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NIROP FRIDLEY
5090.3a

RMT, Inc.
744 Heartland Trail
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444
FAX: 608-831-3334

A-E QUALITY CONTROL SUMMARY REPORT FOR GROUND WATER SAMPLING AT THE NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT FRIDLEY, MINNESOTA

MAY 1991

CONTRACT NO. DACA45-86-C-0015
MODIFICATION NOS. P00008
AND P00009

Ronald H. Vaughn
Geologist

Thomas E. Koch
Hydrogeologist

Bernd W. Rehm
Manager, Remedial Action Department

Eric Gredell, P.E.
Project Manager

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Minnesota.

Date 5/9/91 Registration No. 19450

Daniel E. Oman, P.E.
Vice President, Northern Region

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RMT, Inc.
744 Heartland Trail
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444
FAX: 608-831-3334

May 9, 1991

Name and Location of Project: Naval Industrial Reserve Ordnance Plant (NIROP); Fridley, Minnesota

Contract No.: DACA45-86-C-0015
Modification No. P00008 & P00009
RMT Project No. 1870

U.S. Army Corps of Engineers
Omaha District
Attn: CEMRO-ED-ED-2 (John Japp)
215 North 17th Street
Omaha, NE 68102-4978

Dear John:

Enclosed for your use are 7 copies of the A-E Quality Control Summary Report for Ground Water Sampling at the Naval Industrial Reserve Ordnance Plant. This report addresses the results from the second round of ground water sampling performed in February 1991. Other copies of this report have been distributed according to the attached Distribution List.

Sincerely,

Eric Gredell

Eric Gredell, P.E.
Project Manager

tfr

Enclosures

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MAY 9, 1991

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Appendix C - Summary of Laboratory Results for Ground Water Samples
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1. INTRODUCTION

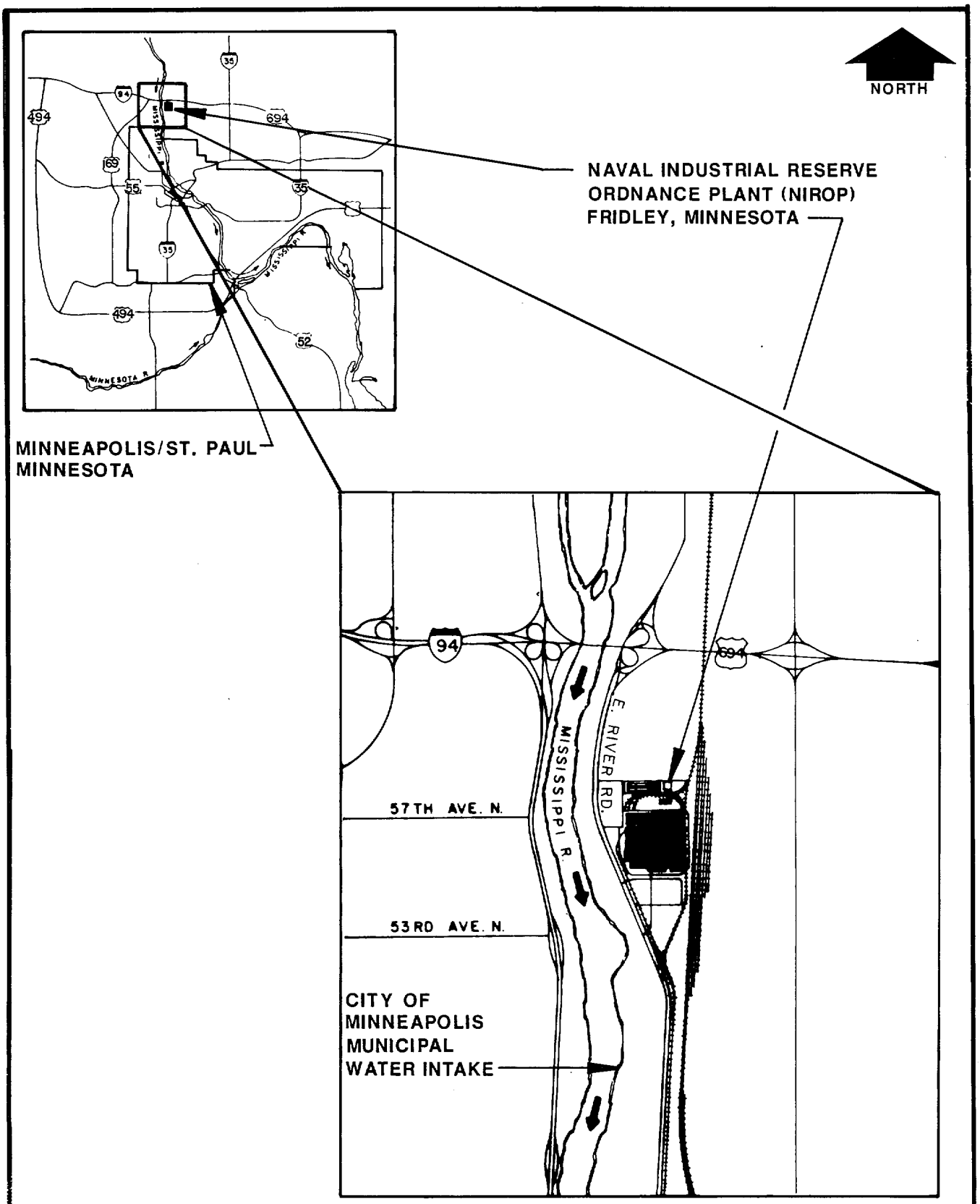
RMT, Inc. (RMT), has been retained by the Omaha District of the U.S. Army Corps of Engineers (USACE) under Contract No. DACA45-86-C-0015, Modifications No. P00008 and P00009, to perform services at the Naval Industrial Reserve Ordnance Plant (NIROP) located in Fridley, Minnesota. Services to be performed include sampling and analysis of ground water.

This A-E Quality Control Summary Report (A-E QCSR) is the second of two A-E QCSR documents, and addresses a round of monitoring well sampling and analyses performed in February 1991. The first A-E QCSR (RMT, 1991) addressed a previous round of monitoring well sampling and analyses, soil sampling and analyses, and monitoring well installation performed in October 1990.

1.1 Project Description

The NIROP is a government-owned, contractor-operated facility. The plant is operated by the Naval Systems Division of FMC Corporation. Advanced naval weapons systems are designed and manufactured at the NIROP. The NIROP began production in 1941, making it the first plant to mass-produce naval guns during World War II. The NIROP has continued to produce naval guns and has expanded into the production of guided missile launching systems, torpedo tubes, and hydraulic and electric power drive and control systems.

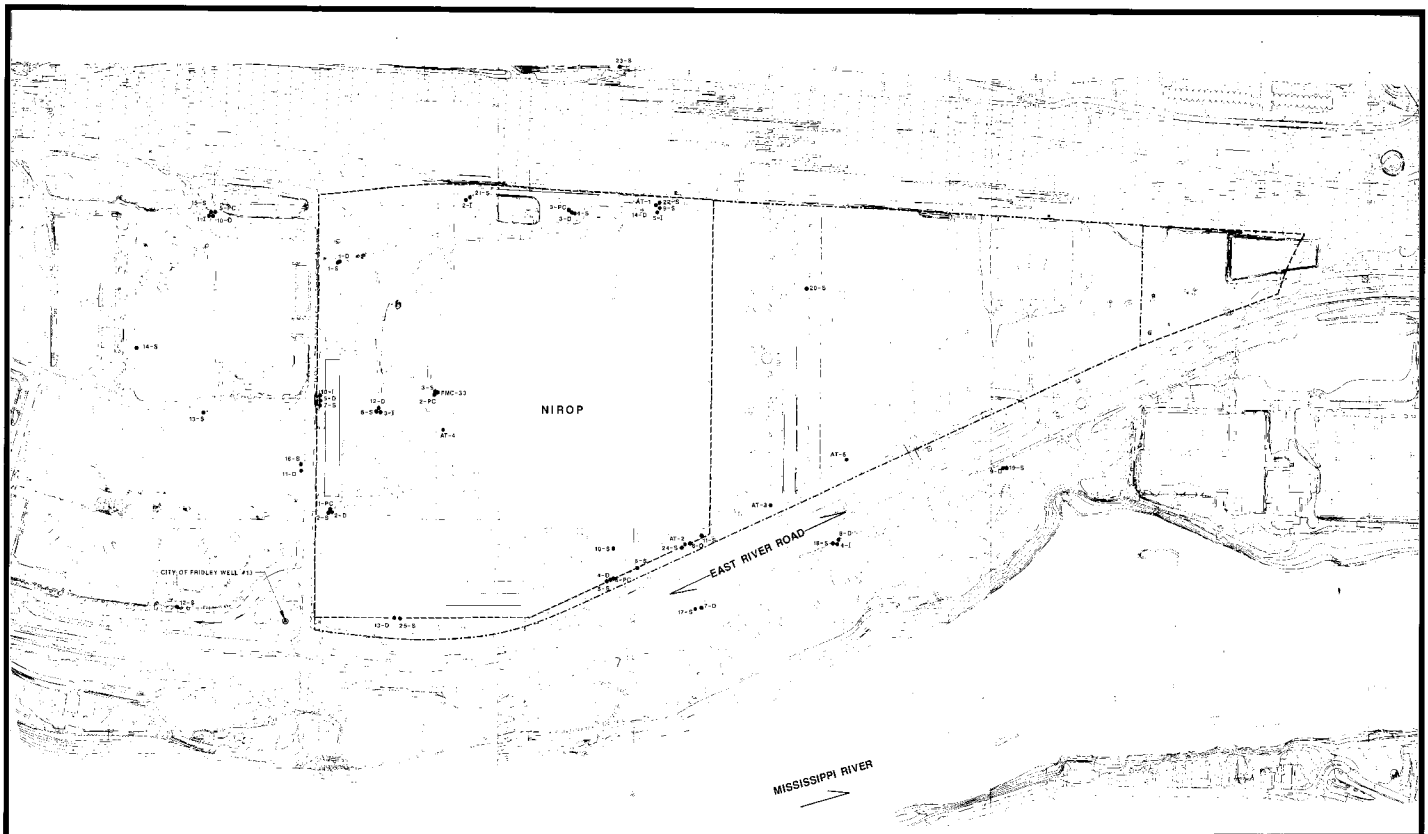
The NIROP is located in the northern portion of the Minneapolis/St. Paul, Minnesota, metropolitan area within the city limits of Fridley, Minnesota (see Figure 1-1). It is situated approximately 700 feet east of the Mississippi River and less than 1 mile south of Interstate 694. The facility is bordered on the west by East River Road and on the east by the Burlington Northern rail yard. The government-owned, contractor-operated portion of the plant occupies about 83 acres. The plant is located in an industrial area which has a number of adjacent manufacturing facilities. A detailed facility map is included as Figure 1-2.



LOCATION MAP

RMT	DWN. BY: MDZ
	DATE: MAY, 1991
	PROJ.# 1870.54

MAY 0 0 1991 FIGURE 1-1



LEGEND

- EXISTING PAVED ROAD
- EXISTING UNPAVED ROAD
- EXISTING BUILDING
- EXISTING FENCE
- 880 EXISTING 5' CONTOUR
- EXISTING 1' CONTOUR
- x 861 EXISTING SPOT ELEVATION
- TREES AND / OR BRUSH
- EDGE OF WATER
- WET AREA
- MUNICIPAL WELL
- 1-S WATER TABLE OBSERVATION WELL IN UNCONSOLIDATED SEDIMENTS
- 1-I INTERMEDIATE DEPTH PIEZOMETER IN UNCONSOLIDATED SEDIMENTS
- 1-D DEEP PIEZOMETERS IN UNCONSOLIDATED SEDIMENTS
- 1-PC BEDROCK PIEZOMETERS
- AT-1 PRODUCTION WELLS
- APPROXIMATE NIROP PROPERTY LINE
- APPROXIMATE FMC PROPERTY LINE
- APPROXIMATE BNR PROPERTY LINE

SCALE: 1" = 200'
0 200 400 800 FEET

NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJECT: QUALITY CONTROL SUMMARY REPORT
NIROP-FRIDLEY, MINNESOTA

SHEET TITLE: NIROP FACILITY AND WELL LOCATIONS

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CHECKED BY: | DWG. NO.
APPROVED BY: | DATE PRINTED: MAY 08 1991 | SHEET FIGURE 1-2
DATE: MAY, 1991

RMT

1.2 Purpose and Scope

The purpose of this report is to present the quality control (QC) assessment of ground water sampling activities performed at the NIROP in February 1991. This work consisted of the following tasks:

- Measuring water levels in 54 monitoring wells and sampling 52 monitoring wells, plus Fridley Well No. 13.
- Analyzing samples from 52 monitoring wells, plus Fridley Well No. 13.

Ground water quality at the NIROP was monitored to provide baseline data prior to the startup of the ground water recovery and containment system, which has been selected as the remedial alternative for ground water at the site.

This report includes the following information:

- Findings and conclusions.
- Recommendations.
- Summary of field activities and data collection procedures.
- Summary of water sample analysis procedures and presentation of results.
- Summary of ground water levels in all 54 monitoring wells.
- Documentation of quality assurance and quality control (QA/QC) activities.

Upon completion of this A-E QCSR, Technical Memorandum No. 2 will be prepared which will evaluate the results of the ground water sampling round performed in February 1991.

1.3 Report Organization

Ground water levels and water quality are the main topics discussed under separate sections of this report. Each section is further arranged to discuss the following:

- Planned procedures
- Quality control activities
- Implementation problems and corrective actions
- Data presentation

Daily Quality Control Reports (DQCRs) were prepared during the period of field activity. These reports were written in the field office daily and mailed to the RMT office in Madison, Wisconsin, and to the USACE, on a weekly basis. The DQCRs are included in Appendix A for the period coincident to ground water sampling activities. Because this report incorporates information from the DQCRs, they are included for reference (Appendix A), but are not discussed or further summarized in this report.

