1230.0	1230.0	1230.0	1230.0	1230.0	1180.0	1160.0	1135.0	1125.3	1115.0	1105.0	1100.0	1095.0	1095.0
	1080.0	1075.0	1070.0	1065.0	1060.0	1055.0	1050.0	1048.0	1047.0	1044.0	1040.0	1040.0	1043.0	1048.0	1090.0
	1180.0	1230.0	1254.3	1277.5	1359.5	1390.0									
25	1230.0	1230.0	1230.0	1230.0	1230.0	1215.0	1170.0	1140.0	1125.0	1110.9	1100.0	1095.0	1095.0	1090.0	1085.0
	1077.0	1072.0	1070.0	1060.0	1055.0	1050.0	1049.0	1047.0	1043.0	1040.0	1040.0	1043.0	1048.0	1055.0	1150.0
	1200.0	1230.0	1278.6	1278.7	1345.0	1390.0									
26	1230.0	1230.0	1230.0	1230.0	1222.6	1215.0	1150.0	1120.0	1105.0	1095.0	1080.0	1075.0	1075.0	1070.0	1070.0
	1065.0	1060.0	1055.0	1050.0	1049.0	1047.0	1045.0	1043.0	1040.0	1040.0	1043.0	1048.0	1060.0	1090.0	1180.0
	1230.0	1237.6	1274.2	1290.0	1375.6	1390.0									
27	1240.6	1230.0	1230.0	1230.0	1225.4	1195.0	1125.0	1100.0	1080.0	1075.0	1070.0	1060.0	1058.0	1054.0	1051.0
	1050.0	1049.0	1048.0	1046.0	1044.0	1042.0	1040.0	1040.0	1043.0	1047.0	1050.0	1060.0	1090.0	1125.0	1185.0
	1230.0	1247.8	1280.2	1290.0	1390.0	1390.0									
28	1246.5	1230.0	1230.0	1222.2	1216.1	1180.0	1115.0	1085.0	1075.0	1065.2	1053.0	1050.0	1049.0	1048.0	1047.0
	1045.0	1043.0	1041.0	1040.0	1040.0	1040.0	1043.0	1047.0	1050.0	1060.0	1065.0	1080.0	1120.0	1140.0	1190.0
	1230.0	1275.5	1290.0	1290.0	1390.0	1390.0									
29	1250.0	1214.2	1230.0	1219.0	1223.3	1150.0	1100.0	1080.0	1060.0	1050.5	1048.0	1047.0	1046.0	1046.0	1043.0
	1041.0	1040.0	1040.0	1042.0	1045.0	1048.0	1050.0	1055.0	1065.0	1080.0	1090.0	1115.0	1125.0	1150.0	1200.0
	1238.7	1282.7	1290.0	1290.0	1346.3	1390.0									
30	1250.0	1208.1	1230.0	1215.8	1211.2	1150.0	1100.0	1075.0	1050.0	1048.3	1046.0	1044.0	1042.0	1040.0	1040.0
	1040.0	1042.0	1045.0	1047.0	1049.0	1051.0	1065.0	1080.0	1085.0	1100.0	1110.0	1125.0	1135.0	1165.0	1200.0
	1232.0	1276.9	1275.0	1290.0	1358.6	1390.0									
31	1250.0	1207.4	1225.2	1230.0	1221.4	1160.0	1100.0	1070.0	1049.0	1047.6	1044.0	1041.0	1040.0	1040.0	1040.0
	1042.0	1047.0	1049.0	1050.0	1060.0	1070.0	1080.0	1090.0	1100.0	1110.0	1120.0	1130.0	1140.0	1160.0	1200.0
	1241.7	1259.8	1272.9	1290.0	1349.4	1390.0									
32	1250.0	1200.0	1223.2	1230.0	1228.5	1160.0	1110.0	1070.0	1048.0	1045.4	1042.0	1040.0	1040.0	1042.0	1044.0
	1047.0	1049.0	1060.0	1065.0	1075.0	1080.0	1090.0	1105.0	1110.0	1115.0	1120.0	1130.0	1140.0	1150.0	1170.0
	1220.0	1238.6	1262.0	1290.0	1290.0	1390.0									
33	1250.0	1200.0	1212.5	1230.0	1230.0	1150.0	1090.0	1050.0	1045.0	1040.9	1040.0	1040.0	1040.0	1045.0	1050.0
	1050.0	1060.0	1065.0	1075.0	1080.0	1090.0	1100.0	1105.0	1110.0	1115.0	1120.0	1130.0	1140.0	1150.0	1180.0
	1200.0	1213.3	1261.7	1290.0	1290.0	1390.0									
34	1250.0	1200.0	1203.8	1222.9	1230.0	1130.0	1075.0	1045.0	1040.0	1040.1	1040.0	1040.0	1045.0	1050.0	1055.0
	1060.0	1065.0	1070.0	1080.0	1090.0	1095.0	1105.0	1110.0	1115.0	1120.0	1125.0	1135.0	1145.0	1160.0	1200.0
	1210.0	1230.0	1267.4	1290.0	1290.0	1390.0									
35	1250.0	1200.0	1203.4	1226.0	1222.0	1125.0	1060.0	1045.0	1040.0	1040.5	1040.0	1040.0	1045.0	1050.0	1055.0
	1065.0	1070.0	1075.0	1080.0	1090.0	1095.0	1105.0	1110.0	1115.0	1125.0	1125.0	1140.0	1150.0	1180.0	1210.0
	1225.0	1240.8	1279.3	1290.0	1290.0	1364.9									
36	1250.0	1200.0	1185.4	1212.9	1216.8	1110.0	1050.0	1045.0	1040.0	1040.5	1040.0	1040.0	1045.0	1055.0	1055.0
	1060.0	1070.0	1075.0	1080.0	1090.0	1095.0	1105.0	1110.0	1115.0	1125.0	1130.0	1150.0	1175.0	1200.0	1210.0
	1220.0	1240.0	1281.1	1265.7	1290.0	1374.3									
37	1250.0	1200.0	1177.8	1204.3	1184.1	1105.0	1060.0	1045.0	1040.0	1040.4	1040.0	1040.0	1040.0	1045.0	1045.0
	1050.0	1060.0	1065.0	1075.0	1075.0	1080.0	1090.0	1095.0	1100.0	1115.0	1120.0	1155.0	1180.0	1202.0	1210.9
	1206.4	1247.3	1279.7	1268.1	1290.0	1366.4									
38	1250.0	1204.0	1171.5	1193.2	1170.2	1100.0	1060.0	1045.0	1040.0	1040.0	1040.0	1040.0	1040.0	1045.0	1045.0
	1050.0	1055.0	1060.0	1070.0	1080.0	1085.0	1085.0	1095.0	1105.0	1110.0	1120.0	1160.0	1180.0	1202.0	1210.0
	1220.0	1242.6	1274.4	1253.5	1290.0	1367.5									
39	1245.9	1204.2	1156.2	1177.2	1159.4	1085.0	1055.0	1045.0	1040.0	1040.3	1040.0	1040.0	1040.0	1040.0	1045.0
	1050.0	1055.0	1060.0	1065.0	1075.0	1080.0	1090.0	1095.0	1100.0	1110.0	1120.0	1165.0	1180.0	1201.0	1210.0
	1220.0	1239.0	1268.7	1275.7	1290.0	1359.5									
40	1248.8	1200.0	1152.8	1167.1	1151.2	1080.0	1055.0	1045.0	1040.0	1040.0	1040.0	1040.0	1040.0	1040.0	1045.0
	1050.0	1055.0	1060.0	1060.0	1075.0	1080.0	1085.0	1095.0	1100.0	1110.0	1130.0	1160.0	1175.0	1200.0	1205.0
	1215.0	1225.0	1255.8	1266.4	1290.0	1362.4									
41	1248.8	1200.0	1150.0	1157.0	1125.0	1080.0	1050.0	1045.0	1040.0	1040.0	1040.0	1040.0	1040.0	1040.0	1045.0
	1045.0	1055.0	1060.0	1070.0	1075.0	1080.0	1085.0	1090.0	1100.0	1105.0	1130.0	1155.0	1175.0	1195.0	1205.0

	1210.0	1220.0	1243.0	1240.8	1290.0	1365.3									
42	1247.8	1200.0	1150.0	1130.0	1110.0	1085.0	1055.0	1045.0	1040.0	1040.0	1040.0	1040.0	1040.0	1040.0	1040.0
	1045.0	1050.0	1060.0	1065.0	1075.0	1080.0	1085.0	1095.0	1100.0	1105.0	1115.0	1150.0	1165.0	1185.0	1200.0
	1210.0	1215.0	1220.0	1249.5	1290.0	1368.9									
43	1245.6	1200.0	1150.0	1130.8	1111.7	1090.0	1065.0	1045.0	1040.0	1040.0	1040.0	1040.0	1040.0	1040.0	1040.0
	1045.0	1050.0	1060.0	1065.0	1075.0	1080.0	1090.0	1095.0	1100.0	1105.0	1115.0	1140.0	1160.0	1175.0	1190.0
	1205.0	1215.0	1220.0	1242.3	1290.0	1376.8									
44	1243.1	1200.0	1150.0	1134.2	1119.3	1100.0	1075.0	1045.0	1040.0	1040.0	1040.0	1040.0	1040.0	1040.0	1040.0
	1045.0	1050.0	1055.0	1065.0	1075.0	1085.0	1090.0	1100.0	1105.0	1110.0	1120.0	1130.0	1150.0	1165.0	1185.0
	1200.0	1220.0	1230.0	1244.6	1290.0	1335.6									
45	1257.4	1200.0	1180.0	1160.0	1150.0	1125.0	1080.0	1050.0	1045.0	1040.0	1040.0	1040.0	1040.0	1040.0	1040.0
	1040.0	1045.0	1060.0	1075.0	1080.0	1090.0	1100.0	1105.0	1110.0	1115.0	1120.0	1135.0	1150.0	1165.0	1180.0
	1200.0	1220.0	1237.3	1264.0	1285.4	1347.3									
46	1263.4	1200.0	1150.0	1117.5	1109.5	1100.0	1100.0	1080.0	1050.0	1045.0	1040.0	1040.0	1040.0	1040.0	1040.0
	1040.0	1045.0	1055.0	1070.0	1080.0	1085.0	1095.0	1105.0	1110.0	1115.0	1120.0	1140.0	1150.0	1165.0	1180.0
	1202.0	1222.0	1239.4	1276.9	1281.4	1315.2									
47	1268.0	1206.8	1190.0	1180.0	1170.0	1160.0	1135.0	1090.0	1060.0	1045.0	1040.0	1040.0	1040.0	1040.0	1040.0
	1040.0	1045.0	1060.0	1070.0	1080.0	1085.0	1095.0	1105.0	1110.0	1115.0	1120.0	1125.0	1150.0	1165.0	1180.0
	1200.0	1225.0	1236.9	1272.7	1282.1	1284.0									
48	1270.7	1205.8	1190.0	1180.0	1170.0	1160.0	1150.0	1100.0	1075.0	1050.0	1045.0	1040.0	1040.0	1040.0	1040.0
	1040.0	1045.0	1055.0	1065.0	1075.0	1085.0	1095.0	1100.0	1110.0	1115.0	1120.0	1125.0	1130.0	1140.0	1160.0
	1180.0	1215.0	1239.5	1282.0	1282.6	1278.4									
49	1275.0	1204.9	1190.0	1180.0	1170.0	1160.0	1150.0	1110.0	1080.0	1050.0	1045.0	1040.0	1040.0	1040.0	1040.0
	1040.0	1045.0	1055.0	1070.0	1080.0	1090.0	1095.0	1105.0	1110.0	1115.0	1120.0	1125.0	1135.0	1140.0	1160.0
	1185.0	1220.0	1242.0	1279.1	1268.7	1285.6									
50	1277.4	1204.0	1190.0	1180.0	1170.0	1165.0	1160.0	1140.0	1110.0	1075.0	1050.0	1045.0	1040.0	1040.0	1040.0
	1040.0	1045.0	1055.0	1070.0	1080.0	1090.0	1095.0	1100.0	1110.0	1115.0	1120.0	1125.0	1130.0	1140.0	1150.0
	1180.0	1215.0	1242.6	1271.1	1273.5	1265.6									
51	1266.1	1203.0	1195.0	1185.0	1180.0	1175.0	1160.0	1150.0	1120.0	1090.0	1060.0	1045.0	1040.0	1040.0	1040.0
	1040.0	1045.0	1055.0	1065.0	1075.0	1085.0	1095.0	1100.0	1105.0	1110.0	1115.0	1120.0	1130.0	1135.0	1150.0
	1180.0	1215.0	1242.8	1257.0	1278.3	1261.6									
52	1275.9	1201.9	1195.0	1185.0	1180.0	1175.0	1165.0	1155.0	1130.0	1115.0	1075.0	1050.0	1045.0	1040.0	1040.0
	1040.0	1045.0	1055.0	1065.0	1075.0	1085.0	1095.0	1100.0	1105.0	1110.0	1115.0	1120.0	1125.0	1135.0	1145.0
	1180.0	1215.0	1241.6	1257.9	1284.6	1243.5									
53	1277.1	1204.0	1195.0	1185.0	1180.0	1175.0	1170.0	1155.0	1140.0	1120.0	1080.0	1050.0	1045.0	1040.0	1040.0
	1040.0	1045.0	1050.0	1070.0	1075.0	1085.0	1090.0	1095.0	1105.0	1110.0	1115.0	1120.0	1125.0	1135.0	1145.0
	1180.0	1215.0	1243.1	1254.5	1264.7	1234.7									
54	1280.0	1213.7	1195.0	1185.0	1175.0	1170.0	1160.0	1150.0	1125.0	1100.0	1060.0	1045.0	1040.0	1040.0	1040.0
	1040.0	1045.0	1050.0	1060.0	1075.0	1080.0	1085.0	1095.0	1100.0	1110.0	1115.0	1120.0	1125.0	1135.0	1145.0
	1175.0	1215.0	1231.6	1245.9	1242.6	1235.1									
55	1284.7	1231.2	1200.0	1185.0	1165.0	1150.0	1100.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1062.3
	1061.3	1060.2	1055.9	1062.7	1069.4	1076.1	1084.0	1090.1	1100.9	1101.9	1100.6	1102.3	1103.7	1125.4	1150.0
	1150.0	1177.0	1214.2	1238.2	1234.2	1273.5									
56	1290.0	1236.9	1190.0	1170.0	1150.0	1140.0	1080.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0
	1050.0	1050.0	1050.3	1057.0	1063.5	1069.7	1075.6	1081.5	1087.4	1093.3	1100.1	1100.0	1100.0	1123.6	1130.8
	1150.0	1172.9	1211.0	1240.2	1236.2	1275.6									
57	1290.0	1247.1	1200.0	1180.0	1150.0	1100.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0
	1050.0	1050.0	1050.0	1051.4	1057.1	1062.9	1068.6	1074.3	1081.0	1086.7	1100.0	1100.0	1109.6	1116.2	1131.2
	1150.0	1173.9	1205.3	1247.8	1254.0	1279.7									
58	1275.7	1282.9	1221.6	1140.0	1125.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0
	1050.0	1050.0	1050.0	1050.0	1054.2	1059.7	1065.8	1072.0	1078.1	1084.2	1100.0	1100.0	1107.9	1119.7	1136.5
	1159.6	1187.3	1216.5	1273.8	1324.5	1309.1									
59	1237.0	1290.0	1247.9	1162.8	1095.9	1059.7	1061.7	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1061.2	1059.1
	1057.1	1061.0	1059.5	1057.9	1054.0	1061.1	1068.2	1078.6	1082.3	1089.9	1097.5	1106.7	1117.7	1130.3	1147.7
	1172.1	1204.3	1242.9	1281.7	1371.8	1385.5									
60	1237.4	1282.9	1267.3	1207.9	1093.9	1050.0	1059.4	1062.8	1050.0	1050.0	1050.0	1050.0	1063.9	1061.7	1059.4
	1057.2	1054.9	1061.3	1059.5	1056.6	1064.6	1072.6	1080.6	1089.7	1096.3	1103.6	1112.5	1123.5	1136.0	1156.1
	1194.3	1217.1	1249.0	1322.6	1390.0	1390.0									
61	1234.8	1270.0	1290.0	1200.2	1116.3	1050.0	1061.8	1062.7	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1058.8
	1056.5	1061.3	1062.5	1056.7	1066.7	1066.9	1074.9	1083.0	1091.1	1099.1	1106.8	1116.4	1126.3	1160.3	1164.8
	1182.0	1223.8	1251.3	1290.0	1347.8	1390.0									

62	1241.1	1241.2	1271.0	1206.3	1108.2	1050.0	1062.1	1063.8	1050.0	1050.0	1050.0	1050.0	1062.7	1060.5	1058.2
	1056.0	1053.7	1062.8	1052.7	1060.8	1068.8	1076.8	1089.4	1092.9	1100.9	1108.6	1118.2	1129.7	1153.0	1169.5
	1186.1	1222.1	1239.2	1276.5	1348.3	1386.0									
63	1206.6	1238.9	1237.1	1206.5	1080.8	1058.1	1064.3	1050.0	1050.0	1050.0	1050.0	1050.0	1061.7	1059.5	1057.4
	1055.5	1059.8	1057.8	1054.5	1062.5	1070.6	1077.7	1080.2	1094.6	1125.9	1119.0	1124.5	1132.5	1154.1	1171.3
	1195.6	1221.0	1238.7	1279.7	1326.1	1363.1									
64	1200.0	1227.6	1217.6	1164.2	1076.0	1059.6	1065.2	1066.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0
	1050.0	1053.9	1062.3	1055.2	1063.3	1070.5	1077.6	1084.8	1091.9	1126.7	1107.7	1118.8	1130.0	1155.9	1173.1
	1196.6	1214.1	1245.2	1281.9	1271.7	1339.7									
65	1200.0	1215.4	1200.8	1138.4	1074.6	1060.2	1067.8	1050.0	1050.0	1050.0	1050.0	1050.0	1061.3	1059.1	1056.9
	1054.8	1063.0	1060.6	1055.7	1062.7	1069.8	1076.8	1080.0	1092.2	1117.4	1114.2	1117.6	1129.9	1144.4	1166.7
	1199.5	1200.0	1235.9	1267.8	1286.4	1280.5									
66	1200.0	1203.8	1180.3	1079.3	1075.0	1065.1	1072.6	1050.0	1050.0	1050.0	1063.9	1062.0	1061.4	1059.2	1057.1
	1058.3	1057.0	1055.8	1055.3	1062.4	1069.4	1076.5	1083.2	1089.4	1104.4	1102.3	1112.8	1125.4	1147.6	1160.7
	1189.7	1200.0	1233.6	1276.2	1265.6	1286.2									
67	1200.0	1180.3	1150.7	1091.3	1050.0	1065.8	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0
	1050.0	1066.3	1050.0	1050.0	1056.1	1062.7	1069.3	1075.8	1082.4	1088.8	1093.8	1103.2	1114.9	1127.8	1144.4
	1173.5	1196.1	1216.2	1236.0	1230.4	1258.0									
68	1200.0	1166.2	1129.3	1070.7	1062.8	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0
	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1051.1	1056.6	1065.3	1071.9	1078.5	1086.7	1095.5	1116.9	1128.5
	1155.5	1186.0	1200.0	1238.1	1263.3	1290.0									
69	1169.2	1150.0	1116.8	1067.9	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0
	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1050.0	1067.2	1065.7	1056.5	1067.3	1084.1	1101.5
	1124.5	1166.9	1210.5	1231.7	1279.4	1335.3									

SOLUTION BY THE STRONGLY IMPLICIT PROCEDURE

MAXIMUM ITERATIONS ALLOWED FOR CLOSURE = 100
ACCELERATION PARAMETER = 1.0000
HEAD CHANGE CRITERION FOR CLOSURE = 0.60000E-01
SIP HEAD CHANGE PRINTOUT INTERVAL = 1
CALCULATE ITERATION PARAMETERS FROM MODEL CALCULATED WSEED

STRESS PERIOD NO.   1, LENGTH =   2629800.

NUMBER OF TIME STEPS =   1

MULTIPLIER FOR DELT =   1.500

INITIAL TIME STEP SIZE =   2629800.

