N91192.AR.000972
NIROP FRIDLEY
5090.3a

DRAFT FIELD INVESTIGATION SUMMARY REPORT EAST PLATING SHOP SOIL AND GROUNDWATER INVESTIGATION NIROP FRIDLEY MN

5/1/95

HALLIBURTON

Field Investigation Summary Report

for

East Plating Shop Soil and Groundwater Investigation,

Naval Industrial Reserve Ordnance Plant

Fridley, Minnesota

Northern Division
Naval Facilities Engineering Command

Contract Number N62472-90-D-1298
Contract Task Order 0214

May 1995

Halliburton NUS
CORPORATION

059506/P

DRAFT
FIELD INVESTIGATION SUMMARY REPORT
EAST PLATING SHOP SOIL AND GROUNDWATER INVESTIGATION
FOR

NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT
FRIDLEY, MINNESOTA

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN)

Submitted to:
Northern Division
Environmental Branch, Code 18
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #82
Lester, Pennsylvania 19113-2090

Submitted by:
Halliburton NUS Corporation
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

CONTRACT NUMBER N62472-90-D-1298
CONTRACT TASK ORDER 0214

MAY 1995

SUBMITTED BY:

RICHARD M. NINESTEEL, P.E.
PROJECT MANAGER
HALLIBURTON NUS CORPORATION
PITTSBURGH, PENNSYLVANIA

APPROVED BY:

JOHN J. TREPANOWSKI, P.E.
PROGRAM MANAGER
HALLIBURTON NUS CORPORATION
WAYNE, PENNSYLVANIA

TABLE OF CONTENTS

TABLES

FIGURES

EXECUTIVE SUMMARY

This Field Investigation Summary Report is for Contract Task Order (CTO) 214, under the Comprehensive Long-Term Environmental Action Navy (CLEAN), Contract Number N62472-90-D-1298. CTO 214 requests that Halliburton NUS investigate the soil and groundwater under the floor of the East Plating Shop in the Naval Industrial Reserve Ordnance Plant (NIROP), Fridley, Minnesota.

Field activities were conducted during ongoing construction activities at the East Plating Shop. Currently, this area of the Naval Industrial Reserve Ordnance Plant is being renovated, and access to this area for environmental sampling was possible. The East Plating Shop Soil and Groundwater Investigation included installation of seven soil borings and three temporary monitoring wells. At least three subsurface soil samples were collected from each soil boring. One groundwater sample was collected from each temporary monitoring well. Samples were analyzed for chemicals that were potentially used during past plating operations. Groundwater was analyzed for volatile organics, semivolatile organics, total and dissolved metals, cyanide, and pH. Soil was analyzed for volatile organics, semivolatile organics, metals, cyanide, pH, and PCBs.

Sample results indicate that soil and groundwater under the East Plating Shop have been affected by past operations at the site. Trichloroethene (TCE) is the primary contaminant found in the soil and groundwater samples. Other volatile organic compounds, including tetrachloroethene (TCA), acetone, styrene, and metals such as chromium, lead, and cyanide, were detected at slightly elevated levels in soil and groundwater. The highest levels of soil and groundwater contamination with TCE appear to be present in a clay unit underlying the west side of the East Plating Shop. Metals results in soil were highest in the vicinity of a previously existing sump and appear to be limited to this area.

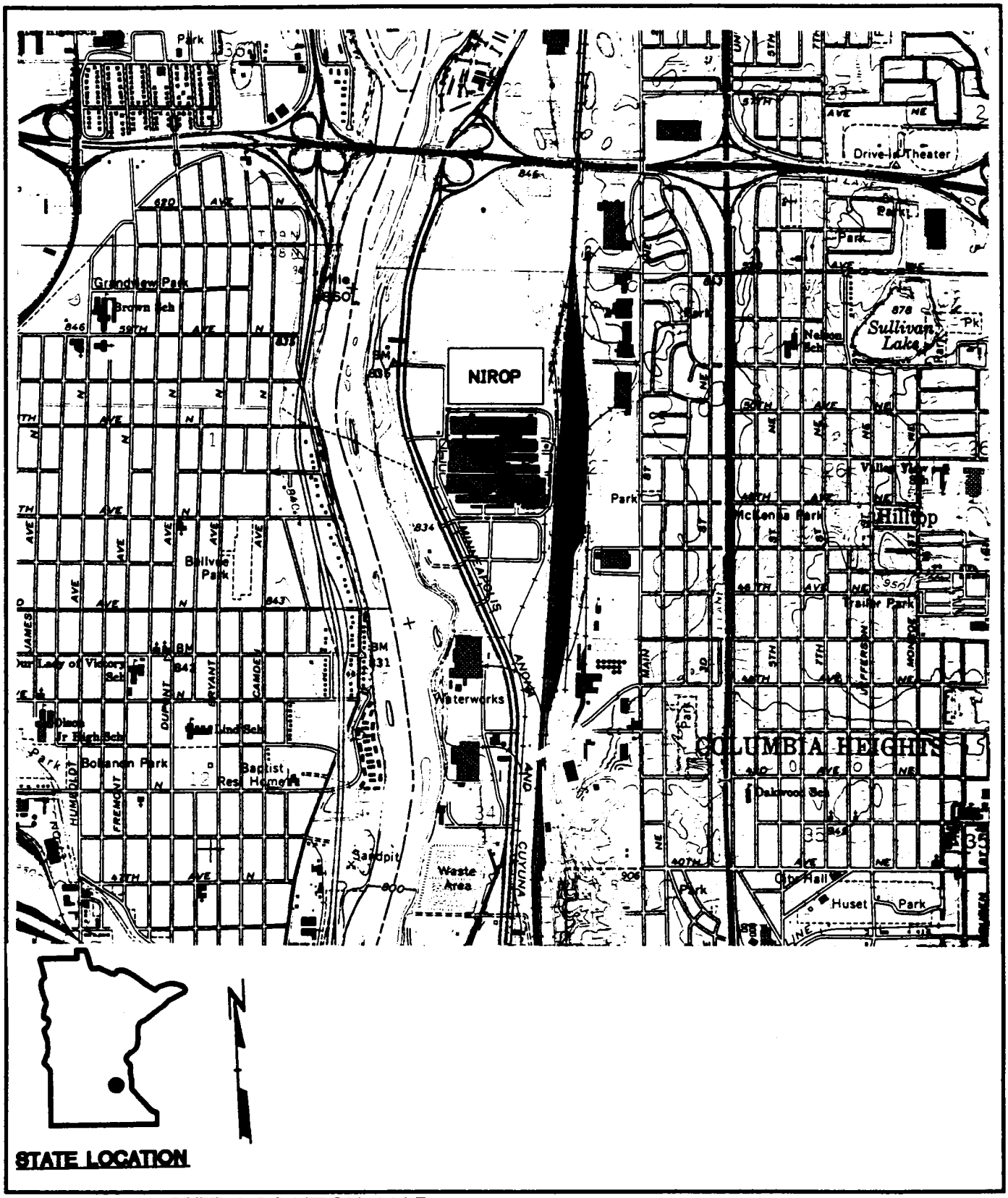
1.0 INTRODUCTION

1.1 PLANT HISTORY

The Naval Industrial Reserve Ordnance Plant (NIROP) is located in Fridley, Minnesota (Figure 1-1). One-half of the plant is government owned and contractor operated (GOCO) by United Defense LP. NIROP is listed on the U.S. Environmental Protection Agency's National Priorities List (NPL). The portions of the plant operated by United Defense LP are separate sites and are being remediated under a consent order between United Defense LP and the Minnesota Pollution Control Agency (MPCA). The dominant pollutant of concern at the NIROP facility is trichloroethene (TCE), a volatile organic compound.

The NIROP Fridley facility is used for a variety of operations, including construction of naval guns and other heavy industrial operations. Plant operations include plating shops, which are operated on site for etching and plating of metal components. Plating activities have been conducted since the mid-1940s in the East Plating Shop and in the nearby West Plating Shop. Operations at the East and West Plating Shops have included the use of TCE in vapor degreasers and a variety of plating agents, including metals, cyanide, acid and alkali baths. Additional research will be performed as part of the Operable Unit #3 (OU#3) Remedial Investigation (RI) to gain knowledge of past plating operations at the plant. The location of the East Plating Shop within the NIROP building is shown on Figure 1-2.

The East Plating Shop was refurbished in 1973. The refurbishing included construction of a 5-foot-deep pit that contains all plating baths. The pit was constructed of 8- to 12-inch reinforced concrete, which had several coatings of chemical-resistant sealant applied during the active life of the plating operations. The post-1973 configuration of the East Plating Shop is shown on Figure 1-3. Process and recovery operations were also upgraded in the early 1970s to include collection sumps for chromium, acids/alkali, and cyanide liquids. Treatment tanks were also installed at this time and are located between the East and West Shops. Liquids collected in the sumps were transferred to the appropriate treatment tank after a determination was made concerning the composition of the liquid. Cyanide and TCE use were discontinued at the facility in 1987 and 1993, respectively. Several soil samples collected from below the East Plating Shop floor during 1994 identified elevated concentrations of several metals and cyanide (Bay West, 1994). The floor of the pit appears to be intact, and there are no visible cracks or breaks in the east plating pit floor that may have allowed plating liquids to migrate into the soil.



SOURCE: MAP FROM MINEAPOLIS NORTH, MINNESOTA, 7.5 MINUTE USGS QUADRANGLE

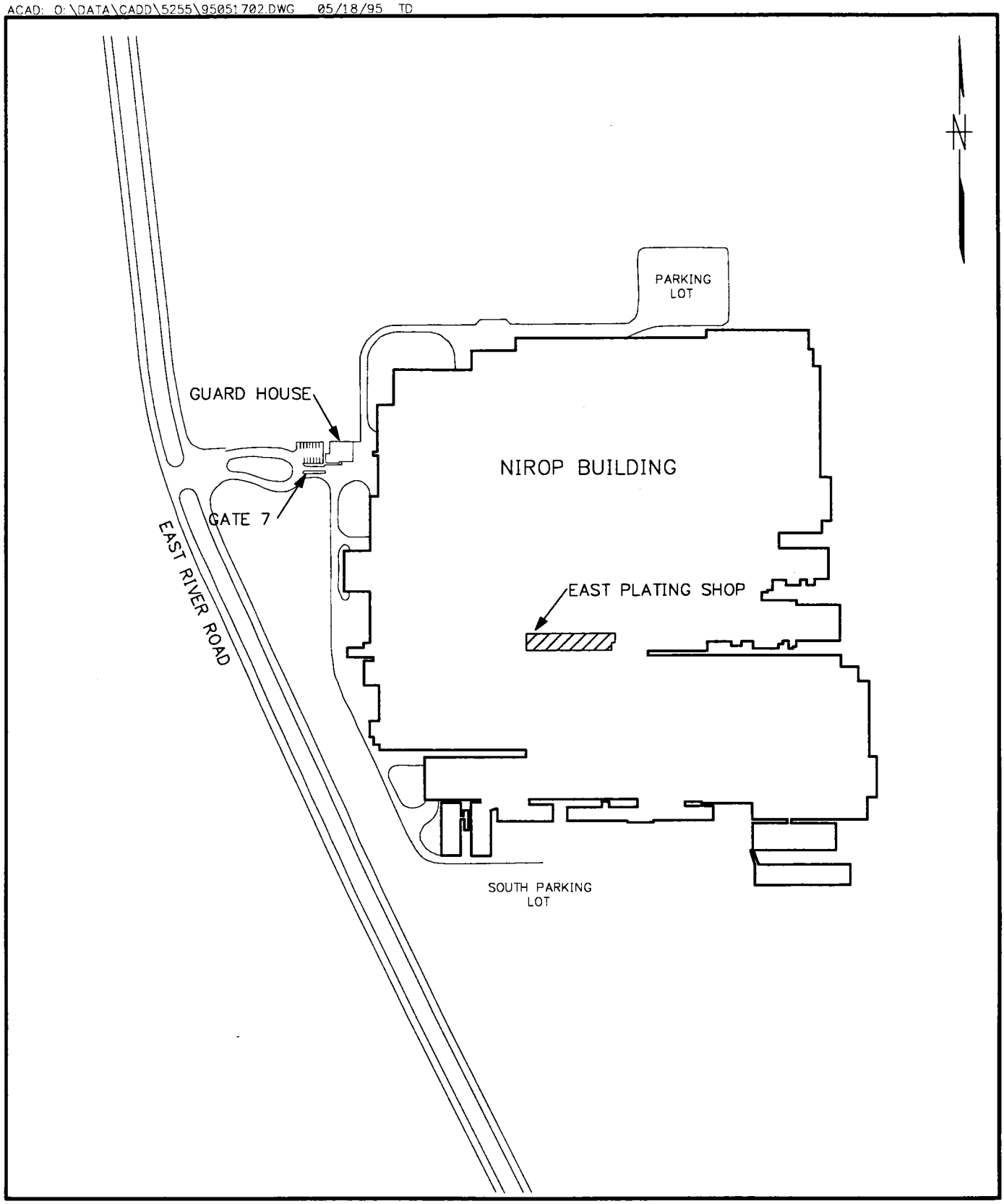
SITE LOCATION MAP
NIROP, FRIDLEY
FRIDLEY, MINNESOTA

0 2000 4000
SCALE IN FEET

FIGURE 1-1

Halliburton NUS CORPORATION

ACAD: O:\DATA\CADD\5255\95051702.DWG 05/18/95 TD



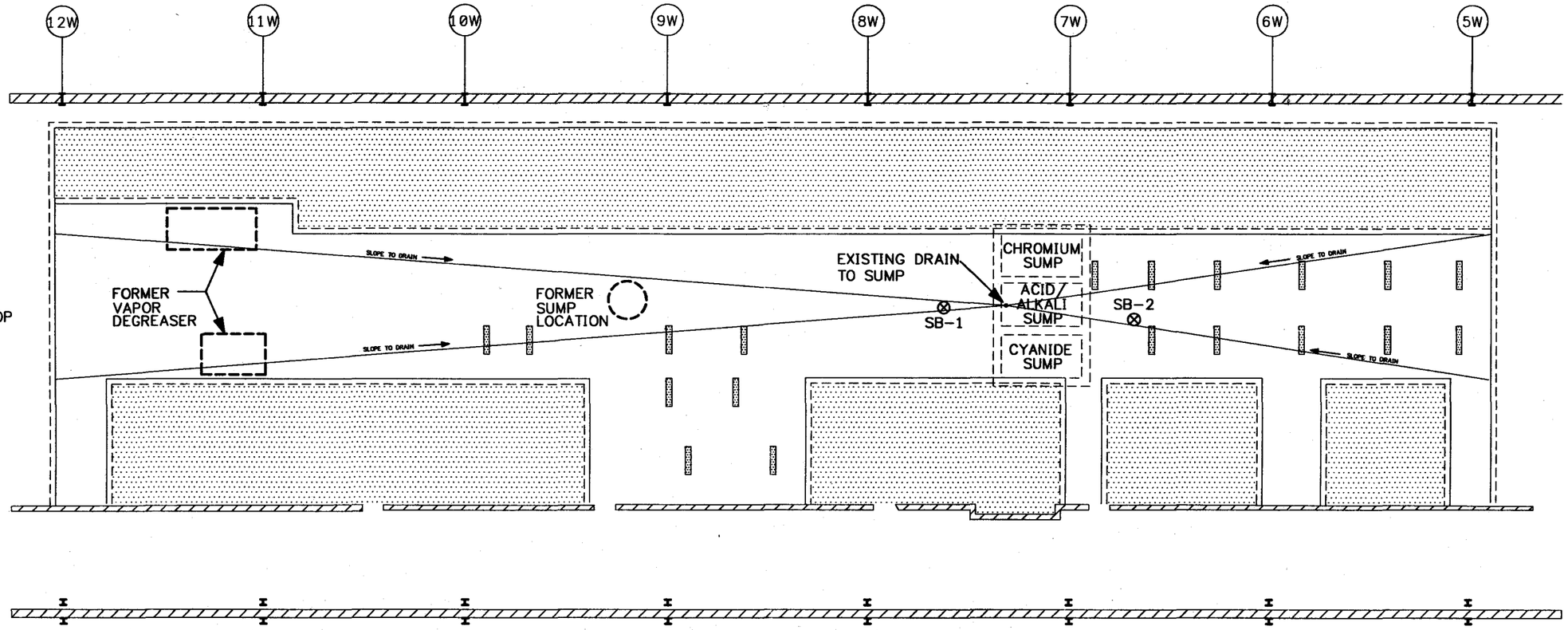
LOCATION OF EAST PLATING SHOP
WITHIN NIROP BUILDING
NIROP, FRIDLEY

FIGURE 1-2

Halliburton NUS CORPORATION

This Page Intentionally Left Blank

DRAFT



LEGEND

- (9W) BUILDING COLUMN
- CONCRETE PIER
- SB-1 ⊗ 1994 SOIL BORING LOCATION
- FORMER SUMP LOCATION (PRE-1973)
- FORMER VAPOR DEGREASER LOCATION

FIGURE 1-3

CONFIGURATION OF EAST PLATING SHOP
NIROP, FRIDLEY

0 15 30
SCALE IN FEET

Halliburton NUS CORPORATION

Currently, the East Plating Shop is being renovated to accommodate an electrical assembly facility. Plating operations will be moved to the West Plating Shop, which remains active. As part of these renovations, all tanks in the East Plating Shop have been removed and the east pit will be decontaminated, backfilled, and a concrete floor will be installed. Between renovation activities, soil and groundwater samples were collected from below the East Plating Shop to determine whether past plating activities have impacted soil and groundwater beneath the building.

1.2 PAST INVESTIGATIONS

The NIROP Fridley site has been segregated into three Operable Units: OU#1 addresses groundwater; OU#2 addresses soil contamination outside the footprint of the building; and OU#3 addresses soil contamination under the footprint of the building. The U.S. Navy has entered into a Federal Facilities Agreement (FFA) with the United States Environmental Protection Agency (USEPA) and the MPCA. A Record of Decision (ROD) on OU#1 has been signed and a pump-and-treat remedy has been implemented for the cleanup of groundwater. The study of OU#2 is currently in the Feasibility Study phase; a Remedial Investigation of OU#2 was completed in 1993. The investigation of OU#3 is required by the FFA, although a starting date for this operation has not been stated. The field operations performed during April 1995 by Halliburton NUS were completed to take advantage of access to the East Plating Shop during plant renovation. This investigation is not designed to initiate work for OU#3, although data gathered during this investigation will be used as part of the OU#3 investigation. Soil investigations were described in the Remedial Investigation Report for the Soils Operable Unit (OU#2) (RMT, 1993). Groundwater investigations are described in the Annual Monitoring Report for 1994 Groundwater Extraction and Pretreatment System (OU#1) (RMT, 1995).

A limited number of subsurface soil samples were collected from under the East Plating Shop prior to the current investigation. Three soil samples were collected from below the East Plating Shop floor in August 1994 (Bay West, 1994). Two soil borings (SB-1 and SB-2) were manually advanced, and samples were collected from between 1.5 and 4.1 feet below the plating pit floor. Samples were analyzed for volatile organic compounds (VOCs), chromium, copper, nickel, and cyanide. Sample results indicate that TCE was present above 2.6 feet (at a concentration of 0.5 mg/kg), but was not detected in a sample collected from 3.4 to 4.1 feet. Chromium, nickel, and cyanide were also detected in soil samples. These soil sample locations are shown on Figure 1-3.

2.0 FIELD INVESTIGATION ACTIVITIES

2.1 SUMMARY OF FIELD INVESTIGATION ACTIVITIES

Soil and groundwater samples were collected from below the plating shop floor to determine whether past plating operations in the East Plating Shop have affected the environment. A total of seven soil borings were installed in the East Plating Shop, and soil samples were collected from each soil boring. A total of 22 soil samples and two duplicate samples were collected. At three boring locations, temporary monitoring wells were installed and sampled to determine groundwater quality in this area of the NIROP facility. A total of three groundwater samples and one duplicate sample were collected. Both soil and groundwater samples were collected from areas of the plating shop that have the highest probability of containing residual contamination from past plating activities. Areas targeted for sampling include locations of degreasers that used TCE, as well as former and existing sump locations that collected liquids from plating operations. The past and current locations of sumps in the East Plating Shop were chosen as the most likely locations for a contaminant release because these areas are the lowest elevation on the floor and collected liquids used in plating operations.

Documents that were prepared previously by RMT, Inc. and approved by regulatory agencies were used as the basis for soil and groundwater sampling procedures. These documents are listed below:

- The Remedial Investigation Work Plan for the Soils Operable Unit and the companion document, the Field Sampling Plan (NIROP FSP, 1992a) were referenced as the basis for all field operations involving soil sampling and drilling operations.

- The Remedial Action Work Plan for Remedial Action Monitoring Plan for Groundwater Remediation and the companion document, the Field Sampling Plan for Groundwater Remediation (NIROP FSP, 1992b) were referenced as the basis for all field operations involving groundwater sampling and well installation operations.

In addition to these documents prepared by RMT, a Work Plan was prepared by Halliburton NUS (1995) that included site-specific sampling locations for the East Plating Shop Soil and Groundwater Investigation. A revised Quality Assurance Project Plan (QAPP) and Health and Safety Plan (HASP) were prepared to address specific (QA/QC) and Health and Safety issues related to this field investigation. These documents were included in the HNUS Work Plan.

2.2 SOIL BORING INSTALLATION

A total of seven soil borings were advanced in the East Plating Shop. Soil borings were used to identify any subsurface soil contamination that might be present and allowed for the installation of temporary monitoring wells.

2.2.1 Drilling Locations

Soil borings were located in areas of the East Plating Shop where contamination from past activities was most likely to have entered the soil. The following locations were targeted for soil investigation.

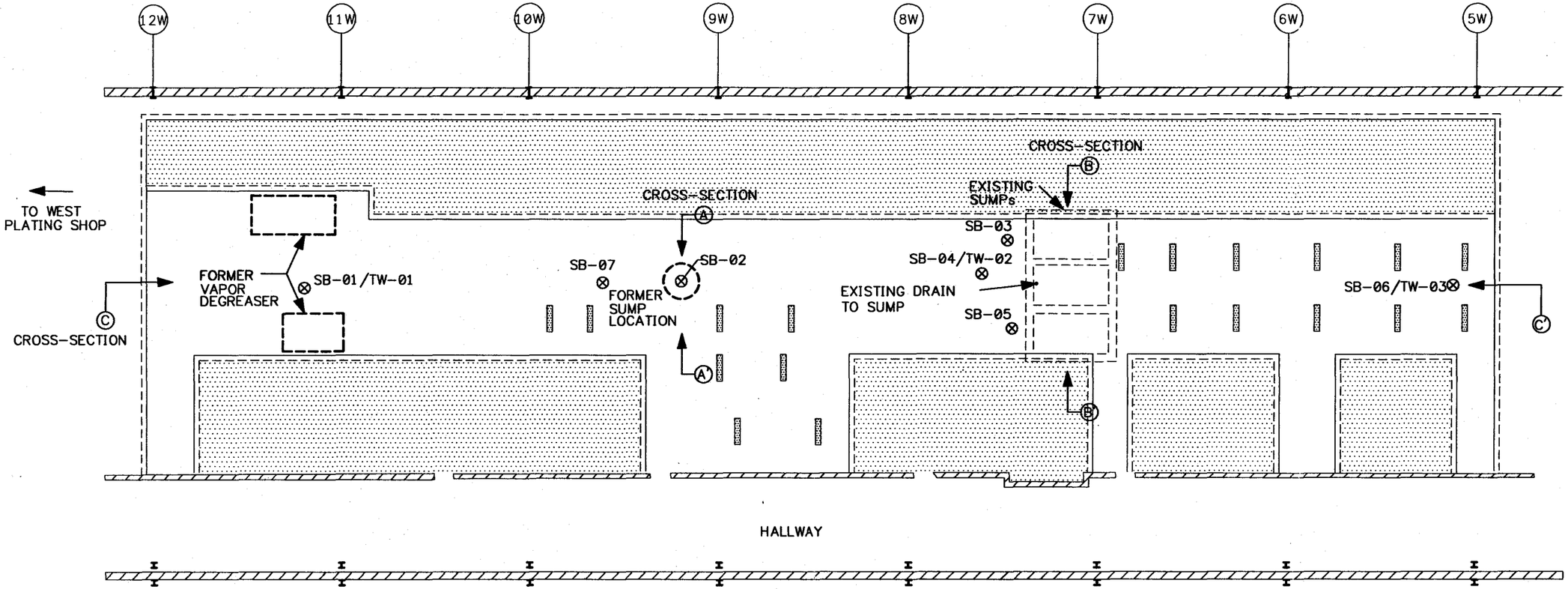
- The former location of vapor degreasers that previously contained TCE. These vapor degreasers were located along the west end of the plating line and have since been removed. Soil boring SB-01 was located between the former locations of these degreasers to determine whether soil contamination may be present as a result of former activities.

- The former location of a sump present in the plating shop floor prior to reconfiguration of the plating line in 1973. The sump was approximately 7 feet deep and may have collected liquids prior to disposal. Soil boring SB-02 was installed in the location of this sump, as shown on Figure 2-1. A cross section of the former sump showing the as-built construction details is shown in Figure 2-2.

- Three existing sumps, are present in the plating shop floor. These sumps are approximately 8 feet deep and were used to collect liquids from the plating operations prior to treatment and disposal. There is no reported evidence of leaks or cracks in the walls of these sumps that may have allowed liquids to escape; however; each sump location was investigated to determine whether soil contamination is present in these areas. A total of three soil borings (SB-03, SB-04, and SB-05) were installed immediately downgradient (west) of each sump. A cross section of the existing sumps is shown in Figure 2-2. A lengthwise cross section of the plating shop is shown on Figure 2-3.

- One location upgradient (east) of the sumps. Soil boring SB-06 was installed in this area to determine whether soil contamination is present upgradient of the existing sumps.

DRAFT



LEGEND

- 9W — BUILDING COLUMN
- CONCRETE PIER
- FORMER SUMP LOCATION (PRE-1973)
- FORMER VAPOR DEGREASER LOCATION
- SB-01/TW-01 — SOIL BORING/ TEMPORARY WELL LOCATION
- A — A' — CROSS-SECTION LOCATION

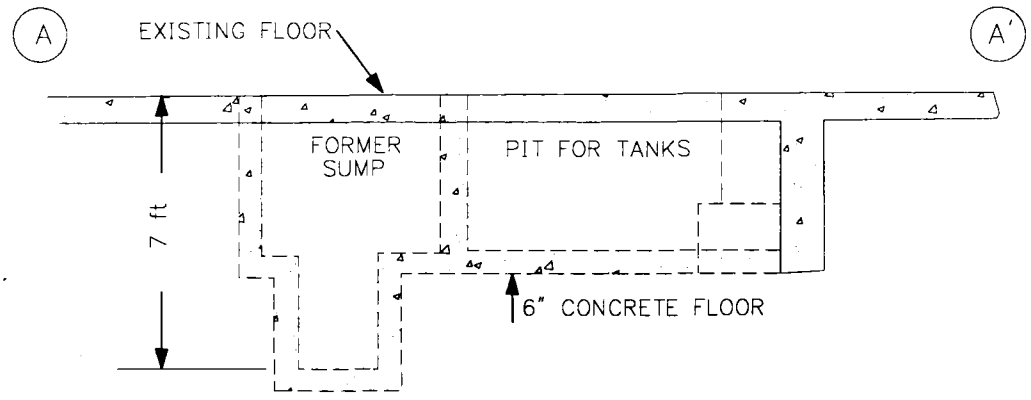
SURVEY DATA FOR SOIL BORINGS / WELLS		
WELL/BORING	STATE PLANE COORDINATES	ELEVATION
SB-01/TW-01	1078642.7759, 2811514.2783	829.5 GROUND
SB-02	1078643.6444, 2811549.2176	829.3 GROUND
SB-03	1078644.6229, 2811608.6421	829.3 GROUND
SB-04/TW-02	1078640.1975, 2811605.3233	829.0 GROUND
SB-05	1078632.9496, 2811609.2425	829.3 GROUND
SB-06/TW-03	1078643.1822, 2811666.3711	829.6 GROUND
SB-07	1078643.4735, 2811538.8190	829.4 GROUND

SOIL BORING AND TEMPORARY WELL LOCATIONS
EAST PLATING SHOP
SOIL AND GROUNDWATER INVESTIGATION
NIROP, FRIDLEY

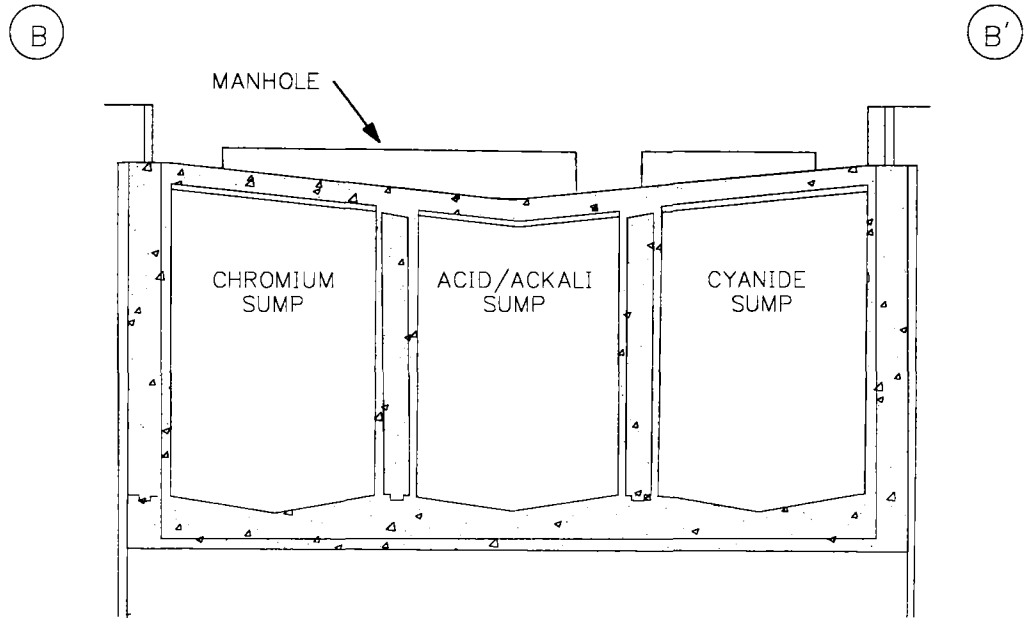
0 15 30
SCALE IN FEET

FIGURE 2-1

Halliburton NUS CORPORATION



CROSS SECTION A–A': FORMER SUMPS (PRE–1973)



CROSS SECTION B–B': EXISTING SUMPS (POST–1973)

NOTE: SEE FIGURE 2–1 FOR LOCATION OF CROSS SECTION

SUMP CROSS SECTIONS
EAST PLATING SHOP
NIROP, FRIDLEY

0 5 10
SCALE IN FEET

FIGURE 2–2

Halliburton NUS CORPORATION

This page intentionally left blank.

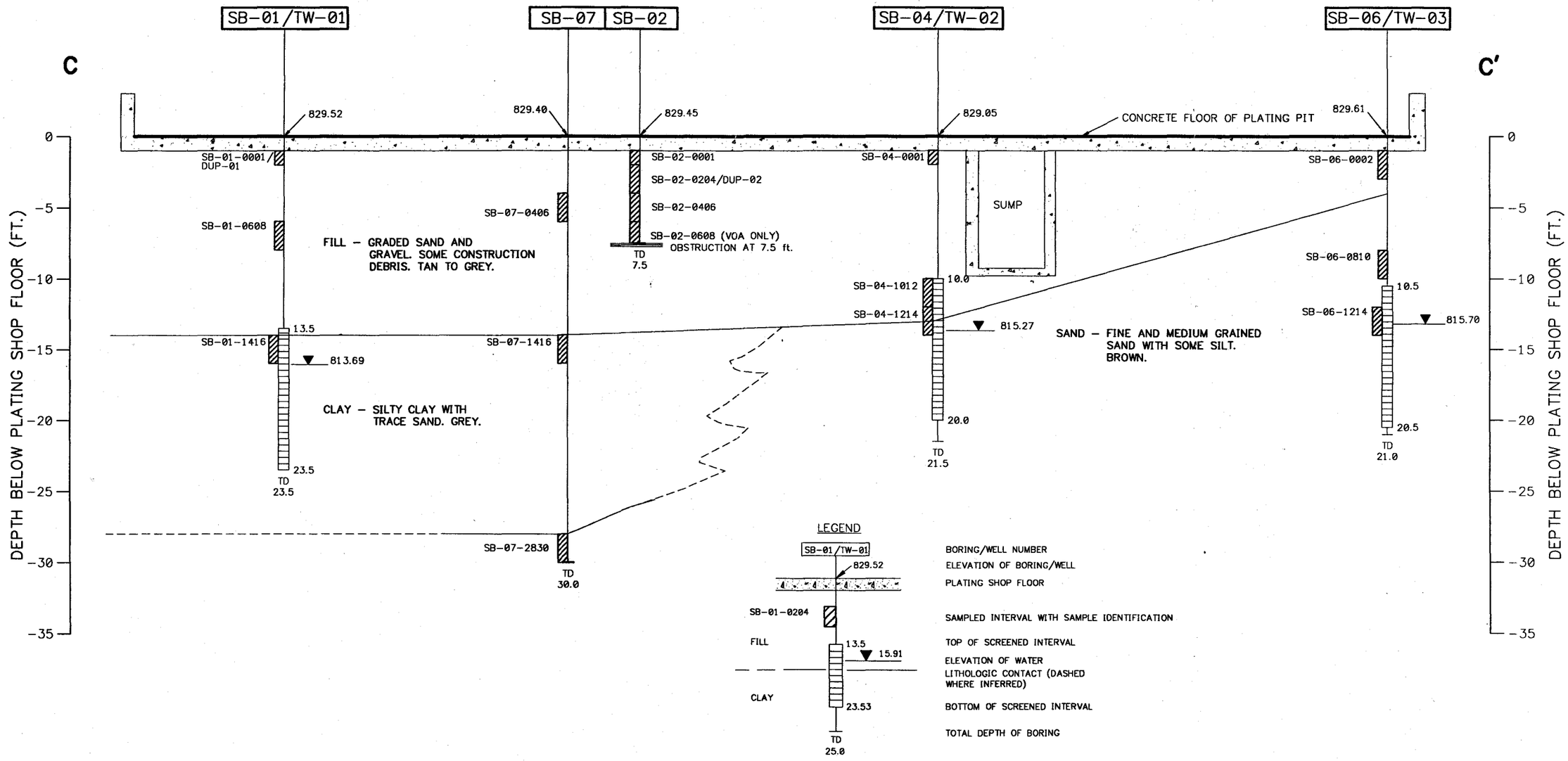
ACAD: O:\DATA\CADD\5255\95042001.DWG 05/08/95 TD

DRAFT

WEST

← TO WEST PLATING

EAST



LEGEND

BORING/WELL NUMBER

ELEVATION OF BORING/WELL

PLATING SHOP FLOOR

SAMPLED INTERVAL WITH SAMPLE IDENTIFICATION

TOP OF SCREENED INTERVAL

ELEVATION OF WATER

LITHOLOGIC CONTACT (DASHED WHERE INFERRED)

BOTTOM OF SCREENED INTERVAL

TOTAL DEPTH OF BORING

EAST-WEST CROSS-SECTION OF EAST PLATING SHOP SOIL AND GROUNDWATER INVESTIGATION NIROP, FRIDLEY

0 15 30
HORIZONTAL SCALE IN FEET

0 8 15
VERTICAL SCALE IN FEET

FIGURE 2-3

Halliburton NUS CORPORATION

CTO 214

059506/P

- One location downgradient (west) of the former sump location, investigated at SB-02. Soil boring SB-07 was installed in this location to determine the extent of stained soil encountered in soil boring SB-02.

A detailed drawing of the plating shop and all soil boring locations is provided in Figure 2-1.

2.2.2 Soil Sampling Intervals

At each soil boring location, three intervals (shallow, intermediate, and deep) were sampled to determine the vertical extent of any soil contamination that may be present below the plating shop floor. A total of 22 soil samples were collected from seven soil borings. Soil sampling locations and depths are summarized in Table 2-1. The target sample intervals and sampling rationale are detailed below.

- One shallow sample was collected from immediately below the concrete floor of the plating shop. At each soil boring, one sample was taken from 1 foot below the floor from the first split-spoon sample collected from each boring. This interval was sampled to determine whether contamination is present immediately below the floor.

- One intermediate sample was collected from each soil boring between the bottom of the floor and the top of the water table based on elevated readings collected using a photo ionization detector/flame ionization detector (PID/FID) or based on visual indications of staining and contamination. If no elevated PID/FID readings or evidence of contamination were noted, the sample was collected from approximately halfway between the plating shop floor and the water table, when possible. Because of split-spoon refusal and low sample recovery in some borings, the intermediate sample could not be collected from halfway between the top and bottom of the boring. However, intermediate samples were collected from each soil boring. These sampling intervals were chosen to provide a vertical profile of contamination present below the plating shop floor.

- One deep sample was collected from each boring immediately above the water table, at approximately 15 feet below the plating shop floor. Because of split-spoon refusal at some boring locations, the water table was not encountered in all borings. If the water table was not encountered, the deep sample was collected from the deepest split-spoon collected from each soil boring. This sample was used to determine whether soil above the water table is contaminated.

TABLE 2-1

SOIL BORING LOCATIONS AND DEPTHS
EAST PLATING SHOP SOIL AND GROUNDWATER INVESTIGATION
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT (NIROP)
FRIDLEY, MINNESOTA

Soil Boring Number	Soil Boring Location	Soil Boring Rationale	Sampled Intervals (ft bgs)*
SB-01	West end of Plating Shop	Determine whether former vapor degreaser operation affected soil	0 to 1 6 to 8 14 to 16
SB-02	Central portion of Plating Shop	Determine whether former sump operation affected soil	0 to 1 2 to 4 4 to 6 6 to 8
SB-03	Downgradient of existing chromium sump	Determine whether current plating operations have affected soil	0 to 1 10 to 12 12 to 14
SB-04	Downgradient of existing acid/alkali sump	Determine whether current plating operations have affected soil	0 to 1 10 to 12 12 to 14
SB-05	Downgradient of existing cyanide sump	Determine whether current plating operations have affected soil	0 to 1 10 to 12 13 to 15
SB-06	East end of Plating Shop	Determine upgradient soil quality	0 to 2 8 to 10 12 to 14
SB-07	Downgradient of former sump location	Determine extent of soil contamination found near SB-02.	4 to 6 14 to 16 28 to 30

* ft bgs = feet below ground surface.

All soil samples were analyzed for analytes most likely to have been used at the plating shop, including Target Compound List (TCL) volatiles, TCL semivolatiles, TCL Polychlornated biphenols (PCB)s, Target Analyte List (TAL) metals, cyanide, and pH. Analytical results for each soil sample are summarized in Section 3.0 of this Field Investigation Report.

2.2.3 Soil Boring Drilling

At each drilling location, concrete was cored prior to drilling to allow for drilling below the plating shop floor. The hollow-stem auger drilling method was used for advancing the soil borings. Split-spoon samples were collected continuously to the bottom of the boring to characterize subsurface conditions. A lithologic description was made of each split-spoon sample on a boring log. Boring logs for each soil boring are included in Appendix A. Drilling methods and sampling procedures were performed in accordance with the NIROP Field Sampling Plan (FSP) (RMT, 1992a), Section 7.0, Sampling Equipment and Procedures, and the Work Plan prepared for the East Plating Shop Soil and Groundwater Investigation (HNUS, 1995).

Results of soil borings at the site indicate that three lithologies underlie the East Plating Shop. These lithologies are as follows:

1. Fill Material ranging from fine sand to coarse gravel containing wood and concrete pieces. Fill was encountered in all soil borings and is thickest under the three existing sumps and the west side of the Plating Shop. Auger refusal was encountered at 7.5 feet in SB-02 and at 15 feet in SB-03 and SB-05, a fact which indicates that large objects, possibly concrete pieces, are present at these intervals. Fill material was generally dry or moist and contained some stained soils. PID readings were generally less than 20 ppm although readings as high as 500 ppm were recorded.

2. Clay that contained silt and occasional sandy zones. This clay was present in two soil borings located in the western portion of the plating shop (SB-01 and SB-07) and does not appear to extend under the eastern section of the plating shop. This clay is approximately 10 feet thick, although only one soil boring (SB-07) was advanced through the full extent of this unit. The lateral extent of the clay unit was not defined. PID readings were generally high in this lithology, ranging from 80 to 500 ppm from split-spoon samples retrieved from this unit. A chemical odor was noted while drilling through the clay. Water was encountered at approximately 15 feet.

3. Sand material ranging from fine-to medium-grained sand with some silt. The sand was encountered directly under the fill in the east end of the plating shop in borings SB-04 and SB-06 and under the clay unit in the west end in SB-07. PID readings from this unit ranged from 2 to 100 ppm and were generally below 10 ppm. Water was encountered at approximately 15 feet in the sand unit.

Figure 2-3 illustrates a cross section of the East Plating Shop showing the locations, depths, and lithologic units encountered during the drilling activities.

2.3 TEMPORARY WELL INSTALLATION

Temporary monitoring wells were installed in three soil borings to sample shallow groundwater below the East Plating Shop. Temporary monitoring well locations are shown on Figure 2-1. Temporary well locations and rationale are described below:

- One temporary well (TW-01) was installed at SB-01, near the former location of the vapor degreasers at the west end of the plating shop. This location was selected because it is downgradient/crossgradient of the existing plating sumps and provides data on groundwater quality in this area.

- One temporary well (TW-02) was installed at SB-04, immediately downgradient (west) of the existing sumps. This location was selected to determine whether the activities at the plating sumps have affected groundwater.

- One temporary well (TW-03) was installed at SB-06 at the east end of the plating shop. This location is upgradient of most past plating shop activities and was selected to determine the quality of groundwater flowing past the East Plating Shop.

One groundwater sample was collected from each temporary monitoring well. Groundwater samples were analyzed for TCL volatiles, TCL semivolatiles, TAL metals (total and dissolved), cyanide, and pH.

2.3.2 Temporary Well Construction

Monitoring wells were constructed of 2-inch I.D., PVC, flush-joint riser pipe and flush-joint, factory slotted (0.01-inch) well screen. Well screens were 10 feet in length. The top of the screened interval was positioned approximately 2 feet above the stabilized water level in each boring. After each boring was

advanced to the desired depth, the well screen and riser pipe were installed through the augers. Figure 2-4 illustrates a typical temporary monitoring well construction detail. The annulus of the boring around the well screen, and 2 to 3 feet above the well screen, was backfilled with clean sand (No. 30 size). A bentonite pellet seal was installed above the sand pack to the ground surface. Following sampling and surveying, each temporary was pulled out and the void space was filled with cement grout. The top 2 feet of each soil boring was capped with neat cement. A monitoring well construction form was completed for each monitoring well installed (see Appendix A).

2.3.3 Groundwater Sampling

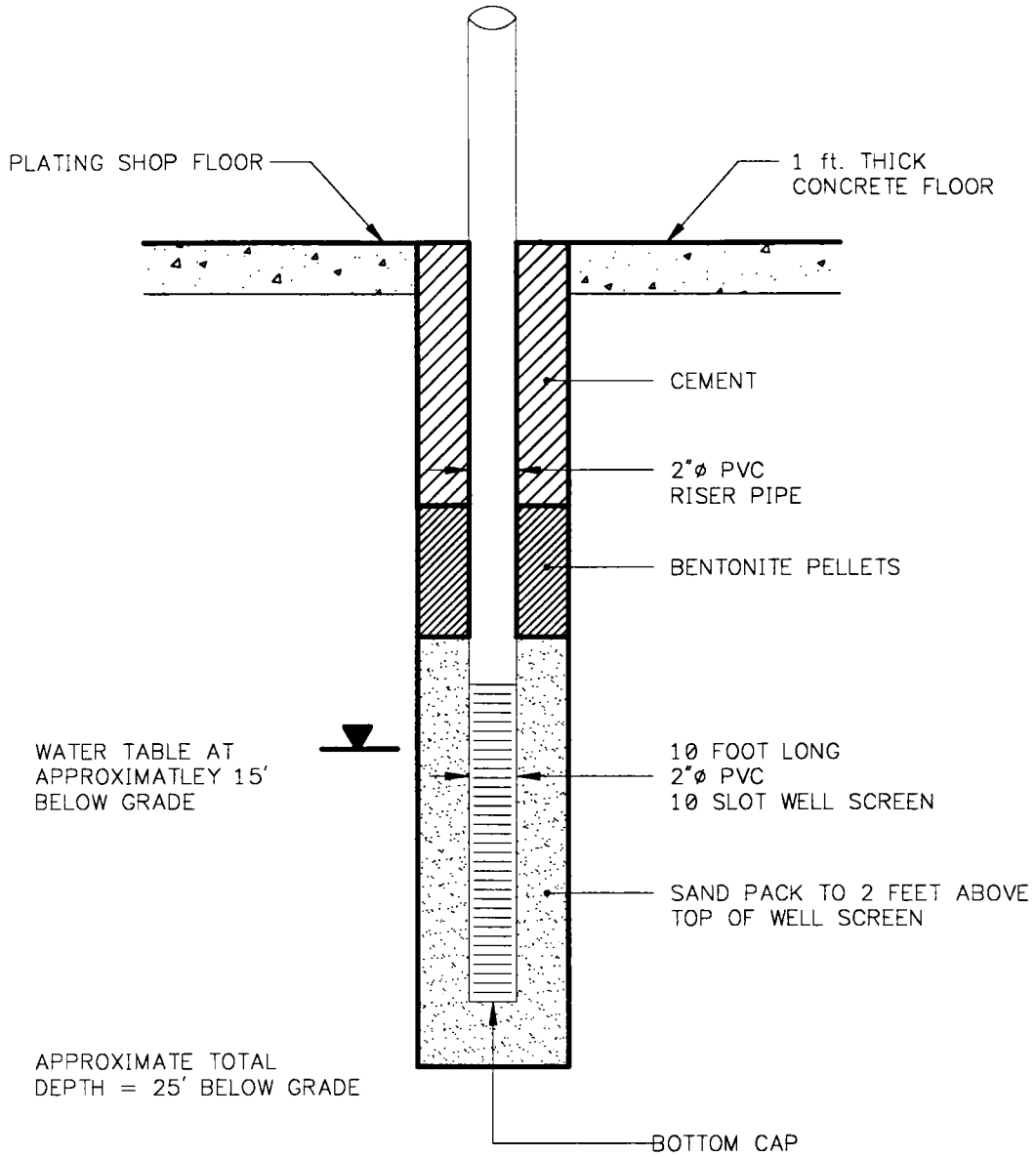
Groundwater samples were collected from three temporary groundwater monitoring wells installed during this investigation. Before samples were collected, water levels were measured and the wells were purged using a stainless-steel bailer. Groundwater sample log sheets listing purging and sample parameters are provided in Appendix A.

General guidelines followed for monitoring well purging are provided in the RMT NIROP FSP (1992b), outlined below:

- Hand bailing was used for well purging.
- Field measurements of pH, temperature, dissolved oxygen, and specific conductance (SC) were taken initially and at the end of each well volume during purging.
- Three to six well volumes were purged. Field measurements were allowed to stabilize during purging prior to sampling.

Following well purging, sampling was conducted using the following guidelines, as provided in the RMT NIROP FSP (1992b):

- Groundwater samples were collected immediately after well purging.
- Samples were collected in the following order: VOAs, SVOAs, total metals, dissolved metals, and cyanide.



NOTE: TEMPORARY WELLS WERE PULLED AFTER SAMPLING.
VOID SPACE WAS FILLED WITH CEMENT
GROUT FILLED TO FLOOR LEVEL.

TEMPORARY MONITORING WELL CONSTRUCTION DIAGRAM
EAST PLATING SHOP
SOIL AND GROUNDWATER INVESTIGATION
NIROP, FRIDLEY

FIGURE 2-4

NOT TO SCALE

Halliburton NUS CORPORATION

- Filtered metals samples were collected and filtered using a 0.45-micron pore diameter, in-line filter and peristaltic pump.

- Pre-preserved bottles were used.

2.4 WELL DEVELOPMENT

The monitoring wells were developed after installation to remove fine-grained material from the area around the well screens and to remove drill cuttings and residual fluids from the formation surrounding the monitored interval of the boring. Wells were developed using a stainless-steel bailer until turbidity was reduced. Wells were continuously developed for approximately 1 hour. Note that temporary well TW-01 was screened in a clay unit and due to the low yield of this well was difficult to fully develop. This well had elevated levels of groundwater turbidity following development due to the fine-grained nature of this water-bearing unit. Temporary monitoring wells TW-02 and TW-03 were screened in a fine-grained sand unit, which allowed for more complete development of these wells. Development of TW-02 and TW-03 was considered complete after turbidity measured in groundwater was reduced to a consistent level.

2.5 SURVEYING

All soil boring locations and temporary monitoring wells were surveyed for vertical and horizontal location following installation. Existing survey monuments immediately outside the NIROP facility were used as reference points. Horizontal locations were surveyed to the nearest 0.10 foot. Vertical elevations were referenced to the 1929 North American Datum and were surveyed to the nearest 0.01 foot at the measuring point where the uncapped riser pipe is notched. Ground surface elevations were also surveyed to the nearest 0.01 foot. Surveyed locations for all soil borings and temporary wells and surveyor notes are included in Appendix A. Figure 2-1 lists the survey data for all soil borings and temporary monitoring wells installed in this investigation.

2.6 DECONTAMINATION

2.6.1 Major Equipment

All downhole drilling equipment and sampling tools were decontaminated using a high-pressure steam wash prior to beginning work, between borings, and at the completion of the project. All decontamination

activities took place in a bermed, plastic-lined pad constructed inside the plating pit. All decontamination water was collected and containerized.

2.6.2 Sampling Equipment

All sampling equipment used for collecting samples was decontaminated in accordance with the RMT NIROP FSP (1992a and 1992b), Section 6.0, Decontamination Procedures. The following decontamination steps were taken:

- Liquinox detergent wash
- Potable water rinse
- Reagent-grade isopropanol rinse
- Double distilled or deionized water rinse

All sampling equipment was decontaminated following these procedures after each use.

Field analytical instruments, such as pH, conductivity, and temperature probes, were rinsed first with analyte-free water, then with the sample liquid. All decontamination activities were performed over a container, and fluids were containerized for proper disposal.

2.7 SAMPLE PACKING AND SHIPPING

All samples were cooled by placement in an ice-filled cooler immediately after sampling. Samples were shipped to the analytical laboratory in coolers with sufficient ice to keep the samples at 4°C during shipment to the lab. Samples were shipped within 24 hours after collection. Chain-of-custody forms were included with each sample shipment. Pre-preserved bottles shipped from the lab were used for all analytical parameters that required preservatives.

2.8 SAMPLE CUSTODY

Custody of samples was maintained and documented at all times. Chain-of-custody begins with the collection of the samples in the field and continues until the samples are shipped to the analytical laboratory. Chain-of-custody forms completed during this investigation, which list the date, time, and sample analytes, are provided in Appendix A.

2.9 SAMPLE IDENTIFICATION

Each sample collected was assigned a unique sample tracking number. The sample tracking number consists of an alphanumeric code that identifies the site, the sample medium and location, and sample depth (for soils samples).

The alphanumeric coding used for this investigation is explained in the table below and the subsequent definitions:

Medium	Location	Sample Depth
AA	NN	NNNN

Character Type:
- A = Alpha
- N = Numeric

Medium:
- GW = Groundwater
- SB = Subsurface Soil

Sample Location:
- Subsurface soil = soil boring number
- Groundwater sample = temporary well number

Sample Depth: For subsoil samples - top and bottom of sample interval depth in feet below floor level. Not used for groundwater samples

Filtered Samples: TAL metals samples that have been filtered are denoted with an "F" after the sample location.

2.9.1 Field Duplicate Labels

Field duplicates were designated as DUP-01, DUP-02, etc., when they were submitted to the laboratory so that the duplicates were submitted to the laboratory "blind." The chain-of-custody form and other documentation submitted to the laboratory were filled out such that the lab could match the duplicates to the original sample. The times on the duplicate samples were noted as 00:00. Correct sample identifications and times are noted on the sample log sheets, included in Appendix A. The duplicate sample locations are listed below:

- DUP-01 was collected at sample location SB-01-0001.
- DUP-02 was collected at sample location SB-02-0204.
- DUP-03 was collected at sample location GW-03.