The ground water samples collected in February 1991 were analyzed by RMT Laboratories, Inc., following USEPA Contract Laboratory Program (CLP) protocols (USEPA, 1988a and 1988b). Volatile organic compound (VOC) results for ground water are reported in µg/L units, as required by the CLP. Ground water sampling results before October 1990 have been reported in mg/L, in accordance with the USACE protocols used at that time. Previous protocols also reported VOCs using common names, e.g., trichloroethylene and tetrachloroethylene. CLP procedures replace the common names with the International Union of Pure and Applied Chemistry nomenclature system, e.g., trichloroethene and tetrachloroethene, which have been used throughout this report.

2. FINDINGS AND CONCLUSIONS

Data acquired through these investigations are suitable for further use in defining the extent and characteristics of ground water contamination at the NIROP and as a baseline prior to the start of remediation.

3. RECOMMENDATIONS

Preparation of Technical Memorandum No. 2 - Monitoring Well Sampling Round 2 should be completed using the data presented in this A-E QCSR.

4. HYDRAULIC CONDUCTIVITY

4.1 Planned Procedures

The collection of data for determining hydraulic conductivity at well 10-I was performed in conjunction with ground water sampling. Hydraulic conductivity testing procedures used by RMT are described in the Draft A-E Quality Control Plan and Sampling Plan for Soil Sampling and Monitoring Well Installation (A-E QCP-SP; RMT, 1990a), as modified by agreements reached during telephone conference calls among the Navy, the USACE, RMT, the MPCA, and the USEPA. A pressure transducer data logger, in combination with slug testing procedures, was used to collect data to determine the formation's hydraulic conductivity at the 65- to 75-foot depth interval at the northernmost edge of the NIROP facility. The analytical method used was the unconfined aquifer slug test (Bouwer and Rice, 1976).

4.2 Quality Control Activities

The pressure transducer was set up at the newly constructed well 10-I according to the manufacturer's instructions. After the transducer was lowered down the well and into the static water column, data were displayed to the operator to verify that the equipment was working properly. Two methods were used to perform the tests: a falling-head test and a rising-head test. Each method was repeated three times. Data from the data logger were downloaded to a printer after each test to verify the test results. A total of six tests were performed at well 10-I.

4.3 Implementation Problems and Corrective Action

Problem	Corrective Action
Unable to use segments of the data collected, due to the formation's high hydraulic conductivity; the water level within the well oscillated above and below the static water level immediately (3 seconds) after initial head change.	The segment of data which contained the initial head change and the first oscillation which passed the static water level were used to determine the hydraulic conductivity. The remaining oscillation data were not used in calculating the hydraulic conductivity.

4.4 Data Presentation

The hydraulic conductivity of the screened interval of well 10-I (65 feet to 75 feet) was determined to be approximately 2×10^{-2} cm/sec. The results of the first 3 seconds of each of the six tests were nearly identical; thus, one test which represented all tests was used to determine a hydraulic conductivity value. The value determined is only an approximation, because so few data points were determined to be reliable.

The data and calculations for determining the hydraulic conductivity of Well 10-I are included in Appendix D.

5. GROUND WATER LEVELS

5.1 Planned Procedures

The measurement of ground water levels in wells was performed in conjunction with ground water sampling. The data from water level measurements are needed to determine well purging requirements, to establish ground water gradients, and, ultimately, to determine the direction of ground water flow.

All ground water level measurements were made using the established reference point on the well casing. This reference point was documented in field records.

A battery-operated water level indicator was the primary device for water level measurements. The indicator is a self-contained transistorized instrument equipped with a cable and sensor which activates a buzzer and a light when it comes in contact with the water. The depth to water is read from permanent 1-foot and 0.01-foot increment markings on the cable.

5.2 Quality Control Activities

Foot markers for the first 100 feet of cable from the water level measurement device were checked for accuracy against a steel tape prior to measuring water levels.

A single measuring device (electronic tape) was used to measure all water levels, thereby avoiding potential discrepancies with the use of multiple measuring devices.

5.3 Implementation Problems and Corrective Actions

Problem	Corrective Action
Total depth of well 1-PC could not be measured with the water-level indicator or plopper tape because length of the measuring device used was approximately equal to depth to bottom of well.	No corrective action was taken. Total depth of the well was previously documented during well construction.
Depth to water at well 2-S was not measured on February 12, 1991, because RMT field staff did not have a well key.	Key was obtained from Dick Hanson (DPRO) on February 25, 1991, and the water level was measured and recorded.

5.4 Data Presentation

Ground water elevations for the 54 wells are listed in Table 5-1. Water level measurements were taken on February 12, 1991, for all wells except well 2-S, which was measured on February 25, 1991.

TABLE 5-1

GROUND WATER ELEVATIONS - FEBRUARY 12, 1991

Well No.	Top of Well Casing Elevation (feet M.S.L.)	Depth to Water (feet)	Water Elevation (feet M.S.L.)
1-S	837.14	24.98	812.16
1-I	835.28	22.87	812.41
1-D	836.75	24.49	812.26
1-PC	837.63	24.61	813.02
2-S*	836.07	23.91	812.16
2-I	838.05	26.59	811.46
2-D	836.04	23.88	812.16
2-PC	838.05	25.71	812.34
3-S	836.75	24.70	812.05
3-I	837.38	25.18	812.20
3-D	837.48	26.33	811.15
3-PC	839.21	27.21	812.00
4-S	837.45	25.72	811.73
4-I	833.46	28.88	804.58
4-D	834.79	30.03	804.76
4-PC	834.75	22.75	812.00
5-S	835.06	23.43	811.63
5-I	838.02	26.86	811.16
5-D	836.00	22.36	813.64
5-PC	834.49	22.11	812.38
6-S	835.73	24.19	811.54
6-D	835.69	30.05	805.64
7-S	835.97	23.79	812.18
7-D	835.63	33.30	802.33
8-S	835.76	23.61	812.15
8-D	834.02	29.41	804.61
9-S	836.68	25.30	811.38
9-D	834.30	34.31	799.99

TABLE 5-1 (CONTINUED)

GROUND WATER ELEVATIONS - FEBRUARY 12, 1991

Well No.	Top of Well Casing Elevation (feet M.S.L.)	Depth to Water (feet)	Water Elevation (feet M.S.L.)
10-S	835.89	24.05	811.84
10-I	837.04	24.76	812.28
10-D	834.77	22.42	812.35
11-S	835.89	30.35	805.54
11-D	837.52	25.05	812.47
12-S	838.51	26.18	812.33
12-D	837.79	25.49	812.30
13-S	834.59	22.38	812.21
13-D	835.77	23.38	812.39
14-S	835.99	23.78	812.21
14-D	837.92	26.82	811.10
15-S	834.83	22.62	812.21
16-S	837.26	25.04	812.22
17-S	835.75	26.71	809.04
18-S	834.08	29.36	804.72
19-S	834.56	34.01	800.55
20-S	837.62	26.42	811.20
21-S	837.67	25.70	811.97
22-S	837.76	26.35	811.41
23-S	847.11	35.66	811.45
24-S	836.33	24.80	811.53
25-S	835.31	23.19	812.12
FMC-33	837.05	25.11	811.94
AT-1	838.53	27.24	811.29
AT-2	836.45	24.89	811.56
AT-3	836.39	29.50	806.89

Note:

* Water level for 2-S measured on February 25, 1991.

6. WATER QUALITY

6.1 Planned Procedures

The second round of ground water samples collected during February 1991 included 52 existing wells and the City of Fridley Well No. 13. Ground water sample collection procedures used by RMT are described in the Draft A-E Quality Control Plan and Sampling Plan for Monitoring Well Sampling (A-E QCP-SP; RMT, 1990b), as modified by agreements reached during telephone conference calls among the Navy, the USACE, RMT, the MPCA, and the USEPA. RMT also used methods outlined in the document titled Procedures for Ground Water Monitoring (MPCA, 1986).

Ground water was analyzed for the parameters shown in Table 6-1. Approximately 20 percent of the wells (total of 11) included pesticide/PCB analyses.

Common elements of water quality sampling and analysis included the following:

- Record of the depth to water and bottom of each well to be sampled.
- Calculation of well volumes.
- Well stabilization test or well recovery test during well purging.
- In-field measurements of temperature, pH, and specific conductance.
- Sample collection.
- Sample filtration (dissolved metals only).
- Sample container, preservative, and holding-time criteria.
- Documentation and chain-of-custody procedures.
- Sample shipment.
- Sample analysis.

TABLE 6-1

CHEMICAL PARAMETERS ANALYZED IN GROUND WATER SAMPLES

Volatile Organic Compounds	Pesticides/PCBs*	Metals (dissolved)
Trichlorofluoromethane	Alpha-BHC	Barium
Vinyl chloride	Beta-BHC	Manganese
Methylene chloride	Delta-BHC	Selenium
1,1-Dichloroethene	Gamma-BHC (Lindane)	Zinc
1,1-Dichloroethane	Heptachlor	
1,2-Dichloroethene (total)	Aldrin	
Chloroform	Heptachlor epoxide	
1,1,1-Trichloroethane	Endosulfan I	
Trichloroethene	Dieldrin	
Benzene	4,4′-DDE	
Tetrachloroethene	Endrin	
Toluene	Endosulfan II	
Ethylbenzene	4,4′-DDD	
Xylenes (total)	Endosulfan sulfate	
	4,4′-DDT	
	Methoxychlor	
	Endrin ketone	
	Alpha-Chlordane	
	Gamma-Chlordane	
	Toxaphene	
	Aroclor-1016	
	Aroclor-1221	
	Aroclor-1232	
	Aroclor-1242	
	Aroclor-1248	
	Aroclor-1254	
	Aroclor-1260	

* Pesticides/PCBs were analyzed in 11 selected wells. Volatile organic compounds and dissolved metals were analyzed in ground water from all wells.

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6.2 Quality Control Activities

6.2.1 Field Measurements

Battery checks and field calibrations were performed periodically throughout each day on each instrument while in use, in accordance with the Draft A-E QCP-SP (RMT, 1990b). The pH meters and the conductivity meter were checked several times each day with fresh solutions. Calibration data were recorded in field log books.

6.2.2 Laboratory Data

Samples from 52 monitoring wells and Fridley Well No. 13 were taken and shipped to RMT Laboratories, Inc., for analysis. In addition, trip blanks, field blanks, and field duplicates were submitted to RMT Laboratories for quality control (QC) purposes. Quality assurance (QA) trip blanks, field blanks, and field duplicates were submitted to the USACE-Missouri River Division (MRD) Laboratory for quality assurance checks. Subsequent discussions focus on RMT QC activities.

Sample Tracking

Laboratory reports received from RMT Laboratories were first checked against sample collection and shipping records, to confirm that results were received for each sample that was shipped. Test results were also compared to the parameter list originally requested for analysis to check for completeness. All results for all sampling locations were received.

The sample identification system used for ground water samples was as follows (where "00" represents numeric values):

AT00	Production well
FMC00	Pre-existing production well installed by FMC
M00D	Deep monitoring well
M00I	Intermediate monitoring well
M00S	Shallow monitoring well
QAD00	Blind field duplicate sent to USACE-MRD Laboratory
QAF00	Field blank sent to the USACE-MRD Laboratory
QAT00	Trip blank sent to the USACE-MRD Laboratory
QCD00	Blind field duplicate sent to RMT Laboratories
QCF00	Field blank sent to RMT Laboratories
QCT00	Trip blank sent to RMT Laboratories

Completed chain-of-custody forms for all well and QC samples are included in Appendix B. Laboratory data sheets include the sample identification code, as described above, as well as the laboratory sample tag number and case number.

Holding Times

The VOC analyses for all water samples except M06S and the analysis of 1,2-dichloroethene for M10S were completed within 10 days of the VTSR (validated time of sample receipt at the laboratory). The exceptions were analyzed within 24 days of VTSR.

The semivolatile extractions for all water samples were completed within 5 days of the VTSR, and the analyses were completed within 40 days of the VTSR.

No sample results were rejected based on holding times.

Method Blanks

Method blank results are included in the data packages for each class of compounds. Method blanks are intended to define the level of laboratory background contamination. Twelve method blanks were analyzed for VOCs in water. No VOCs were detected in 10 of the 12 method blanks, and results for all constituents in all blanks were below reporting limits. One method blank contained trichloroethene below the reporting limit at an estimated concentration of 3 μg/L. A second method blank contained methylene chloride below the reporting limit at an estimated concentration of 3 μg/L. These data and the samples associated with these blanks are shown in Table 6-2.

Four method blanks were analyzed for PCBs/pesticides in water. No PCBs/pesticides were detected in any method blanks.

Trip Blanks

Ten trip blanks for water were submitted to RMT Laboratories with the samples and were analyzed for VOCs only, along with the samples. A trip blank was generated by adding deionized water to an empty sample container in the laboratory and transporting the sealed

TABLE 6-2

VOC METHOD BLANKS

Parameter	Units	VBLK06	VBLK09
Trichlorofluoromethane	µg/L	10 U	10 U
Vinyl chloride	µg/L	10 U	10 U
Methylene chloride	µg/L	5 U	3 J
1,1-Dichloroethene	µg/L	5 U	5 U
1,1-Dichloroethane	µg/L	5 U	5 U
1,2-Dichloroethene (total)	µg/L	5 U	5 U
Chloroform	µg/L	5 U	5 U
1,1,1-Trichloroethane	µg/L	5 U	5 U
Trichloroethene	µg/L	3 J	5 U
Benzene	µg/L	5U	5 U
Tetrachloroethene	µg/L	5 U	5 U
Toluene	µg/L	5 U	5 U
Ethylbenzene	µg/L	5 U	5 U
Xylenes (total)	µg/L	5 U	5 U
Associated Samples		M01D	AT02
		M21SDL	M03PC
		QCD07	M07D
		M21SMS	M24S
		M21SMSD	QCD08
All parameters for the following method blanks were reported as undetected: VBLK03, VBLK05, VBLK08, VBLK10, VBLK12, VBLK13, VBLK14, VBLK15, VBLK16, VBLK20			QCD09
			QCD10
			QCF14
			QCT15
			QCT16

container with the other sample bottles to the field and back to the laboratory for analysis. Trip blanks are intended to define the cumulative contamination that samples are exposed to during transport, sampling, and analysis. No VOCs were detected in any trip blank.

