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ADDENDUM TO THE REMEDIAL INVESTIGATION REPORT FOR THE REMEDIAL INVESTIGATION/FEASIBILITY STUDY AT THE NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT FRIDLEY, MINNESOTA

JULY 1988

CONTRACT NO. DACA45-86-C-0015

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EXECUTIVE SUMMARY

The Naval Industrial Reserve Ordnance Plant (NIROP) is located in an industrial area in the northern portion of the Minneapolis/St. Paul Metropolitan Area within the city limits of Fridley, Minnesota. Advanced naval weapons systems are designed and manufactured at the NIROP. The northern portion of the facility is government-owned and operated by a private contractor (FMC Corporation), and the remainder of the facility is owned independently by FMC.

The City of Minneapolis water supply intake in the Mississippi River is less than one mile downstream from the NIROP. A portion of the Anoka County Islands of Peace Mississippi River Front Park is located west of the NIROP adjacent to the river.

Ground water use in the vicinity of the NIROP consists primarily of high-capacity industrial production wells completed in the Prairie du Chien/Jordan (PCJ) aquifer system. The City of Fridley also maintains a backup well finished in the PCJ immediately north of the NIROP.

An aquifer within unconsolidated Quaternary sediments overlies the PCJ in the vicinity of the NIROP. The unconsolidated aquifer is hydraulically separated from the PCJ by a silty to shaly basal bed of the St. Peter Sandstone except for an area where the St. Peter Sandstone has been eroded. The unconsolidated aquifer is in contact with the PCJ in the eroded area. The City of Minneapolis had plans to utilize the unconsolidated aquifer for a "Ranney" well system to serve as a backup to the Mississippi River surface water intake. These plans are now on hold indefinitely due to questionable capacity of the aquifer and the presence of contaminants in the ground water.

In March 1981, an anonymous phone call to the MPCA led to the discovery of trichloroethylene (TCE) in three NIROP water supply wells finished in the PCJ. Grab samples obtained from NIROP storm sewer outfalls at the Mississippi River also showed contamination by TCE and other volatile organic compounds (VOCs) at that time. Subsequent sampling at the City of Minneapolis Mississippi River water intake also revealed measurable concentrations of TCE.

Investigations into potential problems at the NIROP began immediately by FMC Corporation. Two separate areas of concern were identified as the South Study Area (FMC-owned property) and the North Study Area (government-owned property) by Hickok and Associates (Hickok, 1981). FMC pursued investigation of the South Study Area separately from the government-owned North Study Area. An agreement was reached between FMC and the MPCA for what Hickok had called the South Study Area. That agreement called for pumping and discharging untreated contaminated ground water to the Pig's Eye Wastewater Treatment Plant. Cleanup levels for the ground water have been set at 0.270 mg/l total VOCs. This Remedial Investigation Report details the Navy's efforts related to investigation of what Hickok (Hickok, 1981) called the North Study Area, which is herein referred to as the NIROP or "the site."

On March 31, 1982, Naval officials implemented the Navy Assessment and Control of Installation Pollutants (NACIP) Program to identify and control environmental contamination from past use and disposal practices. An Initial Assessment Study (IAS) was completed in June 1983 by Envirodyne Engineers, Inc. The IAS determined that drummed wastes had occasionally been buried in the northern portion of the NIROP and,

additionally, that the area beneath the NIROP building may be contributing to ground water problems. As a result of IAS recommendations, the Navy contracted the U.S. Army Corps of Engineers (USACE) to continue investigations.

Through various geophysical and remote sensing techniques, nine areas were selected for excavation based on their likelihood for containing drummed wastes. These areas were excavated under USACE direction in the fall of 1983. Forty-three excavated drums and underlying soils were found to contain VOCs, PCBs, oil and grease, pesticides, and metals. The 43 excavated drums and 1,200 cubic yards of soil were disposed at USEPA-approved landfills (USACE, 1984).

Four phases of ground water monitoring well installation began in June 1983 under USACE direction. The current network consists of 51 monitoring wells installed under the USACE's direction and 1 FMC-installed monitoring well. Wells have been finished in the shallow, intermediate, and deep portions of the unconsolidated aquifer, as well as the PCJ aquifer in the bedrock. The monitoring well network has been used to determine physical and chemical characteristics of the unconsolidated and PCJ aquifers underlying the NIROP and some adjacent areas.

Analysis of information gathered during this investigation and comparisons with previous information indicate the following:

- All use of TCE at the NIROP was discontinued by the end of the first quarter of 1987. Plant operations which previously used TCE now use 1,1,1-trichloroethane. A solvent management program is currently in place at the NIROP.

- Ground water flow in the unconsolidated aquifer is generally from the northeast to the southwest across the NIROP, consistent with previous findings.

- Ground water in the unconsolidated aquifer beneath the NIROP has been contaminated with VOCs. TCE was found more frequently and at higher concentrations than any other VOC, and is therefore the best indicator of this contamination.

- One- hundred to two-hundred feet per year is a representative ground water velocity in the shallow unconsolidated aquifer at the NIROP. Ground water velocities calculated for the shallow unconsolidated aquifer ranged from 11 to 7,600 ft/yr. Ground water velocities in the deep unconsolidated aquifer were substantially less, ranging from 4 to 54 feet per year.

- Vertical ground water gradients were very small, indicating that ground water flow across the NIROP is essentially horizontal.

- The additional investigations showed the NIROP and vicinity to be underlain by a silty-sand to sandy-clay till layer at about the intermediate depth of the unconsolidated aquifer. The effect of this till layer is to impede vertical migration of contaminants. However, this till layer appears absent in a wide band that extends north to south across the NIROP, and then to the southwest in the shape of an old river bed. Absence of the till layer in this region tends to facilitate vertical migration of contaminants in the aquifer.

- Elevated concentrations of TCE/DCE were found in soil pore gas near the former pit/trench disposal area, the decontamination pad, and at several locations near the north property boundary.

- Multiple areas of ground water contamination were detected in the vicinity of the NIROP as follows:

  - An unidentified TCE source upgradient (northeast) of the NIROP, consistent with previous findings.

  - The former pit/trench disposal area (and immediate vicinity) in the north region of the NIROP, consistent with previous findings. This is considered an on-site source area.

  - Unidentified sources either on-site near the eastern NIROP property boundary or off-site (east of the property), consistent with previous findings. The additional investigations showed particularly high TCE concentrations at the intermediate depth of the unconsolidated aquifer in the southeast corner of the NIROP, a zone previously uninvestigated.

  - The off-site area immediately north of the northwest portion of the NIROP. Ground water level data collected

to date indicate that flow direction is variable, and therefore identification of the TCE source (on-site or off-site) is inconclusive.

- The southwest region of the NIROP, which may be registering contamination that originates from the former pit/trench disposal area (and immediate vicinity), based on contamination characteristics. This contamination was previously thought to originate from the former TCE storage tank location or from within the building envelope.

- TCE concentrations downgradient of the former pit/trench disposal area continue to decrease as a result of the removal action completed in 1984. Findings from the recently completed pore gas survey and ongoing occurrence of TCE suggest it is likely that some VOC residuals and/or VOC-contaminated soils still exist in this area.

- Ground water in the southeast corner of the NIROP, previously showing low levels of contamination in the shallow unconsolidated aquifer, was found to have high levels of TCE at the intermediate depth based on the results of samples collected from new intermediate-depth monitoring wells. The source(s) of this high TCE concentration has not been identified. Data suggest that potential off-site as well as potential on-site sources exist.

- TCE concentrations downgradient of the NIROP, measured near the center of the contamination plume, increased in the shallow unconsolidated aquifer and remained high in the deeper sediments since the previous sampling round in November 1986.

- Concentrations of TCE in ground water reaching the Mississippi River are probably on the order of 1 to 10 mg/l, consistent with previous conclusions. This range of TCE concentrations can be expected to continue, given the high TCE levels detected at the southeast corner of the NIROP.

- The additional investigations continue to show no significant contamination of the Prairie du Chien bedrock aquifer.

- VOCs were not found in storm sewer samples collected as part of the additional investigations.

- Re-evaluation of the No-Action Alternative indicates that the current health-based carcinogenic risk level for TCE calculated at the only existing receptor area, the Minneapolis water treatment plant intake, is slightly above the USEPA target risk value of 10^{-6}, based on the assumption of 10 percent dilution of ground water by the Mississippi River. However, the calculated TCE risk value at 10 percent dilution

is well within the USEPA allowable range of 10^{-4} to 10^{-7}. The calculated TCE risk value at the intake based on the assumption of 100 percent ground water to river water dilution is nearly 10 times lower than the USEPA target risk value of 10^{-6}. Samples of raw and treated water from the Minneapolis Water Treatment Plant collected by the MDH generally fall between the 10^{-6} to 10^{-7} risk levels.

- The NIROP is located less than one-half mile downgradient of one USEPA Superfund site and one potential hazardous waste disposal site, both involving an actual or potential ground water contamination problem. Other USEPA Superfund sites involving ground water VOC contamination are located farther upgradient of the NIROP. The potential that contamination from these sites, or other as yet unidentified sites will eventually reach the NIROP may exist, although the likelihood of this occurrence is uncertain.

- Results of bench-scale tests of NIROP ground water conducted on-site indicate that aeration of the ground water will cause precipitation of significant amounts of iron hydroxide and calcium carbonate. The precipitated solids would cause potential operation or maintenance problems for certain types of ground water treatment equipment.

- TCE continues to be the best indicator for evaluating remedial alternatives at the NIROP.

1. INTRODUCTION

1.1 Background

RMT, Inc., has been retained by the Omaha District of the U.S. Army Corps of Engineers (USACE) to complete a Remedial Investigation (RI) Report for the Naval Industrial Reserve Ordnance Plant (NIROP) located in Fridley, Minnesota.

A draft RI Report was issued in May 1987. Following receipt of review comments on the draft report from the USACE, U.S. Navy, and the Minnesota Pollution Control Agency (MPCA), a final RI Report was prepared and issued in June 1987 (RMT, 1987a).

Findings of the June 1987 RI Report suggested that additional investigations were necessary to assess the extent of ground water contamination in the vicinity of the NIROP, and to better define contamination source areas and migration pathways. Extensive additional investigations were conducted at the NIROP from November 1987 through February 1988. The results of these investigations with updated findings and conclusions of the remedial investigation are presented in this RI Addendum Report.

1.2 Purpose and Scope

June 1987 RI Report

The purpose of the June 1987 RI Report was to use existing information to evaluate the impacts of past disposal practices on subsoils and ground water. The scope of the report was limited to a review of existing information related to the NIROP site and surrounding areas which was developed by other consultants, the Corps of Engineers,

and RMT. A list of prior investigations which formed the basis for the June 1987 RI Report follows:

- Initial Assessment Study of Naval Industrial Reserve Ordnance Plant, Minneapolis, Minnesota, prepared by Envirodyne Engineers, Inc., for the Navy Assessment, June 1983.

- Draft NIROP Hazardous Waste Clean-Up Report prepared by the Corps of Engineers in October 1984, and finalized by RMT in September 1986.

- Ground water quality and ground water level measurement data collected by the Corps of Engineers from October 1983 to March 1986.

- Summary Report on Ground Water Conditions, FMC Northern Ordnance Division Plant, Minneapolis, Minnesota, 1983, S.S. Papadopolus and Associates, Inc.

- Final Report Phase I and Phase II Investigation Programs, Northern Ordnance Division FMC Corporation, 1984, S.S. Papadopolus and Associates, Inc.

- Evaluation of Remedial Action Alternatives, FMC and BNR Lands, Ground Water Regime, May 1985, Connestoga-Rovers & Associates Limited.

- Evaluation of Past Disposal Practices Phase I Initial Assessment, April 1981, Eugene A. Hickok and Associates.

- Evaluation of Past Disposal Practices Phase II Hydrogeological Investigation, Eugene A. Hickok and Associates, December 1981.

- Feasibility Study, FMC and BNR Lands, Ground Water Regime, January 1985, Connestoga-Rovers & Associates, Limited.

- Response Action Plan, Fridley, Minnesota, April 1985, Connestoga-Rovers & Associates, Limited.

RI Addendum Report

The purpose of this RI Addendum Report is to present an assessment of the existing conditions and the nature and extent of ground water contamination at and around the NIROP, using the information and data accumulated since the start of remedial investigation activities.

The scope of the report is limited to a presentation of the data developed from the investigations conducted from November 1987 through February 1988, and other pertinent information acquired since the June 1987 RI Report was issued. However, the findings and conclusions presented in this report were developed using the cumulative information and data from the remedial investigation activities undertaken since 1982.

Additional information regarding an aquifer test, monitoring well construction, and ground water sampling and analyses conducted during the latest investigation is presented in separate documents (RMT, 1988a) (RMT, In Preparation(b)) (RMT, In Preparation(a)).

2. INVESTIGATION SUMMARY

2.1 Site Background Information

2.1.1 Site Description

A general vicinities map is included as Figure 2-1, and a NIROP facility map is shown on Figure 2-2.

Regional Features (see Figure 2-3)

Two Superfund sites in the region are located generally upgradient of the NIROP with respect to the ground water flow. These sites are the New Brighton/Arden Hills/St. Anthony USEPA Superfund site, number 43 on Update 6 of the National Priorities List (NPL), and the Twin Cities Army Ammunition Plant (TCAAP). A Federal Facility Agreement was recently signed for the TCAAP site, where a Remedial Investigation/Feasibility Study (RI/FS) is required at each of 14 separate areas where hazardous waste contamination has been identified. A preliminary RI has been completed at the New Brighton/Arden Hills/St. Anthony site, and completion of a comprehensive RI/FS is anticipated by the end of 1988. Interim Remedial Measures (IRM) have been implemented at both sites.

Information provided to RMT by the MPCA indicates that, as of several months ago, a VOC-contaminated plume in the ground water had migrated from the TCAAP site over half of the distance between the TCAAP and the NIROP. The Record of Decision for the alternate water supply at the New Brighton/Arden Hills/St. Anthony site (USEPA, 1986b) indicates that four significant source areas of ground water contamination observed in the study area for this site may exist. These general source areas are located either on the TCAAP or in the vicinity of the TCAAP. Trichloroethylene was the most prevalent volatile organic

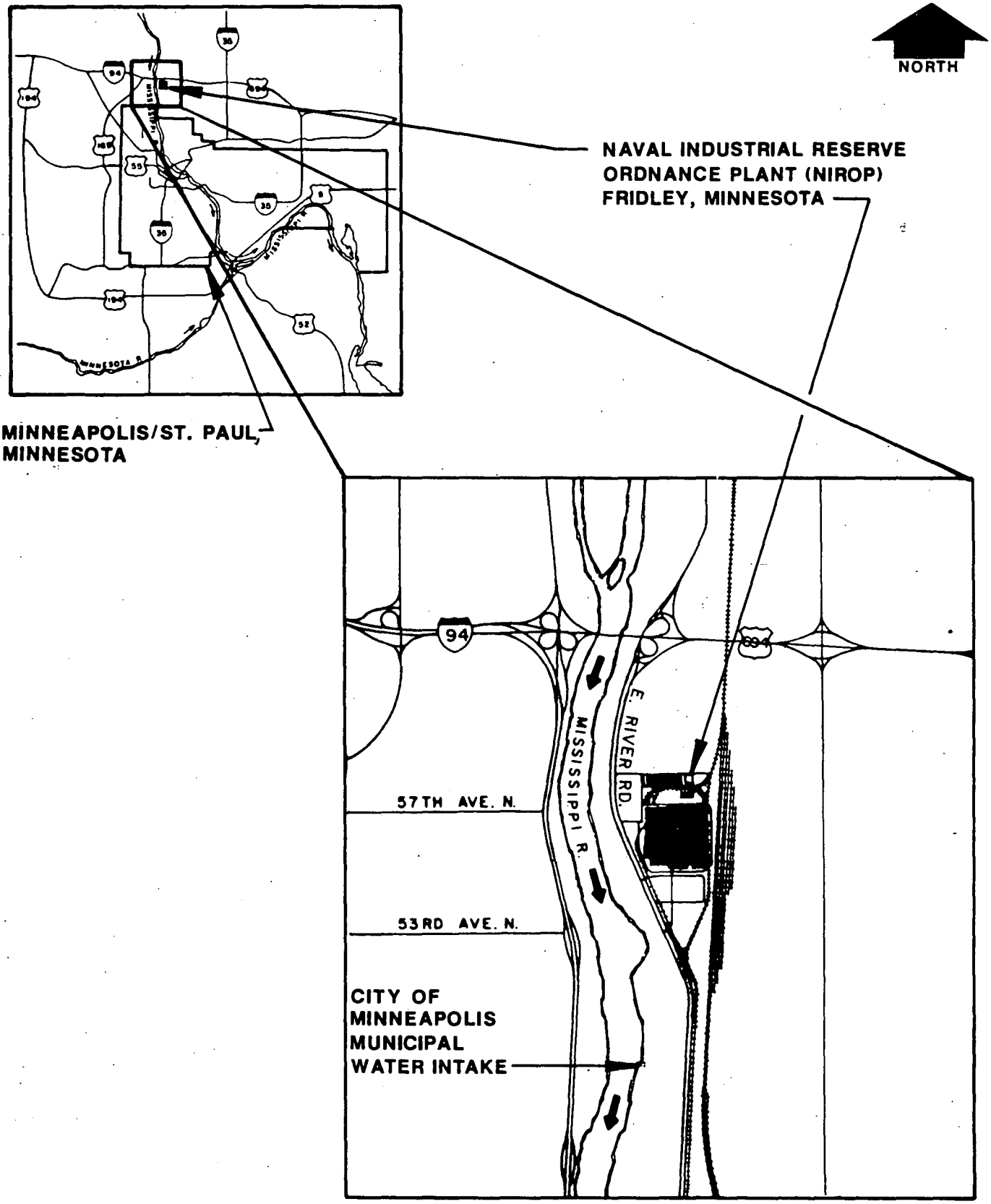

FIGURE 1-1
GENERAL VICINITIES MAP

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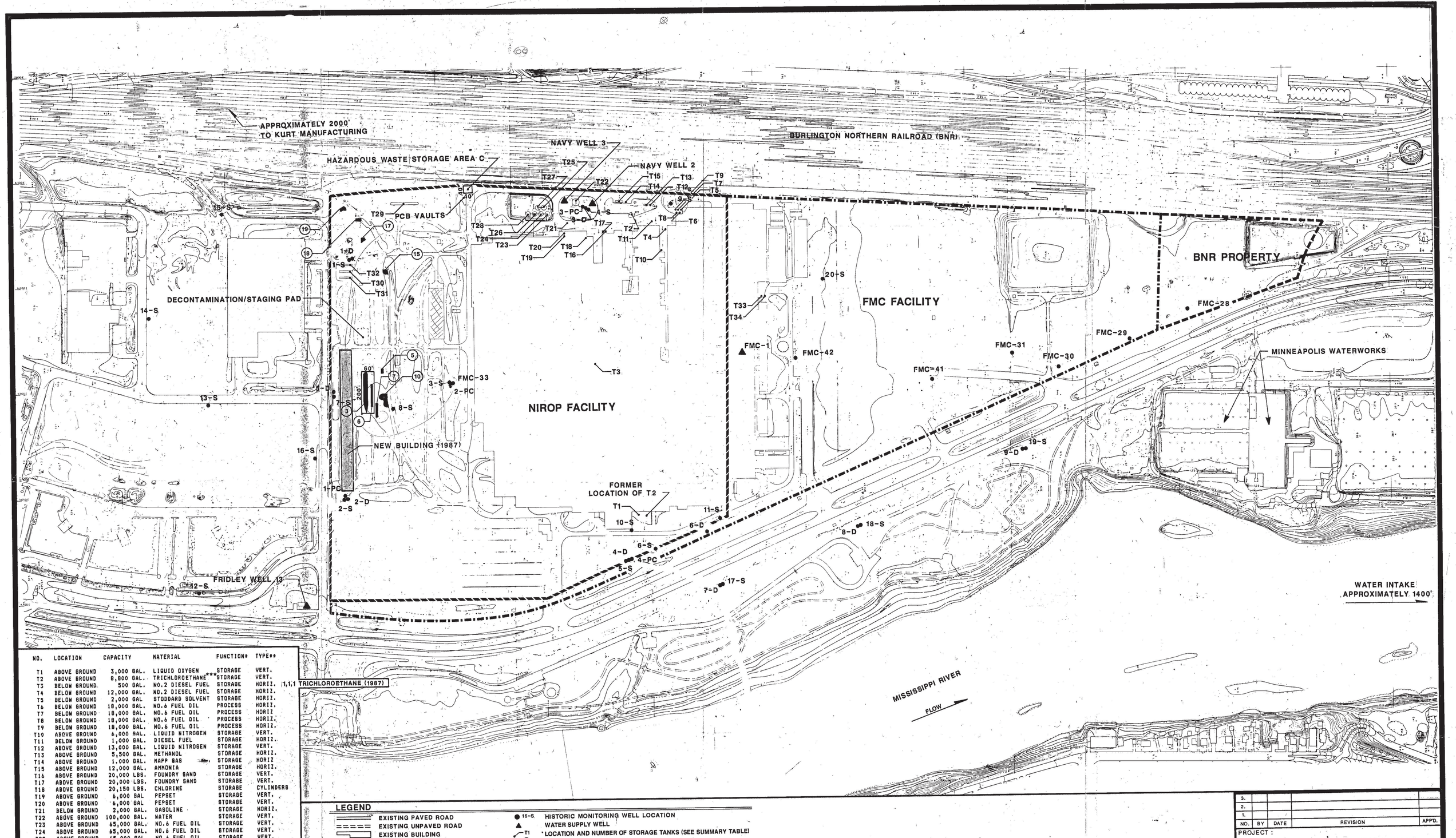
	PROJ.# 1332.53

FIGURE 2-1



NO.	LOCATION	CAPACITY	MATERIAL	FUNCTION*	TYPE**
T1	ABOVE GROUND	3,000 GAL.	LIQUID OXYGEN	STORAGE	VERT.
T2	ABOVE GROUND	8,800 GAL.	TRICHLOROETHANE***	STORAGE	VERT.
T3	BELOW GROUND.	500 GAL.	NO.2 DIESEL FUEL	STORAGE	HORIZ.
T4	BELOW GROUND	12,000 GAL.	NO.2 DIESEL FUEL	STORAGE	HORIZ.
T5	BELOW GROUND	2,000 GAL	STODDARD SOLVENT	STORAGE	HORIZ.
T6	BELOW GROUND	18,000 GAL.	NO.6 FUEL OIL	PROCESS	HORIZ.
T7	BELOW GROUND	18,000 GAL.	NO.6 FUEL OIL	PROCESS	HORIZ
T8	BELOW GROUND	18,000 GAL.	NO.6 FUEL OIL	PROCESS	HORIZ.
T9	BELOW GROUND	18,000 GAL.	NO.6 FUEL OIL	PROCESS	HORIZ.
T10	ABOVE GROUND	6,000 GAL.	LIQUID NITROGEN	STORAGE	VERT.
T11	BELOW GROUND	1,000 GAL.	DIESEL FUEL	STORAGE	HORIZ.
T12	ABOVE GROUND	13,000 GAL.	LIQUID NITROGEN	STORAGE	VERT.
T13	ABOVE GROUND	5,500 GAL.	METHANOL	STORAGE	HORIZ.
T14	ABOVE GROUND	1,000 GAL.	MAPP GAS	STORAGE	HORIZ
T15	ABOVE GROUND	12,000 GAL.	AMMONIA	STORAGE	HORIZ.
T16	ABOVE GROUND	20,000 LBS.	FOUNDRY SAND	STORAGE	VERT.
T17	ABOVE GROUND	20,000 LBS.	FOUNDRY SAND	STORAGE	VERT.
T18	ABOVE GROUND	20,150 LBS.	CHLORINE	STORAGE	CYLINDERS
T19	ABOVE GROUND	6,000 GAL	PEPSET	STORAGE	VERT.
T20	ABOVE GROUND	6,000 GAL	PEPSET	STORAGE	VERT.
T21	BELOW GROUND	2,000 GAL.	GASOLINE	STORAGE	HORIZ.
T22	ABOVE GROUND	100,000 GAL.	WATER	STORAGE	VERT.
T23	ABOVE GROUND	65,000 GAL.	NO.6 FUEL OIL	STORAGE	VERT.
T24	ABOVE GROUND	65,000 GAL.	NO.6 FUEL OIL	STORAGE	VERT.
T25	ABOVE GROUND	65,000 GAL.	NO.6 FUEL OIL	STORAGE	VERT.
T26	ABOVE GROUND	65,000 GAL.	NO.6 FUEL OIL	STORAGE	VERT.
T27	ABOVE GROUND	65,000 GAL.	NO.6 FUEL OIL	STORAGE	VERT.
T28	ABOVE GROUND	65,000 GAL.	NO.6 FUEL OIL	STORAGE	VERT.
T29	ABOVE GROUND	90,000 GAL.	PROPANE	STORAGE	HORIZ.
T30	ABOVE GROUND	17,303 GAL.	PROPANE	STORAGE	HORIZ.
T31	ABOVE GROUND	17,303 GAL.	PROPANE	STORAGE	HORIZ.
T32	ABOVE GROUND	17,303 GAL.	PROPANE	STORAGE	HORIZ.
T33	BELOW GROUND	1,000 GAL.	GASOLINE	STORAGE	HORIZ.
T34	BELOW GROUND	1,000 GAL.	GASOLINE	STORAGE	HORIZ.

* STORAGE OR PROCESS
** TANKS, BINS, DRUMS, ETC.
*** FORMERLY TRICHLOROETHYLENE

TANK LOCATIONS FROM ENVIRODYNE, 1983

LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- x 865.1 EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- 16-S HISTORIC MONITORING WELL LOCATION
- WATER SUPPLY WELL
- T1 LOCATION AND NUMBER OF STORAGE TANKS (SEE SUMMARY TABLE)
- 3 EXCAVATED WASTE DISPOSAL PITS/TRENCHES
- NIROP PROPERTY LINE (APPROXIMATE)
- FMC PROPERTY LINE (APPROXIMATE)

BASE MAP PROVIDED BY CORPS OF ENGINEERS. DATE OF SURVEY AND DATUM UNKNOWN. MONITORING WELL LOCATIONS ARE APPROXIMATE, BASED ON PROXIMITY TO LANDMARKS.

SCALE: 1" = 200'
0 200 400 600 FEET

CONTRACT NO. DACA45-86-C-0015

NO.	BY	DATE	REVISION	APPD.
3.				
2.				
1.				

PROJECT:
ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE:
NIROP FACILITY MAP

DRAWN BY: JMM MDZ
CHECKED BY: KEB
APPROVED BY: TEG
DATE: 7/6/88
SCALE: 1" = 200'
DATE PRINTED: JUL 07 1988
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FIGURE 2-2

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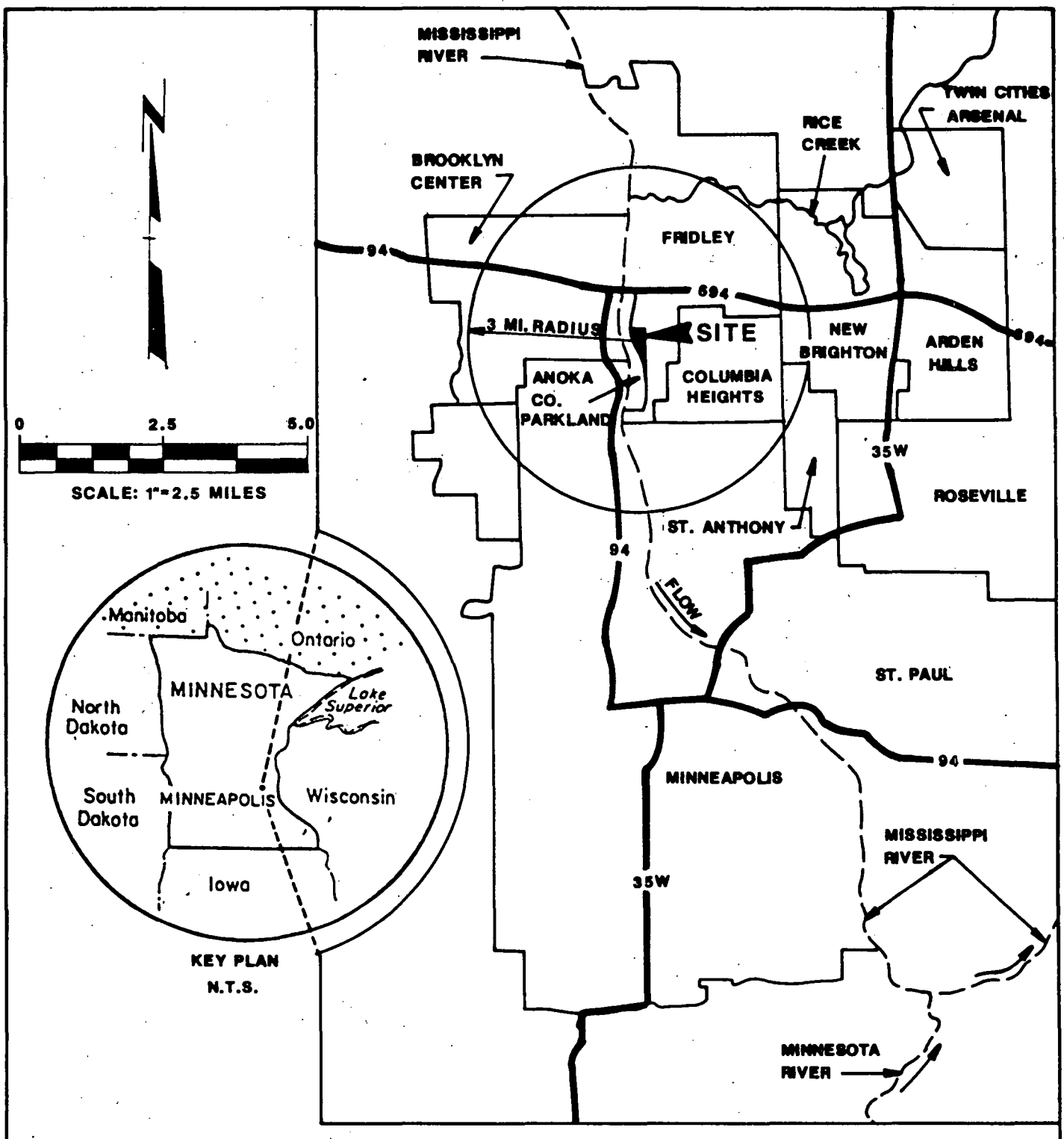

NOTE:

USEPA SUPERFUND SITES ARE IDENTIFIED AT THE TWIN CITIES ARSENAL (TCAAP) AND BRIGHTON/ST. ANTHONY/ARDEN HILLS.

LOCATION MAP

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FIGURE 2-3

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compound found, and generally had the highest concentrations. Therefore, it was used by the USEPA as the indicator chemical for the ground water studies. The potential that contamination from these two sites will eventually reach the NIROP may exist, although the likelihood that this will occur is uncertain.

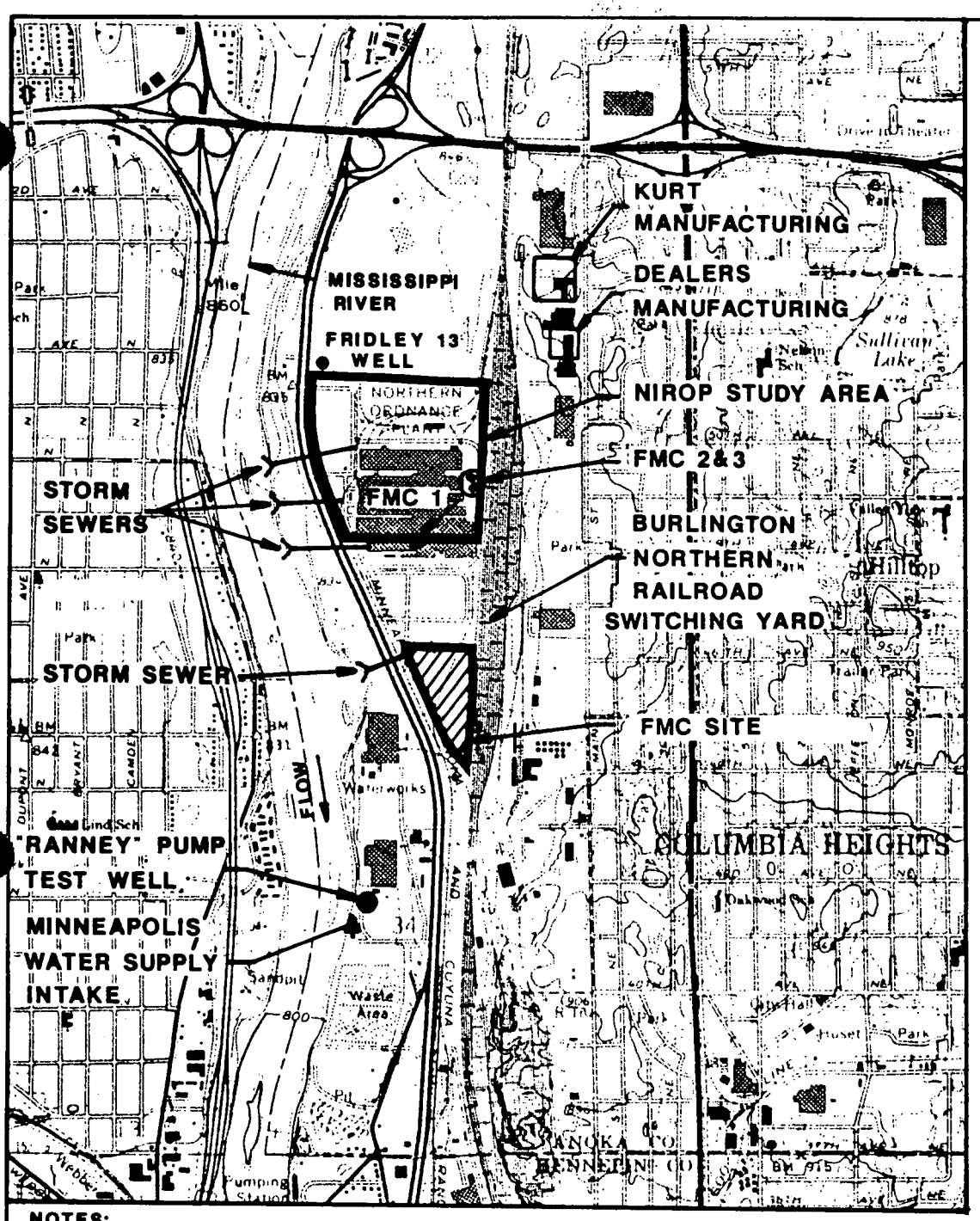
The area encompassed within a 3-mile radius of the NIROP includes parts of Minneapolis/St. Paul, New Brighton, St. Anthony, and most of Fridley and Brooklyn Center. The MPCA estimates that approximately 70,000 people are serviced by ground water from within the 3-mile radius; approximately 200,000 people live within that radius; and approximately 500,000 people are serviced by the Minneapolis water treatment plant located about one mile downstream from the NIROP on the Mississippi River.

Local Features (see Figure 2-4)

The NIROP is potentially downgradient from the Kurt Manufacturing USEPA Superfund site, number 618 on Update 6 of the NPL, and one potential hazardous waste site, Dealer's Manufacturing. Both sites are less than 0.5 mile from, and generally upgradient of, the NIROP site.

The Kurt Manufacturing site involves a ground water contamination problem. Ground water extraction wells are believed to be currently in operation at the site, based on information provided by MPCA personnel.

Potential hazardous waste disposal at the Dealer's Manufacturing plant was brought to the attention of FMC Corporation and the MPCA in September 1987 by an anonymous phone caller. The caller alleged that



NOTES:

(1) KURT MFG. AND THE FMC SITE ARE U.S. EPA SUPERFUND SITES.

(2) DEALERS MFG. IS A SITE WITH SUSPECTED DISPOSAL OF NUMEROUS DRUMS OF TCE INTO SOIL.

SOURCE:
USGS MINNEAPOLIS NORTH QUADRANGLE 1967; PHOTO-REVISED 1972 AND 1980.

REGIONAL SITE MAP

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FIGURE 2-4

JUL 7 1988

from 1972 to 1982, standard practice at the plant was to dump the contents of approximately two 55-gallon drums of spent trichloroethylene every week onto the ground in back of their building. MPCA personnel have informed RMT that the Preliminary Assessment/Site Inspection group of the MPCA is proceeding with investigations at the site.

The potential that ground water contaminants from the two local sites will eventually reach the NIROP may exist. However, the presence of contaminants from these sites in the NIROP ground water based on the ground water quality data collected to date for this remedial investigation is inconclusive.

The NIROP is also adjacent to the FMC Corporation Fridley Plant site, which is number 17 on Update 6 of the NPL.

2.1.2 Chronology of Remedial Work and Investigations

Remedial work and investigations conducted at the NIROP through June 1987 are described in the June 1987 RI Report (RMT, 1987a).

From November 1987 through February 1988, RMT, Inc., conducted additional investigations at the NIROP. These investigations included the following major work elements:

- A soil pore gas survey.
- Installation of sixteen (16) new ground water monitoring wells.
- Installation of two (2) new pumping/monitoring wells and performance of two aquifer pumping tests and <u>in-situ</u> permeability tests.
- A comprehensive ground water sampling round including the fifty-two (52) monitoring wells on and adjacent to the NIROP property, with water level measurements at all the wells.

- Sampling of two (2) storm sewers which receive flow from the NIROP.

- Analysis of soil samples from the borings installed for monitoring well construction for physical properties of the soils.

- Bench-scale tests of ground water samples collected during the aquifer pumping tests.

A summary of the additional investigations conducted from November 1987 through February 1988 is presented below.

Soil Pore Gas Survey

The objectives of the soil pore gas survey were to provide a screening technique to determine potential source areas of VOC contamination and to assist in the placement of monitoring wells. The survey included on-site analysis of pore gas samples using a field gas chromatograph. A detailed description of the work performed and results of the survey is included in the A-E Quality Control Summary Report issued in February 1988 (RMT, 1988a). A summary of the soil pore gas survey is included in Section 4.1.4 of this report.

Monitoring Wells

Sixteen (16) new monitoring wells and two (2) new pumping/monitoring wells were installed to improve knowledge of the geology and hydrogeology in several areas on and adjacent to the NIROP, and to better delineate the extent and concentration of hazardous substances in the ground water. The wells installed included five (5) water table wells, seven (7) wells placed in the middle of the aquifer

in the unconsolidated sediments, and five (5) wells placed at the bottom of the aquifer in the unconsolidated sediments. One (1) well was finished in the Prairie du Chien/Jordan aquifer to investigate potential contamination in the bedrock aquifer upgradient of the NIROP.

The design and construction details of the monitoring wells are described in detail in the A-E Quality Control and Sampling Plan issued in January 1988 (RMT, 1988b).

Aquifer Tests

Two aquifer tests were conducted as part of the additional investigations. The first test was designed to assess the source(s) of VOCs observed in previous samples from well 9-S by analyzing chemical time-series data. Details of this test and the test results are described in Section 5.3.5.

The second test consisted of an aquifer pumping test designed to provide information on the hydraulic properties of the unconsolidated sediments for use in the detailed evaluation of remedial alternatives in the Feasibility Study. The information would also provide design data for the ground water pumping component of a ground water remedial action, if this alternative is selected for implementation. Details of the aquifer pumping test and the test results are described in the A-E QCSR for Aquifer Tests (RMT, In Preparation(b)), which also includes descriptions of in-situ permeability tests conducted at several of the wells.

Sampling and Lab Analysis

A comprehensive ground water sampling round was conducted, consisting of sample collection and water level measurements from the 34 previously existing wells and the 18 new wells. Water samples from two storm sewers which receive flow from the NIROP were also collected. Nine (9) rounds of ground water sampling have been conducted at the NIROP since October 1983.

All samples were analyzed by the U.S. Army Corps of Engineers Waterways Experiment Station laboratory in Vicksburg, Mississippi. Quality assurance samples were analyzed by the U.S. Army Corps of Engineers Missouri River Division laboratory in Omaha, Nebraska. Lab analysis results are presented in Section 5.3.4 and discussed in Section 5.3.5.

Soil Tests

Physical testing of soil samples collected during the installation of monitoring wells was performed by the RMT Soils Laboratory in Madison, Wisconsin. Three (3) samples from the deepest boring at each of the nine well installation locations were analyzed for grain size, Atterberg limits, and moisture content. A summary of the test results is included in the Appendix.

Bench-Scale Tests

Bench-scale tests of ground water samples collected from the pump discharge during the aquifer pumping test were conducted at the NIROP to evaluate the chemical characteristics of the ground water which might

affect the physical operation of remedial equipment, e.g., scaling or blinding due to precipitation of iron hydroxide or calcium carbonate. A description of the tests performed and a summary of the test results are included in Section 5.3.4.

2.1.3 Historical Description

A private airfield previously owned by Northern Pump Company existed near the NIROP for several years. The airfield was located north of the existing NIROP property. It was abandoned sometime in the 1970's. Two runways laid out in northeast-to-southwest and northwest-to-southeast directions extended from immediately north of the NIROP nearly to Interstate Highway 694. A hangar was located at the airfield. Information regarding previous aircraft maintenance and refueling operations which may have impacted ground water quality north of the NIROP has not been obtained.

(No other changes to the June 1987 RI Report.)

2.1.4 Other Factors

Planned Use

(No changes to the June 1987 RI Report.)

Conflicting or Missing Information

Based on the results of the field investigations conducted from November 1987 through February 1988, several information deficiencies identified in the June 1987 RI Report have been corrected, as noted below.

June 1987 RI Report	New Information
. Data regarding ground water quality in the deeper portions of the unconfined aquifer are lacking in some locations.	. Five (5) new wells were installed in the middle of the aquifer, and five (5) new wells were installed at the bottom of the aquifer. Ground water samples collected from each of these wells provided data regarding water quality in the deeper portions of the aquifer. The water quality data are discussed in Section 5.3.5 of this report.
. Ground water data for xylene are sparse in the immediate area of the pits/trenches.	. Ground water samples from each of the fifty-two (52) monitoring wells sampled in January and February 1988 were analyzed for total xylene. The lab analysis results are discussed in Section 5.3.5 of this report.
. There are no monitoring wells located downgradient of Hazardous Waste Storage Area C.	. A new monitoring well nest consisting of a shallow (well 21-S) and intermediate (2-I) depth well has been installed adjacent to Hazardous Waste Storage Area C.
. Current (storm sewer) sampling data would be useful to look at VOC loading to the Mississippi River.	. Two (2) storm sewers were sampled in January 1988. The samples were analyzed for the same constituents as the ground water samples collected during the same sampling round. The results of the water quality analyses are discussed in Section 4.1.3.

2.2 Nature and Extent of the Problem

Based on the results of the additional investigations conducted from November 1987 through February 1988, the findings and conclusions regarding the nature and extent of ground water contamination at the NIROP site have been re-evaluated. Information provided by the additional investigations allowed a more complete assessment of the site

geology; ground water flow system and ground water quality; locations of the highest residual VOC contamination near-surface in soil; and the potential contribution from off-site, upgradient sources of ground water contamination. The updated findings and conclusions are discussed in the individual sections of this report.

2.2.1 Special Waste Considerations

(No changes to the June 1987 RI Report.)

2.2.2 Effects of Contaminants from the Site

(No changes to the June 1987 RI Report.)

2.2.3 Near-Future Impacts of Site Conditions

For the past several years, the City of Minneapolis Water Works has been investigating the potential for aquifer development in the lands owned by the city adjacent to their water treatment facility. The goal of aquifer development is to supplement the water supply for the City of Minneapolis and surrounding communities, ideally on a daily basis and at least for emergency and back-up purposes. The desired capacity for this proposed system is from 10 to 40 MGD. The current water demand for the same target population is about 65 MGD.

The initial plan was to develop a shallow well field in the overburden alluvial aquifer near the water treatment plant and the Mississippi River, using the "Ranney" well system. The goal of this system was to draw a substantial amount of water from the Mississippi River. RMT has been informed by several sources that this plan has been

put on hold indefinitely. It is on hold because the aquifer does not appear to be able to supply the required capacity and because of the presence of TCE in the ground water.

The City of Minneapolis Water Works has contracted the United States Geologic Survey (USGS) to conduct a three-year evaluation of the Prairie du Chien/Jordan (PCJ) bedrock aquifer to determine the potential yield and the potential for contamination from the upper aquifer. The study is in its second year. At the end of the study, the USGS will have developed and calibrated a computer model for the upper and lower aquifer systems. At that time, the City of Minneapolis will evaluate the results and select a course of action, which may include the Ranney system, a PCJ well system on city land, or a PCJ well system at a distance from the city land.

The potential impact of ground water contaminants from the NIROP and other sources on the ground water quality downgradient of the NIROP will probably be a factor in the city's decision regarding location of their supplemental water supply system.

2.3 Investigation Summary

In June 1986, RMT, Inc., was retained by the USACE to complete the remedial investigation for the NIROP. Investigations conducted prior to June 1986 are summarized in the June 1987 RI Report.

In November 1986, RMT performed a comprehensive sampling round of the 34 existing ground water monitoring wells in the study area. Analytical results from this sampling round were included in the June 1987 RI Report.

From November 1987 through February 1988, RMT conducted additional investigations at the NIROP, as described in Section 2.1.2. The results, findings, and conclusions from these additional investigations are presented in this RI Addendum Report.

2.4 Overview of Report

This RI Addendum generally follows the format of the June 1987 RI Report. To highlight information obtained since the June 1987 RI Report was issued, primarily the results, findings, and conclusions based on the additional investigations conducted from November 1987 through February 1988 are presented in this addendum. However, specific comparisons to information from the June 1987 RI Report are presented in some instances. The June 1987 RI Report should be used in conjunction with this addendum to provide the complete results of the remedial investigation.

3. SITE FEATURES INVESTIGATION

(No changes to the June 1987 RI Report.)

4. HAZARDOUS SUBSTANCES INVESTIGATION

4.1 Hazardous Substance Types

4.1.1 Raw Materials

As of April 1987, one (1) underground tank was being used for storing Stoddard solvent. The tank is located on the north end and outside of the Boiler Room on the east side of the plant building (see Figure 2-2). It was installed in the 1950s, and has been used only for storing mineral spirits and Stoddard solvent for use in degreasing operations. This tank is currently in use.

The use of TCE at the NIROP was discontinued in the first quarter of 1987 (FMC, 1988). At that time, open-top degreaser units were either switched to a different solvent (1,1,1-trichloroethane), or the units were decommissioned. The above-ground solvent storage tank located on the east side of the plant (T2 on Figure 2-2) was also converted to 1,1,1-trichloroethane.

A series of management programs are currently in place at the NIROP to minimize the entry of hazardous materials into the plant sewers (FMC, 1988).

4.1.2 Industrial Processes

A representative of FMC Corporation reported that during 1985 and 1986, approximately 40 percent of the various production areas within the plant were relocated. Therefore, the production area locations shown on Figure 4-1 of the June 1987 RI Report (adapted from the 1983 Initial Assessment Study Report by Envirodyne) do not reflect current locations for all of the areas. The evolution of the plant building

structure and production area layout within the building envelope since construction of the NIROP was not studied as part of this investigation.

Records of spills or leaks of potentially hazardous materials were not kept prior to 1984.

Several degreaser units are located throughout the plant in concrete containment pits beneath the main plant floor. Past releases of solvent-contaminated liquids from these degreasers have been reported. The releases flowed into floor drains in the pits, or, in at least one instance, through a hole in the pit floor into the soil beneath the pit. The current condition of the degreaser pits and associated water sumps is unknown. Therefore, the possibility that these units may be current potential sources of solvent releases to plant sewers or subsoil cannot be determined.

4.1.3 Waste Storage, Processing, and Disposal Practices

Hazardous Waste Storage Areas.

(No changes to the June 1987 RI Report.)

PCB Storage.

(No changes to the June 1987 RI Report.)

On-Site Waste Disposal

The presence of residual VOC concentrations in the soil in the vicinity of former disposal trenches #3 and #6, and in other portions of the former waste disposal area, was confirmed by the results of the on-

site soil pore gas survey conducted in November 1987. The results of the soil pore gas survey are summarized in Section 4.1.4.

Sewer Systems.

Two storm sewers which discharge flow from the NIROP to the Mississippi River were sampled in January 1988. The approximate location of these sewers at the NIROP is shown on Figure 4-4. Analytical results of the grab samples collected in January 1988 from the sewers tributary to NPDES Outfall #20200 (the "north" storm sewer outfall) and NPDES Outfall #20300 (the "south" storm sewer outfall) are presented in Table 4-1. The only previous storm sewer sampling results available are from samples collected in March 1981 (see Table 4-6 in the June 1987 RI Report).

The 42-inch storm sewer outfall located to the north of NPDES Outfall #20200 (see Figure 4-4) normally has no discharge to the river. This sewer receives only storm water runoff. Therefore, the 42-inch storm sewer was not included in the January 1988 sampling round.

Two of the metals analyzed, dissolved barium and manganese, were detected at approximately 0.1 and 0.3 mg/l, respectively, in both of the 1988 sewer samples. A trace amount of dissolved zinc was also found in the north storm sewer. Barium and manganese were not analyzed in the March 1981 samples. Zinc was detected at trace levels in March 1981 in both sewers.

The only VOC detected in January 1988 samples was methylene chloride (a common laboratory contaminant) at 0.026 mg/l in the north storm sewer. Methylene chloride was not detected in March 1981. The

TABLE 4-1
RESULTS OF JANUARY 1988 STORM SEWER
SAMPLE ANALYSES

	NPDES #20200 North Storm Sewer	NPDES #20300 South Storm Sewer
1,1,1-Trichloroethane	< 0.005	< 0.005
1,1-Dichloroethane	< 0.005	< 0.005
1,1-Dichloroethylene	< 0.005	< 0.005
Barium, Dissolved	0.116	0.123
Benzene	< 0.005	< 0.005
Chloroform	< 0.005	< 0.005
Cis-1,2-Dichloroethylene	< 0.005	< 0.005
Ethyl Benzene	< 0.005	< 0.005
Manganese, Dissolved	0.314	0.327
Methylene Chloride	0.026	< 0.005
Selenium, Dissolved	< 0.005	< 0.005
Tetrachloroethylene	< 0.005	< 0.005
Toluene	< 0.005	< 0.005
Total Xylenes	< 0.005	< 0.005
Trans 1,2-Dichloroethylene	< 0.005	< 0.005
Trichloroethylene	< 0.005	< 0.005
Trichlorofluoromethane	< 0.005	< 0.005
Vinyl Chloride	< 0.01	< 0.01
Zinc, Dissolved	0.032	< 0.03

All values are in mg/l.

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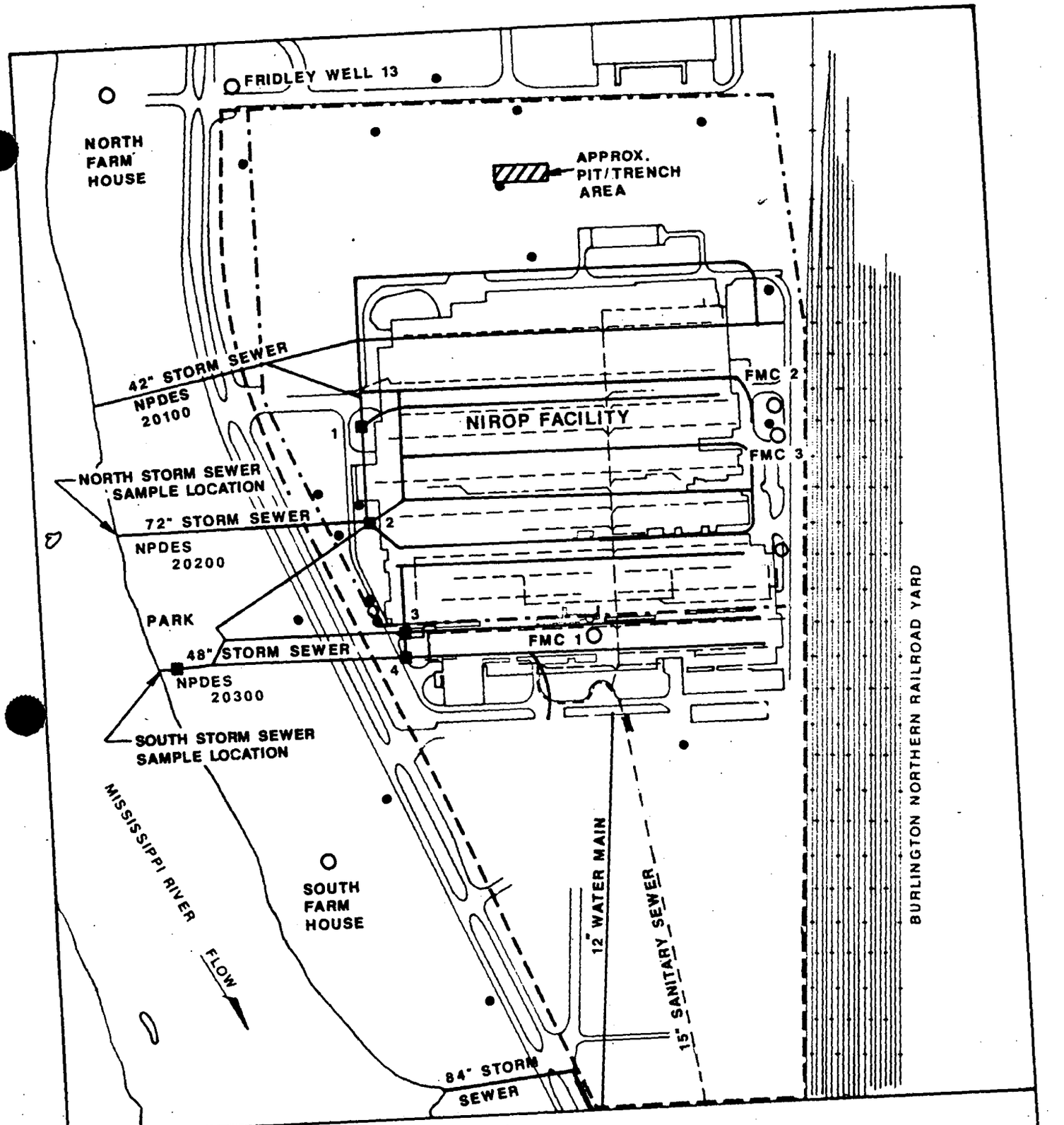

LEGEND

- NIROP PROPERTY BOUNDRY
- FMC FACILITY BOUNDARY
- SANITARY SEWER
- STORM SEWER
- NIROP STUDY AREA MONITORING WELL OR WELL NEST LOCATION.
- PRODUCTION WELL (EXISTING OR FORMER)
- MDH STORM SEWER SAMPLE POINT

APPROXIMATE SANITARY AND STORM SEWER SYSTEMS AT NIROP

ADAPTED FROM FMC DRAWING 4252 (1984), ENVIRODYNE (1983) AND HICKOK (1981)

N

0 500

1" = 500'

RMT

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FIGURE 4-4

March 1981 results also showed that, of several VOCs analyzed, only acetone was detected at a low concentration in the south storm sewer. However, the north storm sewer contained 0.40 mg/l TCE, 0.3 mg/l acetone, 0.1 mg/l isopropyl alcohol, and 0.3 mg/l MEK. The analyses of the January 1988 samples suggest that the sources of water discharged to the storm sewers during regular plant operations in winter weather conditions do not currently create a potential for release of significant levels of hazardous constituents to the shallow ground water flow system beneath the NIROP, or to the Mississippi River.

Industrial Wastewater Pretreatment Plant.

(No changes to the June 1987 RI Report.)

4.1.4 Soil Pore Gas Survey

In November 1987, RMT conducted a soil pore gas survey at the NIROP. The purpose of the soil gas sampling program was to screen and identify areas of shallow, VOC-contaminated soil that may be contributing to the ground water contamination problem. Once the soils were identified, the results were used for the following purposes:

1. Assist in selecting final locations for the ground water monitoring wells installed in December 1987 through February 1988.

2. Locate contaminated soil that may be a continuing source of VOC contamination of ground water so that further analysis, including soil borings and laboratory analysis of the soils, can be done if desired.

3. Identify areas that may require soil remediation.

A complete description of the field sampling and analysis methods, QA/QC procedures, and results of the soil pore gas survey are included in the A-E Quality Control Summary Report for the Soil Gas Survey issued in February 1988 (RMT, 1988a).

The soil gas sampling locations and the results of field gas chromatograph (GC) analyses of the gas samples are shown on Figures 4-3A and 4-3B. A summary of the key results, findings, and conclusions is presented below.

Methodology. Two methods were used for collecting soil gas samples for analysis by the field GC: a stainless steel tube (probe) driven into the ground, through which a gas sample was drawn by applying a vacuum to the probe; and headspace from a soil sample collected by hand-augering into the ground. Both sample collection methods gave comparable results from GC analysis of the samples. Both methods also gave fairly reproducible results. The mean percent difference between replicates was 19.7 percent for headspace samples and 6.1 percent for pore gas samples.

Results. The "areas" referred to below are shown on Figure 4-3A.

Area I (Former TCE Tank Area West of Plant) and Background

- All samples had relatively low VOC concentrations in soil gas. The highest concentration was 1.9 ppm at sample point SG-8.

Area II (Trench Disposal and Storage Area North of Plant)

- Three areas of elevated soil gas concentrations were found as follows:
  - Near the former disposal trench area.
  - Near the newly installed water main at the north edge of the property.
  - Near the decontamination pad constructed for the drum and soil removal operations in 1983-84.