2.9.2 Quality Control Sample Labels

Quality control samples were taken periodically. These Quality Assurance/Quality Control (QA/QC) samples were used to document the effectiveness of decontamination, to determine the quality of water used for decontamination, and to identify possible cross contamination occurring during transit. These blank samples, including trip blanks, field blanks, and equipment blanks, used the quality control sample identification scheme, listed below:

Sample Type	Sample Number	Sample Date
AA	NN	NNNNNN

Sample Type: TB = Trip blank
RB = Equipment rinsate blank
FB = Field blank of source water

Sample Number: A sequential numeric designation assigned to each type of blank on a daily basis.

Sample Date: Day the sample was generated, using the format, MMDDYR (MM=month, DD=day, YR=year).

2.10 QUALITY CONTROL SAMPLES

In addition to regular calibration of field equipment and appropriate documentation, quality control (QC) samples were collected or generated during environmental sampling activities. QC samples include field duplicates, field blanks, and equipment rinsate blanks. Trip blanks were provided by the analytical laboratory (CEIMIC). Each type of field QC sample is defined as follows:

- **Field Duplicates**. Field duplicates are two samples collected (1) independently at a sampling location in the case of groundwater, or (2) a single sample split into two portions in the case of soil. Duplicates were obtained during a single act of sampling and are used to assess the overall precision of the sampling and analysis program. At least 10 percent of all

samples for each media were field duplicates. Duplicates were analyzed in the laboratory for the same parameters as their environmental sample counterparts.

- **Equipment Rinsate Blanks**. Equipment rinsate blanks are collected under representative field conditions by running analyte-free water through sampling equipment (bailer, split-spoon, etc.) after decontamination and placing it in the appropriate sample containers for analysis. Equipment blanks were used to assess the effectiveness of decontamination procedures. Equipment blanks were collected for each type of nondedicated sampling equipment used and were submitted at a frequency of one per day per media. Equipment rinsate blanks were analyzed for the same suite of analytical parameters as the associated environmental samples.

- **Field Blanks**. Field blanks were collected by sampling the waters used for decontamination during the field investigation. Samples consist of the (1) source water used in steam cleaning of large equipment and (2) analyte-free water used for decontamination of sampling equipment. Field blanks were used to confirm the effectiveness of decontamination procedures and to determine whether the analyte-free water or the potable water (used for steam cleaning) may be contributing to sample contamination. Field blanks were collected for each type of water used for decontamination and were submitted at a frequency of one per sampling event. Field blanks, were analyzed for the entire suite of parameters under investigation. The field blanks collected during this investigation are described below:

- Field blank sample FB-01-040495 was collected from potable water used for decontamination.

- Field blank sample FB-02-040495 was collected from deionized water used for decontamination.

- **Trip Blanks**. Trip blanks are included when analyzing for volatile organics and were prepared and provided by the subcontractor laboratory (CEIMIC). Trip blanks remained with the sample containers at all times and are thus subjected to the same field conditions as the field samples. One trip blank was included in each cooler that contained samples of volatile organics to be analyzed for soil and/or groundwater samples.

2.11 LABORATORY ANALYSIS

Samples collected at the site were submitted for the laboratory analyses as presented in Table 2-2. This table indicates the analytical parameters and analytical methods for each sample. Number and type of sample and the associated field quality control samples are also included on this table. A Contract Laboratory Program (CLP) Laboratory (CEIMIC) was used for analysis of all samples. Laboratory data received quick-turnaround (7 days) verbal results and 2-week written data results.

2.12 DATA VALIDATION

All analytical data (100 percent) were validated by Halliburton NUS chemists after sample results were received. All data validation followed USEPA Laboratory National Functional Guidance for organic and inorganic data review. Data validation letters and all validated data are included in Appendix B of this report.

TABLE 2- 2

ANALYTICAL PROGRAM
EAST PLATING SHOP SOIL AND GROUNDWATER INVESTIGATION
NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT (NIROP)
FRIDLEY, MINNESOTA

Parameter	Analytical Method	Number of Samples	Trip Blanks	Equipment Rinsates	Field Blanks	Field Duplicates	Total Number of Samples
SOIL SAMPLES							
TCL Volatiles	CLP SOW OLM01.8	22	5	5	--	2	34
TCL Semivolatiles	CLP SOW OLM1.8	21	--	5	--	2	28
TCL PCBs	CLP SOW OLM01.8	21	--	5	--	2	28
TAL Metals/Cyanide	CLP SOW ILM02.1	21	--	5	--	2	28
pH	SW-846/9045	21	--	--	--	2	23
TCLP *	SW-846/1311, 40 CFR 261	1	--	--	--	--	1
GROUNDWATER SAMPLES							
TCL Volatiles	CLP SOW OLM01.8	3	2	2	2	1	10
TCL Semivolatiles	CLP SOW OLM01.8	3	--	2	2	1	8
TAL Metals/Cyanide (Total)	CLP SOW ILM02.1	3	--	2	2	1	8
TAL Metals (Dissolved)	CLP SOW ILM02.1	3	--	2	2	1	8
TCL PCBs	CLP SOW OLM01.8	--	--		2	--	2
pH	Field Analysis	6	--	--	--	--	6

*PCBs Polychlorinated biphenyls
TAL Target Analyte List
TCL Target Compound List
TCLP Toxicity Characteristic Leaching Procedure
TCLP includes organics, inorganics, reactivity, and corrosivity.

3.0 SAMPLE RESULTS

3.1 SOIL ANALYTICAL RESULTS

A summary of positive detections for soil samples is provided in Table 3-1.

Soil sampling results are summarized below.

- Elevated levels of volatile organic compounds, (VOCs), particularly trichloroethene (TCE) and tetrachloroethene (PCE), are present in soil. The highest levels of soil contamination were noted in the clay unit underlying the west side of the plating shop. Samples that were collected from this clay from soil borings SB-01 and SB-07 contain the highest levels of TCE (55,000 and 100,000 ppb, respectively). These two samples were collected from approximately 15 feet below the plating shop floor. A strong chemical odor was noted while drilling through this unit in these borings. Other soil samples collected from other soil borings contain significantly lower levels of VOCs. The fill material above the clay unit shows relatively low levels of VOC contamination. The clay unit is approximately 15 feet below the bottom of the floor and is approximately 10 feet thick. The lateral extent of this clay unit is unknown. The clay unit immediately underlying the west end of the plating shop may have been affected by past plating activities, prior to the reconfiguration of the plating shop in 1973. Because of the low permeability of the clay unit, residence time of contaminants in this unit may be longer than higher permeability units such as the fill and fine-grained sand lithologies underlying the plating shop.

- TCE was detected in soil immediately below the plating shop floor at concentrations as high as 640 parts per billion (ppb). The existing floor, installed in 1973, is approximately 1-foot-thick, reinforced concrete. The floor shows no cracks or conduits that might have allowed TCE from plating operations to adversely affect the soils. Therefore, this result may be due to past plating operations which occurred before 1973, prior to the installation of the existing cement floor.

TABLE 3-1

SUMMARY OF SOIL SAMPLE RESULTS
NIROP, FRIDLEY

Parameter	Sample Number											
	SB-01				SB-02					SB-03		
	SB-01-0001	DUP-01	SB-01-0608	SB-01-1416	SB-02-0001	SB-02-0204	DUP-02	SB-02-0406	SB-02-0608	SB-03-0001	SB-03-1012	SB-03-1214
VOLATILES (ug/kg)												
Chloromethane	--	--	--	--	--	--	--	--	--	--	--	--
Acetone	--	--	--	--	31	--	110	--	460	--	--	700
Carbon disulfide	--	--	--	--	--	--	16	--	--	--	--	--
1,1-Dichloroethane	--	--	--	--	--	--	19	--	--	--	--	--
1,2-Dichloroethene (total)	8	--	--	--	--	--	190	--	--	--	--	--
2-Butanone	--	--	--	--	--	--	270	3	4	5	--	--
1,1,2-Trichloroethane	--	--	--	--	--	--		9	8	--	--	--
Trichloroethene	640	12	14	55,000	130	71	1,200	770	690	14	1,100	160
4-Methyl-2-pentanone	--	--	--	--	--	--	--	680	--	--	--	--
2-Hexanone	--	--	--	--	2	--	--	560	--	--	--	--
Tetrachloroethene	--	--	--	2,300	--	90	--	760	740	--	--	--
Toluene	1	--	--	--	--	--	--	8	6	--	--	--
Ethylbenzene	--	--	--	--	--	--	--	7	8	--	--	--
Styrene	--	--	--	--	--	--	--	--	--	9	--	--
Xlyene (total)	--	--	--	--	--	4	--	48	54	--	--	--
SEMIVOLATILES (ug/kg)												
Bis(2-ethylhexyl)phthalate	160	700	61	45	56	920	1,200	4,400	--	--	--	--
Phenanthrene	--	--	--	--	--	--	--	180	--	--	--	--
Pyrene	--	--	--	--	--	52	50	100	--	--	--	--
Naphthalene	--	--	--	--	--	--	--	73	--	--	--	--

TABLE 3-1 (Continued)
SUMMARY OF SOIL SAMPLE RESULTS
NIROP, FRIDLEY

Parameter	Sample Number											
	SB-01				SB-02					SB-03		
	SB-01-0001	DUP-01	SB-01-0608	SB-01-1416	SB-02-0001	SB-02-0204	DUP-02	SB-02-0406	SB-02-0608	SB-03-0001	SB-03-1012	SB-03-1214
2-Methylnaphthalene	--	--	--	--	--	--	--	87	--	--	--	--
Dibenzofuran	--	--	--	--	--	--	--	78	--	--	--	--
Di-n-butylphthalate	--	--	--	--	--	--	--	140	--	--	--	--
Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--
4-Methylphenol	--	--	--	--	--	--	--	--	--	--	--	--
METALS (mg/kg)												
Aluminum	4,820	3,660	2,550	5,450	3,310	525	498	2,220	NA	2,590	5,210	2,490
Arsenic	2.1	4.1	1.4	2.6	2.1	0.42	--	0.94	NA	5.8	2.3	0.78
Barium	32.6	37	16.4	55.2	28.1	19.5	13.8	36.2	NA	201	27.7	12
Beryllium	--	0.29	--	0.23	0.19	--	--	--	NA	0.21	0.29	0.22
Calcium	14,100	17,400	5,780	26,300	12,100	882	768	7,910	NA	4,260	25,200	4,710
Chromium	17.9	19.5	--	15.9	20	72.3	73.6	618	NA	13.4	11.4	--
Cobalt	5.4	3.7	4.1	5.1	4	--	--	2.2	NA	6.9	4.8	3.1
Copper	13	14.6	4.2	11.8	14.9	24.9	17.9	54.5	NA	13.9	9.9	6.8
Iron	10,400	13,400	7,200	11,100	8,990	2,990	2,430	14,200	NA	14,600	11,400	6,260
Lead	6	6.1	3.9	3.9	12.1	215	175	231	NA	7.6	3.5	1.7
Magnesium	4,700	5,800	4,060	11,400	5,080	211	153	3970	NA	1,880	8,540	2,070
Manganese	307	364	122	327	403	61.3	31.2	103	NA	2,490	297	177
Nickel	19.6	19.7	--	20.5	27.4	--	--	15.3	NA	14.7	--	--
Potassium	550	417	403	963	380	147	157	466	NA	268	862	347
Sodium	333	316	194	314	142	103	86	280	NA	259	175	--

TABLE 3-1 (Continued)
SUMMARY OF SOIL SAMPLE RESULTS
NIROP, FRIDLEY

Parameter	Sample Number											
	SB-01				SB-02					SB-03		
	SB-01-0001	DUP-01	SB-01-0608	SB-01-1416	SB-02-0001	SB-02-0204	DUP-02	SB-02-0406	SB-02-0608	SB-03-0001	SB-03-1012	SB-03-1214
Vanadium	15.2	17.6	9.2	23.4	12	2	2.3	7.2	NA	10.1	25.2	14.1
Zinc	21.4	19	13	26.1	24.9	8.5	--	28.6	NA	26.4	24.2	11.6
Cyanide	--	--	--	2.9	--	79	90	140	NA	1.1	--	--
PCBs (ug/kg)												
Aroclor-1254	--	--	--	--	--	--	--	--	--	--	--	--
pH	11.61	11.42	9.24	7.55	10.93	6.85	6.89	5.63	NA	9.47	8.38	8.21
Comment:		duplicate of SB-01-0001			discolored soil	discolored soil	discolored soil	discolored soil	only VOA collected			

TABLE 3-1 (Continued)
SUMMARY OF SOIL SAMPLE RESULTS
NIROP, FRIDLEY

Parameter	Sample Number											
	SB-04			SB-05			SB-06			SB-07		
	SB-04-0001	SB-04-1012	SB-04-1214	SB-05-0001	SB-05-1012	SB-05-1315	SB-06-0002	SB-06-0810	SB-06-1214	SB-07-0406	SB-07-1416	SB-07-2830
VOLATILES (ug/kg)												
Chloromethane	--	--	--	--	--	--	--	--	1	--	--	--
Acetone	--	--	--	--	890	--	280	--	120	--	--	--
Carbon disulfide	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethene (total)	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone	--	--	--	--	--	--	--	4	3	--	--	--
1,1,2-Trichloroethane	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	16	15	66	9	1,100	13	7	4	8	290	100,000	13,000
4-Methyl-2-pentanone	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	--	--	1		1	--	--	--	--	120	3,800	250
Toluene	--	--	--	--	2	--	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	--	--	--	--	--	--	--
Styrene	--	--	--	--	--	--	4	--	--	--	--	--
Xlyene (total)	--	--	--	--	--	--	--	--	--	--	--	--
SEMIVOLATILES (ug/kg)												
Bis(2-ethylhexyl)phthalate	--	66	--	--	--	--	--	--	--	1,800	--	--
Phenanthrene	--	--	--	50	--	--	--	--	--	--	--	--
Pyrene	--	--	--	40	--	--	--	--	--	--	--	--
Naphthalene	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	--	--	--	--	--	--	--	--	--	--	--	--

TABLE 3-1 (Continued)
SUMMARY OF SOIL SAMPLE RESULTS
NIROP, FRIDLEY

Parameter	Sample Number											
	SB-04			SB-05			SB-06			SB-07		
	SB-04-0001	SB-04-1012	SB-04-1214	SB-05-0001	SB-05-1012	SB-05-1315	SB-06-0002	SB-06-0810	SB-06-1214	SB-07-0406	SB-07-1416	SB-07-2830
Dibenzofuran	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate	--	--	--	--	--	--	--	--	--	87	--	--
Benzo(b)fluoranthene	--	--	--	40	--	--	--	--	--	--	--	--
4-Methylphenol	--	--	--	--	--	--	--	--	--	--	320	--
METALS (mg/kg)												
Aluminum	3,490	5,310	2,440	3,700	4,210	2,540	2,790	2,040	1,700	1,090	3,940	1,940
Arsenic	3.4	2.9	1.1	2.5	2	0.78	4.5	0.94	0.46	0.5	2.8	0.84
Barium	67.3	29.9	--	37.5	25.5	--	21.9	--	--	30.7	47.4	--
Beryllium	0.23	0.22	--	0.26	0.31	0.2	0.25	0.2	0.17	--	0.21	--
Calcium	6,400	24,300	13,900	9,790	30,600	4,520	19,100	7,280	3,490	1080	31,900	4,880
Chromium	10.2	13.2	12.7	15.9	--	--	27.9	-	--	175	--	--
Cobalt	5.3	5.1	5.1	4.9	4.3	3.2	7.2	3.1	2.2	1.6	5.4	2.4
Copper	14.7	10.3	8.5	21.4	10	7	9.6	6.4	4.8	67.7	--	--
Iron	11,700	11,400	6,920	10,400	9,960	6,520	8,570	4,810	3,920	7,620	9,270	5,120
Lead	9	4	2.2	32.6	3.4	1.3	2.6	1.2	1.1	515	5.2	1.6
Magnesium	2,920	9,510	7,660	4,410	11,500	2,140	6,630	1,900	1,480	286	11,200	1,850
Manganese	638	302	152	442	316	107	246	71.3	79.7	--	406	91.5
Nickel	--	--	--	--	--	--	--	--	--	--	--	--
Potassium	382	1000	276	413	748	240	285	209	198	210	1130	251
Sodium	180	177	84.2	145	162	--	128	--	--	262	337	81.8
Vanadium	13.7	24.8	12.5	15.9	20.7	12.4	11.3	9.3	9.4	4.9	15.2	12

TABLE 3-1 (Continued)
SUMMARY OF SOIL SAMPLE RESULTS
NIROP, FRIDLEY

Parameter	Sample Number											
	SB-04			SB-05			SB-06			SB-07		
	SB-04-0001	SB-04-1012	SB-04-1214	SB-05-0001	SB-05-1012	SB-05-1315	SB-06-0002	SB-06-0810	SB-06-1214	SB-07-0406	SB-07-1416	SB-07-2830
Zinc	19.4	23.2	11.9	22.9	21.7	12.1	15.2	9.9	--	21.8	29.5	--
Cyanide	--	--	--	--	--	--	--	--	--	148	--	--
PCBs (ug/kg)												
Aroclor-1254	--	--	--	1,200	--	--	--	--	--	--	--	--
pH	9.22	8.32	8.36	8.79	8.64	8.62	9.54	8.62	8.53	5.88	8.66	8.32
Comment:												

Note:

Table based on validated data.
Shading = highest result for chemical
-- Indicates nondetect.
NA Not Analyzed
PCBs = Polychlorinated biphenyls (PCBs)
VOA = Volatile Organic Analysis

- Low levels of TCE (<100 ppb) were detected in all soil samples. These results may be the result of contamination of soil and soil-gas by groundwater, which contains higher concentrations of contamination than is observed in most soil underlying the site.

- Discolored soil that was stained blue and green was collected in SB-02 and SB-07 to a depth of approximately 8 feet. Elevated levels of metals, including cadmium, chromium, copper, lead, nickel, and cyanide were present in these samples. TCE was present at concentrations as high as 1,200 ppb from these discolored soils. These samples have low pH values, which may suggest past exposure to acids. During the installation of SB-02, an obstruction was encountered at approximately 7.5 feet below ground surface. This corresponds to the approximate depth of the bottom of the former sump in this location. Soil boring SB-02 may have been completed directly through this former sump and may therefore have encountered the cement floor of this sump. The discolored soil encountered in this boring may represent a sump used before the 1973 reconfiguring of the East Plating Shop that was filled without being completely drained. These elevated levels of metals appear to be limited in extent to this area. Significantly stained soil was not encountered in other boring locations, and lower metals concentrations were detected in soil samples collected from other borings.

- Some low levels of cyanide and metals, including arsenic, lead, and manganese were detected in several soil samples. This may indicate that past plating activities prior to the installation of the cement floor in 1973, may have affected soils and thus resulted in elevated metals concentrations.

- One PCB detection of 1.2 ppm from SB-05 at a depth of 0 to 1 foot was noted. The source of these PCBs is unknown. Because of the low concentration detected at this location and because no other PCBs were detected in any soil samples collected at the site, there does not appear to be significant PCB contamination at the site.

- Semivolatile compounds were detected in soil borings at elevated levels. The highest levels of semivolatile contamination were noted in samples from SB-02, in the vicinity of the former sump. Positive detections were generally noted in the fill material below the plating shop floor. Because of the low concentrations detected at these sampling locations and because widespread semivolatile contaminants were not detected in soil or groundwater samples collected at the site, there does not appear to be significant semivolatile contamination at the site.

- A sample from the cuttings of SB-02, near the location of the former sump, was analyzed for TCLP. Results from this sample indicated that the soil in the vicinity of SB-02 does not exhibit toxicity characteristics. TCLP sample data are summarized on Table 3-2 and complete data is included in Appendix B.

3.2 GROUNDWATER ANALYTICAL RESULTS

A summary of positive detections for groundwater samples are provided in Table 3-3.

Groundwater sampling results are summarized below.

- Groundwater sample results indicate that the dominant contaminant of concern in the groundwater beneath the East Plating Shop is TCE, which is present in the three wells installed at the site. TCE levels range from 1,200 ppb (GW-02) to 140,000 ppb (GW-03). Other VOCs present in all three wells include DCE and TCA.

- TCE concentrations are highest in the clay layer encountered below the west side of the plating shop. The highest VOC concentrations were encountered in sample GW-01 obtained from TW-01, which is screened within this clay unit. Soil sample results from this clay also show elevated levels of TCE, 1,2-DCE, and PCE. The former locations of the vapor degreasers are in this area of the plating shop. This clay unit may be retaining VOCs that may have been released during past plating operations. The fill material above the clay unit shows relatively low levels of VOC contamination. The clay unit is located approximately 15 feet below the bottom of the floor and is approximately 10 feet thick. The lateral extent of this clay unit is unknown.

- The location of TW-01 is approximately upgradient of the highest levels of TCE contamination noted in offsite wells 18-S and 27-S, located across East River Road from the NIROP building. These wells showed TCE concentrations of more than 10,000 ppb in recent sampling events. One additional well (recovery well AT-3A) is located approximately between these offsite wells, and TW-01 and has showed historically high levels of TCE contamination. The clay unit underlying the East Plating Shop may be contributing to groundwater contamination.

TABLE 3-2

TCLP SAMPLE RESULT FOR SB-02 SAMPLE
NIROP FRIDLEY

Compound	TCLP Result	TCLP Allowable Limit[1]
INORGANICS		
Cadmium	0.03 ppm	1 ppm
VOLATILE ORGANICS		
Trichloroethene	0.012 ppm	0.5 ppm
2-Butanone	0.044 ppm	200 ppm
OTHER TCLP ANALYSIS		
pH	7.61	---
Flashpoint	No Combustion[2]	---

(1) As per 40 CFR, Section 261.24, Toxicity Characteristic

(2) No combustion below 200°F method reporting limit.

TABLE 3-3

SUMMARY OF GROUNDWATER SAMPLE RESULTS
NIROP, FRIDLEY

Parameter	Sample Number							
	GW-01	GW-01-F	GW-02	GW-02-F	DUP-03	DUP-03-F	GW-03	GW-03-F
VOLATILES (ug/L)								
Carbon disulfide	--	NA	--	NA	31	NA	--	NA
1,1-Dichloroethane	--	NA	22	NA	16	NA	9	NA
1,2-Dichloroethene (total)	12,000	NA	180	NA	160	NA	100	NA
1,1,1-Trichloroethane	--	NA	9	NA	--	NA	9	NA
Trichloroethene	140,000	NA	1,200	NA	1,200	NA	1,700	NA
Tetrachloroethene	160	NA	5	NA	--	NA	--	NA
SEMIVOLATILES (ug/L)								
4-Methylphenol	11	NA	--	NA	--	NA	--	NA
Phenol	10	--	--	--	--	--	--	--
2-Methylphenol	2	--	--	--	--	--	--	--
2,4-Dimethylphenol	6	--	--	--	--	--	--	--
METALS (mg/L)								
Aluminum	19,400	--	8,500	370	6,280	--	8,450	--
Arsenic	11	4.9	4.2	--	3.8	--	3.9	--
Barium	380	147	154	100	142	89.9	137	--
Calcium	132,000	91,500	215,000	182,000	187,000	194,000	144,000	153,000
Chromium	286	--	--	--	--	--	--	--
Cobalt	23.8	12.2	12.2	--	10.6	--	12.7	--
Copper	172	23.6	--	18.8	--	21.1	43.1	--
Iron	27,000	--	14,100	348	10,400	--	15,300	--
Lead	10	--	2.3	--	2.3	--	5.1	--
Magnesium	47,900	30,200	65,700	55,500	57,000	58,500	42,100	42,600

TABLE 3-3 (Continued)
SUMMARY OF GROUNDWATER SAMPLE RESULTS
NIROP, FRIDLEY

Parameter	Sample Number							
	GW-01	GW-01-F	GW-02	GW-02-F	DUP-03	DUP-03-F	GW-03	GW-03-F
Manganese	993	201	1,520	890	1,250	947	862	199
Potassium	5,430	5,730	6610	4,610	5,470	4,640	6,430	5,480
Selenium	--	--	--	--	--	--	33.3	36.7
Sodium	89,100	90,800	10,100	9,010	8,950	9,640	9,960	11,500
Vanadium	53.9	--	30.4	--	22.6	--	33.7	--
Zinc	159	--	--	--	--	--	--	--
Cyanide	291	NA	--	NA	--	NA	--	NA
pH	7.53	NA	6.95	NA	6.95	NA	7.34	NA
Comment:		filtered sample		filtered sample	duplicate of GW-02	filtered sample		filtered sample

Note:

Table based on validated data.
shading = highest result for chemical.
NA = not analyzed.
-- indicates non-detect.

- Elevated levels of metals (arsenic, lead, and chromium,) and cyanide are present in total metal samples from TW-01. Dissolved metal samples show reduced levels for these contaminants in TW-01.

- For several metals (arsenic, barium, cobalt, copper, nickel and sodium), dissolved metals concentrations increase at the downgradient (west) side of the plating shop in TW-01 compared to the upgradient samples in TW-03. Past plating activities appear to have slightly increased dissolved metals concentrations in the vicinity of TW-01.

4.0 CONCLUSIONS

Based on the analytical results for the soil and groundwater samples collected from below the East Plating Shop at the NIROP facility, past plating activities appear to have adversely affected these media. Sample results indicate that TCE is the primary contaminant of concern in the soil and groundwater. Other volatile organic compounds, including TCA and DCE, are present at elevated levels in soil and groundwater samples although concentrations are significantly lower then TCE concentrations by several orders of magnitude.

The highest levels of TCE in soil and groundwater are present in the shallow clay underlying the western portion of the plating shop. This contamination is thought to be the result of plating activities at the site prior to 1973, when the existing concrete floor was constructed. All samples collected from the vicinity of existing sumps do not show significant levels of contamination.

Low levels of cyanide and metals, including arsenic, chromium, lead, and nickel, are present in soil and groundwater. The most significant metals contamination in the soil is located within a 10-foot area around a former sump, which was active prior to a renovation of the plating shop in 1973. Away from this former sump, metals levels in soil and groundwater are significantly reduced.

Slightly elevated levels of metals were detected in unfiltered groundwater samples. These results may be attributed to the turbidity of the groundwater samples collected at the site. Filtered groundwater samples show significantly reduced metals levels. A comparison of filtered and unfiltered groundwater samples indicates that significant dissolved metals contamination is not present in the vicinity of the East Plating Shop. Groundwater appears to be affected by TCE underlying the site, although an active, downgradient, containment system is currently in operation and is containing TCE contamination.

REFERENCES

Bay West Inc., September, 1994. Letter Report on East Plating Room Sampling.

Halliburton NUS, March, 1995. Work Plan for East Plating Shop Soil and Groundwater Investigation, Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota.

RMT, Inc., January, 1992. Remedial Investigation Work Plan for the Soils Operable Unit at the Naval Industrial Ordnance Plant, Fridley, Minnesota.

RMT, 1992a. NIROP Field Sampling Plan, Appendix A of RMT, Inc., January, 1992. Remedial Investigation Work Plan for the Soils Operable Unit at the Naval Industrial Ordnance Plant, Fridley, Minnesota.

RMT, Inc. September, 1992. Remedial Action Work Plan - Part 1, Remedial Action Monitoring Plan for Groundwater Remediation at the Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota.

RMT, Inc., 1992b. NIROP Field Sampling Plan, Attachment 1 of RMT, Inc. September, 1992. Remedial Action Work Plan - Part 1, Remedial Action Monitoring Plan for Groundwater Remediation at the Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota.

RMT, Inc. September, 1993. Remedial Investigation Report for the Soils Operable Unit at the Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota.

RMT, Inc. January, 1995. Annual Monitoring Report for 1994 Groundwater Extraction and Pretreatment System, Naval Industrial Reserve Ordnance Plant, Fridley, Minnesota.

APPENDIX A

FORMS FOR FIELD INVESTIGATION

A.1 Boring Log Forms

A.2 Temporary Monitoring Well Construction Forms

A.3 Sample Log Forms

A.4 Soil Boring / Temporary Monitoring Well Survey Data

A.5 Chain-of-Custody Forms

A.1 BORING LOG FORMS

BORING LOG

Brown & Root Environmental

PROJECT: NIROP FRIDLEY — BORING NO.: SB-01 / TW-01
PROJECT NO.: 5255 — DATE: 4/10/95 — DRILLER: BERGERSON-CASWELL
ELEVATION: — FIELD GEOLOGIST: P. NIMMER
WATER LEVEL DATA:
(Date, Time & Conditions) 4/10/95 START @ 1330 END @ 1629 65° Inside building.

	SAMPLE NO. & TYPE	DEPTH (FT) OR RUN NO.	BLOWS 6" OR BOD (%)	SAMPLE RECOVERY / SAMPLE LENGTH	LITHOLOGY CHANGE (DEPTH, FT)	MATERIAL DESCRIPTION*: SOIL DENSITY, CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	ROCK BR. OR USCS	REMARKS (HNu (ppm))
					Concrete			CONCRETE 0 TO 1 FT.		
*	S1 1340	2.0	22 / 20	0.9 / 1.0	SW	MED. DENSE	BROWN	GRADED SAND W/ FINE GRAVEL.	SW	S1 0 to 1' MOIST 3" SPOON 20 ppm
			4 / 6							COLLECTED DUP-01 0 to 1 ft 3" SPOON USED
	S2 1400	4.0	9 / 10	2.0 / 2.0	GP	MED. DENSE	TAN to BLACK	V. FINE SAND BELOW COARSE GRAVEL W/ GRADED SAND.	SW	S2 2 to 4' FILL 15 ppm
			5 / 6		SW					DRY 12 ppm FROM HOLE
	S3 1410	6.0	8 / 7	1.0 / 2.0		MED. DENSE	TAN to GREY	V. FINE GRAIN SAND, WELL GRADED.	SW	S3 4 to 6' DRY 15 ppm
			6 / 7							
*	S4 1419	8.0	8 / 8	1.6 / 2.0		MED. DENSE	TAN to BROWN	COARSE SAND W/ FINE GRAVEL	SW	S4 6 to 8' 3" SPOON FILL 12 ppm
			3 / 6							MS/MSD collected 6 to 8 per ACT standard interval.
	S5 1425	10.0	4 / 6	1.0 / 2.0		MED. DENSE	TAN	AS ABOVE	SW	S5 8 to 10' DRY 8 ppm
			5 / 6							STAINED INTERVAL?
⊛	S6 1430	12.0	6 / 7	0.5 / 2.0		MED. DENSE	TAN	AS ABOVE	SW	S6 10 to 12' 15 ppm
			6 / 6							HNu reading of 120 ppm from hole.
*	S7 1504	14.0	235 / 100	1.0 / 2.0		VERY DENSE	TAN	AS ABOVE W/ LARGE GRAVEL	SW	S7 12 to 14' 20 ppm
			3 / 3							DRY. *=VOA only collected
*	S8 1515	16.0	4 / 8	1.2 / 2.0	ML	LOOSE	DARK GREY	CLAYEY SILT W/ SOME COARSE SAND AND GRAVEL	ML	S8 14 to 16' 120 ppm
			5 / 6							MOIST
	S9 1530	18.0	8 / 9	1.0 / 2.0		MED. DENSE	DARK GREY	AS ABOVE.	ML	S9 16 to 18' 80 ppm
								Augered to 19'		MOIST
		20.0	2 / 6							
	S10 1535	21.0	6 / 7	1.8 / 2.0		LOOSE	DARK GREY	AS ABOVE		S10 19 to 21 MOIST 80 ppm
	S11 1550	23.0		0.0 / 2.0				AS ABOVE		S11 21 to 23' MOIST 200 ppm
					TD: 23.5					3" SPOON USED 21 to 23
								TOTAL DEPTH = 23.5 FT SCREEN FROM 23.5 TO 13.5 SAND TO		

REMARKS: DIETRICH 25 SKID MOUNTED RIG W/ 140 lb. HAMMER
* = SAMPLE SENT FOR ANALYSIS.
⊛ SAMPLE SB-IV-1012 COLLECTED BY MPCA FOR VOC ANALYSIS

BORING SB-01 / TW-01

PAGE 1 OF 1

* See Legend on Back

BORING LOG

Brown & Root Environmental

PROJECT: NIROP FRIDLEY — BORING NO.: SB-02
PROJECT NO.: 5255 — DATE: 4/10/95 — DRILLER: BERGERSON-CASWELL
ELEVATION: — FIELD GEOLOGIST: P. NIMMER
WATER LEVEL DATA: —
(Date, Time & Conditions) Start @ 1840, End @ 2000, 65° Inside Building

	SAMPLE NO. & TYPE	DEPTH (FT) OR RUN NO.	BLOWS 6" OR RQD (%)	SAMPLE RECOVERY / SAMPLE LENGTH	LITHOLOGY CHANGE (DOTTED FT.)	MATERIAL DESCRIPTION* SOIL DENSITY/CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	ROCK BR. OR USCS	REMARKS (HNu / CFM)
					Concrete			Concrete 0 to 1 ft		
*	S1 1842	2.0	30 / 22	0.9 / 1.0		med. dense	Brown	Graded Sand w/some Gravel and some Silt	SP	S1 Dry 40 ppm @ 1 to 2' 3" Spoon Refusal
			9 / 12							
* Dup	S2 1850	4.0	15 / 28	1.0 / 2.0		med. dense	Green-Grey	As above w/Large Gravel	SP	S2 2-4' Dry 200 ppm Green stained soil
			25 / 39		SP					
*	S3 1900	6.0	169/3	1.0 / 1.5		V. Dense	Green Grey	As above	SP	S3 4 to 5.5' Dry 500 ppm Green stained soil
			18 / 50					Silt/Spoon Refusal @ 6.5 ft		
✓ (VOA only)	S4 1920	8.0	120/5	1.0 / 1.5	TD = 7.5'	V. Dense	Green Grey	As above. Refusal @ 7.5'		S4 6 to 7.5 500 ppm
	S5							~~Auger refusal @~~		Green stained soil. Auger Refusal @ 7.5'
		~~1900~~		— / —						S5 3" Spoon Refusal @ 7.5'

REMARKS: District 25 Skid Mounted Rig w/140 lb. hammer.
* = Sample Sent for Analysis
Dup-02 taken at 02 to 04 intervals - NO VOA Dup! Only 1 8 oz Jar for Dup.

BORING SB-02

PAGE 1 OF 1

• See Legend on Back

BORING LOG

Brown & Root Environmental

PROJECT: NIROP FRIDLEY — BORING NO.: SB-03
PROJECT NO.: 5255 — DATE: 4/5/95 — DRILLER: BERGERSON-CASWELL
ELEVATION: — FIELD GEOLOGIST: P. NIMMER
WATER LEVEL DATA:
(Date, Time & Conditions) 4/5/95, START @ 1440 END @ 1615 65° INSIDE BUILDING

SAMPLE NO. & TYPE	DEPTH (FT) OR RUN NO.	BLOWS 6" OR ROD (%)	SAMPLE RECOVERY / SAMPLE LENGTH	LITHOLOGY CHANGE (DEPTH, FT.)	MATERIAL DESCRIPTION*: SOIL DENSITY, CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	ROCK BR OR USCS	REMARKS	HNu Rdng (PPM)
* S1 1443				6" Concrete & A.B.		BLK-BRN	FINE AND MEDIUM SAND W/ SILT AND CONCRETE PIECES	SP	S1 IN 1' CONCRETE & 0-2' ABOVE SOIL	3.0
S1	2.0	17 / 23	1.0 / 2.0	SP	MED. DENSE				DRY 3" SPOON USED 1 TO 2'	
✓ S2 1450		5 / 6				BROWN-BRN	GRADED SAND W/ SILT AND GRAVEL.	SW	S2 2 TO 4' DRY	8.0
	4.0	8 / 12	1.8 / 2.0	SW/SM	MED. DENSE				LIKELY FILL, STAINED LOOKING	
S3 1500		7 / 6				GREY-BLACK	SILT W/ SOME CLAY AND COARSE SAND.	SM	S3 4 TO 6' MOIST	8.0
	6.0	9 / 11	1.5 / 2.0		MED. DENSE					
S4 1512		5 / 6				GREY-BLACK	SILTY CLAY W/ SOME SAND.	ML	S4 6-8' MOIST	12.0
	8.0	7 / 9	1.0 / 2.0	ML	MED. DENSE					
S5 1520		8 / 12				GREY-BLACK	AS ABOVE	ML	S5 8-10' MOIST	5.0
	10.0	16 / 12	1.8 / 2.0		MED. DENSE					
* S6 1525		5 / 9				GREY-BLACK	AS ABOVE	ML	S6 10-12' MOIST	4.0
	12.0	8 / 10	1.1 / 2.0		MED. DENSE					
* S7 1540		53 / 91		SW		BROWN	MED TO COARSE SAND W/ SOME SILT. AUGER REFUSAL @ 13'	SW	S7 12-14' MOIST	5.0
	14.0	32 / 19	1.0 / 2.0	SP		BROWN-BLACK	USED 3" SPOON FROM 13-15' WOOD, GRAVEL + SILTY SAND.	SP	NATURAL MATERIAL? FILL AT 14'	3.0
S8 1600		100		TD=15'			REFUSAL @ 15'		S8 14-15' 3" SPOON	
S9 1610	16.0		- / 2.0						S9 15-15.25' 3" SPOON	
							TD = 15'			
							WATER NOT ENCOUNTERED			
							7 2" SPOONS USED			
							2 3" SPOONS USED			
							15' AUGER DRILLED.			

REMARKS: DIETRICH 25 SKID MOUNTED DRILL RIG W/ 140 lb. HAMMER
* = SAMPLE SENT FOR ANALYSIS.

BORING SB-03

PAGE 1 OF 1

* See Legend on Back

BORING LOG

Brown & Root Environmental

PROJECT: NIROP FRIDLEY — BORING NO.: SB-04 / TW-02

PROJECT NO.: 5255 — DATE: 4/6/95 — DRILLER: BERGERSON-CASWELL

ELEVATION: — FIELD GEOLOGIST: P. NIMMER

WATER LEVEL DATA:

(Date, Time & Conditions) 4/6/95, START @ 1252, END @ 1400 4/6/95. FOR RIG 4/10/95

4/10/95, START @ 0920, END @ 1130

	SAMPLE NO. & TYPE	DEPTH (FT) OR RUN NO.	BLOWS 6" OR BOD (%)	SAMPLE RECOVERY / SAMPLE LENGTH	LITHOLOGY CHANGE (DEPTH, FT)	MATERIAL DESCRIPTION*: SOIL DENSITY, CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	ROCK BR. OR USCS	REMARKS	HNu_{sv} (PPM)
					Concrete			CONCRETE 0 to 1'		CORED THRU CONCRETE	
*	S1 1250	2.0	16 / 64	1.0 / 1.0	SM	MED. DENSE	BROWN	GRADED SAND W/ FINE GRAVEL, SLT	SM	S1 3" SPOON 1103' DRY	3.0
			6 / 8							DRILLERS ADJUST RIG MICA SPLIT SAMPLE	
	S2 1315	4.0	12 / 23	1.5 / 2.0	ML	MED. DENSE	BROWN	CLAYEY SLT W/ SOME SAND SOME GRAVEL	ML	S2 2 to 4' MOIST	5.0
			4 / 6								
	S3 1330	6.0	12 / 19	1.2 / 2.0		MED. DENSE	BROWN-GREY	AS ABOVE.	ML	S3 4-6' MOIST	8.0
4/6/95			5 / 8								
↑	S4 1342	8.0	9 / 12	0.5 / 2.0		MED. DENSE	BROWN-GREY	AS ABOVE	ML	S4 6-8' MOIST	1.0
↓			4 / 6							RIG BROKEN	
4/10/95	S5 0930	10.0	9 / 4	0.5 / 2.0		MED. DENSE	BROWN-GREY	AS ABOVE	ML	S5 8-12' MOIST	1.0
			6 / 6								
*	S6 0945	12.0	7 / 14	1.2 / 2.0		MED. DENSE	BROWN GREY	AS ABOVE W/ OCCASIONAL GRAVEL	ML	S6 MOIST 10-12	1.0
			30 / 26							3" SPOON USED @ 10-12'	
*	S7 0958	14.0	20 / 29	1.0 / 2.0	SW	DENSE	BROWN	MEDIUM SAND W/ SOME SLT	SW	S7 12-14' MOIST	2.0
			50 / 59							POSSIBLE NATURAL MATERIAL MICA SPLIT SAMPLE	
	S8 1012	16.0	68 / 70	0.5 / 2.0		DENSE	BROWN	AS ABOVE. POOR RECOVERY, LARGE ROCK IN SPOON.		S8 WATER @ 15' 14-16'	1.0
								AUGERED TO 21'		3" SPOON USED 14 TO 16'	
		18.0			NO RECOVERY						
								WATER @ 15'			
		20.0						5 2" SPOONS USED			
		21.0						3 3" SPOONS. USED.			
					TD=21			AUGERED TO 21'			
								WELL SCREENED 20 to 10'			
								SAND TO 8'. BENTONITE			
								TO SURFACE, 19" CASING STICK UP			

REMARKS DESTRUCH 25 SKID MOUNTED Drill RIG W/ 140 lb. HAMMER

* = SAMPLE SENT FOR ANALYSIS.

RIG DOWN @ 1400 ON 4/6/95. FIXED 4/10/95.

BORING SB-04 / TW-02

PAGE 1 OF 1

* See Legend on Back

BORING CONVERTED TO TW-01 ON 4/10/95.

MW-4 SAMPLED @ 0-1' and 10' to 12' Triplicate or Duplicates

BORING LOG

Brown & Root Environmental

PROJECT: NIROP FRIDLEY — BORING NO.: SB-05
PROJECT NO.: 5255 — DATE: 4/6/95 — DRILLER: BERGERSON-CASWELL
ELEVATION: — FIELD GEOLOGIST: P. NIMMER
WATER LEVEL DATA:
(Date, Time & Conditions) 4/6/95, START @ 0835, END @ 1000

	SAMPLE NO. & TYPE	DEPTH (FT) OR RUN NO.	BLOWS 6" OR ROD (%)	SAMPLE RECOVERY / SAMPLE LENGTH	LITHOLOGY CHANGE (DEPTH, FT)	MATERIAL DESCRIPTION* SOIL DENSITY CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	ROCK BR. OR USCS	REMARKS (HNU PPM)
					Concrete			Concrete 0 to 1 ft.		
*	S1 0835	2.0	6 / 12	0.8 / 1.0		Loose	Brown	Medium and coarse sand with some silt and gravel	GM	S1 3" spoon 1 to 2' 1 to 2' Dry HNu = 0.0
			5 / 6		GM					
	S2 0940	4.0	8 / 7	1.6 / 2.0		Loose	Brown - Black	Graded sand w/ some silt and gravel.	GM	S2 Dry. 2 to 4' Fill material HNu = 1.0
			4 / 6							
	S3 0849	6.0	6 / 7	1.0 / 2.0	SM	Med. dense	Grey	Silt w/ some sand and gravel.	SM	S3 moist HNu = 1.0 4 to 6'
			3 / 3							
	S4 0857	8.0	5 / 5	1.2 / 2.0	ML	Loose	Grey	Silty clay w/ some fine sand occasional gravel.	ML	S4 moist HNu = 1.5 6-8'
			1 / 3							
	S5 0905	10.0	5 / 8	1.8 / 2.0		Loose	Grey - Brown	As above	ML	S5 moist HNu = 8.0 8-10'
			4 / 8							
*	S6 0910	12.0	19 / 21	1.5 / 2.0		Med. dense	Grey - Brown	As above	ML	S6 moist HNu = 8.0 10-12'
V	S7 0929	13.0	25 / 100	1.0 / 1.0	SM			Auger Refusal at 13' Silty sand w/ clay and large gravel	SM	S7 used 3" spoon 12-13 from 12-13'
			41 / 40							
*	S8 0940	15.0	27 / 26	1.5 / 2.0	SW	Dense	Grey Brown	Silty graded sand - fine to medium grained.	SM SW	S8 3.75 HNu = 5.0
					TD=15'					
								Total Depth = 15'		
								Auger Refusal at 15'		
								6 2" spoons used		
								2 3" spoons used		

REMARKS: DEITRICH 25 SKID MOUNTED Drilling Rig w/ 140 lb. hammer.
* = Sample Sent for analysis.
V = Sample collected, not sent for analysis.

BORING SB-05

PAGE 1 OF 1

* See Legend on Back

BORING LOG

Brown & Root Environmental

PROJECT: NIROP FRIDLEY — BORING NO.: SB-06 / TW-03
PROJECT NO.: 5255 — DATE: 4/4/95 — DRILLER: BERGERSEN-CASWELL
ELEVATION: — FIELD GEOLOGIST: P. NIMMER
WATER LEVEL DATA:
(Date, Time & Conditions) 4/4/95, 65° INSIDE BUILDING

	SAMPLE NO. & TYPE	DEPTH (FT) OR RUN NO.	BLOWS 6" OR ROD (ft)	SAMPLE RECOVERY / SAMPLE LENGTH	LITHOLOGY CHANGE (Depth, Ft.)	MATERIAL DESCRIPTION* SOIL DENSITY CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	ROCK BR. OR USCS	REMARKS	HNu (PPM)
			9 / 16					CONCRETE MEDIUM TO COARSE SAND W/	SM	CONCRETE TO 1' ABOVE SOIL	
*	S1 1314	2.0	13 / 7	1.2 / 2.0	SM	MED. DENSE	BLACK-TAN	SOME GRAVEL, SOME SILT.		S1 DRY DT 0-2'	2.5
			6 / 6						GP		
	S2 1325	4.0	8 / 14	1.0 / 2.0	GP	MED. DENSE	BROWN	GRADED SAND W/ GRAVEL		S2 DRY 2-4' FILL?	4.0
			3 / 4						SW		
	S3 1336	6.0	8 / 12	1.0 / 2.0		MED DENSE	BROWN	MED TO COARSE SAND.		S3 DRY 4-6'	3.0
			5 / 6						SW		
*	S4 1348	8.0	8 / 12	1.0 / 2.0		MED. DENSE	BROWN	AS ABOVE		S9 DRY 6-8'	2.0
			7 / 8		SW				SW		
	S5 1353	10.0	12 / 22	1.2 / 2.0		MED. DENSE	BROWN	AS ABOVE W/ FINE GRAVEL		S5 MOIST 8-10'	8.0
			7 / 12						SW		
*	S6 1415	12.0	17 / 19	1.2 / 2.0		MED. DENSE	BROWN	AS ABOVE. NO GRAVEL +		S6 MOIST 10-12'	2.0
			8 / 10						SW		
*	S7 1423	14.0	16 / 21	1.3 / 2.0		M-DENSE	BROWN	AS ABOVE		S7 WATER @ 14' 12-14'	3.0
			6 / 8						SW		
	S8 1430	16.0	14 / 21	1.1 / 2.0		MED. DENSE	BROWN-GREY	COARSE SAND		S8 SATURATED 14-16'	1.0
			10 / 6						SW		
	S9 1443	18.0	9 / 12	1.2 / 2.0		MED. DENSE	BROWN-GREY	AS ABOVE		S9 SATURATED 16-18'	1.0
			9 / 9						SW		
	S10 1452	20.0	8 / 15	1.5 / 2.0		MED. DENSE	GREY	AS ABOVE		S10 SATURATED 18-20'	1.5
					TD=20'						
								TOTAL DEPTH = 21'			
								SHOW TO 20', AUGER TO 21'			

REMARKS: DIEDRICH 25 SKID MOUNTED RIG W/ 140 lb. HAMMER
* = SENT FOR ANALYSIS.
BORING CONVERTED TO TW-03

BORING SB-06/TW-03

PAGE 1 OF 1

* See Legend on Back

BORING LOG

Brown & Root Environmental

PROJECT: NIROP FRIDLEY — BORING NO.: SB-07
PROJECT NO.: 5255 — DATE: 4/11/95 — DRILLER: BERGERSON-CASWELL
ELEVATION: — FIELD GEOLOGIST: P. NIMMER
WATER LEVEL DATA: SB07 IS 10' WEST of SB-02
(Date, Time & Conditions) 4/11/95 START @ 1238, END @ 1800 65° FRIDAY Building

SAMPLE NO. & TYPE	DEPTH (FT) OR RUN NO.	BLOWS 6" OR ROD (%)	SAMPLE RECOVERY / SAMPLE LENGTH	LITHOLOGY CHANGE (DEPTH, FT)	MATERIAL DESCRIPTION* SOIL DENSITY/ CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	ROCK BR. OR USCS	REMARKS (HNu (ppm))
				Concrete			CONCRETE 0 TO 2'		
*S1 1240	2.0	92 / 185	0.8 / 1.0		V. DENSE	Brown	GRADED SAND w/ GRAVEL	SW	S1 3" SPOON USED 20 1 TO 2 FT DRY ppm
		6 / 14							
*S2 1250	4.0	20 / 24	1.1 / 2.0	SW	MED. DENSE	BLUE-TAN	AS ABOVE. LESS GRAVEL	SW	S2 DRY 5 ppm 2 TO 4 BLUE STAINED
		4 / 4							
*S3 1300	6.0	30 / 20	1.2 / 2.0		MED. DENSE	BLUE-TAN	AS ABOVE	SW	S3 DRY 500 4 TO 6' BLUE STAINS ppm
S4 1315	7.0	40 / 90/5	0.1 / 1.0	No Recovery	V. DENSE	BLUE	AS ABOVE. VERY LIMITED RECOVERY		HIGH HNu & DISCOLORED S4 6 TO 7' DRY
S4	8.0		— / 2.0	No Recovery			NO RECOVERY 7 TO 8'. AUGERED TO 8'		AUGERED FROM 7 TO 8'
S5 1329		95 / 65							S5 DRY 500 8 TO 9.5 ppm
	10.0	100/1	0.2 / 1.1 TOP	SW	V. HARD	Brown	AS ABOVE w/ LARGE GRAVEL	SW	VERY LIMITED LESS RECOVERY. STAINING
S6 1355		9 / 13							
S6 1355	12.0	9 / 18	0.2 / 2.0	SM	MED. DENSE	BROWN	SANDY SILT w/ TRACE clay	SM	S6 MOIST 500 10 TO 12 ppm
		6 / 7							Sam. @ 12' 500 ppm From Hole
S7 1428	14.0	8 / 4	0.1 / 2.0		MED. DENSE	BROWN	AS ABOVE w/ TRACE GRAVEL	SW	S7 MOIST 500 12 TO 14 ppm
		8 / 16							14 TO 16 3" SPOON MOIST USED
*S8 1440	16.0	17 / 14	2.0 / 2.0	CL	MED. DENSE	GREY	SILTY CLAY w/ TRACE SAND	CL	S8 400 ppm 14 TO 16 STRONG ODOR
		4 / 8							
S9 1506	18.0	8 / 8	2.0 / 2.0		MED. DENSE	GREY	AS ABOVE	CL	S9 MOIST 500 ppm 16 TO 18 STRONG ODOR
		9 / 10							
S10 1604	20.0	8 / 14	2.0 / 2.0		MED. DENSE	GREY	AS ABOVE		S10 MOIST 500 ppm 18 TO 20
		14 / 16							
S11 1630	22.0	16 / 12	1.2 / 2.0		MED. DENSE	GREY	AS ABOVE		S11 MOIST 500 ppm 20 TO 22 ODOR NOTICEABLE
							AUGERED TO 28 FT		
	24.0			No Recovery					

REMARKS DIETRICH 25 SKID MOUNTED RIG w/ 140 lb. HAMMER.
* Indicates Sample Sent FOR ANALYSIS

BORING SB-07
PAGE 1 OF 2

• See Legend on Back

BORING LOG

Brown & Root Environmental

PROJECT: NIROP FRIDLEY — BORING NO.: SB-07
PROJECT NO.: 5255 — DATE: 4/11/95 — DRILLER: BERGESON-CASWELL
ELEVATION: — FIELD GEOLOGIST: P. NIMMER
WATER LEVEL DATA: —
(Date, Time & Conditions) —

SAMPLE NO. & TYPE	DEPTH (FT) OR RUN NO.	BLOWS 6" OR ROD (%)	SAMPLE RECOVERY / SAMPLE LENGTH	LITHOLOGY CHANGE (Depth, Ft.)	MATERIAL DESCRIPTION* SOIL DENSITY CONSISTENCY OR ROCK HARDNESS	COLOR	MATERIAL CLASSIFICATION	ROCK BR. OR USCS	REMARKS HNu (PPm)
	26.0						Augered From 22' to 28'	—	
				NO RECOVERY			No Recovery		
	28.0								Interval Saturated
		6 7			MED. DENSE	Brown	Coarse Sand w/ Some Silt	SW	S12 28 to 30' 100 PPm
* S12 1715	30.0	8 12	1.5 / 2.0	SW					
				TD=30'					
							Total Depth = 30'		
							Water @ ~ 28'		
							10 2" spoons		
							2 3" spoons		
							30' HSA Drilling		
							30' Boring Back Fill		

