STATE OF NEBRASKA

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Governor

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DEC 13 1994

Diane Easley
U.S. EPA, Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

RE: Explanation of Significant Differences (ESD) - Plume 1, Well #3 Subsite, Hastings, Nebraska

Dear Ms. Easley:

The Department has reviewed the Explanation of Significant Differences (ESD) for the Plume 1, Well #3 Subsite, and the memorandum on the estimated air emission rates for the proposed air stripper system both dated November 29, 1994. Based on the results of the air emission study which estimate emission rates to be well below levels that would create adverse health effects, the Department agrees with EPA's proposed changes to the remedy selected in the Record of Decision (ROD).

If there are any questions, you may call Ken Maas at (402) 471-3388.

Sincerely,

Richard Schlenker

Richard Schlenker
Superfund Section, Supervisor
Air and Waste Division

30353458
Superfund

DECLARATION AND EXPLANATION OF SIGNIFICANT DIFFERENCES

SITE NAME AND LOCATION

Well #3 Subsite, Operable Unit #13, Plume 1 Ground Water
Hastings Ground Water Contamination Site
Hastings, Nebraska

STATEMENT OF PURPOSE

This document sets forth the basis for the decision of the United States Environmental Protection Agency (EPA) to modify an aspect of the interim action remedy that EPA selected in the June 30, 1993 Record of Decision (ROD) concerning the Well #3 Subsite, Ground Water Operable Unit #13, Plume 1.

STATUTORY BASIS FOR ISSUANCE OF EXPLANATION OF SIGNIFICANT DIFFERENCES

Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. § 9617(c), provides that if any remedial action taken after adoption of a final remedial action plan differs in any significant respects from the final plan (i.e. in scope, performance or cost), EPA shall publish an explanation of the significant differences (ESD) and the reason such changes were made. In addition, the EPA may, at its discretion, prepare an ESD when the Agency determines the need for a significant change to the ROD which does not alter the selected remedy.

Based on information which has developed during the course of the remedial design, EPA has determined that changes are necessary to components of the selected remedy described in the ROD. The changes to the remedy are the result of pre-design evaluations performed to assure the cost-effective implementation of the remedy and attainment of remedial action goals. The changes do not fundamentally alter the remedy selected in the ROD with respect to scope, performance, or cost.

Components of the selected remedy which are impacted involve the system to treat contaminated extracted ground water prior to reinjection. In the ROD, EPA had considered both a granular activated carbon (GAC) system and an air stripping system as possible treatment systems. EPA had selected GAC based upon the expected concentration loading factor and the anticipated rate of removal prior to release, reuse or reinjection. Through this ESD, EPA changes that decision and selects air stripping as the system to treat contaminated ground water prior to reinjection.

In accordance with Section 117(d) of CERCLA, 42 U.S.C. § 9617, this ESD and supporting documents will become part of the Administrative Record which is available

for public review at the EPA Region VII Records Center, 726 Minnesota Avenue, Kansas City, Kansas and at the Hastings Public Library, Fourth and Denver Streets, Hastings, Nebraska.

The EPA serves as the lead agency for this project, with support from the Nebraska Department of Environmental Quality (NDEQ).

The EPA completed a series of investigations of the Well #3 Subsite and released a draft Feasibility Study Report in 1993. The EPA published a ROD for the ground water interim action on June 30, 1993. A detailed history of activities at the subsite and a discussion of contamination problems associated with the Well #3 Subsite are contained in the ROD. The ROD defines the Agency's selected remedy for two distinct plumes of contamination at the subsite. This document presents the change in the selected interim remedy for Plume #1 as presented in the ROD. The reader is referred to the ROD for additional information about the subsite and EPA's decision to require cleanup of the ground water.

DESCRIPTION OF SIGNIFICANT DIFFERENCE

The ROD, which contains the interim remedial action plan for Plume 1 at the Well #3 Subsite, selects extraction and treatment as a remedy for Plume #1 and specifies that GAC be used to treat contaminated ground water to MCLs prior to reinjection or reuse. This document modifies the ROD by selecting air stripping prior to reinjection as the means to treat contaminated ground water.

EPA conducted a pre-design investigation of the subsite in 1994.[1] During the investigation, EPA observed a dramatic decline in the levels of CCl_4 contamination at the subsite. This may be attributable to the success of SVE, which was conducted from June 1992 through June 1993 at the subsite, as well as the recent rebounding of the ground water.[2]

Results of the pre-design investigation indicated that the highest levels of CCl_4 are now in the vicinity of CW-5, a monitoring well located approximately 1900 feet downgradient of the source area. CW-5 is positioned to capture the majority of contamination flowing downgradient from the source area and will capture any water that exceeds the 31 ug/l interim action target concentration. For that reason, CW-5 was chosen as the well where the extraction and treatment would occur. It is anticipated that the levels of CCl_4 will diminish within a short period of time and for the majority of time

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[1] The results of this study are published in the Draft Pre-Design Investigation Report for Well #3 Ground Water Interim Action, June 1994.

[2] Ground water levels at CW-1 have risen 5.74 feet from September 1992 to April 1994.

that CW-5 is pumping, the levels of CCl_4 will be below 10 ug/l.

EPA concluded in its investigation that GAC would not be a cost effective treatment technology for the low levels of contamination now being observed in Plume #1.[3] This is based on the fact that GAC has very limited adsorption capacity when used to treat low levels of contamination. The adsorption capacity of GAC is only 0.24 micrograms of CCl_4 per gram of GAC when water is contaminated with 10 ug/l of CCl_4. Therefore, GAC costs would be very high on a mass removed per dollar basis (an estimated $5000 per pound).

Through this ESD, EPA is selecting air stripping without emission controls as a means for removing the CCl_4 from the contaminated ground water. The emissions associated with air stripping are estimated to be well below levels that would create adverse health effects. Air stripping without emissions control will not violate any Federal or State standard, requirement, or limitation that is Applicable or Relevant and Appropriate (ARAR), including Title 129 of the State of Nebraska Rules and Regulations - Air Pollution Control Rules and Regulations.

EPA selects air stripping for the following reasons:

Effectiveness: air stripping is well proven to achieve volatile organic compound (VOC) removal efficiencies of over 99 percent.

Implementability: Air strippers for this application are readily available from a number of vendors. Installation and operation is simple. There are no hazardous waste residuals generated through the process, as opposed to GAC which requires transportation and treatment or disposal at a RCRA permitted facility.

Cost: Air stripping without emissions control is the least costly VOC treatment process available.

A tray-type, low-profile air stripper is recommended as it is more compact, easy to install and economical.

EPA evaluated the following discharge options for the treated water: industrial use, storm water discharge, infiltration trenches and reinjection wells. EPA selected reinjection of the treated water back into the aquifer to allow for water conservation. The number and location of the reinjection wells were based upon subsite data.

The State of Nebraska agrees with the changes presented in this ESD.

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[3] These conclusions are set forth in the Preliminary Design Report for the Well #3, Plume 1 Ground Water Operable Unit Number 13, August 1994.

AFFIRMATION OF STATUTORY DETERMINATIONS

This interim action is protective of public health, welfare and the environment. This action complies with action-specific and chemical-specific Federal and State ARARs and is cost-effective. Although this interim action is not intended to fully address the statutory mandate for permanence and treatment to the maximum extent practicable, this interim action utilizes treatment and thus is in furtherance of that statutory mandate. Subsequent actions are contemplated to further address the threats posed by the conditions at this subsite. Because this interim remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted to ensure that the interim remedy continues to provide adequate protection of human health and the environment within five (5) years after commencement of the remedial action. Review of this subsite and of this interim remedy will be ongoing as EPA continues to develop remedial alternatives for the Well #3 Subsite.

PUBLIC INFORMATION

This ESD is being mailed to State and Local officials, the Potentially Responsible Parties and other interested parties who obtained copies of the ROD from EPA. The EPA will publish a notice regarding availability of this ESD in the Hastings Tribune. This document will also be included in the Administrative Record.

DECLARATION

For the foregoing reasons, by my signature below, EPA is issuing this Explanation of Significant Differences for the Well #3 Subsite, Hastings Ground Water Contamination Site, Hastings, Nebraska.

12/13/94
Date

for Dennis Grams, P.E.
Regional Administrator

DRAFT

PRE-DESIGN INVESTIGATION REPORT FOR

WELL NUMBER 3 GROUND WATER INTERIM ACTION

June 1994

U.S. ENVIRONMENTAL PROTECTION AGENCY

CONTRACT NO. 68-W9-0025

HASTINGS GROUND WATER CONTAMINATION SITE HASTINGS, NEBRASKA

Prepared By:

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DRAFT

PRE-DESIGN INVESTIGATION REPORT
WELL NUMBER 3 GROUND WATER INTERIM ACTION

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PRE-DESIGN INVESTIGATION REPORT
WELL NUMBER 3 GROUND WATER INTERIM ACTION

1.0 INTRODUCTION

Morrison Knudsen Corporation (MK) conducted a field investigation to support remedial design (RD) at the Well Number 3 subsite in Hastings, Nebraska. Work was generally conducted in accordance with the Remedial Design Work Plan for the Well #3, Plume 1 Ground Water Operable Unit Number 13 dated March, 1994 (MK, 1994). The investigation focused upon addressing data gaps with regard to the extent of the 31 microgram per liter (μg/l) carbon tetrachloride (CCl_4) plume targeted for interim action, the extent of the silt/clay layer, which has been determined to be an effective barrier to contaminant movement into the deeper part of the aquifer, and to determine the probable aquifer response to pumping above the silt/clay layer so that a well system could be designed (flow rates and well spacings).

An investigatory borehole program was conducted in order to satisfy the study objectives focusing on plume limits and extent of the silt/clay lens. Data from that program generated information as to the CCl_4 distribution through in situ ground water samples. The presence of the silt/clay lens was also determined through logging of core samples. The investigatory borehole program operations and results are presented in Section 2.

A ground water extraction pumping test, followed by a 39-day pilot test, was conducted to determine hydraulic properties of the aquifer in the vicinity of the plume. The objectives of the 39-day pilot test were:

- To determine the time rate of removal of CCl_4;
- to determine the of influent concentration of CCl_4 as a function of time, and to observe the concentration trends of other compounds (notably trichloroethylene [TCE], 1,1,1-trichloroethane [TCA], and tetrachloroethylene [PCE]) as a function of time; and

- to understand the long term effects of pumping upon aquifer drawdown and the radius of influence.

The sum of this information may be used to aid in water extraction and treatment system design. Hydraulic testing operations and results are summarized in Section 3.

Results and summary interpretations of the overall investigation findings are presented in Section 4.

2.0 INVESTIGATION BOREHOLE PROGRAM

Four investigatory boreholes were drilled at the locations shown in Figure 1 to profile CCl_4 contamination and extent of the silt/clay layer. Boreholes were drilled between April 9, 1994 and April 22, 1994 according to procedures described in the Sampling and Analysis Plan (SAP), Appendix A of the Remedial Design Work Plan. Core samples were collected within the aquifer to furnish sample for grain size analysis and to determine the presence and depth to the silt/clay lens as specified in the SAP. In situ ground water samples were collected to determine lateral and vertical extent of CCl_4 contamination. In addition to the sampling specified in the SAP, EPA requested that selected soil core samples be submitted for analysis of volatile organic compounds (VOCs).

In situ water samples were analyzed using a field gas chromatography (GC) which results in quick turnaround of results. As investigation results became available, the sequence of borehole drilling, borehole locations and sampling depths was modified from the initial SAP which had specified that five boreholes be drilled. The modified program was directed toward more cost effectively determining the presence of CCl_4 contamination at or above the interim action clean-up goal of 31 μg/l. For example, because the first borehole, RDB-1, did not find the clay layer, subsequent drilling focused upon locations RDB-3 and RDB-5, where higher contaminant concentrations were anticipated to be found. When CCl_4 concentrations were found to be below the 31 μg/l interim action target concentration at these locations, plans to drill two other boreholes, RDB-2 and RDB-4, were dropped. These two boreholes were located in areas where concentrations were anticipated to be lower than at the locations where boreholes had already been drilled. A new borehole location, RDB-6, was added where data collected during the subsite remedial investigation (RI, MK, 1992) suggested CCl_4 concentrations in excess of 100 μg/l existed in 1991 and 1992 and

where "stepping in" from the first two boreholes added more refinement in estimating the plume limits.

In addition to the remedial design boreholes, two observation wells (P1 and P2) were drilled in the vicinity of CW-1 in conjunction with the pumping test on that well. Sample results from the observation well boreholes are incorporated in the following discussions of the borehole investigatory program.

The following sections present a summary of the borehole investigation activities in situ soil sample results and in situ water sample results.

2.1 Investigation Operations Summary

Conventional hollow stem auger methods were used to drill the investigatory borings and observation well boreholes. J&R Drilling, Inc. of Grimes, Iowa, provided drilling services. In situ aquifer core samples and in situ water samples were collected by inserting and retrieving sampling tool and rod assemblies through the hollow core of the augers. Selected samples were analyzed for VOCs.

In situ water samples were collected with a HydroPunch® I sampler. The HydroPunch® and associated sampling tubing and stopcock was disassembled and decontaminated with a hot water sprayer between each sample depth, and between borehole locations. The drive rods were decontaminated between borehole locations. The intake screen was replaced when worn or broken from use.

In situ aquifer cores were collected using three varieties of coring tools, a standard 2-inch (1.5-inch I.D.) by 24-inch split-spoon, a 3-inch (2.5-inch I.D.) by 18-inch California Modified split-barrel sampler, and a 3.5-inch (3-inch I.D.) by 5-foot split-barrel CME sampler. The CME sampler permitted a reduced number of sample runs in the effort to identify the silt/clay layer.

Hastings Municipal Supply water was added to each borehole after the shallowest in situ ground water and all but one of the shallowest in situ aquifer core samples were acquired. Water was added for the purpose of controlling sand flowing into the augers or preventing sand binding sampling equipment (sand lock) within the augers.

Cuttings samples were collected in Ziploc® bags and in 8 ounce glass jars on alternate five foot intervals within the vadose zone. The cuttings samples collected in 8 ounce jars were used to classify the drilling waste for disposal purposes, and to describe the subsurface lithology. The cuttings collected in Ziploc® bags were described. MK personnel logged all cuttings and core according to the Unified Soil Classification System (USCS), and collected all samples. Borehole logs are presented in Appendix A. The descriptions are compared to descriptions from previous subsite investigations by PRC (1990) and MK (1992).

Remedial design boreholes were abandoned by pumping a bentonite/water slurry after drilling. The pumping test observation wells were left open for potential future sampling and to measure aquifer response in future tests, including any remedial action.

2.2 In Situ Soil Sample Results

The soil (aquifer core) sampling was directed at determining the presence of the silt/clay lens, aquifer grain size and descriptive physical characteristics, and VOC concentration.

The silt/clay lens was absent in borings RDB-1, RDB-3, and RDB-5. It was confirmed to be present at the observation well locations. No attempt was made to determine its presence at RDB-6 because its presence had been confirmed in borings surrounding this location during the present and previous investigations.

In situ core samples were submitted for analysis at the EPA Region VII laboratory and at MK's Hastings field office. Core samples were submitted for analysis via the following methods:

- Region VII EPA standard operating procedures for soils analysis and soil headspace analysis

- GC on saturated soil sample headspace at MK's Hastings field office according to Attachment C of the SAP

The results of the soil sampling are presented in Table 1. All EPA analyses reported non-detectable concentrations of VOCs. These results normalized the VOC concentrations on a mass to mass basis (total mass of compound per unit mass of dry soil matrix). The on site GC results reported detectable quantities of VOCs including CCl_4, 1,1,1-TCA, TCE, and

PCE. An interference with 1,1-dichloroethylene (1,1-DCE) prevented reliable detection and quantification of this compound for the on site analysis. On site results for this compound are not summarized in Table 1.

The EPA soil analyses included dual analyses of each sample submitted. One analysis was performed on the sample collected using standard methods (8 oz. glass jar container). An analysis on a sample collected using an experimental collection procedure (plastic syringe/40-ml vials) was also performed. The on site GC sample was collected in the same manner as the experimental sample.

The concentration units reported for the on site GC results are identical to in situ ground water sample concentration units. Detectable concentrations reflect the presence of contaminants present in the ground water retained in the pores of the sample as well as contaminants adhering to the matrix. Because the on site GC analyzed vapor derived from the soil and pore water, these results should be used as an indicator of the presence of these compounds, not as quantification of actual concentrations in the soil matrix.

The sampling points and lithologic descriptions of the samples are referenced in the borehole logs (Appendix A). Appendix C contains the results of the physical and chemical tests on soil and water samples.

2.3 In Situ Ground Water Sample Results

The in situ ground water sampling was directed at determining the 31 μg/l spatial limits of CCl_4 contamination exceeding 31 μg/l to establish the areal extent of the plume to be targeted for remediation. All in situ ground water samples were submitted for analysis via the following methods:

- Region VII EPA standard operating procedures for low detection limit VOC water sample analysis

- GC on water sample headspace at MK's Hastings field office according to Attachment C of the SAP

A sample collected at a depth of approximately 135 feet at boring RDB-6 was submitted to a private laboratory subcontracted by MK and analyzed by EPA Method 624 in addition to

EPA Region VII laboratory analysis and on site headspace analysis. The results of the in situ ground water sampling are presented in Table 2. The table presents, for each water sample, the lab which performed the analysis, whether the sample was a duplicate, VOCs detected, and their concentrations. Concentrations of CCl_4 are comparable between the site GC and off site (EPA and private) laboratories. Detections of TCE, PCE, and 1,1,1-TCA are also consistent between on site and off site analyses, given the concentration levels and method detection limits.

An interference with 1,1-DCE identical to that which prevented reliable detection and quantification of this compound for the on site soil analysis was also present in the on site in situ ground water analyses. Therefore, the on site results for this compound have not been summarized in Table 2. One occurrence of 1,1-DCE above detection limits was reported by EPA (2 μg/l at observation well P-2). Only one additional compound, chloroform at 1 μg/l at observation well P-2, was reported above detection limits by EPA.

In general, on site GC analyses reported similar numerical concentrations as the EPA results, and are not significantly different than EPA data. Preliminary results for the Hastings on site GC were 40 to 50 times higher for VOC concentrations than appear in Tables 1 and 2. These initial results were recomputed based upon new calibration standards. Both the EPA and private lab results confirm the recomputed concentrations.

Figure 2 presents the in situ ground water sample results with the April, 1994 Well#3 quarterly ground water sample results. The map also presents the area previously suspected to have CCl_4 concentrations exceeding 31 μg/l based on data presented in the 1992 RI report.

3.0 SUMMARY OF PUMPING TEST PREPARATION AND OPERATION ACTIVITIES

Observation well drilling and redevelopment of well CW-1 were undertaken from April 5 through April 9, 1994, prior to the start of pumping tests at well CW-1. An abbreviated step test and 3-day pumping test were conducted between April 9 and April 14, 1994. A 39-day test commenced April 23, 1994. Activities associated with these tests are described in the following sections. Test results are summarized in Sections 4.3 and 4.4. Appendix B presents a detailed description and analysis of the 3-day pumping test.

3.1 Preparation of CW-1

CW-1 was redeveloped prior to pump installation for aquifer tests and the treatability study. The well was redeveloped through a combination of surging, bailing, and pumping. Surging concentrated on five foot intervals of well screen using a three-foot stroke. Immediately upon completion of surging, the well was bailed. Silt and minor volumes of fine sand were retrieved in the bailer. After the initial redevelopment of well CW-1, two feet of solid material was found at the bottom, which had not been the case when the well was sounded prior to development. The volume of material was of concern, for some of the sediment was of a size larger than the screen slot size of 0.010 inch. The material could represent filter sand that may have entered the well during its construction (i.e. while being tremied). If the original development was incomplete, both the presence of the large size particles and the large amount of silt produced in the current redevelopment would be consistent.

A second possible cause for the larger particles is a damaged well screen, allowing formation material to enter the well. It is conceivable that either the casing damage had existed and gone unnoticed over the years, or was caused by the redevelopment. The well was able to produce clear water over the pumping test, and as such its condition should be reevaluated if CW-1 is to be used in the final remedy.

Residual suspended material was removed from the well with a Grundfos Redi-Flo 2® pump set at a rate of 1.7 gallons per minute. The pump was set slightly above the bottom of the well. Water quality parameters (pH, temperature, and specific conductivity) were monitored on a regular basis. Discharge water turbidity was noted. As water clarity improved, the discharge was directed down the well casing to wash the casing and to agitate the water column. The pump was periodically shut off to allow the discharge to back flow into the well to provide additional agitation of the water column and place into suspension fine materials for pumping. This procedure was repeated until no further improvement in water clarity could be observed, and water quality parameters had stabilized.

After re-development, a Grundfos JS 10-05 submersible pump was placed in the well on 1.25-inch Schedule 80 threaded PVC pipe cut in 10 foot lengths. A check valve was installed immediately above the pump. Teflon tape was wrapped around the threads at each pipe joint. Threaded PVC couplers joined each length of pipe.

The Schedule 80 pipe was suspended in a sanitary seal placed in the well casing. The pump intake is 2.3 feet above the bottom of the well. Static water level is approximately 9.5 feet above the pump intake.

A pre-built well shed providing security, heat, and electrical power was placed by crane over the well and secured to a concrete pad surrounding the well after pump installation.

3.2 Observation Well Construction

Two observation wells were installed from April 6 through April 9, 1994. Well casing and screen materials consist of 2-inch Schedule 80 PVC. Screen slot size is 0.020 inches. Annular materials include a 16-30 sand pack, bentonite pellet seal, and bentonite slurry grout. The surface completion at each well includes a locking steel protective casing set in concrete.

Well P-1 was completed 12 feet from CW-1 with 20 feet of screen. This well fully penetrates the aquifer above the silt/clay lens. Well P-2 was completed 34 feet from CW-1 with 15 feet of screen. The screen position provides nearly complete penetration of the aquifer above the silt/clay lens. The water table currently extends above the screen by approximately two feet. The aquifer thickness at P-2 at the time of installation was approximately 16.5 feet. Borehole logs and well completion diagrams for observation wells P-1 and P-2 are presented in Appendix A.

3.3 Pumping Test Operations Summary

A 3-day pumping test was conducted at a flow rate of approximately 6 gallons per minute (gpm) on well CW-1 from April 11 to 14, 1994. The description of the test, the methods of analysis, and the results are presented in detail in Appendix B. Samples from CW-1 were collected on each day of the test for on site GC analysis, and at the end of the pumping period for EPA Region VII laboratory analysis. Prior to the 3-day test, a step-test was run to check the system, establish flow rates, and to collect water samples prior to and after water treatment. The granular activated carbon treatment units (two 55-gallon drums) were by-passed during the 3-day pumping test due to high pressure in the discharge system. The high pressure buckled the drum lids, but did not render the drums unusable for the 39-day test. The high pressure was caused by back pressure due to several hundred feet of 5/8-inch inside diameter discharge hose extending from CW-1 to a storm sewer grate. This diameter

hose created pressure greater than 30 psi through the granular activated carbon treatment units.

The 3-day pumping test cell consisted of a pumping well, CW-1, and four observation wells: preexisting monitor wells, CW-2 and CW-3R, and two new piezometers, P-1 and P-2. The cell layout is shown in Appendix B.

Water levels were measured with a water level indicator over a 7-day period at average 5-hour intervals, with pressure transducers used to record water levels in wells P-1 and P-2 during the 3 days of pumping and one day of recovery. Recovery was monitored until 10:00 April 15, 1994, at which point 90% recovery had been achieved in wells CW-1, P-1 and P-2.

The results from the aquifer hydraulic analysis are discussed in Section 4.3. Analyses of water samples collected during the 3-day test and step-test are discussed in Section 4.4.

The long term pumping of well CW-1 began on April 23, 1994 and was discontinued on June 1, 1994. This test was originally to be 60 days; however, the test was cut short for the following reasons:

- CCl_4 concentration vs time was relatively stable at 4 to 5 μg/l; therefore, EPA felt it would be appropriate to stop pumping for a month or two to evaluate whether a rebounding effect would occur.

- The pump experienced sporadic shutdowns resulting from blown fuses. MK will investigate possible causes for these shutdowns and try to correct the problems so pumping of CW-1 can be resumed without continued shutdowns.

The discharge tubing creating high system pressure was replaced with 1-inch diameter tubing for this test. A flow rate of 8 gpm was realized without further damage to the carbon units. Samples were collected on a weekly basis from CW-1. These samples were collected prior to and after treatment. Analytical results for the samples collected during this test are presented in Section 4.4. Section 4.4 also presents the findings of water level measurements collected during the 39-day test.

4.0 INTERPRETATION OF INVESTIGATION AND PUMPING TEST RESULTS

The RD investigation provided additional data on the extent of the silt/clay layer. The data have been interpreted to indicate that area covered by the silt/clay layer is less than previously interpreted for the RI (MK, 1992). The extent of the silt/clay layer is further discussed in Section 4.1. In situ ground water sample results provided data regarding the lateral and vertical extent of CCl_4 contamination in the investigation area. All in situ ground water samples indicated CCl_4 concentrations less than 31 μg/l, the target concentration for the interim action. The significance of these results is presented in Section 4.2. The results of the 3-day pumping test are presented in Section 4.3. Results from the long term pumping test are presented in Section 4.4.

4.1 Limits of Silt/Clay Layer

The limits of the silt/clay layer may be reasonably interpreted to extend 500 feet downgradient, and 200 to 300 feet side-gradient of CW-1, located at the source area (Figure 1 and 2). It was absent in borings RDB-1, RDB-3, and RDB-5 south of the Burlington Northern (BN) railroad tracks. The layer is also absent in well CW-4, north of the BN tracks. The absence of this clay in the boreholes south of the BN tracks and in CW-4 demonstrate that the extent of the silt/clay layer should be approximately no further down-gradient than a line drawn from CW-4 to RDB-1. The distance to this line from CW-1 along the direction of groundwater flow is approximately 900 feet. The layer's limited extent restricts the utility of this natural barrier to vertical flow to site extraction wells. Its absence would allow contaminants to disperse vertically through the aquifer. This concept of vertical dispersion of CCl_4 contamination where the silt/clay lens is absent is consistent with analytical data from deeper in situ samples (i.e., below 140 feet). In areas where the silt/clay layer is present, deep contamination is usually absent. In areas where the layer is absent, deep contamination is usually present.

4.2 Carbon Tetrachloride Distribution in Ground Water

CCl_4 at concentrations less than 31 μg/l is widespread throughout the study area. In many cases, in situ samples revealed CCl_4 concentrations below the Maximum Contaminant Level (MCL) of 5 μg/l. Figure 2 presents the investigation results for each borehole location. Data are tabulated by borehole as opposed to contoured because low level concentrations through the study area do not show a pattern that can be obviously contoured above MCLs.

Although concentrations are low compared to the 1992 RI, they are consistent with both the current monitoring well data from the CW- series wells, and a one to one and a half year concentration decline for CCl_4 in several investigation area monitoring wells, which adds perspective on processes that might have occurred over the last 18 months.

Figure 3 presents the concentration of CCl_4 in samples collected from well CW-1 for the time period March, 1989 to present. As indicated in the figure, there has been an overall decreasing trend in concentration after December, 1989, when CCl_4 concentration reached 1400 μg/l. Concentrations have declined rapidly since September, 1992. There are at least two possible causes for this recent decline in concentration:

- Remediation of the vadose zone through soil vapor extraction in the source area, accompanied by re-equilibration of CCl_4 concentrations between the ground water and soil vapor; and

- Flushing of the aquifer accelerated by rising water levels at the subsite since September, 1992. Ground water levels at CW-1 have risen 5.74 feet from September 1992 to April 1994.

The relative degree to which these phenomena have impacted CCl_4 concentrations near the source area is unknown. Concentrations of CCl_4 outside the source area have shown variable trends in shallow and intermediate depth samples. Shallow samples in well M-3 and intermediate depth samples in well MW-23 have shown stable or increasing trends in CCl_4 concentration (Figures 4 and 5). M-3 and MW-23 are downgradient 4,610 and 5,540 feet, respectively, from the source area. CCl_4 concentration in CW-5 has shown a decrease since September, 1992 to April, 1994 from 21 μg/l to 14 μg/l (Figure 6). CCl_4 concentration remained at 21 μg/l from September, 1992 through March, 1993, before starting to decline in June, 1993. This well is located directly in the flow direction from CW-1, 1,875 feet down-gradient. Its screen is presently 14 to 43 feet below the water table. Since September, 1992 to April, 1994, CCl_4 concentration in CW-4 has shown a change from 3 to 4 μg/l (Figure 7). This well is located 1,150 feet down and side-gradient to CW-1. Its screen is presently 8 to 27 feet below the water table.

April 1994 CW-series monitoring well sample results are presented for comparison with in situ data on Figure 2. When the combination of borehole and monitoring well results are evaluated, there appears to be a narrow strip of contamination in the 10 to 15 μg/l range

extending from RDB-3 through the area of CW-5 to depths of 25 to 35 feet below the water table. The southern extent of this strip is appears bounded by the low concentration (0.6 μg/l, on site sample) of CCl_4 at 144 feet(20 feet below water) in RDB-5. In the area investigated and within this narrow zone of contamination, CCl_4 is found at its greatest depths below the water table. At least the upper 23 feet of the aquifer at RDB-3 and 35 feet at CW-5 (from 1991 in situ results and the current water level) contain CCl_4.

Consistent with the conclusions of the RI, the vertical distribution of CCl_4 appears to be controlled both by the limit of the silt/clay layer and ground water flow direction. The area of deeper contamination defined by boreholes RDB-3, RDB-5, and CW-5 is found downgradient of the silt/clay layer.

CCl_4 contamination in the ground water from 5 to 10 feet below the water table ranges from 2 to 15 μg/l (EPA results) in in situ groundwater samples. The highest concentrations were found at the source area (14 μg/l at P-2), and at the furthest down-gradient borehole location (15 μg/l, RDB-5). The other shallow in situ sample results are close to or below the MCL for CCl_4 of 5 μg/l.

4.3 3-Day Pumping Test

The average discharge for the test was 5.96 gpm. Drawdown in CW-1 reached approximately two feet after 3 days. Drawdown reached 0.09 foot in well CW-2, 188 feet from the pumping well. Drawdowns in observation well P-2, 34 feet from the pumping well, and in P-1, 12 feet from the pumping well, reached 0.41 and 0.60 feet, respectively.

The aquifer response observed at well CW-1 was that of an unconfined aquifer with an effective saturated thickness of 14 feet (i.e., limited by the localized clay layer). The transmissivity of the zone above the clay was estimated as approximately 8000 gpd/ft. Based on a 14-foot saturated thickness, this transmissivity represents an average hydraulic conductivity of 0.03 cm/sec. Unconfined specific yield of the aquifer was indicated to be approximately 0.05. Detailed evaluations of the data may be found in Appendix B. Other than the distance-drawdown analysis, all 3-day aquifer test data evaluations were facilitated using Geraghty & Miller, Inc. AQTESOLV, version 1.1R4, 1991.

From the distance-drawdown graph, Figure B-9 of Appendix B, and the 0.09 foot of drawdown in well CW-2, it is estimated that the radius of influence of well CW-1 extended to 295 feet, at least in the direction of CW-2.

Because the overall thickness of the Pleistocene aquifer is approximately 70 feet in the area of well CW-1 and there was good evidence from the CW-1 pumping test of the effective local hydraulic isolation its upper 14 feet, a pump and treat remedy can be applied effectively in the upper portion of this aquifer, with a minimal flow rate capable of exerting a sizeable radius of influence in the CCl_4 zone above the silt/ clay layer.

4.4 39-Day Pumping Test

As of June 1, 1994, the system discharged at an average operating rate of 7.9 gpm. From the readings on the totalizing flow meter on the discharge line, it is estimated that there were 63 non-operating hours between May 16 and May 18, and an additional 27 non-operating hours between May 19 and 20. The total volume of water pumped from April 23 to June 1 is approximately 392,000 gallons (1.48×10^6 liters).

4.4.1 Chemistry Results

Figure 8 indicates the CCl_4 concentration as a function of time after the pump was turned on. Samples were taken approximately once per week directly from the discharge pipe, prior to carbon treatment, and were analyzed at MK's Hastings office using a gas chromatograph. Figure 8 indicates that the CCl_4 concentration is approximately 5 μg/l, and is constant with time. For the pumping period, the product of the total discharge volume and the average concentration results in an estimate of 7.4 grams of CCl_4 removed from the ground water. Continued operation would result in approximately 5.7 grams per month CCl_4 removal.

The results obtained from the 39-day pumping test are generally consistent with the 3-day test, step test, and quarterly ground water sample result from CW-1 (Figure 8). Exceptions are an in situ sample result of 11.7 and 20 μg/l from 34-foot distant observation well P-2, and the result of 22 μg/l from the EPA analyzed sample collected during the third day of the 3-day test. These results may be indicative of varying concentration pockets or slugs moving through the ground water.

4.4.2 Hydraulic Results

The drawdown data for the pumping well and the same wells measured for the 3-day test, P-1 and P-2, are shown on Table 3. The data indicate that a steady state is quickly reached, and that drawdowns have stabilized at approximately 0.7 feet and 0.5 feet in wells P-1 and P-2, respectively. These drawdowns correlate with the drawdowns measured at the end of the 3 days test, in which well P-1 experienced roughly 0.6 feet of drawdown, and well P-2 experienced 0.41 feet of drawdown at a pumping rate of 5.96 gpm. The increase in drawdown in each of these well is, as expected, in direct proportion to the increase in discharge rate of well CW-1 between the two tests.

The results indicate that the discharge from the pumping well is sustainable over the long term, that steady state is quickly achieved as a result of pumping, and that well CW-1 can be used as an effective component of a pump and treat system for remedial action in this aquifer zone. Owing to the fact that the radius of influence was approximately 300 feet at the end of the 3 day test, and that drawdowns in closely spaced observation wells were similar for the 39-day test, the long term radius of influence for this well should likewise be on the order of 300 feet.

5.0 REFERENCES

Morrison Knudsen Corporation, March 1994. Remedial Design Work Plan for the Well #3, Plume 1 Ground Water Operable Unit Number 13.

Morrison Knudsen Corporation, December 1992. Remedial Investigation Report, Ground Water Operable Unit at the Well No. 3 Subsite, Hastings, Nebraska.

PRC Environmental Management, Inc., March 1990. Well Number 3 Remedial Investigation Final Technical Memorandum.