Field Blanks

Field (rinsate) blanks were collected for each class of compounds. Field blanks consist of sampler rinsate and are intended to demonstrate the effectiveness of decontamination procedures for sampling equipment. Eleven field blanks were collected for VOCs in water. Results were below the reporting limits for all constituents (Table 6-3). Seven of 11 blanks (64%) contained toluene below the reporting limit (5 μg/L) at estimated concentrations ranging from 0.8 to 2 μg/L. Toluene does not appear to be originating from cross-contamination in the field. This conclusion is based on the fact that only 7.7 percent of the water samples contained toluene at estimated concentrations below the reporting limits ranging from 0.7 to 2 μg/L. Toluene also does not appear to be originating from laboratory contamination because none of the twelve method blanks contained detectable toluene. Toluene contamination during sample transport is a third possibility, but this route is not supported by the data since the 10 trip blanks contained no detectable toluene.

The source of low-level toluene in the field blanks is likely to be fugitive atmospheric contamination at the site or low-level contamination of the decontamination water. The significant difference in toluene occurrences in the field blanks (64%) compared to the samples (7.7%) is either related to the prerinsing that sample bailers receive during well purging, or to the direct contamination of decontamination water, which is also used to generate field blanks.

Two other VOCs were reported in field blanks. 1,1,1-Trichloroethane (1,1,1-TCA) was detected below reporting limits in three of 11 field blanks (27%) at estimated concentrations of 0.5 to 1 μg/L. 1,1,1-TCA in the field blanks does not appear to be originating from cross-contamination because two of three field blanks with detectable 1,1,1-TCA were generated

TABLE 6-3

VOC FIELD BLANKS - WATER
(all units µg/L)

Parameter	QCF10	QCF11	QCF12	QCF15	QCF16	QCF17	QCF18	QCF19
Trichlorofluoromethane	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethene (total)	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Chloroform	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,1,1-Trichloroethane	0.5 J	1 J	5 U	5 U	5 U	0.7 J	5 U	5 U
Trichloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Benzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Tetrachloroethene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Toluene	5 U	0.9 J	0.8 J	2 J	0.9 J	1 J	1 J	0.8 J
Ethylbenzene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Xylenes (total)	5 U	5 U	5 U	2 J	5 U	5 U	5 U	5 U

U = Undetected. All parameters for the following field blanks were reported as undetected: QCF09, QCF13, and QCF14.

J = Estimated concentration

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before any samples containing 1,1,1-TCA at concentrations over the reporting limit were collected. 1,1,1-TCA does not appear to be originating from laboratory contamination because none of the 12 method blanks contained detectable 1,1,1-TCA. None of the 10 trip blanks contained detectable 1,1,1-TCA, which would indicate that contamination probably did not occur during sample transport. As with toluene, on-site fugitive atmospheric contamination is implicated in the field blank detects of 1,1,1-TCA.

Xylene was detected in one of 11 field blanks at an estimated concentration of 2 μg/L.

Eleven field blanks were collected for PCB/pesticide analysis. No PCBs/pesticides were detected in 10 field blanks. One field blank (GCF17) contained 0.36 μg/L 4,4′-DDT, which is a site-related constituent.

Eleven field blanks were collected for the analysis of barium, manganese, selenium, and zinc. Ten blanks contained no detectable metals. One blank (QCF18) contained 28.4 μg/L zinc. Zinc was previously reported in field blanks at this site (Round 1, October 1990) in two of eight blanks. Some of the zinc reported in ground water samples could be attributable to cleaning procedures for sampling equipment, and may not be site related, because the concentrations were below 5 x 28.4 (142 μg/L). Evaluating sample concentrations against 5 times a blank concentration is consistent with the procedure cited in the laboratory data validation guidelines for inorganics (USEPA, 1988c).

Duplicate Samples

Blind field duplicate samples were collected and submitted for analysis. Analytical results were used to demonstrate cumulative laboratory precision and sample homogeneity. A total of five samples were duplicated. Table 6-4 shows a comparison of analyses for VOCs in field duplicates of water. Although 14 VOCs were analyzed in five pairs of duplicates, only three pairs of values exhibited concentrations greater then 5 times the reporting limits. Relative percent difference (RPD) values were only calculated when both sample and duplicate concentrations exceeded 5 times CRDL or CRQL. This procedure is consistent with that cited

TABLE 6-4

VOC BLIND FIELD DUPLICATES - WATER
(all concentrations in µg/L)

1,1-Dichloroethane		
Original	Duplicate	RPD (%)
M02I 2 J	QCD07 2 J	--
M07D 4 J	QCD08 3 J	--
M09D 3 J	QCD09 2 J	--

1,2-Dichloroethene (Total)		
Original	Duplicate	RPD (%)
M07D 10	QCD08 10	--
M09D 7	QCD09 7	--

1,1,1-Trichloroethane		
Original	Duplicate	RPD (%)
M02I 5 U	QCD07 0.7 J	--
M09D 2 J	QCD09 2 J	--

Tetrachloroethene		
Original	Duplicate	RPD (%)
M09D 3 J	QCD09 3 J	--

Trichloroethane		
Original	Duplicate	RPD (%)
M02I 20	QCD07 22 B	--
M07D 40	QCD08 42	4.9
M09D 78	QCD09 68	14
M06D 28	QCD10 27	3.6
M04PC 1 J	QCD11 0.7 J	--

RPD = Relative Percent Difference

U = Undetected J = Estimated Concentration B = Present in Method Blank

-- = Both values are less than 5 times the reporting limit; therefore, an RPD calculation is of limited significance and was not done.

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in the Statement of Work (SOW) for CLP inorganics for laboratory duplicates (USEPA, 1988b). For these pairs, the calculated RPDs were less than 15 percent. No sample results were rejected based on these comparisons.

A comparison of analyses for PCBs/pesticides in one blind field duplicate was also conducted. No detectable concentrations were reported in the duplicate sample.

Table 6-5 shows a comparison of analyses for the metals in blind field duplicates of water. Only two metals, manganese and zinc, exhibited observed concentrations in which at least one value was greater than 5 times the method detection limit. (None of the selenium values was above the detection limit in the five pairs of duplicates.) All other pairs of values near the detection limits were not considered highly meaningful in a calculation of relative percent difference (RPD). Of the eight pairs of calculated values, all were within 10 percent RPD. No sample results were rejected based on these comparisons.

Matrix-Spiked Samples

The effect of the site matrices on the accuracy of the data was evaluated by analyzing percent recovery of spiked compounds in actual samples. (Precision was evaluated by analyzing matrix spike duplicates.) Matrix spikes were created by fortifying samples with known quantities of specific compounds and subjecting the samples to the entire analytical procedure. Matrix spike data indicated that laboratory procedures were appropriate for water samples.

Surrogate-Spiked Samples

Laboratory analytical accuracy was evaluated by analyzing percent recovery data for surrogate-spiked samples. A surrogate-spiked sample was created by adding known quantities of compounds, not expected to be detected in the samples, to the samples, blanks, and matrix-spiked samples. Chronic or systematic errors were not observed, based on the recoveries for surrogate-spiked samples.

TABLE 6-5

METALS BLIND FIELD DUPLICATES - WATER
(All concentrations in µg/L)

Barium		
Original	Duplicate	RPD (%)
M02I 111	QCD07 114	--
M07D 94.8	QCD08 90.7	--
M06D 57.4	QCD10 54.9	--
M04PC 58.3	QCD11 60.5	--

Zinc		
Original	Duplicate	RPD (%)
M07D 611	QCD08 594	2.8
M09D 1,360	QCD09 1,520	11
M06D 149	QCD10 151	1.3
M04PC 1,750	QCD11 1,880	7.2

Manganese		
Original	Duplicate	RPD (%)
M02I 931	QCD07 906	2.7
M07D 404	QCD08 402	0.50
M09D 64.3	QCD09 68	5.6
M06D 206	QCD10 206	0
M04PC 25.10	QCD11 23.9	4.9

-- = Both values are less than 5 times the detection limit; therefore, an RPD calculation was not done.

QC Data/Documentation Completeness

The following documentation was checked to verify that it was included in the data package, appropriate flagging was used, out-of-control difficulties were noted, and QC failures were cited in the case narrative:

Organics	Inorganics
- Case narratives	- Cover pages
- Sample data forms (e.g., Form I, quant. report, mass spectra, etc.)	- Case narratives
- GC/MS tunes	- Sample I.D., units completeness
- Blanks	- Calibrations
- Surrogate recoveries	- Blanks
- Matrix spikes	- Interference check
- Holding times	- Pre-digestion spike recoveries
- Initial calibrations	- Post-digestion spike recoveries
- Continuing calibrations	- Duplicates, recoveries
- Pesticide calibration analytical sequence for pesticide	- Laboratory control
- DDT/Endrin/DBC degradation check	- Standard additions
- Evaluation standards check	- ICP linear range
- Pesticide/PCB standards summary	- Preparation logs
- DDT retention time	
- Retention time windows	

6.3 Implementation Problems and Corrective Actions

Problem	Corrective Action
Unable to unlock well 2-S.	Key for well was obtained from Dick Hanson (DPRO).
The 3-inch submersible pump seized during decontamination procedures.	Rented another 3-inch pump to finish the sampling job. Pump was decontaminated prior to use.
Wells AT-1 and AT-3 were not sampled due to sediment present in the well screen interval.	No action taken.

6.4 Data Presentation

All 52 monitoring wells, including AT-2 plus Fridley Well No. 13 shown on Figure 1-2, were sampled and analyzed for the constituents listed in Table 6-1. Table 6-6 lists sampling dates and summarizes the results of in-field measurements. Laboratory results are summarized in Appendix C.

TABLE 6-6

SUMMARY OF SAMPLING DATES AND WATER QUALITY IN-FIELD MEASUREMENTS

Well No.	Sampling Date	pH (S.U.)	Temperature (°C)	SEC @ 25°C (µmhos/cm)	Color[a]	Turbidity[b]	Odor[b]
1-S	2-13-91	6.8	10.5	1,030	None	None	None
1-I	2-13-91	7.7	10.0	1,110	None	None	None
1-D	2-18-91	7.4	10.0	850	None	None	None
1-PC	2-25-91	7.4	10.0	910	None	None	None
2-S	2-25-91	6.9	9.0	1,060	None	Turbid	None
2-I	2-15-91	7.2	10.0	1,040	None	Turbid	None
2-D	2-25-91	7.1	8.0	940	None	None	None
2-PC	2-22-91	7.4	9.5	920	None	None	None
3-S	2-22-91	7.1	9.0	860	None	Slight	None
3-I	2-22-91	7.0	9.0	920	None	Slight	None
3-D	2-19-91	7.2	10.5	1,030	None	None	None
3-PC	2-19-91	7.4	11.0	830	None	None	None
4-S	2-15-91	7.6	13.0	530	None	Slight	None
4-I	2-20-91	7.4	11.0	1,150	None	Turbid	None
4-D	2-21-91	7.4	10.0	910	None	None	None
4-PC	2-21-91	7.4	10.0	910	None	None	None
5-S	2-21-91	6.9	9.5	1,110	None	Turbid	None
5-I	2-26-91	6.8	9.5	1,380	None	None	None
5-D	2-25-91	7.3	8.5	930	None	None	None
5-PC	2-14-91	7.5	10.0	780	None	None	None
6-S	2-21-91	7.2	12.0	630	None	Turbid	None
6-D	2-20-91	7.3	13.0	930	None	None	None
7-S	2-25-91	6.7	10.0	1,270	None	Slight	None
7-D	2-19-91	7.5	9.5	1,070	None	None	None
8-S	2-25-91	6.9	8.0	870	None	Slight	None
8-D	2-19-91	7.6	10.5	900	None	None	None
9-S	2-26-91	6.9	10.0	1,170	None	Slight	None
9-D	2-20-91	7.5	11.0	770	None	None	None
10-S	2-21-91	6.9	12.0	1,320	None	Turbid	None

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TABLE 6-6 (CONTINUED)

SUMMARY OF SAMPLING DATES AND WATER QUALITY IN-FIELD MEASUREMENTS

Well No.	Sampling Date	pH (S.U.)	Temperature (°C)	SEC @ 25°C (µmhos/cm)	Color[a]	Turbidity[b]	Odor[b]
10-I	2-14-91	7.0	10.0	910	None	None	None
10-D	2-14-91	7.6	9.5	660	None	Slight	None
11-S	2-20-91	7.4	12.0	480	None	Slight	None
11-D	2-21-91	7.4	10.0	910	None	None	None
12-S	2-12-91	7.2	10.0	910	None	Slight	None
12-D	2-22-91	7.2	9.5	980	None	None	None
13-S	2-12-91	7.3	9.0	790	None	Slight	None
13-D	2-19-91	7.4	10.0	720	None	None	None
14-S	2-12-91	7.1	10.0	910	None	Slight	None
14-D	2-26-91	7.3	10.0	1,040	None	None	None
15-S	2-12-91	7.2	9.5	720	None	Slight	None
16-S	2-21-91	6.9	10.0	780	None	Slight	None
17-S	2-19-91	7.1	11.0	1,090	None	Slight	None
18-S	2-19-91	7.5	10.0	1,300	None	Slight	Slight
19-S	2-20-91	7.2	10.5	1,160	None	Turbid	None
20-S	2-26-91	7.3	11.0	520	None	Moderate	None
21-S	2-15-91	6.9	10.0	980	None	Turbid	None
22-S	2-26-91	7.0	10.0	1,300	None	Very	None
23-S	2-13-91	7.3	10.0	650	None	Very	None
24-S	2-20-91	7.0	13.5	1,230	None	Turbid	None
25-S	2-12-91	7.0	11.0	700	None	Moderate	None
FMC-33	2-22-91	7.0	8.0	870	None	None	None
FW13	2-14-91	7.2	10.0	610	None[b, c]	None	None
AT-1[d]	--	--	--	--	--	--	--
AT-2	2-20-91	6.9	16.0	1,300	None	None	None
AT-3[d]	--	--	--	--	--	--	--

Notes:
[a] Based on filtrate.
[b] Based on unfiltered portion.
[c] Sample not filtered as per protocol.
[d] Wells not sampled due to sediment in well screen interval.