REMARKS: STRONG CHEMICAL ODOR WHILE AUGERING BELOW 14'

BORING SB-07

PAGE 2 OF 2

* See Legend on Back

A.2 TEMPORARY MONITORING WELL CONSTRUCTION FORMS

BORING NO IW-01

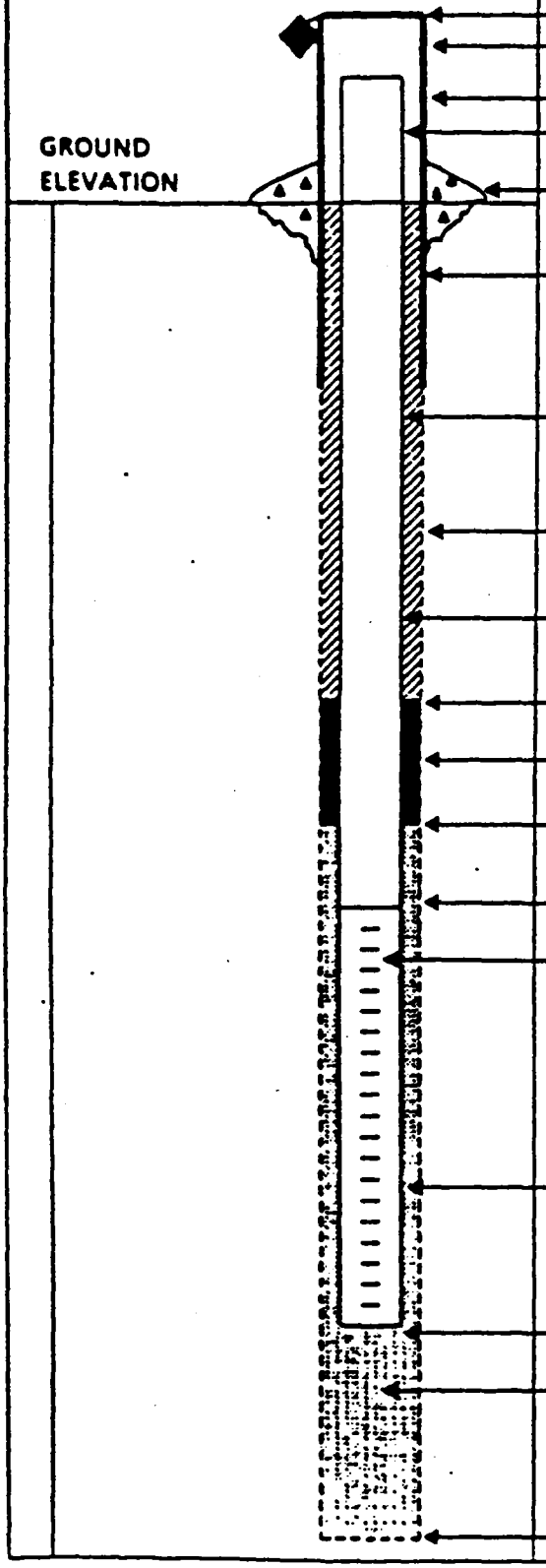
HALLIBURTON NUS
Environmental Corporation

TEMPORARY MONITORING WELL SHEET

PROJECT NIROP FRIDLEY
PROJECT NO. 5255
ELEVATION
FIELD GEOLOGIST P.NIMMER

LOCATION SB-01, WEST SIDE
BORING SB-01
DATE 4/10/95

DRILLER BERGERSON-CASWELL
DRILLING METHOD HS Auger
DEVELOPMENT METHOD SS Bailer, ~~Submersible Pump~~



ELEVATION OF TOP OF SURFACE CASING: NONE
ELEVATION OF TOP OF RISER PIPE: NONE
STICK - UP TOP OF SURFACE CASING: NONE
STICK - UP RISER PIPE: 37.50"
TYPE OF SURFACE SEAL: CONCRETE
I.D. OF SURFACE CASING: NONE
TYPE OF SURFACE CASING: NONE
RISER PIPE I.D. 2 INCH Ø
TYPE OF RISER PIPE: SCH. 40 PVC
BOREHOLE DIAMETER: 6 INCH Ø HOLE
TYPE OF BACKFILL: BENTONITE
ELEVATION / DEPTH TOP OF SEAL: 2.0
TYPE OF SEAL: BENTONITE
DEPTH TOP OF SAND PACK: 11.5
ELEVATION / DEPTH TOP OF SCREEN: 13.5
TYPE OF SCREEN: PVC
SLOT SIZE x LENGTH: 0.01 SLOT x 10 FT
I.D. OF SCREEN: 2" Ø
TYPE OF SAND PACK: #30 RED FLINT SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 23.5
ELEVATION / DEPTH BOTTOM OF SAND PACK: 23.5
TYPE OF BACKFILL BELOW OBSERVATION WELL: NONE
ELEVATION / DEPTH OF HOLE: 25.5

BORING NO. MW-04

HALLIBURTON NUS
Environmental Corporation

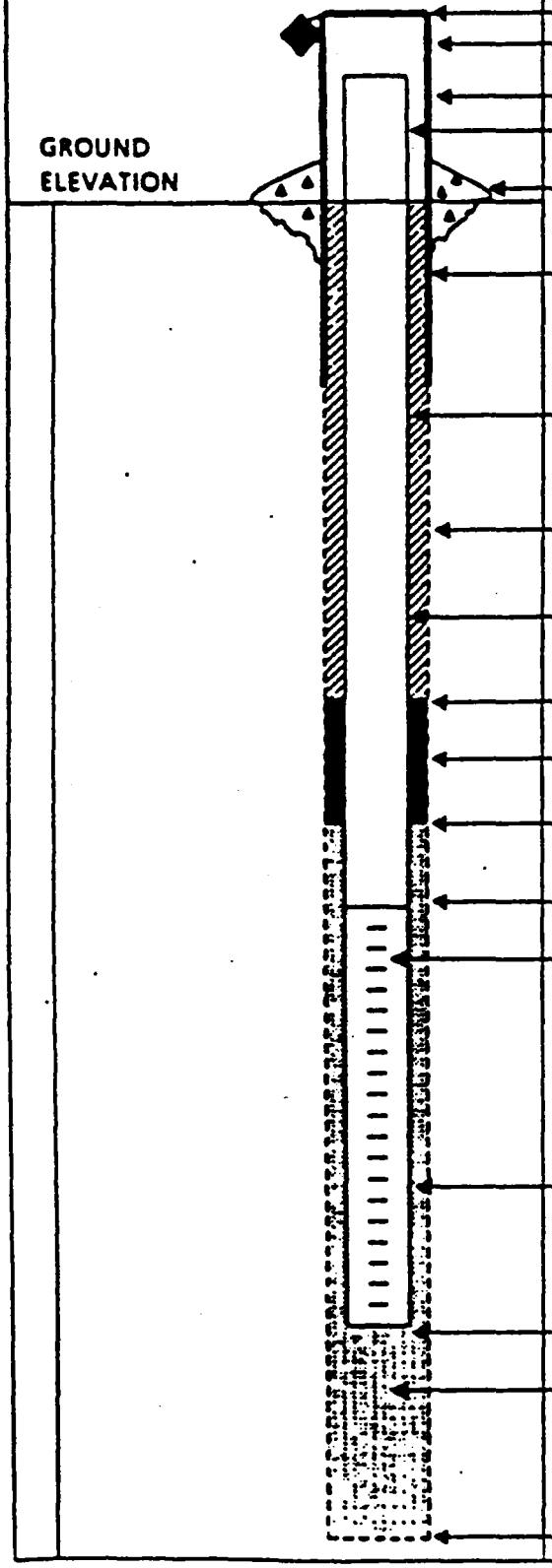
TEMPORARY

MONITORING WELL SHEET

PROJECT NIROP FRIDLEY
PROJECT NO. 5255
ELEVATION
FIELD GEOLOGIST P. NIMMER

LOCATION SB-04, NEAR SUMP
BORING SB-04
DATE 4/10/95

DRILLER Bergeson-Caswell
DRILLING METHOD HSA Drilling
DEVELOPMENT METHOD SS Bailer and Submersable Pump



ELEVATION OF TOP OF SURFACE CASING: NONE
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING: NONE
STICK - UP RISER PIPE: 19.0 inches
TYPE OF SURFACE SEAL: Concrete
I.D. OF SURFACE CASING: NONE
TYPE OF SURFACE CASING: NONE
RISER PIPE I.D. 2 inch
TYPE OF RISER PIPE: Sch. 40 PVC
BOREHOLE DIAMETER: 6 inch Ø Hole
TYPE OF BACKFILL: Bentonite
ELEVATION / DEPTH TOP OF SEAL: 0.0 ~~8.0~~
TYPE OF SEAL: Bentonite
DEPTH TOP OF SAND PACK: 8.0
ELEVATION / DEPTH TOP OF SCREEN: 10.0
TYPE OF SCREEN: Sch. 40 PVC
SLOT SIZE x LENGTH: 0.01 x 10 ft
I.D. OF SCREEN: 2" Ø
TYPE OF SAND PACK: #30 Sand
ELEVATION / DEPTH BOTTOM OF SCREEN: 20.0
ELEVATION / DEPTH BOTTOM OF SAND PACK: 20.0
TYPE OF BACKFILL BELOW OBSERVATION WELL: Natural Collapse
ELEVATION / DEPTH OF HOLE: 21.5'

BORING NO IW-03

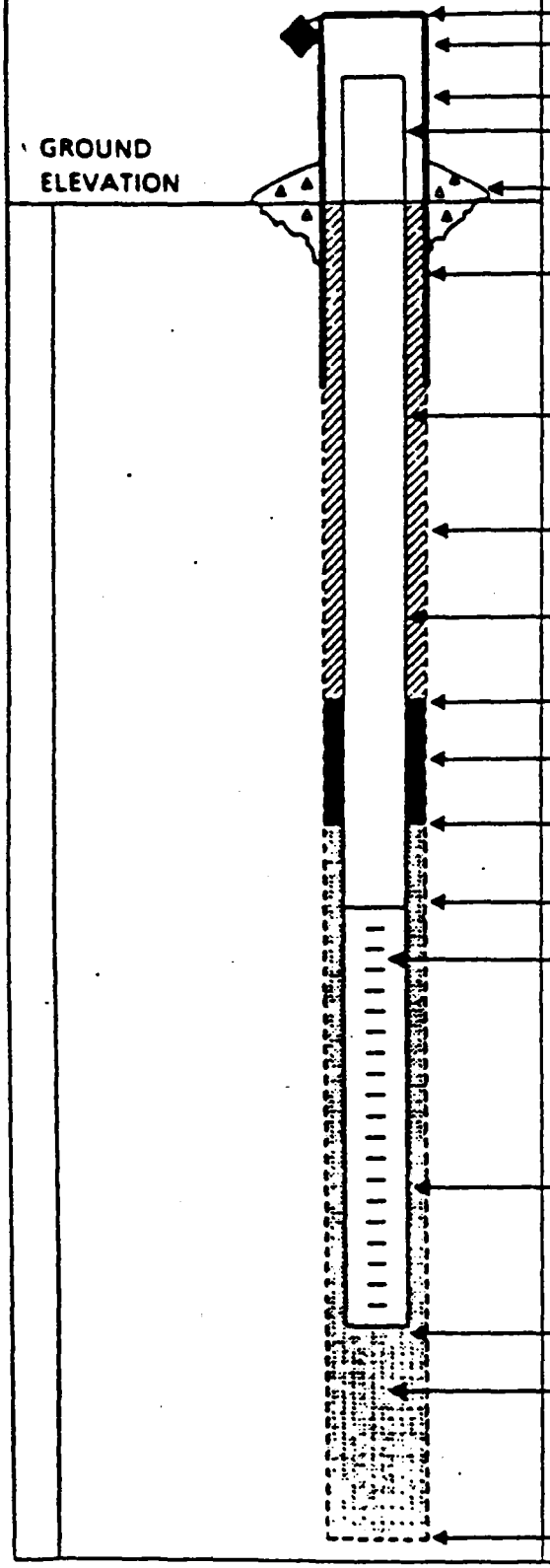
HALLIBURTON NUS
Environmental Corporation

TEMPORARY MONITORING WELL SHEET

PROJECT NIROP FRIDLEY
PROJECT NO. 5255
ELEVATION
FIELD GEOLOGIST P. NIMMER

LOCATION EAST SIDE OF SITE
BORING SB-06 / TW-03
DATE 4/4/95

DRILLER BERGERSON - CASWELL
DRILLING METHOD HSA
DEVELOPMENT METHOD



ELEVATION OF TOP OF SURFACE CASING: NONE
ELEVATION OF TOP OF RISER PIPE:
STICK - UP TOP OF SURFACE CASING: NONE
STICK - UP RISER PIPE: 1.50'
TYPE OF SURFACE SEAL: ~~OPEN~~ ~~CONCRETE~~ Bentonite
I.D. OF SURFACE CASING: NONE
TYPE OF SURFACE CASING: NONE
RISER PIPE I.D. 2"
TYPE OF RISER PIPE: Sch. 40 PVC 11.5 TO
BOREHOLE DIAMETER: 6" Ø HOLE
TYPE OF BACKFILL: VOID FILLED W/ Bentonite
ELEVATION / DEPTH TOP OF SEAL: 0.0 ~~TO~~ TO 9.0
TYPE OF SEAL: BENTONITE
DEPTH TOP OF SAND PACK: #30 RED FLINT SAND 9.0 TO 20.5
ELEVATION / DEPTH TOP OF SCREEN: 10.5 TO 20.5
TYPE OF SCREEN: 2" PVC, Sch. 40
SLOT SIZE x LENGTH: 0.01 slot x 10'
I.D. OF SCREEN: 2"
TYPE OF SAND PACK: #30 RED FLINT SAND
ELEVATION / DEPTH BOTTOM OF SCREEN: 20.5
ELEVATION / DEPTH BOTTOM OF SAND PACK: 20.5
TYPE OF BACKFILL BELOW OBSERVATION WELL: NATURAL COLLAPSE 20.5 TO 21'
ELEVATION / DEPTH OF HOLE: 21'

A.3 SAMPLE LOG FORMS

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PLN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-001-0001 Source Location SB-01 / TW-01

Sample Method: SS Bowl / Trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 0 to 1 ft			
Sample Date & Time: 4/10/95 1340			
Sampled By: PLN			
Signature(s):			
Type of Sample			
☒ Low Concentration			
☐ High Concentration			
☒ Grab			
☐ Composite			
☐ Grab - Composite			

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown	Graded sand w/fine Gravel. Moist.

Analysis:	
TCL VOAs	1 40z. Jar
TCL SVOCs	
TCL PCBs	2 8 oz. Jar
TAL Metals / CN	
pH	

Observations / Notes

HNu @ 20 ppm From Interval.

Duplicate sample DUP-01 collected From this Interval.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page ____ of ____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other ____

Case # ____

By PLN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-01-0608 Source Location SB-01 / TW-01

Sample Metnod: SS Bowl / TROWEL

Depth Sampled: 6 to 8 ft

Sample Date & Time: 4/10/95 1419

Sampled By: PLN

Signature(s): [signature]

Type of Sample
- ☑ Low Concentration
- ☐ High Concentration
- ☒ Grab
- ☐ Composite
- ☐ Grab - Composite

Composite Sample Data

Sample	Time	Color / Description

Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown	Course Sand w/ Fine Gravel

Analysis:
- TCL VOAs — 2 4oz. Jar
- TCL SVOCs — 8 oz. Jar
- TCL PCBs — 8 oz. Jar
- TAL METALS / CN — 8 oz. Jar
- pH — 8 oz. Jar

Observations / Notes

12 ppm HNu reading from Interval.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page ____ of ____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other ____

Case # ____

By PCN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-01-1916 Source Location SB-01 / TW-01

Sample Method: SS Bowl / Trowel

Depth Sampled: 14 to 16 ft

Sample Date & Time: 9/10/95 1515

Sampled By: PCN

Signature(s): Pete Mumm

Type of Sample
- ☒ Low Concentration
- ☐ High Concentration
- ☒ Grab
- ☐ Composite
- ☐ Grab - Composite

Analysis:
- TCL VOAs — 1 40z. Jar
- TCL SVOCs
- TCL PCBs — 8 oz. Jar
- TAL METALS / CN
- pH

Composite Sample Data

Sample	Time	Color / Description

Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Grey	Clayey Silt w/ some Sand and Gravel. Moist

Observations / Notes

HNu @ 120 ppm From Interval.

MPCA collected sample SB-1V-1012 From 10 to 12' Interval above this sample.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page ____ of ____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other ____

Case # ____

By PCN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-02-0001 Source Location SB-02

Sample Method: SS Bowl / Trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 0 to 1 ft			
Sample Date & Time: 4/10/95 1842			
Sampled By: PCN			
Signature(s): Peter Nunn			
Type of Sample: ☒ Low Concentration ☐ High Concentration ☒ Grab ☐ Composite ☐ Grab - Composite			

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown	Graded Sand w/ Silt and Gravel. Dry

Analysis:	
TCL VOAs	2 40z. Jar
TCL SVOCs	2 8 oz Jar
TCL PCBs	
TAL Metals / CN	
pH	

Observations / Notes

HNu @ 40 ppm from Interval.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page ____ of ____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other ____

Case # ____

By PLN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-02-0204 Source Location SB-02

Sample Metnod: SS Bowl / Trowel

Depth Sampled: 2 to 4 ft

Sample Date & Time: 9/10/95 1852

Sampled By: PLN

Signature(s): Peter Nunn

Type of Sample
- ☑ Low Concentration
- ☐ High Concentration
- ☒ Grab
- ☐ Composite
- ☐ Grab - Composite

Analysis:

TCL VOAs	1 40z. Jar
TCL SVOCs	1
TCL PCBs	8 oz. Jar
TAL MEtals /CN	
pH	

Composite Sample Data

Sample	Time	Color / Description

Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Green-Grey	Graded SAND w/large Gravel. Dry.

Observations / Notes

Soil STAINED Green. HNa @ 200 ppm.

Dup-02 taken From splitspoon.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PCN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-02-0406 Source Location SB-02

Sample Metnod: SS Bowl / TRowEL

Depth Sampled: 4 to 6 ft

Sample Date & Time: 4/10/95 1900

Sampled By: PCN

Signature(s):

Type of Sample
- ☑ Low Concentration
- ☐ High Concentration
- ☒ Grab
- ☐ Composite
- ☐ Grab - Composite

Composite Sample Data		
Sample	Time	Color / Description

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Green-Grey	Graded Sand w/ some Gravel. Dry.

Analysis:
- TCL VOAs — 1 4oz. Jar
- TCL SVOCs
- TCL PCBs — 8 oz Jar
- TAL Metals / CN
- pH

Observations / Notes

Soil Stained Green. NH_4 @ 500 ppm From Interval.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PCN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-02-0608 Source Location SB-02

Sample Metnod: SS Bowl / trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 6 to 8 ft			
Sample Date & Time: 4/10/95 1920			
Sampled By: PCN			
Signature(s): Peter Mann			
Type of Sample: ☒ Low Concentration ☐ High Concentration ☒ Grab ☐ Composite ☐ Grab - Composite			

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Green Grey	Graded Sand w/ Gravel. Dry.

Analysis:

- TCL VOAs — 1 40z. Jar
- ~~TCL SVOCs~~
- ~~TCL PCBs~~ — ~~2 8 oz Jar~~
- ~~TAL Metals / CN~~
- ~~pH~~

Observations / Notes

Soil stained green. HNu @ 500 ppm from this interval.

VOAs only collected from interval due to limited sample recovery.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PCN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-03-0001 Source Location SB-03

Sample Method: SS Bowl / Trowel

Depth Sampled: 0 to 1'

Sample Date & Time: 4/5/95 1443

Sampled By: PCN

Signature(s): [signature]

Type of Sample
- ☒ Low Concentration
- ☐ High Concentration
- ☒ Grab
- ☐ Composite
- ☐ Grab - Composite

Composite Sample Data

Sample	Time	Color / Description

Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown - Black	Fine and medium sand w/silt and gravel. Dry

Analysis:
- TCL VOAs — 1 40z. Jar
- TCL SVOCs — 2 8 oz. Jar
- TCL PCBs
- TAL Metals / CN
- pH

Observations / Notes

HNu Reading of 3.0 noted at Interface. Collected using 3" splitspoon.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PCN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-03-02 Source Location SB-03

Sample Method: SS Bowl / Trowel	Composite Sample Data			
	Sample	Time	Color / Description	
Depth Sampled: 10 to 12'				
Sample Date & Time: 4/5/95 1525				
Sampled By: PCN				
Signature(s):				
Type of Sample				
☒ Low Concentration				
☐ High Concentration				
☒ Grab				
☐ Composite				
☐ Grab - Composite				

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Grey-Black	Silty Clay w/ some Sand. Moist.

Analysis:	
TCL VOAs	1 40z. Jar
TCL SVOCs	
TCL PCBs	2 8 oz Jar
TAL Metals / CN	
pH	

Observations / Notes

HNu Reading of 4.0 ppm noted at interval from Split Spoon.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PLN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-03-1214 Source Location SB-03

Sample Metnod: SS Bowl / Trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 12 to 14'			
Sample Date & Time: 4/5/95 1540			
Sampled By: PLN			
Signature(s): Pete Nunn			

Type of Sample

- ☒ Low Concentration
- ☐ High Concentration
- ☒ Grab
- ☐ Composite
- ☐ Grab - Composite

Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown to Black	MED. to Coarse Sand w/Silt + Gravel. Moist.

Analysis:

TCL VOAs	1 40z. Jar
TCL SVOCs	
TCL PCBs	8 oz. Jar
TAL MEGALS / CN	
pH	

Observations / Notes

Wood, Gravel Noted. Likely Fill. Auger Refusal Below this depth. HNu reading of 3.0 ppm Noted From Spoon.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page ____ of ____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other ____

Case # ____

By PCN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-04-0001 Source Location SB-04 / TW-02

Sample Metnod: SS Bowl / trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 0 to 1 ft			
Sample Date & Time: 4/6/95 1250			
Sampled By: PCN			
Signature(s):			
Type of Sample			
☑ Low Concentration			
☐ High Concentration			
☑ Grab			
☐ Composite			
☐ Grab - Composite			

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown	Graded Sand w/ silt + Gravel. Dry.

Analysis:	
TCL VOAs	1 4oz. Jar
TCL SVOCs	
TCL PCBs	8 oz. Jar
TAL Metals / CN	
pH	

Observations / Notes

HNu reading of 0.0 ppm from Interval.

M. Ferrey of MPCA collected duplicate sample From this Interval w/ Identical sample ID #

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PLN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-04-1012 Source Location SB-04 / TW-02

Sample Method: SS Bowl / ~~New~~ Trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 10 to 12'			
Sample Date & Time: 4/10/95 0935			
Sampled By: PLN			
Signature(s):			
Type of Sample ☑ Low Concentration ☐ High Concentration ☒ Grab ☐ Composite ☐ Grab - Composite			

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Gray-Brown	clayey SILT w/ Graded SAND. MOIST.

Analysis:	
TCL VOAs	1 40z. Jar
TCL SVOCs	
TCL PCBs	8 oz. Jar
TAL METALS / CN	
pH	

Observations / Notes

HNu reading of 1.0 from this interval.

MPCR Takes SPLIT of this sample with same SAMPLE ID.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page ____ of ____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other ____

Case # ____

By PN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-04-1214 Source Location SB-04 / TW-02

Sample Method: SS Bowl / Trowel	
Depth Sampled: 12-14	
Sample Date & Time: 4/10/95 0958	
Sampled By: PN	
Signature(s):	

Type of Sample

- ☒ Low Concentration
- ☐ High Concentration
- ☒ Grab
- ☐ Composite
- ☐ Grab - Composite

Composite Sample Data

Sample	Time	Color / Description

Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown	MED. GRAINED SAND W/SILT - MOIST.

Analysis:

- TCL VOAs — 1 40z. Jar
- TCL SVOCs
- TCL PCBs — 2 8 oz. Jar
- TAL METALS / CN
- pH

Observations / Notes

HNu reading of 2.0 ppm from this interval.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page ____ of ____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other ____

Case # ____

By PLW

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-05-0001 Source Location SB-05

Sample Method: SS Bowl / trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 0 to 1 ft			
Sample Date & Time: 4/6/95 0835			
Sampled By: PLW			
Signature(s):			
Type of Sample: ☒ Low Concentration ☐ High Concentration ☒ Grab ☐ Composite ☐ Grab - Composite			

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown	Medium to coarse sand w/ silt. Dry.

Analysis:

- TCL VOAs — 1 4oz. Jar
- TCL SVOCs — 2 8 oz. Jar
- TCL PCBs
- TAL Metals / CN
- pH

Observations / Notes

HNu reading of 0.0 ppm from this interval.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PLN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-05-1012 Source Location SB-05

Sample Method: SS Bowl / Trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 10 to 12'			
Sample Date & Time: 4/6/95 0910			
Sampled By: PLN			
Signature(s):			

Type of Sample
- ☑ Low Concentration
- ☐ High Concentration
- ☑ Grab
- ☐ Composite
- ☐ Grab - Composite

Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Gray-Brown	Silty clay w/ sand. moist.

Analysis:
- TCL VOAs — 1 40z. Jar
- TCL SVOCs
- TCL PCBs — 2 8 oz Jar
- TAL METALS / CN
- pH

Observations / Notes

HN_4 reading of 3.0 ppm from this interval.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PLN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-05-1315 Source Location SB-05

Sample Metnod: SS Bowl / Hand C	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 13 to 15 ft			
Sample Date & Time: 4/6/95 0940			
Sampled By: PLN			
Signature(s): Pete Mann			
Type of Sample ☑ Low Concentration ☐ High Concentration ☑ Grab ☐ Composite ☐ Grab - Composite			

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Grey-Brown	Silty Graded Sand, Moist.

Analysis:

- TCL VOAs — 1 40z. Jar
- TCL SVOCs
- TCL PCBs — 1 8 oz. Jar
- TAL Metals / CN
- pH

Observations / Notes

HNu reading of 5.0 ppm from interval.

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page ____ of ____

☐ Surface Soil
☒ Subsurface Soil
☐ Sediment
☐ Lagoon / Pond
☐ Other ____

Case # ____

By PW

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-06-0002 Source Location SB-06 / TW-03

Sample Method: SS Bowl / Trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 0-2'			
Sample Date & Time: 4/4/95 1311			
Sampled By: PW / MC			
Signature(s): Peter Wynn			
Type of Sample			
☑ Low Concentration			
☐ High Concentration			
☑ Grab			
☐ Composite			
☐ Grab - Composite			

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
BROWN	Graded SAND w/Gravel, SILT

Analysis:	
TCL VOAs	1 4oz. Jar
TCL SVOCs	
TCL PCBs	1 8 oz. Jar
TAL METALS / CN	
pH	

Observations / Notes

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page _____ of _____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other _____

Case # _____

By PLN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-06-0810 Source Location SB-06 / TW-03

Sample Metnod: SS Bowl / trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 8 - 10'			
Sample Date & Time: 4/4/95 1348			
Sampled By: PLN / MC			
Signature(s): Peter Nunn			
Type of Sample			

- ☒ Low Concentration
- ☐ High Concentration
- ☒ Grab
- ☐ Composite
- ☐ Grab - Composite

Sample Data

Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown	MEDIUM TO COARSE SAND. DRY

Analysis:	
TCL VOAs	1 40z. Jar
TCL SVOCs	
TCL PCBs	1 8 oz. Jar
TAL METALS / CN	
pH	

Observations / Notes

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

SAMPLE LOG SHEET

HALLIBURTON NUS
Environmental Corporation

Page ____ of ____

- ☐ Surface Soil
- ☒ Subsurface Soil
- ☐ Sediment
- ☐ Lagoon / Pond
- ☐ Other ____

Case # ____

By PLN

Project Site Name NIROP FRIDLEY Project Site Number 5255

NUS Source No. SB-06 - 1214 Source Location SB-06 / TW-03

Sample Metnod: SS Bowl / Trowel	Composite Sample Data		
	Sample	Time	Color / Description
Depth Sampled: 12 to 14'			
Sample Date & Time: 4/4/94			
Sampled By: PLN / MC			
Signature(s): Peter Nunnum			
Type of Sample			
☑ Low Concentration			
☐ High Concentration			
☑ Grab			
☐ Composite			
☐ Grab - Composite			

Sample Data	
Color	Description: (Sand, Clay, Dry, Moist, Wet, etc.)
Brown	MEDIUM to COARSE SAND, MOIST

Analysis:	
TCL VOAs	1 40z. Jar
TCL SVOCs	
TCL PCBs	1 8 oz. Jar
TAL METALS / CN	
pH	

Observations / Notes

	Organic	Inorganic
Traffic Report #		
Tag #		
AB #		
Date Shipped		
Time Shipped		
Lab		
Volume		

HALLIBURTON NUS
Environmental Corporation

SAMPLE LOG SHEET

☐ SURFACE SOIL ☐ LAGOON/POND
☐ SUBSURFACE SOIL ☒ OTHER
☐ SEDIMENT

WATER SAMPLES - QA/QC SAMPLES

SAMPLERS SIGNATURE Pete Murray

SITE NAME NIROP FRIDLEY

SITE NUMBER 5255

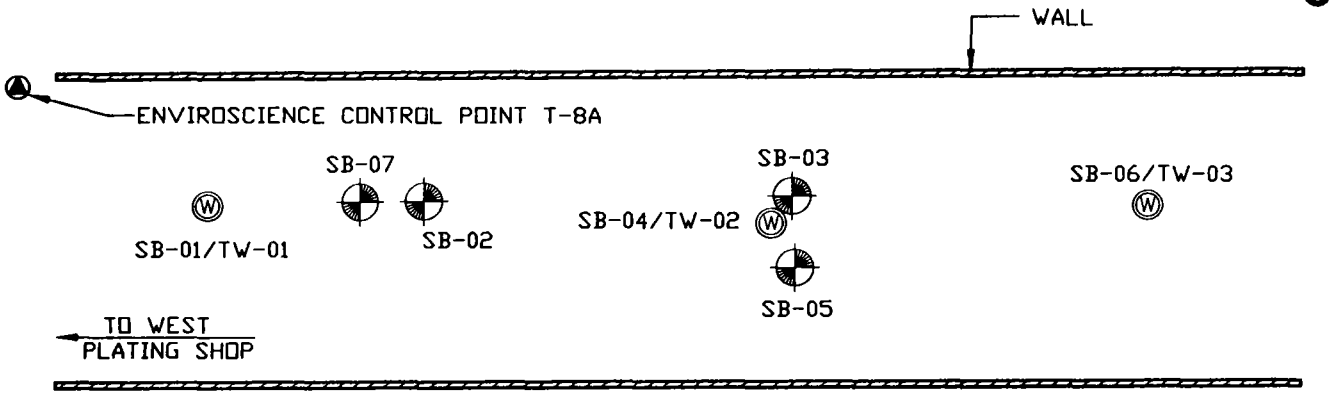
SAMPLE No.	SAMPLE METHOD	DEPTH (FT)	DATE	TIME	SAMPLED BY	CONCENTRATION (L)OW (H)IGH	(G)RAB (C)OMPOSITE	ANALYSES: TCL VOAs (2 40 ml)	TCL SVOCs (1 L amber)	TCL PCBs (1 L amber)	MEtals - total (1 L PE)	Metals dissolved (1 L PE)	CN (1 L PE)	PH (250 ml PE)	No. OF CONT TOTAL	SOIL DESCRIPTION
TB-01-041195	FROM LAB	-	4/11/95	From LAB	PLN	L	G	x							2	TRIP BLANK
RB-01-041195(-F)	-	-	↓	0800	PLN	L	G	x	x	x	x	x	x	x	8	RINSATE OFF SS TROWEL USED FOR SOIL SAMPLING.
TB-01-041294	FROM LAB	-	4/12/95	From LAB	PLN	L	G	x							2	TRIP BLANK
RB-01-041294	-	-	↓	1245	PLN	L	G	x	x	x	x		x	x	7	RINSATE FROM BAILER USED FOR GW SAMPLING.
RB-01-041294-F	-	-	↓	1245	PLN	L	G					x				TO BE FILTERED AT LAB RINSATE FROM BAILER

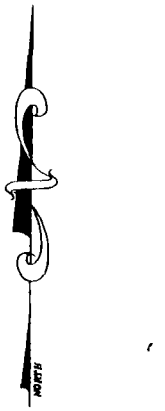
REMARKS:
ALL SAMPLES GET 7 day TURN

LAB:

A.4 SOIL BORING / TEMPORARY MONITORING WELL SURVEY DATA

TEMPORARY WELL AND SOIL BORING LOCATIONS NIROP-FRIDLEY,MN. FOR HALLIBURTON NUS CORPORATION





GRAPHIC SCALE

0 10 20 40

(IN FEET)

1 inch = 20 ft.

LEGEND:

- SOIL BORING
- TEMPORARY MONITORING WELL

NO.'S	Y	X	ELEV.
TW-01/ SB-01	1078642.7759	2811514.2783	832.60 TOP PIPE 829.5 GROUND
SB-02	1078643.6444	2811549.2176	829.3 GROUND
SB-07	1078643.4732	2811538.8190	829.4 GROUND
SB-03	1078644.6229	2811608.6421	829.3 GROUND
TW-02/ SB-04	1078640.1975	2811605.3233	830.47 TOP PIPE 829.0 GROUND
SB-05	1078632.9496	2811609.2425	829.3 GROUND
TW-03/ SB-06	1078643.1822	2811666.3711	831.12 TOP PIPE 829.6 GROUND

NOTES:

- HORIZONTAL CONTROL ESTABLISHED BY 1992 G.P.S. TRAVERSE, BASED ON GEODETIC SECOND ORDER CONTROL ADJUSTED TO THE 1983 NORTH AMERICAN DATUM (NAD 83) 1986 ADJUSTMENT. STATE PLANE COORDINATE VALUES ARE BASED ON THE LAMPERT GRID SYSTEM, MINNESOTA. SOUTH ZONE.
  1. BLAINE - MNDOT
  2. DRISSEN - MNDOT
  3. GORG - MNDOT
- VERTICAL DATUM IS BASED ON N.G.V.D. 1929 ADJUSTMENT (SEA LEVEL)
- COORDINATES SHOWN ARE U.S. SURVEY FOOT

BENCHMARKS:

- TOP NUT HYDRANT ELEV.= 837.79 150±' NO. OF ENTRANCE 3A.
- MNDOT ALUM CAP VERTICAL CONTROL MARK M254=833.41 (1970)

CERTIFICATION:

I hereby certify that this survey, plan or report was prepared by me or under my direct supervision and that I am a duly Registered Land Surveyor under the laws of the state of Minnesota.

Lee J. Nord Date: 20 APRIL 95

Lee J. Nord
MN. Reg. No. 22033

REVISED 4/27/95: ADD'T. OF SOIL BORING SB-02 LJN

ENVIROSCIENCE
8474 CITY WEST PARKWAY
EDEN PRAIRIE, MINNESOTA 55344
(612) 944-8486

FMC DWG PROJECT NO. 5020.21 FIELD BOOK NO. 16 DRAWN BY: JRH

EMC Fridley Mn

Soil Boring Survey

#5020.211

Book 16

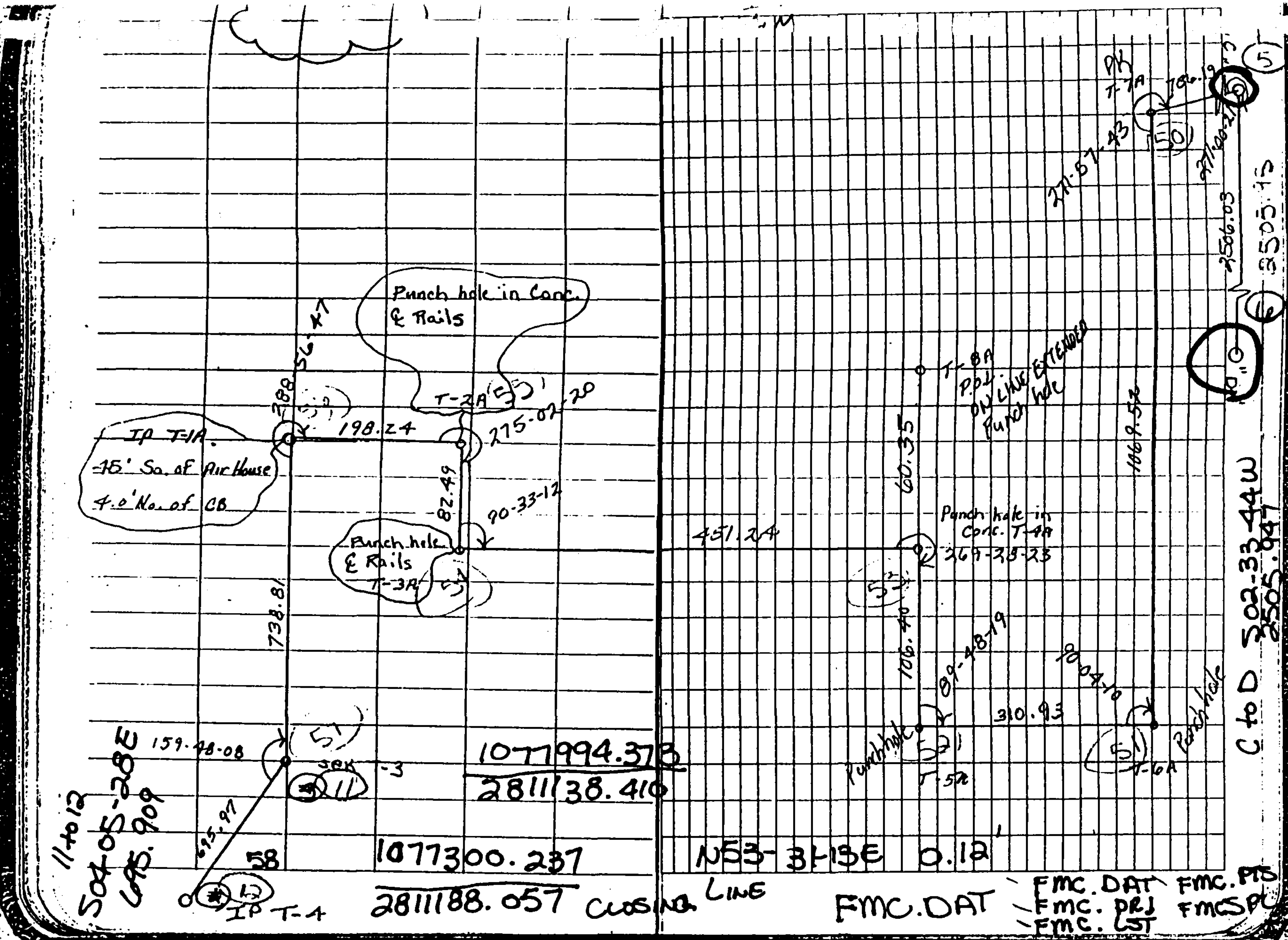
4-3-95

41° Sunny

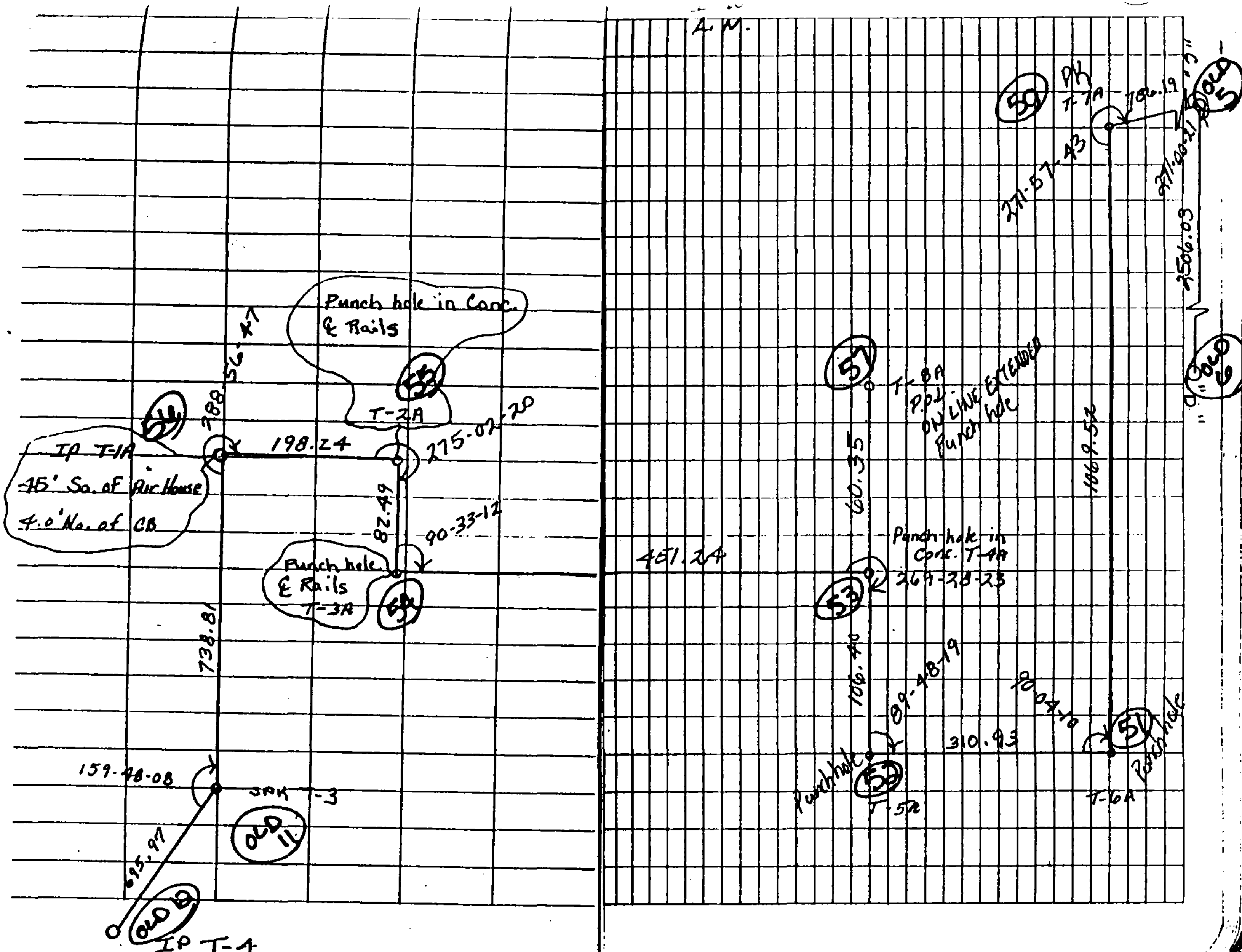
B. Mullins

I Willeman

SEE Book 4 for Previous EMC Notes



Punch hole in Conc. & Rails
IP T-1A
15' So. of Air House
4.0' No. of CB
198.24
T-2A
275-02-20
82.49
90-33-12
Punch hole & Rails
T-3A
738.81
159-48-08
695.97
IP T-4
58
1077994.378
2811138.410
1077300.237
2811188.057
CLOSING LINE
N53-31-15E 0.12
S04-05-28E
451.24
T-8A
Punch hole in Conc. T-4A
269-38-23
60.35
106.40
89-48-19
Punch hole
T-5A
310.93
T-6A
1069.52
271-57-43
T-7A
2506.03
3505.75
C to D S02-33-44W
3505.947
FMC.DAT
FMC.DAT
FMC.PRJ
FMC.LST
FMC.PTS
FMC.SPL


Punch hole in Conc.
& Rails
T-2A
275-02-20
198.24
IP T-1A
45' So. of Air House
4.0' No. of CB
82.49
90-33-12
Punch hole
& Rails
T-3A
738.81
159-48-08
OLD 11
695.97
OLD 12
IP T-4
T-8A
P.O.L.
ON LINE EXTENDED
Punch hole
60.35
451.24
Punch hole in
Conc. T-4A
269-38-23
106.40
89-48-19
310.93
Punch hole
T-5A
T-6A
Punch hole
1069.52
2506.03
T-7A
271-57-43
OLD 5
OLD 6

		dist
LC T-3		
BS T-4		695.97
~~XRt to T-1A~~	1) ~~159-48-09~~	738.81
	2) 159-48-10	(225.190)
	3) 159-48-07	
	M) (159-48-08)	
	H) 800-11-55	
LC T-1A		
BS T-3		738.815
~~XRt to T-2A~~	1) ~~288-56-58~~	
	2) 288-56-48	(60.424)
	3) 288-56-47	198.24
	M) (288-56-47)	
	H) 71-03-14	
LC T-2A		
BS T-1A		198.23
XRt to T-3A	d 1) 275-02-19	82.49
	2) 275-02-21	(25.143)
	R 1) 275-02-18	
	2) 275-02-20	
	M) (275-02-20)	
	H) 84-57-35	

	4 N
SPK	
IP	
Set IP	
Set IP	
SPK (Fnd)	
punch hole & Rails	
Punch hole & Rails	
Set IP	
Punch hole & Rails	

			dist
TO T-3 A			
BS T-2A			82.50
*RET. TO T-4A	D 1) 90 33 09		(137.535 m)
	2) 90 -33-13		451.23
	R 1) 90-33-15		
	2) 90-33-11		
	M) 90-33-12		
	H) 269-26-48		
TO T-4A			
BS T-3A			451.24
*RT TO T-5A	D 1) 269-28-25		106.40
	2) 269-28-20		(32.430)
	R. 1) 269-28-18		
	2) 269-28-29		
	M) 269-28-23		
	H) 90-31-45		
TO T-5A			
BS T-4A			106.40
*T-T-6A	1) 89-48-17		(94.773 m)
	2) 89-48-15		310.935'
	1) 89-48-22		
	2) 89-48-20		
	M) 89-48-19		
	H) 270-11-42		

L. N.

PUNCH HOLE 2) & RAILS

Punch hole & Rails

Punch hole & to (S) x South Wall line

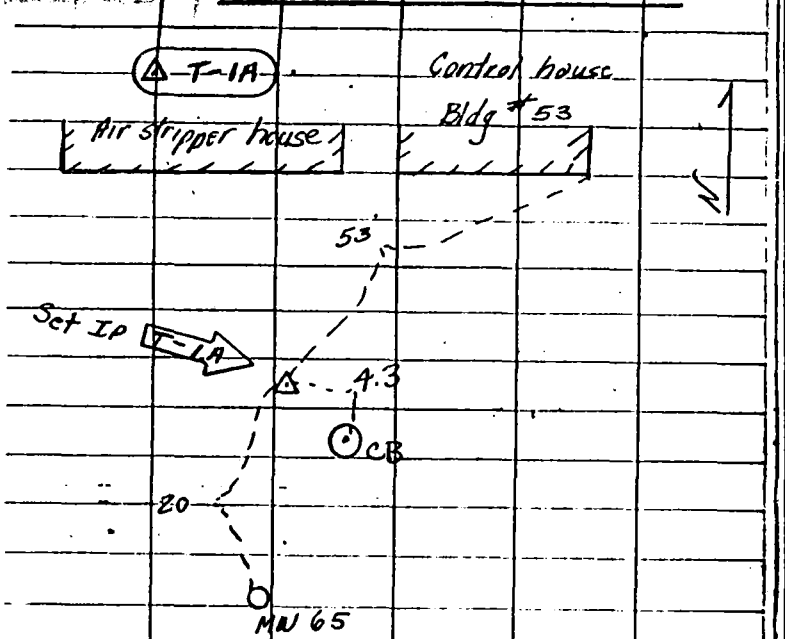
℄ 6A		
BS T-6A		310, 9.30
℄ Rt to T-7A		1069.52
		(325.988)
	1) 90-04-10	
	2) 90-04-09	
R		
	1) 90-04-09	
	2) 90-04-10	
	M) 90-04-10	
	H) 269-55-51	
℄ @ T-7A		
B.S T-6A		1069.52
F.S. "C"	1) 271-57-40	(289.628m)
	2) 271-57-45	286.18
	M) 271-57-43	
	H) 88-02-17	
℄ @ 5A		
BS 4A		106.40
		(50.825m)
℄ Rt 00.00.00		166.75'
℄ Rt 180 to		5.92'

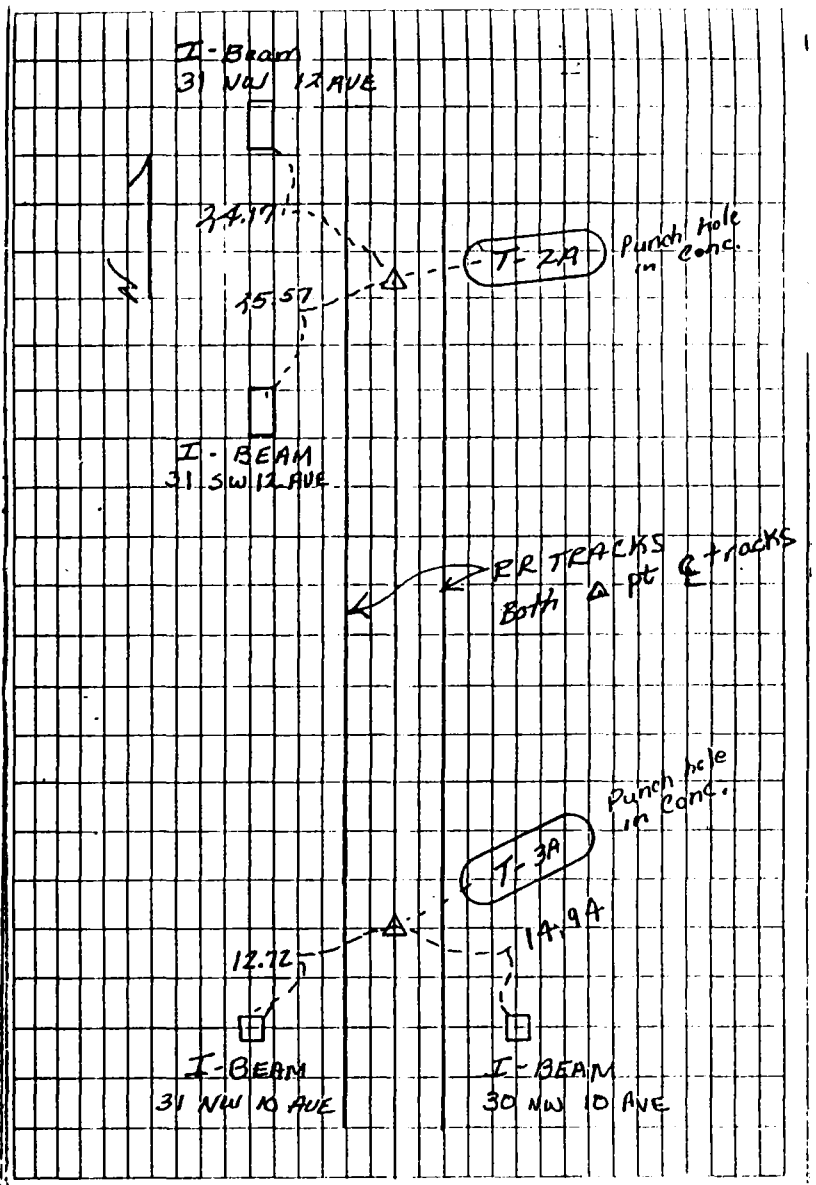
Punch hole in Conc.
PK in Conc. (out side)

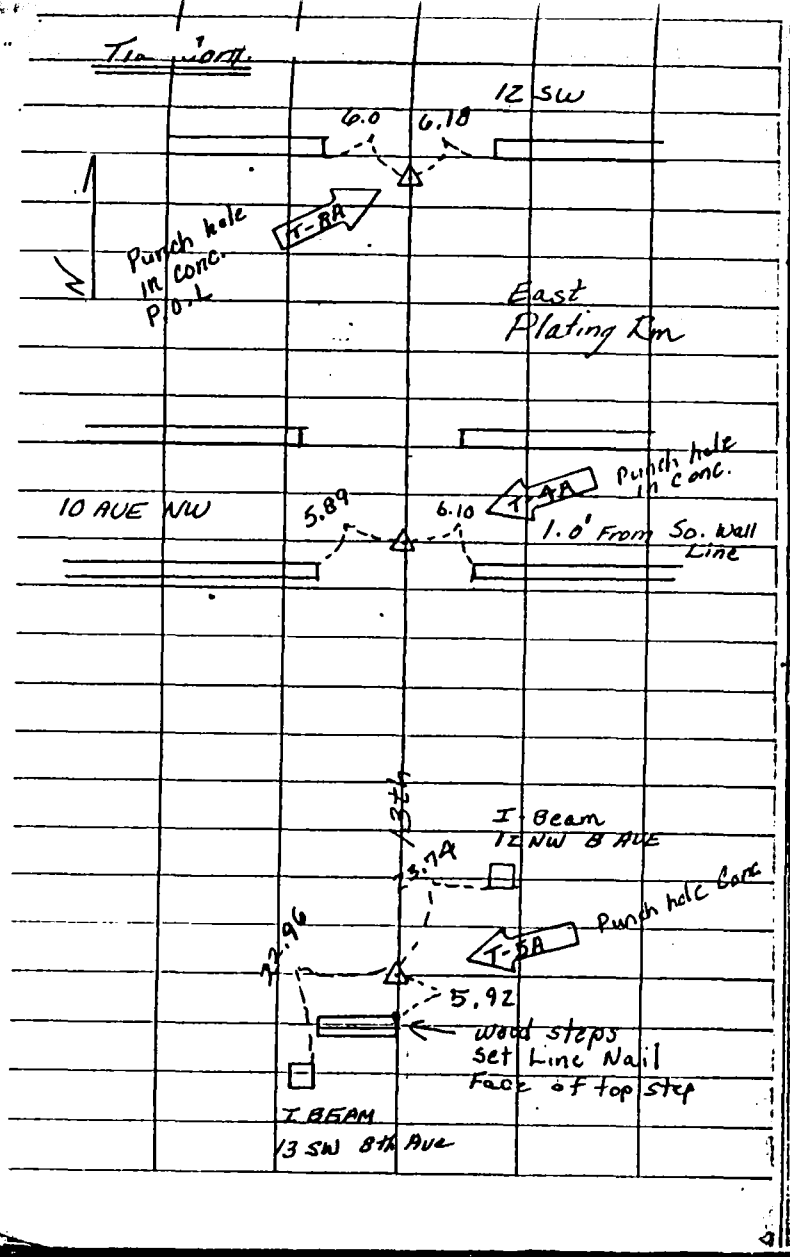
PK in Conc.
Top Bolt Eastend hand Rail (So. hand Rail) No. Bolt
SEE Book 4 pg 42 for ties

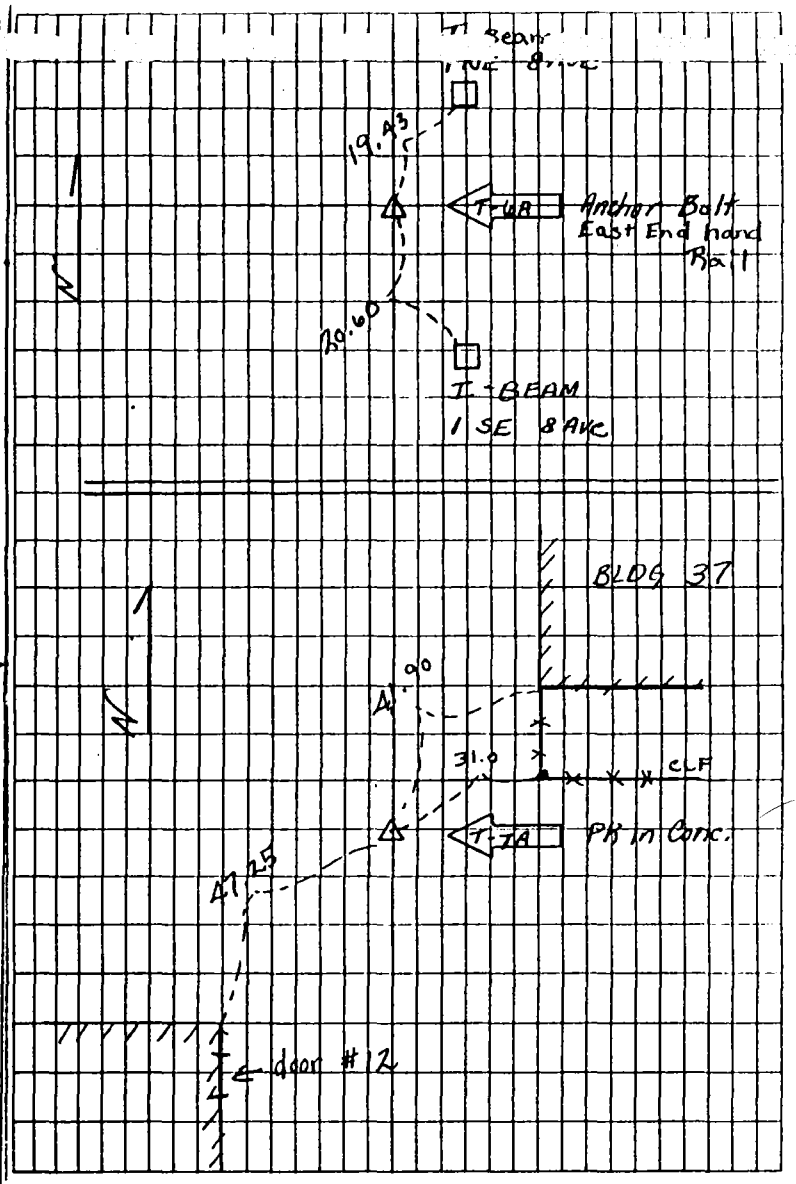
Nail in Vertick face of top step

Ties to Control Pts






Tie North
12 SW
6.0
6.18
T-BA
Punch hole in conc. P/O L
East Plating Rm
10 AVE NW
5.89
6.10
T-AA
Punch hole in conc.
1.0' From So. Wall Line
13th
I-Beam
12 NW 8 AVE
3.7A
Punch hole Conc
T-5A
27.96
5.92
wood steps
set Line Nail
Face of top step
I BEAM
13 SW 8th Ave


I Beam
1 NW 8 Ave
19.43
T-6A
Anchor Bolt
East End hand Rail
30.60
I-BEAM
1 SE 8 Ave
BLDG 37
41.90
31.0
CLF
T-7A
Ph in Conc.
41.25
door #12

Traverse Close out

		dist
℄ @ "C"		
BS T-7A		786.19'
℄ RT to "D"		3506.03
		(763.836)
	1) 371-00-20	
	2) 371-00-22	
	3) 371-00-21	
	4) 88-59-39	

I.W.