TABLES

1 THROUGH 3

TA[redacted]1

Aquifer (Borehole Soil) Sample Concentrations

Boring Location/Date	Sample Depth (Feet Below Ground)	Lab	Sample Identification	Compound Concentrations in µg/l (On Site Lab)[a], µg/kg (EPA Lab)			
				CCl_4	TCE	PCE	1,1,1-TCA
P-2 4/7/94	123.5 - 125	On Site EPA EPA	CORE-124 4-CS4MJ-060 4-CS4MJ-160	1.8 10U 9U	1.1 10U 9U	1.4 10U 9U	0.0 10U 9U
P-1 4/8/94	127.8 - 129.0	On Site EPA EPA	P-1-128S 4-CS4MJ-043 4-CS4MJ-143	0.3 6U 6U	1.9 6U 6U	0.1 6U 6U	0.0 6U 6U
P-1 4/8/94	136.9 - 137.1	On Site EPA EPA	P-1-137.3S 4-CS4MJ-044 4-CS4MJ-144	1.3 8U 9U	0.0 8U 9U	0.4 8U 9U	0.0 8U 9U
RDB-1 4/10/94	130.3 - 131.6	On Site EPA EPA	RDB-1-131S 4-CS4MJ-045 4-CS4MJ-145	0.1 11U 7U	0.0 11U 7U	0.3 11U 7U	0.0 11U 7U
RDB-1 4/10/94	140.3 - 145.3	On Site EPA EPA	RDB-1-143S 4-CS4MJ-046 4-CS4MJ-146	0.0 7U 6U	0.3 7U 6U	0.0 7U 6U	0.0 7U 6U
RDB-3 4/12/94	124.8 - 125.9	On Site On Site EPA EPA	RDB-3-125S RDB-3-125S-D 4-CS4MJ-047 4-CS4MJ-147	0.0 0.1 6U 7U	0.0 0.0 6U 7U	0.2 0.0 6U 7U	0.0 0.0 6U 7U
RDB-3 4/12/94	139.0 - 144.0	On Site On Site EPA EPA	RDB-3-142S RDB-3-142S-D 4-CS4MJ-048 4-CS4MJ-148	12.7 2.5 6U 8U	0.0 0.2 6U 8U	2.2 1.0 6U 8U	0.0 0.0 6U 8U
RDB-5 4/19/94	128.7 - 133.8	On Site EPA EPA	RDB-5-131S 4-CS4MJ-049 4-CS4MJ-149	4.0 6U 7U	0.0 6U 7U	0.0 6U 7U	0.0 6U 7U
RDB-5 4/19/94	135.0 - 140.0	On Site EPA EPA	RDB-5-138S 4-CS4MJ-050 4-CS4MJ-150	4.1 7U 7U	0.0 7U 7U	0.4 7U 7U	0.0 7U 7U
RDB-6 4/22/94	128.9 - 130.4	On Site EPA EPA	RDB-6-129S 4-CS4MJ-051 4-CS4MJ-151	2.6 6U 6U	5.8 6U 6U	4.6 6U 6U	0.9 6U 6U

[a] Quantities reported in units scaled to on site water sample headspace analysis
U: Actual value of sample is less than the measurement detection limit (reported value)

TABLE 2

In-Situ Ground Water Sample Concentrations

Boring Location/Date	Sample Depth (Feet Below Ground)	Lab	Sample Identification	Selected Compound Concentrations in µg/l			
				CCl_4	TCE	PCE	1,1,1-TCA
P-2 4/7/94	125 - 126.5	On Site On Site EPA	P-2-126.5 P-2-126.5-D 4-CS4MJ-001	**11.7** **20.0** **14**	**17.7** **26.3** **20**	**7.7** **13.9** **7**	**1.9** **2.8** **3**
RDB-1 4/10/94	131.5 - 133.0	On Site EPA	RDB-1-132 4-CS4MJ-008	**2.2** **2**	0.0 1U	**0.9** 1U	0.0 1U
RBD-1 4/10/94	145.1 - 146.6	On Site EPA	RDB-1-146 4-CS4MJ-009	0.0 1U	0.0 1U	**0.2** 1U	0.0 1U
RDB-1 4/10/94	163.2 - 164.7	On Site EPA	RDB-1-164 4-CS4MJ-011	0.0 1U	0.0 1U	**0.2** 1U	0.0 1U
RDB-3 4/12/94	129.4 - 130.9	On Site On Site EPA EPA	RDB-3-132 RDB-3-132-D 4-CS4MJ-012 4-CS4MJ-012-D	**3.0** **2.5** **3** **3**	0.0 0.0 1U 1U	**0.1** **0.1** 1U 1U	0.0 0.0 1U 1U
RDB-3 4/12/94	144.6 - 146.1	On Site On Site EPA	RDB-3-145 RDB-3-145-D 4-CS4MJ-013	**7.6** **7.5** **8**	**0.1** **0.2** 1U	**3.1** **4.9** **2**	0.0 0.0 1U
RDB-3 4/12/94	162.5 - 164.0	On Site EPA	RDB-3-164 4-CS4MJ-015	0.0 1U	0.0 1U	**0.3** 1U	0.0 1U
RDB-5 4/19/94	128.5 - 130.0	On Site On Site EPA	RDB-5-129 RDB-5-129-D 4-CS4MJ-016	**9.3** **10.2** **15**	0.0 0.0 1U	**0.7** **0.3** 1U	0.0 0.0 1U
RDB-5 4/19/94	143.4 - 144.9	On Site EPA	RDB-5-144 4-CS4MJ-019	**0.4** 1U	0.0 1U	0.0 1U	0.0 1U
RDB-5 4/19/94	154.7 - 156.2	On Site EPA	RDB-5-156 4-CS4MJ-020	0.0 1U	0.0 1U	0.0 1U	0.0 1U
RDB-6 4/22/93	134.7 - 136.2	On Site On Site EPA Off Site	RDB-6-135 RDB-6-135-D 4-CS4MJ-052 RDB-6-135	**4.9** **4.9** **6** **5.6**	**2.6** **2.6** **2** 5U	**3.0** **4.2** **2** 5U	**0.2** 0.0 1U 5U

Additional compounds detected in EPA analysis at P-2 (4-CS4MJ-001) include Chloroform at 1 µg/l and 1,1-DCE at 2 µg/l
U: Actual value of sample is less than the measurement detection limit (reported value)

Table 3

Well Flow and Observation Well Readings, CW-1 39-Day Test

Starting Date	Starting Time
23-Apr-94	02:14 PM

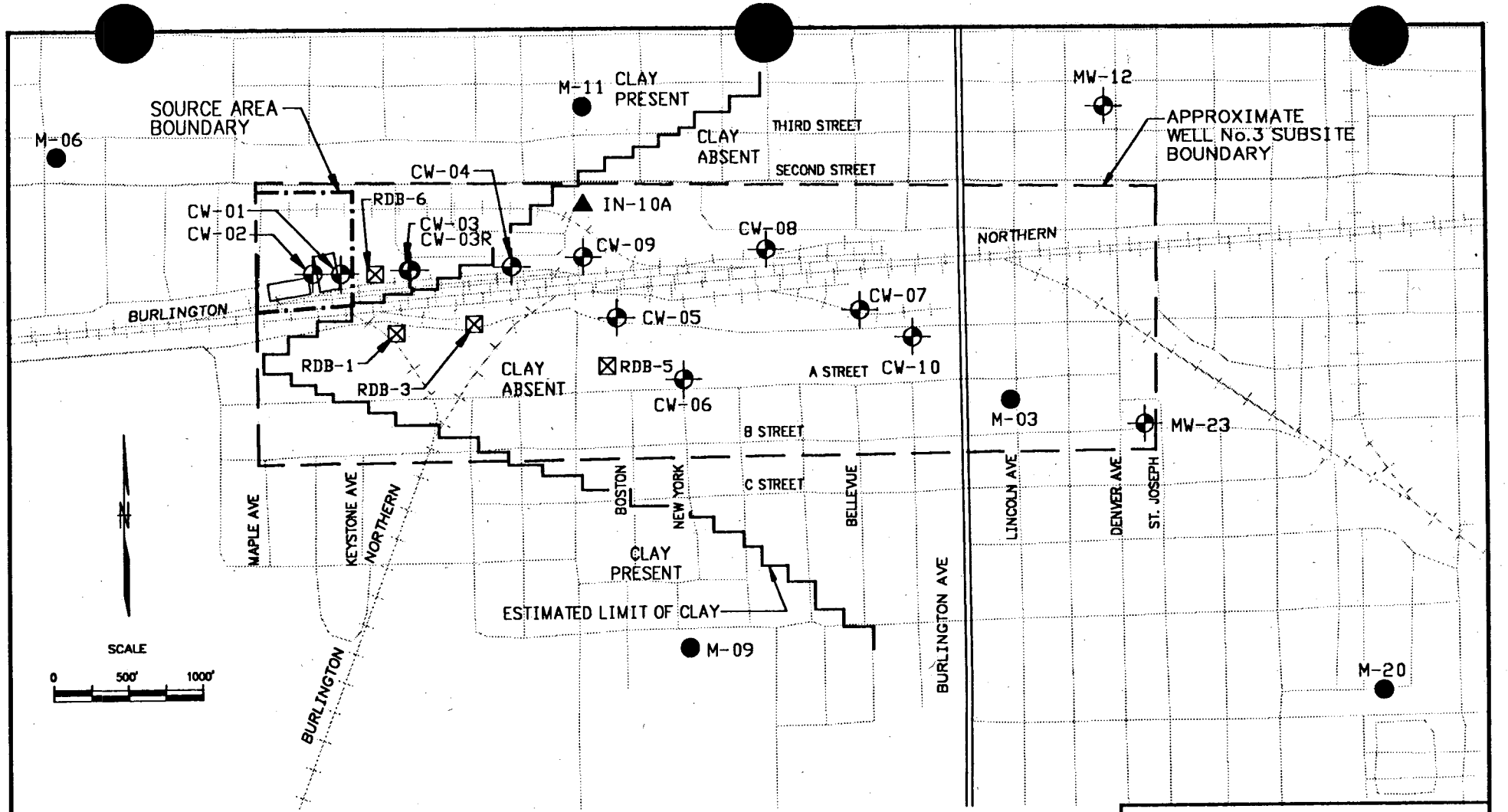
Static Water Levels

CW-1	P-1	P-2
121.87	121.83	122.71

Date	Time	Elapsed Time	Elapsed Time	Meter Reading	Avg. Flow Rate for Time Increment	Water Level Readings CW-1	P-1	P-2	Drawdowns CW-1	P-1	P-2
		(minutes)	(days)	(gallons)	(gpm)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
23-Apr-94	02:14 PM	N/A	N/A	89925	Initial						
23-Apr-94	08:55 PM	401	0.28	93030	7.74	124.25	122.30	123.03	2.38	0.47	0.32
24-Apr-94	05:02 PM	1608	1.12	102450	7.80	124.35	122.41	123.06	2.48	0.58	0.35
26-Apr-94	04:18 PM	4444	3.09	124617	7.82	127.70	122.63	123.41	5.83	0.80	0.70
28-Apr-94	06:26 PM	7452	5.18	148200	7.84	124.74	122.67	124.42	2.87	0.84	1.71
30-Apr-94	01:30 PM	10036	6.97	168470	7.84	124.66	122.64	123.33	2.79	0.81	0.62
03-May-94	08:45 PM	14791	10.27	206020	7.90	124.57	122.55	123.22	2.70	0.72	0.51
05-May-94	06:40 PM	17546	12.18	227970	7.97	124.51	122.48	123.10	2.64	0.65	0.39
07-May-94	08:30 PM	20536	14.26	251850	7.99	124.57	122.53	123.18	2.70	0.70	0.47
10-May-94	08:45 PM	24871	17.27	286380	7.97	124.55	122.50	123.17	2.68	0.67	0.46
12-May-94	06:40 PM	27626	19.18	308333	7.97	124.44	122.48	123.10	2.57	0.65	0.39
14-May-94	04:22 PM	30368	21.09	330114	7.94	124.59	122.51	123.18	2.72	0.68	0.47
17-May-94	07:22 PM	34868	24.21	348246	N/A	Pump off	37.96	hours pumped after prior reading			
18-May-94	09:11 PM		0.00			121.89	121.82	122.84	0.02	-0.01	0.13
18-May-94	09:09 PM	36415	25.29	348250	Restart						
20-May-94	07:45 AM	38491	26.73	353483	N/A	Pump off	10.96	hours pumped after prior reading			
20-May-94	10:58 AM	38684	26.86	353610	Restart						
22-May-94	03:28 PM	41834	29.05	378670	7.96	124.51	122.50	123.15	2.64	0.67	0.44
24-May-94	09:55 PM	45101	31.32	404790	8.00	124.59	122.54	123.21	2.72	0.71	0.50
26-May-94	10:54 AM	47320	32.86	422631	8.04	124.71	122.62	123.31	2.84	0.79	0.60
28-May-94	11:32 AM	50238	34.89	445955	7.99	124.58	122.56	123.20	2.71	0.73	0.49
31-May-94	11:09 AM	54535	37.87	480517	8.04	124.76	122.69	123.35	2.89	0.86	0.64
06-Jun-94	02:18 PM	63364	44.00	481880	N/A	Pump off	2.85	hours pumped after prior reading			
06-Jun-94	02:18 PM		Final	Static Readings:		121.78	121.73	122.65	-0.09	-0.10	-0.06
		Total Pumped =		391,955	gallons						
				1.48E+06	liters						

FIGURES

1 THROUGH 8



<CPD: 06/08/94 [TIME: 1:10 PM] >

HASTINGS GROUND WATER CONTAMINATION SITE
WELL NO. 3 SUBSITE OU13
HASTINGS, NEBRASKA

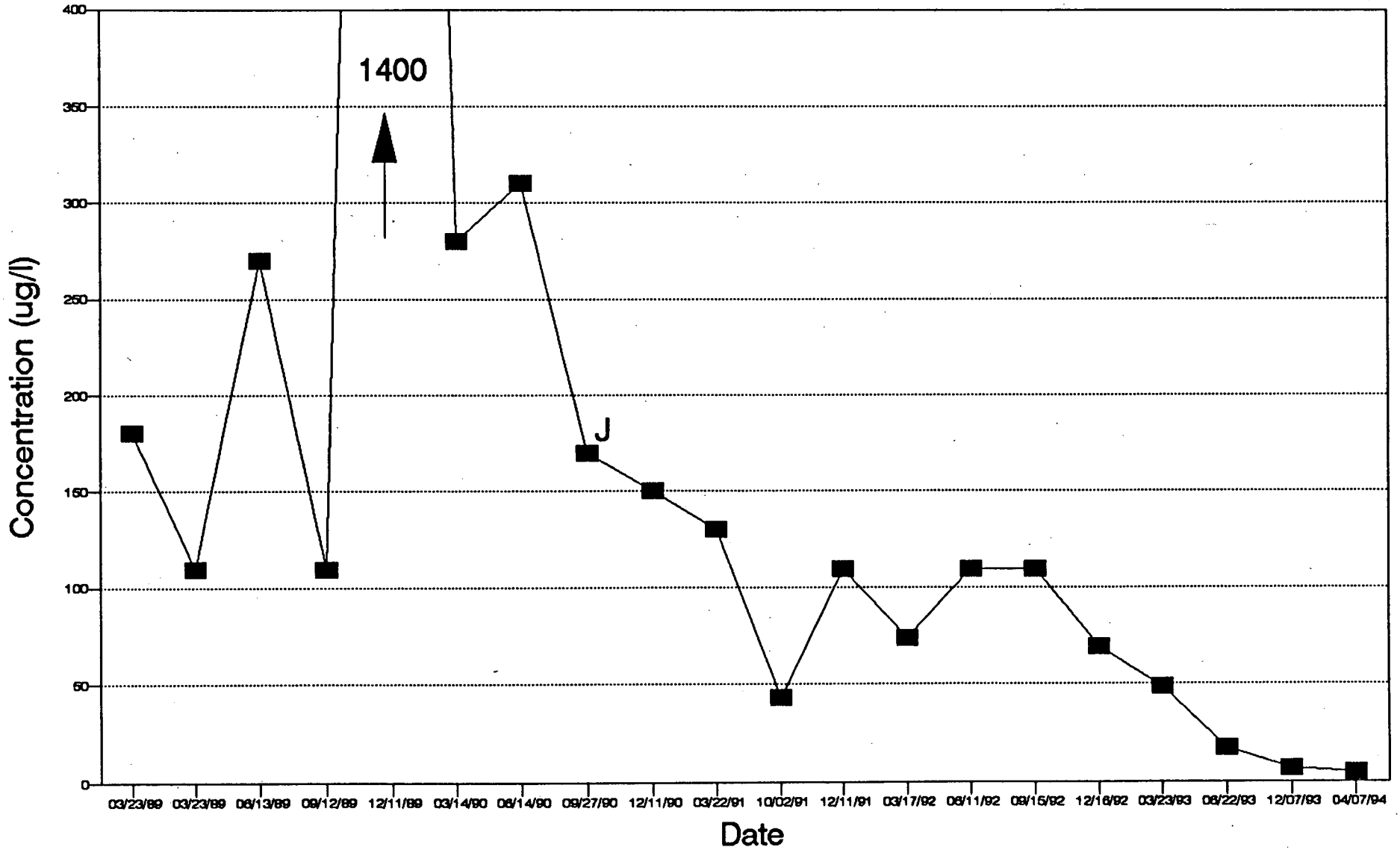
FIGURE 1
REMEDIAL DESIGN
BOREHOLE LOCATIONS

ARCS Regions VI, VII, VIII
US Environmental Protection Agency

MORRISON-KNUDSEN CORPORATION

FILE NAME (CAD) 133G001A.DWG		DATE: 05/24/94		
WORK ORDER	TASK	DRAWING NUMBER	REV	DRT
3780-2752	133G	FIGURE 1	A	P:

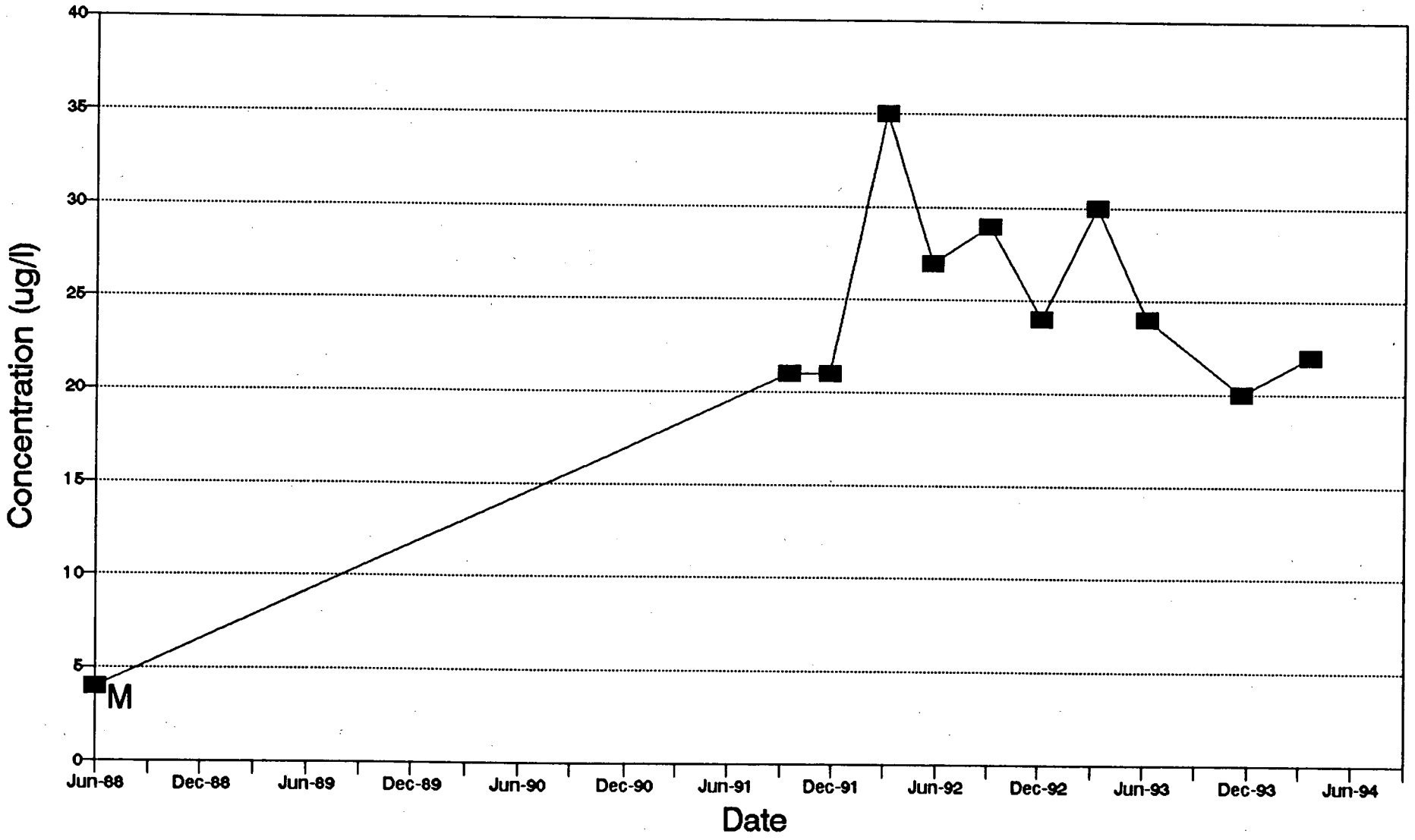
CONCENTRATION OF CCL4 vs. TIME
IN MONITORING WELL CW-1



J: Data Reported but not valid by approved QC procedures

FIGURE 3

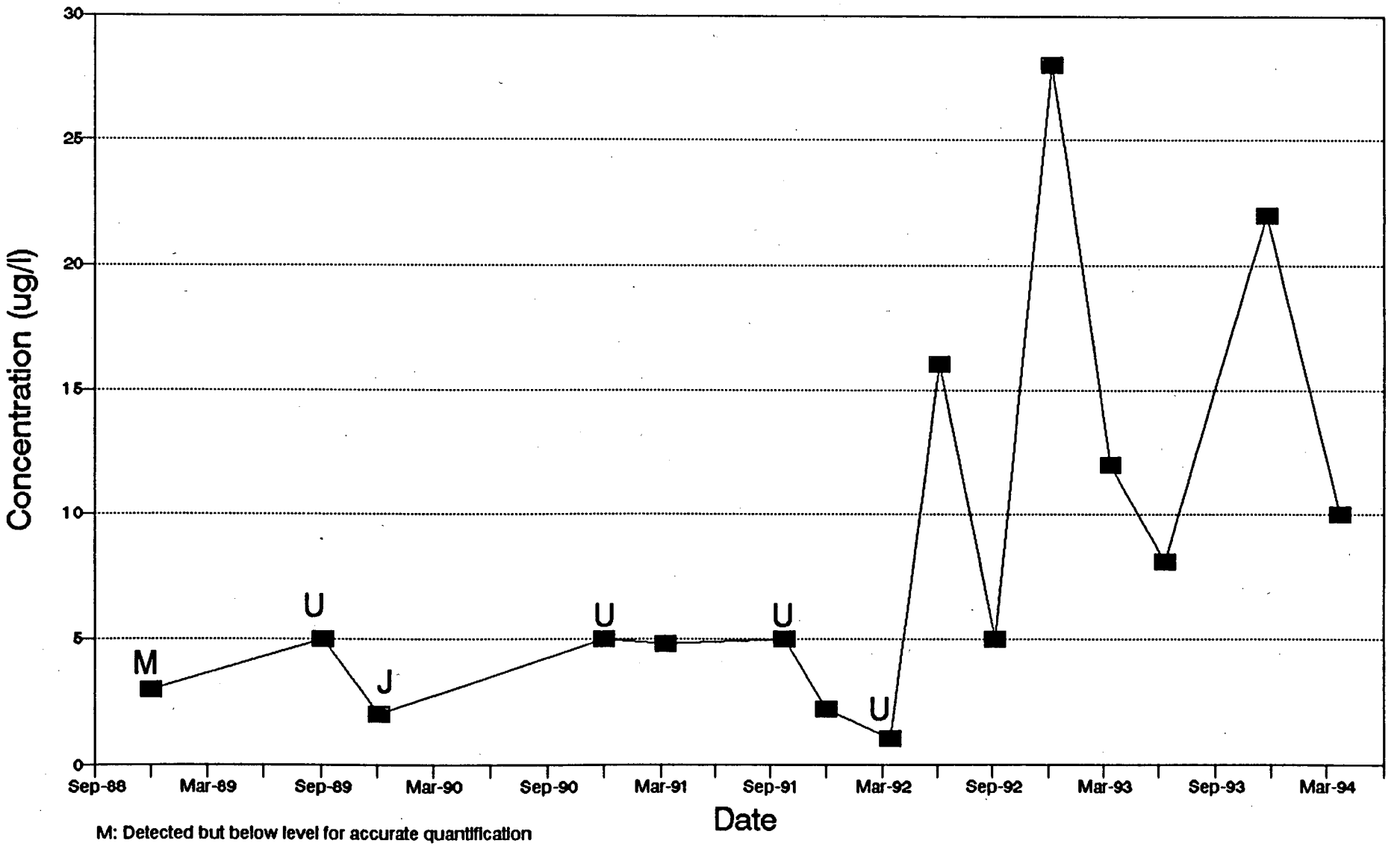
CONCENTRATION OF CCL4 vs. TIME
IN WELL M-3, 135 - 140 ft.



M: Detected but below level for accurate quantification

FIGURE 4

CONCENTRATION OF CCL4 vs. TIME
IN MONITORING WELL MW-23, 160-165 ft



M: Detected but below level for accurate quantification

J: Data Reported but not valid by approved QC procedures

U: Less than specified detection limit

FIGURE 5

CONCENTRATION OF CCL4 vs. TIME
IN MONITORING WELL CW-5

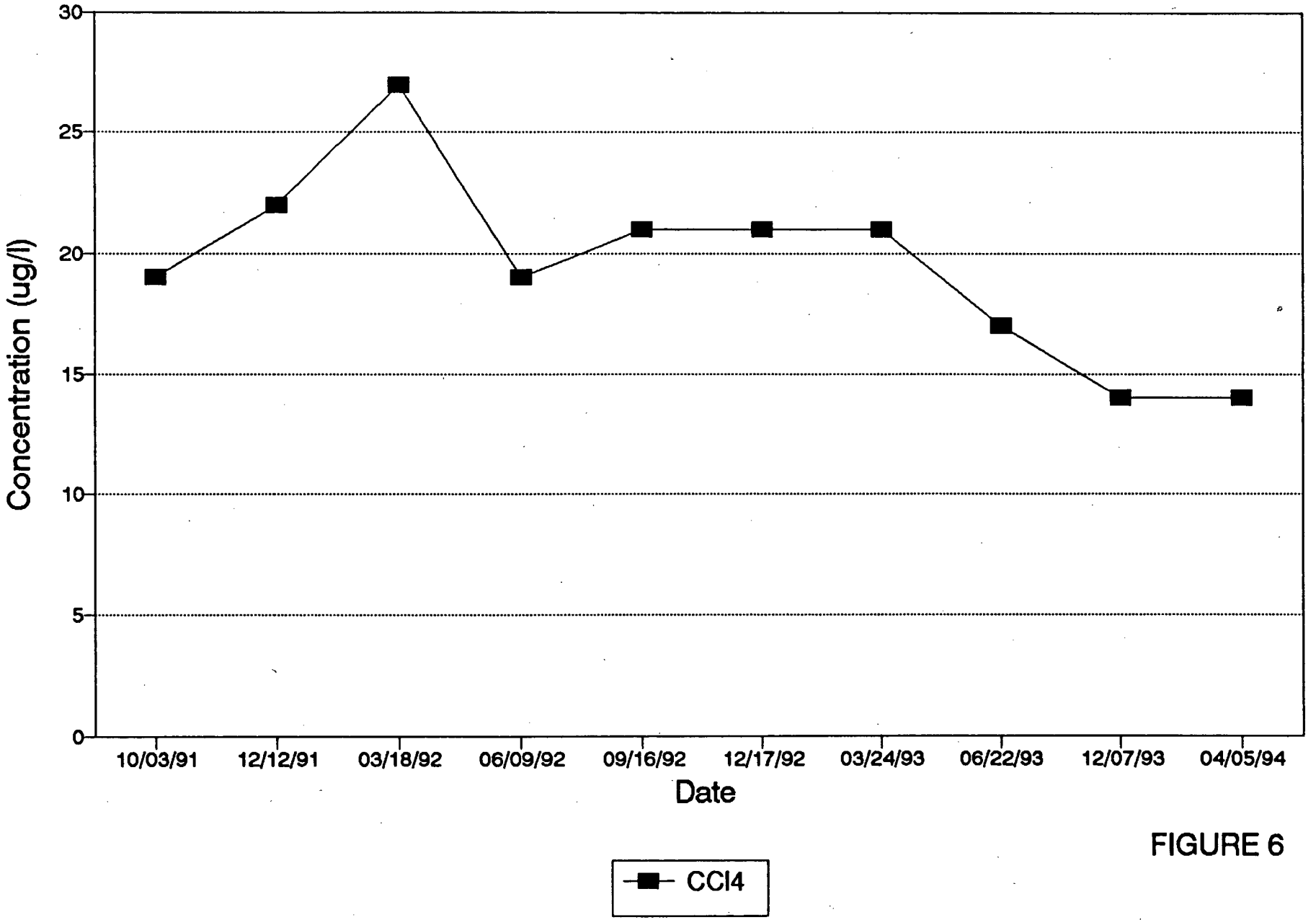
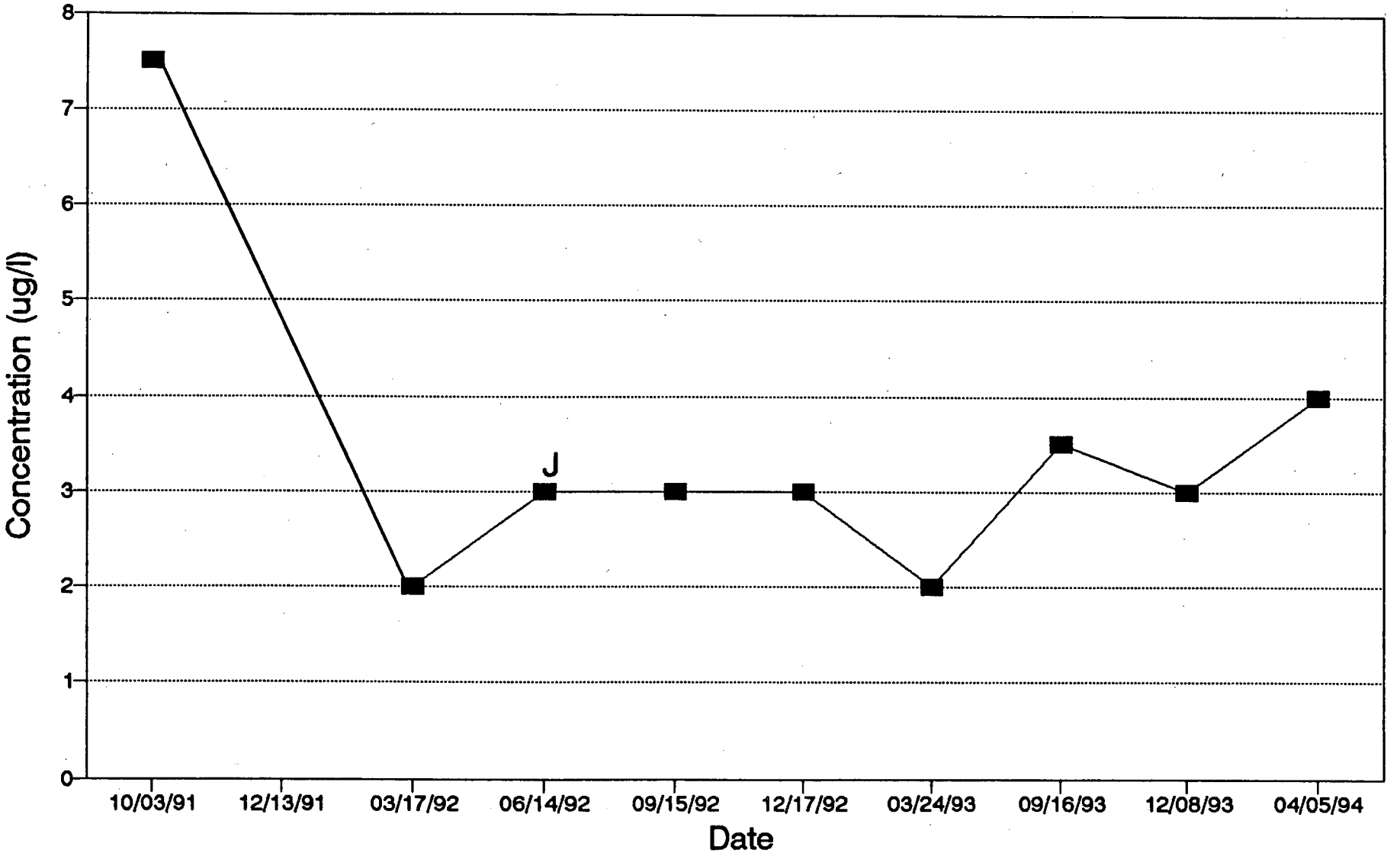


FIGURE 6

CONCENTRATION OF CCL4 vs. TIME
IN MONITORING WELL CW-4



J: Data Reported but not valid by approved QC Procedures

FIGURE 7

Concentration vs. Time

Well CW-1, 39-day Test

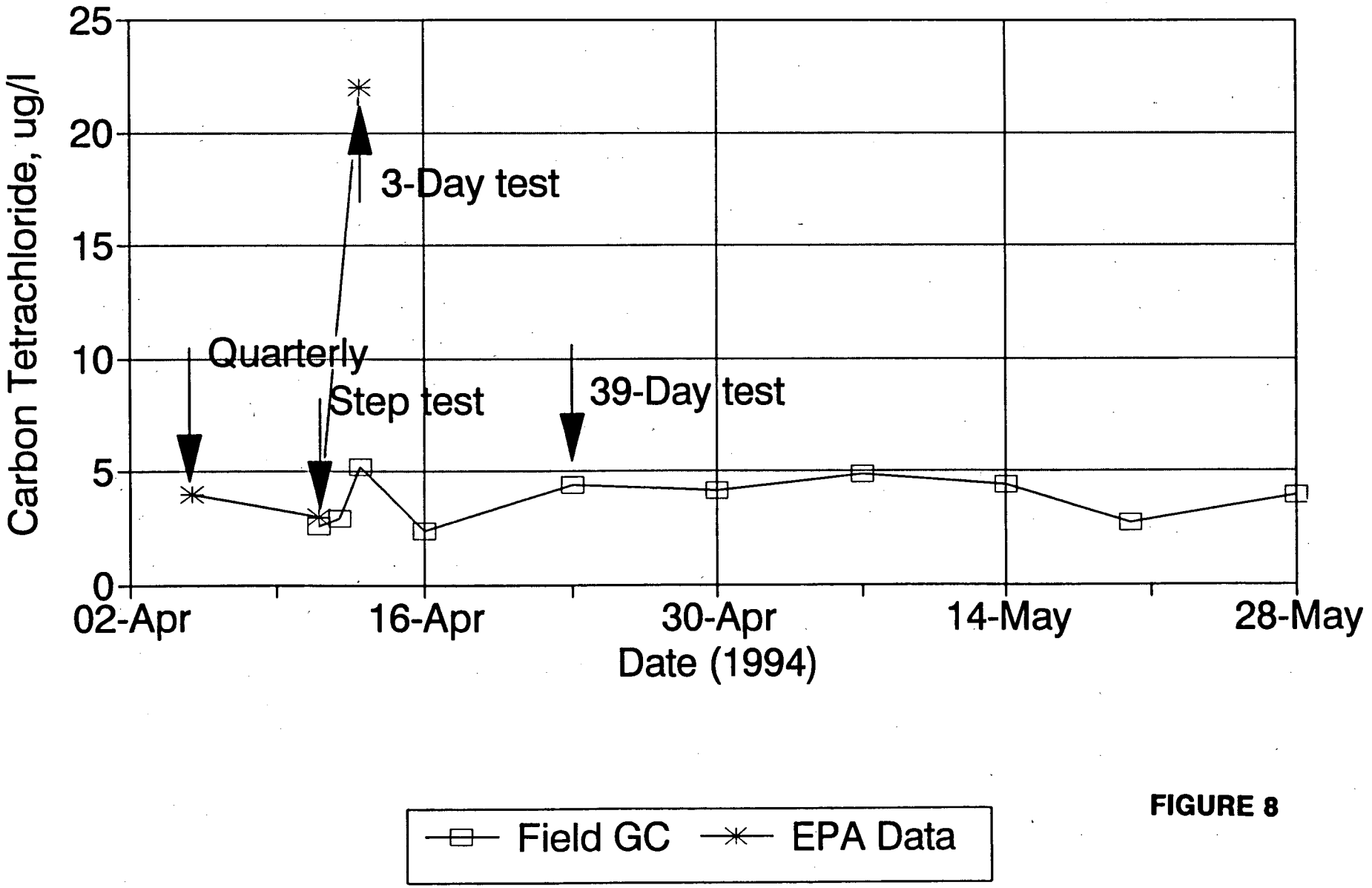


FIGURE 8

APPENDIX A

BOREHOLE LOGS AND WELL COMPLETION DETAILS

- **Borehole Logs**

P-1
P-2

RDB-1
RDB-3
RDB-5
RDB-6

- **Well Completion Diagrams**

Observation Well P-1
Observation Well P-2

BOREHOLE LOGS

Borehole Log Descriptions

Auger drilling mixes cuttings generated as the bit advances at depth with overlying sediments as they are lifted up the borehole. As a consequence, cuttings descriptions are generally considered to less reliably identify subsurface lithology as drilling depths and sediment mixing increase. Comparison of the lithologies described from cuttings collected from this investigation to core samples collected during previous susbite investigations by PRC (1990) and MK (1992) indicate the following:

- Geologic contact depths and descriptions compare closely between cuttings and core samples from the ground to 35 or 40 feet;

- Lithologic descriptions from cuttings tend to identify, to varying degrees, finer grained sediments below 40 or 50 feet. Geologic contacts may appear less well defined and may appear to occur at depths several feet greater than contacts observed or inferred from core samples from these depths;

- Coarse sands and gravels observed in core samples were never observed in cuttings samples. Textural changes in the cuttings samples were observed at comparable depths as coarse sands and gravels were observed in cores, but these particle sizes were never recovered in cuttings samples.

The following logs also report drilling time through the vadose zone, the depth to water as initially measured through the augers, organic vapor readings obtained using an HNu equipped with an 11.7 eV lamp sensitive to subsite compounds, type of sampling tool, percent of core recovery, and blow counts. A summary of the in situ water and core depth intervals is included with sample identifications where analytical samples were collected or grain size analyses samples selected.

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BOREHOLE LOG

Sheet 1 of 2
Project Number: 3780/2752
Hole Number: P-1

Project: WELL #3 RD	Location: 12' SW of CW-1			
Coordinates: CALCULATED STATE PLANE 277432.5N 2082611.6E	Drilling Contractor: J&R DRILLING SERVICES			
Drill Make and Model /Drilling Method: CME 750/HOLLOW STEM AUGER	Depth Top of Rock: -	Depth Casing & Size: BGS 135.93/2" SCH.80	Hole Size: 7 1/2	
Elevation: APPROXIMATE GROUND SURFACE	Angle from Vert. and Bearing: 2 to 2.5° S45W	Depth Bottom of Hole: 140.15		
Water Level: 120.5 BGS	Fluid & Additives: WATER	Date Start: 4/8/94	Date Finish: 4/9/94	Logger: P. WELLS

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION
							NOTE: CUTTINGS IDENTICAL TO P2. SEE P-2 BOREHOLE LOG FOR DESCRIPTION. DRILL TIMES ARE DAISIED BY (TIME, DEPTH) AND FOLLOW (0957, 0)(1013, 20), (1020, 30), (1030, 40), (1056, 65), (1110, 75), (1140, 100), (1200, 115).
	127						WATER @ 120.5 ON 4/8/94 @ 1312
		127.75 129.0	2" SPLIT SPOON	15/15 (100%)	10-44-50(3)		127.75-129.0, SAND (SW-SP), GRAYISH ORANGE, 10YR 7/4, 15% GRAVEL, 15% COARSE SAND (2-5 mm), TRACE SILT, WELL GRADED, SANDS ARE 80-85% QUARTZ, 10% LITHIC GRAINS, 5% DARK MINERALS, SUBROUNDED, SUBANGULAR, WET
	128		HNU @ 0.4 UNITS				ANALYTICAL SAMPLE: P-1-1285/4-C54MJ-043
			ANALYTICAL SOIL AND GRAIN SIZE				GRAIN SIZE SAMPLE: P-1-128G (SOIL)/4-C54MJ-026
	129						
	130						
	131						

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BOREHOLE LOG

Sheet 2 of 2
Project Number: 3780/2752
Hole Number: P-1

Project: Well #3 RD
Location: 122' SW of CW-1

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
	135						
		133.80-140.15 (overfall) HNU 135.23 to 136.27 ≤ 0.8-1.0 units	5' CME	56.5 / 86	–	ML	135.23-139.85 Silt with Sand to Sandy Silt (ML) Pale Yellowish Brown (10YR 6/2) 20-40% fine sand, < 0.125mm, poorly graded, quartzose, subangular to subrounded. Overall core non-plastic, dense, wet. Sharp contact with overlying aquifer sand as evidenced by embedded gravels in top of layer. Grades rapidly to underlying fine sand.
	136						
							Analytical Sample: P-1-137.35/4-C54MJ-044 (soil) collected at 20 to 22 inches below silt layer contact with aquifer
	137						
	138						
	139						
		HNU ≤ 139.45 0.3 units					
	140					SP	
						TD	139.85-140.15' Sand (SP) Pale Yellowish Brown (10YR 6/2) fine grained maximum size < 0.25mm, poorly graded 80% quartz, 20% dark minerals, subrounded, wet.
							T.D. 140.15'
	141						

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BOREHOLE LOG

Sheet 1 of 9

Project Number: 3780-2752

Hole Number: P-2

Project: WELL #3 RD	Location: 343' SW of CW-1
Coordinates: CALCULATED STATE PLANE 277415.6N 2082597.5E	Drilling Contractor: J&J DRILLING SERVICES
Drill Make and Model /Drilling Method: CME 750 / HOLLOW STEM AUGER	Depth Top of Rock: ~
Depth Casing & Size: BGS 138.8 2" SCH. 80	Hole Size: 7 1/2"
Elevation: REFERENCE: GROUND SURFACE	Angle from Vert. and Bearing: STRAIGHT
Depth Bottom of Hole: 138.6 BGS	
Water Level: 121.25 BGS	Fluid & Additives: WATER
Date Start: 4/6/94	Date Finish: 4/9/94
Logger: PAUL WILLS	

TMC

ELEVATION	DEPTH BELOW SURFACE (ft.)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
	10		CUTTINGS				0-4' CLAY, (CL). DUSKY BROWN (5YR 2/2), LOW PLASTICITY, MOIST (1845) 4-24' SILTY CLAY (CL-ML) OR LEAN CLAY, (CL). MODERATE YELLOWISH BROWN (10YR 5/4), LOW TO MEDIUM PLASTICITY, MOIST
	20						
	30						24-35' LEAN CLAY, (CL). DARK YELLOWISH BROWN (10YR 4/2), LOW TO MEDIUM PLASTICITY, MOIST.
	40						35-42' SILTY SAND (SM). DARK YELLOWISH BROWN (10 YR 4/2) FINE GRAINED (0.3mm MAX), 30-35% SILT QUARTZOSE, SUBANGULAR-SUBROUNDED, LOW PLASTICITY, SLIGHTLY MOIST. GRADING DOWNWARD TO SILTY SAND (SM), MODERATE YELLOWISH BROWN, FINE GRAINED, 20% SILT, QUARTZOSE, SUBANG.-SUBROUND, NON-PLASTIC, MOIST 42-57' LEAN CLAY WITH SAND (CL). DARK YELLOWISH BROWN (10 YR 4/2), SAND IS 45% OF SAMPLE, FINE GRAINED (0.125mm MAX) QUARTZ, SUBROUNDED, LOW TO MEDIUM PLASTICITY, MOIST
	50						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 2 of 4
Project Number: 3780-2752
Hole Number P-2

Project: WELL #3 RD
Location: 34.3' SW of CW-1

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
TOC	30		CUTTINGS				
1530 C60	60						57-65' SILTY SAND (SP-SM). MODERATE YELLOWISH BROWN (10 YR 5/4) FINE TO MEDIUM GRAINED TO 0.5 mm, 10-20% SILT, POORLY ~~SORTED~~ GRADED, NON PLASTIC, 95% QUARTZ, 5% DARK MINERALS, SUBANGULAR-SUBROUNDED, SLIGHTLY MOIST
	70						65-70' SILTY SAND (SM). DARK YELLOWISH BROWN (10 YR 4/2), 65-80% FINE TO MEDIUM GRAINED SAND TO 0.8 mm, 20-36% SILT, POORLY GRADED, LOW ~~HIGH~~ PLASTICITY, QUARTZOSE, SUBROUNDED-SUBANGULAR, SLIGHTLY MOIST.
1550 C75	75						70-85' SILTY SAND (SM), AS 65-70', BUT SLIGHTLY FINER GRAINED, ROUNDED, SOME GRAINS TO 1.0 mm.
	80						
1630 C90	90						85-115' SILTY SAND (SP-SM). MODERATE YELLOWISH BROWN (10 YR 5/4), FINE TO MEDIUM GRAINED UP TO 2.0 mm, 5-20% SILT, POORLY GRADED, NON PLASTIC, QUARTZOSE, SUBROUNDED, MOIST.
	100						
	110						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 3 of 9
Project Number: 37851 2752
Hole Number P-2