8 WELLS

LAYER	ROW	COL	STRESS RATE	WELL NO.
1	40	20	-1.0800	1
1	49	15	0.00000E+00	2
1	21	17	-2.7700	3
1	16	24	-1.8000	4
1	12	15	-1.0400	5
1	12	29	0.00000E+00	6
1	46	15	0.00000E+00	7
1	42	20	0.00000E+00	8

RECHARGE WILL BE READ ON UNIT 10 USING FORMAT: (36f3.0)
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	1 11 21 31	2 12 22 32	3 13 23 33	4 14 24 34	5 15 25 35	6 16 26 36	7 17 27	8 18 28	9 19 29	10 20 30
1	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00				
2	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00				
3	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00				
4	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00				
5	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00				
6	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00				
7	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00				
8	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08

	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00				
9	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00				
10	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00				
11	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
12	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
13	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
14	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
15	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
16	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
17	0.0000E+00	2.3850E-07	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
18	0.0000E+00	2.3850E-07	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
19	0.0000E+00	2.3850E-07	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
20	0.0000E+00	2.3850E-07	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
21	0.0000E+00	2.3850E-07	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
22	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
23	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				

24	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
25	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
26	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
27	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
28	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
29	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07	0.0000E+00
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
30	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
31	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
32	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
33	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
34	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
35	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
36	0.0000E+00	0.0000E+00	2.3850E-07	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
37	0.0000E+00	0.0000E+00	2.3850E-07	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
38	0.0000E+00	0.0000E+00	2.3850E-07	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
39	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08

	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	2.6500E-08	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
40	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07	2.6500E-08
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
41	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07	2.6500E-08
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
42	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	2.6500E-08	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
43	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07	2.6500E-08
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
44	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	2.6500E-08	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
45	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	2.6500E-08	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
46	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	2.6500E-08	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
47	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	2.6500E-08	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
48	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
49	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
50	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
51	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
52	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
53	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
54	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08

	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
55	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
56	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
57	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
58	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
59	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
60	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
61	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
62	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
63	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
64	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
65	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
66	0.0000E+00	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
67	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.3850E-07
	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
68	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.3850E-07	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00				
69	0.0000E+00	0.0000E+00	2.3850E-07	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08
	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08	2.6500E-08

1	12	32	1188.	0.9868	1178.	56
1	12	33	1188.	0.5263E-01	1178.	57
1	13	31	1188.	1.053	1178.	58
1	13	32	1188.	0.9868	1178.	59
1	14	31	1188.	1.053	1178.	60
1	14	32	1188.	1.579	1178.	61
1	15	31	1188.	1.250	1178.	62
1	15	32	1188.	0.9868	1178.	63
1	16	30	1188.	0.9868E-01	1178.	64
1	16	31	1188.	1.316	1178.	65
1	16	32	1188.	0.5921	1178.	66
1	17	30	1188.	0.1974	1178.	67
1	17	31	1188.	1.316	1178.	68
1	17	32	1188.	0.3947	1178.	69
1	18	30	1188.	0.2961	1178.	70
1	18	31	1188.	1.316	1178.	71
1	19	30	1188.	0.6908	1178.	72
1	19	31	1188.	0.7895	1178.	73
1	20	30	1188.	0.7401	1178.	74
1	20	31	1188.	0.7895	1178.	75
1	21	30	1188.	0.8882	1178.	76
1	21	31	1188.	0.6579	1178.	77
1	22	29	1188.	0.1645	1178.	78
1	22	30	1188.	0.9868	1178.	79
1	22	31	1188.	0.5263	1178.	80
1	23	29	1188.	0.5921	1178.	81
1	23	30	1188.	1.480	1178.	82
1	23	31	1188.	0.4934	1178.	83
1	24	28	1188.	0.4441	1178.	84
1	24	29	1188.	0.9868	1178.	85
1	24	30	1188.	1.332	1178.	86
1	25	26	1188.	0.1316	1178.	87
1	25	27	1188.	0.4934	1178.	88
1	25	28	1188.	0.9868	1178.	89
1	25	29	1188.	1.316	1178.	90
1	25	30	1188.	0.7895	1178.	91
1	26	22	1188.	0.2961E-01	1178.	92
1	26	23	1188.	0.4934E-01	1178.	93
1	26	24	1188.	0.7895E-01	1178.	94
1	26	25	1188.	0.9868E-01	1178.	95
1	26	26	1188.	0.9868E-01	1178.	96
1	26	27	1188.	0.1480	1178.	97
1	26	28	1188.	0.1480	1178.	98
1	26	29	1188.	0.9868E-01	1178.	99
1	27	20	1188.	0.2632E-01	1178.	100
1	27	21	1188.	0.5921E-01	1178.	101
1	27	22	1188.	0.6579E-01	1178.	102
1	27	23	1188.	0.6579E-01	1178.	103
1	27	24	1188.	0.6579E-01	1178.	104
1	27	25	1188.	0.6579E-01	1178.	105
1	27	26	1188.	0.6579E-01	1178.	106
1	27	27	1188.	0.9868E-01	1178.	107
1	27	28	1188.	0.3947E-01	1178.	108
1	28	19	1188.	0.1974E-01	1178.	109
1	28	20	1188.	0.6579E-01	1178.	110
1	28	21	1188.	0.6579E-01	1178.	111
1	28	22	1188.	0.6579E-01	1178.	112
1	28	23	1188.	0.6579E-01	1178.	113
1	28	24	1188.	0.6579E-01	1178.	114
1	28	25	1188.	0.6579E-01	1178.	115
1	28	26	1188.	0.9868E-01	1178.	116

1	44	13	1188.	0.3289E-01	1178.	239
1	45	8	1188.	0.4934E-01	1178.	240
1	45	9	1188.	0.3701E-01	1178.	241
1	45	10	1188.	0.3701E-01	1178.	242
1	45	11	1188.	0.2467E-01	1178.	243
1	45	12	1188.	0.2467E-01	1178.	244
1	45	13	1188.	0.1234E-01	1178.	245
1	46	8	1188.	0.3947E-01	1178.	246
1	46	9	1188.	0.3701E-01	1178.	247
1	46	10	1188.	0.3701E-01	1178.	248
1	46	11	1188.	0.2467E-01	1178.	249
1	46	12	1188.	0.2467E-01	1178.	250
1	46	13	1188.	0.1234E-01	1178.	251
1	47	8	1188.	0.1845E-01	1178.	252
1	47	9	1188.	0.2467E-01	1178.	253
1	47	10	1188.	0.2467E-01	1178.	254
1	47	11	1188.	0.1645E-01	1178.	255
1	47	12	1188.	0.1645E-01	1178.	256
1	48	8	1188.	0.1316E-01	1178.	257
1	48	9	1188.	0.2467E-01	1178.	258
1	48	10	1188.	0.2467E-01	1178.	259
1	48	11	1188.	0.1645E-01	1178.	260
1	48	12	1188.	0.1645E-01	1178.	261
1	49	9	1188.	0.2467E-01	1178.	262
1	49	10	1188.	0.2467E-01	1178.	263
1	49	11	1188.	0.1645E-01	1178.	264
1	49	12	1188.	0.1645E-01	1178.	265
1	49	13	1188.	0.8220E-02	1178.	266
1	50	9	1188.	0.2467E-01	1178.	267
1	50	10	1188.	0.2467E-01	1178.	268
1	50	11	1188.	0.1645E-01	1178.	269
1	50	12	1188.	0.1645E-01	1178.	270
1	50	13	1188.	0.8220E-02	1178.	271
1	51	9	1188.	0.2467E-01	1178.	272
1	51	10	1188.	0.2467E-01	1178.	273
1	51	11	1188.	0.1645E-01	1178.	274
1	51	12	1188.	0.1645E-01	1178.	275
1	51	13	1188.	0.8220E-02	1178.	276
1	52	9	1188.	0.2961E-01	1178.	277
1	52	10	1188.	0.3701E-01	1178.	278
1	52	11	1188.	0.2467E-01	1178.	279
1	52	12	1188.	0.2467E-01	1178.	280
1	52	13	1188.	0.1234E-01	1178.	281
1	53	9	1188.	0.2961E-01	1178.	282
1	53	10	1188.	0.3701E-01	1178.	283
1	53	11	1188.	0.2467E-01	1178.	284
1	53	12	1188.	0.2467E-01	1178.	285
1	53	13	1188.	0.1234E-01	1178.	286
1	54	9	1188.	0.4441E-01	1178.	287
1	54	10	1188.	0.4934E-01	1178.	288
1	54	11	1188.	0.3289E-01	1178.	289
1	54	12	1188.	0.3289E-01	1178.	290
1	54	13	1188.	0.1645E-01	1178.	291
1	55	9	1188.	0.4441E-01	1178.	292
1	55	10	1188.	0.4934E-01	1178.	293
1	55	11	1188.	0.4934E-01	1178.	294
1	55	12	1188.	0.4934E-01	1178.	295
1	55	13	1188.	0.2467E-01	1178.	296
1	56	9	1188.	0.5921E-01	1178.	297
1	56	10	1188.	0.7401E-01	1178.	298
1	56	11	1188.	0.4934E-01	1178.	299

1	34	16	1188.	0.3289E-01	1178.	178
1	34	17	1188.	0.1645E-01	1178.	179
1	35	8	1188.	0.9870E-02	1178.	180
1	35	9	1188.	0.4934E-01	1178.	181
1	35	10	1188.	0.4934E-01	1178.	182
1	35	11	1188.	0.3289E-01	1178.	183
1	35	12	1188.	0.3289E-01	1178.	184
1	35	13	1188.	0.1645E-01	1178.	185
1	35	15	1188.	0.3289E-01	1178.	186
1	35	16	1188.	0.1645E-01	1178.	187
1	36	8	1188.	0.1974E-01	1178.	188
1	36	9	1188.	0.3701E-01	1178.	189
1	36	10	1188.	0.3701E-01	1178.	190
1	36	11	1188.	0.2467E-01	1178.	191
1	36	14	1188.	0.9870E-02	1178.	192
1	36	15	1188.	0.1480E-01	1178.	193
1	37	8	1188.	0.3947E-01	1178.	194
1	37	9	1188.	0.3701E-01	1178.	195
1	37	10	1188.	0.3701E-01	1178.	196
1	37	11	1188.	0.1234E-01	1178.	197
1	37	14	1188.	0.1974E-01	1178.	198
1	38	8	1188.	0.3289E-01	1178.	199
1	38	9	1188.	0.2467E-01	1178.	200
1	38	10	1188.	0.2467E-01	1178.	201
1	38	12	1188.	0.8220E-02	1178.	202
1	38	14	1188.	0.1645E-01	1178.	203
1	39	8	1188.	0.3289E-01	1178.	204
1	39	9	1188.	0.2467E-01	1178.	205
1	39	10	1188.	0.2220E-01	1178.	206
1	39	11	1188.	0.3290E-02	1178.	207
1	39	12	1188.	0.1316E-01	1178.	208
1	39	14	1188.	0.1645E-01	1178.	209
1	40	8	1188.	0.3289E-01	1178.	210
1	40	9	1188.	0.2467E-01	1178.	211
1	40	10	1188.	0.1974E-01	1178.	212
1	40	11	1188.	0.1645E-01	1178.	213
1	40	12	1188.	0.1316E-01	1178.	214
1	40	14	1188.	0.1645E-01	1178.	215
1	41	8	1188.	0.3289E-01	1178.	216
1	41	9	1188.	0.2467E-01	1178.	217
1	41	10	1188.	0.1850E-01	1178.	218
1	41	11	1188.	0.1645E-01	1178.	219
1	41	12	1188.	0.1645E-01	1178.	220
1	41	13	1188.	0.1316E-01	1178.	221
1	42	8	1188.	0.4934E-01	1178.	222
1	42	9	1188.	0.3701E-01	1178.	223
1	42	10	1188.	0.2220E-01	1178.	224
1	42	11	1188.	0.2467E-01	1178.	225
1	42	12	1188.	0.2467E-01	1178.	226
1	42	13	1188.	0.2467E-01	1178.	227
1	43	8	1188.	0.4934E-01	1178.	228
1	43	9	1188.	0.3701E-01	1178.	229
1	43	10	1188.	0.2590E-01	1178.	230
1	43	11	1188.	0.2467E-01	1178.	231
1	43	12	1188.	0.2467E-01	1178.	232
1	43	13	1188.	0.2467E-01	1178.	233
1	44	8	1188.	0.6579E-01	1178.	234
1	44	9	1188.	0.4934E-01	1178.	235
1	44	10	1188.	0.4934E-01	1178.	236
1	44	11	1188.	0.3289E-01	1178.	237
1	44	12	1188.	0.3289E-01	1178.	238

1	28	27	1188.	0.5921E-01	1178.	117
1	29	12	1188.	0.6580E-02	1178.	118
1	29	13	1188.	0.1320E-02	1178.	119
1	29	18	1188.	0.3947E-01	1178.	120
1	29	19	1188.	0.6579E-01	1178.	121
1	29	20	1188.	0.6579E-01	1178.	122
1	29	21	1188.	0.6579E-01	1178.	123
1	29	22	1188.	0.6579E-01	1178.	124
1	29	23	1188.	0.6579E-01	1178.	125
1	29	24	1188.	0.6579E-01	1178.	126
1	29	25	1188.	0.4605E-01	1178.	127
1	29	26	1188.	0.2961E-01	1178.	128
1	30	13	1188.	0.1645E-01	1178.	129
1	30	14	1188.	0.3947E-01	1178.	130
1	30	15	1188.	0.9870E-02	1178.	131
1	30	16	1188.	0.3289E-01	1178.	132
1	30	17	1188.	0.5592E-01	1178.	133
1	30	18	1188.	0.6579E-01	1178.	134
1	30	19	1188.	0.6579E-01	1178.	135
1	30	20	1188.	0.6579E-01	1178.	136
1	30	21	1188.	0.6579E-01	1178.	137
1	30	22	1188.	0.6579E-01	1178.	138
1	30	23	1188.	0.3947E-01	1178.	139
1	30	24	1188.	0.1316E-01	1178.	140
1	31	12	1188.	0.8220E-02	1178.	141
1	31	13	1188.	0.3289E-01	1178.	142
1	31	14	1188.	0.3289E-01	1178.	143
1	31	15	1188.	0.3289E-01	1178.	144
1	31	16	1188.	0.3289E-01	1178.	145
1	31	17	1188.	0.3289E-01	1178.	146
1	31	18	1188.	0.3289E-01	1178.	147
1	31	19	1188.	0.3289E-01	1178.	148
1	31	20	1188.	0.3289E-01	1178.	149
1	31	21	1188.	0.2303E-01	1178.	150
1	32	10	1188.	0.1480E-01	1178.	151
1	32	11	1188.	0.3701E-01	1178.	152
1	32	12	1188.	0.4934E-01	1178.	153
1	32	13	1188.	0.4934E-01	1178.	154
1	32	14	1188.	0.4934E-01	1178.	155
1	32	15	1188.	0.4934E-01	1178.	156
1	32	16	1188.	0.4934E-01	1178.	157
1	32	17	1188.	0.4934E-01	1178.	158
1	32	18	1188.	0.4934E-01	1178.	159
1	32	19	1188.	0.2467E-01	1178.	160
1	32	20	1188.	0.1480E-01	1178.	161
1	33	9	1188.	0.7400E-02	1178.	162
1	33	10	1188.	0.4934E-01	1178.	163
1	33	11	1188.	0.3289E-01	1178.	164
1	33	12	1188.	0.3289E-01	1178.	165
1	33	13	1188.	0.3289E-01	1178.	166
1	33	14	1188.	0.3289E-01	1178.	167
1	33	15	1188.	0.3289E-01	1178.	168
1	33	16	1188.	0.3289E-01	1178.	169
1	33	17	1188.	0.3289E-01	1178.	170
1	33	18	1188.	0.8220E-02	1178.	171
1	34	9	1188.	0.3454E-01	1178.	172
1	34	10	1188.	0.4934E-01	1178.	173
1	34	11	1188.	0.3289E-01	1178.	174
1	34	12	1188.	0.3289E-01	1178.	175
1	34	13	1188.	0.3289E-01	1178.	176
1	34	14	1188.	0.2632E-01	1178.	177

2.6500E-08 2.3850E-07 0.0000E+00 0.0000E+00 0.0000E+00 0.0000E+00

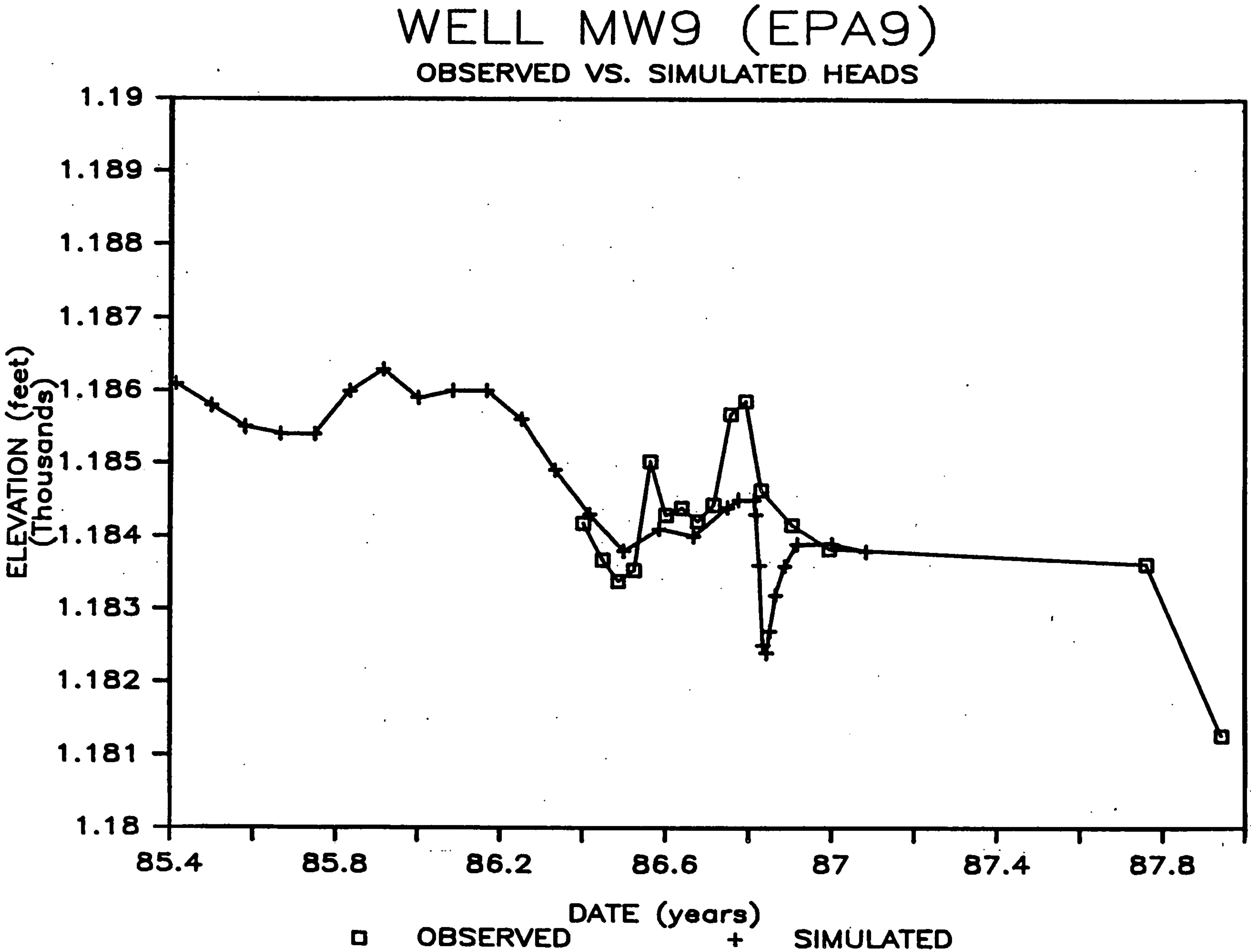
357 RIVER REACHES

LAYER	ROW	COL	STAGE	CONDUCTANCE	BOTTOM ELEVATION	RIVER REACH
1	1	22	1188.	2.961	1178.	1
1	1	23	1188.	5.329	1178.	2
1	1	24	1188.	5.921	1178.	3
1	1	25	1188.	5.921	1178.	4
1	1	26	1188.	2.961	1178.	5
1	1	27	1188.	2.664	1178.	6
1	1	29	1188.	1.184	1178.	7
1	1	30	1188.	3.553	1178.	8
1	1	31	1188.	7.105	1178.	9
1	2	23	1188.	0.1974	1178.	10
1	2	24	1188.	0.7895	1178.	11
1	2	25	1188.	1.184	1178.	12
1	2	26	1188.	1.579	1178.	13
1	2	27	1188.	2.368	1178.	14
1	2	28	1188.	4.145	1178.	15
1	2	29	1188.	6.316	1178.	16
1	2	30	1188.	8.289	1178.	17
1	2	31	1188.	12.63	1178.	18
1	2	32	1188.	7.105	1178.	19
1	3	29	1188.	3.684	1178.	20
1	3	30	1188.	6.316	1178.	21
1	3	31	1188.	8.421	1178.	22
1	3	32	1188.	7.895	1178.	23
1	4	31	1188.	7.105	1178.	24
1	4	32	1188.	8.289	1178.	25
1	4	33	1188.	0.3158	1178.	26
1	4	34	1188.	0.4737	1178.	27
1	4	35	1188.	0.6316	1178.	28
1	5	30	1188.	0.3947	1178.	29
1	5	31	1188.	4.211	1178.	30
1	5	32	1188.	7.105	1178.	31
1	5	33	1188.	0.2105	1178.	32
1	5	34	1188.	0.3158	1178.	33
1	5	35	1188.	0.4211	1178.	34
1	6	31	1188.	2.763	1178.	35
1	6	32	1188.	5.329	1178.	36
1	6	33	1188.	0.1579	1178.	37
1	6	35	1188.	0.3158	1178.	38
1	7	31	1188.	1.842	1178.	39
1	7	32	1188.	3.158	1178.	40
1	7	33	1188.	0.1053	1178.	41
1	7	35	1188.	0.2105	1178.	42
1	8	31	1188.	1.382	1178.	43
1	8	32	1188.	2.368	1178.	44
1	8	33	1188.	0.7895E-01	1178.	45
1	9	31	1188.	1.382	1178.	46
1	9	32	1188.	1.776	1178.	47
1	9	33	1188.	0.7895E-01	1178.	48
1	10	31	1188.	0.9211	1178.	49
1	10	32	1188.	0.9868	1178.	50
1	10	33	1188.	0.5263E-01	1178.	51
1	11	31	1188.	1.053	1178.	52
1	11	32	1188.	0.9868	1178.	53
1	11	33	1188.	0.5263E-01	1178.	54
1	12	31	1188.	1.053	1178.	55