See BK 4 for ties Pg 42

See BK 4 for ties Pg 42

Level Loop through Aprs
T-1A – T-8A

	+	Hi	–	ELEV.	
BM	4.02	837.43		833.41	
TP			4.91	832.52	
	4.68	837.20			
TBM			2.74	834.46	(834.51)
	5.23	839.69			
TBM			2.10	837.59	
	1.96	839.85			
TP			5.10	834.75	
	5.26	840.01			
TBM			5.37	834.64	
	5.18	839.82			
TBM			5.13	834.69	
	5.20	839.89			
TBM			5.27	834.62	
	5.22	839.84			
TBM			5.10	834.74	
	5.15	839.89			
TBM			5.17	834.72	
	5.29	840.01			
TBM			5.11	834.90	

I.W.

USGS Alyon Cap Modot M254
(See BK4 PG 51)

SPK E. side PP 10 North Gate 7

TNH 50'± No of Ent. 96A

Floor

T-2A

T-3A

T-4A

T-8A P.O.L.

T-5A

T-6A Top Bolt East End Hand Rail

Loop Cont.

	+	Hi	−	ELEV	
	5.14	840.04			
TP			5.21	834.83	
	5.26	840.09			
TP			5.24	834.85	
	5.27	840.12			
TBM			5.69	834.43	
	5.08	839.51			
TBM			1.72	837.79	
	1.90	839.69			
TBM			2.73	836.96	
	4.12	841.08			
TP			6.29	834.79	
	1.87	836.66			
TP			0.98	835.68	
	1.38	837.06			
TP			2.69	834.37	
	2.87	837.24			
TBM			3.51	833.73	(833.78)
				↘ 0.05 closure	

Floor

Floor

T-7A PK in Crack of Conc

TNH 150± No of Ent. 3A

TNH 100± So of SE Cor Gaud Shack Gate Ent ↑

Top Wood Post

Top Wood Post

Top Wood Post

Spk on Wood Post East of Well 365
(See BK 4 Pg 51)

	Loop to +	check	Sub -	AP.
BM	4.09	837.5		833.41
TBM			3.03	834.47

↘ (834.51)

Model M354
Spk E. side of Gate 7

(See Bk 4 Pg. 51)

Fmc

B. OSBORN
I WITTMEN

4/12/95

WELL LOCATION & SOIL BORING LOCATION

⊼ @ T-8A
BS @ T-5A

⊼RT	DIST	HORIZ. ⊼
302-12-20	36.64	57-47-40
288-50-15	58.69	71-09-40
278-11-00	126.68	81-46-05
280-28-10	124.10	79-32-00
283-19-20	129.40	76-40-30
276-11-30	184.17	
258-34-09	6.25	
269-08-00	85.73	
271-14-15	210.77	
285-24-20	182.57	
301-32-17	92.57	

DESCRIPTION
TW-01
SB-07
SB-03
TW-02
SB-05
TW-03
WALL LINE
" "
" "
" "
" "

Fmd cont.

BM	6.12	839.86		834.74	
			7.26	832.60	
			10.41	829.45	
			10.59	829.27	
			9.39	830.47	
			10.51	829.35	
			8.74	831.12	
TP	7.70	839.84	7.72	832.14	
BM			5.22	834.62	(834.62)
BM	5.28	840.02		834.74	
			10.50	~~829.52~~ ~~830.52~~	
			10.97	829.05	
			10.41	829.61	
TP	7.79	839.93	7.88	832.14	
BM			5.31	834.62	(834.62)

(58)

4/12/95

T-8A SEE PG 53
TW-01 TOP PIPE
SB-07 GROUND
SB-08 "
TW-02 TOP PIPE
SB-05 GROUND
TW-03 TOP PIPE
T-4A

T-8A
TW-01 GROUND
TW-02 GROUND
TW-03 GROUND
T-4A

1992 SURVEY FOR M-K

BOOK 4

PG 39-

1 APRIL 92
L. NORTH
R. MULLINS
CLEAR 35° +

FMC NE MPLS
JOB # 90064

U.S. Survey Foot

$\left(\frac{3937}{1200}\right)$ meters

N 1,084,035.170

E 2,813,246.224

S.F. = 0.99997150

N 330413.971 m

E 857479.164 m

USE 0°

196° 44' 16"

CONTROL TRAVERSE

GPS "RAIL" 40

(1) 140

"A" (2) 1184.140

171-59-58.8

"B" (3) 1194.245

172-27-10.8

(4) 1380.555

181-22-21.5

"D" (5) 2506.020

177-49-21.5

(6) 2429.220

168-00-57.8

"E" (7) 2629.695

124-55-43.5

(8) 1206.94

"F"

N 1,067,582.875

E 2,814,898.660

SF = 0.99996083

N 325399.911 m

E 857982.777 m

(GPS)

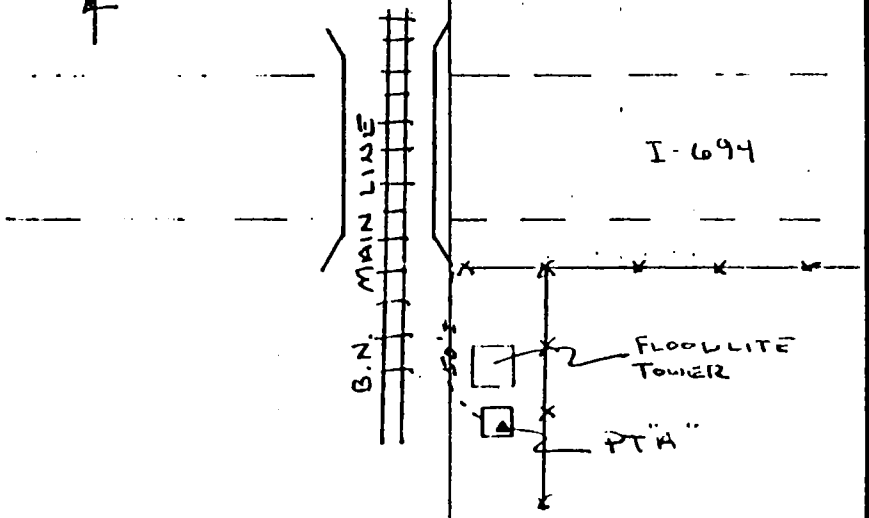
@ "A" 3
BS "RWLL"
& RT To "B"

1	171-59-53	1184.14	(360.925)
2	171-59-53		
3	171-59-48	1996.23	(608.451)
4	171-59-49		
m	171-59-50.8		
	(188-00-08)		

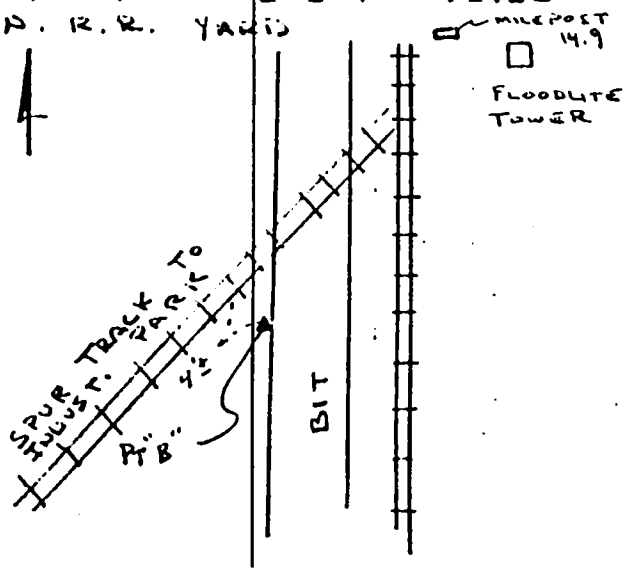
@ "B"
BS "A"
& RT To "C"

	172-27-09	1996.26	
1	~~172-27-19~~	1380.55	(420.793)
2	172-27-14		
3	172-27-10		
4	172-27-10		
m	172-27-10.8		
	(187-32-45)		

"A" = "X" IN SE CONC FOUNDATION FOR ELEC PAD

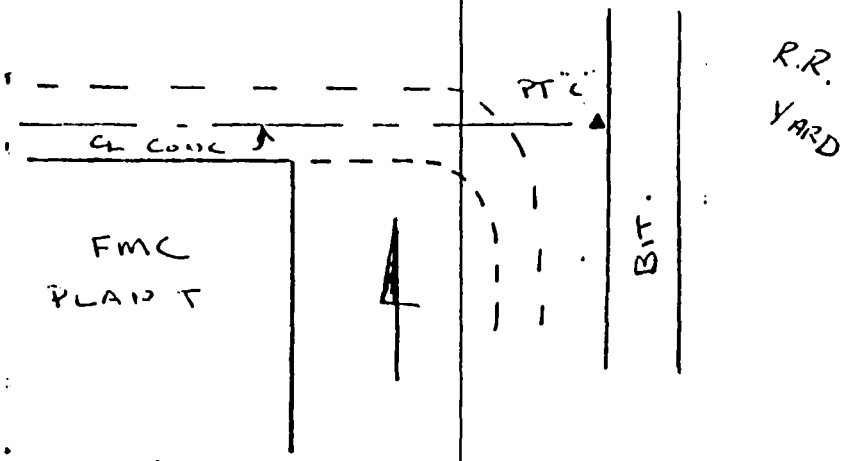


"B" = ½ INF SET W. EDGE BIT W. SIDE B.N. R.R. YARD



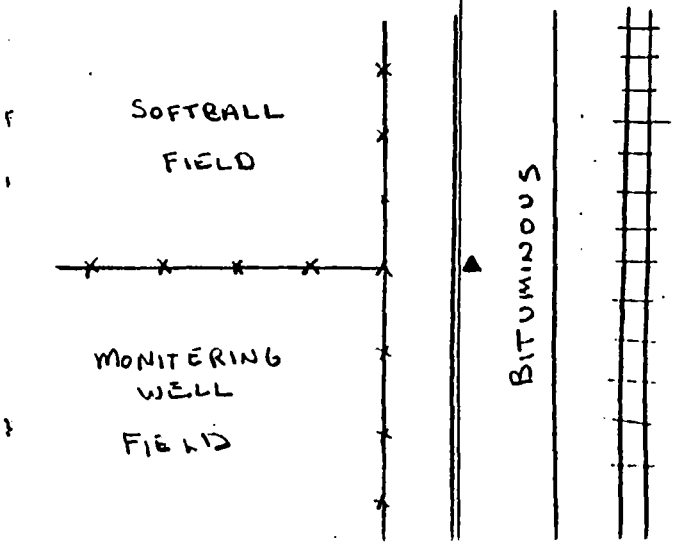
	@ "C"	1380.56	
	BS "B"		
	& RT TO "C"		
1	181-22-18	2505.99	(763.827)
2	181-22-23		
3	181-22-24		
4	181-22-21		
m	181-22-21.5		
	(178-37-38)		

"C" = 1/2" INP SET W. EDGE BIT @ & EXT EAST FROM CONC ROAD CENTER & NORTH WALL FMC PLANT



	@ "D"		
	BS "C"	2506.05	
	& RT TO "E"		
1	177-49-36	2429.21	(740.424)
2	177-49-36		
3	177-49-33		
4	177-49-33		
m	177-49-34.5		
	(182-10-30)		

"D" = PK 2" I E. of W. Edge BIT ROAD @ FENCE LINE EXT E'ly.

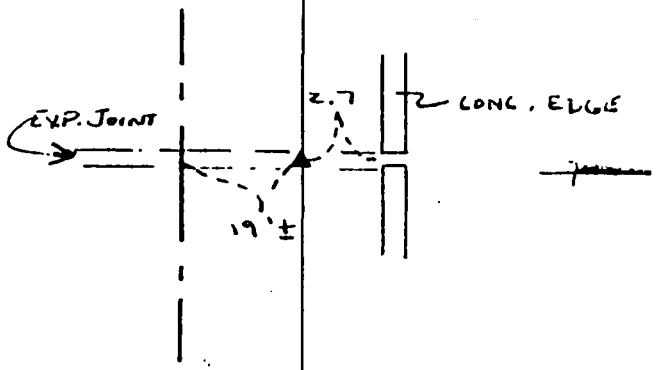


2 APRIL 92
L NORD
R. MULLISS

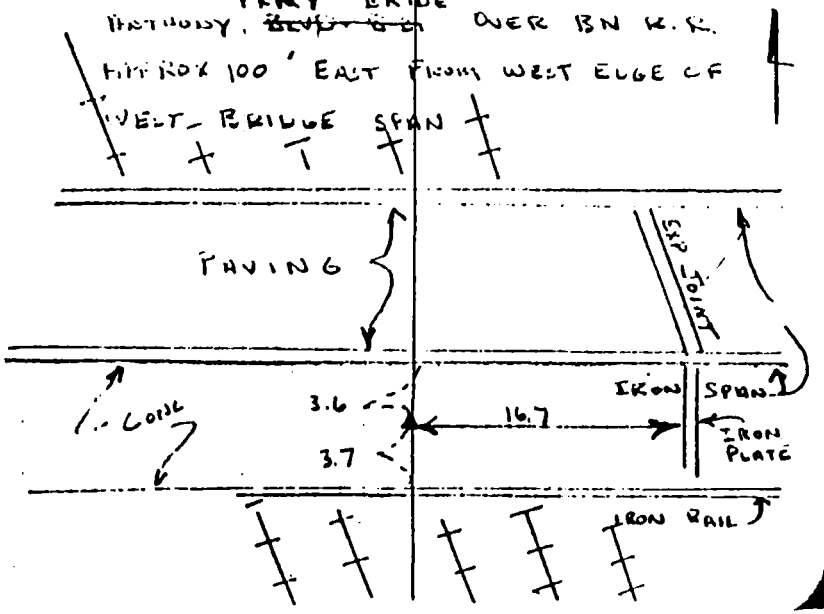
FMC CONT CUEAK 40°

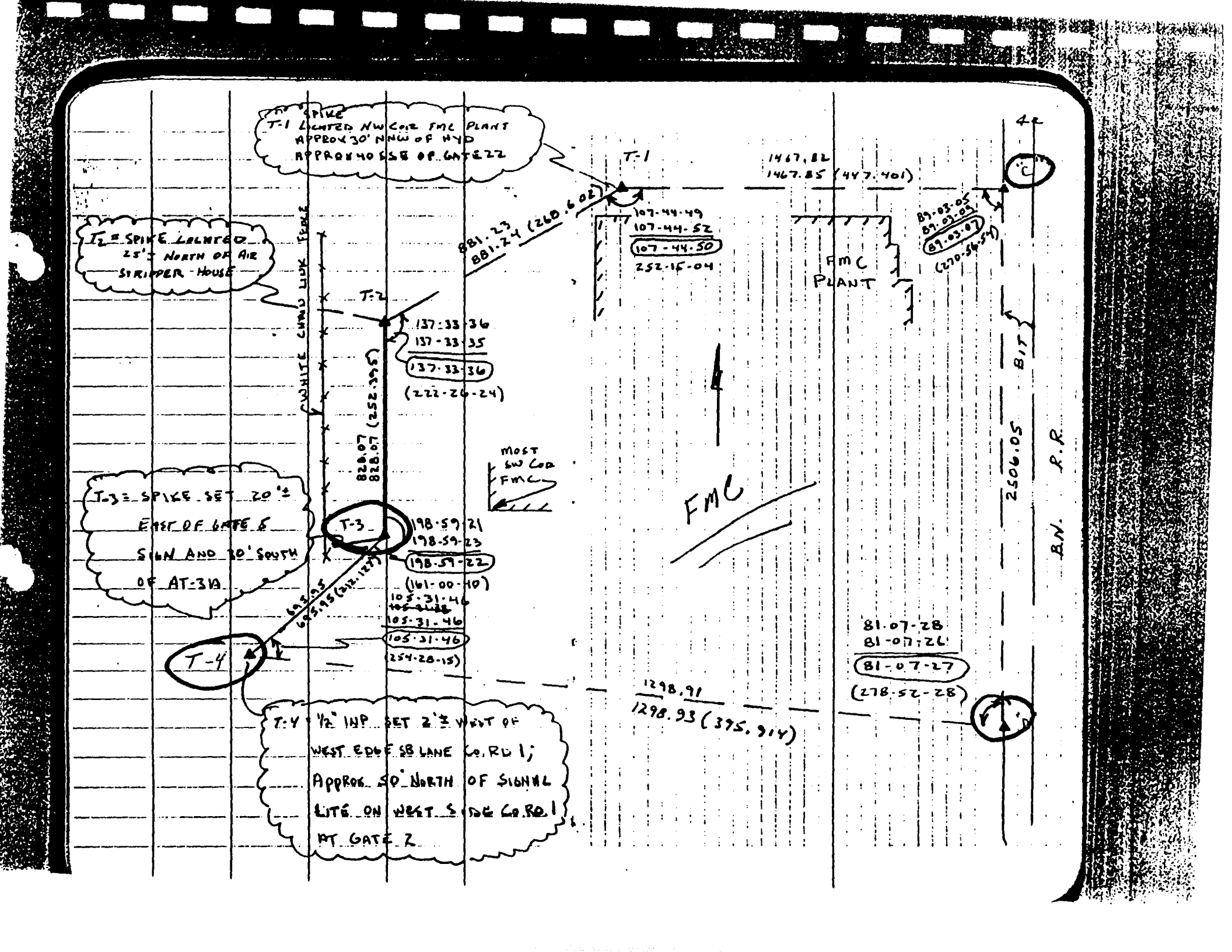
	@ "E"			
	BS "D"		2424.43	
	∠ RT to "F"			
1	168-00-55			
2	168-00-59		6689.82	(2039.064)
3	168-01-01			
4	168-00-56			
m	168-00-57.8			
	(191-58-56)			
	@ "F"			
	BS "E"		6689.83	
GPS	∠RT TO "BNRR"			
1	124-55-45		1206.91	(367.877)
2	124-55-40			
3	124-55-43			
4	124-55-46			
m	124-55-43.5			
	(235-04-22)			

"E" = SPIKE IN CONC EXP. JOINT CO. RD 2 BRIDGE OVER B.N. RAIL YARD AT APPROX P.C. WESTERL END OF BRIDGE.

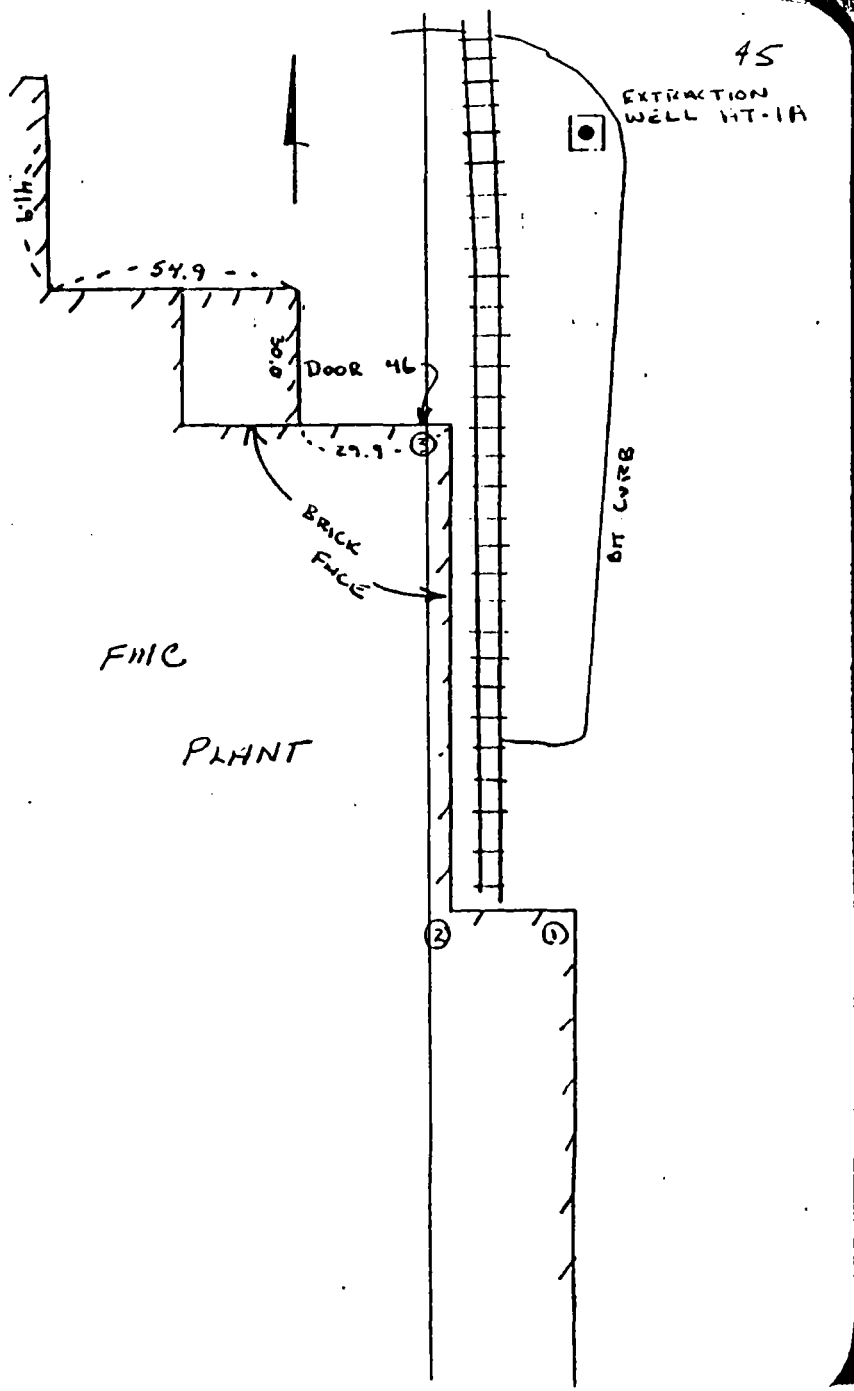


"F" = DRILL HOLE SO. SIDEWALK ON ST. ANTHONY, ~~BLVD. GLEN~~ PARKY BRIDGE OVER BN R.R. APPROX 100' EAST FROM WEST EDGE OF WEST BRIDGE SPAN

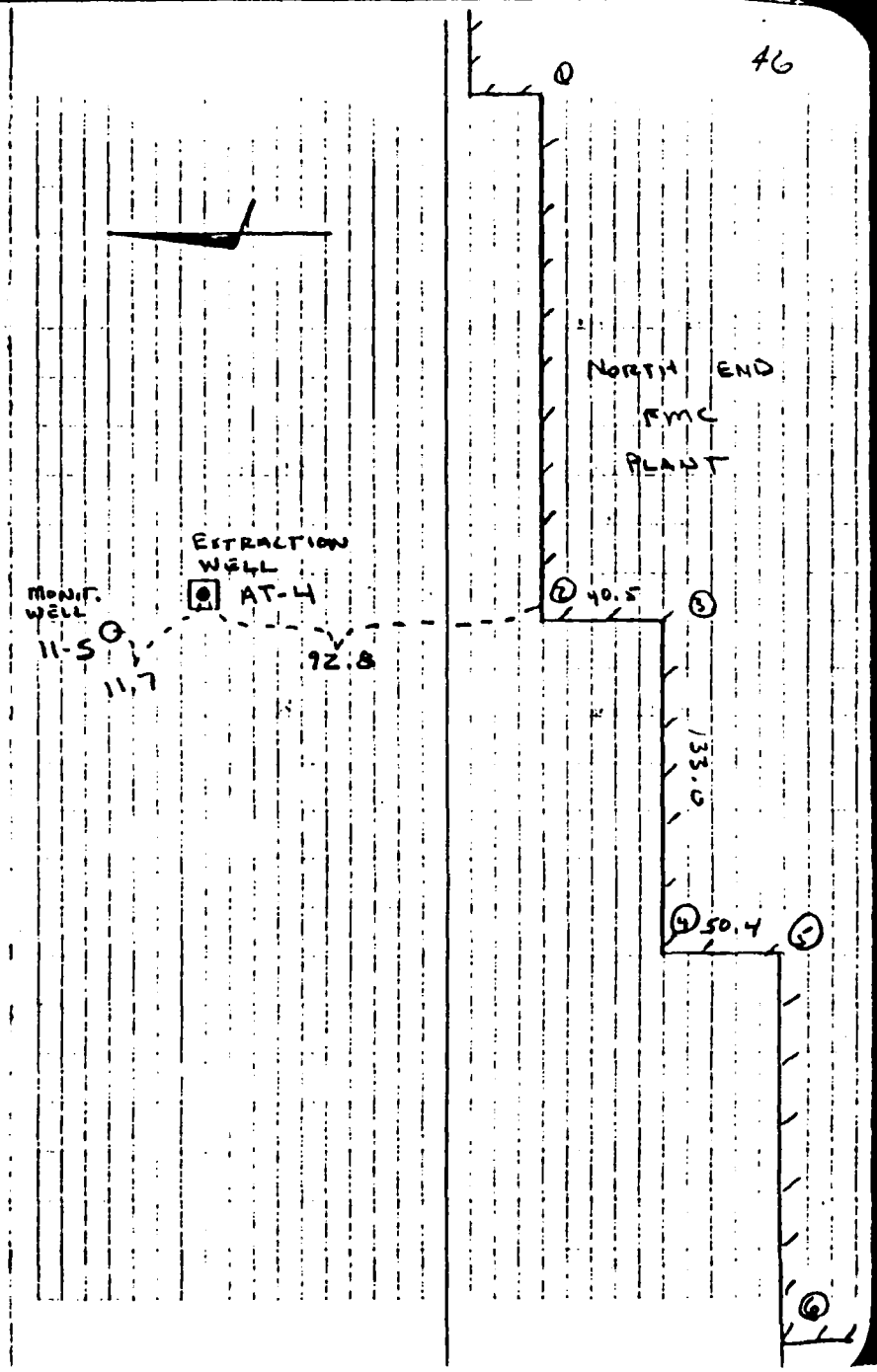



T-1 = SPIKE
T-1 LOCATED NW COR FMC PLANT
APPROX 30' NNW OF HYD
APPROX 40' SSE OF GATE 22
T-1
1467.82
1467.85 (447.401)
107-44-49
107-44-52
107-44-50
252-15-04
89-03-05
89-03-03
89-03-07
(270-56-54)
FMC
PLANT
T-2 = SPIKE LOCATED
25'± NORTH OF AIR
STRIPPER HOUSE
WHITE CHAIN LINK FENCE
881.23
881.24 (260.602)
T-2
137-33-36
137-33-35
137-33-36
(222-26-24)
828.07
828.07 (252.395)
MOST
SW COR
FMC
FMC
T-3 = SPIKE SET 20'±
EAST OF GATE 6
SIGN AND 30' SOUTH
OF AT-31A
T-3
198-59-21
198-59-23
198-59-22
(161-00-40)
693.95
693.95 (211.427)
105-31-46
105-31-46
105-31-46
(254-28-15)
T-4
81-07-28
81-07-26
81-07-27
(278-52-28)
1298.91
1298.93 (395.914)
T-4 = ½" INP SET 2'± WEST OF
WEST EDGE SB LANE Co. RD 1;
APPROX 50' NORTH OF SIGNAL
LITE ON WEST SIDE Co. RD 1
AT GATE 2
2506.05
B.N. R.R.

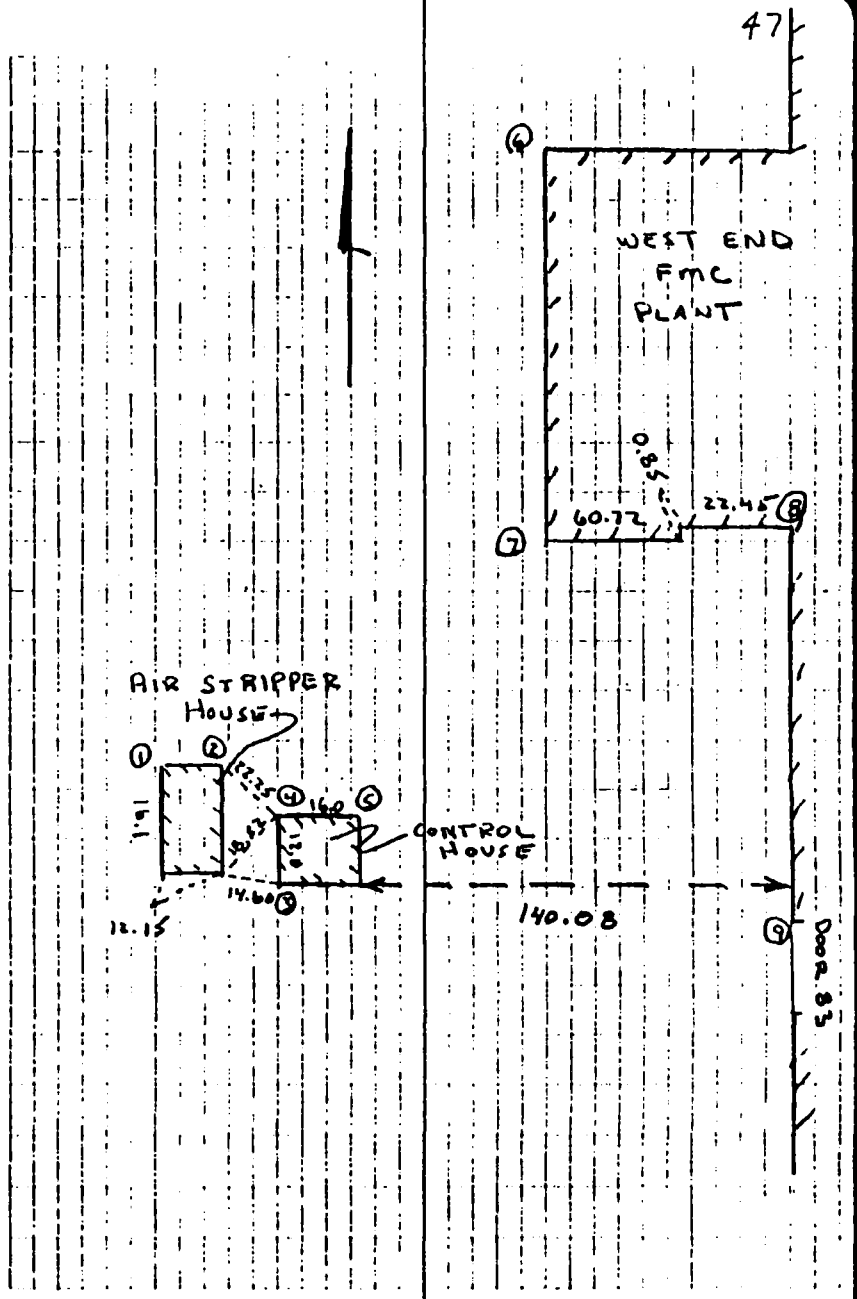
		TO "C" 5			
		35 T-1 9			
		& S TO THE RIGHT			
AT-1A 13		275·28·35 (84·31·25)	964.65	(294.026)	
●	① 14	274·03·50		1240.4	BLLG COR
✱	② 15	274·53·14		1242.6	BLLG COR
✱	③ 16	276·20·40		1021.66	BLLG COR



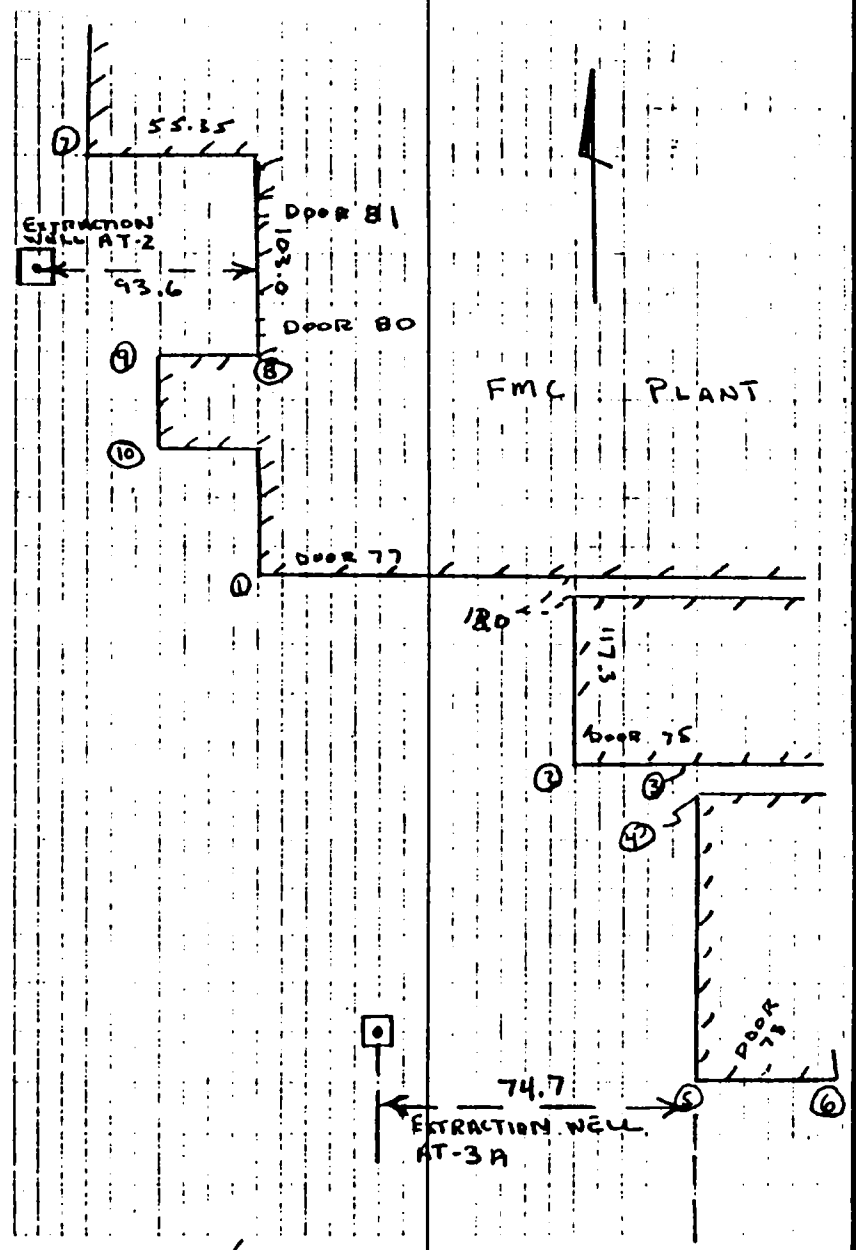
	T@T-1	9			
	BS "C"	5			
	7's RT	TO			
AT-4 17	354:36:26			322.75	(98.373)
MW 11S 18	353:01:03			315.18	(96.068)
19 ①	02:56:15			861.19	
20 ②	11:19:39			319.12	
③					
④					
⑤					
⑥ 21	102:17:06			168.90	



		RC T-2	10		
		BS T-1	9		
		∠'s TO THE RIGHT			
①	22	167-32-10		22.53	BLDG COR
②	23	137-50-06		24.24	"
③	24	128-54-40		45.90	"
④	25	118-52-13		36.20	"
⑤	26	104-24-35		48.38	"
⑥	27	13-53-29		175.04	"
⑦	28	60-33-26		98.10	"
⑧	29	64-44-50		180.75 ~~180.50~~	"
⑨	30	85-51-31		186.78	BLDG LINE



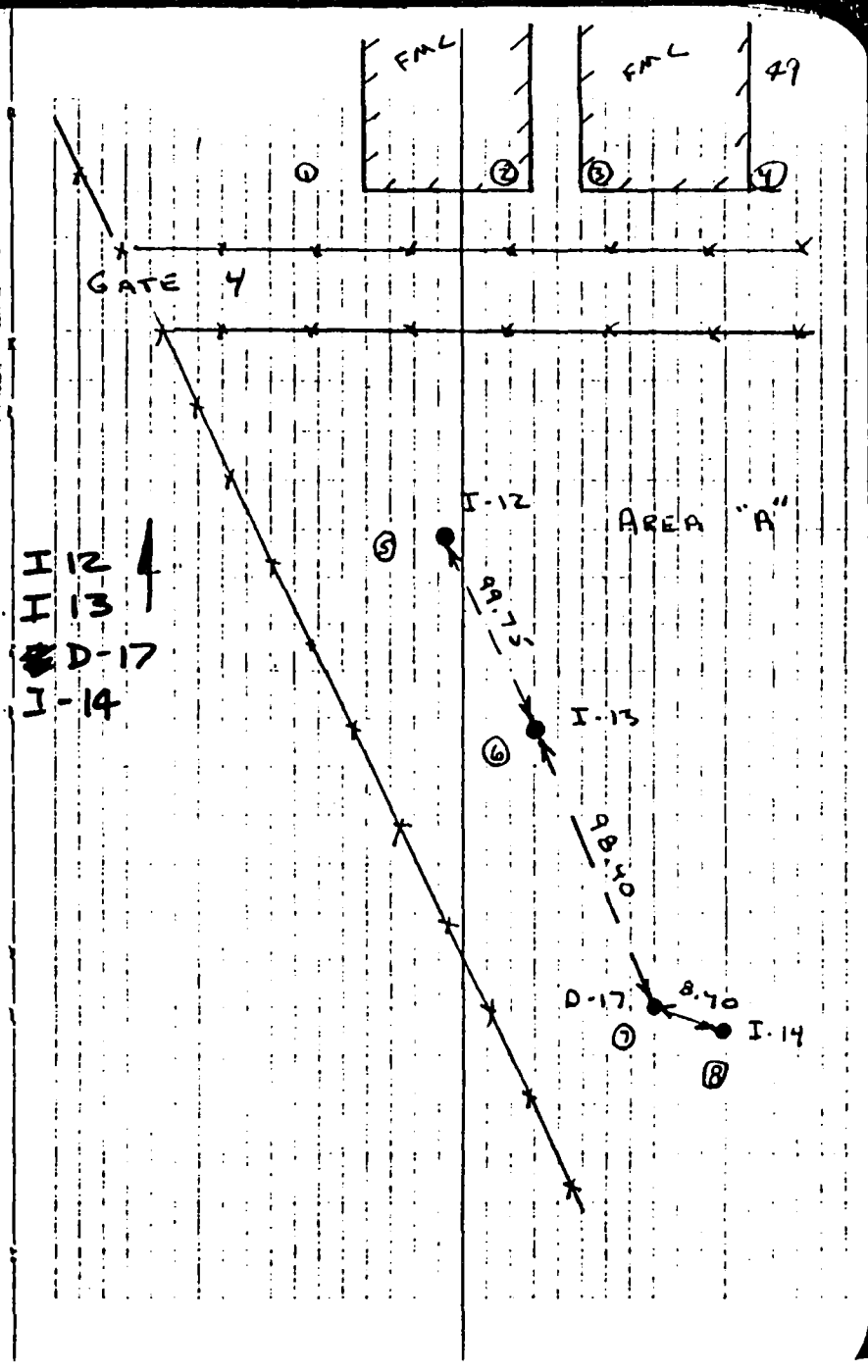
		TO T-3	11			
		BS T-2	10			
		¾ TO THE RIGHT				
	AT-2 31	357:05:18			483.04	
	AT-3A 32	03:08:40			26.20	
1						
2	0 33	03-27-40			350.2	BLDG COR.
3	E 34	27:03:10			195.4	" "
4	3 35	40:08:10			204.2	BLDG LINE
5	4 36	40:44:05			199.7	BLDG COR.
6	C 37	84:07:10			79.2	" "
7	6 38	97:39:50			126.42	" "
8						
9		TO T-2	10			
		BS T-3	11			
		¾ TO THE RIGHT				
	9 39	351:28:06			287.5	BLDG COR.
	8 40	352:18:60			403.5	"
	9 41	355:37:50			390.6	"
	10 42	358:16:46			429.8	"



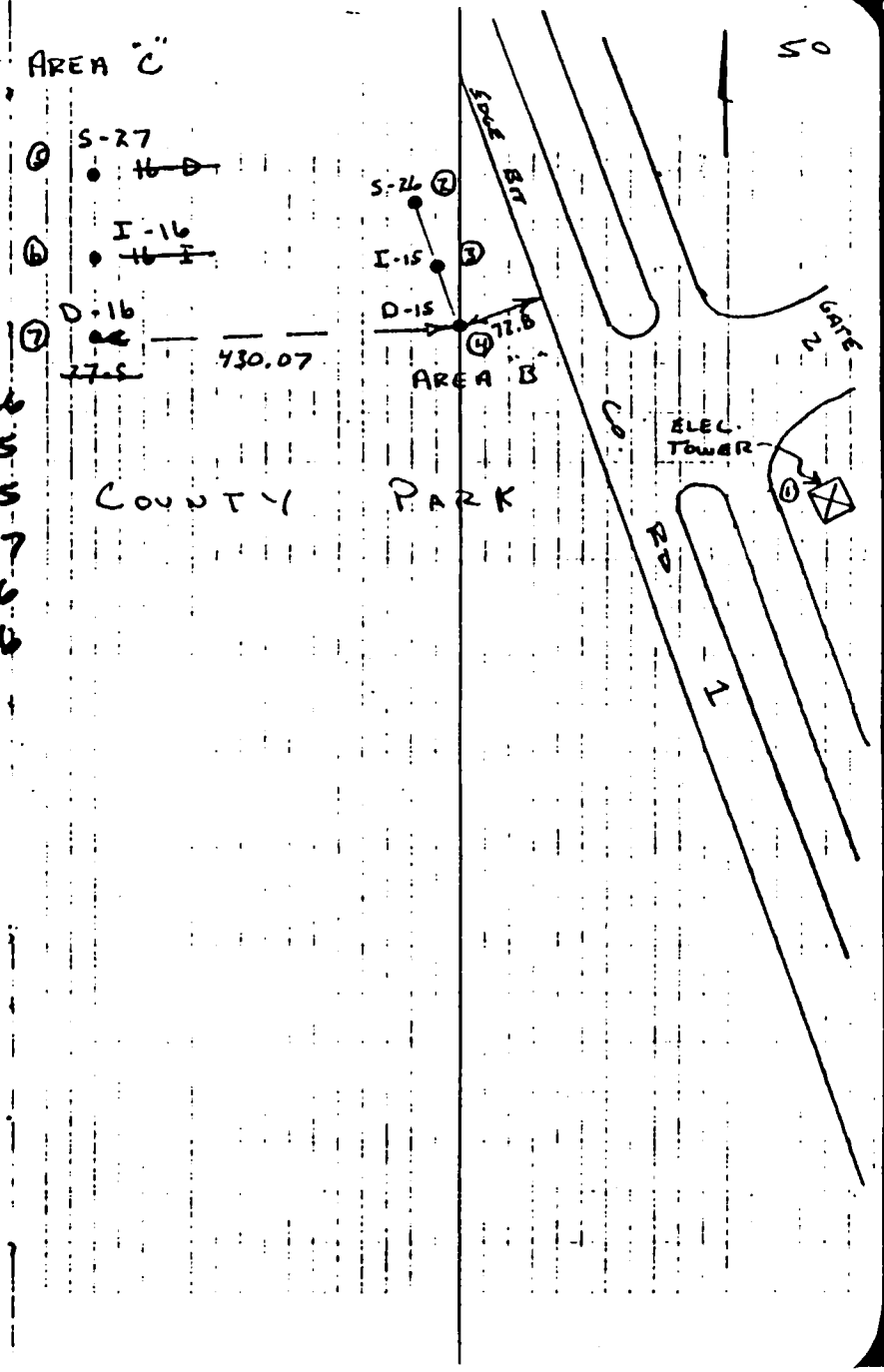
3 APRIL 92 PIC 40°
L. NORIS
R. MULLINS

AT @ T-4 12
BS T-3 11
X's TO THE RIGHT

① 43	05:02:14	728.26	BLDG COR	
② 44	09:43:56	732.04	"	"
③ 45	11:43:39	735.07	"	"
④ 46	16:18:52	745.79	"	"
⑤ 47	07:30:10	571.34	MONIT. WELL	I 12
⑥ 48	12:56:37	484.99	"	" I 13
⑦ 49	20:39:37	406.94	"	" D-17
⑧ 50	21:43:25	403.30	"	" I-14



		Tet-4	12			
		QS T-3	11			
		&'s To THE RIGHT				
①	51	99:55:28			174.6	NW CORNER ELEC TOWER
②	52	312:21:40			151.66	MONIT. WELL S-26
③	53	310:14:27			141.26	" I-15
④	54	308-00-16			131.88	" D-15
⑤	55	280-12-44			540.38	" S-27
⑥	56	279-19-51			540.05	" I-16
⑦	57	278-22-16			539.73	" D-16



6 APRIL 97 55° P.C

L. Nord
R. Mullins

	+	HI	-	ELEV	DESC.
Bm	4.31	837.72		833.41	USGS ALUM CAP, MNDOT M254 (1970)
T.P.	6.29	836.58	7.43	830.29	
T.B.m.#1	5.05	839.56	3.07	834.51	SPK E. SIDE P.P. NORTH SIDE GATE 7 TO FMC PLANT, 10' ± SE OF BUS STOP
T.B.m.#2	5.82	839.62	5.76	833.80	SELY CORNER AIR STRIPPER BLDG FOUND.
T.B.m.#3	4.72	839.84	4.50	835.12	AT-2 TOP OF FLANGE - EAST SIDE
T.B.m.#4	3.14	839.24	3.74	836.10	AT-3A TOP OF FLANGE - NE SIDE
T.P.	2.35	836.66	4.93	834.31	
T.B.m.#5	2.71	836.49	2.88	833.78	BARN SPK, TOP WOOD POST EAST OF WELL 5-26
T.P.	2.81	837.50	1.80	834.69	
T.P.	4.20	838.30	3.40	834.10	
T.P.	1.43	837.24	2.49	835.81	
T.P.	4.47	837.20	4.51	832.73	

	+	HI	-	ELEV		
T.P	4.90	838.62	3.48	833.72		
T.P	3.02	838.23	3.41	835.21		
BM			4.82	833.41	833.41	MnDOT / USGS — M 254 (1970)
	56.22		56.22			
BM	7.98	841.39		833.41		M 254 (1970)
BM	4.72	841.37	4.74	836.65		CITY OF FRIDLEY : TNH E. RIVER RD. SERVICE ROAD & 57 ST W.H.Y
BM			7.95	833.42	833.41	M 254 (1970)
				Error = 0.01		

BENCH LOOP FOR AT-1A, AT-4, 11-S

	+	HI	−	ELEV	
TBM #1	5.53	839.33 ~~840.01~~		~~834.61~~	833.80
T.P.	4.98	839.85 ~~840.56~~	4.46	~~835.68~~	834.87
T.P.	2.13	840.00 ~~840.71~~	1.98	~~838.58~~	837.87
T.B.M. #6	3.59	840.03 ~~840.74~~	3.56	~~837.15~~	836.44
T.B.M. #7	3.28	841.32 ~~841.03~~	1.99	~~838.75~~	838.04
T.P.	1.65	839.62 ~~840.33~~	3.36	~~838.68~~	837.97
T.P.	5.32	839.93 ~~840.64~~	5.07	~~835.32~~	834.61
T.P.	5.49 ~~4.77~~	840.31 ~~841.02~~	5.11	~~835.53~~	834.82
TBM #8	4.79	841.36 ~~842.07~~	3.74	~~837.28~~	836.57
T.P.	5.05	841.09 ~~841.80~~	5.32	~~836.75~~	836.04
T.P.	4.41	839.87 ~~840.58~~	5.63	~~836.17~~	835.46
T.P.	2.18 ~~1.95~~	~~840.85~~ ~~840.63~~ 840.14	1.91	~~838.67~~	837.96

SE'LY COR AIR STRIKER PLOG FOUND.