Project: WELL #3 RD
Location: 348' SW of CW-1

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
	110		CUTTINGS				
1700 ±115	115						
		SCALE CHANGE					CHANGE SCALE @123 FOR CORE DESCRIPTION
							WATER @ 121.25 on 4/7/94 @ 0830
							SAMPLE SUMMARY SOIL SAMPLE ① AT 123.5-125.0' (3" SPLIT BARREL) HYDROPUNCH SAMPLE ② AT 125-126.5' SOIL SAMPLE AT 133.9-135.9 (2" SPLIT SPOON) SOIL SAMPLE AT 137.9-138.6 (CME SAMPLE) ① 4-CS4MJ-060 CORE-124 ② P-2-126.5 4-CS4MJ-001
123							
		123.5-125.0	3" SPLIT BARREL	9½"/18	8-15-40		123.5-123.9 No Recovery
124		HNU @ BACKGROUND	ANALYTICAL SOIL IN SPOON			SP	123.9-124.35 SAND (SP) VERY PALE ORANGE (10YR 2/2) TO GRAYISH ORANGE (10YR 7/4) FINE TO MEDIUM GRAINED (UP TO 2mm CLASTS) POORLY GRADED, 95% QUARTZ, 5% DARK AND RED CLASTS, SUBANG-SUBROUNDED, (0.5-2mm; 50-80% OF SAMPLE, 0.5-1mm DOMINANT)
						SC	124.35-124.7 CLAYEY SAND (SC) YELLOWISH GRAY 5Y 7/2, MEDIUM SAND (1-2mm) DOMINANT, GRAVELS (5-10%) TO 10mm, POORLY GRADED LOW PLASTICITY, 15-20% CLAY, SAND IS QUARTZOSE, GRAVELS ARE LITHIC, SAND ROUNDED-SUBANGULAR, GRAVELS ROUNDED, WET
							124.7-125 No Recovery
125							ANALYTICAL SAMPLE: CORE-124/4-CS4MJ-060 (SOIL) WATER ANALYTICAL SAMPLE: P-2-126.5/4-CS4MJ-001
							BREAK TO 133
132.8							
133		HNU @ BACK-GROUND	3" SPLIT BARREL	3"/8"	40-50(2")	SP/SW	(132.8-133.5') SAND (SP/SW) GRAYISH ORANGE (10YR 7/4) DOMINANTLY MEDIUM TO COARSE (80-85% 0.5mm), 5-10% GRAVEL TO 10mm, MODERATE GRADING, SAND IS 80-85% QUARTZ, 10% FELDSPAR, 5% DARK MINERALS, GRAVELS DOMINANTLY FELDSPAR, SUBROUNDED, WET
134							

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 4 of 4
Project Number: 3786-275Z
Hole Number P-2

Project: WELL #3 RD
Location: 34.8' SW of CW-1

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
	133						
	134	133.9-135.9 HW a BACKREAM	2" SPLIT-SPOON AND 5' CME	19/24 CME 25/56	11-28-48-28 CME CORE RUN 133.9-138.6'		133.9-134.6 No RECOVERY
						SP	134.6-135.1 SAND (SP) GRAYISH ORANGE 10YR7/4, DOMINANTLY MEDIUM GRAINED, (60-70% IN 0.5-1.0mm RANGE) 5% GRAVEL TO 10mm, <5% SILT, POORLY GRADED, 85-90% QUARTZ, 5% DARK MINERALS, 5-10% FELDSPAR/LITHIC, SUBROUNDED, WET, GRADES DOWNWARD TO
	135					SP-SM to SM	135.1-135.6 SAND (SP-SM) to SILTY SAND (SM) PALE YELLOWISH BROWN 10YR6/2, FINE GRAINED (< 0.125mm), POORLY GRADED, QUARTZOSE, SUBROUNDED - SUBANGULAR, 10-20% SILT, WET.
						SW	135.6-135.7 SAND (SW) WITH GRAVEL, GRAYISH ORANGE 10YR7/4, FINE-COARSE SAND, TRACE SILT, 25-30% GRAVEL TO 30mm, WELL GRADED, 75% QUARTZ, SUBROUNDED, WET
							135.7-135.9 No RECOVERY
	136						↑ NO CME RECOVERY
							CME
						SW	136.52-137.85 SAND (SW), GRAYISH ORANGE, 10YR7/4, PREDOMINANTLY MEDIUM GRAINED (ESTIMATE 40-50% IN 0.5-1.5mm RANGE, 5-10% GRAVELS TO 30mm, TRACE TO NO SILT, 80-85% QUARTZ, SUBROUNDED, WET
	137						
							(0.17-0.33' GRAVELLY ALLUVIAL DEPOSIT ((15-20%) GRAVEL), ABRUPT SHARP CONTACT WITH UNDERLYING SILT.
	138					ML	137.85-138.6 SILT WITH SAND (ML) PALE YELLOWISH BROWN (10YR6/2), 20-40% FINE SAND, 60.125mm, POORLY GRADED SAND, SAMPLE NON-PLASTIC, DENSE, SAND QUARTZOSE, SUBANGULAR SUBROUNDED, WET.
							T.D. 138.6 BGS
	139						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 1 of 5
Project Number: 3780-2752
Hole Number: 2DJ-1

Project: WELL #3 2D		Location: So. of BNR TRACKS CROSS-GRADIENT TO CW3		
Coordinates: CALCULATED STATE PLANE 277642.1 N 2082993.1 E		Drilling Contractor: J&R DRILLING SERVICES		
Drill Make and Model /Drilling Method: CME 750 / HOLLOW STEM AUGER	Depth Top of Rock: -	Depth Casing & Size: -	Hole Size: 7 1/2"	
Elevation: REFERENCE = GROUND SURFACE	Angle from Vert. and Bearing: VERTICAL	Depth Bottom of Hole: 163		
Water Level: 123.93 BGS	Fluid & Additives: WATER	Date Start: 4/9/94	Date Finish: 4/10/94	Logger: P WELLS

TIME ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
1630	0		CUTTINGS			CL	0-3' LEAN CLAY (CL). DUSKY BROWN (5YR 2/2), MEDIUM PLASTICITY, SLIGHTLY MOIST (TOP SOIL)
						CONCRETE	3-5' CONCRETE WITH REBAR, YELLOWISH GRAY (5Y 8/1)
						SM	5-19' SILTY SAND (SM), PALE YELLOWISH BROWN (10YR 6/2), FINE TO MEDIUM GRAINED (5-10% MEDIUM GRAINED TO 1.0mm), 25-30% SILT, POORLY GRADED, NON-PLASTIC, QUARTZOSE, SUBROUNDED TO SUBANGULAR, DRY TO SLIGHTLY MOIST.
	10						
	20					CH	19-26' FAT CLAY (CH). DARK YELLOWISH BROWN (10YR 4/2) HIGH PLASTICITY, MOIST.
25'@ 1650						CL	26-33' LEAN CLAY (CL). DUSKY BROWN (5YR 2/2). GRAINS ARE DOMINANTLY SILT SIZE, LOW TO MEDIUM PLASTICITY, MOIST.
	30						
						CL	33-40' LEAN CLAY (CL). DARK YELLOWISH BROWN (10YR 4/2) 5-10% FINE GRAINED SAND TO 0.125mm, GRAINS ARE DOMINANTLY SILT SIZED, LOW TO MEDIUM PLASTICITY, MOIST.
40'@ 1702	40					SP	40-45' SAND (SP) MODERATE YELLOWISH BROWN (10YR 5/4), 5-10% SILT, FINE GRAINED TO 0.125mm, POORLY GRADED, QUARTZOSE, 10% FELDSPAR AND DARK MINERALS, SUBANGULAR TO SUBROUNDED, MOIST, FINING DOWNWARDS TO
						SM	45-50' SILTY SAND (SM). DARK YELLOWISH BROWN (10YR 4/2) 60% FINE GRAINED SAND TO 0.125mm, POORLY GRADED, NON PLASTIC, QUARTZOSE, SUBANGULAR TO SUBROUNDED, SLIGHTLY MOIST.
	50						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 2 of 5
Project Number: 3780-2752
Hole Number: RDB-1

Project: Well #3 RD
Location: So. of BNRR TRACKS; CROSS-GRADIENT TO CW-3

TIME	ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS: 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
							CL	50-60' LEAN CLAY WITH SAND (CL). DARK YELLOWISH BROWN (10YR 4/2), GRAINS ARE SILT AND SAND, 15-20% FINE GRAINED SAND (QUARTZOSE), LOW PLASTICITY, MOIST, DECREASING SAND CONTENT 55-60'.
60'@ 1730		60					ML	60-70' SANDY SILT (ML). DARK YELLOWISH BROWN (10YR 4/2), 30-40% FINE GRAINED SAND (POORLY GRADED, QUARTZOSE), LOW PLASTICITY, MOIST
		70	70-75' HNU 0.5 on cuttings	CUTTINGS			SP	70-75' SAND (SP). MODERATE YELLOWISH BROWN (10YR5/4) FINE TO MEDIUM GRAINED (5-10% MED. GR), POORLY GRADED, NON-PLASTIC, QUARTZOSE, SUBROUNDED, MOIST
75'@ 1750							SM	75-85' SILTY SAND (SM). DARK YELLOWISH BROWN (10YR 4/2), FINE GRAINED TO 0.4 mm, 10-30% SILT, POORLY GRADED, NON-PLASTIC, QUARTZOSE, SUBANGULAR-SUBROUNDED, MOIST.
		80						
85'@ 1805			85-90 HNU 1.5 ppm in Auger Hollow				SP-SM	85-95' SAND (SP-SM). MODERATE BROWN (10YR3/4), FINE TO MEDIUM (10-15%) GRAINED, 10-20% SILT, POORLY GRADED, NON-PLASTIC, 85% QUARTZ, 15% FELDSPAR, SUBANGULAR-SUBROUNDED, MOIST.
		90						
							SP	95-115' SAND (SP). DARK YELLOWISH BROWN (10YR4/2), FINE TO MEDIUM (10-15%) GRAINED, 5-10% SILT CLASTS DOWNWARD, POORLY GRADED, NON PLASTIC 80% QUARTZ, 20% FELDSPAR PLUS LITHIC GRAINS, ANGULAR TO ROUNDED, MOIST.
100'@ 1820 / 100'@ 0855		100						
		110						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 3 of 5
Project Number: 3780-2752
Hole Number: RDB-1

Project: WELL #3 RD
Location: SE. of BNRR TRACKS; CROSS GRADIENT TO CW-3

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
	120		CUTTINGS			No Recovery	115-130' No Recovery ▽ DEPTH TO WATER 123.93 ON 04/10/94 @ 0930 SCALE CHANGE AT 130 FEET
	130	130.3-131.63	3" SPLIT BARREL	16/16	25-48-50/4	SW	130.3-131.63 WELL-GRADED SAND (SW), MODERATE YELLOWISH BROWN (10YR 5/4), DOMINANTLY MEDIUM GRAINED (50-60% 0.4 TO 2.0 mm) 10% COARSE (2-5 mm), 20-25% FINE, 10-15% GRAVEL TO 15 mm, SAMPLE APPEARS WELL GRADED, 80-85% QUARTZ, 15% FELDSPAR, SUBANGULAR-SUBROUNDED, WET.
	131	HNU @ 0.2 ppm	ANALYTICAL SOIL SAMPLE AND LEAD IN SIZE				ANALYTICAL SAMPLE: RDB-1-131.5/4-C54MJ-045 (SOIL) GRAIN SIZE SAMPLE: RDB-1-131.6/4-C54MJ-027
	132					No Recovery	WATER ANALYTICAL SAMPLE: RDB-1-132/4-C54MJ-008 (131.46-133.96) = SCREEN INTERVAL
	135	135.42 TO 140.35	CME	29/60			135.42-140.35 WELL-GRADED SAND WITH GRAVEL (SW), MODERATE YELLOWISH BROWN (10YR 5/4), DOMINANTLY MEDIUM TO COARSE SAND (25-35% COARSE SAND (2-5 mm)), 20-25% GRAVEL, 85%, SUBANGULAR TO SUBROUNDED, WET.
	136	HNU @ 1.0 ppm					

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 4 of 5
Project Number: 3780-2752
Hole Number: RDB-1

Project: Well #3 RD
Location: So. of BNRR tracks; Cross Gradient to CW-3

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
						SW	SEE DESCRIPTION FOR 135.42-140.35'.
	137						
						?	
	138						
	139					No Recovery	
	140						
		140.35 TO 145.31	CME Analytical Soil Sample	17"/60"		SW	140.35-145.31 WELL-GRADED SAND (SW). MODERATE YELLOWISH BROWN (10YR 5/4) DOMINANTLY MODERATE TO COARSE GRAINED, 25-30% COARSE SAND, 10% GRAVEL TO 10 mm, 10-15% FINE SAND (0.07-0.4 mm), 75-80% QUARTZ, SUBANGULAR TO SUBROUNDED, WET, AND (AT BOTTOM OF CORED INTERVAL), POORLY GRADED SAND (SP). PALE YELLOWISH BROWN (10YR 6/2), FINE SAND (<0.4 mm) DOMINANTLY LESS THAN 0.3 mm, 75% QUAR 25% DARK MINERALS (MICA?), SUBANGULAR, WET
	141	HNU @ 0.6 ppm					
						?	
	142					No Recovery	ANALYTICAL SAMPLE: RDB-1-143S/4-CSAMJ-046 (SOIL-SW)

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 5 of 5
Project Number: 3780-2752
Hole Number: RDB-1

Project: WELL #3 RD
Location: So. of BNRR TRACKS; CROSS-GRADIENT TO CW-3

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS: 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
143							
144						NO RECOVERY	
145						P SP	WATER ANALYTICAL SAMPLE RDB-1-146/4-CSAMJ-009 SCREEN INTERVAL 145.11-146.61
							BREAK - NO CUTTINGS RECOVERY
163							
	163.34 TO 164.18	3" SPLIT BARREL	10/9.5	28-50 (3½")	CL		163.34-163.59 CLAY (CL). LIGHT BROWN (5YR5/6), DENSE, (CANNOT PERFORM PLASTICITY TEST), WET. (GRAVEL CLASTS TO 6mm EMBEDDED ON SHARP UPPER CONTACT). SHRINK CRACKS ON DRYING.
					SM		163.59-163.93 SILTY SAND (SM). MODERATE YELLOWISH BROWN (10YR5/4), DOMINANTLY FINE SAND, 5% MEDIUM SAND TO 1.0mm, 30-35% SILT, QUARTZOSE, SUBROUNDED, WET. SHARP CONTACTS WITH ADJOINING LITHOLOGY.
164	WNU & 0.2 TO 0.4				SP-SW		163.93-164.18 POORLY GRADED TO WELL GRADED SAND (SP/SW), GRAYISH ORANGE (10YR7/4), MEDIUM TO COARSE SAND DOMINATES, 15-20% COARSE SAND, 5% GRAVEL TO 10mm, 75-80% QUARTZ, SUBANGULAR-SUBROUNDED, WET.
165							WATER ANALYTICAL SAMPLE: RDB-1-164/4-CSAMJ-011 REVISED SCREENED INTERVAL 163.23-164.73

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 1 of 6
Project Number: 3780.2752
Hole Number: RDB-3

Project: WELL #3 RD			Location: So. of BNRR TRACKS; No. of TURNTABLE	
Coordinates: CALCULATED STATE PLANE 277101.4 N 2083512.3 E			Drilling Contractor: J & R DRILLING	
Drill Make and Model /Drilling Method: CME 750 / HOLLOW STEM AUGER	Depth Top of Rock: -	Depth Casing & Size: —	Hole Size: 7 1/2"	
Elevation: REFERENCE: GROUND SURFACE	Angle from Vert. and Bearing: STRAIGHT HOLE	Depth Bottom of Hole: 163		
Water Level: 121.95 BES	Fluid & Additives: WATER	Date Start: 4/11/94	Date Finish: 4/12/94	Logger: P. WELLS

TIME / ELEVATION	DEPTH BELOW SURFACE (ft.)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
4/11 @ 1355 SPUD	0		CUTTINGS			BRICK	0-5' BRICK. MODERATE REDDISH BROWN (10R4/6)
						CL	5-10' LEAN CLAY (CL). MODERATE BROWN (5YR3/4), NO SAND (ALL SILT AND CLAY), MEDIUM PLASTICITY, MOIST
14	10					CH	10-25' FAT CLAY (CH). DARK YELLOWISH BROWN (10YR4/2), NO SAND, HIGH PLASTICITY, MOIST.
	20						
						CH	25-30' FAT CLAY (CH). DUSKY BROWN (5YR2/2), NO SAND, HIGH PLASTICITY, MOIST.
35' @ 1435	30					CL-CH	30-55' LEAN TO FAT CLAY (CL-CH). DARK YELLOWISH BROWN (10YR4/2), TRACE FINE SAND, GRAINS DOMINANTLY IN SILT SIZE RANGE, MEDIUM TO HIGH PLASTICITY, MOIST
	40						
	50						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 2 of 6
Project Number: 3780-2752
Hole Number: RDB-3

Project: WELL #3 RD
Location: So. OF BNRR TRACKS, No. OF TURNTABLE

ELEVATION	DEPTH BELOW SURFACE (ft.)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS: 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
	50		CUTTINGS				30-55' (SEE PAGE 1)
	60					SP	55-95' SAND (SP). MODERATE YELLOWISH BROWN (10YR 5/4) FINE TO 25-40% MEDIUM GRAINED, 5-10% SILT, POORLY GRADED, NON-PLASTIC, QUARTZOSE, SUBANGULAR TO ROUNDED, MOIST
	70						
	80						
	90						
	100					SM	95-110' SILTY SAND (SM). DARK YELLOWISH BROWN (10YR 4/2) FINE TO 15-20% MEDIUM GRAINED, 25-30% SILT, POORLY GRADED, NON-PLASTIC, QUARTZOSE, SUBROUNDED, COARSENING DOWNWARD.
	110						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 3 of 6
Project Number: 3780-2752
Hole Number: RDB-3

Project: WELL #3RD
Location: So. of BNRR TRACKS; No. OF TURNTABLE

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS: 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
	110		CUTTINGS			SP	110-120' SAND (SP). DARK YELLOWISH BROWN (10YR 4/2), FINE TO 10-15% MEDIUM GRAINED, 10% SILT, TRACE GRAVEL TO 10 mm, POORLY GRADED, NON PLASTIC, 80% QUARTZ, 20% FELDSPAR PLUS LITHIC GRAINS, ANGULAR TO ROUNDED, MOIST.
	120					NO RECOVERY	SCALE CHANGE DEPTH TO WATER AT 121.95 BGS ON 4/12/94 @ 0830
	124						
	125	124.76-125.93' HNU 0.5 ppm	3" SPLIT BARREL ANALYTICAL SOIL SAMPLE AND GRAIN SIZE	10"/14"	12-43-50/2"	SP	124.76-125.93' SAND (SP). DARK YELLOWISH BROWN (10YR 4/2), DOMINANTLY FINE TO MEDIUM GRAINED (0.125-1 mm), 5-10% COARSE, 5% GRAVEL, 85% QUARTZ, 5% FELDSPAR, 5% LITHIC, 5% DARK MINERALS IN FINE SAND RANGE, ROUNDED, SUBROUNDED.
						? NO RECOVERY	SOIL ANALYTICAL SAMPLE RDB-3-125S/4-CS4MJ-047 GRAIN SIZE SAMPLE 4-CS4MJ-028/RDB-3-125G
	126						
	128						
	129	128.63-133.63' HNU @ BACKGROUND	CME	24"/60" GRAIN SIZE		SW	128.63-133.63' WELL-GRADED SAND (SW), DARK YELLOWISH BROWN (10YR 4/2), BOTTOM 18" OF SAMPLE: GRAVELLY SAND, 15-20% GRAVEL TO 15 mm, 55-65% OF SAMPLE

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 4 of 6
Project Number: 3780-2752
Hole Number RDB-3

Project: WELL #3 RD
Location: So. OF BNRR; No. OF TURNTABLE

ELEVATION	DEPTH BELOW SURFACE (ft.)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
129						SW	CONTINUED.. MEDIUM TO COARSE GRAINED, 75% QUARTZ, 20% FELDSPAR, 5% LITHIC, SUBROUNDED/ SUBANGULAR; 18-24" FROM BOTTOM: SAND (SP). 80% MEDIUM GRAINED, 10% COARSE 90% QUARTZ, SUBANGULAR-SUBROUNDED.
130							COMPOSITE SELECTED FOR GRAIN SIZE RDB-3-130G/4-C54MJ-029
						?	HYDROPUNCH WATER SAMPLE 129.40-130.90; ORIGINALLY COMPUTED AS 131.68-132.58' RDB-3-132/4-C54MJ-012 AND 4-C54MJ-012-D.
131						No Recovery	
133							
	133.63-138.67	CME	10"/60"			No Recovery	133.63-138.67 [BOTTOM 4"]; SAND (SP) DARK YELLOWISH BROWN (10YR 4/2), FINE SAND TO 0.125mm, POORLY GRADED, QUARTZOSE, 5% LITHIC & DARK MINERAL GRAINS, SUBROUNDED. [4-10"]; GRAVELLY (30-35%) 55-60% COARSE SAND, REMAINDER MEDIUM, LITTLE FINE SAND, 40-45% FELDSPAR; LITHIC GRAINS, ROUNDED TO SUBROUNDED
134						SP	
						SP	
135						?	
						No Recovery	
136							

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 5 of 6
Project Number: 3780-2752
Hole Number RDB-3

Project: WELL #3 RD
Location: So. of BNRR, North of Turntable

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
136						No Recovery	
139		138.96-143.96 HNu Background	CME Analytical Soil Sample	34/60		No Recovery	138.96-143.96' [Bottom of core to 11.5" from bottom] Sand (SP). Dark Yellowish Brown (10YR4/2), fine sand to 0.125mm, poorly graded, quartzote with 5% lithic and dark mineral grains, subrounded, coarse sand lens from 5-6.5"
140						? SP	[From 11.5-34"] Sand (SP) Dark Yellowish Brown (10YR4/2), dominantly coarse grained, 30-35% gravel, trace fine sand, poorly graded, 60-65% quartz, 35-40% feldspar and lithic grains.
141							Soil Analytical Sample RDB-3-142.5/4-CS4MJ-098 from fine sand
142						SP	
143						? No Recovery	Hydropunch Water Sample RDB-3-145/4-CS4MJ-013 Sample interval 144.59-146.09 originally computed as 144.76-146.26
144							

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 6 of 6
Project Number: 3780-2752
Hole Number RDB-3

Project: WELL #3 RD
Location: So. of BNRR, North of TURNTABLE

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
	162						HYDROPUNCH WATER SAMPLE RDB-3-164/4-CSAMJ-015 SAMPLE INTERVAL 162.48-163.98, ORIGINALLY COMPOSED AS 163.24-164.74'
	163	163-163.25	3" SPLIT SPOON	0"/3"	50(3")	NO RECOVERY	No Recovery 163-163.25'
	164						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 1 of 5

Project Number: 3780-2752

Hole Number: RDB-5

Project: WELL #3 RD

Location: BETWEEN SOUTH 'A' ST., UPGRADIENT FROM CW-6

Coordinates: CALCULATED STATE PLANE 276815.8N 2084404.4E

Drilling Contractor: J&L DRILLING

Drill Make and Model /Drilling Method: CME T50/HOLLOW STEM AUGER

Depth Top of Rock: —

Depth Casing & Size: —

Hole Size: 7 1/2"

Elevation: REFERENCE GROUND SURFACE

Angle from Vert. and Bearing: STRAIGHT HOLE

Depth Bottom of Hole: 155 FEET

Water Level: 123.73 BGS

Fluid & Additives: WATER

Date Start: 4/18/94

Date Finish: 4/19/94

Logger: S. WELLS

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
TIME							
0 1815 SPUD @ 1845			CUTTINGS			CH	0-7' FAT CLAY (CH). DUSKY YELLOWISH BROWN (10YR 2/2), DOMINANTLY SILT SIZED GRAINS, 5-10% FINE SAND TO 0.1 mm, HIGH PLASTICITY, MOIST (= TOP SOIL)
	10					CL-CH	7-28' LEAN TO FAT CLAY (CL-CH) DARK YELLOWISH BROWN (10YR 4/2), TO MODERATE YELLOWISH BROWN (10YR 5/4), GRAINS ARE DOMINANTLY SILT SIZED, MEDIUM TO HIGH PLASTICITY, MOIST
20' @ 1500	20						
	30					CL-CH	28-33' LEAN TO FAT CLAY (CL-CH). DARK YELLOWISH BROWN (10YR 4/2) TO MODERATE BROWN (5YR 3/4), DOMINANTLY SILT, TRACE (5-10%) FINE SAND, MEDIUM TO HIGH PLASTICITY, MOIST
						CL-CH	33-35' CLAY WITH SAND (CL-CH). DARK YELLOWISH BROWN (10YR 4/2), DOMINANTLY SILT WITH 15-20% FINE SAND TO 0.1 mm, MEDIUM TO HIGH PLASTICITY, MOIST
40' @ 1515	40					CL	35-45' SANDY CLAY (CL). DARK YELLOWISH BROWN (10YR 4/2) TO MODERATE YELLOWISH BROWN (10YR 5/4), COARSENING TOWARD 45' WITH 30-40% FINE SAND TO 0.1 mm, LOW TO MEDIUM PLASTICITY, MOIST.
						CL-CH	45-55 CLAY (CL-CH). MODERATE YELLOWISH BROWN (CONTINUED)
	50						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 2 of 5
Project Number: 3780-2752
Hole Number RDB-5

Project: WELL #3 RD
Location: BETWEEN SO. AND A ST; UPGRADIENT FROM CW-6

TIME	ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
		50						45-55' CONTINUED.. (10YR5/4), 5-10% SAND TO 0.1mm, MEDIUM TO HIGH PLASTICITY, MOIST.
55'@ 1535							ML	55-60' SANDY SILT (ML). DARK YELLOWISH BROWN (10YR4/2) TO DUSKY YELLOWISH BROWN (10YR2/2), 30-40% FINE SAND TO 0.25mm, LOW PLASTICITY, MOIST, @ 60' SAND (SP), MODERATE YELLOWISH BROWN (10YR5/4), DOMINANTLY FINE TO 10% MEDIUM, POORLY GRADED, NON-PLASTIC, MOIST, QUARTZOSE, 5-10% FELDSPAR, SUBROUNDED
		60					SC	
							SM	
70'@ 1604		70						60-65' CLAYEY SAND (SC). MODERATE YELLOWISH BROWN (10YR5/4) TO DARK YELLOWISH BROWN (10YR4/2), 60% SAND, DOMINANTLY FINE, 10-15% OF SAND MEDIUM, TO 0.5mm, POORLY GRADED, QUARTZOSE, SUBANGULAR-SUBROUNDED, LOW TO MEDIUM PLASTICITY FINES APPEAR TO BE SILT.
		80					CL-SP	65-75' SILTY SAND (SM). MODERATE (10YR5/4) TO DARK (10YR4/2) YELLOWISH BROWN, 70-75% OF SAMPLE FINE-MEDIUM (10-20%) SAND, POORLY GRADED, NON-PLASTIC TO LOW PLASTICITY (FINES ARE SILT SIZED) QUARTZOSE, SUBANGULAR TO SUBROUNDED, MOIST
85'@ 1630								
		90						75-105' SANDY LEAN CLAY (CL), DARK YELLOWISH BROWN (10YR4/2), 30-45% SAND, FINE TO MEDIUM GRAINED TO 0.5mm, FINES ARE SILT SIZED, POORLY GRADED, LOW PLASTICITY, 90% QUARTZ, 10% DARK MINERALS AND FELDSPAR, SUBANGULAR-SUBROUNDED, MOIST, ALTERNATING WITH SAND (SP), MODERATE YELLOWISH BROWN (10YR5/4), 5-10% SILT, DOMINANTLY FINE GRAINED, POORLY GRADED, NON-PLASTIC, QUARTZOSE (90% DARK + FELDSPAR), SUBROUNDED, MOIST.
100'@ 1700		100		CUTTINGS				
				NO RECOVERY				
		110						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 3 of 5
Project Number: 3780-2752
Hole Number: RDB-5

Project: Well #3 RD
Location: Between So. and A St.; Up-gradient from CU-6

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS: 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
	11[illegible]						
							SCALE CHANGE
							DEPTH TO WATER AT 123.73' BGS @ 0940 ON 4/19/94
	128						
							HYDROPUNCH WATER SAMPLE 128.50-130.0' ORIGINALLY COMPUTED AS 128.68-130.18' RDB-5-129/4-CS4MJ-016
		128.71-133.79	CME	16/60			
	129	HNU @ 0.8 ppm					128.71-133.79' [8-16" ABOVE BOTTOM OF RECOVERED CORE]
							GRAVELLY SAND (SW). MODERATE YELLOWISH BROWN (10YR5/4), 30-40% GRAVEL, 35% COARSE SAND (2-5 mm) NO FINES, 60% QUARTZ, 40% FELDSPAR PLUS LITHIC CLASTS, SUBROUNDED-ROUNDED (1 GRAVEL 15x10 mm)
	130					NO RECOVERY	GRAIN SIZE ANALYSIS SAMPLE RDB-5-131G/ 4-CS4MJ-031
						?	
			GRAIN SIZE SAMPLE			SW	[0-8" ABOVE BOTTOM OF RECOVERED CORE]
	131						POORLY GRADED TO WELL GRADED SAND (SP-SW) MODERATE YELLOWISH BROWN (10YR5/4), DOMINANTLY MEDIUM GRAINED, 25% FINE SAND, 10-15% COARSE (2-5 mm) 5% GRAVEL, 80% QUARTZ, 10% FELDSPAR AND LITHIC CLASTS, 5-10% DARK MINERALS, SUBANGULAR TO SUBROUNDED.
			ANALYTICAL SOIL SAMPLE AND GRAIN SIZE SAMPLE			SW-SP	
	132					?	GRAIN SIZE ANALYSIS RDB-5-132G/ 4-CS4MJ-030
						NO RECOVERY	SOIL ANALYTICAL SAMPLE RDB-5-131S/ 4-CS4MJ-049
	133						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 4 of 5
Project Number: 3780-2752
Hole Number: RDB-5

Project: WELL #3 RD
Location: BETWEEN SOUTH AND A ST. UPGRADIENT FROM CW-6

ELEVATION	DEPTH BELOW SURFACE (ft.)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS: 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
	135	135-140	CME	30"/60"		NO RECOVERY	135-140.e4
		HNU 0.8ppm					[6.5 TO 12" AND 18-30" ABOVE BOTTOM OF CORE] WELL GRADED SAND (SW). MODERATE YELLOWISH BROWN (10YR 5/4), 10-15% GRAVEL TO 10 mm, 20-35% COARSE SAND, 80-85% QUARTZ, 15% FELDSPAR & LITHIC, 5% DARK MINERALS, SUBROUNDED TO ROUNDED
	136					SW ?	GRAIN SIZE ANALYSIS RDB-5-137G/4-CS4MJ-033
			GRAIN SIZE SAMPLE				[0 TO 6.5" AND 12 TO 18" ABOVE BOTTOM OF CORE]
	137					SP	POORLY GRADED SAND (SP). MODERATE YELLOWISH BROWN (10YR 5/4), 10-25% FINE SAND, 60% MEDIUM SAND (0.4-2.0 mm), 90% QUARTZ, 5% DARK MINERALS, 5% LITHIC AND FELDSPAR, SUBANGULAR TO ROUNDED
			GRAIN SIZE SAMPLE			SW	GRAIN SIZE ANALYSIS RDB-5-138G/4-CS4MJ-032
	138					SP	SOIL ANALYTICAL SAMPLE RDB-5-138S/ 4-CS4MJ-050
			ANALYTICAL SOIL SAMPLE			?	
	139					NO RECOVERY	
	140						HYDROPUNCH WATER SAMPLE 143.43-144.88' ORIGINALLY COMPUTED AS 143.56-145.06' RDB-5-144/4-CS4MJ-019
	141						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 5 of 5
Project Number: 3780-2752
Hole Number: RDB-5

Project: WELL #3 RD
Location: BETWEEN SOUTH 1A & 5; UPGRADIENT FROM CW-6

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION
	154						
	154.68	155.43	3" SPLIT BARREL	4"/9"	40-50(3)	NO RECOVERY	154.68-155.43' POORLY GRADED SAND (SP). MODERATE YELLOWISH BROWN (10YR 5/4), 70-75% MEDIUM GRAINED, 10-15% COARSE GRAINED, 5% GRAVEL, 85-90% QUARTZ, 10-15% LITHIC AND FELDSPAR, SUBROUNDED TO SUBANGULAR.
	155					SP	
							HYDROPUNCH WATER SAMPLE 154.70-156.20' ORIGINALLY COMPUTED 154.88-156.38' RDB-5-156/4-CS4MJ-020
	156						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 1 of 3

Project Number: 3780-2752

Hole Number: RDB-6

Project: WELL #3 RD	Location: 228' WEST OF CW-3R
Coordinates: CALCULATED STATE PLANE 277439.0'N 2082851.0'E	Drilling Contractor: J&R DRILLING
Drill Make and Model /Drilling Method: CME 750/HOLLOW STEM AUGER	Depth Top of Rock: — / Depth Casing & Size: — / Hole Size: 7 1/2"
Elevation: REFERENCE: GROUND SURFACE	Angle from Vert. and Bearing: STRAIGHT / Depth Bottom of Hole:
Water Level: 124.74 BGS	Fluid & Additives: WATER
Date Start: 4/21/94	Date Finish: 4/22/94
Logger: P. WELLS	

TIME / ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
4/21/94 Spud @ 1630	0		CUTTINGS			CL	0-8' CLAY (CL). DARK YELLOWISH BROWN (10YR4/2) TO DUSKY YELLOWISH BROWN (10YR2/2), NO SAND, MEDIUM TO HIGH PLASTICITY, MOIST (TOP SOIL)
	10					CL-CH	8-10' CLAY (CL-CH) MODERATE YELLOWISH BROWN (10YR5/4), NO SAND, SLIGHTLY THAN 0-8', MED. TO HIGH PLASTICITY, MOIST
						CH	10-20' FAT CLAY (CH). MODERATE YELLOWISH BROWN (10YR5/4), HIGH PLASTICITY, MOIST.
20 @ 1640	20						20-25' FAT CLAY (CH). MODERATE BROWN (5YR3/4) TRACE FINE SAND (<5%), HIGH PLASTICITY, MOIST
						CL	25-40' LEAN CLAY WITH SAND (CL). DARK YELLOWISH BROWN (10YR4/2), 25-30% FINE SAND, QUARTZOSE, SUBROUNDED TO ROUNDED, MEDIUM PLASTICITY, MOIST.
30 @ 1649	30						
40 @ 1700	40					SC	40-53' CLAYEY SAND (SC). MODERATE YELLOWISH BROWN (10YR5/4), 70% OF SAMPLE SAND, FINE TO MEDIUM GRAINED, 0.5mm MAXIMUM SIZE, QUARTZOSE, SUBROUNDED, MEDIUM PLASTICITY, MOIST
50 @ 1707	50						

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 2 of 3
Project Number: 3780-2752
Hole Number RDB-6

Project: WELL #3 RD
Location: 228' WEST OF CW-3R

ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE % RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION (Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.)
	50						
						SP	53-60' POORLY GRADED SAND (SP). MODERATE YELLOWISH BROWN (10YR 5/4), FINE TO MEDIUM (15-20%) GRAINED, QUARTZOSE (90%), SUBROUNDED TO ROUNDED, MOIST, BECOMING SILTIER TOWARD 60' (10-15% SILT @ 60')
	60					SP	60-65' POORLY GRADED SAND (SP) LIGHT BROWN (5YR 6/5), FINE TO MEDIUM (10-15%) GRAINED, 5-10% SILT, GRAINS TO 1.0 mm, NON PLASTIC, QUARTZOSE, SUBANGULAR - SUBROUNDED, MOIST
65'e 1730						SP-SM	65-85' POORLY GRADED SAND TO SILTY SAND (SP- DARK YELLOWISH BROWN (10YR 4/2), FINE TO MEDIUM GRAINED (5-10% MEDIUM, UP TO 1 mm) 5 TO 20% SILT AND CLAY, NON PLASTIC TO LOW PLASTICITY, QUARTZOSE, SUBANGULAR TO SUBROUNDED, MOIST.
70'e 1740	70						
80'e 1755	80						
						SP	85-120' POORLY GRADED SAND (SP). MODERATE YELLOWISH BROWN (10YR 5/4), FINE TO MEDIUM GRAINED, MAXIMUM GRAIN SIZE 1 mm, 20-25% MEDIUM SAND, < 5% SILT, NON-PLASTIC, QUARTZOSE, SUBANGULAR TO ROUNDED, MOIST.
90'e 1810	90	Hydrovac 0.4pm	CUTTINGS				
100'e 1820	100						
110'e 1830	110	Hydrovac 0.2pm					

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 3 of 3
Project Number: 3780-2752
Hole Number RDB-6

Project: WELL #3 AD
Location: 228' WEST OF CW-3R

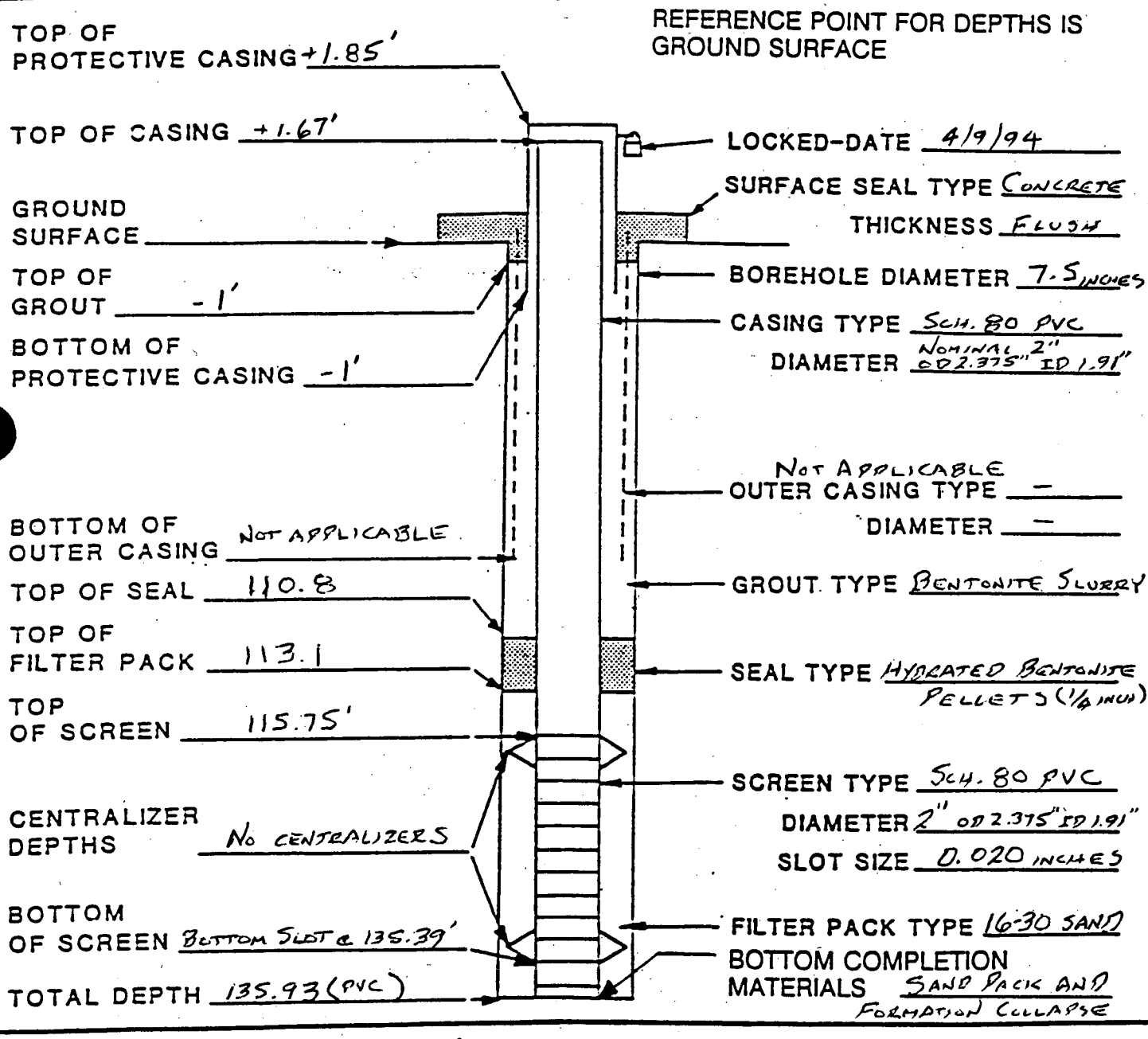
ELEVATION	DEPTH BELOW SURFACE (ft)	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: % RECOVERY	STANDARD PENETRATION TEST RESULTS: 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, color, grain size, sorting (or gradation), plasticity, weathering, mineralogy, inclusions, angularity, moisture content.
115'@ 1835	110		CUTTINGS				
	120						
							SCALE CHANGE
	128						DEPTH TO WATER AT 124.74' BGS @ 0800 ON 4/22/94
	129	128.91-130.41 HNU @ BACKGROUND GRAIN SIZE & ANALYTICAL SAMPLE	3" SPLIT-BARREL GRAIN SIZE SAMPLE & ANALYTICAL SAMPLE	11"/18"	18-30-46	SP	128.91-130.41' POORLY GRADED SAND (SP). GRAYISH ORANGE (10YR 7/4), 70% MEDIUM GRAINED, 5-10% COARSE GRAINED, NO SILT 85-90% QUARTZ, 5-10% FELDSPAR AND LITHIC, 5% DARK MINERALS, SUBROUNDED TO ROUNDED.
	130					? NO RECOVERY	GRAIN SIZE ANALYSIS: RDB-6-129G1 4-CS4MJ-034
							SOIL ANALYTICAL SAMPLE RDB-6-129S1 4-CS4MJ-051
	131						HYDROPUNCH WATER SAMPLE 134.67-136.17 ORIGINALLY COMPUTED AS 134.85-136.35
							RDB-6-135 / 4-CS4MJ-052
	132						