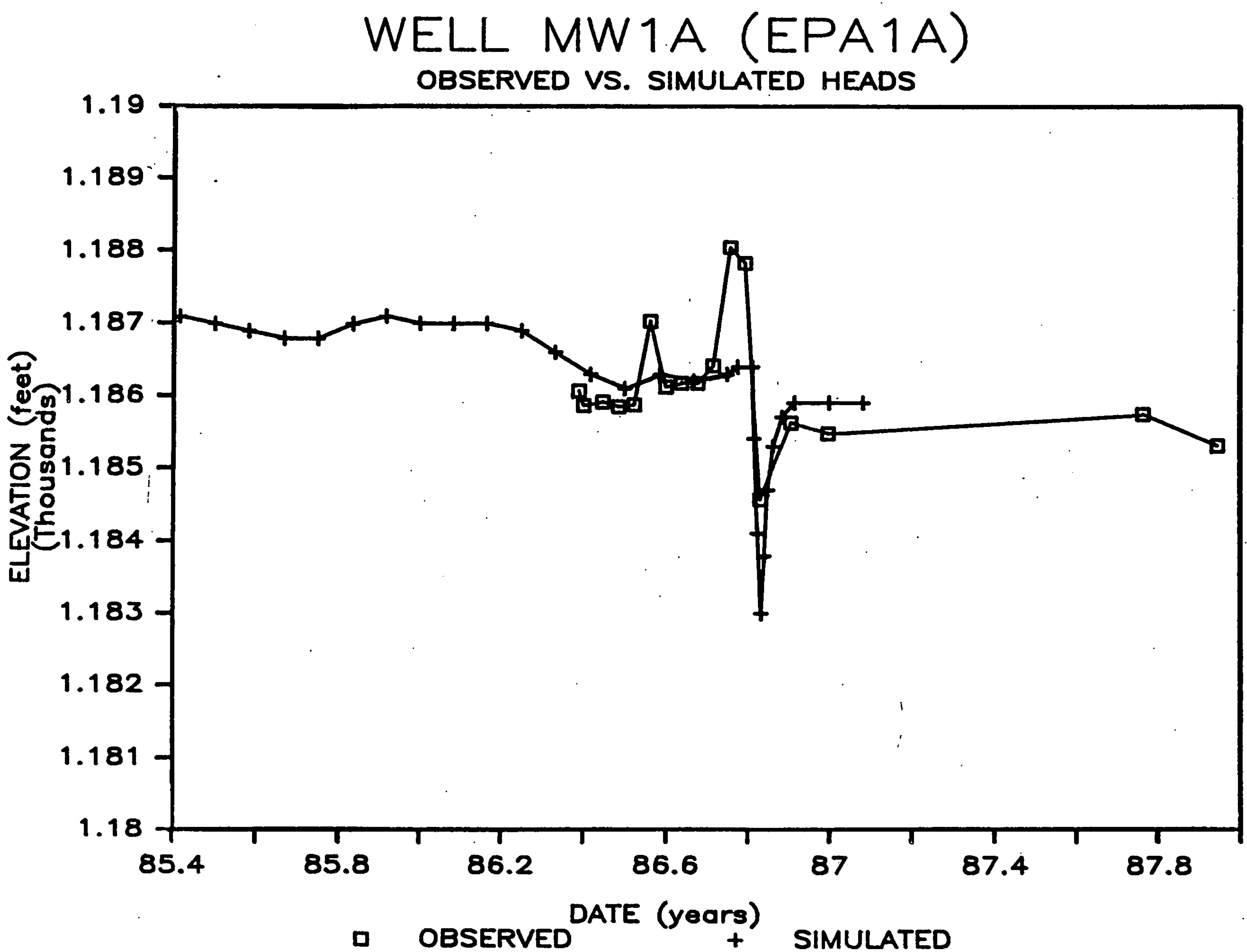
1	56	12	1188.	0.4934E-01	1178.	300
1	56	13	1188.	0.1480E-01	1178.	301
1	57	8	1188.	0.1053	1178.	302
1	57	9	1188.	0.9868E-01	1178.	303
1	57	10	1188.	0.9868E-01	1178.	304
1	57	11	1188.	0.6579E-01	1178.	305
1	57	12	1188.	0.1974E-01	1178.	306
1	58	6	1188.	0.1184	1178.	307
1	58	7	1188.	0.2368	1178.	308
1	58	8	1188.	0.1974	1178.	309
1	58	9	1188.	0.1480	1178.	310
1	58	10	1188.	0.1480	1178.	311
1	58	11	1188.	0.1974E-01	1178.	312
1	59	6	1188.	0.3158	1178.	313
1	59	7	1188.	0.8882E-01	1178.	314
1	59	9	1188.	0.1332	1178.	315
1	59	10	1188.	0.1332	1178.	316
1	60	6	1188.	0.2368	1178.	317
1	60	7	1188.	0.1184	1178.	318
1	60	9	1188.	0.8882E-01	1178.	319
1	60	10	1188.	0.1480	1178.	320
1	60	11	1188.	0.4934E-01	1178.	321
1	61	6	1188.	0.7895E-01	1178.	322
1	61	7	1188.	0.1184	1178.	323
1	61	9	1188.	0.4934E-01	1178.	324
1	61	10	1188.	0.4934E-01	1178.	325
1	62	6	1188.	0.3947E-01	1178.	326
1	62	7	1188.	0.8882E-01	1178.	327
1	63	6	1188.	0.1579	1178.	328
1	63	7	1188.	0.1184	1178.	329
1	64	6	1188.	0.1974	1178.	330
1	64	7	1188.	0.4441E-01	1178.	331
1	65	5	1188.	0.2961E-01	1156.	332
1	65	6	1188.	0.1382	1156.	333
1	66	5	1188.	0.1184	1156.	334
1	66	6	1188.	0.2368	1156.	335
1	67	5	1188.	0.2961	1156.	336
1	67	6	1188.	0.2763	1156.	337
1	67	7	1188.	0.1184	1156.	338
1	68	5	1188.	0.1382	1156.	339
1	68	6	1188.	0.2303	1156.	340
1	68	7	1188.	0.3454E-01	1156.	341
1	68	8	1188.	0.2303E-01	1156.	342
1	68	9	1188.	0.4317E-01	1156.	343
1	68	10	1188.	0.1727E-01	1156.	344
1	68	11	1188.	0.1151E-01	1156.	345
1	68	12	1188.	0.1151E-01	1156.	346
1	68	13	1188.	0.1151E-01	1156.	347
1	68	14	1188.	0.2303E-01	1156.	348
1	68	15	1188.	0.2303E-01	1156.	349
1	69	6	1188.	0.6908E-01	1156.	350
1	69	7	1188.	0.1382	1156.	351
1	69	8	1188.	0.1036	1156.	352
1	69	9	1188.	0.1727E-01	1156.	353
1	69	13	1188.	0.1151E-01	1156.	354
1	69	14	1188.	0.2303E-01	1156.	355
1	69	15	1188.	0.9211E-01	1156.	356
1	69	16	1188.	0.8059E-01	1156.	357

APPENDIX K

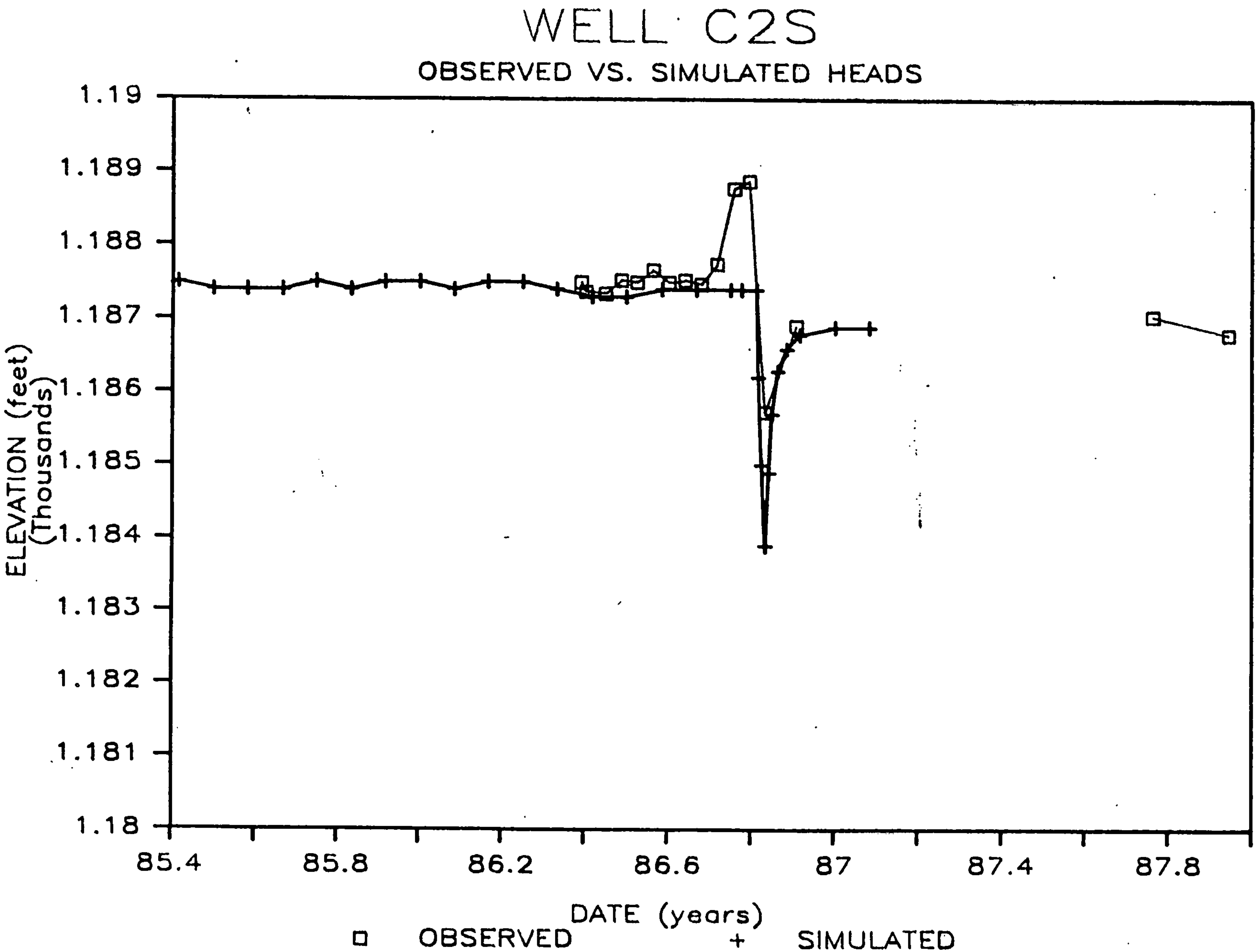
OBSERVED VS. SIMULATED WATER LEVELS USED IN FLOW MODEL CALIBRATION

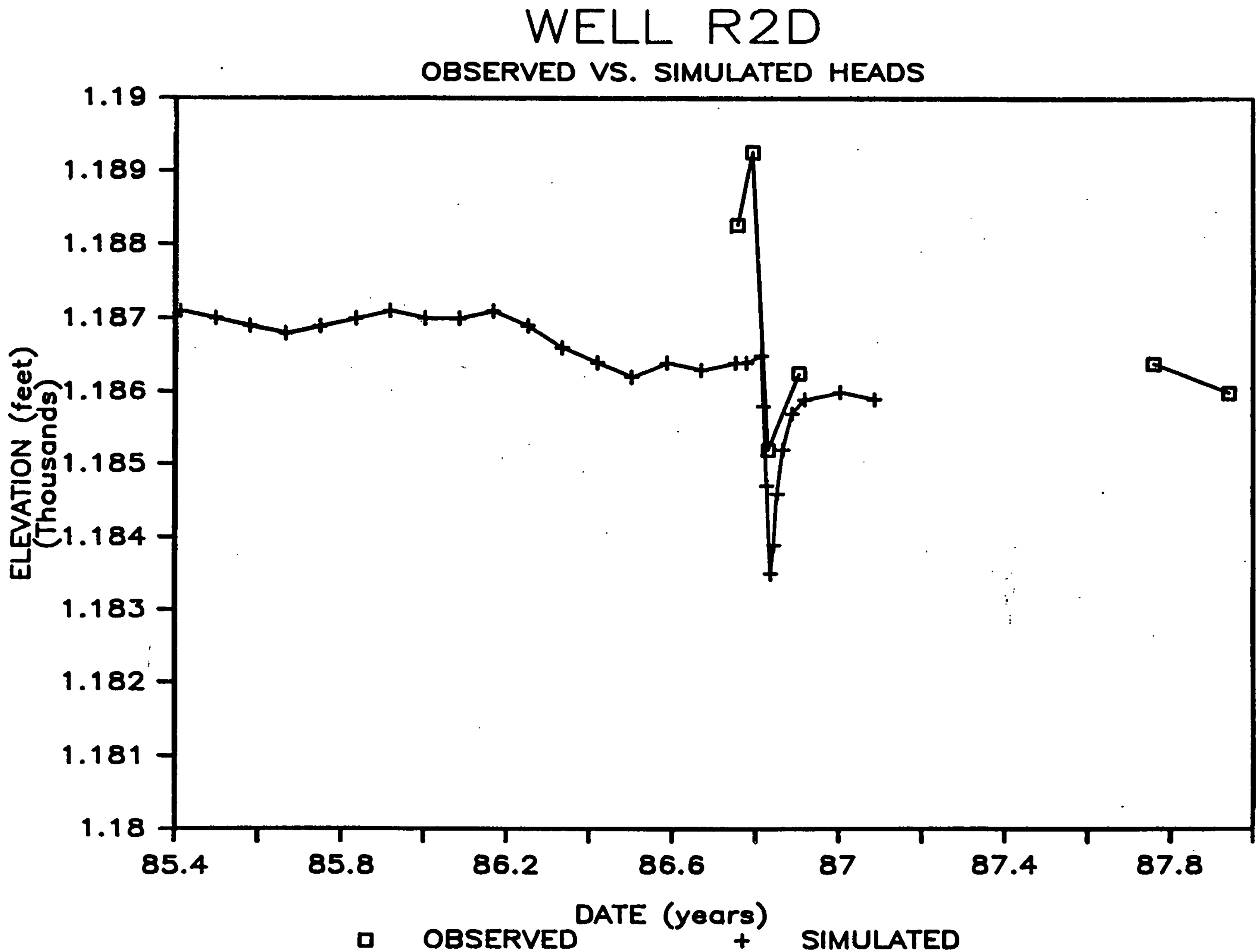


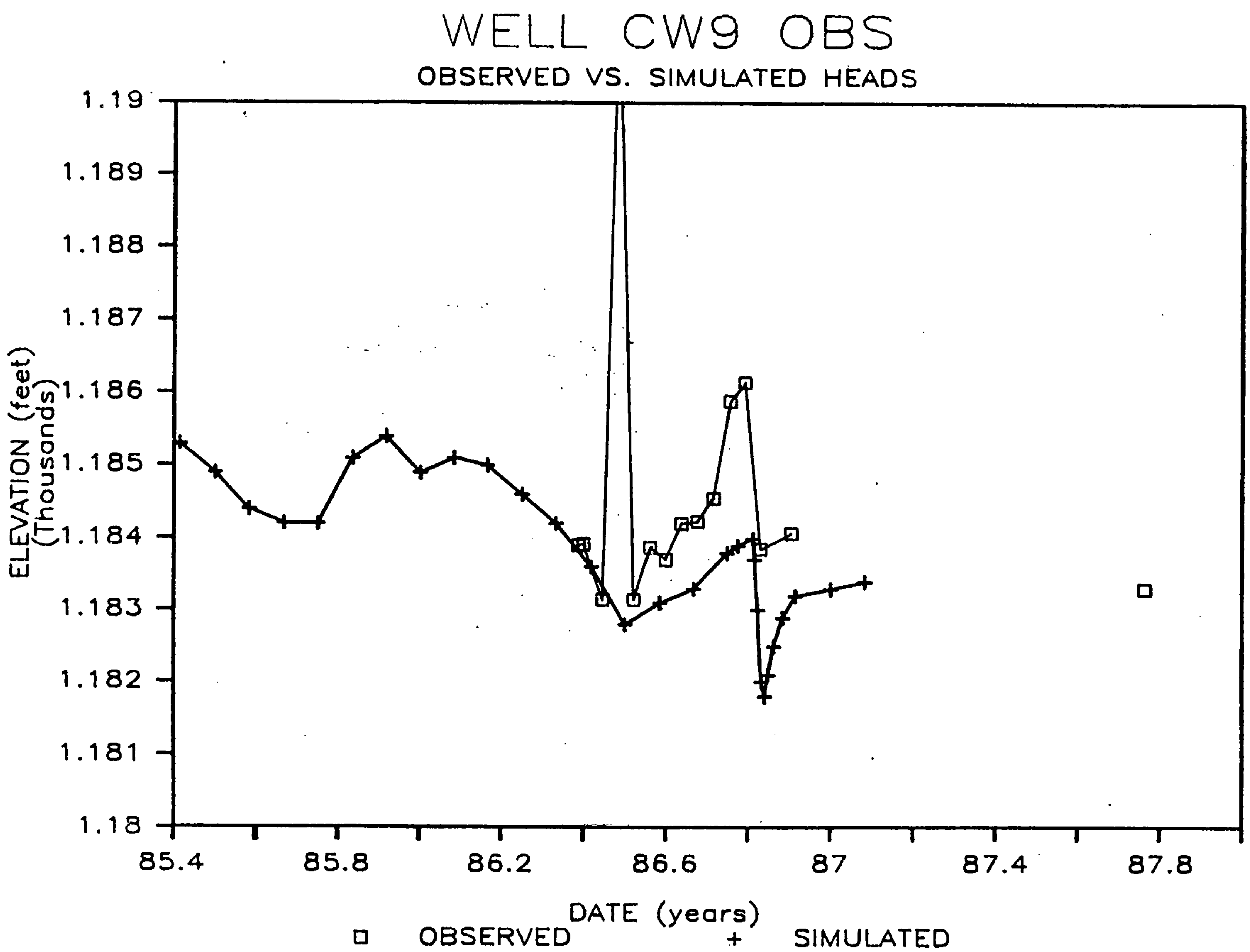
WELL MW9 (EPA9)
OBSERVED VS. SIMULATED HEADS
ELEVATION (feet)
(Thousands)
1.19
1.189
1.188
1.187
1.186
1.185
1.184
1.183
1.182
1.181
1.18
85.4
85.8
86.2
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED



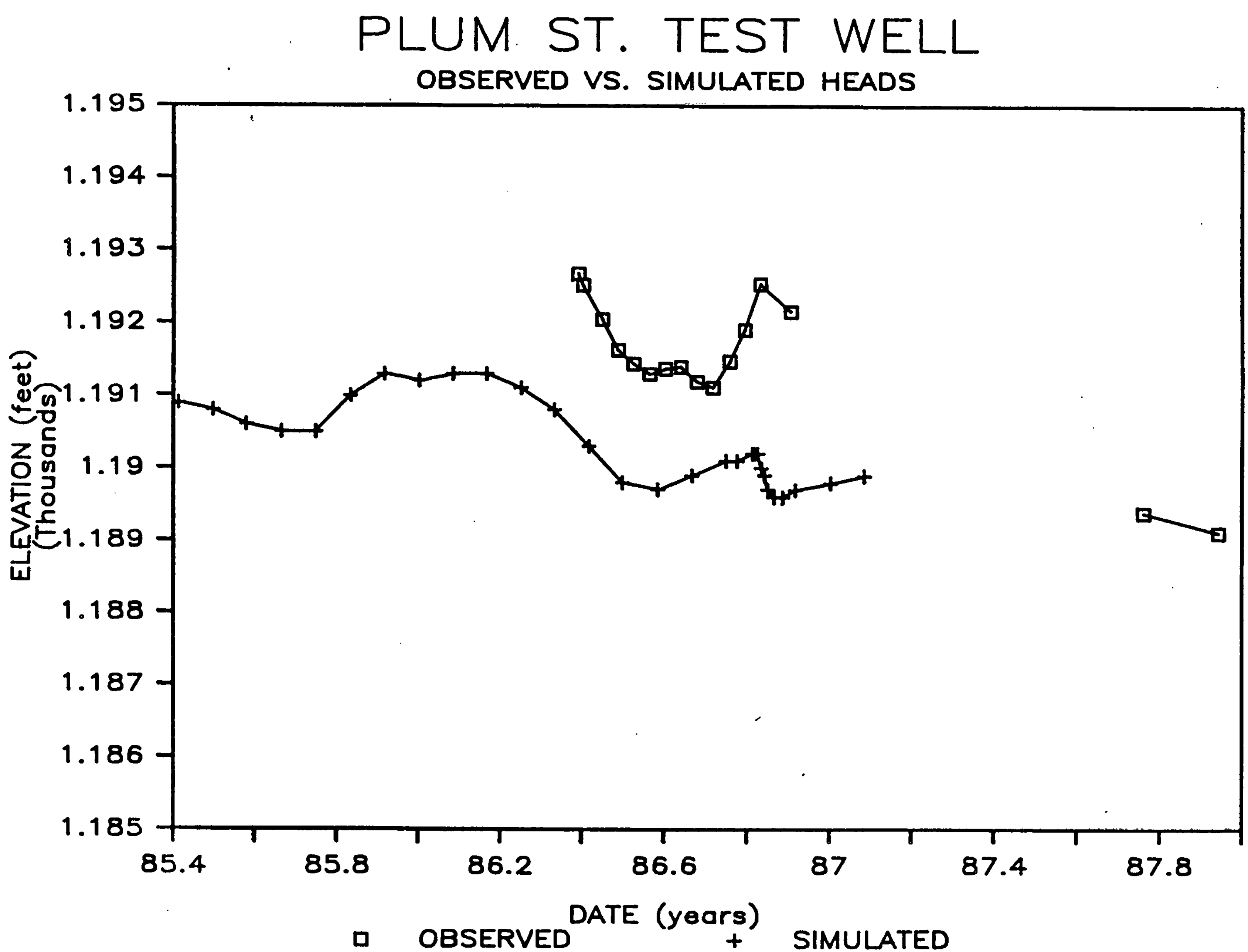
WELL MW1A (EPA1A)
OBSERVED VS. SIMULATED HEADS
ELEVATION (feet)
(Thousands)
1.19
1.189
1.188
1.187
1.186
1.185
1.184
1.183
1.182
1.181
1.18
85.4
85.8
86.2
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED


WELL C2S
OBSERVED VS. SIMULATED HEADS
ELEVATION (feet)
(Thousands)
1.19
1.189
1.188
1.187
1.186
1.185
1.184
1.183
1.182
1.181
1.18
85.4
85.8
86.2
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED


WELL R2D
OBSERVED VS. SIMULATED HEADS
ELEVATION (feet)
(Thousands)
1.19
1.189
1.188
1.187
1.186
1.185
1.184
1.183
1.182
1.181
1.18
85.4
85.8
86.2
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED



WELL CW9 OBS
OBSERVED VS. SIMULATED HEADS
ELEVATION (feet)
(Thousands)
1.19
1.189
1.188
1.187
1.186
1.185
1.184
1.183
1.182
1.181
1.18
85.4
85.8
86.2
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED


PLUM ST. TEST WELL
OBSERVED VS. SIMULATED HEADS
ELEVATION (feet)
(Thousands)
1.195
1.194
1.193
1.192
1.191
1.19
1.189
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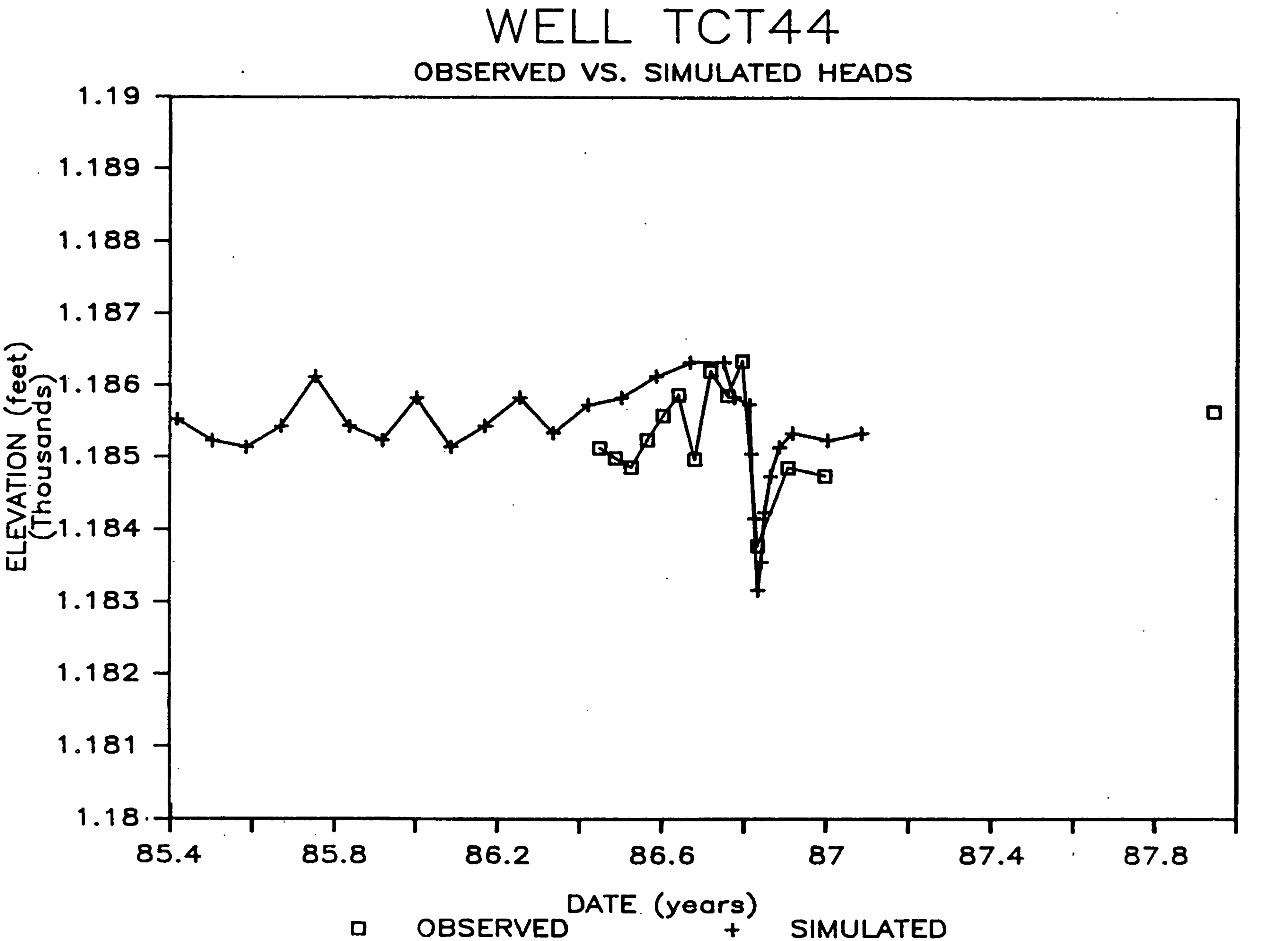
DATE (years)
OBSERVED
SIMULATED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(Thousands)
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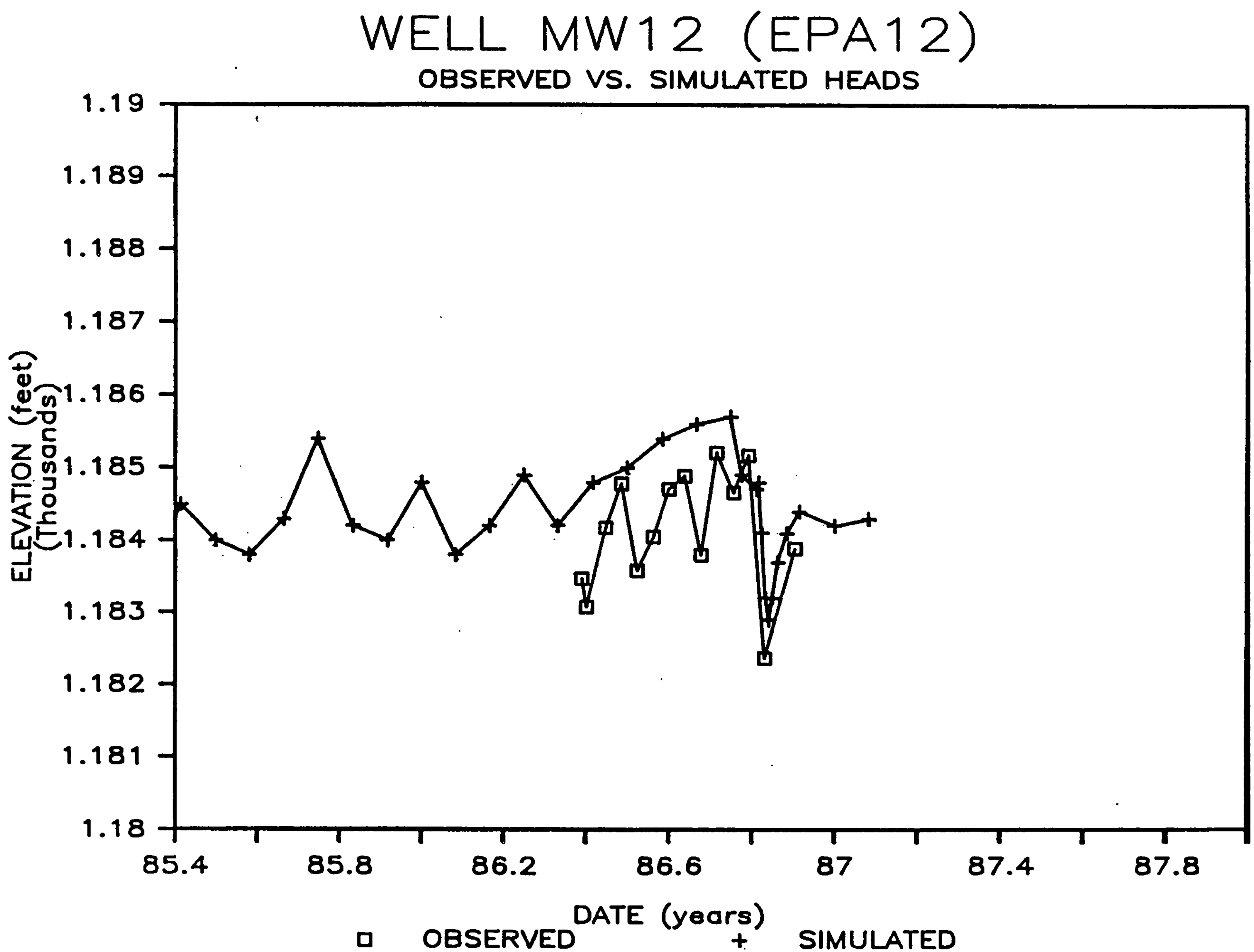
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED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(Thousands)
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1.183
1.182
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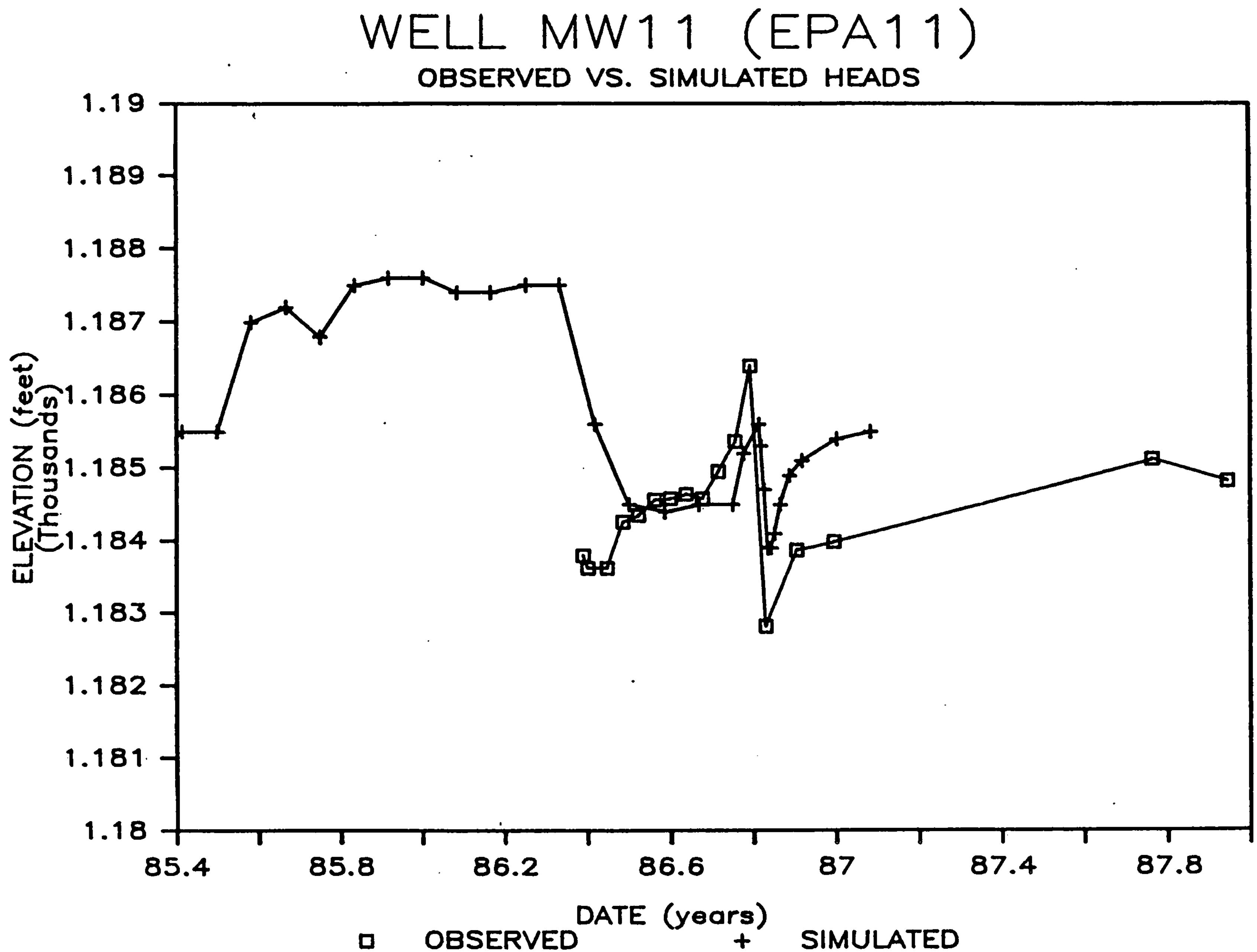
DATE (years)
OBSERVED
SIMULATED



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(Thousands)
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1.185
1.184
1.183
1.182
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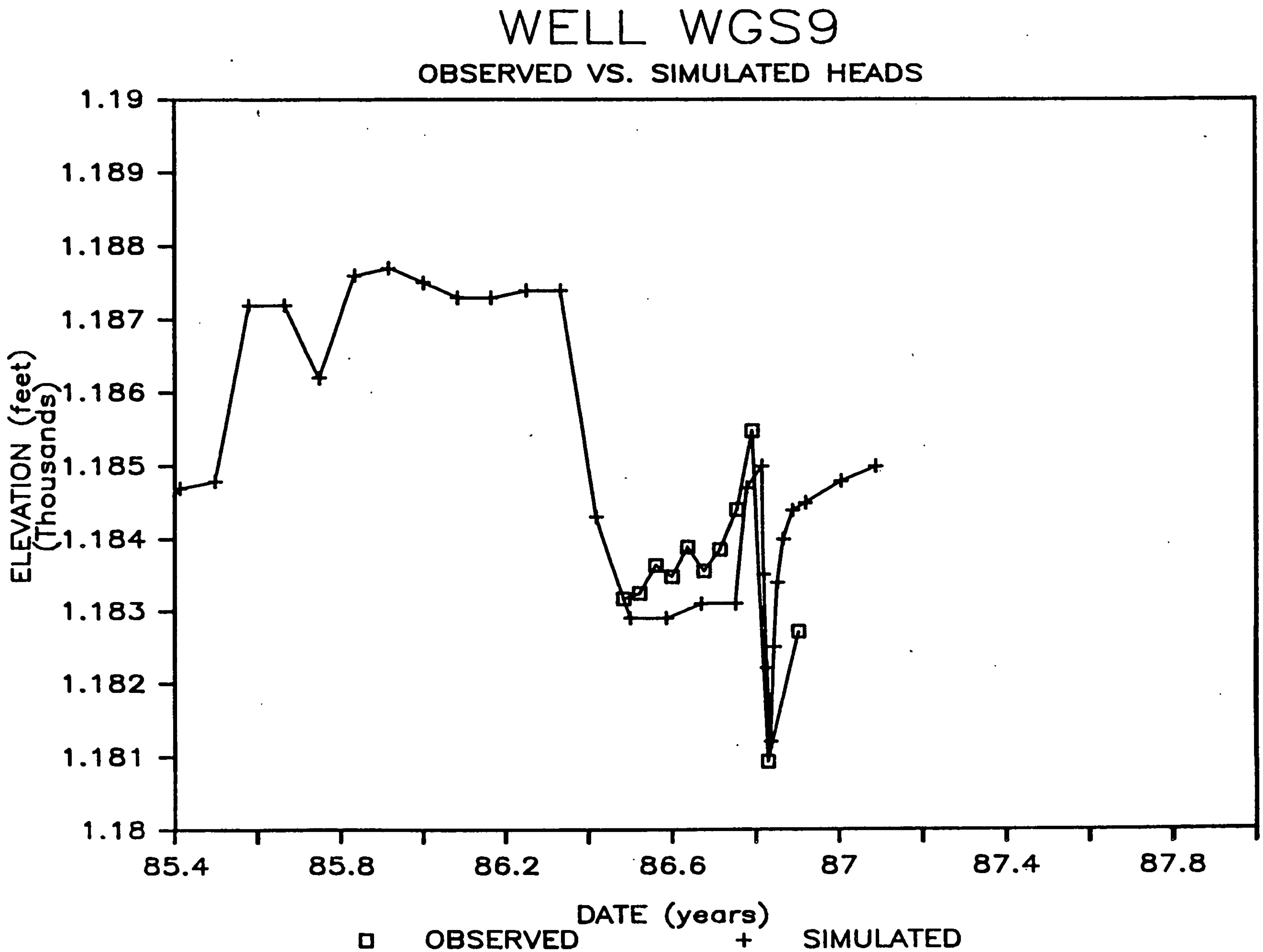
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED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(Thousands)
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1.183
1.182
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85.8
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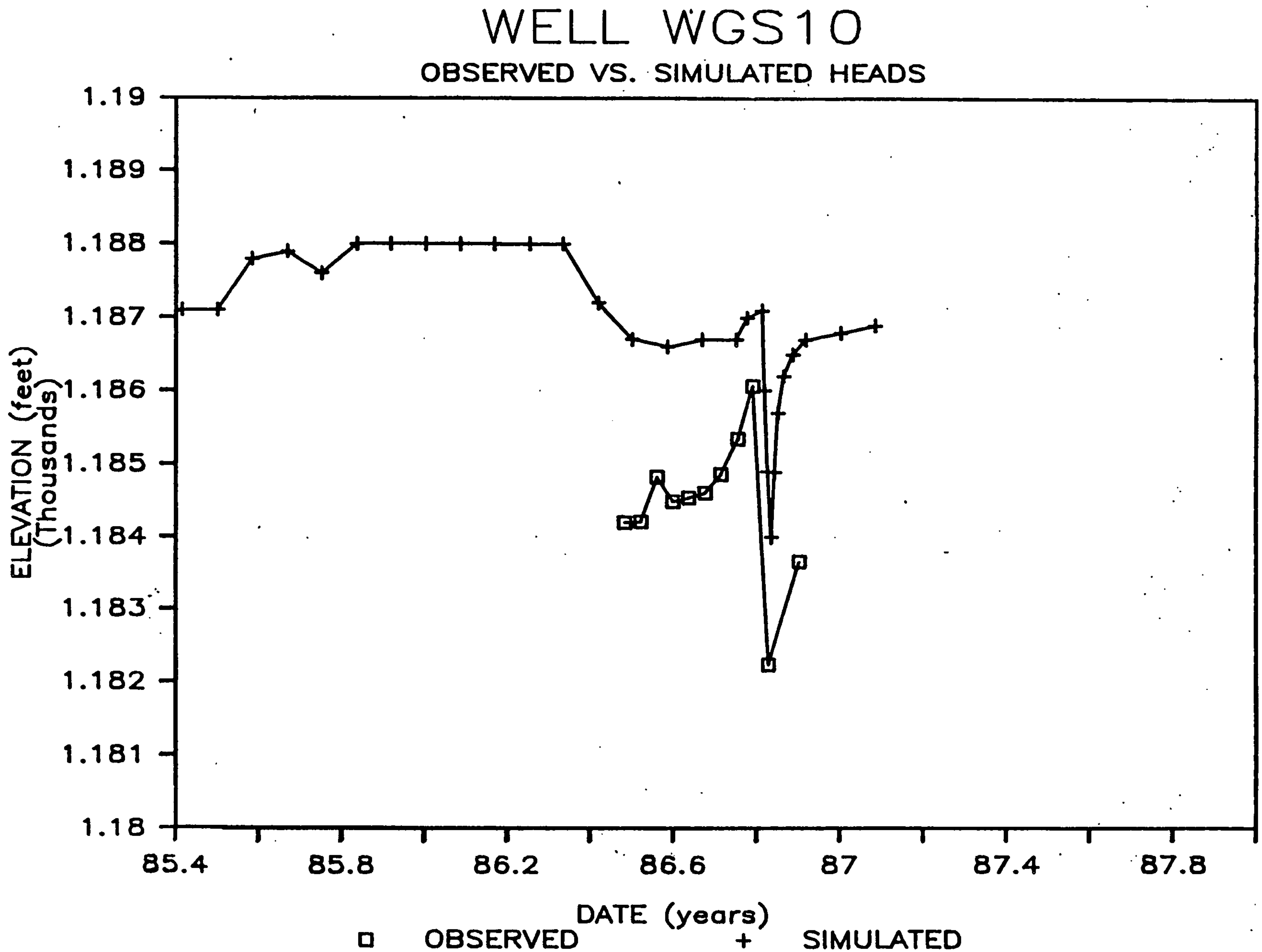
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED



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(Thousands)
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1.185
1.184
1.183
1.182
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85.4
85.8
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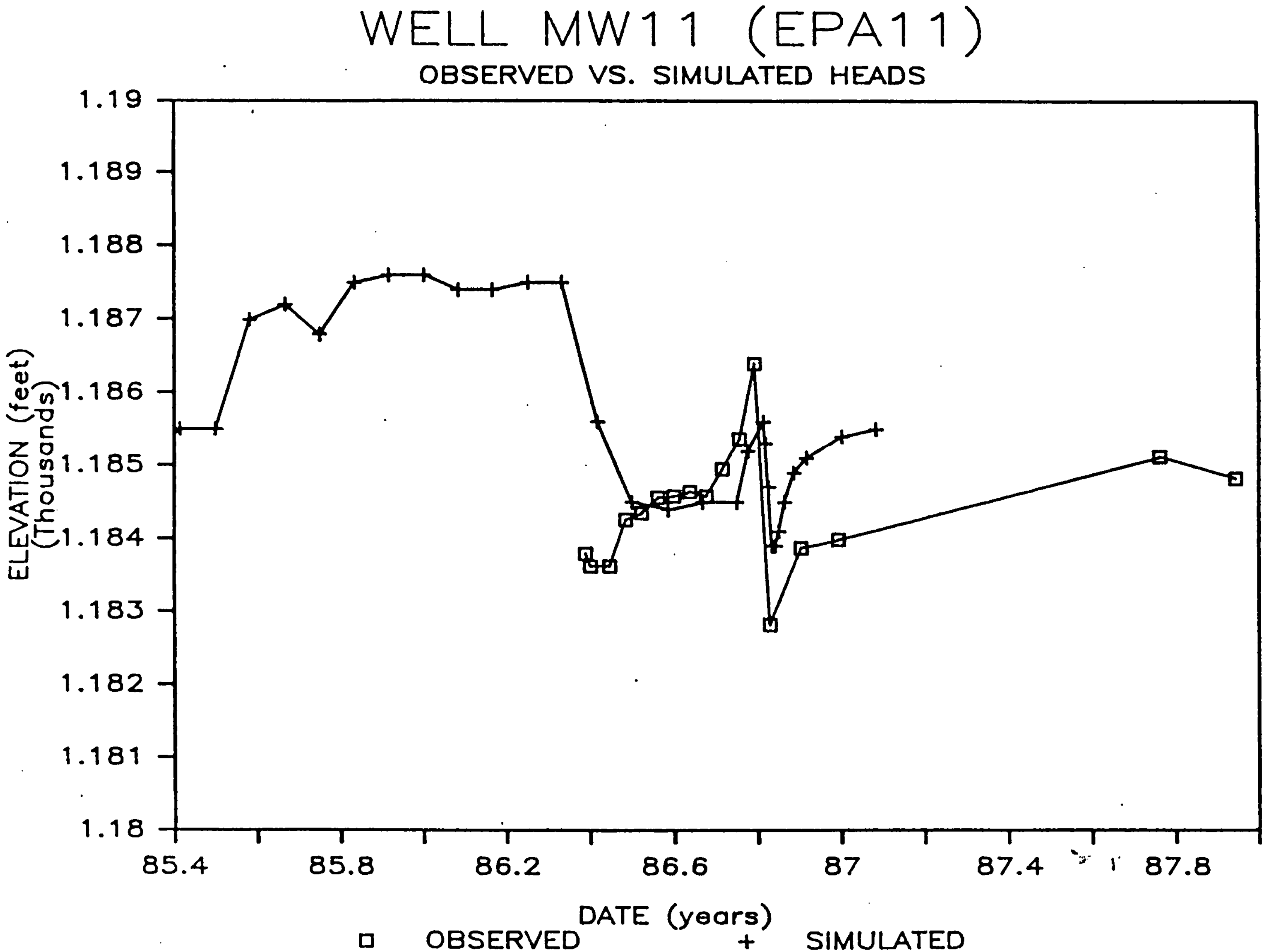
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED


WELL MW11 (EPA11)
OBSERVED VS. SIMULATED HEADS
ELEVATION (feet)
(Thousands)
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1.188
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1.186
1.185
1.184
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1.182
1.181
1.18
85.4
85.8
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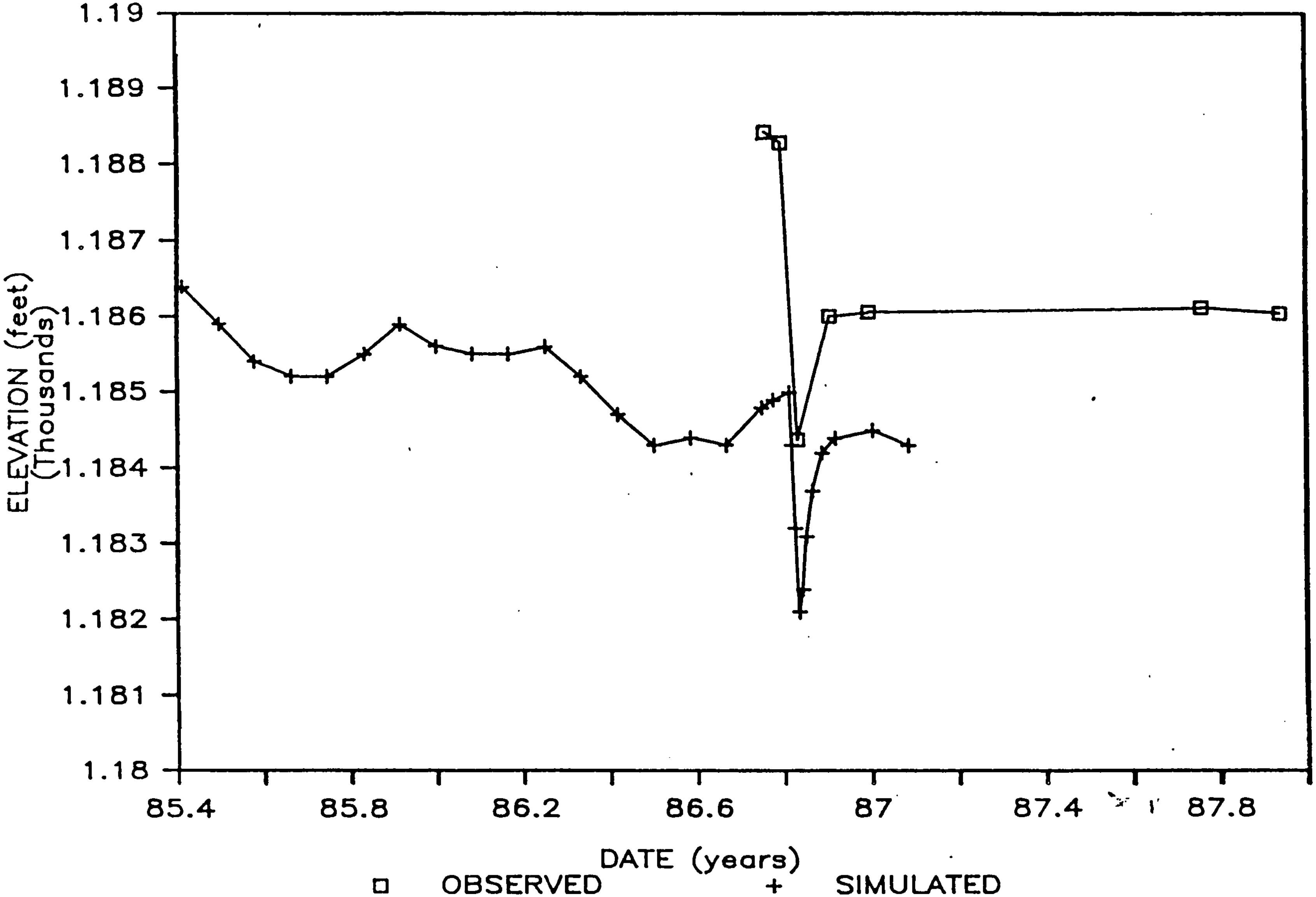
86.6
87
87.4
87.8
DATE (years)
OBSERVED
SIMULATED

WELL GM4D

OBSERVED VS. SIMULATED HEADS



APPENDIX L

INDUSTRIAL SURVEY REPORT

INDUSTRIAL SURVEY
WAUSAU NPL SITE

1.0 GENERAL INFORMATION

An Industrial Survey (Survey) of Potentially Responsible Parties (PRPs) and other businesses and industries located in the vicinity of the Wausau municipal well field was initiated in August, 1987.

The purpose of the Survey was to acquire information on the operations and activities of industries and facilities in the vicinity of the Wausau well field. Emphasis was placed on identifying past and present storage and disposal practices of products or wastes which may have resulted in the release of chemicals, petroleum products and/or solvents to soil or groundwater. Industries and businesses were chosen for the Survey based on type of operation or product produced, location of the facility with respect to probable groundwater flow direction, and documented points of groundwater contamination. Information obtained during the Survey was evaluated and used to complete planning for the Phase I field investigation.

The Survey consisted of a brief interview with entity representatives and a tour of the facility operations and grounds. Photographs were taken in order to determine the status of facilities and operations at the time of the Survey. The Survey also permitted an opportunity to provide information to, and obtain input from, the various entities relating to the Phase I field investigation at their facilities and to determine what measures would be necessary to obtain access to their properties.

A total of eight facilities were included in the August 6 and 7, 1987 Survey. Industries and facilities interviewed and toured during the August 6 and 7 Survey included the following:

- Wausau Energy Co. - (Formerly Rush Distributing - Amoco Oil)
- Steel Flite Scaffolding
- Marathon Press (Marathon Pilot Graphics)
- Wergin Construction

C.M. St. P. & P. Railroad (Soo Railroad)
Wausau Chemical Co.
Marathon Electric Inc.
Marathon Box Co.

Several additional area facilities, both closed and active, were added to the Survey during the course of the Phase I field investigation.

These facilities were included due to their strategic locations and recent information (provided by others) which justified reason for inclusion.

Refer to Drawing 13076-B10 for location of surveyed industries and businesses.

2.0 AUGUST 6 and 7, 1987 SURVEY

The survey team consisted of the following persons:

Margaret Guerriero - U.S. EPA Project Officer
Michelle Debrock - Owens - WDNR Project Hydrogeologist
Dennis Iverson - Warzyn Project Manager
Craig Rawlinson - Warzyn Project Hydrogeologist

Of the eight facilities surveyed, four reported they currently use chlorinated organic solvents and have reportedly submitted material safety data sheets to the WDNR and/or the U.S. EPA during previous industrial surveys. Facilities in the immediate vicinity of the municipal well field currently using or storing halogenated solvents include:

Wausau Chemical Co.
Marathon Press Co.
Marathon Electric Inc.
Wergin Construction Co.

A summary of information gained from the Survey is presented in the following sections.

2.1 WAUSAU ENERGY - 2102 2ND STREET

This facility has historically operated as a bulk oil facility and has undergone several changes of ownership during the past 15 years. According to Mr. Daniel K. LaCerte, General Manager, Wausau Energy acquired the bulk oil facility from Rush Distributing in 1983. Rush Distributing purchased the facility from Amoco Oil in 1975 and operated it as a bulk oil distribution plant. Prior to 1975, Amoco Oil operated the bulk distribution facility for approximately 30 years. Mr. LaCerte indicated Wausau Energy acquired the facility as part of a buyout of Rush Distributing that was designed to expand their customer base. The facility has reportedly not been used as an industrial facility by Wausau Energy, but is currently leased to Marathon Press for warehouse purposes. However, during the course of field work, several Wausau Energy tank trucks were observed at the facility.

The property includes a one story brick framed office and storage building and attached three bay garage located on the north side of the structure (Photo 1). The southernmost bay had an earthern floor which exhibited some soil staining. A former bulk tank farm was located directly south of the building (Photo 2). A railroad spur and loading docks are located on the west side of the building (Photo 3).

Mr. LaCerte indicated the above ground tanks were removed in 1983, shortly after Wausau Energy acquired the property. He was not aware of buried tanks being located at the site. According to Mr. Areland Rush (Rush Distributing), Amoco operated the facility as a bulk oil facility which received oil and petroleum products by rail. Review of the Soo Railroad manifests confirm several bulk petroleum product shipments to Amoco Oil during this time. The products were unloaded at the spur area on the west side of the building and were either stored or repackaged for distribution in the Wausau area. This process continued until 1969 when rail service deliveries were discontinued. Subsequent to 1969 deliveries were made by truck. Based on inventory of records, the following products were reportedly handled by Rush Distributing and Amoco: No. 1 fuel oil, No. 2 fuel oil, lead free gasoline, premium gasoline, regular gasoline, kerosene, diesel fuel, hydraulic fluids, and motor oils (Foth and Van Dyke, June, 1986).

Mr. Rush indicated in addition to petroleum products, Amasol, a degreasing compound, was also stored and sold. The composition of this compound is not presently known. Mr. Rush also indicated a fuel oil leak occurred during the early 1970's, while he was an employee of Amoco. The leak reportedly occurred along the east side of the building and drained into the storm sewer on Second

Street. During a 1984 hydrogeologic investigation of the East Wausau Well Field, the WDNR detected PCE and Toluene contamination in soil samples collected from near the southwest loading dock. Neither Mr. Rush or Mr. LaCerte was aware of any spills or leaks in this area.

At the request of the WDNR, Wausau Energy contracted a consultant (Foth and Van Dyke) to perform a hydrogeologic investigation of the facility. Soil samples from eight test borings were collected and analyzed for VOCs. Analyses of these soil samples indicated detectable concentrations of several hydrocarbon related compounds including: benzene, ethylbenzene, toluene and xylenes (BETX). Based on the borings, soil impact appears to be greatest in the vicinity of borings 2, 3 and 4 located southwest of the Wausau Energy building. Generally, the greatest soil impact was detected at a depth of 15 feet (just above the water table). In addition to BETX impact on soils southwest of the Wausau Energy building, PCE was detected in soil samples obtained from Borings TB-7, TB-104 and TB-105 located northeast of the Wausau Energy building (Foth and Van Dyke, June, 1986 and December, 1986). PCE detected in soil samples along the North side of Wausau Energy may be related to past storage of waste products in this area (see Foth and Van Dyke, December 1986). Groundwater monitoring conducted by Foth and Van Dyke indicate total elevated BETX concentrations in Monitoring Wells TB-5 and TB-2, located south of the main building. These wells also indicate elevated concentrations of PCE and TCE. However, upgradient Monitoring Well WC5A also indicates substantial concentrations of PCE and TCE. Therefore, the observed PCE and TCE concentrations in the groundwater may be the result of on upgradient source.

Mr. Rush indicated that during the bulk facility operation period (1960's to 1983), solid waste disposal was contracted to a solid waste hauler for disposal at the city landfill. Liquid wastes were commonly discharged to the City sanitary sewer system. Mr. LaCerte indicated since the facility is presently leased to Marathon Press for storage purposes, very little waste is currently generated at this facility. The waste that is generated at the site consists of light commercial type refuse including: boxes, crates, paper goods, etc.

3.2 STEEL FLITE SCAFFOLDING - 2308 N. THIRD STREET

The survey initiated with an interview with Irving R. Jacobson (owner). Mr. Jacobson indicated the Company manufactures and leases tubular steel scaffolding. The property was purchased in 1959, and operations were moved from Schofield in 1962. The business operated from a building on the north portion of the site until 1970, after which operations were moved to their present location on the south side of the site. According to Mr. Jacobson, the site was formerly used for lumber storage during the Works Progress Administration (WPA) days of the 1930's. The site was also previously used for sand and gravel excavation and was reportedly filled with miscellaneous debris including construction debris and cuttings from area granite polishing operations.

Mr. Jacobson indicated only minor quantities of solvents are used in his company's operations and material safety data sheets had been provided to the WDNR and/or U.S. EPA during previous industrial surveys. According to Mr. Jacobson, a phosphate detergent (Oakite 31, Cryscoat 187) is used to clean the tubular steel prior to welding. Waste cleaning solution is discharged to the City sanitary sewer through a floor drain. Mr. Jacobson indicated a solvent type paint thinner is added to the paint tank to control paint viscosity. In addition to these materials, approximately 1 gal/month of solvent (brand name Aquasol) is used as a grease cutter and cleaner.

With the exception of the paint dip tank and detergent dip tank, Mr. Jacobson was not aware of any above or below ground tanks on his property. The north building at the site is used to store electrical supplies and no manufacturing operations occur in this building. Manufacturing, painting and management activities are also located in the south building (Photos 4 and 5). Liquid wastes from the south building are disposed to the sanitary sewer and solid waste disposal is handled by a private contractor. Mr. Jacobson was aware of only one spill during the time he has operated the facility. He indicated that a City employee observed one of his employees relatively recently dumped 1 quart of gasoline on soil west of the main building. A sample of the soil was collected by the city for GC-MS analysis. Soil analysis conducted by Zimpro confirmed that gasoline had been disposed on the surface soils. Other than BETX, no additional compounds were detected. The City notified the WDNR of the incident. The WDNR issued enforcement correspondence to Steel Flite and notified the U.S. EPA.

2.3 MARATHON PRESS COMPANY, INC. PARK AVENUE AT SECOND

An interview was conducted with Mr. Ronald A. Westgate, Jr. (President of marathon Press Company). Mr. Westgate indicated Marathon Press has operated at the current address for approximately 30 years. Prior to operations as Marathon Press, the property was owned by the Alexander family (local developers). Marathon Press provides printing and graphics services for commercial and industrial clients.

Marathon Press facilities consists of two buildings separated by a loading dock and transport staging area (Photo 6). The southern building is located on the corner of Park and 2nd Street. This building houses the printing and graphics operations (Photo 7). A tour of the facility indicated the following processes and materials usage:

Process	Material Usage
Type Setting	Developer and activator
Plate Making	Plate developer and fixer
Developing Room	Photo developing agents and fixer
Letter Press	Rubber based ink, Hanculite (C-247 solvent) is used to clean machinery
Offset Printing	Various inks, alcohol and mineral spirits

Mr. Westgate indicated small quantities of alcohol and solvents (primarily acetone) were used to clean equipment. These materials are delivered to the loading dock on the north side of the main building.

Solvents and other bulk liquids are stored in a fenced concrete pad and curbing area located at the northeast corner of the main building.
Mr. Westgate has reportedly supplied the WDNR and U.S. EPA with material safety data sheets. According to Mr. Westgate, the solvents are received in bulk quantity (55 gallon drums) and are transferred to smaller containers (1 gallon) which are stored near the printing presses. Photo 6 shows the loading dock and drum storage area. The solvents are applied to rags used to

clean and degrease equipment and machinery. Mr. Westgate estimated Marathon Press uses approximately one 55 gallon drum of solvent per year.

Mr. Westgate indicated solid wastes including solvent applying rags are collected by a private contractor for disposal at the City landfill. Some liquid wastes are disposed through floor drains into the city sanitary sewer system. Other liquid wastes, including developing chemicals, are stored near the loading dock and are collected by a private recycling firm. Mr. Westgate was aware of only one underground tank located at the facility. This tank is located near the south side of the main building and is used to store fuel oil. Mr. Westgate indicated that Marathon Press stores dry goods (paper and printing supplies) in the buildings north of the main facility and at the property owned by Wausau Energy. Mr. Westgate was not aware of any spills during the course of Marathon Press operations at the Wausau Energy facility.

2.4 C.M. ST. P&P RAILROAD

The Survey of the railroad consisted of an interview with Mr. Herbert Hentze at the local railroad yard. Mr. Hentze indicated he has been a railroad employee for approximately 40 years and currently holds the position of Roadmaster. Mr. Hentze discussed railroad operations and reviewed manifests dating back to 1979. According to Mr. Hentze, the railroad made bulk deliveries of oil and petroleum products to the former Amoco Oil facility and to Riiser Oil (a former bulk oil facility located north of Wausau Chemical). The rail deliveries of oil discontinued approximately 20 years ago. Bulk deliveries of chlorine and stabilizing compounds including soda ash and potash were made to Wausau Chemical. The rail deliveries were discontinued in 1982. Presently, all shipments to Wausau Chemical are by truck. Mr. Hentze was not aware of any bulk shipments of solvents made to or from any businesses in the Wausau well field vicinity. Mr. Hentze was also not aware of any railcar leaks or spills during his employment by the railroad.

Mr. Hentze indicated a former city landfill was located near the east bank (south side) of the Wisconsin River near Bridge Street. This landfill reportedly closed approximately 45 years ago. Mr. Hentze also pointed out several railroad spurs were used for product transfer areas. One such spur formerly extended along the north side of Marathon Electric.

2.5 WERGIN CONSTRUCTION - 200 E. WAUSAU AVENUE

A brief interview and tour of Wergin construction facility was conducted with Mr. Phil Wergin (owner) and Mr. Joe Malak (Maintenance Foreman). Mr. Wergin indicated the City garage previously occupied the location where Wergin Construction is presently situated. The site was purchased from the City in 1959. Prior to service as a city garage, the east portion of the site was used to store lumber during the 1930's. The site is presently used as base of operations for the construction company and consists of a maintenance building, offices, and equipment and supply storage (Photos 8 and 9). In addition to these structures, much of the site is covered by miscellaneous construction debris, equipment and trailers (Photo 10). Mr. Wergin indicated the Company provides construction services for industrial, commercial and institutional clients.

Mr. Malak indicated limited quantities of solvents are used in cleaning and degreasing operations. He estimated approximately 55 to 75 gallons of solvents are used per year. Phosphate detergents (Johnson Forward and Midwest Fleet Clean) are the primary cleaning compounds used on site. Mr. Wergin indicated Material Safety Data sheets had been supplied to the U.S. EPA. Cleaning solutions and solvents are primarily used in the maintenance building. Mr. Wergin was not aware of any spills or leaks of solvent type material. However, Mr. Malak indicated that a small hydraulic fluid release occurred a couple of years ago. Mr. Wergin indicated the majority of the construction waste generated was disposed by Lloyd Bros. Inc. Surplus materials and salvage materials from construction operations are occasionally stockpiled at the site. Solid wastes generated at the site are either incinerated or disposed by a contracted waste hauler.

Mr. Wergin indicated three underground tanks are present at the site. The tanks are located just west of main building (Refer to Photo 11) and are used to store regular gasoline, unleaded gasoline and diesel fuel for company vehicles. Mr. Malak also indicated an elevated above ground storage tank is used to store waste oil and solvents until they are picked up by a recycling firm. This storage tank is located approximately 150 feet southwest of City Well 3.

2.6 WAUSAU CHEMICAL - 2001 N. RIVER DRIVE

The Survey of Wausau Chemical Corporation (Wausau Chemical) consisted of an interview with Mr. James Cherwinka (president) and a tour of facility operations. Mr. Cherwinka indicated the company was established in the 1960's. The southern portion of the property was acquired from the City of Wausau. An additional parcel located just south of E. Wausau Avenue was acquired from Riiser Oil during the early 1970's. This facility formerly operated as a bulk oil distribution plant (Photo 12). Wausau Chemical property extends from E. Wausau Avenue to the north, to the City of Wausau Water Treatment Plant to the south. The facility is bounded on the east by the C.M. ST P&P Railroad and on the west by North River Drive.

Mr. Cherwinka emphasized that Wausau Chemical is not a manufacturing facility. The primary functions of the company are two fold. They act as a transfer station for the collection and shipment of waste chemicals and solvents from area businesses to Waste Research and Reclamation (WRR) in Eau Claire, Wisconsin. Secondly, Wausau Chemical is a distributor for various chemicals and solvents. Mr. Cherwinka indicated Wausau Chemical operates several tractor trailer rigs and one tank truck that is federally and state licensed to transport hazardous waste. According to Mr. Cherwinka, RCRA permits allow Wausau Chemical to store hazardous waste materials for up to 10 days. The permit does not limit the storage of chemicals (i.e., PCE, TCE, DCE) that are not classified as hazardous wastes. Mr. Cherwinka, indicated the WDNR approves the waste stream which can be handled by the Wausau Chemical.

The site consists of a large metal framed building on a concrete slab foundation. Four loading docks are located on the west side of the building. Two additional loading areas are located on the east side of the building. Empty drum storage areas are located on the east and south sides of the building (Photo 13). Several empty storage tanks are located near the southeast corner of the site (Photo 14). Company offices are located in the southwest portion of the building. The remaining building space located in the west central portion of the building is leased to STS Consulting Ltd.