T.N.H NEAR T-1

AT-4 TOP OF FLANGE - SOUTH SIDE

11-S TOP OF CASING (OUTER PIPE NORTH SIDE)

T.N.H. WEST OF POST 17 B

AT-1A TOP OF FLANGE - SE SIDE

T.N.H.

		840.20			
T.P.	5.74	~~840.91~~	5.68	~~835.17~~	
	~~5.78~~	~~840.94~~	~~5.46~~	~~835.16~~	834.46
		839.73	5.01		
T.P.	4.54	~~840.43~~	~~5.05~~	~~835.89~~	835.19
TBM #2			5.22	834.51	834.51

	Bench +	Loop HI	Arms -	A, B, C Elev	
TBM #4	3.17	839.27		836.10	
	"		~~4.33~~	~~834.9~~	
	4.19	839.13	4.33	834.94	
	3.93	838.89	4.17	834.96	
	DIDN'T	SHOOT,	CASING	NOT	FINISHED
	4.02	839.23	3.68	835.21	
TBM #5			5.44	833.79	833.78
TBM #5	2.33	836.10		833.78	
	1.86	835.92	2.04	834.06	
	2.50	836.24	2.18	833.74	
	2.02	836.03	2.23	834.01	
TBM #5			2.25	833.78	833.78

AT - 3A

I - 12 TOP NORTH RIM

I - 13 " " "

D - 17 " " "

I - 14 " " "

SPIC TOP WOOD POST

S - 26 TOP OF CASING - SOUTH SIDE OUTSIDE PIPE

I - 15 " " " " " " "

I - 15 " " " " " " "

		+	HI	−	ELEV	
TP	TBM #5	1.55	835.33		833.78	
		2.49	835.23	2.59	832.74	S-27 TOP OF CASING - SOUTH SIDE PIPE * OUTSIDE PIPE
		2.43	835.20	2.46	832.77	I-16
		2.15	835.23	2.12	833.08	D-16
	TBM #5			1.45	833.78	
T						
TB						
T						

	+	HI	−	ELEV
TBM #2	5.74			
			2.55	
			2.54	
			2.52	
			2.50	
			2.50	
	5.74		2.54	
			2.54	
			2.52	
			2.50	
			2.50	
TBM #2			5.74	

AT-4 4 SHUT-OFF VALVES
AT-1A INSIDE AIR STRIPPER BLDG
AT-2
AT-3A
SOUTH PIPE

AT-4
AT-1A
AT-2
AT-3A
SOUTH PIPE

	+	HI	-	ELEV
TBm	3.82			835.21
			3.79	835.24

I-14	MONITORING WELL
D-17	MONITORING WELL

A.5 CHAIN-OF-CUSTODY FORMS

CHAIN OF CUSTODY

1438

Original Chain of Custody goes to Laboratory

Page 1 of 1

Proj. # 5255	Project name NIROP FRIDLEY																
Samplers (Please print) PETER NIMMER / MARCUS CHASE																	
DATE	Time	Comp. / Grab.	Sample Identification	Sample Matrix	Number of containers	Analyses: TCL VOAs	TCL SVOCs	TCL PCBs	TAL METALS/CN (TOTAL)	TAL METALS (DISSOLVED)	pH			Remarks			
4/4/95	FROM LAB	TRIP BLANK	TB-01-040495	AQ.	2	X											
	1312	G	SB-06-0002	SOIL	3	X	X	X	X		X			SOIL SVOC, PCB, pH IN ONE 8 oz JAR			
	1348	G	SB-06-0608	SOIL	3	X	X	X	X		X						
	1423	G	SB-06-1214	SOIL	3	X	X	X	X		X						
	1520	G	RI FB-01-040494	AQ.	7	X	X	X	X	X	X			ANALYSES - PCBs AND pH IN SAME BOTTLE.			
	1615	G	FB-02-040494	AQ.	7	X	X	X	X	X	X						
	1650	G	RB-01-040494	AQ.	7	X	X	X	X	X	X						

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	Remarks:
Peter Nimmer	4/4/95 7:00			
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	

CEIMIC Corporation 10 Dean Knauss Drive, Narragansett, RI 02882 (401) 782-8900 FAX (401) 782-8905

CHAIN OF CUSTODY

1440

Original Chain of Custody goes to Laboratory

Page 1 of 1

( ) = Aqueous Container
[ ] = Soil Container

Proj. # 5255	Project name NIROP FRIDLEY					Analyses
Samplers (Please print) PETER NIMMER / MARCUS CHASE						

DATE	Time	Comp. / Grab.	Sample Identification	Sample Matrix	Number of containers	TCL VOAs (3 x 40 ml) [4 oz]	TCL SVOCs (1 amber) [8 oz]	TCL PCBs (1 amber) [8 oz]	CN (1 PE) [8 oz]	PH (250 ml PE) [8 oz]	TAL METALS TOTAL (500 ml PE) [8 oz]	TAL METALS DISSOLVED (500 ml PE)		Remarks
4/5/95	From Lab	Trip Blank	TB-01-040595	AQ	2									
	1120	G	RB-01-040595	AQ	7	X	X	X	X	X	X			
	1120	G	RB-01-040595-F	AQ	1						X	X		
	1443	G	SB-03-0001	Soil	3	X	X	X	X	X	X			FOR SOILS-
	1525	G	SB-03-012	Soil	3	X	X	X	X	X	X			SVOC, PCB, CN AND
	1540	G	SB-03-14	Soil	3	X	X	X	X	X	X			PH IN ONE
														8 OZ JAR. METALS AND
														CN IN ONE 8 OZ JAR

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	Remarks
PETER NIMMER	4/5/95 1800	FED EX AIRBILL # 145085057 5		⊛ ALL SAMPLES GET 7 DAY TURN AROUND
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	

CEIMIC Corporation 10 Dean Knauss Drive, Narragansett, RI 02882 (401) 782-8900 FAX (401) 782-8905

CHAIN OF CUSTODY

1532

Original Chain of Custody goes to Laboratory

Page 1 of 1

Proj. # 5255 | Project name NIROP FRIDLEY

Samplers (Please print): PETE NIMMER / MARCUS CHASE

DATE	Time	Comp. / Grab.	Sample Identification	Sample Matrix	Number of containers	Analyses: TCL VOA (3 40 mL) [4oz Jar]	TCL SVOCs (1 Liter) [8 oz]	TCL PCBs (1 Liter) [8 oz]	CN (1 L PE) [8 oz]	pH (250 mL PE) (8 oz)	TAL MCMS - TOTAL (500 mL PE) [8 oz]	TAL MTMS - DISSOLVED * (500 mL PE)		Remarks
4/6/95	From LAB	Trip Blank	TB-01-040695	AQ.	2	X								
	1040	G	RB-01-040695	AQ.	8	X	X	X	X	X	X	X		UNPRESERVED BOTTLE TO BE FILTERED
	0835	G	SB-05-0001	Soil	3	X	X	X	X	X	X			
	0910	G	SB-05-1012	Soil	3	X	X	X	X	X	X			
	0940	G	SB-05-1315	Soil	3	X	X	X	X	X	X			
↓	1250	G	SB-04-0001	Soil	3	X	X	X	X	X	X			

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
Pete Nimmer	4/6/95 1800	FEDEX AIR BILL # 145085058 6	
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time

Remarks:

* UNPRESERVED METALS BOTTLE TO BE FILTERED UPON RECIPT AND ANALYZED FOR DISSOLVED METALS.
* ALL SAMPLES GET 7-DAY TURN AROUND.
* FOR SOILS, SVOAS, PCBS + pH IN 1 JAR, METALS AND CN IN ONE JAR.

CEIMIC Corporation 10 Dean Knauss Drive, Narragansett, RI 02882 (401) 782-8900 FAX (401) 782-8905

CHAIN OF CUSTODY

1533

Original Chain of Custody goes to Laboratory

Page 1 of 1

Proj. # 5255 | Project name NIROP FRIDLEY

Samplers (Please print): PETER NIMMER / MARCUS CLARK

DATE	Time	Comp. / Grab.	Sample Identification	Sample Matrix	Number of containers	Analyses: TCL VOAs (3 40mL)	TCL SVOCs (1 L amber)	TCL PCBs (1 L amber)	CN (1L PE)	pH (250 mL PE)	TAL METALS - TOTAL (500 mL PE)	TAL METALS - DISSOLVED * (500 mL PE)		Remarks
4/7/95	FROM LAB	TRIP Blank	TB-01-040795	AQ.	2	X								
	1350	G	GW-03	AQ	7	X	X	X	X	X	X			
	1350	G	GW-03-F	AQ	1							X		TO BE FILTERED AT LAB.
	1425	G	RB-01-040795	AQ	7	X	X	X	X	X	X			
	1425	G	RB-01-040795-F	AQ	1							X		TO BE FILTERED AT LAB.

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
Peter Nimmer	4/7/95 1800	FED EX AIR BILL # 745085060 1	
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time

Remarks:

* DISSOLVED METALS TO BE FILTERED AT LAB - SAMPLES GW-03-F AND RB-01-040795-F.

CEIMIC Corporation 10 Dean Knauss Drive, Narragansett, RI 02882 (401) 782-8900 FAX (401) 782-8905

CHAIN OF CUSTODY

1534

Original Chain of Custody goes to Laboratory

Page 1 of 1

Proj. # 5255	Project name NIROP FRIDLEY																
Samplers (Please print) Peter Nimmer / Marcus Chase																	
DATE	Time	Comp. / Grab.	Sample Identification	Sample Matrix	Number of containers	Analyses (Water containers / Soil Containers): Tcl VOAs (3 40 mL vials); Tcl SVOCs (1 L amber [8 oz]); TCL PCBs (1 L amber [8 oz]); (1 L PE [8 oz]); pH (250 mL PE [8 oz]); TAL Metals - Total (500 mL PE [8 oz]); TAL Metals - Dissolved (500 mL PE);									Remarks
4/10/95	FIELD LAB	Trip Blank	TB-01-041095	AQ.	2	X											
	1630	G	RB-01-041095	AQ.	~~2~~ 2	X	X	X	X	X	X	X					
	~~1650~~	~~G~~	~~RB-01-041095-F~~	~~AQ~~	~~1~~	~~X~~ PW							X				TO BE FILTERED AT LAB
	0945	G	SB-04-1012	SOIL	3	X	X	X	X	X	X						
	0958	G	SB-04-1214	SOIL	3	X	X	X	X	X	X						
	1340	G	SB-01-0001	SOIL	3	X	X	X	X	X	X						
	1419	G	SB-01-0608	SOIL	6	X	X	X	X	X	X						DO MS/MSD
	1515	G	SB-01-1416	SOIL	3	X	X	X	X	X	X						
	0000	G	DUP-01	SOIL	3	X	X	X	X	X	X						

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	Remarks
Peter Nimmer	4/10/95 1800	FED EX AIR BILL # 450761034	4/10/95 1800	For SOILS - SVOAs, PCBs, pH in 1 Jar Metals and CN in 1 jar.
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	(*) ALL SAMPLES GET 7-day TURN
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	

CEIMIC Corporation 10 Dean Knauss Drive, Narragansett, RI 02882 (401) 782-8900 FAX (401) 782-8905

CHAIN OF CUSTODY

1437

Original Chain of Custody goes to Laboratory

Page 1 of 1

Proj. # 5255	Project name NIROP FRIDLEY					Analyses (WATER CONTAINER) [SOIL CONTAINER]								
Samplers (Please print) PETER NIMMER						TCL VOAs (2 40 ml [4 oz] Jar)	TCL SVOAs (2 8 oz Jars) (1 L amber)	TCL PEST (1 L amber) [8 oz]	TAL METALS (1 L PE) [8 oz]	pH (250 ml PE) [8 oz]	TAL METALS-TOTAL (500 ml PE) [8 oz]	TAL METALS-DISSOLVED (500 ml PE)		
DATE	Time	Comp. / Grab.	Sample Identification	Sample Matrix	Number of containers									Remarks
4/11/95	FROM LAB	TRIP BLANK	TB-01-041195	AQ	2	X								
	1630	G	RB-01-041095	AQ	6		X	X	X	X	X	X		DISSOLVED METALS TO BE FILTERED AT LAB.
	0800	G	RB-01-041195	AQ	8	X	X	X	X	X	X	X		
	1842	G	SB-02-0001	SOIL	3	X	X	X	X	X	X			
	1852	G	SB-02-0204	SOIL	2	X	X	X	X	X	X			ONLY 2 SAMPLE JARS
	1900	G	SB-02-0406	SOIL	3	X	X	X	X	X	X			
	1920	G	SB-02-0608	SOIL	1	X								
	0000	G	DUP-02	SOIL	1		X	X	X	X	X			NO VOA SAMPLE
	1300	G	SB-07-0406	SOIL	3	X	X	X	X	X	X			
	1440	G	SB-07-1416	SOIL	3	X	X	X	X	X	X			
↓	1715	G	SB-07-2830	SOIL	3	X	X	X	X	X	X			

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	Remarks:
Pete Nimmer	4/11/95 1900	FIX EX AIR BILL # 145076104 5	4/11/95 1900	ALL SAMPLES GET 7-DAY TURN
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	TWO SAMPLES (SB-02-0204 AND DUP-02) HAVE LIMITED SAMPLE VOLUME.
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	

CEIMIC Corporation 10 Dean Knauss Drive, Narragansett, RI 02882 (401) 782-8900 FAX (401) 782-8905

CHAIN OF CUSTODY

1446

Original Chain of Custody goes to Laboratory

Page 1 of 1 1

Proj. # 5255 | Project name NIROP FRIDLEY

Samplers (Please print): PETER L. NIMMER / MARCUS CHASE

DATE	Time	Comp. / Grab.	Sample Identification	Sample Matrix	Number of containers	Analyses: TCL VOAs (40 ml)	TCL SVOCs (1 L amber)	TCL PCBs (1 L amber)	CN (1 L PE)	Total Metals (1 [illegible] PE)	pH (250 ml PE)	Dissolved Metals (500 ml PE)		Remarks
	From Lab	Trip Blank	TB-01-041294	AQ.	2	X								
	1245	G	RB-01-041294		7	X	X	X	X	X	X			[illegible]
	1245	G	RB-01-041294-F		1							X		DISSOLVED METALS TO BE FILTERED AT LAB
	0925	G	GW-01		7	X	X	X	X	X	X			
	0925	G	GW-01-F		1							X		
	0855	G	GW-02		7	X	X	X	X	X	X			
	0855	G	GW-02-F		1							X		
	0000	G	DUP-03		7	X	X	X	X	X	X			
↓	0000	G	DUP-03-F	↓	1							X		

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	Remarks
Peter Nimmer	4/17/95 1800	FED EX AIR BILL #	4/17/95 1800	ALL SAMPLES GET 7-DAY TURN
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	
Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time	

CEIMIC Corporation 10 Dean Knauss Drive, Narragansett, RI 02882 (401) 782-8900 FAX (401) 782-8905

APPENDIX B

ANALYTICAL DATA

B.1 Analytical Data

B.2 Data Validation Letters

B.1 ANALYTICAL DATA

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			TB-01-040495		FB-01-040495		FB-02-040495		RB-01-040495		TB-01-040595	
LABORATORY ID:			950200-01		950200-05		950200-06		950200-07		950200-08	
TCL VOLATILE WATERS (UG/L)												
ANALYTE	CRQL	MDL										
CHLOROMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
BROMOMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	10	2	10	U	10	U	10	U	10	U	10	U
CHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	10	2	10	U	10	U	10	U	10	U	10	U
ACETONE	10	2	10	U	10	U	19	U	14	U	10	U
CARBON DISULFIDE	10	2	10	U	10	U	10	U	10	U	10	U
1,1-DICHLOROETHENE	10	2	10	U	10	U	10	U	10	U	10	U
1,1-DICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
1,2-DICHLOROETHENE (TOTAL)	10	2	10	U	10	U	10	U	10	U	10	U
CHLOROFORM	10	2	10	U	10	U	10	U	10	U	10	U
1,2-DICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
2-BUTANONE	10	2	10	U	10	U	10	U	10	U	10	U
1,1,1-TRICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
CARBON TETRACHLORIDE	10	2	10	U	10	U	10	U	10	U	10	U
BROMODICHLOROMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
1,2-DICHLOROPROPANE	10	2	10	U	10	U	10	U	10	U	10	U
CIS-1,3-DICHLOROPROPENE	10	2	10	U	10	U	10	U	10	U	10	U
TRICHLOROETHENE	10	2	10	U	10	U	10	U	10	U	10	U
DIBROMOCHLOROMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
1,1,2-TRICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
BENZENE	10	2	10	U	10	U	10	U	10	U	10	U
TRANS-1,3-DICHLOROPROPENE	10	2	10	U	10	U	10	U	10	U	10	U
BROMOFORM	10	2	10	U	10	U	10	U	10	U	10	U
4-METHYL-2-PENTANONE	10	2	10	U	10	U	10	U	10	U	10	U
2-HEXANONE	10	2	10	U	10	U	10	U	10	U	10	U
TETRACHLOROETHENE	10	2	10	U	10	U	10	U	10	U	10	U
1,1,2,2-TETRACHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
TOLUENE	10	2	10	U	10	U	10	U	10	U	10	U
CHLOROBENZENE	10	2	10	U	10	U	10	U	10	U	10	U
ETHYLBENZENE	10	2	10	U	10	U	10	U	10	U	10	U
STYRENE	10	2	10	U	10	U	10	U	10	U	10	U
XYLENE (TOTAL)	10	2	10	U	10	U	10	U	10	U	10	U
DILUTION FACTOR:			1.0		1.0		1.0		1.0		1.0	

* RESULT FROM DILUTION ANALYSIS

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			RB-01-040595		TB-01-040695		RB-01-040695		TB-01-040795		GW-03	
LABORATORY ID:			950200-09		950200-13		950200-14		950200-19		950200-20	
TCL VOLATILE WATERS (UG/L)												
ANALYTE	CRQL	MDL										
CHLOROMETHANE	10	2	10	U	10	U	10	U	10	UJ	10	U
BROMOMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	10	2	10	U	10	U	10	U	10	U	10	U
CHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	10	2	10	U	10	U	10	U	10	U	10	U
ACETONE	10	2	14	U	17	U	16	U	10	U	10	U
CARBON DISULFIDE	10	2	10	U	10	U	10	U	10	U	10	U
1,1-DICHLOROETHENE	10	2	10	U	10	U	10	U	10	U	10	U
1,1-DICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	9	J
1,2-DICHLOROETHENE (TOTAL)	10	2	10	U	10	U	10	U	10	U	100	
CHLOROFORM	10	2	10	U	10	U	10	U	10	U	10	U
1,2-DICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
2-BUTANONE	10	2	10	U	10	U	10	U	10	U	10	U
1,1,1-TRICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	9	J
CARBON TETRACHLORIDE	10	2	10	U	10	U	10	U	10	U	10	U
BROMODICHLOROMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
1,2-DICHLOROPROPANE	10	2	10	U	10	U	10	U	10	U	10	U
CIS-1,3-DICHLOROPROPENE	10	2	10	U	10	U	10	U	10	U	10	U
TRICHLOROETHENE	10	2	10	U	10	U	10	U	10	U	*1700	
DIBROMOCHLOROMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
1,1,2-TRICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
BENZENE	10	2	10	U	10	U	10	U	10	U	10	U
TRANS-1,3-DICHLOROPROPENE	10	2	10	U	10	U	10	U	10	U	10	U
BROMOFORM	10	2	10	U	10	U	10	U	10	U	10	U
4-METHYL-2-PENTANONE	10	2	10	U	10	U	10	U	10	UJ	10	U
2-HEXANONE	10	2	10	U	10	U	10	U	10	U	10	U
TETRACHLOROETHENE	10	2	10	U	10	U	10	U	10	U	10	U
1,1,2,2-TETRACHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
TOLUENE	10	2	10	U	10	U	10	U	10	U	10	U
CHLOROBENZENE	10	2	10	U	10	U	10	U	10	U	10	U
ETHYLBENZENE	10	2	10	U	10	U	10	U	10	U	10	U
STYRENE	10	2	10	U	10	U	10	U	10	U	10	U
XYLENE (TOTAL)	10	2	10	U	10	U	10	U	10	U	10	U
DILUTION FACTOR:			1.0		1.0		1.0		1.0		1.0	

* RESULT FROM DILUTION ANALYSIS

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-06-0002		SB-06-0608		SB-06-1214		SB-03-0001		SB-03-1012	
LABORATORY ID:			950200-02		950200-03		950200-04		950200-10		950200-11	
TCL VOLATILE SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
CHLOROMETHANE	10	2	11	U	10	U	1	J	11	U	1500	U
BROMOMETHANE	10	2	11	U	10	U	11	U	11	U	1500	U
VINYL CHLORIDE	10	2	11	U	10	U	11	U	11	U	1500	U
CHLOROETHANE	10	2	11	U	10	U	11	U	11	U	1500	U
METHYLENE CHLORIDE	10	2	11	U	10	U	11	U	11	U	1500	U
ACETONE	10	2	*280		10	U	120		15	U	1500	U
CARBON DISULFIDE	10	2	11	U	10	U	11	U	11	U	1500	U
1,1-DICHLOROETHENE	10	2	11	U	10	U	11	U	11	U	1500	U
1,1-DICHLOROETHANE	10	2	11	U	10	U	11	U	11	U	1500	U
1,2-DICHLOROETHENE (TOTAL)	10	2	11	U	10	U	11	U	11	U	1500	U
CHLOROFORM	10	2	11	U	10	U	11	U	11	U	1500	U
1,2-DICHLOROETHANE	10	2	11	U	10	U	11	U	11	U	1500	U
2-BUTANONE	10	2	11	UJ	4	J	3	J	5	J	1500	U
1,1,1-TRICHLOROETHANE	10	2	11	U	10	U	11	U	11	U	1500	U
CARBON TETRACHLORIDE	10	2	11	U	10	U	11	U	11	U	1500	U
BROMODICHLOROMETHANE	10	2	11	U	10	U	11	U	11	U	1500	U
1,2-DICHLOROPROPANE	10	2	11	U	10	U	11	U	11	U	1500	U
CIS-1,3-DICHLOROPROPENE	10	2	11	U	10	U	11	U	11	U	1500	U
TRICHLOROETHENE	10	2	7	J	4	J	8	J	14		1100	J
DIBROMOCHLOROMETHANE	10	2	11	U	10	U	11	U	11	U	1500	U
1,1,2-TRICHLOROETHANE	10	2	11	U	10	U	11	U	11	U	1500	U
BENZENE	10	2	11	U	10	U	11	U	11	U	1500	U
TRANS-1,3-DICHLOROPROPENE	10	2	11	U	10	U	11	U	11	U	1500	U
BROMOFORM	10	2	11	U	10	U	11	U	11	U	1500	U
4-METHYL-2-PENTANONE	10	2	11	U	10	U	11	U	11	U	1500	U
2-HEXANONE	10	2	11	U	10	U	11	U	11	U	1500	U
TETRACHLOROETHENE	10	2	11	U	10	U	11	U	11	U	1500	U
1,1,2,2-TETRACHLOROETHANE	10	2	11	U	10	U	11	U	11	U	1500	U
TOLUENE	10	2	11	U	10	U	11	U	11	U	1500	U
CHLOROBENZENE	10	2	11	U	10	U	11	U	11	U	1500	U
ETHYLBENZENE	10	2	11	U	10	U	11	U	11	U	1500	U
STYRENE	10	2	4	J	10	U	11	U	9	J	1500	U
XYLENE (TOTAL)	10	2	11	U	10	U	11	U	11	U	1500	U
% SOLIDS:			95.0		97.0		91.0		94.0		86.0	
DILUTION FACTOR:			1.0		1.0		1.0		1.0		125.0	

* RESULT FROM DILUTION ANALYSIS

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-03-1214		SB-05-0001		SB-05-1012		SB-05-1315		SB-04-0001	
LABORATORY ID:			950200-12		950200-15		950200-16		950200-17		950200-18	
TCL VOLATILE SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
CHLOROMETHANE	10	2	56	U	11	U	12	U	10	U	11	U
BROMOMETHANE	10	2	56	U	11	U	12	U	10	U	11	U
VINYL CHLORIDE	10	2	56	U	11	U	12	U	10	U	11	U
CHLOROETHANE	10	2	56	UJ	11	UJ	12	U	10	U	11	UJ
METHYLENE CHLORIDE	10	2	56	U	11	U	12	U	10	U	11	U
ACETONE	10	2	700		14	U	*890		30	U	38	U
CARBON DISULFIDE	10	2	56	U	11	U	12	U	10	U	11	U
1,1-DICHLOROETHENE	10	2	56	U	11	U	12	U	10	U	11	U
1,1-DICHLOROETHANE	10	2	56	U	11	U	12	U	10	U	11	U
1,2-DICHLOROETHENE (TOTAL)	10	2	56	U	11	U	12	U	10	U	11	U
CHLOROFORM	10	2	56	U	11	U	12	U	10	U	11	U
1,2-DICHLOROETHANE	10	2	56	U	11	U	12	U	10	U	11	U
2-BUTANONE	10	2	56	U	11	U	12	U	10	U	11	U
1,1,1-TRICHLOROETHANE	10	2	56	U	11	U	12	U	10	U	11	U
CARBON TETRACHLORIDE	10	2	56	U	11	U	12	U	10	U	11	U
BROMODICHLOROMETHANE	10	2	56	U	11	U	12	U	10	U	11	U
1,2-DICHLOROPROPANE	10	2	56	U	11	U	12	U	10	U	11	U
CIS-1,3-DICHLOROPROPENE	10	2	56	U	11	U	12	U	10	U	11	U
TRICHLOROETHENE	10	2	160		9	J	*1100		13		16	
DIBROMOCHLOROMETHANE	10	2	56	U	11	U	12	U	10	U	11	U
1,1,2-TRICHLOROETHANE	10	2	56	U	11	U	12	U	10	U	11	U
BENZENE	10	2	56	U	11	U	12	U	10	U	11	U
TRANS-1,3-DICHLOROPROPENE	10	2	56	U	11	U	12	U	10	UJ	11	U
BROMOFORM	10	2	56	U	11	U	12	U	10	U	11	U
4-METHYL-2-PENTANONE	10	2	56	U	11	U	12	U	10	U	11	U
2-HEXANONE	10	2	56	U	11	U	12	U	10	U	11	UJ
TETRACHLOROETHENE	10	2	56	UJ	11	UJ	1	J	10	U	11	U
1,1,2,2-TETRACHLOROETHANE	10	2	56	U	11	U	12	U	10	U	11	U
TOLUENE	10	2	56	U	11	U	2	J	10	U	11	U
CHLOROBENZENE	10	2	56	U	11	U	12	U	10	U	11	U
ETHYLBENZENE	10	2	56	U	11	U	12	U	10	U	11	U
STYRENE	10	2	56	U	11	U	12	U	10	U	11	U
XYLENE (TOTAL)	10	2	56	U	11	U	12	U	10	U	11	U
% SOLIDS:			89.0		95.0		84.0		97.0		95.0	
DILUTION FACTOR:			5.0		1.0		1.0		1.0		1.0	

* RESULT FROM DILUTION ANALYSIS

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			FB-01-040495		FB-02-040495		RB-01-040495		RB-01-040595		GW-03	
LABORATORY ID:			950200-05		950200-06		950200-07		950200-09		950200-20	
TCL SEMIVOLATILE WATERS (UG/L)												
ANALYTE	CRQL	MDL										
PHENOL	10	1	10	U	10	U	10	U	10	U	10	U
BIS(2-CHLOROETHYL)ETHER	10	1	10	U	10	U	10	U	10	U	10	U
2-CHLOROPHENOL	10	1	10	U	10	U	10	U	10	U	10	U
1,3-DICHLOROBENZENE	10	1	10	U	10	U	10	U	10	U	10	U
1,4-DICHLOROBENZENE	10	1	10	U	10	U	10	U	10	U	10	U
1,2-DICHLOROBENZENE	10	1	10	U	10	U	10	U	10	U	10	U
2-METHYLPHENOL	10	1	10	U	10	U	10	U	10	U	10	U
2,2'-OXYBIS(1-CHLOROPROPANE)	10	1	10	UJ	10	UJ	10	UJ	10	UJ	10	U
4-METHYLPHENOL	10	1	10	U	10	U	10	U	10	U	10	U
N-NITROSO-DI-N-PROPYLAMINE	10	1	10	U	10	U	10	U	10	U	10	U
HEXACHLOROETHANE	10	1	10	U	10	U	10	U	10	U	10	U
NITROBENZENE	10	1	10	U	10	U	10	U	10	U	10	U
ISOPHORONE	10	1	10	U	10	U	10	U	10	U	10	U
2-NITROPHENOL	10	1	10	U	10	U	10	U	10	U	10	U
2,4-DIMETHYLPHENOL	10	1	10	U	10	U	10	U	10	U	10	U
BIS(2-CHLOROETHOXY)METHANE	10	1	10	U	10	U	10	U	10	U	10	U
2,4-DICHLOROPHENOL	10	1	10	U	10	U	10	U	10	U	10	U
1,2,4-TRICHLOROBENZENE	10	1	10	U	10	U	10	U	10	U	10	U
NAPHTHALENE	10	1	10	U	10	U	10	U	10	U	10	U
4-CHLOROANILINE	10	1	10	U	10	U	10	U	10	U	10	U
HEXACHLOROBUTADIENE	10	1	10	U	10	U	10	U	10	U	10	U
4-CHLORO-3-METHYLPHENOL	10	1	10	U	10	U	10	U	10	U	10	U
2-METHYLNAPHTHALENE	10	1	10	U	10	U	10	U	10	U	10	U
HEXACHLOROCYCLOPENTADIENE	10	1	10	U	10	U	10	U	10	U	10	U
2,4,6-TRICHLOROPHENOL	10	1	10	U	10	U	10	U	10	U	10	U
2,4,5-TRICHLOROPHENOL	25	2.5	25	U	25	U	25	U	25	U	25	U
2-CHLORONAPHTHALENE	10	1	10	U	10	U	10	U	10	U	10	U
2-NITROANILINE	25	2.5	25	U	25	U	25	U	25	U	25	U
DIMETHYL PHTHALATE	10	1	10	U	10	U	10	U	10	U	10	U
ACENAPHTHYLENE	10	1	10	U	10	U	10	U	10	U	10	U
2,6-DINITROTOLUENE	10	1	10	U	10	U	10	U	10	U	10	U
3-NITROANILINE	25	2.5	25	U	25	U	25	U	25	U	25	U
ACENAPHTHENE	10	1	10	U	10	U	10	U	10	U	10	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			FB-01-040495		FB-02-040495		RB-01-040495		RB-01-040595		GW-03	
LABORATORY ID:			950200-05		950200-06		950200-07		950200-09		950200-20	
TCL SEMIVOLATILE WATERS (UG/L)												
ANALYTE	CRQL	MDL										
2,4-DINITROPHENOL	25	2.5	25	U	25	U	25	U	25	U	25	U
4-NITROPHENOL	25	2.5	25	UJ	25	UJ	25	UJ	25	UJ	25	U
DIBENZOFURAN	10	1	10	U	10	U	10	U	10	U	10	U
2,4-DINITROTOLUENE	10	1	10	U	10	U	10	U	10	U	10	U
DIETHYL PHTHALATE	10	1	10	U	10	U	1	J	10	U	10	U
4-CHLOROPHENYL PHENYL ETHER	10	1	10	U	10	U	10	U	10	U	10	U
FLUORENE	10	1	10	U	10	U	10	U	10	U	10	U
4-NITROANILINE	25	2.5	25	U	25	U	25	U	25	U	25	U
4,6-DINITRO-2-METHYLPHENOL	25	2.5	25	U	25	U	25	U	25	U	25	U
N-NITROSODIPHENYLAMINE	10	1	10	U	10	U	10	U	10	U	10	U
4-BROMOPHENYL PHENYL ETHER	10	1	10	U	10	U	10	U	10	U	10	U
HEXACHLOROBENZENE	10	1	10	UJ	10	UJ	10	UJ	10	UJ	10	U
PENTACHLOROPHENOL	25	2.5	25	U	25	U	25	U	25	U	25	U
PHENANTHRENE	10	1	10	U	10	U	10	U	10	U	10	U
ANTHRACENE	10	1	10	U	10	U	10	U	10	U	10	U
DI-N-BUTYL PHTHALATE	10	1	10	U	10	U	10	U	10	U	10	U
FLUORANTHENE	10	1	10	U	10	U	10	U	10	U	10	U
CARBAZOLE	10	1	10	U	10	U	10	U	10	U	10	U
PYRENE	10	1	10	U	10	U	10	U	10	U	10	U
BUTYLBENZYL PHTHALATE	10	1	10	U	10	U	10	U	10	U	10	U
3,3'-DICHLOROBENZIDINE	10	1	10	U	10	U	10	U	10	U	10	U
BENZO(A)ANTHRACENE	10	1	10	U	10	U	10	U	10	U	10	U
CHRYSENE	10	1	10	U	10	U	10	U	10	U	10	U
BIS(2-ETHYLHEXYL)PHTHALATE	10	1	2	J	1	J	1	J	10	U	10	U
DI-N-OCTYL PHTHALATE	10	1	10	U	10	U	10	U	10	U	10	U
BENZO(B)FLUORANTHENE	10	1	10	U	10	U	10	U	10	U	10	U
BENZO(K)FLUORANTHENE	10	1	10	U	10	U	10	U	10	U	10	U
BENZO(A)PYRENE	10	1	10	U	10	U	10	U	10	U	10	U
INDENO(1,2,3-CD)PYRENE	10	1	10	U	10	U	10	U	10	U	10	U
DIBENZO(A,H)ANTHRACENE	10	1	10	U	10	U	10	U	10	U	10	U
BENZO(G,H,I)PERYLENE	10	1	10	U	10	U	10	U	10	U	10	U
DILUTION FACTOR			1.0		1.0		1.0		1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID: RB-01-040695
LABORATORY ID: 95200-14

TCL SEMIVOLATILE WATERS (UG/L)

ANALYTE	CRQL	MDL		
PHENOL	10	1	10	U
BIS(2-CHLOROETHYL)ETHER	10	1	10	U
2-CHLOROPHENOL	10	1	10	U
1,3-DICHLOROBENZENE	10	1	10	U
1,4-DICHLOROBENZENE	10	1	10	U
1,2-DICHLOROBENZENE	10	1	10	U
2-METHYLPHENOL	10	1	10	U
2,2'-OXYBIS(1-CHLOROPROPANE)	10	1	10	UJ
4-METHYLPHENOL	10	1	10	U
N-NITROSO-DI-N-PROPYLAMINE	10	1	10	U
HEXACHLOROETHANE	10	1	10	U
NITROBENZENE	10	1	10	U
ISOPHORONE	10	1	10	U
2-NITROPHENOL	10	1	10	U
2,4-DIMETHYLPHENOL	10	1	10	U
BIS(2-CHLOROETHOXY)METHANE	10	1	10	U
2,4-DICHLOROPHENOL	10	1	10	U
1,2,4-TRICHLOROBENZENE	10	1	10	U
NAPHTHALENE	10	1	10	U
4-CHLOROANILINE	10	1	10	U
HEXACHLOROBUTADIENE	10	1	10	U
4-CHLORO-3-METHYLPHENOL	10	1	10	U
2-METHYLNAPHTHALENE	10	1	10	U
HEXACHLOROCYCLOPENTADIENE	10	1	10	U
2,4,6-TRICHLOROPHENOL	10	1	10	U
2,4,5-TRICHLOROPHENOL	25	2.5	25	U
2-CHLORONAPHTHALENE	10	1	10	U
2-NITROANILINE	25	2.5	25	U
DIMETHYL PHTHALATE	10	1	10	U
ACENAPHTHYLENE	10	1	10	U
2,6-DINITROTOLUENE	10	1	10	U
3-NITROANILINE	25	2.5	25	U
ACENAPHTHENE	10	1	10	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID: RB-01-040695
LABORATORY ID: 95200-14

TCL SEMIVOLATILE WATERS (UG/L)

ANALYTE	CRQL	MDL		
2,4-DINITROPHENOL	25	2.5	25	U
4-NITROPHENOL	25	2.5	25	UJ
DIBENZOFURAN	10	1	10	U
2,4-DINITROTOLUENE	10	1	10	U
DIETHYL PHTHALATE	10	1	10	U
4-CHLOROPHENYL PHENYL ETHER	10	1	10	U
FLUORENE	10	1	10	U
4-NITROANILINE	25	2.5	25	U
4,6-DINITRO-2-METHYLPHENOL	25	2.5	25	U
N-NITROSODIPHENYLAMINE	10	1	10	U
4-BROMOPHENYL PHENYL ETHER	10	1	10	U
HEXACHLOROBENZENE	10	1	10	UJ
PENTACHLOROPHENOL	25	2.5	25	U
PHENANTHRENE	10	1	10	U
ANTHRACENE	10	1	10	U
DI-N-BUTYL PHTHALATE	10	1	10	U
FLUORANTHENE	10	1	10	U
CARBAZOLE	10	1	10	U
PYRENE	10	1	10	U
BUTYLBENZYL PHTHALATE	10	1	10	U
3,3'-DICHLOROBENZIDINE	10	1	10	U
BENZO(A)ANTHRACENE	10	1	10	U
CHRYSENE	10	1	10	U
BIS(2-ETHYLHEXYL)PHTHALATE	10	1	10	U
DI-N-OCTYL PHTHALATE	10	1	10	U
BENZO(B)FLUORANTHENE	10	1	10	U
BENZO(K)FLUORANTHENE	10	1	10	U
BENZO(A)PYRENE	10	1	10	U
INDENO(1,2,3-CD)PYRENE	10	1	10	U
DIBENZO(A,H)ANTHRACENE	10	1	10	U
BENZO(G,H,I)PERYLENE	10	1	10	U
DILUTION FACTOR			1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-06-0002		SB-06-0608		SB-06-1214		SB-03-0001		SB-03-1012	
LABORATORY ID:			950200-02		950200-03		950200-04		950200-10		950200-11	
TCL SEMIVOLATILE SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
PHENOL	300	30	340	U	330	U	350	U	350	U	370	U
BIS(2-CHLOROETHYL)ETHER	300	30	340	U	330	U	350	U	350	U	370	U
2-CHLOROPHENOL	300	30	340	U	330	U	350	U	350	U	370	U
1,3-DICHLOROBENZENE	300	30	340	U	330	U	350	U	350	U	370	U
1,4-DICHLOROBENZENE	300	30	340	U	330	U	350	U	350	U	370	U
1,2-DICHLOROBENZENE	300	30	340	U	330	U	350	U	350	U	370	U
2-METHYLPHENOL	300	30	340	U	330	U	350	U	350	U	370	U
2,2'-OXYBIS(1-CHLOROPROPANE)	300	30	340	UJ	330	U	350	U	350	U	370	U
4-METHYLPHENOL	300	30	340	UJ	330	U	350	U	350	U	370	U
N-NITROSO-DI-N-PROPYLAMINE	300	30	340	U	330	U	350	U	350	U	370	U
HEXACHLOROETHANE	300	30	340	U	330	U	350	U	350	U	370	U
NITROBENZENE	300	30	340	UJ	330	U	350	U	350	U	370	U
ISOPHORONE	300	30	340	U	330	U	350	U	350	U	370	U
2-NITROPHENOL	300	30	340	U	330	U	350	U	350	U	370	U
2,4-DIMETHYLPHENOL	300	30	340	U	330	U	350	U	350	U	370	U
BIS(2-CHLOROETHOXY)METHANE	300	30	340	U	330	U	350	U	350	U	370	U
2,4-DICHLOROPHENOL	300	30	340	U	330	U	350	U	350	U	370	U
1,2,4-TRICHLOROBENZENE	300	30	340	U	330	U	350	U	350	U	370	U
NAPHTHALENE	300	30	340	U	330	U	350	U	350	U	370	U
4-CHLOROANILINE	300	30	340	U	330	U	350	U	350	U	370	U
HEXACHLOROBUTADIENE	300	30	340	U	330	UJ	350	UJ	350	UJ	370	UJ
4-CHLORO-3-METHYLPHENOL	300	30	340	U	330	U	350	U	350	U	370	U
2-METHYLNAPHTHALENE	300	30	340	U	330	U	350	U	350	U	370	U
HEXACHLOROCYCLOPENTADIENE	300	30	340	U	330	U	350	U	350	U	370	U
2,4,6-TRICHLOROPHENOL	300	30	340	U	330	U	350	U	350	U	370	U
2,4,5-TRICHLOROPHENOL	800	80	820	U	810	U	850	U	850	U	890	U
2-CHLORONAPHTHALENE	300	30	340	U	330	U	350	U	350	U	370	U
2-NITROANILINE	800	80	820	UJ	810	U	850	U	850	U	890	U
DIMETHYL PHTHALATE	300	30	340	U	330	U	350	U	350	U	370	U
ACENAPHTHYLENE	300	30	340	U	330	U	350	U	350	U	370	U
2,6-DINITROTOLUENE	300	30	340	U	330	U	350	U	350	U	370	U
3-NITROANILINE	800	80	820	UJ	810	UJ	850	UJ	850	UJ	890	UJ
ACENAPHTHENE	300	30	340	U	330	U	350	U	350	U	370	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-06-0002		SB-06-0608		SB-06-1214		SB-03-0001		SB-03-1012	
LABORATORY ID:			950200-02		950200-03		950200-04		950200-10		950200-11	
TCL SEMIVOLATILE SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
2,4-DINITROPHENOL	800	80	820	UJ	810	UJ	850	UJ	850	UJ	890	UJ
4-NITROPHENOL	800	80	820	U	810	UJ	850	UJ	850	UJ	890	UJ
DIBENZOFURAN	300	30	340	U	330	U	350	U	350	U	370	U
2,4-DINITROTOLUENE	300	30	340	U	330	U	350	U	350	U	370	U
DIETHYL PHTHALATE	300	30	340	U	330	U	350	U	350	U	370	U
4-CHLOROPHENYL PHENYL ETHER	300	30	340	U	330	U	350	U	350	U	370	U
FLUORENE	300	30	340	U	330	U	350	U	350	U	370	U
4-NITROANILINE	800	80	820	UJ	810	UJ	850	UJ	850	UJ	890	UJ
4,6-DINITRO-2-METHYLPHENOL	800	80	820	UJ	810	UJ	850	UJ	850	UJ	890	UJ
N-NITROSODIPHENYLAMINE	300	30	340	U	330	U	350	U	350	U	370	U
4-BROMOPHENYL PHENYL ETHER	300	30	340	U	330	U	350	U	350	U	370	U
HEXACHLOROBENZENE	300	30	340	U	330	UJ	350	UJ	350	UJ	370	UJ
PENTACHLOROPHENOL	800	80	820	U	810	UJ	850	UJ	850	UJ	890	UJ
PHENANTHRENE	300	30	340	U	330	U	350	U	350	U	370	U
ANTHRACENE	300	30	340	U	330	U	350	U	350	U	370	U
DI-N-BUTYL PHTHALATE	300	30	340	U	330	U	350	U	350	U	370	U
FLUORANTHENE	300	30	340	U	330	U	350	U	350	U	370	U
CARBAZOLE	300	30	340	UJ	330	U	350	U	350	U	370	U
PYRENE	300	30	340	U	330	U	350	U	350	U	370	U
BUTYLBENZYL PHTHALATE	300	30	340	U	330	U	350	U	350	U	370	U
3,3'-DICHLOROBENZIDINE	300	30	340	UJ	330	UJ	350	UJ	350	UJ	370	UJ
BENZO(A)ANTHRACENE	300	30	340	U	330	U	350	U	350	U	370	U
CHRYSENE	300	30	340	U	330	U	350	U	350	U	370	U
BIS(2-ETHYLHEXYL)PHTHALATE	300	30	340	U	330	U	350	U	350	U	370	U
DI-N-OCTYL PHTHALATE	300	30	340	U	330	U	350	U	350	U	370	U
BENZO(B)FLUORANTHENE	300	30	340	U	330	U	350	U	350	U	370	U
BENZO(K)FLUORANTHENE	300	30	340	U	330	U	350	U	350	U	370	U
BENZO(A)PYRENE	300	30	340	U	330	U	350	U	350	U	370	U
INDENO(1,2,3-CD)PYRENE	300	30	340	U	330	U	350	U	350	U	370	U
DIBENZO(A,H)ANTHRACENE	300	30	340	U	330	U	350	U	350	U	370	U
BENZO(G,H,I)PERYLENE	300	30	340	U	330	U	350	U	350	U	370	U
% SOLIDS:			97.0		98.0		94.0		94.0		88.0	
DILUTION FACTOR:			1.0		1.0		1.0		1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-03-1214		SB-05-0001		SB-05-1012		SB-05-1315		SB-04-0001	
LABORATORY ID:			950200-12		950200-15		950200-16		950200-17		950200-18	
TCL SEMIVOLATILE SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
PHENOL	300	30	360	U	360	U	380	U	350	U	350	U
BIS(2-CHLOROETHYL)ETHER	300	30	360	U	360	U	380	U	350	U	350	U
2-CHLOROPHENOL	300	30	360	U	360	U	380	U	350	U	350	U
1,3-DICHLOROBENZENE	300	30	360	U	360	U	380	U	350	U	350	U
1,4-DICHLOROBENZENE	300	30	360	U	360	U	380	U	350	U	350	U
1,2-DICHLOROBENZENE	300	30	360	U	360	U	380	U	350	U	350	U
2-METHYLPHENOL	300	30	360	U	360	U	380	U	350	U	350	U
2,2'-OXYBIS(1-CHLOROPROPANE)	300	30	360	U	360	U	380	U	350	U	350	U
4-METHYLPHENOL	300	30	360	U	360	U	380	U	350	U	350	U
N-NITROSO-DI-N-PROPYLAMINE	300	30	360	U	360	U	380	U	350	U	350	U
HEXACHLOROETHANE	300	30	360	U	360	U	380	U	350	U	350	U
NITROBENZENE	300	30	360	U	360	U	380	U	350	U	350	U
ISOPHORONE	300	30	360	U	360	U	380	U	350	U	350	U
2-NITROPHENOL	300	30	360	U	360	U	380	U	350	U	350	U
2,4-DIMETHYLPHENOL	300	30	360	U	360	U	380	U	350	U	350	U
BIS(2-CHLOROETHOXY)METHANE	300	30	360	U	360	U	380	U	350	U	350	U
2,4-DICHLOROPHENOL	300	30	360	U	360	U	380	U	350	U	350	U
1,2,4-TRICHLOROBENZENE	300	30	360	U	360	U	380	U	350	U	350	U
NAPHTHALENE	300	30	360	U	360	U	380	U	350	U	350	U
4-CHLOROANILINE	300	30	360	U	360	U	380	U	350	U	350	U
HEXACHLOROBUTADIENE	300	30	360	UJ	360	U	380	U	350	U	350	U
4-CHLORO-3-METHYLPHENOL	300	30	360	U	360	U	380	U	350	U	350	U
2-METHYLNAPHTHALENE	300	30	360	U	360	U	380	U	350	U	350	U
HEXACHLOROCYCLOPENTADIENE	300	30	360	U	360	UJ	380	UJ	350	UJ	350	UJ
2,4,6-TRICHLOROPHENOL	300	30	360	U	360	U	380	U	350	U	350	U
2,4,5-TRICHLOROPHENOL	800	80	880	U	870	U	920	U	850	U	840	U
2-CHLORONAPHTHALENE	300	30	360	U	360	U	380	U	350	U	350	U
2-NITROANILINE	800	80	880	U	870	U	920	U	850	U	840	U
DIMETHYL PHTHALATE	300	30	360	U	360	U	380	U	350	U	350	U
ACENAPHTHYLENE	300	30	360	U	360	U	380	U	350	U	350	U
2,6-DINITROTOLUENE	300	30	360	U	360	U	380	U	350	U	350	U
3-NITROANILINE	800	80	880	UJ	870	U	920	U	850	U	840	U
ACENAPHTHENE	300	30	360	U	360	U	380	U	350	U	350	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID: RB-01-040695
LABORATORY ID: 950200-14

TCL PESTICIDE/PCB WATERS (UG/L)

