EG-989 REMEDIAL INVESTIGATION
Mn/DOT Maintenance Facility
Jordan, Minnesota

MINNESOTA DEPARTMENT OF
TRANSPORTATION

October 30, 1990

BRAUN™

6800 South TH-169, P.O. Box 39108
Minneapolis, Minnesota 55439
Phone 612/941-5600 Fax: 612/942-4844

BRAUN ENVIRONMENTAL LABORATORIES

Quality Services Since 1957

December 18, 1990

Mr. Calvin Lucas
Minnesota Department of Transportation
Golden Valley Office
2055 North Lilac Drive
Golden Valley, MN 55422

RE: EG-989 REMEDIAL INVESTIGATION
Mn/DOT Maintenance Facility
Jordan, Minnesota

Dear Mr. Lucas:

In accordance with the Mn/DOT Purchase Order #744533 dated August 3, 1990, we have completed the remedial investigation at the above-referenced site. The purpose of the remedial investigation was to evaluate the extent of soil and groundwater contamination resulting from a petroleum release previously identified at the site. This report describes the methods, results, conclusions and recommendations of this investigation.

If you have any questions concerning this report, please contact us at (612) 683-8700.

Very truly yours,

BRAUN ENVIRONMENTAL LABORATORIES, INC.

Ronald C. Weaver

Ronald C. Weaver
Project Manager/Hydrogeologist

LeeAnn M. Hammerbeck

LeeAnn M. Hammerbeck
Contract Administrator

Mark B. Larson

Mark B. Larson
Supervisor of Hydrogeologic Investigations

RCW\LMH\MBL:lgj9\EG-989.sep

Attachment: Remedial Investigation Report

Table of Contents

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December 18, 1990

EG-989 REMEDIAL INVESTIGATION
Mn/DOT Maintenance Facility
Jordan, Minnesota

1.0 INTRODUCTION

The Minnesota Department of Transportation (Mn/DOT) authorized Braun Environmental Laboratories, Inc. (Braun) on August 3, 1990 (M contract # M-2317), to perform a remedial investigation (RI) at the Mn/DOT maintenance facility located at 705 Syndicate Street in Jordan, Minnesota (see Figure 1 in Appendix A). The RI was conducted in response to a previously identified petroleum release at the site (MPCA Leak#0001388).
1338

The purpose of the RI was to characterize soil and groundwater contamination resulting from a petroleum release previously identified at the site, evaluate subsurface hydrogeologic characteristics that could affect contaminant migration and assess possible receptors in terms of potential impacts from the contamination.

The scope of services provided for the RI consisted of the following:

- Reviewing and summarizing available published and unpublished information regarding site hydrogeologic characteristics;
- Conducting eight soil borings in proximity to the former tank basin on August 15 and 16, 1990;
- Completing three of the eight soil borings as monitoring wells;
- Scanning soil samples retrieved from the soil borings and performing jar headspace analyses, using a photoionization detector (PID);

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- Chemically analyzing five soil samples collected from the soil borings for benzene, ethyl benzene, toluene, and xylene (BETX), methyl tertiary butyl ether (MTBE) and total hydrocarbons as gasoline and fuel oil (THC);

- Collecting water samples from each of the groundwater monitoring wells and a field blank on August 20, 1990 and chemically analyzing them for volatile organic compounds (VOCs), MTBE and THC; and

- Preparing this report detailing methods and findings of the RI.

The report has been organized to be in accordance with the reporting format for Mn/DOT as well as that prescribed by the Minnesota Pollution Control Agency (MPCA). In summary, results of the above-described services indicate that petroleum-contaminated soil is present near the south and west side of the former UST basin. Low levels of dissolved-phase petroleum hydrocarbons were detected in one of the monitoring wells. Groundwater flow is to the northwest, towards Sand Creek and the Minnesota River. A potential receptor located between the site and the creek and river does not utilize the unconsolidated aquifer. Therefore, based on this information, it is our opinion that remedial action is not warranted at this site. However, the monitoring wells should be sampled on a quarterly basis for a one year period.

2.0 BACKGROUND

2.1. Site Location: The site is located in the NW 1/4 of the NW 1/4 of the NE 1/4 of Section 19, T114N, R23W (see Figure 1). The site, located at 705 Syndicate Street in Jordan, Minnesota, lies immediately north of U. S. Highway 169. The site is bordered by residential homes to the north, a mobile home residential area to the east, and a Frontage Road and open fields to the west. The legal description of the 3.2 acre parcel is lot 1 to 10, block 8.