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7. REFERENCES

Bouwer, H., and R.C. Rice. 1976. A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells. Water Resources Research. Vol. 12, No. 3. pp. 423-428.

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U.S. Environmental Protection Agency. 1988c. Laboratory data validation functional guidelines for evaluating inorganics analyses. July 1, 1988.

APPENDIX A

A-E DAILY QUALITY CONTROL REPORTS

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: Feb 11, 1991 AUTHOR: RON VAUGHN

WEATHER: SUNNY, LIGHT WIND, 10°-15° F.

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL 'D' PROTECTION USED ALL DAY.
NO PROBLEMS ENCOUNTERED.

WORK PERFORMED:
COMPANY TRUCKS WERE LOADED WITH EQUIP. AND SAMPLE CONTAINERS. TRUCKS WERE DRIVEN TO FRIDLEY, MN. ONCE ON SITE, ORGANIZED THE ARRIVAL AND PLACEMENT OF THE OFFICE TRAILER AND DUMPSTER. THE GASOLINE POWERED GENERATOR (RENTAL) WAS PICKED UP AND DELIVERED TO THE SITE. THE EMPLOYEE FROM ENPRO WAS CONTACTED, ~~AND~~, LATE AFTERNOON HE ARRIVED ON SITE TO HELP WITH UNLOADING TRUCKS AND ORGANIZING THE OFFICE TRAILER. FIELD EQUIP WAS ASSEMBLED AND CHECKED

SAMPLING PERFORMED:
NO SAMPLES COLLECTED.

FIELD ANALYSIS PERFORMED:

NONE.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

NONE.

QUALITY CONTROL ACTIVITIES INITIATED:

PRIMARY QC CHECKS PERFORMED ON pH METERS, SUBMERSIBLE PUMPS.

Site Coordinator Signature: Ronald H. Vy L **DATE:** 2-11-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: Feb 12, 1991 AUTHOR: RON VAUGHN

WEATHER:
SUNNY, LIGHT WIND, TEMP. 25°F

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL D USED ALL DAY, DURING GROUND WATER SAMPLING, PROTECTIVE GLOVES WERE USED.

WORK PERFORMED:
PROPANE GAS WAS CONNECTED TO OFFICE TRAILER.
GROUND WATER LEVELS WERE MEASURED IN ALL BUT ONE WELL (2-S) FOR WHICH WE HAD NO KEY.
5 MONITORING WELLS WERE SAMPLED.
IN-SITU SLUG TESTS WERE PERFORMED AT WELL 10I.
1 FIELD BLANK WAS COLLECTED.

SAMPLING PERFORMED:
GROUND WATER WAS SAMPLED AT LOCATIONS.
M15S
M14S
M13S
M12S
M25S
FIELD BLANK - QCFØ9

FIELD ANALYSIS PERFORMED:

HNU READINGS WERE RECORDED AT EACH WELL AS A WATER LEVEL WAS MEASUREMENT. pH, CONDUCTIVITY, and TEMPERATURE WAS RECORDED OF EACH GROUND WATER SAMPLE COLLECTED.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

WELL 2S WAS NOT ABLE TO OPEN, DUE TO NOT HAVING WELL KEY.

WILL TRY TO LOCATE WELL KEY FROM NIROP PERSONNEL

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THOUGHOUT THE DAY.

FIELD RINSATE SAMPLE (QCF09) WAS COLLECTED.

DAILY FIELD NOTES WERE CHECKED FOR COMPLETENESS AND ACCURACY.

Site Coordinator Signature: Ronald N. Kyle DATE: 2-12-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-13-91 **AUTHOR:** RON VAUGHN

WEATHER:
AM- SUNNY AND CLOUDY, LOW WIND, TEMP 28°F
PM- LIGHT AND HEAVY SNOW FALL, CLOUDY, LOW WIND, TEMP. 25°F.

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL - D USED THOUGHOUT THE DAY
PROTECTIVE GLOVES WERE USED DURING GROUND WATER SAMPLING.

WORK PERFORMED:
3 MONITORING WELLS WERE SAMPLED.
1 FIELD BLANK WAS COLLECTED.

SAMPLING PERFORMED:
GROUND WATER SAMPLES WERE COLLECTED AT.

MØ1I
MØ1S
M23S
FIELD BLANK - QCF1Ø

FIELD ANALYSIS PERFORMED:

pH, CONDUCTIVITY, AND TEMP WAS RECORDED OF EACH GROUND WATER SAMPLE COLLECTED.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

WELLS 130, 1ØD AND SPC WERE NOT SAMPLED TODAY DUE TO ~~PL~~ SUBMERICIBLE PUMP FAILURES. BOTH THE 2" AND 3" PUMPS WOULD NOT OPERATE. THE 2" MAY HAVE ICE BUILD UP IN THE PLASTIC DISCHARGE TUBING. THE PUMP AND TUBING WILL BE KEPT IN A HEATED ROOM TONITE IN ORDER TO THAW OUT THE PUMP. THE 3" ~~IS BE~~ PUMP IS BELIEVED TO HAVE JAMMED INSIDE. A RENTAL AGREEMENT HAS BEEN ARRANGED, AND THE PUMP WILL BE PICKED UP TOMMROW

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THROUGH OUT THE DAY.

A FIELD RINSATE BLANK (QCFIØ) WAS COLLECTED.

DAILY FIELD NOTES WERE CHECKED FOR COMPLETENESS AND ACCURACY.

Site Coordinator Signature: [signature] DATE: 2-13-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-14-91 AUTHOR: RON VAUGHN

WEATHER:
High of 13°F. Light Snow. Wind Gusts of 35-40 mph, windchill up to -20's°F.

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL-D USED THROUGHOUT THE DAY.
PROTECTIVE GLOVES ~~WHE~~ WERE WORN DURING GROUND WATER SAMPLING.

WORK PERFORMED:
4 MONITORING WELLS WERE SAMPLED.
FRIDLEY WELL 13 WAS SAMPLED
THE NEW RENTAL 3" PUMP WAS PICKED UP AND BROUGHT BACK TO THE SITE
THE RENTAL GENERATOR WAS RETURNED BECAUSE IT WOULD NOT OPERATE.
PLUMBING FITTINGS HAD TO BE ALTERED ON THE 3" PUMP.
1 FIELD BLANK WAS COLLECTED

SAMPLING PERFORMED:
GROUND WATER SAMPLES WERE COLLECTED AT
MIØI
MIØD
MØSPC
FW13 - FRIDLEY WELL #13.
QCF11 - FIELD BLANK.

FIELD ANALYSIS PERFORMED:

pH, CONDUCTIVITY, AND TEMP. WAS RECORDED ~~AT~~ OF EACH GROUND WATER SAMPLE COLLECTED.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

THE GENERATOR (RENTAL) WAS RETURNED BECAUSE IT WOULD NOT OPERATE. MAINTANCE WAS PERFORMED ON THE GENERATOR, THE GENERATOR WAS FIXED AND RETURNED TO SITE.
ONE OF THE FIELD SAMPLING TRUCKS HAD TO LEAVE THE SITE TO PICK UP THE RENTAL 3" PUMP.
COLD TEMPERATURE CAUSED MANY DELAYS THROUGHOUT THE DAY, DUE TO ITEMS FREEZING.
THE HEATER BLOWER FAN STOPPED WORKING IN ONE OF THE TRUCKS. THE TRUCK WAS TAKEN OFF SITE TO BE REPAIRED. THE TRUCK WAS OUT OF USE FOR ABOUT 4 HOURS.

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THROUGHOUT THE DAY.

A FIELD RINSATE BLANK (QCF11) WAS COLLECTED.

DAILY FIELD NOTES WERE CHECKED FOR COMPLETENESS AND ACCURACY.

Site Coordinator Signature: [signature] **DATE:** 2-14-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-15-91 AUTHOR: RON VAUGHN

WEATHER:
LOW OF -13°F, WITH WINDCHILL OF -45°F
WINDY, SUNNY.

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL-D AND COLD WEATHER CLOTHING USED THROUGHOUT THE DAY. PROTECTIVE GLOVES USED DURING GROUND WATER SAMPLING.

WORK PERFORMED:
3 MONITORING WELLS WERE SAMPLED
1 DUPLICATE SAMPLE WAS COLLECTED
1 FIELD BLANK WAS COLLECTED

OFFICE TRAILER WAS LOADED WITH GEAR/EQUIP THE THE WEEK END.

SAMPLING PERFORMED:
GROUND WATER SAMPLES WERE COLLECTED AT:
M045 included Pest/PCB samples
M02I
M21S included matrix spike/matrix spike dup.
QCD01 Duplicate sample
QCF12 FIELD RINSATE BLANK

FIELD ANALYSIS PERFORMED:

pH, Conductivity and Temp were recorded for each water sample collected.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

Cold temperatures and high winds caused many slight delays

A Field ~~crew~~ personnel decided not use the submersible pumps in the cold temperature - this resulted in sampling wells out of order.

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THROUGHOUT THE DAY.

A FIELD RINSATE BLANK (QCF12) WAS COLLECTED

DAILY NOTES WERE CHECKED FOR COMPLETE AND ACCURACY

Site Coordinator Signature: [signature] DATE: 2-15-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-18-91 AUTHOR: RON VAUGHN

WEATHER: CLOUDY, HEAVY SNOWFALL (6") IN PM. 28-35°F LOW WIND.

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL - D USED THROUGHOUT THE DAY.
PROTECTIVE GLOVES USED DURING WELL PURGING AND SAMPLING.

WORK PERFORMED:
VEHICLE LOADED UP IN MADISON, WI. DROVE VEHICLE TO JOB SITE IN FRIDLEY, MN.
CALIBRATED FIELD INSTRUMENTS.
PERFORMED MAINTANCE ON VEHICLE.
COLLECTED A GROUND WATER SAMPLE AND FIELD BLANK
PACKAGED AND ~~SEN~~ SHIPPED WATER SAMPLES TO RMT LABORATORY.

SAMPLING PERFORMED:
COLLECTED A GROUND WATER SAMPLE AT MØ1D

FIELD BLANK - QCF13

FIELD ANALYSIS PERFORMED:

RECORDED pH, CONDUCTIVITY AND TEMP. OF ALL WATER SAMPLES COLLECTED.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

WHILE MOBILIZING THE TRUCK TO WELL 1D A PIECE OF SCRAP METAL WHICH WAS BURIED IN THE SNOW WAS DRIVEN OVER BY A FRONT TIRE OF THE TRUCK, CAUSED THE METAL TO 'FLIP UP' AND PUNCTURE A HOLE INTO THE OIL FILTER, THUS DISABLING THE TRUCK FROM WORK/SAMPLING ACTIVITIES. REPLACEMENT FILTER AND OIL HAD TO BE PURSHED AND INSTALLED.

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THROUGHOUT THE DAY.

A FIELD RINSATE BLANK (GCF13) WAS COLLECTED.

DAILY FIELD NOTES WERE CHECKED FOR COMPLETENESS AND ACCURACY.

~~AND~~

Site Coordinator Signature: [signature] **DATE:** 2-18-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-19-91 AUTHOR: RON VAUGHAN

WEATHER: SUNNY, LOW WIND, TEMP → 20°F to 25°F.

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL 'D' USED THROUGHOUT THE DAY.
PROTECTIVE GLOVES WERE WORN DURING GROUND WATER SAMPLING.

WORK PERFORMED:
7 MONITORING WELLS WERE SAMPLED.
1 DUPLICATE SAMPLE WAS COLLECTED
1 FIELD BLANK WAS COLLECTED.

PACKAGED AND SHIPPED WATER SAMPLES TO THE RMT LABORATORY.

SAMPLING PERFORMED:
GROUND WATER SAMPLES COLLECTED AT
M03D
M03PC
M07D
M08D
M13D
M17S
M18S
QCD08 — DUPLICATE SAMPLE
QCF14 — FIELD RINSATE SAMPLE

FIELD ANALYSIS PERFORMED:

PH, CONDUCTIVITY, AND TEMPERATURE WERE RECORDE. AT EACH SAMPLING POINT.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

A FUSE WAS BLOWN ON THE 2" SUBERMERCIBLE PUMP. I HAD TO LEAVE SITE TO RE PURCHASE NEW FUSES.

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES DURING THE DAY.

A DUPLICATE SAMPLE AND FIELD RINSATE BLANK WERE COLLECTED.

DAILY FIELD NOTES WERE CHECKED FOR COMPLETNESS AND ACCURACY.

Site Coordinator Signature: Ronald W. [illegible] DATE: 2-19-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870. 41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-20-91 AUTHOR: RON VAUGHN

WEATHER: SUNNY AND PARTLY CLOUDY. TEMP 25°-33°F
LOW WIND

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL-D USE THROUGHOUT THE DAY.
PROTECTIVE GLOVES USED DURING WATER SAMPLING.

WORK PERFORMED:
7 MONITORING WELLS WERE PURGED AND SAMPLED
2 DUPLICATE SAMPLES WERE COLLECTED
1 FIELD RINSATE SAMPLE WAS ~~DO~~ COLLECTED.

PACKAGED AND SHIPPED WATER SAMPLES TO THE RMT LABORATORY.