ANALYTE	CRQL	MDL		
AROCLOR-1016	1	0.33	1.0	U
AROCLOR-1221	2	0.67	2.0	U
AROCLOR-1232	1	0.33	1.0	U
AROCLOR-1242	1	0.33	1.0	U
AROCLOR-1248	1	0.33	1.0	U
AROCLOR-1254	1	0.33	1.0	U
AROCLOR-1260	1	0.33	1.0	U
DILUTION FACTOR:			1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-03-0001		SB-03-1012		SB-03-1214		SB-04-0001		SB-05-0001	
LABORATORY ID:			950200-10		950200-11		950200-12		950200-18		950200-15	
TAL METAL SOILS (MG/KG)												
ANALYTE	CRDL	IDL										
ALUMINUM	40	2.6	2590		5210		2490		3490		3700	
ANTIMONY	12	10	8.8	U	8.6	U	8.4	U	9.4	U	8.8	U
ARSENIC	2	0.4	5.8		2.3		0.78		3.4		2.5	
BARIUM	40	1.8	201		27.7		12.0		67.3		37.5	
BERYLLIUM	1	0.2	0.21	J	0.29	J	0.22	J	0.23	J	0.26	J
CADMIUM	1	0.6	2.6	U	0.52	UJ	0.51	UJ	0.57	UJ	0.53	UJ
CALCIUM	1000	20	4260		25200		4710		6400		9790	
CHROMIUM	2	1.0	13.4		11.4		6.1	U	10.2		15.9	
COBALT	10	1.8	6.9		4.8		3.1		5.3		4.9	
COPPER	5	1.2	13.9	J	9.9	J	6.8	J	14.7	J	21.4	
IRON	20	0.6	14600		11400		6260		11700		10400	
LEAD	0.6	0.4	7.6		3.5		1.7	J	9.0		32.6	
MAGNESIUM	1000	20.0	1880		8540		2070		2920		4410	
MANGANESE	3	1.0	2490		297		177		638		442	
MERCURY	0.1	0.05	0.05	U	0.05	U	0.05	U	0.04	U	0.05	U
NICKEL	8	1.8	14.7	J	11.8	U	6.7	U	12.4	U	13.6	U
POTASSIUM	1000	20	268		862		347		382		413	
SELENIUM	1	0.8	0.71	U	0.69	U	0.68	U	0.75	U	0.71	U
SILVER	2	1.0	0.88	U	0.86	U	0.84	U	0.94	U	0.88	U
SODIUM	1000	20.0	259		175		92.8	U	180		145	
THALLIUM	2	1.0	0.88	U	0.86	U	0.84	U	0.94	U	0.88	U
VANADIUM	10	1.0	10.1		25.2		14.1		13.7		15.9	
ZINC	4	1.0	26.4		24.2		11.6		19.4		22.9	
CYANIDE	1	1.0	1.1		1.2	U	1.1	U	1.1	U	1.1	U
% SOLIDS:			94.4		86.7		91.1		93.9		87.7	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-05-1012		SB-05-1315		SB-06-0002		SB-06-0608		SB-06-1214	
LABORATORY ID:			950200-16		950200-17		950200-02		950200-03		950200-04	
TAL METAL SOILS (MG/KG)												
ANALYTE	CRDL	IDL										
ALUMINUM	40	2.6	4210		2540		2790		2040		1700	
ANTIMONY	12	10	9.5	U	8.6	U	8.9	U	8.6	U	8.4	U
ARSENIC	2	0.4	2.0		0.78		4.5		0.94		0.46	
BARIUM	40	1.8	25.5		8.3	U	21.9		6.8	U	6.6	U
BERYLLIUM	1	0.2	0.31	J	0.20	J	0.25	J	0.20	J	0.17	J
CADMIUM	1	0.6	0.57	UJ	0.52	UJ	0.54	UJ	0.52	UJ	0.50	UJ
CALCIUM	1000	20	30600		4520		19100		7280		3490	
CHROMIUM	2	1.0	9.8	U	5.9	U	27.9		4.4	U	4.8	U
COBALT	10	1.8	4.3		3.2		7.2		3.1		2.2	
COPPER	5	1.2	10.0	J	7.0	J	9.6	J	6.4	J	4.8	J
IRON	20	0.6	9960		6520		8570		4810		3920	
LEAD	0.6	0.4	3.4		1.3	J	2.6		1.2	J	1.1	J
MAGNESIUM	1000	20.0	11500		2140		6630		1900		1480	
MANGANESE	3	1.0	316		107		246		71.3		79.7	
MERCURY	0.1	0.05	0.05	U	0.05	U	0.05	U	0.05	U	0.04	U
NICKEL	8	1.8	10.4	U	8.3	U	12.9	U	6.9	U	5.5	U
POTASSIUM	1000	20	748		240		285		209		198	
SELENIUM	1	0.8	0.76	U	0.69	U	0.71	U	0.69	U	0.67	U
SILVER	2	1.0	0.95	U	0.86	U	0.89	U	0.86	U	0.84	U
SODIUM	1000	20.0	162		95.0	U	128		67.2	U	70.6	U
THALLIUM	2	1.0	0.95	U	0.86	U	0.89	U	0.86	U	0.84	U
VANADIUM	10	1.0	20.7		12.4		11.3		9.3		9.4	
ZINC	4	1.0	21.7		12.1		15.2		9.9		7.8	U
CYANIDE	1	1.0	1.1	U	1.0	U	1.0	U	1.0	U	1.1	U
% SOLIDS:			87.3		96.2		95.7		97.8		92.5	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			FB-01-040495		FB-02-040495		GW-03		RB-01-040495		RB-01-040595	
LABORATORY ID:			950200-05		950200-06		950200-20		950200-07		950200-09	
TAL METAL WATERS (UG/L)												
ANALYTE	CRDL	IDL										
ALUMINUM	200	13	13.0	U	16.8	U	8450		13.0	U	13.0	U
ANTIMONY	60	50	50.0	U	50.0	U	50.0	U	50.0	U	50.0	U
ARSENIC	10	2	2.0	U	2.0	U	3.9		2.0	U	2.0	U
BARIUM	200	9	9.0	U	9.0	U	137		9.0	U	9.0	U
BERYLLIUM	5	1	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	5	3	3.0	UJ	3.0	UJ	5.6	U	3.0	UJ	3.0	UJ
CALCIUM	5000	100	152	U	144	U	144000		131	U	127	U
CHROMIUM	10	5	5.0	U	5.0	U	28.9	U	5.0	U	5.0	U
COBALT	50	9	9.0	U	9.0	U	12.7		9.0	U	9.0	U
COPPER	25	6	6.0	U	6.0	U	43.1	J	6.0	U	6.0	U
IRON	100	3	7.4	U	13.4	U	15300		3.0	U	7.8	U
LEAD	3	2	2.0	U	2.0	U	5.1	J	2.0	U	2.0	U
MAGNESIUM	5000	100	100	U	100	U	42100		100	U	100	U
MANGANESE	15	5	5.0	U	5.0	U	862		5.0	U	5.0	U
MERCURY	0.2	0.1	0.13	U	0.13	U	0.10	U	0.13	U	0.13	U
NICKEL	40	9	9.0	U	9.0	U	38.9	U	9.0	U	9.0	U
POTASSIUM	5000	100	100	U	100	U	6430		100	U	100	U
SELENIUM	5	4	4.0	U	4.0	U	33.3		4.0	U	4.0	U
SILVER	10	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
SODIUM	5000	100	220	U	253	U	9960		203	U	188	U
THALLIUM	10	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
VANADIUM	50	5	5.0	U	5.0	U	33.7		5.0	U	5.0	U
ZINC	20	5	5.1	U	7.2	U	31.8	U	5.0	U	17.8	U
CYANIDE	10	10	10.0	U	10.0	U	10.0	U	10.0	U	10.0	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID: RB-01-040695
LABORATORY ID: 950200-14

TAL METAL WATERS (UG/L)

ANALYTE	CRDL	IDL		
ALUMINUM	200	13	13.0	U
ANTIMONY	60	50	50.0	U
ARSENIC	10	2	2.0	U
BARIUM	200	9	9.0	U
BERYLLIUM	5	1	1.0	U
CADMIUM	5	3	3.0	UJ
CALCIUM	5000	100	129	U
CHROMIUM	10	5	5.0	U
COBALT	50	9	9.0	U
COPPER	25	6	6.0	U
IRON	100	3	4.4	U
LEAD	3	2	2.0	U
MAGNESIUM	5000	100	100	U
MANGANESE	15	5	5.0	U
MERCURY	0.2	0.1	0.12	U
NICKEL	40	9	9.0	U
POTASSIUM	5000	100	100	U
SELENIUM	5	4	4.0	U
SILVER	10	5	5.0	U
SODIUM	5000	100	184	U
THALLIUM	10	5	5.0	U
VANADIUM	50	5	5.0	U
ZINC	20	5	5.7	U
CYANIDE	10	10	10.0	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			FB-01-040495		FB-02-040495		RB-01-040495		RB-01-040595		RB-01-040695	
LABORATORY ID:			951200-05		951200-06		951200-07		951200-09		951200-14	
TAL METAL WATERS, DISSOLVED (UG/L)												
ANALYTE	CRDL	IDL										
ALUMINUM	200	13	13.0	U	13.0	U	13.0	U	16.8	U	13.0	U
ANTIMONY	60	50	50.0	U	50.0	U	50.0	U	50.0	U	50.0	U
ARSENIC	10	2	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
BARIUM	200	9	9.0	U	9.0	U	9.0	U	9.0	U	9.0	U
BERYLLIUM	5	1	1.0	U	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	5	3	3.0	UJ	3.0	UJ	3.0	UJ	3.0	UJ	3.0	UJ
CALCIUM	5000	100	136	U	137	U	169	U	175	U	159	U
CHROMIUM	10	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
COBALT	50	9	9.0	U	9.0	U	9.0	U	9.0	U	9.0	U
COPPER	25	6	6.0	U	6.0	U	6.0	U	6.0	U	6.0	U
IRON	100	3	15.5	U	6.3	U	6.0	U	14.0	U	4.1	U
LEAD	3	2	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
MAGNESIUM	5000	100	100	U	100	U	100	U	100	U	100	U
MANGANESE	15	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
MERCURY	0.2	0.1	0.13	U	0.13	U	0.13	U	0.13	U	0.13	U
NICKEL	40	9	9.0	U	9.0	U	9.0	U	9.0	U	9.0	U
POTASSIUM	5000	100	100	U	100	U	100	U	100	U	100	U
SELENIUM	5	4	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
SILVER	10	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
SODIUM	5000	100	246	U	310	U	255	U	244	U	295	U
THALLIUM	10	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
VANADIUM	50	5	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
ZINC	20	5	5.6		5.0	U	8.4		5.0	U	5.0	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			GW-03-F		RB-01-040795F		RB-01-041095F		RB-01-041195F	
LABORATORY ID:			953200-21		953200-23		953200-33		953200-34	
TAL METAL WATERS, DISSOLVED (UG/L)										
ANALYTE	CRDL	IDL								
ALUMINUM	200	13	35.0	U	40.6	U	23.5	U	32.1	U
ANTIMONY	60	50	50.0	U	50.0	U	50.0	U	50.0	U
ARSENIC	10	2	2.0	U	2.0	U	2.0	U	2.0	U
BARIUM	200	9	47.1	U	9.0	U	9.0	U	9.0	U
BERYLLIUM	5	1	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	5	3	3.0	U	3.2	U	3.5	U	4.1	U
CALCIUM	5000	100	153000		167	U	237	U	129	U
CHROMIUM	10	5	5.0	U	5.6	U	5.0	U	5.0	U
COBALT	50	9	9.0	U	9.0	U	9.0	U	9.0	U
COPPER	25	6	6.0	U	6.0	U	6.0	U	6.0	U
IRON	100	3	41.1	U	27.3	U	27.2	U	28.3	U
LEAD	3	2	2.0	U	2.0	U	2.0	U	2.0	U
MAGNESIUM	5000	100	42600		100	U	100	U	100	U
MANGANESE	15	5	199		5.0	U	5.0	U	5.0	U
MERCURY	0.2	0.1	0.13	U	0.13	U	0.13	U	0.14	U
NICKEL	40	9	9.0	U	9.0	U	9.0	U	9.0	U
POTASSIUM	5000	100	5480		100	U	100	U	100	U
SELENIUM	5	4	36.7		4.0	U	4.0	U	4.0	U
SILVER	10	5	5.0	U	5.0	U	5.0	U	5.0	U
SODIUM	5000	100	11500		352	U	355	U	321	U
THALLIUM	10	5	5.0	U	5.0	U	5.0	U	5.0	U
VANADIUM	50	5	5.0	U	5.0	U	5.0	U	5.0	U
ZINC	20	5	5.0	U	5.0	U	13.9	U	5.0	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			DUP-03-F		GW-01-F		GW-02-F		RB-01-041295-F	
LABORATORY ID:			954200-51		954200-47		954200-49		954200-45	
TAL METAL WATERS, DISSOLVED (UG/L)										
ANALYTE	CRDL	IDL								
ALUMINUM	200	13	44.0	U	46.5	U	370		57.8	U
ANTIMONY	60	50	50.0	U	50.0	U	50.0	U	50.0	U
ARSENIC	10	2	2.0	U	4.9		2.0	U	2.0	U
BARIUM	200	9	89.9		147		100		9.0	U
BERYLLIUM	5	1	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	5	3	3.0	U	6.1	U	6.0	U	3.5	U
CALCIUM	5000	100	194000		91500		182000		145	U
CHROMIUM	10	5	5.0	U	5.0	U	5.0	U	5.0	U
COBALT	50	9	9.0	U	12.2		9.0	U	9.0	U
COPPER	25	6	21.1		23.6		18.8		6.0	U
IRON	100	3	44.7	U	50.5	U	348		61.7	U
LEAD	3	2	2.0	U	2.0	U	2.0	U	2.0	U
MAGNESIUM	5000	100	58500		30200		55500		100	U
MANGANESE	15	5	947		201		890		5.0	U
MERCURY	0.2	0.1	0.13	U	0.14	U	0.14	U	0.16	U
NICKEL	40	9	9.0	U	20.9	U	15.4	U	9.0	U
POTASSIUM	5000	100	4640		5730		4610		100	U
SELENIUM	5	4	4.0	U	4.0	U	4.0	U	4.0	U
SILVER	10	5	5.0	U	5.0	U	5.0	U	5.0	U
SODIUM	5000	100	9640		90800		9010		316	U
THALLIUM	10	5	5.0	U	5.0	U	5.0	U	5.0	U
VANADIUM	50	5	5.0	U	5.0	U	5.0	U	5.0	U
ZINC	20	5	5.0	U	5.0	U	5.0	U	6.9	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-07-1416		SB-07-2830	
LABORATORY ID:			954200-41		954200-42	
TAL METAL SOILS (MG/KG)						
ANALYTE	CRDL	IDL				
ALUMINUM	40	2.6	3940		1940	
ANTIMONY	12	10	10.1	U	10.0	U
ARSENIC	2	0.4	2.8		0.84	
BARIUM	40	1.8	47.4		8.6	U
BERYLLIUM	1	0.2	0.21	J	0.20	U
CADMIUM	1	0.6	0.60	U	0.60	U
CALCIUM	1000	20	31900		4880	
CHROMIUM	2	1.0	10.2	U	5.6	U
COBALT	10	1.8	5.4		2.4	
COPPER	5	1.2	9.2	U	6.1	U
IRON	20	0.6	9270		5120	
LEAD	0.6	0.4	5.2		1.6	J
MAGNESIUM	1000	20.0	11200		1850	
MANGANESE	3	1.0	406		91.5	
MERCURY	0.1	0.05	0.05	U	0.06	U
NICKEL	8	1.8	13.0	U	7.0	U
POTASSIUM	1000	20	1130		251	
SELENIUM	1	0.8	0.81	U	0.80	U
SILVER	2	1.0	1.0	U	1.0	U
SODIUM	1000	20.0	337		81.8	
THALLIUM	2	1.0	1.0	U	1.0	U
VANADIUM	10	1.0	15.2		12.0	
ZINC	4	1.0	29.5		7.9	U
CYANIDE	1	1.0	1.1	U	1.1	U
% SOLIDS:			85.5		82.1	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			DUP-03		GW-01		GW-02		RB-01-041295	
LABORATORY ID:			954200-50		954200-46		954200-48		954200-44	
TAL METAL WATERS (UG/L)										
ANALYTE	CRDL	IDL								
ALUMINUM	200	13	6280		19400		8500		149	U
ANTIMONY	60	50	50.0	U	50.0	U	50.0	U	50.0	U
ARSENIC	10	2	3.8		11.0		4.2		2.0	U
BARIUM	200	9	142		380		154		11.8	U
BERYLLIUM	5	1	1.0	U	1.0	U	1.0	U	1.0	U
CADMIUM	5	3	3.0	U	3.7	U	3.0	U	3.5	U
CALCIUM	5000	100	187000		132000		215000		139	U
CHROMIUM	10	5	25.1	U	286		24.4	U	5.0	U
COBALT	50	9	10.6		23.8		12.2		9.0	U
COPPER	25	6	24.9	U	172		28.7	U	9.1	
IRON	100	3	10400		27000		14100		170	
LEAD	3	2	2.3	J	10.0		2.3	J	2.0	U
MAGNESIUM	5000	100	57000		47900		65700		371	
MANGANESE	15	5	1250		993		1520		5.0	U
MERCURY	0.2	0.1	0.13	U	0.14	U	0.14	U	0.13	U
NICKEL	40	9	24.3	U	63.6	U	24.9	U	9.0	U
POTASSIUM	5000	100	5470		9430		6610		133	U
SELENIUM	5	4	4.0	U	4.0	U	4.0	U	4.0	U
SILVER	10	5	5.0	U	5.0	U	5.0	U	5.0	U
SODIUM	5000	100	8950		89100		10100		248	U
THALLIUM	10	5	5.0	U	5.0	U	5.0	U	5.0	U
VANADIUM	50	5	22.6		53.9		30.4		5.0	U
ZINC	20	5	26.1	U	159		36.8	U	5.0	U
CYANIDE	10	10	10.0	U	291		10.0	U	10.0	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			DUP-01		DUP-02		SB-01-0001		SB-01-0608		SB-01-1416	
LABORATORY ID:			952200-31		952200-39		952200-28		952200-29		952200-30	
TAL METAL SOILS (MG/KG)												
ANALYTE	CRDL	IDL										
ALUMINUM	40	2.6	3660		498		4820		2550		5450	
ANTIMONY	12	10.0	8.9	UJ	9.4	U	8.8	UJ	7.8	UJ	8.9	UJ
ARSENIC	2	0.40	4.1		0.32	U	2.1		1.4		2.6	
BARIUM	40	1.8	37.0		13.8		32.6		16.4		55.2	
BERYLLIUM	1	0.20	0.29	J	0.16	U	0.18	U	0.16	U	0.23	J
CADMIUM	1	0.60	0.53	U	0.79	U	0.53	U	0.47	U	0.53	U
CALCIUM	1000	20.0	17400		768		14100		5780		26300	
CHROMIUM	2	1.0	19.5		73.6		17.9		8.6	U	15.9	
COBALT	10	1.8	3.7		1.5	U	5.4		4.1		5.1	
COPPER	5	1.2	14.6	J	17.9		13.0	J	4.2	J	11.8	J
IRON	20	0.60	13400		2430		10400		7200		11100	
LEAD	0.6	0.40	6.1		175		6.0		3.9		3.9	
MAGNESIUM	1000	20.0	5800		153		4700		4060		11400	
MANGANESE	3	1.0	364	J	31.2	J	307	J	122	J	327	J
MERCURY	0.1	0.05	0.04	U	0.04	U	0.04	U	0.04	U	0.05	U
NICKEL	8	1.8	19.7	J	4.6	U	19.6	J	7.4	U	20.5	J
POTASSIUM	1000	20.0	417		157		550		403		963	
SELENIUM	1	0.80	0.71	UJ	0.64	UJ	0.71	UJ	0.62	UJ	0.71	UJ
SILVER	2	1.0	0.89	U	0.81	U	0.88	U	0.78	U	0.89	U
SODIUM	1000	20.0	316		86.0		333		194		314	
THALLIUM	2	1.0	0.89	U	0.81	U	0.88	U	0.78	U	0.89	U
VANADIUM	10	1.0	17.6		2.3		15.2		9.2		23.4	
ZINC	4	1.0	19.0		8.9	U	21.4		13.0		26.1	
CYANIDE	1	1.0	0.94	U	90.4		0.99	U	1.0	U	2.9	
% SOLIDS:			94.0		96.9		94.4		96.7		86.3	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-02-0001		SB-02-0204		SB-02-0406		SB-04-1012		SB-04-1214	
LABORATORY ID:			952200-35		952200-36		952200-37		952200-26		952200-27	
TAL METAL SOILS (MG/KG)												
ANALYTE	CRDL	IDL										
ALUMINUM	40	2.6	3310		525		2220		5310		2440	
ANTIMONY	12	10.0	8.0	UJ	8.6	UJ	9.7	UJ	9.6	UJ	8.7	UJ
ARSENIC	2	0.40	2.1		0.42		0.94		2.9		1.1	
BARIUM	40	1.8	28.1		19.5		36.2		29.9		9.9	U
BERYLLIUM	1	0.20	0.19	J	0.17	U	0.19	U	0.22	J	0.17	U
CADMIUM	1	0.60	1.8	U	1.0	U	3.7	U	0.58	U	0.70	U
CALCIUM	1000	20.0	12100		882		7910		24300		13900	
CHROMIUM	2	1.0	20.0		72.3		618		13.2		12.7	
COBALT	10	1.8	4.0		1.5	U	2.2		5.1		5.1	
COPPER	5	1.2	14.9	J	24.9		54.5		10.3	J	8.5	J
IRON	20	0.60	8990		2990		14200		11400		6920	
LEAD	0.6	0.40	12.1		215		231		4.0		2.2	
MAGNESIUM	1000	20.0	5080		211		3970		9510		7660	
MANGANESE	3	1.0	403	J	61.3	J	103	J	302	J	152	J
MERCURY	0.1	0.05	0.04	U	0.05	U	0.04	U	0.05	U	0.05	U
NICKEL	8	1.8	27.4		7.9	U	15.3	J	13.8	U	14.0	U
POTASSIUM	1000	20.0	380		147		466		1000		276	
SELENIUM	1	0.80	0.64	UJ	0.69	UJ	0.78	UJ	0.77	UJ	0.70	UJ
SILVER	2	1.0	0.80	U	0.86	U	0.97	U	0.96	U	0.87	U
SODIUM	1000	20.0	142		103		280		177		84.2	
THALLIUM	2	1.0	0.80	U	0.86	U	0.97	U	0.96	U	0.87	U
VANADIUM	10	1.0	12.0		2.0		7.2		24.8		12.5	
ZINC	4	1.0	24.9		8.5	U	28.6		23.2		11.9	
CYANIDE	1	1.0	0.89	U	79.0		140		1.1	U	1.1	U
% SOLIDS:			96.6		96.4		90.9		85.9		90.3	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID: SB-07-0406
LABORATORY ID: 952200-40

TAL METAL SOILS (MG/KG)

ANALYTE	CRDL	IDL		
ALUMINUM	40	2.6	1090	
ANTIMONY	12	10.0	8.4	UJ
ARSENIC	2	0.40	0.50	
BARIUM	40	1.8	30.7	
BERYLLIUM	1	0.20	0.17	U
CADMIUM	1	0.60	3.1	U
CALCIUM	1000	20.0	1080	
CHROMIUM	2	1.0	175	
COBALT	10	1.8	1.6	
COPPER	5	1.2	57.7	
IRON	20	0.60	7620	
LEAD	0.6	0.40	515	
MAGNESIUM	1000	20.0	286	
MANGANESE	3	1.0	38.3	J
MERCURY	0.1	0.05	0.04	U
NICKEL	8	1.8	6.7	U
POTASSIUM	1000	20.0	210	
SELENIUM	1	0.80	0.67	UJ
SILVER	2	1.0	0.84	U
SODIUM	1000	20.0	262	
THALLIUM	2	1.0	0.84	U
VANADIUM	10	1.0	4.9	
ZINC	4	1.0	21.8	
CYANIDE	1	1.0	148	
% SOLIDS:			94.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			RB-01-040795		RB-01-041095		RB-01-041195	
LABORATORY ID:			952200-22		952200-33		952200-34	
TAL METAL WATERS (UG/L)								
ANALYTE	CRDL	IDL						
ALUMINUM	200	13	49.8	U	53.8	U	19.5	U
ANTIMONY	60	50	50.0	U	50.0	U	50.0	U
ARSENIC	10	2	2.0	U	2.0	U	2.0	U
BARIUM	200	9	9.0	U	9.0	U	9.0	U
BERYLLIUM	5	1	1.0	U	1.0	U	1.0	U
CADMIUM	5	3	3.0	U	5.2	U	3.0	U
CALCIUM	5000	100	172	U	152	U	135	U
CHROMIUM	10	5	5.0	U	7.0	U	5.0	U
COBALT	50	9	9.0	U	9.0	U	9.0	U
COPPER	25	6	6.0	U	6.0	U	6.0	U
IRON	100	3	43.2	U	43.9	U	28.6	U
LEAD	3	2	2.0	U	2.0	U	2.0	U
MAGNESIUM	5000	100	100	U	100	U	100	U
MANGANESE	15	5	5.0	U	5.0	U	5.0	U
MERCURY	0.2	0.1	0.13	U	0.13	U	0.13	U
NICKEL	40	9	9.0	U	9.0	U	9.0	U
POTASSIUM	5000	100	103	U	100	U	100	U
SELENIUM	5	4	4.0	U	4.0	U	4.0	U
SILVER	10	5	5.0	U	5.0	U	5.0	U
SODIUM	5000	100	259	U	296	U	256	U
THALLIUM	10	5	5.0	U	5.0	U	5.0	U
VANADIUM	50	5	5.0	U	5.0	U	5.0	U
ZINC	20	5	5.0	U	5.0	U	5.0	U
CYANIDE	10	10	10.0	U	10.0	U	10.0	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-04-1012		SB-04-1214		SB-01-0001		SB-01-0608		SB-01-1416	
LABORATORY ID:			950200-26		950200-27		950200-28		950200-29		950200-30	
TCL VOLATILE SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
CHLOROMETHANE	10	2	11	U	11	U	12	U	10	U	1500	U
BROMOMETHANE	10	2	11	U	11	U	12	U	10	U	1500	U
VINYL CHLORIDE	10	2	11	U	11	U	12	U	10	U	1500	U
CHLOROETHANE	10	2	11	U	11	U	12	U	10	UJ	1500	U
METHYLENE CHLORIDE	10	2	11	U	11	U	12	U	10	U	1500	U
ACETONE	10	2	41	U	19	U	24	U	10	U	1500	U
CARBON DISULFIDE	10	2	11	U	11	U	12	U	10	U	1500	U
1,1-DICHLOROETHENE	10	2	11	U	11	U	12	U	10	U	1500	U
1,1-DICHLOROETHANE	10	2	11	U	11	U	12	U	10	U	1500	U
1,2-DICHLOROETHENE (TOTAL)	10	2	11	U	11	U	12	U	10	U	1500	U
CHLOROFORM	10	2	11	U	11	U	8	J	10	U	1500	U
1,2-DICHLOROETHANE	10	2	11	U	11	U	12	U	10	U	1500	U
2-BUTANONE	10	2	11	U	11	U	12	U	10	U	1500	U
1,1,1-TRICHLOROETHANE	10	2	11	U	11	U	12	U	10	U	1500	U
CARBON TETRACHLORIDE	10	2	11	U	11	U	12	U	10	U	1500	U
BROMODICHLOROMETHANE	10	2	11	U	11	U	12	U	10	U	1500	U
1,2-DICHLOROPROPANE	10	2	11	U	11	U	12	U	10	U	1500	U
CIS-1,3-DICHLOROPROPENE	10	2	11	U	11	U	12	U	10	U	1500	U
TRICHLOROETHENE	10	2	15		66		*640	J	14		*55000	
DIBROMOCHLOROMETHANE	10	2	11	U	11	U	12	U	10	U	1500	U
1,1,2-TRICHLOROETHANE	10	2	11	U	11	U	12	U	10	U	1500	U
BENZENE	10	2	11	U	11	U	12	U	10	U	1500	U
TRANS-1,3-DICHLOROPROPENE	10	2	11	UJ	11	UJ	12	UJ	10	U	1500	U
BROMOFORM	10	2	11	U	11	U	12	U	10	U	1500	U
4-METHYL-2-PENTANONE	10	2	11	U	11	U	12	U	10	U	1500	U
2-HEXANONE	10	2	11	U	11	U	12	U	10	UJ	1500	U
TETRACHLOROETHENE	10	2	11	U	1	J	12	U	10	U	2300	
1,1,2,2-TETRACHLOROETHANE	10	2	11	U	11	U	12	U	10	U	1500	U
TOLUENE	10	2	11	U	11	U	1	J	10	U	1500	U
CHLOROBENZENE	10	2	11	U	11	U	12	U	10	U	1500	U
ETHYLBENZENE	10	2	11	U	11	U	12	U	10	U	1500	U
STYRENE	10	2	11	U	11	U	12	U	10	U	1500	U
XYLENE (TOTAL)	10	2	11	U	11	U	12	U	10	U	1500	U
% SOLIDS:			93.0		90.0		81.0		96.0		86.0	
DILUTION FACTOR:			1.0		1.0		1.0		1.0		1.0	

* RESULT FROM DILUTION ANALYSIS

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			RB-01-040795		TB-01-041095		RB-01-041095		TB-01-041195		RB-01-041195	
LABORATORY ID:			950200-22		950200-24		950200-25		950200-32		950200-34	
TCL VOLATILE WATERS (UG/L)												
ANALYTE	CRQL	MDL										
CHLOROMETHANE	10	2	10	UJ	10	U	10	U	10	UJ	10	U
BROMOMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
VINYL CHLORIDE	10	2	10	U	10	U	10	U	10	U	10	U
CHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
METHYLENE CHLORIDE	10	2	10	U	10	U	10	U	10	U	10	U
ACETONE	10	2	10	U	10	U	14		10	U	10	U
CARBON DISULFIDE	10	2	10	U	10	U	10	U	10	U	10	U
1,1-DICHLOROETHENE	10	2	10	U	10	U	10	U	10	U	10	U
1,1-DICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
1,2-DICHLOROETHENE (TOTAL)	10	2	10	U	10	U	10	U	10	U	10	U
CHLOROFORM	10	2	10	U	10	U	10	U	10	U	10	U
1,2-DICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
2-BUTANONE	10	2	10	U	10	U	10	U	10	U	10	U
1,1,1-TRICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
CARBON TETRACHLORIDE	10	2	10	U	10	U	10	U	10	U	10	U
BROMODICHLOROMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
1,2-DICHLOROPROPANE	10	2	10	U	10	U	10	U	10	U	10	U
CIS-1,3-DICHLOROPROPENE	10	2	10	U	10	U	10	U	10	U	10	U
TRICHLOROETHENE	10	2	10	U	10	U	10	U	10	U	10	U
DIBROMOCHLOROMETHANE	10	2	10	U	10	U	10	U	10	U	10	U
1,1,2-TRICHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
BENZENE	10	2	10	U	10	U	10	U	10	U	10	U
TRANS-1,3-DICHLOROPROPENE	10	2	10	U	10	U	10	U	10	U	10	U
BROMOFORM	10	2	10	U	10	U	10	U	10	U	10	U
4-METHYL-2-PENTANONE	10	2	10	UJ	10	U	10	U	10	UJ	10	U
2-HEXANONE	10	2	10	U	10	U	10	U	10	U	10	U
TETRACHLOROETHENE	10	2	10	U	10	U	10	U	10	U	10	U
1,1,2,2-TETRACHLOROETHANE	10	2	10	U	10	U	10	U	10	U	10	U
TOLUENE	10	2	10	U	10	U	10	U	10	U	10	U
CHLOROBENZENE	10	2	10	U	10	U	10	U	10	U	10	U
ETHYLBENZENE	10	2	10	U	10	U	10	U	10	U	10	U
STYRENE	10	2	10	U	10	U	10	U	10	U	10	U
XYLENE (TOTAL)	10	2	10	U	10	U	10	U	10	U	10	U
DILUTION FACTOR:			1.0		1.0		1.0		1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

TCL VOLATILE SOILS (UG/KG)

CLIENT ID:			DUP-01		SB-02-0001		SB-02-0204		SB-02-0406		SB-02-0608	
LABORATORY ID:			950200-31		950200-35		950200-36		950200-37		950200-38	
ANALYTE	CRQL	MDL										
CHLOROMETHANE	10	2	12	U	11	UJ	11	UJ	11	UJ	11	UJ
BROMOMETHANE	10	2	12	U	11	U	11	U	11	U	11	U
VINYL CHLORIDE	10	2	12	U	11	UJ	11	UJ	11	UJ	11	UJ
CHLOROETHANE	10	2	12	UJ	11	U	11	U	11	U	11	U
METHYLENE CHLORIDE	10	2	12	U	11	U	11	U	11	U	11	U
ACETONE	10	2	110	U	31	U	26	U	66	U	460	J
CARBON DISULFIDE	10	2	12	U	11	U	11	U	11	U	11	U
1,1-DICHLOROETHENE	10	2	12	U	11	U	11	U	11	U	11	U
1,1-DICHLOROETHANE	10	2	12	U	11	U	11	U	11	U	11	U
1,2-DICHLOROETHENE (TOTAL)	10	2	12	U	11	U	11	U	11	U	11	U
CHLOROFORM	10	2	12	U	11	U	11	U	11	U	11	U
1,2-DICHLOROETHANE	10	2	12	U	11	U	11	U	11	U	11	U
2-BUTANONE	10	2	12	U	11	UJ	11	UJ	3	J	4	J
1,1,1-TRICHLOROETHANE	10	2	12	U	11	U	11	U	11	U	11	U
CARBON TETRACHLORIDE	10	2	12	U	11	U	11	U	11	U	11	U
BROMODICHLOROMETHANE	10	2	12	U	11	U	11	U	11	U	11	U
1,2-DICHLOROPROPANE	10	2	12	U	11	U	11	U	11	U	11	U
CIS-1,3-DICHLOROPROPENE	10	2	12	U	11	U	11	U	11	U	11	U
TRICHLOROETHENE	10	2	12	J	130		71		*770	J	*690	J
DIBROMOCHLOROMETHANE	10	2	12	U	11	U	11	U	11	U	11	U
1,1,2-TRICHLOROETHANE	10	2	12	U	11	U	11	U	9	J	8	J
BENZENE	10	2	12	U	11	U	11	U	11	U	11	U
TRANS-1,3-DICHLOROPROPENE	10	2	12	U	11	U	11	U	11	U	11	U
BROMOFORM	10	2	12	U	11	U	11	U	11	U	11	U
4-METHYL-2-PENTANONE	10	2	12	U	11	UJ	11	UJ	11	UJ	11	UJ
2-HEXANONE	10	2	12	UJ	11	U	11	U	11	U	11	U
TETRACHLOROETHENE	10	2	12	U	11	U	90		*760	J	*740	J
1,1,2,2-TETRACHLOROETHANE	10	2	12	U	11	U	11	U	11	U	11	U
TOLUENE	10	2	12	U	11	U	11	U	8	J	6	J
CHLOROBENZENE	10	2	12	U	11	U	11	U	11	U	11	U
ETHYLBENZENE	10	2	12	U	11	U	11	U	7	J	8	J
STYRENE	10	2	12	U	11	U	11	U	11	U	11	U
XYLENE (TOTAL)	10	2	12	U	11	U	4	J	48		54	
% SOLIDS:			84.0		90.0		95.0		90.0		89.0	
DILUTION FACTOR:			1.0		1.0		1.0		1.0		1.0	

* RESULT FROM DILUTION ANALYSIS

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID: SB-07-0406
LABORATORY ID: 950200-40

TCL VOLATILE SOILS (UG/KG)

ANALYTE	CRQL	MDL		
CHLOROMETHANE	10	2	53	U
BROMOMETHANE	10	2	53	U
VINYL CHLORIDE	10	2	53	U
CHLOROETHANE	10	2	53	U
METHYLENE CHLORIDE	10	2	53	U
ACETONE	10	2	53	U
CARBON DISULFIDE	10	2	53	U
1,1-DICHLOROETHENE	10	2	53	U
1,1-DICHLOROETHANE	10	2	53	U
1,2-DICHLOROETHENE (TOTAL)	10	2	53	U
CHLOROFORM	10	2	53	U
1,2-DICHLOROETHANE	10	2	53	U
2-BUTANONE	10	2	53	U
1,1,1-TRICHLOROETHANE	10	2	53	U
CARBON TETRACHLORIDE	10	2	53	U
BROMODICHLOROMETHANE	10	2	53	U
1,2-DICHLOROPROPANE	10	2	53	U
CIS-1,3-DICHLOROPROPENE	10	2	53	U
TRICHLOROETHENE	10	2	290	
DIBROMOCHLOROMETHANE	10	2	53	U
1,1,2-TRICHLOROETHANE	10	2	53	U
BENZENE	10	2	53	U
TRANS-1,3-DICHLOROPROPENE	10	2	53	U
BROMOFORM	10	2	53	U
4-METHYL-2-PENTANONE	10	2	53	U
2-HEXANONE	10	2	53	U
TETRACHLOROETHENE	10	2	120	
1,1,2,2-TETRACHLOROETHANE	10	2	53	U
TOLUENE	10	2	53	U
CHLOROBENZENE	10	2	53	U
ETHYLBENZENE	10	2	53	U
STYRENE	10	2	53	U
XYLENE (TOTAL)	10	2	53	U
% SOLIDS:			94.0	
DILUTION FACTOR:			5.0	

* RESULT FROM DILUTION ANALYSIS

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID: SB-07-0406
LABORATORY ID: 950200-40

TCL SEMIVOLATILE SOILS (UG/KG)

ANALYTE	CRQL	MDL		
PHENOL	300	30	350	U
BIS(2-CHLOROETHYL)ETHER	300	30	350	U
2-CHLOROPHENOL	300	30	350	U
1,3-DICHLOROBENZENE	300	30	350	U
1,4-DICHLOROBENZENE	300	30	350	U
1,2-DICHLOROBENZENE	300	30	350	U
2-METHYLPHENOL	300	30	350	U
2,2'-OXYBIS(1-CHLOROPROPANE)	300	30	350	UJ
4-METHYLPHENOL	300	30	350	U
N-NITROSO-DI-N-PROPYLAMINE	300	30	350	U
HEXACHLOROETHANE	300	30	350	U
NITROBENZENE	300	30	350	U
ISOPHORONE	300	30	350	U
2-NITROPHENOL	300	30	350	U
2,4-DIMETHYLPHENOL	300	30	350	U
BIS(2-CHLOROETHOXY)METHANE	300	30	350	U
2,4-DICHLOROPHENOL	300	30	350	U
1,2,4-TRICHLOROBENZENE	300	30	350	U
NAPHTHALENE	300	30	350	U
4-CHLOROANILINE	300	30	350	U
HEXACHLOROBUTADIENE	300	30	350	U
4-CHLORO-3-METHYLPHENOL	300	30	350	U
2-METHYLNAPHTHALENE	300	30	350	U
HEXACHLOROCYCLOPENTADIENE	300	30	350	U
2,4,6-TRICHLOROPHENOL	300	30	350	U
2,4,5-TRICHLOROPHENOL	800	80	850	U
2-CHLORONAPHTHALENE	300	30	350	U
2-NITROANILINE	800	80	850	U
DIMETHYL PHTHALATE	300	30	350	U
ACENAPHTHYLENE	300	30	350	U
2,6-DINITROTOLUENE	300	30	350	U
3-NITROANILINE	800	80	850	U
ACENAPHTHENE	300	30	350	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID: SB-07-0406
LABORATORY ID: 950200-40

TCL SEMIVOLATILE SOILS (UG/KG)

ANALYTE	CRQL	MDL		
2,4-DINITROPHENOL	800	80	850	U
4-NITROPHENOL	800	80	850	U
DIBENZOFURAN	300	30	350	U
2,4-DINITROTOLUENE	300	30	350	U
DIETHYL PHTHALATE	300	30	350	U
4-CHLOROPHENYL PHENYL ETHER	300	30	350	U
FLUORENE	300	30	350	U
4-NITROANILINE	800	80	850	U
4,6-DINITRO-2-METHYLPHENOL	800	80	850	U
N-NITROSODIPHENYLAMINE	300	30	350	U
4-BROMOPHENYL PHENYL ETHER	300	30	350	U
HEXACHLOROBENZENE	300	30	350	U
PENTACHLOROPHENOL	800	80	850	U
PHENANTHRENE	300	30	350	U
ANTHRACENE	300	30	350	U
DI-N-BUTYLPHTHALATE	300	30	87	J
FLUORANTHENE	300	30	350	U
CARBAZOLE	300	30	350	U
PYRENE	300	30	350	U
BUTYLBENZYL PHTHALATE	300	30	350	U
3,3'-DICHLOROBENZIDINE	300	30	350	U
BENZO(A)ANTHRACENE	300	30	350	U
CHRYSENE	300	30	350	U
BIS(2-ETHYLHEXYL)PHTHALATE	300	30	1800	
DI-N-OCTYL PHTHALATE	300	30	350	U
BENZO(B)FLUORANTHENE	300	30	350	U
BENZO(K)FLUORANTHENE	300	30	350	U
BENZO(A)PYRENE	300	30	350	U
INDENO(1,2,3-CD)PYRENE	300	30	350	U
DIBENZO(A,H)ANTHRACENE	300	30	350	U
BENZO(G,H,I)PERYLENE	300	30	350	U

% SOLIDS:	94.0
DILUTION FACTOR:	1.0

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			RB-01-040795		RB-01-041095		RB-01-041195	
LABORATORY ID:			950200-22		950200-33		950200-34	
TCL SEMIVOLATILE WATERS (UG/L)								
ANALYTE	CRQL	MDL						
PHENOL	10	1	10	U	10	U	10	U
BIS(2-CHLOROETHYL)ETHER	10	1	10	U	10	U	10	U
2-CHLOROPHENOL	10	1	10	U	10	U	10	U
1,3-DICHLOROBENZENE	10	1	10	U	10	U	10	U
1,4-DICHLOROBENZENE	10	1	10	U	10	U	10	U
1,2-DICHLOROBENZENE	10	1	10	U	10	U	10	U
2-METHYLPHENOL	10	1	10	U	10	U	10	U
2,2'-OXYBIS(1-CHLOROPROPANE)	10	1	10	U	10	U	10	U
4-METHYLPHENOL	10	1	10	U	10	U	10	U
N-NITROSO-DI-N-PROPYLAMINE	10	1	10	U	10	U	10	U
HEXACHLOROETHANE	10	1	10	U	10	U	10	U
NITROBENZENE	10	1	10	U	10	U	10	U
ISOPHORONE	10	1	10	U	10	U	10	U
2-NITROPHENOL	10	1	10	U	10	U	10	U
2,4-DIMETHYLPHENOL	10	1	10	U	10	U	10	U
BIS(2-CHLOROETHOXY)METHANE	10	1	10	U	10	U	10	U
2,4-DICHLOROPHENOL	10	1	10	U	10	U	10	U
1,2,4-TRICHLOROBENZENE	10	1	10	U	10	U	10	U
NAPHTHALENE	10	1	10	U	10	U	10	U
4-CHLOROANILINE	10	1	10	U	10	U	10	U
HEXACHLOROBUTADIENE	10	1	10	U	10	U	10	U
4-CHLORO-3-METHYLPHENOL	10	1	10	U	10	U	10	U
2-METHYLNAPHTHALENE	10	1	10	U	10	U	10	U
HEXACHLOROCYCLOPENTADIENE	10	1	10	U	10	U	10	U
2,4,6-TRICHLOROPHENOL	10	1	10	U	10	U	10	U
2,4,5-TRICHLOROPHENOL	25	2.5	25	U	25	U	25	U
2-CHLORONAPHTHALENE	10	1	10	U	10	U	10	U
2-NITROANILINE	25	2.5	25	U	25	U	25	U
DIMETHYL PHTHALATE	10	1	10	U	10	U	10	U
ACENAPHTHYLENE	10	1	10	U	10	U	10	U
2,6-DINITROTOLUENE	10	1	10	U	10	U	10	U
3-NITROANILINE	25	2.5	25	U	25	U	25	U
ACENAPHTHENE	10	1	10	U	10	U	10	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			RB-01-040795		RB-01-041095		RB-01-041195	
LABORATORY ID:			950200-22		950200-33		950200-34	
TCL SEMIVOLATILE WATERS (UG/L)								
ANALYTE	CRQL	MDL						
2,4-DINITROPHENOL	25	2.5	25	U	25	UJ	25	UJ
4-NITROPHENOL	25	2.5	25	U	25	U	25	U
DIBENZOFURAN	10	1	10	U	10	U	10	U
2,4-DINITROTOLUENE	10	1	10	U	10	U	10	U
DIETHYL PHTHALATE	10	1	10	U	10	U	10	U
4-CHLOROPHENYL PHENYL ETHER	10	1	10	U	10	U	10	U
FLUORENE	10	1	10	U	10	U	10	U
4-NITROANILINE	25	2.5	25	U	25	U	25	U
4,6-DINITRO-2-METHYLPHENOL	25	2.5	25	U	25	U	25	U
N-NITROSODIPHENYLAMINE	10	1	10	U	10	U	10	U
4-BROMOPHENYL PHENYL ETHER	10	1	10	U	10	U	10	U
HEXACHLOROBENZENE	10	1	10	U	10	U	10	U
PENTACHLOROPHENOL	25	2.5	25	U	25	U	25	U
PHENANTHRENE	10	1	10	U	10	U	10	U
ANTHRACENE	10	1	10	U	10	U	10	U
DI-N-BUTYLPHTHALATE	10	1	10	U	10	U	10	U
FLUORANTHENE	10	1	10	U	10	U	10	U
CARBAZOLE	10	1	10	U	10	U	10	U
PYRENE	10	1	10	U	10	U	10	U
BUTYLBENZYL PHTHALATE	10	1	10	U	10	U	10	U
3,3'-DICHLOROBENZIDINE	10	1	10	U	10	U	10	U
BENZO(A)ANTHRACENE	10	1	10	U	10	U	10	U
CHRYSENE	10	1	10	U	10	U	10	U
BIS(2-ETHYLHEXYL)PHTHALATE	10	1	10	U	10	U	10	U
DI-N-OCTYL PHTHALATE	10	1	10	U	10	U	10	U
BENZO(B)FLUORANTHENE	10	1	10	U	10	U	10	U
BENZO(K)FLUORANTHENE	10	1	10	U	10	U	10	U
BENZO(A)PYRENE	10	1	10	U	10	U	10	U
INDENO(1,2,3-CD)PYRENE	10	1	10	U	10	U	10	U
DIBENZO(A,H)ANTHRACENE	10	1	10	U	10	U	10	U
BENZO(G,H,I)PERYLENE	10	1	10	U	10	U	10	U
DILUTION FACTOR:			1.0		1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

TCL SEMIVOLATILE SOILS (UG/KG)

ANALYTE	CRQL	MDL	CLIENT ID: DUP-01 / LAB ID: 950200-31		CLIENT ID: SB-02-0001 / LAB ID: 950200-35		CLIENT ID: SB-02-0204 / LAB ID: 950200-36		CLIENT ID: SB-02-0406 / LAB ID: 950200-37		CLIENT ID: DUP-02 / LAB ID: 950200-39	
PHENOL	300	30	340	U	340	U	330	U	700	U	340	U
BIS(2-CHLOROETHYL)ETHER	300	30	340	U	340	U	330	U	700	U	340	U
2-CHLOROPHENOL	300	30	340	U	340	U	330	U	700	U	340	U
1,3-DICHLOROBENZENE	300	30	340	U	340	U	330	U	700	U	340	U
1,4-DICHLOROBENZENE	300	30	340	U	340	U	330	U	700	U	340	U
1,2-DICHLOROBENZENE	300	30	340	U	340	U	330	U	700	U	340	U
2-METHYLPHENOL	300	30	340	U	340	U	330	U	700	U	340	U
2,2'-OXYBIS(1-CHLOROPROPANE)	300	30	340	U	340	U	330	U	700	U	340	UJ
4-METHYLPHENOL	300	30	340	U	340	U	330	U	700	U	340	U
N-NITROSO-DI-N-PROPYLAMINE	300	30	340	U	340	U	330	U	700	U	340	U
HEXACHLOROETHANE	300	30	340	U	340	U	330	U	700	U	340	U
NITROBENZENE	300	30	340	U	340	U	330	U	700	U	340	U
ISOPHORONE	300	30	340	U	340	U	330	U	700	U	340	U
2-NITROPHENOL	300	30	340	U	340	U	330	U	700	U	340	U
2,4-DIMETHYLPHENOL	300	30	340	U	340	U	330	U	700	U	340	U
BIS(2-CHLOROETHOXY)METHANE	300	30	340	U	340	U	330	U	700	U	340	U
2,4-DICHLOROPHENOL	300	30	340	U	340	U	330	U	700	U	340	U
1,2,4-TRICHLOROBENZENE	300	30	340	U	340	U	330	U	700	U	340	U
NAPHTHALENE	300	30	340	U	340	U	330	U	73	J	340	U
4-CHLOROANILINE	300	30	340	U	340	U	330	U	700	U	340	U
HEXACHLOROBUTADIENE	300	30	340	U	340	U	330	U	700	U	340	U
4-CHLORO-3-METHYLPHENOL	300	30	340	U	340	U	330	U	700	U	340	U
2-METHYLNAPHTHALENE	300	30	340	U	340	U	330	U	87	J	340	U
HEXACHLOROCYCLOPENTADIENE	300	30	340	U	340	U	330	U	700	U	340	U
2,4,6-TRICHLOROPHENOL	300	30	340	U	340	U	330	U	700	U	340	U
2,4,5-TRICHLOROPHENOL	800	80	830	U	810	U	810	U	1700	U	820	U
2-CHLORONAPHTHALENE	300	30	340	U	340	U	330	U	700	U	340	U
2-NITROANILINE	800	80	830	U	810	U	810	U	1700	U	820	U
DIMETHYL PHTHALATE	300	30	340	U	340	U	330	U	700	U	340	U
ACENAPHTHYLENE	300	30	340	U	340	U	330	U	700	U	340	U
2,6-DINITROTOLUENE	300	30	340	U	340	U	330	U	700	U	340	U
3-NITROANILINE	800	80	830	U	810	U	810	U	1700	U	820	U
ACENAPHTHENE	300	30	340	U	340	U	330	U	700	U	340	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			DUP-01		SB-02-0001		SB-02-0204		SB-02-0406		DUP-02	
LABORATORY ID:			950200-31		950200-35		950200-36		950200-37		950200-39	
TCL SEMIVOLATILE SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
2,4-DINITROPHENOL	800	80	830	U	810	U	810	U	1700	U	820	U
4-NITROPHENOL	800	80	830	U	810	U	810	U	1700	U	820	U
DIBENZOFURAN	300	30	340	U	340	U	330	U	78	J	340	U
2,4-DINITROTOLUENE	300	30	340	U	340	U	330	U	700	U	340	U
DIETHYL PHTHALATE	300	30	340	U	340	U	330	U	700	U	340	U
4-CHLOROPHENYL PHENYL ETHER	300	30	340	U	340	U	330	U	700	U	340	U
FLUORENE	300	30	340	U	340	U	330	U	700	U	340	U
4-NITROANILINE	800	80	830	U	810	U	810	U	1700	U	820	U
4,6-DINITRO-2-METHYLPHENOL	800	80	830	U	810	U	810	U	1700	U	820	U
N-NITROSODIPHENYLAMINE	300	30	340	U	340	U	330	U	700	U	340	U
4-BROMOPHENYL PHENYL ETHER	300	30	340	U	340	U	330	U	700	U	340	U
HEXACHLOROBENZENE	300	30	340	UJ	340	UJ	330	U	700	U	340	U
PENTACHLOROPHENOL	800	80	830	U	810	U	810	U	1700	U	820	U
PHENANTHRENE	300	30	340	U	340	U	330	U	180	J	340	U
ANTHRACENE	300	30	340	U	340	U	330	U	700	U	340	U
DI-N-BUTYLPHTHALATE	300	30	340	U	340	U	330	U	140	J	340	U
FLUORANTHENE	300	30	340	U	340	U	330	U	700	U	340	U
CARBAZOLE	300	30	340	U	340	U	330	U	700	U	340	U
PYRENE	300	30	340	U	340	U	52	J	100	J	50	J
BUTYLBENZYL PHTHALATE	300	30	340	U	340	U	330	U	700	U	340	UJ
3,3'-DICHLOROBENZIDINE	300	30	340	UJ	340	UJ	330	U	700	U	340	UJ
BENZO(A)ANTHRACENE	300	30	340	U	340	U	330	U	700	U	340	UJ
CHRYSENE	300	30	340	U	340	U	330	U	700	U	340	UJ
BIS(2-ETHYLHEXYL)PHTHALATE	300	30	700	J	56	J	920		4400		1200	J
DI-N-OCTYL PHTHALATE	300	30	340	U	340	U	330	UJ	700	UJ	340	UJ
BENZO(B)FLUORANTHENE	300	30	340	U	340	U	330	UJ	700	UJ	340	UJ
BENZO(K)FLUORANTHENE	300	30	340	U	340	U	330	UJ	700	UJ	340	UJ
BENZO(A)PYRENE	300	30	340	U	340	U	330	UJ	700	UJ	340	UJ
INDENO(1,2,3-CD)PYRENE	300	30	340	U	340	U	330	UJ	700	UJ	340	UJ
DIBENZO(A,H)ANTHRACENE	300	30	340	U	340	U	330	UJ	700	UJ	340	UJ
BENZO(G,H,I)PERYLENE	300	30	340	U	340	U	330	UJ	700	UJ	340	UJ
% SOLIDS:			95.0		98.0		98.0		94.0		97.0	
DILUTION FACTOR:			1.0		1.0		1.0		2.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

TCL SEMIVOLATILE SOILS (UG/KG)