2.2. **Site Operations**: The site formerly contained two USTs which stored gasoline and diesel fuel used in fueling Mn/DOT vehicles (see Figure 2). These tanks were installed in 1956 or 1957. A summary of each tank system is provided in Table 1.

TABLE 1

UST Summary

	Tank ID # 331	Tank ID # 332
Substance stored	Regular/Unleaded Gasoline	Diesel Fuel
Tank Capacity (gal.)	1,200	3,000
Tank Length (ft.)	12	18
Tank Width (ft.)	4	5.3
Tank Shape	Cylindrical	Cylindrical
Tank Material	Steel	Steel
Piping Material	Steel	Steel
Pump Type	Suction	Suction
Backfill	Coarse sand and gravel	Coarse sand and gravel

A petroleum release was first reported to the MPCA on July 19, 1989 (MPCA Leak#0001388). The quantity released, the time the release began and the method of release (leak, spill, overfill) are unknown. Tank integrity tests, a permanent leak detection system nor product recovery operations have been implemented at this site.

Tank removal activities were conducted on October 20, 1989 by Mn/DOT personnel and supervised by Nova Environmental Services Inc. Summarizing, the Nova Tank Excavation Report indicated that the tanks were in relatively good condition with only slight oxidation and pitting. Visual observations and PID readings indicated the presence of petroleum contamination. Approximately 160 yards of petroleum-contaminated soil were removed from the tank basin and

stockpiled on site. Subsequent chemical analysis of free product collected from the base of the tank basin at the water table indicated the soils were contaminated with #2 fuel oil. The maximum concentration of total hydrocarbons (THC) as fuel oil was 1,600 parts per million (ppm). The MPCA worksheet "Excavation Report for Petroleum Release Sites" is provided in Appendix B. The worksheet was prepared based on the Nova report. Based on these data an RI was recommended.

One tank is currently present on site. The tank, an above-grade 240 gallon steel tank used to store waste oil, has been filed with the MPCA. The date the tank was installed is unknown.

3.0 RESULTS

3.1. Literature Review

3.1.1 Topography: The site is situated in the Minnesota River Valley approximately 2/5 mile west of a northeast/southwest trending ridge. The top of the ridge is at an elevation of 900 feet or more above National Geodetic Vertical Datum (NGVD). The site elevation is approximately 750 feet. Topography gently slopes from the site west towards Sand Creek and the Minnesota River. A terrace deposit rising to an elevation of about 820 feet and situated between Sand Creek and the Minnesota River interrupts this gently sloping topography. The Minnesota River forms the regional topographic low in the area.

3.1.2. Quaternary Geology: The principal unconsolidated sediments which lie east of the site and form the ridges consist of a mixture of Des Moines lobe and Superior lobe till deposits. The Des Moines lobe deposits consist primarily of gray, calcareous, shale-rich, clayey till, while the Superior lobe sediments consist of reddish-brown, sandy and gravely till. Significant deposits of outwash, ice-contact stratified drift and valley-fill sediments are also present. The total thickness of unconsolidated deposits east of the site is 200 feet or more (Balaban and McSwiggen, 1982).

Surficial sediments underlying the site consist of flood plain alluvial deposits. Three to more than ten feet thick, these deposits consist of gray to brown clay and silt interbedded with sand and gravel. These sediments are of variable texture, sorting and bedding. Small areas of lake, marsh and stream deposits are also found interspersed with the alluvium. A mixture of Des Moines lobe and Superior lobe tills generally underlie the alluvial deposits. These deposits were previously described. Layers of peat, and sand and gravel may also be found in the area. The thickness of unconsolidated sediments in the vicinity of the site is approximately 50 feet (Balaban and McSwiggen, 1982).

The unconsolidated sediments west of the site consist primarily of sand and gravel, and a mixture of Des Moines lobe and Superior lobe sediments. The thickness of unconsolidated deposits gradually diminishes west of the site to ten feet or less (Balaban and McSwiggen).