WELL COMPLETION DIAGRAMS

WELL COMPLETION RECORD

WELL NUMBER P-1 DATE INSTALLED 4/8/94

REPRESENTATIVE P. WELLS DRILLER J&R DRILLING



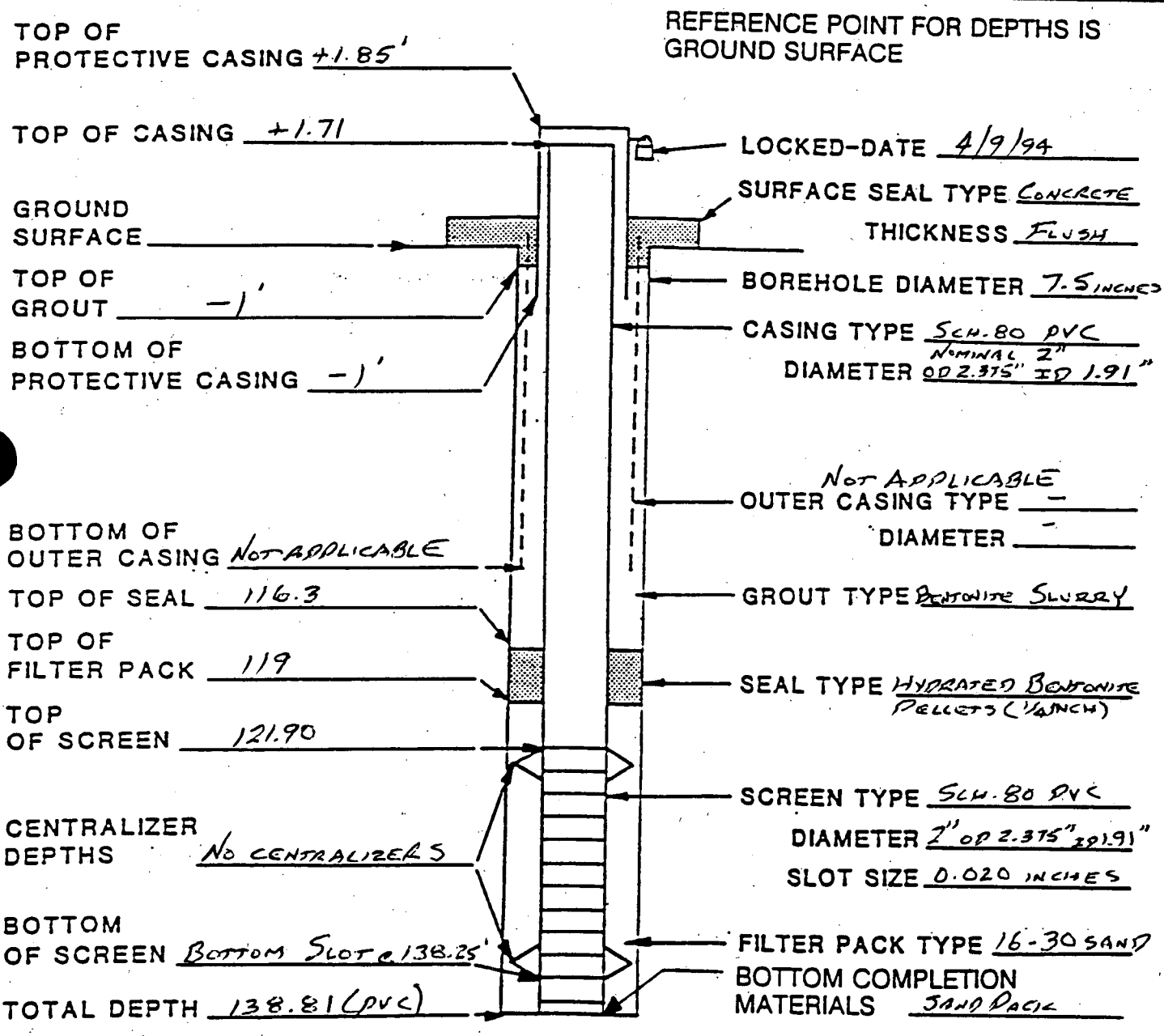
COMMENTS Boring drilled to 139.85' Bentonite pellet plug set at 137.85-138.33' Silt/clay layer at 135.23'

REPRESENTATIVE SIGNATURE Paul S. Wells DATE 6/1/94

WELL COMPLETION RECORD

WELL NUMBER P-2 DATE INSTALLED 4/7/94

REPRESENTATIVE D. WELLS DRILLER J&R DRILLING



COMMENTS BORING DRILLED TO 138.6' SILT/CLAY LAYER AT 137.85'

REPRESENTATIVE SIGNATURE Paul D. Wells DATE 6/1/94

APPENDIX B

THREE-DAY PUMPING TEST, WELL CW-1

APPENDIX B

THREE-DAY PUMPING TEST, WELL CW-1

Table of Contents and List of Exhibits

APPENDIX B

THREE-DAY PUMPING TEST, WELL CW-1

Table of Contents and List of Exhibits, continued

Figures:

Water Level Field Data:

APPENDIX B

THREE-DAY PUMPING TEST, WELL CW-1

1.0 OBSERVATION WELL LAYOUT

The pumping test cell consisted of a pumping well, CW-1, and four observation wells: preexisting monitor wells, CW-2 and CW-3R, and two new piezometers, P-1 and P-2. Figure B-1 shows the cell layout. Table B-1 summarizes distances of observation wells from pumping well CW-1. Commencing April 8, 1994, these wells were the focus of three days of static water level monitoring, three days of drawdown recording in response to pumping well CW-1 at a constant rate, and one day of drawdown recovery observation.

1.1 Water Level Monitoring

Water levels were measured with a water level indicator ("probe", on text figures) from the test cell wells over a 7-day period at average 5-hour intervals, commencing three days before the test (t = -4100 minutes), and concluding 17 hours after the pump was turned off (t = 5300 minutes). These historical water levels are shown on Figure B-2. Figure B-2 also reflects pumping test drawdowns between t = 0 and t = 4320 minutes, and suggests fluctuations due to environmental conditions (barometric pressure and recharge from a precipitation event during the pretest and pumping period).

For the test itself, 10-psi pressure transducers were installed in wells P-1 and P-2 and connected to an InSitu, Inc. "Hermit 2000" data logger, and a second water level indicator was dedicated to well CW-1. Shortly before the pump was turned on, transducer reference levels were set in the Hermit based on water level readings from the first water level indicator. Water levels in P-1 and P-2 were recorded by the Hermit from startup of the pump (t = 0 minutes), through the end of both the pumping period (t = 4320 minutes) and the recovery period (t = 5300 minutes).

1.2 Corrections to Drawdown Data

Water level monitoring indicated two factors external to the pumping stress that affected water levels, and thus required correction before aquifer evaluation from test drawdown data. Water levels in all test cell wells required correction for the environmental effects

mentioned above. Levels detected by the transducers in wells P-1 and P-2 also needed correction for an apparent steady drift of transducer readings away from intermittent corroborative water level indicator readings of the same wells.

1.2.1 Environmental Corrections

Barometric pressure readings recorded hourly at Hastings airport were obtained from National Weather Service for the 7-day monitored period. These data are reproduced on Figure B-3 for comparison to water levels in the test cell's remote well, CW-3R. A significant low pressure event passed through Hastings during the pumping period, accompanied by approximately 1.7 inches of rainfall at the site. The effect of environmental conditions on water levels is made apparent by the similarity of fluctuation of barometric pressure to that of water level in CW-3R. Water levels in CW-3R rose 0.35 foot from t = -980 to t = 4287 minutes, and subsequently fell 0.40 foot between t = 4287 minutes and t = 5300 minutes in response to the passing of the storm.

CW-3R lay outside of the radius of influence of the test pumping in well CW-1. Although test-related drawdown is apparent in proximal wells CW-1, P-1 and P-2 in Figure B-2, the overprint of environmental fluctuations, as indicated by the CW-3R curve, on all the wells is also apparent. The timing and magnitudes of water level fluctuations in each well are essentially the same.

Because of the equivalence of response of the five wells, CW-3R water levels were used to normalize "static" water levels in the remaining wells. The CW-3R water level at the test startup time (124.11' below top of casing, t = 0 minutes) was subtracted from the 32 recorded levels in the well, resulting in Figure B-4. These correction factors were then applied to water level indicator-recorded levels in the remaining four wells (Figure B-5). Accuracy of this correction method is indicated by the close alignment of all pretest (static) water levels (t = -4100 to t = 0 minutes) with zero drawdown. Test-related drawdowns are apparent in Figure B-5, including those of CW-2. Distance-drawdown analysis, discussed later, is based on these corrected data.

1.2.2 Corrections for Transducer Drift

Comparison of intermittent continued water level indicator readings to transducer level readings indicated that following pump startup, both transducers yielded progressively higher

water table elevations with respect to the water level indicator. After consideration of the apparent drift, as well as age of the transducer units, a service representative of the transducer manufacturer concluded faulty polyurethane seals between the cables and units were likely to be responsible. The apparent water level deviations versus time are plotted in Figure B-6. Apparent discrepancies between water level indicator and transducer values in the final set of readings at t = 5300 minutes were 0.217 foot in well P-1 and 0.348 foot in well P-2.

1.2.3 Implementation of Corrections to Water Level Data

Correction factors for both environmental conditions and transducer drift were summed to create the net corrections to field water level data shown in Figure B-7. Field data for well CW-1 were corrected only for environmental conditions, since data collection from this well did not utilize a transducer.

Net corrections to field data collected at intervening times were interpolated from the linear equations representing the line segments connecting correction points, as shown in Figure B-7. All corrections, observed and corrected water levels, and intermediate data are tabulated at the end of this appendix.

2.0 GENERAL DESCRIPTION OF TEST

The CW-1 pumping test was conducted from 16:00, April 11, 1994 until 16:00, April 14, 1994. Recovery was monitored until 10:00 April 15, 1994, at which point 90% recovery had been achieved in proximal wells CW-1, P-1 and P-2. The average discharge for the test was 5.96 gpm. Table B-3 summarizes the discharge versus time, and Figure B-8 illustrates the uniformity of the flow rate throughout the test.

The CW-1 pumping assembly consisted of a Grundfos Type JS 10-05 submersible pump and check valve hung on 1.25-inch Schedule 80 PVC pipe. The 4-inch pump intake hung at 131.44-131.77 feet below top of casing, positioning it approximately 9.5 feet below the static water level. Drawdown in CW-1 reached approximately two feet after three days, corresponding to a minimum water depth of 7.5 feet to the pump intake.

2.1 Method of Flow Measurement

A Neptune 0.625-inch flowmeter plumbed into the pump discharge line provided readings of cumulative discharge during the test.

2.2 Drawdown in the Pleistocene Aquifer

Drawdowns, listed in Table B-1, reached 0.575 foot in well P-1, 0.375 foot in P-2, and 0.09 foot in CW-2. Distance-drawdown analysis, Figure B-9, indicates, at r = 457 feet, CW-3R lay outside of the radius of influence, r_o = 295 feet, of the test.

3.0 AQUIFER TEST RESULTS

Table B-2 summarizes the aquifer test results from the CW-1 pumping test. Other than the distance-drawdown analysis, all data evaluations were facilitated using Geraghty & Miller, Inc. AQTESOLV, version 1.1R4, 1991. AQTESOLV includes solutions for unconfined aquifers based on the work of Theis, Cooper & Jacob and Neuman, as referenced in Table B-2.

Aquifer response reflected unconfined conditions, with saturated thickness effectively limited by a localized clay layer 14 feet below the static water level. The transmissivity of the zone above the clay is approximately 8000 gpd/ft, representing an average of analyses excluding Theis and Straight-Line analyses of well P-2 (see "Individual Well Responses: P-2"). Based on a 14-foot saturated thickness, this transmissivity represents an average hydraulic conductivity of 0.03 cm/sec. Unconfined specific yield of the aquifer was indicated to be approximately 0.05.

From the distance-drawdown graph, Figure B-9, and the 0.09 foot of drawdown in well CW-2, it is estimated that the radius of influence of well CW-1 extended to 295 feet, at least in the direction of CW-2.

Overall thickness of the Pleistocene aquifer is approximately 70 feet in the area of well CW-1. Evidence from the CW-1 pumping test of the effective local hydraulic isolation of the upper 14 aquifer feet includes two factors:

- Transmissivity calculated from the various methods from both pumping and recovery data was in the range 7000 to 17,000 gpd/ft, far less than the 100,000 to 200,000 gpd/ft transmissivity reported for the Pleistocene aquifer in the region, and observed at other Hastings subsites. Drawdown was concentrated within a limited thickness, making for a transmissivity reflective only of the zone that was effectively pumped.

- The distance-drawdown relationship within 295 feet of the pumping well did not indicate deviation from a single straight line (Figure B-9). If the clay was absent or ineffective as a flow-restricting barrier, drawdown would be expected to eventually be distributed through the full 70 feet of the aquifer. In that case, the partial penetration of pumping well CW-1 would cause drawdown at the nearest well, P-1, to be magnified relative to the more distant wells because of its position relative to the screen of the pumping well. However, the distance-drawdown graph does not show P-1 to deflect to greater drawdown relative to the straight line passed through more distant wells P-2 and CW-2. Furthermore, the transmissivity derived from distance-drawdown analysis is consistent with that obtained from time-drawdown analysis on the individual wells.

Recovery data indicate that no permanent depletion of the aquifer occurred as a result of the three days of pumping. This is reflected by straight-line matches to recovery data in which drawdown approaches zero when $t/t' = 1$. (t/t' is the ratio of time since pumping started to time since pumping stopped. $t/t' = 1$ implies "infinite" recovery time.)

Individual Well Responses

P-1 (Figures B-10 - B12): Theis curve analysis reflected an excellent fit of the corrected field data. The good match of the data to the theoretical Theis curve indicates absence of phenomena such as delayed response of the water table, or boundary conditions having been encountered. Since drawdown was small (0.575 foot) relative the saturated thickness of the aquifer, analysis of the drawdown data by the Theis method for a confined aquifer (i.e., one in which the aquifer does not thin) was valid.

P-2 (Figures B-13 - B16): Well P-2 exhibited a transition in the log time-log drawdown graph from 10 minutes to 1000 minutes into the pumping which may be reflective of a delayed water table response. Theis analysis, which ignores the delayed yield effect, indicates a storativity of 0.0024 and a transmissivity of 15,000 gpd/ft, almost double that obtained for well P-1. The appearance of high transmissivity and low storativity is consistent

with a delayed water table response having occurred, but otherwise not able to be accounted for in the Theis method.

Neuman analysis assumes that early drawdowns are reflective of pore depressurization and water release from storage through expansion of the water. Later drawdowns are theoretically influenced primarily by physical drainage of pores from the water table. Based on Neuman analysis of early drawdown data from well P-2, confined storage of the aquifer is 0.0027. This is consistent with the storativity value based on Theis discussed in the preceding paragraph. Unconfined storage (specific yield) from late-data Neuman analysis is 0.029, and the Neuman transmissivity is 9400 gpd/ft. Both of these values are consistent with those derived from well P-1 and from distance-drawdown analysis.

Neuman analysis requires matching field data to a selection from a family of type curves, each representing a different β parameter. β is defined as:

$$\beta = (K_z/K_r)(r^2/b^2),$$

where

K_z/K_r = ratio of vertical to horizontal hydraulic conductivity
r = distance of observation to pumping well
b = saturated aquifer thickness.

The best fit to field data was achieved by the Neuman curve corresponding to $\beta = 0.06$, indicating that $K_z/K_r = 0.01$. Although quantification of this parameter was not a primary objective of the test, it was nevertheless necessary to the Neuman analysis. Given that the aquifer is stratified, the calculated ratio of K_z/K_r is considered a reasonable estimate.

CW-1 (Figure B-17): Because drawdown is affected by well loss in the pumping well, only the recovery data were analyzed. Results indicate a transmissivity of approximately 13,300 gpd/ft.

TABLE B-1

Distance vs. Drawdown
CW-1 Pumping Test

Observation Well	Distance to Pumping Well (feet)	Orientation of Observation Well from Pumping Well	Drawdown in Observation Well near end of Pumping Period (feet)
CW-1	0	--	1.995
P-1	12.2	SW	0.575
P-2	34.25	SW	0.375
CW-2	187.6	W	0.090
CW-3R	457.2	E	0

TABLE B-2

Aquifer Parameters as Obtained From Observation Well Data
CW-1 Pumping Test

Observation Well	Distance to Pumping Well (ft)	Method of Analysis	Pumping Data, Q = 5.96 gpm (0.797 ft^3/min)						Recovery Data			
			Transmissivity		Hydraulic Conductivity		Stor-ativity	Sp. Yield	Transmissivity		Hydraulic Conductivity	
			gpd/ft	ft^2/min	cm/sec	ft/min			gpd/ft	ft^2/min	cm/sec	ft/min
P-1	12.2	Theis	8300	0.771	0.027	0.054		0.046	6940	0.645	0.023	0.045
		SL	8265	0.767	0.027	0.054		0.038				
P-2	34.3	Theis	15090	1.40	0.050	0.098	0.0024		16670	1.55	0.055	0.108
		SL	15380	1.43	0.051	0.100	0.0024					
		Neuman	9380	0.873	0.031	0.061	0.0027	0.029				
CW-1	—	Theis							13270	1.23	0.044	0.086
P-1, P-2, CW-2	—	DD	7750	0.720	0.026	0.050		0.078				

"Theis" = Theis Approximation for Unconfined Aquifer, Kruseman, G.P. and N.A. DeRidder, 1979. Analysis and Evaluation of Pumping Test Data, Bulletin 11, Intern. Inst. for Land Reclamation and Improvements, Wageningen, Netherlands, 200p., and Theis, 1935 (referenced below).

"SL" = Straight Line Approximation for Unconfined Aquifer, Kruseman and DeRidder, 1979 (as above), and Cooper, H.H. and C.E.Jacob, 1946, A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History, Am. Geophys. Union Trans., vol. 27, pp. 526-534.

"Neuman" = Neuman Delayed Yield Curve Method, Neuman, S.P., 1975, Analysis of Pumping Test Data from Anisotropic Unconfined Aquifers Considering Delayed Yield, Water Resources Research, vol. 11, no. 2, pp. 329-342.

"DD" = Distance-Drawdown Straight-Line Approximation for Unconfined Aquifer, a variation of Cooper and Jacob, 1946 (referenced above).

Note: the Neuman analysis of P-2 pumping data yielded $\beta = (K_z/K_r)(r^2/b^2) = 0.06$, indicating $K_z/K_r = 0.01$.

TABLE B-3: Discharge Versus Time, Pumping Well CW-1, CW-1 Pumping Test

Time (minutes)	Cumulative Discharge (gallons)	Incremental Time (minutes)	Incremental Discharge (gallons)	Incremental Discharge (gpm)
0	805			
9	860	9	55	6.11
25	960	16	100	6.25
30	980	5	20	4.00
35	1010	5	30	6.00
40	1039	5	29	5.80
45	1060	5	21	4.20
50	1090	5	30	6.00
55	1130	5	40	8.00
60	1150	5	20	4.00
70	1200	10	50	5.00
85	1290	15	90	6.00
100	1380	15	90	6.00
122	1510	22	130	5.91
141	1620	19	110	5.79
163	1750	22	130	5.91
182	1860	19	110	5.79
225	2110	43	250	5.81
324	2700	99	590	5.96
366	2940	42	240	5.71
534	3940	168	1000	5.95
550	4040	16	100	6.25
614	4420	64	380	5.94
651	4630	37	210	5.68
1121	7410	470	2780	5.91
1180	7770	59	360	6.10
1388	9000	208	1230	5.91
1426	9230	38	230	6.05
1575	10110	149	880	5.91
1735	11060	160	950	5.94
1923	12180	188	1120	5.96
1982	12530	59	350	5.93
2258	14180	276	1650	5.98
2662	16580	404	2400	5.94
2852	17710	190	1130	5.95
2990	18540	138	830	6.01
3181	19680	191	1140	5.97
3243	20050	62	370	5.97
3497	21570	254	1520	5.98

TABLE B-3: Discharge Versus Time, Pumping Well CW-1, CW-1 Pumping Test

Time (minutes)	Cumulative Discharge (gallons)	Incremental Time (minutes)	Incremental Discharge (gallons)	Incremental Discharge (gpm)
3946	24280	449	2710	6.04
4183	25720	237	1440	6.08
4287	26350	104	630	6.06
4320	26540	33	190	5.76
SUMS		4320	25735	5.96

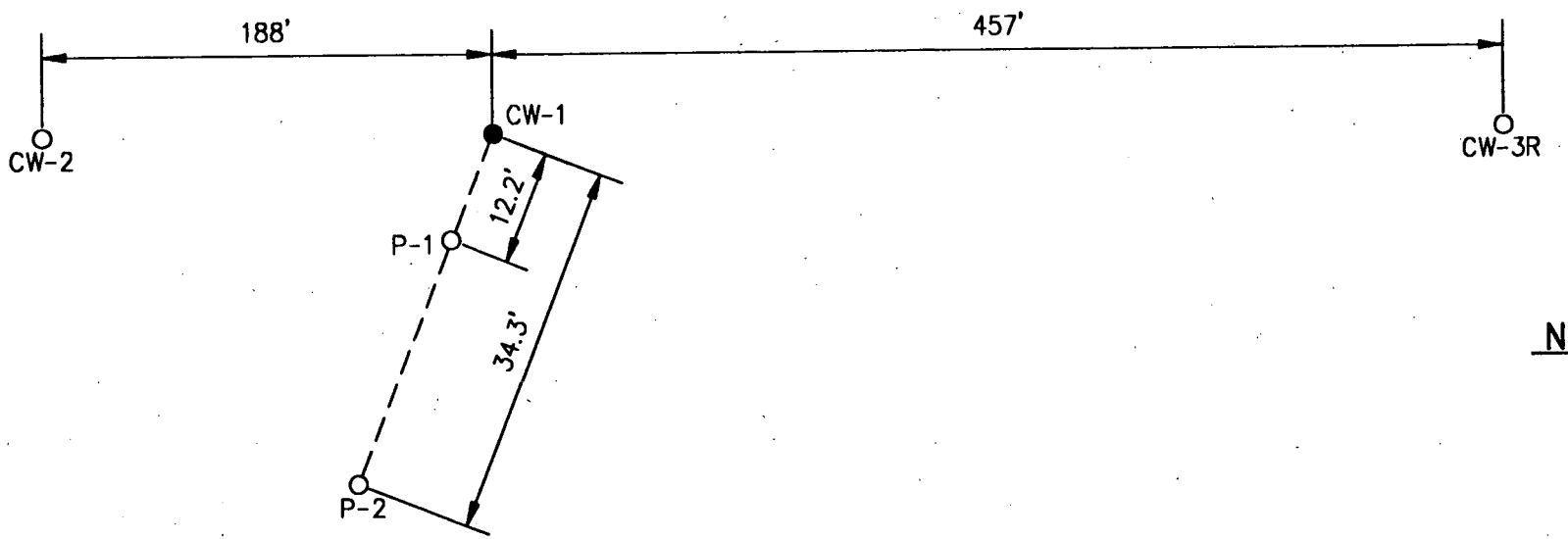
TABLE B-4

Test Cell Well Specifications
CW-1 Pumping Test

Well	CW-1	P-1	P-2	CW-2	CW-3R
Distance, pumping to obs. well, feet	0	12.2	34.25	187.6	457.2
Initial water level, feet below TOC	121.915	121.79	122.76	121.30	124.11
Datum (ground surface) elevation, feet	1935.0	no survey	no survey	1935.5	1936.65
Depth to base of screen, feet	134	135.39	138.25	133.0	154.98
Depth to top of screen, feet	114	115.75	123.56	124.03	125.15
Screen length, feet	20	19.64	14.69	8.97	29.83
Depth to base of aquifer, feet	134	135.23	137.85	135.5	134.5
Stickup, feet	2.4	2	2	1.99	1.97
Depth to water table, feet	119.515	119.79	120.76	119.31	122.14
Saturated thickness, feet	14.485	15.44	17.09	16.19	12.36
Screen inner diameter, inches	3/82	1.937	1.937	3.82	8
Sand pack outer diameter, inches	11	7.5	7.5	10	14
Screen material	Sch 80 PVC	Sch 80 PVC	Sch 80 PVC	Sch 80 PVC	stnls/wire
Slot size, inches	0.01	0.02	0.02	0.02	0.025

LEGEND:

- ● PUMPING WELL
- ○ OBSERVATION WELL



NO SCALE

HASTINGS GROUND WATER CONTAMINATION SITE
WELL NO. 3 SUBSITE
HASTINGS, NEBRASKA

FIGURE B-1
SCHEMATIC PLAN OF CW-1 TEST CELL

ARCS Regions VI, VII, VIII
US Environmental Protection Agency

MORRISON-KNUDSEN CORPORATION

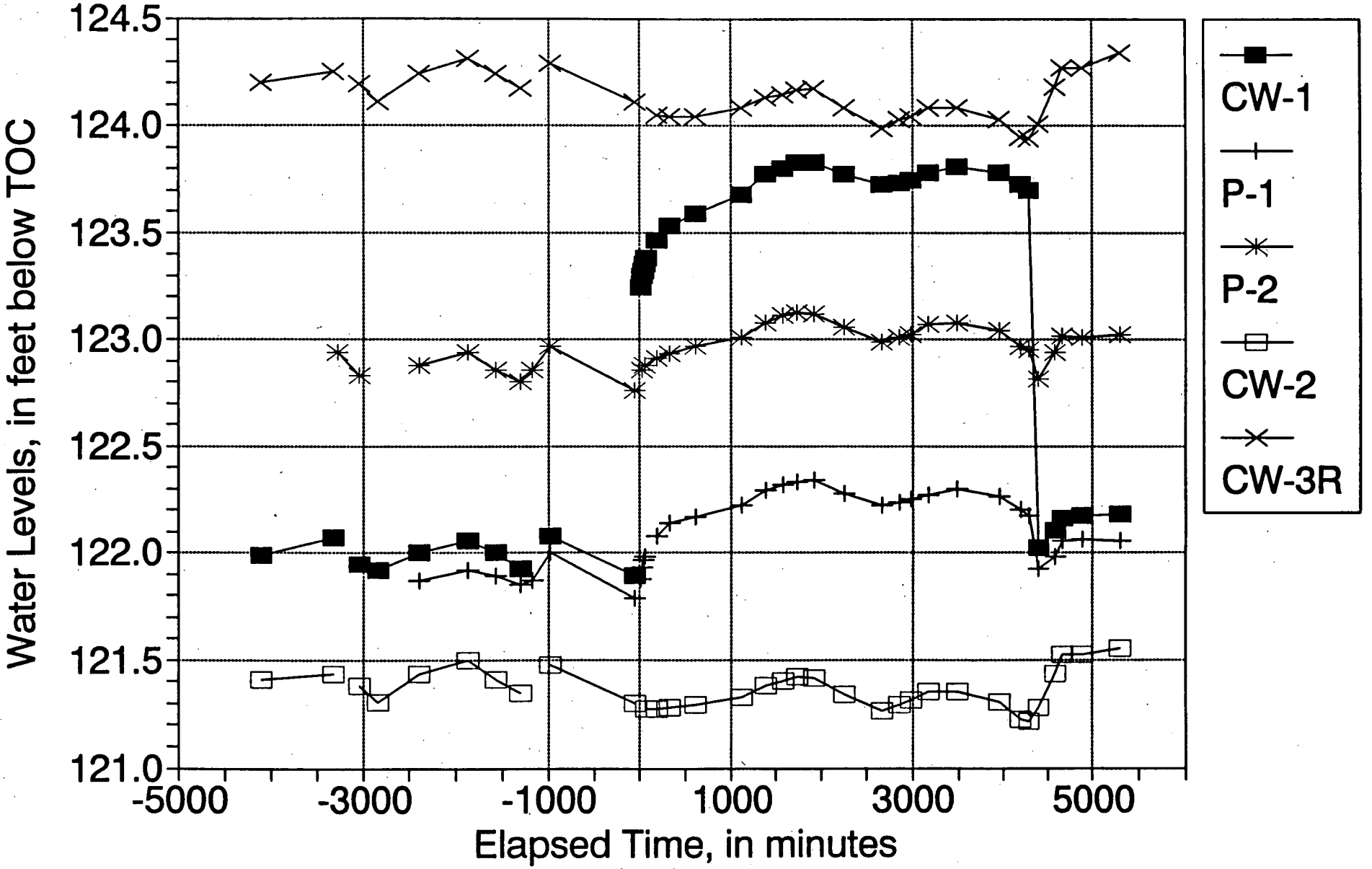
FILE NAME (CAD) 133A015A.DWG		DATE: 9/21/93		
WORK ORDER	TASK	DRAWING NUMBER	REV.	DR'T
3780-2752	133G	FIGURE B-1	A	P:

<CPD: 05/05/94 [TIME: 12:43 AM]>

Figur

Water Levels in Test Cell Wells

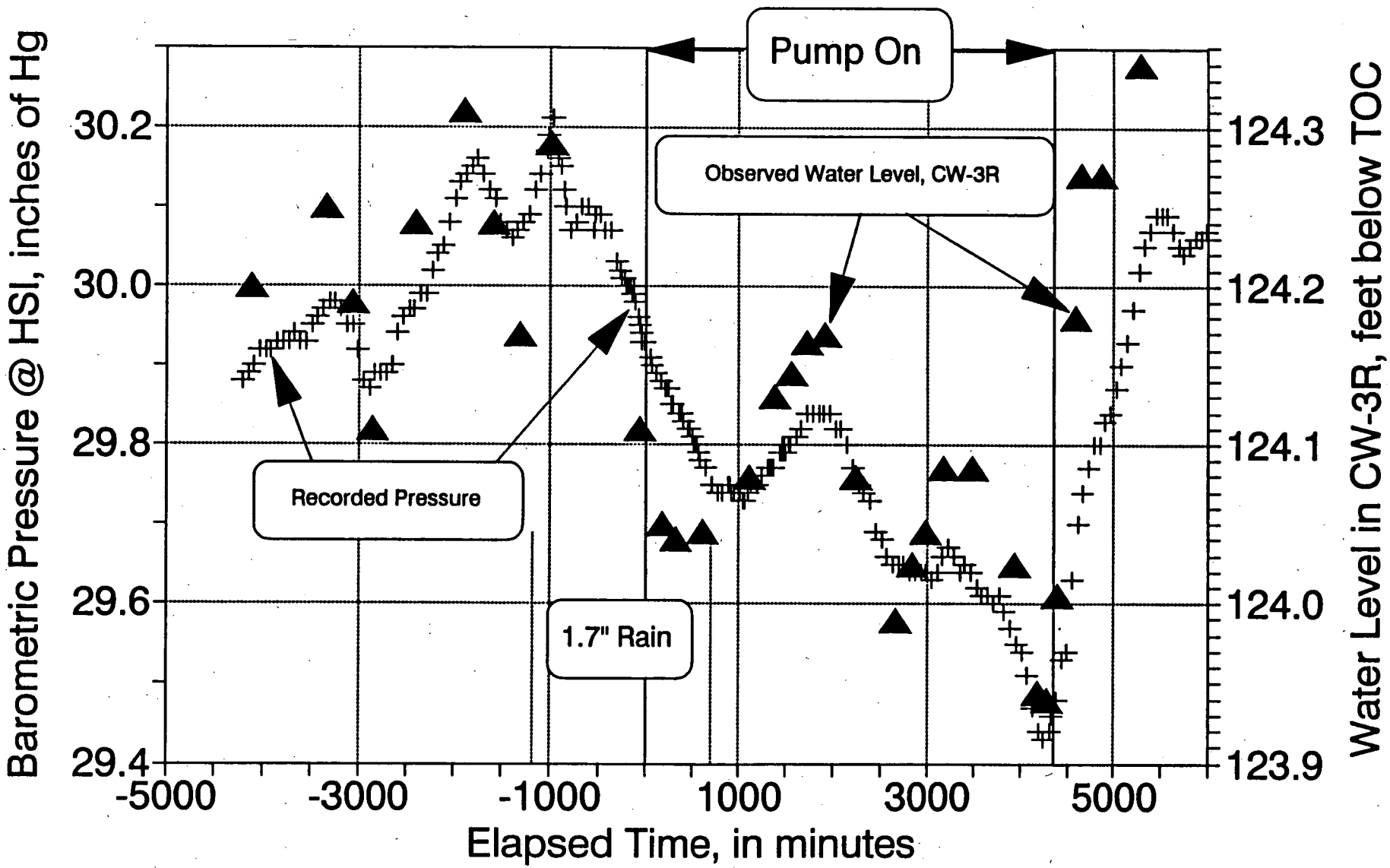
CW-1 Pumping Test



Figure

Environmental Effect on Water Levels

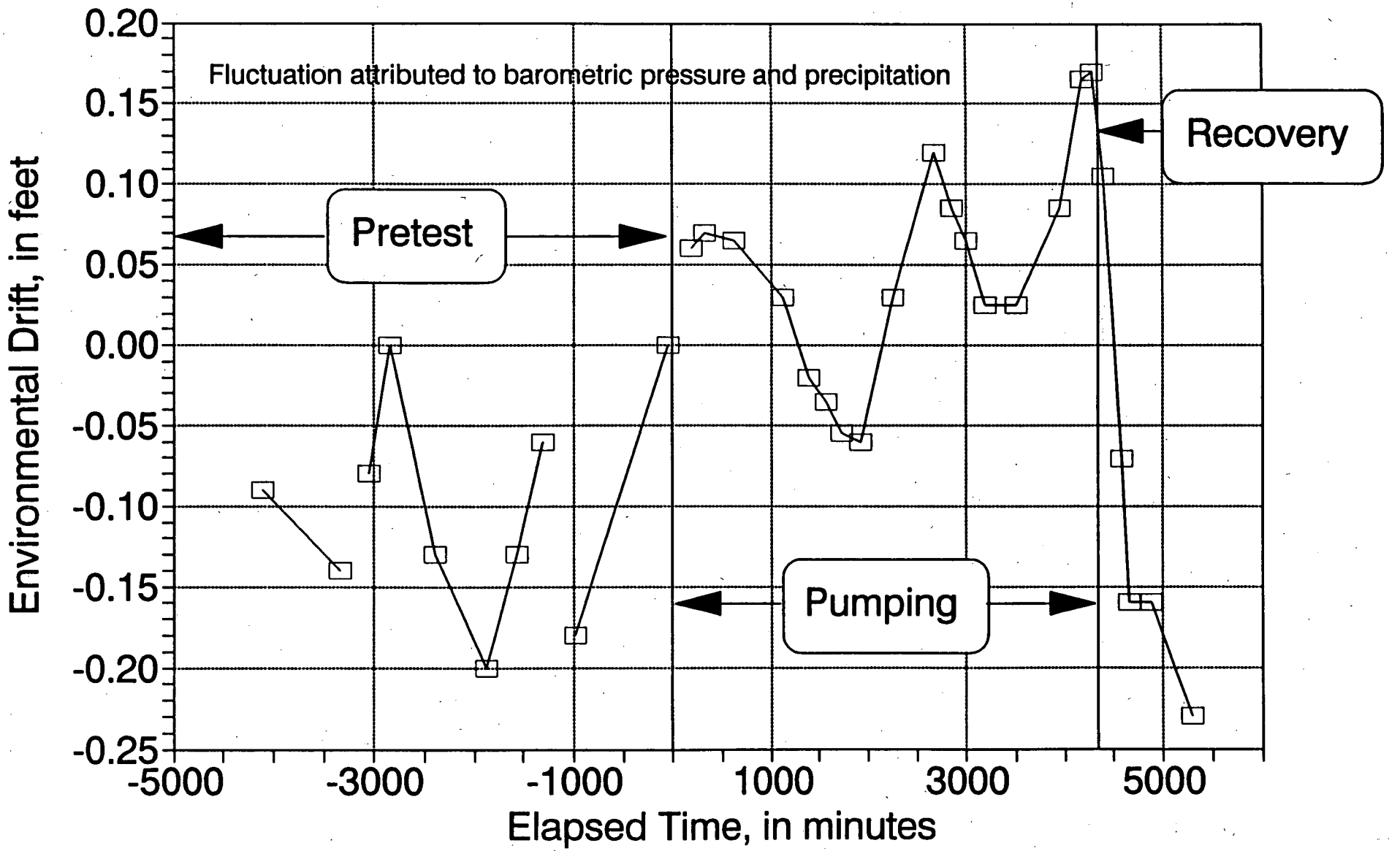
CW-1 Pumping Test



Figur

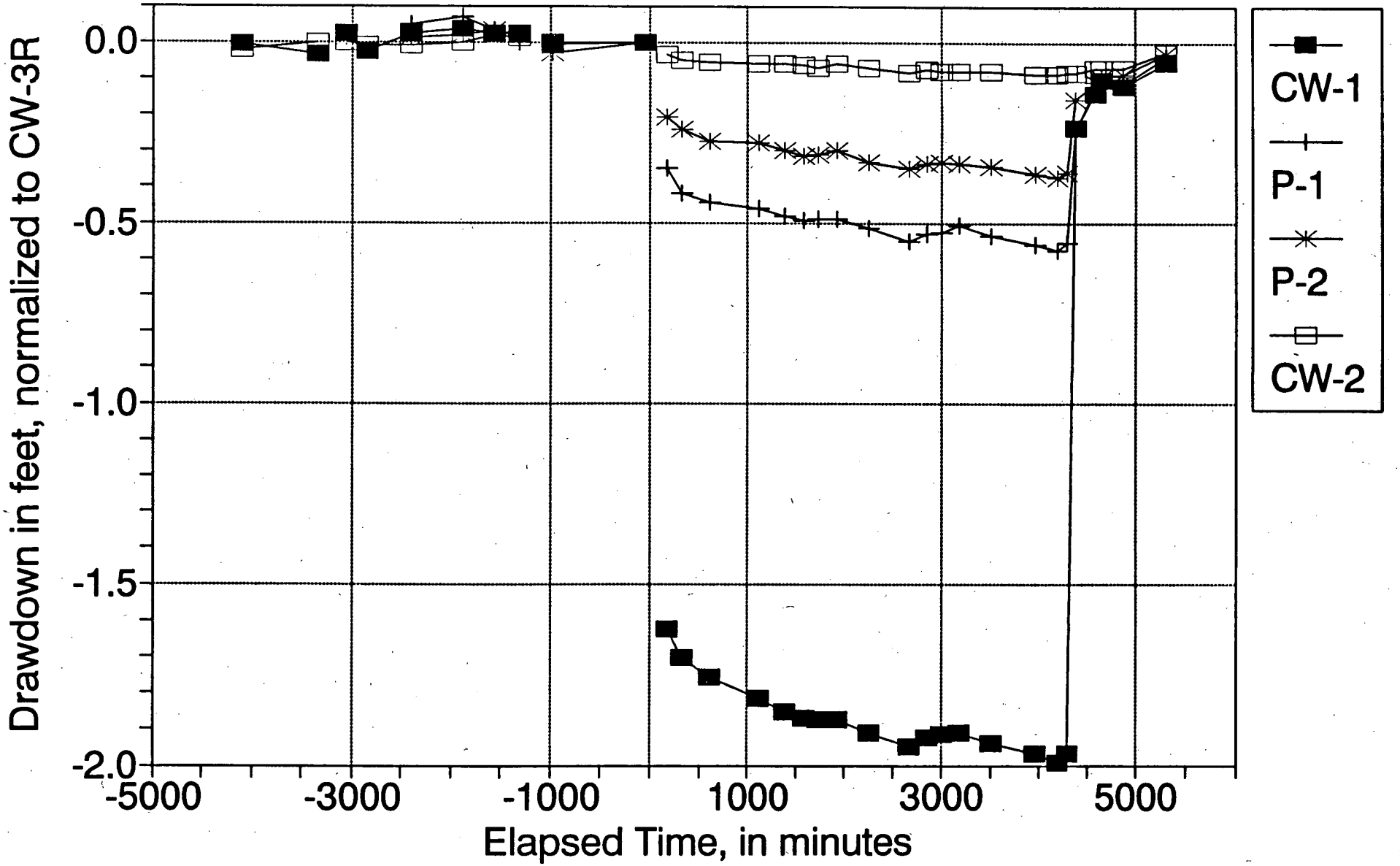
Water Table Fluctuation in Well CW-3R

CW-1 Pumping Test



Drawdown, Normalized to Well CW-3R

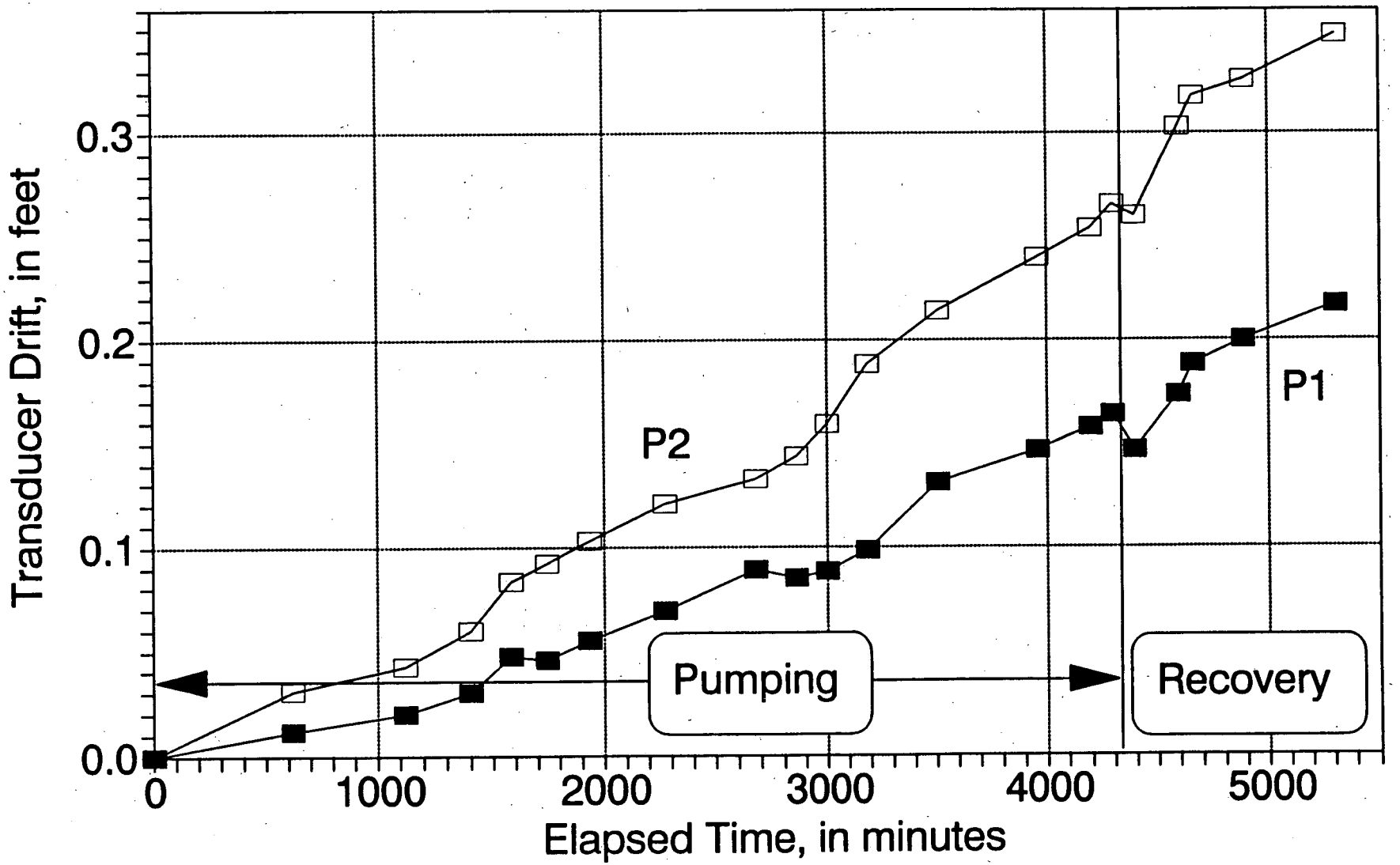
CW-1 Pumping Test



Figur

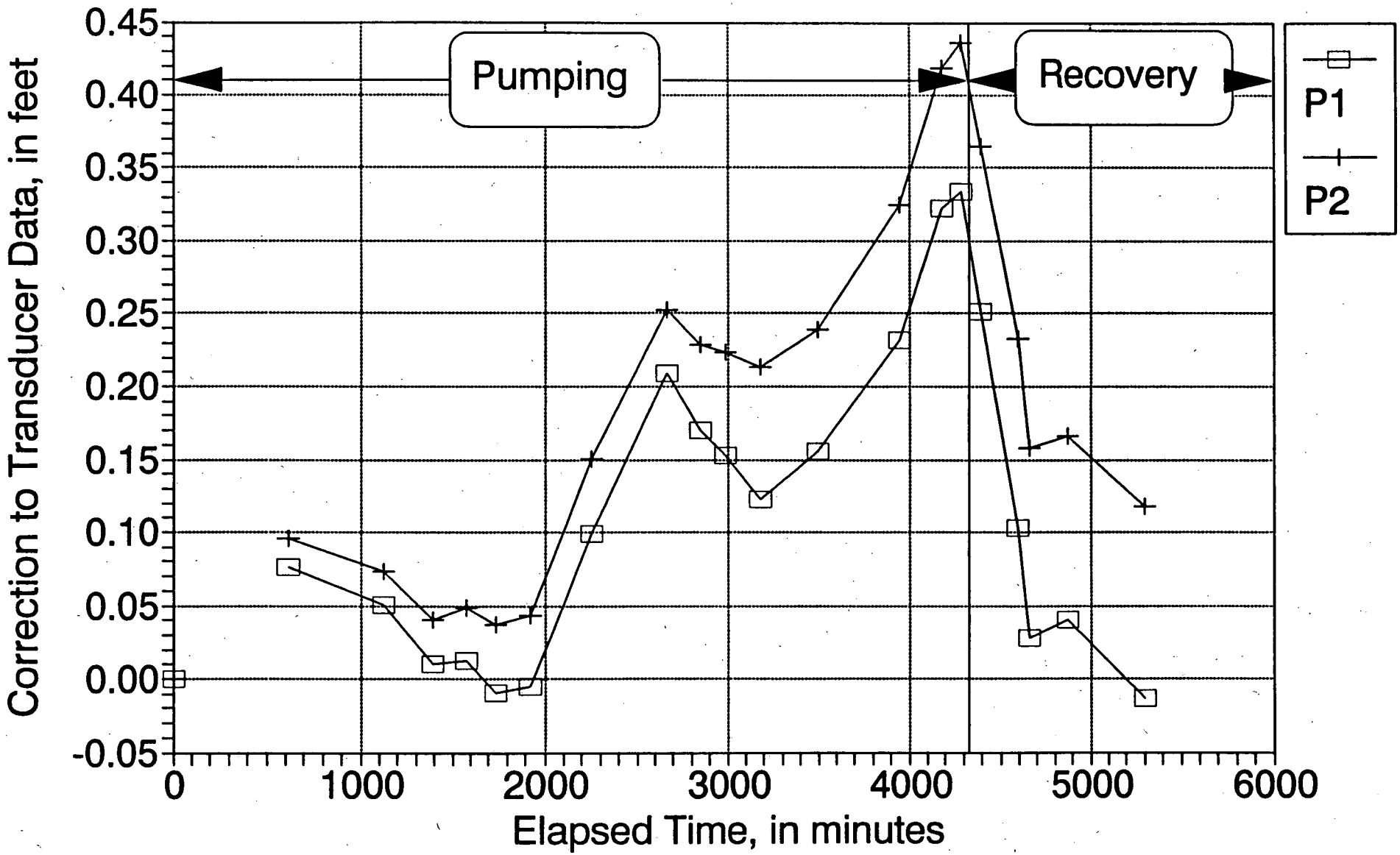
W.L. Deviation: Transducers vs. Probe

CW-1 Pumping Test



Transducer Corrections, Wells P-1 & P-2

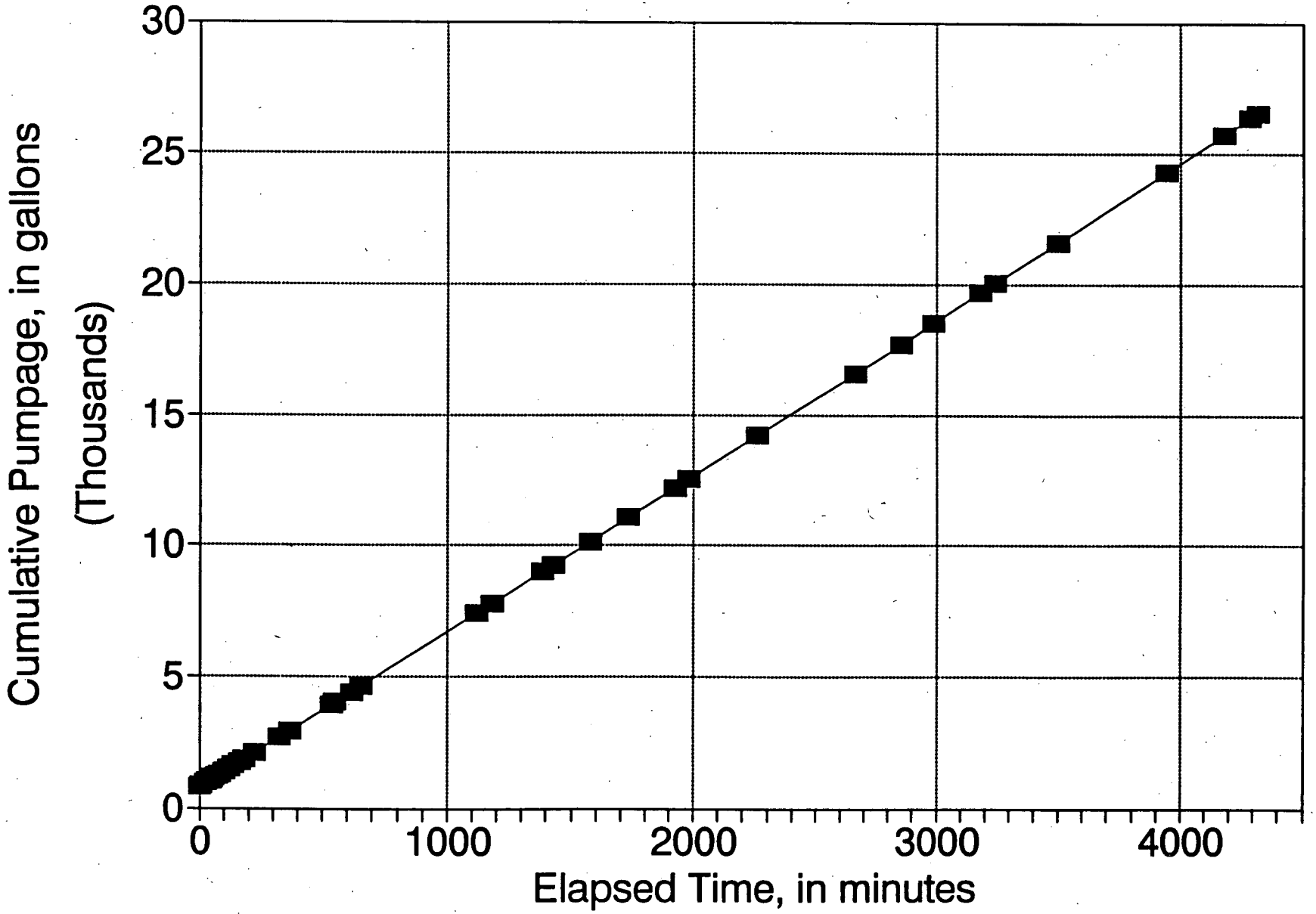
CW-1 Pumping Test



Fig[illegible]-8

Discharge vs. Time

CW-1 Pumping Test



Distance-Drawdown Plot @ t=4183 Minutes

CW-1 Pumping Test

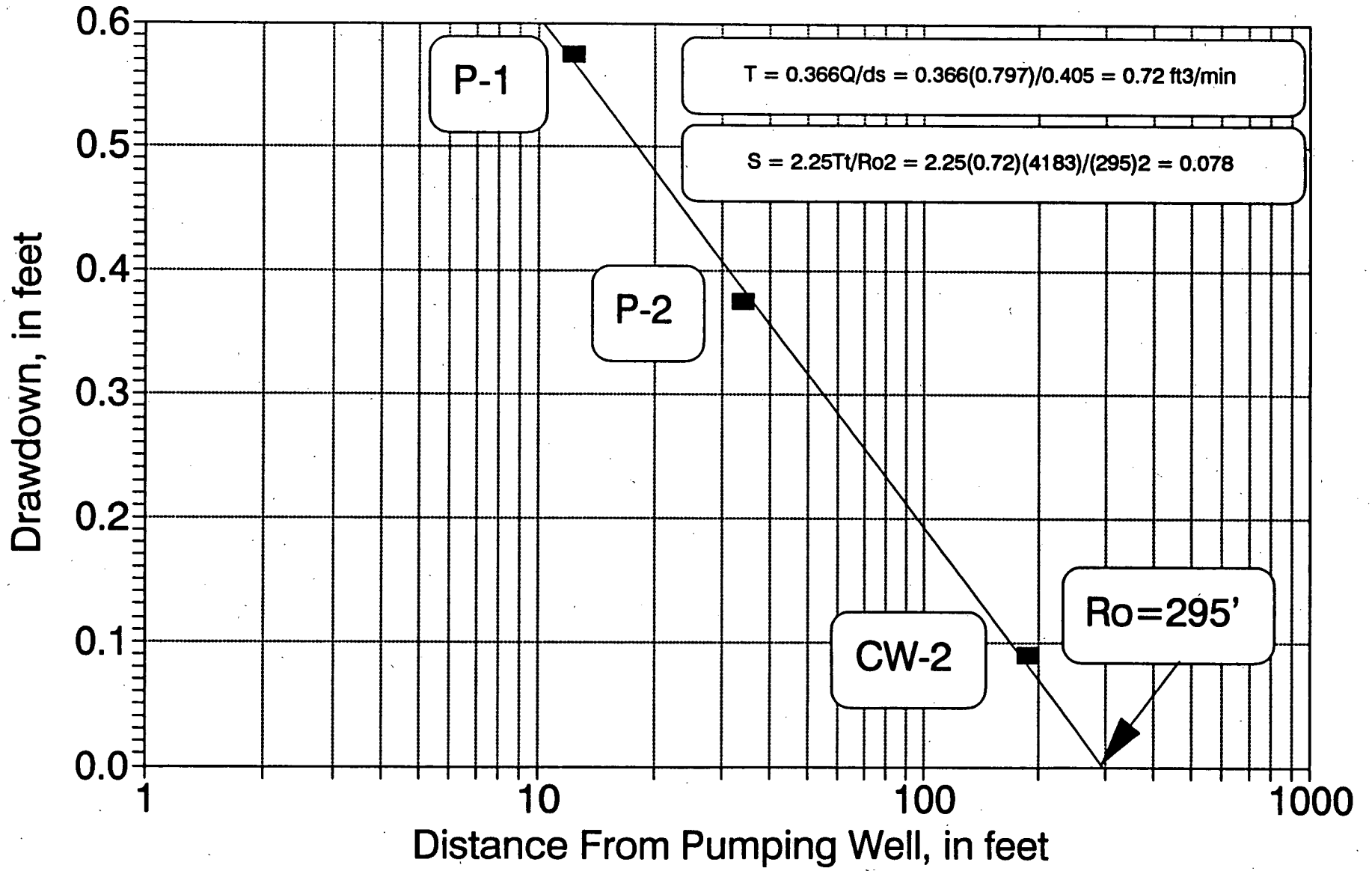


Figure B-10 Theis Solution

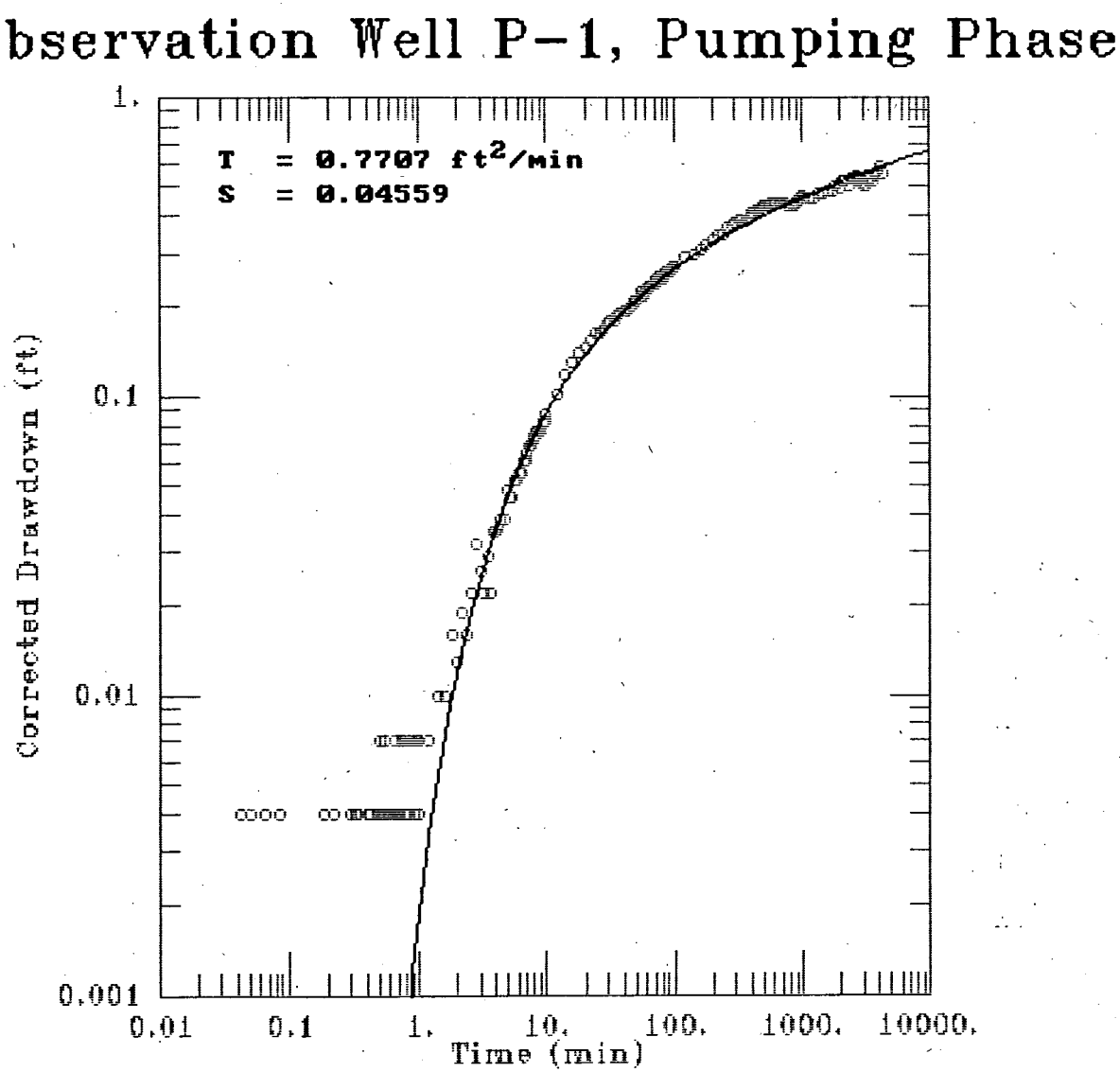


Figure B-11 Straight-Line Solution

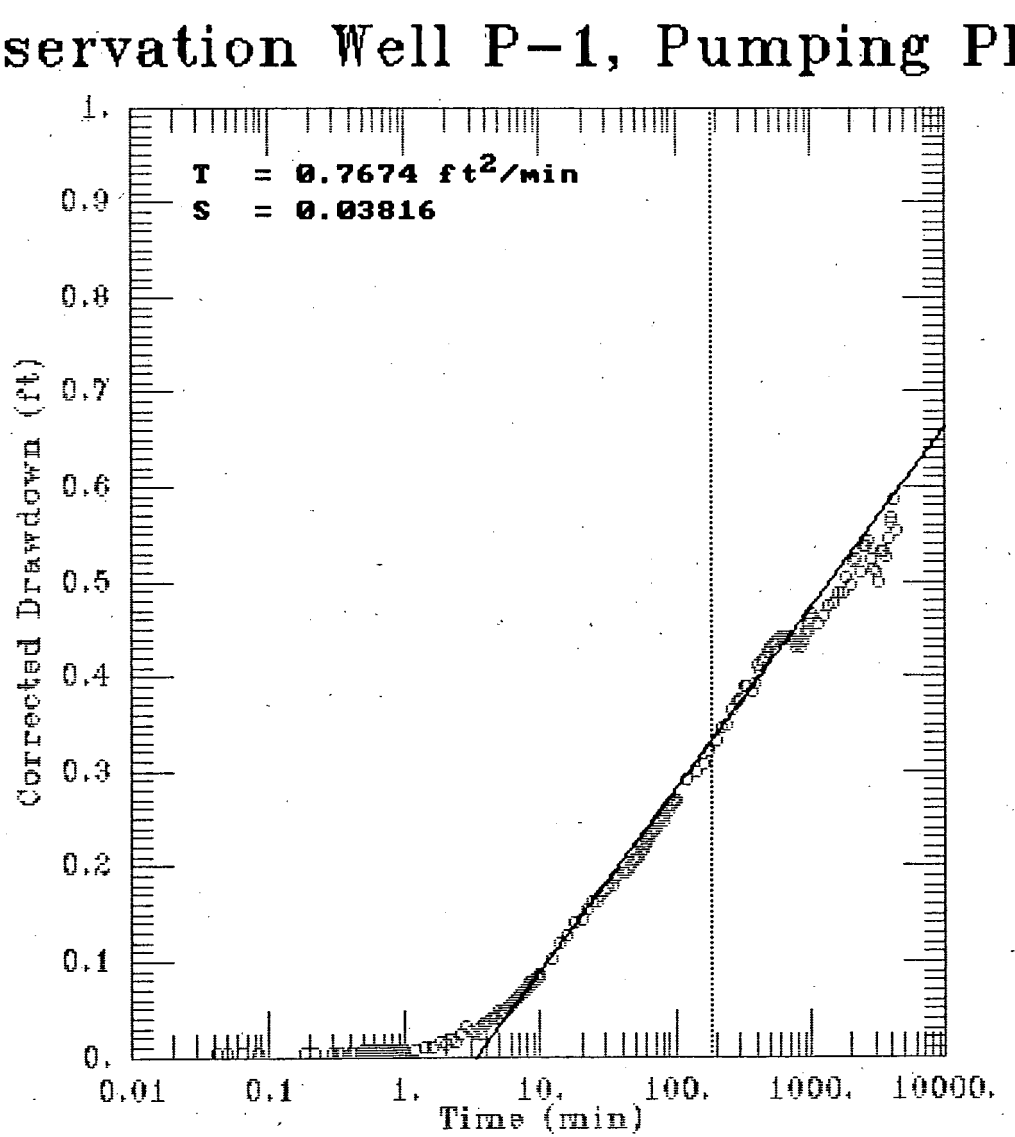


Figure B-12 Theis Solution

Observation Well P-1, Recovery Phase

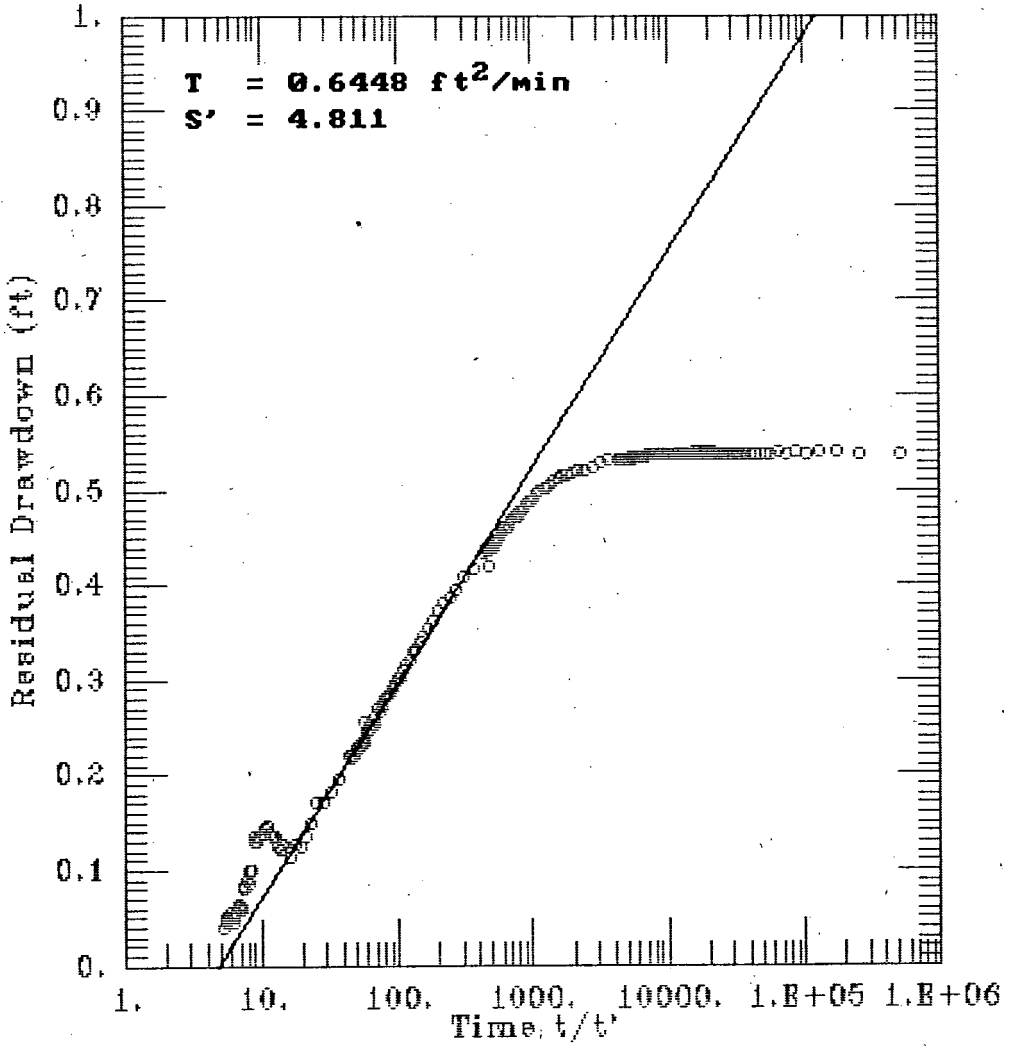


Figure B-13 Theis Solution

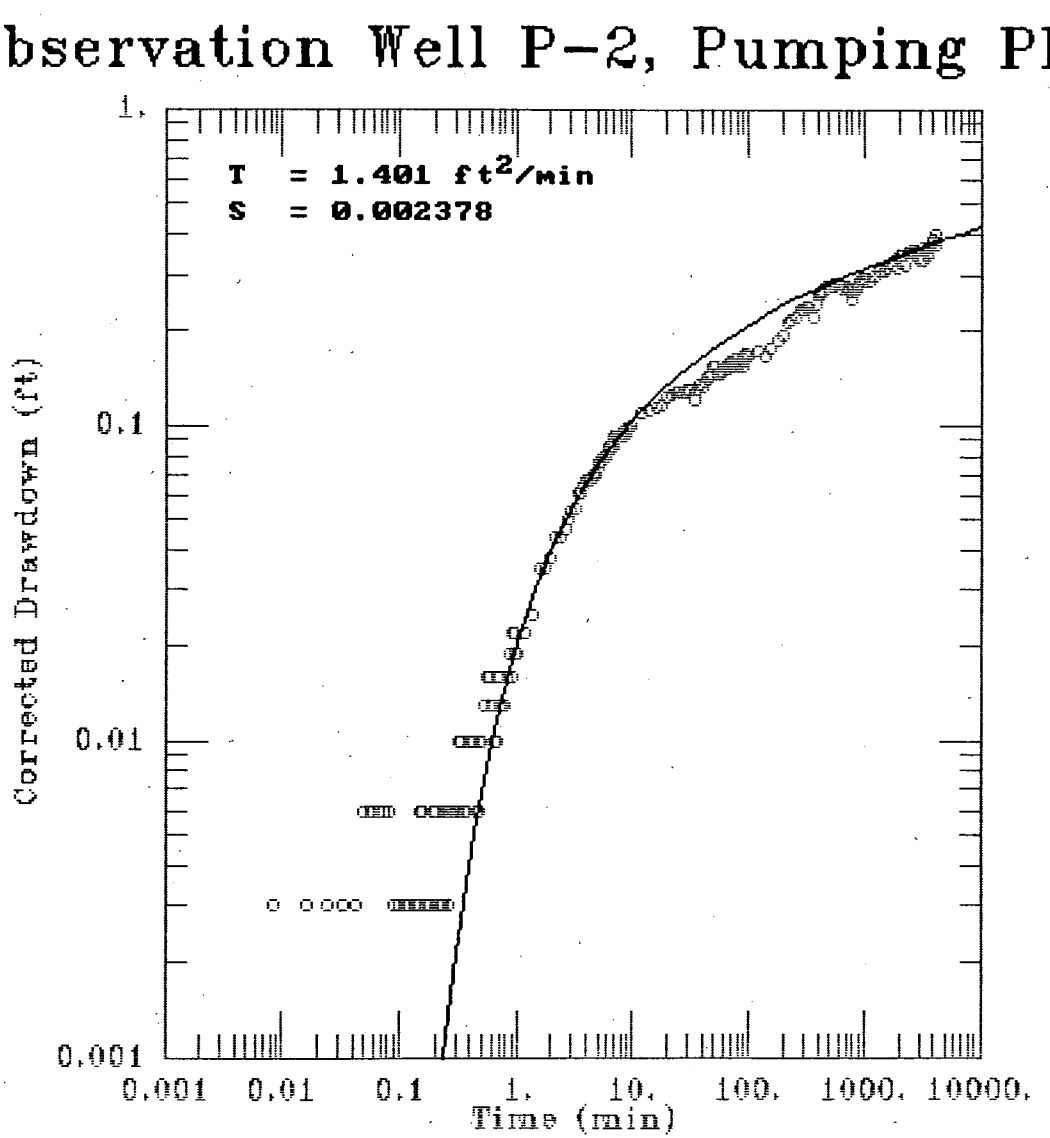


Figure B-14 Straight-Line Solution

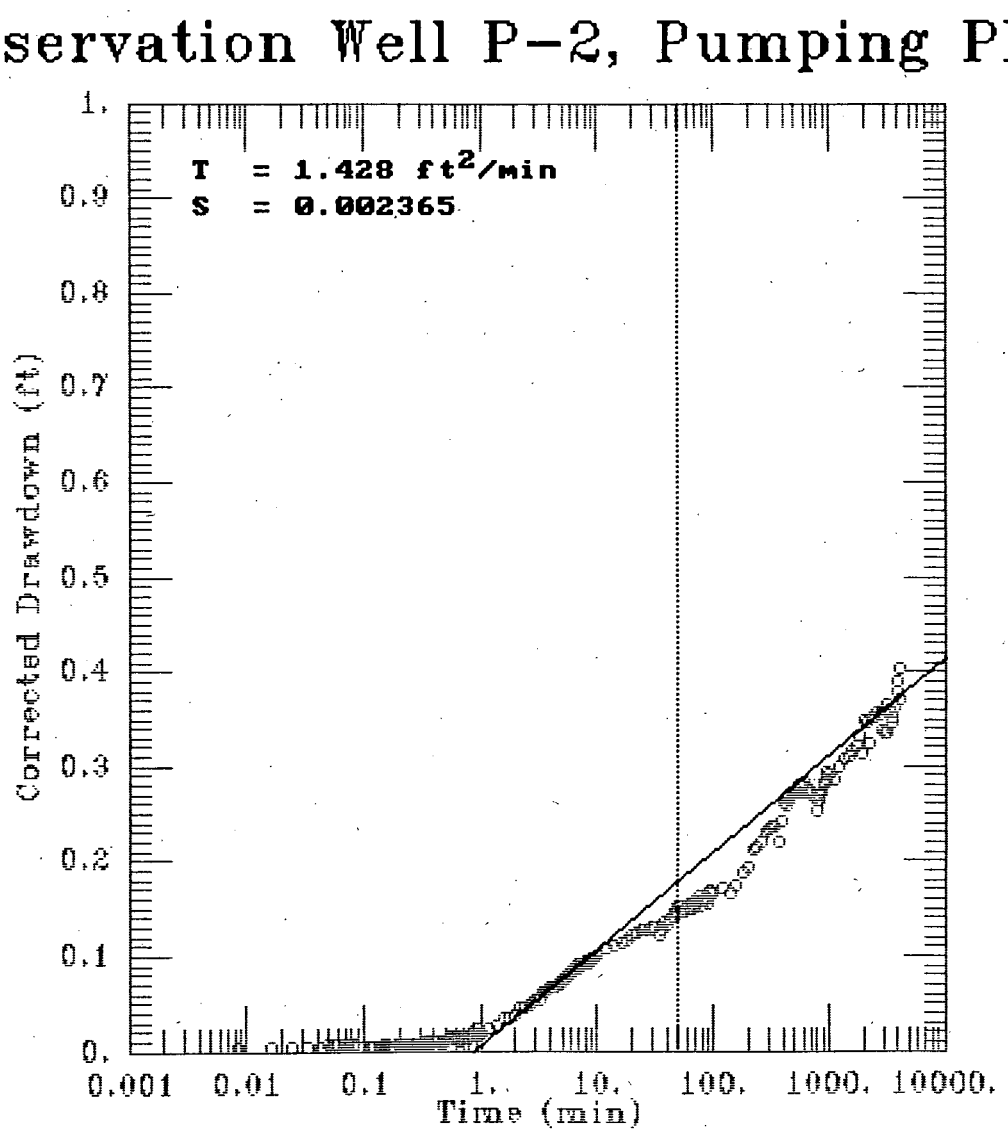


Figure B-15 Neuman Solution

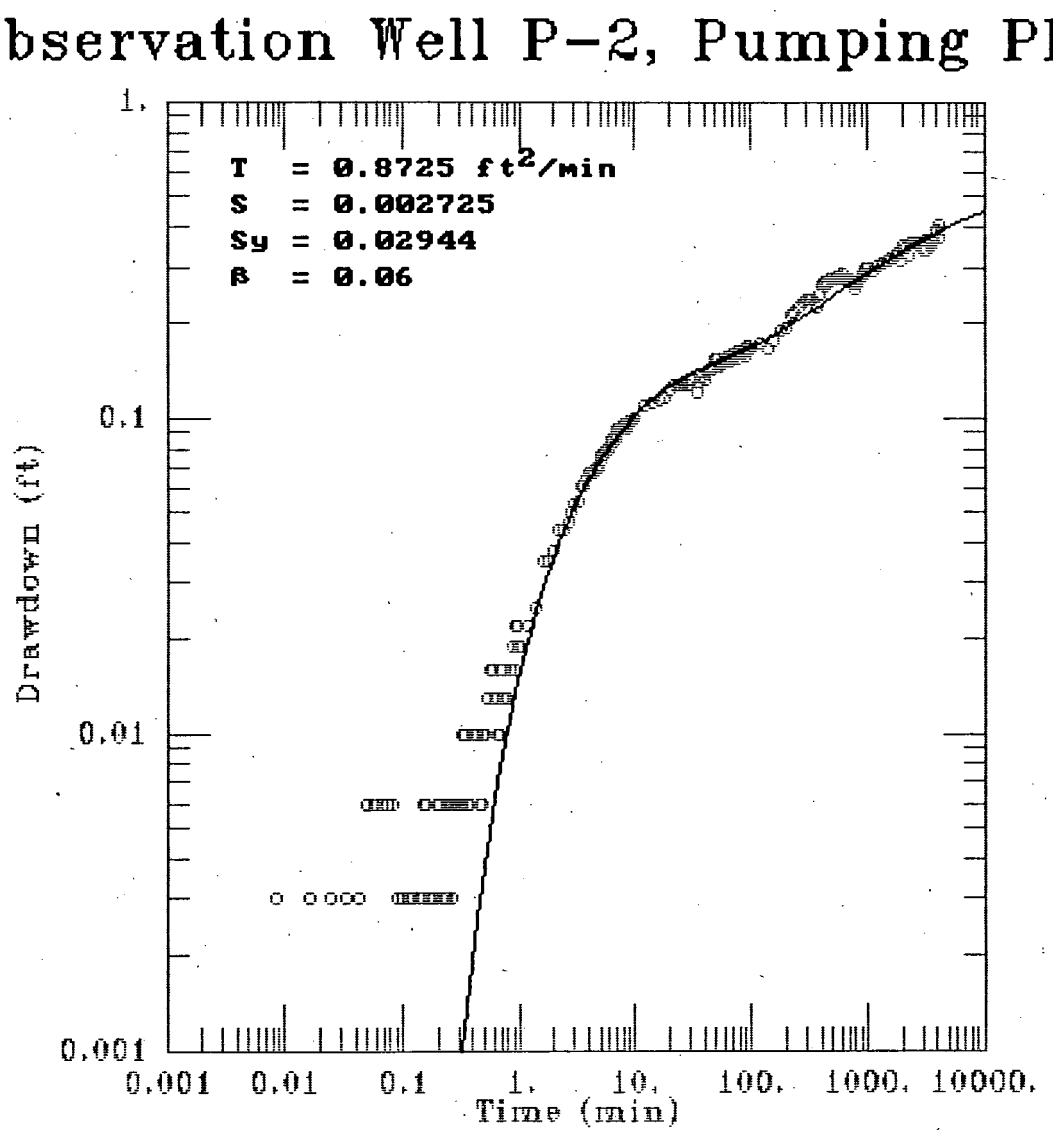


Figure B-16 Theis Solution

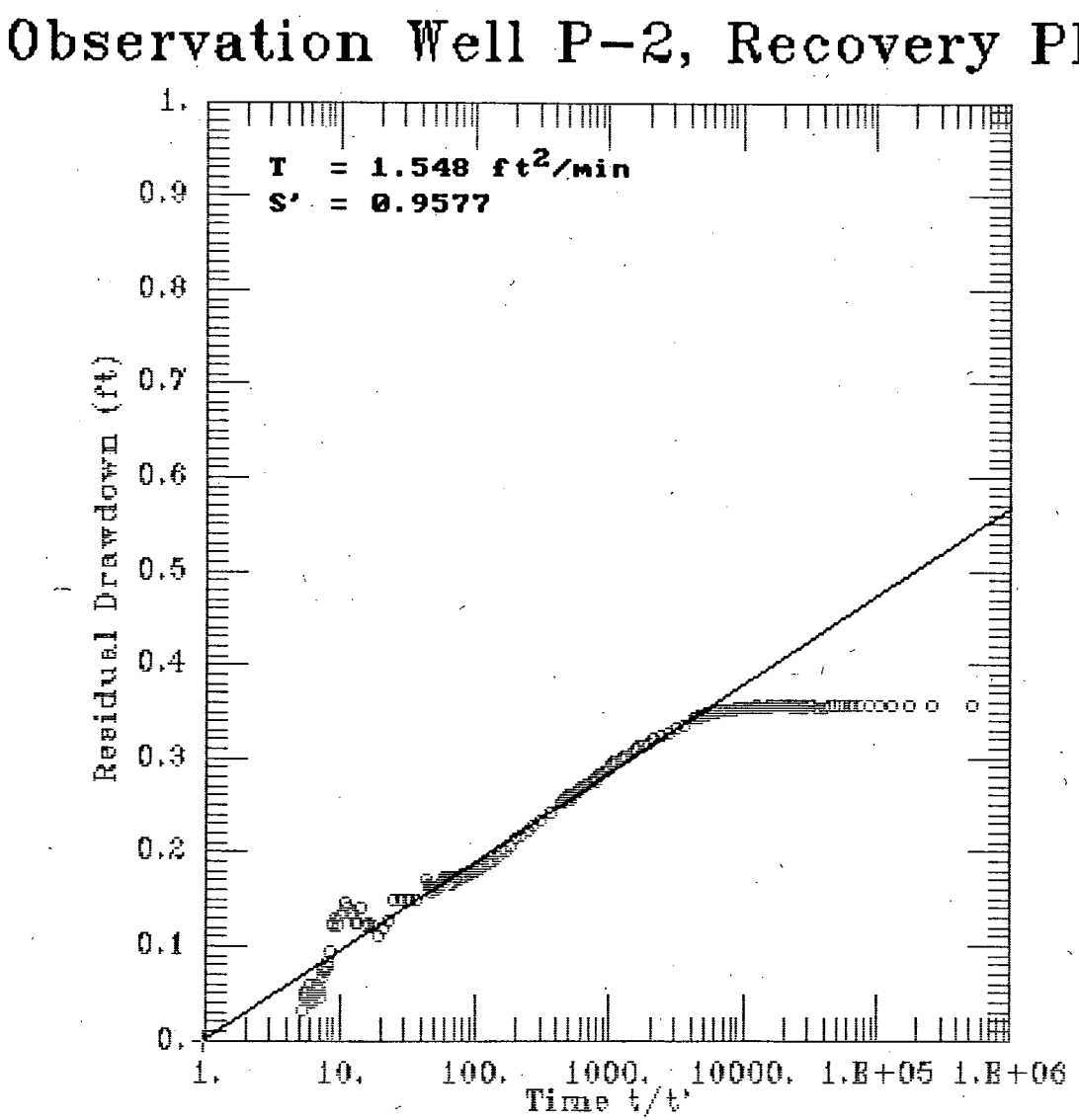
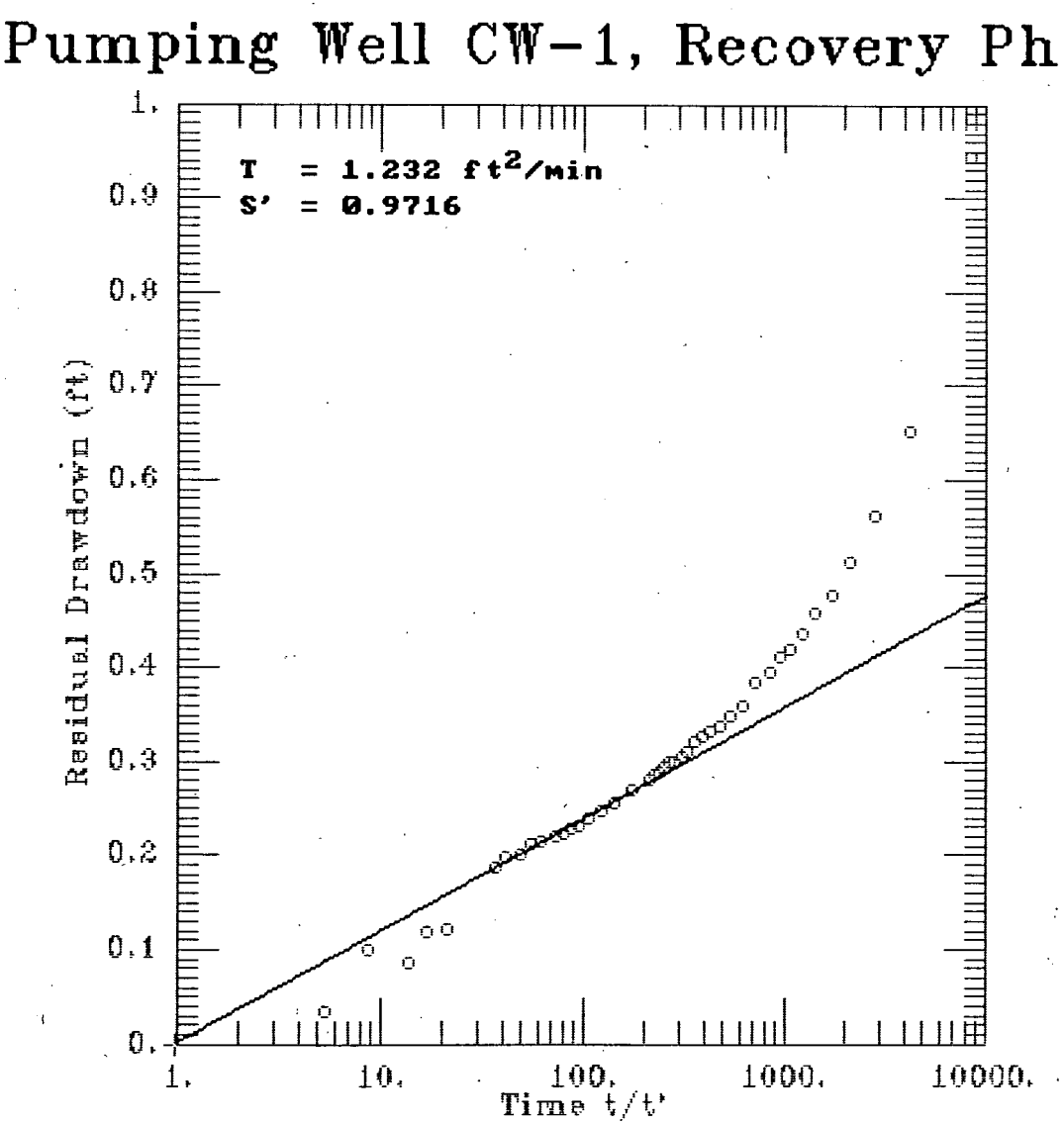


Figure B-17 Theis Solution



Historical W.L.'s from Probe, CW-1 Pumping Test

Time (minutes)	Observed W.L.: CW-1 (feet)	Observed W.L.: P-1 (feet)	Observed W.L.: P-2 (feet)	Observed W.L.: CW-2 (feet)	Observed W.L.: CW-3R (feet)
-4100	121.990			121.410	124.200
-3335	122.070			121.440	124.250
-3275			122.940		
-3050	121.950		122.830	121.380	124.190
-2840	121.920			121.310	124.110
-2400	122.000	121.870	122.880	121.440	124.240
-1880	122.060	121.920	122.940	121.500	124.310
-1570	122.000	121.890	122.860	121.410	124.240
-1305	121.930	121.850	122.800	121.350	124.170
-1175		121.870	122.860		
-980	122.080	122.000	122.970	121.480	124.290
-50	121.895	121.790	122.760	121.300	124.110
13	123.240	121.880			
30	123.300	121.935	122.860		
40	123.320	121.970			
60	123.350	121.980	122.880		
78	123.380			121.270	
182	123.460	122.080	122.910	121.275	124.050
324	123.530	122.140	122.930	121.280	124.040
614	123.590	122.170	122.970	121.290	124.045
1121	123.680	122.220	123.010	121.330	124.080
1388	123.770	122.290	123.080	121.380	124.130
1575	123.800	122.320	123.110	121.400	124.145
1735	123.825	122.335	123.125	121.425	124.165
1923	123.830	122.340	123.120	121.420	124.170
2258	123.775	122.275	123.060	121.340	124.080
2662	123.725	122.220	122.990	121.265	123.990
2852	123.735	122.235	123.010	121.290	124.025
2990	123.745	122.250	123.025	121.315	124.045
3181	123.780	122.270	123.070	121.355	124.085
3497	123.810	122.300	123.080	121.355	124.085
3946	123.780	122.265	123.040	121.305	124.025
4183	123.725	122.200	122.970	121.225	123.945
4287	123.695	122.175	122.950	121.215	123.940
4390	122.025	121.930	122.815	121.280	124.005
4589	122.105	121.985	122.940	121.440	124.180
4655	122.160	122.060	123.015	121.530	124.270
4879	122.175	122.065	123.010	121.530	124.270
5300	122.180	122.060	123.020	121.555	124.340

Historical W.L.'s from Probe, continued: Corrected Drawdowns, CW-1 Pumping Test

Time (minutes)	CW-3R Dev. from t=-50 (feet)	Env. Corr'd. Drawdown: CW-1 (ft)	Env. Corr'd. Drawdown: P-1 (ft)	Env. Corr'd. Drawdown: P-2 (ft)	Env. Corr'd. Drawdown: CW-2 (ft)
-4100	-0.09	-0.005			-0.02
-3335	-0.14	-0.035			0
-3275					
-3050	-0.08	0.025		0.01	0
-2840	0	-0.025			-0.01
-2400	-0.13	0.025	0.05	0.01	-0.01
-1880	-0.2	0.035	0.07	0.02	0
-1570	-0.13	0.025	0.03	0.03	0.02
-1305	-0.06	0.025	0	0.02	0.01
-1175					
-980	-0.18	-0.005	-0.03	-0.03	0
-50	0	0	0	0	0
13					
30					
40					
60					
78					
182	0.06	-1.625	-0.35	-0.21	-0.035
324	0.07	-1.705	-0.42	-0.24	-0.05
614	0.065	-1.76	-0.445	-0.275	-0.055
1121	0.03	-1.815	-0.46	-0.28	-0.06
1388	-0.02	-1.855	-0.48	-0.3	-0.06
1575	-0.035	-1.87	-0.495	-0.315	-0.065
1735	-0.055	-1.875	-0.49	-0.31	-0.07
1923	-0.06	-1.875	-0.49	-0.3	-0.06
2258	0.03	-1.91	-0.515	-0.33	-0.07
2662	0.12	-1.95	-0.55	-0.35	-0.085
2852	0.085	-1.925	-0.53	-0.335	-0.075
2990	0.065	-1.915	-0.525	-0.33	-0.08
3181	0.025	-1.91	-0.505	-0.335	-0.08
3497	0.025	-1.94	-0.535	-0.345	-0.08
3946	0.085	-1.97	-0.56	-0.365	-0.09
4183	0.165	-1.995	-0.575	-0.375	-0.09
4287	0.17	-1.97	-0.555	-0.36	-0.085
4390	0.105	-0.235	-0.245	-0.16	-0.085
4589	-0.07	-0.14	-0.125	-0.11	-0.07
4655	-0.16	-0.105	-0.11	-0.095	-0.07
4879	-0.16	-0.12	-0.115	-0.09	-0.07
5300	-0.23	-0.055	-0.04	-0.03	-0.025

Historical W.L.'s from Probe, continued: Correction Factors, CW-1 Pumping Test

Time (minutes)	CW-3R Dev. from t=0 min. (feet)	Transducer Deviation: P-1 (ft)	Transducer Deviation: P-2 (ft)	Net Correction: P-1 (ft)	Net Correction: P-2 (ft)
-4100	-0.09				
-3335	-0.14				
-3275					
-3050	-0.08				
-2840	0				
-2400	-0.13				
-1880	-0.2				
-1570	-0.13				
-1305	-0.06				
-1175					
-980	-0.18				
-50	0				
13					
30					
40					
60					
78					
182	0.06				
324	0.07				
614	0.065	0.011	0.031	0.076	0.096
1121	0.03	0.02	0.043	0.05	0.073
1388	-0.02	0.03	0.06	0.01	0.04
1575	-0.035	0.047	0.083	0.012	0.048
1735	-0.055	0.046	0.092	-0.009	0.037
1923	-0.06	0.055	0.103	-0.005	0.043
2258	0.03	0.069	0.121	0.099	0.151
2662	0.12	0.089	0.133	0.209	0.253
2852	0.085	0.085	0.144	0.17	0.229
2990	0.065	0.088	0.159	0.153	0.224
3181	0.025	0.098	0.188	0.123	0.213
3497	0.025	0.131	0.214	0.156	0.239
3946	0.085	0.147	0.24	0.232	0.325
4183	0.165	0.158	0.254	0.323	0.419
4287	0.17	0.164	0.266	0.334	0.436
4390	0.105	0.147	0.26	0.252	0.365
4589	-0.07	0.173	0.303	0.103	0.233
4655	-0.16	0.188	0.318	0.028	0.158
4879	-0.16	0.2	0.326	0.04	0.166
5300	-0.23	0.217	0.348	-0.013	0.118

Observed and Corrected Water Levels, Pumping Period, Well CW-1, CW-1 Pumping Test

Time (minutes)	Water Level (feet)	Environmental Correction (feet)	Corrected Water Level (feet)	Corrected Drawdown (feet)
0	121.915	0.0000	121.915	0.000
0.5	122.7	0.0002	122.700	0.785
1	122.86	0.0003	122.860	0.945
1.5	122.96	0.0005	122.960	1.045
2	123.01	0.0007	123.011	1.096
2.5	123.05	0.0008	123.051	1.136
3	123.07	0.0010	123.071	1.156
3.5	123.1	0.0012	123.101	1.186
4	123.12	0.0013	123.121	1.206
4.5	123.12	0.0015	123.121	1.206
5	123.14	0.0016	123.142	1.227
6	123.16	0.0020	123.162	1.247
7	123.18	0.0023	123.182	1.267
8	123.19	0.0026	123.193	1.278
9	123.21	0.0030	123.213	1.298
10	123.21	0.0033	123.213	1.298
11	123.23	0.0036	123.234	1.319
12	123.24	0.0040	123.244	1.329
13	123.24	0.0043	123.244	1.329
14	123.24	0.0046	123.245	1.330
15	123.25	0.0049	123.255	1.340
16	123.25	0.0053	123.255	1.340
17	123.26	0.0056	123.266	1.351
18	123.27	0.0059	123.276	1.361
19	123.27	0.0063	123.276	1.361
20	123.28	0.0066	123.287	1.372
25	123.29	0.0082	123.298	1.383
30	123.3	0.0099	123.310	1.395
35	123.31	0.0115	123.322	1.407
40	123.32	0.0132	123.333	1.418
45	123.33	0.0148	123.345	1.430
50	123.34	0.0165	123.356	1.441
55	123.35	0.0181	123.368	1.453
60	123.35	0.0198	123.370	1.455
70	123.37	0.0231	123.393	1.478
85	123.38	0.0280	123.408	1.493
100	123.4	0.0330	123.433	1.518
122	123.41	0.0402	123.450	1.535
141	123.43	0.0465	123.476	1.561

Observed and Corrected Water Levels, Pumping Period, Well CW-1, CW-1 Pumping Test

Time (minutes)	Water Level (feet)	Environmental Correction (feet)	Corrected Water Level (feet)	Corrected Drawdown (feet)
163	123.44	0.0537	123.494	1.579
182	123.46	0.0600	123.520	1.605
225	123.49	0.0630	123.553	1.638
324	123.53	0.0700	123.600	1.685
366	123.53	0.0693	123.599	1.684
534	123.59	0.0664	123.656	1.741
614	123.59	0.0650	123.655	1.740
1121	123.68	0.0300	123.710	1.795
1185	123.7	0.0180	123.718	1.803
1388	123.77	-0.0200	123.750	1.835
1426	123.76	-0.0230	123.737	1.822
1575	123.8	-0.0350	123.765	1.850
1735	123.825	-0.0550	123.770	1.855
1923	123.83	-0.0600	123.770	1.855
1982	123.83	-0.0441	123.786	1.871
2258	123.775	0.0300	123.805	1.890
2662	123.725	0.1200	123.845	1.930
2852	123.735	0.0850	123.820	1.905
2990	123.745	0.0650	123.810	1.895
3181	123.78	0.0250	123.805	1.890
3243	123.805	0.0250	123.830	1.915
3497	123.81	0.0250	123.835	1.920
3946	123.78	0.0850	123.865	1.950
4183	123.725	0.1650	123.890	1.975
4287	123.695	0.1700	123.865	1.950
4316	123.695	0.1517	123.847	1.932

Observed and Corrected Water Levels, Recovery Period, Well CW-1, CW-1 Pumping Test

Time (minutes)	Observed Water Level (feet)	Environmental Correction (feet)	Corrected Drawdown (feet)
0	123.695	0.149	1.929
0.5	122.710	0.149	0.944
1	122.420	0.148	0.653
1.5	122.330	0.148	0.563
2	122.280	0.148	0.513
2.5	122.245	0.147	0.477
3	122.225	0.147	0.457
3.5	122.205	0.147	0.437
4	122.190	0.146	0.421
4.5	122.180	0.146	0.411
5	122.165	0.146	0.396
6	122.155	0.145	0.385
7	122.130	0.145	0.360
8	122.120	0.144	0.349
9	122.110	0.143	0.338
10	122.105	0.143	0.333
11	122.100	0.142	0.327
12	122.095	0.141	0.321
13	122.085	0.141	0.311
14	122.080	0.140	0.305
15	122.075	0.140	0.300
16	122.075	0.139	0.299
17	122.070	0.138	0.293
18	122.065	0.138	0.288
19	122.065	0.137	0.287
20	122.060	0.136	0.281
25	122.050	0.133	0.268
30	122.040	0.130	0.255
35	122.035	0.127	0.247
40	122.030	0.124	0.239
45	122.025	0.121	0.231
50	122.025	0.118	0.228
55	122.025	0.114	0.224
60	122.025	0.111	0.221
70	122.025	0.105	0.215
80	122.030	0.096	0.211
90	122.030	0.087	0.202
105	122.040	0.074	0.199
120	122.040	0.061	0.186

Observed and Corrected Water Levels, Recovery Period, Well CW-1, CW-1 Pumping Test

Time (minutes)	Observed Water Level (feet)	Environmental Correction (feet)	Corrected Drawdown (feet)
214	122.060	-0.022	0.123
269	122.105	-0.070	0.120
335	122.160	-0.160	0.085
559	122.175	-0.160	0.100
980	122.180	-0.230	0.035

Environmental Water Level Correction Lookup Table, Well CW-1, CW-1 Pumping Test

Time (minutes)	Environmental Correction (feet)	Segment Slope (ft/min)	Segment Y-Intercept (feet)
0	0.000	0.00033	0.000
182	0.060	0.00007	0.047
324	0.070	-0.00002	0.076
614	0.065	-0.00007	0.107
1121	0.030	-0.00019	0.240
1388	-0.020	-0.00008	0.091
1575	-0.035	-0.00013	0.162
1735	-0.055	-0.00003	-0.009
1923	-0.060	0.00027	-0.577
2258	0.030	0.00022	-0.473
2662	0.120	-0.00018	0.610
2852	0.085	-0.00014	0.498
2990	0.065	-0.00021	0.691
3181	0.025	0.00000	0.025
3497	0.025	0.00013	-0.442
3946	0.085	0.00034	-1.247
4183	0.165	0.00005	-0.036
4287	0.170	-0.00063	2.875
4390	0.105	-0.00088	3.966
4589	-0.070	-0.00136	6.188
4655	-0.160	0.00000	-0.160
4879	-0.160	-0.00017	0.651
5300	-0.230		

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Observed Water Level: P-1 (ft)	Observed Water Level: P-2 (ft)	Net Correction: P-1 (ft)	Net Correction: P-2 (ft)
0.000	121.786	122.750	0.0000	0.0000
0.008	121.786	122.753	0.0000	0.0000
0.017	121.786	122.753	0.0000	0.0000
0.025	121.786	122.753	0.0000	0.0000
0.033	121.786	122.753	0.0000	0.0000
0.042	121.790	122.753	0.0000	0.0000
0.050	121.790	122.756	0.0000	0.0000
0.058	121.786	122.756	0.0000	0.0000
0.067	121.790	122.756	0.0000	0.0000
0.075	121.783	122.756	0.0000	0.0000
0.083	121.790	122.756	0.0000	0.0000
0.092	121.786	122.753	0.0000	0.0000
0.100	121.783	122.753	0.0000	0.0000
0.108	121.786	122.753	0.0000	0.0000
0.117	121.783	122.753	0.0000	0.0000
0.125	121.783	122.753	0.0000	0.0000
0.133	121.786	122.753	0.0000	0.0000
0.142	121.786	122.753	0.0000	0.0000
0.150	121.783	122.756	0.0000	0.0000
0.158	121.786	122.756	0.0000	0.0000
0.167	121.786	122.753	0.0000	0.0000
0.175	121.786	122.753	0.0000	0.0000
0.183	121.790	122.753	0.0000	0.0000
0.192	121.786	122.756	0.0000	0.0000
0.200	121.786	122.756	0.0000	0.0000
0.208	121.786	122.756	0.0000	0.0000
0.217	121.790	122.753	0.0000	0.0000
0.225	121.786	122.753	0.0000	0.0000
0.233	121.786	122.753	0.0000	0.0000
0.242	121.786	122.756	0.0000	0.0000
0.250	121.786	122.756	0.0000	0.0000
0.258	121.786	122.753	0.0000	0.0000
0.267	121.786	122.756	0.0000	0.0000
0.275	121.786	122.756	0.0000	0.0000
0.283	121.786	122.756	0.0000	0.0000
0.292	121.790	122.756	0.0000	0.0000
0.300	121.786	122.756	0.0000	0.0000
0.308	121.786	122.756	0.0000	0.0000
0.317	121.786	122.756	0.0000	0.0000

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Observed Water Level: P-1 (ft)	Observed Water Level: P-2 (ft)	Net Correction: P-1 (ft)	Net Correction: P-2 (ft)
0.325	121.790	122.760	0.0000	0.0001
0.333	121.790	122.760	0.0000	0.0001
0.350	121.786	122.756	0.0000	0.0001
0.367	121.786	122.756	0.0000	0.0001
0.383	121.786	122.760	0.0000	0.0001
0.400	121.790	122.760	0.0000	0.0001
0.417	121.790	122.760	0.0001	0.0001
0.433	121.786	122.760	0.0001	0.0001
0.450	121.786	122.756	0.0001	0.0001
0.467	121.790	122.756	0.0001	0.0001
0.483	121.786	122.760	0.0001	0.0001