BURLINGTON NORTHERN RAILROAD (BNR)

AREA III

DECONTAMINATION PAD

AREA II

SEE FIGURE 4-3B FOR ENLARGEMENT

NEW BUILDING

WELL

NIROP FACILITY

AREA I

MINNEAPOLIS WATERWORKS

MISSISSIPPI RIVER FLOW

BACKGROUND SAMPLE AREA

LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- 800 — EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- x 865.1 — EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- (58) — INTENDED LOCATION, NOT SAMPLED
- 8● — SITE NUMBER
- (3) — CONCENTRATION OF TCE AND DCE IN PPM
- AREA BOUNDARY LINE
- ENLARGEMENT BOUNDARY LINE

SCALE: 1"=200'

0 200 400 600 FEET

NO.	BY	DATE	REVISION	APP'D.
3.				
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PROJECT :
ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE :
SOIL GAS SAMPLING LOCATIONS
AND TCE + DCE CONCENTRATIONS

DRAWN BY: JM	SCALE: 1"=200'	PROJ. NO. 1332.53
CHECKED BY: KEB		DRWG. NO.
APPROVED BY: TEG	DATE PRINTED: MAR 29 1996	SHEET FIGURE 4-3A
DATE: 7/6/88		

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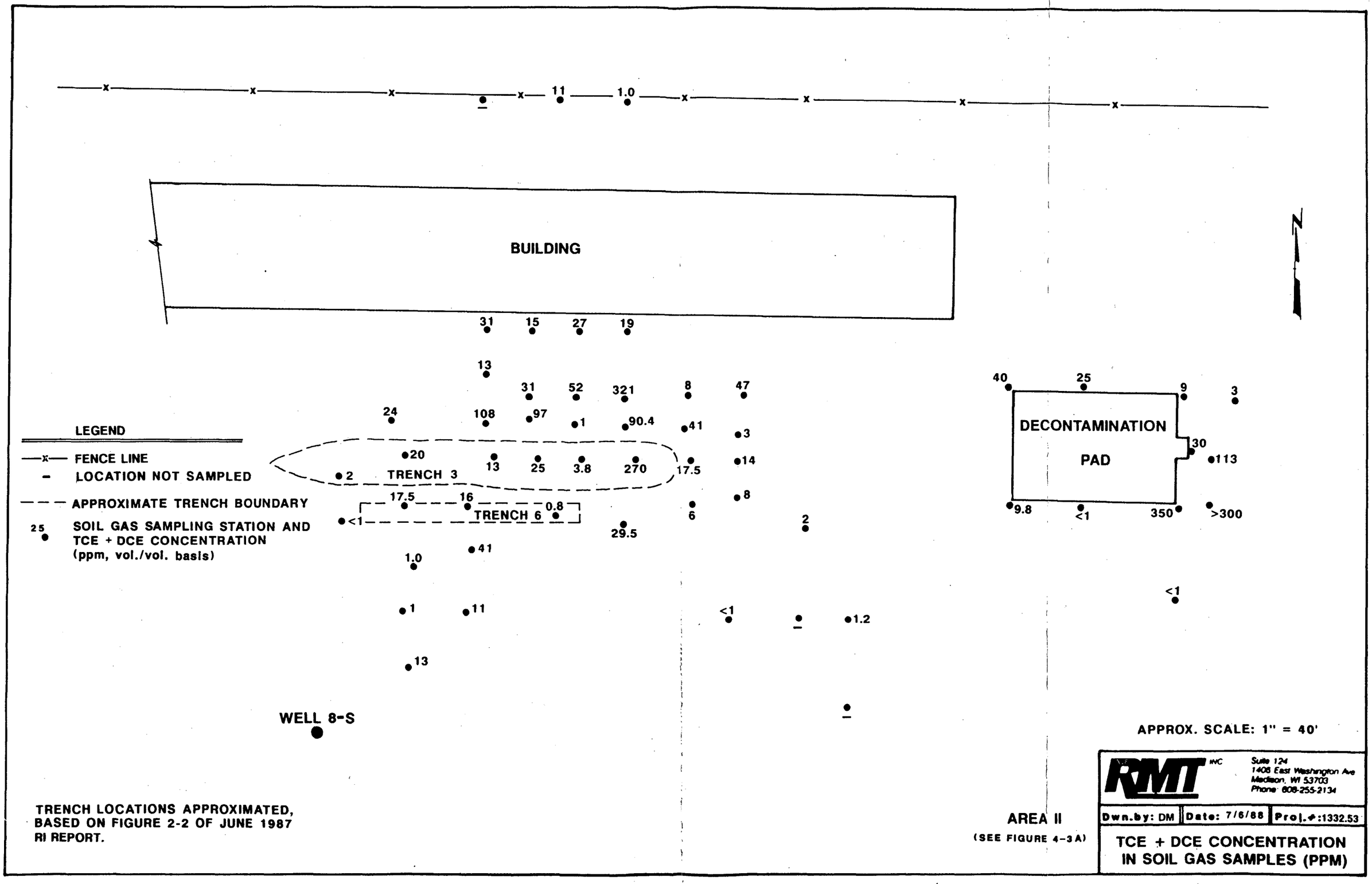


JUL 7 1990

FIGURE 4-3B

- Other sections of Area II had low soil gas concentrations.

- Areas of the highest soil gas concentrations (> 100 ppm TCE plus DCE) were south and east of the decontamination pad and in the vicinity of Trench 3.

- Concentrations decreased with increasing distance away from Trench 3, in the trench area.

- Trichloroethylene was the predominant soil gas contaminant in most areas. However, in the areas of highest contamination, cis-dichloroethylene was generally present in the highest concentration. Trans-dichloroethylene was generally present at low concentrations, if present at all, and was above 10 ppm in only two samples.

- Other unidentified compounds were detected at three locations: two next to the decontamination pad and one near Trench 3.

Area III (Existing TCA Tank Area East of Plant)

- Soil gas concentrations were generally low in Area III samples. The two sample points at the west edge of the TCA tank both had concentrations of 3 ppm. The other five samples had concentrations less than 1 ppm.

Conclusions

- No significant chlorinated ethylene contamination of near-surface soils was found in Area I, suggesting that possible historic surface spills in this area are probably not currently contributing to ground water contamination.

- No significant chlorinated ethylene contamination of near-surface soil was found in Area III. The high TCE concentrations that have been found in monitoring well 9-S do not appear to have originated near the ground surface adjacent to well 9-S.

- A fairly large portion of Area II was found to have near-surface soil contamination of chlorinated ethylenes. The following three contiguous areas had the greatest contamination levels:

  - Former disposal trench area
  - Decontamination pad area
  - New water main trench area (north edge of Area II)

  The highest concentrations of chlorinated ethylenes were in the immediate vicinity of Trench 3 and near the decontamination pad.

- TCE was the predominant contaminant except in the most contaminated areas, where cis-DCE was at higher concentrations. The trans-DCE isomer was a small portion of the total chlorinated ethylenes in all but two of the contaminated sites. Both the cis- and trans-DCE isomers are breakdown products of TCE.

- Current locations of the ground water monitoring wells are sufficient for monitoring the impact of the identified surface soil contamination areas.

4.2 Waste Component Characteristics and Behavior

4.2.1 Introduction

During the November 1986 sampling round of 34 monitoring wells, selenium was detected in two wells: 0.076 mg/l (total) and 0.049 mg/l (dissolved) in well 9-S; and 0.008 mg/l (dissolved) in well 14-S. During the January 1988 sampling round of 52 monitoring wells, selenium was detected in only one well: 0.08 mg/l (dissolved) in well 9-S. Other constituents discussed in Section 4.2 of the June 1987 RI Report which were detected in at least one well during the January 1988 sampling round are as follows:

Constituent	Well No.	Concentration, mg/l
Toluene	5-I	0.057
	AT-1	0.0074
Ethyl benzene	AT-1	0.004*
Total xylenes	5-I	0.036
	AT-1	0.063

*Estimated concentration. Detected as present but below the instrument detection limit.

Due to the presence of these hazardous constituents in the ground water, the discussion of the behavior and toxicology of the VOCs and selenium presented in the June 1987 RI Report remains appropriate to the investigations at the NIROP.

4.2.2 Behavior of Individual Compounds

(No changes to the June 1987 RI Report.)

4.2.3 Toxicology of Individual Compounds

(No changes to the June 1987 RI Report.)

5. SUBSURFACE INVESTIGATIONS

The U.S. Army Corps of Engineers (USACE) installed 33 monitoring wells at the NIROP site in three phases in May 1983, May 1985, and January 1986. The recent, additional investigation added several new borings and wells, partly to improve geologic definition, but predominantly to broaden the ground water monitoring network. Wells have been designated with suffixes to identify the stratigraphic position of the monitoring well intakes:

S - Shallow (water table) well in the unconsolidated unit.

I - Intermediate piezometer in the unconsolidated unit.

D - Deep well piezometer in the unconsolidated unit.

PC - Piezometer in the Prairie du Chien Formation.

One new bedrock piezometer, 5-PC, was added northeast of the facility as part of an upgradient well nest. Several wells were added in the unconsolidated unit to improve the horizontal and vertical definition of contaminant occurrence.

This section discusses those findings which are new and, to some extent, reiterates pertinent facts from previous investigations, especially those which appear to have a bearing on the evaluation of the migration of contaminants.

5.1 Soils

(No changes to the June 1987 RI Report.)

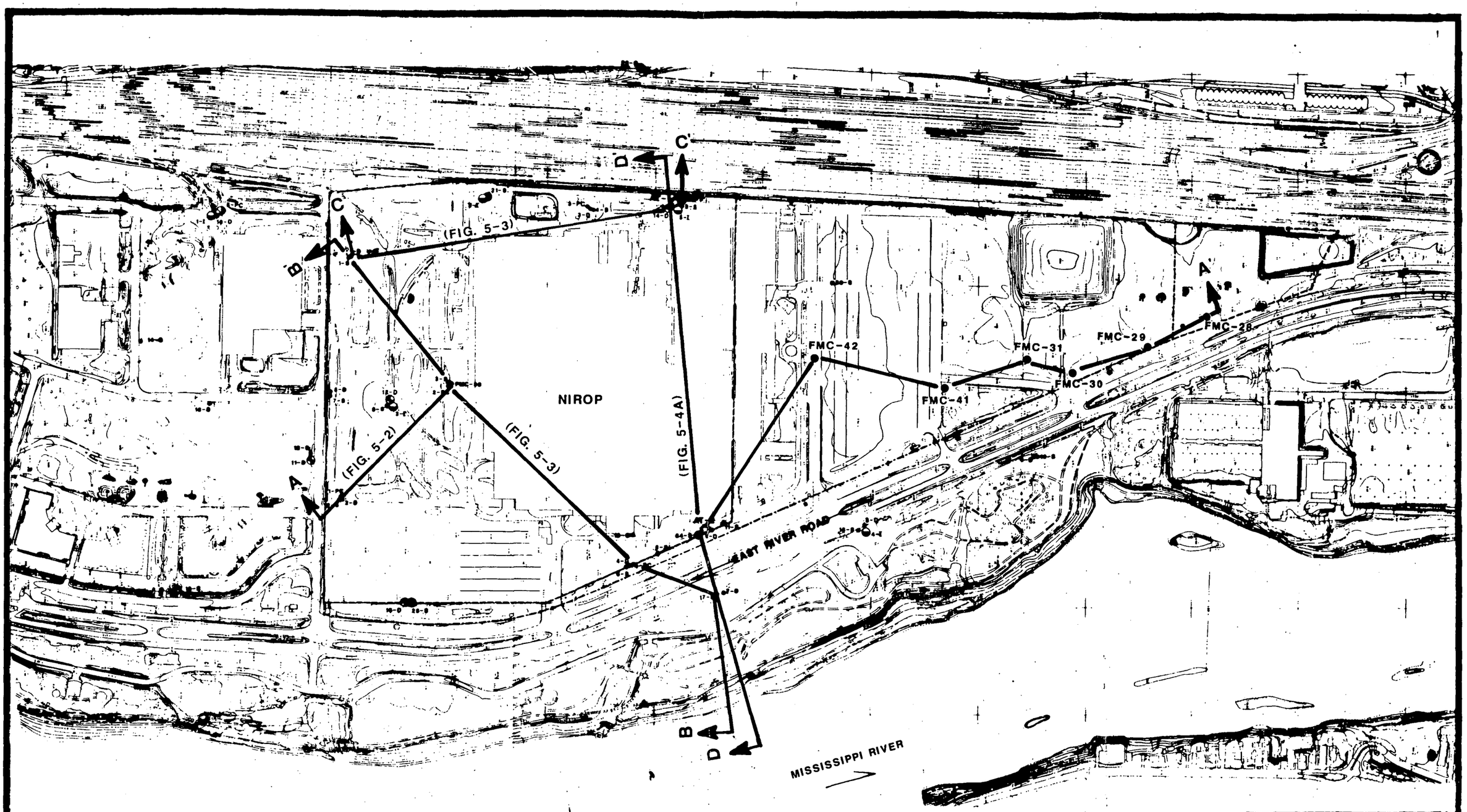
5.2 Geology

Up to 150 feet of predominantly silty sand unconsolidated deposits overlie bedrock beneath the NIROP. The facility lies on an alluvial terrace adjacent to the Mississippi River. These deposits are illustrated on the geologic cross sections from the June 1987 RI Report and included here as Figures 5-2 and 5-3. Figure 5-1 shows the location of these cross-sections.

Previous studies found a fairly continuous layer of clayey glacial till to the south of the NIROP beneath the FMC property. This layer forms an aquitard and has a significant impact on ground water flow and hazardous substance migration (Papadopolus, 1984; Connestoga-Rovers, 1985). Beneath the NIROP, the finer grained layer appeared to pinch out, and only discontinuous lenses of silty and clayey soil were found. New boring logs and soils data were compared to previous geologic interpretations to correlate the data and refine our understanding of subsurface conditions.

Integrating the new data, it appears that there may be a silty sand to sandy clay glacial till which extends beneath much of the NIROP. While its consistency varies, and was logged differently over time, a silty to clayey sand glacial till appears to be present between approximate elevations of 760 to 780 feet (approximate grade elevation around the NIROP is 835 feet). This correlates well with the clayey till identified to the south.

The data also suggest that this till is not continuous under the NIROP. In several borings, it appears that the sandy and gravelly soils are interconnected vertically. Figure 5-4B illustrates the approximate



LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- WATER TABLE OBSERVATION WELL IN UNCONSOLIDATED SEDIMENTS
- INTERMEDIATE DEPTH PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- DEEP PIEZOMETERS IN UNCONSOLIDATED SEDIMENTS
- BEDROCK PIEZOMETERS
- PRODUCTION WELLS
- STORM SEWER OUTFALL SAMPLING LOCATIONS
- APPROXIMATE NIROP PROPERTY LINE
- APPROXIMATE FMC PROPERTY LINE
- APPROXIMATE BNR PROPERTY LINE
- CROSS SECTION LOCATION

NOTE: ● MONITORING WELLS INSTALLED PRIOR TO DECEMBER, 1987 ○ MONITORING WELLS INSTALLED DECEMBER, 1987 THROUGH FEBRUARY, 1988

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3				
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PROJECT: ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

DWG TITLE: GEOLOGIC CROSS SECTION LOCATIONS

DRAWN BY
CHECKED BY
APPROVED BY
DATE 7/6/88

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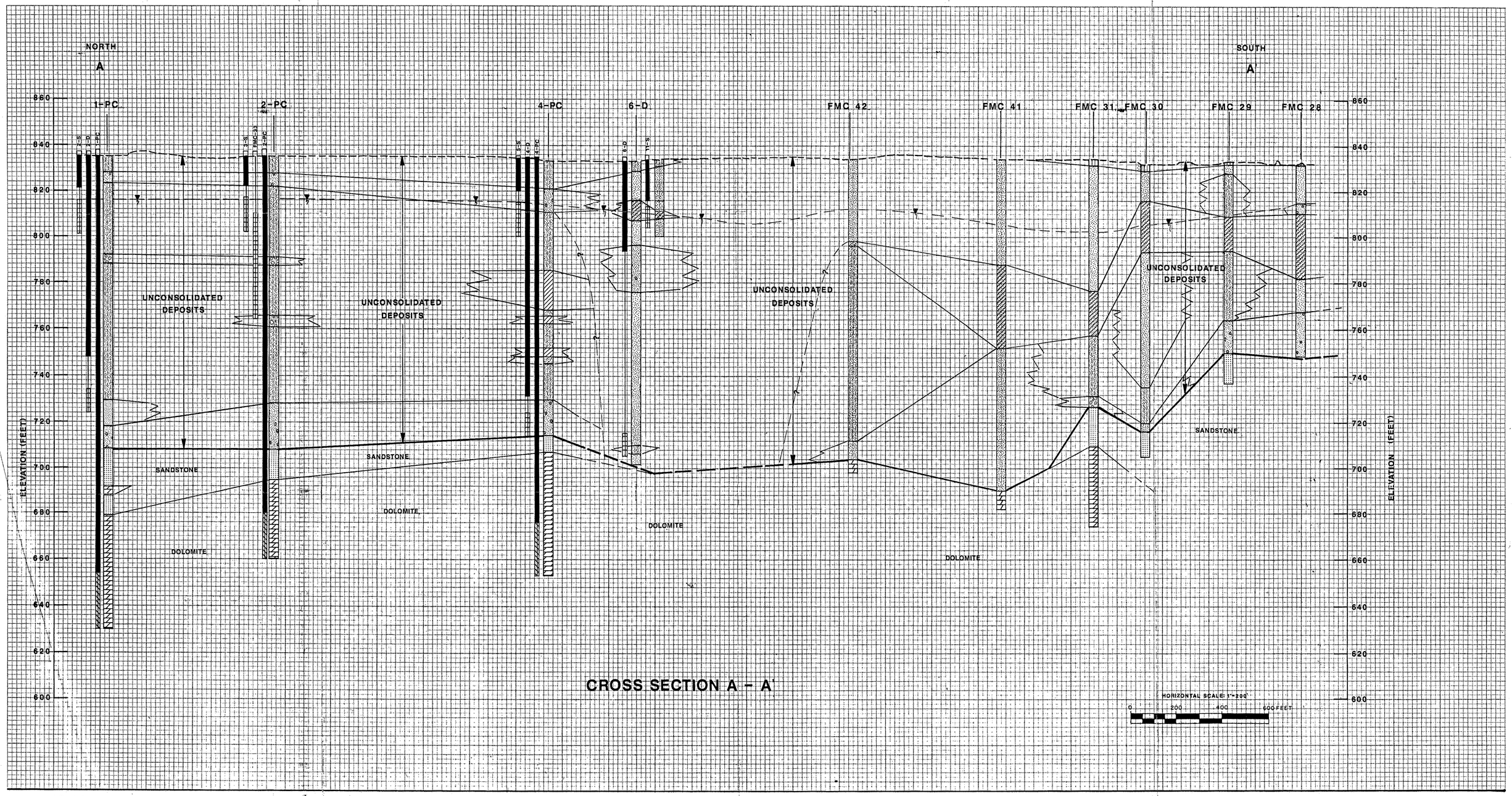

CROSS SECTION A - A'

LEGEND

- EXISTING GROUND SURFACE
- BEDROCK SURFACE
- STRATIGRAPHIC BOUNDARY
- INFERRED STRATIGRAPHIC BOUNDARY
- WATER TABLE (JULY 22, 1986)
- WELL STICKUP ABOVE GROUND
- LOCATIONS OF WELL SEALS
- LOCATION OF WELL SCREEN
- OPEN BOREHOLE

SAND (SP)	SILT (ML)
GRAVELLY SAND (SP)	GRAVELLY SILT (ML)
SILTY SAND (SM)	SANDY SILT (ML)
CLAYEY SAND (SC)	CLAYEY SILT (ML)
CLAY (CL)	GRAVEL (GP)
GRAVELLY CLAY (CL)	SANDY GRAVEL (GW)
SILTY CLAY (CL)	SILTY GRAVEL (GM)
SANDY CLAY (CL)	CLAYEY GRAVEL (GC)
TOPSOIL	
FILL-MANMADE	SANDSTONE
COBBLES & BOULDERS	LIMESTONE
PEAT OR MUCK	DOLOMITE
CRYSTALLINE ROCK	SHALE

NOTES:

- NIROP BORING LOCATIONS ARE APPROXIMATE, BASED ON FIELD CHECKS AGAINST CULTURAL FEATURES.
- LOCATIONS AND GEOLOGIC DATA FOR FMC BORINGS FROM PAPADOPULOS (1983 AND 1984).
- SUFFIXES:
  - PC-MONITORING WELL COMPLETED IN THE PRARIE DU CHIEN FORMATION
  - D-MONITORING WELL COMPLETED IN THE BASE OF UNCONFINED AQUIFER IN THE UNCONSOLIDATED DEPOSITS
  - S-MONITORING WELL COMPLETED NEAR THE WATER TABLE IN THE UNCONFINED AQUIFER IN THE UNCONSOLIDATED DEPOSITS
- STRATIGRAPHIC INTERPRETATIONS HAVE NOT BEEN UPDATED FROM THE JUNE 1987 RI ON SECTIONS A-A', B-B' AND C-C'

NOTE:
ALL GEOLOGIC INFORMATION SHOWN ON THIS FIGURE IS A REPRESENTATION OF PROBABLE CONDITIONS EXISTING IN THE FIELD. ACTUAL CONDITIONS BETWEEN BORINGS MAY DIFFER FROM THIS REPRESENTATION.

NO.	BY	DATE	REVISION	APP'D.
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PROJECT :
ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE :
GEOLOGIC CROSS SECTION A-A'

DRAWN BY: MDZ	SCALE : HORIZ. 1" = 200' VERT. 1" = 20'	PROJ . NO . 1332.53
CHECKED BY: KEB		DRWG . NO . *
APPROVED BY: TEG	DATE PRINTED : JUL 07 1989	FIGURE 5-2
DATE : 7/6/88		

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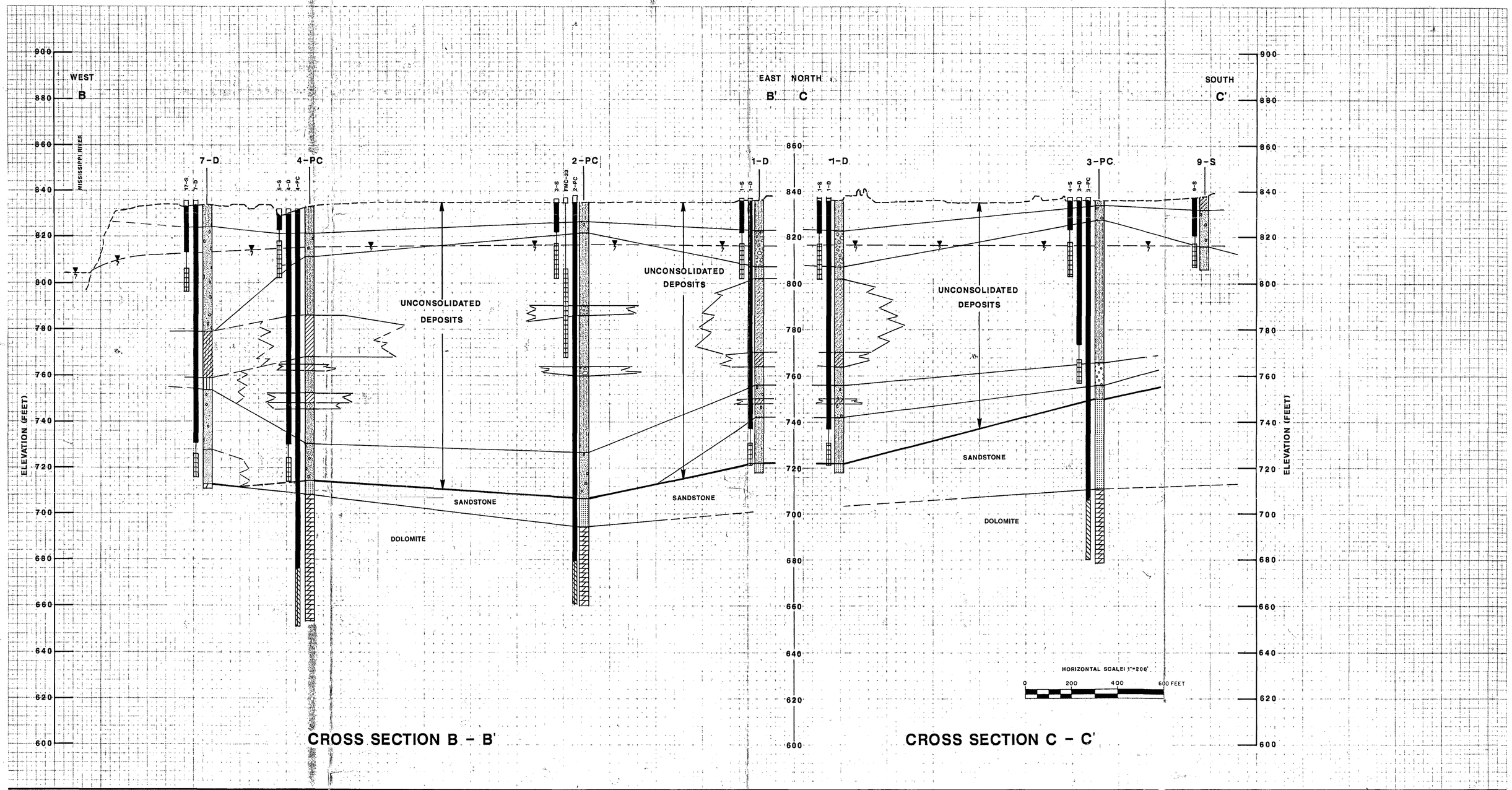

LEGEND

- EXISTING GROUND SURFACE
- BEDROCK SURFACE
- STRATIGRAPHIC BOUNDARY
- INFERRED STRATIGRAPHIC BOUNDARY
- WATER TABLE (JULY 22, 1986)
- WELL STICKUP ABOVE GROUND
- LOCATIONS OF WELL SEALS
- LOCATION OF WELL SCREEN
- OPEN BOREHOLE

SAND (SP)	SILT (ML)
GRAVELLY SAND (SP)	GRAVELLY SILT (ML)
SILTY SAND (SM)	SANDY SILT (ML)
CLAYEY SAND (SC)	CLAYEY SILT (ML)
CLAY (CL)	GRAVEL (GP)
GRAVELLY CLAY (CL)	SANDY GRAVEL (GW)
SILTY CLAY (CL)	SILTY GRAVEL (GM)
SANDY CLAY (CL)	CLAYEY GRAVEL (GC)
TOPSOIL	
FILL-MANMADE	SANDSTONE
COBBLES & BOULDERS	LIMESTONE
PEAT OR MUCK	DOLOMITE
CRYSTALLINE ROCK	SHALE

NOTES:

- NIROP BORING LOCATIONS ARE APPROXIMATE, BASED ON FIELD CHECKS AGAINST CULTURAL FEATURES.
- LOCATIONS AND GEOLOGIC DATA FOR FMC BORINGS FROM PAPADOPULOS (1983 AND 1984).
- SUFFIXES:
  - PC-MONITORING WELL COMPLETED IN THE PRARIE DU CHIEN FORMATION
  - D-MONITORING WELL COMPLETED IN THE BASE OF UNCONFINED AQUIFER IN THE UNCONSOLIDATED DEPOSITS
  - S-MONITORING WELL COMPLETED NEAR THE WATER TABLE IN THE UNCONFINED AQUIFER IN THE UNCONSOLIDATED DEPOSITS
- STRATIGRAPHIC INTERPRETATIONS HAVE NOT BEEN UPDATED FROM THE JUNE 1987 RI ON SECTIONS A-A', B-B' AND C-C'.

NOTE:
ALL GEOLOGIC INFORMATION SHOWN ON THIS FIGURE IS A REPRESENTATION OF PROBABLE CONDITIONS EXISTING IN THE FIELD. ACTUAL CONDITIONS BETWEEN BORINGS MAY DIFFER FROM THIS REPRESENTATION.

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PROJECT:
ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE:
GEOLOGIC CROSS SECTIONS
B-B' AND C-C'

DRAWN BY: JMM	SCALE: HORIZ. 1" = 200' VERT. 1" = 20'	PROJ. NO. 1332.53
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APPROVED BY: TEG	DATE PRINTED: JUL 07 1988	FIGURE 5-3
DATE: 7/6/88		

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area where it appears that an old river channel may have cut through the till, leaving alluvial sands. A new east-west cross section (D-D', Figure 5-4A) was prepared to illustrate the geologic interpretation beneath the building area, in the apparent direction of the major ground water pathway. It shows that there is more than one soil layer which could impede the vertical migration of contaminants in the vicinity of the eastern edge of the plant where contamination has been found. While there is considerable uncertainty regarding geology beneath the building, geologic data for the north and south-southwest areas as well as the distribution of chemicals in the ground water leads to this interpretation.

5.3 Ground Water

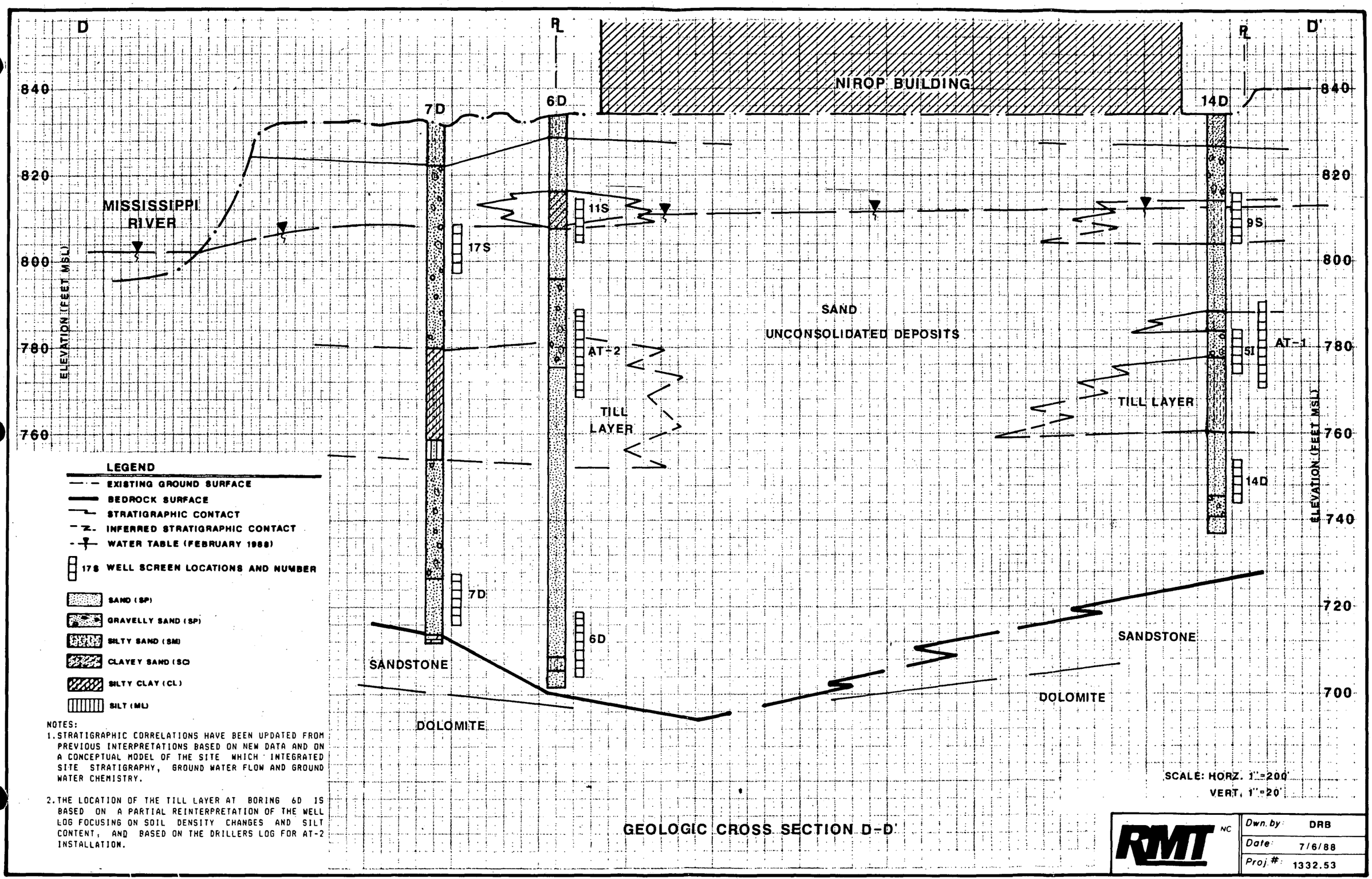
5.3.1 Ground Water Occurrence

(No changes to the June 1987 RI Report.)

5.3.2 Ground Water Flow

The following ground water wells were installed as part of the additional investigation to supplement the previously installed well network:

- Five "water table observation wells" (21-S through 25-S) installed in the shallow unconsolidated sediments, for a total of 25 water table wells.
- Five "intermediate depth piezometers" (1-I through 5-I) installed in intermediate-depth unconsolidated sediments, for a total of five intermediate piezometers.
- Two "production test wells" (AT-1 and AT-2) installed in intermediate-depth unconsolidated sediments, for a total of three production wells (including FMC-33), which also function as monitoring wells.



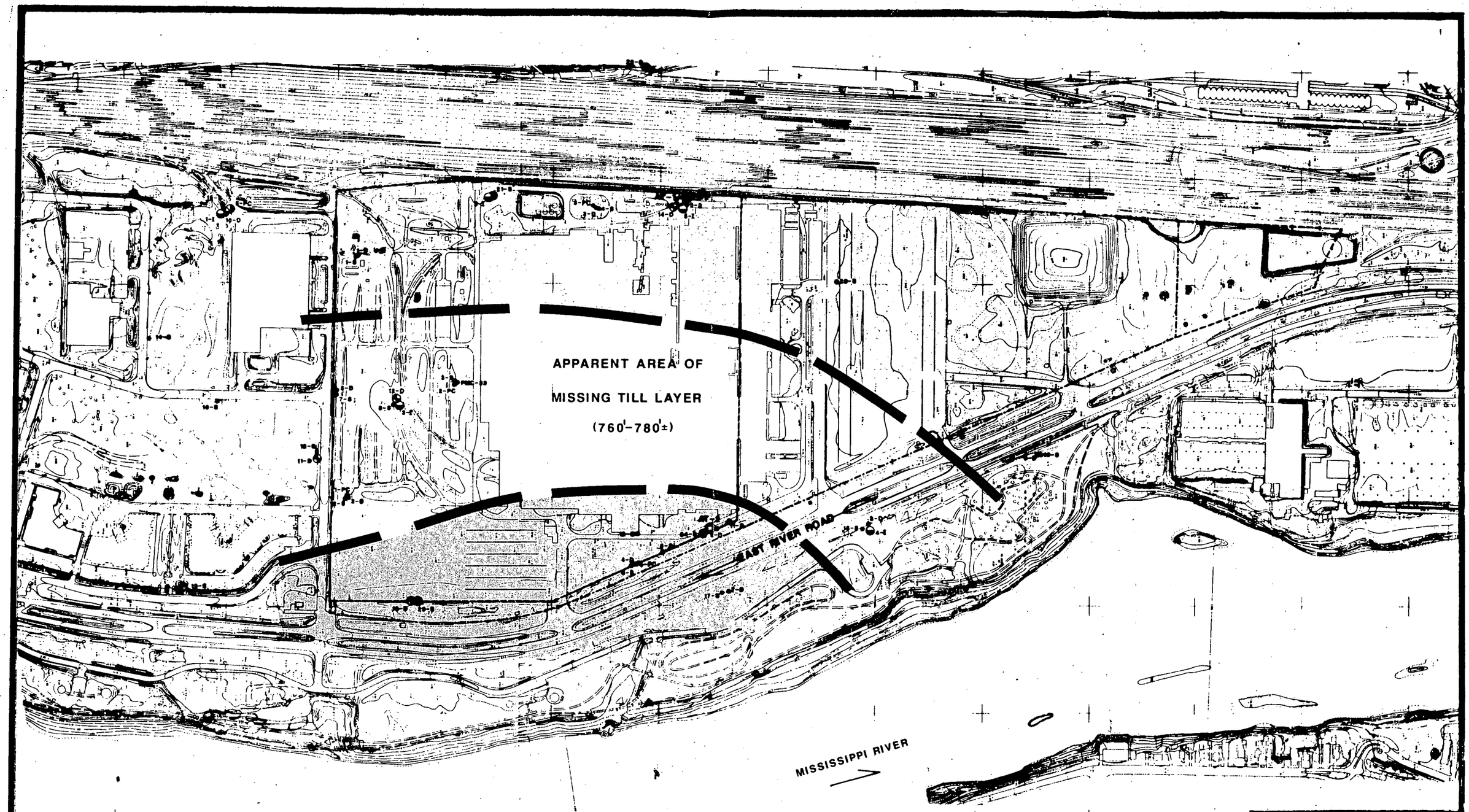
NOTES:

1. STRATIGRAPHIC CORRELATIONS HAVE BEEN UPDATED FROM PREVIOUS INTERPRETATIONS BASED ON NEW DATA AND ON A CONCEPTUAL MODEL OF THE SITE WHICH INTEGRATED SITE STRATIGRAPHY, GROUND WATER FLOW AND GROUND WATER CHEMISTRY.

2. THE LOCATION OF THE TILL LAYER AT BORING 6D IS BASED ON A PARTIAL REINTERPRETATION OF THE WELL LOG FOCUSING ON SOIL DENSITY CHANGES AND SILT CONTENT, AND BASED ON THE DRILLERS LOG FOR AT-2 INSTALLATION.

GEOLOGIC CROSS SECTION D-D'

FIGURE 5-4A



LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- WATER TABLE OBSERVATION WELL IN UNCONSOLIDATED SEDIMENTS
- INTERMEDIATE DEPTH PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- DEEP PIEZOMETERS IN UNCONSOLIDATED SEDIMENTS
- BEDROCK PIEZOMETERS
- PRODUCTION WELLS
- STORM SEWER OUTFALL SAMPLING LOCATIONS
- APPROXIMATE HIROP PROPERTY LINE
- APPROXIMATE FMC PROPERTY LINE
- APPROXIMATE BNR PROPERTY LINE
- ESTIMATED EXTENT OF SILTY SAND TO SANDY CLAY GLACIAL TILL LAYER

NOTE: ● MONITORING WELLS INSTALLED PRIOR TO DECEMBER, 1987 ○ MONITORING WELLS INSTALLED DECEMBER, 1987 THROUGH FEBRUARY, 1988

NO	BY	DATE	REVISION	APP'D
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PROJECT: ADDITIONAL REMEDIAL INVESTIGATIONS
COE-HIROP FRIDLEY, MINNESOTA

SHEET TITLE: EXTENT OF INTERMEDIATE TILL

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APPROVED BY:
DATE: 7/6/88
SCALE:
DATE PRINTED:
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SHEET

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- Five "deep piezometers" (10-D through 14-D) installed at the base of the unconsolidated sediments, for a total of 14 deep piezometers.

- One "bedrock piezometer" (5-PC) installed in the Prairie du Chien dolomite, for a total of five bedrock piezometers.

Measurements from all 52 wells comprise the data base from which the following observations were made:

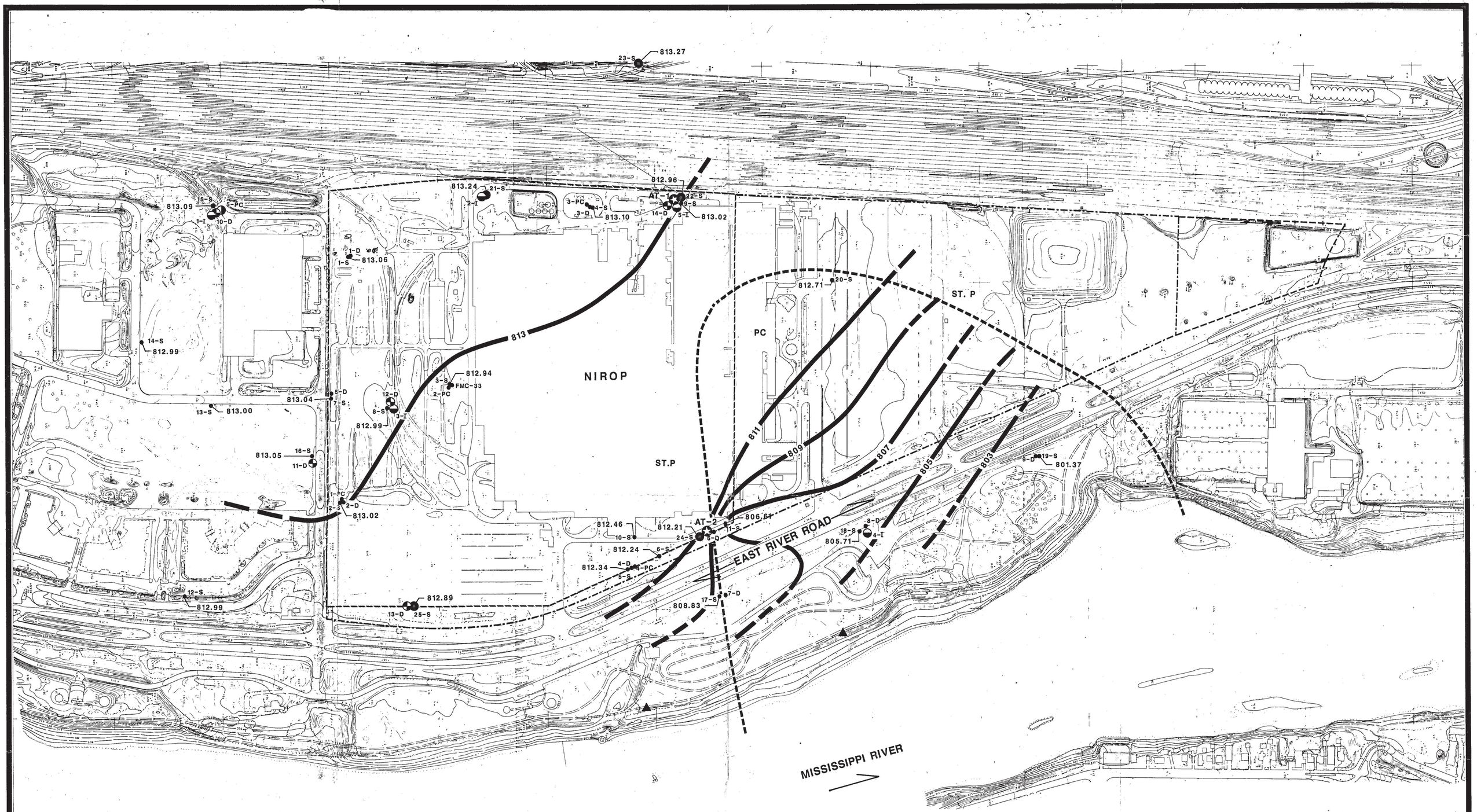
Shallow Unconsolidated Sediments

- Water levels in the shallow unconsolidated sediments (Figure 5-5) were approximately 3 feet lower than reported in the June 1987 RI Report, which presented results of water level measurements made in July 1986. Ground water flow direction is generally from the northeast to the southwest across the NIROP, as previously reported. However, as shown on Figure 5-5, the water table measurements made in February 1988 indicate a flow component to the west in the northern portion of the NIROP property.

- In-situ permeability tests were conducted on five water table observation wells, yielding a hydraulic conductivity range of 16 to more than 540 ft/day, with a geometric mean of at least 94 ft/day and a median value of 79 ft/day. This is higher than the median value of 65 ft/day used in calculations in the June 1987 RI Report.

- Horizontal ground water gradients for the shallow unconsolidated sediments were similar to those calculated for the June 1987 RI Report. Gradients were very flat over most of the NIROP, ranging from 0.0001 to 0.0017 ft/ft. The gradient steepened to 0.067 ft/ft in the extreme southwest corner of the NIROP near well AT-2, steeper than the 0.014 ft/ft previously calculated for this region. Horizontal gradients south-southwest of the NIROP were estimated at 0.0078 ft/ft.

- Ground water velocities in the shallow unconsolidated sediments range from approximately 11 ft/yr northeast of the NIROP, to more than 7,600 ft/yr in the extreme southwest corner of the NIROP. One to two hundred feet per year is probably representative of the NIROP as a whole. This compares to a velocity range of 40 to 1,100 ft/yr cited in the June 1987 RI Report.



LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- 800 — EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- x 865.1 — EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- WATER TABLE OBSERVATION WELL IN UNCONSOLIDATED SEDIMENTS
- INTERMEDIATE DEPTH PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- DEEP PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- BEDROCK PIEZOMETER
- PRODUCTION WELL
- STORM SEWER OUTFALL SAMPLING LOCATION
- APPROXIMATE NIROP PROPERTY LINE
- APPROXIMATE FMC PROPERTY LINE
- APPROXIMATE BNR PROPERTY LINE
- WATER TABLE SURFACE (FT ABOVE MSL)
- CONTACT BETWEEN ST. PETER AND PRAIRIE du CHIEN FORMATIONS
- ST.P — ST. PETER SANDSTONE
- PC — PRAIRIE du CHIEN DOLOMITE

SCALE: 1" = 200'

0 200 400 600 FEET

NOTE: ● MONITORING WELLS INSTALLED PRIOR TO DECEMBER, 1987 ○ MONITORING WELLS INSTALLED DECEMBER, 1987 THROUGH FEBRUARY, 1988

NO.	BY	DATE	REVISION	APP'D.
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PROJECT :
ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE :
WATER TABLE IN UNCONSOLIDATED SEDIMENTS
FEBRUARY 1988

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CHECKED BY: KEB		DRWG . NO .
APPROVED BY: TBS	DATE PRINTED : MAR 29 1996	SHEET FIGURE 5-5
DATE : 7/6/88		

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Deep Unconsolidated Sediments

- The piezometric surface of the deep unconsolidated sediments (Figure 5-6) was 2 to 3 feet lower than reported in the June 1987 RI Report, a decrease similar to the shallow zone. Ground water flow direction is generally from the northeast to the southwest across the NIROP, as concluded in the June 1987 RI Report.

- In-situ permeability tests were conducted on two deep piezometers, yielding a hydraulic conductivity range of 0.87 to 28 ft/day, with a geometric mean of approximately 5 ft/day and a median value of 14 ft/day. This is substantially lower than the median value of 65 ft/day used in calculations in the June 1987 RI Report.

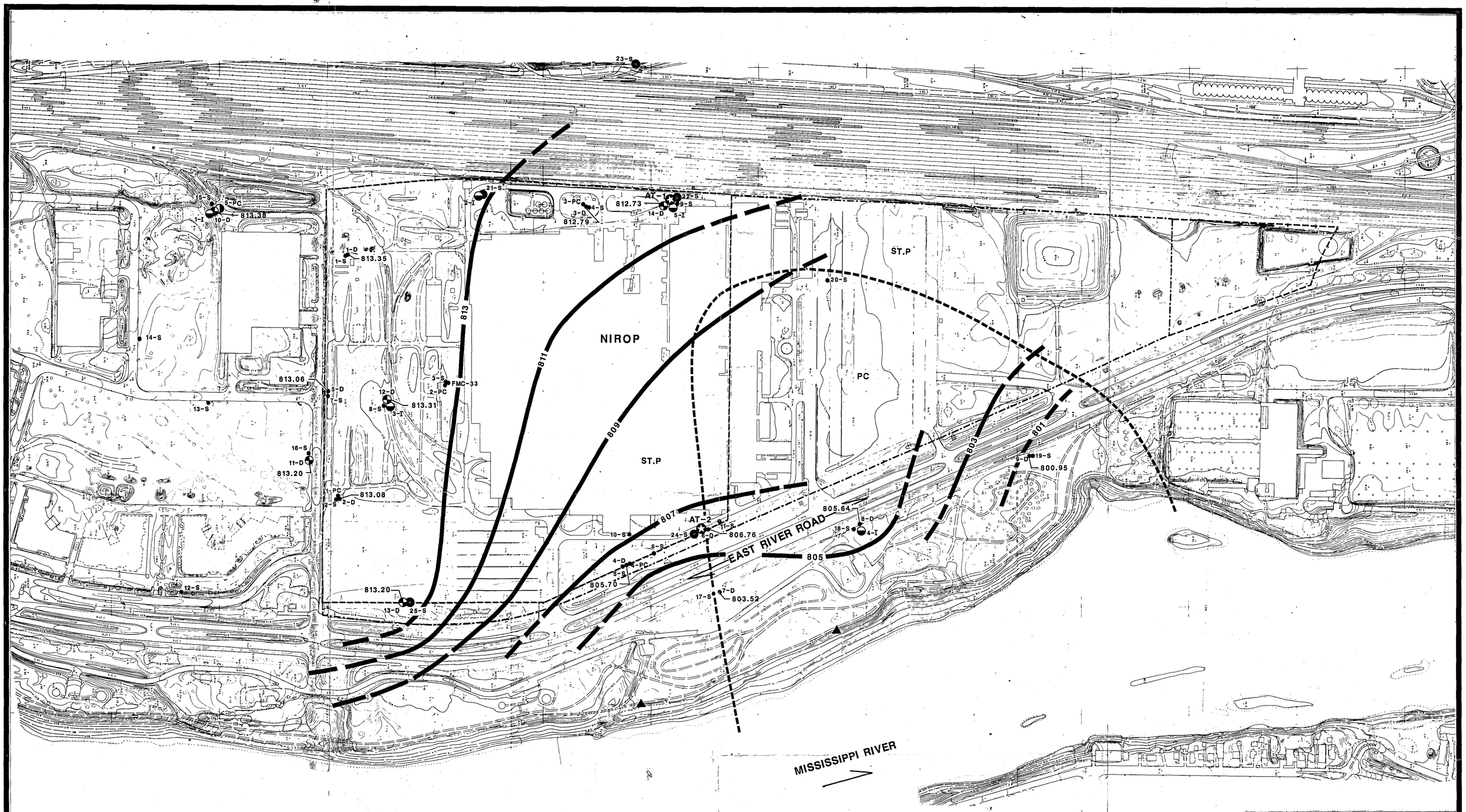
- Horizontal ground water gradients for the deep unconsolidated sediments ranged from a very flat 0.00061 ft/ft value in the northern NIROP region, to 0.0089 ft/ft in the southwest region. Gradients over the central NIROP ranged from 0.0037 to 0.0041 ft/ft. These gradients are similar to the 0.0044 to 0.012 ft/ft range calculated for the June 1987 RI Report.

- Ground water velocities in the deep unconsolidated sediments were substantially lower than for the shallow zone, ranging from 4 to 54 ft/yr. These velocities are substantially lower than the 350-950 ft/yr range cited in the June 1987 RI Report, and are a reflection of the significantly lower hydraulic conductivities determined from the recent investigation.

Bedrock

- The piezometric surface of the bedrock aquifer (Figure 5-7) in the northern region (on- and off-site) was approximately 2 feet lower than reported in the June 1987 RI Report, and gradients appear very flat. Data from FMC property south of the NIROP facility were not available.

- Flow directions in the northern region appear to be away from the Mississippi River toward the east-southeast. These findings contrast with the June 1987 RI Report, where the piezometric surface was inferred from bedrock wells located to the south, and flow direction was shown to be to the south-southwest. Very flat gradients in this region may be susceptible to seasonal and perhaps pumping effects from City of Fridley Well No. 13. This well operates infrequently during the winter months. However, its use increases substantially during warm weather months. During May 1988, Well No. 13 was operated approximately 8 hours per day. In mid-June 1988, the operating time had increased to greater than 12 hours per day. The well is installed to a depth of 332 feet, and has a pumping rate of 1,100 gpm.



LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- 800 — EXISTING 5' CONTOUR
- x 865.1 — EXISTING 1' CONTOUR
- EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- WATER TABLE OBSERVATION WELL IN UNCONSOLIDATED SEDIMENTS
- INTERMEDIATE DEPTH PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- DEEP PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- BEDROCK PIEZOMETER
- PRODUCTION WELL
- STORM SEWER OUTFALL SAMPLING LOCATION
- APPROXIMATE NIROP PROPERTY LINE
- APPROXIMATE FMC PROPERTY LINE
- APPROXIMATE BNR PROPERTY LINE
- EQUIPOTENTIAL LINE (FT ABOVE MSL)
- CONTACT BETWEEN ST. PETER AND PRAIRIE du CHIEN FORMATIONS
- ST.P — ST. PETER SANDSTONE
- PC — PRAIRIE du CHIEN DOLOMITE

NOTE: ● MONITORING WELLS INSTALLED PRIOR TO DECEMBER, 1987 ○ MONITORING WELLS INSTALLED DECEMBER, 1987 THROUGH FEBRUARY, 1988

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PROJECT:
ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE:
PIEZOMETRIC SURFACE NEAR THE BASE OF UNCONSOLIDATED SEDIMENTS, FEBRUARY 1988

DRAWN BY: DRB	SCALE: 1"=200'	PROJ. NO. 1332.53
CHECKED BY: KEB		DRWG. NO.
APPROVED BY:	DATE PRINTED: JUL 07 1988	SHEET FIGURE 5-6
DATE: 7/6/88		

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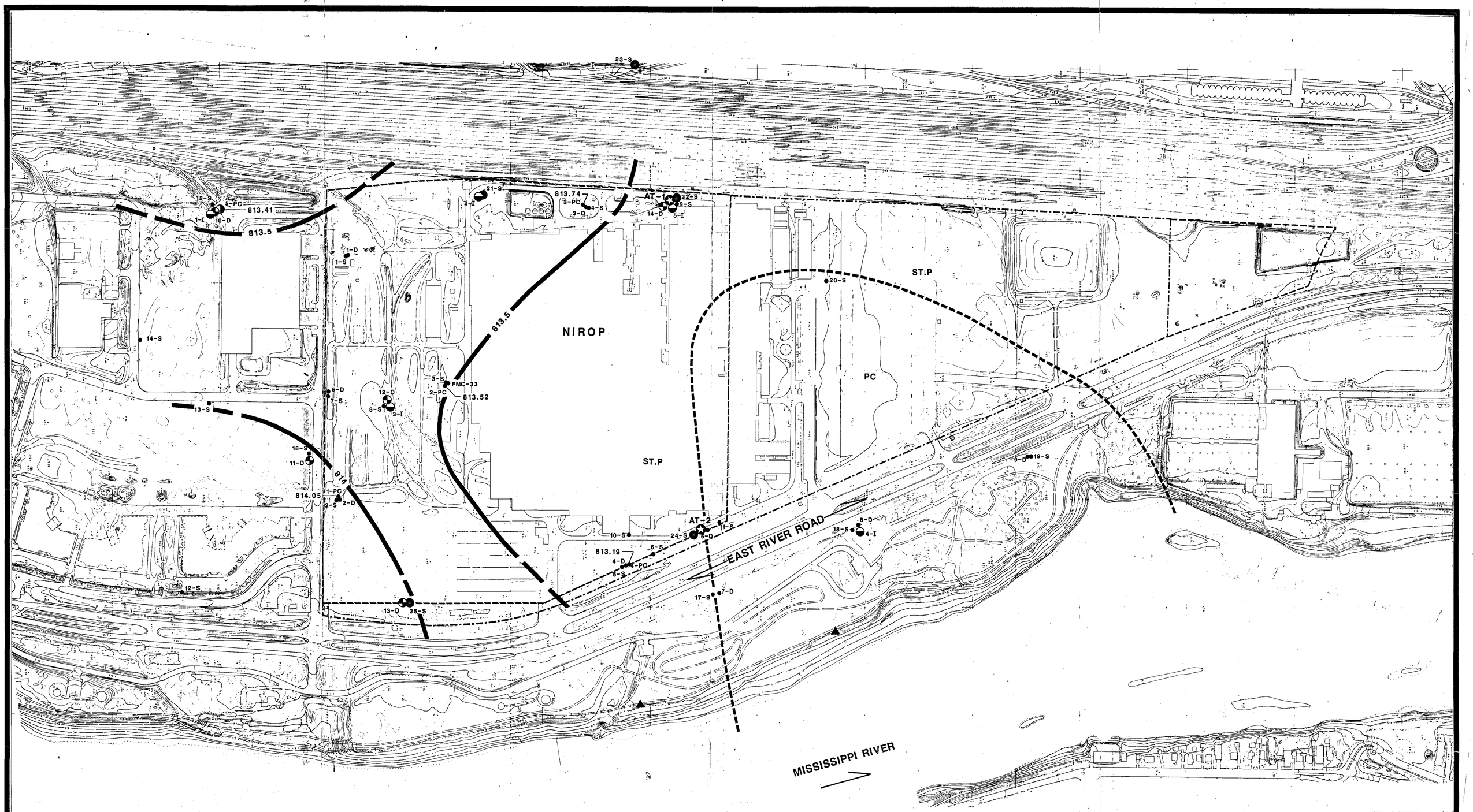

LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- 800 EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- x 865.1 EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- WATER TABLE OBSERVATION WELL IN UNCONSOLIDATED SEDIMENTS
- INTERMEDIATE DEPTH PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- DEEP PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- BEDROCK PIEZOMETER
- PRODUCTION WELL
- STORM SEWER OUTFALL SAMPLING LOCATION
- APPROXIMATE NIROP PROPERTY LINE
- APPROXIMATE FMC PROPERTY LINE
- APPROXIMATE BNR PROPERTY LINE
- EQUIPOTENTIAL LINE (FT ABOVE MSL)
- CONTACT BETWEEN ST. PETER AND PRAIRIE du CHIEN FORMATIONS
- ST.P ST. PETER SANDSTONE
- PC PRAIRIE du CHIEN DOLOMITE

NOTE: ● MONITORING WELLS INSTALLED PRIOR TO DECEMBER, 1987 ○ MONITORING WELLS INSTALLED DECEMBER, 1987 THROUGH FEBRUARY, 1988

SCALE: 1" = 200'
0 200 400 600 FEET

NO.	BY	DATE	REVISION	APP'D.
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PROJECT:
ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE:
PRAIRIE du CHIEN PIEZOMETRIC SURFACE
FEBRUARY 1988

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CHECKED BY: KEB		DRWG. NO.
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DATE: 7/6/88		

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- In-situ permeability tests were conducted at one bedrock well, 5-PC, yielding a hydraulic conductivity of more than 110 ft/day. This contrasts with 46 ft/day estimated for the bedrock aquifer in the June 1987 RI Report.

- Horizontal ground water gradients were not calculated for the bedrock aquifer for the following reasons:

  - Data for the southern region (on- and off-site) were not available, which only allowed characterization of the northern region.

  - The piezometric surface of the northern region (on- and off-site) was extremely flat.

- Vertical gradients in the north and northeast region were typically upward, while gradients in the southern region (southeast and southwest) were typically downward.

- The magnitude of the vertical ground water gradients, independent of direction, ranged from 0.00020 to 0.0063 ft/ft for several off-site and on-site well nests, indicating that ground water flow across the NIROP has a weak vertical component, and is essentially horizontal. Gradients were typically steeper between shallow and intermediate zones in the unconsolidated sediments, than between intermediate and deep zones.

5.3.3 Data QA/QC Evaluation and Presentation

Ground water samples collected by RMT were analyzed by the U.S. Army Corps of Engineers-Waterways Experiment Station (WES) for constituents listed in Table 5-1. The WES laboratory also performed internal laboratory quality assurance analyses. Quality assurance samples collected by RMT were analyzed by the U.S. Army Corps of Engineers-Missouri River Division (MRD) laboratory. Sample bottles for all field and QA/QC samples were supplied by RMT. Additional information on the quality control and assurance aspects of water quality analysis are found in the A-E Quality Control Summary Report for Well Installation and Sampling (RMT, In Preparation(a)).

TABLE 5-1
CHEMICAL PARAMETERS ANALYZED IN GROUND WATER SAMPLES

Volatile Organic Compounds[1]	Metals[2] (Dissolved)
Vinyl Chloride	Barium
Methylene Chloride	Selenium
Trichlorofluoromethane	Manganese
1,1 Dichloroethylene	Zinc
1,1 Dichloroethane	
Cis- and Trans- 1,2 Dichloroethylene	
Chloroform	
1,1,1 Trichloroethane	
Trichloroethylene	
Benzene	
Tetrachloroethylene	
Toluene	
Ethyl Benzene	
Xylene	

[1]VOCs selected for analyses were based on the list of VOCs detected to date as reported in the June 1987 RI Report (RMT, R4). Parameters recommended for analysis in the report also included xylene due to its detection in pits/trenches, and vinyl chloride which was added to the list because it is a breakdown product of TCE.

[2]Metals selected for analyses were based on Table 7-2 of the June 1987 RI Report (RMT, R4). Parameters selected are those metals that exhibited a determinable off-site health risk. Selenium was added due to its detection at well 9-S at a concentration exceeding its Maximum Contaminant Level.