The soil borings conducted during this investigation indicate that site soils consist primarily of swamp deposits of lean clay (CL) and organic silt (OL) to a depth of 7 to 10 feet below grade. The swamp deposits are underlain by coarse alluvium consisting of poorly graded sand (SP) to poorly graded sand with silt (SP/SM). The coarse alluvium is typically yellow-brown to dark gray, medium-to coarse-grained sand, with some gravel layers. Geologic cross-sections through the site are provided as Figures 3, 4 and 5.

3.1.3 Bedrock Geology: The bedrock elevation at the site is estimated at 700 feet NGVD. The bedrock topography slopes from south to north ranging from about 750 feet NGVD to less than 650 feet NGVD. A localized bedrock depression lies immediately east of the site. An east-west trending bedrock valley with basal elevations of about 450 feet NGVD lies approximately 1 mile north of the site (Balaban and McSwiggen, 1982).

The uppermost bedrock units in the region are the St. Lawrence and Franconia Formations of Upper Cambrian Age. The younger St. Lawrence Formation consists of silty dolomite interbedded with siltstone, soft shale, and very fine-grained quartzose sandstone. Immediately north and east

of the site uppermost bedrock consists of the Franconia Formation consisting primarily of very fine-grained, glauconitic, quartzose sandstone and shale. The younger St. Lawrence Formation has been eroded away in these areas. Where uneroded the St. Lawrence and Franconia Formations are typically 45 to 60 and 130 to 150 feet thick, respectively (Balaban and McSwiggen, 1982).

3.1.4. Hydrogeology: The water table was encountered at about 8 feet below ground surface. The water table is present in the swamp deposits in the area north of the former tank basin and in the coarse alluvium in the area south of the former tank basin. Based on water levels measured in the monitoring wells, shallow groundwater flow is to the northwest, towards Sand Creek and the Minnesota River. Sand Creek is situated approximately 750 feet west of the site. The Minnesota River lies approximately 3 miles west of the site. There are no on-site surface water expressions (ponds, ditches) which may be potential groundwater discharge areas. The MPCA worksheet "Hydrogeologic Setting and Ground Water Contamination Characterization Petroleum Release Sites" is provided in Appendix C.

The uppermost bedrock aquifer beneath the site is the Franconia Formation. Regional groundwater flow in the Franconia Formation in the vicinity of the site is anticipated to be to the north, with the potentiometric surface at approximately 730 feet (Balaban and McSwiggen, 1982).

3.1.5 Groundwater Receptor Survey: Water well records available at the Minnesota Geological Survey (MGS) for wells located within two miles of the site are provided in Appendix D. The data from the MGS records are summarized in a table also provided in Appendix D. No potential receptors which utilize the unconsolidated aquifer were identified downgradient between the site and the likely discharge points (Sand Creek, Minnesota River). One well installed in the Franconia Formation is situated about 4,000 feet downgradient from the site.

City of Jordan personnel identified 30 wells in the city which are private use wells. None of these wells are situated directly downgradient of the site. Two wells, one approximately 1,000 feet to

the west and one about 500 feet to the northwest, are situated in a radially downgradient direction (see Appendix D). Local ordinances require that residents hook-up to city water within one year of availability. At that time, private use wells may only be used for outdoor activities such as watering lawns and washing cars.

Four local well drilling companies were contacted to determine whether there may be unregistered wells located within a one mile radius of the site. Two well drilling companies (J-K Well Drilling and Pump Repair; Kaderlik Well Drilling) had no knowledge of unregistered wells in the city. One well drilling company (Geib Well Company) did not respond to our request for information. The fourth well drilling company (Hartmann Well Company) estimated that there were 50 to 100 unregistered wells in the city. All homes constructed prior to 1975, the year in which city residents were placed on a municipal water supply system, have wells. Most of these wells are likely no longer in use and it is unlikely that these wells were properly abandoned. The majority of these wells are believed to be finished in unconsolidated materials. The well driller was unable to supply additional information such as specific well locations and well logs. For additional information, please refer to Appendix D.

3.1.6 **Petroleum Vapor Risk Assessment and Survey**: There are several utilities (sewer, water, gas, telephone) which traverse the site in proximity to the former UST basin. There are no on-site buildings with sumps or basements. Organic Vapor Field Data Sheets are provided in Appendix E. Given the low concentrations of soil contamination encountered, combined with the presence of fine-grained soils, it does not appear that a significant risk from vapor migration is present.