0.500	121.793	122.760	0.0001	0.0001
0.517	121.790	122.763	0.0001	0.0001
0.533	121.790	122.763	0.0001	0.0001
0.550	121.793	122.766	0.0001	0.0001
0.567	121.783	122.766	0.0001	0.0001
0.583	121.790	122.766	0.0001	0.0001
0.600	121.790	122.763	0.0001	0.0001
0.617	121.790	122.763	0.0001	0.0001
0.633	121.793	122.760	0.0001	0.0001
0.650	121.790	122.760	0.0001	0.0001
0.667	121.790	122.760	0.0001	0.0001
0.683	121.790	122.766	0.0001	0.0001
0.700	121.790	122.766	0.0001	0.0001
0.717	121.790	122.763	0.0001	0.0001
0.733	121.793	122.766	0.0001	0.0001
0.750	121.793	122.763	0.0001	0.0001
0.767	121.790	122.763	0.0001	0.0001
0.783	121.790	122.763	0.0001	0.0001
0.800	121.790	122.763	0.0001	0.0001
0.817	121.793	122.766	0.0001	0.0001
0.833	121.793	122.766	0.0001	0.0001
0.850	121.793	122.766	0.0001	0.0001
0.867	121.793	122.769	0.0001	0.0001
0.883	121.793	122.769	0.0001	0.0001
0.900	121.790	122.766	0.0001	0.0001
0.917	121.793	122.766	0.0001	0.0001
0.933	121.793	122.772	0.0001	0.0001
0.950	121.793	122.772	0.0001	0.0001

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Observed Water Level: P-1 (ft)	Observed Water Level: P-2 (ft)	Net Correction: P-1 (ft)	Net Correction: P-2 (ft)
0.967	121.793	122.769	0.0001	0.0002
0.983	121.790	122.769	0.0001	0.0002
1.000	121.793	122.769	0.0001	0.0002
1.200	121.793	122.772	0.0001	0.0002
1.400	121.796	122.775	0.0002	0.0002
1.600	121.796	122.785	0.0002	0.0003
1.800	121.802	122.785	0.0002	0.0003
2.000	121.799	122.788	0.0002	0.0003
2.200	121.805	122.794	0.0003	0.0003
2.400	121.802	122.794	0.0003	0.0004
2.600	121.808	122.797	0.0003	0.0004
2.800	121.818	122.800	0.0003	0.0004
3.000	121.812	122.803	0.0004	0.0005
3.200	121.808	122.803	0.0004	0.0005
3.400	121.815	122.810	0.0004	0.0005
3.600	121.808	122.810	0.0004	0.0006
3.800	121.821	122.813	0.0005	0.0006
4.000	121.821	122.816	0.0005	0.0006
4.200	121.821	122.816	0.0005	0.0007
4.400	121.824	122.816	0.0005	0.0007
4.600	121.824	122.819	0.0006	0.0007
4.800	121.824	122.819	0.0006	0.0008
5.000	121.834	122.822	0.0006	0.0008
5.200	121.831	122.825	0.0006	0.0008
5.400	121.831	122.825	0.0007	0.0008
5.600	121.837	122.829	0.0007	0.0009
5.800	121.837	122.829	0.0007	0.0009
6.000	121.840	122.829	0.0007	0.0009
6.200	121.840	122.835	0.0008	0.0010
6.400	121.840	122.832	0.0008	0.0010
6.600	121.846	122.835	0.0008	0.0010
6.800	121.846	122.835	0.0008	0.0011
7.000	121.850	122.841	0.0009	0.0011
7.200	121.853	122.841	0.0009	0.0011
7.400	121.853	122.841	0.0009	0.0012
7.600	121.853	122.841	0.0009	0.0012
7.800	121.859	122.841	0.0010	0.0012
8.000	121.856	122.844	0.0010	0.0013
8.200	121.859	122.841	0.0010	0.0013

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Observed Water Level: P-1 (ft)	Observed Water Level: P-2 (ft)	Net Correction: P-1 (ft)	Net Correction: P-2 (ft)
8.400	121.862	122.841	0.0010	0.0013
8.600	121.862	122.844	0.0011	0.0013
8.800	121.862	122.844	0.0011	0.0014
9.000	121.862	122.847	0.0011	0.0014
9.200	121.868	122.847	0.0011	0.0014
9.400	121.868	122.847	0.0012	0.0015
9.600	121.868	122.847	0.0012	0.0015
9.800	121.872	122.847	0.0012	0.0015
10.000	121.868	122.847	0.0012	0.0016
12.000	121.887	122.857	0.0015	0.0019
14.000	121.903	122.860	0.0017	0.0022
16.000	121.913	122.860	0.0020	0.0025
18.000	121.925	122.863	0.0022	0.0028
20.000	121.929	122.869	0.0025	0.0031
22.000	121.938	122.873	0.0027	0.0034
24.000	121.947	122.873	0.0030	0.0038
26.000	121.947	122.873	0.0032	0.0041
28.000	121.951	122.873	0.0035	0.0044
30.000	121.957	122.876	0.0037	0.0047
32.000	121.960	122.876	0.0040	0.0050
34.000	121.963	122.866	0.0042	0.0053
36.000	121.970	122.873	0.0045	0.0056
38.000	121.973	122.879	0.0047	0.0059
40.000	121.976	122.876	0.0050	0.0063
42.000	121.976	122.882	0.0052	0.0066
44.000	121.979	122.885	0.0054	0.0069
46.000	121.982	122.885	0.0057	0.0072
48.000	121.989	122.888	0.0059	0.0075
50.000	121.989	122.895	0.0062	0.0078
52.000	121.992	122.895	0.0064	0.0081
54.000	121.995	122.888	0.0067	0.0084
56.000	122.004	122.888	0.0069	0.0088
58.000	121.998	122.891	0.0072	0.0091
60.000	122.004	122.891	0.0074	0.0094
62.000	122.007	122.895	0.0077	0.0097
64.000	122.011	122.891	0.0079	0.0100
66.000	122.014	122.891	0.0082	0.0103
68.000	122.017	122.895	0.0084	0.0106
70.000	122.017	122.898	0.0087	0.0109

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Observed Water Level: P-1 (ft)	Observed Water Level: P-2 (ft)	Net Correction: P-1 (ft)	Net Correction: P-2 (ft)
72.000	122.023	122.895	0.0089	0.0113
74.000	122.026	122.895	0.0092	0.0116
76.000	122.030	122.901	0.0094	0.0119
78.000	122.030	122.891	0.0097	0.0122
80.000	122.030	122.895	0.0099	0.0125
82.000	122.026	122.895	0.0101	0.0128
84.000	122.039	122.895	0.0104	0.0131
86.000	122.039	122.898	0.0106	0.0134
88.000	122.036	122.898	0.0109	0.0138
90.000	122.036	122.891	0.0111	0.0141
92.000	122.042	122.898	0.0114	0.0144
94.000	122.039	122.901	0.0116	0.0147
96.000	122.042	122.904	0.0119	0.0150
98.000	122.045	122.901	0.0121	0.0153
100.000	122.045	122.901	0.0124	0.0156
120.000	122.064	122.904	0.0149	0.0188
140.000	122.071	122.895	0.0173	0.0219
160.000	122.077	122.901	0.0198	0.0250
180.000	122.090	122.910	0.0223	0.0281
200.000	122.096	122.913	0.0248	0.0313
220.000	122.109	122.929	0.0272	0.0344
240.000	122.109	122.929	0.0297	0.0375
260.000	122.124	122.932	0.0322	0.0407
280.000	122.128	122.939	0.0347	0.0438
300.000	122.131	122.939	0.0371	0.0469
320.000	122.140	122.939	0.0396	0.0500
340.000	122.140	122.935	0.0421	0.0532
360.000	122.131	122.917	0.0446	0.0563
380.000	122.137	122.935	0.0470	0.0594
400.000	122.153	122.951	0.0495	0.0625
420.000	122.146	122.945	0.0520	0.0657
440.000	122.156	122.951	0.0545	0.0688
460.000	122.156	122.945	0.0569	0.0719
480.000	122.159	122.951	0.0594	0.0750
500.000	122.162	122.948	0.0619	0.0782
520.000	122.162	122.945	0.0644	0.0813
540.000	122.162	122.942	0.0668	0.0844
560.000	122.162	122.945	0.0693	0.0876
580.000	122.162	122.942	0.0718	0.0907

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Observed Water Level: P-1 (ft)	Observed Water Level: P-2 (ft)	Net Correction: P-1 (ft)	Net Correction: P-2 (ft)
600.000	122.162	122.942	0.0743	0.0938
620.000	122.159	122.939	0.0757	0.0957
640.000	122.159	122.929	0.0747	0.0948
660.000	122.159	122.932	0.0736	0.0939
680.000	122.162	122.935	0.0726	0.0930
700.000	122.159	122.932	0.0716	0.0921
720.000	122.162	122.935	0.0706	0.0912
740.000	122.162	122.929	0.0695	0.0903
760.000	122.159	122.929	0.0685	0.0894
780.000	122.156	122.917	0.0675	0.0885
800.000	122.159	122.929	0.0665	0.0876
820.000	122.159	122.929	0.0654	0.0867
840.000	122.159	122.935	0.0644	0.0857
860.000	122.165	122.939	0.0634	0.0848
880.000	122.169	122.942	0.0624	0.0839
900.000	122.178	122.954	0.0613	0.0830
920.000	122.178	122.951	0.0603	0.0821
940.000	122.181	122.957	0.0593	0.0812
960.000	122.191	122.967	0.0583	0.0803
980.000	122.197	122.967	0.0572	0.0794
1000.000	122.203	122.967	0.0562	0.0785
1120.000	122.200	122.967	0.0501	0.0730
1240.000	122.225	122.995	0.0322	0.0583
1360.000	122.254	123.017	0.0142	0.0435
1480.000	122.260	123.020	0.0110	0.0439
1600.000	122.273	123.023	0.0087	0.0463
1720.000	122.289	123.036	-0.0070	0.0380
1840.000	122.308	123.045	-0.0068	0.0404
1960.000	122.285	123.011	0.0065	0.0549
2080.000	122.273	123.008	0.0437	0.0936
2200.000	122.238	122.967	0.0810	0.1323
2320.000	122.188	122.910	0.1159	0.1667
2440.000	122.184	122.910	0.1486	0.1970
2560.000	122.153	122.879	0.1812	0.2272
2680.000	122.134	122.860	0.2053	0.2507
2800.000	122.140	122.873	0.1807	0.2356
2920.000	122.146	122.866	0.1616	0.2265
3040.000	122.159	122.869	0.1451	0.2211
3160.000	122.169	122.876	0.1263	0.2142

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Observed Water Level: P-1 (ft)	Observed Water Level: P-2 (ft)	Net Correction: P-1 (ft)	Net Correction: P-2 (ft)
3280.000	122.194	122.898	0.1333	0.2211
3400.000	122.181	122.882	0.1459	0.2310
3520.000	122.169	122.863	0.1599	0.2434
3640.000	122.143	122.835	0.1802	0.2664
3760.000	122.140	122.829	0.2005	0.2894
3880.000	122.143	122.832	0.2208	0.3124
4000.000	122.105	122.788	0.2527	0.3464
4120.000	122.086	122.766	0.2988	0.3940
4240.000	122.023	122.697	0.3290	0.4283

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Corrected Water Level: P-1 (ft)	Corrected Water Level: P-2 (ft)	Corrected Drawdown: P-1 (ftF)	Corrected Drawdown: P-2 (ft)
0.000	121.786	122.750	0.000	0.000
0.008	121.786	122.753	0.000	0.003
0.017	121.786	122.753	0.000	0.003
0.025	121.786	122.753	0.000	0.003
0.033	121.786	122.753	0.000	0.003
0.042	121.790	122.753	0.004	0.003
0.050	121.790	122.756	0.004	0.006
0.058	121.786	122.756	0.000	0.006
0.067	121.790	122.756	0.004	0.006
0.075	121.783	122.756	-0.003	0.006
0.083	121.790	122.756	0.004	0.006
0.092	121.786	122.753	0.000	0.003
0.100	121.783	122.753	-0.003	0.003
0.108	121.786	122.753	0.000	0.003
0.117	121.783	122.753	-0.003	0.003
0.125	121.783	122.753	-0.003	0.003
0.133	121.786	122.753	0.000	0.003
0.142	121.786	122.753	0.000	0.003
0.150	121.783	122.756	-0.003	0.006
0.158	121.786	122.756	0.000	0.006
0.167	121.786	122.753	0.000	0.003
0.175	121.786	122.753	0.000	0.003
0.183	121.790	122.753	0.004	0.003
0.192	121.786	122.756	0.000	0.006
0.200	121.786	122.756	0.000	0.006
0.208	121.786	122.756	0.000	0.006
0.217	121.790	122.753	0.004	0.003
0.225	121.786	122.753	0.000	0.003
0.233	121.786	122.753	0.000	0.003
0.242	121.786	122.756	0.000	0.006
0.250	121.786	122.756	0.000	0.006
0.258	121.786	122.753	0.000	0.003
0.267	121.786	122.756	0.000	0.006
0.275	121.786	122.756	0.000	0.006
0.283	121.786	122.756	0.000	0.006
0.292	121.790	122.756	0.004	0.006
0.300	121.786	122.756	0.000	0.006
0.308	121.786	122.756	0.000	0.006
0.317	121.786	122.756	0.000	0.006

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Corrected Water Level: P-1 (ft)	Corrected Water Level: P-2 (ft)	Corrected Drawdown: P-1 (ftF)	Corrected Drawdown: P-2 (ft)
0.325	121.790	122.760	0.004	0.010
0.333	121.790	122.760	0.004	0.010
0.350	121.786	122.756	0.000	0.006
0.367	121.786	122.756	0.000	0.006
0.383	121.786	122.760	0.000	0.010
0.400	121.790	122.760	0.004	0.010
0.417	121.790	122.760	0.004	0.010
0.433	121.786	122.760	0.000	0.010
0.450	121.786	122.756	0.000	0.006
0.467	121.790	122.756	0.004	0.006
0.483	121.786	122.760	0.000	0.010
0.500	121.793	122.760	0.007	0.010
0.517	121.790	122.763	0.004	0.013
0.533	121.790	122.763	0.004	0.013
0.550	121.793	122.766	0.007	0.016
0.567	121.783	122.766	-0.003	0.016
0.583	121.790	122.766	0.004	0.016
0.600	121.790	122.763	0.004	0.013
0.617	121.790	122.763	0.004	0.013
0.633	121.793	122.760	0.007	0.010
0.650	121.790	122.760	0.004	0.010
0.667	121.790	122.760	0.004	0.010
0.683	121.790	122.766	0.004	0.016
0.700	121.790	122.766	0.004	0.016
0.717	121.790	122.763	0.004	0.013
0.733	121.793	122.766	0.007	0.016
0.750	121.793	122.763	0.007	0.013
0.767	121.790	122.763	0.004	0.013
0.783	121.790	122.763	0.004	0.013
0.800	121.790	122.763	0.004	0.013
0.817	121.793	122.766	0.007	0.016
0.833	121.793	122.766	0.007	0.016
0.850	121.793	122.766	0.007	0.016
0.867	121.793	122.769	0.007	0.019
0.883	121.793	122.769	0.007	0.019
0.900	121.790	122.766	0.004	0.016
0.917	121.793	122.766	0.007	0.016
0.933	121.793	122.772	0.007	0.022
0.950	121.793	122.772	0.007	0.022

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Corrected Water Level: P-1 (ft)	Corrected Water Level: P-2 (ft)	Corrected Drawdown: P-1 (ftF)	Corrected Drawdown: P-2 (ft)
0.967	121.793	122.769	0.007	0.019
0.983	121.790	122.769	0.004	0.019
1.000	121.793	122.769	0.007	0.019
1.200	121.793	122.772	0.007	0.022
1.400	121.796	122.775	0.010	0.025
1.600	121.796	122.785	0.010	0.035
1.800	121.802	122.785	0.016	0.035
2.000	121.799	122.788	0.013	0.038
2.200	121.805	122.794	0.019	0.044
2.400	121.802	122.794	0.016	0.044
2.600	121.808	122.797	0.022	0.047
2.800	121.818	122.800	0.032	0.050
3.000	121.812	122.803	0.026	0.053
3.200	121.808	122.804	0.022	0.054
3.400	121.815	122.811	0.029	0.061
3.600	121.808	122.811	0.022	0.061
3.800	121.821	122.814	0.035	0.064
4.000	121.821	122.817	0.035	0.067
4.200	121.822	122.817	0.036	0.067
4.400	121.825	122.817	0.039	0.067
4.600	121.825	122.820	0.039	0.070
4.800	121.825	122.820	0.039	0.070
5.000	121.835	122.823	0.049	0.073
5.200	121.832	122.826	0.046	0.076
5.400	121.832	122.826	0.046	0.076
5.600	121.838	122.830	0.052	0.080
5.800	121.838	122.830	0.052	0.080
6.000	121.841	122.830	0.055	0.080
6.200	121.841	122.836	0.055	0.086
6.400	121.841	122.833	0.055	0.083
6.600	121.847	122.836	0.061	0.086
6.800	121.847	122.836	0.061	0.086
7.000	121.851	122.842	0.065	0.092
7.200	121.854	122.842	0.068	0.092
7.400	121.854	122.842	0.068	0.092
7.600	121.854	122.842	0.068	0.092
7.800	121.860	122.842	0.074	0.092
8.000	121.857	122.845	0.071	0.095
8.200	121.860	122.842	0.074	0.092