SAMPLING PERFORMED:

GROUND WATER	SAMPLES WERE COLLECTED AT
M09D	AT02
M19S	QCD09 - DUPLICATE SAMPLE
M04I	QCD10 - DUPLICATE SAMPLE
M24S	QCT16 - TRIP BLANK
M11S	QCF15 - FIELD RINSATE BLANK
M06D	

FIELD ANALYSIS PERFORMED:

PH, CONDUCTIVITY AND TEMP. WERE RECORDED OF EACH WATER SAMPLE COLLECTED DURING THE DAY.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

OUR DISTILLED WATER VENDOR DID NOT DELIEVER WATER TO SITE TODAY. I HAD TO LEAVE SITE TO PURCHASE DISTILLED WATER.

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THROUGHOUT THE DAY

2 DUPLICATE SAMPLES AND 1 FIELD RINSATE SAMPLE WERE COLLECTED.

DAILY FIELD NOTES WERE CHECKED FOR COMPLETNESS AND ACCURACY.

Site Coordinator Signature: Ronald N. [illegible] **DATE:** 2-24-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-21-91 **AUTHOR:** R. VAUGHNN

WEATHER:
SUNNY, AND CLOUDY, LIGHT RAIN IN THE AM.
30°-40°F

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL D USED THROUGHOUT THE DAY.
PROTECTIVE GLOVES USED DURING WATER SAMPLING.

WORK PERFORMED:
7 MONITORING WELLS WERE SAMPLED.
1 DUPLICATE SAMPLE WAS COLLECTED.
1 FIELD RINSATE BLANK SAMPLE WAS COLLECTED

UNLOADED WATER FROM WATER VENDOR TRUCK AND STORED IN OFFICE TRAILER

PACKAGED AND SHIPPED THE WATER SAMPLES TO THE RMT LABORATORY.

SAMPLING PERFORMED:
GROUND SAMPLES WERE COLLECTED AT:
M04PC
M04D
M10S
M11D
M16S
M05S
M06S
QCD11 - DUPLICATE SAMPLE
QCF16 - RINSATE BLANK

FIELD ANALYSIS PERFORMED:

PH, CONDUCTIVITY, AND TEMPERATURE WERE RECORDED OF EACH WATER SAMPLE COLLECTED.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

SLIGHT TIME DELAYS DUE TO NOT BEING ABLE TO OPERATE BOTH TRUCKS ON SITE DUE TO SECURITY AT SITE.

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THROUGHOUT THE DAY

1 DUPLICATE SAMPLE AND FIELD RINSATE BLANK WERE COLLECTED.

DAILY FIELD NOTES WERE CHECKED FOR COMPLETENESS AND ACCURACY.

Site Coordinator Signature: Ronald N. Vyl **DATE:** 2-21-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.41 Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-22-91 **AUTHOR:** RON VAUGHAN

WEATHER: SUNNY. WINDY, 20°F, WIND CHILL ≈10°F

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
'LEVEL-D' USED THROUGHOUT THE DAY.
PROTECTIVE GLOVES WERE USED WHILE SAMPLING WATER SAMPLES

WORK PERFORMED:
5 MONITORING WELLS WERE SAMPLED AND PURGED.
1 FIELD BLANK WAS COLLECTED.
ALL EQUIPMENT WAS MOVED FROM TRUCKS AND U-HAUL TRAILER TO OFFICE TRAILER FOR THE WEEKEND.

PACKAGED AND SHIPPED THE WATER SAMPLES TO THE RMT LABORATORY FOR A SATURDAY DELIVERY.

SAMPLING PERFORMED:
GROUND WATER SAMPLES ~~WAS~~ WERE COLLECTED AT
MØ2PC
MØ3S - INCLUDES MATRIX SPIKE AND MATRIX SPIKE DUPLICATE
FMC-33
MØ3I
M12D
QCF17 - FIELD RINSATE BLANK

FIELD ANALYSIS PERFORMED:

pH, CONDUCTIVITY, AND TEMPERATURE WERE RECORDED AT EACH WATER / SAMPLE COLLECTED.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

NONE.

HOWEVER TIME DELAYS OF WORK PERFORMED DUE TO ONLY HAVING ONE TRUCK ON SITE.

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THROUGHOUT THE DAY.

1 FIELD RINSATE BLANK WAS COLLECTED.

DAILY FIELD NOTES WERE CHECKED FOR COMPLETENESS AND ACCURACY

Site Coordinator Signature: [signature] **DATE:** 2-22-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.___ Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-25-91 AUTHOR: RON VAUGHN

WEATHER:
SUNNY, LOW WIND, 7°-15°F.

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL D USED THROUGHOUT THE DAY.
PROTECTIVE GLOVES USED DURING WATER SAMPLING.
COLD WEATHER CLOTHS USED THROUGHOUT THE DAY.

WORK PERFORMED:
6 MONITORING WELLS WERE PURGED AND SAMPLED
2 FIELD BLANKS WERE COLLECTED
5 DUPLICATE SAMPLES WERE COLLECTED.

PACKAGED AND SHIPPED WATER SAMPLES TO THE RMT LAB AND DUPLICATE (QA) SAMPLES TO THE MRD LAB.

A-E DQCR'S FOR THE WEEK OF 2/18/91 WERE SENT TO ARMY C.O.E. OFFICE.

SAMPLING PERFORMED:

GROUND WATER SAMPLES COLLECTED	
MØ8S	DUPLICATES
MØ1PC	QADØ8
MØ2S	QADØ9
MØ2D	QAD1Ø
MØ5D	QAD11
MØ7S	QAD12
QCF18 - FIELD RINSATE.	QAFØ3 - FIELD RINSATE BLANK

FIELD ANALYSIS PERFORMED:

pH, CONDUCTIVITY, AND TEMPERATURE WERE RECORDED OF EACH WATER SAMPLE COLLECTED.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

THE RMT ATV WOULD NOT START DUE TO THE COLD TEMPERATURES.

DELAYS IN FIELD WORK PROGRESS DUE TO HAVEING ONLY ONE TRUCK ON SITE

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THROUGHOUT THE DAY.
5 DUPLICATE SAMPLES AND
2 FIELD RINSATE BLANK WERE COLLECTED.
DAILY FIELD NOTES WERE CHECKED FOR COMPLETENESS AND ACCURACY.

Site Coordinator Signature: Ronald N. [illegible] **DATE:** 2-25-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.___ Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-26-91 **AUTHOR:** RON VAUGHN

WEATHER:
SUNNY, MOD. WIND 15°-20°F.

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
LEVEL D USED THROUGHOUT THE DAY.
PROTECTIVE GLOVES USED DURING WATER SAMPLING.

WORK PERFORMED:
5 MONITORING WELLS WERE PURGED AND SAMPLED.
1 FIELD BLANK WAS COLLECTED.
FINAL DECON. WAS PERFORMED ON BOTH THE 2" AND 3" SUBMERICIBLE PUMPS.
THE 3" RENTAL PUMP WAS RETURNED.
THE GAS POWERED GENERATOR WAS RETURNED.
EQUIPMENT AND SUPPLIES IN OFFICE TRAILER WAS PACKED UP AND PUT IN BOXES.
PHONE CALLS WERE MADE TO DISCONTINUE WATER VENDOR, OFFICE TRAILER RENTAL, GARBAGE DUMPSTER RENTAL, ~~FOR~~ PROPANE GAS/TANK RENTAL.

SAMPLING PERFORMED:
GROUND WATER COLLECTED AT:
MØ5I
MØ9S
M14D
M2ØS
M22S
QCF19 - FIELD RINSATE BLANK
Ø

FIELD ANALYSIS PERFORMED:

pH, CONDUCTIVITY, AND TEMPERATURE WERE RECORDED OF EACH WATER SAMPLE COLLECTED.

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

NONE,

SLIGHT TIME DELAY, DUE TO ONLY HAVING ONE TRUCK ON SITE.

QUALITY CONTROL ACTIVITIES INITIATED:

FIELD INSTRUMENTS WERE CALIBRATED MANY TIMES THROUGHOUT OUT THE DAY.
1 FIELD RINSATE BLANK WAS COLLECTED
DAILY FIELD NOTES WERE CHECKED FOR COMPLETENESS AND ACCURACY.

Site Coordinator Signature: Ronald A. Vaughn **DATE:** 2-26-91

A-E DAILY QUALITY CONTROL REPORT (DQCR)
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT, FRIDLEY, MN
RMT, Inc., Project No. 1870.___ Contract No. DACA45-86-C-0015
(MOD NO. P00009)

DATE: 2-27-91 AUTHOR: RON VAUGHN

WEATHER:
CLOUDY, LOW WIND, 17°F.

HEALTH AND SAFETY - LEVELS OF PROTECTION AND PROBLEMS/SOLUTIONS:
NONE.

WORK PERFORMED:
4 MONITORING WELL I.D. LABELS WERE ATTACHED TO 4 WELLS.
OFFICE TRAILER WAS UNLOADED OF EQUIP. AND CLEANED.
TRUCKS AND U-HAUL TRAILER WERE LOADED UP WITH SAMPLING EQUIP. AND SUPPLIES.
ATV WAS ALSO LOADED UP.
ALL TRUCKS AND SAMPLING EQUIP. WAS DRIVEN BACK TO MADISON.
EQUIP. WAS UNLOADED.

SAMPLING PERFORMED:
NONE.

FIELD ANALYSIS PERFORMED:

NONE

PROBLEMS ENCOUNTERED AND CORRECTIVE ACTIONS:

NONE

QUALITY CONTROL ACTIVITIES INITIATED:

NONE NEEDED.

Site Coordinator Signature: R.V. L DATE: 2-27-91

APPENDIX B

CHAIN-OF-CUSTODY RECORDS

RMT INC LABORATORIES

F-268 (R2/88)
(Use Black Ink Only)

Madison, WI 53717
744 Heartland Trail
Phone (608) 831-4444
FAX (608) 831-7530

Washington, D.C. | Santa Monica, CA | Grand Ledge, MI | Nashville, TN | Greenville, SC | Schaumburg, IL

1 of 1

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022428

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No. 1870.41 80 PAM 2/13/91
Client: NIROP

Filtered (Yes/No): N Y N
Preserved (Code): E B A
Refrigerated (Yes/No): Y Y Y

Code: A - None, B - HNO_3, C - H_2SO_4, D - NaOH, E - HCl

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml VIAL	1L Plastic	1L Amber/Glass					Comments:
61955	2-12	2:15P	M15S	6	3	1	2					w/ PCB-PEST.
61956	2-12	3:15P	M14S	4	3	1	—					
61957	2-12	4:10P	M13S	4	3	1	—					
61958	2-12	5:10P	M25S	4	3	1	—					
61959	2-12	6:05P	M12S	4	3	1	—					
61960	2-12	6:20P	QCF09	6	3	1	2					FIELD BLANK
61961	2-12	—	QCT10	3	—	—	—					TRIP BLANK w/ PCB-PEST

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① R. Wagner	2-12-91 7:45P	② Federal Express Shipper Name & #	2-12-91 7:45P
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ FEDERAL EXPRESS	Date/Time 2/13/91 10:30	Received by (Sig.) ⑥ Matt Lal Shipper Name & #	Date/Time 2/13/91 10:30

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp 6°C Cool
Receipt pH Cool
Client P.O. Number
Subsequent Analysis: (Check)

Seal # at'chd by ◯ Recvd. intact by ◯ Seal # at'chd by ◯ Recvd. intact by ◯

Date Resubmitted

RMT INC LABORATORIES

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744 Heartland Trail
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FAX (608) 831-7530

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F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 021235

Bottles Prepared by: E. PUTMAN
Date/Time: 2/91
Office Code: (State) WI

Project No. 80 1870.41 PMM 3/1/91
Client: NIROP

Filtered (Yes/No): N Y N
Preserved (Code): E B A
Refrigerated (Yes/No): Y Y Y

Code: A - None
B - HNO3
C - H_2SO_4
D - NaOH
E - HCl

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	Container Inventory: 40ml VIAL	1L PLASTIC	1L AMBER/GLASS					Comments:
62012	2-13	1:45P	MØ1I	3	3	1	—					
62013	2-13	3:52P	MZ3S	3	3	1	—					
62014	2-13	4:45P	MØ1S	6	3	1	2					INCLUDES PEST/PCB
62015	2-13	4:20P	QCF1Ø	6	3	1	2					INCLUDES PEST/PCB

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① R.J. Mark P. Hunt John M. Mason	2-13-91 6:45P	② FEDERAL EXPRESS Shipper Name & #	2-13-91 6:45P
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ FED EX	2/14/91 10:00	Received by (Sig.) ⑥ Shipper Name & #	2/14/91 10:00

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp 4°C Good
Receipt pH Good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by Recvd. Intact by Seal # at'chd by Recvd. Intact by

RMT INC LABORATORIES

F-268 (R2/88)
(Use Black Ink Only)

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1 of 3

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022430

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No. 1870.44 MW
Client: NIROP

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	Container Inventory: 40 ml Vial	1 l Plastic	1 l Amber/Glass						Comments:
					Filtered (Yes/No)	N	Y	N					
					Preserved (Code)	E	B	A					
					Refrigerated (Yes/No)	Y	Y	Y					
62109	2-14	9:50A	M10 I	16		9	1	6					INCLUDES MS/MSD
	~~2-14~~	~~3:30P~~	~~M10 D~~	~~4~~		~~3~~	~~1~~	~~—~~	RMI 2-14-91				DOESNT FIT IN COOLER
	~~2-14~~	~~5:10P~~	~~M05PC~~	~~4~~		~~3~~	~~1~~	~~—~~	RMI 2-14-91				
62110	2-14	6:15P	QCF11	6		3	1	2					

Code: A = None
B = HNO_3
C = H_2SO_4
D = NaOH
E = HCl

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① Mark C. Hanson, R.C.J. John M. Mason	2-14-91 7:45P	② Federal Express Shipper Name & # 4127845091	2-14-91 7:45P
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ Fed Ex	Date/Time 2/15/91 11:00A	Received by (Sig.) ⑥ Shipper Name & #	Date/Time 2/15/91 11:00A

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp Good
Receipt pH Good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by Recvd. intact by Seal # at'chd by Recvd. intact by