ANALYTE	CRQL	MDL	CLIENT ID: SB-04-1012 LABORATORY ID: 950200-26		CLIENT ID: SB-04-1214 LABORATORY ID: 950200-27		CLIENT ID: SB-01-0001 LABORATORY ID: 950200-28		CLIENT ID: SB-01-0608 LABORATORY ID: 950200-29		CLIENT ID: SB-01-1416 LABORATORY ID: 950200-30	
PHENOL	300	30	380	U	370	U	350	U	330	U	370	U
BIS(2-CHLOROETHYL)ETHER	300	30	380	U	370	U	350	U	330	U	370	U
2-CHLOROPHENOL	300	30	380	U	370	U	350	U	330	U	370	U
1,3-DICHLOROBENZENE	300	30	380	U	370	U	350	U	330	U	370	U
1,4-DICHLOROBENZENE	300	30	380	U	370	U	350	U	330	U	370	U
1,2-DICHLOROBENZENE	300	30	380	U	370	U	350	U	330	U	370	U
2-METHYLPHENOL	300	30	380	U	370	U	350	U	330	U	370	U
2,2'-OXYBIS(1-CHLOROPROPANE)	300	30	380	U	370	U	350	U	330	U	370	U
4-METHYLPHENOL	300	30	380	U	370	U	350	U	330	U	370	U
N-NITROSO-DI-N-PROPYLAMINE	300	30	380	U	370	U	350	U	330	U	370	U
HEXACHLOROETHANE	300	30	380	U	370	U	350	U	330	U	370	U
NITROBENZENE	300	30	380	U	370	U	350	U	330	U	370	U
ISOPHORONE	300	30	380	U	370	U	350	U	330	U	370	U
2-NITROPHENOL	300	30	380	U	370	U	350	U	330	U	370	U
2,4-DIMETHYLPHENOL	300	30	380	U	370	U	350	U	330	U	370	U
BIS(2-CHLOROETHOXY)METHANE	300	30	380	U	370	U	350	U	330	U	370	U
2,4-DICHLOROPHENOL	300	30	380	U	370	U	350	U	330	U	370	U
1,2,4-TRICHLOROBENZENE	300	30	380	U	370	U	350	U	330	U	370	U
NAPHTHALENE	300	30	380	U	370	U	350	U	330	U	370	U
4-CHLOROANILINE	300	30	380	U	370	U	350	U	330	U	370	U
HEXACHLOROBUTADIENE	300	30	380	U	370	U	350	U	330	U	370	U
4-CHLORO-3-METHYLPHENOL	300	30	380	U	370	U	350	U	330	U	370	U
2-METHYLNAPHTHALENE	300	30	380	U	370	U	350	U	330	U	370	U
HEXACHLOROCYCLOPENTADIENE	300	30	380	U	370	U	350	U	330	U	370	U
2,4,6-TRICHLOROPHENOL	300	30	380	U	370	U	350	U	330	U	370	U
2,4,5-TRICHLOROPHENOL	800	80	920	U	890	U	850	U	790	U	900	U
2-CHLORONAPHTHALENE	300	30	380	U	370	U	350	U	330	U	370	U
2-NITROANILINE	800	80	920	U	890	U	850	U	790	U	900	U
DIMETHYL PHTHALATE	300	30	380	U	370	U	350	U	330	U	370	U
ACENAPHTHYLENE	300	30	380	U	370	U	350	U	330	U	370	U
2,6-DINITROTOLUENE	300	30	380	U	370	U	350	U	330	U	370	U
3-NITROANILINE	800	80	920	U	890	U	850	U	790	U	900	U
ACENAPHTHENE	300	30	380	U	370	U	350	U	330	U	370	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-04-1012		SB-04-1214		SB-01-0001		SB-01-0608		SB-01-1416	
LABORATORY ID:			950200-26		950200-27		950200-28		950200-29		950200-30	
TCL SEMIVOLATILE SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
2,4-DINITROPHENOL	800	80	920	U	890	U	850	U	790	U	900	U
4-NITROPHENOL	800	80	920	U	890	U	850	U	790	U	900	U
DIBENZOFURAN	300	30	380	U	370	U	350	U	330	U	370	U
2,4-DINITROTOLUENE	300	30	380	U	370	U	350	U	330	U	370	U
DIETHYL PHTHALATE	300	30	380	U	370	U	350	U	330	U	370	U
4-CHLOROPHENYL PHENYL ETHER	300	30	380	U	370	U	350	U	330	U	370	U
FLUORENE	300	30	380	U	370	U	350	U	330	U	370	U
4-NITROANILINE	800	80	920	U	890	U	850	U	790	U	900	U
4,6-DINITRO-2-METHYLPHENOL	800	80	920	U	890	U	850	U	790	U	900	U
N-NITROSODIPHENYLAMINE	300	30	380	U	370	U	350	U	330	U	370	U
4-BROMOPHENYL PHENYL ETHER	300	30	380	U	370	U	350	U	330	U	370	U
HEXACHLOROBENZENE	300	30	380	UJ	370	UJ	350	UJ	330	UJ	370	UJ
PENTACHLOROPHENOL	800	80	920	U	890	U	850	U	790	U	900	U
PHENANTHRENE	300	30	380	U	370	U	350	U	330	U	370	U
ANTHRACENE	300	30	380	U	370	U	350	U	330	U	370	U
DI-N-BUTYLPHTHALATE	300	30	380	U	370	U	350	U	330	U	370	U
FLUORANTHENE	300	30	380	U	370	U	350	U	330	U	370	U
CARBAZOLE	300	30	380	U	370	U	350	U	330	U	370	U
PYRENE	300	30	380	U	370	U	350	U	330	U	370	U
BUTYLBENZYL PHTHALATE	300	30	380	U	370	U	350	U	330	U	370	U
3,3'-DICHLOROBENZIDINE	300	30	380	UJ	370	UJ	350	UJ	330	UJ	370	UJ
BENZO(A)ANTHRACENE	300	30	380	U	370	U	350	U	330	U	370	U
CHRYSENE	300	30	380	U	370	U	350	U	330	U	370	U
BIS(2-ETHYLHEXYL)PHTHALATE	300	30	380	U	66	J	160	J	61	J	47	J
DI-N-OCTYL PHTHALATE	300	30	380	U	370	U	350	U	330	U	370	U
BENZO(B)FLUORANTHENE	300	30	380	U	370	U	350	U	330	U	370	U
BENZO(K)FLUORANTHENE	300	30	380	U	370	U	350	U	330	U	370	U
BENZO(A)PYRENE	300	30	380	U	370	U	350	U	330	U	370	U
INDENO(1,2,3-CD)PYRENE	300	30	380	U	370	U	350	U	330	U	370	U
DIBENZO(A,H)ANTHRACENE	300	30	380	U	370	U	350	U	330	U	370	U
BENZO(G,H,I)PERYLENE	300	30	380	U	370	U	350	U	330	U	370	U
% SOLIDS:			87.0		89.0		94.0		100.0		88.0	
DILUTION FACTOR:			1.0		1.0		1.0		1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			RB-01-040795		RB-01-041095		RB-01-041195	
LABORATORY ID:			950200-22		950200-33		950200-34	
TCL PESTICIDE/PCB WATERS (UG/L)								
ANALYTE	CRQL	MDL						
AROCLOR-1016	1	0.33	1.0	U	1.0	U	1.0	U
AROCLOR-1221	2	0.67	2.0	U	2.0	U	2.0	U
AROCLOR-1232	1	0.33	1.0	U	1.0	U	1.0	U
AROCLOR-1242	1	0.33	1.0	U	1.0	U	1.0	U
AROCLOR-1248	1	0.33	1.0	U	1.0	U	1.0	U
AROCLOR-1254	1	0.33	1.0	U	1.0	U	1.0	U
AROCLOR-1260	1	0.33	1.0	U	1.0	U	1.0	U
DILUTION FACTOR:			1.0		1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			DUP-01		DUP-02		SB-01-0001		SB-01-1416		SB-02-0001	
LABORATORY ID:			950200-31		950200-39		950200-28		950200-30		950200-35	
TCL PESTICIDE/PCB SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
AROCLOR-1016	33	11	34	U	170	U	35	U	37	U	34	U
AROCLOR-1221	67	22	70	U	340	U	71	U	76	U	68	U
AROCLOR-1232	33	11	34	U	170	U	35	U	37	U	34	U
AROCLOR-1242	33	11	34	U	170	U	35	U	37	U	34	U
AROCLOR-1248	33	11	34	U	170	U	35	U	37	U	34	U
AROCLOR-1254	33	11	34	U	170	U	35	U	37	U	34	U
AROCLOR-1260	33	11	34	U	170	U	35	U	37	U	34	U
% SOLIDS:			95.0		97.0		94.0		88.0		98.0	
DILUTION FACTOR:			1.0		5.0		1.0		1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-02-0204		SB-02-0406		SB-04-1012		SB-04-1214		SB-07-0406	
LABORATORY ID:			950200-36		950200-37		950200-26		950200-27		950200-40	
TCL PESTICIDE/PCB SOILS (UG/KG)												
ANALYTE	CRQL	MDL										
AROCLOR-1016	33	11	170	U	170	U	38	U	37	U	170	U
AROCLOR-1221	67	22	340	U	350	U	77	U	74	U	350	U
AROCLOR-1232	33	11	170	U	170	U	38	U	37	U	170	U
AROCLOR-1242	33	11	170	U	170	U	38	U	37	U	170	U
AROCLOR-1248	33	11	170	U	170	U	38	U	37	U	170	U
AROCLOR-1254	33	11	170	U	170	U	38	U	37	U	170	U
AROCLOR-1260	33	11	170	U	170	U	38	U	37	U	170	U
% SOLIDS:			98.0		94.0		87.0		89.0		94.0	
DILUTION FACTOR:			5.0		5.0		1.0		1.0		5.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:	SB010608
LABORATORY ID:	950200-29

TCL PESTICIDE/PCB SOILS (UG/KG)

ANALYTE	CRQL	MDL		
AROCLOR-1016	33	11	33	U
AROCLOR-1221	67	22	67	U
AROCLOR-1232	33	11	33	U
AROCLOR-1242	33	11	33	U
AROCLOR-1248	33	11	33	U
AROCLOR-1254	33	11	33	U
AROCLOR-1260	33	11	33	U
% SOLIDS:			100.0	
DILUTION FACTOR:			1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-07-1416		SB-07-2830	
LABORATORY ID:			950200-41		950200-42	
TCL VOLATILE SOILS (UG/KG)						
ANALYTE	CRQL	MDL				
CHLOROMETHANE	10	2	7200	U	60	U
BROMOMETHANE	10	2	7200	U	60	U
VINYL CHLORIDE	10	2	7200	U	60	U
CHLOROETHANE	10	2	7200	U	60	U
METHYLENE CHLORIDE	10	2	7200	U	60	U
ACETONE	10	2	7200	UJ	60	U
CARBON DISULFIDE	10	2	7200	U	60	U
1,1-DICHLOROETHENE	10	2	7200	U	60	U
1,1-DICHLOROETHANE	10	2	7200	U	60	U
1,2-DICHLOROETHENE (TOTAL)	10	2	7200	U	60	U
CHLOROFORM	10	2	7200	U	60	U
1,2-DICHLOROETHANE	10	2	7200	U	60	U
2-BUTANONE	10	2	7200	UJ	60	U
1,1,1-TRICHLOROETHANE	10	2	7200	U	60	U
CARBON TETRACHLORIDE	10	2	7200	U	60	U
BROMODICHLOROMETHANE	10	2	7200	U	60	U
1,2-DICHLOROPROPANE	10	2	7200	U	60	U
CIS-1,3-DICHLOROPROPENE	10	2	7200	U	60	U
TRICHLOROETHENE	10	2	100000		*13000	
DIBROMOCHLOROMETHANE	10	2	7200	U	60	U
1,1,2-TRICHLOROETHANE	10	2	7200	U	60	U
BENZENE	10	2	7200	U	60	U
TRANS-1,3-DICHLOROPROPENE	10	2	7200	U	60	U
BROMOFORM	10	2	7200	U	60	U
4-METHYL-2-PENTANONE	10	2	7200	UJ	60	U
2-HEXANONE	10	2	7200	UJ	60	U
TETRACHLOROETHENE	10	2	3800	J	250	
1,1,2,2-TETRACHLOROETHANE	10	2	7200	U	60	U
TOLUENE	10	2	7200	U	60	U
CHLOROBENZENE	10	2	7200	U	60	U
ETHYLBENZENE	10	2	7200	U	60	U
STYRENE	10	2	7200	U	60	U
XYLENE (TOTAL)	10	2	7200	U	60	U
% SOLIDS:			87.0		83.0	
DILUTION FACTOR:			625.0		5.0	

* RESULT FROM DILUTION ANALYSIS

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			TB-01-041295		RB-01-041295		GW-01		GW-02		DUP-03	
LABORATORY ID:			950200-43		950200-44		950200-46		950200-48		950200-50	
TCL VOLATILE WATERS (UG/L)												
ANALYTE	CRQL	MDL										
CHLOROMETHANE	10	2	10	UJ	10	UJ	1000	U	10	U	100	U
BROMOMETHANE	10	2	10	U	10	U	1000	UJ	10	U	100	U
VINYL CHLORIDE	10	2	10	U	10	U	1000	U	10	U	100	UJ
CHLOROETHANE	10	2	10	U	10	U	1000	U	10	U	100	U
METHYLENE CHLORIDE	10	2	10	U	10	U	1000	U	10	U	100	U
ACETONE	10	2	10	U	12		1000	U	17	U	100	U
CARBON DISULFIDE	10	2	10	U	10	U	1000	U	10	U	31	J
1,1-DICHLOROETHENE	10	2	10	U	10	U	1000	U	10	U	100	U
1,1-DICHLOROETHANE	10	2	10	U	10	U	1000	U	22		16	J
1,2-DICHLOROETHENE (TOTAL)	10	2	10	U	10	U	12000		180		160	
CHLOROFORM	10	2	10	U	10	U	1000	U	10	U	100	U
1,2-DICHLOROETHANE	10	2	10	U	10	U	1000	U	10	U	100	U
2-BUTANONE	10	2	10	U	10	U	1000	UJ	10	UJ	270	J
1,1,1-TRICHLOROETHANE	10	2	10	U	10	U	1000	U	9	J	100	U
CARBON TETRACHLORIDE	10	2	10	U	10	U	1000	U	10	U	100	U
BROMODICHLOROMETHANE	10	2	10	U	10	U	1000	U	10	U	100	U
1,2-DICHLOROPROPANE	10	2	10	U	10	U	1000	U	10	U	100	U
CIS-1,3-DICHLOROPROPENE	10	2	10	U	10	U	1000	U	10	U	100	U
TRICHLOROETHENE	10	2	10	U	10	U	*140000		*1200		1200	
DIBROMOCHLOROMETHANE	10	2	10	U	10	U	1000	U	10	U	100	U
1,1,2-TRICHLOROETHANE	10	2	10	U	10	U	1000	U	10	U	100	U
BENZENE	10	2	10	U	10	U	1000	U	10	U	100	U
TRANS-1,3-DICHLOROPROPENE	10	2	10	U	10	U	1000	U	10	U	100	U
BROMOFORM	10	2	10	U	10	U	1000	U	10	U	100	U
4-METHYL-2-PENTANONE	10	2	10	UJ	10	UJ	1000	UJ	10	UJ	100	UJ
2-HEXANONE	10	2	10	U	10	U	1000	UJ	10	UJ	100	UJ
TETRACHLOROETHENE	10	2	10	U	10	U	160	J	5	J	100	U
1,1,2,2-TETRACHLOROETHANE	10	2	10	U	10	U	1000	U	10	U	100	U
TOLUENE	10	2	10	U	10	U	1000	U	10	U	100	U
CHLOROBENZENE	10	2	10	U	10	U	1000	U	10	U	100	U
ETHYLBENZENE	10	2	10	U	10	U	1000	U	10	U	100	U
STYRENE	10	2	10	U	10	U	1000	U	10	U	100	U
XYLENE (TOTAL)	10	2	10	U	10	U	1000	U	10	U	100	U
DILUTION FACTOR:			1.0		1.0		100.0		1.0		10.0	

* RESULT FROM DILUTION ANALYSIS

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			RB-01-041295		GW-01		GW-02		DUP-03	
LABORATORY ID:			950200-44		950200-46		950200-48		950200-50	
TCL SEMIVOLATILE WATERS (UG/L)										
ANALYTE	CRQL	MDL								
PHENOL	10	1	10	U	10		10	U	10	U
BIS(2-CHLOROETHYL)ETHER	10	1	10	U	10	U	10	U	10	U
2-CHLOROPHENOL	10	1	10	U	10	U	10	U	10	U
1,3-DICHLOROBENZENE	10	1	10	U	10	U	10	U	10	U
1,4-DICHLOROBENZENE	10	1	10	U	10	U	10	U	10	U
1,2-DICHLOROBENZENE	10	1	10	U	10	U	10	U	10	U
2-METHYLPHENOL	10	1	10	U	2	J	10	U	10	U
2,2'-OXYBIS(1-CHLOROPROPANE)	10	1	10	U	10	U	10	U	10	U
4-METHYLPHENOL	10	1	10	U	11		10	U	10	U
N-NITROSO-DI-N-PROPYLAMINE	10	1	10	U	10	U	10	U	10	U
HEXACHLOROETHANE	10	1	10	U	10	U	10	U	10	U
NITROBENZENE	10	1	10	U	10	U	10	U	10	U
ISOPHORONE	10	1	10	U	10	U	10	U	10	U
2-NITROPHENOL	10	1	10	U	10	U	10	U	10	U
2,4-DIMETHYLPHENOL	10	1	10	U	5	J	10	U	10	U
BIS(2-CHLOROETHOXY)METHANE	10	1	10	U	10	U	10	U	10	U
2,4-DICHLOROPHENOL	10	1	10	U	10	U	10	U	10	U
1,2,4-TRICHLOROBENZENE	10	1	10	U	10	U	10	U	10	U
NAPHTHALENE	10	1	10	U	10	U	10	U	10	U
4-CHLOROANILINE	10	1	10	U	10	U	10	U	10	U
HEXACHLOROBUTADIENE	10	1	10	U	10	U	10	U	10	U
4-CHLORO-3-METHYLPHENOL	10	1	10	U	10	U	10	U	10	U
2-METHYLNAPHTHALENE	10	1	10	U	10	U	10	U	10	U
HEXACHLOROCYCLOPENTADIENE	10	1	10	U	10	U	10	U	10	U
2,4,6-TRICHLOROPHENOL	10	1	10	U	10	U	10	U	10	U
2,4,5-TRICHLOROPHENOL	25	2.5	25	U	25	U	25	U	25	U
2-CHLORONAPHTHALENE	10	1	10	U	10	U	10	U	10	U
2-NITROANILINE	25	2.5	25	U	25	U	25	U	25	U
DIMETHYL PHTHALATE	10	1	10	U	10	U	10	U	10	U
ACENAPHTHYLENE	10	1	10	U	10	U	10	U	10	U
2,6-DINITROTOLUENE	10	1	10	U	10	U	10	U	10	U
3-NITROANILINE	25	2.5	25	U	25	U	25	U	25	U
ACENAPHTHENE	10	1	10	U	10	U	10	U	10	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			RB-01-041295		GW-01		GW-02		DUP-03	
LABORATORY ID:			950200-44		950200-46		950200-48		950200-50	
TCL SEMIVOLATILE WATERS (UG/L)										
ANALYTE	CRQL	MDL								
2,4-DINITROPHENOL	25	2.5	25	U	25	U	25	U	25	U
4-NITROPHENOL	25	2.5	25	U	25	U	25	U	25	U
DIBENZOFURAN	10	1	10	U	10	U	10	U	10	U
2,4-DINITROTOLUENE	10	1	10	U	10	U	10	U	10	U
DIETHYL PHTHALATE	10	1	10	U	10	U	10	U	10	U
4-CHLOROPHENYL PHENYL ETHER	10	1	10	U	10	U	10	U	10	U
FLUORENE	10	1	10	U	10	U	10	U	10	U
4-NITROANILINE	25	2.5	25	U	25	U	25	U	25	U
4,6-DINITRO-2-METHYLPHENOL	25	2.5	25	U	25	U	25	U	25	U
N-NITROSODIPHENYLAMINE	10	1	10	U	10	U	10	U	10	U
4-BROMOPHENYL PHENYL ETHER	10	1	10	U	10	U	10	U	10	U
HEXACHLOROBENZENE	10	1	10	U	10	U	10	U	10	U
PENTACHLOROPHENOL	25	2.5	25	U	25	U	25	U	25	U
PHENANTHRENE	10	1	10	U	10	U	10	U	10	U
ANTHRACENE	10	1	10	U	10	U	10	U	10	U
DI-N-BUTYL PHTHALATE	10	1	10	U	10	U	10	U	10	U
FLUORANTHENE	10	1	10	U	10	U	10	U	10	U
CARBAZOLE	10	1	10	U	10	U	10	U	10	U
PYRENE	10	1	10	U	10	U	10	U	10	U
BUTYLBENZYL PHTHALATE	10	1	10	U	10	U	10	U	10	U
3,3'-DICHLOROBENZIDINE	10	1	10	U	10	U	10	U	10	U
BENZO(A)ANTHRACENE	10	1	10	U	10	U	10	U	10	U
CHRYSENE	10	1	10	U	10	U	10	U	10	U
BIS(2-ETHYLHEXYL)PHTHALATE	10	1	10	U	10	U	10	U	10	U
DI-N-OCTYL PHTHALATE	10	1	10	U	10	U	10	U	10	U
BENZO(B)FLUORANTHENE	10	1	10	U	10	U	10	U	10	U
BENZO(K)FLUORANTHENE	10	1	10	U	10	U	10	U	10	U
BENZO(A)PYRENE	10	1	10	U	10	U	10	U	10	U
INDENO(1,2,3-CD)PYRENE	10	1	10	U	10	U	10	U	10	U
DIBENZO(A,H)ANTHRACENE	10	1	10	U	10	U	10	U	10	U
BENZO(G,H,I)PERYLENE	10	1	10	U	10	U	10	U	10	U
DILUTION FACTOR			1.0		1.0		1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-07-1416		SB-07-2830	
LABORATORY ID:			950200-41		950200-42	
TCL SEMIVOLATILE SOILS (UG/KG)						
ANALYTE	CRQL	MDL				
PHENOL	300	30	370	U	380	U
BIS(2-CHLOROETHYL)ETHER	300	30	370	U	380	U
2-CHLOROPHENOL	300	30	370	U	380	U
1,3-DICHLOROBENZENE	300	30	370	U	380	U
1,4-DICHLOROBENZENE	300	30	370	U	380	U
1,2-DICHLOROBENZENE	300	30	370	U	380	U
2-METHYLPHENOL	300	30	370	U	380	U
2,2'-OXYBIS(1-CHLOROPROPANE)	300	30	370	U	380	U
4-METHYLPHENOL	300	30	320	J	380	U
N-NITROSO-DI-N-PROPYLAMINE	300	30	370	U	380	U
HEXACHLOROETHANE	300	30	370	U	380	U
NITROBENZENE	300	30	370	U	380	U
ISOPHORONE	300	30	370	U	380	U
2-NITROPHENOL	300	30	370	U	380	U
2,4-DIMETHYLPHENOL	300	30	370	U	380	U
BIS(2-CHLOROETHOXY)METHANE	300	30	370	U	380	U
2,4-DICHLOROPHENOL	300	30	370	U	380	U
1,2,4-TRICHLOROBENZENE	300	30	370	U	380	U
NAPHTHALENE	300	30	370	U	380	U
4-CHLOROANILINE	300	30	370	U	380	U
HEXACHLOROBUTADIENE	300	30	370	U	380	UJ
4-CHLORO-3-METHYLPHENOL	300	30	370	U	380	U
2-METHYLNAPHTHALENE	300	30	370	U	380	U
HEXACHLOROCYCLOPENTADIENE	300	30	370	U	380	UJ
2,4,6-TRICHLOROPHENOL	300	30	370	U	380	U
2,4,5-TRICHLOROPHENOL	800	80	900	U	930	U
2-CHLORONAPHTHALENE	300	30	370	U	380	U
2-NITROANILINE	800	80	900	U	930	U
DIMETHYL PHTHALATE	300	30	370	U	380	U
ACENAPHTHYLENE	300	30	370	U	380	U
2,6-DINITROTOLUENE	300	30	370	U	380	U
3-NITROANILINE	800	80	900	U	930	U
ACENAPHTHENE	300	30	370	U	380	U

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-07-1416		SB-07-2830	
LABORATORY ID:			950200-41		950200-42	
TCL SEMIVOLATILE SOILS (UG/KG)						
ANALYTE	CRQL	MDL				
2,4-DINITROPHENOL	800	80	900	U	930	U
4-NITROPHENOL	800	80	900	U	930	U
DIBENZOFURAN	300	30	370	U	380	U
2,4-DINITROTOLUENE	300	30	370	U	380	U
DIETHYL PHTHALATE	300	30	370	U	380	U
4-CHLOROPHENYL PHENYL ETHER	300	30	370	U	380	U
FLUORENE	300	30	370	U	380	U
4-NITROANILINE	800	80	900	U	930	U
4,6-DINITRO-2-METHYLPHENOL	800	80	900	U	930	U
N-NITROSODIPHENYLAMINE	300	30	370	U	380	U
4-BROMOPHENYL PHENYL ETHER	300	30	370	U	380	UJ
HEXACHLOROBENZENE	300	30	370	UJ	380	UJ
PENTACHLOROPHENOL	800	80	900	U	930	UJ
PHENANTHRENE	300	30	370	U	380	U
ANTHRACENE	300	30	370	U	380	U
DI-N-BUTYL PHTHALATE	300	30	43	J	380	U
FLUORANTHENE	300	30	370	U	380	U
CARBAZOLE	300	30	370	U	380	U
PYRENE	300	30	370	U	380	U
BUTYLBENZYL PHTHALATE	300	30	370	U	380	U
3,3'-DICHLOROBENZIDINE	300	30	370	UJ	380	UJ
BENZO(A)ANTHRACENE	300	30	370	U	380	U
CHRYSENE	300	30	370	U	380	U
BIS(2-ETHYLHEXYL)PHTHALATE	300	30	210	J	45	J
DI-N-OCTYL PHTHALATE	300	30	370	U	380	UJ
BENZO(B)FLUORANTHENE	300	30	370	U	380	U
BENZO(K)FLUORANTHENE	300	30	370	U	380	U
BENZO(A)PYRENE	300	30	370	U	380	U
INDENO(1,2,3-CD)PYRENE	300	30	370	U	380	U
DIBENZO(A,H)ANTHRACENE	300	30	370	U	380	U
BENZO(G,H,I)PERYLENE	300	30	370	U	380	U
% SOLIDS:			88.0		85.0	
DILUTION FACTOR:			1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			DUP-03		GW-01		GW-02		RB-01-041295	
LABORATORY ID:			950200-50		950200-46		950200-48		950200-44	
TCL PESTICIDE/PCB WATERS (UG/L)										
ANALYTE	CRQL	MDL								
AROCLOR-1016	1	0.33	1.0	U	1.0	U	1.0	U	1.0	U
AROCLOR-1221	2	0.67	2.0	U	2.0	U	2.0	U	2.0	U
AROCLOR-1232	1	0.33	1.0	U	1.0	U	1.0	U	1.0	U
AROCLOR-1242	1	0.33	1.0	U	1.0	U	1.0	U	1.0	U
AROCLOR-1248	1	0.33	1.0	U	1.0	U	1.0	U	1.0	U
AROCLOR-1254	1	0.33	1.0	U	1.0	U	1.0	U	1.0	U
AROCLOR-1260	1	0.33	1.0	U	1.0	U	1.0	U	1.0	U
DILUTION FACTOR:			1.0		1.0		1.0		1.0	

CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CEIMIC CORPORATION

CLIENT ID:			SB-07-1416		SB-07-2830	
LABORATORY ID:			950200-41		950200-42	
TCL PESTICIDE/PCB SOILS (UG/KG)						
ANALYTE	CRQL	MDL				
AROCLOR-1016	33	11	74	U	38	U
AROCLOR-1221	67	22	150	U	78	U
AROCLOR-1232	33	11	74	U	38	U
AROCLOR-1242	33	11	74	U	38	U
AROCLOR-1248	33	11	74	U	38	U
AROCLOR-1254	33	11	74	U	38	U
AROCLOR-1260	33	11	74	U	38	U
% SOLIDS:			88.0		85.0	
DILUTION FACTOR:			2.0		1.0	

pH Analysis

Method 9040/9045

Client: Brown & Root Environmental
Project No.: 950200
Dates Samples Received: 4/05/95 - 4/13/95
Result in: S.U.

Client ID	Laboratory ID	Result	Date Sampled	Date Analyzed
SB-06-0002	950200-02	9.54	4/04/95	4/05/95
SB-06-0608	950200-03	8.62	4/04/95	4/05/95
SB-06-1214	950200-04	8.53	4/04/95	4/05/95
FB-01-040495	950200-05	5.59	4/04/95	4/05/95
FB-02-040495	950200-06	5.27	4/04/95	4/05/95
RB-01-040495	950200-07	5.29	4/04/95	4/05/95
RB-01-040595	950200-09	5.35	4/05/95	4/06/95
SB-03-0001	950200-10	9.47	4/05/95	4/06/95
SB-03-1012	950200-11	8.38	4/05/95	4/06/95
SB-03-1214	950200-12	8.21	4/05/95	4/06/95
RB-01-040695	950200-14	5.14	4/06/95	4/07/95
SB-05-0001	950200-15	8.79	4/06/95	4/07/95
SB-05-1012	950200-16	8.64	4/06/95	4/07/95
SB-05-1315	950200-17	8.62	4/06/95	4/07/95
SB-04-0001	950200-18	9.22	4/06/95	4/07/95
GW-03	950200-20	7.34	4/07/95	4/10/95
RB-01-040795	950200-22	5.30	4/07/95	4/10/95
SB-04-1012	950200-26	8.32	4/10/95	4/11/95
SB-04-1214	950200-27	8.36	4/10/95	4/11/95
SB-01-0001	950200-28	11.51	4/10/95	4/11/95
SB-01-0608	950200-29	9.24	4/10/95	4/11/95
SB-01-1416	950200-30	7.55	4/10/95	4/11/95
DUP-01	950200-31	11.42	4/10/95	4/11/95
RB-01-041095	950200-33	5.22	4/11/95	4/12/95
RB-01-041195	950200-34	5.01	4/11/95	4/12/95
SB-02-0001	950200-35	10.93	4/11/95	4/12/95
SB-02-0204	950200-36	6.85	4/11/95	4/13/95
SB-02-0406	950200-37	5.63	4/11/95	4/12/95
DUP-02	950200-39	6.89	4/11/95	4/12/95
SB-07-0406	950200-40	5.88	4/11/95	4/12/95
SB-07-1416	950200-41	8.66	4/11/95	4/12/95
SB-07-2830	950200-42	8.32	4/11/95	4/12/95
RB-01-041295	950200-44	5.13	4/12/95	4/13/95
GW-01	950200-46	7.53	4/12/95	4/13/95
GW-02	950200-48	6.95	4/12/95	4/13/95
DUP-03	950200-50	6.95	4/12/95	4/13/95

Reported by: [signature]

Approved by: [signature]

1951

CEIMIC Corporation

"Analytical Chemistry for Environmental Management"

TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)
VOLATILE ORGANICS ANALYSIS
SW846 METHOD 8240

Client: Brown & Root Environmental

Client Sample ID: SB-02 DRUM #8

Date Sampled: 05/10/95

Date Sample Received: 05/11/95

Matrix: Leachate

Laboratory ID: 950295-01

Date TCLP Performed: 05/11/95

Date Sample Analyzed: 05/12/95

Associated Extraction Blank: VTCLP0511-B1

Dilution Factor: 1

Concentration in: µg/L (ppb)

Target Analyte	Sample Concentration	Quantitation Limit
Vinyl Chloride	ND	10
1,1-Dichloroethene	ND	10
Chloroform	ND	10
1,2-Dichloroethane	ND	10
2-Butanone	44	10
Carbon Tetrachloride	ND	10
Trichloroethene	12	10
Benzene	ND	10
Tetrachloroethene	ND	10
Chlorobenzene	ND	10

ND = Not detected

Reported by: _____ Approved by: _____

TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)
VOLATILE ORGANICS ANALYSIS
SW846 METHOD 8240

Client: Brown & Root Environmental

Client Sample ID: SB-02 DRUM #8

Date Sampled: 05/10/95

Date Sample Received: 05/11/95

Matrix: Leachate

Laboratory ID: 950295-01

Date TCLP Performed: 05/11/95

Date Sample Analyzed: 05/12/95

Associated Extraction Blank: VTCLP0511-B1

Dilution Factor: 1

Concentration in: µg/L (ppb)

Surrogate Spike Recovery

Surrogate Compound	Recovery(%)	QC Limits(%)
1,2-Dichloroethane-d4	102	76 - 114
Toluene-d8	101	88 - 110
Bromofluorobenzene	99	86 - 115

Reported by: _____ Approved by: _____

CEIMIC
Corporation
"Analytical Chemistry for Environmental Management"

TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)

SEMIVOLATILE ORGANICS TARGET ANALYTES

Client: Brown & Root Environmental
Client Sample ID: SB-02 Drum #8
Laboratory ID: 950295-01
Concentration in: µg/L (ppb)

Date Sampled: 5/10/95
Date TCLP Performed: 5/11/95
Date Sample Extracted: 5/13/95
Date Extract Analyzed: 5/14/95

Target Analyte	Sample Concentration	Method Reporting Limits
Pyridine	ND	40
2,4-Dinitrotoluene	ND	40
Hexachlorobenzene	ND	40
Hexachloro-1,3-butadiene	ND	40
Hexachloroethane	ND	40
Nitrobenzene	ND	40
1,4-Dichlorobenzene	ND	40
2-Methyl Phenol	ND	40
3&4-Methyl Phenol	ND	40
Pentachlorophenol	ND	100
2,4,5-Trichlorophenol	ND	100
2,4,6-Trichlorophenol	ND	40

ND = Not detected

Reported by:_____ Approved by:_____

10 Dean Knauss Drive, Narragansett, RI 02882 • Tel: (401) 782-8900 • Fax: (401) 782-8905

CEIMIC
Corporation
"Analytical Chemistry for Environmental Management"

TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)

ORGANOCHLORINE PESTICIDES

EPA Method 8080

Client: Brown & Root Environmental

Client Sample ID: SB-02 Drum #8 | Laboratory ID: 950295-01

Date Sample Received: 5/11/95 | Date Sample Prepared: 5/11/95

Date Sample Analyzed: 5/15/95 | Concentration in: µg/L (ppb)

Target Analyte	Sample Concentration	Method Reporting Limit
gamma-BHC (Lindane)	ND	0.2
Heptachlor	ND	0.2
Heptachlor Epoxide	ND	0.2
Endrin	ND	0.4
Methoxychlor	ND	2.0
Chlordane	ND	4.0
Toxaphene	ND	20

ND = Not detected

Reported by: _____ Approved by: _____

10 Dean Knauss Drive, Narragansett, RI 02882 • Tel: (401) 782-8900 • Fax: (401) 782-8905

CEIMIC
Corporation
"Analytical Chemistry for Environmental Management"

TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP)

ORGANOCHLORINE HERBICIDES

EPA Method 8150

Client: Brown & Root Environmental

Client ID: SB-02 Drum #8 **Laboratory ID:** 950295-01

Date Sample Received: 5/11/95 **Date Sample Prepared:** 5/11/95

Date Sample Analyzed: 5/14/95 **Concentration in:** µg/L (ppb)

Target Analyte	Sample Concentration	Method Reporting Limits
2,4-D	ND	2.0
2,4,5-TP (Silvex)	ND	2.0

ND = Not detected

Reported by: KK Approved by: [signature]

10 Dean Knauss Drive, Narragansett, RI 02882 • Tel: (401) 782-8900 • Fax: (401) 782-8905

CEIMIC
Corporation
"Analytical Chemistry for Environmental Management"

INORGANIC ANALYTES

Client: Brown & Root Environmental

Client ID: SB-02 Drum #8

Laboratory ID: 950295-01

Date Sample Received: 5/11/95

Date Sampled: 5/10/95

Target Analyte	Result	Units	Method Reporting Limit	Date Analyzed
Flashpoint	NC	°F	200	5/11/95
Paint Filter Liquids Test	NFL	---	---	5/11/95
pH	7.61	S.U.	----	5/11/95
Reactive Cyanide	ND	mg/kg*	0.5	5/11/95
Reactive Sulfide	ND	mg/kg*	1.3	5/11/95

NFL = No free liquids are present

NC = No combustion below 200°F method reporting limit

* Reported on a dry weight basis, total solids = 96.2%

ND = Not detected

Reported by: Jeffrey D. Maynor Approved by: Alan Chiang

10 Dean Knauss Drive, Narragansett, RI 02882 • Tel: (401) 782-8900 • Fax: (401) 782-8905

CEIMIC
CORPORATION
"Analytical Chemistry for Environmental Management"

METHOD BLANK
TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)
SW846 METHOD 1311, 6010 AND 7470

Client: Brown & Root Environmental

Ceimic Project: 950295

Blank ID: PBW

Date Analysis Completed: 05/17/95

Matrix: Aqueous

Concentration in: mg/L (ppm)

Target Analyte	Preparation Batch	Sample Concentration	Quantitation Limit
Arsenic	0515	ND	0.2
Barium	0515	ND	1
Cadmium	0515	ND	0.01
Chromium	0515	ND	0.02
Lead	0515	ND	0.2
Mercury	0515	ND	0.0008
Selenium	0515	ND	0.2
Silver	0515	ND	0.01

ND = Not Detected

Reported by: _____ Approved by: _____

10 Dean Knauss Drive, Narragansett, R.I. 02882 • (401) 782-8900 • FAX (401) 782-8905

CEIMIC
CORPORATION
"Analytical Chemistry for Environmental Management"

METHOD BLANK
TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)
SW846 METHOD 1311, 6010 AND 7470

Client: Brown & Root Environmental

Ceimic Project: 950295

Blank ID: TCLP_BLANK

Date Analysis Completed: 05/17/95

Matrix: Leachate

Concentration in: mg/L (ppm)

Target Analyte	Preparation Batch	Sample Concentration	Quantitation Limit
Arsenic	0515	ND	0.2
Barium	0515	ND	1
Cadmium	0515	ND	0.01
Chromium	0515	ND	0.02
Lead	0515	ND	0.2
Mercury	0515	ND	0.0008
Selenium	0515	ND	0.2
Silver	0515	ND	0.01

ND = Not Detected

Reported by: _____ Approved by: _____

10 Dean Knauss Drive, Narragansett, R.I. 02882 • (401) 782-8900 • FAX (401) 782-8905

CEIMIC
CORPORATION
"Analytical Chemistry for Environmental Management"

TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)
SW846 METHOD 1311, 6010 AND 7470

Client: Brown & Root Environmental

Client Sample ID: SB-02 DRUM #8

Laboratory ID: 950295-01

Date Sampled: 05/10/95

Date Analysis Completed: 05/17/95

Date Sample Received: 05/11/95

Concentration in: mg/L (ppm)

Matrix: Leachate

Target Analyte	Preparation Batch	Sample Concentration	Quantitation Limit
Arsenic	0515	ND	0.2
Barium	0515	ND	1
Cadmium	0515	0.03	0.01
Chromium	0515	ND	0.02
Lead	0515	ND	0.2
Mercury	0515	ND	0.0008
Selenium	0515	ND	0.2
Silver	0515	ND	0.01

ND = Not Detected

Reported by: _____ Approved by: _____

10 Dean Knauss Drive, Narragansett, R.I. 02882 • (401) 782-8900 • FAX (401) 782-8905

CEIMIC
CORPORATION
"Analytical Chemistry for Environmental Management"

LABORATORY CONTROL SAMPLE SUMMARY
TOXICITY CHARACTERISTICS LEACHING PROCEDURE (TCLP)
SW846 METHOD 1311, 6010 AND 7470

Client: Brown & Root Environmental

Laboratory Control Spike ID: LCSW

Ceimic Project: 950295

Matrix: Aqueous

Date Analysis Completed: 05/17/95

Concentration in: mg/L (ppm)

Target Analyte	Preparation Batch	Spike Added	Lab Control Spike Result	Lab Control Spike Recovery(%)	QC Limits(%)
Arsenic	0515	5.00	4.97	99.3	75 - 125
Barium	0515	10.00	9.00	90.0	75 - 125
Cadmium	0515	2.50	2.31	92.4	75 - 125
Chromium	0515	1.00	0.919	91.9	75 - 125
Lead	0515	5.00	4.94	98.9	75 - 125
Mercury	0515	0.00250	0.00269	108.0	75 - 125
Selenium	0515	5.00	5.27	105.3	75 - 125
Silver	0515	1.25	1.12	89.9	75 - 125

Reported by: _____ Approved by: _____

10 Dean Knauss Drive, Narragansett, R.I. 02882 • (401) 782-8900 • FAX (401) 782-8905

B.2 DATA VALIDATION LETTERS

Halliburton NUS CORPORATION

INTERNAL CORRESPONDENCE

C-49-05-5-085

TO: **MR. RICH NINESTEEL** **DATE:** **MAY 15, 1995**

FROM: **MICHELLE L. ALLEN** **CC:** **D.V. FILE**

SUBJECT: **ORGANIC DATA VALIDATION - TCL VOCs/SVOCs/PCBs**
CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CASE NO. 5255, SDG NO. TB-01-040495

SAMPLES: 10/Soil/

SB-03-0001	SB-03-1012	SB-03-1214
SB-04-0001	SB-05-0001	SB-05-1012
SB-05-1315	SB-06-0002	SB-06-0608
SB-06-1214		

10/Aqueous/

GW-03

TB-01-040495	TB-01-040595	TB-01-040695
TB-01-040795	RB-01-040495	RB-01-040595
RB-01-040695	FB-01-040495	FB-02-040495

Overview

The sample set for CTO 214, NIROP Fridley, SDG No. TB-01-040495 consists of ten (10) environmental soil samples, one (1) aqueous environmental sample, three (3) rinsate blanks (designated RB-), two (2) field blanks (designated FB-), and four (4) trip blanks (designated TB-) for Target Compound List (TCL) volatile, semivolatile, and PCB organic compounds, with the exception of the trip blanks which were analyzed for volatiles only. No field duplicate pairs were analyzed with this SDG.

The samples were collected by Halliburton NUS personnel on April 4th, 5th, 6th, and 7th, 1995 and analyzed by Ceimic Corporation under Naval Energy and Environmental Support Activity (NEESA) Level D Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using the Contract Laboratory Program (CLP) Statement of Work (SOW) OLM01.8 analytical and reporting protocols.

The data contained in this SDG were validated with regard to the following parameters:

Continuing calibration %Ds associated with the laboratory method blanks for several semivolatile compounds were greater than the 25% quality control limit. No action was necessary since these are only quality control samples.

No contaminants were detected in the laboratory method blanks. The following contaminants were detected in the field quality control blank analyses at the maximum concentrations summarized below:

Contaminant	Maximum Concentration	Action Level
Diethylphthalate	1 µg/L	10 µg/L, 330 µg/Kg
Bis(2-ethylhexyl)phthalate	2 µg/L	20 µg/L, 660 µg/Kg

Blank Actions:

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

Percent moisture, dilution factors, and sample aliquot used for analysis were taken into consideration during the application of the action level. No actions were taken for diethylphthalate as no positive results were reported for this compound in the associated samples. The positive results reported for bis(2-ethylhexyl)phthalate in the affected soil samples were qualified in the manner indicated by the blank action table.

The surrogate spike Percent Recovery (%R) for terphenyl-d14 (TPH) in sample GW-03 was below the lower quality control limit. No actions were taken since only one surrogate spike compound from the base/neutral fraction was outside of the quality control limits.

Several Tentatively Identified Compounds (TICs) were reported in the semivolatile laboratory method blanks. Environmental sample TICs also reported in associated blanks and TICs identified as adol-condensation products (laboratory artifacts) are not included in the Appendix A TIC summary.

Neither an aqueous nor soil Laboratory Control Sample (LCS) analysis was performed for the semivolatile fraction. Hence, the data were not evaluated for this parameter.

PCB Fraction

The surrogate spike %Rs for tetrachloro-m-xylene (TCX) and decachlorobiphenyl (DCB) on both analytical GC columns were below

the lower quality control limits in the laboratory method blank, PBLK03. In addition, the associated samples SB-05-1315, SB-04-0001, and SB-05-0001 yielded low %Rs for TCX, and sample SB-05-1315 yielded a low %R for DCB. The positive and nondetected results for the PCBs in these samples are qualified as estimated, "J" and "UJ", respectively.

A high %R for TCX was noted on column DB-1701 in sample RB-01-040695. No qualification was necessary since no positive results were reported for the target compounds in this sample.

The positive PCB result for Aroclor 1254 in sample SB-05-0001 yielded a %D between the GC analytical columns which exceeded 25%. This performance may indicate that the quantitation of this PCB may not be exact. Hence, the positive PCB result was qualified as estimated, "J".

The Aroclor 1254 result in sample SB-05-0001 exhibited potential peak saturation. Hence, the result from the 10-fold diluted analysis was used in the data validation.

Neither an aqueous nor soil Laboratory Control Sample (LCS) analysis was performed for the PCB fraction. Hence, the data were not evaluated for this parameter.

Additional Comments

Positive results reported at concentrations below the CRQL are qualified as estimated, "J".

No other problems were noted.

Data Qualifier Key

U	-	Value is a nondetect as reported by the laboratory or has been qualified based on blank contamination.
J	-	Positive result is considered to be estimated based on various technical reasons (i.e., continuing calibration %D > 25%, low surrogate %R, %D between GC columns > 25%, or values less than the CRQL).
UJ	-	Nondetected result is considered to be estimated as a result of various technical reasons (continuing calibration %D > 25% or low surrogate %R).

NIROP FRIDLEY
SDG NO. TB-01-040495

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	Volatile		Semivolatile		PCB
SB-03-0001	$A^{1,2,3}$	$J^{1,4}$	A^{5}	J^{1}	
SB-03-1012		J^{4}		J^{1}	
SB-03-1214	A^{2}	J^{1}	A^{5}	J^{1}	
SB-04-0001	$A^{2,3}$	J^{1}	A^{5}	J^{1}	J^{2}
SB-05-0001	$A^{1,2,3,4}$	$J^{1,4}$		$J^{1,4}$	$J^{2,3}$
SB-05-1012	$A^{1,2}$	J^{4}		J^{1}	
SB-05-1315	$A^{2,3}$	J^{1}		J^{1}	J^{2}
SB-06-0002	A^{2}	$J^{1,4}$		J^{1}	
SB-06-0608	A^{2}	$J^{1,4}$		J^{1}	
SB-06-1214	$A^{1,2}$	$J^{1,4}$	A^{5}	J^{1}	
GW-03		J^{4}			
TB-01-040495					
TB-01-040595					
TB-01-040695	$A^{2,3}$				
TB-01-040795		J^{1}			
RB-01-040495	A^{3}			$J^{1,4}$	
RB-01-040595	A^{3}			J^{1}	
RB-01-040695	$A^{2,3}$			J^{1}	
FB-01-040495	$A^{2,3}$			$J^{1,4}$	
FB-02-040495	A^{3}			$J^{1,4}$	

A^{1} - Accept data, but change positive result for bromomethane to a revised reporting limit as a result of blank contamination.

A^{2} - Accept data, but change positive result for methylene chloride to a revised reporting limit as a result of blank contamination.

A^{3} - Accept data, but change positive result for acetone to a revised reporting limit as a result of blank contamination.

A^{4} - Accept data, but change positive result for 2-hexanone to a revised reporting limit as a result of blank contamination.

A^{5} - Accept data, but change positive result for bis (2-ethylhexyl)phthalate to a revised reporting limit as a result of blank contamination.

J^1 - Estimate, "J" or "UJ", positive or nondetected results as a result of continuing calibration %Ds > 25%.

J^2 - Estimate, "J" and "UJ", positive and nondetected results as a result of low PCB surrogate %Rs.

J^3 - Estimate, "J", positive PCB result as a result of %D between GC analytical columns > 25%.

J^4 - Estimate, "J", positive results reported at concentrations below the CRQL.

Summary of Tentatively Identified Compounds (TICs)
Remaining After Data Qualification

Fraction	Named TIC
Volatile	Isopropyl alcohol
Semivolatile	Unknowns
	Unknown amide
	Aliphatic hydrocarbons
	1,1'-Biphenyl, hexachloro isomer
	1,1'-Biphenyl, pentachloro isomer
	1,1'-Biphenyl, tetrachloro isomer
	Naphthalene, tetrachloro
	Polychlorinated biphenyl
	Polychlorinated polynuclear aromatic hydrocarbons
	Propionic acid, 2-methyl-, 2,2-dimethyl-1-(2-hydroxy-1-methylethyl)propyl ester

Halliburton NUS CORPORATION

INTERNAL CORRESPONDENCE

C-49-05-5-070

TO: RICH NINESTEEL DATE: MAY 15, 1995

FROM: RICKY C. DEPAUL COPIES: D. V. FILES

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE
CTO 214, NIROP FRIDLEY, MINNESOTA
CASE NO. CTO 214, SDG 040495

SAMPLES:

Soil:	SB-03-0001	SB-03-1012	SB-03-1214
	SB-04-0001	SB-05-0001	SB-05-1012
	SB-05-1315	SB-06-0002	SB-06-0608
	SB-06-1214		
Water:	GW-03	**FB-01-040495**	**FB-02-040495**
	RB-01-040495	**RB-01-040595**	**RB-01-040695**

Overview:

The sample set for CTO 214, NIROP Fridley, SDG. 040495 consists of 10 soil samples and 1 environmental water sample. Additionally, two field quality control blanks, and three equipment rinsate blanks were included for analyses. No field duplicates were included with this analytical data set. The samples were analyzed for Target Analyte List (TAL) unfiltered metals and cyanide. The samples were collected by Halliburton NUS on April 4, 5, 6, and 7, 1995 and analyzed by Ceimic Corporation under Naval Energy and Environmental Support Activity (NEESA) Level D Quality Assurance/Quality Control (QA/QC) Statement of Work (SOW) ILM02.1 analytical and reporting protocols.

The data contained in this SDG were validated with regard to the following parameters:

- Data Completeness
- * Calibration Data
- Holding Times
- * Laboratory and Field Blank Analyses
- ICP Interference Check Sample Results
- Laboratory Control Sample Results
- Detection Limits
- Sample Quantitation

The symbol (*) indicates that quality control criteria were not met for this parameter. Problems affecting data usability are addressed below and indicated in the attached Table 1.

Samples FB-01-040495, FB-02-040495, and RB-01-04049, were incorrectly transcribed onto

the Chain-of-Custody (C.O.C.) form with the suffix **-**-040494. This transcription error was amended by the validator on the C.O.C. form in an effort to avoid subsequent confusion regarding sample identification for these field quality control blanks.

All analyses (with the exception of mercury and cyanide) were analyzed via Inductively Coupled Plasma (ICP) methodology.

The laboratory did not perform matrix spike and/or duplicate analyses for the soils and water samples included in this SDG. Additionally, serial dilution analyses were not performed. Hence, the sample data could not be evaluated for these parameters.

Calibration Data

The Contract Required Detection Limit (CRDL) Standard analysis recoveries for beryllium, copper, nickel, and lead exceeded the 120% upper quality control limit. Positive results < 3X CRDL for these analyte were qualified as estimated, "J". No actions were necessary for nondetected results for these analytes in affected samples as these results were not adversely impacted by high CRDL Standard analysis recoveries.

The CRDL Standard analysis recoveries for cadmium were additionally poor. Both high and low recovery situations were noted for this analyte. Only nondetects were reported for cadmium in affected samples and these results were qualified as estimated, "UJ".

The CRDL Standard analysis recoveries for antimony, chromium, manganese, mercury, and silver also exceeded the upper quality control limit. However, no validation actions were necessary for these analytes in affected samples as only non impacted nondetects were reported for antimony, mercury, and silver; whereas, all positive results for chromium and manganese exceeded 3X CRDL.

Blanks

The following contaminants were detected at maximum concentrations in the associated laboratory method and/or preparation blanks:

Analyte	Maximum Contaminant Level	Action Level (s)[1]
aluminum	9.098 mg/Kg	45.49 mg/Kg
aluminum	44.1 µg/L	220.5 µg/L
antimony	52.9 µg/L	264.5 µg/L, 52.9 mg/Kg
barium	9.3 µg/L	46.5 µg/L, 9.3 mg/Kg
cadmium	4.2 µg/L	21.0 µg/L, 4.2 mg/Kg
calcium	166.43 µg/L	832.15 µg/L

Analyte	Maximum Contaminant Level	Action Level (s)[1]
chromium	8.9 µg/L	44.5 µg/L, 8.9 mg/Kg
iron	18.5 µg/L	18.5 mg/Kg
iron[2]	87.58 µg/L	437.9 µg/L
nickel	13.6 µg/L	68.0 µg/L, 13.6 mg/Kg
potassium	103.2 µg/L	516µg/L, 103.2 mg/Kg
silver	5.1 µg/L	25.5 µg/L, 5.1 mg/Kg
sodium	21.748 mg/Kg	108.74 mg/Kg
sodium	280.960 µg/L	1404.8 µg/L
zinc	8.9 µg/L	44.5 µg/L, ,8.9 mg/Kg

[1]A 1 gm into 200 ml sample digestion procedure was employed for the soils contained in this SDG.
[2] Maximum concentration was detected in an associated aqueous preparation blank.