NOTE: Analysis methods followed USEPA SW-846 methods, 3rd edition, November 1986.

Findings and conclusions for samples analyzed by the WES laboratory are as follows:

- Laboratory precision, as determined by analysis of five duplicate sample pairs, was generally within the historic range of Percent Relative Standard Deviation (% RSD) established by the USEPA for SW-846 methods (USEPA, 1987b p.F-7). The upper range for TCE (33.7%) was slightly outside of the historic limit of 28%, but this is not considered significant. All mean precision data were within the historic precision range.

- Thirteen trip blanks were submitted for analysis. All results were below the analytical detection level for all constituents, except for five trip blanks that contained traces of methylene chloride. The source of this constituent originated during bottle preparation in the laboratory. Any trace detection of this constituent in field samples should be interpreted as originating from the same process.

- Five field (rinsate) blanks were collected and submitted for analysis. Methylene chloride was detected in one of the three field blanks for which results were received, indicating laboratory contamination. All other constituents were below detection levels. Results for the remaining two field blanks were not available.

- Laboratory accuracy, as determined by percent recovery of surrogate-spiked samples, was determined through analysis of 75 field and QA/QC samples for three surrogate parameters. Mean accuracies were very high, with results close to 100 percent recovery. Minimum and maximum values for all three surrogates analyzed were outside of EPA guidance levels established for these constituents, based on SW-846 and Contract Laboratory Program methods (USEPA, 1987a p. B-37; USEPA, 1987b p.F-7). Given the high degree of accuracy for mean values, however, laboratory accuracy is considered acceptable.

5.3.4 Evaluation of Constituents

Four inorganic constituents and 15 volatile organic compounds (VOCs) (Table 5-1) were analyzed from ground water samples collected by RMT from January 25 through February 18, 1988. Findings and conclusions from the analysis results are discussed below for each constituent. A

discussion of the occurrence and migration of these constituents at the NIROP site is included in Section 5.3.5.

Inorganics

- Barium, Dissolved - Barium was above the detection level in all samples, but never exceeded the Maximum Contaminant Level (MCL) for drinking water of 1.0 mg/l. Barium ranged from 0.05 mg/l at well 3-PC, to 0.256 mg/l at well 1-I. This range is comparable to the November 1986 sample round. Well 1-I is a northeast off-site well, demonstrating that observed barium levels do not appear to be originating from on-site operations.

- Manganese, Dissolved - Manganese was above the detection level in all samples, ranging from 0.003 mg/l at well 2-PC (north, on-site), to 2.51 mg/l at well 7-S (north, on-site). Manganese exceeded the Secondary Maximum Contaminant Level (SMCL) for drinking water of 0.05 mg/l at 44 out of 52 wells. Concentrations near 0.7 mg/l were found upgradient of the NIROP in off-site wells, and northeast off-site well 15-S contained 2.33 mg/l. This demonstrates that comparable concentrations were found on-site as well as off-site. These results support the June 1987 RI Report conclusion that the observed manganese levels do not appear to be originating on-site.

- Selenium, Dissolved - Selenium was detected in only one well, 9-S, at a concentration of 0.08 mg/l. This is above the MCL of 0.01 mg/l and above the November 1986 level of 0.049 mg/l. As noted in the June 1987 RI Report (page 5-42), selenium was analyzed for the first time in samples collected during November 1986. In that sampling round, selenium was detected in only two wells: background well 14-S (0.008 mg/l) and on-site well 9-S (0.049 mg/l). The continued presence of selenium only in well 9-S is an indication of a possible off-site, upgradient contaminant source east of the NIROP property.

- Zinc, Dissolved - Zinc was detected at 47 out of 52 wells. The highest concentration of 2.18 mg/l was detected in an off-site well north of the NIROP (well 16-S), and is well below the 5.0 mg/l SMCL. The 2.18 mg/l value is also lower than the maximum concentration of 4.71 mg/l detected at well 18-S in November 1986. In January 1988, concentrations near 1 to 1.5 mg/l were frequently found north, off-site. Based on these results, and as concluded in the June 1987 RI Report, zinc does not originate exclusively from the NIROP.

Volatile Organic Compounds (VOCs)

Of the 15 VOCs analyzed, benzene, chloroform, ethyl benzene, trichlorofluoromethane, and vinyl chloride were not detected in any wells during the recent sampling round. Methylene chloride was detected in several instances, but is assumed to originate from within the laboratory as discussed in Section 5.3.3.

In November 1986, benzene was detected in well 17-S at 0.0065 mg/l. Chloroform and ethyl benzene were not detected at any location during that sampling round. Trichlorofluoromethane and vinyl chloride were not previously analyzed. Vinyl chloride (along with 1,1-dichloroethylene, and cis-and trans-1,2-dichloroethylene) is a breakdown product of trichloroethylene, which in turn is a potential degradation product of tetrachloroethylene.

The following findings and conclusions focus on the nine remaining VOCs that were detected in the January-February 1988 samples.

- 1,1,1-Trichloroethane (TCA) - TCA was detected in 7 wells, ranging from 0.086 mg/l in well 9-D (southwest, off-site) to 0.75 mg/l in well AT-1 (southeast, on-site). This is in excess of the 0.2 mg/l MCL. The MCL was also exceeded at well 5-I (0.287 mg/l), located near well AT-1. The highest concentration of TCA detected in November 1986 was at well 6-S (0.13 mg/l) in the southwest NIROP, where TCA has subsequently decreased to below the detection limit. Consistent with previous findings, TCA was not detected in any background wells, and was usually associated with significant levels of TCE.

- 1,1-Dichloroethane (1,1-DCA) - 1,1-DCA was detected in six on-site wells near the former pit/trench area and in the southeast NIROP, consistent with previous findings. Concentrations ranged from 0.0089 mg/l at well 3-I (north, on-site) to 0.106 mg/l in well 5-I (southeast, on-site). The highest concentration detected in November 1986 was 0.035 mg/l at well 9-S, which is a shallow well located adjacent to Well 5-I. 1,1-DCA was not detected in background wells and was always associated with the occurrence of TCE, consistent with previous findings. There are no regulatory limits set for this constituent.

- 1,1-Dichloroethylene (1,1-DCE) - 1,1-DCE was only detected in two on-site wells, AT-1 and 5-I (southeast) and in one off-site downgradient well, 18-S (southwest). 1,1-DCE is a breakdown product of TCE. Concentrations ranged from 0.009 mg/l at the downgradient well to 0.021 mg/l at well AT-1. Concentrations exceeded the MCL of 0.007 mg/l in every instance where it occurred. 1,1 DCE was not detected at any well location during November 1986, but had been previously reported at well 9-S at concentrations ranging from 0.0056-0.0092 mg/l.

- Cis-1,2-Dichloroethylene (Cis-1,2-DCE) - Cis-1,2-DCE is a breakdown product of TCE and was detected in 19 wells, always in the presence of TCE. Cis-1,2-DCE was not detected in any background wells, but was found in four off-site downgradient wells. Concentrations in on-site wells ranged from 0.011 mg/l in well 11-S (southwest) to 1.41 mg/l in well 5-I (southeast). The highest concentration (2.44 mg/l) was found in off-site well 18-S (southwest). These results cannot be directly compared to previous results, since previous results were expressed as total 1,2-DCE, which included both cis- and trans- isomers. There are no regulatory limits for this constituent.

- Tetrachloroethylene (PCE) - PCE was detected in 10 on-site wells and one downgradient off-site well, 17-S (southwest). Concentrations ranged from 0.0058 mg/l to 0.37 mg/l, comparable to previous findings. The highest concentrations were found in wells 5-I and AT-1 (southeast), which correspond to the location of highest concentration in November 1986 (0.20 mg/l at 9-S). There are no regulatory limits established for PCE. PCE was found in the presence of TCE with the exception of well 4-S, where TCE was not detected.

- Toluene and Xylenes - Toluene and xylenes are petroleum derivatives that were only found at intermediate-depth wells AT-1 and 5-I, in the southeast corner of the facility. These wells were installed to about the same depth (screened interval 45 to 60 feet below ground), approximately 10 to 15 feet apart. The highest concentrations of toluene and xylene were found in well AT-1, at 0.0074 mg/l and 0.063 mg/l, respectively. There are no regulatory limits established for these constituents. Toluene was not detected in any wells in November 1986. Xylene was not analyzed prior to January 1988.

- Trans-1,2-Dichloroethylene (Trans-1,2-DCE) - Trans-1,2-DCE is a breakdown product of TCE. It was found in only two instances, and was associated with high concentrations of TCE. The highest concentration measured was 0.22 mg/l at off-site well 4-I (southwest). Results from the recent sampling round for Trans-1,2-DCE cannot be directly compared to previous results, since previous results were expressed as total 1,2-DCE concentrations, which included both cis- and trans- isomers.

- Trichloroethylene (TCE) - TCE was detected in two background wells (15-S and 23-S), 22 on-site wells, and 6 downgradient, off-site wells. The concentration in background well 15-S (northeast) was 0.011 mg/l. The analysis of the sample from background well 23-S, located approximately 550 feet to the east of the NIROP on property owned by the Burlington Northern railroad, showed the presence of TCE, although it was below the analytical detection limit. On-site well concentrations ranged from 0.008 mg/l (3-D, east) to 11.3 mg/l (AT-1, southeast). The highest concentration measured downgradient (off-site) was 12.7 mg/l at well 18-S. The MCL for TCE is 0.005 mg/l. The highest concentrations of TCE measured in November 1986 were 9.2 mg/l at on-site well 8-S (north) and 10.7 mg/l at off-site, downgradient, well 8-D.

Nine wells exhibited TCE concentrations several orders of magnitude higher than the lowest detectable concentration (0.005 mg/l). These nine wells represent two main problem or source areas, and one downgradient, off-site area as follows:

Well No.	TCE Concentration (mg/l)	General Location	Location Description
8-S	6.8	North, on-site	Area downgradient of former disposal trenches
3-I	2.7	North, on-site	Area downgradient of former disposal trenches
FMC-33	1.3	North, on-site	Area downgradient of former disposal trenches
9-S	1.32	Southeast on-site	Unknown on-site or off-site source
5-I	7.1	Southeast on-site	Unknown on-site or off-site source
AT-1	11.3	Southeast on-site	Unknown on-site or off-site source
18-S	12.7	Southwest off-site	Combined contaminant plume
4-I	8.1	Southwest off-site	Combined contaminant plume
8-D	10.8	Southwest off-site	Combined contaminant plume

TCE continues to be the best indicator of the occurrence and migration of ground water contamination at the NIROP. TCE is used in the following section to define contaminant plumes and migration.

5.3.5 Occurrence and Migration of Hazardous Substances in Ground Water

This section focuses more extensively on the concentrations and distribution of TCE and other specific constituents within the unconsolidated aquifer. Emphasis is on findings from the most recent ground water sampling round (January-February 1988), although historic trends are also analyzed. The discussion is organized by problem area, as shown in Table 5-2, to highlight information on potential source areas. The general "areas" referred to below are identified on Figures 5-8 through 5-10. These figures also show the assumed distribution of TCE concentrations across the general study area as estimated concentration contour lines.

Area 1 - Background

- Wells in this area are background wells, i.e., wells unaffected by NIROP activities. There were no VOCs detected in water table wells or piezometers, with the exception of wells 15-S and 23-S. Well 15-S registered 0.011 mg/l TCE. TCE at well 15-S is a recurring problem with fluctuating low levels of TCE since April 1986. TCE at well 15-S is the basis for extension of the TCE plume upgradient of the NIROP (Figure 5-8). It is likely that the low levels of TCE detected at well 15-S originating from an unidentified off-site, upgradient, source continue to impact NIROP ground water quality.

Area 2 - North, On-Site and Off-Site

- On-site wells in this area are likely affected by residual contamination from the former pit/trench disposal area. The highest degree of contamination is found at well nests 3-S and 8-S, located downgradient from the previously identified

TABLE 5-2
TCE-CONTAMINATED REGIONS

Area Designation	Problem Area	Associated Well Nests*	Significance
1	Background; North, Northeast	12-S, 13-S, 14-S, 15-S, 1-S	Low level TCE contamination at nest 15-S.
2	North, On-Site and Off-Site	7-S, 16-S, 2-S, 8-S, 3-S	Source of residual TCE and other VOCS.
3	East, On-site	21-S, 4-S	Low-level TCE originating on-site or off-site.
4	Southeast, On-site	9-S, 22-S	Highest TCE concentration detected on-site.
5	Southwest, On-site	5-S, 6-S, 10-S, 11-S, 24-S	Low to moderate levels of TCE. Probably reflects contaminants migrating from trench disposal area.
6	Southwest, Off-site	17-S, 18-S, 19-S	Downgradient off-site wells.

*Refer to previously cited figures or Figures 5-8 through 5-10 to identify the intermediate, deep, and bedrock piezometers associated with the shallow wells identified in this table.

NIROP

AREA 1

AREA 2

AREA 3

AREA 4

AREA 5

AREA 6

EAST RIVER ROAD

MISSISSIPPI RIVER

23-S
21-S
2-I
3-PC
4-S
3-D
AT-1
22-S
19-S
14-D
5-I
20-S
6-PC
1-I
10-D
1-D
1-S
14-S
13-S
5-D
7-S
12-D
8-S
3-I
3-S
FMC-33
2-PC
6-S
11-D
1-PC
2-S
2-D
12-S
13-D
25-S
10-S
24-S
AT-2
11-S
8-D
4-D
4-PC
5-S
17-S
7-D
18-S
6-D
4-I
9-D
19-S
0.01
0.1
1.0
10.0

LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- 800 — EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- x 865.1 — EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- WATER TABLE OBSERVATION WELL IN UNCONSOLIDATED SEDIMENTS
- INTERMEDIATE DEPTH PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- DEEP PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- BEDROCK PIEZOMETER
- PRODUCTION WELL
- STORM SEWER OUTFALL SAMPLING LOCATION
- APPROXIMATE NIROP PROPERTY LINE
- APPROXIMATE FMC PROPERTY LINE
- APPROXIMATE BNR PROPERTY LINE
- 0.1 — TCE CONCENTRATIONS IN mg/l
- INFERRED TCE CONCENTRATION
- AREA 1 — AREA DESIGNATIONS FOR TEXT DISCUSSION PURPOSES

NOTE: ● MONITORING WELLS INSTALLED PRIOR TO DECEMBER, 1987 ○ MONITORING WELLS INSTALLED DECEMBER, 1987 THROUGH FEBRUARY, 1988

SCALE: 1" = 200'
0 200 400 600 FEET

NO.	BY	DATE	REVISION	APP'D.
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PROJECT :
ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE : EXTENT OF TCE CONTAMINATION IN SHALLOW UNCONSOLIDATED AQUIFER JANUARY 1988

DRAWN BY: DRB	SCALE : 1"=200'	PROJ . NO . 1332.53
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DATE : 7/6/88		

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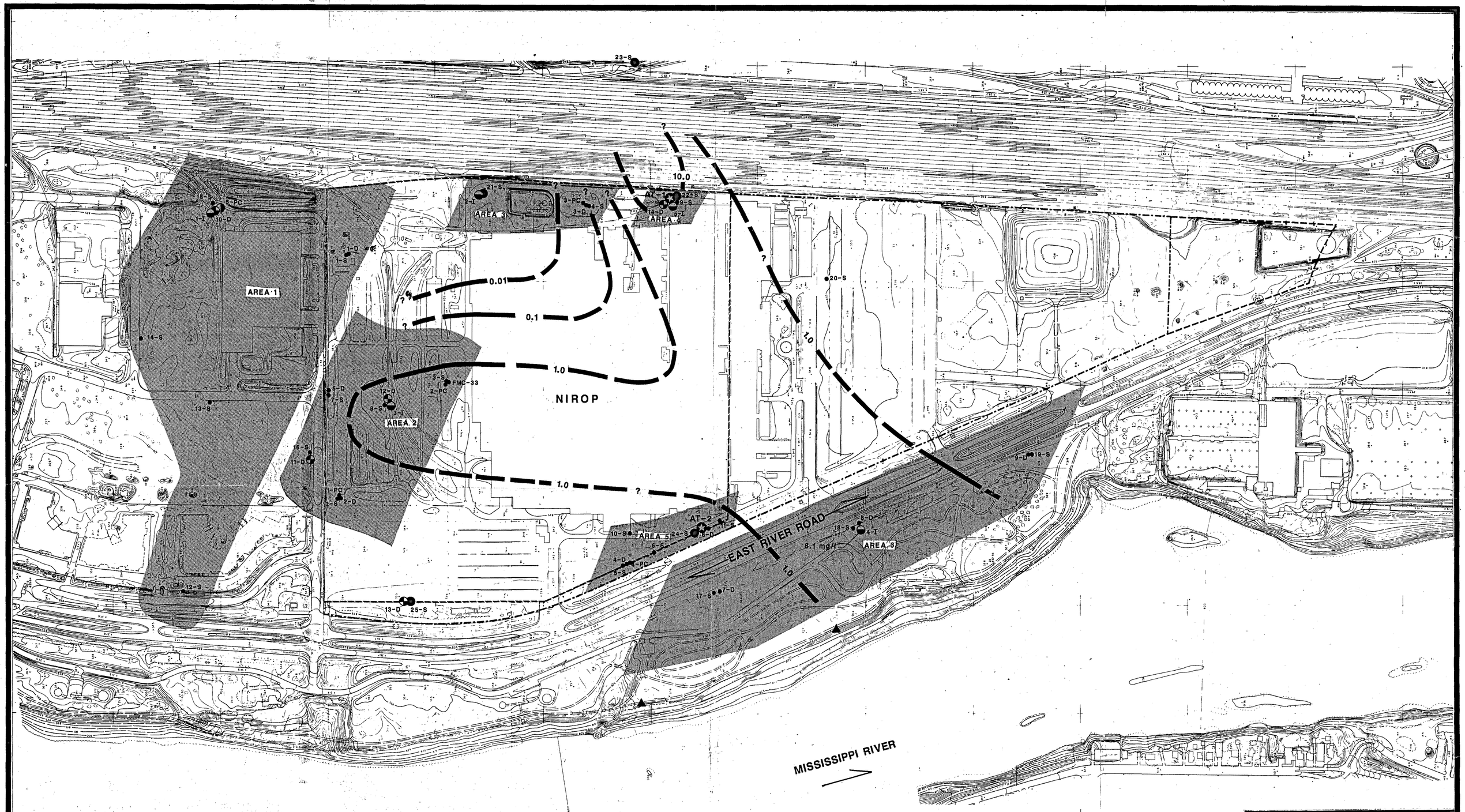

LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- 800 — EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- x 863.1 — EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA

- WATER TABLE OBSERVATION WELL IN UNCONSOLIDATED SEDIMENTS
- INTERMEDIATE DEPTH PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- DEEP PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- BEDROCK PIEZOMETER
- PRODUCTION WELL
- STORM SEWER OUTFALL SAMPLING LOCATION

- APPROXIMATE NIROP PROPERTY LINE
- APPROXIMATE FMC PROPERTY LINE
- APPROXIMATE BNR PROPERTY LINE
- 0.1 — TCE CONCENTRATIONS IN mg/l
- INFERRED TCE CONCENTRATION
- AREA 1 — AREA DESIGNATIONS FOR TEXT DISCUSSION PURPOSES

SCALE: 1" = 200'
0 200 400 600 FEET

NOTE: ● MONITORING WELLS INSTALLED PRIOR TO DECEMBER, 1987 ○ MONITORING WELLS INSTALLED DECEMBER, 1987 THROUGH FEBRUARY, 1988

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PROJECT : ADDITIONAL REMEDIAL INVESTIGATIONS COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE : EXTENT OF TCE CONTAMINATION IN THE INTERMEDIATE ZONE OF THE UNCONSOLIDATED AQUIFER, JANUARY 1988

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APPROVED BY: TEG	DATE PRINTED : MAR 29 1996	SHEET FIGURE 5-9
DATE : 7/6/88		

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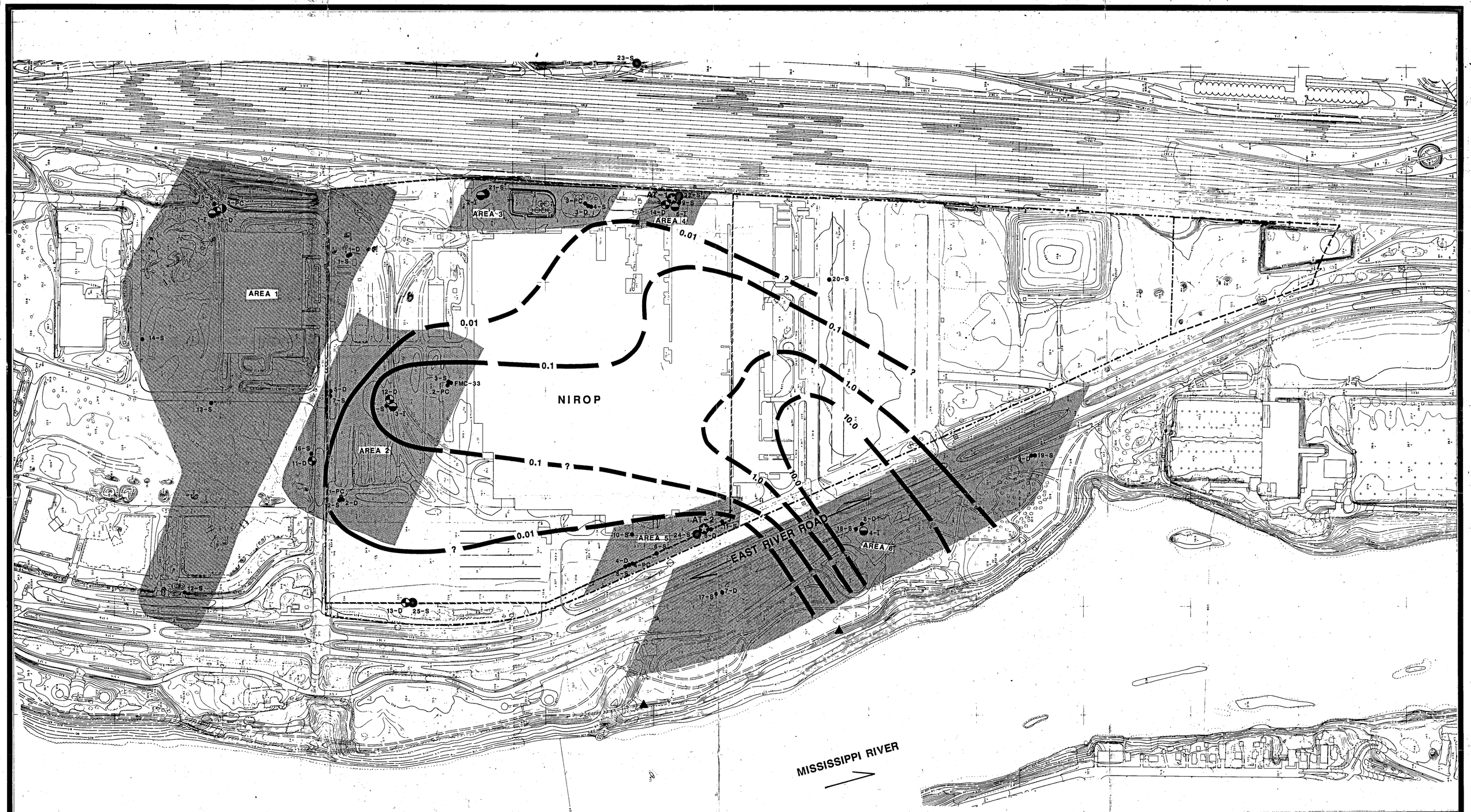

LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- 800 — EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- x 865.1 — EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- WATER TABLE OBSERVATION WELL IN UNCONSOLIDATED SEDIMENTS
- INTERMEDIATE DEPTH PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- DEEP PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- BEDROCK PIEZOMETER
- PRODUCTION WELL
- STORM SEWER OUTFALL SAMPLING LOCATION
- APPROXIMATE NIROP PROPERTY LINE
- APPROXIMATE FMC PROPERTY LINE
- APPROXIMATE BNR PROPERTY LINE
- 0.1 — TCE CONCENTRATIONS IN mg/l
- INFERRED TCE CONCENTRATION
- AREA 1 — AREA DESIGNATIONS FOR TEXT DISCUSSION PURPOSES

NOTE: ● MONITORING WELLS INSTALLED PRIOR TO DECEMBER, 1987 ○ MONITORING WELLS INSTALLED DECEMBER, 1987 THROUGH FEBRUARY, 1988

SCALE: 1" = 200'
0 200 400 600 FEET

NO.	BY	DATE	REVISION	APP'D.
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PROJECT :
ADDITIONAL REMEDIAL INVESTIGATIONS
COE-NIROP FRIDLEY, MINNESOTA

SHEET TITLE :
EXTENT OF TCE CONTAMINATION IN THE DEEP UNCONSOLIDATED AQUIFER, JANUARY 1988

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APPROVED BY: TES	DATE PRINTED : MAR 29 1996	SHEET FIGURE 5-10
DATE : 7/6/88		

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pit/trench disposal areas. These findings are supported by the soil pore gas survey results (Section 4.1.4).

- TCE has been detected in the range of 0.1 to 0.2 mg/l in well 16-S in three sampling rounds since April 1986. TCE was not found in the new deep piezometer 11-D at this location, indicating that TCE occurrence is limited to the upper portions of the aquifer in the unconsolidated sediments. Horizontal flow gradients measured over this same period indicate that flow direction in the north area is variable, which may be the result of seasonal effects and perhaps pumping effects from Fridley Well No. 13. Soil pore gas samples were not collected in the area immediately north of well 16-S due to the inability to obtain access permission from the property owner (RMT, 1988a). Identification of the source (on-site or off-site) of TCE contamination in well 16-S is inconclusive, due to the fluctuating ground water flow direction in the north area and the lack of soil pore gas results in the area north of well 16-S.

- Low levels of TCE were found at well nest 2-S (0.031 to 0.05 mg/l), which may also be attributable to the former trench disposal area east of the well. However, in this case, TCE appears to have migrated throughout the unconsolidated aquifer, since it was detected in the shallow well (0.05 mg/l) and the deep piezometer (2-D, 0.031 mg/l) as well. The soil pore gas survey also found elevated TCE/DCE concentrations at the water main excavation site immediately east of this well nest. Solvent-like odors were detected by construction workers during excavation of a new water main trench along the northern NIROP fence line, to the east of well nest 2-S, in October 1987. Detectable levels of VOCs were measured by MPCA personnel who visited the site during the construction work, using portable instruments (Vojvodich, 1987). These findings confirm the presence of residual VOC contamination in the soil in this area, but do not indicate whether or not the area is a separate source of ground water contamination indicated by wells 2-S and 2-D.

- Well nest 7-S showed a low concentration of TCE (0.066 mg/l) in well 7-S, but no TCE in the deep piezometer (well 5-D). The ground water flow directions suggested by the water table contours shown on Figure 5-5 indicate that TCE detected in this location may originate from an off-site, upgradient source.

- A TCE concentration of 6.8 mg/l was found at well 8-S immediately downgradient of the former pit/trench disposal area. TCE was also detected at the intermediate depth (2.7 mg/l) and at the base of the unconsolidated aquifer (0.33 mg/l), indicating migration throughout the aquifer has occurred at this location. TCE at well 8-S decreased from 9.2

mg/l in November 1986, to the present 6.8 mg/l concentration. Multiple contaminants in addition to breakdown products of TCE were also detected, including TCA, 1,1-DCA, and PCE.

- Moderate levels of TCE were found in well nest 3-S, increasing from 0.41 mg/l in well 3-S, to 1.3 mg/l in intermediate depth well FMC-33. There is no deep piezometer installed at this location, but contamination likely exists throughout the unconsolidated aquifer, since it also exists at a low level in bedrock well 2-PC (TCE 0.01 mg/l). Currently, well 2-PC is the only bedrock well showing any detectable TCE contamination. A slight increase in TCE concentration at well 2-PC has occurred between November 1986 and January 1988, which suggests a leveling-off or reversal of an otherwise decreasing trend in concentration. Unlike well nest 8-S, TCA and PCE were not detected at any depth.

- Comparing well nest 8-S to well nest 3-S approximately 300 feet to the southeast, well nest 3-S shows less contamination by TCE (factor of 16 difference in shallow zone), and no detectable PCE at any depth. The decreased TCE concentrations and absence of PCE at well nest 3-S suggest two different source areas, or simply greater dilation of a single source as detected at well nest 3-S. Dilution by ground water could occur if well nest 3-S is further downgradient from the source(s) than well nest 8-S, as well as off-set (to the southeast) from the plume centerline.

- Contamination was not detected directly east or west of Area 2, based on lab data for well nests 1-S (east) and 25-S (west). This shows the contaminant plume to be confined to a region that more or less conforms to the "old river channel" discussed in Section 5.2 and shown on Figure 5-4B, and to the ground water flow directions indicated by horizontal gradients shown on Figures 5-5 and 5-6.

Area 3 - East, On-Site

- Well nests 21-S and 4-S are contained within this area, which borders the east boundary of the NIROP. Low to moderate levels of TCE are found at these locations, but the mix of constituents is different between the two locations. Each well nest may be detecting an off-site component of contamination.

- Well nest 21-S is newly installed and located immediately downgradient to Hazardous Waste Storage Area C. TCE was detected in well 21-S at 0.4 mg/l along with smaller amounts of TCA (0.023 mg/l) and PCE (0.038 mg/l). These contaminants were also detected in the dry well at Hazardous Waste Storage Area C (RMT, 1987a). VOCs were not detected in the

intermediate well 2-I, suggesting that the contamination source is Hazardous Waste Storage Area C, or an off-site source in the nearby area. Contaminants generated from the area likely contribute to the downgradient contaminant plume (Area 6).

- The shallow and deep wells at well nest 4-S have a history of low-level contamination which, like nest 21-S, cannot be attributed to a specific on-site or off-site source area. TCE was not detected in well 4-S in June 1985, but concentrations have gradually increased to 0.077 mg/l in January - February 1988. TCE was also detected in the deep piezometer (well 3-D) at low levels, decreasing slightly from November 1986 (0.012 mg/l) to January 1988 (0.008 mg/l). A low concentration of PCE was reported in bedrock well 3-PC (0.0058 mg/l) just above the detection limit, but TCE was not present. This is the first occurrence of PCE in well 3-PC, and may simply be a laboratory artifact. However, this well should be included in any future sampling at the NIROP in order to determine whether this report of PCE actually represents ground water contamination.

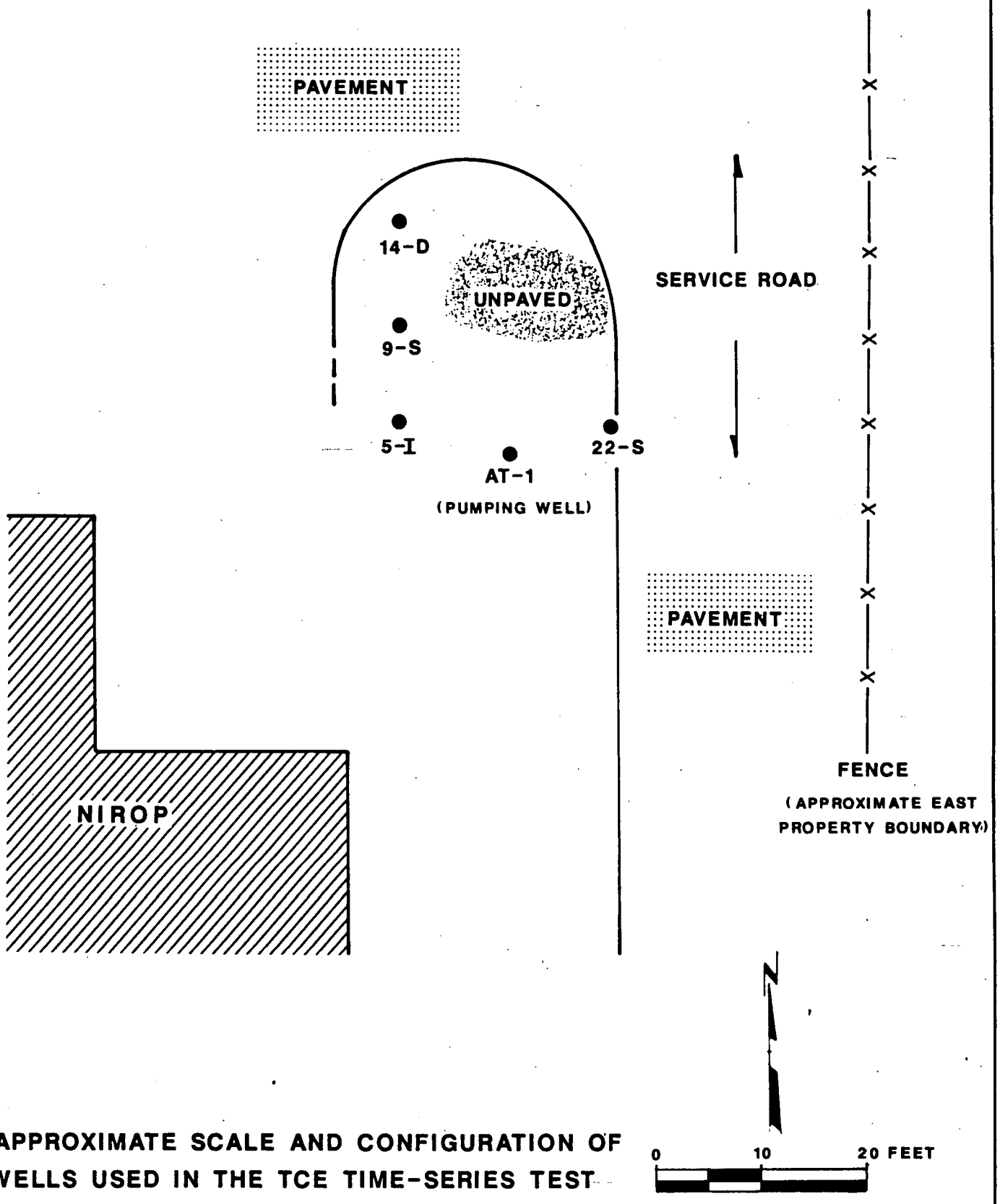
Area 4 - Southeast, On-site

- The highest level of TCE contamination on-site was found at this location, at the intermediate depth. All wells in this area other than well 9-S are newly installed.

- TCE was detected in wells 9-S (1.32 mg/l) and 22-S (0.4 mg/l), along with a mix of other contaminants, including PCE and selenium. Selenium is considered to be an indicator of off-site contamination, since it was not used directly in any NIROP process (RMT, 1987a). Selenium has been found consistently only in well 9-S. The TCE concentration at well 9-S has decreased since January 1986, when 4.2 mg/l was measured.

- Well 22-S was generally less contaminated with TCE and other constituents than well 9-S. Well 22-S is located approximately 25 feet to the east-southeast of well 9-S, and is slightly upgradient of well 9-S in relation to the direction of ground water flow (see Figure 5-11). Well 22-S may reflect an upgradient off-site source.

- Concentrations of TCE detected at the intermediate depth in wells 5-I (7.1 mg/l) and AT-1 (11.3 mg/l) were greater than those reported from the shallow, water table wells. A wide mix of other contaminants was detected at much lower concentrations, including PCE, toluene, and xylenes. The vertical extent of this contamination may be limited by the less permeable till layer discussed in Section 5.2 and shown on Figure 5-4B. Contamination may have been present previously at this depth, but has gone undetected in the



APPROXIMATE SCALE AND CONFIGURATION OF WELLS USED IN THE TCE TIME-SERIES TEST

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	Date 6/9/88
	Proj # 1332.53

FIGURE 5-11

JUL 7 1988

absence of intermediate-depth wells. It is probably a major contributor to the contaminant plume detected downgradient (southwest) of the facility.

- No VOCs were detected in the deep piezometer (well 14-D), which may be due to the intervening till layer noted above.

- A TCE time-series test was conducted using the wells in this area to assess the presence or absence of an off-site contamination source. A detailed description of the procedures and results of this test is presented in a separate document (RMT, In Preparation(a)). A plan view of wells used in the TCE time-series test is shown on Figure 5-11. Figure 5-12 provides a cross-sectional view and also graphically illustrates results. Well 14-D is not shown on Figure 5-12 because TCE concentrations were at or near the detection limit throughout the test, and results were assumed to exhibit only analytical variability. Findings and conclusions from the TCE time-series test are as follows:

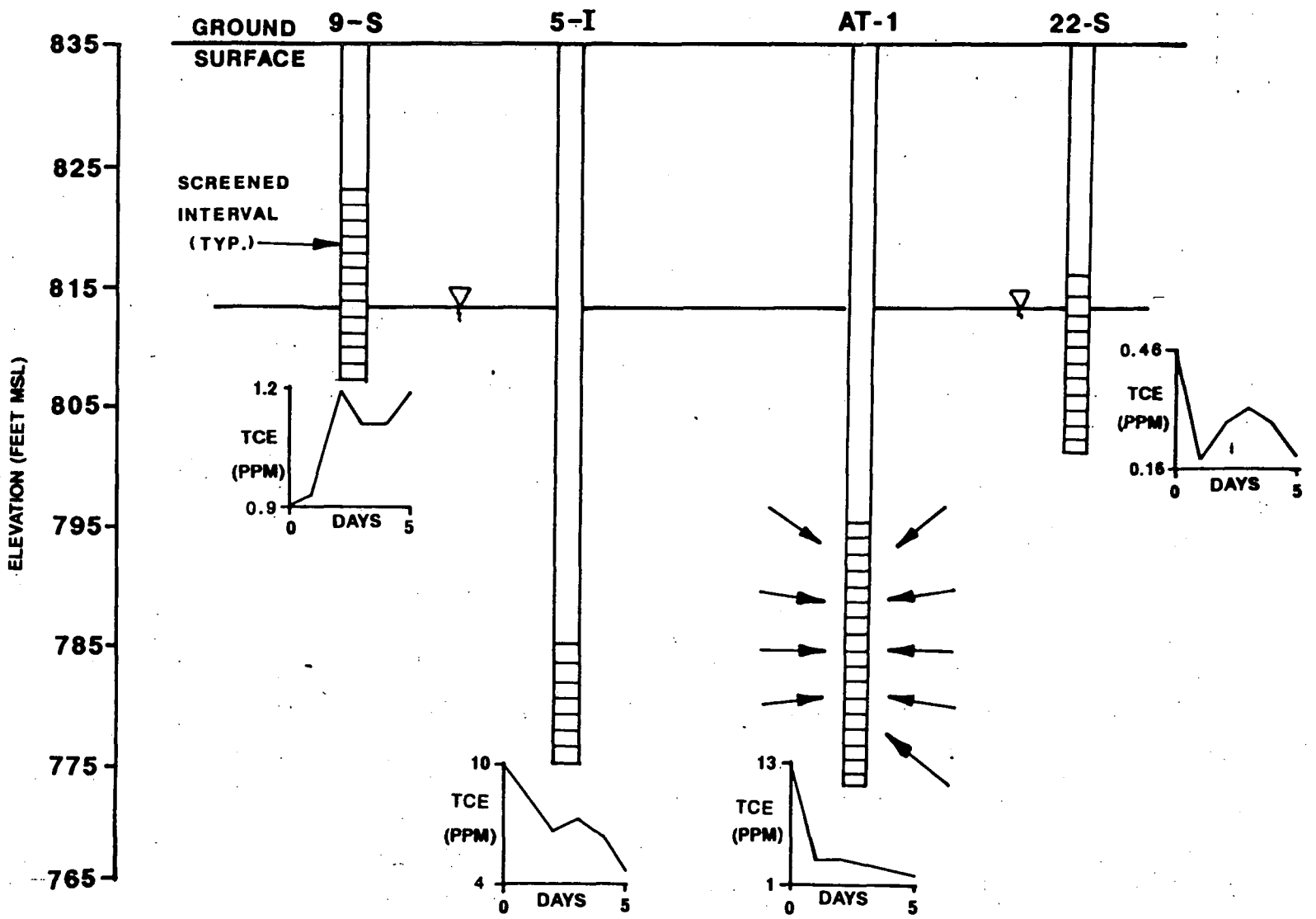
  - Analysis of time-series data from well 9-S indicates an area (and potentially a source) of higher TCE concentration northwest of well 9-S.

  - Analysis of time-series data from well 22-S suggests the possibility of a low-level upgradient, and potentially off-site source, although a substantial amount of uncertainty exists due to the shape of the concentration versus time plot (Figure 5-12).

  - Analysis of time-series data from well 5-I can be interpreted in one of two ways as follows:

    1. Deeper, cleaner water may have been drawn upward past the well screen of 5-I as pumping proceeded. However, given the probable existence of a less permeable till layer near the base of the screen, this flow condition was unlikely.

    2. Assuming well 5-I was situated closer to the far edge of the TCE plume than the pumping well AT-1 (initial concentrations of 10 and 13 mg/l, respectively), less contaminated water would have been drawn past the well screen of 5-I as pumping progressed. TCE concentrations in 5-I would have registered this decrease. Given this scenario, the plume center would have to have been between 5-I and AT-1, or to the east-southeast of AT-1.



HORIZONTAL SCALE: CONCEPTUAL ONLY

TCE TIME SERIES TEST RESULTS

RMT INC

Dwn. by.:	DRB
Date:	7/6/88
Proj. #:	1332.53

FIGURE 5-12

JUL 7 1988

Area 5 - Southwest, On-site

- TCE was detected at relatively low concentrations in four out of five shallow water table wells in this area, ranging from 0.023 mg/l in well 24-S, to 0.32 mg/l in well 6-S. TCE was also detected in the production well AT-2 (0.6 mg/l), installed at the intermediate depth. TCE was not detected in the deep piezometers or in the bedrock well 4-PC. Historic data for these wells, plus January 1988 data, indicate that TCE concentrations are fluctuating at well 6-S, steady or slightly increasing at well 10-S, and steady at well 11-S.

- The water quality represented by wells 6-S and 10-S is distinct from the water quality represented by wells 11-S and 24-S, in that wells 6-S and 10-S also show PCE contamination. PCE may be originating from the upgradient former pit/trench disposal area, since it was found in wells 8-S and 3-I, and may be migrating through the region represented by wells 6-S and 10-S. TCE concentrations are also higher in wells 6-S and 10-S than in wells 11-S and 24-S. TCE may be originating from the upgradient former pit/trench disposal area, where it was detected in high concentrations. There is no direct evidence that sources of ground water contamination in this area originate wit the NIROP. TCE levels in well 9-D have fluctuated between 0.15 and 0.65 mg/l since April 1986. TCE levels in 19-S have fluctuated between 0.0062 and 0.088 mg/l over the same time period.

Area 6 - Southwest, Off-site

- Well nest 17-S is positioned downgradient from Area 5 and exhibits contamination characteristics very similar to wells 6-S and 10-S of that area. TCE (0.276 mg/l) and PCE (0.021 mg/l), as well as a breakdown product of TCE, are found in well 17-S. TCE concentrations at well 17-S have been fluctuating, with a possible increasing trend. No VOCs have been detected in the deep piezometer (well 7-D).

- Well nest 18-S appears to be centrally located within the contaminant plume leaving the NIROP. It is therefore well positioned to detect changes over the long term. A high TCE concentration was measured in well 18-S (12.7 mg/l), along with several other VOCs at lower concentrations. PCE was not detected. High TCE concentrations were also detected at the intermediate depth (8.1 mg/l) and at the base of the unconsolidated aquifer (10.8 mg/l), indicating migration of TCE throughout the unconsolidated sediments.

  TCE in well 18-S has risen dramatically from November 1986 (1.53 mg/l) to January 1988 (12.7 mg/l). Similarly, TCE in

well 8-D rose from 5.7 mg/l (April 1986) to 10.7 mg/l in November 1986, where it has remained nearly constant. It is expected that the high TCE concentrations found in the southeast as well as the northern NIROP area contribute to the quantities of TCE detected at this downgradient site.

- Well nest 19-S appears to be situated to the south of the contaminant plume leaving the NIROP. A low TCE concentration was measured in well 19-S (0.0062 mg/l) in January - February 1988. However, a higher concentration (0.15 mg/l) was measured in the deep piezometer (well 9-D), along with low-level TCE breakdown products and TCA. It is not known if any components of this contamination originate from the FMC property to the south of the NIROP. TCE levels in well 9-D have fluctuated between 0.15 and 0.65 mg/l since April 1986. TCE levels in 19-S have fluctuated between 0.0062 and 0.088 mg/l over the same time period.

Summary

An unidentified, off-site source of ground water VOC contamination exists to the northeast of the NIROP. This source probably contributes relatively low concentrations of VOCs to the ground water contamination detected at the NIROP.

The potential exists that an upgradient, off-site source located northeast of the NIROP may currently, or in the future, contribute to the ground water contamination detected at the southeast corner of the NIROP. However, the current existence or absence of such an off-site source, or the likelihood that future effects of an off-site source will be detected at the NIROP, could not be determined from the existing information.

The source of ground water VOC contamination detected immediately to the northwest of the NIROP property cannot be conclusively identified. The source may be on-site or off-site, based on the fluctuating ground water flow direction measured in this area.

Significant levels of contamination were detected at two locations on the NIROP: the former pit/trench disposal area in the northern portion of the property, and the southeast corner of the NIROP. Contamination from each of the two major on-site contamination areas appears to converge at some point beneath the plant and discharge to the southwest, off-site through the old river bed deposits.

5.3.6 Bench-Scale Testing

Packed-bed air stripping columns and carbon adsorption are being evaluated as potential technologies for remediation of ground water at the NIROP (RMT, 1987b). On-site, bench-scale tests of the ground water were conducted to determine whether the chemical characteristics of the ground water would result in potential operation or maintenance problems if implementation of either of these technologies was pursued.

Based on previous ground water quality data, it was anticipated that ground water in the vicinity of the NIROP may be in a chemically reduced condition. If so, the water may contain dissolved iron at sufficient concentrations to cause precipitation of iron hydroxide and subsequent fouling of treatment equipment if the iron is oxidized by oxygen absorbed from the atmosphere. Similarly, it was anticipated that precipitation of calcium carbonate from the ground water could foul remediation equipment. Calcium carbonate precipitation could occur if the ground water is supersaturated with carbon dioxide with respect to the atmosphere. As the water loses carbon dioxide to the atmosphere, the pH rises and calcium carbonate may precipitate, causing scaling and fouling of treatment equipment and piping.

To test the potential for calcium carbonate and iron hydroxide precipitation, five samples of pumped ground water were collected from the discharge of well AT-2 during the aquifer pumping test conducted in February 1988 (A-E QCSR-Aquifer Tests (RMT, In Preparation(b)). The samples were collected after allowing the discharge water quality to stabilize, as determined by constant pH, temperature, and specific conductance. Samples were drawn from a tap on the pump discharge header through a Tygon® tube inserted directly into the sample container, to minimize air contact during sampling.

The samples were analyzed for various constituents before and after equilibration with the atmosphere. To speed up equilibration, air was bubbled through the samples for varying time durations. The samples were also analyzed for various constituents after allowing the precipitated solids formed during the aeration step to settle for varying amounts of time. Lab analyses for the bench-scale tests were conducted by RMT Laboratories, Inc., of Madison, Wisconsin.

A description of the tests conducted is given in Table 5-3. The results of the bench-scale tests are presented in Table 5-4.

The results indicate the ground water is characterized by high concentrations of dissolved calcium (250 mg/l), and is supersaturated with respect to calcium carbonate (Langelier Saturation Index greater than zero). The dissolved calcium concentration in the ground water decreased with increasing aeration time, indicating precipitation of calcium carbonate. This was confirmed by the significant increase in total suspended solids after aeration, which was also visually observed

TABLE 5-3
DESCRIPTION OF BENCH-SCALE GROUND
WATER TREATABILITY TESTS

Test No.	Test Description
1	Untreated, unfiltered
2	Untreated, filtered
3	Aerated 1 minute, settled 10 minutes, unfiltered supernatant
4	Aerated 1 minute, settled 10 minutes, filtered supernatant
5	Aerated 5 minutes, settled 10 minutes, unfiltered supernatant
6	Aerated 5 minutes, settled 10 minutes, filtered supernatant
7	Aerated 10 minutes, settled 10 minutes, unfiltered supernatant
8	Aerated 10 minutes, settled 10 minutes, filtered supernatant
9	Aerated 10 minutes, settled 60 minutes, unfiltered supernatant
10	Aerated 10 minutes, settled 60 minutes, filtered supernatant

TABLE 5-4
RESULTS OF BENCH-SCALE GROUND
WATER TREATABILITY TESTS

Test No.	1	2	3	4	5	6	7	8	9	10
Aeration time, minutes	0	0	1	1	5	5	10	10	10	10
Post-aeration settling time, minutes	0	0	10	10	10	10	10	10	60	60
Post-settling filtration										
Yes		X		X		X		X		X
No	X		X		X		X		X	
pH - Initial	7.3	-	7.3	-	7.3	-	7.3	-	7.3	-
Post-aeration	-	-	7.8	-	8.3	-	8.4	-	8.4	-
Post-settling, supernatant	-	-	7.8	-	8.3	-	8.5	-	8.3	-
Temperature, °C										
Initial	14	-	14	-	14	-	14	-	14	-
Post-aeration	-	-	11.5	-	11.5	-	12	-	12	-
Post-settling, supernatant	-	-	11.5	-	11.5	-	12	-	12	-
Specific conductance, (umhos/cm @ temp. noted above)										
Initial	100	-	100	-	100	-	100	-	100	-
Post-aeration	-	-	100	-	95	-	95	-	95	-
Post-settling, supernatant	-	-	98	-	98	-	95	-	95	-

TABLE 5-4 (CONT'D)
RESULTS OF BENCH-SCALE GROUND
WATER TREATABILITY TESTS

Test No.	1	2	3	4	5	6	7	8	9	10
Total suspended solids, mg/l in supernatant after settling	220*	-	590	-	50	-	28	-	130	-
Total alkalinity @ pH 4.5, mg/l as $CaCO_3$, after filtration	-	440	-	420	-	390	-	340	-	340
Calcium, mg/l										
Total - supernatant after settling	220*	-	220	-	220	-	220	-	200	-
Dissolved - supernatant after filtration	-	250	-	240	-	220	-	230	-	230
Iron, mg/l										
Total - supernatant after settling	1.7*	-	1.8	-	1.8	-	1.8	-	1.4	-
Dissolved - supernatant after filtration	-	1.0	-	0.53	-	<0.04	-	<0.04	-	<0.04
Langelier Saturation Index	-	0.78	-	1.24	-	1.67	-	1.74	-	1.74

*Value is for untreated, well-mixed sample without settling.

by the analyst as increased turbidity of the samples. Calcium carbonate precipitation is further confirmed by decreasing alkalinity with increased aeration. The decrease in calcium and alkalinity concentrations was found to be a linear relationship with time of aeration. The sample also contained 1.7 mg/l total iron, which was almost completely precipitated after five minutes of aeration.

The bench-scale test results indicate that aeration of ground water from the NIROP site will cause precipitation of significant amounts of iron hydroxide and calcium carbonate. The precipitated solids would cause potential operation or maintenance problems for certain types of ground water treatment equipment. These conclusions will be used in the evaluation of remedial alternatives conducted in the Feasibility Study.

6. SURFACE WATER INVESTIGATION

6.1 Surface Water Characteristics

(No changes to the June 1987 RI Report.)

6.2 Ground Water/Surface Water Relationship

(No changes to the June 1987 RI Report.)

6.3 Surface Water Use

(No changes to the June 1987 RI Report.)

6.4 Surface Water Contamination

A summary of TCE concentrations detected at the raw water intake of the Minneapolis Water Treatment Plant for the period July 1981 to August 1982 is presented in the June 1987 RI Report (Table 6-1, page 6-4). A limited amount of water quality data is available after 1982 for the raw water (intake) supply to the Minneapolis Water Treatment Plant. Results of samples collected for the period November 1983 to December 1984 are shown in Table 6-1 in this report. MPCA personnel also reported by telephone that a sample of the raw water supply to the Water Treatment Plant collected in April 1984 contained 0.0034 mg/l TCE.

Additional analyses of the finished (treated) water from the Minneapolis Water Treatment Plant for the period December 1986 to December 1987 are shown in Table 6-2. The data indicate that the TCE concentration in the finished water during 1987 was consistently less than 0.001 mg/l.

TABLE 6-1
RESULTS OF WATER QUALITY ANALYSES
AT THE MINNEAPOLIS WATER TREATMENT PLANT

Compound	Sample of Nov 30, 1983		Sample of Dec. 28, 1983		Sample of Aug. 3, 1984		Sample of Dec. 7,1984	
	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water	Raw Water	Treated Water
Bromodichloromethane	< 0.0005	0.0008	< 0.0005	0.0007	< 0.0005	0.0011	< 0.0005	0.0007
Chloroform	< 0.0002	0.0081	0.0002	0.0074	< 0.0002	0.0089	0.0007	0.0055
Cis-1,2-Dichloroethylene	< 0.0002	< 0.0002	0.0005	0.0003	0.0002	< 0.0002	0.0005	0.0002
Methylene Chloride	0.0012	0.0015	0.0012	< 0.001	0.0020	0.0027	< 0.0010	< 0.0010
1,1,1-Trichloroethane	< 0.0002	< 0.0002	0.0003	< 0.0002	< 0.0002	< 0.0002	0.0002	< 0.0002
Trichloroethylene	0.0004	0.0002	0.0031	0.0015	0.0011	0.0002	0.0024	0.0015

NOTES:

(1) All values are in mg/l.

(2) Only compounds detected for at least one source are presented.

(3) Samples were collected by the Minnesota Department of Health (MDH).

(4) Water Treatment Plant raw water is essentially Mississippi River water at the intake.

TABLE 6-2
TCE CONCENTRATIONS IN TREATED WATER
FROM THE MINNEAPOLIS WATER TREATMENT PLANT

Sample Date	TCE, mg/l
December 8, 1986	None detected(1)
February 23, 1987	0.0008
May 20, 1987	0.0004
August 24, 1987	0.0005
December 7, 1987	0.0003

NOTES:

(1) Method detection limit reported to be 0.0002 mg/l.

(2) Data received by telephone from representative of the Water Supply Division of the Minnesota Department of Public Health (MDH).

(3) Samples were collected by the MDH. No raw water (intake) samples were collected with the treated water.

(4) Treated water samples were collected at randomly selected residental and commercial water taps on the distribution system.

7. ASSESSMENT OF POTENTIAL IMPACT OF EXISTING GROUND WATER CONTAMINATION TO PUBLIC HEALTH

7.1 Introduction

Section 7 is updated to reflect information obtained through additional investigations subsequent to the June 1987 RI Report. In particular, additional water quality data, information on ground water flow paths, and re-evaluation of river dilution were used to recalculate risk levels for observed TCE levels in ground water. The risk assessment was evaluated for the potential receptor area of the Minneapolis municipal water supply intake located approximately one mile downstream of the NIROP on the Mississippi River.

The public health assessment presented in this section includes a comparison of calculated incremental carcinogenic risk from the presence of TCE in river water at the intake to the City of Minneapolis Water Treatment Plant to the allowable risk criteria published by the USEPA (USEPA, 1986a). The evaluation method used in the assessment also followed USEPA guidelines (USEPA, 1986a). The assessment does not take the routine treatment of raw river water (and the resulting decrease in TCE concentrations) into account when calculating risk levels to water users.

The allowable carcinogenic risk range established by the USEPA is 10^{-4} to 10^{-7}. These values are defined as a risk in the range of 1-in-10,000 to 1-in-10 million that an adult weighing 154 pounds who drinks 2.1 quarts of water, contaminated with a corresponding range of a cancer-causing constituent, per day for 70 years will develop cancer.

7.2 Summary of Existing Conditions

- Significant levels of contamination were detected at two locations on the NIROP: the former pit/trench disposal area at the north end of the NIROP, and the southeast corner of the NIROP. A less significant off-site source northeast of the NIROP, and other possible off-site sources east and north of the NIROP, may contribute to the contamination plume. Ground water flow from each of the two major on-site contamination source areas appears to converge at some point beneath the plant and discharge to the southwest, off-site.

- Contaminant transport is controlled by an apparent old river bed which traverses from north to south across the property and beneath the plant, and then to the southwest. The less-permeable till layer normally present beneath the NIROP is absent in this area.

- Contaminants discharging to the river are subject to dilution in proportion to the ratio of ground water flow to river flow within the effective mixing zone. Dilution factors were calculated assuming 10 and 100 percent dilution. These dilution factors are much higher than values calculated for the June 1987 RI Report, for the following reasons:

  - Estimated ground water flow to the river decreased from 180,000 ft^3/day to 68,000 ft^3/day based on new estimates of hydraulic conductivity and ground water gradients.

  - Mississippi River mean annual flow was used in place of the 5-year, 1-day low flow, resulting in an increase from 100 million ft^3/day to 660 million ft^3/day. Mean annual flow was considered a more appropriate estimate for use in the calculation of risk over an extended period of time, consistent with other assumptions used by the USEPA to develop the acceptable carcinogenic risk range (USEPA, 1986a). The previous calculation (RMT, 1987a) represented the risk associated with a relatively infrequent hydrologic occurrence and not what a water user is typically exposed to over a life-time.

  - Concentrations of TCE at the water intake reported by the Minnesota Department of Health are bracketed by the 10 and 100 percent dilution factors, suggesting that this model may be representative of actual conditions.

- The volumetric flow rates used above for calculation of the dilution factor were offset somewhat by use of a higher average TCE concentration in downgradient off-site wells. The average TCE concentration calculated for the June 1987 RI Report was 1.85 mg/l, compared to 3.4 mg/l calculated from the previous data updated to include the January 1988 data.