RMT INC LABORATORIES

Madison, WI 53717
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F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022427

Bottles Prepared by: E. Pottman
Date/Time: 2/91
Office Code: (State) WI

Project No.: 1870.41
Client: NIROP

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1L Plastic	1L Amber/Glass							Comments:
Filtered (Yes/No)					N	Y	N							
Preserved (Code)					E	B	A							
Refrigerated (Yes/No)					Y	Y	Y							
6211	2-14	3:30P	MIØD	4	3	1	—							
6212	2-14	5:10P	MØ5PC	4	3	1	—							
6213	2-14	—	QCT12	3	3	—	—							

Container Inventory

Code: A = None
B = HNO3
C = H_2SO_4
D = NaOH
E = HCl

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① John Mason	2-14-91 7:45P	② Federal Express Shipper Name & # 4127845061	
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ Fed Ex	Date/Time 2/15/91 11:00A	Received by (Sig.) ⑥ Shipper Name & #	Date/Time 2/15/91 11:00A

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp Good
Receipt pH Good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by Recvd. intact by Seal # at'chd by Recvd. intact by

RMT INC LABORATORIES
Madison, WI 53717
744 Heartland Trail
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Nashville, TN
Greenville, SC
Schaumburg, IL

3 of 3

F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022429

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No.: 1870.41
Client: NIROP

Filtered (Yes/No): N Y N
Preserved (Code): E B A
Refrigerated (Yes/No): Y Y Y

Code: A - None
B - HNO3
C - H_2SO_4
D - NaOH
E - HCl

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40ml Vial	1L Plastic	1L Amber/Glass						Comments:
62114	2-14	11:05A	FW13	3	3	—	—						
62115	2-14	—	QCT11	3	3	—	—						TRIP BLANK

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① Mark P. Hartshorn, John M. Mason	2-14-91 7:45P	② Federal Express Shipper Name & # 4127845061	2-14-91 7:45
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ Fed Ex	Date/Time 2/15/91 11:00A	Received by (Sig.) ⑥ Eric A. Pitt Shipper Name & #	Date/Time 2/15/91 11:05A

Seal # at'chd by ◯ Recvd. intact by ◯ Seal # at'chd by ◯ Recvd. intact by ◯

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp good Receipt pH Good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

RMT INC LABORATORIES

F-268 (R2/88)
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1 of 3

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022431

Bottles Prepared by:	Date/Time	Office Code: (State)
E. Putman	2/91	WI

Project No.	Client:
1870.80	NIROP

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1l Plastic	1l Amber/Glass					Comments:
Filtered (Yes/No)					N	Y	N					
Preserved (Code)					E	B	A					
Refrigerated (Yes/No)					Y	Y	Y					
62210	2-15	12:15P	MØ4S	6	3	1	2					
62211	2-15	12:50P	QCF12	6	3	1	2					
62212	2-15	—	QCT13	3	3	—	—					

Code: A - None
B - HNO3
C - H_2SO_4
D - NaOH
E - HCl

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① R. Vang / John M Mason	2-15-91 8:00P	② ~~Federal Express~~ WALK IN RAV 2-15-91 Shipper Name & #	2/15/91 8:40
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ WALK IN	2/16/91 8:00	Received by (Sig.) ⑥ Matt Cal Shipper Name & #	2/18/91 8:00

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)

Receipt Temp good Receipt pH good

Client P.O. Number _____

Subsequent Analysis: _____ (Check)

Date Resubmitted _____

Seal # at'chd by ◯ Recvd. intact by ◯ Seal # at'chd by ◯ Recvd. intact by ◯

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2 of 3

F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW, WW, SW, Soil, Other)

№ 022433

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No.: 1870.41
Client: NIROP

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1L Plastic	1L Amber/Glass					Comments:
Filtered (Yes/No)					N	Y	N					
Preserved (Code)					E	B	A					
Refrigerated (Yes/No)					Y	Y	Y					
62213	2-15	9:30A	MZ1S	16	9	1	6					INCLUDE MATRIX SPIKE
					7							2 received broken 2/18/91 MAC

Code: A - None
B - HNO3
C - H_2SO_4
D - NaOH
E - HCl

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① R. Ly John M. Mason	2-15-91 8:40P	② ~~Federal Express~~ WALK IN Shipper Name & # BNB 2-15-91	2/15/91 8:40
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ WALK IN	Date/Time 2/18/91 8:00	Received by (Sig.) ⑥ Mat Lab Shipper Name & #	Date/Time 2/18/91 8:00

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp good
Receipt pH good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by Recvd. intact by Seal # at'chd by Recvd. intact by

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FAX (608) 831-7530

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3 of 3

F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022432

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No.: 1870.41
Client: NIROP

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1L Plastic	1L Amber/Glass					Comments:
Filtered (Yes/No)					N	Y	N					
Preserved (Code)					E	B	A					
Refrigerated (Yes/No)					Y	Y	Y					
62214	2-15	10:45A	MØ2I	6	3	1	2					
62215	2-15	—	QCDØ7	6	3	1	2					

Code: A - None
B - HNO3
C - H_2SO_4
D - NaOH
E - HCl

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① John M. Mason	2-15-91 8:40P	② ~~Federal Express~~ Shipper Name & # WALK IN RMT 2-15-91	2/15/91 8:40
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ WALK IN	2/18/91 8:00	Received by (Sig.) ⑥ Shipper Name & #	2/18/91 8:00

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp good
Receipt pH good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by Recvd. intact by Seal # at'chd by Recvd. intact by

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F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW), WW, SW, Soil, Other)

№ 022434

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No.: 1870.41
Client: NIROP

Filtered (Yes/No): N Y N
Preserved (Code): E A A
Refrigerated (Yes/No): Y Y Y

Code: A - None
B - HNO3
C - H_2SO_4
D - NaOH
E - HCl

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1L Plastic	1L Amber/Glass						Comments:
62271	2-18	5:00P	MØ1D	4	3	1	—						
62272	2-18	2:00P	QCF13	6	3	1	2						
62273	2-18	—	QCT14	3	3								

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① R. [illegible] J. Mason	2-18-91 6:00P	② Federal Express Shipper Name & # 4127845072	2-18-91 6:00P
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ Fed Ex	Date/Time 2/19/91 10:00	Received by (Sig.) ⑥ [illegible] Shipper Name & #	Date/Time 2/19/91 10:0

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp good
Receipt pH good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by Recvd. intact by Seal # at'chd by Recvd. intact by

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F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022435

Bottles Prepared by: E. Pitman
Date/Time: 2/91
Office Code: (State) WI

Project No. 80 1870.44 LAP
Client: NIROP

Filtered (Yes/No): N Y N
Preserved (Code): E B A
Refrigerated (Yes/No): Y Y Y

Code: A = None, B = HNO3, C = H_2SO_4, D = NaOH, E = HCl

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1 l Plastic	1 l Amber/Glass						Comments:
	~~2-19~~	~~9:55A~~	~~M03D~~	~~4~~	~~3~~	~~1~~	~~—~~						~~MAL 2/20/91~~
	~~2-19~~	~~10:25A~~	~~M03PC~~	~~4~~	~~3~~	~~1~~	~~—~~						~~MAL 2/20/91~~
62315	2-19	2:22P	M07D	4	3	1	—						
62316	2-19	2:45P	M13D	4	3	1	—						
62317	2-19	3:55P	M08D	4	3	1	—						
62318	2-19	4:20P	M17S	4	3	1	—						
62319	2-19	5:01P	M18S	6	3	1	2						
62320	2-19	1:00P	QCF14	6	3	1	2						
62321	2-19	—	QCD08	4	3	1	—						
62322	2-19	—	QCT15	3	3	—	—						

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① [signature] R.W. [signature]	2-19-91 7:10P	② Federal Express Shipper Name & # 9127845083	2-19-91 7:10P
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ Fed Ex	Date/Time 2/20/91 10:15	Received by (Sig.) ⑥ [signature] Shipper Name & #	Date/Time 2/20/91 10:15

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp Good
Receipt pH Good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by Recvd. intact by Seal # at'chd by Recvd. intact by

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1 of 2

F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022437

Bottles Prepared by: E. Putman | Date/Time: 2/91 | Office Code: (State) WI

Project No. 1870.41 | Client: NIROP

Filtered (Yes/No): N Y N
Preserved (Code): E B A
Refrigerated (Yes/No): Y Y Y

Code: A - None, B - HNO3, C - H_2SO_4, D - NaOH, E - HCl

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1l Plastic	1l Amber Glass						Comments:
62347	2-20	3:35P	AT Ø2	4	3	1	—						ORG/VOA/MET
62348	2-20-91	2-19 9:55A	MØ3D	4	3	1	—						
62349	2-19	10:25A	MØ3PC	4	3	1	—						
62350	2-20	—	QCDØ9	4	3	1	—						
62351	2-20	—	QCDIØ	4	3	1	—						
62352	2-20	—	QCTI6	3	3	—	—						

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① [signature] John M. Mason	2-20-91 6:30P	② Federal Express Shipper Name & # 4127845094	2-20-91 6:30P
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ Fed Ex	2/21/91 10:05	Received by (Sig.) ⑥ [signature] Shipper Name & #	2/21/91 10:05

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp good Received iced | Receipt pH good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by ◯ Recvd. intact by ◯ Seal # at'chd by ◯ Recvd. intact by ◯

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2 of 2

F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW), WW, SW, Soil, Other)

№ 022436

Bottles Prepared by: E. Potman
Date/Time: 2/91
Office Code: (State) WI

Project No.: 1870.44 80
Client: NIROP

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1l Plastic	1l Amber Glass					Comments:
Filtered (Yes/No)					N	Y	N					
Preserved (Code)					E	B	A					
Refrigerated (Yes/No)					Y	Y	Y					
62353	2-20	1:45P	M24S	6	3	1	2					
62354	2-20	9:45A	M19S	4	3	1	—					
62355	2-20	3:15P	M11S	4	3	1	—					
62356	2-20	10:10A	M03D	4	3	1	—					
62357	2-20	3:45P	M06D	4	3	1	—					
62358	2-20	11:30A	M04I	4	3	1	—					
62359	2-20	4:25P	QCF15	6	3	1	2					

Code: A - None
B - HNO_3
C - H_2SO_4
D - NaOH
E - HCl

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① Mark P. Hamilton / John M. Mason	2-20-91 6:30P	② Federal Express Shipper Name & # 4127845094	2-20-91 6:30P
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ Fed Ex	2/21/91 10:05	Received by (Sig.) ⑥ Matt Lal Shipper Name & #	2/21/91 10:05

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)

Receipt Temp _____ Receipt pH _____

Client P.O. Number _____

Subsequent Analysis: _____ (Check)

Date Resubmitted _____

Seal # at'chd by ◯ Recvd. intact by ◯ Seal # at'chd by ◯ Recvd. intact by ◯

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F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW), WW, SW, Soil, Other)

№ 022438

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No.: 1870.44
Client: NIROP

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1 Q Plastic	1 Q Amber/Glass						Comments:
Filtered (Yes/No)					N	Y	N						
Preserved (Code)					E	B	A						
Refrigerated (Yes/No)					Y	Y	Y						
62375	2-21	10:55A	MØ6S	6	3	1	2						
62376	2-21	3:10P	M16S	4	3	1	—						
62377	2-21	10:20A	MØ4D	4	3	1	—						
62378	2-21	10:45A	MØ4PC	4	3	1	—						
62379	2-21	10:40A	MØ5S	4	3	1	—						
62380	2-21	2:40P	M1ØS	4	3	1	—						
62381	2-21	4:30P	M11D	4	3	1	—						
62382	2-21	—	QCD11 RHY 2-21-91	~~6~~ 4	3	1	—						
62383	2-21	—	QCT17	3	3	—	—						
62384	2-21	1:50P	QCF16	6	3	1	2						

Container Inventory: 40 ml Vial, 1 Q Plastic, 1 Q Amber/Glass

Code: A = None, B = HNO_3, C = H_2SO_4, D = NaOH, E = HCl

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① R.Y. John Mason Mark C. Hamilton	2-21-91 6:15P	② Federal Express Shipper Name & # 4127845105	2-21-91 6:15P
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ Federal Ex	Date/Time 2/22/91 10:15	Received by (Sig.) ⑥ Mark Col Shipper Name & #	Date/Time 2/22/91 10:15

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp good Receipt pH good
Client P.O. Number
Subsequent Analysis: (Check)

Seal # at'chd by Recvd. intact by Seal # at'chd by Recvd. intact by Date Resubmitted

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F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022439

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No. 1870, 41, 55
Client: NIROP

Filtered (Yes/No): N Y N
Preserved (Code): E B A
Refrigerated (Yes/No): Y Y Y

Code: A = None, B = HNO3, C = H_2SO_4, D = NaOH, E = HCl

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1l Plastic	1l Amber/Glass					Comments:
62404	2-22	11:00A	MØ3S	16	9	1	6					INCLUDES MS/MSD
62405	2-22	11:45A	FMC33	4	3	1	–					
62406	2-22	10:45A	MØ2PC	4	3	1	–					
62407	2-22	3:15P	MØ3I	4	3	1	–					
62408	2-22	3:30P	M12D	4	3	1	–					
62409	2-22	4:00P	QCF17	6	3	1	2					
62410	2-22	—	QCT18	3	3	–	–					

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① John M. Mason	2-22-91 6:00P	② Federal Express Shipper Name & # 6488721634	2-22-91 6:00P
③ Federal Express	2/23/91 10:15	④ WALK IN COOLER Shipper Name & #	2/23/91 10:15
⑤ WALK IN COOLER	2/25/91 8:15	⑥ Shipper Name & #	2/25/91 8:15

Seal # at'chd by ◯ Recvd. intact by ◯ Seal # at'chd by ◯ Recvd. Intact by ◯

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp good Receipt pH good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

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F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022441

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No.: 1870.44 LAD 80
Client: NIROP