Wausau Chemical collects spent solvents and chemicals from local businesses and transfers the materials to the WRR recycling facility in Eau Claire, Wisconsin or to an out-of-state Rollins incineration facility. The material is collected in DOT approved 55 gallon drums. These materials are generally shipped directly to the recycling facility or incinerator without unloading or repackaging at the Wausau Chemical facility. However, Mr. Cherwinka indicated that occasionally materials are collected which fail to meet the reclamation facility specifications. These materials must be blended with other chemicals at Wausau Chemical to meet specifications.

According to Mr. Cherwinka, prior to 1984, Wausau Chemical operated a solvent bulk farm in which PCE was stored in several above ground tanks along the south side of the main building. The solvents were transferred from tank cars to the storage tanks and then to 55 gallon drums which were sold and distributed to area businesses. In 1983, the facility experienced two PCE releases and subsequently discontinued the use of the storage tanks. Tanker car deliveries of solvents are now reportedly transferred directly to 55 gallon drums which are warehoused on pallets adjacent to the north loading dock.

Mr. Cherwinka indicated he was not aware of any underground storage tanks on the property. Two of the former above ground oil storage tanks acquired from Riiser Oil are presently used for storage of calcium chloride. The remaining above ground tanks observed on the southeast side of the facility are reportedly empty (Photo 15).

Mr. Cherwinka indicated he was aware of only three spills or leakages of chemical or solvents at the Wausau Chemical facility. He stated that the WDNR was notified in each case. The first spill reportedly occurred in February 1983, near the northwest loading dock (Photo 16). Approximately 100 to 250 gallons of PCE was lost when a small tank was damaged by a fork lift. A portion of the product reportedly pooled on North River Drive and was removed using snow plows. Remaining product was flushed into storm sewers and the River during thaw events. The largest release reportedly occurred in

December, 1983 when a storage tank located south of the main building experienced a valve malfunction which resulted in the leakage of approximately 900 gallons of virgin PCE. A portion of the product reportedly pooled on the frozen ground was removed. Affected soils and storage tanks were removed during the spring of 1984. A third small spill of approximately 2 to 3 gallons of PCE occurred in late 1986. This spill occurred on the bituminous pavement area near the southwest loading dock.

Mr. Cherwinka was not aware of any additional spills. However, file information indicates soil excavations conducted for the water treatment plant expansion in 1975 encountered soils and groundwater contaminated by PCE, TCE, toluene, and xylenes along the south side of Wausau Chemical property. WDNR requested Wausau Chemical to remove contaminated soil, however, no action was reportedly taken to address the requests.

STS Consulting Ltd. of Green Bay, Wisconsin was contracted by Wausau Chemical to perform a hydrogeologic investigation of the groundwater impact from the 1983 PCE releases. Results of this investigation are presented in reports dated July 25, 1984; April 3, 1985 and in subsequent correspondence. STS was retained by Wausau Chemical to design and implement a groundwater extraction and treatment system. A groundwater extraction system consisting of 15 wells was installed during the summer and fall of 1985. An air stripper was installed during the week of October 11, 1985 for treatment of contaminated groundwater (Refer to Photo 15). The system was operated intermittently from October 31, 1985 to December 5, 1985, after which the system remained inoperative until June 24, 1986. With the exception of periodic maintenance and winterization, the system has reportedly been operated continuously since June 1986.

Groundwater extraction has been accomplished by pumping well clusters generally consisting of six extraction wells arranged in a rectangular array. Since installation in October 1985, the system has been operating an equivalent of approximately 250, 24-hour pumping days. Discharge rates have fluctuated substantially, but generally have averaged approximately 100 GPM.

2.7 MARATHON ELECTRIC - 100 EAST RANDOLPH STREET

The Survey of the Marathon Electric facility consisted of an interview with Mr. David Eisenreich (Vice President of Administration) and Mr. Mark Thimke (Foley and Lardner, Attorneys at Law). Following the interview a plant tour was provided by Mr. Walter Matson (Plant Manager). Mr. Eisenreich indicated Marathon Electric has been operating at the present site for approximately 45 years. The company manufactures electric motors ranging from 1/2 H.P. to 500 H.P. and generators ranging from 50 K.W. to 1000 K.W. According to Mr. Eisenreich, Marathon Electric used to manufacture washing machines. The company currently employs approximately 1000 persons. Marathon Electric's manufacturing processes can be separated into fabricating processes and assembly processes. Fabrication operations include: foundry, punch press, aluminum diecast and machining of aluminum and iron. Assembly operations include: shaft machining, frame fabrication, winding, subassembly and painting. Specific processes and materials utilized in plant operations are shown on Table 1. Refer to Drawing 13076-A16 for location of plant operations.
The Marathon Electric site occupies approximately 30 acres bounded by Randolph Street on the north, Cherry Street on the west, the Wisconsin River on the east and Employers Insurance Company and the James River Corporation on the south (Drawing 13076-B10). The site consists of two main buildings, the foundry/fabrication building located on the southern portion of the site (Photo 17), and the assembly building located in the northern part of the site. The assembly building includes corporate offices and shipping and receiving areas (Photos 18 and 19). A large parking lot separates the two buildings. Numerous small storage buildings are located south of the plant foundry. These warehouses are reportedly owned by Employers Insurance Company of Wausau and Marathon Electric. Refer to Drawing 13076-A16 for locations of plant operations.

Mr. Eisenreich indicated the present foundry facilities were constructed in 1969, over a portion of the former City of Wausau landfill. Prior to 1969, the foundry was located southwest of the main office. During a previous plant survey (WDNR 1982), Mr. Matson indicated that 55 gallon drums of waste were encountered during excavation for the foundry building foundation.

Mr. Eisenreich was not familiar with Marathon Electric chemical useage, waste generation or disposal practices. However, Mr. Matson indicated that Marathon Electric operations required the useage of a wide variety of paint, varnish, stripping compounds, solvents, caustics, acids, etc. Material and chemical usage for 1974 is presented in Table 2. Based on the types of quantities of waste generated, Marathon Electric is classified as a hazardous waste generator and is RCRA permitted to store and transport hazardous materials. The company currently stores hazardous wastes in warehouse #5, located south of the foundry (See Photo 20). Prior to 1982, hazardous wastes were stored on an asphalt pad located southeast of the foundry. Marathon Electric currently stores drums of varnish adjacent to the receiving area on the southeast side of the assembly building (Refer to Drawing 13076-A16).

Mr. Matson indicated any spills occurring at the plant would be documented in company files. These files were not available during the plant survey. However, WDNR records indicate two documented releases. In October, 1980 an anonymous call was received indicating a paint spill had occurred along the southeast corner of the foundry building. Further investigation indicated a drum containing paint wastes had been ruptured during moving activities. WDNR collected soil samples for heavy metal analyses. Affected soils were subsequently disposed at the Holtz Krouse landfill. In addition, a ruptured barrel containing varnish wastes was noted during a WDNR plant survey in 1982. The company was advised to clean up contaminated soils and to have drums more thoroughly inspected prior to useage.

Mr. Matson indicated that approximately 163,200 gallons of sanitary and contact process water is discharged daily to the city sanitary sewer. Discharge is monitored at three outfalls locations. The company also discharges approximately 73,000 gallons of non-contaminated process water to a sewer which discharges to Bos Creek south of Randolph Street.

According to Mr. Matson there are presently three underground storage tanks located at the Marathon Electric facility. A 20,000 gallon diesel fuel tank is reportedly located near the southwest corner of the foundry. An

8,000 gallon fuel oil tank is located directly east of the receiving dock area. A 20,000 gallon xylene tank is located directly west of the company cafeteria (See Photo 21). Mr. Matson indicated additional tanks were located along the north side of the assembly building, beneath the present cafeteria (Photo 22). These tanks were reportedly removed in 1982 when the cafeteria was built. Mr. Matson was unsure of the contents of these tanks but felt they may have been used to store varnish and or solvents. In addition to the underground storage tanks, an above ground, horizontal, liquid nitrogen tank is located directly west of the cafeteria.

2.8 MARATHON BOX - 207 N. 1ST STREET

An interview and site survey was conducted with Mr. Scott Teneyck, Vice President, Marathon Box. Mr. Teneyck indicated that Marathon Box is a family run business that was established at the N. Second Street site in 1928. The company manufactures pallets and crates. According to Mr. Teneyck, Marathon Box moved its manufacturing operations from the site in 1982. A portion of the factory was subsequently removed (see Photos 23 and 24). The site presently consists of three framed buildings and an adjacent lumber storage yard (Refer to Photos 25, 26 and 27). The buildings are reportedly used to warehouse lumber and equipment. However, the survey was not conducted inside any of the structures since Mr. Teneyck did not have the keys for door locks.

Mr. Teneyck indicated no solvents had been used at the site during present or past operations. However, wood preservatives had been used. Mr. Teneyck also indicated that years ago, a private contractor had been hired to spread dust inhibiting agents at the site. The composition of the dust inhibitors is reportedly not known. According to Mr. Teneyck, no surface or below ground tanks are present at the site.

During the site survey, oil stained sawdust was observed inside a pit located in the floor of the former factory (Photo 28). A can of discarded cutting oil was also noted near Monitoring Well MW10 (EPA10). Several unlabeled discarded drums were noted along the north side of the gray frame building. Stained soils have been reported during previous investigations (Johnson, 1985).

3.0 FACILITIES SUBSEQUENTLY INCLUDED IN THE SURVEY

The following are other facilities which information was gathered as part of the survey.

3.1 DON FITZGERALD CLEANERS AND TAILORS - 1006 SIXTH STREET

Based on previous industrial surveys, Don Fitzgerald Cleaners and Tailors has been identified as a user of halogenated solvents. This facility is located approximately 1500 feet southeast of Municipal Well CW4. Previous interviews with Mr. Don Fitzgerald (owner) indicate the dry cleaning operations use approximately 50 gallons per month of PCE. Prior to 1984, liquid waste from the facility was disposed to the sanitary sewer system via drains and toilets. Waste solvents generated during dry cleaning operations are currently transported to Wausau Camelot Cleaners for recycling (sparging).

3.2 SENIC SIGN COMPANY - 1502 FIRST AVENUE

The Senic Sign Company (see Drawing 13076-B10) has also been identified as a local user of paint thinners, and solvents. WDNR records indicate this facility is classified as a very small quantity generator of hazardous wastes. The wastes are considered hazardous due to the igniteable characteristics of lacquer thinners and mineral spirits used and stored on site. The company also uses a wide variety of paints, paint thinners, solvents and screenprinting chemicals. Inventory forms supplied to WDNR indicate delivery of bulk solvents (LAC-SOLV 300) from Wausau Chemical to Senic Sign. Liquid wastes are generally collected in 55 gallon drums that are disposed by either Rock Refining or Lloyd Brothers trucking.

3.3 CORNERSTONE FURNITURE - 1310 CHERRY STREET

Cornerstone Furniture located at 1310 Cherry Street (see Drawing 13076-B10) was not included in the August 6 and 7, 1987 Survey but was subsequently contacted regarding facility operations. The owner of this facility indicated operations consisted of furniture design, construction and antique restoration. He was not aware of the use of PCE or TCE at his facility but indicated Dimethylene Chloride was frequently used as a paint and varnish remover.

3.4 CAMELOT CLEANERS - 1902 NORTH SIXTH

Camelot Cleaners located at 1902 N. 6th Street (corner of Lincoln and 6th) is a potential user of chlorinated solvents. This company performs a variety of dry cleaning operations on site. The company is located approximately 1500 feet upgradient (east) of Municipal Wells CW4 and CW3.

3.5 FORMER CITY LANDFILL

During the course of Phase I field activities, the abandoned City of Wausau landfill was identified as a potential source of VOC contamination. Two former city employees who were familiar with landfilling practices were interviewed on December 9, 1987. The interview included the following persons:

Margaret Guerriero - U.S. EPA Project Officer
Craig Rawlinson - Warzyn Project Hydrogeologist
David Cook - Wausau City Engineer
James Lonsdorf - Special Council for the City of Wausau
Ervin Sigmund - Former Landfill Employee
Heimrich Oswald - Former Landfill Employee

According to Mr. Sigmund and Mr. Oswald;

- The City landfill occupied a former sand and gravel pit located on the west bank of the Wisconsin River. The landfill covered approximately two acres, underlying the southeastern portion of Marathon Electric property (Refer to Drawing 13076-B10). The former landfill extended from the present Marathon Electric Main entrance road, to the electric substation. The landfill was bounded on the east by the Wisconsin River, and to the west by the former gravel pit excavation face which extended south from the present Marathon Electric shipping area. The information was obtained from review of aerial photographs at the City of Wausau, Department of Engineering.

- The landfill operated from approximately 1948 to 1955 and was the only landfill within the City of Wausau at the time. During its period of operation almost all commercial, industrial and residential wastes generated within the city was disposed at the site. Both Mr. Sigmund and Mr. Oswald indicated that no effort was made to control the type of waste accepted at the landfill. Mr. Oswald recalled several instances when bulk liquid wastes contained in 55 gallon drums were emptied directly into the fill. He could not recall the specific generator(s) of the wastes, but indicated the practice was fairly common.

- The landfilling began in the northwest portion of the sand and gravel pit and progressed south and east. A rock crusher was located near the northeast portion of the gravel pit. Crushed rock and construction debris was generally filled into the northeast portion of the sand and gravel pit. Mr. Oswald and Mr. Sigmund indicated waste was often burned in order to conserve space. Ash and cinders were disposed throughout the landfill. Mr. Sigmund recalled burning several loads of dry cleaning rags and lint soaked with a flammable liquid.

- In many cases incineration could not keep pace with the amount of waste received in a day. In such instances, waste materials were landfilled directly. Such materials were generally filled into the western portion of the former sand and gravel pit. Mr. Oswald stated drums of unknown industrial wastes were also filled into the western portion of the landfill.

- The landfill was not generally fenced or secured, allowing waste disposal to occur during nonworking hours and weekends. Mr. Oswald also indicated landfill users were charged one bulk disposal rate regardless of the size of the load or the contents. Therefore, it is difficult to characterize waste types or volumes disposed at the landfill.

- The landfill base grades were controlled by pre-existing sand and gravel operations. Generally, the deepest filled areas were located in the eastern portion of the landfill, where sand and gravel operations had excavated to within a few feet of river level. Mr. Oswald indicated that approximately 40 feet of waste materials were disposed near the west bank of the Wisconsin River. The base of the landfill sloped upward toward the west in a slightly concave manner.

- Low lying areas west of the sand and gravel pit were filled by Marathon Electric and the American Toothpick Company. Wastes reportedly disposed in this area included moldings and foundry wastes. Most of the landfilled areas were sold by the City of Wausau to Marathon Electric in 1965. The land was used for plant expansion and additional parking. Excavations conducted during the construction of the Marathon Electric Foundry reportedly encountered drummed wastes beneath the eastern portion of the foundry (Walter Matson, personal communication).

- According to Mr. Oswald and Mr. Sigmund, the former City landfill extended as far south as the present Marathon Electric substation (Refer to Drawing 13076-B10). Fill materials observed along the river bank south of Marathon Electric may have been filled by an unknown party subsequent to the closure of the City portion of the landfill in 1955.

4.0 SUMMARY AND RECOMMENDATIONS

A total of eight businesses were field surveyed August 6 and 7, 1987. Subsequent to that time 5 other facilities/entities were added to the Survey for consideration. Based on information obtained from the Survey, the following facilities were investigated in varying degree during the Phase I field investigation:

- Senic Sign Company
- Camelot Cleaners
- Former City Landfill

Based on the results of the Phase I field work, it is recommended that further investigations continue at the former City landfill site.

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[wpmisc-104-58]

TABLES

TABLE 1

MARATHON ELECTRIC
OPERATIONAL PROCESSES*

SERVICE DEPARTMENT - Trichloroethylene wire stripping to remove varnish from stator wires to facilitate easy removal

STOCK ROOM - Plating Room - zinc - cadmium plating of small parts.

ROTOR DEPARTMENT - Etch Tanks - Etching of aluminum rotors with a caustic bath and then an acid rinse.

Selas Burner - Gas fired heater with water quench for rotors.

PUNCH PRESS - Annealing Ovens - Heat treating of lamination steel.

DIE CAST - Aluminum melting - coreplating using coreplate material.

SMALL WINDING - Stator Varnishing - Varnishing and baking of stators.

BODY DEPARTMENT - Wash Tanks - Washes motor parts prior to painting. Paint Over - Dips and bakes motor parts in enamel paint and bakes in oven. Welding Booths - Welding of small motor frames using arc, inert gas welding.

SHAFT DEPARTMENT - Turning and grinding of small shafts using various coolants.

L.G. SHAFT & ROTOR - Turning and grinding of large shafts using coolants. Insulation Cutting - Cutting of fiberglass boards with saws and a grinder. Welding - Welding and braising of rotors.

FOUNDRY - Induction Furnace - Used to melt gray iron. Muller - Used to mix sand for molding. Pangborn - Dust collector.

BRACKET - Machining of cast iron motor parts.

ASSEMBLY - Assembly of small motors. Paint Booth - Spray painting of motors.

SWITCH DEPARTMENT - Assembly of switch panels, rotor exciters, cutting of insulation for motors.

LG MOTOR & GENERATOR ASSEMBLY - Paint Booths - Painting motors and generators.

MEDIUM INTEGRAL WINDING - Bake Oven - Baking varnish on stators.

LG WINDING - Bake Ovens - Baking varnish on stators.

MEDIUM INTEGRAL ASSEMBLY - Paint Booth - Spray painting of motors.

* Source WDNR 1982 Plant Survey

[wpmisc-104-57]

TABLE 2

MARATHON ELECTRIC CHEMICAL AND RAW MATERIAL USAGE IN 1974*

Desmutter acid deoxidizer	4,450#
Kenbrite Salts B1	8,800#
Kenvert #12 chromate	1,600#
BZ100A Cleaner	5,200#
Vortesal XE-3500 Cleaner	2,400#
Kenbrite Enveloper	185 gal
Kenbrite Regulator	200 gal
Compound Metalline F-5500	110 gal
Muriatic Acid 130#	465 gal
Trichloroethylene	770 gal
Napthrol Spirits	220 gal
Paint Stripper	110 gal
Blacking Salts (5-1/4 oz K, 3# NaOH, 5-1/2 oz NaNO2)	100#
Boric Acid Powder	300#
Ammonia	575 gal
Nitric Acid	54 gal
Phosphoric Acid	20 gal
Aluminum Etch Compound	7,900#
Mineral Spirits	110 gal
Ethyl Alcohol	2 gal
Butyl Cellosolve	410#
Methyl Cellosolve Isopropawal Toluene	15 gal
Xylol	21,500 gal
Cimplus 48A	715 gal
CX 305 Cimcool	110 gal
Die Slick	25 gal
Filstone M-28 Lube	25 gal
Kleno Bowel	14 gal
West Power	24 gal
West Solv #30 Solvent	110 gal
West Foam Concentrate	4 gal
#43 West Lake Solvent	110 gal

* Data based on WDNR Industrial Survey (December 3, 1975).

OILS

Mobil Met 33	770 gal
Del Vac	330 gal
DTE 24	4,620 gal
Velocite #10	20 gal
Vactra #3	340 gal
DTE 103	280 gal
Vactra #1	210 gal
DTE #26	1,850 gal
Mobil Met #305	10,000 gal
Compound BB	2,035 gal
Pyrogard #53	385 gal
Mobil Fluid 220	550 gal
Delvac 1230	220 gal
Mobil 1220	275 gal
Nyvac FR200	220 gal
DTE Extra Heavy	220 gal
Solvac 500	55 gal
Vacmul UB-78	5,000 gal

PAINTS

BK-259 Black Paint	440 gal
A95 Red Enamel	50 gal
A54 White Enamel	75 gal
A98 Blue Enamel	50 gal
A101 Red Lacquer	35 gal
Grey Lacquer	75 gal
#655 Epoxy Reducer	12 gal
Gray Epoxy Paint	12 gal
Gray Spray Enamel	3,500 gal
Gray Aquazen Primer	5,500 gal
Stabilizer	100 gal
Gray Dip & Bake Enamel	3,960 gal

VARNISHES

Isonel Varnish	4,400 gal
#31 Isonel Varnish	22,000 gal
Red Varnish	160 gal

RAW MATERIALS

Aluminum	1,574,844#
Steel	19,961,176#
Cast Iron	12,551,800#
Copper Wire	16,256,488#

FOUNDRY SUPPLIES

Molding Sand	538 tons
Core Sand	1,680 tons
Part rite Liquid	1,045 gal
Core Oil CWC-G	825 gal
Sand Conditioning Oil	1,705 gal
Liquid Pyrokote 2 Core Wash	580 gal
Fast Lite Solvent	605 gal
Core Binder	4,455 gal
Graphite Core Wash	65 gal
Carbon Riser	27,000#
Additrol ME-W-2 Blend	340 tons
SMZ 12M X 32M	7 tons
Carbo Carbo Sil 50	280 tons
Sodium Silicate	28 gal
Asbestos Sheets 42" X 46" X 5/32"	108 sheets
Isomica Sheets 36" X 36" X .0153	20 sheets

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INDUSTRIAL SURVEY PHOTOGRAPHS

Photo 1

View of east side of Wausau Energy Building. Building is currently leased by Marathon Press and is used for storage of printing materials.

Wausau Energy
2112 2nd Street

WARZYN

Photo 2

South side of Wausau Energy where former Rush Distributing/Amoco Bulk Storage tanks were located. Foth and Van Dyke monitoring wells TB-2 and TB-5 visible in foreground.