7.3 Evaluation of the Impact of Existing Conditions to Public Health

7.3.1 Method of Evaluation

There were no changes to this section other than the use of new dilution factors, as discussed in Section 7.2

7.3.2 Deviations and Assumptions

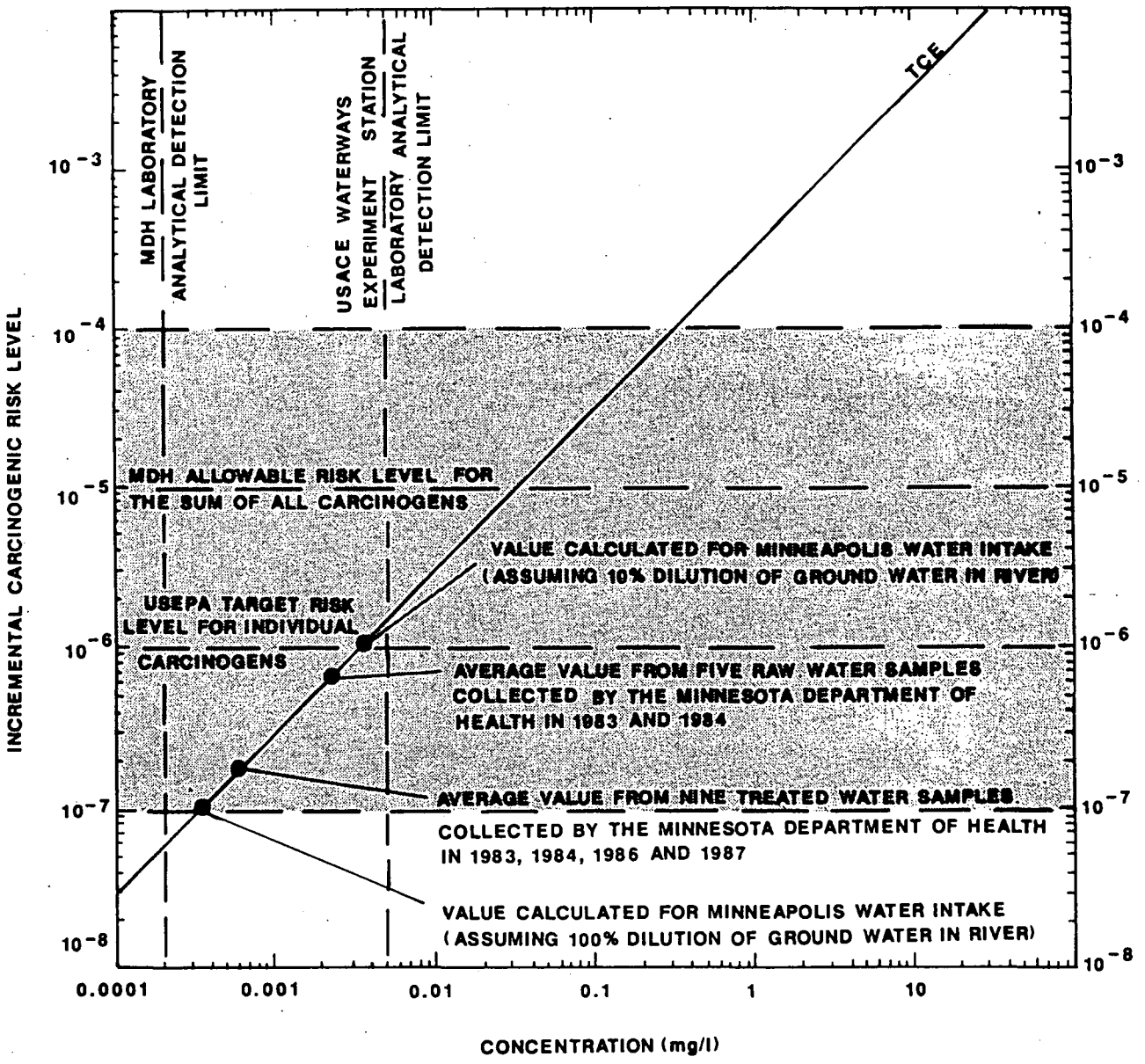
No VOCs were detected in storm sewer samples collected during January 1988. This supports the previous assumption that the discharge to the river from storm sewers which receive flow from the NIROP does not currently impact the VOC concentrations detected at the city water supply intake.

7.3.3 Computation of Results

Results of the incremental carcinogenic risk calculations for TCE at the Minneapolis water supply intake attributable to contaminated ground water discharging to the river to the southwest of the NIROP are presented graphically on Figure 7-1. The following discussion presents additional information related to these calculations.

- Calculated values of TCE concentrations at the Minneapolis municipal water intake were 0.0035 mg/l assuming 10 percent dilution, and 0.00035 mg/l assuming 100 percent dilution. This is a decrease of an order of magnitude from values calculated for the June 1987 RI Report.

- The TCE concentration calculated at the water supply intake based on the assumption of 10 percent dilution results in a carcinogenic risk level for TCE just above 10^{-6} (Figure 7-1), the USEPA target risk level for individual carcinogens. This is well within the USEPA allowable risk range of 10^{-4} to 10^{-7}.



INCREMENTAL CARCINOGENIC RISK LEVELS AT THE MINNEAPOLIS WATER TREATMENT PLANT INTAKE FOR CALCULATED AND MEASURED TCE CONCENTRATIONS

NOTES:

1. THE USEPA ALLOWABLE RISK RANGE OF 10^{-4} TO 10^{-7} IS REPRESENTED BY THE SHADED AREA.
2. THE INCREMENTAL CARCINOGENIC RISK LEVEL IS CALCULATED BASED ON ASSUMPTIONS DISCUSSED IN TEXT SECTION 7.

RMT INC

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Date	7/6/88
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FIGURE 7-1

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- The TCE concentration calculated at the water supply intake based on the assumption of 100 per cent dilution results in a risk level for TCE near 10^{-7}, nearly 10 times lower than the USEPA target risk value, and at the low end of the USEPA allowable risk range.

7.4 Evaluation of Possible Future Effects

Downgradient TCE concentrations may continue to increase, as observed between November 1986 and January 1988. This conclusion is based on discovery of high TCE concentrations at the intermediate depth in the southeast corner of the NIROP. Neither the source nor extent of contamination at this location is adequately defined. This area of contamination, in addition to other poorly defined potential off-site sources, preclude reliable estimates of downgradient TCE concentrations in the future.

The Minnesota Department of Health (MDH) discontinued sampling and analysis of the Minneapolis water supply intake for TCE after 1984. Therefore, TCE concentration trends in the river water at the location of the water supply intake over the last four years cannot be determined.

However, TCE analyses of finished (treated) water from the Minneapolis Water Treatment Plant from samples collected by the MDH quarterly from the fourth quarter of 1986 through the fourth quarter of 1987 showed only trace amounts of TCE (less than 0.001 mg/l), with a decreasing concentration trend during this period. These results indicate that, although the TCE concentration in ground water discharging to the river downgradient of the NIROP increased significantly during 1987, the TCE concentration in treated water from the water treatment plant decreased over this same period, and was

always within acceptable levels. Therefore, it is likely that the incremental effect of continued increasing TCE concentrations in the ground water downgradient of the NIROP on treated water TCE concentrations from the city water treatment plant will be negligible in the near future. The TCE concentration in both the intake water and treated water at the city water treatment plant should be monitored closely for possible indications of an increasing concentration trend.

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9. TERMINOLOGY GUIDE

(No revisions or additions to the June 1987 RI Report).

APPENDIX A

CHRONOLOGICAL SUMMARY OF CONSTITUENTS DETECTED IN AT LEAST ONE SAMPLE FROM NIROP GROUND WATER ANALYSES

Chronological Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l).

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Oct-83	1,1,1-Trichloroethane	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010		
Oct-83	1,1-Dichloroethane	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.017	<0.010		<0.010	<0.010	<0.010		<0.010		
Oct-83	1,1-Dichloroethene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010		
Oct-83	Arsenic, Total																		
Oct-83	Benzene	P 0.010	0.022		0.021	P 0.010	P 0.010		<0.010	P 0.010	P 0.010		0.014	<0.010	P 0.010		P 0.010		
Oct-83	Bis(2ethylhexyl)Phthalate																		
Oct-83	Cadmium, Total	0.0085	0.0051		0.0024	0.0013	0.0031		0.0014	0.0076	0.0033		0.0013	0.0019	0.0029		0.0014		
Oct-83	Chloroform	<0.010	<0.010		<0.010	P 0.010	<0.010		P 0.010	<0.010	<0.010		P 0.010	P 0.010	<0.010		<0.010		
Oct-83	Chromium, Total	0.037	0.005		0.011	0.057	0.004		0.007	0.020	0.008		0.003	0.013	0.005		0.003		
Oct-83	Cis 1,2-Dichloroethene(ethyl)																		
Oct-83	Copper, Total	0.054	0.010		0.004	0.214	0.021		0.012	0.004	0.017		0.011	0.027	0.012		<0.001		
Oct-83	Ethylbenzene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.037	<0.010		<0.010	<0.010	<0.010		<0.010		
Oct-83	Lead, Total	0.035	0.025		<0.001	0.334	0.025		0.003	0.093	0.025		0.001	0.021	0.013		0.002		
Oct-83	Manganese, Total	1.99	0.152		0.001	6.58	0.094		0.027	1.78	0.075		0.076	0.416	0.093		0.385		
Oct-83	Mercury, Total																		
Oct-83	Methylene Chloride	P 0.010	P 0.010		<0.010	41.0	0.011		6.0	0.010	0.030		0.011	0.00	<0.010		P 0.010		
Oct-83	Nickel, Total																		
Oct-83	PCB 1242	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001		
Oct-83	PCB 1248	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001		
Oct-83	PCB 1254	<0.0015	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001		
Oct-83	PCB 1260	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001		
Oct-83	Silver, Total	<0.001	<0.001		<0.001	<0.001	<0.001		<0.001	<0.001	<0.001		<0.001	<0.001	<0.001		<0.001		
Oct-83	Tetrachloroethene	<0.010	<0.010		P 0.010	<0.010	<0.010		<0.010	0.017	<0.010		<0.010	<0.010	<0.010		<0.010		
Oct-83	TOC	22.0	642.0		51.0	57.0	4.0		15.9	16.1	3.5		6.6	10.1	30.7		2.3		
Oct-83	Toluene	P 0.010	0.012		<0.010	P 0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	P 0.010		<0.010		
Oct-83	Trans 1,1-Dichloroethene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.075	<0.010		<0.010	<0.010	<0.010		<0.010		
Oct-83	Trichloroethene	<0.010	<0.010		<0.010	0.13	<0.010		0.062	20.0	P 0.010		0.001	P 0.010	<0.010		<0.010		
Oct-83	Zinc, Total	1.12	7.05		<0.05	3.98	2.91		<0.05	3.64	3.26		<0.05	1.69	2.07		<0.05		
Apr-84	1,1,1-Trichloroethane	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010				
Apr-84	1,1-Dichloroethane	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.026	<0.010		<0.010	<0.010	<0.010				
Apr-84	1,1-Dichloroethene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010				
Apr-84	Arsenic, Total	0.008	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005				
Apr-84	Benzene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		0.014	<0.010	<0.010				
Apr-84	Bis(2ethylhexyl)Phthalate	0.018	<0.010		<0.010	0.004	0.004		0.030	0.14	0.058		0.023	0.010	0.073				
Apr-84	Cadmium, Total	0.0016	0.0033		0.0017	0.0041	0.0014		0.0032	0.0010	0.0044		0.0092	0.0021	0.0015				
Apr-84	Chloroform	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010				
Apr-84	Chromium, Total	0.011	0.004		0.014	0.029	0.005		0.006	0.011	0.025		0.019	0.009	0.009				
Apr-84	Cis 1,2-Dichloroethene(ethyl)	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.076	<0.010		<0.010	<0.010	<0.010				
Apr-84	Copper, Total	0.019	0.056		0.041	0.060	0.029		0.019	0.026	0.053		0.034	0.041	0.056				
Apr-84	Ethylbenzene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.029	<0.010		<0.010	<0.010	<0.010				
Apr-84	Lead, Total	0.014	0.019		0.170	0.018	0.007		0.015	0.010	0.077		0.046	0.019	0.044				
Apr-84	Manganese, Total																		
Apr-84	Mercury, Total	<0.0004	<0.0004		<0.0004	<0.0015	<0.0004		0.0008	0.0013	<0.0004		<0.0004	0.0007	0.0004				
Apr-84	Methylene Chloride	<0.010	<0.010		0.022	<0.010	0.010		0.021	0.064	<0.010		0.11	<0.010	0.013				
Apr-84	Nickel, Total	0.024	0.03		0.008	0.107	0.053		0.005	0.022	0.01		0.049	0.017	0.005				
Apr-84	PCB 1242	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002				
Apr-84	PCB 1248	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		0.0004	<0.0002	<0.0002				
Apr-84	PCB 1254	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002				
Apr-84	PCB 1260	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002				
Apr-84	Silver, Total	<0.001	<0.001		<0.001	<0.001	<0.001		<0.001	<0.001	<0.001		<0.001	<0.001	<0.001				
Apr-84	Tetrachloroethene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.013	<0.010		<0.010	<0.010	<0.010				

Chronological Summary of Constituents Detected in at Least One Sample From NIRCP Ground Water Chemical Analyses (mg/l).

01-Jun-93 1322:52 ITP

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Apr-84	TOC	9.7	2.7		9.9	I	7.4		3.0	15.2	1.7		3.2	9.1	1.0				
Apr-84	Toluene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010				
Apr-84	Trans 1,1-Dichloroethene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.076	<0.010		<0.010	<0.010	<0.010				
Apr-84	Trichloroethene	<0.010	<0.010		<0.010	0.069	<0.010		0.014	5.0	0.023		0.001	<0.010	<0.010				
Apr-84	Zinc, Total	0.41	2.45		0.384	0.755	0.972		1.41	0.54	7.68		1.43	1.14	3.13				
Oct-84	1,1,1-Trichloroethane	<0.010	<0.010		<0.010	P 0.010	<0.010		<0.010	<0.010	<0.010		<0.010	P 0.010	<0.010				
Oct-84	1,1-Dichloroethane	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010				
Oct-84	1,1-Dichloroethene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010				
Oct-84	Arsenic, Total																		
Oct-84	Benzene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.100	<0.010	<0.010				
Oct-84	Bis(2ethylhexyl)Phthalate	0.002	<0.002		<0.012	<0.002	0.003		0.005	0.008	0.004		0.008	0.003	0.004				
Oct-84	Cadmium, Total																		
Oct-84	Chloroform	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010				
Oct-84	Chromium, Total																		
Oct-84	Cis 1,2-Dichloroethene(ethyl)	<0.010	<0.010		<0.010	<0.010	<0.010		0.024	0.084	<0.010		P 0.010	<0.010	<0.010				
Oct-84	Copper, Total																		
Oct-84	Ethylbenzene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	P 0.010	<0.010		<0.010	<0.010	<0.010				
Oct-84	Lead, Total	0.091	0.013		0.090	0.149	0.014		0.029	0.063	0.019		0.035	0.050	0.032				
Oct-84	Manganese, Total	3.68	0.095		0.775	1.89	0.368		0.203	2.12	0.180		0.109	0.420	0.231				
Oct-84	Mercury, Total																		
Oct-84	Methylene Chloride	<0.010	0.062		<0.010	0.029	P 0.010		0.20	0.13	P 0.010		0.012	0.014	0.44				
Oct-84	Nickel, Total																		
Oct-84	PCB 1242	0.0005	0.0002		0.0003	<0.0002	<0.0002		0.0005	<0.0002	0.0002		0.0003	0.0002	<0.0002				
Oct-84	PCB 1243	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		0.0002	<0.0002	<0.0002				
Oct-84	PCB 1254	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002				
Oct-84	PCB 1260	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0011				
Oct-84	Silver, Total																		
Oct-84	Tetrachlorethene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	P 0.010	<0.010		<0.010	<0.010	<0.010				
Oct-84	TOC																		
Oct-84	Toluene	<0.010	P 0.010		P 0.010	<0.010	<0.010		P 0.010	P 0.010	<0.010		<0.010	P 0.010	P 0.010				
Oct-84	Trans 1,1-Dichloroethene	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.004	<0.010		<0.010	<0.010	<0.010				
Oct-84	Trichloroethene	<0.010	<0.010		<0.010	0.061	P 0.010		0.024	1.3	0.013		P 0.010	<0.010	<0.010				
Oct-84	Zinc, Total	1.68	4.75		1.31	3.14	0.469		0.743	3.39	0.959		0.425	6.20	0.995				
Jan-85	1,1,1-Trichloroethane	<0.005	<0.005		<0.005	P 0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005				
Jan-85	1,1-Dichloroethane	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005				
Jan-85	1,1-Dichloroethene	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005				
Jan-85	Arsenic, Total																		
Jan-85	Benzene	P 0.005	P 0.005		P 0.005	P 0.005	<0.005		0.023	P 0.005	P 0.005		P 0.005	0.0061	P 0.005				
Jan-85	Bis(2ethylhexyl)Phthalate	<0.00001	<0.00001		0.00007	<0.00001	<0.00001		<0.00001	<0.00001	<0.00001		<0.00001	<0.00001	<0.00001				
Jan-85	Cadmium, Total																		
Jan-85	Chloroform	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005				
Jan-85	Chromium, Total																		
Jan-85	Cis 1,2-Dichloroethene(ethyl)																		
Jan-85	Copper, Total																		
Jan-85	Ethylbenzene	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005				
Jan-85	Lead, Total	0.027	0.042		0.053	0.082	0.020		0.011	0.035	0.024		0.015	0.020	0.013				
Jan-85	Manganese, Total	1.76	0.064		0.705	1.40	0.214		0.247	1.72	0.230		0.102	0.522	0.362				
Jan-85	Mercury, Total																		
Jan-85	Methylene Chloride	0.30	0.11		P 0.005	P 0.005	0.03		0.012	0.0067	<0.0005		0.0065	0.065	P 0.0005				
Jan-85	Nickel, Total																		
Jan-85	PCB 1242	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002		<0.0002	<0.0002	<0.0002				

Chronological Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l).

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Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Jan-85	PCB 1248	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002				
Jan-85	PCB 1254	< 0.0002	0.0005		0.0003	0.0011	0.0002		0.0005	0.0007	0.0003		0.0003	0.0004	< 0.0002				
Jan-85	PCB 1260	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002				
Jan-85	Silver, Total																		
Jan-85	Tetrachlorethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005				
Jan-85	TOC																		
Jan-85	Toluene	P 0.005	0.0099		0.011	P 0.005	P 0.005		0.028	P 0.005	0.0072		0.014	< 0.005	0.0061				
Jan-85	Trans 1,1-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	0.17	< 0.005		< 0.005	< 0.005	< 0.005				
Jan-85	Trichloroethene	< 0.005	< 0.005		< 0.005	0.060	P 0.005		0.011	0.63	0.017		P 0.005	< 0.005	< 0.005				
Jan-85	Zinc, Total	0.546	9.25		1.02	0.602	4.07		0.273	1.40	2.13		0.686	1.31	1.14				
Jun-85	1,1,1-Trichloroethane	< 0.005	< 0.005		< 0.005	0.0058	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jun-85	1,1-Dichloroethane	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jun-85	1,1-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jun-85	Arsenic, Total																		
Jun-85	Benzene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jun-85	Bis(2ethylhexyl)Phthalate	< 0.005	< 0.005		<0.00001	0.0038	0.0032		<0.00001	0.0036	0.0049		0.0013	0.0047	0.0030		0.0059		
Jun-85	Cadmium, Total																		
Jun-85	Chloroform	0.0014	0.0026		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jun-85	Chromium, Total																		
Jun-85	Cis 1,2-Dichloroethene(ethyl)																		
Jun-85	Copper, Total																		
Jun-85	Ethylbenzene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jun-85	Lead, Total	0.010	0.054		0.018	0.293	0.023		0.039	0.026	0.045		0.011	0.084	0.029		0.026		
Jun-85	Manganese, Total	1.15	0.065		0.044	6.98	0.516		0.439	3.16	0.091		0.139	1.81	0.093		0.424		
Jun-85	Mercury, Total																		
Jun-85	Methylene Chloride	< 0.005	< 0.005		0.16	0.0057	< 0.005		< 0.005	0.025	< 0.005		< 0.005	< 0.005	< 0.005		0.019		
Jun-85	Nickel, Total																		
Jun-85	PCB 1242	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002		
Jun-85	PCB 1248	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002		
Jun-85	PCB 1254	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002		
Jun-85	PCB 1260	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002		
Jun-85	Silver, Total																		
Jun-85	Tetrachlorethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jun-85	TOC																		
Jun-85	Toluene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		0.0065	< 0.005	< 0.005		0.014		
Jun-85	Trans 1,1-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	0.097	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jun-85	Trichloroethene	< 0.005	< 0.005		< 0.005	0.069	0.005		0.0097	0.52	0.014		< 0.005	< 0.005	< 0.005		< 0.005		
Jun-85	Zinc, Total	0.256	2.54		0.234	3.57	1.17		0.143	1.37	4.58		0.136	3.73	0.462		1.24		
Jan-86	1,1,1-Trichloroethane																		
Jan-86	1,1-Dichloroethane																		
Jan-86	1,1-Dichloroethene																		
Jan-86	Arsenic, Total																		
Jan-86	Benzene																		
Jan-86	Bis(2ethylhexyl)Phthalate																		
Jan-86	Cadmium, Total																		
Jan-86	Chloroform																		
Jan-86	Chromium, Total																		
Jan-86	Cis 1,2-Dichloroethene(ethyl)																		
Jan-86	Copper, Total																		
Jan-86	Ethylbenzene																		
Jan-86	Lead, Total																		

Chronological Summary of Constituents Detected in at Least One Sample From MIROP Ground Water Chemical Analyses (mg/l).

03-Jun-89 1332.52

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Jan-86	Manganese, Total																		
Jan-86	Mercury, Total																		
Jan-86	Methylene Chloride																		
Jan-86	Nickel, Total																		
Jan-86	PCB 1242																		
Jan-86	PCB 1248																		
Jan-86	PCB 1254																		
Jan-86	PCB 1260																		
Jan-86	Silver, Total																		
Jan-86	Tetrachlorethene																		
Jan-86	TOC																		
Jan-86	Toluene																		
Jan-86	Trans 1,1-Dichloroethene																		
Jan-86	Trichloroethene																		
Jan-86	Zinc, Total																		
Apr-86	1,1,1-Trichloroethane																		
Apr-86	1,1-Dichloroethane																		
Apr-86	1,1-Dichloroethene																		
Apr-86	Arsenic, Total																		
Apr-86	Benzene																		
Apr-86	Bis(2ethylhexyl)Phthalate																		
Apr-86	Cadmium, Total																		
Apr-86	Chloroform																		
Apr-86	Chromium, Total																		
Apr-86	Cis 1,2-Dichloroethene(ethyl)																		
Apr-86	Copper, Total																		
Apr-86	Ethylbenzene																		
Apr-86	Lead, Total																		
Apr-86	Manganese, Total																		
Apr-86	Mercury, Total																		
Apr-86	Methylene Chloride																		
Apr-86	Nickel, Total																		
Apr-86	PCB 1242																		
Apr-86	PCB 1248																		
Apr-86	PCB 1254																		
Apr-86	PCB 1260																		
Apr-86	Silver, Total																		
Apr-86	Tetrachlorethene																		
Apr-86	TOC																		
Apr-86	Toluene																		
Apr-86	Trans 1,1-Dichloroethene																		
Apr-86	Trichloroethene																		
Apr-86	Zinc, Total																		
Nov-85	1,1,1-Trichloroethane	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-85	1,1-Dichloroethane	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-85	1,1-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-85	2-Butanone	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.012		< 0.010		
Nov-85	Alkalinity	333	231		234	569	286		9.5	491	383		237	242	258		233		
Nov-85	Arsenic, Diss.	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-85	Arsenic, Total									< 0.005									
Nov-85	Barium, Diss	0.030	0.040		0.119	0.105	0.075		0.051	0.165	0.074		0.074	0.058	0.039		0.097		

Chronological Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l).

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Nov-86	Barium, Total									0.089									
Nov-86	Benzene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	Bis(2ethylhexyl)Phthalate																		
Nov-86	Cadmium, Diss.	< 0.0001	0.0004		0.0009	0.0006	0.0004		0.0005	0.0003	0.0004		0.0005	0.0006	0.0002		0.0005		
Nov-86	Cadmium, Total									0.0014									
Nov-86	Calcium, Diss.	101	86.8		81.5	169	110		21.1	157	115		110	64.9	99.3		90.4		
Nov-86	Calcium, Total									169									
Nov-86	Chloride	19.5	30.9		58.4	4.5	41.7		59.7	4.0	22.6		31.7	4.2	72.6		75.6		
Nov-86	Chloroform	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	Chromium, Diss.	0.005	0.002		0.002	0.003	0.001		0.002	0.003	0.001		0.002	0.002	0.001		< 0.001		
Nov-86	Chromium, Total									0.009									
Nov-86	Cis 1,2-Dichloroethene(ethyl)	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	0.29	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	Copper, Diss.	0.004	< 0.001		0.005	0.008	< 0.001		0.005	0.003	0.006		0.003	0.009	< 0.001		0.002		
Nov-86	Copper, Total									0.024									
Nov-86	Cyanide	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010		
Nov-86	Ethylbenzene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	Lead, Diss.	< 0.001	< 0.001		0.002	0.001	< 0.001		0.003	0.002	< 0.001		0.001	< 0.001	< 0.001		< 0.001		
Nov-86	Lead, Total									0.171									
Nov-86	Magnesium, Diss.	20.2	30.9		45.0	38.6	51.6		10.7	30.1	43.5		54.9	21.5	48.4		45.9		
Nov-86	Manganese, Diss.	1.07	0.090		0.046	0.198	0.392		0.002	1.04	0.076		0.052	0.005	0.362		0.210		
Nov-86	Manganese, Total									1.56									
Nov-86	Mercury, Diss.	< 0.0004	< 0.0004		< 0.0004	< 0.0004	< 0.0004		< 0.0004	< 0.0004	< 0.0004		< 0.0004	< 0.0004	< 0.0004		< 0.0004		
Nov-86	Mercury, Total									< 0.0004									
Nov-86	Methylene Chloride	0.013	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	Nickel, Diss.	0.009	0.003		< 0.001	0.005	0.002		0.007	< 0.001	0.004		< 0.001	0.009	< 0.001		0.014		
Nov-86	Nickel, Total									0.018									
Nov-86	Nitrate-Nitrogen				0.209	1.37			0.160	1.17			0.060	6.56			1.06		
Nov-86	PCB 1242																		
Nov-86	PCB 1248																		
Nov-86	PCB 1254																		
Nov-86	PCB 1260																		
Nov-86	Potassium, Diss.	3.93	2.20		3.20	3.69	2.67		36.0	3.05	2.20		2.62	2.79	2.43		3.52		
Nov-86	Selenium, Diss.	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	Selenium, Total									< 0.005									
Nov-86	Silver, Diss.	0.005	0.003		0.002	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001		
Nov-86	Silver, Total									0.001									
Nov-86	Sodium, Diss.	14.3	5.05		12.9	5.99	6.06		34.0	7.03	4.31		5.60	11.5	13.5		10.2		
Nov-86	Sulfates	77.5	129		96.0	56.3	104		130	97.0	203		304	45.2	140		85.9		
Nov-86	Tetrachloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	TOC																		
Nov-86	Toluene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	Trans 1,2-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	0.29	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	Trichloroethene	< 0.005	< 0.005		< 0.005	0.065	0.0092		0.0053	0.03	0.012		< 0.005	0.019	< 0.005		< 0.005		
Nov-86	Trichlorofluoromethane	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		0.0077	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Nov-86	Zinc, Diss.	0.133	1.25		0.068	0.951	0.568		< 0.020	0.131	0.042		0.057	0.674	0.492		0.036		
Nov-86	Zinc, Total									1.52									
Jan-89	1,1,1-Trichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.097	< 0.005
Jan-89	1,1-Dichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0089	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.106	< 0.005
Jan-89	1,1-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.007	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.014	< 0.005
Jan-89	Barium, Diss.	0.06	0.047	0.056	0.132	0.118	0.057	0.032	0.06	0.143	0.069	0.12	0.05	0.063	0.107	0.15	0.089	0.143	0.007
Jan-89	Benzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Chronological Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l). 03-Jun-88 1332.52 CST

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Jan-88	Chloroform	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Cis-1,2-Dichloroethylene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.31	< 0.005	0.7	< 0.005	< 0.005	< 0.005	0.092	< 0.005	1.41	< 0.005
Jan-88	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Manganese, Diss.	0.754	0.109	0.735	0.056	0.767	0.332	1.52	0.003	0.307	0.041	0.501	0.034	0.089	0.36	0.319	0.093	0.58	0.177
Jan-88	Methylene Chloride	< 0.005	< 0.005	J 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.1	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Selenium, Diss.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Tetrachloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.033	< 0.0058	< 0.005	< 0.005	< 0.005	< 0.005	0.141	< 0.005
Jan-88	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0057	< 0.005
Jan-88	Total Xylenes	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.036	< 0.005
Jan-88	Trans 1,2-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.22	< 0.005	< 0.005	< 0.005
Jan-88	Trichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	0.05	< 0.031	< 0.005	0.01	0.41	< 0.008	2.7	J 0.003	0.077	J 0.002	0.1	< 0.005	7.1	< 0.005
Jan-88	Trichlorofluoromethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Vinyl Chloride	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Jan-88	Zinc, Diss.	0.052	1.62	0.129	1.44	< 0.03	0.572	0.129	0.063	0.033	0.762	0.097	0.642	0.232	0.703	0.033	2.12	0.189	0.07

Chronological Summary of Constituents Detected in at Least One Sample From MIRGP Ground Water Chemical Analyses (mg/l).

03-Jun-88 1332.52 1??

Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-S	10-D	11-S	11-D	12-S	12-D	13-S	13-D
Oct-83	1,1,1-Trichloroethane	< 0.010		0.027															
Oct-83	1,1-Dichloroethane	< 0.010		< 0.010															
Oct-83	1,1-Dichloroethene	< 0.010		< 0.010															
Oct-83	Arsenic, Total																		
Oct-83	Benzene	< 0.010		P 0.010															
Oct-83	Bis(2ethylhexyl)Phthalate																		
Oct-83	Cadmium, Total	0.0068		0.0062															
Oct-83	Chloroform	< 0.010		< 0.010															
Oct-83	Chromium, Total	0.013		0.040															
Oct-83	Cis 1,2-Dichloroethene(ethyl)																		
Oct-83	Copper, Total	0.040		0.002															
Oct-83	Ethylbenzene	< 0.010		< 0.010															
Oct-83	Lead, Total	0.019		0.142															
Oct-83	Manganese, Total	2.74		6.54															
Oct-83	Mercury, Total																		
Oct-83	Methylene Chloride	< 0.010		< 0.010															
Oct-83	Nickel, Total																		
Oct-83	PCB 1242	< 0.0001		< 0.0001															
Oct-83	PCB 1248	< 0.0001		< 0.0001															
Oct-83	PCB 1254	< 0.0001		< 0.0001															
Oct-83	PCB 1260	< 0.0001		< 0.0001															
Oct-83	Silver, Total	< 0.001		< 0.001															
Oct-83	Tetrachloroethene	< 0.010		P 0.010															
Oct-83	TOC	649.0		27.6															
Oct-83	Toluene	< 0.010		< 0.010															
Oct-83	Trans 1,1-Dichloroethene	< 0.010		0.041															
Oct-83	Trichloroethene	< 0.010		1.0															
Oct-83	Zinc, Total	0.406		7.37															
Apr-84	1,1,1-Trichloroethane	< 0.010		0.096															
Apr-84	1,1-Dichloroethane	< 0.010		< 0.010															
Apr-84	1,1-Dichloroethene	< 0.010		< 0.010															
Apr-84	Arsenic, Total	< 0.005		< 0.005															
Apr-84	Benzene	< 0.010		< 0.010															
Apr-84	Bis(2ethylhexyl)Phthalate	0.016		0.22															
Apr-84	Cadmium, Total	0.0017		0.0017															
Apr-84	Chloroform	< 0.010		< 0.010															
Apr-84	Chromium, Total	0.006		0.027															
Apr-84	Cis 1,2-Dichloroethene(ethyl)	< 0.010		0.15															
Apr-84	Copper, Total	0.019		0.023															
Apr-84	Ethylbenzene	< 0.010		< 0.010															
Apr-84	Lead, Total	0.009		0.022															
Apr-84	Manganese, Total																		
Apr-84	Mercury, Total	< 0.0004		0.0009															
Apr-84	Methylene Chloride	< 0.010		< 0.010															
Apr-84	Nickel, Total	0.013		0.040															
Apr-84	PCB 1242	< 0.0002		< 0.0002															
Apr-84	PCB 1248	< 0.0002		< 0.0002															
Apr-84	PCB 1254	< 0.0002		< 0.0002															
Apr-84	PCB 1260	< 0.0002		< 0.0002															
Apr-84	Silver, Total	< 0.001		< 0.001															
Apr-84	Tetrachloroethene	< 0.010		0.042															

Chronological Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l).

Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Apr-84	TOC	13.5		13.2															
Apr-84	Toluene	< 0.010		< 0.010															
Apr-84	Trans 1,1-Dichloroethene	< 0.010		0.15															
Apr-84	Trichloroethene	< 0.010		0.94															
Apr-84	Zinc, Total	0.157		1.33															
Oct-84	1,1,1-Trichloroethane	< 0.010		0.069															
Oct-84	1,1-Dichloroethane	< 0.010		P 0.010															
Oct-84	1,1-Dichloroethene	< 0.010		< 0.010															
Oct-84	Arsenic, Total																		
Oct-84	Benzene	< 0.010		< 0.010															
Oct-84	Bis(2ethylhexyl)Phthalate	0.011		0.005															
Oct-84	Cadmium, Total																		
Oct-84	Chloroform	< 0.010		< 0.010															
Oct-84	Chromium, Total																		
Oct-84	Cis 1,2-Dichloroethene(ethyl)	< 0.010		0.017															
Oct-84	Copper, Total																		
Oct-84	Ethylbenzene	< 0.010		< 0.010															
Oct-84	Lead, Total	0.017		0.221															
Oct-84	Manganese, Total	2.31		2.37															
Oct-84	Mercury, Total																		
Oct-84	Methylene Chloride	0.029		0.070															
Oct-84	Nickel, Total																		
Oct-84	PCB 1242	0.0004		0.0002															
Oct-84	PCB 1248	< 0.0002		< 0.0002															
Oct-84	PCB 1254	< 0.0002		< 0.0002															
Oct-84	PCB 1260	< 0.0002		< 0.0002															
Oct-84	Silver, Total																		
Oct-94	Tetrachloroethene	< 0.010		0.030															
Oct-84	TOC																		
Oct-94	Toluene	< 0.010		< 0.010															
Oct-84	Trans 1,1-Dichloroethene	< 0.010		0.17															
Oct-94	Trichloroethene	< 0.010		0.03															
Oct-84	Zinc, Total	0.781		26.6															
Jan-95	1,1,1-Trichloroethane	< 0.005		< 0.005															
Jan-85	1,1-Dichloroethane	< 0.005		< 0.005															
Jan-85	1,1-Dichloroethene	< 0.005		< 0.005															
Jan-85	Arsenic, Total																		
Jan-85	Benzene	0.0059		0.010															
Jan-85	Bis(2ethylhexyl)Phthalate	<0.00001		<0.00001															
Jan-95	Cadmium, Total																		
Jan-95	Chloroform	< 0.005		< 0.005															
Jan-85	Chromium, Total																		
Jan-95	Cis 1,2-Dichloroethene(ethyl)																		
Jan-95	Copper, Total																		
Jan-95	Ethylbenzene	< 0.005		< 0.005															
Jan-85	Lead, Total	0.022		0.022															
Jan-95	Manganese, Total	3.86		1.46															
Jan-95	Mercury, Total																		
Jan-95	Methylene Chloride	0.011		0.026															
Jan-95	Nickel, Total																		
Jan-95	PCB 1242	< 0.0002		< 0.0002															

Chronological Summary of Constituents Detected in at Least One Sample From MIRCP Ground Water Chemical Analyses (mg/l).

03-Jun-89 1332.52 [illegible]

Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Jan-85	PCB 1248	< 0.0002		< 0.0002															
Jan-85	PCB 1254	0.0022		< 0.0002															
Jan-85	PCB 1260	< 0.0002		< 0.0002															
Jan-85	Silver, Total																		
Jan-85	Tetrachloroethene	< 0.005		< 0.005															
Jan-85	TOC																		
Jan-85	Toluene	< 0.005		< 0.005															
Jan-85	Trans 1,1-Dichloroethene	< 0.005		< 0.005															
Jan-85	Trichloroethene	< 0.005		< 0.005															
Jan-85	Zinc, Total	0.654		2.07															
Jun-85	1,1,1-Trichloroethane	< 0.005	< 0.005	0.043	< 0.005	< 0.005		0.039		0.39			< 0.005		< 0.005				
Jun-85	1,1-Dichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		0.066			< 0.005		< 0.005				
Jun-85	1,1-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		0.0092			< 0.005		< 0.005				
Jun-85	Arsenic, Total																		
Jun-85	Benzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005			< 0.005		< 0.005				
Jun-85	Bis(2ethylhexyl)Phthalate	0.0026	0.0036	0.00062	0.0030	0.00091		<0.00001		<0.00001			0.00033		0.00080				
Jun-85	Cadmium, Total																		
Jun-85	Chloroform	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005			< 0.005		< 0.005				
Jun-85	Chromium, Total																		
Jun-85	Cis 1,2-Dichloroethene(ethyl)																		
Jun-85	Copper, Total																		
Jun-85	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005			< 0.005		< 0.005				
Jun-85	Lead, Total	0.022	0.166	0.294	0.016	0.089		0.154		0.054			0.109		0.063				
Jun-85	Manganese, Total	4.09	0.312	4.29	0.361	27.50		11.9		2.07			0.74		5.00				
Jun-85	Mercury, Total																		
Jun-85	Methylene Chloride	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005			< 0.005		< 0.005				
Jun-85	Nickel, Total																		
Jun-85	PCB 1242	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002		< 0.0002		< 0.0002			< 0.0002		< 0.0002				
Jun-85	PCB 1248	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002		< 0.0002		< 0.0002			< 0.0002		< 0.0002				
Jun-85	PCB 1254	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002		< 0.0002		< 0.0002			< 0.0002		< 0.0002				
Jun-85	PCB 1260	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002		< 0.0002		< 0.0002			< 0.0002		< 0.0002				
Jun-85	Silver, Total																		
Jun-85	Tetrachloroethene	< 0.005	< 0.005	0.045	< 0.005	< 0.005		0.046		0.22			< 0.005		< 0.005				
Jun-85	TOC																		
Jun-85	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005			< 0.005		< 0.005				
Jun-85	Trans 1,1-Dichloroethene	< 0.005	< 0.005	0.093	< 0.005	< 0.005		0.19		0.50			0.015		0.036				
Jun-85	Trichloroethene	< 0.005	< 0.005	0.62	0.006	0.15		4.0		3.2			0.15		0.025				
Jun-85	Zinc, Total	0.419	6.02	3.42	2.30	1.16		1.81		1.10			1.38		1.47				
Jan-86	1,1,1-Trichloroethane					0.0065				0.29			< 0.005		< 0.005				
Jan-86	1,1-Dichloroethane					< 0.005				0.061			< 0.005		< 0.005				
Jan-86	1,1-Dichloroethene					< 0.005				0.0056			< 0.005		< 0.005				
Jan-86	Arsenic, Total																		
Jan-86	Benzene					< 0.005				< 0.005			< 0.005		< 0.005				
Jan-86	Bis(2ethylhexyl)Phthalate																		
Jan-86	Cadmium, Total																		
Jan-86	Chloroform					< 0.005				< 0.005			< 0.005		< 0.005				
Jan-86	Chromium, Total																		
Jan-86	Cis 1,2-Dichloroethene(ethyl)																		
Jan-86	Copper, Total																		
Jan-86	Ethylbenzene					< 0.005				< 0.005			< 0.005		< 0.005				
Jan-86	Lead, Total					0.107				0.025			0.043		0.070				

Chronological Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l).

25-Jun-88 1332.52 ???

Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Jan-86	Manganese, Total					9.30				1.30			9.59		2.23				
Jan-86	Mercury, Total																		
Jan-86	Methylene Chloride					<0.005				<0.005			<0.005		<0.005				
Jan-86	Nickel, Total																		
Jan-86	PCB 1242					<0.0002				<0.0002			<0.0002		<0.0002				
Jan-86	PCB 1248					<0.0002				<0.0002			<0.0002		<0.0002				
Jan-86	PCB 1254					<0.0002				<0.0002			<0.0002		<0.0002				
Jan-86	PCB 1260					<0.0002				<0.0002			<0.0002		<0.0002				
Jan-86	Silver, Total																		
Jan-86	Tetrachlorethene					<0.005				0.21			<0.005		<0.005				
Jan-86	TOC																		
Jan-86	Toluene					<0.005				<0.005			<0.005		<0.005				
Jan-86	Trans 1,1-Dichloroethene					<0.005				0.51			0.012		0.034				
Jan-86	Trichloroethene					0.134				4.2			0.134		0.044				
Jan-86	Zinc, Total					3.25				1.05			29.8		1.81				
Apr-86	1,1,1-Trichloroethane		<0.005		<0.005		<0.005		<0.005		<0.005						<0.005		<0.005
Apr-86	1,1-Dichloroethane		<0.005		<0.005		<0.005		<0.005		<0.005						<0.005		<0.005
Apr-86	1,1-Dichloroethene		<0.005		<0.005		<0.005		<0.005		<0.005						<0.005		<0.005
Apr-86	Arsenic, Total																		
Apr-86	Benzene		<0.005		<0.005		<0.005		0.0052		0.005						<0.005		<0.005
Apr-86	Bis(2ethylhexyl)Phthalate																		
Apr-86	Cadmium, Total																		
Apr-86	Chloroform		<0.005		<0.005		<0.005		<0.005		<0.005						<0.005		<0.005
Apr-86	Chromium, Total																		
Apr-86	Cis 1,2-Dichloroethene(ethyl)																		
Apr-86	Copper, Total																		
Apr-86	Ethylbenzene		<0.005		<0.005		<0.005		<0.005		<0.005						<0.005		<0.005
Apr-86	Lead, Total		0.061		0.133		0.034		0.112		0.061						0.366		0.033
Apr-86	Manganese, Total		0.138		0.503		0.695		0.003		0.523						10.7		1.89
Apr-86	Mercury, Total																		
Apr-86	Methylene Chloride		<0.005		<0.005		<0.005		<0.005		<0.005						<0.005		<0.005
Apr-86	Nickel, Total																		
Apr-86	PCB 1242		<0.0002		<0.0002		<0.0002		<0.0002		<0.0002						<0.0002		B
Apr-86	PCB 1248		<0.0002		<0.0002		<0.0002		<0.0002		<0.0002						<0.0002		B
Apr-86	PCB 1254		<0.0002		<0.0002		<0.0002		<0.0002		<0.0002						<0.0002		B
Apr-86	PCB 1260		<0.0002		<0.0002		<0.0002		<0.0002		<0.0002						<0.0002		B
Apr-86	Silver, Total																		
Apr-86	Tetrachlorethene		<0.005		<0.005		<0.005		<0.005		<0.005						<0.005		<0.005
Apr-86	TOC																		
Apr-86	Toluene		<0.005		<0.005		<0.005		<0.005		0.0092						<0.005		<0.005
Apr-86	Trans 1,1-Dichloroethene		<0.005		<0.005		<0.005		0.079		0.013						<0.005		<0.005
Apr-86	Trichloroethene		<0.005		0.0067		<0.005		5.7		0.25						<0.005		<0.005
Apr-86	Zinc, Total		4.02		5.57		10.4		14.90		4.45						6.11		6.12
Nov-86	1,1,1-Trichloroethane	<0.005	<0.005	0.12	<0.005	0.0051	<0.005	0.018	<0.005	0.12	0.0036		<0.005		<0.005		<0.005		<0.005
Nov-86	1,1-Dichloroethane	<0.005	<0.005	0.019	<0.005	<0.005	<0.005	0.0073	<0.005	0.035	<0.005		<0.005		<0.005		<0.005		<0.005
Nov-86	1,1-Dichloroethene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005		<0.005		<0.005		<0.005
Nov-86	2-Butanone	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		<0.010		<0.010		<0.010		<0.010
Nov-86	Alkalinity	492	387	456	260	522	387	469	267	435	362		492		426		417		374
Nov-86	Arsenic, Diss.	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005		<0.005		<0.005		<0.005
Nov-86	Arsenic, Total									0.022									
Nov-86	Barium, Diss	0.261	0.080	0.077	0.092	0.060	0.111	0.072	0.070	0.109	0.061		0.079		0.106		0.064		0.072

Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Nov-86	Barium, Total									0.936									
Nov-86	Benzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Nov-86	Bis(2ethylhexyl)Phthalate																		
Nov-86	Cadmium, Diss.	0.0009	< 0.0001	0.0004	< 0.0001	0.0008	0.0002	0.0009	0.0003	0.0006	0.0007		0.0006		< 0.0021		0.0013		0.0011
Nov-86	Cadmium, Total									0.0054									
Nov-86	Calcium, Diss.	186	117	145	102	216	113	134	113	133	122		143		158		126		154
Nov-86	Calcium, Total									154									
Nov-86	Chloride	50.0	3.2	32.7	72.5	18.7	36.0	5.9	47.7	15.2	42.9		36.6		23.2		45.7		13.7
Nov-86	Chloroform	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Nov-86	Chromium, Diss.	0.002	0.002	< 0.001	< 0.001	0.002	0.002	0.002	0.002	0.003	0.002		0.003		0.001		< 0.001		< 0.001
Nov-86	Chromium, Total									0.267									
Nov-86	Cis 1,2-Dichloroethene(ethyl)	< 0.005	< 0.005	0.58	< 0.005	< 0.005	< 0.005	0.24	0.048	0.34	0.028		0.036		0.022		< 0.005		< 0.005
Nov-86	Copper, Diss.	0.004	< 0.001	< 0.001	0.009	0.003	0.004	0.003	0.002	0.005	0.002		0.005		0.002		0.002		0.005
Nov-86	Copper, Total									0.377									
Nov-86	Cyanide	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010		< 0.010		< 0.010		< 0.010
Nov-86	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Nov-86	Lead, Diss.	< 0.001	< 0.001	0.002	0.003	0.002	0.002	< 0.001	0.002	0.003	0.011		0.005		< 0.001		0.001		0.005
Nov-86	Lead, Total									0.174									
Nov-86	Magnesium, Diss.	43.5	61.4	39.4	47.6	27.3	52.4	33.0	54.9	33.0	49.2		50.0		58.1		33.0		36.9
Nov-86	Manganese, Diss.	0.593	0.180	0.564	0.330	1.01	0.403	1.94	0.700	0.025	0.142		1.58		0.003		1.20		1.50
Nov-86	Manganese, Total									2.54									
Nov-86	Mercury, Diss.	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004		< 0.0004		< 0.0004		< 0.0004		< 0.0004
Nov-86	Mercury, Total									< 0.0004									
Nov-86	Methylene Chloride	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Nov-86	Nickel, Diss.	0.012	< 0.001	0.025	0.043	0.072	< 0.001	0.054	< 0.001	< 0.001	0.001		0.032		0.004		0.005		0.013
Nov-86	Nickel, Total									0.332									
Nov-86	Nitrate-Nitrogen	2.66			0.036	3.29	0.031	1.69	0.022	3.92	0.221		0.205		0.003		6.05		2.09
Nov-86	PCB 1242																		
Nov-86	PCB 1249																		
Nov-86	PCB 1254																		
Nov-86	PCB 1260																		
Nov-86	Potassium, Diss.	4.67	2.74	4.00	2.34	2.03	4.75	3.74	4.51	5.49	3.52		3.67		3.97		3.67		3.26
Nov-86	Selenium, Diss.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.049	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Nov-86	Selenium, Total									0.076									
Nov-86	Silver, Diss.	< 0.001	0.002	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001	0.002		< 0.001		< 0.001		0.001		< 0.001
Nov-86	Silver, Total									0.001									
Nov-86	Sodium, Diss.	18.0	3.57	26.0	15.0	6.77	9.36	6.89	11.0	29.2	19.5		16.5		7.44		17.1		6.50
Nov-86	Sulfates	192	184	172	176	148	251	193	272	91.7	189		224		362		56.4		213
Nov-86	Tetrachlorethene	< 0.005	< 0.005	0.20	< 0.005	< 0.005	< 0.005	0.046	< 0.005	0.12	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Nov-86	TOC																		
Nov-86	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Nov-86	Trans 1,2-Dichloroethene	< 0.005	< 0.005	0.58	< 0.005	< 0.005	< 0.005	0.24	0.048	0.34	0.028		0.036		0.022		< 0.005		< 0.005
Nov-86	Trichloroethene	< 0.005	< 0.005	3.0	0.011	0.13	< 0.005	9.2	10.7	1.3	0.55		0.21		0.022		< 0.005		< 0.005
Nov-86	Trichlorofluoromethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Nov-86	Zinc, Diss.	0.601	0.587	0.709	0.323	1.05	1.23	4.42	1.07	0.134	1.07		0.735		0.246		3.31		3.07
Nov-86	Zinc, Total									5.15									
Jan-88	1,1,1-Trichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.042	< 0.005	0.05	0.0055	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	1,1-Dichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.013	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	1,1-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Barium, Diss.	0.072	0.076	0.077	0.095	0.076	0.123	0.124	0.112	0.097	0.084	0.097	0.092	0.051	0.092	0.104	0.09	0.09	0.132
Jan-88	Benzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

Chronological Summary of Constituents Detected in at Least One Sample From WISOP Ground Water Chemical Analyses (mg/l). 03-Jun-88 1552.52 [illegible]

Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Jan-88	Chloroform	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Cis-1,2-Dichloroethylene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.16	< 0.005	0.17	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Manganese, Diss.	1.72	0.095	0.924	0.37	2.51	0.112	1.81	0.44	0.013	0.091	0.256	1.08	0.219	0.03	0.139	0.926	0.298	1.73
Jan-88	Methylene Chloride	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Selenium, Diss.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Tetrachloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Total Xylenes	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Trans 1,2-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.017	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Trichloroethene	< 0.005	< 0.005	0.32	< 0.0092	0.066	< 0.005	6.9	10.3	1.32	0.15	< 0.005	0.23	J 0.004	0.025	0.33	< 0.005	< 0.005	J 0.002
Jan-88	Trichlorofluoromethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Vinyl Chloride	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Jan-88	Zinc, Diss.	0.497	1.08	0.338	0.357	0.129	0.382	0.072	0.476	0.339	1.98	0.505	0.195	0.202	0.069	0.098	0.703	0.11	1.42

Chronological Summary of Constituents Detected in at Least One Sample From NIRGP Ground Water Chemical Analyses (mg/l).

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Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMCCS	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Oct-83	1,1,1-Trichloroethane																<0.010		
Oct-83	1,1-Dichloroethane																0.027		
Oct-83	1,1-Dichloroethene																<0.010		
Oct-83	Arsenic, Total																		
Oct-83	Benzene																0.010		
Oct-83	Bis(2ethylhexyl)Phthalate																		
Oct-83	Cadmium, Total																0.0013		
Oct-83	Chloroform																<0.010		
Oct-83	Chromium, Total																0.003		
Oct-83	Cis 1,2-Dichloroethene(ethyl)																		
Oct-83	Copper, Total																0.009		
Oct-83	Ethylbenzene																0.21		
Oct-83	Lead, Total																0.014		
Oct-83	Manganese, Total																0.957		
Oct-83	Mercury, Total																		
Oct-83	Methylene Chloride																<0.010		
Oct-83	Nickel, Total																		
Oct-83	PCB 1242																<0.0001		
Oct-83	PCB 1248																<0.0001		
Oct-83	PCB 1254																<0.0001		
Oct-83	PCB 1260																<0.0001		
Oct-83	Silver, Total																<0.050		
Oct-83	Tetrachloroethene																0.024		
Oct-83	TOC																3.6		
Oct-83	Toluene																<0.010		
Oct-83	Trans 1,1-Dichloroethene																0.12		
Oct-83	Trichloroethene																37.0		
Oct-83	Zinc, Total																4.09		
Apr-84	1,1,1-Trichloroethane																<0.010		
Apr-84	1,1-Dichloroethane																0.011		
Apr-84	1,1-Dichloroethene																<0.010		
Apr-84	Arsenic, Total																<0.005		
Apr-84	Benzene																<0.010		
Apr-84	Bis(2ethylhexyl)Phthalate																0.079		
Apr-84	Cadmium, Total																0.0051		
Apr-84	Chloroform																<0.010		
Apr-84	Chromium, Total																0.004		
Apr-84	Cis 1,2-Dichloroethene(ethyl)																0.076		
Apr-84	Copper, Total																0.032		
Apr-84	Ethylbenzene																0.065		
Apr-84	Lead, Total																0.057		
Apr-84	Manganese, Total																		
Apr-84	Mercury, Total																0.0012		
Apr-84	Methylene Chloride																<0.010		
Apr-84	Nickel, Total																0.007		
Apr-84	PCB 1242																<0.0002		
Apr-84	PCB 1248																<0.0002		
Apr-84	PCB 1254																<0.0002		
Apr-84	PCB 1260																<0.0002		
Apr-84	Silver, Total																<0.001		
Apr-84	Tetrachloroethene																<0.010		

Chronological Summary of Constituents Detected in at Least One Sample From MIROP Ground Water Chemical Analyses (mg/l).

07-Jun-89 1332.52 1??

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Apr-84	TOC																4.5		
Apr-84	Toluene																< 0.010		
Apr-84	Trans 1,1-Dichloroethene																0.096		
Apr-84	Trichloroethene																2.9		
Apr-84	Zinc, Total																2.95		
Oct-84	1,1,1-Trichloroethane																< 0.010		
Oct-84	1,1-Dichloroethane																P 0.010		
Oct-84	1,1-Dichloroethene																< 0.010		
Oct-84	Arsenic, Total																		
Oct-84	Benzene																< 0.010		
Oct-84	Bis(2ethylhexyl)Phthalate																0.013		
Oct-84	Cadmium, Total																		
Oct-84	Chloroform																< 0.010		
Oct-84	Chromium, Total																		
Oct-84	Cis 1,2-Dichloroethene(ethyl)																0.23		
Oct-84	Copper, Total																		
Oct-84	Ethylbenzene																0.099		
Oct-84	Lead, Total																0.020		
Oct-84	Manganese, Total																0.414		
Oct-84	Mercury, Total																		
Oct-84	Methylene Chloride																0.12		
Oct-84	Nickel, Total																		
Oct-84	PCB 1242																< 0.0002		
Oct-84	PCB 1248																< 0.0002		
Oct-84	PCB 1254																< 0.0002		
Oct-84	PCB 1260																< 0.0002		
Oct-84	Silver, Total																		
Oct-84	Tetrachloroethene																< 0.010		
Oct-84	TOC																		
Oct-84	Toluene																P 0.010		
Oct-84	Trans 1,1-Dichloroethene																0.23		
Oct-84	Trichloroethene																1.6		
Oct-84	Zinc, Total																1.56		
Jan-85	1,1,1-Trichloroethane																< 0.005		
Jan-85	1,1-Dichloroethane																0.011		
Jan-85	1,1-Dichloroethene																< 0.005		
Jan-85	Arsenic, Total																		
Jan-85	Benzene																0.0069		
Jan-85	Bis(2ethylhexyl)Phthalate																<0.00001		
Jan-85	Cadmium, Total																		
Jan-85	Chloroform																< 0.005		
Jan-85	Chromium, Total																		
Jan-85	Cis 1,2-Dichloroethene(ethyl)																		
Jan-85	Copper, Total																		
Jan-85	Ethylbenzene																< 0.005		
Jan-85	Lead, Total																0.021		
Jan-85	Manganese, Total																0.579		
Jan-85	Mercury, Total																		
Jan-85	Methylene Chloride																0.038		
Jan-85	Nickel, Total																		
Jan-85	PCB 1242																< 0.0002		

Chronological Summary of Constituents Detected in at Least One Sample From MIRCP Ground Water Chemical Analyses (mg/l).

07-Jun-88 1232.52 17?

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMCCC	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Jan-85	PCB 1248																<0.0002		
Jan-85	PCB 1254																<0.0002		
Jan-85	PCB 1260																<0.0002		
Jan-85	Silver, Total																		
Jan-85	Tetrachloroethene																P 0.005		
Jan-85	TOC																		
Jan-85	Toluene																<0.005		
Jan-85	Trans 1,1-Dichloroethene																0.10		
Jan-85	Trichloroethene																2.1		
Jan-85	Zinc, Total																0.919		
Jun-85	1,1,1-Trichloroethane																<0.005		
Jun-85	1,1-Dichloroethane																0.0063		
Jun-85	1,1-Dichloroethene																<0.005		
Jun-85	Arsenic, Total																		
Jun-85	Benzene																<0.005		
Jun-85	Bis(2ethylhexyl)Phthalate																<0.00001		
Jun-85	Cadmium, Total																		
Jun-85	Chloroform																<0.005		
Jun-85	Chromium, Total																		
Jun-85	Cis 1,2-Dichloroethene(ethyl)																		
Jun-85	Copper, Total																		
Jun-85	Ethylbenzene																0.016		
Jun-85	Lead, Total																0.018		
Jun-85	Manganese, Total																0.34		
Jun-85	Mercury, Total																		
Jun-85	Methylene Chloride																0.016		
Jun-85	Nickel, Total																		
Jun-85	PCB 1242																<0.0002		
Jun-85	PCB 1248																<0.0002		
Jun-85	PCB 1254																<0.0002		
Jun-85	PCB 1260																<0.0002		
Jun-85	Silver, Total																		
Jun-85	Tetrachloroethene																0.0053		
Jun-85	TOC																		
Jun-85	Toluene																<0.005		
Jun-85	Trans 1,1-Dichloroethene																0.11		
Jun-85	Trichloroethene																2.6		
Jun-85	Zinc, Total																0.730		
Jan-86	1,1,1-Trichloroethane																		
Jan-86	1,1-Dichloroethane																		
Jan-86	1,1-Dichloroethene																		
Jan-86	Arsenic, Total																		
Jan-86	Benzene																		
Jan-86	Bis(2ethylhexyl)Phthalate																		
Jan-86	Cadmium, Total																		
Jan-86	Chloroform																		
Jan-86	Chromium, Total																		
Jan-86	Cis 1,2-Dichloroethene(ethyl)																		
Jan-86	Copper, Total																		
Jan-86	Ethylbenzene																		
Jan-86	Lead, Total																		

Chronological Summary of Constituents Detected in at Least One Sample From NIRDP Ground Water Chemical Analyses (mg/l).