Filtered (Yes/No): N Y N
Preserved (Code): E B A
Refrigerated (Yes/No): Y Y Y

Code: A - None, B - HNO3, C - H_2SO_4, D - NaOH, E - HCl

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40ml Vial	1l Plastic	1l Amber/Glass						Comments:
62457	2-25	4:30P	MØ8S	6	3	1	2						
62458	2-25	11:00A	MØ1PC RIW 2-25-91	~~4~~ 7	~~3~~ 6	1	—						INCLUDE MS/MSD
62459	2-25	10:50A	MØ2S	4	3	1	—						
62460	2-25	11:15A	MØ2D	4	3	1	—						
62461	2-25	3:00P	MØ5D	4	3	1	—						
62462	2-25	2:45P	MØ7S	4	3	1	—						
62463	2-25	4:50P	QCF18	6	3	1	2						
62464	2-25	—	QCT19	3	3	—	—						

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① John Mason, R. [illegible], Mark P. Newman	2-25-91 7:30P	② Federal Express Shipper Name & # 6148921623	2-25-91 7:30P
③		④ Shipper Name & #	
⑤ Fed Ex	2/26/91 10:20	⑥ [illegible] Shipper Name & #	2/26/91 10:20

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp good
Receipt pH good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by Recvd. intact by Seal # at'chd by Recvd. intact by

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F-268 (R2/88)
(Use Black Ink Only)

CHAIN OF CUSTODY RECORD

Sample Type: (GW) WW, SW, Soil, Other)

№ 022426

Bottles Prepared by: E. Putman
Date/Time: 2/91
Office Code: (State) WI

Project No.: 1870.4 Hmac 80
Client: NIROP

Filtered (Yes/No): N Y N
Preserved (Code): E B A
Refrigerated (Yes/No): Y Y Y

Code: A = None, B = HNO3, C = H_2SO_4, D = NaOH, E = HCl

RMT Lab NO.	Yr. 91 Date	Time	Sample Station ID	Total Number Of Containers	40 ml Vial	1l Plastic	1l Amber/Glass						Comments:
62494	2-26	11:25A	MØ5I	4	3	1	—						
62495	2-26	9:40A	MØ9S	4	3	1	—						
62496	2-26	10:45A	M14D	4	3	1	—						
62497	2-26	2:05P	M2ØS	4	3	1	—						
62498	2-26	10:35A	M22S	4	3	1	—						
62499	2-26	11:45A	QCF19	6	3	1	2						
62500	2-26	—	QCTZØ	3	3	—	—						

SAMPLER Relinquished by (Sig.)	Date/Time	Received by (Sig.)	Date/Time
① John Mason	2-26-91 6:00P	② Federal Express Shipper Name & #	2-26-91 6:05P
Relinquished by (Sig.) ③	Date/Time	Received by (Sig.) ④ Shipper Name & #	Date/Time
Relinquished by (Sig.) ⑤ Federal Express	2/27/91 10:10	Received by (Sig.) ⑥ Matt Lah Shipper Name & #	2/27/91 10:10AM

HAZARDS ASSOCIATED WITH SAMPLES

(For Lab Use Only)
Receipt Temp good Receipt pH good
Client P.O. Number
Subsequent Analysis: (Check)
Date Resubmitted

Seal # at'chd by ◯ Recvd. intact by ◯ Seal # at'chd by ◯ Recvd. intact by ◯

APPENDIX C

SUMMARY OF LABORATORY RESULTS FOR GROUND WATER SAMPLES

WATER VOLATILES

SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	AT02		FMC33		M01D		M01I		M01PC		M01S	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	3	J	3	J	5	U	5	U	5	U	5	U
1,2-DICHLOROETHENE (TOTAL)	UG/L	270	D	140		5	U	5	U	5	U	5	U
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U	5	U	0.8	J	5	U	5	U
TRICHLOROETHENE	UG/L	1700	D	320	D	5	U	5	U	5	U	5	U
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TOLUENE	UG/L	5	U	5	U	5	U	0.8	J	5	U	5	U
ETHYLBENZENE	UG/L	5	U	1	J	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	1	J	5	U	5	U

U = Undetected
B = Present in Method Blank
J = Estimated Concentration
D = Reported value is from a second analytical run because the value exceeded the calibration limit in the first run

Report Generated 04/10/91 Project # : 1870.54 FILE: W2VOC

SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M02D		M02I		M02PC		M02S		M03D		M03I	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	7	
1,1-DICHLOROETHANE	UG/L	5	U	2	J	5	U	5	U	5	U	9	
1,2-DICHLOROETHENE (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	1000	D
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U	5	U	1	J	5	U	5	U
TRICHLOROETHENE	UG/L	37		20		17		89		14		3500	D
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	5	U	5	U	0.9	J	5	U	41	
TOLUENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U

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Report Generated 04/10/91 Project # : 1870.54 FILE: W2VOC

SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M03PC		M03S		M04D		M04I		M04PC		M04S	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	500	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	500	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	250	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	250	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	5	U	5	U	5	U	250	U	5	U	5	U
1,2-DICHLOROETHENE (TOTAL)	UG/L	5	U	130		5	U	820		5	U	5	U
CHLOROFORM	UG/L	5	U	5	U	5	U	250	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U	5	U	250	U	5	U	5	U
TRICHLOROETHENE	UG/L	4	J	170	D	5	U	6400		1	J	7	
BENZENE	UG/L	5	U	5	U	5	U	250	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	5	U	5	U	250	U	5	U	5	U
TOLUENE	UG/L	5	U	5	U	5	U	250	U	5	U	5	U
ETHYLBENZENE	UG/L	5	U	5	U	5	U	250	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	250	U	5	U	5	U

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Report Generated 04/10/91 Project # : 1870.54 FILE: W2VOC

SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M05D		M05I		M05PC		M05S		M06D		M06S	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	51		5	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	5	U	15		9		2	J	5	U	5	U
1,2-DICHLOROETHENE (TOTAL)	UG/L	5	U	72		5	U	5	U	5	U	130	
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	7		5	U	5	U	5	U	5	U
TRICHLOROETHENE	UG/L	5	U	420	D	5	U	21		28		55	
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	15		0.8	J	5	U	5	U	4	J
TOLUENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U

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Report Generated 04/10/91 Project # : 1870.54 FILE: W2VOC

SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M07D		M07S		M08D		M08S		M09D		M09S	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	250	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	250	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	120	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	3	J	120	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	4	J	5	U	5	U	120	U	3	J	63	
1,2-DICHLOROETHENE (TOTAL)	UG/L	10		5	U	92		120	U	7		1000	D
CHLOROFORM	UG/L	5	U	5	U	5	U	120	U	5	U	1	J
1,1,1-TRICHLOROETHANE	UG/L	5	U	4	J	5	U	120	U	2	J	130	
TRICHLOROETHENE	UG/L	40		100		21000	D	3100		78		2300	D
BENZENE	UG/L	5	U	5	U	5	U	120	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	1	J	1	J	22	J	3	J	360	D
TOLUENE	UG/L	5	U	5	U	5	U	120	U	5	U	5	U
ETHYLBENZENE	UG/L	5	U	5	U	5	U	120	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	120	U	5	U	5	U

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SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M10D		M10I		M10S		M11D		M11S		M12D	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	5	U	5	U	17		5	U	5	U	0.8	J
1,2-DICHLOROETHENE (TOTAL)	UG/L	5	U	5	U	3200	D	5	U	5	U	7	
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U	17		5	U	5	U	5	U
TRICHLOROETHENE	UG/L	5	U	0.5	J	550	D	1	J	25		20	
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	5	U	52		5	U	5	U	5	U
TOLUENE	UG/L	5	U	5	U	5	U	2	J	5	U	0.7	J
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U

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SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M12S		M13D		M13S		M14D		M14S		M15S	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	4	J	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,2-DICHLOROETHENE (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TRICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	3	J
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TOLUENE	UG/L	5	U	1	J	5	U	5	U	5	U	5	U
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	2	J	5	U	5	U	5	U	5	U

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SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M16S		M17S		M18S		M19S		M20S		M21S	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	4	J	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	5	U	4	J	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	2	J	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	5	U	5	U	5	U	5	U	5	U	2	J
1,2-DICHLOROETHENE (TOTAL)	UG/L	5	U	16		2000	D	5	U	5	U	14	
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U	5	U	0.9	J	5	U	15	
TRICHLOROETHENE	UG/L	78		83		4000	D	6		2	J	1000	BD
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	0.8	J	5		1	J	0.9	J	5	U	67	
TOLUENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U

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SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M22S		M23S		M24S		M25S		QCD07		QCD08	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	3	J	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	5	U	5	U	2	J	5	U	2	J	3	J
1,2-DICHLOROETHENE (TOTAL)	UG/L	22		5	U	36		5	U	5	U	10	
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	3	J	1	J	5	U	5	U	0.7	J	5	U
TRICHLOROETHENE	UG/L	77		3	J	2	J	5	U	22	B	42	
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	6		3	J	5	U	5	U	5	U	5	U
TOLUENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U

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SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	QCD09		QCD10		QCD11		QCF09		QCF10		QCF11	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	2	J	5	U	5	U	5	U	5	U	5	U
1,2-DICHLOROETHENE (TOTAL)	UG/L	7		5	U	5	U	5	U	5	U	5	U
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	2	J	5	U	5	U	5	U	0.5	J	1	J
TRICHLOROETHENE	UG/L	68		27		0.7	J	5	U	5	U	5	U
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	3	J	5	U	5	U	5	U	5	U	5	U
TOLUENE	UG/L	5	U	5	U	5	U	5	U	5	U	0.9	J
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U

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SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	QCF12		QCF13		QCF14		QCF15		QCF16		QCF17	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,2-DICHLOROETHENE (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U	5	U	5	U	5	U	0.7	J
TRICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TOLUENE	UG/L	0.8	J	5	U	5	U	2	J	0.9	J	1	J
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	2	J	5	U	5	U

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SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	QCF18		QCF19		QCT10		QCT12		QCT13		QCT14	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,2-DICHLOROETHENE (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TRICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TOLUENE	UG/L	1	J	0.8	J	5	U	5	U	5	U	5	U
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U

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SUMMARY OF ANALYTICAL RESULTS
WATER VOLATILES

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	QCT15		QCT16		QCT17		QCT18		QCT19		QCT20	
TRICHLOROFLUOROMETHANE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	UG/L	10	U	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1-DICHLOROETHANE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,2-DICHLOROETHENE (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
CHLOROFORM	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
1,1,1-TRICHLOROETHANE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TRICHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
BENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TETRACHLOROETHENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
TOLUENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
ETHYLBENZENE	UG/L	5	U	5	U	5	U	5	U	5	U	5	U
XYLENES (TOTAL)	UG/L	5	U	5	U	5	U	5	U	5	U	5	U

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WATER METALS

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	AT02	FMC33	M01D	M01I	M01PC	M01S
BARIUM	UG/L	50.00 U	50.00 U	50.00 U	135.00	95.80	72.80
MANGANESE	UG/L	1430.00	1160.00	95.90	648.00	128.00	1690.00
SELENIUM	UG/L	3.00 UW	3.00 U	3.00 U	3.00 UW	3.00 U	3.00 UW
ZINC	UG/L	112.00	43.50	897.00	20.00 U	2090.00	292.00

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M02D	M02I	M02PC	M02S	M03D	M03I
BARIUM	UG/L	50.00 U	111.00	50.00 U	99.90	54.00	50.00 U
MANGANESE	UG/L	305.00	931.00	51.00	807.00	25.10	401.00
SELENIUM	UG/L	3.00 U	3.00 U	3.00 U	3.00 UW	3.00 U	3.00 U
ZINC	UG/L	109.00	20.00 U	715.00	136.00	20.00 U	20.00 U

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M03PC	M03S	M04D	M04I	M04PC	M04S
BARIUM	UG/L	50.00 U	87.40	62.30	54.90	58.30	51.70
MANGANESE	UG/L	15.60	1000.00	82.00	212.00	25.10	8.90
SELENIUM	UG/L	3.00 U	3.00 UW	3.00 UW	3.00 U	3.00 UW	18.50
ZINC	UG/L	301.00	74.60	56.00	20.00 U	1750.00	512.00

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M05D	M05I	M05PC	M05S	M06D	M06S
BARIUM	UG/L	50.00 U	50.00 U	50.00 U	52.80	57.40	50.00 U
MANGANESE	UG/L	93.40	948.00	135.00	1400.00	206.00	591.00
SELENIUM	UG/L	3.00 U	3.00 UW	3.00 U	3.00 U	3.00 U	3.00 U
ZINC	UG/L	258.00	32.70	376.00	216.00	149.00	370.00

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M07D	M07S	M08D	M08S	M09D	M09S
BARIUM	UG/L	94.80	50.00 U	59.60	53.10	50.00 U	62.50
MANGANESE	UG/L	404.00	4200.00	291.00	1780.00	64.30	130.00
SELENIUM	UG/L	3.00 U	8.60	3.00 U	3.00 U	3.00 U	125.00
ZINC	UG/L	611.00	102.00	125.00	219.00	1360.00	166.00

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M10D	M10I	M10S	M11D	M11S	M12D
BARIUM	UG/L	50.00 U	50.00 U	50.00 U	50.00 U	50.00 U	50.00 U
MANGANESE	UG/L	169.00	768.00	1190.00	196.00	5.00 U	223.00
SELENIUM	UG/L	3.00 U	3.00 UW	3.00 UW	3.00 UW	5.40	3.00 U
ZINC	UG/L	20.00 U	20.00 U	357.00	20.30	233.00	20.00 U

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
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Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M12S	M13D	M13S	M14D	M14S	M15S
BARIUM	UG/L	50.00 U	50.00 U	77.70	50.00 U	202.00	50.00 U
MANGANESE	UG/L	1840.00	197.00	1940.00	162.00	926.00	1320.00
SELENIUM	UG/L	5.50	3.00 U	3.00 UW	3.00 U	12.20	3.00 U
ZINC	UG/L	525.00	20.00 U	1330.00	21.20	1730.00	2100.00