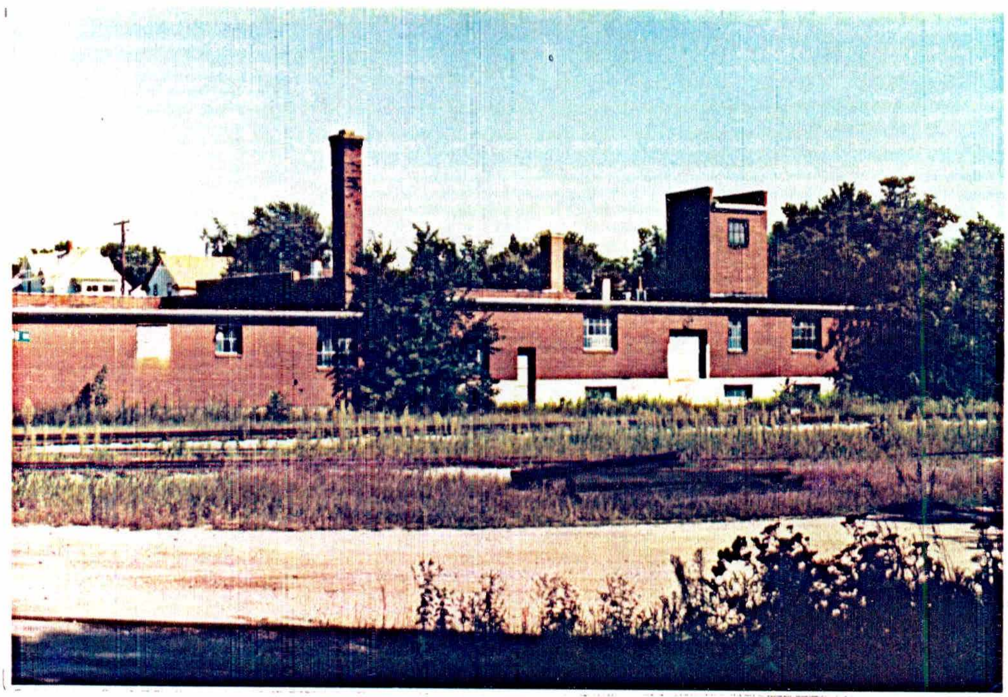

Photo 3

West side of Wausau Energy. Railroad spur located in foreground.

Wausau Energy
2102 2nd Street

WARZYN

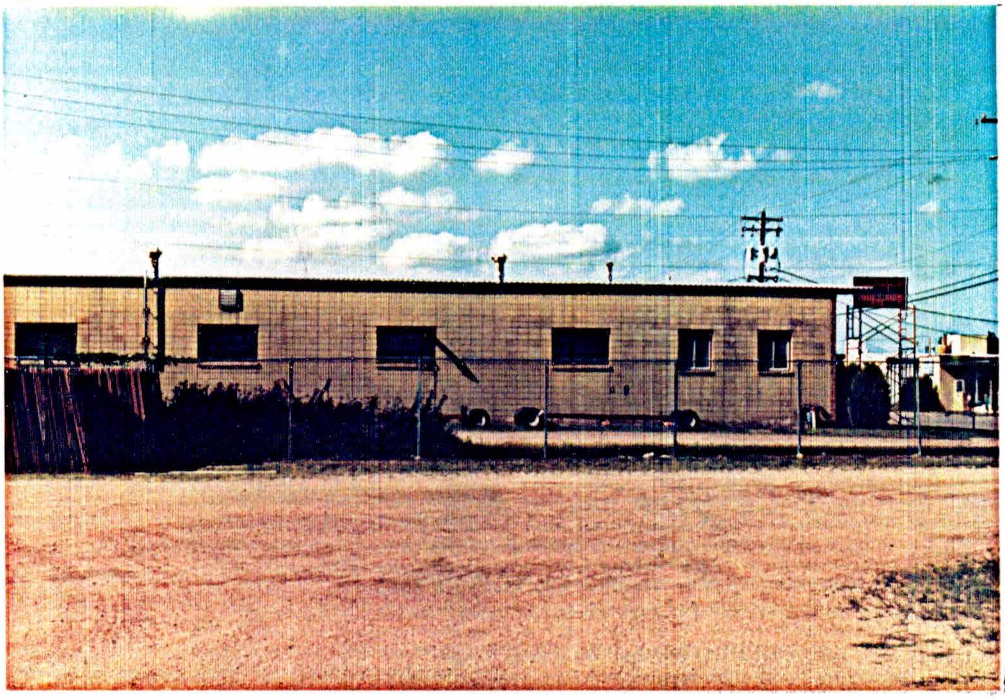

Photo 4

View of south side of Steel Flite Scaffolding

Photo 5

South side of Steel Flite Scaffolding and additional storage building in background.

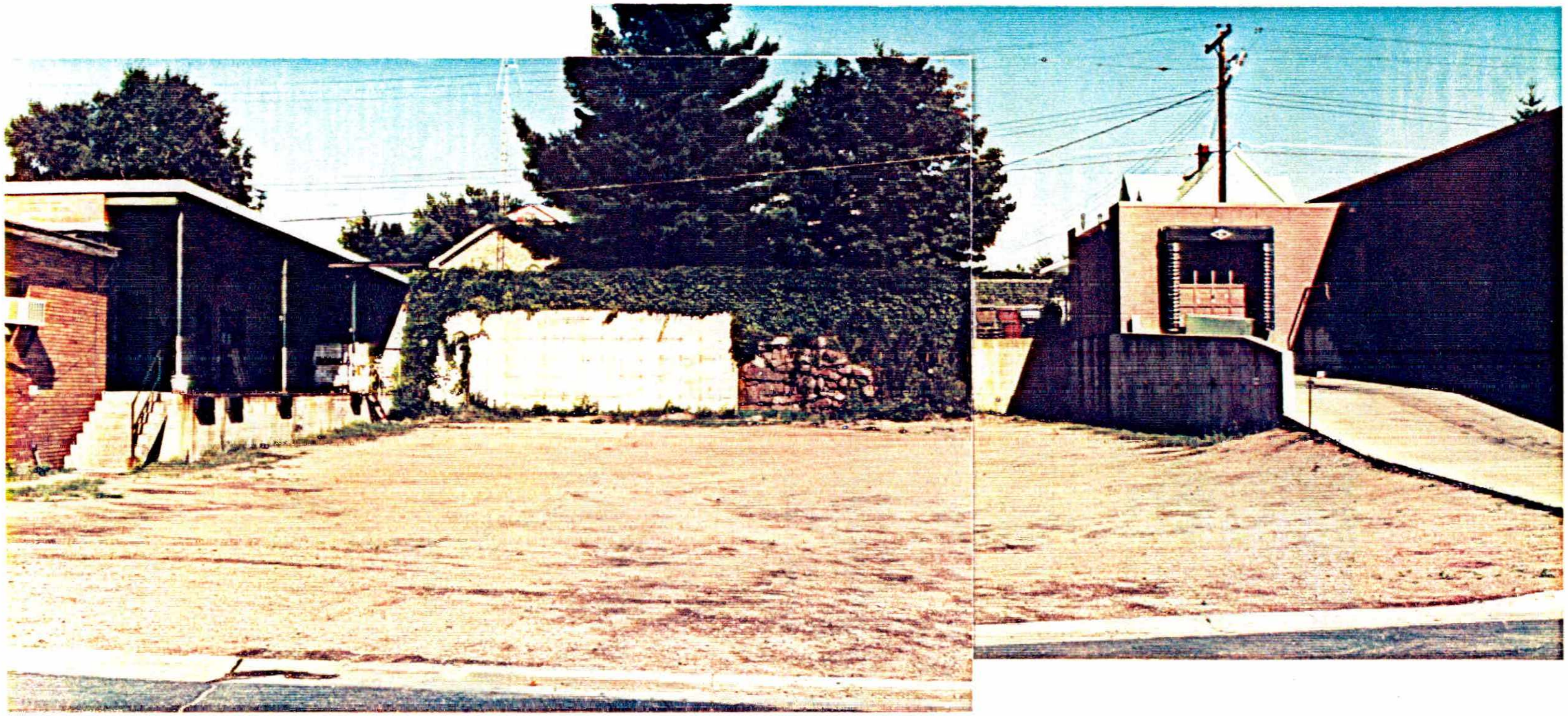

Photo 6

Loading docks and transport staging area. View looking east.
Drum storage area located on concrete pad at right of photo.

Marathon Press
Park Avenue and Second

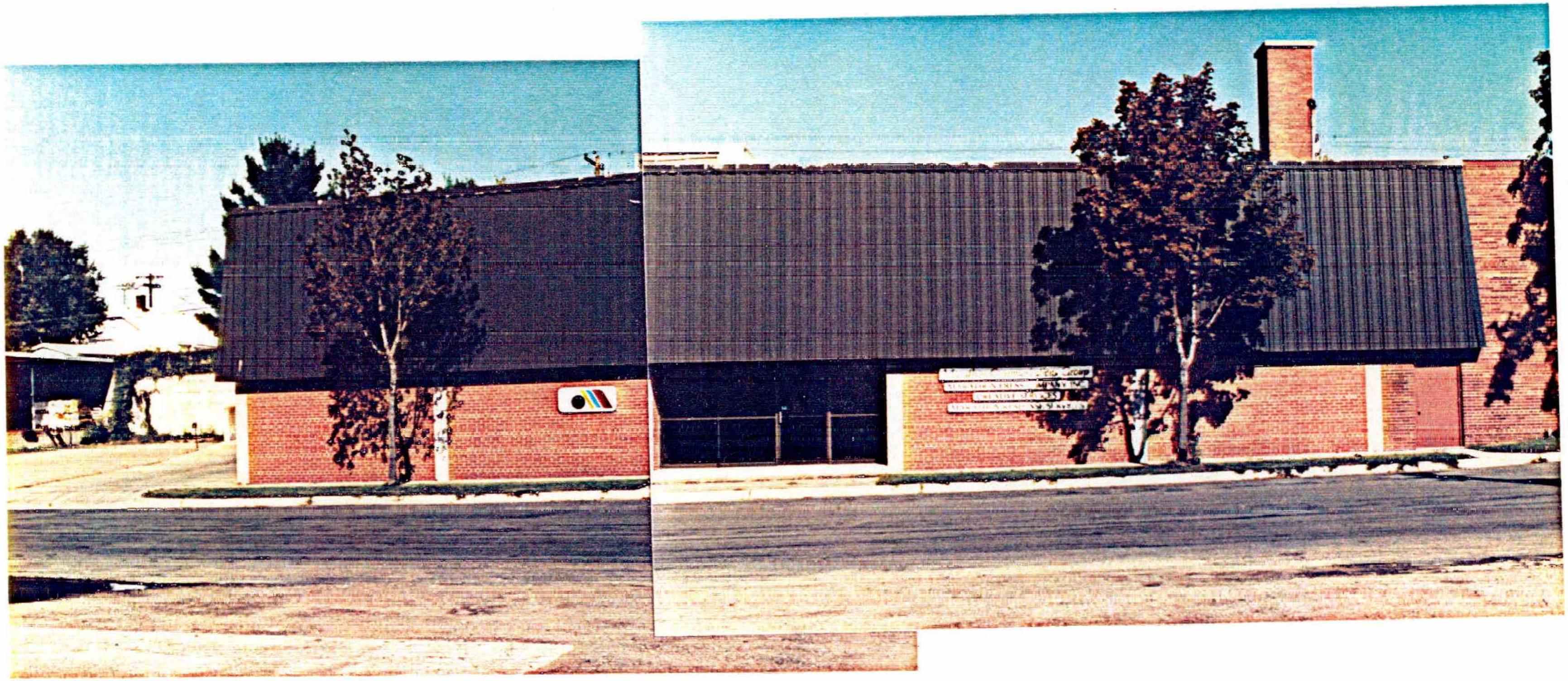

Photo 7

Northwest portion of Marathon Press printing, graphics and office building. View looking east across Second Street.

Marathon Press
Park Avenue and Second

WARZYN

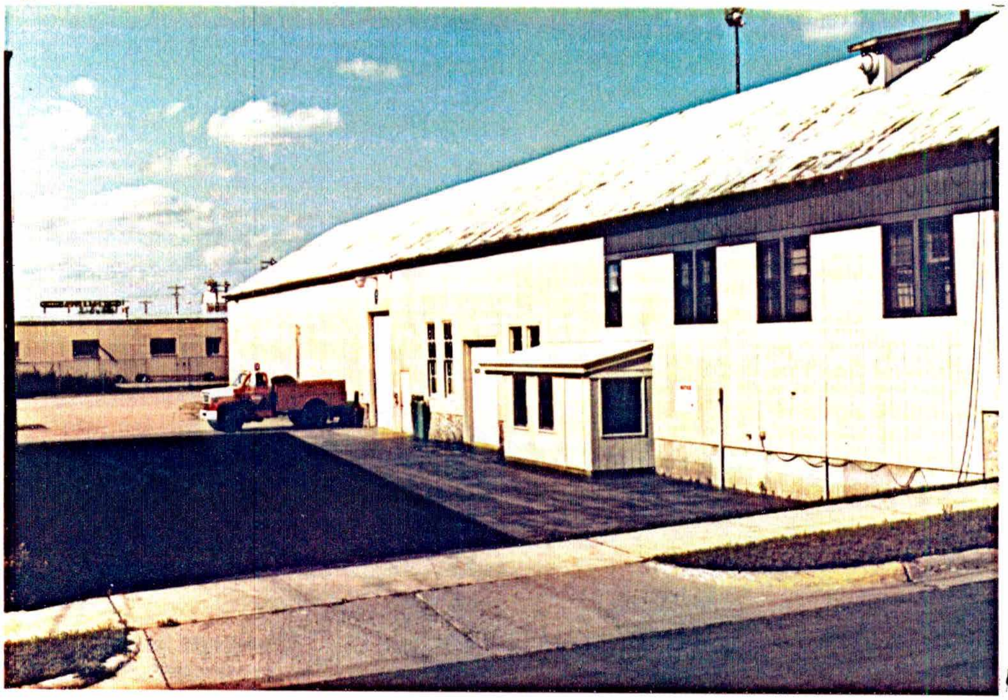

Photo 8

Wergin Construction office and storage building. View looking northeast.

Photo 9

Wergin Construction maintenance garage. View looking northeast.

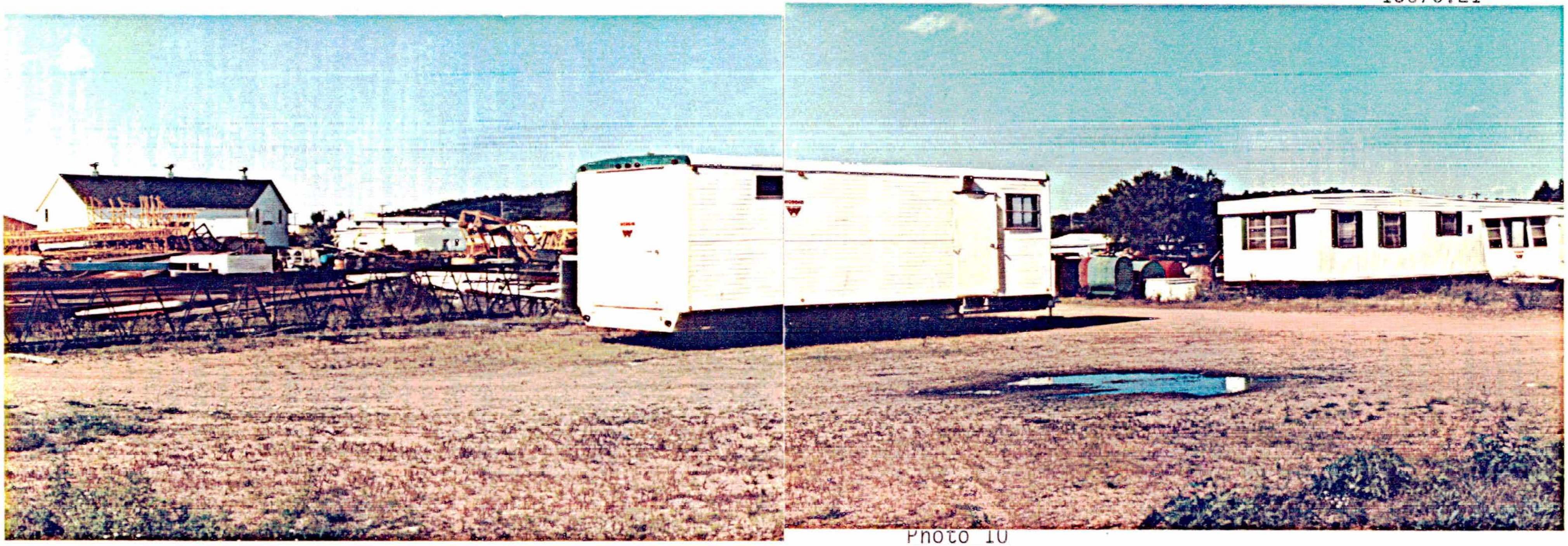

Photo 10

Wergin Construction storage area located west of C.M. ST P&P Railroad, north of E. Wausau Avenue.

Photo 11

Wergin Construction pump island. Underground storage tanks containing regular, unleaded and diesel are located immediately east (right) of the pump island. Municipal well CW-3 is visible (metal frame building just left of small brick building) in background.

Wergin Construction
200 East Wausau Avenue

WARZYN

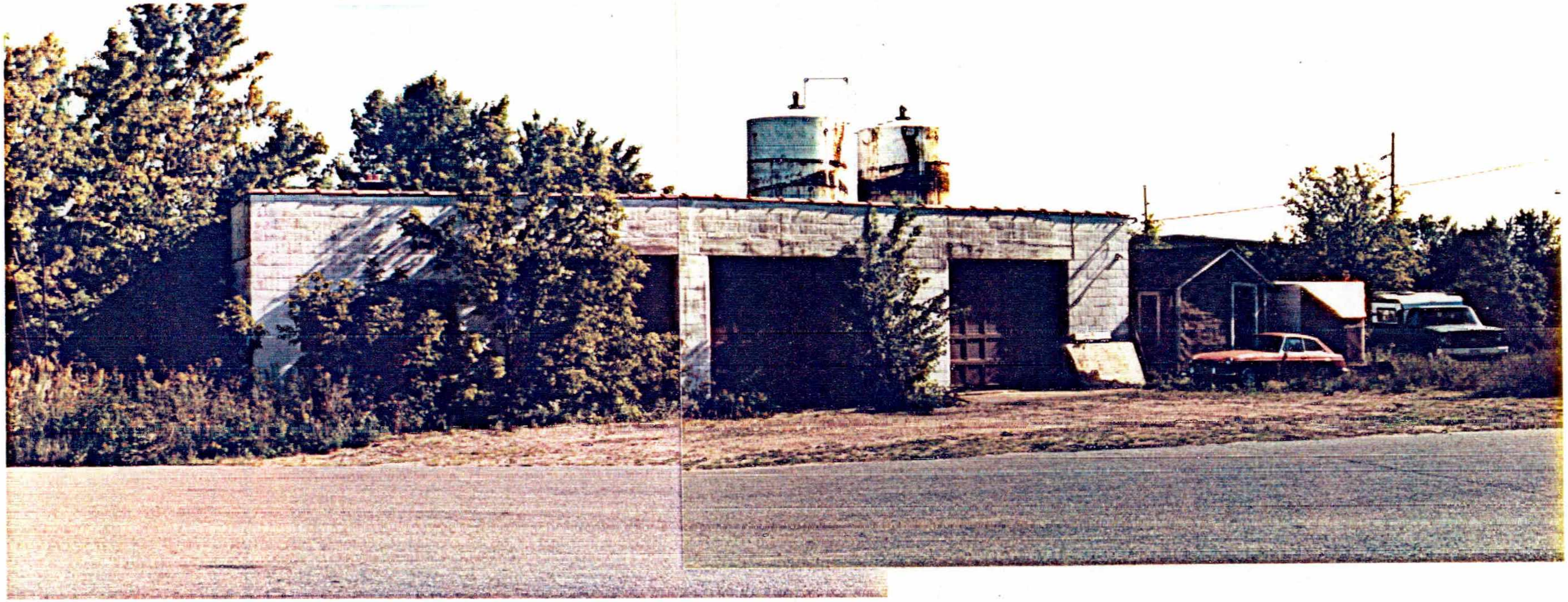

Photo 12

Former Pure Oil Bulk facility. Property currently owned by Wausau Chemical. Vertical tanks used for calcium chloride storage located in background. Photo looking south across E. Wausau Avenue.

Wausau Chemical
2001 N. River Drive

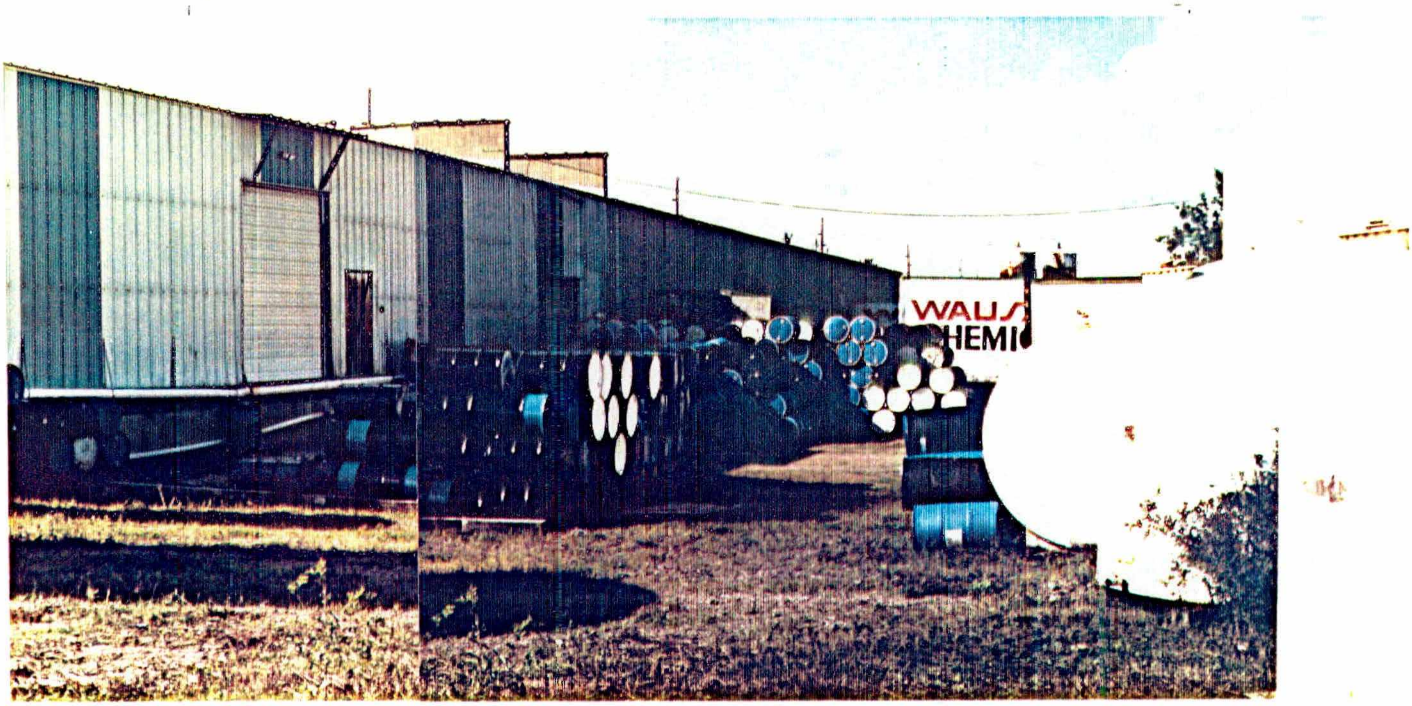

Photo 13

Empty drum storage area located east of Wausau Chemical building. View looking north from former bulk storage tank retainment area. Empty bulk storage tanks visible at right of photo.