03-Jun-88 1232.52 13

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMCSU	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Jan-86	Manganese, Total																		
Jan-86	Mercury, Total																		
Jan-86	Methylene Chloride																		
Jan-86	Nickel, Total																		
Jan-86	PCB 1242																		
Jan-86	PCB 1248																		
Jan-86	PCB 1254																		
Jan-86	PCB 1260																		
Jan-86	Silver, Total																		
Jan-86	Tetrachlorethene																		
Jan-86	TOC																		
Jan-86	Toluene																		
Jan-86	Trans 1,1-Dichloroethene																		
Jan-86	Trichloroethene																		
Jan-86	Zinc, Total																		
Apr-86	1,1,1-Trichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Apr-86	1,1-Dichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Apr-86	1,1-Dichloroethene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Apr-86	Arsenic, Total																		
Apr-86	Benzene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Apr-86	Bis(2ethylhexyl)Phthalate																		
Apr-86	Cadmium, Total																		
Apr-86	Chloroform		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Apr-86	Chromium, Total																		
Apr-86	Cis 1,2-Dichloroethene(ethyl)																		
Apr-86	Copper, Total																		
Apr-86	Ethylbenzene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Apr-86	Lead, Total		0.101	0.054	0.073	0.060	0.120	0.097	0.152										
Apr-86	Manganese, Total		0.532	2.12	1.64	1.46	1.38	0.622	1.71										
Apr-86	Mercury, Total																		
Apr-86	Methylene Chloride		<0.005	0.0056	<0.005	<0.005	<0.005	<0.005	<0.005										
Apr-86	Nickel, Total																		
Apr-86	PCB 1242		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002										
Apr-86	PCB 1248		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002										
Apr-86	PCB 1254		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002										
Apr-86	PCB 1260		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002										
Apr-86	Silver, Total																		
Apr-86	Tetrachlorethene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Apr-86	TOC																		
Apr-86	Toluene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Apr-86	Trans 1,1-Dichloroethene		<0.005	<0.005	<0.005	0.044	4.7	<0.005	<0.005										
Apr-86	Trichloroethene		<0.005	0.017	0.096	0.19	2.9	0.042	<0.005										
Apr-86	Zinc, Total		17.5	17.5	6.11	4.55	9.38	3.21	4.25										
Nov-86	1,1,1-Trichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-86	1,1-Dichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								0.0072		
Nov-86	1,1-Dichloroethene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-86	2-Butanone		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010								<0.010		
Nov-86	Alkalinity		383	477	395	458	382	254	198								524		
Nov-86	Arsenic, Diss.		<0.005	<0.014	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-86	Arsenic, Total			0.045															
Nov-86	Barium, Diss		0.093	0.136	0.063	0.058	0.095	0.052	0.055								0.129		

Date	Parameter	14-D	14-S	15-S	16-S	17-S	19-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMCCC	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Nov-96	Barium, Total			0.172															
Nov-96	Benzene		<0.005	<0.005	<0.005	0.0065	<0.005	<0.005	<0.005								<0.005		
Nov-96	Bis(2ethylhexyl)Phthalate																		
Nov-96	Cadmium, Diss.		0.0021	0.0008	0.0010	0.0006	0.0005	0.0024	0.0009								0.0004		
Nov-96	Cadmium, Total			0.0194															
Nov-96	Calcium, Diss.		190	159	109	178	157	66.0	66.0								209		
Nov-96	Calcium, Total			207															
Nov-96	Chloride		58.0	15.0	4.6	25.6	26.6	54.6	15.3								12.9		
Nov-96	Chloroform		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-96	Chromium, Diss.		<0.001	0.002	0.001	0.003	0.002	0.002	0.001								0.001		
Nov-96	Chromium, Total			0.011															
Nov-96	Cis 1,2-Dichloroethene(ethyl)		<0.005	<0.005	<0.005	0.027	0.33	<0.005	<0.005								0.11		
Nov-96	Copper, Diss.		0.002	0.002	0.004	0.003	0.003	0.004	0.004								0.002		
Nov-96	Copper, Total			0.009															
Nov-96	Cyanide		<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010								<0.010		
Nov-96	Ethylbenzene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-96	Lead, Diss.		0.004	0.003	0.003	0.005	0.004	0.009	0.004								0.003		
Nov-96	Lead, Total			0.174															
Nov-96	Magnesium, Diss.		33.0	53.4	29.0	54.9	54.1	19.0	17.2								53.4		
Nov-96	Manganese, Diss.		0.376	1.96	1.84	0.368	0.920	0.034	0.038								1.00		
Nov-96	Manganese, Total			2.46															
Nov-96	Mercury, Diss.		<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004								<0.0004		
Nov-96	Mercury, Total			<0.0004															
Nov-96	Methylene Chloride		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-96	Nickel, Diss.		0.037	<0.001	0.005	0.003	<0.001	<0.001	0.004								<0.001		
Nov-96	Nickel, Total			0.039															
Nov-96	Nitrate-Nitrogen		17.0	0.029	0.110	2.02	0.016	2.74	0.434								0.020		
Nov-96	PCB 1242																		
Nov-96	PCB 1248																		
Nov-96	PCB 1254																		
Nov-96	PCB 1260																		
Nov-96	Potassium, Diss.		1.92	4.92	3.29	3.85	2.87	2.22	2.22								3.36		
Nov-96	Selenium, Diss.		0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-96	Selenium, Total			<0.005															
Nov-96	Silver, Diss.		<0.001	<0.001	<0.003	<0.001	<0.002	<0.002	<0.001								<0.001		
Nov-96	Silver, Total			<0.001															
Nov-96	Sodium, Diss.		5.77	10.6	4.14	16.3	0.19	41.1	9.45								7.19		
Nov-96	Sulfates		164	318	59.5	333	422	26.3	72.4								321		
Nov-96	Tetrachloroethene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-96	TOC																		
Nov-96	Toluene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-96	Trans 1,2-Dichloroethene		<0.005	<0.005	<0.005	0.027	0.33	<0.005	<0.005								0.11		
Nov-96	Trichloroethene		<0.005	0.0272	0.17	0.097	1.53	0.008	<0.005								1.3		
Nov-96	Trichlorofluoromethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Nov-96	Zinc, Diss.		3.25	1.34	2.07	2.21	4.71	3.78	3.10								0.526		
Nov-96	Zinc, Total			25.4															
Jan-98	1,1,1-Trichloroethane	<0.005	<0.005	<0.005	<0.001	<0.005	<0.005	<0.005	<0.005	0.003	0.017	J 0.002	<0.005	<0.005	0.75	<0.005	<0.005	<0.005	<0.005
Jan-98	1,1-Dichloroethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	J 0.004	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	0.014	<0.005	<0.005
Jan-98	1,1-Dichloroethene	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.021	<0.005	<0.005	<0.005	<0.005
Jan-98	Barium, Diss.	0.191	0.216	0.181	0.076	0.062	0.116	0.078	0.074	0.050	0.103	0.079	0.149	0.092	0.067	0.125	0.102	0.116	0.122
Jan-98	Benzene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Chronological Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l).

05-Jun-99 1332.52 13?

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC13	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Jan-89	Chloroform	< 0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Jan-89	Cis-1,2-Dichloroethylene	< 0.005	0.005	0.005	0.005	0.026	2.44	0.005	0.005	J 0.004	0.049	0.005	0.17	< 0.005	1.2	0.0072	0.34	0.005	0.005
Jan-89	Ethylbenzene	< 0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	J 0.004	0.005	0.005	0.005	0.005
Jan-89	Manganese, Diss.	0.707	0.729	2.33	1.41	0.333	1.12	0.007	0.149	0.987	0.372	0.043	1.74	0.52	1.05	1.01	1.02	0.314	0.327
Jan-89	Methylene Chloride	0.035	0.005	0.005	J 0.004	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.026	0.005
Jan-89	Selenium, Diss.	< 0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Jan-89	Tetrachloroethene	< 0.005	0.005	0.005	J 0.001	0.021	0.005	0.005	0.005	0.038	0.241	0.005	0.005	0.005	0.37	0.005	0.005	0.005	0.005
Jan-89	Toluene	< 0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.0074	0.005	0.005	0.005	0.005
Jan-89	Total Xylenes	< 0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.063	0.005	0.005	0.005	0.005
Jan-89	Trans 1,2-Dichloroethene	< 0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	J 0.0047	0.005	0.005
Jan-89	Trichloroethene	< 0.005	J 0.002	0.011	0.16	0.276	12.7	0.0062	0.005	0.4	0.4	J 0.004	0.023	0.005	11.3	0.6	1.3	0.005	0.005
Jan-89	Trichlorofluoroethane	< 0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Jan-89	Vinyl Chloride	< 0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Jan-89	Zinc, Diss.	< 0.03	1.58	1.33	2.19	2.01	1.97	1.25	0.022	0.033	< 0.03	0.121	0.033	< 0.03	0.03	0.065	0.206	0.032	0.03

APPENDIX B

ALPHABETICAL SUMMARY OF CONSTITUENTS DETECTED IN AT LEAST ONE SAMPLE FROM NIROP GROUND WATER ANALYSES

Alphabetical Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l).

03-Jun-88 1322.52 [illegible]

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Oct-83	1,1,1-Trichloroethane	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010		
Apr-84	1,1,1-Trichloroethane	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010				
Oct-84	1,1,1-Trichloroethane	< 0.010	< 0.010		< 0.010	P 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	P 0.010	< 0.010				
Jan-85	1,1,1-Trichloroethane	< 0.005	< 0.005		< 0.005	P 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005				
Jun-85	1,1,1-Trichloroethane	< 0.005	< 0.005		< 0.005	0.0058	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-86	1,1,1-Trichloroethane																		
Apr-86	1,1,1-Trichloroethane																		
Nov-86	1,1,1-Trichloroethane	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-88	1,1,1-Trichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.297	< 0.005
Oct-83	1,1-Dichloroethane	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	0.017	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010		
Apr-84	1,1-Dichloroethane	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	0.026	< 0.010		< 0.010	< 0.010	< 0.010				
Oct-84	1,1-Dichloroethane	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010				
Jan-85	1,1-Dichloroethane	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005				
Jun-85	1,1-Dichloroethane	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-86	1,1-Dichloroethane																		
Apr-86	1,1-Dichloroethane																		
Nov-86	1,1-Dichloroethane	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-88	1,1-Dichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0089	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.106	< 0.005
Oct-83	1,1-Dichloroethene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010		
Apr-84	1,1-Dichloroethene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010				
Oct-84	1,1-Dichloroethene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010				
Jan-85	1,1-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005				
Jun-85	1,1-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-86	1,1-Dichloroethene																		
Apr-86	1,1-Dichloroethene																		
Nov-86	1,1-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-88	1,1-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	J 0.003	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.014	< 0.005
Nov-86	2-Butanone	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010		
Nov-86	Alkalinity	333	231		234	569	286		8.5	481	302		239	242	258		232		
Nov-86	Arsenic, Diss.	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Oct-83	Arsenic, Total																		
Apr-84	Arsenic, Total	0.008	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005				
Oct-84	Arsenic, Total																		
Jan-85	Arsenic, Total																		
Jun-85	Arsenic, Total																		
Jan-86	Arsenic, Total																		
Apr-86	Arsenic, Total																		
Nov-86	Arsenic, Total									< 0.005									
Nov-86	Barium, Diss	0.088	0.040		0.119	0.105	0.075		0.051	0.165	0.074		0.034	0.258	0.099		0.092		
Jan-88	Barium, Diss.	0.06	0.047	0.256	0.132	0.118	0.037	0.232	0.06	0.142	0.069	0.12	0.05	0.063	0.107	0.15	0.088	0.143	0.002
Nov-86	Barium, Total									0.089									
Oct-83	Benzene	P 0.010	0.022		0.021	P 0.010	P 0.010		< 0.010	P 0.010	P 0.010		0.014	< 0.010	P 0.010		P 0.010		
Apr-84	Benzene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		0.014	< 0.010	< 0.010				
Oct-84	Benzene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.100	< 0.010	< 0.010				
Jan-85	Benzene	P 0.005	P 0.005		P 0.005	P 0.005	< 0.005		0.003	P 0.005	P 0.005		P 0.005	0.0061	P 0.005				
Jun-85	Benzene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-86	Benzene																		
Apr-86	Benzene																		
Nov-86	Benzene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-88	Benzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Oct-83	Bis(2ethylhexyl)Phthalate																		

< means not detected using detection limit shown; P means present but below detection limit; I means insufficient sample; J means estimated value; E means [illegible]

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Apr-84	Bis(2ethylhexyl)Phthalate	0.010	<0.010		<0.010	0.004	0.004		0.030	0.14	0.058		0.027	0.018	0.073				
Oct-84	Bis(2ethylhexyl)Phthalate	0.002	<0.002		<0.012	<0.002	0.003		0.005	0.008	0.004		0.008	0.003	0.004				
Jan-85	Bis(2ethylhexyl)Phthalate	<0.00001	<0.00001		0.00007	<0.00001	<0.00001		<0.00001	<0.00001	<0.00001		<0.00001	<0.00001	<0.00001				
Jun-85	Bis(2ethylhexyl)Phthalate	<0.005	<0.005		<0.00001	0.0038	0.0052		<0.00001	0.0036	0.0049		0.0013	0.0047	0.0030		0.0059		
Jan-86	Bis(2ethylhexyl)Phthalate																		
Apr-86	Bis(2ethylhexyl)Phthalate																		
Nov-86	Bis(2ethylhexyl)Phthalate																		
Nov-86	Cadmium, Diss.	<0.0001	0.0004		0.0008	0.0006	0.0004		0.0005	0.0003	0.0004		0.0005	0.0006	0.0002		0.0005		
Oct-83	Cadmium, Total	0.0005	0.0061		0.0024	0.0013	0.0031		0.0014	0.0076	0.0033		0.0013	0.0019	0.0029		0.0014		
Apr-84	Cadmium, Total	0.0016	0.0033		0.0017	0.0041	0.0014		0.0032	0.0010	0.0044		0.0092	0.0021	0.0015				
Oct-84	Cadmium, Total																		
Jan-85	Cadmium, Total																		
Jun-85	Cadmium, Total																		
Jan-86	Cadmium, Total																		
Apr-86	Cadmium, Total																		
Nov-86	Cadmium, Total									0.0014									
Nov-86	Calcium, Diss.	101	86.0		81.5	169	110		21.1	157	115		110	64.9	99.3		90.4		
Nov-86	Calcium, Total									169									
Nov-86	Chloride	19.5	30.9		58.4	4.5	41.7		59.7	4.8	22.6		31.7	4.2	72.6		75.6		
Oct-83	Chloroform	<0.010	<0.010		<0.010	P0.010	<0.010		P0.010	<0.010	<0.010		P0.010	P0.010	<0.010		<0.010		
Apr-84	Chloroform	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010				
Oct-84	Chloroform	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	<0.010	<0.010				
Jan-85	Chloroform	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005				
Jun-85	Chloroform	0.0014	0.0026		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005		
Jan-86	Chloroform																		
Apr-86	Chloroform																		
Nov-86	Chloroform	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005		
Jan-88	Chloroform	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nov-86	Chromium, Diss.	0.005	0.002		0.002	0.003	0.001		0.002	0.003	0.001		0.002	0.002	0.001		<0.001		
Oct-83	Chromium, Total	0.037	0.003		0.011	0.057	0.004		0.007	0.020	0.008		0.003	0.013	0.005		0.003		
Apr-84	Chromium, Total	0.011	0.004		0.014	0.029	0.005		0.006	0.011	0.025		0.019	0.009	0.008				
Oct-84	Chromium, Total																		
Jan-85	Chromium, Total																		
Jun-85	Chromium, Total																		
Jan-86	Chromium, Total																		
Apr-86	Chromium, Total																		
Nov-86	Chromium, Total									0.009									
Oct-83	Cis 1,2-Dichloroethene(ethyl)																		
Apr-84	Cis 1,2-Dichloroethene(ethyl)	<0.010	<0.010		<0.010	<0.010	<0.010		<0.010	0.076	<0.010		<0.010	<0.010	<0.010				
Oct-84	Cis 1,2-Dichloroethene(ethyl)	<0.010	<0.010		<0.010	<0.010	<0.010		0.024	0.004	<0.010		P0.010	<0.010	<0.010				
Jan-85	Cis 1,2-Dichloroethene(ethyl)																		
Jun-85	Cis 1,2-Dichloroethene(ethyl)																		
Jan-86	Cis 1,2-Dichloroethene(ethyl)																		
Apr-86	Cis 1,2-Dichloroethene(ethyl)																		
Nov-86	Cis 1,2-Dichloroethene(ethyl)	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	0.29	<0.005		<0.005	<0.005	<0.005		<0.005		
Jan-88	Cis-1,2-Dichloroethylene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.31	<0.005	0.7	<0.005	<0.005	<0.005	0.092	<0.005	1.41	<0.005
Nov-86	Copper, Diss.	0.004	<0.001		0.005	0.008	<0.001		0.003	0.003	0.006		0.002	0.009	<0.001		0.002		
Oct-83	Copper, Total	0.054	0.010		0.004	0.014	0.021		0.012	0.004	0.017		0.011	0.027	0.012		<0.001		
Apr-84	Copper, Total	0.017	0.056		0.041	0.068	0.029		0.017	0.026	0.053		0.074	0.041	0.056				
Oct-84	Copper, Total																		
Jan-85	Copper, Total																		

< means not detected using detection limit shown; P means present but below detection limit; I means insufficient sample; E means estimated value; * means broken.

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Jun-85	Copper, Total																		
Jan-86	Copper, Total																		
Apr-86	Copper, Total																		
Nov-86	Copper, Total									0.024									
Nov-86	Cyanide	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010		
Oct-83	Ethylbenzene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	0.037	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010		
Apr-84	Ethylbenzene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	0.029	< 0.010		< 0.010	< 0.010	< 0.010				
Oct-84	Ethylbenzene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	P 0.010	< 0.010		< 0.010	< 0.010	< 0.010				
Jan-85	Ethylbenzene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005				
Jun-85	Ethylbenzene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-86	Ethylbenzene																		
Apr-86	Ethylbenzene																		
Nov-86	Ethylbenzene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-88	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nov-86	Lead, Diss.	< 0.001	< 0.001		0.002	0.001	< 0.001		0.003	0.002	< 0.001		0.001	< 0.001	< 0.001		< 0.001		
Oct-83	Lead, Total	0.035	0.035		< 0.001	0.334	0.025		0.003	0.003	0.025		0.001	0.021	0.013		0.002		
Apr-84	Lead, Total	0.014	0.019		0.170	0.019	0.007		0.015	0.010	0.077		0.046	0.019	0.044				
Oct-84	Lead, Total	0.091	0.013		0.090	0.149	0.014		0.029	0.063	0.010		0.035	0.058	0.032				
Jan-85	Lead, Total	0.037	0.043		0.050	0.093	0.030		0.011	0.035	0.024		0.015	0.020	0.010				
Jun-85	Lead, Total	0.010	0.054		0.010	0.293	0.023		0.039	0.026	0.045		0.011	0.004	0.029		0.026		
Jan-86	Lead, Total																		
Apr-86	Lead, Total																		
Nov-86	Lead, Total									0.171									
Nov-86	Magnesium, Diss.	20.2	30.8		45.0	30.6	51.6		10.7	30.1	43.5		54.9	21.5	40.4		45.9		
Nov-86	Manganese, Diss.	1.07	0.090		0.045	0.199	0.392		0.002	1.04	0.076		0.052	0.005	0.362		0.210		
Jan-88	Manganese, Diss.	0.754	0.109	0.735	0.056	0.767	0.332	1.52	0.003	0.907	0.041	0.501	0.034	0.009	0.36	0.319	0.098	0.68	0.177
Oct-83	Manganese, Total	1.99	0.152		0.001	6.58	0.094		0.027	1.70	0.075		0.076	0.416	0.093		0.385		
Apr-84	Manganese, Total																		
Oct-84	Manganese, Total	3.68	0.095		0.775	1.09	0.360		0.283	2.12	0.100		0.109	0.430	0.231				
Jan-85	Manganese, Total	1.76	0.064		0.705	1.40	0.314		0.347	1.72	0.098		0.102	0.323	0.362				
Jun-85	Manganese, Total	1.15	0.065		0.344	6.90	0.516		0.439	3.16	0.091		0.139	1.01	0.093		0.424		
Jan-86	Manganese, Total																		
Apr-86	Manganese, Total																		
Nov-86	Manganese, Total									1.56									
Nov-86	Mercury, Diss.	< 0.0004	< 0.0004		< 0.0004	< 0.0004	< 0.0004		< 0.0004	< 0.0004	< 0.0004		< 0.0004	< 0.0004	< 0.0004		< 0.0004		
Oct-83	Mercury, Total																		
Apr-84	Mercury, Total	< 0.0004	< 0.0004		< 0.0004	< 0.0015	< 0.0004		0.0009	0.0013	< 0.0024		< 0.0004	0.0007	0.0004				
Oct-84	Mercury, Total																		
Jan-85	Mercury, Total																		
Jun-85	Mercury, Total																		
Jan-86	Mercury, Total																		
Apr-86	Mercury, Total																		
Nov-86	Mercury, Total									< 0.0004									
Oct-83	Methylene Chloride	P 0.010	P 0.010		< 0.010	41.0	0.011		6.0	0.010	0.030		0.011	0.00	< 0.010		P 0.010		
Apr-84	Methylene Chloride	< 0.010	< 0.010		0.022	< 0.010	0.010		0.021	0.064	< 0.010		0.11	< 0.010	0.013				
Oct-84	Methylene Chloride	< 0.010	0.062		< 0.010	0.029	P 0.010		0.20	0.13	P 0.010		0.012	0.014	0.44				
Jan-85	Methylene Chloride	0.30	0.11		P 0.005	P 0.005	0.33		0.012	0.0057	0.0005		0.0065	0.065	P 0.0005				
Jun-85	Methylene Chloride	< 0.005	< 0.005		0.16	0.0057	< 0.005		< 0.005	0.025	< 0.005		< 0.005	< 0.005	< 0.005		0.017		
Jan-86	Methylene Chloride																		
Apr-86	Methylene Chloride																		
Nov-86	Methylene Chloride	0.013	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		

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Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Jan-88	Methylene Chloride	< 0.005	< 0.005	J 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.1	< 0.005	< 0.005	< 0.005	< 0.005
Nov-86	Nickel, Diss.	0.009	0.003		< 0.001	0.005	0.002		0.007	< 0.001	0.004		< 0.001	0.009	< 0.001		0.014		
Oct-83	Nickel, Total																		
Apr-84	Nickel, Total	0.024	0.03		0.008	0.107	0.053		0.005	0.022	0.01		0.043	0.017	0.006				
Oct-84	Nickel, Total																		
Jan-85	Nickel, Total																		
Jun-85	Nickel, Total																		
Jan-86	Nickel, Total																		
Apr-86	Nickel, Total																		
Nov-86	Nickel, Total									0.018									
Nov-86	Nitrate-Nitrogen				0.289	1.37			0.160	1.17			0.950	6.56			1.06		
Oct-83	PCB 1242	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001		
Apr-84	PCB 1242	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002				
Oct-84	PCB 1242	0.0005	0.0002		0.0003	< 0.0002	< 0.0002		0.0005	< 0.0002	0.0002		0.0003	0.0002	< 0.0002				
Jan-85	PCB 1242	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002				
Jun-85	PCB 1242	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002		
Jan-86	PCB 1242																		
Apr-86	PCB 1242																		
Nov-86	PCB 1242																		
Oct-83	PCB 1248	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001		
Apr-84	PCB 1248	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		0.0004	< 0.0002	< 0.0002				
Oct-84	PCB 1248	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		0.0002	< 0.0002	< 0.0002				
Jan-85	PCB 1248	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002				
Jun-85	PCB 1248	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002		
Jan-86	PCB 1248																		
Apr-86	PCB 1248																		
Nov-86	PCB 1248																		
Oct-83	PCB 1254	< 0.0015	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001		
Apr-84	PCB 1254	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002				
Oct-84	PCB 1254	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002				
Jan-85	PCB 1254	< 0.0002	0.0005		0.0003	0.0011	0.0002		0.0005	0.0007	0.0003		0.0003	0.0004	0.0002				
Jun-85	PCB 1254	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002		
Jan-86	PCB 1254																		
Apr-86	PCB 1254																		
Nov-86	PCB 1254																		
Oct-83	PCB 1260	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001		< 0.0001		
Apr-84	PCB 1260	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002				
Oct-84	PCB 1260	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0011				
Jan-85	PCB 1260	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002				
Jun-85	PCB 1260	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002	< 0.0002	< 0.0002		< 0.0002		
Jan-86	PCB 1260																		
Apr-86	PCB 1260																		
Nov-86	PCB 1260																		
Nov-86	Potassium, Diss.	3.93	2.20		3.29	3.69	2.67		36.3	3.85	2.20		2.62	2.79	2.43		3.52		
Nov-86	Selenium, Diss.	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-88	Selenium, Diss.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nov-86	Selenium, Total									< 0.005									
Nov-86	Silver, Diss.	0.005	0.002		0.002	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001		
Oct-83	Silver, Total	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001		
Apr-84	Silver, Total	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001				
Oct-84	Silver, Total																		

< means not detected using detection limit shown; P means present but below detection limit; I means insufficient sample; J means estimated value; B means broken.

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Jan-85	Silver, Total																		
Jun-85	Silver, Total																		
Jan-86	Silver, Total																		
Apr-86	Silver, Total																		
Nov-86	Silver, Total									0.001									
Nov-86	Sodium, Diss.	14.3	5.85		12.9	5.99	6.06		34.8	7.83	4.31		5.68	11.5	13.5		10.2		
Nov-86	Sulfates	77.5	129		96.8	56.3	194		170	97.8	283		304	45.2	148		85.9		
Oct-83	Tetrachlorethene	< 0.010	< 0.010		P 0.010	< 0.010	< 0.010		< 0.010	0.017	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010		
Apr-84	Tetrachlorethene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	0.013	< 0.010		< 0.010	< 0.010	< 0.010				
Oct-84	Tetrachlorethene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	P 0.010	< 0.010		< 0.010	< 0.010	< 0.010				
Jan-85	Tetrachlorethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005				
Jun-85	Tetrachlorethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-86	Tetrachlorethene																		
Apr-86	Tetrachlorethene																		
Nov-86	Tetrachlorethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-88	Tetrachlorethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.033	0.0050	< 0.005	< 0.005	< 0.005	< 0.005	0.141	< 0.005
Oct-83	TOC	22.8	642.0		51.8	57.0	4.9		15.9	16.1	3.5		6.6	10.1	30.7		2.3		
Apr-84	TOC	9.7	2.7		9.9	I	7.4		3.0	15.2	1.7		3.2	9.1	1.0				
Oct-84	TOC																		
Jan-85	TOC																		
Jun-85	TOC																		
Jan-86	TOC																		
Apr-86	TOC																		
Nov-86	TOC																		
Oct-83	Toluene	P 0.010	0.012		< 0.010	P 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	P 0.010		< 0.010		
Apr-84	Toluene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010				
Oct-84	Toluene	< 0.010	P 0.010		P 0.010	< 0.010	< 0.010		P 0.010	P 0.010	< 0.010		< 0.010	P 0.010	P 0.010				
Jan-85	Toluene	P 0.005	0.0099		0.011	P 0.005	P 0.005		0.020	P 0.005	0.0072		0.014	< 0.005	0.0061				
Jun-85	Toluene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		0.0065	< 0.005	< 0.005		0.014		
Jan-86	Toluene																		
Apr-86	Toluene																		
Nov-86	Toluene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-88	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0057	< 0.005
Jan-88	Total Xylenes	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.036	< 0.005
Oct-83	Trans 1,1-Dichloroethene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	0.075	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010		
Apr-84	Trans 1,1-Dichloroethene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	0.076	< 0.010		< 0.010	< 0.010	< 0.010				
Oct-84	Trans 1,1-Dichloroethene	< 0.010	< 0.010		< 0.010	< 0.010	< 0.010		< 0.010	0.084	< 0.010		< 0.010	< 0.010	< 0.010				
Jan-85	Trans 1,1-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	0.17	< 0.005		< 0.005	< 0.005	< 0.005				
Jun-85	Trans 1,1-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	0.097	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-86	Trans 1,1-Dichloroethene																		
Apr-86	Trans 1,1-Dichloroethene																		
Nov-86	Trans 1,2-Dichloroethene	< 0.005	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005	0.29	< 0.005		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-88	Trans 1,2-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.22	< 0.005	< 0.005	< 0.005
Oct-83	Trichloroethene	< 0.010	< 0.010		< 0.010	0.13	< 0.010		0.062	28.0	P 0.010		0.081	P 0.010	< 0.010		< 0.010		
Apr-84	Trichloroethene	< 0.010	< 0.010		< 0.010	0.068	< 0.010		0.014	5.0	0.023		0.081	< 0.010	< 0.010				
Oct-84	Trichloroethene	< 0.010	< 0.010		< 0.010	0.061	P 0.010		0.024	1.3	0.013		P 0.010	< 0.010	< 0.010				
Jan-85	Trichloroethene	< 0.005	< 0.005		< 0.005	0.050	P 0.005		0.011	0.52	0.017		P 0.005	< 0.005	< 0.005				
Jun-85	Trichloroethene	< 0.005	< 0.005		< 0.005	0.067	0.005		0.0037	0.62	0.014		< 0.005	< 0.005	< 0.005		< 0.005		
Jan-86	Trichloroethene																		
Apr-86	Trichloroethene																		
Nov-86	Trichloroethene	< 0.005	< 0.005		< 0.005	0.065	0.0072		0.0057	0.33	0.012		< 0.005	0.017	< 0.005		< 0.005		

< means not detected using detection limit shown; P means present but below detection limits; I means insufficient sample; E means estimated value; R means rerun.

Alphabetical Summary of Constituents Detected in at Least One Sample From NIPDP Ground Water Chemical Analyses (mg/l).

03-Jun-88 1322.52 ET

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Jan-88	Trichloroethene	<0.005	<0.005	<0.005	<0.005	0.05	0.031	<0.005	0.01	0.41	0.088	2.7	J0.003	0.077	J0.002	0.1	<0.005	7.1	<0.005
Nov-86	Trichlorofluoromethane	<0.005	<0.005		<0.005	<0.005	<0.005		0.0077	<0.005	<0.005		<0.005	<0.005	<0.005		<0.005		
Jan-88	Trichlorofluoromethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Vinyl Chloride	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Nov-86	Zinc, Diss.	0.133	1.25		0.068	0.051	0.560		0.030	0.131	0.042		0.357	0.634	0.492		0.086		
Jan-88	Zinc, Diss.	0.052	1.62	0.129	1.44	<0.03	0.572	0.129	0.062	0.033	0.762	0.097	0.542	0.232	0.783	0.033	2.12	0.189	0.07
Oct-83	Zinc, Total	1.12	7.05		<0.05	3.98	2.91		<0.05	3.64	3.26		<0.05	1.69	2.07		<0.05		
Apr-84	Zinc, Total	0.41	2.45		0.384	0.755	0.972		1.41	0.54	7.68		1.43	1.14	3.13				
Oct-84	Zinc, Total	1.68	4.75		1.31	3.14	0.469		0.743	3.39	0.959		0.425	6.28	0.995				
Jan-85	Zinc, Total	0.546	9.25		1.02	0.682	4.07		0.273	1.40	2.13		0.686	1.31	1.14				
Jun-85	Zinc, Total	0.256	2.54		0.234	3.57	1.17		0.143	1.37	4.58		0.136	3.73	0.462		1.34		
Jan-86	Zinc, Total																		
Apr-86	Zinc, Total																		
Nov-86	Zinc, Total									1.52			-						

< means not detected using detection limit shown; P means present but below detection limit; I means insufficient sample; J means estimated value; B means broken.

Alphabetical Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l). 07-Jun-90 1332.52

Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Oct-83	1,1,1-Trichloroethane	< 0.010		0.027															
Apr-84	1,1,1-Trichloroethane	< 0.010		0.098															
Oct-84	1,1,1-Trichloroethane	< 0.010		0.069															
Jan-85	1,1,1-Trichloroethane	< 0.005		< 0.005															
Jun-85	1,1,1-Trichloroethane	< 0.005	< 0.005	0.043	< 0.005	< 0.005		0.039		0.39			< 0.005		< 0.005				
Jan-86	1,1,1-Trichloroethane					0.0065				0.29			< 0.005		< 0.005				
Apr-86	1,1,1-Trichloroethane		< 0.005		< 0.005		< 0.005		< 0.005		< 0.005						< 0.005		< 0.005
Nov-86	1,1,1-Trichloroethane	< 0.005	< 0.005	0.13	< 0.005	0.0051	< 0.005	0.010	< 0.005	0.12	0.0026		< 0.005		< 0.005		< 0.005		< 0.005
Jan-88	1,1,1-Trichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	J 0.003	< 0.005	0.042	< 0.005	0.05	0.0006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Oct-83	1,1-Dichloroethane	< 0.010		< 0.010															
Apr-84	1,1-Dichloroethane	< 0.010		< 0.010															
Oct-84	1,1-Dichloroethane	< 0.010		P 0.010															
Jan-85	1,1-Dichloroethane	< 0.005		< 0.005															
Jun-85	1,1-Dichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		0.066			< 0.005		< 0.005				
Jan-86	1,1-Dichloroethane					< 0.005				0.061			< 0.005		< 0.005				
Apr-86	1,1-Dichloroethane		< 0.005		< 0.005		< 0.005		< 0.005		< 0.005						< 0.005		< 0.005
Nov-86	1,1-Dichloroethane	< 0.005	< 0.005	0.019	< 0.005	< 0.005	< 0.005	0.0073	< 0.005	0.035	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Jan-88	1,1-Dichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.009	< 0.005	0.010	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Oct-83	1,1-Dichloroethene	< 0.010		< 0.010															
Apr-84	1,1-Dichloroethene	< 0.010		< 0.010															
Oct-84	1,1-Dichloroethene	< 0.010		< 0.010															
Jan-85	1,1-Dichloroethene	< 0.005		< 0.005															
Jun-85	1,1-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		0.0092			< 0.005		< 0.005				
Jan-86	1,1-Dichloroethene					< 0.005				0.0056			< 0.005		< 0.005				
Apr-86	1,1-Dichloroethene		< 0.005		< 0.005		< 0.005		< 0.005		< 0.005						< 0.005		< 0.005
Nov-86	1,1-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Jan-88	1,1-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	J 0.003	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nov-86	2-Butanone	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010		< 0.010		< 0.010		< 0.010
Nov-86	Alkalinity	497	303	456	260	533	303	469	267	436	362		493		426		417		374
Nov-86	Arsenic, Diss.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Oct-83	Arsenic, Total																		
Apr-84	Arsenic, Total	< 0.005		< 0.005															
Oct-84	Arsenic, Total																		
Jan-85	Arsenic, Total																		
Jun-85	Arsenic, Total																		
Jan-86	Arsenic, Total																		
Apr-86	Arsenic, Total																		
Nov-86	Arsenic, Total									0.023									
Nov-86	Barium, Diss	0.061	0.080	0.077	0.092	0.068	0.111	0.072	0.098	0.109	0.061		0.079		0.106		0.064		0.093
Jan-88	Barium, Diss.	0.072	0.078	0.077	0.095	0.076	0.108	0.104	0.112	0.097	0.084	0.097	0.092	0.051	0.092	0.104	0.08	0.09	0.132
Nov-86	Barium, Total									0.936									
Oct-83	Benzene	< 0.010		P 0.010															
Apr-84	Benzene	< 0.010		< 0.010															
Oct-84	Benzene	< 0.010		< 0.010															
Jan-85	Benzene	0.0059		0.010															
Jun-85	Benzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005			< 0.005		< 0.005				
Jan-86	Benzene					< 0.005				< 0.005			< 0.005		< 0.005				
Apr-86	Benzene		< 0.005		< 0.005		< 0.005		< 0.005		0.0052				0.005				0.005
Nov-86	Benzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Jan-88	Benzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Oct-83	Bis(2ethylhexyl)Phthalate																		

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Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Apr-84	Bis(2ethylhexyl)Phthalate	0.016		0.22															
Oct-84	Bis(2ethylhexyl)Phthalate	0.011		0.005															
Jan-85	Bis(2ethylhexyl)Phthalate	<0.00001		<0.00001															
Jun-85	Bis(2ethylhexyl)Phthalate	0.0026	0.0036	0.00062	0.0038	0.00091		<0.00001		<0.00001			0.00033		0.00090				
Jan-86	Bis(2ethylhexyl)Phthalate																		
Apr-86	Bis(2ethylhexyl)Phthalate																		
Nov-86	Bis(2ethylhexyl)Phthalate																		
Nov-86	Cadmium, Diss.	0.0009	<0.0001	0.0004	<0.0001	0.0008	0.0002	0.0009	0.0003	0.0006	0.0007		0.0006		<0.0001		0.0013		0.0011
Oct-83	Cadmium, Total	0.0068		0.0062															
Apr-84	Cadmium, Total	0.0017		0.0017															
Oct-84	Cadmium, Total																		
Jan-85	Cadmium, Total																		
Jun-85	Cadmium, Total																		
Jan-86	Cadmium, Total																		
Apr-86	Cadmium, Total																		
Nov-86	Cadmium, Total									0.0034									
Nov-86	Calcium, Diss.	186	117	145	102	216	113	134	113	133	122		143		158		126		154
Nov-86	Calcium, Total									154									
Nov-86	Chloride	50.0	3.2	32.7	72.5	18.7	36.0	5.9	47.7	15.2	42.9		36.6		23.2		45.7		13.7
Oct-83	Chloroform	<0.010		<0.010															
Apr-84	Chloroform	<0.010		<0.010															
Oct-84	Chloroform	<0.010		<0.010															
Jan-85	Chloroform	<0.005		<0.005															
Jun-85	Chloroform	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005		<0.005			<0.005		<0.005				
Jan-86	Chloroform					<0.005				<0.005			<0.005		<0.005				
Apr-86	Chloroform		<0.005		<0.005		<0.005		<0.005		<0.005						<0.005		<0.005
Nov-86	Chloroform	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005		<0.005		<0.005		<0.005
Jan-88	Chloroform	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nov-86	Chromium, Diss.	0.002	0.002	<0.001	<0.001	0.002	0.002	0.002	0.002	0.003	0.002		0.003		0.001		<0.001		<0.001
Oct-83	Chromium, Total	0.013		0.040															
Apr-84	Chromium, Total	0.006		0.027															
Oct-84	Chromium, Total																		
Jan-85	Chromium, Total																		
Jun-85	Chromium, Total																		
Jan-86	Chromium, Total																		
Apr-86	Chromium, Total																		
Nov-86	Chromium, Total									0.267									
Oct-83	Cis 1,2-Dichloroethene(ethyl)																		
Apr-84	Cis 1,2-Dichloroethene(ethyl)	<0.010		0.15															
Oct-84	Cis 1,2-Dichloroethene(ethyl)	<0.010		0.017															
Jan-85	Cis 1,2-Dichloroethene(ethyl)																		
Jun-85	Cis 1,2-Dichloroethene(ethyl)																		
Jan-86	Cis 1,2-Dichloroethene(ethyl)																		
Apr-86	Cis 1,2-Dichloroethene(ethyl)																		
Nov-86	Cis 1,2-Dichloroethene(ethyl)	<0.005	<0.005	0.59	<0.005	<0.005	<0.005	0.24	0.048	0.34	0.228		0.036		0.022		<0.005		<0.005
Jan-88	Cis-1,2-Dichloroethylene	<0.005	<0.005	0.029	<0.005	<0.005	<0.005	0.16	0.027	0.17	0.012	<0.005	0.045	<0.005	0.011	0.012	<0.005	<0.005	<0.005
Nov-86	Copper, Diss.	0.004	<0.001	<0.001	0.009	0.002	0.004	0.003	0.002	0.005	0.002		0.005		0.002		0.001		0.005
Oct-83	Copper, Total	0.040		0.092															
Apr-84	Copper, Total	0.013		0.023															
Oct-84	Copper, Total																		
Jan-85	Copper, Total																		

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Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Jun-85	Copper, Total																		
Jan-86	Copper, Total																		
Apr-86	Copper, Total																		
Nov-86	Copper, Total									0.377									
Nov-86	Cyanide	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010		< 0.010		< 0.010		< 0.010
Oct-83	Ethylbenzene	< 0.010		< 0.010															
Apr-84	Ethylbenzene	< 0.010		< 0.010															
Oct-84	Ethylbenzene	< 0.010		< 0.010															
Jan-85	Ethylbenzene	< 0.005		< 0.005															
Jun-85	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005			< 0.005		< 0.005				
Jan-86	Ethylbenzene					< 0.005				< 0.005			< 0.005		< 0.005				
Apr-86	Ethylbenzene		< 0.005		< 0.005		< 0.005		< 0.005		< 0.005						< 0.005		< 0.005
Nov-86	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Jan-88	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nov-86	Lead, Diss.	< 0.001	< 0.001	0.002	0.003	0.002	0.002	< 0.001	0.002	0.003	0.011		0.005		< 0.001		0.001		0.005
Oct-83	Lead, Total	0.010		0.142															
Apr-84	Lead, Total	0.008		0.022															
Oct-84	Lead, Total	0.017		0.221															
Jan-85	Lead, Total	0.022		0.023															
Jun-85	Lead, Total	0.022	0.166	0.294	0.016	0.009		0.154		0.054			0.109		0.063				
Jan-86	Lead, Total					0.107				0.035			0.040		0.030				
Apr-86	Lead, Total		0.061		0.133		0.034		0.112		0.061						0.366		0.033
Nov-86	Lead, Total									0.174									
Nov-86	Magnesium, Diss.	43.5	61.4	39.4	47.6	27.3	52.4	33.0	54.9	33.0	49.2		50.8		58.1		33.0		36.9
Nov-86	Manganese, Diss.	0.593	0.100	0.564	0.330	1.01	0.403	1.94	0.700	0.026	0.142		1.59		0.003		1.20		1.58
Jan-88	Manganese, Diss.	1.72	0.095	0.934	0.37	2.51	0.112	1.81	0.44	0.013	0.091	0.256	1.08	0.219	0.03	0.138	0.936	0.298	1.73
Oct-83	Manganese, Total	2.74		6.54															
Apr-84	Manganese, Total																		
Oct-84	Manganese, Total	2.31		2.37															
Jan-85	Manganese, Total	3.86		1.46															
Jun-85	Manganese, Total	4.09	0.312	4.29	0.361	27.50		11.0		2.07			8.74		5.60				
Jan-86	Manganese, Total					9.30				1.30			9.59		2.23				
Apr-86	Manganese, Total		0.130		0.503		0.695		0.003		0.523						10.7		1.09
Nov-86	Manganese, Total									2.54									
Nov-86	Mercury, Diss.	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004		< 0.0004		< 0.0004		< 0.0004		< 0.0004
Oct-83	Mercury, Total																		
Apr-84	Mercury, Total	< 0.0004		0.0009															
Oct-84	Mercury, Total																		
Jan-85	Mercury, Total																		
Jun-85	Mercury, Total																		
Jan-86	Mercury, Total																		
Apr-86	Mercury, Total																		
Nov-86	Mercury, Total									< 0.0004									
Oct-83	Methylene Chloride	< 0.010		< 0.010															
Apr-84	Methylene Chloride	< 0.010		< 0.010															
Oct-84	Methylene Chloride	0.029		0.070															
Jan-85	Methylene Chloride	0.011		0.025															
Jun-85	Methylene Chloride	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005			< 0.005		< 0.005				
Jan-86	Methylene Chloride					< 0.005				< 0.005			< 0.005		< 0.005				
Apr-86	Methylene Chloride		< 0.005		< 0.005		< 0.005		< 0.005		< 0.005						< 0.005		< 0.005
Nov-86	Methylene Chloride	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005

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Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Jan-88	Methylene Chloride	< 0.005	< 0.005	0.007	< 0.005	0.006	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.009	< 0.005	< 0.005	< 0.005	0.043	< 0.005	0.15
Nov-96	Nickel, Diss.	0.012	< 0.001	0.025	0.043	0.072	< 0.001	0.054	< 0.001	< 0.001	0.001		0.032		0.004		0.006		0.017
Oct-83	Nickel, Total																		
Apr-84	Nickel, Total	0.018		0.048															
Oct-84	Nickel, Total																		
Jan-85	Nickel, Total																		
Jun-85	Nickel, Total																		
Jan-86	Nickel, Total																		
Apr-86	Nickel, Total																		
Nov-86	Nickel, Total									0.332									
Nov-86	Nitrate-Nitrogen	2.66			0.026	3.29	0.071	1.69	0.022	3.92	0.221		0.205		0.003		6.05		2.09
Oct-83	PCB 1242	< 0.0001		< 0.0001															
Apr-84	PCB 1242	< 0.0002		< 0.0002															
Oct-84	PCB 1242	0.0004		0.0002															
Jan-85	PCB 1242	< 0.0002		< 0.0002															
Jun-85	PCB 1242	< 0.0002	< 0.0022	< 0.0002	< 0.0002	< 0.0002		< 0.0002		< 0.0002			< 0.0002		< 0.0002				
Jan-86	PCB 1242					< 0.0002				< 0.0002			< 0.0002		< 0.0002				
Apr-86	PCB 1242		< 0.0002		< 0.0002		< 0.0002		< 0.0002		< 0.0002						< 0.0002		B
Nov-86	PCB 1242																		
Oct-83	PCB 1248	< 0.0001		< 0.0001															
Apr-84	PCB 1248	< 0.0002		< 0.0002															
Oct-84	PCB 1248	< 0.0002		< 0.0002															
Jan-85	PCB 1248	< 0.0002		< 0.0002															
Jun-85	PCB 1248	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002		< 0.0002		< 0.0002			< 0.0002		< 0.0002				
Jan-86	PCB 1248					< 0.0002				< 0.0002			< 0.0002		< 0.0002				
Apr-86	PCB 1248		< 0.0002		< 0.0002		< 0.0002		< 0.0002		< 0.0002						< 0.0002		B
Nov-86	PCB 1248																		
Oct-83	PCB 1254	< 0.0001		< 0.0001															
Apr-84	PCB 1254	< 0.0002		< 0.0002															
Oct-84	PCB 1254	< 0.0002		< 0.0002															
Jan-85	PCB 1254	0.0002		< 0.0002															
Jun-85	PCB 1254	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002		< 0.0002		< 0.0002			< 0.0002		< 0.0002				
Jan-86	PCB 1254					< 0.0002				< 0.0002			< 0.0002		< 0.0002				
Apr-86	PCB 1254		< 0.0002		< 0.0002		< 0.0002		< 0.0002		< 0.0002						< 0.0002		B
Nov-86	PCB 1254																		
Oct-83	PCB 1260	< 0.0001		< 0.0001															
Apr-84	PCB 1260	< 0.0002		< 0.0002															
Oct-84	PCB 1260	< 0.0002		< 0.0002															
Jan-85	PCB 1260	< 0.0002		< 0.0002															
Jun-85	PCB 1260	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002		< 0.0002		< 0.0002			< 0.0002		< 0.0002				
Jan-86	PCB 1260					< 0.0002				< 0.0002			< 0.0002		< 0.0002				
Apr-86	PCB 1260		< 0.0002		< 0.0002		< 0.0002		< 0.0002		< 0.0002						< 0.0002		B
Nov-86	PCB 1260																		
Nov-86	Potassium, Diss.	4.67	2.74	4.20	2.34	2.83	4.75	3.74	4.51	5.43	3.52		3.67		3.97		3.67		3.2[illegible]
Nov-86	Selenium, Diss.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.049	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Jan-88	Selenium, Diss.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.08	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nov-86	Selenium, Total									0.076									
Nov-86	Silver, Diss.	< 0.001	0.003	< 0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	< 0.001	0.002		< 0.001		< 0.001		0.001		< 0.001
Oct-83	Silver, Total	< 0.001		< 0.001															
Apr-84	Silver, Total	< 0.001		< 0.001															
Oct-84	Silver, Total																		

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Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Jan-85	Silver, Total																		
Jun-85	Silver, Total																		
Jan-86	Silver, Total																		
Apr-86	Silver, Total																		
Nov-86	Silver, Total									0.001									
Nov-86	Sodium, Diss.	18.8	3.57	26.8	15.8	6.77	9.36	6.89	11.8	28.2	19.5		16.5		7.44		17.1		6.58
Nov-86	Sulfates	192	184	172	176	148	251	183	272	91.7	189		224		363		56.4		219
Oct-83	Tetrachlorethene	< 0.010		P 0.018															
Apr-84	Tetrachlorethene	< 0.010		0.042															
Oct-84	Tetrachlorethene	< 0.010		0.038															
Jan-85	Tetrachlorethene	< 0.005		< 0.005															
Jun-85	Tetrachlorethene	< 0.005	< 0.005	0.045	< 0.005	< 0.005		0.046		0.22			< 0.005		< 0.005				
Jan-86	Tetrachlorethene					< 0.005				0.21			< 0.005		< 0.005				
Apr-86	Tetrachlorethene		< 0.005		< 0.005		< 0.005		< 0.005		< 0.005						< 0.005		< 0.005
Nov-86	Tetrachlorethene	< 0.005	< 0.005	0.20	< 0.005	< 0.005	< 0.005	0.046	< 0.005	0.12	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Jan-88	Tetrachlorethene	< 0.005	< 0.005	0.026	< 0.005	< 0.005	< 0.005	0.031	< 0.005	0.11	< 0.005	< 0.005	0.021	< 0.005	< 0.005	J 0.001	< 0.005	< 0.005	< 0.005
Oct-83	TOC	649.0		27.6															
Apr-84	TOC	13.5		13.2															
Oct-84	TOC																		
Jan-85	TOC																		
Jun-85	TOC																		
Jan-86	TOC																		
Apr-86	TOC																		
Nov-86	TOC																		
Oct-83	Toluene	< 0.010		< 0.010															
Apr-84	Toluene	< 0.010		< 0.010															
Oct-84	Toluene	< 0.010		< 0.010															
Jan-85	Toluene	< 0.005		< 0.005															
Jun-85	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005			< 0.005		< 0.005				
Jan-86	Toluene					< 0.005				< 0.005			< 0.005		< 0.005				
Apr-86	Toluene		< 0.005		< 0.005		< 0.005		< 0.005		0.0082						< 0.005		< 0.005
Nov-86	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Jan-88	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Total Xylenes	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Oct-83	Trans 1,1-Dichloroethene	< 0.010		0.041															
Apr-84	Trans 1,1-Dichloroethene	< 0.010		0.15															
Oct-84	Trans 1,1-Dichloroethene	< 0.010		0.17															
Jan-85	Trans 1,1-Dichloroethene	< 0.005		< 0.005															
Jun-85	Trans 1,1-Dichloroethene	< 0.005	< 0.005	0.093	< 0.005	< 0.005		0.19		0.58			0.015		0.036				
Jan-86	Trans 1,1-Dichloroethene					< 0.005				0.51			0.012		0.034				
Apr-86	Trans 1,1-Dichloroethene		< 0.005		< 0.005		< 0.005		0.037		0.013						< 0.005		< 0.005
Nov-86	Trans 1,2-Dichloroethene	< 0.005	< 0.005	0.53	< 0.005	< 0.005	< 0.005	0.24	0.043	0.34	0.038		0.036		0.022		< 0.005		< 0.005
Jan-88	Trans 1,2-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.017	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Oct-83	Trichloroethene	< 0.010		1.8															
Apr-84	Trichloroethene	< 0.010		0.74															
Oct-84	Trichloroethene	< 0.010		0.53															
Jan-85	Trichloroethene	< 0.005		< 0.005															
Jun-85	Trichloroethene	< 0.005	< 0.005	0.52	0.006	0.15		4.0		3.2			0.15		0.025				
Jan-86	Trichloroethene					0.134				4.2			0.134		0.044				
Apr-86	Trichloroethene		< 0.005		0.0067		< 0.005		5.7		0.25						< 0.005		< 0.005
Nov-86	Trichloroethene	< 0.005	< 0.005	3.3	0.011	0.12	< 0.005	9.2	10.7	1.3	0.55		0.21		0.022		< 0.005		< 0.005

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Alphabetical Summary of Constituents Detected in at Least One Sample From NISOP Ground Water Chemical Analyses (mg/l).

03-Jun-99 1352.52 [illegible]

Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Jan-88	Trichloroethene	< 0.005	< 0.005	0.32	< 0.0092	0.066	< 0.005	6.9	10.3	1.32	0.15	< 0.005	0.23	J 0.004	0.035	0.33	< 0.005	< 0.005	J 0.002
Nov-86	Trichlorofluoroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005		< 0.005		< 0.005		< 0.005		< 0.005
Jan-88	Trichlorofluoroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-99	Vinyl Chloride	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nov-86	Zinc, Diss.	0.601	0.687	0.989	0.823	1.05	1.23	4.42	1.03	0.184	1.07		0.735		0.246		3.01		3.05
Jan-88	Zinc, Diss.	0.497	1.00	0.338	0.357	0.129	0.982	0.032	0.476	0.339	1.98	0.505	0.195	0.292	0.069	0.099	0.708	0.11	1.42
Oct-83	Zinc, Total	0.486		7.37															
Apr-84	Zinc, Total	0.157		1.33															
Oct-84	Zinc, Total	0.781		26.6															
Jan-85	Zinc, Total	0.654		2.07															
Jun-85	Zinc, Total	0.419	6.02	3.43	2.30	1.16		1.81		1.10			1.38		1.47				
Jan-86	Zinc, Total					3.25				1.05			29.8		1.01				
Apr-86	Zinc, Total		4.02		5.57		10.4		14.90		4.43						6.11		6.17
Nov-86	Zinc, Total									3.15									

< means not detected using detection limit shown; B means present but below detection limit; E means the MDL was greater; J means estimated (of or D means [illegible]

Alphabetical Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l).

03-Jun-93 1332.52 [illegible]

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Oct-83	1,1,1-Trichloroethane																<0.010		
Apr-84	1,1,1-Trichloroethane																<0.010		
Oct-84	1,1,1-Trichloroethane																<0.010		
Jan-85	1,1,1-Trichloroethane																<0.005		
Jun-85	1,1,1-Trichloroethane																<0.005		
Jan-86	1,1,1-Trichloroethane																		
Apr-86	1,1,1-Trichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Nov-86	1,1,1-Trichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Jan-88	1,1,1-Trichloroethane	<0.005	<0.005	<0.005	J 0.001	<0.005	<0.005	<0.005	<0.005	0.023	0.017	J 0.002	<0.005	<0.005	0.75	<0.005	<0.005	<0.005	<0.005
Oct-83	1,1-Dichloroethane																0.027		
Apr-84	1,1-Dichloroethane																0.011		
Oct-84	1,1-Dichloroethane																P 0.010		
Jan-85	1,1-Dichloroethane																0.011		
Jun-85	1,1-Dichloroethane																0.0063		
Jan-86	1,1-Dichloroethane																		
Apr-86	1,1-Dichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Nov-86	1,1-Dichloroethane		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								0.0073		
Jan-88	1,1-Dichloroethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	J 0.004	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	0.014	<0.005	<0.005
Oct-83	1,1-Dichloroethene																<0.010		
Apr-84	1,1-Dichloroethene																<0.010		
Oct-84	1,1-Dichloroethene																<0.010		
Jan-85	1,1-Dichloroethene																<0.005		
Jun-85	1,1-Dichloroethene																<0.005		
Jan-86	1,1-Dichloroethene																		
Apr-86	1,1-Dichloroethene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Nov-86	1,1-Dichloroethene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Jan-88	1,1-Dichloroethene	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.021	<0.005	<0.005	<0.005	<0.005
Nov-86	2-Butanone		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010								<0.010		
Nov-86	Alkalinity		383	477	395	458	302	264	190								504		
Nov-86	Arsenic, Diss.		<0.005	0.014	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Oct-83	Arsenic, Total																		
Apr-84	Arsenic, Total																<0.005		
Oct-84	Arsenic, Total																		
Jan-85	Arsenic, Total																		
Jun-85	Arsenic, Total																		
Jan-86	Arsenic, Total																		
Apr-86	Arsenic, Total																		
Nov-86	Arsenic, Total			0.045															
Nov-86	Barium, Diss		0.093	0.136	0.068	0.050	0.095	0.032	0.055								0.129		
Jan-88	Barium, Diss.	0.181	0.216	0.181	0.076	0.062	0.118	0.038	0.094	0.253	0.123	0.079	0.149	0.092	0.007	0.125	0.102	0.116	0.123
Nov-86	Barium, Total			0.172															
Oct-83	Benzene																0.010		
Apr-84	Benzene																<0.010		
Oct-84	Benzene																0.010		
Jan-85	Benzene																0.0069		
Jun-85	Benzene																<0.005		
Jan-86	Benzene																		
Apr-86	Benzene		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Nov-86	Benzene		<0.005	<0.005	<0.005	0.0065	<0.005	<0.005	<0.005								<0.005		
Jan-88	Benzene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Oct-83	Bis(2ethylhexyl)Phthalate																		

< means not detected using detection limit shown; P means present but below detection limit; I means insufficient sample; J means estimated value; B means header

Alphabetical Summary of Constituents Detected in at Least One Sample From NIRCP Ground Water Chemical Analyses (mg/l).

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMCII	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Apr-84	Bis(2ethylhexyl)Phthalate																0.079		
Oct-84	Bis(2ethylhexyl)Phthalate																0.013		
Jan-85	Bis(2ethylhexyl)Phthalate																<0.00001		
Jun-85	Bis(2ethylhexyl)Phthalate																<0.00001		
Jan-86	Bis(2ethylhexyl)Phthalate																		
Apr-86	Bis(2ethylhexyl)Phthalate																		
Nov-86	Bis(2ethylhexyl)Phthalate																		
Nov-86	Cadmium, Diss.		0.0021	0.0008	0.0010	0.0006	0.0005	0.0024	0.0009								0.0004		
Oct-83	Cadmium, Total																0.0013		
Apr-84	Cadmium, Total																0.0051		
Oct-84	Cadmium, Total																		
Jan-85	Cadmium, Total																		
Jun-85	Cadmium, Total																		
Jan-86	Cadmium, Total																		
Apr-86	Cadmium, Total																		
Nov-86	Cadmium, Total			0.0194															
Nov-86	Calcium, Diss.		190	159	188	178	157	66.3	66.0								208		
Nov-86	Calcium, Total			207															
Nov-86	Chloride		58.8	15.0	4.6	25.6	26.6	54.6	15.3								12.9		
Oct-83	Chloroform																<0.010		
Apr-84	Chloroform																<0.010		
Oct-84	Chloroform																<0.010		
Jan-85	Chloroform																<0.005		
Jun-85	Chloroform																<0.005		
Jan-86	Chloroform																		
Apr-86	Chloroform		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005										
Nov-86	Chloroform		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Jan-88	Chloroform	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nov-86	Chromium, Diss.		<0.001	0.002	0.001	0.003	0.002	0.002	0.001								0.001		
Oct-83	Chromium, Total																0.003		
Apr-84	Chromium, Total																0.004		
Oct-84	Chromium, Total																		
Jan-85	Chromium, Total																		
Jun-85	Chromium, Total																		
Jan-86	Chromium, Total																		
Apr-86	Chromium, Total																		
Nov-86	Chromium, Total			0.011															
Oct-83	Cis 1,2-Dichloroethene(ethyl)																		
Apr-84	Cis 1,2-Dichloroethene(ethyl)																0.096		
Oct-84	Cis 1,2-Dichloroethene(ethyl)																0.23		
Jan-85	Cis 1,2-Dichloroethene(ethyl)																		
Jun-85	Cis 1,2-Dichloroethene(ethyl)																		
Jan-86	Cis 1,2-Dichloroethene(ethyl)																		
Apr-86	Cis 1,2-Dichloroethene(ethyl)																		
Nov-86	Cis 1,2-Dichloroethene(ethyl)		<0.005	<0.005	<0.005	0.027	0.33	<0.005	<0.005								0.11		
Jan-88	Cis-1,2-Dichloroethylene	<0.005	<0.005	<0.005	<0.005	0.026	2.44	<0.005	<0.005	J 0.004	0.049	<0.005	0.17	<0.005	1.2	0.0072	0.34	<0.005	<0.005
Nov-86	Copper, Diss.		0.002	0.002	0.004	0.002	0.002	0.004	0.004								0.002		
Oct-83	Copper, Total																0.008		
Apr-84	Copper, Total																0.072		
Oct-84	Copper, Total																		
Jan-85	Copper, Total																		

* means not detected using detection limit shown; B means engaged in a value detection limit; I means interfering element; J means estimated value; N or P means Nickel.