Sample weight, moisture content, and dilution factors were taken into account prior to the application off the action levels. Positive results below the action levels for aluminum, barium, cadmium, calcium, chromium, iron, nickel, sodium, and zinc were qualified as laboratory artifacts, i.e., nondetected, "U". No actions were necessary for the remaining analytes as all positive results for these analytes exceeded the respective action levels.

Contamination present in the field quality control blanks could be attributed to laboratory artifacts.

Negative concentrations detected at levels exceeding the respective Instrument Detection Limits (IDLs) for aluminum, antimony, and zinc were noted in some laboratory method blanks. This may be indicative of base-line drifting and poor instrument response. However, no validation actions were taken for these analytes in affected samples as it is in the professional opinion of the data reviewer that sample data quality is not impacted as a result of the infrequency of these negative concentration detections.

Executive Summary:

Laboratory Performance: The CRDL Standard analysis recoveries for numerous analytes were poor. Several analytes were detected in the laboratory method blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", February 1994, and the NEESA document entitled "Sampling and Chemical Analysis Quality Assurance requirements for the Navy Installation

Restoration Program" (NEESA 20.2-047B; 6/88).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NEESA Guidelines and the Quality Assurance Project Plan (QAPP)."

Halliburton NUS Corporation

Ricky C. DePaul
Chemist/Data Validator

Halliburton NUS Corporation

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Table 1 - Data Qualification Summary Table
NIROP Fridley, Minnesota
Case No. CTO 214, SDG No. 040495

Aluminum	A^1		Magnesium		
Antimony			Manganese		
Arsenic			Mercury		
Barium	A^1		Nickel	A^1,	J^1
Beryllium		J^1	Potassium		
Cadmium	A^1,	J^2	Selenium		
Calcium	A^1		Silver		
Chromium	A^1		Sodium	A^1	
Cobalt			Thallium		
Copper		J^1	Vanadium		
Iron	A^1		Zinc	A^1	
Lead		J^1	Cyanide		

If the field is left blank, the qualifier is A, accept all data.

A^1 - Accept data, but qualify positive results within the action level as nondetected, "U", as a result of blank contamination.

J^1 - Accept data, but qualify as estimated, "J", positive results based upon CRDL Standard analysis recoveries > 120%.

J^2 - Accept data, but qualify as estimated, "UJ", nondetects based upon poor CRDL Standard analysis recoveries (i.e., < 80%).

Halliburton NUS CORPORATION

INTERNAL CORRESPONDENCE

C-49-05-5-096

TO: RICH NINESTEEL DATE: MAY 15, 1995

FROM: RICKY C. DEPAUL COPIES: D. V. FILES

SUBJECT: INORGANIC DATA VALIDATION - FILTERED TAL METALS
CTO 214, NIROP FRIDLEY, MINNESOTA
CASE NO. CTO 214, SDG NO. D040495

SAMPLES:

Water:	FB-01-040495	FB-02-040495	RB-01-040495
	RB-01-040595F	RB-01-040695	

Overview:

The sample set for CTO 214, NIROP Fridley, SDG No. D40495 consists of 2 field blanks and 3 equipment rinsate blanks for filtered Target Analyte List (TAL) metals. The samples were collected by Halliburton NUS on April 4, 5, and 6, 1995 and analyzed by Ceimic Corporation under Naval Energy and Environmental Support (NEESA) Level D Quality Assurance/Quality Control (QA/QC) Statement of Work (SOW) ILM02.1 analytical and reporting protocols. No field duplicates were included with this analytical data set.

The data contained in this SDG were validated with regard to the following parameters:

- Data Completeness
- * Calibration Data
- Holding Times
- * Laboratory and Field Blank Analyses
- ICP Interference Check Sample Results
- Laboratory Control Sample Results
- Detection Limits
- Sample Quantitation

The symbol (*) indicates that quality control criteria were not met for this parameter.

Problems affecting data usability are addressed below and indicated in the attached Table 1.

All analyses (with the exception of mercury and cyanide) were analyzed via Inductively Coupled Plasma (ICP) methodology.

The laboratory did not perform matrix spike and/or duplicate analyses for the filtered water

samples included in this SDG. Additionally, serial dilution analyses were not performed. Hence, the sample data could not be evaluated for these parameters.

Calibration Data

The Contract Required Detection Limit (CRDL) Standard analysis recovery for cadmium (74.5%) was below the 80% lower quality control limit. Only nondetected results were reported for cadmium in affected samples and these results were qualified as estimated, "UJ".

The CRDL Standard analysis recovery for silver (124.0%) exceeded the 120% upper quality control limit. However, no validation actions were necessary for this analyte in affected samples as only non impacted nondetects were reported for silver in affected samples.

Blanks

The following contaminants were detected at maximum concentrations in the associated laboratory method and/or preparation blanks:

Analyte	Maximum Contaminant Level(µg/L)	Action Level(µg/L)
aluminum	31.630	158.15
cadmium	3.5	17.5
calcium	166.43	832.15
iron	87.58	437.9
sodium	189.34	946.7
zinc[1]	8.4	42.0

[1]Analyte was detected at a maximum concentration in an equipment rinsate blank.

An action level of 5X these maximum contaminant levels was used to evaluate the sample data for blank contamination. Sample weight and dilution factors were considered prior to the application of these action levels. Positive results within the action level for aluminum, calcium, iron, and sodium were qualified as nondetected, "U", as a result of blank contamination. No actions were necessary for cadmium as only non impacted nondetects were reported in affected samples. The contaminant level for zinc was not used to qualify an associated field quality control blank; thus, no validation actions were necessary for this analyte.

Executive Summary:

Laboratory Performance: The CRDL Standard analysis recoveries for cadmium and silver were poor. Several analytes were detected in the laboratory method blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", February 1994, and the NEESA document entitled "Sampling and Chemical Analysis Quality Assurance requirements for the Navy Installation Restoration Program" (NEESA 20.2-047B; 6/88).

The text of this report is formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NEESA Guidelines and the Quality Assurance Project Plan (QAPP)."

Halliburton NUS Corporation

Ricky C. DePaul
Chemist/Data Validator

Halliburton NUS Corporation

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Table 1 - Data Qualification Summary Table
NIROP Fridley, Minnesota
Case No. CTO 214, SDG No. D040495

Aluminum	A^1		Magnesium	
Antimony			Manganese	
Arsenic			Mercury	
Barium			Nickel	
Beryllium			Potassium	
Cadmium		J^1	Selenium	
Calcium	A^1		Silver	
Chromium			Sodium	A^1
Cobalt			Thallium	
Copper			Vanadium	
Iron	A^1		Zinc	
Lead				

If the field is left blank, the qualifier is A, accept all data.

A^1 - Accept data, but qualify positive results within the action level as nondetected, "U", as a result of blank contamination.

J^1 - Accept data, but qualify as estimated, "UJ", nondetected results based upon low CRDL Standard analysis recovery.

Halliburton NUS CORPORATION

INTERNAL CORRESPONDENCE

C-49-05-5-129

TO: RICH NINESTEEL DATE: MAY 15, 1995

FROM: RICKY C. DEPAUL COPIES: D. V. FILES

SUBJECT: INORGANIC DATA VALIDATION - FILTERED TAL METALS
CTO 214, NIROP FRIDLEY, MINNESOTA
CASE NO. CTO 214, SDG. NO. GW03FA

SAMPLES:

Waters: GW03-F RB-01-040795F RB-01-041095F RB-01-041195F

Overview:

The sample set for CTO 214, NIROP Fridley, SDG GW03FA consists of 1 filtered environmental water sample and three associated filtered equipment rinsate blanks. No field duplicates were included with this analytical data set. These samples were analyzed for filtered Target Analyte List (TAL) metals. The samples were collected by Halliburton NUS on April 7, and 11, 1995 and analyzed by Ceimic Corporation under Naval Energy and Support Activity (NEESA) Level D Quality Assurance/Quality Control (QA/QC) Statement of Work (SOW) ILM02.1 analytical and reporting protocols.

The data in this SDG were validated with regard to the following parameters:

- Data Completeness
* • Calibration Data
- Holding Times
* • Laboratory and Field Blank Analyses
- ICP Interference Check Sample Results
- Laboratory Control Sample Results
- Detection Limits
- Sample Quantitation

The symbol (*) indicates that quality control criteria were not met for this parameter. Problems affecting data usability are addressed below and indicated in the attached Table 1.

All analyses (with the exception of mercury and cyanide) were analyzed via Inductively Coupled Plasma (ICP) methodology.

Samples RB-01-041095 and RB-01-041195 were not documented with the "-F" suffix used to denote filtered aqueous analyses. However, for the purposes of clarity and consistency these samples have been presented with the suffix attachment.

Matrix spike and duplicate analyses were not included with this analytical data set.

Additionally, the laboratory did not perform ICP serial dilution analyses. Hence, the sample data could not be evaluated for these parameters.

Calibration Data

The Contract Required Detection Limit (CRDL) Standard analysis recoveries for antimony, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, and silver exceeded the 120% upper quality control limit. However, no validation actions were warranted for antimony, beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver as only non impacted nondetects were reported for these analytes in affected samples. Additionally, no validation actions were necessary for manganese as positive results for this analyte exceeded 3X CRDL. Thus, no data qualifications were necessary.

Blanks

The following contaminants were detected at maximum concentrations in the associated laboratory method blanks:

Analyte	Maximum Contaminant Level(µg/L)	Action Level (µ/L)
aluminum[1]	44.1	220.5
antimony	52.9	264.5
barium	9.3	46.5
cadmium	4.2	21.0
calcium[1]	142.37	711.85
chromium	8.9	44.5
iron[1]	41.750	208.75
nickel	13.6	68.0
potassium	103.2	516
silver	5.1	25.5
sodium[1]	280.96	1404.8
zinc	8.9	44.5

[1]Contaminant was detected at a maximum concentration level in an aqueous preparation blank.

Sample weight and dilution factors were taken into account prior to the application off the action levels. Positive results below the action levels for aluminum, barium, cadmium, calcium, chromium, iron, sodium, and zinc were qualified as laboratory artifacts, i.e., nondetected, "U". No actions were necessary for the remaining analytes as either positive results exceeded the action level or non impacted nondetects were reported in affected samples.

All contamination present in the equipment rinsate blanks were attributable to laboratory

artifacts.

Executive Summary:

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were poor. Additionally, several analytes were detected as contaminants in some laboratory method blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", February 1994, and the NEESA document entitled "Sampling and Chemical Analysis Quality Assurance requirements for the Navy Installation Restoration Program" (NEESA 20.2-047B; 6/88).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NEESA Guidelines and the Quality Assurance Project Plan (QAPP)."

Halliburton NUS Corporation

Ricky C. DePaul
Chemist/Data Validator

Halliburton NUS Corporation

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Table 1 - Data Qualification Summary Table
NIROP Fridley, Minnesota
Case No. CTO 214, SDG No. GW03FA

Aluminum	A[1]	Magnesium	
Antimony		Manganese	
Arsenic		Mercury	
Barium	A[1]	Nickel	
Beryllium		Potassium	
Cadmium	A[1]	Selenium	
Calcium	A1	Silver	
Chromium	A[1]	Sodium	A[1]
Cobalt		Thallium	
Copper		Vanadium	
Iron	A[1]	Zinc	A[1]
Lead			

If the field is left blank, the qualifier is A, accept all data.

A[1] - Accept data, but qualify positive results within the action level as nondetected, "U", as a result of blank contamination.

Halliburton NUS CORPORATION

INTERNAL CORRESPONDENCE

C-49-05-5-113

TO: RICH NINESTEEL DATE: MAY 15, 1995

FROM: RICKY C. DEPAUL COPIES: D. V. FILES

SUBJECT: INORGANIC DATA VALIDATION - FILTERED AND UNFILTERED TAL METALS AND CYANIDE
CTO 214, NIROP FRIDLEY, MINNESOTA
CASE NO. CTO 214, SDG 071416

SAMPLES:

Soils:	SB-07-1416	SB-07-2830
Unfiltered Waters:	GW-01	DUP-03/GW-02
	RB-01-041295	
Filtered Waters:	GW-01-F	DUP-03-F/GW-02-F
	RB-01-041295-F	

Overview:

The sample set for CTO 214, NIROP Fridley, SDG 071416 consists of 2 soil samples, 3 unfiltered waters (including one field duplicate pair), and 3 filtered waters (including one field duplicate pair). Aqueous field duplicate pairs are indicated above. Additionally, one equipment rinsate blank was included for filtered and unfiltered aqueous analyses. Unfiltered aqueous and soil samples were analyzed for Target Analyte List (TAL) metals and cyanide. Filtered aqueous samples were analyzed for TAL metals less cyanide. The samples were collected by Halliburton NUS on April 11 and 12, 1995 and analyzed by Ceimic Corporation under Naval Energy and Support Activity (NEESA) Level D Quality Assurance/Quality Control (QA/QC) Statement of Work (SOW) ILM02.1 analytical and reporting protocols.

The data contained in this SDG were validated with regard to the following parameters:

- Data Completeness
* • Calibration Data
- Holding Times
* • Laboratory and Field Blank Analyses
- ICP Interference Check Sample Results
- Laboratory Control Sample Results
- Field Duplicate Precision
- Detection Limits
- Sample Quantitation

The symbol (*) indicates that quality control criteria were not met for this parameter. Problems affecting data usability are addressed below and indicated in the attached Table 1.

Transcription errors were noted regarding sample nomenclature for samples RB-01-041294 and RB-01-041294-F. The correct sample nomenclature for these samples is RB-01-041295 and RB-01-041295-F, respectively. The validator amended the appropriate Chain-of-Custody (C.O.C.) form for these samples.

All analyses (with the exception of mercury and cyanide) were analyzed via Inductively Coupled Plasma (ICP) methodology.

The laboratory did not perform matrix spike and/or duplicate analyses for the soils and water samples included in this SDG. Additionally, serial dilution analyses were not performed. Hence, the sample data could not be evaluated for these parameters.

Calibration Data

The Contract Required Detection Limit (CRDL) Standard analysis recoveries for beryllium, chromium, copper, manganese, and lead exceeded the 120% upper quality control limit. Positive results < 3X CRDL for beryllium and lead were qualified as estimated, "J". No actions were necessary for chromium, copper, and manganese as positive results for these analytes exceeded 3X CRDL.

CRDL Standard analysis recoveries for antimony, cadmium, nickel, and silver were also high. However, no validation actions were necessary for these analytes in affected samples as only non impacted nondetects were reported for antimony and silver; while all positive results for cadmium and nickel were qualified as nondetected, "U" as a result of blank contamination.

Blanks

The following contaminants were detected at maximum concentrations in the associated laboratory method, preparation, and/or field blanks:

Analyte	Maximum Contaminant Level	Action Level (s)[1]
aluminum	38.9 µg/L	194.5 µg/L, 38.9 mg/Kg
barium	9.3 µg/L	46.5 µg/L, 9.3 mg/Kg
cadmium	4.2 µg/L	21.0 µg/L, 4.2 mg/Kg
calcium[4]	124.4 µg/L	622 µg/L, NA
chromium	8.9 µg/L	44.5 µg/L, 8.9 mg/Kg
copper[2]	9.1 µg/L	45.5 µg/L, 9.1 mg/Kg
iron[2]	170 µg/L	850 µg/L, 170 mg/Kg

Analyte	Maximum Contaminant Level	Action Level (s)[1]
iron[3]	61.7 µg/L	308.5 µg/L
magnesium[2]	371 µg/L	1855 µg/L, 371 mg/Kg
mercury[3]	0.16 µg/L	0.80 µg/L, NA
nickel	13.6 µg/L	68.0 µg/L, 13.6 mg/Kg
potassium	103.2 µg/L	516 µg/L, 103.2 mg/Kg
silver	5.1 µg/L	25.5 µg/L, 5.1 mg/Kg
sodium[4]	231.8 µg/L	1159 µg/L, NA
zinc	8.9 µg/L	44.5µg/L, 8.9 mg/Kg

1 A 1 gm into 200 ml soil digestion procedure was employed for the samples in this analytical data set.
2 Analyte was detected at a maximum concentration in the unfiltered equipment rinsate blank and is associated with all samples in this data set.
3 Analyte was detected at a maximum concentration in the filtered equipment rinsate blank and is associated with filtered aqueous samples only.
4 Analyte was detected at a maximum contaminant level in an aqueous preparation blank only. No other contamination was noted for this analyte in the remaining laboratory method blanks.

Sample weight, moisture content, and dilution factors were taken into account prior to the application off the action levels. Positive results below the action levels for aluminum, barium, cadmium, calcium, chromium, copper, iron, nickel, potassium, sodium, and zinc were qualified as laboratory artifacts, i.e., nondetected, "U". No actions were necessary for magnesium, mercury and silver in affected samples as all positive results for these analytes exceeded the respective action levels.

Negative concentrations were noted for aluminum (in one Continuing Calibration Blank (CCB) and zinc (in two CCBs). However, it is in the professional opinion of the data reviewer that sample data quality is not impacted as a result of these infrequent base-line drifting occurrences. Hence, no validation actions were necessary for these analytes.

Field Duplicate Precision

Field duplicate comparisons are provided for filtered and unfiltered aqueous samples GW02/DUP-03 as noted in the accompanying support documentation. This information has been provided for comparison purposes and has not been used to qualify associated sample data.

Executive Summary:

Laboratory Performance: The CRDL Standard analysis recoveries for several analytes were poor. Several analytes were detected in the laboratory method blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", February 1994, and the NEESA document entitled "Sampling and Chemical Analysis Quality Assurance requirements for the Navy Installation Restoration Program" (NEESA 20.2-047B; 6/88).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NEESA Guidelines and the Quality Assurance Project Plan (QAPP)."

Halliburton NUS Corporation

Ricky C. DePaul
Chemist/Data Validator

Halliburton NUS Corporation

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Table 1 - Data Qualification Summary Table
NIROP Fridley, Minnesota
Case No. CTO 214, SDG No. 071416

Aluminum	A[1]		Magnesium	
Antimony			Manganese	
Arsenic			Mercury	
Barium	A[1]		Nickel	A[1]
Beryllium		J[1]	Potassium	A[1]
Cadmium	A[1]		Selenium	
Calcium	A[1]		Silver	
Chromium	A[1]		Sodium	A[1]
Cobalt			Thallium	
Copper	A[1]		Vanadium	
Iron	A[1]		Zinc	A[1]
Lead		J[1]	Cyanide	

If the field is left blank, the qualifier is A, accept all data.

A[1] - Accept data, but qualify positive results within the action level as nondetected, "U", as a result of blank contamination.

J[1] - Accept data, but qualify positive results < 3X CRDL as estimated, "J", as a result of CRDL Standard analysis recoveries > 120%.

Halliburton NUS CORPORATION

INTERNAL CORRESPONDENCE

C-49-05-5-123

TO: RICH NINESTEEL DATE: MAY 16, 1995

FROM: RICKY C. DEPAUL COPIES: D. V. FILES

SUBJECT: INORGANIC DATA VALIDATION - TAL METALS AND CYANIDE
CTO 214, NIROP FRIDLEY, MINNESOTA
CASE NO. CTO 214, SDG. NO. GW03F

SAMPLES:

Soils:	DUP-01	DUP-02	SB01-0001	SB-01-0608
	SB-01-1416	SB-02-0001	SB-02-0204	SB-02-0406
	SB-04-1012	SB-04-1214	SB-07-0406	
Waters:	RB-01-040795	RB-01-041095	RB-01-041195	

Overview:

The sample set for CTO 214, NIROP Fridley, SDG GW03F consists of 11 soil samples including two field duplicate pairs (namely, samples DUP-01/SB-01-0001 and DUP-02/SB-02-0204). Additionally, three equipment rinsate blanks were included with this analytical data set. These samples were analyzed for Target Analyte List (TAL) metals and cyanide. The samples were collected by Halliburton NUS on April 7, 10, and 11 1995 and analyzed by Ceimic Corporation under Naval Energy and Support Activity (NEESA) Level D Quality Assurance/Quality Control (QA/QC) Statement of Work (SOW) ILM02.1 analytical and reporting protocols.

The data in this SDG were validated with regard to the following parameters:

- Data Completeness
- * Calibration Data
- Holding Times
- * Laboratory and Field Blank Analyses
- ICP Interference Check Sample Results
- * Matrix Spike Results
- Laboratory Duplicate Precision
- Laboratory Control Sample Results
- ICP Serial Dilution Analysis
- Field Duplicate Precision
- Detection Limits
- Sample Quantitation

The symbol (*) indicates that quality control criteria were not met for this parameter. Problems affecting data usability are addressed below and indicated in the attached Table 1.

All analyses (with the exception of mercury and cyanide) were analyzed via Inductively Coupled Plasma (ICP) methodology.

Calibration Data

The Contract Required Detection Limit (CRDL) Standard analysis recoveries for antimony, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, and silver exceeded the 120% upper quality control limit. Positive results < 3X CRDL for beryllium, copper, and nickel were qualified as estimated, "J". No actions were necessary for antimony, cadmium, chromium, manganese, mercury, lead, and silver because only non impacted nondetects were reported for antimony, cadmium, mercury, and silver; while positive results for chromium, manganese, and lead were greater than 3X CRDL. Thus, no validation actions were necessary for these analytes.

Blanks

The following contaminants were detected at maximum concentrations in the associated laboratory method blanks:

Analyte	Maximum Contaminant Level	Action Level (s)[1]
aluminum	9.098 mg/Kg	45.49 mg/Kg
aluminum	44.1 µg/L	220.5 µg/L
antimony	52.9 µg/L	264.5 µg/L, 52.9 mg/Kg
barium	9.3 µg/L	46.5 µg/L, 9.3 mg/Kg
cadmium	4.2 µg/L	21.0 µg/L, 4.2 mg/Kg
calcium[2]	142.37 µg/L	711.85 µg/L
chromium	8.9 µg/L	44.5 µg/L, 8.9 mg/Kg
iron	18.5 µg/L	18.5 mg/Kg
iron[2]	41.75 µg/L	208.75 µg/L
nickel	13.6 µg/L	68.0 µg/L, 13.6 mg/Kg
potassium	103.2 µg/L	516 µg/L, 103.2 mg/Kg
silver	5.1 µg/L	25.5 µg/L, 5.1 mg/Kg
sodium[2]	280.96 µg/L	1404.8 µg/L
zinc	8.9 µg/L	44.0 µg/L, 8.9 mg/Kg

[1] A 1 gm into 200 ml soil digestion procedure was employed for the samples in this analytical data set.

[2] Analyte was detected at a maximum contaminant level in an aqueous preparation blank only. No other contamination was noted for this analyte in the remaining laboratory method blanks.

Sample weight, moisture content, and dilution factors were taken into account prior to the application off the action levels. Positive results below the action levels for aluminum, antimony, barium, cadmium, calcium, chromium, iron, nickel, potassium, sodium, and zinc were qualified as laboratory artifacts, i.e., nondetected, "U".

Matrix Spike Results

The soil Matrix Spike (MS) recoveries for antimony (71.7%) and selenium (68.9%) were marginally below the 75% lower quality control limit. Only nondetects were reported for these analytes in affected samples and these results were qualified as estimated, "UJ".

The soil MS recovery for manganese exceeded the 125% upper quality control limit. Only positive results were reported for this analyte in the affected samples and these results were qualified as estimated, "J".

Field Duplicate Precision

Two field duplicate pairs were included with this analytical data set (namely, samples DUP-01/SB01-0001 and DUP-02/SB02-0204). A comparison of these field duplicate results is provided in the support documentation.

Executive Summary:

Laboratory Performance: Several analytes exhibited poor CRDL Standard analysis recoveries. Numerous analytes were detected as contaminants in the laboratory method blanks.

Other Factors Affecting Data Quality: Matrix spike recoveries for antimony and selenium were low; while the matrix spike recovery for manganese was high.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", February 1994, and the NEESA document entitled "Sampling and Chemical Analysis Quality Assurance requirements for the Navy Installation Restoration Program" (NEESA 20.2-047B; 6/88).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NEESA Guidelines and the Quality Assurance Project Plan (QAPP)."

Halliburton NUS Corporation

Ricky C. DePaul
Chemist/Data Validator

Halliburton NUS Corporation

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Table 1 - Data Qualification Summary Table
NIROP Fridley, Minnesota
Case No. CTO 214, SDG No. GW03F

Aluminum	A^1		Magnesium		
Antimony	A^1	J^2	Manganese		J^3
Arsenic			Mercury		
Barium		A^1	Nickel	A^1,	J^1
Beryllium		J^1	Potassium	A^1	
Cadmium	A^1		Selenium		J^2
Calcium	A^1		Silver		
Chromium	A^1		Sodium	A^1	
Cobalt			Thallium		
Copper		J^1	Vanadium		
Iron	A^1		Zinc	A^1	
Lead			Cyanide		

If the field is left blank, the qualifier is A, accept all data.

A^1 - Accept data, but qualify positive results within the action level as nondetected, "U", as a result of blank contamination.

J^1 - Accept data, but qualify positive results < 3X CRDL as estimated, "J", as a result of CRDL Standard analysis recoveries > 120%.

J^2 - Accept data, but qualify as estimated, "UJ", nondetected results in affected samples as a result of soil matrix spike recovery < 75%, but > 30%.

J^3 - Accept data, but qualify as estimated, "J", positive results in affected samples as a result of soil matrix spike recovery > 125%.

Halliburton NUS CORPORATION

INTERNAL CORRESPONDENCE

C-49-05-5-100

TO: RICH NINESTEEL

DATE: MAY 16, 1995

FROM: RICKY C. DEPAUL

COPIES: D. V. FILES

SUBJECT: MISCELLANEOUS DATA VALIDATION - pH
CTO 214, NIROP FRIDLEY, MINNESOTA
CASE NO. CTO 214, SDG 040495

SAMPLES:

Soils:	SB-01-0001/DUP-01	SB-01-0608	SB-01-1416
	SB-02-0001	SB-02-0204/DUP-02	SB-02-0406
	SB-03-0001	SB-03-1012	SB-03-1214
	SB-04-0001	SB-04-1012	SB-04-1214
	SB-05-0001	SB-05-1012	SB-05-1315
	SB-06-0002	SB-06-0608	SB-06-1214
	SB-07-0406	SB-07-1416	SB-07-2830
Waters:			
	GW-01	GW-02/DUP-03	GW-03
	FB-01-040495	FB-02-040495	RB-01-040495
	RB-01-040595	RB-04-040695	RB-01-040795
	RB-01-041095	RB-01-041195	RB-01-041295

Overview:

The sample set for CTO 214, NIROP Fridley, SDG 040495 consists of 21 soil samples (including two field duplicate pairs; namely samples SB-01-001/DUP-01 and SB-02-0204/DUP-02) and 3 waters (including one field duplicate pair; namely, samples GW-02/DUP-03) for pH via method 9040/9045. Additionally, nine field quality control blanks were included with this analytical data set. The samples were collected by Halliburton NUS on April 4, 5, 6, 10, 11, and 12 , 1995 and analyzed by Ceimic Corporation under Naval Energy and Support Activity (NEESA) Level D Quality Assurance/Quality Control (QA/QC) Statement of Work (SOW) ILM02.1 analytical and reporting protocols.

The data in this SDG were evaluated with regard to the following parameters:

- Data Completeness
- Holding Times
- Field Duplicate Precision

The symbol (*) indicates that quality control criteria were not met for this parameter.

Holding Times

All samples were analyzed within 1 to 3 days of sample collection. Hence, no validation actions were necessary. Sample data quality is unaffected.

Additional Comments

Samples FB-01-040495, FB-02-040495, RB-01-040495, and RB-01-041295 were incorrectly transcribed onto the Chain-of-Custody (C.O.C.) forms with the suffix **-**-04**-94. This transcription error was amended by the validator on the C.O.C. form in an effort to avoid subsequent confusion regarding sample identification for these field quality control blanks.

No other problems were noted with the data. Field duplicate precision was acceptable. Sample data is acceptable without data qualification.

Executive Summary:

Laboratory Performance: No problems were noted upon review.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Data Validation", February 1994, and the NEESA document entitled "Sampling and Chemical Analysis Quality Assurance requirements for the Navy Installation Restoration Program" (NEESA 20.2-047B; 6/88).

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NEESA Guidelines and the Quality Assurance Project Plan (QAPP)."

Halliburton NUS Corporation

Ricky C. DePaul
Chemist/Data Validator

Halliburton NUS Corporation

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Halliburton NUS CORPORATION

INTERNAL CORRESPONDENCE

C-49-05-5-168

TO: MR. RICH NINESTEEL DATE: MAY 17, 1995

FROM: KELLY A. JOHNSON COPIES: DV FILE

SUBJECT: ORGANIC DATA VALIDATION - VOA/BNA/PESTICIDE/PCB ORGANICS
CTO 214, NIROP FRIDLEY, MINNESOTA
CASE 5255, SDG GW03F

SAMPLES:

Solids:

SB-02-0406	SB-02-0608	SB-07-0406	SB-01-1416
DUP-01	SB-02-0001	SB-02-0204	SB-04-1012
SB-04-1214	SB-01-0001	SB-01-0608	DUP-02

Aqueous:

RB-01-040795	TB-01-041095	RB-01-041095	TB-01-041195
RB-01-041195			

Ceimic Laboratories analyzed 11 solid samples (including two field duplicate pairs SB-01-0001, DUP-01 and SB-02-0204, DUP-02), 3 aqueous rinsate blanks (designated RB-), and 2 trip blanks (designated TB-) for Target Compound List (TCL) volatile organic compounds, semivolatile organic compounds, and Polychlorinated Biphenyls (PCBs). The trip blanks and sample SB-02-0608 were analyzed for volatile organic compounds only. Additionally, sample DUP-02 was not analyzed for volatile organic compounds.

The samples were collected by Halliburton NUS Corporation on April 7th, 10th, and 11th 1994 and were analyzed by Ceimic. The TCL organic compound analyses (e.g., volatile, semivolatile, and PCBs) were analyzed as Naval Energy and Environmental Support Activity (NEESA) Level D, using the methods prescribed by the 3/90 Contract Laboratory Program (CLP) Statement of Work (SOW) OLM01.8.

- Data completeness
- Holding times
- GC/MS Tuning
* • Initial and continuing calibrations
* • Laboratory and field blank analyses
* • Surrogate spike recoveries
- Laboratory control spike/laboratory control spike duplicate results
* • Internal standards performance
* • Matrix Spike/Matrix Spike Duplicate results
- Instrument performance
- Detection limits
- Sample quantitation
- Tentatively identified compounds

The symbol (*) indicates that quality control criteria were not met for this parameter. Problems affecting data usability are discussed below and the attached Table 1 summarizes the validation qualifications.

Volatiles

Several continuing calibration Percent Differences (%Ds) for trans-1,3-dichloropropene, chloroethane, 2-hexanone, chloromethane, vinyl chloride, 2-butanone, and 4-methyl-2-pentanone were greater than the 25% quality control criteria. Positive and nondetected results reported for these compounds were qualified as estimated, "J" and "UJ", respectively.

Several continuing calibration %Ds for acetone were greater than the 25% quality control criteria. No actions were taken for acetone as these results were qualified as a result of blank contamination and did not require further qualification. Additionally, there several other calibration noncompliances but the only affected samples were dilution analyses. No data qualification was warranted because only the trichloroethene and tetrachloroethene results were used in validation.

The following compounds were detected in the low level laboratory method and field quality control blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Action Level
bromomethane	6 µg/kg	30 µg/kg
methylene chloride	4 µg/kg	40 µg/kg
chloromethane	1 µg/kg	5 µg/kg
acetone	9 µg/kg	90 µg/kg
4-methyl-2-pentanone	7 µg/kg	35 µg/kg
2-hexanone	8 µg/kg	40 µg/kg
acetone	14 µg/L	140 µg/Kg

- Maximum concentrations indicated were detected in the field quality control blanks.

Samples Affected: All low level soil samples.

Percent moisture, sample aliquot size, and dilution factors were taken into consideration during the application of all action levels. Positive results reported at concentrations below the detection limit but less than the action level were raised to the detection limit and qualified as undetected "U". Positive results reported at concentrations above the detection limit but less than the action level were qualified as undetected "U". No actions were taken for chloromethane since no positive result were reported for this compound in the affected samples. It should be noted that field quality control blanks are not qualified based on field quality control blank contamination.

The following compounds were detected in the medium level laboratory method blanks at the maximum concentrations indicated below:

Compound	Maximum Concentration	Action Level
chloromethane	500 µg/kg	2500 µg/kg
4-methyl-2-pentanone	650 µg/kg	3250 µg/kg
2-hexanone	570 µg/kg	2850 µg/kg

Samples Affected: All medium level soil samples.

Percent moisture, sample aliquot size, and dilution factors were taken into consideration during the application of all action levels. No actions were taken for chloromethane, 4-methyl-2-pentanone, and 2-hexanone since no positive result were reported for these compounds in the affected samples.

The positive results for trichloroethene in the field duplicate pair SB-01-0001 and DUP-01 were qualified as estimated, "J", as a result of poor field duplicate precision (Relative Percent Difference greater than 50%).

Trichloroethene and tetrachloroethene exceeded the instrument's linear calibration range in sample SB-02-0406. This sample was diluted (125-fold) and reanalyzed. The dilution results for these compounds were transposed over to the original analytical data and used in validation of this SDG.

Acetone, trichloroethene, and tetrachloroethene exceeded the instrument's linear calibration range in sample SB-02-0608. This sample was diluted (125-fold) and reanalyzed. The dilution results for trichloroethene and tetrachloroethene were transposed over to the original analytical data and used in validation of this SDG. Acetone was not detected in the dilution analysis, hence, the acetone result from the original analytical data was estimated, "J", and used in the validation of this SDG.

Sample SB-07-0406 was originally analyzed at a 5-fold dilution.

Sample SB-01-1416 was originally analyzed as a medium level sample as a result of high levels of trichloroethene. This sample was further diluted 2-fold as a result of trichloroethene exceeding the instrument's linear calibration range. The 2-fold dilution result for trichloroethene was transposed over to the original sample analysis and used in validation.

Trichloroethene exceeded the instrument's linear calibration range in sample SB-01-0001. This sample was diluted (10-fold) and reanalyzed. The dilution results for this compound was transposed over to the original analytical data and used in validation of this SDG.

Positive results reported at concentrations below the Contract Required Quantitation Limit (CRQL) were qualified as estimated, "J".

The Matrix Spike Duplicate analyses of sample SB02-0406 yielded a high recovery for 1,2-dichloroethane-d4. No actions were taken since this noncompliance affected a quality control sample.

No other problems were noted.

Semivolatiles

An initial calibration Percent Relative Standard Deviation (%RSD) exceeded the 30% quality control limit for 3,3'-dichlorobenzidine. No action was taken as a result of this calibration exceedance.

Continuing calibration %Ds for 2,4-dinitrophenol, 2,2'-oxybis(1-chloropropane), hexachlorobenzene, and 3,3'-dichlorobenzidine exceeded the 25% quality control criteria. The positive and nondetected results reported for these compounds in the affected samples was qualified as estimated, "J" and "UJ", respectively.

Continuing calibration %Ds for several compounds exceeded the 25% quality control criteria. No actions were necessary for any of these compounds since the only affected sample was a reanalysis, which was not used in the validation of this SDG.

The internal standard areas for chrysene-d12 and perylene-d12 were below the lower quality control limit in sample DUP-02. Upon subsequent reanalysis, there were no improvements in these internal standard areas. Positive and

nondetected results reported for target compounds quantitated by the failed internal standard areas were qualified as estimated, "J" and "UJ".

The internal standard areas for perylene-d12 were low in samples SB-02-0204 and SB-02-0406. There were no improvements in these internal standard areas upon the subsequent reanalyses of these samples. Positive and nondetected results reported for target compounds quantitated by the failed internal standard areas were qualified as estimated, "J" and "UJ".

The Matrix Spike/Matrix Spike Duplicate (MS/MSD) analyses of sample SB-01-0608 yielded a high Percent Recovery (%R) for 2,4-dinitrotoluene. No action was necessary since only nondetected results were reported for this compound in the unspiked sample and nondetects are not compromised by high %Rs.

The positive results for bis(2-ethylhexyl)phthalate in the field duplicate pair SB-01-0001 and DUP-01 were qualified as estimated, "J", as a result of poor field duplicate precision (Relative Percent Difference greater than 50%).

Positive results reported at concentrations below the Contract Required Quantitation Limit (CRQL) were qualified as estimated, "J".

No other problems were noted.

PCBs

The surrogate %Rs for tetrachloro-m-xylene (TCX) on column 1 and 2, and decachlorobiphenyl (DCB) on column 2 were high for samples DUP-02DL, SB-07-0406DL, and SB-02-0406DL. The surrogate %Rs for TCX on column 1 and 2 were high for sample SB-02-0204DL. Additionally the surrogate for TCX on column 1 was high for sample SB-02-0406. No actions were necessary in any of the aforementioned samples because no positive results were reported in any of these samples.

Sample DUP-02, SB-02-0204, SB-02-0406, and SB-07-0406 were originally analyzed at a 5-fold dilution due to a pesticide compounds in excess of the instrument's linear calibration. However, samples were only to be analyzed for PCB compounds. This was an error made by the laboratory, which resulted in high detection limits for PCB compounds. No qualifications were made to the data.

No problems were noted.

Additional Comments

Tentatively identified compounds (TICs) which were present in laboratory and/or field quality control blanks and also present in environmental samples were not included in the Summary of TICs.

Executive summary

Laboratory Performance: Several volatile and semivolatile continuing calibration %Ds were noncompliant. Several contaminants were detected in the laboratory method blanks.

Other Factors Affecting Data Quality: A noncompliant matrix spike/matrix spike duplicate %R was noted in the semivolatile fraction. Several samples contained high surrogate %Rs in PCB fraction analyses. High internal standard areas were noted in several semivolatile sample analyses. Poor field duplicate precision was noted for trichloroethene and bis(2-ethylhexyl)phthalate. Positive results reported at concentrations below the CRQL are considered to be estimated.

TO: MR. RICH NINESTEEL
DATE: MAY 17,1995 - PAGE 5

The data for these analyses were reviewed with reference to the U.S. EPA "National Functional Guidelines for Organic Data Evaluation " (2/94) and the NEESA guidance document entitled "Sampling and Chemical Analysis Quality Assurance requirements for the Navy Installation Restoration Program" (NEESA 20.2-047B; June, 1988.)

The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NEESA Guidelines and the Quality Assurance Project Plan (QAPP)."

Halliburton NUS Corporation

Kelly A. Johnson
Chemist/Data Validator

Halliburton NUS Corporation

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

NIROP FRIDLEY
CASE 5255, SDG GW03F

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	VOA		BNA	PEST/PCB
SB-02-0406	A[1,2,3,4],	J[3,6]	J[6,12]	
SB-02-0608	A[2],	J[3,6,7]		
SB-07-0406			J[6,9]	
SB-01-1416			J[6,10]	
DUP-01	A[1,2,3,6],	J[5]	J[10,11]	
SB-02-0001	A[3,5],	J[3,5]	J[6,10]	
SB-02-0204	A[2,3],	J[3,6]	J[6,12]	
SB-04-1012	A[1,2,3],	J[1]	J[10]	
SB-04-1214	A[2,3],	J[1,6]	J[6,10]	
SB-01-0001	A[2,3],	J[1,5,6]	J[6,10,11]	
SB-01-0608	A[1,2],	J[2]	J[6,10]	
DUP-02			J[6,9,12]	
RB-01-040795		J[4]		
TB-01-041095				
RB-01-041095			J[8]	
TB-01-041195		J[4]		
RB-01-041195			J[8]	

If the field is left blank, the qualifier is A - Accept all data.

A[1] - Qualify positive result for bromomethane as undetected, "U", as a result of laboratory blank contamination.

A[2] - Qualify positive result for methylene chloride as undetected, "U", as a result of laboratory blank contamination.

A[3] - Qualify positive result for acetone as undetected, "U", as a result of laboratory blank contamination.

A[4] - Qualify positive result for 4-methyl-2-pentanone as undetected, "U", as a result of laboratory blank contamination.

A[5] - Qualify positive result for 2-hexanone as undetected, "U", as a result of laboratory blank contamination.

A[6] - Qualify positive result for acetone as undetected, "U", as a result of field quality control blank contamination.

J[1] - Estimate, "UJ", nondetected result for trans-1,3-dichloropropene as a result of a continuing calibration %D > 25%.

J[2] - Estimate, "UJ", nondetected result for chloroethane and 2-hexanone as a result of continuing calibration %Ds > 25%.

J[3] - Estimate, "UJ", nondetected result for chloromethane, vinyl chloride, 2-butanone, and 4-methyl-2-pentanone as a result of continuing calibration %Ds > 25%.

J^4 - Estimate, "UJ", nondetected result for chloromethane and 4-methyl-2-pentanone as a result of continuing calibration %Ds > 25%.

J^5 - Estimate, "J", positive result for trichloroethene as a result of poor field duplicate precision.

J^6 - Estimate, "J", positive results reported at concentrations below the CRQL.

J^7 - Estimate, "J", positive result for acetone due to this compound exceeding the instrument's linear calibration range.

J^8 - Estimate, "UJ", nondetected result for 2,4-dinitrophenol as a result of continuing calibration %Ds > 25%.

J^9 - Estimate, "UJ", nondetected result for 2,2'-oxybis(1-chloropropane) as a result of continuing calibration %Ds > 25%.

J^{10} - Estimate, "UJ", nondetected result for hexachlorobenzene and 3,3'-dichlorobenzidine as a result of continuing calibration %Ds > 25%.

J^{11} - Estimate, "J", positive result for bis(2-ethylhexyl)phthalate as a result of poor field duplicate precision.

J^{12} - Estimate, "J" and "UJ", positive and nondetected results for compound quantitated by the failed internal standards.

Summary of Tentatively Identified Compounds (TICs)
Remaining After Data Qualification

Fraction	Named TIC
Volatile	Unknown(s)
	Isopropyl alcohol
	Aliphatic hydrocarbons
	C3-benzene isomer
	C4-benzene isomer
	Cyclic hydrocarbons
	Propyl-benzene
	1,1,3,4-tetrachloro-1,3-butadiene
Semivolatile	Unknown(s)
	Unknown amide(s)
	Aliphatic hydrocarbon
	Phenol, fluoro, nitro isomer
	Tetrachloro-benzene isomer
	Trichloro-naphthalene isomer
	Tetrachloro-naphthalene isomer
	Octachloro-naphthalene
	2-methyl, 2,2-dimethyl-1-(2-hydroxy-1-methylethyl)propyl ester
	2-(2-butoxyethoxy)Ethanol
	Polychlorinated Polynuclear Aromatic Hydrocarbon
	Quinoline, methylisomer
	Benzoquinoline isomer
	C13H9N isomer

Data Qualifier Summary

U - Nondetect as reported by the laboratory or an artifact of blank contamination, qualified B as a false positive.

J - Estimate positive results for various technical reasons (i.e. calibration noncompliances, RPDs, and values less than the CRQL).

UJ - Estimate nondetects as a result of calibration noncompliances.

Halliburton NUS CORPORATION

INTERNAL CORRESPONDENCE

C-49-05-5-089

TO:	**MR. RICH NINESTEEL**	**DATE:**	**MAY 17, 1995**
FROM:	**MICHELLE L. ALLEN**	**COPIES:**	**DV FILE**

SUBJECT: **ORGANIC DATA VALIDATION - TCL VOCs/SVOCs/PCBs**
CTO 214, NIROP FRIDLEY, FRIDLEY, MINNESOTA
CASE NO. 5255, SDG NO. SB-07-1416

SAMPLES: 2/Soil/

SB-07-1416 SB-07-2830

5/Aqueous/

GW-01 GW-02 DUP-03

TB-01-041295 RB-01-041295

Overview

The sample set for CTO 214, NIROP Fridley, SDG No. SB-07-1416 consists of two (2) environmental soil samples, three (3) aqueous environmental samples (including one field duplicate pair - GW-02 and DUP-03), one (1) rinsate blank (RB-01-041295), and one (1) trip blank (TB-01-041295) for Target Compound List (TCL) volatile, semivolatile, and PCB organic compounds, with the exception of the trip blank which was analyzed for volatiles only.

The samples were collected by Halliburton NUS personnel on April 11th and 12th, 1995 and analyzed by Ceimic Corporation under Naval Energy and Environmental Support Activity (NEESA) Level D Quality Assurance/Quality Control (QA/QC) criteria. All analyses were conducted using the Contract Laboratory Program (CLP) Statement of Work (SOW) OLM01.8 analytical and reporting protocols.

The data contained in this SDG were validated with regard to the following parameters:

- Data completeness
- Holding times
- GC/MS tuning and mass calibration
- * Initial and continuing calibrations
- * Laboratory and field blanks analyses
- * Surrogate spike recoveries
- Laboratory control sample results
- Internal standard performance
- Detection limits
- * Sample identification

* • Sample quantitation
* • Tentatively Identified Compounds (TICs)

The symbol (*) indicates that quality control criteria were not met for this parameter. Problems affecting data usability are discussed below and the attached Table 1 summarizes the validation qualifications.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples are designated by the field crew with a frequency of one MS/MSD per twenty samples of like matrix. No semivolatile or PCB MS/MSD samples were included in this analytical data set, hence, the environmental samples contained within this SDG could not be evaluated for this parameter in these fractions.

Volatile Fraction

Some continuing calibration Percent Differences (%Ds) for chloromethane, bromomethane, acetone, 2-butanone, bromoform, 4-methyl-2-pentanone, 2-hexanone, and tetrachloroethene were greater than the 25% quality control limit. This calibration noncompliance indicates a lack of consistency in instrumental responses which could lead to compromised detection and quantitation of the affected compounds. No action was taken for acetone, bromoform, or tetrachlroethene since the associated sample results were either qualified for blank contamination or not used in the data validation. The remaining positive and nondetected results reported for these compounds the affected environmental samples are qualified as estimated, "J" and "UJ", respectively.

The following contaminants were detected in the laboratory method blank and field quality control analyses at the maximum concentrations summarized below:

Contaminant	Maximum Concentration	Action Level
Acetone•	12 µg/L	120 µg/L, µg/Kg
Methylene Chloride	4 µg/Kg	40 µg/Kg
Methylene Chloride••	400 µg/Kg	4000 µg/Kg
2-Hexanone••	570 µg/Kg	2850 µg/Kg
2-Hexanone	4 µg/L	20 µg/L
4-Methyl-2-pentanone••	650 µg/Kg	3250 µg/Kg

• - Maximum concentration detected in a field quality control blank.
•• - Applicable to medium level soil analyses only.

Blank Actions:

- Value < Contract Required Quantitation Limit (CRQL); report CRQL followed by a U.
- Value > CRQL and < action level; report value followed by a U.
- Value > CRQL and > action level; report value unqualified.

Percent moisture, dilution factors, and sample aliquot used for analysis were taken into consideration during the application of the action level. No actions were taken for methylene chloride, 2-hexanone, and 4-methyl-2-pentanone as no positive results were reported for these compounds in the associated samples. The positive results reported for acetone in the affected samples were qualified in the manner indicated by the blank actions table.

Poor field duplicate precision was noted for 2-butanone in the field duplicate pair GW-02 and DUP-03. This compound was reported as a nondetect in sample GW-02, however, it was detected above the CRQL in the duplicate sample. Hence, the positive and nondetected for 2-butanone in the field duplicate pair is qualified as estimated, "J" and "UJ", respectively.

The results for trichloroethene in samples GW-01, GW-02, and SB-07-2830 exceeded the instrument's linear calibration range in the original analyses. The results from the diluted analyses were used in the validation of the data.

Samples SB-07-1416 and SB-07-2830DL were analyzed as a medium level soils as a result of the high concentration of trichloroethene contained in the sample.

The laboratory analyzed sample DUP-03 at a 10-fold dilution prior to analysis as a result of the high concentrations of target compounds.

Semivolatile Fraction

An initial calibration Percent Relative Standard Deviation (%RSD) for 3,3'-dichlorobenzidine exceeded the 30% quality control limit. No actions were necessary in the associated environmental samples since no positive results were reported for these compounds and nondetects are not compromised.

Some continuing calibration %Ds for hexachlorobutadiene, hexachlorocyclopentadiene, 4-bromophenyl phenyl ether hexachlorobenzene, pentachlorophenol, 3,3'-dichlorobenzidine, and di-octylphthalate exceeded the 25% quality control criterion. Only nondetected results were reported for these compounds in the affected samples and these nondetects are qualified as estimated, "UJ".

No contaminants were detected in the laboratory method or field quality control blanks.

The surrogate spike Percent Recovery (%R) for terphenyl-d14 (TPH) in samples GW-01, GW-02, and DUP-03 were below the lower quality control limit. No qualifications were necessary in these samples since only one surrogate spike compound from the base/neutral fraction was outside of the quality control limit.

Several Tentatively Identified Compounds (TICs) were reported in the semivolatile laboratory method blanks. Environmental sample TICs also reported in associated blanks and TICs identified as adol-condensation products (laboratory artifacts) are not included in the Appendix A TIC summary.

Neither an aqueous nor soil Laboratory Control Sample (LCS) analysis was performed for the semivolatile fraction. Hence, the data were not evaluated for this parameter.

PCB Fraction

Neither an aqueous nor soil Laboratory Control Sample (LCS) analysis was performed for the PCB fraction. Hence, the data were not evaluated for this parameter.

Additional Comments

Positive results reported at concentrations below the CRQL are qualified as estimated, "J".

No other problems were noted.

Executive Summary

Laboratory Performance Issues: Methylene chloride, 4-methyl-2-pentanone, 2-hexanone, and semivolatile TICs were detected in the laboratory method blanks. Continuing calibration %Ds for several volatile and semivolatile compounds exceeded 25%. LCS or MS/MSD analyses were not performed for the semivolatile or PCB fraction.

Other Factors Affecting Data Quality: Acetone was detected in the field quality control blanks. Some samples contained a noncompliant base/neutral surrogate recoveries. Some samples required dilutions. Positive results reported at concentrations below the CRQL are qualified as estimates.

The data for these analyses were reviewed with reference to the EPA "Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses (2/94)" and the Naval Energy and Environmental Support Activity (NEESA) "Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program" (20.2-047B, 6/88). The text of this report has been formulated to address only those problem areas affecting data quality.

"I attest that the data referenced herein were validated according to the agreed upon validation criteria as specified in the NEESA guidelines and the Quality Assurance Project Plan (QAPP)."

Halliburton NUS Corporation

Michelle L. Allen
Chemist/Data Validator

Halliburton NUS Corporation

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as Reported by the Laboratory
3. Appendix C - Support Documentation

Data Qualifier Key

U	-	Value is a nondetect as reported by the laboratory or has been qualified based on blank contamination.
J	-	Positive result is considered to be estimated based on various technical reasons (i.e., continuing calibration %D > 25%, poor field duplicate precision, or values less than the CRQL).
UJ	-	Nondetected result is considered to be estimated as a result of various technical reasons (continuing calibration %D > 25% or poor field duplicate precision).

NIROP FRIDLEY
SDG NO. SB-07-1416

TABLE 1 - RECOMMENDATION SUMMARY

Sample No.	Volatile		Semivolatile	PCB
SB-07-1416		J[1,3]	J[1]	
SB-07-2830			J[1]	
GW-01	A[1]	J[1,3]	J[3]	
GW-02	A[1]	J[1,2,3]		
DUP-03	A[1]	J[1,2,3]		
TB-01-041295		J[1]		
RB-01-041295		J[1]		

A[1] - Accept data, but change positive result for acetone to a revised reporting limit as a result of blank contamination.

J[1] - Estimate, "J" or "UJ", positive or nondetected results as a result of continuing calibration %Ds > 25%.

J[2] - Estimate, "J" and "UJ", positive and nondetected results as a result of field duplicate imprecision.

J[3] - Estimate, "J", positive results reported at concentrations below the CRQL.

Summary of Tentatively Identified Compounds (TICs)
Remaining After Data Qualification

Fraction	Named TIC
Volatile	Isopropyl alcohol
Semivolatile	Unknowns
	Unknown aromatic
	Aliphatic hydrocarbons
	C3 Alkyl phenols
	Chlorinated polynuclear aromatic hydrocarbons
	2,5-Cyclohexadiene-1,4-dione
	Naphthalene, tetrachloro isomer
	1,8-Naphthalic anhydride
	Phenol, dimethyl isomer
	Polychlorinated polynuclear aromatic hydrocarbons