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Corrected Water Level: P-1 (ft)	Corrected Water Level: P-2 (ft)	Corrected Drawdown: P-1 (ftF)	Corrected Drawdown: P-2 (ft)
8.400	121.863	122.842	0.077	0.092
8.600	121.863	122.845	0.077	0.095
8.800	121.863	122.845	0.077	0.095
9.000	121.863	122.848	0.077	0.098
9.200	121.869	122.848	0.083	0.098
9.400	121.869	122.848	0.083	0.098
9.600	121.869	122.849	0.083	0.099
9.800	121.873	122.849	0.087	0.099
10.000	121.869	122.849	0.083	0.099
12.000	121.888	122.859	0.102	0.109
14.000	121.905	122.862	0.119	0.112
16.000	121.915	122.863	0.129	0.113
18.000	121.927	122.866	0.141	0.116
20.000	121.931	122.872	0.145	0.122
22.000	121.941	122.876	0.155	0.126
24.000	121.950	122.877	0.164	0.127
26.000	121.950	122.877	0.164	0.127
28.000	121.954	122.877	0.168	0.127
30.000	121.961	122.881	0.175	0.131
32.000	121.964	122.881	0.178	0.131
34.000	121.967	122.871	0.181	0.121
36.000	121.974	122.879	0.188	0.129
38.000	121.978	122.885	0.192	0.135
40.000	121.981	122.882	0.195	0.132
42.000	121.981	122.889	0.195	0.139
44.000	121.984	122.892	0.198	0.142
46.000	121.988	122.892	0.202	0.142
48.000	121.995	122.896	0.209	0.146
50.000	121.995	122.903	0.209	0.153
52.000	121.998	122.903	0.212	0.153
54.000	122.002	122.896	0.216	0.146
56.000	122.011	122.897	0.225	0.147
58.000	122.005	122.900	0.219	0.150
60.000	122.011	122.900	0.225	0.150
62.000	122.015	122.905	0.229	0.155
64.000	122.019	122.901	0.233	0.151
66.000	122.022	122.901	0.236	0.151
68.000	122.025	122.906	0.239	0.156
70.000	122.026	122.909	0.240	0.159

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Corrected Water Level: P-1 (ft)	Corrected Water Level: P-2 (ft)	Corrected Drawdown: P-1 (ftF)	Corrected Drawdown: P-2 (ft)
72.000	122.032	122.906	0.246	0.156
74.000	122.035	122.907	0.249	0.157
76.000	122.039	122.913	0.253	0.163
78.000	122.040	122.903	0.254	0.153
80.000	122.040	122.908	0.254	0.158
82.000	122.036	122.908	0.250	0.158
84.000	122.049	122.908	0.263	0.158
86.000	122.050	122.911	0.264	0.161
88.000	122.047	122.912	0.261	0.162
90.000	122.047	122.905	0.261	0.155
92.000	122.053	122.912	0.267	0.162
94.000	122.051	122.916	0.265	0.166
96.000	122.054	122.919	0.268	0.169
98.000	122.057	122.916	0.271	0.166
100.000	122.057	122.917	0.271	0.167
120.000	122.079	122.923	0.293	0.173
140.000	122.088	122.917	0.302	0.167
160.000	122.097	122.926	0.311	0.176
180.000	122.112	122.938	0.326	0.188
200.000	122.121	122.944	0.335	0.194
220.000	122.136	122.963	0.350	0.213
240.000	122.139	122.967	0.353	0.217
260.000	122.156	122.973	0.370	0.223
280.000	122.163	122.983	0.377	0.233
300.000	122.168	122.986	0.382	0.236
320.000	122.180	122.989	0.394	0.239
340.000	122.182	122.988	0.396	0.238
360.000	122.176	122.973	0.390	0.223
380.000	122.184	122.994	0.398	0.244
400.000	122.203	123.014	0.417	0.264
420.000	122.198	123.011	0.412	0.261
440.000	122.210	123.020	0.424	0.270
460.000	122.213	123.017	0.427	0.267
480.000	122.218	123.026	0.432	0.276
500.000	122.224	123.026	0.438	0.276
520.000	122.226	123.026	0.440	0.276
540.000	122.229	123.026	0.443	0.276
560.000	122.231	123.033	0.445	0.283
580.000	122.234	123.033	0.448	0.283

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Corrected Water Level: P-1 (ft)	Corrected Water Level: P-2 (ft)	Corrected Drawdown: P-1 (ftF)	Corrected Drawdown: P-2 (ft)
600.000	122.236	123.036	0.450	0.286
620.000	122.235	123.035	0.449	0.285
640.000	122.234	123.024	0.448	0.274
660.000	122.233	123.026	0.447	0.276
680.000	122.235	123.028	0.449	0.278
700.000	122.231	123.024	0.445	0.274
720.000	122.233	123.026	0.447	0.276
740.000	122.232	123.019	0.446	0.269
760.000	122.228	123.018	0.442	0.268
780.000	122.223	123.005	0.437	0.255
800.000	122.225	123.017	0.439	0.267
820.000	122.224	123.016	0.438	0.266
840.000	122.223	123.021	0.437	0.271
860.000	122.228	123.024	0.442	0.274
880.000	122.231	123.026	0.445	0.276
900.000	122.239	123.037	0.453	0.287
920.000	122.238	123.033	0.452	0.283
940.000	122.240	123.038	0.454	0.288
960.000	122.249	123.047	0.463	0.297
980.000	122.254	123.046	0.468	0.296
1000.000	122.259	123.045	0.473	0.295
1120.000	122.250	123.040	0.464	0.290
1240.000	122.257	123.053	0.471	0.303
1360.000	122.268	123.060	0.482	0.310
1480.000	122.271	123.064	0.485	0.314
1600.000	122.282	123.069	0.496	0.319
1720.000	122.282	123.074	0.496	0.324
1840.000	122.301	123.085	0.515	0.335
1960.000	122.291	123.066	0.505	0.316
2080.000	122.317	123.102	0.531	0.352
2200.000	122.319	123.099	0.533	0.349
2320.000	122.304	123.077	0.518	0.327
2440.000	122.333	123.107	0.547	0.357
2560.000	122.334	123.106	0.548	0.356
2680.000	122.339	123.111	0.553	0.361
2800.000	122.321	123.109	0.535	0.359
2920.000	122.308	123.093	0.522	0.343
3040.000	122.304	123.090	0.518	0.340
3160.000	122.295	123.090	0.509	0.340

Observed and Corrected Water Level Data, Pumping Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Corrected Water Level: P-1 (ft)	Corrected Water Level: P-2 (ft)	Corrected Drawdown: P-1 (ftF)	Corrected Drawdown: P-2 (ft)
3280.000	122.327	123.119	0.541	0.369
3400.000	122.327	123.113	0.541	0.363
3520.000	122.329	123.106	0.543	0.356
3640.000	122.323	123.101	0.537	0.351
3760.000	122.341	123.118	0.555	0.368
3880.000	122.364	123.144	0.578	0.394
4000.000	122.358	123.134	0.572	0.384
4120.000	122.385	123.160	0.599	0.410
4240.000	122.352	123.125	0.566	0.375

Observed & Corrected Water Level Data, Recovery Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (min)	Observed Water Level P-1 (ft)	Observed Water Level P-2 (ft)	Net Correction P-1 (ft)	Net Correction P-2 (ft)	Corrected Drawdown P-1 (ft)	Corrected Drawdown P-2 (ft)
0.000	122.014	122.694	0.308	0.415	0.536	0.359
0.008	122.014	122.694	0.308	0.414	0.536	0.358
0.017	122.014	122.694	0.308	0.414	0.536	0.358
0.025	122.017	122.694	0.308	0.414	0.539	0.358
0.033	122.017	122.694	0.308	0.414	0.539	0.358
0.042	122.014	122.694	0.308	0.414	0.536	0.358
0.050	122.017	122.694	0.308	0.414	0.539	0.358
0.058	122.014	122.694	0.308	0.414	0.536	0.358
0.067	122.017	122.694	0.308	0.414	0.539	0.358
0.075	122.014	122.694	0.308	0.414	0.536	0.358
0.083	122.014	122.694	0.308	0.414	0.536	0.358
0.092	122.014	122.694	0.308	0.414	0.536	0.358
0.100	122.014	122.694	0.308	0.414	0.536	0.358
0.108	122.014	122.690	0.308	0.414	0.536	0.354
0.117	122.014	122.690	0.308	0.414	0.536	0.354
0.125	122.014	122.690	0.308	0.414	0.536	0.354
0.133	122.014	122.694	0.308	0.414	0.536	0.358
0.142	122.014	122.694	0.308	0.414	0.536	0.358
0.150	122.014	122.690	0.308	0.414	0.536	0.354
0.158	122.014	122.694	0.308	0.414	0.536	0.358
0.167	122.014	122.690	0.308	0.414	0.536	0.354
0.175	122.014	122.694	0.308	0.414	0.536	0.358
0.183	122.014	122.694	0.308	0.414	0.536	0.358
0.192	122.014	122.690	0.308	0.414	0.536	0.354
0.200	122.014	122.694	0.308	0.414	0.536	0.358
0.208	122.017	122.694	0.308	0.414	0.539	0.358
0.217	122.014	122.694	0.308	0.414	0.536	0.358
0.225	122.017	122.694	0.308	0.414	0.539	0.358
0.233	122.017	122.694	0.308	0.414	0.539	0.358
0.242	122.014	122.694	0.308	0.414	0.536	0.358
0.250	122.014	122.694	0.308	0.414	0.536	0.358
0.258	122.017	122.694	0.308	0.414	0.539	0.358
0.267	122.014	122.694	0.308	0.414	0.536	0.358
0.275	122.017	122.694	0.308	0.414	0.539	0.358
0.283	122.014	122.690	0.308	0.414	0.536	0.354
0.292	122.014	122.690	0.308	0.414	0.536	0.354
0.300	122.014	122.690	0.308	0.414	0.536	0.354
0.308	122.014	122.690	0.308	0.414	0.536	0.354
0.317	122.014	122.690	0.308	0.414	0.536	0.354

Observed & Corrected Water Level Data, Recovery Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (min)	Observed Water Level P-1 (ft)	Observed Water Level P-2 (ft)	Net Correction P-1 (ft)	Net Correction P-2 (ft)	Corrected Drawdown P-1 (ft)	Corrected Drawdown P-2 (ft)
0.325	122.014	122.690	0.308	0.414	0.536	0.354
0.333	122.014	122.690	0.308	0.414	0.536	0.354
0.350	122.014	122.694	0.308	0.414	0.536	0.358
0.367	122.014	122.690	0.308	0.414	0.536	0.354
0.383	122.014	122.690	0.308	0.414	0.536	0.354
0.400	122.014	122.690	0.308	0.414	0.536	0.354
0.417	122.014	122.690	0.308	0.414	0.536	0.354
0.433	122.014	122.690	0.308	0.414	0.536	0.354
0.450	122.014	122.690	0.308	0.414	0.536	0.354
0.467	122.014	122.690	0.308	0.414	0.536	0.354
0.483	122.014	122.690	0.308	0.414	0.536	0.354
0.500	122.014	122.687	0.308	0.414	0.536	0.351
0.517	122.014	122.687	0.308	0.414	0.536	0.351
0.533	122.014	122.687	0.308	0.414	0.536	0.351
0.550	122.014	122.687	0.308	0.414	0.536	0.351
0.567	122.014	122.687	0.308	0.414	0.536	0.351
0.583	122.014	122.687	0.308	0.414	0.536	0.351
0.600	122.014	122.687	0.308	0.414	0.536	0.351
0.617	122.014	122.687	0.308	0.414	0.536	0.351
0.633	122.014	122.687	0.307	0.414	0.535	0.351
0.650	122.014	122.687	0.307	0.414	0.535	0.351
0.667	122.014	122.687	0.307	0.414	0.535	0.351
0.683	122.014	122.684	0.307	0.414	0.535	0.348
0.700	122.014	122.687	0.307	0.414	0.535	0.351
0.717	122.014	122.684	0.307	0.414	0.535	0.348
0.733	122.014	122.684	0.307	0.414	0.535	0.348
0.750	122.014	122.684	0.307	0.414	0.535	0.348
0.767	122.014	122.684	0.307	0.414	0.535	0.348
0.783	122.014	122.684	0.307	0.414	0.535	0.348
0.800	122.011	122.684	0.307	0.414	0.532	0.348
0.817	122.014	122.684	0.307	0.414	0.535	0.348
0.833	122.011	122.681	0.307	0.414	0.532	0.345
0.850	122.011	122.681	0.307	0.414	0.532	0.345
0.867	122.011	122.681	0.307	0.414	0.532	0.345
0.883	122.011	122.681	0.307	0.414	0.532	0.345
0.900	122.011	122.681	0.307	0.414	0.532	0.345
0.917	122.011	122.681	0.307	0.414	0.532	0.345
0.933	122.011	122.681	0.307	0.414	0.532	0.345
0.950	122.011	122.678	0.307	0.414	0.532	0.342

Observed & Corrected Water Level Data, Recovery Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (min)	Observed Water Level P-1 (ft)	Observed Water Level P-2 (ft)	Net Correction P-1 (ft)	Net Correction P-2 (ft)	Corrected Drawdown P-1 (ft)	Corrected Drawdown P-2 (ft)
0.967	122.011	122.678	0.307	0.414	0.532	0.342
0.983	122.011	122.678	0.307	0.414	0.532	0.342
1.000	122.011	122.678	0.307	0.414	0.532	0.342
1.200	122.011	122.672	0.307	0.414	0.532	0.336
1.400	122.007	122.668	0.307	0.414	0.528	0.332
1.600	122.004	122.665	0.307	0.413	0.525	0.328
1.800	122.001	122.662	0.307	0.413	0.522	0.325
2.000	122.001	122.659	0.306	0.413	0.521	0.322
2.200	121.998	122.653	0.306	0.413	0.518	0.316
2.400	121.995	122.650	0.306	0.413	0.515	0.313
2.600	121.995	122.650	0.306	0.413	0.515	0.313
2.800	121.992	122.646	0.306	0.413	0.512	0.309
3.000	121.989	122.643	0.306	0.412	0.509	0.305
3.200	121.985	122.640	0.305	0.412	0.504	0.302
3.400	121.982	122.640	0.305	0.412	0.501	0.302
3.600	121.982	122.637	0.305	0.412	0.501	0.299
3.800	121.979	122.634	0.305	0.412	0.498	0.296
4.000	121.976	122.634	0.305	0.412	0.495	0.296
4.200	121.973	122.631	0.305	0.412	0.492	0.293
4.400	121.970	122.628	0.304	0.411	0.488	0.289
4.600	121.970	122.624	0.304	0.411	0.488	0.285
4.800	121.966	122.624	0.304	0.411	0.484	0.285
5.000	121.963	122.621	0.304	0.411	0.481	0.282
5.200	121.960	122.621	0.304	0.411	0.478	0.282
5.400	121.960	122.618	0.304	0.411	0.478	0.279
5.600	121.954	122.615	0.304	0.411	0.472	0.276
5.800	121.954	122.615	0.303	0.410	0.471	0.275
6.000	121.954	122.615	0.303	0.410	0.471	0.275
6.200	121.951	122.612	0.303	0.410	0.468	0.272
6.400	121.944	122.612	0.303	0.410	0.461	0.272
6.600	121.944	122.612	0.303	0.410	0.461	0.272
6.800	121.944	122.609	0.303	0.410	0.461	0.269
7.000	121.944	122.609	0.302	0.410	0.460	0.269
7.200	121.941	122.609	0.302	0.409	0.457	0.268
7.400	121.938	122.606	0.302	0.409	0.454	0.265
7.600	121.935	122.606	0.302	0.409	0.451	0.265
7.800	121.935	122.606	0.302	0.409	0.451	0.265
8.000	121.932	122.602	0.302	0.409	0.448	0.261
8.200	121.929	122.602	0.301	0.409	0.444	0.261

Observed & Corrected Water Level Data, Recovery Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (min)	Observed Water Level P-1 (ft)	Observed Water Level P-2 (ft)	Net Correction P-1 (ft)	Net Correction P-2 (ft)	Corrected Drawdown P-1 (ft)	Corrected Drawdown P-2 (ft)
8.400	121.929	122.602	0.301	0.409	0.444	0.261
8.600	121.925	122.599	0.301	0.408	0.440	0.257
8.800	121.925	122.602	0.301	0.408	0.440	0.260
9.000	121.925	122.599	0.301	0.408	0.440	0.257
9.200	121.922	122.599	0.301	0.408	0.437	0.257
9.400	121.906	122.599	0.300	0.408	0.420	0.257
9.600	121.925	122.599	0.300	0.408	0.439	0.257
9.800	121.922	122.596	0.300	0.408	0.436	0.254
10.000	121.919	122.596	0.300	0.407	0.433	0.253
12.000	121.906	122.587	0.298	0.406	0.418	0.243
14.000	121.897	122.580	0.297	0.405	0.408	0.235
16.000	121.887	122.574	0.295	0.403	0.396	0.227
18.000	121.878	122.571	0.294	0.402	0.386	0.223
20.000	121.875	122.568	0.292	0.400	0.381	0.218
22.000	121.868	122.565	0.290	0.399	0.372	0.214
24.000	121.859	122.558	0.289	0.398	0.362	0.206
26.000	121.853	122.555	0.287	0.396	0.354	0.201
28.000	121.846	122.555	0.286	0.395	0.346	0.200
30.000	121.843	122.552	0.284	0.393	0.341	0.195
32.000	121.837	122.549	0.282	0.392	0.333	0.191
34.000	121.834	122.549	0.281	0.390	0.329	0.189
36.000	121.827	122.549	0.279	0.389	0.320	0.188
38.000	121.824	122.549	0.278	0.388	0.316	0.187
40.000	121.821	122.546	0.276	0.386	0.311	0.182
42.000	121.815	122.546	0.274	0.385	0.303	0.181
44.000	121.815	122.546	0.273	0.383	0.302	0.179
46.000	121.812	122.546	0.271	0.382	0.297	0.178
48.000	121.808	122.546	0.270	0.381	0.292	0.177
50.000	121.805	122.546	0.268	0.379	0.287	0.175
52.000	121.802	122.546	0.266	0.378	0.282	0.174
54.000	121.802	122.549	0.265	0.376	0.281	0.175
56.000	121.799	122.549	0.263	0.375	0.276	0.174
58.000	121.796	122.549	0.262	0.373	0.272	0.172
60.000	121.793	122.549	0.260	0.372	0.267	0.171
62.000	121.796	122.546	0.258	0.371	0.268	0.167
64.000	121.790	122.546	0.257	0.369	0.261	0.165
66.000	121.783	122.555	0.255	0.368	0.252	0.173
68.000	121.786	122.558	0.254	0.366	0.254	0.174
70.000	121.786	122.558	0.252	0.365	0.252	0.173

Observed & Corrected Water Level Data, Recovery Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (min)	Observed Water Level P-1 (ft)	Observed Water Level P-2 (ft)	Net Correction P-1 (ft)	Net Correction P-2 (ft)	Corrected Drawdown P-1 (ft)	Corrected Drawdown P-2 (ft)
72.000	121.783	122.558	0.251	0.364	0.248	0.172
74.000	121.783	122.562	0.249	0.362	0.246	0.174
76.000	121.793	122.558	0.248	0.361	0.255	0.169
78.000	121.774	122.555	0.246	0.360	0.234	0.165
80.000	121.774	122.558	0.245	0.358	0.233	0.166
82.000	121.777	122.558	0.243	0.357	0.234	0.165
84.000	121.774	122.555	0.242	0.356	0.230	0.161
86.000	121.774	122.558	0.240	0.354	0.228	0.162
88.000	121.774	122.558	0.239	0.353	0.227	0.161
90.000	121.774	122.558	0.237	0.352	0.225	0.160
92.000	121.771	122.558	0.236	0.350	0.221	0.158
94.000	121.771	122.565	0.234	0.349	0.219	0.164
96.000	121.771	122.568	0.233	0.348	0.218	0.166
98.000	121.774	122.568	0.231	0.346	0.219	0.164
100.000	121.777	122.577	0.230	0.345	0.221	0.172
120.000	121.767	122.568	0.215	0.332	0.196	0.150
140.000	121.767	122.580	0.200	0.319	0.181	0.149
160.000	121.771	122.593	0.185	0.305	0.170	0.148
180.000	121.786	122.606	0.170	0.292	0.170	0.148
200.000	121.780	122.599	0.155	0.279	0.149	0.128
220.000	121.780	122.602	0.140	0.266	0.134	0.118
240.000	121.786	122.609	0.125	0.252	0.125	0.111
260.000	121.802	122.634	0.110	0.239	0.126	0.123
280.000	121.808	122.653	0.090	0.221	0.113	0.124
300.000	121.843	122.675	0.068	0.198	0.125	0.123
320.000	121.868	122.716	0.045	0.175	0.127	0.141
340.000	121.881	122.716	0.028	0.158	0.123	0.124
360.000	121.881	122.716	0.029	0.159	0.124	0.125
380.000	121.891	122.725	0.030	0.160	0.135	0.135
400.000	121.891	122.725	0.031	0.160	0.136	0.135
420.000	121.891	122.731	0.033	0.161	0.138	0.142
440.000	121.897	122.734	0.034	0.162	0.145	0.146
460.000	121.894	122.722	0.035	0.162	0.143	0.134
480.000	121.887	122.719	0.036	0.163	0.137	0.132
500.000	121.884	122.709	0.037	0.164	0.135	0.123
520.000	121.878	122.716	0.038	0.165	0.130	0.131
540.000	121.881	122.709	0.039	0.165	0.134	0.124
560.000	121.875	122.706	0.040	0.166	0.129	0.122
580.000	121.850	122.681	0.037	0.164	0.101	0.095

Observed & Corrected Water Level Data, Recovery Period, Wells P-1 & P-2, CW-1 Pumping Test

Time (min)	Observed Water Level P-1 (ft)	Observed Water Level P-2 (ft)	Net Correction P-1 (ft)	Net Correction P-2 (ft)	Corrected Drawdown P-1 (ft)	Corrected Drawdown P-2 (ft)
600.000	121.850	122.672	0.035	0.161	0.099	0.083
620.000	121.840	122.668	0.032	0.159	0.086	0.077
640.000	121.846	122.665	0.030	0.157	0.090	0.072
660.000	121.843	122.672	0.027	0.154	0.084	0.076
680.000	121.843	122.665	0.025	0.152	0.082	0.067
700.000	121.824	122.646	0.022	0.150	0.060	0.046
720.000	121.827	122.656	0.020	0.148	0.061	0.054
740.000	121.831	122.665	0.017	0.145	0.062	0.060
760.000	121.834	122.662	0.015	0.143	0.063	0.055
780.000	121.831	122.656	0.012	0.141	0.057	0.047
800.000	121.827	122.653	0.010	0.139	0.051	0.042
820.000	121.824	122.653	0.007	0.136	0.045	0.039
840.000	121.831	122.665	0.005	0.134	0.050	0.049
860.000	121.840	122.678	0.002	0.132	0.056	0.060
880.000	121.837	122.662	-0.000	0.129	0.051	0.041
900.000	121.837	122.668	-0.003	0.127	0.048	0.045
920.000	121.840	122.675	-0.005	0.125	0.049	0.050
940.000	121.843	122.678	-0.008	0.123	0.049	0.051
960.000	121.846	122.675	-0.010	0.120	0.050	0.045
980.000	121.843	122.678	-0.013	0.118	0.044	0.046

Environmental Water Level Correction Lookup Table, Wells P-1 & P-2, CW-1 Pumping Test

Time (minutes)	Segment Slope: P-1 (ft/min)	Y-Intercept: P-1 (feet)	Segment Slope: P-2 (ft/min)	Y-Intercept: P-2 (feet)
0	0.00012	0.00000	0.00016	0.00000
614	-0.00005	0.10749	-0.00005	0.12385
1121	-0.00015	0.21794	-0.00012	0.21155
1388	0.00001	-0.00484	0.00004	-0.01938
1575	-0.00013	0.21872	-0.00007	0.15628
1735	0.00002	-0.04591	0.00003	-0.01837
1923	0.00031	-0.60199	0.00032	-0.57695
2258	0.00027	-0.51580	0.00025	-0.41909
2662	-0.00021	0.75541	-0.00013	0.58925
2852	-0.00012	0.52133	-0.00004	0.33233
2990	-0.00016	0.62263	-0.00006	0.39620
3181	0.00010	-0.20919	0.00008	-0.04873
3497	0.00017	-0.43592	0.00019	-0.43080
3946	0.00038	-1.28313	0.00040	-1.24008
4183	0.00011	-0.11943	0.00016	-0.26476
4287	-0.00080	3.74695	-0.00069	3.39112
4390	-0.00075	3.53898	-0.00066	3.27696
4589	-0.00114	5.31777	-0.00114	5.44777
4655	0.00005	-0.22138	0.00004	-0.00825
4879	-0.00013	0.65422	-0.00011	0.72228
5300				

APPENDIX C

ANALYTICAL DATA FROM FIELD INVESTIGATION

C.1 EPA LABORATORY ANALYSIS

EXPLORATION BOREHOLES
Soil Samples
In Situ Ground Water Samples

PUMPING TEST DISCHARGE SAMPLES
3-day test and step test

C.2 ON SITE LABORATORY ANALYSIS

EXPLORATION BOREHOLES
Soil Samples
In Situ Ground Water Samples

PUMPING TEST DISCHARGE SAMPLES
3-day test and step test

Untreated
Treated (Carbon Adsorption)

PUMPING TEST DISCHARGE SAMPLES
39-day test

Untreated
Treated (Carbon Adsorption)

C.1 EPA LABORATORY ANALYSIS

EXPLORATION BOREHOLES
Soil Samples
In Situ Ground Water Samples

PUMPING TEST DISCHARGE SAMPLES
3-day test and step test

Partial

ANALYSIS REQUEST REPORT

FOR ACTIVITY: CS4NJ

05/06/94 15:30:49

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

ALL REAL SAMPLES AND FIELD Q.C.

MORBY, ROBERT SPFD

* LABO APPROVED

FY: 94 ACTIVITY: CS4NJ DESCRIPTION: HASTINGS-WELL NO. 3 (GW) LOCATION: HASTINGS NEBRASKA

STATUS: ACTIVE TYPE: SAMPLING - IN HOUSE ANALYSIS PROJECT: L33

LABO DUE DATE IS 6/24/94. REPORT DUE DATE IS 6/ 7/94.

INSPECTION DATE: 4/23/94 ALL SAMPLES RECEIVED DATE: 04/25/94

ALL DATA APPROVED BY LABO DATE: 05/06/94 FINAL REPORT TRANSMITTED DATE: 00/00/00

EXPECTED LABO TURNAROUND TIME IS 60 DAYS EXPECTED REPORT TURNAROUND TIME IS 45 DAYS

ACTUAL LABO TURNAROUND TIME IS 11 DAYS ACTUAL REPORT TURNAROUND TIME IS 0 DAYS

SITE CODE: NJ SITE: MW3 GROUNDWATER

IANP. NO.	QCC	M	DESCRIPTION	SAMPLE # STATUS	CITY	STATE	AIRS/ STORET LOC NO	SECT	LAY-ER	BEG. DATE	BEG. TIME	END. DATE	END. TIME
001		W	OBSERVATION WELL P-2	1	HASTINGS	NEBRASKA				04/07/94	10:30	/ /	:
002	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA				04/07/94	19:30	/ /	:
003		W	WELL CW-1	1	HASTINGS	NEBRASKA				04/13/94	21:35	/ /	:
004	D	W	WELL CW-1/DUPLICATE OF 003	1	HASTINGS	NEBRASKA				04/13/94	21:35	/ /	:
005		W	WELL CW-1S1	1	HASTINGS	NEBRASKA				04/10/94	21:20	/ /	:
006		W	WELL CW-1 S1B	1	HASTINGS	NEBRASKA				04/10/94	21:20	/ /	:
008		W	BORING RDB-1	1	HASTINGS	NEBRASKA				04/10/94	11:20	/ /	:
009		W	BORING RDB-1	1	HASTINGS	NEBRASKA				04/10/94	14:05	/ /	:
010	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA				04/11/94	12:30	/ /	:
011		W	RDB-1-164	1	HASTINGS	NEBRASKA				04/10/94	16:20	/ /	:
012		W	RDB-3-132	1	HASTINGS	NEBRASKA				04/12/94	10:30	/ /	:
012	D	W	RDB-3-132/DUPLICATE OF 012	1	HASTINGS	NEBRASKA				04/12/94	10:30	/ /	:
013		W	RDB-3-145	1	HASTINGS	NEBRASKA				04/12/94	15:30	/ /	:
014	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA				04/13/94	09:50	/ /	:
015		W	RDB-E-164	1	HASTINGS	NEBRASKA				04/12/94	17:35	/ /	:
016		W	RDB-5-129	1	HASTINGS	NEBRASKA				04/19/94	09:15	/ /	:
017		W	RINSATE BLANK	1	HASTINGS	NEBRASKA				04/19/94	11:20	/ /	:
018	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA				04/13/94	22:00	/ /	:
019		W	RDB-5-144	1	HASTINGS	NEBRASKA				04/19/94	16:45	/ /	:
020		W	RDB-5-156	1	HASTINGS	NEBRASKA				04/19/94	18:00	/ /	:
022	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA				04/19/94	12:06	/ /	:
023	F	W	TRIP BLANK	1	HASTINGS	NEBRASKA				04/23/94	08:50	/ /	:
026		S	OBSERVATION WELL P-1-128S	1	HASTINGS	NEBRASKA				04/08/94	13:40	/ /	:

SAMP. NO.	QCC	R	DESCRIPTION	SAMPLE # STATUS	CITY	STATE	AIRS/ STORET LOC NO	SECT	LAY-ER	LABORATORY APPROVED DATA PROJECT LEADER APPROVAL PENDING BEG. DATE	BEG. TIME	END. DATE	END. TIME
027		S	BORING RDB-1-131G	1	HASTINGS	NEBRASKA				04/10/94	10:00	/ /	:
028		S	BORING RDB-3-125G	1	HASTINGS	NEBRASKA				04/12/94	09:40	/ /	:
029		S	BORING RDB-3-130G	1	HASTINGS	NEBRASKA				04/12/94	11:00	/ /	:
030		S	BORING RDB-5-132G	1	HASTINGS	NEBRASKA				04/19/94	09:55	/ /	:
031		S	BORING RDB-5-131G	1	HASTINGS	NEBRASKA				04/19/94	09:55	/ /	:
032		S	BORING RDB-3-138G	1	HASTINGS	NEBRASKA				04/19/94	16:15	/ /	:
033		S	BORING RDB-5-137G	1	HASTINGS	NEBRASKA				04/19/94	16:15	/ /	:
034		S	BORING RDB-6-129G	1	HASTINGS	NEBRASKA				04/22/94	08:46	/ /	:
043		S	P-1-128.5	1	HASTINGS	NEBRASKA				04/08/94	13:46	/ /	:
044		S	P-1-137.3S	1	HASTINGS	NEBRASKA				04/08/94	14:40	/ /	:
045		S	RDB-1-131.S	1	HASTINGS	NEBRASKA				04/10/94	10:00	/ /	:
046		S	RDB-1-143.S	1	HASTINGS	NEBRASKA				04/10/94	12:20	/ /	:
047		S	RDB-3-125S	1	HASTINGS	NEBRASKA				04/12/94	09:00	/ /	:
048		S	RDB-3-142S	1	HASTINGS	NEBRASKA				04/12/94	12:00	/ /	:
049		S	RDB-5-131.S	1	HASTINGS	NEBRASKA				04/19/94	09:55	/ /	:
050		S	RDB-5-138.S	1	HASTINGS	NEBRASKA				04/19/94	16:15	/ /	:
051		S	RDB-6-129S	1	HASTINGS	NEBRASKA				04/22/94	08:40	/ /	:
052		V	RDB-6-135	1	HASTINGS	NEBRASKA				04/22/94	09:55	/ /	:
060		S	EXPERIMENTAL VOA COLLECTION METHOD	1	HASTINGS	NEBRASKA				04/07/94	09:30	04/07/94	09:30
143		S	P-1-128.5/HEAD SPACE SAMPLE FROM 043	0	HASTINGS	NEBRASKA				04/08/94	13:46	/ /	:
144		S	P-1-137.3S/HEAD SPACE SAMPLE FROM 044	0	HASTINGS	NEBRASKA				04/08/94	14:40	/ /	:
145		S	RDB-1-131.S/HEAD SPACE SAMPLE FROM 045	0	HASTINGS	NEBRASKA				04/10/94	10:00	/ /	:
146		S	RDB-1-143.S/HEAD SPACE SAMPLE FROM 046	0	HASTINGS	NEBRASKA				04/10/94	12:20	/ /	:
147		S	RDB-3-125S/HEAD SPACE SAMPLE FROM 047	0	HASTINGS	NEBRASKA				04/12/94	09:00	/ /	:
148		S	RDB-3-142S/HEAD SPACE SAMPLE FROM 048	0	HASTINGS	NEBRASKA				04/12/94	12:00	/ /	:
149		S	RDB-5-131.S/HEAD SPACE SAMPLE FROM 049	0	HASTINGS	NEBRASKA				04/19/94	09:55	/ /	:
150		S	RDB-5-138.S/HEAD SPACE SAMPLE FROM 050	0	HASTINGS	NEBRASKA				04/19/94	16:15	/ /	:
151		S	RDB-6-129S/HEAD SPACE SAMPLE FROM 051	0	HASTINGS	NEBRASKA				04/22/94	08:40	/ /	:
160		S	EXPERIMENTAL VOA/HEAD SP. SAMPLE 060	0	HASTINGS	NEBRASKA				04/07/94	09:30	04/07/94	09:30

EXPLANATION OF CODES AND INFORMATION ON ANALYSIS REQUEST DETAIL REPORT

SAMPLE INFORMATION:

SAMP. NO. = SAMPLE IDENTIFICATION NUMBER (A 3-DIGIT NUMBER WHICH IN COMBINATION WITH THE ACTIVITY NUMBER AND QCC, PROVIDES AN UNIQUE NUMBER FOR EACH SAMPLE FOR IDENTIFICATION PURPOSES)

QCC = QUALITY CONTROL CODE (A ONE-LETTER CODE USED TO DESIGNATE SPECIFIC QC SAMPLES. THIS FIELD WILL BE BLANK FOR ALL NON-QC OR ACTUAL SAMPLES):
- B = CAL INCREASED CONCENTRATION FOR A LAB SPIKED DUP SAMPLE
- D = MEASURED VALUE FOR FIELD DUPLICATE SAMPLE
- F = MEASURED VALUE FOR FIELD BLANK
- G = MEASURED VALUE FOR METHOD STANDARD
- H = TRUE VALUE FOR METHOD STANDARD
- K = CAL INCREASED CONCENTRATION FOR FIELD SPIKED DUP SAMPLE
- L = MEASURED VALUE FOR A LAB DUPLICATE SAMPLE
- N = MEASURED VALUE FOR LAB BLANK
- M = MEASURED CONCENTRATION OF FIELD SPIKED DUPLICATE
- P = MEASURED VALUE FOR PERFORMANCE STANDARD
- R = CAL INCREASED CONCENTRATION RESULTING FROM LAB SPIKE
- S = MEASURED CONCENTRATION OF LAB SPIKED SAMPLE
- T = TRUE VALUE OF PERFORMANCE STANDARD
- U = MEASURED CONCENTRATION OF LAB SPIKED DUPLICATE
- Y = MEASURED CONCENTRATION OF FIELD SPIKED SAMPLE
- Z = CAL INCREASED CONCENTRATION RESULTING FROM FIELD SPIKE
- 1 = MEASURED VALUE OF FIRST SPIKED REPLICATE
- 2 = MEASURED VALUE OF SECOND SPIKED REPLICATE
- 3 = MEASURED VALUE OF THIRD SPIKED REPLICATE
- 4 = MEASURED VALUE OF FOURTH SPIKED REPLICATE
- 5 = MEASURED VALUE OF FIFTH SPIKED REPLICATE
- 6 = MEASURED VALUE OF SIXTH SPIKED REPLICATE
- 7 = MEASURED VALUE OF SEVENTH SPIKED REPLICATE

= MEDIA CODE (A ONE-LETTER CODE DESIGNATING THE MEDIA OF THE SAMPLE):
- A = AIR H = HAZARDOUS WASTE/OTHER
- S = SOLID (SOIL, SEDIMENT, SLUDGE)
- T = TISSUE (PLANT & ANIMAL)
- W = WATER (GROUND WATER, SURFACE WATER, WASTE WATER, DRINKING WATER)

ESCRIPTION = A SHORT DESCRIPTION OF THE LOCATION WHERE SAMPLE WAS COLLECTED

IRS/STORET LOC. NO. = THE SPECIFIC LOCATION ID NUMBER OF EITHER OF THESE NATIONAL DATABASE SYSTEMS, AS APPROPRIATE

ATE/TIME INFORMATION = SPECIFIC INFORMATION REGARDING WHEN THE SAMPLE WAS COLLECTED
- BEG. DATE = DATE SAMPLING WAS STARTED
- BEG. TIME = TIME SAMPLING WAS STARTED
- END DATE = DATE SAMPLING WAS COMPLETED
- END TIME = TIME SAMPLING WAS COMPLETED
- NOTE: A GRAB SAMPLE WILL CONTAIN ONLY BEG. DATE/TIME
  A TIMED COMPOSITE SAMPLE WILL CONTAIN BOTH BEG AND END DATE/TIME TO DESIGNATE DURATION OF SAMPLE COLLECTION

THER CODES
- V = VALIDATED

ANALYTICAL RESULTS/MEASUREMENTS INFORMATION:

COMPOUND = NGP (MEDIA-GROUP-PARAMETER) CODE AND NAME OF THE MEASURED CONSTITUENT OR CHARACTERISTIC OF EACH SAMPLE

UNITS = SPECIFIC UNITS IN WHICH RESULTS ARE REPORTED:
- C = CENTIGRADE (CELSIUS) DEGREES
- CFS = CUBIC FEET PER SECOND
- GPM = GALLONS PER MINUTE
- IN = INCHES
- I.D. = SPECIES IDENTIFICATION
- KG = KILOGRAM
- L = LITER
- LB = POUNDS
- MG = MILLIGRAMS (1 X 10-3 GRAMS)
- MGD = MILLION GALLONS PER DAY
- MPH = MILES PER HOUR
- MV = MILLIVOLT
- M/F = MALE/FEMALE
- M2 = SQUARE METER
- M3 = CUBIC METER
- NA = NOT APPLICABLE
- NG = NANOGRAMS (1 X 10-9 GRAMS)
- NTU = NEPHELOMETRIC TURBIDITY UNITS
- PC/L = PICO (1 X 10-12) CURRIES PER LITER
- PG = PICOGRAMS (1 X 10-12 GRAMS)
- P/CM2 = PICOGRAMS PER SQUARE CENTIMETER
- SCM = STANDARD CUBIC METER (1 ATM, 25 C)
- SQ FT = SQUARE FEET
- SU = STANDARD UNITS (PH)
- UG = MICROGRAMS (1 X 10-6 GRAMS)
- UMHOS = MICROMHOS/CM (CONDUCTIVITY UNITS)
- U/CC2 = MICROGRAMS PER 100 SQUARE CENTIMETERS
- U/CM2 = MICROGRAMS PER SQUARE CENTIMETER
- 1000G = 1000 GALLONS
- +/- = POSITIVE/NEGATIVE
- # = NUMBER