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Jun-85	Copper, Total																		
Jan-86	Copper, Total																		
Apr-86	Copper, Total																		
Nov-86	Copper, Total			0.089															
Nov-86	Cyanide		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010									< 0.010		
Oct-83	Ethylbenzene																0.21		
Apr-84	Ethylbenzene																0.063		
Oct-84	Ethylbenzene																0.099		
Jan-85	Ethylbenzene																< 0.005		
Jun-85	Ethylbenzene																0.016		
Jan-86	Ethylbenzene																		
Apr-86	Ethylbenzene		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005										
Nov-86	Ethylbenzene		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005								< 0.005		
Jan-88	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	J 0.004	< 0.005	< 0.005	< 0.005	< 0.005
Nov-86	Lead, Diss.		0.004	0.003	0.003	0.005	0.004	0.007	0.004								0.003		
Oct-83	Lead, Total																0.014		
Apr-84	Lead, Total																0.057		
Oct-84	Lead, Total																0.030		
Jan-85	Lead, Total																0.021		
Jun-85	Lead, Total																0.010		
Jan-86	Lead, Total																		
Apr-86	Lead, Total		0.101	0.054	0.073	0.060	0.120	0.097	0.152										
Nov-86	Lead, Total			0.174															
Nov-86	Magnesium, Diss.		33.0	53.4	29.0	54.9	54.1	18.0	17.2								53.4		
Nov-86	Manganese, Diss.		0.376	1.96	1.04	0.388	0.920	0.034	0.059								1.00		
Jan-88	Manganese, Diss.	0.987	0.729	2.33	1.41	0.333	1.12	0.089	0.149	0.987	0.372	0.043	1.74	0.52	1.05	1.01	1.02	0.314	0.327
Oct-83	Manganese, Total																0.957		
Apr-84	Manganese, Total																		
Oct-84	Manganese, Total																0.414		
Jan-85	Manganese, Total																0.539		
Jun-85	Manganese, Total																0.34		
Jan-86	Manganese, Total																		
Apr-86	Manganese, Total		0.532	2.12	1.64	1.46	1.38	0.622	1.71										
Nov-86	Manganese, Total			2.46															
Nov-86	Mercury, Diss.		< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004								< 0.0004		
Oct-83	Mercury, Total																		
Apr-84	Mercury, Total																0.0012		
Oct-84	Mercury, Total																		
Jan-85	Mercury, Total																		
Jun-85	Mercury, Total																		
Jan-86	Mercury, Total																		
Apr-86	Mercury, Total																		
Nov-86	Mercury, Total			< 0.0004															
Oct-83	Methylene Chloride																< 0.010		
Apr-84	Methylene Chloride																< 0.010		
Oct-84	Methylene Chloride																0.12		
Jan-85	Methylene Chloride																0.073		
Jun-85	Methylene Chloride																0.016		
Jan-86	Methylene Chloride																		
Apr-86	Methylene Chloride		< 0.005	0.0055	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005										
Nov-86	Methylene Chloride		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005								< 0.005		

< means not detected using detection limit shown; P means present but below detection limit; I means insufficient sample; J means estimated value; R means proper

Alphabetical Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l).

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Jan-88	Methylene Chloride	0.005	<0.005	<0.005	J 0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.026	<0.005
Nov-86	Nickel, Diss.		0.037	<0.001	0.005	0.003	<0.001	<0.001	0.004								<0.001		
Oct-83	Nickel, Total																		
Apr-84	Nickel, Total																0.002		
Oct-84	Nickel, Total																		
Jan-85	Nickel, Total																		
Jun-85	Nickel, Total																		
Jan-86	Nickel, Total																		
Apr-86	Nickel, Total																		
Nov-86	Nickel, Total			0.039															
Nov-86	Nitrate-Nitrogen		17.0	0.028	0.110	2.02	0.016	2.74	0.434								0.020		
Oct-83	PCB 1242																<0.0001		
Apr-84	PCB 1242																<0.0002		
Oct-84	PCB 1242																<0.0002		
Jan-85	PCB 1242																<0.0002		
Jun-85	PCB 1242																<0.0002		
Jan-86	PCB 1242																		
Apr-86	PCB 1242		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002										
Nov-86	PCB 1242																		
Oct-83	PCB 1248																<0.0001		
Apr-84	PCB 1248																<0.0002		
Oct-84	PCB 1248																<0.0002		
Jan-85	PCB 1248																<0.0002		
Jun-85	PCB 1248																<0.0002		
Jan-86	PCB 1248																		
Apr-86	PCB 1248		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002										
Nov-86	PCB 1248																		
Oct-83	PCB 1254																<0.0001		
Apr-84	PCB 1254																<0.0002		
Oct-84	PCB 1254																<0.0002		
Jan-85	PCB 1254																<0.0002		
Jun-85	PCB 1254																<0.0002		
Jan-86	PCB 1254																		
Apr-86	PCB 1254		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002										
Nov-86	PCB 1254																		
Oct-83	PCB 1260																<0.0001		
Apr-84	PCB 1260																<0.0002		
Oct-84	PCB 1260																<0.0002		
Jan-85	PCB 1260																<0.0002		
Jun-85	PCB 1260																<0.0002		
Jan-86	PCB 1260																		
Apr-86	PCB 1260		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002										
Nov-86	PCB 1260																		
Nov-86	Potassium, Diss.		1.92	4.92	3.29	3.05	2.87	2.22	2.22								3.36		
Nov-86	Selenium, Diss.		0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005								<0.005		
Jan-88	Selenium, Diss.	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Nov-86	Selenium, Total			<0.005															
Nov-86	Silver, Diss.		<0.001	<0.001	0.002	<0.001	0.002	0.002	<0.001								<0.001		
Oct-83	Silver, Total																<0.050		
Apr-84	Silver, Total																<0.001		
Oct-84	Silver, Total																		

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Jan-85	Silver, Total																		
Jun-85	Silver, Total																		
Jan-86	Silver, Total																		
Apr-86	Silver, Total																		
Nov-86	Silver, Total			< 0.001															
Nov-86	Sodium, Diss.		5.77	18.6	4.14	16.8	8.18	41.1	9.45								7.19		
Nov-86	Sulfates		164	318	59.5	333	422	26.8	72.4								321		
Oct-83	Tetrachlorethene																0.024		
Apr-84	Tetrachlorethene																< 0.010		
Oct-84	Tetrachlorethene																< 0.010		
Jan-85	Tetrachlorethene																P 0.005		
Jun-85	Tetrachlorethene																0.0053		
Jan-86	Tetrachlorethene																		
Apr-86	Tetrachlorethene		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005										
Nov-86	Tetrachlorethene		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005								< 0.005		
Jan-88	Tetrachlorethene	< 0.005	< 0.005	< 0.005	J 0.001	0.021	< 0.005	< 0.005	< 0.005	0.038	0.041	< 0.005	< 0.005	< 0.005	0.37	< 0.005	< 0.005	< 0.005	< 0.005
Oct-83	TOC																3.6		
Apr-84	TOC																4.5		
Oct-84	TOC																		
Jan-85	TOC																		
Jun-85	TOC																		
Jan-86	TOC																		
Apr-86	TOC																		
Nov-86	TOC																		
Oct-83	Toluene																< 0.010		
Apr-84	Toluene																< 0.010		
Oct-84	Toluene																P 0.010		
Jan-85	Toluene																< 0.005		
Jun-85	Toluene																< 0.005		
Jan-86	Toluene																		
Apr-86	Toluene		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005										
Nov-86	Toluene		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005								< 0.005		
Jan-88	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0074	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Total Xylenes	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.063	< 0.005	< 0.005	< 0.005	< 0.005
Oct-83	Trans 1,1-Dichloroethene																0.12		
Apr-84	Trans 1,1-Dichloroethene																0.056		
Oct-84	Trans 1,1-Dichloroethene																0.22		
Jan-85	Trans 1,1-Dichloroethene																0.10		
Jun-85	Trans 1,1-Dichloroethene																0.11		
Jan-86	Trans 1,1-Dichloroethene																		
Apr-86	Trans 1,1-Dichloroethene		< 0.005	< 0.005	< 0.005	0.044	4.7	< 0.005	< 0.005										
Nov-86	Trans 1,2-Dichloroethene		< 0.005	< 0.005	< 0.005	0.027	0.33	< 0.005	< 0.005								0.11		
Jan-88	Trans 1,2-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	J 0.0047	< 0.005	< 0.005
Oct-83	Trichloroethene																37.0		
Apr-84	Trichloroethene																2.9		
Oct-84	Trichloroethene																1.6		
Jan-85	Trichloroethene																2.1		
Jun-85	Trichloroethene																2.6		
Jan-86	Trichloroethene																		
Apr-86	Trichloroethene		< 0.005	0.017	0.096	0.19	2.9	0.042	< 0.005										
Nov-86	Trichloroethene		< 0.005	0.0071	0.17	0.297	1.53	0.088	< 0.005								1.3		

< means not detected using detection limit shown; P means present but below detection limit; I means insufficient sample; J means estimated value; B means broken.

Alphabetical Summary of Constituents Detected in at Least One Sample From NIROP Ground Water Chemical Analyses (mg/l). 07-Jun-88 1332.52 1?

Date	Parameter	14-D	14-S	15-S	16-S	17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Jan-88	Trichloroethene	< 0.005	J 0.002	0.011	0.16	0.276	12.7	0.0062	< 0.005	0.4	0.4	J 0.004	0.023	< 0.005	11.3	0.6	1.3	< 0.005	< 0.005
Nov-86	Trichlorofluoromethane		< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005								< 0.005		
Jan-88	Trichlorofluoromethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Vinyl Chloride	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nov-86	Zinc, Diss.		3.25	1.84	2.87	2.21	4.71	3.78	3.10								0.526		
Jan-88	Zinc, Diss.	< 0.03	1.58	1.33	2.10	2.01	1.97	1.25	0.022	0.033	< 0.03	0.121	0.033	< 0.03	< 0.03	0.065	0.206	0.032	< 0.03
Oct-83	Zinc, Total																4.09		
Apr-84	Zinc, Total																2.95		
Oct-84	Zinc, Total																1.56		
Jan-85	Zinc, Total																0.919		
Jun-85	Zinc, Total																0.730		
Jan-86	Zinc, Total																		
Apr-86	Zinc, Total		17.6	17.5	6.11	4.56	9.08	3.21	4.25										
Nov-86	Zinc, Total			25.4															

APPENDIX C

MAXIMUM AND MEAN CONCENTRATIONS DETECTED IN NIROP GROUND WATER ANALYSES

Maximum and Mean Concentrations of Constituents Detected in WIRDP Ground Water Chemical Analyses (mg/l). 03-Jun-99 1332.52 1?

Parameter		1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC	5-S	5-D
1,1,1-Trichloroethane	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	1	1	7	4
	MAXIMUM	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.2970	0.0025	0.0050	0.0025
	MEAN	0.0036	0.0036	0.0025	0.0036	0.0040	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0031	0.2970	0.0025	0.0036	0.0025
1,1-Dichloroethane	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	1	1	7	4
	MAXIMUM	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0260	0.0050	0.0089	0.0050	0.0050	0.0050	0.0025	0.0050	0.1060	0.0025	0.0050	0.0025
	MEAN	0.0036	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0036	0.0083	0.0036	0.0089	0.0036	0.0036	0.0036	0.0025	0.0031	0.1060	0.0025	0.0036	0.0025
1,1-Dichloroethene	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	1	1	7	4
	MAXIMUM	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0015	0.0050	0.0050	0.0050	0.0025	0.0050	0.0140	0.0025	0.0050	0.0025
	MEAN	0.0036	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0036	0.0036	0.0036	0.0015	0.0036	0.0036	0.0036	0.0025	0.0031	0.0140	0.0025	0.0036	0.0025
Arsenic, Total	COUNT	1	1	0	1	1	1	0	1	2	1	0	1	1	1	0	0	0	0	1	0
	MAXIMUM	0.0050	0.0025	NA	0.0025	0.0025	0.0025	NA	0.0025	0.0025	0.0025	NA	0.0025	0.0025	0.0025	NA	NA	NA	NA	0.0025	NA
	MEAN	0.0050	0.0025	NA	0.0025	0.0025	0.0025	NA	0.0025	0.0025	0.0025	NA	0.0025	0.0025	0.0025	NA	NA	NA	NA	0.0025	NA
Barium, Diss.	COUNT	2	2	1	2	2	2	1	2	2	2	1	2	2	2	1	2	1	1	2	2
	MAXIMUM	0.0800	0.0470	0.2560	0.1320	0.1190	0.0870	0.2320	0.0600	0.1650	0.0740	0.1200	0.0500	0.0630	0.1070	0.1500	0.0930	0.1430	0.0830	0.0720	0.0800
	MEAN	0.0720	0.0435	0.2560	0.1255	0.1115	0.0810	0.2320	0.0555	0.1535	0.0715	0.1200	0.0420	0.0605	0.1030	0.1500	0.0905	0.1430	0.0830	0.0665	0.0790
Benzene	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	1	1	7	4
	MAXIMUM	0.0050	0.0220	0.0025	0.0210	0.0050	0.0050	0.0025	0.0230	0.0050	0.0050	0.0025	0.0500	0.0061	0.0050	0.0025	0.0050	0.0025	0.0025	0.0059	0.0025
	MEAN	0.0036	0.0260	0.0025	0.0059	0.0036	0.0036	0.0025	0.0065	0.0036	0.0036	0.0025	0.0126	0.0041	0.0036	0.0025	0.0031	0.0025	0.0025	0.0041	0.0025
Bis(2ethylhexyl)Phthalate.	COUNT	4	4	0	4	4	4	0	4	4	4	0	4	4	4	0	1	0	0	4	1
	MAXIMUM	0.0190	0.0050	NA	0.0240	0.0940	0.0040	NA	0.0030	0.1400	0.0530	NA	0.0230	0.0100	0.0770	NA	0.0050	NA	NA	0.0150	0.0050
	MEAN	0.0056	0.0021	NA	0.0028	0.0222	0.0026	NA	0.0028	0.0379	0.0167	NA	0.0081	0.0064	0.0280	NA	0.0050	NA	NA	0.0074	0.0050

Maximum and Mean Concentrations of Constituents Detected in NIROP Ground Water Chemical Analyses (mg/l). 01-Jun-88 1332.32 17

Parameter		1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC	5-S	5-D
Cadmium, Total	COUNT	2	2	0	2	2	2	0	2	3	2	0	2	2	2	0	1	0	0	2	0
	MAXIMUM	0.0085	0.0061	NA	0.0024	0.0041	0.0031	NA	0.0032	0.0076	0.0044	NA	0.0092	0.0021	0.0029	NA	0.0014	NA	NA	0.0068	NA
	MEAN	0.0051	0.0047	NA	0.0020	0.0027	0.0023	NA	0.0023	0.0033	0.0039	NA	0.0053	0.0020	0.0022	NA	0.0014	NA	NA	0.0042	NA
Chloroform	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	1	1	7	4
	MAXIMUM	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0025	0.0025	0.0050	0.0025
	MEAN	0.0034	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0031	0.0025	0.0025	0.0036	0.0025
Chromium, Total	COUNT	2	2	0	2	2	2	0	2	3	2	0	2	2	2	0	1	0	0	2	0
	MAXIMUM	0.0370	0.0040	NA	0.0140	0.0570	0.0050	NA	0.0070	0.0200	0.0250	NA	0.0190	0.0130	0.0080	NA	0.0030	NA	NA	0.0130	NA
	MEAN	0.0240	0.0035	NA	0.0125	0.0430	0.0045	NA	0.0065	0.0133	0.0165	NA	0.0110	0.0110	0.0065	NA	0.0030	NA	NA	0.0095	NA
Cis 1,2-Dichloroethene(ethyl),	COUNT	3	3	0	3	3	3	0	3	3	3	0	3	3	3	0	1	0	0	3	1
	MAXIMUM	0.0050	0.0050	NA	0.0050	0.0050	0.0050	NA	0.0240	0.2900	0.0050	NA	0.0050	0.0050	0.0050	NA	0.0025	NA	NA	0.0050	0.0025
	MEAN	0.0042	0.0042	NA	0.0042	0.0042	0.0042	NA	0.0105	0.1500	0.0042	NA	0.0042	0.0042	0.0042	NA	0.0025	NA	NA	0.0042	0.0025
Copper, Total	COUNT	2	2	0	2	2	2	0	2	3	2	0	2	2	2	0	1	0	0	2	0
	MAXIMUM	0.0540	0.0560	NA	0.0410	0.2140	0.0290	NA	0.0190	0.0840	0.0530	NA	0.0240	0.0410	0.0560	NA	0.0085	NA	NA	0.0480	NA
	MEAN	0.0365	0.0330	NA	0.0225	0.1370	0.0250	NA	0.0155	0.0447	0.0350	NA	0.0225	0.0340	0.0340	NA	0.0085	NA	NA	0.0290	NA
Ethylbenzene	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	6	3	9	10
	MAXIMUM	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0070	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0050	0.0025	0.0050	0.0050
	MEAN	0.0036	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0036	0.0116	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0031	0.0025	0.0017	0.0031	0.0019

Maximum and Mean Concentrations of Constituents Detected in NIRGP Ground Water Chemical Analyses (mg/l). 03-Jun-96 1322:52 [illegible]

Parameter		1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC	5-S	5-D
Lead, Total	COUNT	5	5	0	5	5	5	0	5	6	5	0	5	5	5	0	2	0	0	5	2
	MAXIMUM	0.0910	0.0540	NA	0.1700	0.3340	0.0300	NA	0.0390	0.1710	0.0770	NA	0.0460	0.0840	0.0440	NA	0.0260	NA	NA	0.0220	0.1660
	MEAN	0.0374	0.0328	NA	0.0673	0.1754	0.0190	NA	0.0194	0.0647	0.0378	NA	0.0216	0.0404	0.0272	NA	0.0140	NA	NA	0.0174	0.1135
Manganese, Total	COUNT	4	4	0	4	4	4	0	4	5	4	0	4	4	4	0	2	0	0	4	2
	MAXIMUM	3.6800	0.1520	NA	0.8440	6.9800	0.5160	NA	0.4390	3.1600	0.1000	NA	0.1390	1.8100	0.3620	NA	0.4240	NA	NA	4.0900	0.3120
	MEAN	2.1450	0.0940	NA	0.5812	4.1925	0.3230	NA	0.2740	2.0680	0.0860	NA	0.1065	0.7440	0.1940	NA	0.4045	NA	NA	3.2500	0.2250
Manganese, Diss.	COUNT	2	2	1	2	2	2	1	2	2	2	1	2	2	2	1	2	1	1	2	2
	MAXIMUM	1.0700	0.1090	0.7350	0.3560	0.7670	0.3920	1.5200	0.0030	1.0400	0.0760	0.5010	0.0520	0.0890	0.3620	0.3190	0.2100	0.6800	0.1770	1.7200	0.1000
	MEAN	0.912	0.0995	0.735	0.051	0.4025	0.362	1.52	0.0025	0.9735	0.0585	0.501	0.043	0.007	0.361	0.319	0.154	0.68	0.177	1.1565	0.0975
Mercury, Total	COUNT	1	1	0	1	1	1	0	1	2	1	0	1	1	1	0	0	0	0	1	0
	MAXIMUM	0.0002	0.0002	NA	0.0002	0.0000	0.0002	NA	0.0000	0.0013	0.0002	NA	0.0002	0.0007	0.0004	NA	NA	NA	NA	0.0002	NA
	MEAN	0.0002	0.0002	NA	0.0002	0.0000	0.0002	NA	0.0000	0.0008	0.0002	NA	0.0002	0.0007	0.0004	NA	NA	NA	NA	0.0002	NA
Methylene Chloride	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	2	1	7	4
	MAXIMUM	0.3000	0.1100	0.0020	0.1600	41.0000	0.0300	0.0025	6.0000	0.1300	0.0300	0.0025	0.1100	0.0000	0.4400	0.0025	0.0190	0.0025	0.0025	0.0290	0.0025
	MEAN	0.0476	0.0271	0.0020	0.0285	5.8639	0.0234	0.0025	0.8915	0.0344	0.0060	0.0025	0.0210	0.0274	0.0005	0.0025	0.0073	0.0013	0.0025	0.0082	0.0025

Maximum and Mean Concentrations of Constituents Detected in NIPDF Ground Water Chemical Analyses (mg/l). 03-Jun-89 10:32:52 PM

Parameter		1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC	5-S	5-D
Nickel, Total	COUNT	1	1	0	1	1	1	0	1	2	1	0	1	1	1	0	0	0	0	1	0
	MAXIMUM	0.0240	0.0200	NA	0.0090	0.1070	0.0530	NA	0.0050	0.0220	0.0100	NA	0.0490	0.0170	0.0060	NA	NA	NA	NA	0.0100	NA
	MEAN	0.0240	0.0200	NA	0.0090	0.1070	0.0530	NA	0.0050	0.0200	0.0100	NA	0.0490	0.0170	0.0060	NA	NA	NA	NA	0.0100	NA
PCB 1242	COUNT	5	5	0	5	5	5	0	5	5	5	0	5	5	5	0	2	0	0	5	2
	MAXIMUM	0.0005	0.0002	NA	0.0003	0.0001	0.0001	NA	0.0005	0.0001	0.0002	NA	0.0003	0.0002	0.0001	NA	0.0001	NA	NA	0.0004	0.0001
	MEAN	0.0002	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0002	0.0001	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0001	NA	NA	0.0002	0.0001
PCB 1248	COUNT	5	5	0	5	5	5	0	5	5	5	0	5	5	5	0	2	0	0	5	2
	MAXIMUM	0.0001	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0004	0.0001	0.0001	NA	0.0001	NA	NA	0.0001	0.0001
	MEAN	0.0001	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0002	0.0001	0.0001	NA	0.0001	NA	NA	0.0001	0.0001
PCB 1254	COUNT	5	5	0	5	5	5	0	5	5	5	0	5	5	5	0	2	0	0	5	2
	MAXIMUM	0.0008	0.0005	NA	0.0007	0.0011	0.0002	NA	0.0005	0.0007	0.0003	NA	0.0003	0.0004	0.0001	NA	0.0001	NA	NA	0.0002	0.0001
	MEAN	0.0002	0.0002	NA	0.0001	0.0003	0.0001	NA	0.0002	0.0002	0.0001	NA	0.0001	0.0002	0.0001	NA	0.0001	NA	NA	0.0001	0.0001
PCB 1260	COUNT	5	5	0	5	5	5	0	5	5	5	0	5	5	5	0	2	0	0	5	2
	MAXIMUM	0.0001	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0001	0.0001	0.0002	NA	0.0001	NA	NA	0.0001	0.0001
	MEAN	0.0001	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0001	0.0001	0.0001	NA	0.0001	0.0001	0.0002	NA	0.0001	NA	NA	0.0001	0.0001
Selenium, Diss.	COUNT	2	2	1	2	2	2	1	2	2	2	1	2	2	2	1	2	1	1	2	2
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Silver, Total	COUNT	2	2	0	2	2	2	0	2	3	2	0	2	2	2	0	1	0	0	2	0
	MAXIMUM	0.0005	0.0005	NA	0.0005	0.0005	0.0005	NA	0.0005	0.0010	0.0005	NA	0.0005	0.0010	0.0005	NA	0.0005	NA	NA	0.0005	NA
	MEAN	0.0005	0.0005	NA	0.0005	0.0005	0.0005	NA	0.0005	0.0007	0.0005	NA	0.0005	0.0003	0.0005	NA	0.0005	NA	NA	0.0005	NA

Maximum and Mean Concentrations of Constituents Detected in NISGP Ground Water Chemical Analyses (mg/l). 03-Jun-88 10:32:52 PM

Parameter		1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC	5-S	5-D
Tetrachloroethene	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	1	1	7	4
	MAXIMUM	0.0050	0.0050	0.0025	0.0050	0.0050	0.0050	0.0025	0.0050	0.0170	0.0050	0.0330	0.0050	0.0050	0.0050	0.0025	0.0050	0.1410	0.0025	0.0050	0.0025
	MEAN	0.0036	0.0036	0.0025	0.0036	0.0036	0.0036	0.0025	0.0036	0.0064	0.0036	0.0330	0.0040	0.0036	0.0036	0.0025	0.0031	0.1410	0.0025	0.0036	0.0025
TOC	COUNT	2	2	0	2	1	2	0	2	2	2	0	2	2	2	0	1	0	0	2	0
	MAXIMUM	22.0000	642.0000	NA	51.0000	57.0000	7.4000	NA	15.9000	16.1000	3.5000	NA	6.6000	10.1000	30.7000	NA	2.3000	NA	NA	649.0000	NA
	MEAN	16.2500	322.3500	NA	30.0500	57.0000	6.1000	NA	9.4500	15.6500	2.6000	NA	4.9000	9.6000	15.3500	NA	2.3000	NA	NA	331.2500	NA
Toluene	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	1	1	7	4
	MAXIMUM	0.0050	0.0120	0.0025	0.0110	0.0050	0.0050	0.0025	0.0200	0.0050	0.0072	0.0025	0.0140	0.0050	0.0061	0.0025	0.0140	0.0057	0.0025	0.0050	0.0025
	MEAN	0.0036	0.0056	0.0025	0.0040	0.0036	0.0036	0.0025	0.0061	0.0036	0.0042	0.0025	0.0058	0.0036	0.0041	0.0025	0.0060	0.0057	0.0025	0.0036	0.0025
Trans 1,1-Dichloroethene,	COUNT	5	5	0	5	5	5	0	5	5	5	0	5	5	5	0	2	0	0	5	2
	MAXIMUM	0.0050	0.0050	NA	0.0050	0.0050	0.0050	NA	0.0050	0.1700	0.0050	NA	0.0050	0.0050	0.0050	NA	0.0050	NA	NA	0.0050	0.0025
	MEAN	0.0040	0.0040	NA	0.0040	0.0040	0.0040	NA	0.0040	0.1004	0.0040	NA	0.0040	0.0040	0.0040	NA	0.0038	NA	NA	0.0040	0.0025
Trans 1,2-Dichloroethene,	COUNT	2	2	1	2	2	2	1	2	2	2	1	2	2	2	1	2	1	1	2	2
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.2900	0.0025	0.0025	0.0025	0.0025	0.0025	0.2200	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.1463	0.0025	0.0025	0.0025	0.0025	0.0025	0.2200	0.0025	0.0025	0.0025	0.0025	0.0025
Trichloroethene	COUNT	7	7	1	7	7	7	1	7	7	7	1	7	7	7	1	4	1	1	7	4
	MAXIMUM	0.0050	0.0050	0.0025	0.0050	0.1700	0.0510	0.0025	0.0620	29.0000	0.0220	2.7000	0.0910	0.0770	0.0050	0.1000	0.0050	7.1000	0.0025	0.0050	0.0025
	MEAN	0.0036	0.0036	0.0025	0.0036	0.0719	0.0078	0.0025	0.0193	5.2629	0.0131	2.7000	0.0251	0.0166	0.0074	0.1000	0.0031	7.1000	0.0025	0.0036	0.0025

Maximum and Mean Concentrations of Constituents Detected in NISCP Ground Water Chemical Analyses (ug/l). 20-Jun-90 1332.52 ITP

Parameter		1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC	5-S	5-D
Trichlorofluoromethane	COUNT	2	2	1	2	2	2	1	2	2	2	1	2	2	2	1	2	1	1	2	2
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0077	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0051	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Zinc, Total	COUNT	5	5	0	5	5	5	0	5	6	5	0	5	5	5	0	2	0	0	5	2
	MAXIMUM	1.6000	9.2500	NA	1.3100	3.9800	4.0700	NA	1.4100	3.6400	7.6000	NA	1.4300	6.2000	3.1300	NA	1.3400	NA	NA	0.7010	6.0200
	MEAN	0.9026	5.2000	NA	0.5946	2.4254	1.9102	NA	0.5100	1.9770	3.7219	NA	0.5404	2.0140	1.5594	NA	0.6025	NA	NA	0.4034	5.0200

Maximum and Mean Concentrations of Constituents Detected in NISQP Ground Water Chemical Analyses (mg/l). 27-Jun-99 1332.52 [illegible]

Parameter		6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S	14-D	14-S	15-S	16-S
1,1,1-Trichloroethane	COUNT	7	4	4	3	3	3	4	3	1	4	1	4	1	3	1	3	1	3	3	3
	MAXIMUM	0.1300	0.0025	0.0065	0.0025	0.0420	0.0025	0.3900	0.0086	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0551	0.0025	0.0039	0.0025	0.0330	0.0025	0.2125	0.0066	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0018
1,1-Dichloroethane	COUNT	7	4	4	3	3	3	4	3	1	4	1	4	1	3	1	3	1	3	3	3
	MAXIMUM	0.0190	0.0025	0.0025	0.0025	0.0090	0.0025	0.0660	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0059	0.0025	0.0025	0.0025	0.0063	0.0025	0.0450	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
1,1-Dichloroethene	COUNT	7	4	4	3	3	3	4	3	1	4	1	4	1	3	1	3	1	3	3	3
	MAXIMUM	0.0050	0.0025	0.0025	0.0025	0.0025	0.0025	0.0092	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0036	0.0025	0.0025	0.0025	0.0025	0.0022	0.0050	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Arsenic, Total	COUNT	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	MAXIMUM	0.0025	NA	NA	NA	NA	NA	0.0230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0450	NA
	MEAN	0.0025	NA	NA	NA	NA	NA	0.0230	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0450	NA
Barium, Diss.	COUNT	2	2	2	2	2	2	2	2	1	2	1	2	1	2	1	2	1	2	2	2
	MAXIMUM	0.0770	0.0950	0.0760	0.1110	0.1040	0.1120	0.1090	0.0840	0.0970	0.0920	0.0510	0.1060	0.1040	0.0800	0.0900	0.1320	0.1010	0.2160	0.1360	0.0760
	MEAN	0.0770	0.0935	0.0680	0.1095	0.0880	0.1010	0.1030	0.0725	0.0970	0.0855	0.0510	0.0940	0.1040	0.0720	0.0900	0.1125	0.1010	0.1545	0.1105	0.0720
Benzene	COUNT	7	4	4	3	3	3	4	3	1	4	1	4	1	3	1	3	1	3	3	3
	MAXIMUM	0.0120	0.0025	0.0025	0.0025	0.0025	0.0052	0.0025	0.0050	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0046	0.0025	0.0025	0.0025	0.0025	0.0034	0.0025	0.0033	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Bis(2ethylhexyl)Phthalate,	COUNT	4	1	1	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0
	MAXIMUM	0.2200	0.0020	0.0009	NA	0.0000	NA	0.0000	NA	NA	0.0003	NA	0.0009	NA	NA	NA	NA	NA	NA	NA	NA
	MEAN	0.0564	0.0020	0.0009	NA	0.0000	NA	0.0000	NA	NA	0.0003	NA	0.0006	NA	NA	NA	NA	NA	NA	NA	NA

Maximum and Mean Concentrations of Constituents Detected in NIBCP Ground Water Chemical Analyses (mg/l). 03-Jun-88 1002.52 ITP

Parameter		6-S	6-D	7-S	7-D	9-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S	14-D	14-S	15-S	16-S
Cadmium, Total	COUNT	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	MAXIMUM	0.0062	NA	NA	NA	NA	NA	0.0034	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0194	NA
	MEAN	0.0039	NA	NA	NA	NA	NA	0.0034	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0194	NA
Chloroform	COUNT	7	4	4	3	3	3	4	3	1	4	1	4	1	3	1	3	1	3	3	3
	MAXIMUM	0.0050	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0036	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Chromium, Total	COUNT	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	MAXIMUM	0.0400	NA	NA	NA	NA	NA	0.2670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0110	NA
	MEAN	0.0335	NA	NA	NA	NA	NA	0.2670	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0110	NA
Cis 1,2-Dichloroethene(ethyl),	COUNT	3	1	1	1	1	1	1	1	0	1	0	1	0	1	0	1	0	1	1	1
	MAXIMUM	0.5000	0.0025	0.0025	0.0025	0.2400	0.0400	0.3400	0.0200	NA	0.0360	NA	0.0220	NA	0.0025	NA	0.0025	NA	0.0025	0.0025	0.0025
	MEAN	0.2490	0.0025	0.0025	0.0025	0.2400	0.0400	0.3400	0.0200	NA	0.0360	NA	0.0220	NA	0.0025	NA	0.0025	NA	0.0025	0.0025	0.0025
Copper, Total	COUNT	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	MAXIMUM	0.0020	NA	NA	NA	NA	NA	0.3770	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0090	NA
	MEAN	0.0525	NA	NA	NA	NA	NA	0.3770	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0090	NA
Ethylbenzene	COUNT	12	12	9	8	7	7	8	8	5	6	6	6	6	5	5	5	5	5	7	7
	MAXIMUM	0.0050	0.0050	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0039	0.0039	0.0022	0.0022	0.0021	0.0021	0.0022	0.0022	0.0020	0.0021	0.0021	0.0021	0.0021	0.0020	0.0020	0.0020	0.0020	0.0020	0.0021	0.0021

Maximum and Mean Concentrations of Constituents Detected in MIRCP Ground Water Chemical Analyses (mg/l). 07-Jun-90 1332.52 1?

Parameter		6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S	14-D	14-S	15-S	16-S
Lead, Total	COUNT	5	2	2	1	1	1	3	1	0	2	0	2	0	1	0	1	0	1	2	1
	MAXIMUM	0.2940	0.1330	0.1070	0.0340	0.1540	0.1120	0.1740	0.0610	NA	0.1090	NA	0.0630	NA	0.3660	NA	0.0330	NA	0.1010	0.1740	0.0730
	MEAN	0.1484	0.0745	0.0590	0.0340	0.1540	0.1120	0.0877	0.0610	NA	0.0745	NA	0.0465	NA	0.3660	NA	0.0330	NA	0.1010	0.1140	0.0730
Manganese, Total	COUNT	4	2	2	1	1	1	3	1	0	2	0	2	0	1	0	1	0	1	2	1
	MAXIMUM	6.5400	0.5030	27.5000	0.6950	11.0000	0.0030	2.5400	0.5230	NA	9.5900	NA	5.0000	NA	10.7000	NA	1.0900	NA	0.5320	2.4600	1.6400
	MEAN	3.6625	0.4320	10.4000	0.6950	11.0000	0.0030	1.9700	0.5230	NA	9.1650	NA	3.6150	NA	10.7000	NA	1.0900	NA	0.5320	2.2900	1.6400
Manganese, Diss.	COUNT	2	2	2	2	2	2	2	2	1	2	1	2	1	2	1	2	1	2	2	2
	MAXIMUM	0.9340	0.3700	2.5100	0.4030	1.9400	0.7000	0.0260	0.1420	0.2560	1.5800	0.2100	0.0300	0.1300	1.2000	0.2900	1.7300	0.9070	0.0760	2.3300	1.4100
	MEAN	0.749	0.35	1.76	0.2575	1.375	0.57	0.0195	0.1165	0.256	1.33	0.210	0.0165	0.130	1.060	0.290	1.615	0.907	0.002	2.145	1.225
Mercury, Total	COUNT	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	MAXIMUM	0.0000	NA	NA	NA	NA	NA	0.0002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0002	NA
	MEAN	0.0000	NA	NA	NA	NA	NA	0.0002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0002	NA
Methylene Chloride	COUNT	7	4	4	3	3	3	4	3	1	4	1	4	1	3	1	3	1	3	3	3
	MAXIMUM	0.0700	0.0025	0.0360	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0200	0.0025	0.0025	0.0025	0.0430	0.0025	0.1500	0.0350	0.0025	0.0056	0.0025
	MEAN	0.0211	0.0025	0.0109	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0089	0.0025	0.0025	0.0025	0.0160	0.0025	0.0517	0.0350	0.0025	0.0035	0.0023

Maximum and Mean Concentrations of Constituents Detected in NIROP Ground Water Chemical Analyses (mg/l).

03-Jun-88 1332.52 1?

Parameter		6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S	14-D	14-S	15-S	16-S
Nickel, Total	COUNT	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	MAXIMUM	0.0430	NA	NA	NA	NA	NA	0.3320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0390	NA
	MEAN	0.2430	NA	NA	NA	NA	NA	0.3320	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0390	NA
PCB 1242	COUNT	5	2	2	1	1	1	2	1	0	2	0	2	0	1	0	0	0	1	1	1
	MAXIMUM	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	0.0001	NA	0.0001	NA	0.0001	NA	NA	NA	0.0001	0.0001	0.0001
	MEAN	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	0.0001	NA	0.0001	NA	0.0001	NA	NA	NA	0.0001	0.0001	0.0001
PCB 1248	COUNT	5	2	2	1	1	1	2	1	0	2	0	2	0	1	0	0	0	1	1	1
	MAXIMUM	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	0.0001	NA	0.0001	NA	0.0001	NA	NA	NA	0.0001	0.0001	0.0001
	MEAN	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	0.0001	NA	0.0001	NA	0.0001	NA	NA	NA	0.0001	0.0001	0.0001
PCB 1254	COUNT	5	2	2	1	1	1	2	1	0	2	0	2	0	1	0	0	0	1	1	1
	MAXIMUM	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	0.0001	NA	0.0001	NA	0.0001	NA	NA	NA	0.0001	0.0001	0.0001
	MEAN	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	0.0001	NA	0.0001	NA	0.0001	NA	NA	NA	0.0001	0.0001	0.0001
PCB 1260	COUNT	5	2	2	1	1	1	2	1	0	2	0	2	0	1	0	0	0	1	1	1
	MAXIMUM	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	0.0001	NA	0.0001	NA	0.0001	NA	NA	NA	0.0001	0.0001	0.0001
	MEAN	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	NA	0.0001	NA	0.0001	NA	0.0001	NA	NA	NA	0.0001	0.0001	0.0001
Selenium, Diss.	COUNT	2	2	2	2	2	2	2	2	1	2	1	2	1	2	1	2	1	2	2	2
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0080	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0080	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0645	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0050	0.0025	0.0025
Silver, Total	COUNT	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0
	MAXIMUM	0.0025	NA	NA	NA	NA	NA	0.0010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0025	NA
	MEAN	0.0025	NA	NA	NA	NA	NA	0.0010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0025	NA

Maximum and Mean Concentrations of Constituents Detected in NIROP Ground Water Chemical Analyses (mg/l). 03-Jun-99 1331.51 17

Parameter		6-S	6-D	7-S	7-D	8-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S	14-D	14-S	15-S	16-S
Tetrachloroethene	COUNT	7	4	4	3	3	3	4	3	1	4	1	4	1	3	1	3	1	3	3	3
	MAXIMUM	0.2000	0.0025	0.0025	0.0025	0.0460	0.0025	0.2200	0.0025	0.0025	0.0210	0.0025	0.0025	0.0005	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0512	0.0025	0.0025	0.0025	0.0410	0.0025	0.1650	0.0025	0.0025	0.0071	0.0025	0.0025	0.0005	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0018
TOC	COUNT	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	MAXIMUM	27.6000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	MEAN	20.4000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	COUNT	7	4	4	3	3	3	4	3	1	4	1	4	1	3	1	3	1	3	3	3
	MAXIMUM	0.0050	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0082	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0036	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0044	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Trans 1,1-Dichloroethene,	COUNT	5	2	2	1	1	1	2	1	0	2	0	2	0	1	0	1	0	1	1	1
	MAXIMUM	0.1700	0.0025	0.0025	0.0025	0.1900	0.0390	0.5100	0.0130	NA	0.0150	NA	0.0360	NA	0.0025	NA	0.0025	NA	0.0025	0.0025	0.0025
	MEAN	0.0913	0.0025	0.0025	0.0025	0.1900	0.0390	0.5050	0.0130	NA	0.0135	NA	0.0350	NA	0.0025	NA	0.0025	NA	0.0025	0.0025	0.0025
Trans 1,2-Dichloroethene,	COUNT	2	2	2	2	2	2	2	2	1	2	1	2	1	2	1	2	1	2	2	2
	MAXIMUM	0.5900	0.0025	0.0025	0.0025	0.2400	0.0400	0.3400	0.0290	0.0025	0.0360	0.0025	0.0220	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.2912	0.0025	0.0025	0.0025	0.1213	0.0325	0.1713	0.0153	0.0025	0.0193	0.0025	0.0122	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Trichloroethene	COUNT	7	4	4	3	3	3	4	3	1	4	1	4	1	3	1	3	1	3	3	3
	MAXIMUM	3.3000	0.0110	0.1500	0.0025	9.2000	10.3000	4.2000	0.6500	0.0025	0.2300	0.0020	0.0440	0.3500	0.0025	0.0025	0.0025	0.0025	0.0025	0.0170	0.1700
	MEAN	1.1875	0.0071	0.1300	0.0025	6.6667	9.0667	2.6300	0.3500	0.0025	0.1810	0.0020	0.0265	0.3500	0.0025	0.0025	0.0020	0.0025	0.0020	0.0117	0.1420

Maximum and Mean Concentrations of Constituents Detected in NIPDP Ground Water Chemical Analyses (mg/l). 03-Jun-99 1132.52 137

Parameter		6-S	6-D	7-S	7-D	9-S	8-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S	14-D	14-S	15-S	16-S
Trichlorofluoromethane	COUNT	2	2	2	2	2	2	2	2	1	2	1	2	1	2	1	2	1	2	2	2
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Zinc, Total	COUNT	5	2	2	1	1	1	3	1	0	2	0	2	0	1	0	1	0	1	2	1
	MAXIMUM	26.6000	5.5700	3.2500	10.4000	1.8100	14.9000	3.1500	4.4300	NA	29.8000	NA	1.4700	NA	6.1100	NA	6.1300	NA	17.6000	25.4000	6.1100
	MEAN	8.1600	3.9350	2.2050	10.4000	1.8100	14.9000	1.7667	4.4300	NA	15.5900	NA	1.2400	NA	6.1100	NA	6.1300	NA	17.6000	21.4500	6.1100

Maximum and Mean Concentrations of Constituents Detected in NIROP Ground Water Chemical Analyses (mg/l). 07-Jun-99 1332.52 ???

Parameter		17-G	18-G	19-G	20-G	21-G	22-G	23-G	24-G	25-G	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
1,1,1-Trichloroethane	COUNT	3	3	3	3	1	1	1	1	1	1	1	7	1	1
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0230	0.0170	0.0010	0.0025	0.0025	0.7500	0.0025	0.0050	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0230	0.0170	0.0010	0.0025	0.0025	0.7500	0.0025	0.0036	0.0025	0.0025
1,1-Dichloroethane	COUNT	3	3	3	3	1	1	1	1	1	1	1	7	1	1
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0020	0.0025	0.0025	0.0025	0.0025	0.0070	0.0025	0.0270	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0020	0.0025	0.0025	0.0025	0.0025	0.0070	0.0025	0.0117	0.0025	0.0025
1,1-Dichloroethene	COUNT	3	3	3	3	1	1	1	1	1	1	1	7	1	1
	MAXIMUM	0.0025	0.0090	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0210	0.0025	0.0050	0.0025	0.0025
	MEAN	0.0025	0.0047	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0210	0.0025	0.0036	0.0025	0.0025
Arsenic, Total	COUNT	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	MAXIMUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0025	NA	NA
	MEAN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0025	NA	NA
Barium, Diss.	COUNT	2	2	2	2	1	1	1	1	1	1	1	2	1	1
	MAXIMUM	0.0620	0.1180	0.0380	0.0940	0.2530	0.1230	0.0790	0.1490	0.0920	0.0870	0.1250	0.1280	0.1160	0.1230
	MEAN	0.0560	0.1065	0.0350	0.0745	0.2530	0.1230	0.0790	0.1490	0.0920	0.0870	0.1250	0.1150	0.1160	0.1230
Benzene	COUNT	3	3	3	3	1	1	1	1	1	1	1	7	1	1
	MAXIMUM	0.0065	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0100	0.0025	0.0025
	MEAN	0.0030	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0047	0.0025	0.0025
Bis(2ethylhexyl)Phthalate,	COUNT	0	0	0	0	0	0	0	0	0	0	0	4	0	0
	MAXIMUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0790	NA	NA
	MEAN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0330	NA	NA

Maximum and Mean Concentrations of Constituents Detected in NIROP Ground Water Chemical Analyses (mg/l). 23-Jun-88 1332.52 17

Parameter		17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Cadmium, Total	COUNT	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	MAXIMUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0051	NA	NA
	MEAN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0032	NA	NA
Chloroform	COUNT	3	3	3	3	1	1	1	1	1	1	1	7	1	1
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0050	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0036	0.0025	0.0025
Chromium, Total	COUNT	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	MAXIMUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0040	NA	NA
	MEAN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0035	NA	NA
Cis 1,2-Dichloroethene(ethyl),	COUNT	1	1	1	1	0	0	0	0	0	0	0	3	0	0
	MAXIMUM	0.0270	0.3300	0.0025	0.0025	NA	NA	NA	NA	NA	NA	NA	0.2300	NA	NA
	MEAN	0.0270	0.3300	0.0025	0.0025	NA	NA	NA	NA	NA	NA	NA	0.1453	NA	NA
Copper, Total	COUNT	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	MAXIMUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0320	NA	NA
	MEAN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0200	NA	NA
Ethylbenzene	COUNT	7	7	7	7	5	3	3	3	3	3	3	9	9	3
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.2100	0.2100	0.0025
	MEAN	0.0021	0.0021	0.0021	0.0021	0.0020	0.0017	0.0017	0.0017	0.0017	0.0015	0.0015	0.0442	0.0442	0.0017

Maximum and Mean Concentrations of Constituents Detected in NIROP Ground Water Chemical Analyses (mg/l).

03-Jun-88 1332.52 1??

Parameter		17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Lead, Total	COUNT	1	1	1	1	0	0	0	0	0	0	0	5	0	0
	MAXIMUM	0.0600	0.1200	0.0970	0.1520	NA	NA	NA	NA	NA	NA	NA	0.0570	NA	NA
	MEAN	0.0600	0.1200	0.0970	0.1520	NA	NA	NA	NA	NA	NA	NA	0.0264	NA	NA
Manganese, Total	COUNT	1	1	1	1	0	0	0	0	0	0	0	4	0	0
	MAXIMUM	1.4600	1.3800	0.6220	1.7100	NA	NA	NA	NA	NA	NA	NA	0.9570	NA	NA
	MEAN	1.4600	1.3800	0.6220	1.7100	NA	NA	NA	NA	NA	NA	NA	0.6875	NA	NA
Manganese, Diss.	COUNT	2	2	2	2	1	1	1	1	1	1	1	2	1	1
	MAXIMUM	0.3860	1.1200	0.0340	0.1490	0.9870	0.3720	0.0430	1.7400	0.5200	1.0500	1.0100	1.0200	0.3140	0.3270
	MEAN	0.3605	1.02	0.0215	0.1105	0.987	0.372	0.043	1.74	0.52	1.05	1.01	1.01	0.314	0.327
Mercury, Total	COUNT	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	MAXIMUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0012	NA	NA
	MEAN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0012	NA	NA
Methylene Chloride	COUNT	3	3	3	3	1	1	1	1	1	1	1	7	1	1
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.1200	0.0260	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0270	0.0260	0.0025

Maximum and Mean Concentrations of Constituents Detected in NIRGP Ground Water Chemical Analyses (mg/l). 03-Jun-98 1332.52 1??

Parameter		17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Nickel, Total	COUNT	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	MAXIMUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0030	NA	NA
	MEAN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0030	NA	NA
PCB 1242	COUNT	1	1	1	1	0	0	0	0	0	0	0	5	0	0
	MAXIMUM	0.0001	0.0001	0.0001	0.0001	NA	NA	NA	NA	NA	NA	NA	0.0001	NA	NA
	MEAN	0.0001	0.0001	0.0001	0.0001	NA	NA	NA	NA	NA	NA	NA	0.0001	NA	NA
PCB 1248	COUNT	1	1	1	1	0	0	0	0	0	0	0	5	0	0
	MAXIMUM	0.0001	0.0001	0.0001	0.0001	NA	NA	NA	NA	NA	NA	NA	0.0001	NA	NA
	MEAN	0.0001	0.0001	0.0001	0.0001	NA	NA	NA	NA	NA	NA	NA	0.0001	NA	NA
PCB 1254	COUNT	1	1	1	1	0	0	0	0	0	0	0	5	0	0
	MAXIMUM	0.0001	0.0001	0.0001	0.0001	NA	NA	NA	NA	NA	NA	NA	0.0001	NA	NA
	MEAN	0.0001	0.0001	0.0001	0.0001	NA	NA	NA	NA	NA	NA	NA	0.0001	NA	NA
PCB 1260	COUNT	1	1	1	1	0	0	0	0	0	0	0	5	0	0
	MAXIMUM	0.0001	0.0001	0.0001	0.0001	NA	NA	NA	NA	NA	NA	NA	0.0001	NA	NA
	MEAN	0.0001	0.0001	0.0001	0.0001	NA	NA	NA	NA	NA	NA	NA	0.0001	NA	NA
Selenium, Diss.	COUNT	2	2	2	2	1	1	1	1	1	1	1	2	1	1
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Silver, Total	COUNT	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	MAXIMUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0250	NA	NA
	MEAN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0125	NA	NA

Maximum and Mean Concentrations of Constituents Detected in NIROP Ground Water Chemical Analyses (mg/l).

Parameter		17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMC33	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Tetrachloroethene	COUNT	3	3	3	3	1	1	1	1	1	1	1	7	1	1
	MAXIMUM	0.0210	0.0025	0.0025	0.0025	0.0380	0.0410	0.0025	0.0025	0.0025	0.3700	0.0025	0.0240	0.0025	0.0025
	MEAN	0.0067	0.0025	0.0025	0.0025	0.0380	0.0410	0.0025	0.0025	0.0025	0.3700	0.0025	0.0067	0.0025	0.0025
TCC	COUNT	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	MAXIMUM	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.5000	NA	NA
	MEAN	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.0500	NA	NA
Toluene	COUNT	3	3	3	3	1	1	1	1	1	1	1	7	1	1
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0074	0.0025	0.0050	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0074	0.0025	0.0036	0.0025	0.0025
Trans 1,1-Dichloroethene,	COUNT	1	1	1	1	0	0	0	0	0	0	0	5	0	0
	MAXIMUM	0.0440	4.7000	0.0025	0.0025	NA	NA	NA	NA	NA	NA	NA	0.2300	NA	NA
	MEAN	0.0440	4.7000	0.0025	0.0025	NA	NA	NA	NA	NA	NA	NA	0.1312	NA	NA
Trans 1,2-Dichloroethene,	COUNT	2	2	2	2	1	1	1	1	1	1	1	2	1	1
	MAXIMUM	0.0270	0.3300	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.1100	0.0025	0.0025
	MEAN	0.0149	0.1663	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0562	0.0025	0.0025
Trichloroethene	COUNT	3	3	3	3	1	1	1	1	1	1	1	7	1	1
	MAXIMUM	0.2750	12.7200	0.0990	0.0025	0.4000	0.4000	0.0020	0.0220	0.0025	11.3000	0.6000	37.2000	0.0025	0.0025
	MEAN	0.1377	5.7100	0.0454	0.0025	0.4000	0.4000	0.0020	0.0220	0.0025	11.3000	0.6000	6.9714	0.0025	0.0025

Maximum and Mean Concentrations of Constituents Detected in NIROP Ground Water Chemical Analyses (mg/l).

03-Jun-89 1332.52 1?

Parameter		17-S	18-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMCJJ	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Trichlorofluoromethane	COUNT	2	2	2	2	1	1	1	1	1	1	1	2	1	1
	MAXIMUM	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
	MEAN	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025
Zinc, Total	COUNT	1	1	1	1	0	0	0	0	0	0	0	5	0	0
	MAXIMUM	4.5600	9.0000	3.2100	4.2500	NA	NA	NA	NA	NA	NA	NA	4.0900	NA	NA
	MEAN	4.5600	9.0000	3.2100	4.2500	NA	NA	NA	NA	NA	NA	NA	2.0499	NA	NA

APPENDIX D

CONSTITUENTS ANALYZED JANUARY 1988

Date	Parameter	1-S	1-D	1-I	1-PC	2-S	2-D	2-I	2-PC	3-S	3-D	3-I	3-PC	4-S	4-D	4-I	4-PC	5-I	5-PC
Jan-88	1,1,1-Trichloroethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.237	<0.005
Jan-88	1,1-Dichloroethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0089	<0.005	<0.005	<0.005	<0.005	<0.005	<0.126	<0.005
Jan-88	1,1-Dichloroethene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.014	<0.005
Jan-88	Barium, Diss.	0.26	0.047	0.256	0.132	0.118	0.087	0.232	0.06	0.142	0.069	0.12	0.05	0.063	0.187	0.15	0.088	0.143	0.083
Jan-88	Benzene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Chloroform	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Cis-1,2-Dichloroethylene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.31	<0.005	0.7	<0.005	<0.005	<0.005	0.092	<0.005	1.41	<0.005
Jan-88	Ethylbenzene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Manganese, Diss.	0.754	0.109	0.735	0.056	0.767	0.332	1.52	0.003	0.707	0.041	0.501	0.034	0.089	0.36	0.319	0.098	0.68	0.177
Jan-88	Methylene Chloride	<0.005	<0.005	J 0.004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.1	<0.005	<0.005	<0.005	<0.005
Jan-88	Selenium, Diss.	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Tetrachlorethene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.033	0.0058	<0.005	<0.005	<0.005	<0.005	0.141	<0.005
Jan-88	Toluene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.0057	<0.005
Jan-88	Total Xylenes	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.036	<0.005
Jan-88	Trans 1,2-Dichloroethene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.22	<0.005	<0.005	<0.005
Jan-88	Trichloroethene	<0.005	<0.005	<0.005	<0.005	0.05	0.031	<0.005	0.01	0.41	0.028	2.7	J 0.003	0.077	J 0.002	0.1	<0.005	7.1	<0.005
Jan-88	Trichlorofluoroethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Vinyl Chloride	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Jan-88	Zinc, Diss.	0.052	1.52	0.129	1.44	0.03	0.572	0.129	0.062	0.033	0.762	0.097	0.642	0.232	0.783	0.033	2.12	0.189	0.07

Constituents Analyzed January 1988

03-Jun-98 1331.52

Date	Parameter	5-S	5-D	6-S	6-D	7-S	7-D	8-S	9-D	9-S	9-D	10-D	10-S	11-D	11-S	12-D	12-S	13-D	13-S
Jan-88	1,1,1-Trichloroethane	<0.005	<0.005	<0.005	<0.005	J0.005	<0.005	0.042	<0.005	0.05	0.0096	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	1,1-Dichloroethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	0.013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	1,1-Dichloroethene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	J0.003	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Barium, Diss.	0.072	0.078	0.077	0.075	0.076	0.108	0.104	0.112	0.097	0.084	0.097	0.092	0.051	0.082	0.104	0.08	0.09	0.132
Jan-88	Benzene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Chloroform	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Cis-1,2-Dichloroethylene	<0.005	<0.005	0.029	<0.005	<0.005	<0.005	0.16	0.037	0.17	0.012	<0.005	0.045	<0.005	0.011	0.012	<0.005	<0.005	<0.005
Jan-88	Ethylbenzene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Manganese, Diss.	1.72	0.095	0.934	0.37	2.51	0.112	1.01	0.44	0.013	0.091	0.256	1.08	0.218	0.03	0.138	0.936	0.298	1.73
Jan-88	Methylene Chloride	<0.005	<0.005	0.037	<0.005	0.036	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.028	<0.005	<0.005	<0.005	0.043	<0.005	0.15
Jan-88	Selenium, Diss.	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.08	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Tetrachloroethene	<0.005	<0.005	0.026	<0.005	<0.005	<0.005	0.031	<0.005	0.11	<0.005	<0.005	0.021	<0.005	<0.005	J0.001	<0.005	<0.005	<0.005
Jan-88	Toluene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Total Xylenes	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Trans 1,2-Dichloroethene	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.017	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Trichloroethene	<0.005	<0.005	0.32	<0.0092	0.066	<0.005	6.8	10.9	1.32	0.15	<0.005	-0.23	J0.004	0.035	0.33	<0.005	<0.005	J0.002
Jan-88	Trichlorofluoromethane	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Jan-88	Vinyl Chloride	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Jan-88	Zinc, Diss.	0.497	1.08	0.338	0.357	0.129	0.392	0.832	0.476	0.339	1.08	0.505	0.195	0.292	0.069	0.099	0.708	0.11	1.42

Constituents Analyzed January 1988

07-Jun-89 1322.52 1??