Photo 14

Vertical tanks formerly used for PCE storage. Large tanks in background were removed from south side of building after the December 19, 1983 spill. Tanks located in foreground are similar to the tank that ruptured during the February 1983 spill.

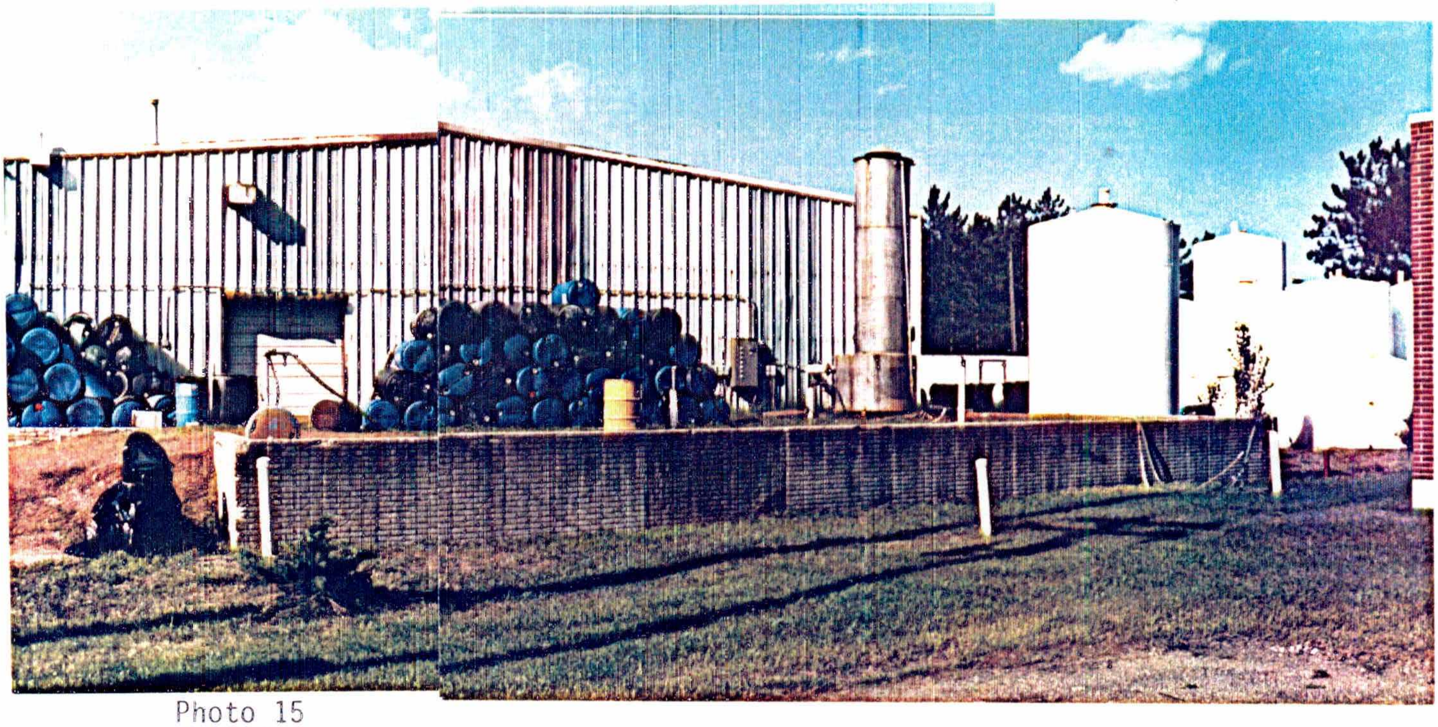

Photo 15

Wausau Chemical PCE extraction system. PVC extraction wells located in foreground, air stripper located at right center of photo. View looking northeast from filtration plant.

Photo 16

Wausau Chemical northwest loading dock, in vicinity of the February 1983 PCE release. Photo view looking east from N. River Drive.

Photo 17

Marathon Electric foundry/fabrication building. View looking southeast from main entrance.

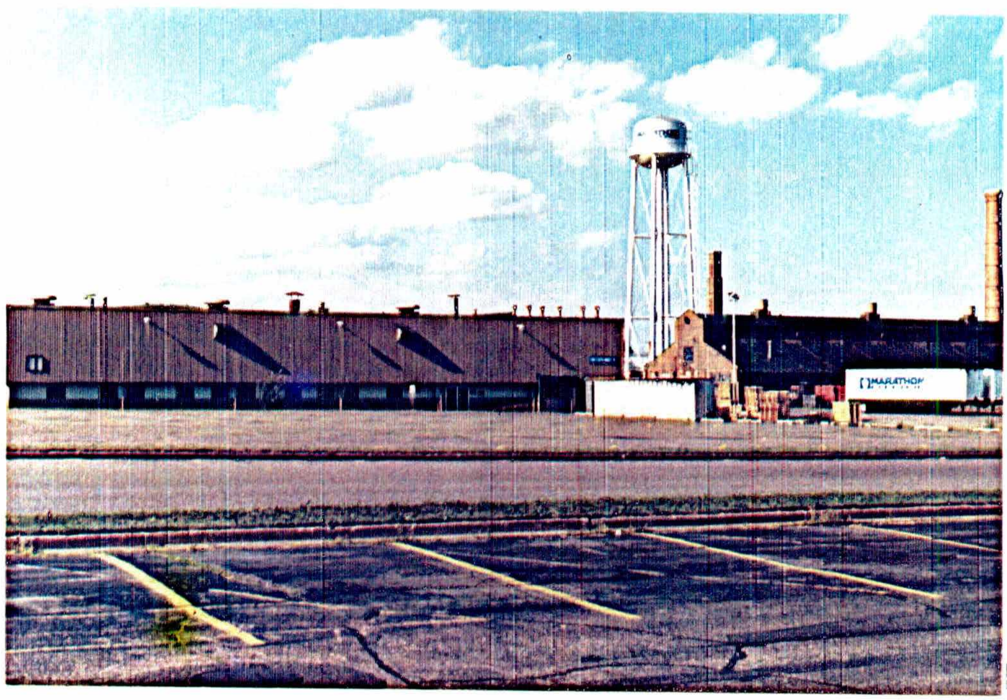

Photo 18

Marathon Electric assembly building and former foundry building (at far right). View looking northeast from main entrance.

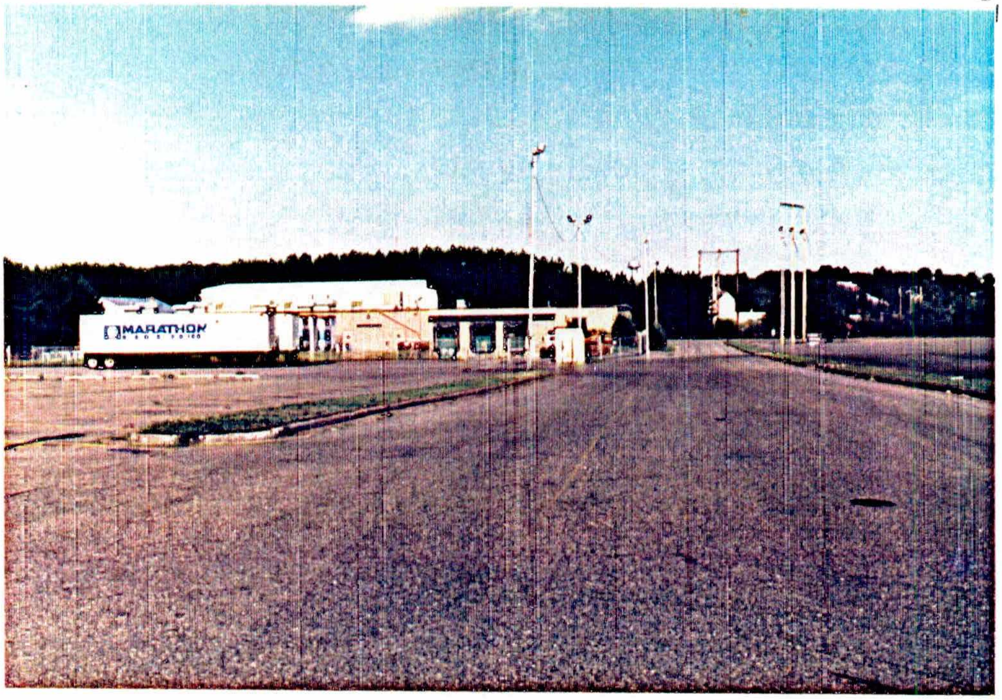

Photo 19

Marathon Electric painting and final assembly areas. Shipping located at right of building. View looking east from main entrance.

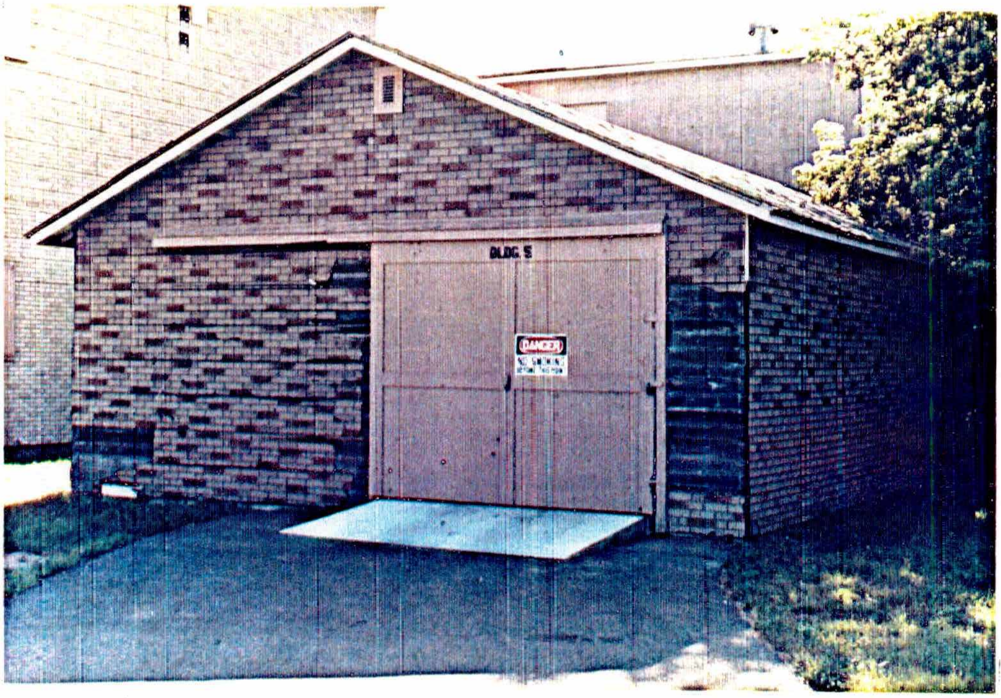

Photo 20

Marathon Electric hazardous waste storage building, located south of foundary. View looking toward southwest.

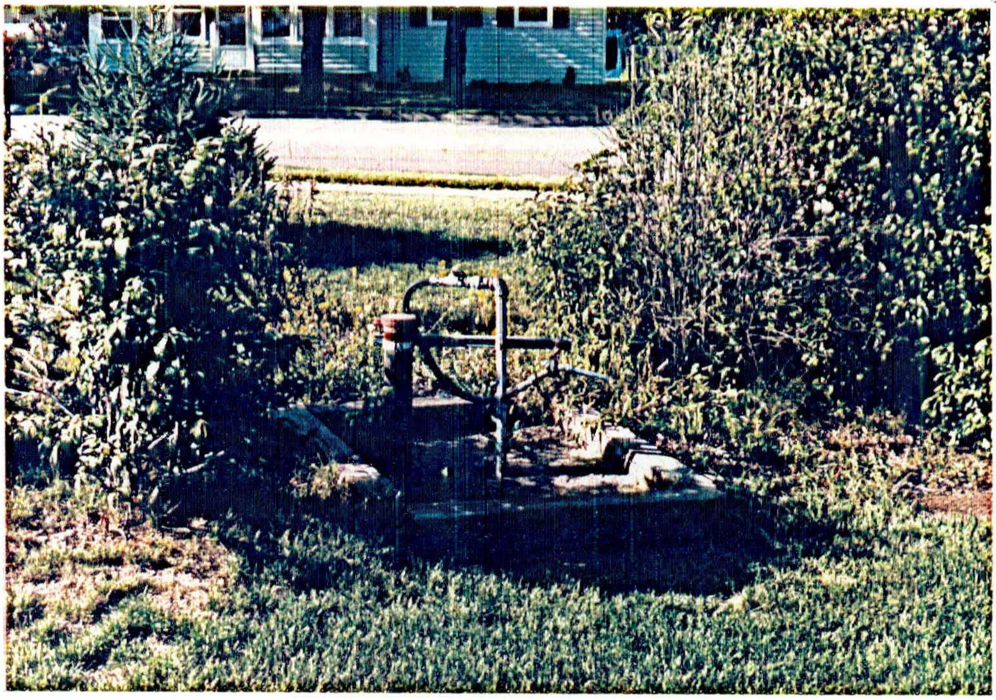

Photo 21

20,000 gallon xylene tank riser pipe. The tank is located on the north side of the Marathon Electric assembly building. Photo view looking north, Randolph Street in background.

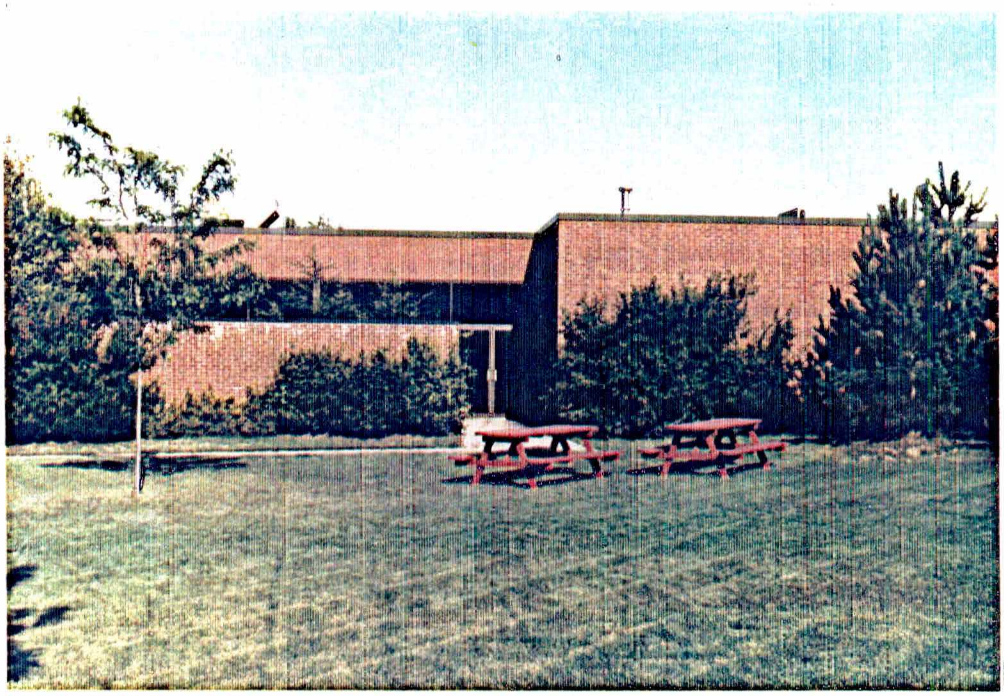

Photo 22

Marathon Electric cafeteria, located on north side of assembly building. Several underground storage tanks were removed during the construction of the cafeteria in 1982.

Photo 23

Former Marathon Box Plant location. View looking southeast. Plant was razed and relocated in 1982.

Photo 24

Existing portion of Marathon Box Plant. View looking north.

Marathon Box
207 N. First

WARZYN

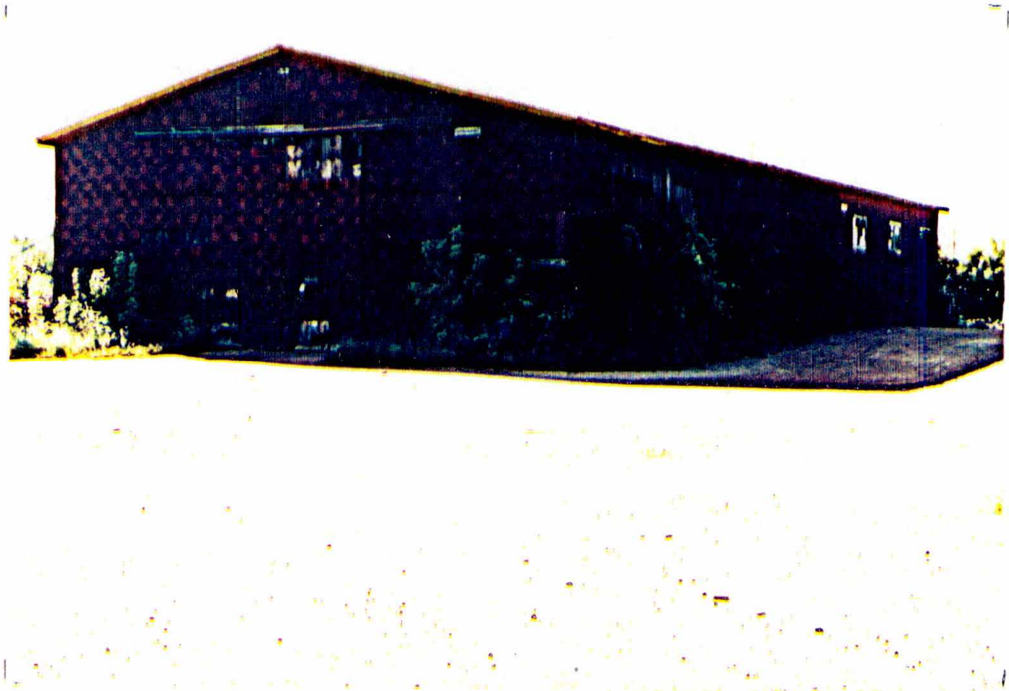

Photo 25

Marathon Box storage building. View looking northeast from main entrance.

Photo 26

Marathon Box storage building. Miscellaneous debris including pallets, drums and scrap metal in foreground.

Photo 27

Marathon Box storage yard. View looking north from main entrance.

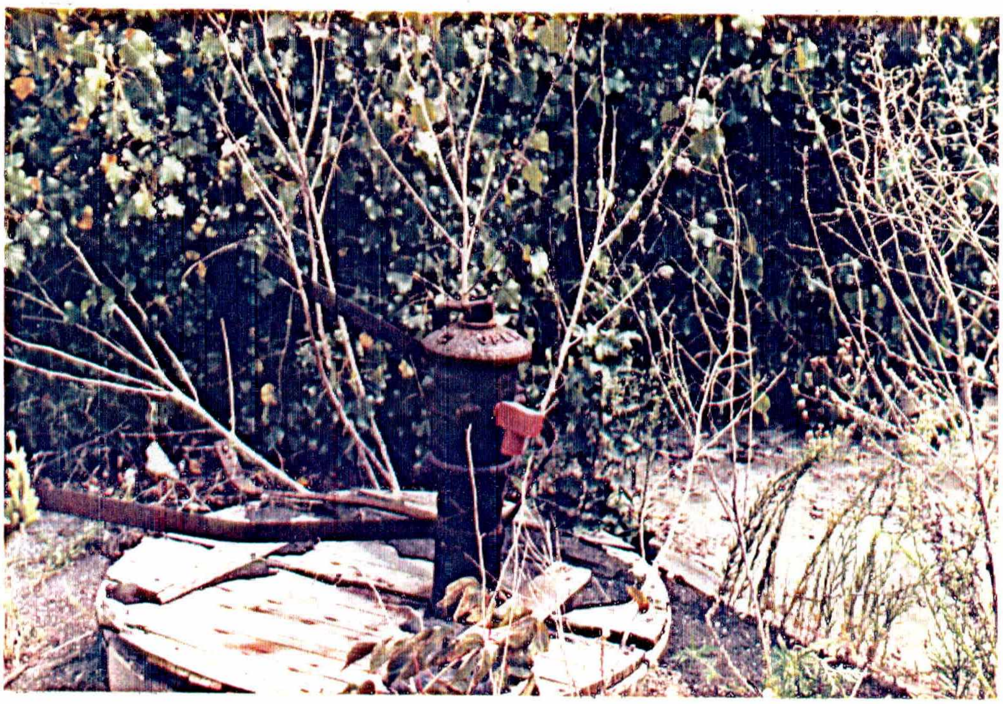

Photo 28

Pit containing oil stained sawdust.