DATA QUALIFIERS = SPECIFIC CODES USED IN CONJUNCTION WITH DATA VALUES TO PROVIDE ADDITIONAL INFORMATION ON THE REPORTED RESULTS, OR USED TO EXPLAIN THE ABSENCE OF A SPECIFIC VALUE:
- BLANK = IF FIELD IS BLANK, NO REMARKS OR QUALIFIERS ARE PERTINENT. FOR FINAL REPORTED DATA, THIS MEANS THAT THE VALUES HAVE BEEN REVIEWED AND FOUND TO BE ACCEPTABLE FOR USE.
- I = INVALID SAMPLE/DATA - VALUE NOT REPORTED
- J = DATA REPORTED BUT NOT VALID BY APPROVED QC PROCEDURES
- K = ACTUAL VALUE OF SAMPLE IS < VALUE REPORTED
- L = ACTUAL VALUE OF SAMPLE IS > VALUE REPORTED
- N = DETECTED BUT BELOW THE LEVEL OF REPORTED VALUE FOR ACCURATE QUANTIFICATION
- O = PARAMETER NOT ANALYZED
- U = ACTUAL VALUE OF SAMPLE IS < THE MEASUREMENT DETECTION LIMIT (REPORTED VALUE)

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4MJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	001	002 F	003	003 D	005
VV40 CHLOROMETHANE, BY GC/MS LDL	UG/L	2 U	2 U	2 U	2 U	2 U
VV41 BROMOMETHANE, BY GC/MS LDL	UG/L	4 U	4 U	4 U	4 U	4 U
VV42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	3 U	3 U	3 U	3 U	3 U
VV43 CHLOROETHANE, BY GC/MS LDL	UG/L	3 U	3 U	3 U	3 U	3 U
VV44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	2 U	2 U	28 U	30 U	2 U
VV45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	2	1 U	5	6	1
VV46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV47 DICHLOROETHYLENE, 1,2- TOTAL LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV48 CHLOROFORM, BY GC/MS LDL	UG/L	1	1 U	2	2	1 U
VV49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	3	1 U	6	6	2
VV51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	14	1 U	22	24	3
VV52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV54 BENZENE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	20	1 U	38	41	11
VV56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	1 U	1 U	1 U	1 U	1 U
VV57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV59 BROMOFORM, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	7	1 U	16	17	4
VV61 TOLUENE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	1 U	1 U	1 U	1 U	1 U
VV63 CHLOROBENZENE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV64 ETHYLBENZENE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV65 ACETONE, BY GC/MS LDL	UG/L	2 U	2 U	5 U	2 U	2 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4NJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	001	002 F	003	003 D	005
VV66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	2 U	2 U	2 U	2 U	2 U
VV68 HEXANONE, 2- BY GC/MS LDL	UG/L	2 U	2 U	2 U	2 U	2 U
VV70 STYRENE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV71 XYLENES, TOTAL, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	1 U	1 U	1 U	1 U	1 U
!Z01 SAMPLE NUMBER	NA	001	002	003	003	005
!Z02 ACTIVITY CODE	NA	CS4NJ	CS4NJ	CS4NJ	CS4NJ	CS4NJ
!Z04 SUBSITE, IDENTIFIER		NJ	NJ	NJ	NJ	NJ
!Z05 OPERABLE UNIT		13	13	13	13	13

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4NJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	006		008		009		010 F		011	
VV40 CHLOROMETHANE, BY GC/MS LDL	UG/L	2	U	2	U	2	U	2	U	2	U
VV41 BROMOMETHANE, BY GC/MS LDL	UG/L	4	U	4	U	4	U	4	U	4	U
VV42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	3	U	3	U	3	U	3	U	3	U
VV43 CHLOROETHANE, BY GC/MS LDL	UG/L	3	U	3	U	3	U	3	U	3	U
VV44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	2	U	2	U	2	U	2	U	2	U
VV45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV47 DICHLOROETHYLENE, 1,2- TOTAL LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV48 CHLOROFORM, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	1	U	2		1	U	1	U	1	U
VV53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV54 BENZENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	1	U	1	U	1	U	1	U	1	U
VV57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV59 BROMOFORM, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV61 TOLUENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	1	U	1	U	1	U	1	U	1	U
VV63 CHLOROBENZENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV64 ETHYLBENZENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV65 ACETONE, BY GC/MS LDL	UG/L	2	U	20	U	2	U	2	U	2	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4MJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	006	008	009	010 F	011
MM66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	2 U	2 U	2 U	2 U	2 U
MM68 HEXANONE, 2- BY GC/MS LDL	UG/L	2 U	2 U	2 U	2 U	2 U
VV70 STYRENE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
MM71 XYLENES, TOTAL, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	1 U	1 U	1 U	1 U	1 U
ZZ01 SAMPLE NUMBER	NA	006	008	009	010	011
ZZ02 ACTIVITY CODE	NA	CS4MJ	CS4MJ	CS4MJ	CS4MJ	CS4MJ
ZZ04 SUBSITE, IDENTIFIER		MJ	MJ	MJ	MJ	MJ
ZZ05 OPERABLE UNIT		13	13	13	13	13

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4MJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	012		012 D		013		014 F		015	
VV40 CHLOROMETHANE, BY GC/MS LDL	UG/L	2	U	2	U	2	U	2	U	2	U
VV41 BROMOMETHANE, BY GC/MS LDL	UG/L	4	U	4	U	4	U	4	U	4	U
VV42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	3	U	3	U	3	U	3	U	3	U
VV43 CHLOROETHANE, BY GC/MS LDL	UG/L	3	U	3	U	3	U	3	U	3	U
VV44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	2	U	2	U	2	U	2	U	2	U
VV45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV47 DICHLOROETHYLENE, 1,2- TOTAL LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV48 CHLOROFORM, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	3		3		8		1	U	1	U
VV52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV54 BENZENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	1	U	1	U	1	U	1	U	1	U
VV57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV59 BROMOFORM, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV61 TOLUENE, BY GC/MS LDL	UG/L	1	U	1	U	2		1	U	1	U
VV62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	1	U	1	U	1	U	1	U	1	U
VV63 CHLOROBENZENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV64 ETHYLBENZENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VV65 ACETONE, BY GC/MS LDL	UG/L	2	U	2	U	22	U	2	U	2	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4NJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	012	012 D	013	014 F	015
VV66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	2 U	2 U	2 U	2 U	2 U
VV68 HEXANONE, 2- BY GC/MS LDL	UG/L	2 U	2 U	2 U	2 U	2 U
VV70 STYRENE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV71 XYLENES, TOTAL, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	1 U	1 U	1 U	1 U	1 U
ZZ01 SAMPLE NUMBER	NA	012	012	013	014	015
ZZ02 ACTIVITY CODE	NA	CS4NJ	CS4NJ	CS4NJ	CS4NJ	CS4NJ
ZZ04 SUBSITE, IDENTIFIER		NJ	NJ	NJ	NJ	NJ
ZZ05 OPERABLE UNIT		13	13	13	13	13

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4RJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	016		017		018 F		019		020	
VW40 CHLOROMETHANE, BY GC/MS LDL	UG/L	2	U	2	U	2	U	2	U	2	U
VW41 BROMOMETHANE, BY GC/MS LDL	UG/L	4	U	4	U	4	U	4	U	4	U
VW42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	3	U	3	U	3	U	3	U	3	U
VW43 CHLOROETHANE, BY GC/MS LDL	UG/L	3	U	3	U	3	U	3	U	3	U
VW44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	4	U	4	U	2	U	4	U	3	U
VW45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW47 DICHLOROETHYLENE, 1,2- TOTAL LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW48 CHLOROFORM, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	15		1	U	1	U	1	U	1	U
VW52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW54 BENZENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	1	U	1	U	1	U	1	U	1	U
VW57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW59 BROMOFORM, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW61 TOLUENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW62 TETRACHLORDETHANE, 1,1,2,2- BY GC/MS, L	UG/L	1	U	1	U	1	U	1	U	1	U
VW63 CHLOROBENZENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW64 ETHYLBENZENE, BY GC/MS LDL	UG/L	1	U	1	U	1	U	1	U	1	U
VW65 ACETONE, BY GC/MS LDL	UG/L	2	U	2	U	2	U	24	U	2	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4MJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	022 F	023 F	026	027	028
SG30 GRAIN SIZE DISTRIBUTION				*	*	*
VV40 CHLOROMETHANE, BY GC/MS LDL	UG/L	2 U	2 U			
VV41 BROMOMETHANE, BY GC/MS LDL	UG/L	4 U	4 U			
VV42 VINYL CHLORIDE, BY GC/MS LDL	UG/L	3 U	3 U			
VV43 CHLOROETHANE, BY GC/MS LDL	UG/L	3 U	3 U			
VV44 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	2 U	2 U			
VV45 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1 U	1 U			
VV46 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	1 U	1 U			
VV47 DICHLOROETHYLENE, 1,2- TOTAL LDL	UG/L	1 U	1 U			
VV48 CHLOROFORM, BY GC/MS LDL	UG/L	1 U	1 U			
VV49 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	1 U	1 U			
VV50 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	1 U	1 U			
VV51 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	1 U	1 U			
VV52 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	1 U	1 U			
VV53 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	1 U	1 U			
VV54 BENZENE, BY GC/MS LDL	UG/L	1 U	1 U			
VV55 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	1 U	1 U			
VV56 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	1 U	1 U			
VV57 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	1 U	1 U			
VV58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	1 U	1 U			
VV59 BROMOFORM, BY GC/MS LDL	UG/L	1 U	1 U			
VV60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	1 U	1 U			
VV61 TOLUENE, BY GC/MS LDL	UG/L	1 U	1 U			
VV62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	1 U	1 U			
VV63 CHLOROBENZENE, BY GC/MS LDL	UG/L	1 U	1 U			
VV64 ETHYLBENZENE, BY GC/MS LDL	UG/L	1 U	1 U			

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4NJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

WSTM DIV→

COMPOUND	UNITS	016	017	018 F	019	020
VV66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	2 U	2 U	2 U	2 U	2 U
VV68 HEXANONE, 2- BY GC/MS LDL	UG/L	2 U	2 U	2 U	2 U	2 U
VV70 STYRENE, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV71 XYLENES, TOTAL, BY GC/MS LDL	UG/L	1 U	1 U	1 U	1 U	1 U
VV72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	1 U	1 U	1 U	1 U	1 U
LZ01 SAMPLE NUMBER	NA	016	017	018	019	020
LZ02 ACTIVITY CODE	NA	CS4NJ	CS4NJ	CS4NJ	CS4NJ	CS4NJ
LZ04 SUBSITE, IDENTIFIER		NJ	NJ	NJ	NJ	NJ
LZ05 OPERABLE UNIT		13	13	13	13	13

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4MJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	029	030	031	032	033
SG30 GRAIN SIZE DISTRIBUTION		*	*	*	*	*
ZZ01 SAMPLE NUMBER	NA	029	030	031	032	033
ZZ02 ACTIVITY CODE	NA	CS4MJ	CS4MJ	CS4MJ	CS4MJ	CS4MJ
ZZ04 SUBSITE, IDENTIFIER		MJ	MJ	MJ	MJ	MJ
ZZ05 OPERABLE UNIT		13	13	13	13	13

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4NJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	022 F	023 F	026	027	028
VV65 ACETONE, BY GC/MS LDL	UG/L	2 U	1 U			
VV66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1 U	1 U			
VV67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	2 U	2 U			
VV68 HEXANONE, 2- BY GC/MS LDL	UG/L	2 U	2 U			
VV70 STYRENE, BY GC/MS LDL	UG/L	1 U	1 U			
VV71 XYLENES, TOTAL, BY GC/MS LDL	UG/L	1 U	1 U			
VV72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	1 U	1 U			
ZZ01 SAMPLE NUMBER	NA	022	023	026	027	028
ZZ02 ACTIVITY CODE	NA	CS4NJ	CS4NJ	CS4NJ	CS4NJ	CS4NJ
ZZ04 SUBSITE, IDENTIFIER		NJ	NJ	NJ	NJ	NJ
ZZ05 OPERABLE UNIT		13	13	13	13	13

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4NJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	034	043	044	045	046
S607 SOLIDS, PERCENT	%		86	82	77	92
S630 GRAIN SIZE DISTRIBUTION		*				
SV03 CHLOROMETHANE, BY GC/MS	UG/KG		12 U	16 U	22 U	14 U
SV04 BROMOMETHANE, BY GC/MS	UG/KG		25 U	33 U	44 U	27 U
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG		18 U	24 U	33 U	20 U
SV06 CHLOROETHANE, BY GC/MS	UG/KG		18 U	24 U	33 U	20 U
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG		12 U	16 U	22 U	14 U
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV11 CHLOROFORM, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV17 BENZENE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG		6 U	8 U	11 U	7 U
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV24 BROMOFORM, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV26 TOLUENE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV28 CHLOROBENZENE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4MJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	034	043	044	045	046
SV29 ETHYL BENZENE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV30 ACETONE, BY GC/MS	UG/KG		12 U	30 U	39 U	14 U
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV32 METHYL ETHYL KETONE	UG/KG		12 U	16 U	22 U	14 U
SV34 HEXANONE, 2-	UG/KG		12 U	16 U	22 U	14 U
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG		12 U	16 U	22 U	14 U
SV36 STYRENE, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV37 XYLENES, TOTAL, BY GC/MS	UG/KG		6 U	8 U	11 U	7 U
SV43 DICHLOROETHYLENE, 1,2-, TOTAL	UG/KG		6 U	8 U	11 U	7 U
ZZ01 SAMPLE NUMBER	NA	034	043	044	045	046
ZZ02 ACTIVITY CODE	NA	CS4MJ	CS4MJ	CS4MJ	CS4MJ	CS4MJ
ZZ04 SUBSITE, IDENTIFIER		MJ	MJ	MJ	MJ	MJ
ZZ05 OPERABLE UNIT		13	13	13	13	13

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-C84RJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	047	048	049	050	051
SG07 SOLIDS, PERCENT	%	85	80	86	84	86
SV03 CHLOROMETHANE, BY GC/MS	UG/KG	13 U	12 U	13 U	13 U	12 U
SV04 BROMOMETHANE, BY GC/MS	UG/KG	25 U	24 U	26 U	26 U	25 U
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG	19 U	18 U	19 U	20 U	19 U
SV06 CHLOROETHANE, BY GC/MS	UG/KG	19 U	18 U	19 U	20 U	19 U
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG	13 U	12 U	13 U	14 U	12 U
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV11 CHLOROFORM, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV17 BENZENE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG	6 U	6 U	6 U	7 U	6 U
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV24 BROMOFORM, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV26 TOLUENE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV28 CHLOROBENZENE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV29 ETHYL BENZENE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4NJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	047	048	049	050	051
SV30 ACETONE, BY GC/MS	UG/KG	13 U	21 U	17 U	21 U	16 U
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV32 METHYL ETHYL KETONE	UG/KG	13 U	12 U	13 U	13 U	12 U
SV34 HEXANONE, 2-	UG/KG	13 U	12 U	13 U	13 U	12 U
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG	13 U	12 U	13 U	13 U	12 U
SV36 STYRENE, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV37 XYLENES, TOTAL, BY GC/MS	UG/KG	6 U	6 U	6 U	7 U	6 U
SV43 DICHLOROETHYLENE, 1,2-, TOTAL	UG/KG	6 U	6 U	6 U	7 U	6 U
ZZ01 SAMPLE NUMBER	NA	047	048	049	050	051
ZZ02 ACTIVITY CODE	NA	CS4NJ	CS4NJ	CS4NJ	CS4NJ	CS4NJ
ZZ04 SUBSITE, IDENTIFIER		NJ	NJ	NJ	NJ	NJ
ZZ05 OPERABLE UNIT		13	13	13	13	13

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4HJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	052	060		143		144		145	
SG07 SOLIDS, PERCENT	%		83							
SV03 CHLOROMETHANE, BY GC/MS	UG/KG		21	U	12	U	17	U	13	U
SV04 BROMOMETHANE, BY GC/MS	UG/KG		41	U	24	U	34	U	26	U
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG		31	U	18	U	26	U	20	U
SV06 CHLOROETHANE, BY GC/MS	UG/KG		31	U	18	U	26	U	20	U
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG		21	U	12	U	17	U	13	U
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV11 CHLOROFORM, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV17 BENZENE, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG		10	U	6	U	9	U	7	U
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV24 BROMOFORM, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV26 TOLUENE, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV28 CHLOROBENZENE, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U
SV29 ETHYLBENZENE, BY GC/MS	UG/KG		10	U	6	U	9	U	7	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4HJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	052		060		143		144		145	
SV30 ACETONE, BY GC/MS	UG/KG			21	U	20	U	22	U	21	U
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG			10	U	6	U	9	U	7	U
SV32 METHYL ETHYL KETONE	UG/KG			21	U	12	U	17	U	13	U
SV34 HEXANONE, 2-	UG/KG			21	U	12	U	17	U	13	U
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG			21	U	12	U	17	U	13	U
SV36 STYRENE, BY GC/MS	UG/KG			10	U	6	U	9	U	7	U
SV37 XYLENES, TOTAL, BY GC/MS	UG/KG			10	U	6	U	9	U	7	U
SV43 DICHLOROETHYLENE, 1,2-, TOTAL	UG/KG			10	U	6	U	9	U	7	U
VV60 CHLOROMETHANE, BY GC/MS LDL	UG/L	2	U								
VV61 BROMOMETHANE, BY GC/MS LDL	UG/L	4	U								
VV62 VINYL CHLORIDE, BY GC/MS LDL	UG/L	3	U								
VV63 CHLOROETHANE, BY GC/MS LDL	UG/L	3	U								
VV64 METHYLENE CHLORIDE (DICHLOROMETHANE) LD	UG/L	2	U								
VV65 DICHLOROETHYLENE, 1,1- BY GC/MS LDL	UG/L	1	U								
VV66 DICHLOROETHANE, 1,1- BY GC/MS LDL	UG/L	1	U								
VV67 DICHLOROETHYLENE, 1,2- TOTAL LDL	UG/L	1	U								
VV68 CHLOROFORM, BY GC/MS LDL	UG/L	1	U								
VV69 DICHLOROETHANE, 1,2- BY GC/MS LDL	UG/L	1	U								
VV70 TRICHLOROETHANE, 1,1,1- BY GC/MS LDL	UG/L	1	U								
VV71 CARBON TETRACHLORIDE, BY GC/MS LDL	UG/L	6									
VV72 BROMODICHLOROMETHANE, BY GC/MS LDL	UG/L	1	U								
VV73 DICHLOROPROPANE, 1,2- BY GC/MS LDL	UG/L	1	U								
VV74 BENZENE, BY GC/MS LDL	UG/L	1	U								
VV75 TRICHLOROETHYLENE, BY GC/MS LDL	UG/L	2									
VV76 DICHLOROPROPYLENE, CIS 1,3- BY GC/MS LD	UG/L	1	U								
VV77 DIBROMOCHLOROMETHANE, BY GC/MS LDL	UG/L	1	U								

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4NJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	052	060	143	144	145
VU58 TRICHLOROETHANE, 1,1,2- BY GC/MS LDL	UG/L	1 U				
VU59 BROMOFORM, BY GC/MS LDL	UG/L	1 U				
VU60 TETRACHLOROETHYLENE, BY GC/MS LDL	UG/L	2				
VU61 TOLUENE, BY GC/MS LDL	UG/L	1 U				
VU62 TETRACHLOROETHANE, 1,1,2,2- BY GC/MS, L	UG/L	1 U				
VU63 CHLOROBENZENE, BY GC/MS LDL	UG/L	1 U				
VU64 ETHYLBENZENE, BY GC/MS LDL	UG/L	1 U				
VU65 ACETONE, BY GC/MS LDL	UG/L	2 U				
VU66 CARBON DISULFIDE, BY GC/MS LDL	UG/L	1 U				
VU67 METHYL ETHYL KETONE (2-BUTANONE) LDL	UG/L	2 U				
VU68 HEXANONE, 2- BY GC/MS LDL	UG/L	2 U				
VU70 STYRENE, BY GC/MS LDL	UG/L	1 U				
VU71 XYLENES, TOTAL, BY GC/MS LDL	UG/L	1 U				
VU72 DICHLOROPROPYLENE, TRANS 1,3- BY GC/MS	UG/L	1 U				
ZO1 SAMPLE NUMBER	NA	052	060	143	144	145
ZO2 ACTIVITY CODE	NA	CS4NJ	CS4NJ	CS4NJ	CS4NJ	CS4NJ
ZO4 SUBSITE, IDENTIFIER		NJ	NJ	NJ	NJ	NJ
ZO5 OPERABLE UNIT		13	13	13	13	13

SENT BY:USEP, REGION VII 5-10-94 13:59 WSTM DIV→ 3032900238:#23

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4NJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	146		147		148		149		150	
SV03 CHLOROMETHANE, BY GC/MS	UG/KG	12	U	13	U	17	U	14	U	13	U
SV04 BROMOMETHANE, BY GC/MS	UG/KG	23	U	26	U	34	U	28	U	27	U
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG	17	U	20	U	25	U	21	U	20	U
SV06 CHLOROETHANE, BY GC/MS	UG/KG	17	U	20	U	25	U	21	U	20	U
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG	12	U	13	U	17	U	18	U	13	U
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV11 CHLOROFORM, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV17 BENZENE, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG	6	U	7	U	8	U	7	U	7	U
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV24 BROMOFORM, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV26 TOLUENE, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV28 CHLOROBENZENE, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV29 ETHYL BENZENE, BY GC/MS	UG/KG	6	U	7	U	8	U	7	U	7	U
SV30 ACETONE, BY GC/MS	UG/KG	16	U	21	U	17	U	14	U	16	U

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4MJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	146	147	148	149	150
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG	6 U	7 U	8 U	7 U	7 U
SV32 METHYL ETHYL KETONE	UG/KG	12 U	13 U	17 U	14 U	13 U
SV34 HEXANONE, 2-	UG/KG	12 U	13 U	17 U	14 U	13 U
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG	12 U	13 U	17 U	14 U	13 U
SV36 STYRENE, BY GC/MS	UG/KG	6 U	7 U	8 U	7 U	7 U
SV37 XYLENES, TOTAL, BY GC/MS	UG/KG	6 U	7 U	8 U	7 U	7 U
SV43 DICHLOROETHYLENE, 1,2-, TOTAL	UG/KG	6 U	7 U	8 U	7 U	7 U
ZZ01 SAMPLE NUMBER	NA	146	147	148	149	150
ZZ02 ACTIVITY CODE	NA	CS4MJ	CS4MJ	CS4MJ	CS4MJ	CS4MJ
ZZ04 SUBSITE, IDENTIFIER		MJ	MJ	MJ	MJ	MJ
ZZ05 OPERABLE UNIT		13	13	13	13	13

ANALYSIS REQUEST DETAIL REPORT ACTIVITY: 4-CS4MJ

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	151		160				
SV03 CHLOROMETHANE, BY GC/MS	UG/KG	12	U	18	U			
SV04 BROMOMETHANE, BY GC/MS	UG/KG	25	U	36	U			
SV05 VINYL CHLORIDE, BY GC/MS	UG/KG	19	U	27	U			
SV06 CHLOROETHANE, BY GC/MS	UG/KG	19	U	27	U			
SV07 METHYLENE CHLORIDE (DICHLOROMETHANE)	UG/KG	12	U	18	U			
SV08 DICHLOROETHYLENE,1,1, BY GC/MS	UG/KG	6	U	9	U			
SV09 DICHLOROETHANE,1,1, BY GC/MS	UG/KG	6	U	9	U			
SV11 CHLOROFORM, BY GC/MS	UG/KG	6	U	9	U			
SV12 DICHLOROETHANE,1,2, BY GC/MS	UG/KG	6	U	9	U			
SV13 TRICHLOROETHANE,1,1,1-, BY GC/MS	UG/KG	6	U	9	U			
SV14 CARBON TETRACHLORIDE, BY GC/MS	UG/KG	6	U	9	U			
SV15 BROMODICHLOROMETHANE, BY GC/MS	UG/KG	6	U	9	U			
SV16 DICHLOROPROPANE,1,2, BY GC/MS	UG/KG	6	U	9	U			
SV17 BENZENE, BY GC/MS	UG/KG	6	U	9	U			
SV18 DICHLOROPROPYLENE,TRANS-1,3	UG/KG	6	U	9	U			
SV19 TRICHLOROETHYLENE, BY GC/MS	UG/KG	6	U	9	U			
SV20 DICHLOROPROPYLENE,CIS-1,3, BY GC/MS	UG/KG	6	U	9	U			
SV21 DIBROMOCHLOROMETHANE, BY GC/MS	UG/KG	6	U	9	U			
SV22 TRICHLOROETHANE,1,1,2-, BY GC/MS	UG/KG	6	U	9	U			
SV24 BROMOFORM, BY GC/MS	UG/KG	6	U	9	U			
SV25 TETRACHLOROETHYLENE, BY GC/MS	UG/KG	6	U	9	U			
SV26 TOLUENE, BY GC/MS	UG/KG	6	U	9	U			
SV27 TETRACHLOROETHANE,1,1,2,2, BY GC/MS	UG/KG	6	U	9	U			
SV28 CHLOROBENZENE, BY GC/MS	UG/KG	6	U	9	U			
SV29 ETHYL BENZENE, BY GC/MS	UG/KG	6	U	9	U			
SV30 ACROLEIN, BY GC/MS	UG/KG	12	U	18	U			

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

COMPOUND	UNITS	151		160				
SV31 CARBON DISULFIDE, BY GC/MS	UG/KG	6	U	9	U			
SV32 METHYL ETHYL KETONE	UG/KG	12	U	18	U			
SV34 HEXANONE, 2-	UG/KG	12	U	18	U			
SV35 4-METHYL-2-PENTANONE(MIBK)	UG/KG	12	U	18	U			
SV36 STYRENE, BY GC/MS	UG/KG	6	U	9	U			
SV37 XYLENES, TOTAL, BY GC/MS	UG/KG	6	U	9	U			
SV43 DICHLOROETHYLENE, 1,2-, TOTAL	UG/KG	6	U	9	U			
ZZ01 SAMPLE NUMBER	NA	151		160				
ZZ02 ACTIVITY CODE	NA	CS4MJ		CS4MJ				
ZZ04 SUBSITE, IDENTIFIER		MJ		MJ				
ZZ05 OPERABLE UNIT		13		13				

LABORATORY APPROVED DATA
PROJECT LEADER APPROVAL PENDING

ACTIVITY CS4MJ HASTINGS-WELL NO. 3 (GW)

THE PROJECT LEADER SHOULD CIRCLE ONE - STORET, AIRS, OR ARCHIVE.

CIRCLE ONE: STORET AIRS ARCHIVE

DATA APPROVED BY LABO FOR TRANSMISSION TO PROJECT LEADER ON 05/06/94 15:30:49 BY

C.2 ON SITE LABORATORY ANALYSIS

EXPLORATION BOREHOLES
Soil Samples
In Situ Ground Water Samples

PUMPING TEST DISCHARGE SAMPLES
3-day test and step test

Untreated
Treated (Carbon Adsorption)

PUMPING TEST DISCHARGE SAMPLES
39-day test

Untreated
Treated (Carbon Adsorption)

APRIL 1994 - SAMPLE RUNS

RESULTS Expressed as MICROGRAMS PER LITER - (NEW Calibrants)

Date	Run	DCE 1.04-20 m	TCA 15.1 min	CCl4 15.6 min	TCE 19.1 min	PCE 23.6 min
4-7	P2-126.5	14.4	1.9	11.7	17.7	7.7
	CORE-124	18.4	0.0	1.8	1.1	1.4
	P2-126.5-D	34.5	2.8	20.0	26.3	13.9
	P1-128.5	22.6	0.0	0.3	1.9	0.1
	P1-137.3	92.1	0.0	1.3	0.0	0.4
4-11	RDB-1-131-S	17.8	0.0	0.1	0.0	0.3
	RDB-1-132	22.2	0.0	2.2	0.0	0.9
	RDB-1-146	27.0	0.0	0.0	0.0	0.2
	RDB-1-164	25.9	0.0	0.0	0.0	0.2
	RDB-1-143-S	22.9	0.0	0.0	0.3	0.0
	CW1-1-S1	16.4	0.7	1.8	5.9	2.0
	CW1-S1-G	47.3	0.0	0.0	0.0	0.2
	CW1-S2	117.0	0.8	2.6	7.9	3.4
	CW1-S2-G	57.5	0.0	0.0	0.0	0.0
4-12	CW1-P1	17.7	0.7	2.6	7.5	5.3
	CW1-P2	29.6	0.1	2.9	5.3	3.0
	RDB-3-164	292.4	0.0	0.0	0.0	0.3
	RDB-3-145	121.6	0.0	7.6	0.1	3.1
	RDB-3-132	47.3	0.0	3.0	0.0	0.1
	RDB-3-125-S	54.4	0.0	0.0	0.0	0.2
	RDB-3-125-S-D	88.2	0.0	0.1	0.0	0.0
	RDB-3-142-S	51.5	0.0	12.7	0.0	2.2
	RDB-3-142-S-D	35.5	0.0	2.5	0.2	1.0
	CW1-P3-D	42.6	0.9	5.2	9.0	4.4
	RDB-3-132-D	71.9	0.0	2.5	0.0	0.1
	RDB-3-145-D	42.8	0.0	7.5	0.2	4.9
	CW1-4-16	9.3	0.3	2.4	3.1	1.8
	CW1-4-16-D	14.5	0.6	3.3	4.8	2.2
4/19	RDB-5-129	63.9	0.0	9.3	0.0	0.7
	RDB-5-144	154.4	0.0	0.4	0.0	0.0
	RDB-5-156	40.9	0.0	0.0	0.0	0.0
	RDB-5-131-S	20.9	0.0	4.0	0.0	0.0
	RDB-5-138-S	34.0	0.0	4.1	0.0	0.4
	RDB-5-129-D	25.2	0.0	10.2	0.0	0.3
4/23	RDB-6-135	59.2	0.2	4.9	2.6	3.0
4/24	RDB-6-135-D	18.7	0.0	4.9	2.6	4.2
	RDB-6-129-S	22.1	0.9	2.6	5.8	4.6
	CW1-4-23	17.0	0.9	4.4	8.9	5.0
	CW1-4-23-G	22.8	0.0	0.0	0.1	0.0
4/30	CW1-4-30-U	140.0	1.2	4.1	8.9	3.7
	CW1-4-30-T	25.9	0.0	0.0	0.0	0.0
	CW1-4-30-U-D	54.7	1.1	4.5	9.5	4.7

Notes:

General:

U or blank: Water sample not treated with granular activated carbon

G or T: Water sample treated with granular activated carbon

D: Duplicate sample

For Pumping Tests:

CW1-S1-G: Water sample collected at Well CW-1/Step-test/Granular activated carbon treated water sample.

CW1-P2: Water sample collected at Well CW-1/3-day Pumping test/2nd day.

CW1-4-23: Water sample collected at Well CW-1/39-day test with sample collection date 4/23, 1994.

For Borehole Investigation

P2-126.5: Water sample collected at borehole P-2 at 126.5 feet below ground

RDB-5-156: Water sample collected at borehole RDB-5 at 156 feet below ground

RDB-5-156-S: In situ aquifer soil (core) sample collected at borehole RDB-5 at 156 feet below ground

APRIL 1994 - SAMPLE RUNS

DATA Expressed as millions of counts

Date	Run	DCE 1.04-20 mi	TCA 15.1 min	CCl4 15.6 min	TCE 19.1 min	PCE 23.6 min
4-7	P2-126.5	3.5392	2.6999	57.43	8.0429	15.204
	CORE-124	4.5153	0	8.675	0.5058	2.7808
	P2-126.5-D	8.4943	4.0036	97.764	11.955	27.377
	P1-128.5	5.5508	0	1.2939	0.8444	0.2205
	P1-137.3	22.662	0	6.3772	0	0.8788
4-11	RDB-1-131-S	4.37	0	0.4193	0	0.5395
	RDB-1-132	5.449	0	10.542	0	1.8106
	RDB-1-146	6.649	0	0	0	0.3055
	RDB-1-164	6.374	0	0	0	0.3547
	RDB-1-143-S	5.637	0	0	0.1149	0
	CW1-1-S1	4.039	0.9635	8.7559	2.665	3.923
	CW1-S1-G	11.632	0	0	0	0.3088
	CW1-S2	28.781	1.1825	12.903	3.5689	6.7213
	CW1-S2-G	14.143	0	0	0	0
4-12	CW1-P1	4.35	1.046	12.607	3.418	10.381
	CW1-P2	7.2804	0.072	14.323	2.416	5.999
	RDB-3-164	71.906	0	0	0	0.5151
	RDB-3-145	29.902	0	37.045	0.03	6.179
	RDB-3-132	11.622	0	14.576	0	0.188
	RDB-3-125-S	13.391	0	0.0585	0	0.311
	RDB-3-125-S-D	21.694	0	0.5653	0	0.065
	RDB-3-142-S	12.673	0	61.952	0	4.398
	RDB-3-142-S-D	8.721	0	11.997	0.071	1.896
	CW1-P3-D	10.479	1.274	25.317	4.095	8.7267
	RDB-3-132-D	17.683	0	12.363	0.01	0.13551
	RDB-3-145-D	10.518	0	36.93	0.0878	9.6947
	CW1-4-16-U	2.2797	0.44396	11.668	1.4093	3.5092
	CW1-4-16-U-D	3.5695	0.77857	16.191	2.2002	4.3445
4/19	RDB-5-129	15.707	0	45.434	0	1.4557
	RDB-5-144	37.984	0	1.8468	0	0
	RDB-5-156	10.068	0	0	0	0
	RDB-5-131-S	5.1438	0	19.47	0	0.02351
	RDB-5-138-S	8.37	0	19.879	0	0.7908
	RDB-5-129-D	6.1967	0	49.941	0	0.5046
4/23	RDB-6-135	14.557	0.3483	24.191	1.16666	5.9402
4/24	RDB-6-135-D	4.5964	0.04	24.15	1.166	8.2204
	RDB-6-129-S	5.4304	1.2975	12.799	2.6459	9.1237
	CW1-4-23-U	4.1863	1.3076	21.455	4.0621	9.8559
	CW1-4-23-T	5.6015	0.0673	0	0.04	0
4/30	CW1-4-30-U	34.42	1.6941	20.226	4.037	7.211
	CW1-4-30-T	6.3749	0	0.085	0	0
	CW1-4-30-U-D	13.451	1.579	22.022	4.31	9.2656

Notes:

General:

U or blank: Water sample not treated with granular activated carbon
G or T: Water sample treated with granular activated carbon
D: Duplicate sample

For Pumping Tests:

CW1-S1-G: Water sample collected at Well CW-1/Step-test/Granular activated carbon treated water sample.
CW1-P2: Water sample collected at Well CW-1/3-day Pumping test/2nd day.
CW1-4-23: Water sample collected at Well CW-1/39-day test with sample collection date 4/23, 1994.

For Borehole Investigation

P2-126.5: Water sample collected at borehole P-2 at 126.5 feet below ground
RDB-5-156: Water sample collected at borehole RDB-5 at 156 feet below ground
RDB-5-156-S: In situ aquifer soil (core) sample collected at borehole RDB-5 at 156 feet below ground

MAY 1994 - SAMPLE RUNS

RESULTS Expressed as MICROGRAMS PER LITER - (NEW Calibrants)

Date	Run	DCE 1.04-20 mi	TCA 15.1 min	CCl4 15.6 min	TCE 19.1 min	PCE 23.6 min
5/7	CW1-5-7-U	20.0	1.2	4.9	9.3	4.9
	CW1-5-7-T	7.6	0.0	0.2	0.0	0.1
	CW1-5-7-U-D	24.3	1.4	5.0	13.0	4.6
5/14	CW1-5-14-U-D	27.8	1.4	4.2	11.2	6.6
	CW1-5-14-U	25.2	1.5	4.4	11.4	5.8
	CW1-5-14-T	30.3	0.1	0.6	0.0	0.5
5/22	CW1-5-20-U-D	22.0	0.8	3.3	7.0	0.0
	CW1-5-20-U	25.2	0.7	2.7	6.0	3.2
	CW1-5-20-T	22.3	0.0	0.2	0.0	0.2
5/28	CW1-5-28-U	16.4	1.7	3.9	15.2	10.1
	CW1-5-28-T-D	0.0	0.0	0.4	0.2	0.0
	CW1-5-28-T	0.0	0.0	0.4	0.0	0.0
5/29	P2-5-28-G	0.0	0.4	1.2	4.1	2.8
	P2-5-28-G-D	21.7	0.7	1.8	7.1	3.5
	P1-5-28-G	23.9	14.7	3.6	122.3	30.0
	P1-5-28-G-D	15.3	12.2	2.8	103.9	22.0
	P1-5-28-G-D2	19.8	11.8	4.1	117.0	23.2

Notes:
U: Water sample not treated with granular activated carbon
T: Water sample treated with granular activated carbon
D: Duplicate sample
G: Ground water sample(untreated)
CW1-5-28: Water sample collected from well CW-1 on May 28, 1994
P2-5-28: Water sample collected from well P-2 on May 28, 1994

MAY 1994 - SAMPLE RUNS
DATA Expressed as millions of counts

Date	Run	DCE 1.04-20 mi	TCA 15.1 min	CCl4 15.6 min	TCE 19.1 min	PCE 23.6 min
5/7	CW1-5-7-U	4.9302	1.6797	24.079	4.2069	9.6549
	CW1-5-7-T	1.862	0	0.8353	0	0.18466
	CW1-5-7-U-D	5.9658	1.9896	24.406	5.917	8.9499
5/14	CW1-5-14-U-D	6.8378	2.0388	20.3653	5.098	13.008
	CW1-5-14-U	6.195571	2.0665	21.6552	5.1933	11.3586
	CW1-5-14-T	7.4497	0.2048	2.7405	0	0.9815
5/22	CW1-5-20-U-D	5.4164	1.1184	16.022	3.192	
	CW1-5-20-U	6.2006	0.92941	13.4239	2.7027	6.231
	CW1-5-20-T	5.4938	0	0.9384	0	0.37878
5/28	CW1-5-28-U	4.0289	2.4575	19.267	6.9018	19.8459
	CW1-5-28-T-D	0	0	2.1344	0.1124	0
	CW1-5-28-T	0	0	1.7968	0	0
5/29	P2-5-28-G		0.62381	6.0661	1.8776	5.476
	P2-5-28-G-D	5.332	0.92957	8.5961	3.2031	6.8716
	P1-5-28-G	5.873	20.7337	17.436	55.52	59.02
	P1-5-28-G-D	3.771	17.184	13.751	47.161	43.226
	P1-5-28-G-D2	4.875	16.684	20.059	53.113	45.663

Notes:
U: Water sample not treated with granular activated carbon
T: Water sample treated with granular activated carbon
D: Duplicate sample
G: Ground water sample(untreated)
CW1-5-28: Water sample collected from well CW-1 on May 28, 1994
P2-5-28: Water sample collected from well P-2 on May 28, 1994

CALIBRATION STANDARDS COUNTS AND DIVISOR AVERAGE

			DCE 1.04-20 mi	TCA 15.1 min	CCl4 15.6 min	TCE 19.1 min	PCE 23.6 min
New	4/23	CAL-50-100N	3205654	37278245	1.6E+08	16705013	69479768
		CAL-50-100ND	3596707	42532471	1.84E+08	27068605	1.05E+08
	4/30	CAL-50-100	6865758	36555404	1.56E+08	17010926	80722547
	5/4	CAL-50-100-R	5529679	69961495	2.48E+08	23642503	1.12E+08
	5/7	CAL-50-100	24495939	68011367	2.46E+08	21621767	86734699
	5/14	CAL-50-100-R	6407690	74690649		24835710	1.01E+08
	5/22	CAL-50-100	4948931	69624511	2.4E+08	20715625	93916965
NEW		DIVISORS	12297125	70572006	2.45E+08	22703901	98350388

Divisors determined from average of FOUR runs (5/4 through 5/22).

Except for DCE - average of 4/30 through 5/7 used.