Date	Parameter	14-S	14-S	15-S	16-S	17-S	19-S	19-S	20-S	21-S	22-S	23-S	24-S	25-S	AT-1	AT-2	FMCCC	STORM SEWER OUTFALL NORTH	STORM SEWER OUTFALL SOUTH
Jan-88	1,1,1-Trichloroethane	< 0.005	< 0.005	< 0.005	J 0.001	< 0.005	< 0.005	< 0.005	< 0.005	0.022	0.017	J 0.002	< 0.005	< 0.005	0.75	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	1,1-Dichloroethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	J 0.004	< 0.005	< 0.005	< 0.005	< 0.005	0.007	< 0.005	0.014	< 0.005	< 0.005
Jan-88	1,1-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.009	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.021	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Barium, Diss.	0.191	0.216	0.181	0.076	0.062	0.119	0.078	0.094	0.253	0.123	0.079	0.149	0.092	0.087	0.125	0.102	0.116	0.123
Jan-88	Benzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Chloroform	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Cis-1,2-Dichloroethylene	< 0.005	< 0.005	< 0.005	< 0.005	0.026	2.44	< 0.005	< 0.005	J 0.004	0.049	< 0.005	0.17	< 0.005	1.2	0.0072	0.34	< 0.005	< 0.005
Jan-88	Ethylbenzene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	J 0.004	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Manganese, Diss.	0.907	0.728	2.33	1.41	0.333	1.12	0.089	0.149	0.987	0.372	0.043	1.74	0.52	1.05	1.01	1.02	0.314	0.327
Jan-88	Methylene Chloride	0.005	< 0.005	< 0.005	J 0.004	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.026	< 0.005
Jan-88	Selenium, Diss.	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Tetrachloroethene	< 0.005	< 0.005	< 0.005	J 0.001	0.021	< 0.005	< 0.005	< 0.005	0.038	0.041	< 0.005	< 0.005	< 0.005	0.37	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Toluene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.0074	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Total Xylenes	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.063	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Trans 1,2-Dichloroethene	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	J 0.0047	< 0.005	< 0.005
Jan-88	Trichloroethene	< 0.005	J 0.002	0.011	0.16	0.276	12.7	0.0062	< 0.005	0.4	0.4	J 0.004	0.023	< 0.005	11.3	0.6	1.3	< 0.005	< 0.005
Jan-88	Trichlorofluoromethane	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Jan-88	Vinyl Chloride	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Jan-88	Zinc, Diss.	< 0.03	1.58	1.33	2.18	2.01	1.97	1.25	0.322	0.033	< 0.03	0.121	0.033	< 0.03	< 0.03	0.065	0.206	0.032	< 0.03

APPENDIX E

BOREHOLE AND WELL CONSTRUCTION LOGS FOR WELLS INSTALLED DECEMBER 1987 - FEBRUARY 1988

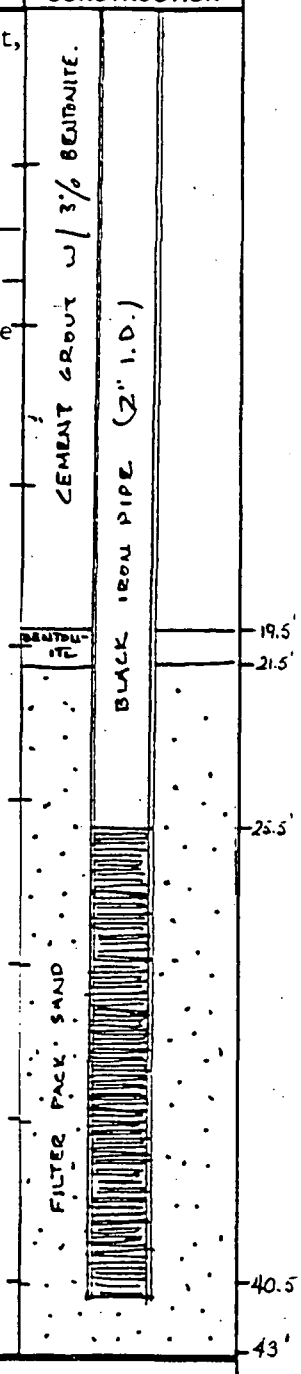
LOG OF TEST BORING

RMT INC

BORING NO.:	23-S
SHEET	1 of 1
PROJECT:	COE-NIROP
PROJECT NO.:	1332.32
LOCATION:	Fridley, MN
SURFACE ELEVATION:	844.6
DRILLED BY:	Layne-Northwest - Milwaukee
DATE STARTED:	2/11/88
DATE COMPLETED:	2/15/88
CREW CHIEF:	Ross Goldbeck
LOGGED BY:	MSM
CHECKED BY:	BWR/ 3/7/88

SAMPLING NOTES NO.	INTERVAL TYPE	RECOVERY BLOWS	RECOVERY %	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	1" Grab				Dk. brown, SAND, fine to med., some silt, trace of clay (topsoil)
2	Grab				
				5	Brown, SAND, fine, trace of silt
	6"				Black SAND, fine to med, trace of clay
3	Grab				
4	Grab				
				10	Brown, SAND, fine to coarse, little fine gravel (alluvium)
	11"				
5					
6	SS				
				15	Brown, SAND, fine to coarse, and fine gravel
	16"				
7					
8	SS				
				20	Brown, SAND, fine to coarse, and fine gravel
	21"				
9					
10	SS				
				25	Brown, SAND, fine to med.
	26"				
11					
12	SS				
				30	Brown, SAND, fine to med., trace coarse sand
	31"				
13					
14	SS				
				35	Brown, SAND, fine to coarse.
	36"				
15					
16	SS				
				40	Brown, SAND, fine to coarse.
17	41"				
18	SS				
					EOB @ 43'

GENERAL WELL CONSTRUCTION



NOTES				
DRILLING METHODS: Cable tool	WATER LEVEL OBSERVATIONS			
	FIRST OCCURENCE:			
	DATE/TIME	2/12/88 - 12:40p	2/15/88 9:30a	
BOREHOLE DIAMETER: 8.0"	DEPTH TO WATER	35'	31'	
DRILL RIG: Bucyrus - Erie ZOR	DEPTH TO CAVE IN			

F-204A (R 09-87)

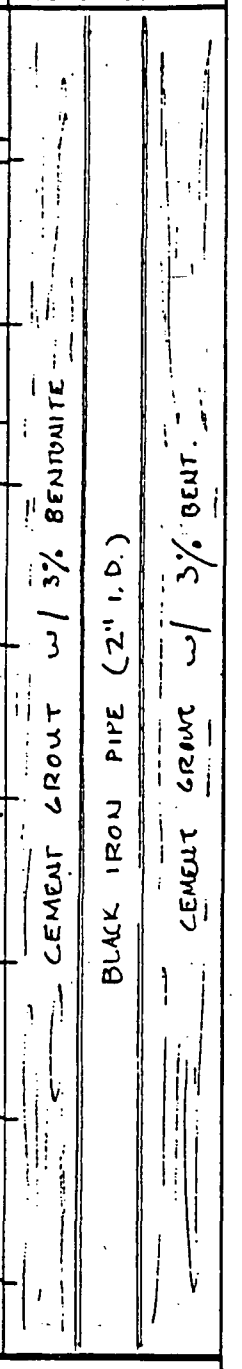
LOG OF TEST BORING

RMT INC

BORING NO.:	2-I
SHEET	1 of 2
PROJECT:	C.O.E. - NIROP
PROJECT NO.:	1332.32
LOCATION:	FRIDLEY, MN
SURFACE ELEVATION:	835.6'
DRILLED BY:	LAYNE NORTHWEST, MILWAUKEE
DATE STARTED:	1-21-88
DATE COMPLETED:	1-28-88
CREW CHIEF:	D. HORNBERG
LOGGED BY:	RON VAUGN
CHECKED BY:	BWR/ 1/28/88

SAMPLING NOTES: INTERVAL NO.	INTERVAL TYPE	RECOVERY BLOWS	RECOVERY %	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	1' Grab	* --	--		BLK, SANDY, vegetative matter, some fine gravel (top soil).
				5	
2	6.5' SS	20	100		DK brown silty SAND, fine to med., (fill).
				10	
3	11.6' SS	22	100		DK brown silty SAND, fine to med., (fill).
				15	
4	16.5' SS	35	100		Brown, SAND, fine to med., trace fine gravel.
				20	
5	21.5' SS	35	100		Brown, SAND, med. to coarse, little coarse gravel and cobbles.
				25	
6	26.5' SS	29	100		Brown, SAND, fine to med., trace cobble.
				30	
7	31.5' SS	31	100		Brown, SAND, fine grained.
				35	
8	36.5' SS	35	100		Brown, SAND, fine, trace silt and clay
				40	

GENERAL WELL CONSTRUCTION



NOTES	WATER LEVEL OBSERVATIONS			
DRILLING METHODS: Cable tool, using a *300 lb hammer and a 3" split-spoon sampler (SS)	FIRST OCCURENCE:			
	DATE/TIME			
BOREHOLE DIAMETER: 8.0 in,	DEPTH TO WATER			
DRILL RIG: Bucyrus-Erie ZZW	DEPTH TO CAVE IN			

F-204A (R 09-87)

LOG OF TEST BORING

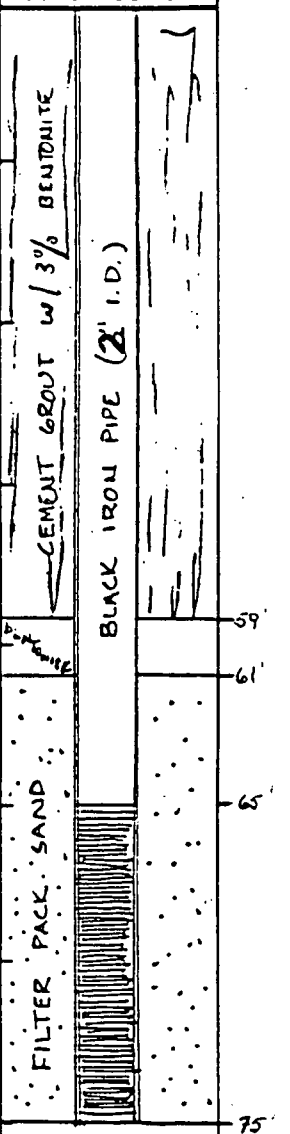
RMT

BORING NO.: 2-I	
SHEET 2 of 2	
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY, MN	SURFACE ELEVATION: -----

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
9	41.5 SS	37	100	40	Brown, SAND, fine trace SILT and clay.
				45	Brown, SAND, fine, some silt and clay.
10	46.5 SS	41	100		
				50	Brown, SAND, fine.
11	51.5 SS	39	100		
				55	Brown, SAND, fine.
12	56.5 SS	51	95		
				60	Brown, silty SAND, fine trace clay. (till)
13	61.5 SS	58	100		
				65	Brown, SAND, fine to med. trace clay.
14	66.5 SS	61	95		
				70	Brown, SAND, fine.
15	71.5 SS	60	95		
				75	Brown SAND fine to med.
16	76.5 SS	65	100		

EOB at 75.0'

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

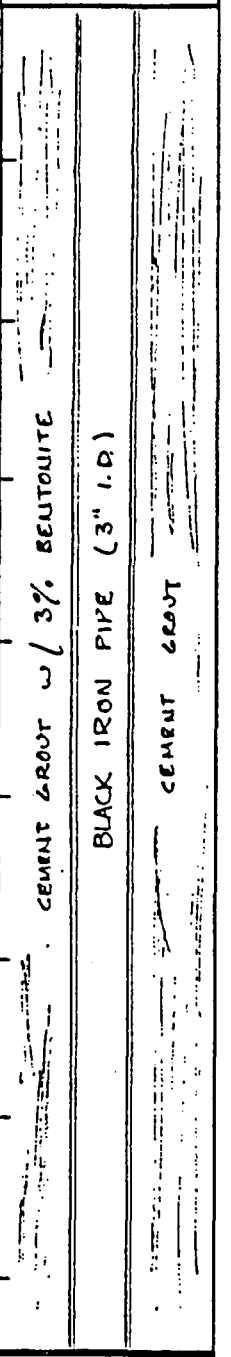
LOG OF TEST BORING

RMT INC

BORING NO.:	10-D
SHEET	1 of 3
PROJECT:	COE-NIROP
PROJECT NO.:	1332.32
LOCATION:	Fridley, MN
SURFACE ELEVATION:	832.1'
DRILLED BY:	Layne Northwest-Milwaukee
DATE STARTED:	1-28-88
DATE COMPLETED:	2-2-88
CREW CHIEF:	Ross Goldbeck
LOGGED BY:	R. Vaughn
CHECKED BY:	BWR/9 Mar. 88

SAMPLING NOTES: INTERVAL NO.	INTERVAL TYPE	RECOVERY BLOWS	RECOVERY %	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	1.5' Grab	--	--	0	Dark brown, SANDY TOP SOIL, vegetative matter, trace of fill material (brick, metal and glass).
				5	Dark brown, SAND, fine to coarse, trace fine gravel.
2	6.5' Grab	--	--		
				10	Dark brown, SAND, fine to coarse, trace fine gravel.
3	11.5 SS	--	--		
				15	Grey brown, SAND, med to coarse.
4	16.5 SS	--	--		
				20	Grey brown, SAND, med to coarse, trace of fine gravel.
5	21.5 SS	--	--		
				25	Grey brown, SAND, med to coarse, trace of fine gravel.
6	26.5 SS	--	--		
				30	Lt. grey brown, SAND, fine to med. poorhigh graded
7	31.5 SS	--	--		
				35	Lt. grey brown, SAND, fine to med. poorhigh graded
8	36.5 SS	--	--		
				40	Lt. grey brown, SAND, fine to med. poorhigh graded
9	41.5 SS	--	--		

GENERAL WELL CONSTRUCTION



NOTES	WATER LEVEL OBSERVATIONS			
DRILLING METHODS: Cable tool rig using a 300 lb split-spoon hammer and a 3" split-spoon sampler	FIRST OCCURENCE:			
	DATE/TIME			
BOREHOLE DIAMETER: 8"	DEPTH TO WATER			
DRILL RIG: Bucyrus-Erie ZOR	DEPTH TO CAVE IN			

F-204A (R 09-87)

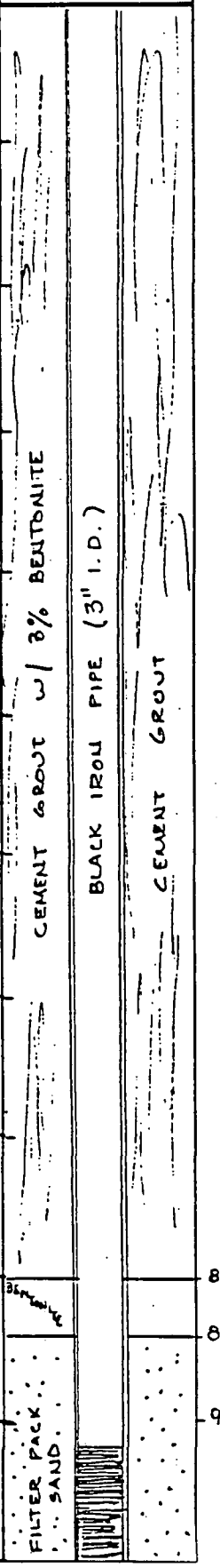
LOG OF TEST BORING

RMT

BORING NO.:	10-D
SHEET	2 of 3
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY, MN	SURFACE ELEVATION: ------

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
				45	Lt. grey brown, SAND, fine to med. little silt.
10	46.5' SS	--	--		
				50	Brown, SAND, fine, some coarse sand, trace of silt. (till)
11	51.5' SS	--	--		
				55	Brown, SAND, med. some clay and gravel, trace of silt.
12	56.5' SS	--	--		
				60	Brown, SAND, med. some clay and gravel, trace of silt.
13	61.5 SS	--	--		
				65	
14	66.5' SS	--	--		
				70	Brown, sand, fine to med.
15	71.5' SS	--	--		
				75	Brown, SAND, med. to coarse trace of cobble.
16	76.5' SS	--	--		
				80	Brown, SAND, med. to coarse, trace of silt. *
17	91.5' SS	--	--		
				85	Brown, SAND, coarse.
18	86.5' SS	--	--		
				90	Dark brown, SAND, med to coarse trace of fine to coarse gravel, and little silt **
19	91.5' SS	--	--		

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

LOG OF TEST BORING

BORING NO.:	10-D
SHEET	3 of 3
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY,MN	SURFACE ELEVATION: -----

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS	GENERAL WELL CONSTRUCTION
				95	Dark brown, SAND, med to coarse trace of fine gravel.	
20	96.5 SS	--	--			
				100	Lt. brown, SAND, med. to coarse, trace of sandstone fragments (St. Peter Sandstone)	FILTER PACK SAND
21	101.5 SS	--	--			101
					EOB at 101'	
					*Top half of split-spoon sample contained a petroleum-like odor after allowing the sample to warm in the office.	
					**Same odor as above noted in the bottom half of split-spoon sample.	

F-204B (R 09-87)

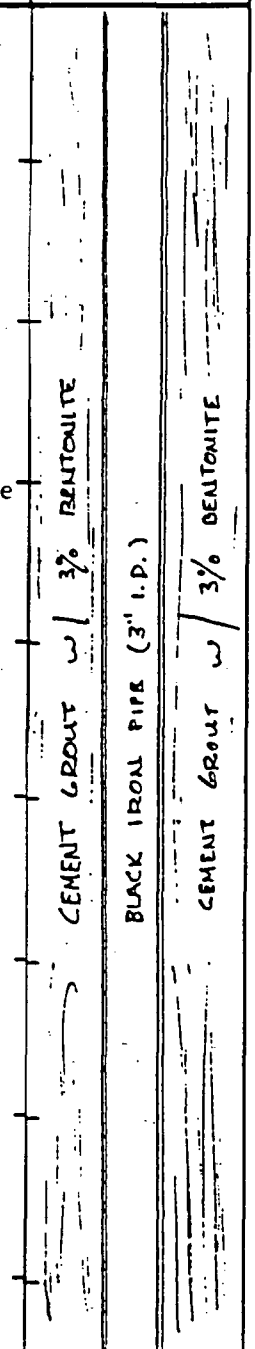
LOG OF TEST BORING

RMT INC

BORING NO.:	11-D
SHEET	1 of 3
PROJECT:	COE-NIROP
PROJECT NO.:	1332.32
LOCATION:	FRIDLEY, MN
SURFACE ELEVATION:	834.6'
DRILLED BY:	Layne Northwest-Milwaukee
DATE STARTED:	2-3-88
DATE COMPLETED:	2-10-88
CREW CHIEF:	Ross Goldbeck
LOGGED BY:	Ron Vaughn
CHECKED BY:	BWR/ 4 mar 88

SAMPLING NOTES NO.	INTERVAL TYPE	RECOVERY BLOWS	RECOVERY %	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	2' Grab	--	--	0'	Dk. Brown, SILT, trace of fill material (top soil).
				5'	Dark brown, SANDY SILT
2	Grab	--	--		
				10'	Dk. brown, SILTY SAND, med. to coarse, some coarse gravel, dense trace, clay
3	11.2' SS	200 / 1.2'	85		
				15'	Brown, SILTY SAND, coarse, trace of fine gravel, dense
4	15.8' SS	200 / .8'	50		
				20'	Brown, SILTY SAND, trace of fine gravel very dense.
5	20.9' SS	200 / .9'	100		
				25'	Brown, SILTY SAND, med.
6	25.9' SS	100 / .9	90		
				30'	Brown, SILTY SAND, med.
7	31.5' SS	50 / 1.5'	90		
				35'	Brown, SILTY SAND, med., med. dense.
8	36' SS	150 / 1.0'	100		
				40'	

GENERAL WELL CONSTRUCTION



NOTES	WATER LEVEL OBSERVATIONS			
DRILLING METHODS: Cable tool using a 3' split-spoon sampler w/a 300 lb. hammer	FIRST OCCURENCE:			
	DATE/TIME			
BOREHOLE DIAMETER: 8"	DEPTH TO WATER			
DRILL RIG: Bucyrus-Erie ZOR	DEPTH TO CAVE IN			

F-204A (R 09-87)

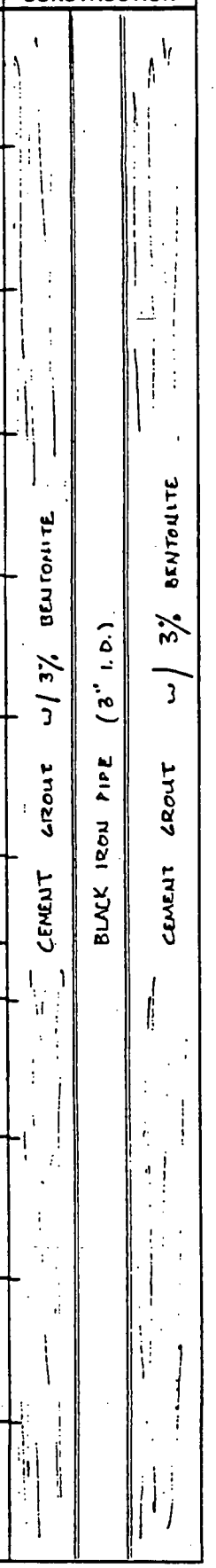
LOG OF TEST BORING

RMT

BORING NO.:	11-D
SHEET	2 of 3
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY, MN	SURFACE ELEVATION: -----

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
9	41' SS	100/1'	100	40	Grey Brown, SAND, fine to coarse, trace of silt, trace of fine gravel, med. dense
10	46' SS	110/1'	80	45	Grey Brown, SAND, fine to coarse, med. dense.
11	51' SS	125/1'	100	50	Grey Brown, SAND, med. to coarse, trace of silt, med. dense.
12	56' SS	105/1'	100	55	Grey Brown, SAND, med. to coarse, trace of fine gravel, trace of silt med. dense.
13	60.9 SS	150	80	60	Grey Brown, GRAVELLY SAND, med. to coarse some fine gravel, poorly sorted, dense.
14	66' SS	55/1'	75	65	Grey Brown, SAND, med. to coarse, fine gravel, low dense, little.
15	71' SS	20/1'	50	70	Grey Brown, SAND, med. to coarse, trace of fine gravel, soft.
16	76' SS	75/1'	75	75	Brown, SAND, med., med. dense.
17	81' SS	100/1'	100	80	Brown, SAND, med., well sorted.
18	86.5 SS	25/1.5'	100	85	Brown, SAND, fine, low dense.
19	90.9 SS	145/.9'	90	90	Brown, SAND, med, dense.

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

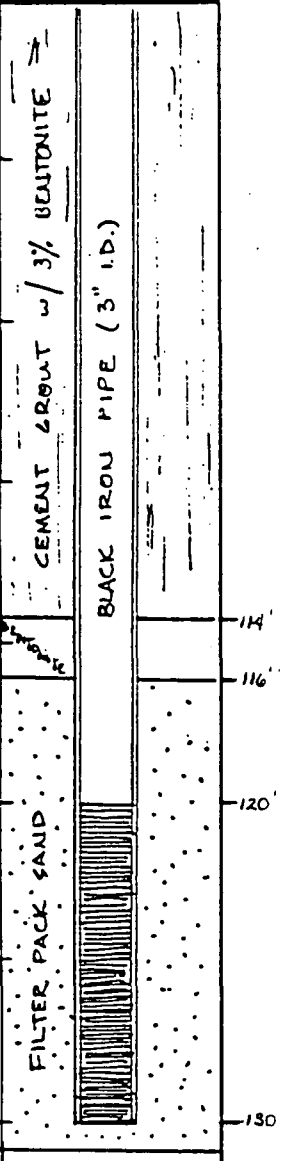
LOG OF TEST BORING

RMT

BORING NO.:	11-D
SHEET	3 of 3
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY, MN	SURFACE ELEVATION: -----

SAMPLING NOTES NO.	INTERVAL TYPE	RECOVERY BLOWS	RECOVERY %	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
20	95.9 SS	140 / .9'	80	95'	Brown, SAND, med. to coarse, dense.
				100'	
21	101' SS	160 / 1'	80		Brown, SAND, med. to coarse, dense.
				105'	
22	106' SS	109 / 1'	90		Brown, SAND, med., dense.
				110'	
23	SS	105 / 1'	80		Brown, SAND, med. trace fine gravel dense.
				115'	Brown, SAND, med. trace fine gravel, dense
24	116.5 SS	135 / 1.5'	80		
				120'	
25	121.7 SS	120 / 1.4'	80		Brown, SAND, med. trace fine gravel dense.
				125	Brown, silty SAND, fine to med.
26	126' SS	105 / 1'	90		
				130	Brown, SAND, med. to coarse, some fragments of sandstone (St. Peter Sandstone)
27	130.9' SS	130 / .9	90	135'	
					EOB at 130.9'

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

LOG OF TEST BORING

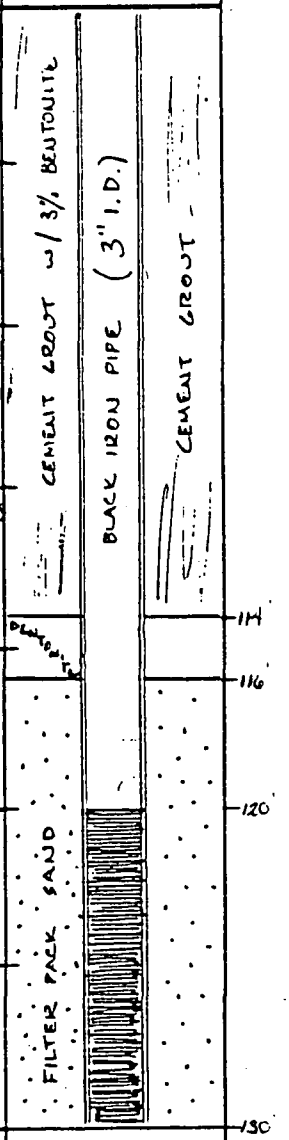
RMT

BORING NO.:	12-D
SHEET	3 of 3
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY,MN	SURFACE ELEVATION: -----

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
19	96.5 SS	--	--	95'	Brown, SAND, med. to coarse, and coarse gravel.
20	101.5 SS	--	--	100	Dark Brown, SAND, fine to coarse trace fine gravel.
21	106.5 SS	--	--	105	Brown, silty SAND, fine to med., coarse sand, trace fine gravel little, trace clay
22	111.5 SS	--	--	110	Brown, silty SAND, fine to med., coarse sand, trace fine gravel little, trace clay
23	116.5 SS	--	--	115	Brown, SAND, fine to coarse.
24	121.5 SS	--	--	120	Brown SAND, fine to coarse trace fine gravel.
25	126.5 SS	--	--	125	Brown, SAND, med. to coarse, trace fine gravel.
26	131.5 SS	--	--	130	Brown, SAND, med. to coarse.

EOB at 130'

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

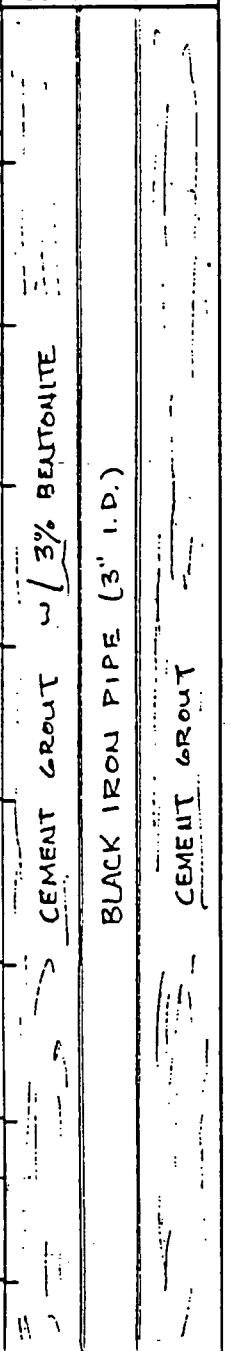
LOG OF TEST BORING

RMT INC

BORING NO.: 13-D	
SHEET 1 of 3	
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: Fridley, MN	SURFACE ELEVATION: 833.3'
DRILLED BY: Layne Northwest - Milwaukee	DATE STARTED: 1-29-88 / DATE COMPLETED: 2-8-88
CREW CHIEF: Dick Hornburg	LOGGED BY: Ron Vaughn / CHECKED BY: BWR/3-4-88

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	Grab	* -	-		Black, SILTY SANDY CLAY, and fill materials, soft
				5'	
2	Grab	-	-		Light brown sand, fine to med.
				10'	
3	SS	35	80		Light brown SAND, fine to med.
				15'	
4	16.3' SS	38	95		Light brown, SAND, little fine gravel
				20'	
5	21.5' SS	82	95		Brown, SAND, med to coarse, some coarse gravel
				25'	
6	26.5' SS	88	60		Brown SAND, med to coarse, some coarse gravel
				30'	
7	31.5' SS	85	80		Grey brown, sand, fine to med. trace of fine gravel
				35'	
8	36.5' SS	83	90		Light brown, SAND, med to coarse.
				40'	(Trace fine gravel @37')
9	41.5' SS	100/.8'	100		Dark grey, CLAYEY SILT, dense

GENERAL WELL CONSTRUCTION



NOTES	WATER LEVEL OBSERVATIONS			
DRILLING METHODS: Cable tool w/Split Spoon (S.S.) Sampler *300lb. Hammer and 3" Split Spoon	FIRST OCCURENCE:			
	DATE/TIME			
BOREHOLE DIAMETER: 8"	DEPTH TO WATER			
DRILL RIG: BUCYRUS-ERIE 22R	DEPTH TO CAVE IN			

F-204A (R 09-87)

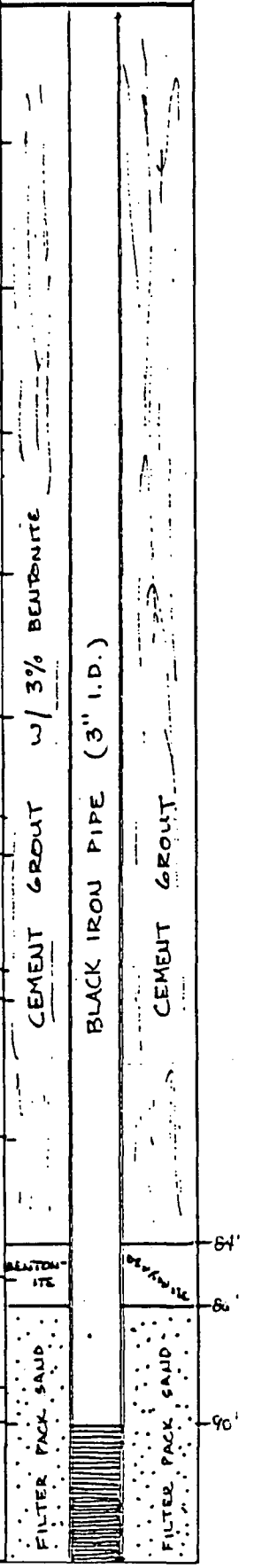
LOG OF TEST BORING

RMT

BORING NO.: 13-D	
SHEET 2 of 3	
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: Fridley, MN	SURFACE ELEVATION: ----

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
-	-	-	-	40	See page 1 @44'
				45'	
10	46.5' SS	100/ .6'	100		Brown CLAYEY SILTY SAND, little coarse gravel, dense
				50'	
11	51.5' SS	200/ .5'	100		Brown SILTY CLAY, trace coarse sand, trace fine gravel @55.5'
				55'	
12	56.5' SS	200/ 1.5'	80		Dark grey, SANDY SILT, little fine sand uniform Brown SAND, little clay @56.3
				60'	
13	61.5' SS	190/ 1.5'	90		Brown, SAND, fine
				65'	
14	66.6' SS	180/ 1.6'	80		Brown SAND, fine to med. @68.5
				70'	
15	71.5' SS	180/ 1'	80		Brown SAND, med to coarse, trace fine gravel, trace of cobbles @74'
				75'	
16	76.5' SS	200/ 1.5	80		Brown, SAND, med to coarse
				80'	
17	81.5 SS	215/ 1.5'	80		Brown, SAND, med to coarse
				85'	
18	86.5' SS	190/ 1.5'	70		Brown, SAND, fine to coarse Trace fine gravel. @89'
				90'	
19	91.5' SS	202/ .3'	50		Brown, GRAVELLY SAND, little cobbles, trace sandstone fragments
				95'	

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

LOG OF TEST BORING

RMT

BORING NO.: 13-D	
SHEET 3 of 3	
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: Fridley, MN	SURFACE ELEVATION: ____

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS	GENERAL WELL CONSTRUCTION
				95'		
20	96.5' SS	204/ .8'	40		Brown, GRAVELLY SAND, little cobbles, trace of fragmented sandstone.	FILTER PACK SAND
				100'		100'
21	Grab	-	-		Yellow brown, SANDSTONE, soft, well sorted, fine to med., trace med sand. (St. Peter Sandstone)	101'
				105'		
					E.O.B. 101'	

F-204B (R 09-87)

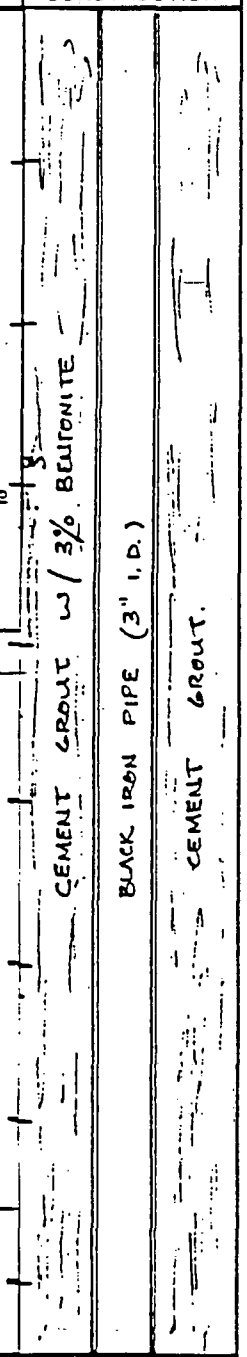
LOG OF TEST BORING

RMT INC

BORING NO.:	14-D
SHEET	1 of 2
PROJECT:	COE-NIROP
PROJECT NO.:	1332.32
LOCATION:	FRIDLEY, MN
SURFACE ELEVATION:	835.3'
DRILLED BY:	Layne-Northwest-Milwaukee
DATE STARTED:	1-11-88
DATE COMPLETED:	1-20-88
CREW CHIEF:	Dick Hornburg
LOGGED BY:	Ron Vaughn
CHECKED BY:	BWR/ 4 Mar 88

SAMPLING NOTES INTERVAL NO.	INTERVAL TYPE	RECOVERY BLOWS	RECOVERY %	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
--	--	--	--	0	(No samples collected 0' - 30', see log for 9S and 5I)
1	31.5' SS	--	80	30	Brown, SAND, fine
2	36.5' SS	--	70	35	Brown, SAND, fine
3	41.5' SS	--	--	40	Brown, SAND, fine to coarse, little fine gravel
4	46.5' SS	--	80	45	Brown, GRAVELLY SAND, fine to coarse, Brown, CLAYEY SAND, fine sand, uniform
				50	At 50' Drilling methods changed from hollow stem augers to cable-tool rig.
5	SS	--	40	50	Dark red brown, CLAYEY SAND, fine sand, Brown, GRAVELLY SAND, fine to coarse, trace of cobbles.
6	55.5' SS		10	55	Ban, SAND, fine to coarse, trace fine gravel
				60	Change to hard drilling at 56.8'

GENERAL WELL CONSTRUCTION



NOTES	WATER LEVEL OBSERVATIONS			
DRILLING METHODS: Hollow stem augers to 50' cable tool after 50': w/ 3" split-spoon sampler using a 300lb hammer.	FIRST OCCURENCE:			
	DATE/TIME			
BOREHOLE DIAMETER: 8"	DEPTH TO WATER			
DRILL RIG: Bucyrus-Erie 22R	DEPTH TO CAVE IN			

F-204A (R 09-87)

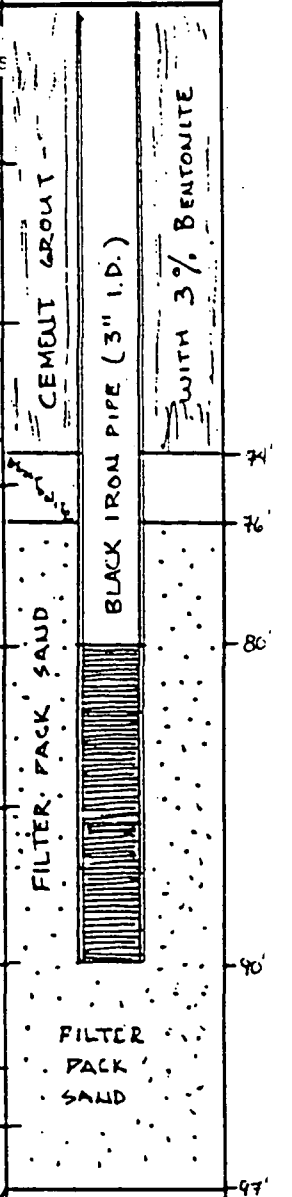
LOG OF TEST BORING

RMT

BORING NO.:	14-D
SHEET	2 of 2
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY,MN	SURFACE ELEVATION: ----

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
7	60.3 SS	--	100	60	Brown, SAND, fine to coarse sand, trace silty gravel, track of clay, trace cobbles (till). (Very hard to drill in.)
8	65.5 SS	200 / .5'	100	65	Brown, Silty SAND, fine to coarse, trace coarse gravel (till)
9	SS	--	100	70	Brown, silty SAND, fine to coarse, trace coarse gravel, trace cobbles (till) @73.5'
10	76.4 SS	200 / 1.4'	100	75	Red brown, SAND, fine to med., trace of fine gravel.
11	81.2 SS	200 / 1.2'	100	80	Red brown, SAND, fine to med., trace of fine gravel. Yellow brown, SAND, fine.
12	86.5 SS	196 / 1.4'	50	85	Redish brown, SAND, fine at 88' Gravelly SAND at 90'
13	90.7 SS	200 / .7'	60	90	Red brown, SAND med. to coarse, some clay, some gravel. at 93'
14	95.5 SS	200 / .5'	70	95	Brown, SAND, fine to coarse, some gravel
				100	EOB 97'

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

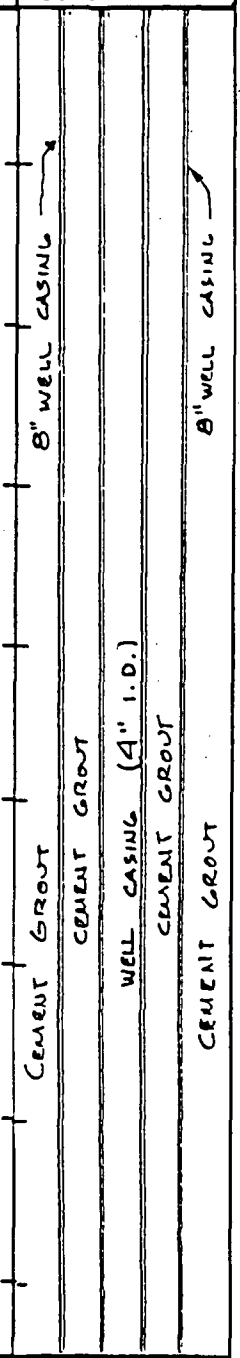
LOG OF TEST BORING

RMT INC

BORING NO.:	5-PC
SHEET	1 of 4
PROJECT:	COE-NIROP
PROJECT NO.:	1332.32
LOCATION:	FRIDLEY, MN
SURFACE ELEVATION:	832.2'
DRILLED BY:	Layne Northwest - Milwaukee
DATE STARTED:	
DATE COMPLETED:	
CREW CHIEF:	
LOGGED BY:	Mark McColloch
CHECKED BY:	BWR 9 Mar. 88

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	IN	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
1	WS	0, 2, 3	2	0	Black, SAND, fine to med. some to little fine gravel, trace of silt and clay, plant roots.
3	WS	5.5	9.5	5	Brown, SAND, and GRAVEL, med. to coarse pieces of wood.
4	WS	10.5	14.5	10	Brown, SAND and GRAVEL, med. to coarse, pieces of wood.
5	WS	15.5	19.5	15	Light brown, SAND, fine to coarse.
6	WS	20.5	25.5	20	Light brown, SAND, fine to coarse.
7	WS	26.5	30.5	25	Light brown, SAND, fine to coarse.
8	WS	31.5	35.5	30	Light brown, SAND, fine to coarse.
9	WS	36.5	40.5	35	Light brown, SAND, fine to coarse.
		41.5		38'	More coarse sand and fine gravel
				40	

GENERAL WELL CONSTRUCTION



NOTES	WATER LEVEL OBSERVATIONS			
DRILLING METHODS: Mud rotary grab samples composited of wash cuttings over 5 ft. intervals.	FIRST OCCURENCE:			
	DATE/TIME			
BOREHOLE DIAMETER: 8" to 6.5" to 3"	DEPTH TO WATER			
DRILL RIG: TH-60: Well Casing Gus Peck Bratt 22R: Rock Core	DEPTH TO CAVE IN			

F-204A (R 09-87)

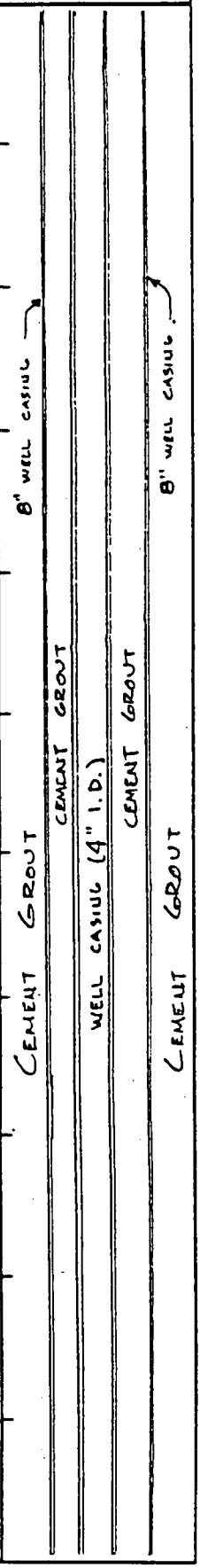
LOG OF TEST BORING

RMT

BORING NO.:	5-PC
SHEET	2 of 4
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY,MN	SURFACE ELEVATION:

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
				40	Brown, SAND, Med. to coarse, trace cobbles.
10	WS				
				45	Brown, SAND, med. to coarse little silt and clay.
11	WS			49	No clay present at 49'
				50	Brown SAND and GRAVEL, med to coarse, little silt and clay.
12	WS				
				55	Brown, SAND, some clay and fine gravel.
13	WS				
				60	
					Brown, SAND, some clay and fine gravel.
14	WS			63' / 65'	Clay becoming more abundant.
				65	
15	WS				Brown, SAND, some clay and fine gravel.
				70	Brown, SAND, some clay and fine gravel.
16	WS			72' / 73'	Clay becoming less abundant.
				75	Brown, SAND, med. to coarse, little fine gravel.
17	WS				
				80	
18	WS				Brown, SAND, med. to coarse, little fine gravel.
				85	
19	WS				Brown, SAND, med. to coarse, little fine gravel.
				90	
20	WS				Brown, SAND, med. to coarse, little fine gravel.
				95	

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

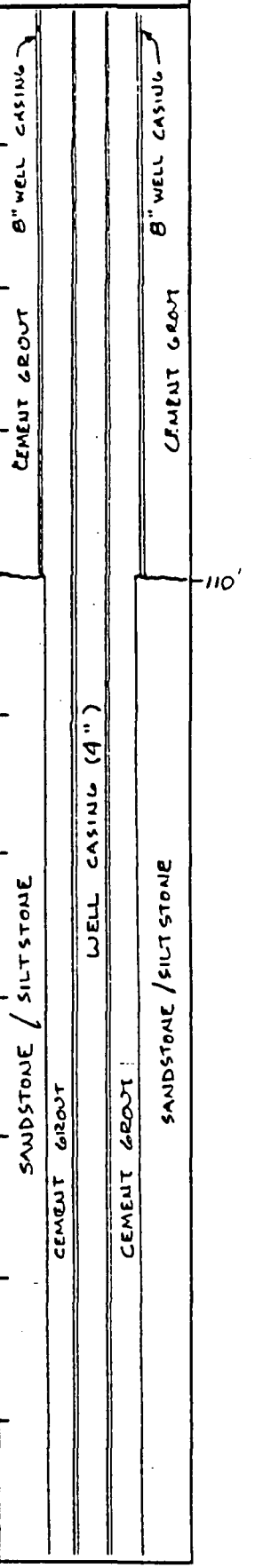
LOG OF TEST BORING

RMT

BORING NO.:	5-PC
SHEET	3 of 4
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY, MN	SURFACE ELEVATION:

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
21	G			95	Dark brown, SAND, med to coarse, trace of siltstone with interbedded shale.
				100	Yellow brown, SILTSTONE, interbedded with soft pale yellow shale.
22	G			103	Yellow brown, SILTSTONE.
	G			105	
24	G				Yellow brown, SILTSTONE.
				110	8" casing grouted. Begain 6.5" borehole.
				110	Yellow brown, SILTSTONE and greenish grey siltstone.
25	G			112	
26	G			115	
27	G				Yellow brown, SILTSTONE and greenish grey siltstone.
				120	
28	G				Yellow brown, SILTSTONE and greenish grey siltstone.
				125	
29	G				Yellow brown, SILTSTONE and greenish grey siltstone.
				130	Tan, SANDSTONE/SILTSTONE, very fine
30	G			133	
31	G			135	Tan, SANDSTONE/SILTSTONE, some greenish white shale.
32	G				Fractured zone, drilling method losing water into bedrock.
				140	Reddish brown, SILTSTONE, and white SANDSTONE/SILTSTONE.
	G			145	

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

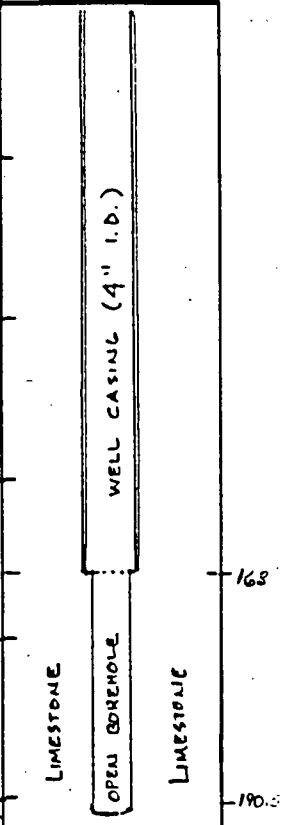
LOG OF TEST BORING

RMT

BORING NO.:	5-PC
SHEET	4 of 4
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY, MN	SURFACE ELEVATION:

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
33	G			145	Reddish brown, SILTSTONE, and white, SANDSTONE/SILTSTONE.
34	G			150	Orange brown, SANDSTONE. White, SANDSTONE/SILTSTONE.
35	G			155	Orange brown, SANDSTONE. White, SANDSTONE/SILTSTONE.
36				160	
	Rock Core				Yellow orange brown, LIMESTONE, interbedded with siltstone, few interbeds of sand, fractured, vugs lined with chalcopynte, pyrite, and calcite.
				190	EOB at 190.5'

GENERAL WELL CONSTRUCTION



F-204B (R 09-87)

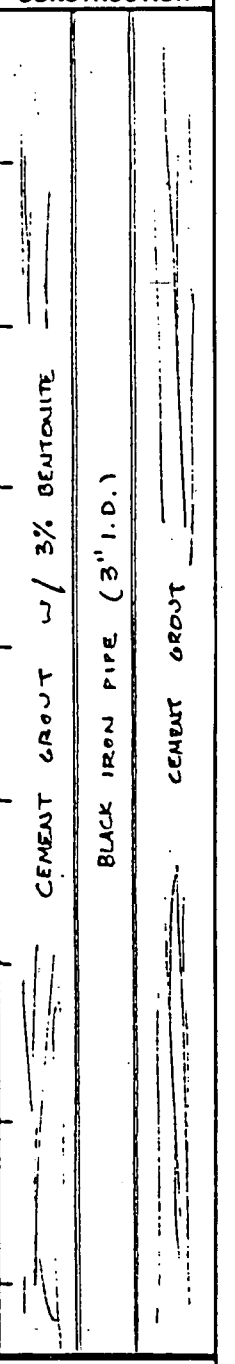
LOG OF TEST BORING

RMT INC

BORING NO.:	12-D
SHEET	1 of 3
PROJECT:	COE-NIROP
PROJECT NO.:	1332.32
LOCATION:	FRIDLEY, MN
SURFACE ELEVATION:	834.9'
DRILLED BY:	Layne Northwest-Milwaukee
DATE STARTED:	1-18-88
DATE COMPLETED:	1-22-88
CREW CHIEF:	Ross Goldbeck
LOGGED BY:	R. Vaughn
CHECKED BY:	BWR/ 9 mar 88

SAMPLING NOTES INTERVAL NO.	TYPE	RECOVERY BLOWS	%	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
					Brown, SILTY TOPSOIL, trace fill material (brick, glass)
				5	Light brown, SAND, fine to med. trace of clay and silt
1	6.5' Grab	--	--		
				10	Light brown, SAND, med to coarse, trace of fine gravel.
2	11.5' Grab	--	--		
				15	Light brown, SAND, med to coarse, trace of fine gravel.
3	16.5' SS	--	--		
				20	Light grey brown, SILTY SAND, fine
4	21.5' SS	--	--		
				25	Brown, SAND, med. to coarse, trace of fine gravel.
5	26.5' SS	--	--		
				30	[0% recovery after 3 attempts]
6	SS	--	--		
				35	Brown, SAND, med. to coarse, trace of fine gravel
7	36.5' SS	--	--		
				40	

GENERAL WELL CONSTRUCTION



NOTES	WATER LEVEL OBSERVATIONS			
DRILLING METHODS: Cable tool rig using a 300 lb hammer with a 3" split-spoon sampler.	FIRST OCCURENCE:			
	DATE/TIME			
BOREHOLE DIAMETER: 8"	DEPTH TO WATER			
DRILL RIG: Bucyrus-Erie ZOR	DEPTH TO CAVE IN			

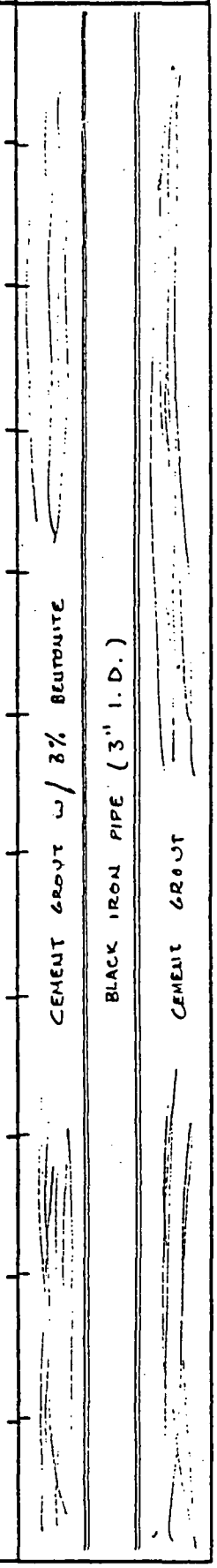
F-204A (R 09-87)

LOG OF TEST BORING

BORING NO.:	12-D
SHEET	2 of 3
PROJECT: COE-NIROP	PROJECT NO.: 1332.32
LOCATION: FRIDLEY,MN	SURFACE ELEVATION: ----

SAMPLING NOTES: INTERVAL NO.	INTERVAL TYPE	RECOVERY BLOWS	RECOVERY %	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
8	41.5 SS	--	--	40'	Brown, SAND, med. to coarse, trace of fine gravel.
				45'	
9	46.5 SS	--	--		Brown, SAND, fine to coarse trace of fine gravel.
				50'	
10	51.5 SS	--	--		Brown, SAND, fine to med. trace of fine gravel.
				55'	
11	56.5 SS	--	--		Brown, SAND, fine to coarse, little fine gravel.
				60'	
12	61.5 SS	--	--		Brown, SAND, coarse, little fine gravel.
				65'	
13	66.5 SS	--	--		Brown, SAND, med. to coarse, little fine gravel.
				70'	
14	71.5 SS	--	--		Brown, SAND, med. to coarse, little fine gravel.
				75'	
15	76.5 SS	--	--		Brown, SAND, med. to coarse, trace of fine gravel.
				80'	Brown, SAND, Fine to med.
16	81.5 SS	--	--		
				85'	Brown, SAND, coarse, trace fine gravel.
17	86.5 SS	--	--		
				90'	Brown, SAND, coarse trace fine gravel.
18	91.5 SS	--	--		

GENERAL WELL CONSTRUCTION

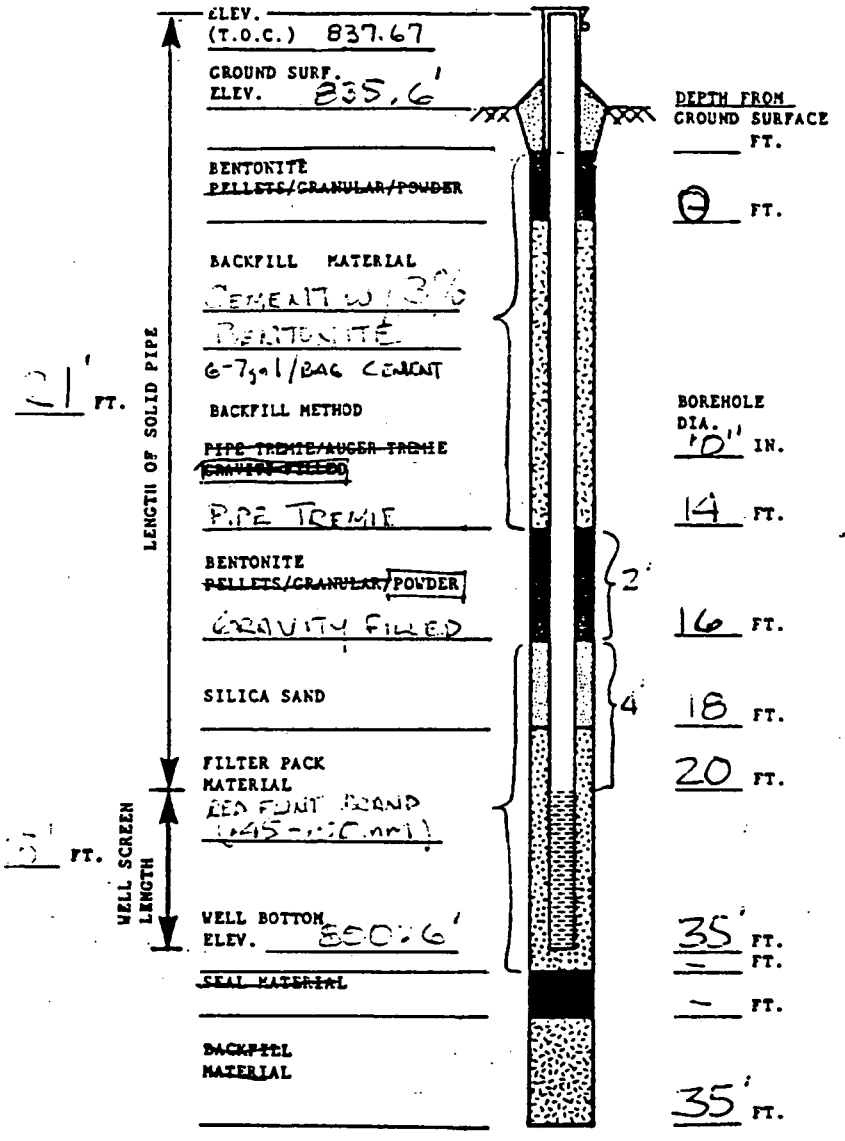


F-204B (R 09-87)

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: NIROP NO. 1332.32
WELL NO. MW 21-S
DATE INSTALLED 12-16-87



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON, OTHER~~ BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS; YES: TEFLON

COUPLINGS, THREADED (W/TAPE?), OTHER

C) WAS SOLVENT USED? ~~YES OR~~ NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2" OD IN. 2 5/16

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO

PROTECTOR PIPE DIA. ~~6 5/16~~ IN. 6.5"

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 3 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 540 gal

ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

NTU = 1.8 (KEB 7-5-88)

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 (24.43')

DATE/TIME

DATE/TIME

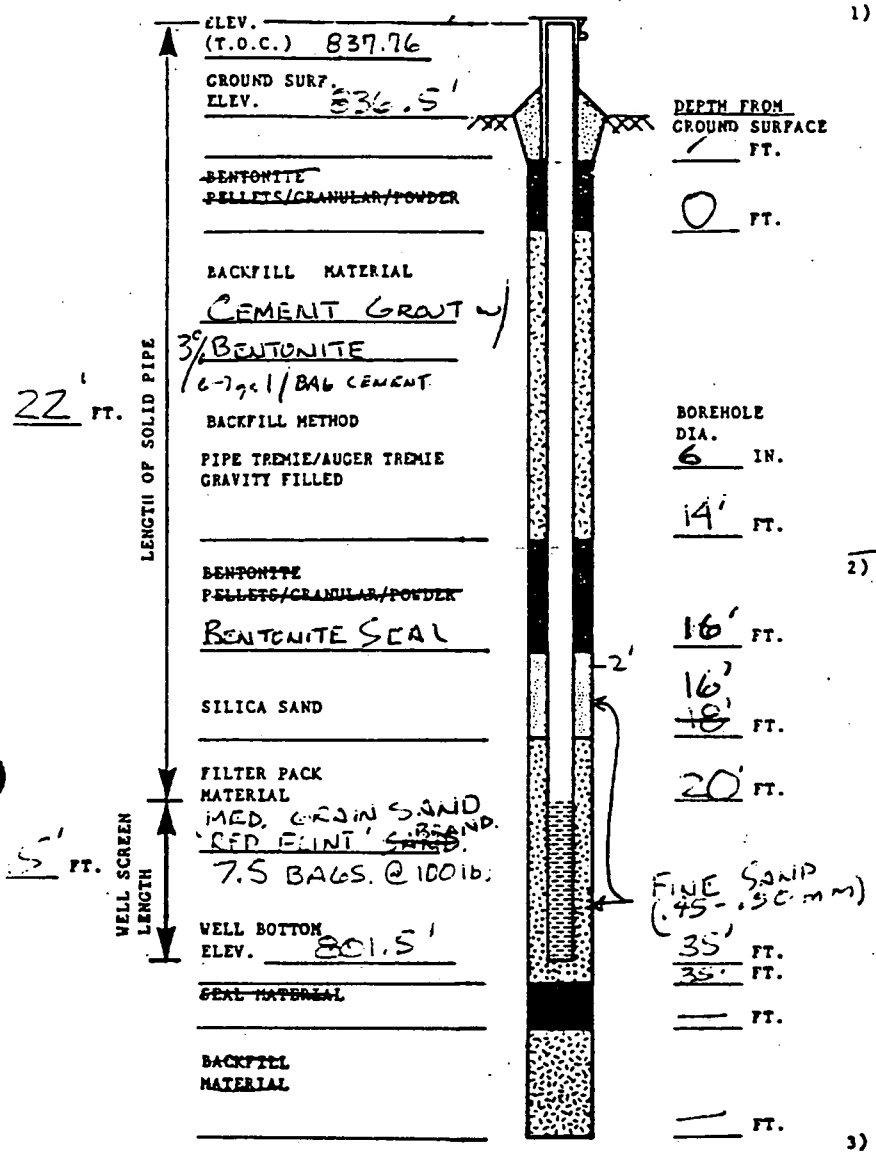
ADDITIONAL COMMENTS: ~12 BAGS OF CEMENT IN THE HOLE.
MIXED 15 BAGS ~~of~~ OF CEMENT PLUS 1 BAG OF BENTONITE
CEMENT = 100 lb. BAGS
BENTONITE = 50 lb. BAGS.
USED 2 CENTRALIZERS.

elevations checked 5/9/88 CAK

FMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: NIRCP NO. 13323
WELL NO. MW-22 S
DATE INSTALLED 12-11-87



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON, OTHER~~ BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), ~~OTHER~~ — YES - TEFLON

C) WAS SOLVENT USED? ~~YES OR~~ NO

D) TYPE OF WELL SCREEN:

~~PVC,~~ STAINLESS, ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2" OD IN. 2 5/16"

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 6.5" IN. O.D.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2.5 HRS.