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M16S	M17S	M18S	M19S	M20S	M21S
BARIUM	UG/L	50.00 U	50.00 U	70.90	50.00 U	73.00	71.50
MANGANESE	UG/L	1480.00	457.00	1030.00	153.00	456.00	1290.00
SELENIUM	UG/L	3.00 UW	3.20	3.00 UW	3.00 UW	5.70 S	27.70 S
ZINC	UG/L	1540.00	2080.00	902.00	1960.00	220.00	20.00 U

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M22S	M23S	M24S	M25S	QCD07	QCD08
BARIUM	UG/L	118.00	50.00 U	51.40	50.00 U	114.00	90.70
MANGANESE	UG/L	353.00	7.30	921.00	932.00	906.00	402.00
SELENIUM	UG/L	63.60	39.20 S	3.00 UW	3.00 U	3.00 U	3.00 U
ZINC	UG/L	20.00 U	20.00 U	20.00 U	20.00 U	20.00 U	594.00

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	QCD09	QCD10	QCD11	QCF09	QCF10	QCF11
BARIUM	UG/L	50.00 U	54.90	60.50	50.00 U	50.00 U	50.00 U
MANGANESE	UG/L	68.00	206.00	23.90	5.00 U	5.00 U	5.00 U
SELENIUM	UG/L	3.00 U	3.00 U	3.00 UW	3.00 U	3.00 U	3.00 U
ZINC	UG/L	1520.00	151.00	1880.00	20.00 U	20.00 U	20.00 U

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	QCF12	QCF13	QCF14	QCF15	QCF16	QCF17
BARIUM	UG/L	50.00 U	50.00 U	50.00 U	50.00 U	50.00 U	50.00 U
MANGANESE	UG/L	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
SELENIUM	UG/L	3.00 UW	3.00 U	3.00 UW	3.00 U	3.00 U	3.00 U
ZINC	UG/L	20.00 U	20.00 U	20.00 U	20.00 U	20.00 U	20.00 U

U = Undetected
W = Post-digestion spike for Furnace AA analysis is out of control limits (85-115%), while sample absorbance is less than 50% of spike absorbance
S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

SUMMARY OF ANALYTICAL RESULTS
WATER METALS

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	QCF18	QCF19
BARIUM	UG/L	50.00 U	50.00 U
MANGANESE	UG/L	5.00 U	5.00 U
SELENIUM	UG/L	3.00 U	3.00 U
ZINC	UG/L	28.40	20.00 U

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S = The reported value was determined by the Method of Standard Additions (MSA)

Report Generated 04/10/91 Project # : 1870.54 FILE: W2MET

WATER PESTICIDES/PCBs

SUMMARY OF ANALYTICAL RESULTS
WATER PESTICIDES/PCBs

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M01S	M02I	M03S	M04S	M06S	M08S
ALPHA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
BETA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
DELTA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
GAMMA-BHC (LINDANE)	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
HEPTACHLOR	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
ALDRIN	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
HEPTACHLOR EPOXIDE	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
ENDOSULFAN I	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
DIELDRIN	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.51 X
METHOXYCHLOR	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ALPHA-CHLORDANE	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
GAMMA-CHLORDANE	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1016	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1260	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

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X = Data was entered manually

Report Generated 04/10/91 Project # : 1870.54 FILE: W2PCB

SUMMARY OF ANALYTICAL RESULTS
WATER PESTICIDES/PCBs

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	M10I	M15S	M18S	M21S	M24S	QCD07
ALPHA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
BETA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
DELTA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
GAMMA-BHC (LINDANE)	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
HEPTACHLOR	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
ALDRIN	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
HEPTACHLOR EPOXIDE	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
ENDOSULFAN I	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
DIELDRIN	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
METHOXYCHLOR	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ALPHA-CHLORDANE	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
GAMMA-CHLORDANE	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1016	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1260	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

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Report Generated 04/10/91 Project # : 1870.54 FILE: W2PCB

SUMMARY OF ANALYTICAL RESULTS
WATER PESTICIDES/PCBs

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	QCF09	QCF10	QCF11	QCF12	QCF13	QCF14
ALPHA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
BETA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
DELTA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
GAMMA-BHC (LINDANE)	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
HEPTACHLOR	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
ALDRIN	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
HEPTACHLOR EPOXIDE	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
ENDOSULFAN I	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
DIELDRIN	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
METHOXYCHLOR	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ALPHA-CHLORDANE	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
GAMMA-CHLORDANE	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1016	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1260	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

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Report Generated 04/10/91 Project # : 1870.54 FILE: W2PCB

SUMMARY OF ANALYTICAL RESULTS
WATER PESTICIDES/PCBs

NIROP
FEBRUARY 1991 SAMPLING

PARAMETER	UNITS	QCF15	QCF16	QCF17	QCF18	QCF19
ALPHA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
BETA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
DELTA-BHC	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
GAMMA-BHC (LINDANE)	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
HEPTACHLOR	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
ALDRIN	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
HEPTACHLOR EPOXIDE	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
ENDOSULFAN I	UG/L	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
DIELDRIN	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDRIN	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN II	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ENDOSULFAN SULFATE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	UG/L	0.10 U	0.10 U	0.36 X	0.10 U	0.10 U
METHOXYCHLOR	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
ENDRIN KETONE	UG/L	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
ALPHA-CHLORDANE	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
GAMMA-CHLORDANE	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
TOXAPHENE	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1016	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1221	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1232	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1242	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1248	UG/L	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
AROCLOR-1254	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
AROCLOR-1260	UG/L	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

U = Undetected
X = Data was entered manually

Report Generated 04/10/91 Project # : 1870.54 FILE: W2PCB

WATER VOLATILES FOR FRIDLEY CITY WELL #13

RMT INC
LABORATORIES

CLIENT: NIROP
SAMPLE #: 62114
PROJECT #: 01870.80
WORK ORDER #: 910215-0187080

REPORT DATE: 02/28/91
COLLECTION DATE: 02/14/91
STATION ID: FW13
SAMPLE COLLECTOR: JMM/MH

VOLATILE ORGANIC ANALYSIS REPORT - METHOD 601 & 602

PARAMETER	RESULT	UNITS
CHLOROMETHANE	<2.0	ug/l
BROMOMETHANE	<2.0	ug/l
VINYL CHLORIDE	<1.0	ug/l
DICHLORODIFLUOROMETHANE	<2.0	ug/l
CHLOROETHANE	<2.0	ug/l
METHYLENE CHLORIDE	<1.0	ug/l
FLUOROTRICHLOROMETHANE	<2.0	ug/l
1,1-DICHLOROETHYLENE	<1.0	ug/l
1,1-DICHLOROETHANE	<1.0	ug/l
1,2-DICHLOROETHYLENE (TOTAL)	<1.0	ug/l
CHLOROFORM	3.4	ug/l
1,2-DICHLOROETHANE	<1.0	ug/l
1,1,1-TRICHLOROETHANE	<2.0	ug/l
CARBON TETRACHLORIDE	<1.0	ug/l
BROMODICHLOROMETHANE	<1.0	ug/l
1,2-DICHLOROPROPANE	<1.0	ug/l
CIS-1,3-DICHLOROPROPYLENE	<2.0	ug/l
TRICHLOROETHYLENE	<2.0	ug/l
BENZENE	<1.0	ug/l
1,1,2-TRICHLOROETHANE	<1.0	ug/l
TRANS-1,3-DICHLOROPROPYLENE	<2.0	ug/l
CHLORODIBROMOMETHANE	<1.0	ug/l
2-CHLOROETHYLVINYL ETHER	<5.0	ug/l
BROMOFORM	<1.0	ug/l
TETRACHLOROETHYLENE	<2.0	ug/l
1,1,2,2-TETRACHLOROETHANE	<2.0	ug/l
TOLUENE	<1.0	ug/l
CHLOROBENZENE	<1.0	ug/l
ETHYLBENZENE	<1.0	ug/l
1,3-DICHLOROBENZENE	<1.0	ug/l
1,2-DICHLOROBENZENE	<1.0	ug/l
1,4-DICHLOROBENZENE	<1.0	ug/l

Mark A. Mieritz
Mark Mieritz, Organic Supervisor

RMT INC
LABORATORIES

CLIENT: NIROP
SAMPLE #: 62115
PROJECT #: 01870.80
WORK ORDER #: 910215-0187080

REPORT DATE: 02/28/91
COLLECTION DATE: 02/14/91
STATION ID: QCT11
SAMPLE COLLECTOR: JMM/MH

VOLATILE ORGANIC ANALYSIS REPORT - METHOD 601 & 602

PARAMETER	RESULT	UNITS
CHLOROMETHANE	<2.0	ug/1
BROMOMETHANE	<2.0	ug/1
VINYL CHLORIDE	<1.0	ug/1
DICHLORODIFLUOROMETHANE	<2.0	ug/1
CHLOROETHANE	<2.0	ug/1
METHYLENE CHLORIDE	<1.0	ug/1
FLUOROTRICHLOROMETHANE	<2.0	ug/1
1,1-DICHLOROETHYLENE	<1.0	ug/1
1,1-DICHLOROETHANE	<1.0	ug/1
1,2-DICHLOROETHYLENE (TOTAL)	<1.0	ug/1
CHLOROFORM	<1.0	ug/1
1,2-DICHLOROETHANE	<1.0	ug/1
1,1,1-TRICHLOROETHANE	<2.0	ug/1
CARBON TETRACHLORIDE	<1.0	ug/1
BROMODICHLOROMETHANE	<1.0	ug/1
1,2-DICHLOROPROPANE	<1.0	ug/1
CIS-1,3-DICHLOROPROPYLENE	<2.0	ug/1
TRICHLOROETHYLENE	<2.0	ug/1
BENZENE	<1.0	ug/1
1,1,2-TRICHLOROETHANE	<1.0	ug/1
TRANS-1,3-DICHLOROPROPYLENE	<2.0	ug/1
CHLORODIBROMOMETHANE	<1.0	ug/1
2-CHLOROETHYLVINYL ETHER	<5.0	ug/1
BROMOFORM	<1.0	ug/1
TETRACHLOROETHYLENE	<2.0	ug/1
1,1,2,2-TETRACHLOROETHANE	<2.0	ug/1
TOLUENE	<1.0	ug/1
CHLOROBENZENE	<1.0	ug/1
ETHYLBENZENE	<1.0	ug/1
1,3-DICHLOROBENZENE	<1.0	ug/1
1,2-DICHLOROBENZENE	<1.0	ug/1
1,4-DICHLOROBENZENE	<1.0	ug/1

Mark A. Mieritz
Mark Mieritz, Organic Supervisor

APPENDIX D

DATA AND CALCULATIONS FOR DETERMINING HYDRAULIC CONDUCTIVITY OF WELL 10-I

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S

04/15/91 17:01:39

PROBLEM DEFINITION

Problem title: NIROP WELL 10I

Knowns and Constants:
- No. of data points.............. 3
- Radius of well casing........... 0.083
- Radius of well.................. 0.33
- Aquifer saturated thickness...... 77.2
- Well screen length.............. 17.1
- Static height of water in well... 52.3
- Log(Re/Rw)...................... 3.13

ESTIMATION RESULTS

Analytical method: Bouwer and Rice (unconfined aquifer slug test)

PARAMETER ESTIMATES

	Estimate		Std. Error
K =	8.3016E-004	+/-	1.7797E-004
y0 =	9.7505E-001	+/-	3.0372E-001

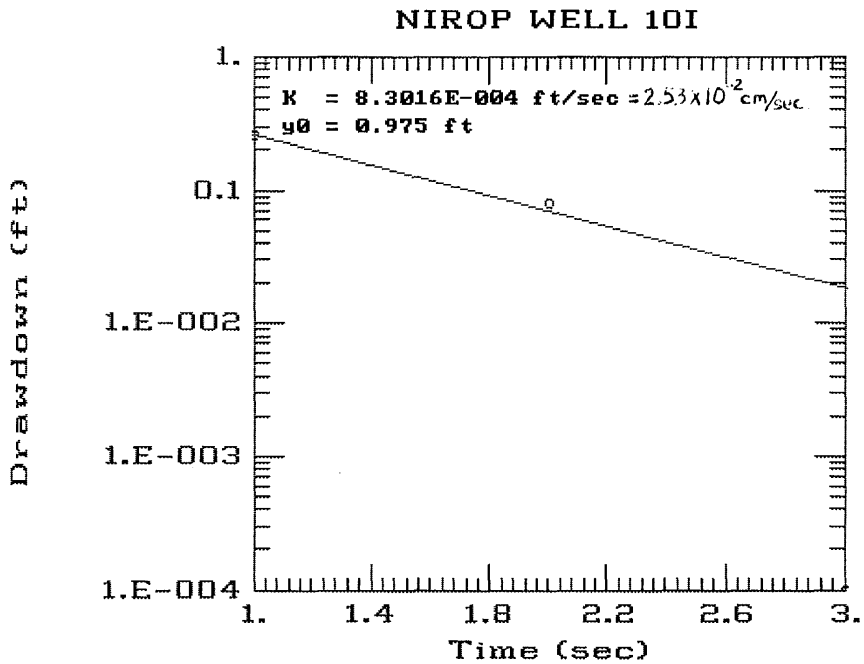
ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals.............. 3
- Number of estimated parameters.... 2
- Degrees of freedom............... 1
- Residual mean.................... -0.003348
- Residual standard deviation....... 0.0212
- Residual variance................ 0.0004496

Model Residuals:

Time	Observed	Calculated	Residual	Weight
1	0.26	0.26133	-0.001331	1
2	0.08	0.070041	0.0099586	1
3	0.0001	0.018772	-0.018672	1


NIROP WELL 10I
K = 8.3016E-004 ft/sec = 2.53x10^-2 cm/sec
y0 = 0.975 ft
1.
0.1
1.E-002
1.E-003
1.E-004
Drawdown (ft)
1.
1.4
1.8
2.2
2.6
3.
Time (sec)