C) APPROXIMATE WATER VOLUME: REMOVED 450 gal
ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE
NTU = 2.0 (KEB 7/5/

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 (24.80')

DATE/TIME

DATE/TIME

ADDITIONAL COMMENTS: 12 BAGS OF CEMENT PLACED IN THE ANNULAR SPACE OUTSIDE OF WELL.
1 BAG OF BENTONITE ~~USED~~ WAS ADDED.
2 - CENTRALIZERS.

elevations checked 5/9/88 CAK

CAK 3/22/88

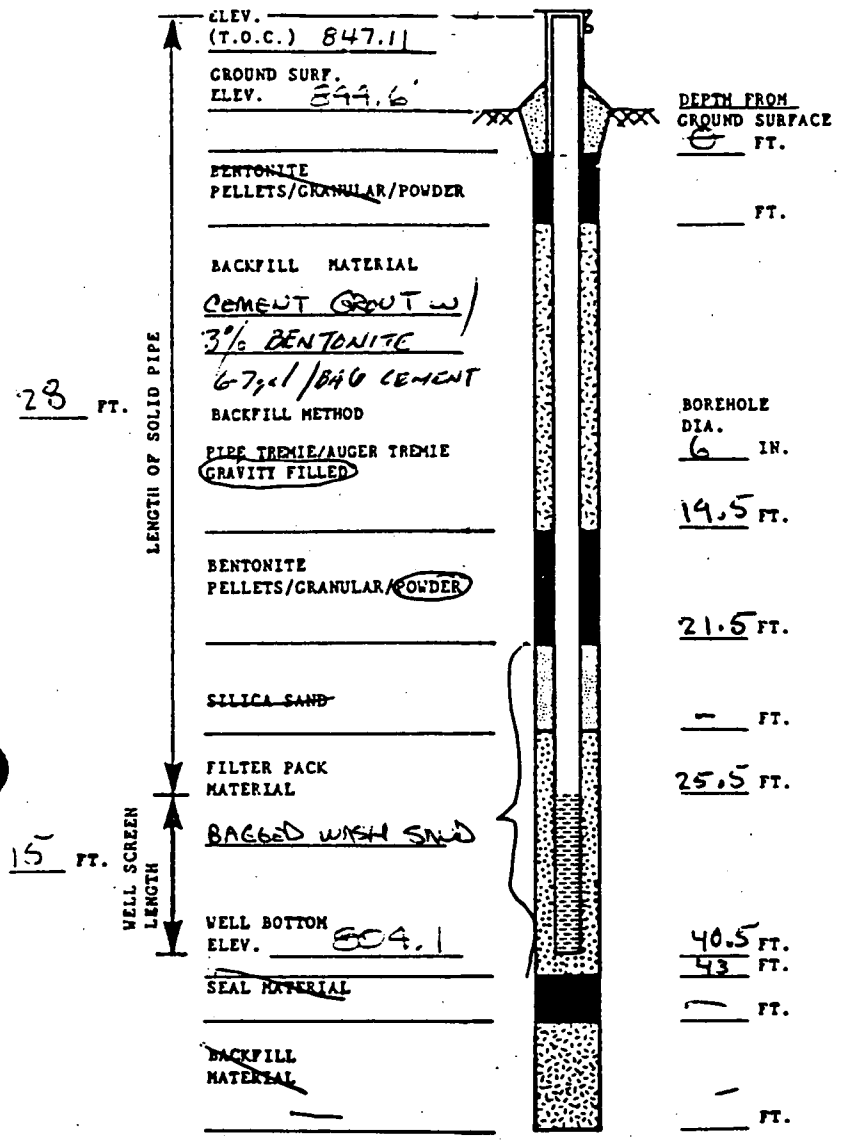
RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: OGE - NIROP NO. 1332.32

WELL NO. 23S

DATE INSTALLED 2-15-88 1:00pm



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, (OTHER) BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

(COUPLINGS), THREADED (W/TAPE?), OTHER W/TEFLON

C) WAS SOLVENT USED? YES OR (NO)

D) TYPE OF WELL SCREEN:

PVC, (STAINLESS), TEFLON, OTHER

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2 OD IN. 2 5/16

G) INSTALLED PROTECTOR PIPE W/LOCK? (YES) OR NO

PROTECTOR PIPE DIA. 6 IN.

2) WELL DEVELOPMENT

A) METHOD

~~BAILING~~, (PUMPING), ~~SURGING~~, ~~COMPRESSED AIR~~

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 480 gal

ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, [TURBID], OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

[CLEAR], SLIGHTLY TURBID, TURBID, OPAQUE

NTU = 1.1 (KEB 7/5/89

F) ODOR? ~~YES~~ OR [NO]

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 31' 9:30AM 2-15-88

DATE/TIME

DATE/TIME

ADDITIONAL COMMENTS: 2 STAINLESS STEEL STABILIZERS PUT ON WELL CASING.

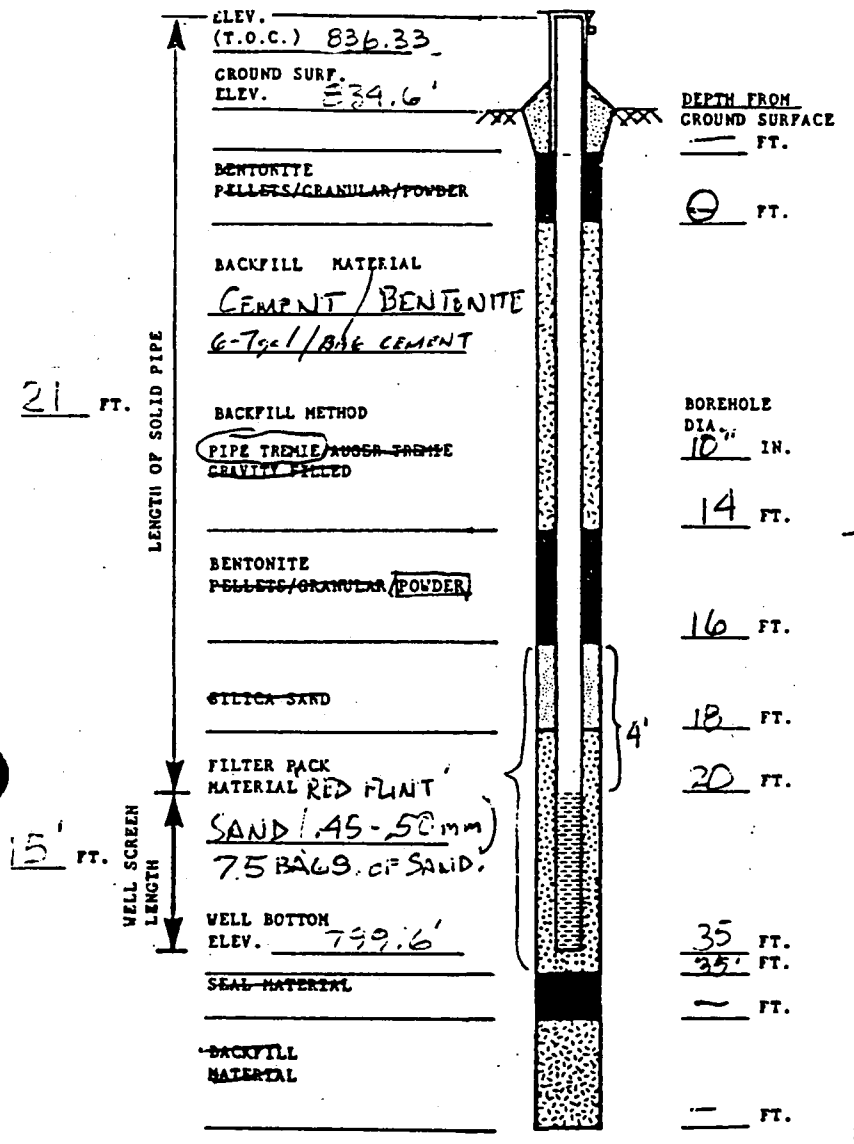
~~ONE ABOVE SCREEN AT ABOUT 16' FROM BOTTOM, AND ANOTHER AT 37' FROM BOTTOM~~ RAN 3-22-88

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: NIROP NO. 1332.32
WELL NO. MW-24S
DATE INSTALLED 12-18-87



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON,~~ OTHER BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), ~~YES: TEFLON~~ YES: TEFLON OTHER

C) WAS SOLVENT USED? ~~YES OR~~ NO

D) TYPE OF WELL SCREEN:

~~PVC,~~ STAINLESS, ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2" OD IN. 2 5/16"

G) INSTALLED PROTECTOR PIPE W/LOCK? ~~YES OR NO~~
PROTECTOR PIPE DIA. 6.5 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2.5 HRS

C) APPROXIMATE WATER VOLUME: REMOVED <750 gal

ADDED

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, ~~OPAQUE~~ SLIGHTLY

F) ODOR? YES OR NO NTU = 0.62 (KEG 7/5/

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 (24.12')

DATE/TIME

DATE/TIME

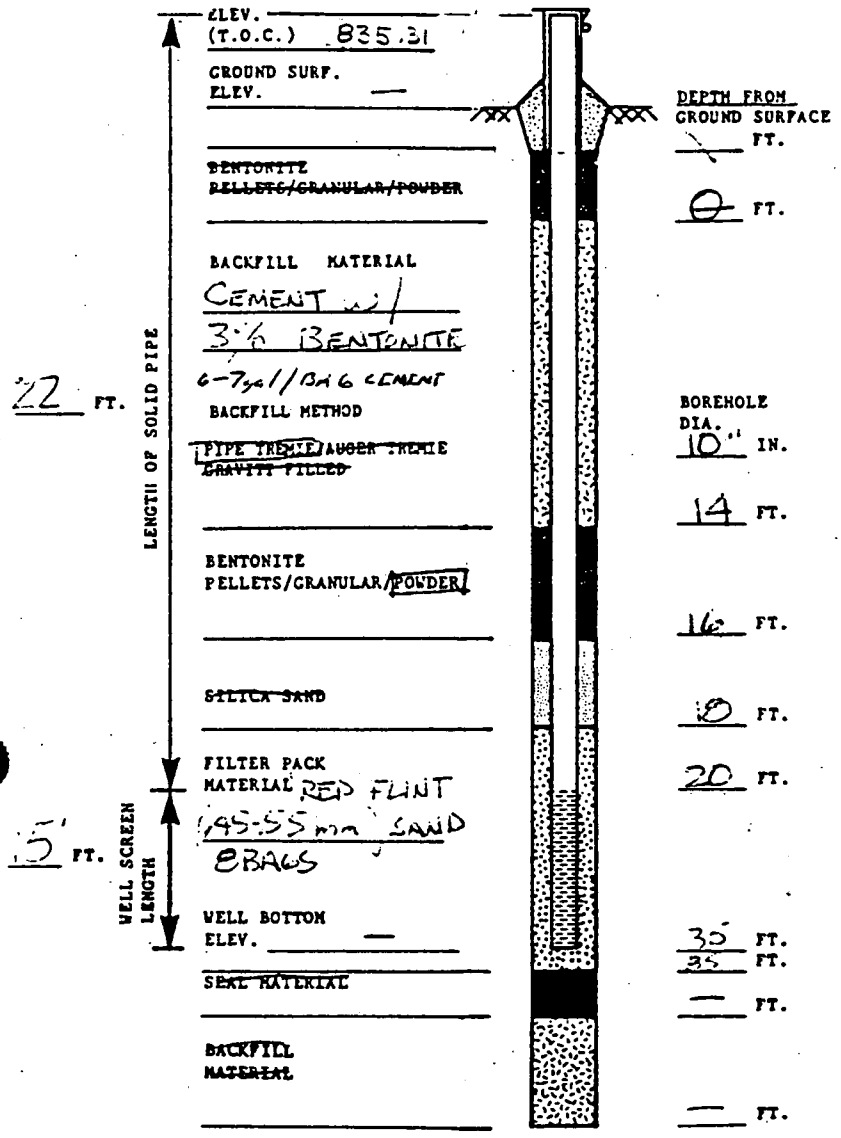
ADDITIONAL COMMENTS: 2 CENTRALIZERS USED.
12 BAGS OF CEMENT / 1.3 ~~BENTONITE~~ BAGS OF BENTONITE

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: NIRDP NO. 1332.32
WELL NO. MW 25-S
DATE INSTALLED 12-21-87



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON, OTHER~~ BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, [THREADED (W/TAPE?)] YES TEFLON OTHER

C) WAS SOLVENT USED? ~~YES OR~~ [NO]

D) TYPE OF WELL SCREEN:

~~PVC,~~ [STAINLESS,] ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2" OD IN. 2 5/16"

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 6.5 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, [PUMPING, SURGING,] COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 3.0 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 540 gal

ADDED

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, [OPAQUE]

E) WATER CLARITY AFTER DEVELOPMENT?

[CLEAR] SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR [NO] NTU = 0.42 (KEC, 7/5

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 (22.42') F

DATE/TIME F

DATE/TIME F

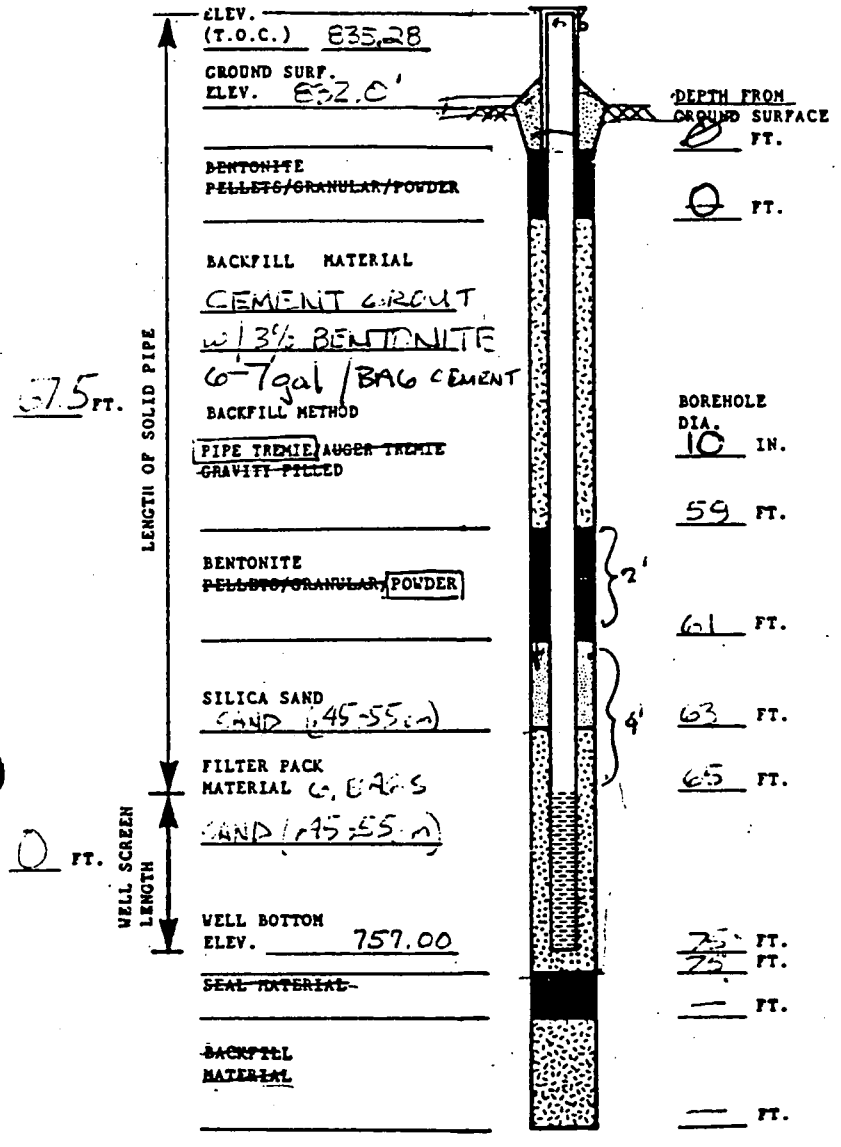
ADDITIONAL COMMENTS: 2 CENTRALIZERS INSTALLED
1 BAG BENTONITE / 11 BAGS CEMENT @ (6-7 gal/BAG OF CEM)

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: NIROP NO. 1352.32
WELL NO. 1-I
DATE INSTALLED 1-15-88



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON, OTHER~~ BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

~~COUPLINGS~~, THREADED (W/TAPE?) YES: TEFLON, ~~OTHER~~

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

~~PVC~~, STAINLESS, ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2 OD IN. 2 5/16

G) INSTALLED PROTECTOR PIPE W/LOCK? YES ~~OR NO~~
PROTECTOR PIPE DIA. 6" IN.

2) WELL DEVELOPMENT

A) METHOD

~~BAILING~~, PUMPING ~~SURGING, COMPRESSED AIR~~

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2.5 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 450 gal
ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, ~~OPAQUE~~ SLIGHTLY

F) ODOR? YES OR NO NTU = 3.4 (REC 7/5/8

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 (21.99')

DATE/TIME

DATE/TIME

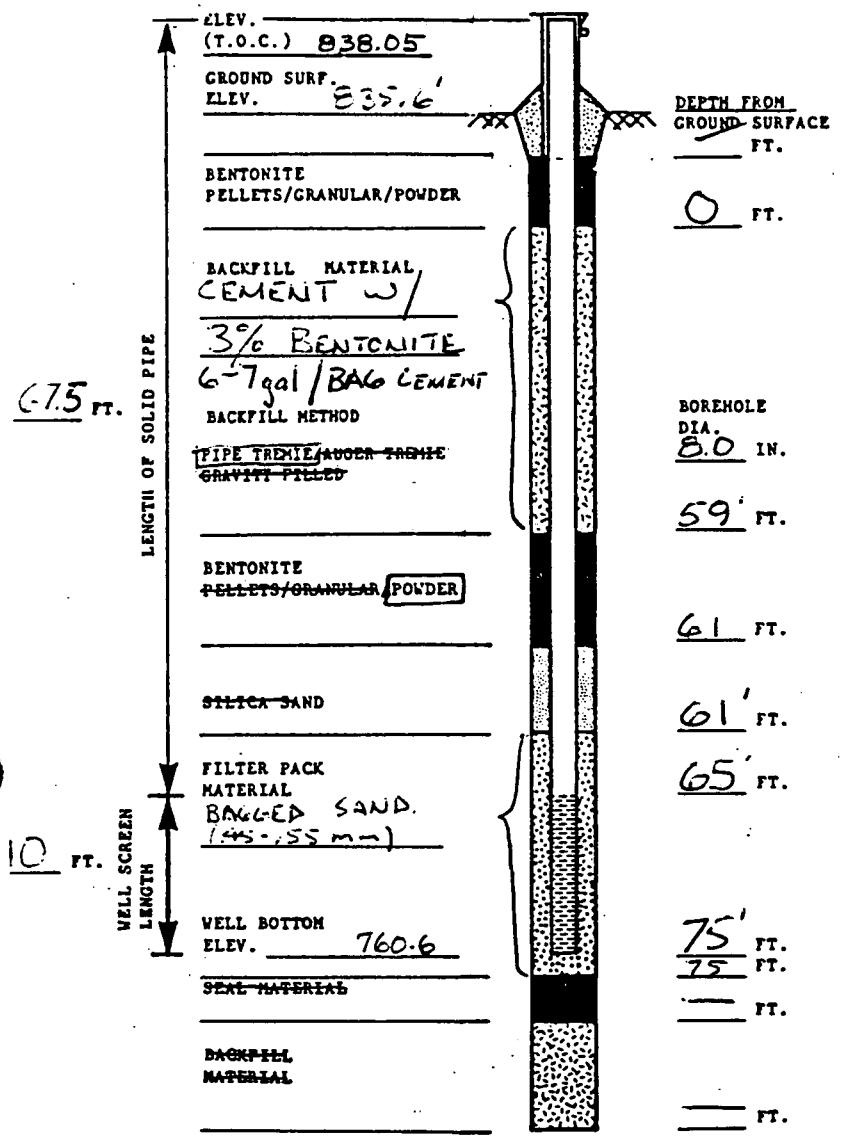
ADDITIONAL COMMENTS: 3 CENTRALIZERS INSTALLED.
40 ~~35~~ BAGS CEMENT PUT DOWN HOLE @ 6-7 gals/BAG
~~40 BAGS~~

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: COE-NIROP(FRIDAY) NO. 1332.32
WELL NO. 2-I
DATE INSTALLED 1-28-88



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON,~~ OTHER BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, [THREADED (W/TAPE?)] OTHER YES: TEFLON

C) WAS SOLVENT USED? ~~YES OR~~ [NO]

D) TYPE OF WELL SCREEN:

~~PVC~~, [STAINLESS] ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2 OD IN. 2 5/16

G) INSTALLED PROTECTOR PIPE W/LOCK? [YES] ~~OR NO~~
PROTECTOR PIPE DIA. 6" IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, [PUMPING, SURGING], COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 3.0 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 540 gal
ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, [OPAQUE]

E) WATER CLARITY AFTER DEVELOPMENT?

[CLEAR], SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR [NO] NTU = 14.8 (KEB 7/5/88)

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-15-88 (25.07')

DATE/TIME

DATE/TIME

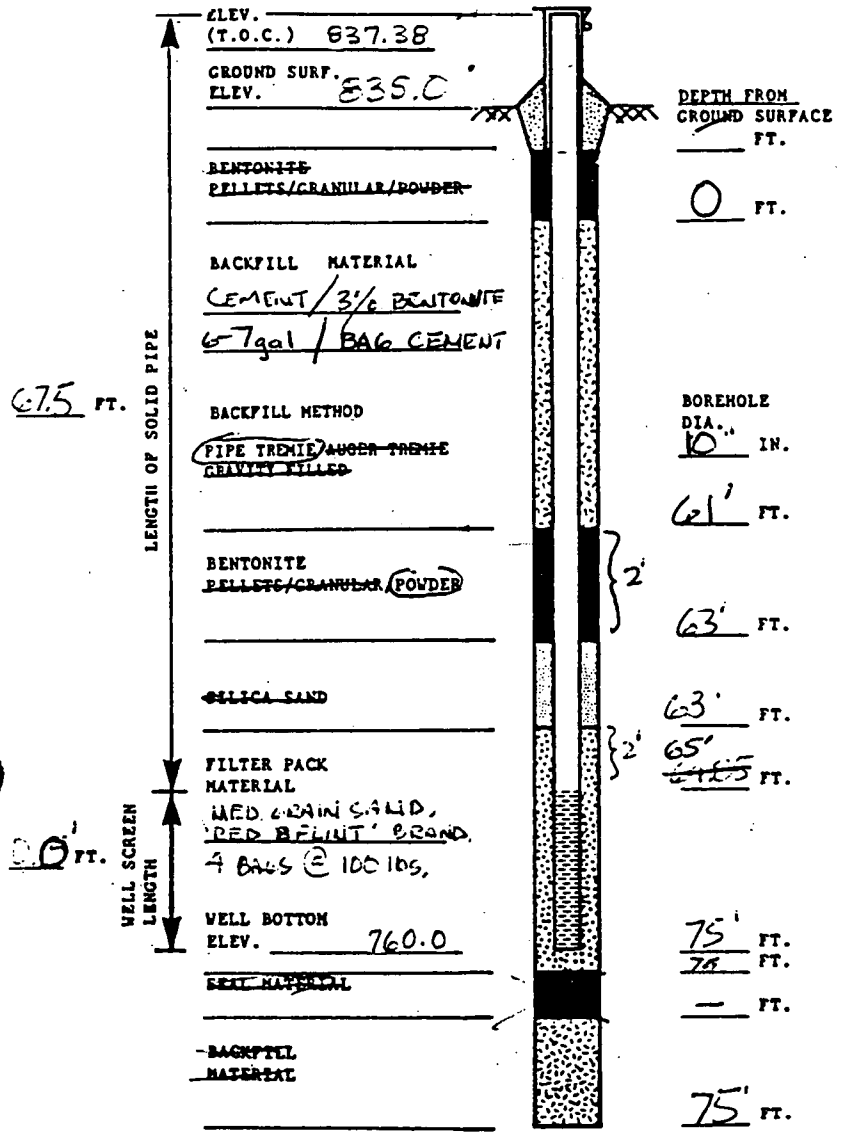
ADDITIONAL COMMENTS: 3 CENTRALIZERS WERE INSTALLED.

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (8 11-85)

PROJECT NAME: NROP NO. 13223.32
WELL NO. MW-3T
DATE INSTALLED 12-10-87



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON, OTHER~~ BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS; ~~MECHANICAL CHECK~~

COUPLINGS, THREADED (W/TAPE?) YES, OTHER

C) WAS SOLVENT USED? ~~YES OR~~ NO

D) TYPE OF WELL SCREEN:

~~PVC,~~ STAINLESS, ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2" OD IN. 2 5/16"

G) INSTALLED PROTECTOR PIPE W/LOCK? YES ~~OR NO~~
PROTECTOR PIPE DIA. 6.5" IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2.5 HRS

C) APPROXIMATE WATER VOLUME: REMOVED — gal
ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, ~~OPAQUE~~ ~~SLIGHTLY~~

F) ODOR? YES OR NO NTU = 2.0 (REC 7/5)

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-10-88 / 2:30 (24.23)
DATE/TIME 2-17-88 / (24.36')
DATE/TIME

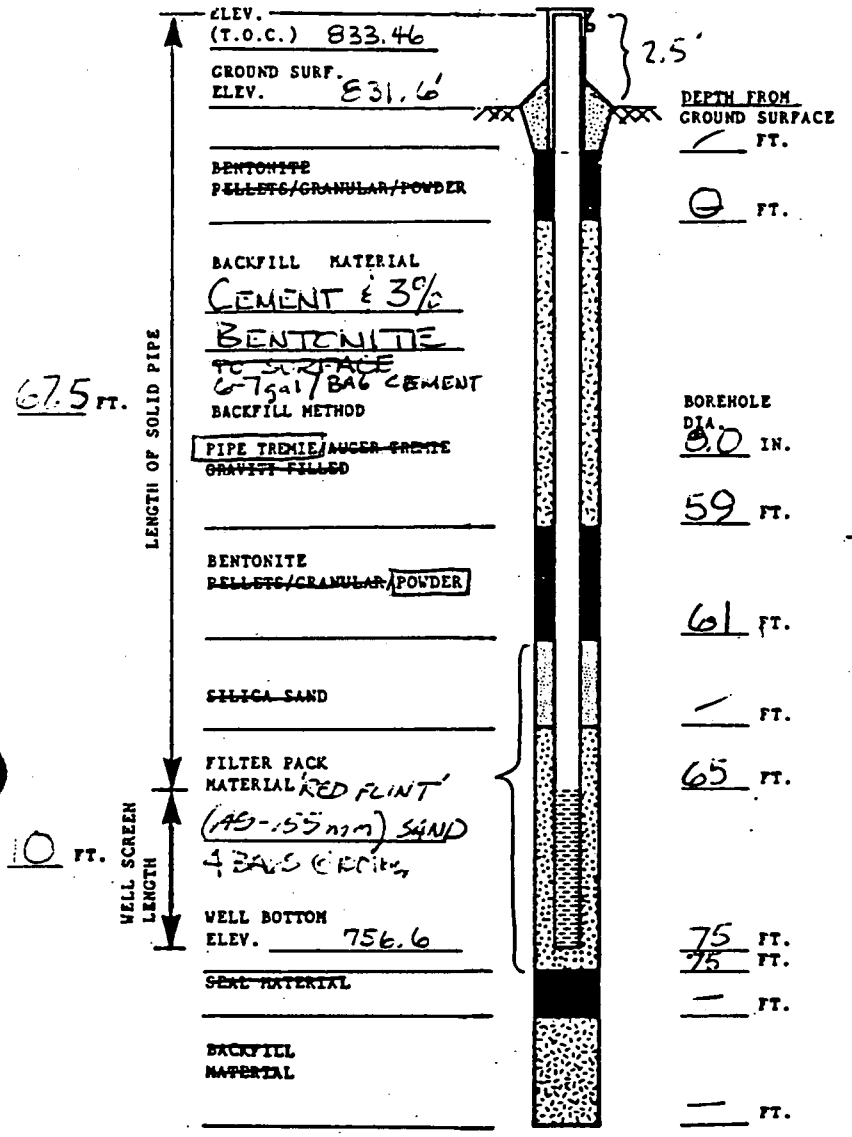
ADDITIONAL COMMENTS: 46.7 BAGS OF CEMENT & 3 BAGS OF BENTONITE
2- CENTRALIZERS

elevations checked 5/9/88 CHK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: NIROP NO. 1332.32
WELL NO. MW 4-I
DATE INSTALLED 12-22-87



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON, OTHER~~ BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

~~COUPLINGS~~, THREADED (W/TAPE?) → YES: TEFLON, ~~OTHER~~

C) WAS SOLVENT USED? ~~YES OR~~ NO

D) TYPE OF WELL SCREEN:

~~PVC~~, STAINLESS, ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2.0 OD IN. 2 5/16

G) INSTALLED PROTECTOR PIPE W/LOCK? YES ~~OR NO~~
PROTECTOR PIPE DIA. 6.5 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 3 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 540 gals
ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, ~~OPAQUE~~ ~~SLIGHTLY~~

F) ODOR? YES OR NO NTU = 1.0 (SEE 7/5/88)

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 (27.81')

DATE/TIME

DATE/TIME

ADDITIONAL COMMENTS: 1.5 BAGS OF BENTONITE MIXED INTO 55 BAGS @ 6-7 gal/BAG. USED ≈37 BAGS.

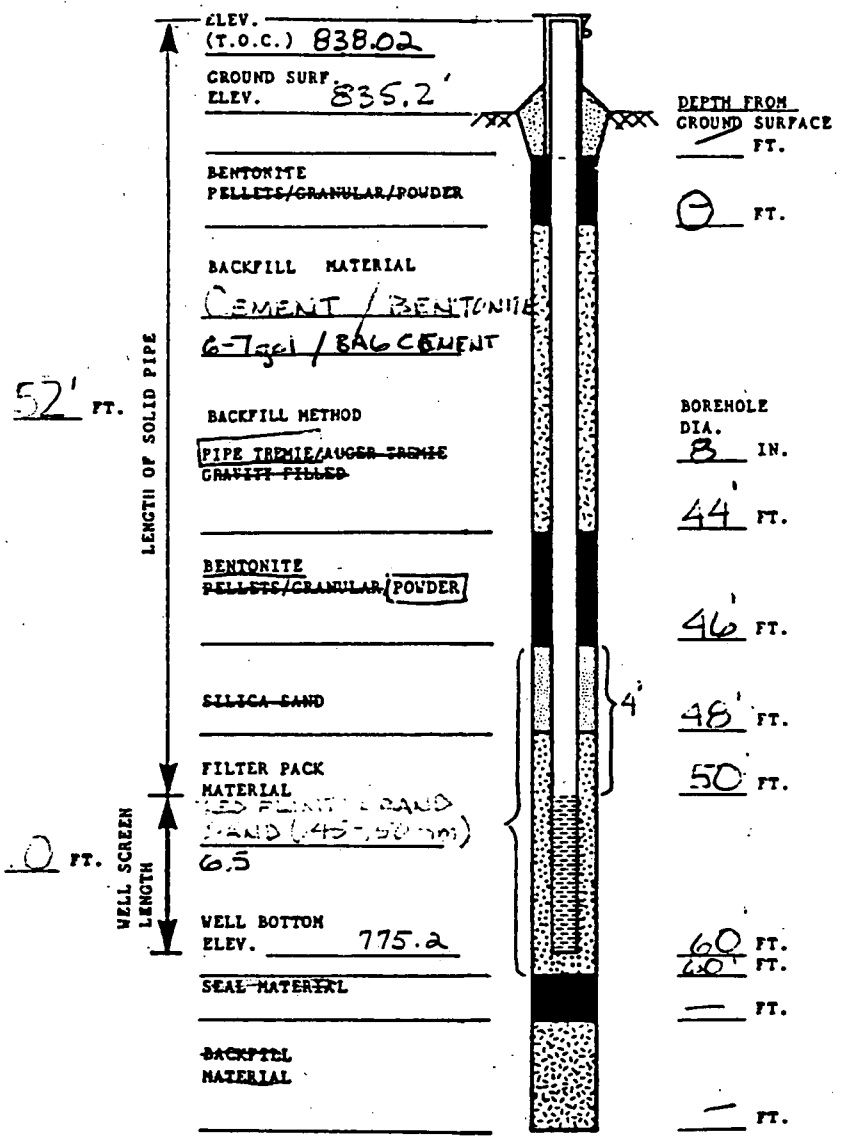
3 CENTRALIZERS USED ON WELL CASING.

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: NIROP NO. 1332.32
WELL NO. MW-5T
DATE INSTALLED 12/17/87



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON, OTHER~~ BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS; → YES : TEFLON

COUPLINGS, THREADED (W/TAPE?), ~~OTHER~~ _____

C) WAS SOLVENT USED? ~~YES OR~~ NO

D) TYPE OF WELL SCREEN:

~~PVC~~, STAINLESS, ~~TEFLON, OTHER~~ _____

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 2" OD IN. 2 5/16"

G) INSTALLED PROTECTOR PIPE W/LOCK? YES ~~OR NO~~
PROTECTOR PIPE DIA. 6.5 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 3 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 540 gal
ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO NTU = 22.0 (KEB 7/5/

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-17-88 (25.23')

DATE/TIME _____

DATE/TIME _____

ADDITIONAL COMMENTS: 30 } 15 bags/yd. @ 2 yd.
15 BAGS OF CEMENT + 2 BAGS OF BENTONITE
2 CENTRALIZERS.

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: OLE-MREC/FARCO NO. 1332 32
WELL NO. 1 D
DATE INSTALLED 2-1-88, 2-2-88

ELEV. (T.O.C.) 834.77

GROUND SURF. ELEV. 832.1'

~~BENTONITE PELLETS/GRANULAR/POWDER~~ NA

BACKFILL MATERIAL cement/bentonite grout 6-7gal/BAG CEMENT

BACKFILL METHOD PIPE TREMIE/AUGER TREMIE GRAVITY FILLED

BENTONITE PELLETS/GRANULAR/POWDER

~~SILICA SAND~~

FILTER PACK MATERIAL 0.45-0.55mm

WELL BOTTOM ELEV. 731.1

~~SEAL MATERIAL~~ NA

~~BACKFILL MATERIAL~~ NA

LENGTH OF SOLID PIPE 94 FT.

WELL SCREEN LENGTH 10 FT.

	DEPTH FROM GROUND SURFACE
	4 FT.
	NA FT.
BOREHOLE DIA. 8 IN.	
	35 FT.
	87 FT.
	~~89~~ FT.
	91 FT.
	101 FT.
	101 FT.
	NA FT.
	NA FT.

1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER Black steel

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 3.0" OD IN. 3.5"

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 6 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2.5 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 450 gal

ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO NTU = 40.0 (KEB 7/5)

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 (21.39')

DATE/TIME

DATE/TIME

ADDITIONAL COMMENTS: 4 centralizers - Above screen, then 25' centers

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: COE-NIROP NO. 1332.32
WELL NO. 11 D
DATE INSTALLED 2-10-88

ELEV. (T.O.C.) 837.52
GROUND SURF. ELEV. 834.6'

~~BENTONITE PELLETS/GRANULAR/POWDER~~

BACKFILL MATERIAL
GROUT-CEMENT
W/ 8% BENTONITE
6.7 gal/BAG CEMENT

BACKFILL METHOD
PIPE TREMIE ~~AUGER TREMIE~~ ~~GRAVITY FILLED~~

BENTONITE
~~PELLETS/GRANULAR~~ POWDER

~~SILICA SAND~~

FILTER PACK MATERIAL
BAGGED SAND
#5 - .55mm

WELL BOTTOM ELEV. 704.6

~~SEAL MATERIAL~~

~~BACKFILL MATERIAL~~

LENGTH OF SOLID PIPE 122.5 FT.

WELL SCREEN LENGTH 10' FT.

DEPTH FROM GROUND SURFACE
8 FT.
— FT.
BOREHOLE DIA. 6 IN.
114 FT.
116 FT.
— FT.
120 FT.
130 FT.
FT.
— FT.
— FT.

1) CASING DETAILS

A) TYPE OF PIPE:
~~PVC, STAINLESS, TEFLON, OTHER~~ BLACK IRON
PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;
COUPLINGS ~~THREADED (W/TAPE?), OTHER~~

C) WAS SOLVENT USED? ~~YES OR~~ NO

D) TYPE OF WELL SCREEN:
~~PVC,~~ STAINLESS, ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 3.0 OD IN. 3.5"

G) INSTALLED PROTECTOR PIPE W/LOCK? YES ~~OR NO~~
PROTECTOR PIPE DIA. 6 IN.

2) WELL DEVELOPMENT

A) METHOD
BAILING, PUMPING, SURGING, COMPRESSED AIR
OTHER —
(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 20 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 360 HRS
ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, SLIGHTLY TURBID, TURBID, ~~OPAQUE~~ SLIGHTLY

F) ODOR? YES OR NO NTU = 23.0 (KEB 7/5/

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?
— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):
DATE/TIME 2-11-88 (24.32')
DATE/TIME
DATE/TIME

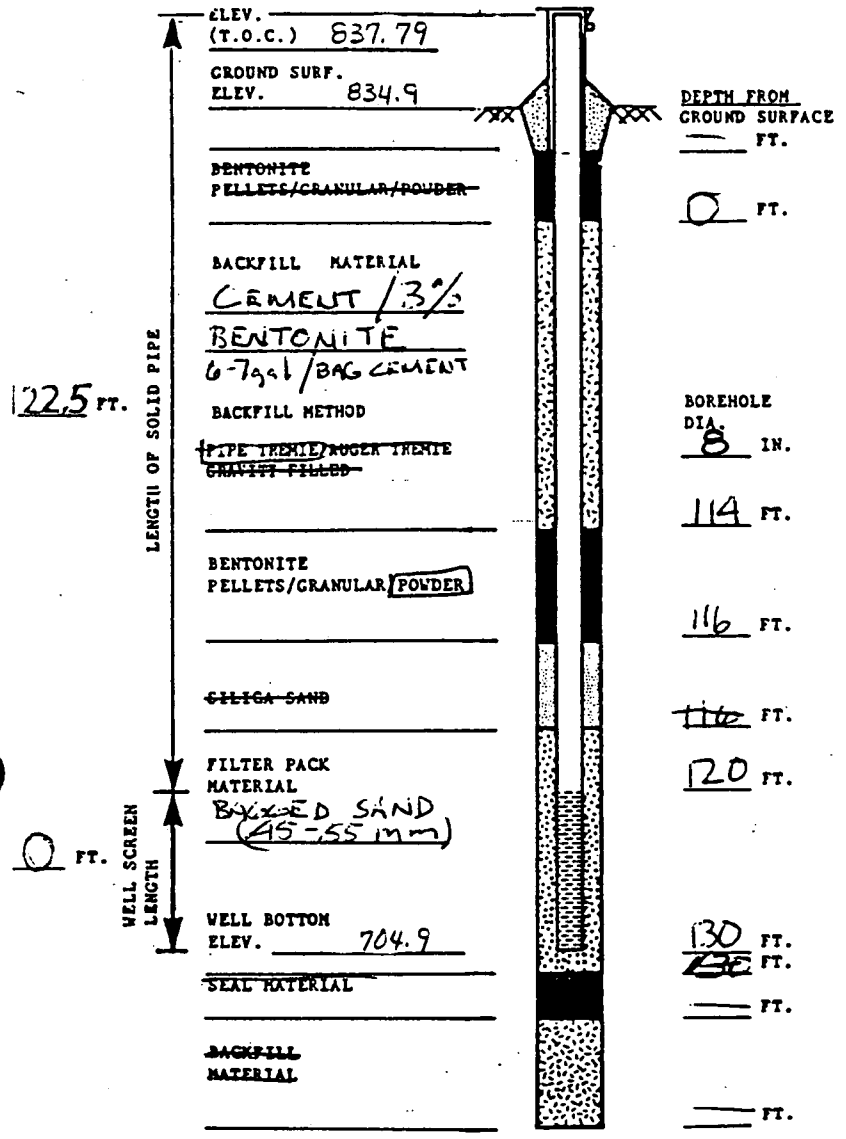
ADDITIONAL COMMENTS: 5 CENTRALIZERS WERE INSTALLED

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: CCE-NIRCP NO. 1332.2c
WELL NO. 12-D
DATE INSTALLED 1/22/88



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON~~, OTHER BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS; YES; TEFLON

COUPLINGS, THREADED (W/TAPE?), OTHER

C) WAS SOLVENT USED? ~~YES OR~~ NO

D) TYPE OF WELL SCREEN:

~~PVC,~~ STAINLESS, ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 3 OD IN. 3 1/2

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO

PROTECTOR PIPE DIA. 6 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2 HRS

C) APPROXIMATE WATER VOLUME: REMOVED ~~240~~ 360

ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, ~~SLIGHTLY OPAQUE~~

F) ODOR? YES OR NO NTU = 276 (KEB 7/5/8

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 (29.48')

DATE/TIME

DATE/TIME

ADDITIONAL COMMENTS: 5 CENTRALIZERS WERE INSTALLED.

elevations checked 5/9/88 CAK

FMT

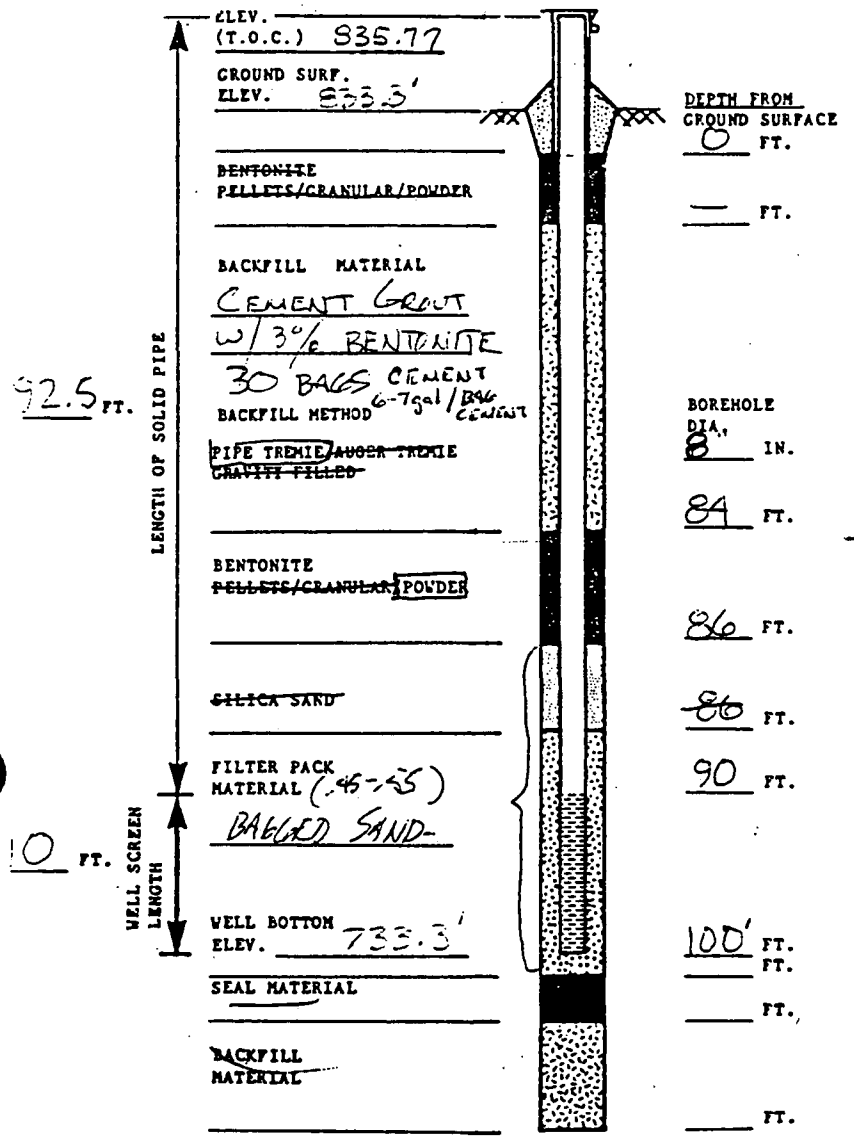
Well Diagram
F-17 (R 11-85)

1332.32

PROJECT NAME: DOE-NIROP NO. ~~13-D~~

WELL NO. 13-D

DATE INSTALLED 2-8-88



1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

~~COUPLINGS~~, THREADED (NO ~~W/TAPER~~), ~~OTHER~~

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

~~PVC~~, STAINLESS, ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 3" OD IN. 3½"

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO

PROTECTOR PIPE DIA. 6" IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2.0 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 360 gal.

ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, ~~OPAQUE~~ ~~SLIGHTLY~~

F) ODOR? YES OR NO NTU = 6.0 (KEB 7/5/9

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 (22.57')

DATE/TIME

DATE/TIME

ADDITIONAL COMMENTS: 4 CENTRALIZERS

30 BAGS OF CEMENT @ 6-7 gal/bag

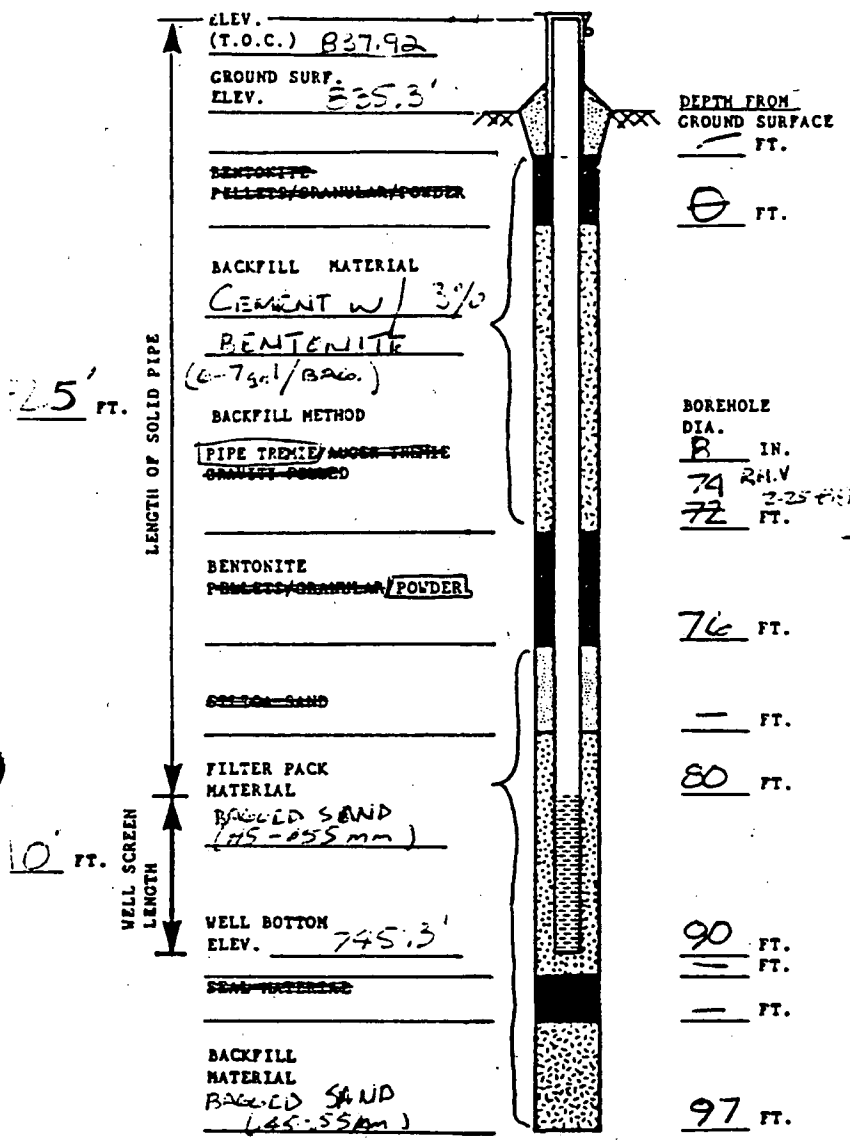
elevations checked 5/9/88 CAK

VCAK 7/22

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: COE-NIROP/FRIDLEY NO. 1332.32
WELL NO. 14-D
DATE INSTALLED 1-20-88



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON,~~ OTHER BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER YES - TEFLON

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

~~PVC~~, STAINLESS, ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .010"

F) PIPE DIA: ID IN. 3 OD IN. 3.5

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 6 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

~~OTHER~~ —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2.5 HRS.

C) APPROXIMATE WATER VOLUME: REMOVED 450 gal
ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, ~~OPAQUE~~ SLIGHTLY

F) ODOR? YES OR NO NTU = 2.5 (KEG 7/5/8

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-15-88 (25.17')

DATE/TIME

DATE/TIME

ADDITIONAL COMMENTS: 4 CENTRALIZERS INSTALLED.

elevation checked 5/9/88 CAK

RMT

Well Diagram

PROJECT NAME: COE-NIROP NO. 1332.32

WELL NO. 5-PC

DATE INSTALLED 1/14/88

1.) CASING DETAILS

A.) Type of pipe: BLACK IRON PIPE

pipe schedule 8" DIA : 30

4" DIA : 40

B) Type of pipe joints welded.

C) was solvent used? NO

d.) Type of well screen: open borehole.

E) PIPE DIA: EXTERNAL: 8" I.D.

INTERNAL: 4" I.D.

F.) EXTERNAL 8" Pipe used as protective pipe w/LOCK.

2) WELL DEVELOPMENT

A) METHOD

BAILING, [PUMPING], SURGING, COMPRESSED AIR

OTHER _____

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 5 HRS.

C) APPROXIMATE WATER VOLUME: REMOVED 900 gals.

ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, [TURBID], OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

[CLEAR], SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR [NO]

NTU = 1.4 KEB 7/5/88

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

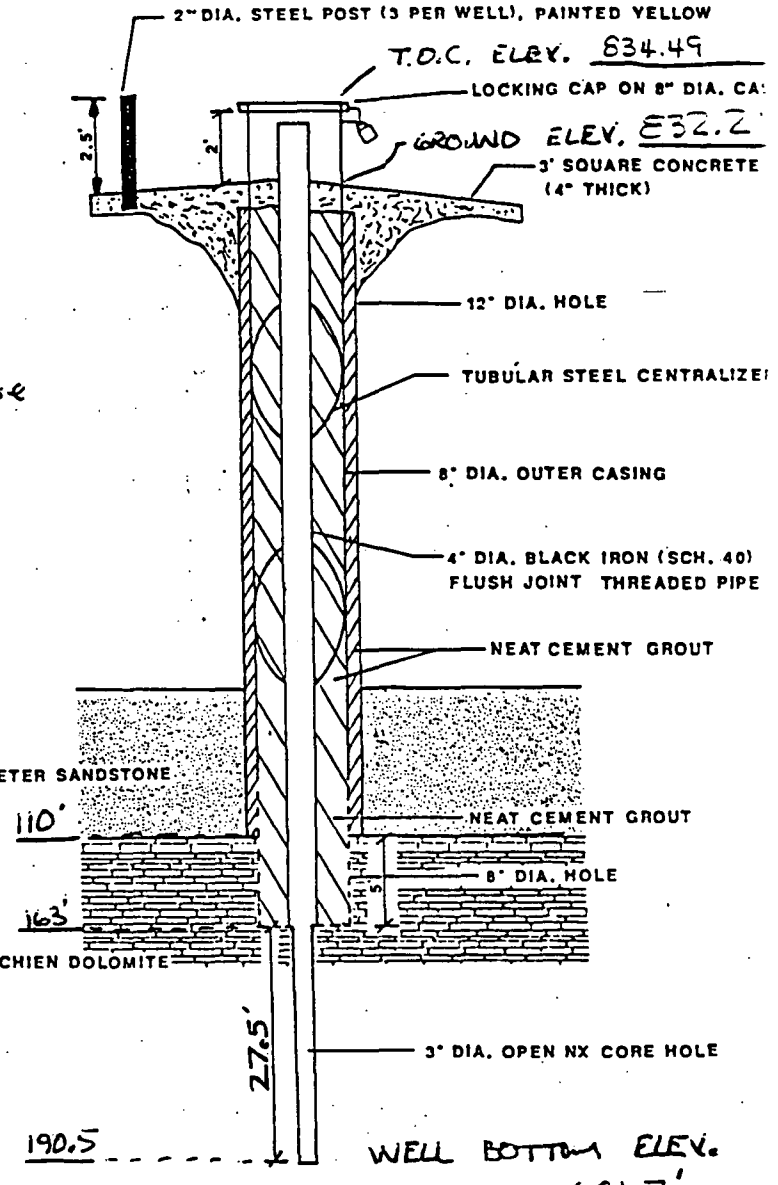
— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-19-88 / 21.08' FT.

DATE/TIME _____ FT.

DATE/TIME _____ FT.



ADDITIONAL COMMENTS: _____

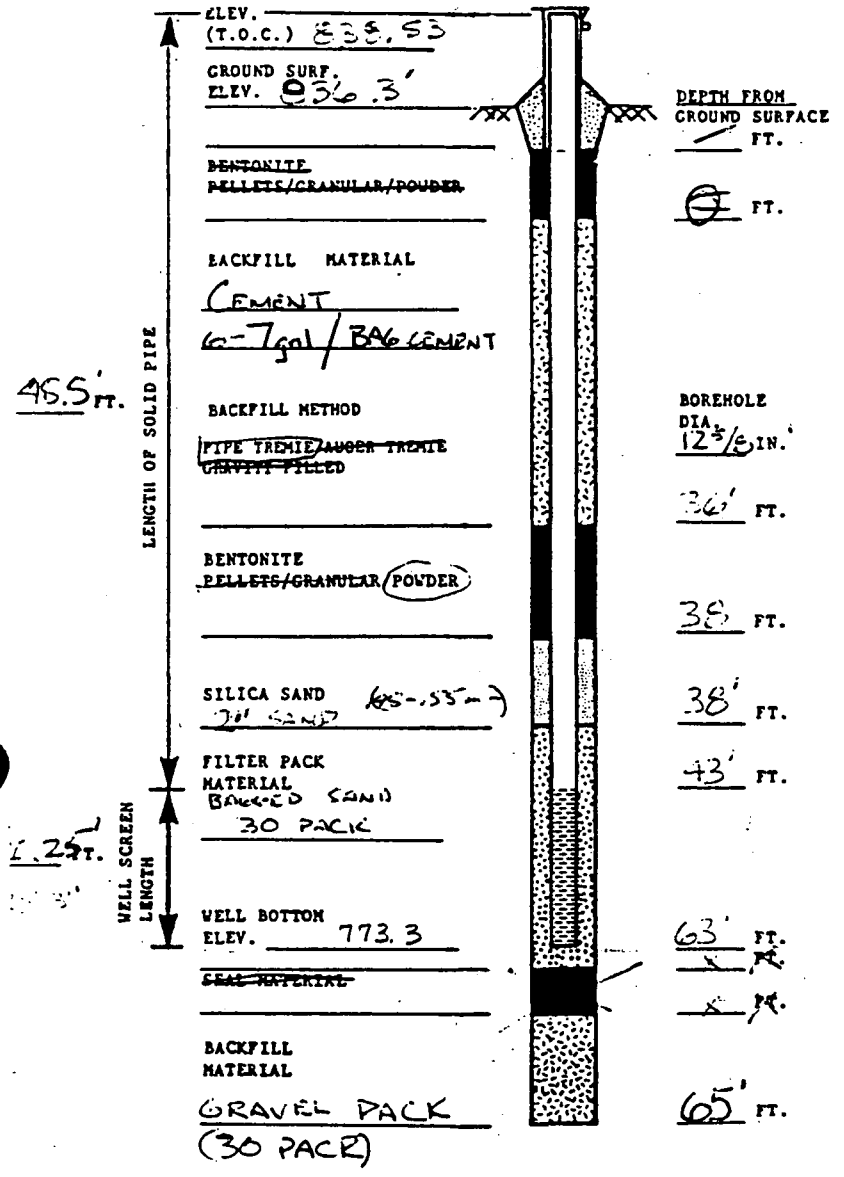
elevations checked 5/9/88 CAK

CAK 5-4

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: ~~FRIDLEY~~ COE/NIROP NO. 133232
WELL NO. AT-1
DATE INSTALLED 12-10-87



1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON~~, OTHER BLACK IRON

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;

~~COUPLINGS, THREADED (W/TAPE?)~~, OTHER WELDED

C) WAS SOLVENT USED? ~~YES~~ OR (NO)

D) TYPE OF WELL SCREEN:

~~PVC~~, (STAINLESS), ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .040"

F) PIPE DIA: ID IN. 6 1/8" OD IN. 6 5/8"

G) INSTALLED PROTECTOR PIPE W/LOCK? (YES) ~~OR~~ NO
PROTECTOR PIPE DIA. — IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING ~~PUMPING~~, SURGING, ~~COMPRESSED AIR~~

OTHER

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2.5 HR

C) APPROXIMATE WATER VOLUME: REMOVED 7,500 gal
ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, [OPAQUE]

E) WATER CLARITY AFTER DEVELOPMENT?

[CLEAR], SLIGHTLY TURBID, TURBID, ~~[OPAQUE]~~ ~~SLIGHTLY~~

F) ODOR? YES OR [NO] NTU = 1.64 (KEB 7/5/

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-15-88 (25.70')

DATE/TIME

DATE/TIME

ADDITIONAL COMMENTS: WELDED ON CENTRALIZERS @ 20'

elevations checked 5/9/88 CAK

RMT

Well Diagram
F-17 (R 11-85)

PROJECT NAME: ~~FRACES, INC~~ CHEMNIREP NO. 1332.32

WELL NO. AT-2

DATE INSTALLED 12-30-87

ELEV. (T.O.C.) 836.45'

GROUND SURF. ELEV. 834.5'

~~BENTONITE PELLETS/GRANULAR/POWDER~~

BACKFILL MATERIAL CEMENT 6-7 gal / BAG CEMENT

BACKFILL METHOD [PIPE TREMIE] ~~AUGER TREMIE~~ ~~GRAVITY FILLED~~

BENTONITE ~~PELLETS/GRANULAR~~ [POWDER]

SILICA SAND BAGGED SAND (.45-.55mm)

FILTER PACK MATERIAL BAGGED SAND ~~(.45-.55cm)~~ 30 PACK

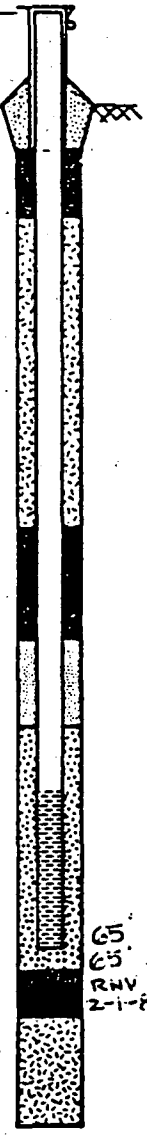
WELL BOTTOM ELEV. 769.5

~~SEAL MATERIAL~~

BACKFILL MATERIAL BAGGED SAND (.45-.55cm)

LENGTH OF SOLID PIPE: 47.5' RHV 2-1-88 ~~47.5'~~ ~~47'~~ FT.

WELL SCREEN LENGTH: 30 FT.



DEPTH FROM GROUND SURFACE

2	FT.
0	FT.
BOREHOLE DIA. 16	IN.
36	FT.
38	FT.
40	FT.
45	FT.
65 ~~75~~	FT.
65 ~~75~~	FT.
RHV 2-1-88	FT.
86	FT.

1) CASING DETAILS

A) TYPE OF PIPE:

~~PVC, STAINLESS, TEFLON, OTHER~~ BLACK IRON

PIPE SCHEDULE (3/8 WALL) 30

B) TYPE OF PIPE JOINTS;

~~COUPLINGS, THREADED (W/TAPE?), OTHER~~ WELDED

C) WAS SOLVENT USED? YES OR [NO]

D) TYPE OF WELL SCREEN:

~~PVC,~~ [STAINLESS] ~~TEFLON, OTHER~~

E) WELL SCREEN SLOT SIZE .040"

F) PIPE DIA: ID IN. 10 OD IN. 10 3/4

G) INSTALLED PROTECTOR PIPE W/LOCK? [YES] OR NO

PROTECTOR PIPE DIA. — IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, [PUMPING], SURGING, COMPRESSED AIR

OTHER —

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 2.5 HRS

C) APPROXIMATE WATER VOLUME: REMOVED 15,000 gal

ADDED —

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, [OPAQUE]

E) WATER CLARITY AFTER DEVELOPMENT?

[CLEAR], SLIGHTLY TURBID, TURBID, ~~OPAQUE~~

F) ODOR? YES OR [NO] NTU = 3.20 (KEB 7/5/9

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

— FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 2-17-88 (24.22') F

DATE/TIME F

DATE/TIME F

ADDITIONAL COMMENTS: WELDED CENTRALIZERS

LOCKING WELL CAP

elevations checked 5/9/88