3.2 Field Investigation Results

3.2.1. **Monitoring Well Installation**: Three groundwater monitoring wells were installed at the site on August 15 and 16, 1990. The wells were installed to determine groundwater quality and groundwater flow direction at the site. Details of the procedures used to conduct the soil borings

and well installations, as well as other field procedures are contained in Appendix F. The boring logs, well construction diagrams, well permits and Minnesota Department of Health Water Well Records are provided in Appendix G.

3.2.2. **Groundwater Flow Conditions**: Water level measurements were collected from the monitoring wells on August 20, 1990. A summary of this data is provided in Table 2. A groundwater flow direction map based on these levels is provided as Figure 6. A hydraulic gradient of 0.003 to the northwest was calculated from this data.

TABLE 2

Groundwater Elevation Data (ft)
8-20-90

Well	Top of Casing Elevation	Depth to Water	Groundwater Elevation
MW-1	757.78	10.56	747.22
MW-2	757.08	10.04	747.04
MW-3	757.25	10.14	747.11

The hydraulic conductivity (K) of site soils at MW-1, MW-2 and MW-3, as determined from falling-head and rising-head slug test data, ranges from 2×10^{-4} cm/sec to 1×10^{-2} cm/sec (4×10^{-4} ft/min to 3×10^{-2} ft/min). Please refer to Appendix H for slug test data and calculations.

The linear groundwater flow velocity (V) for this site can be estimated as follows:

$$V = (ki)/n$$

Where K = Hydraulic conductivity (2×10^{-4} cm/sec to 1×10^{-2} cm/sec)
i = Hydraulic gradient (0.003); and,
n = Porosity (0.3, assumed).

Thus, the groundwater flow velocity range is 2×10^{-3} m/day to 1×10^{-1} m/day. This velocity is indicative of the rate at which non-attenuated contaminants can be expected to migrate once they enter the water table.

3.2.3. **Soil Analyses**: On August 15 and 16, 1990, five soil samples were collected, one each from soil borings ST-1 through ST-5, and analyzed for MTBE, BETX and THC. These are the Minnesota Pollution Control Agency (MPCA) required analyses for soil samples collected in response to petroleum releases from unleaded gasoline and fuel oil tanks.

The soil sample at ST-1 and ST-4 did not contain MTBE, BETX and THC levels above method detection limits. Xylene and THC were present in concentrations above method detection limits at ST-2, ST-3 and ST-5. Maximum xylene and THC concentrations, 5.5 mg/kg and 1600 mg/kg, respectively, were detected at ST-5. Ethyl benzene was also detected at ST-3 at 0.5 mg/kg. A summary of the soil analytical data is provided in Table 3. A copy of the laboratory report and Chain-of-Custody are provided in Appendix I.

TABLE 3

Soil Chemical Analysis Summary

Parameters	Units	ST-1 (10')	ST-2 (7.5')	ST-3 (10')	ST-4 (7.5')	ST-5 (10')
Benzene	mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3
Ethyl Benzene	mg/kg	<0.3	<0.3	0.5	<0.3	<0.3
Toluene	mg/kg	<0.3	<0.3	<0.3	<0.3	<0.3
Xylenes, Total	mg/kg	<0.3	0.5	0.6	<0.3	5.5
Methyl Tertiary Butyl Ether	mg/kg	<1.0	<1.0	<1.0	<1.0	<1.0
THC as Gasoline	mg/kg	<1.0	a	a	<1.0	a
THC as Fuel Oil	mg/kg	<1.0	490	630	<1.0	1600

a = Total hydrocarbons calculated as fuel oil.

Based on the soil analytical data, the extent of soil contamination appears to be limited to within 10 to 15 feet of the former UST basin. A volume calculation of contaminated soil in the unsaturated zone, based on PID readings greater than 1 ppm, is about 200 yards. The PID readings were obtained from the soil borings/monitoring wells conducted during this investigation. A map depicting the estimated extent of soil contamination is provided as Figure 7.

3.2.4. Groundwater Quality Analyses: Monitoring wells MW-1, MW-2 and MW-3 were sampled on August 20, 1990, and subsequently analyzed for VOCs, MTBE and THC. These are the MPCA required analyses for groundwater samples collected in response to petroleum releases from unleaded gasoline and fuel oil tanks. Water sampling/well development data sheets are provided in Appendix J.

Monitoring wells MW-1 and MW-3 did not contain VOCs, MTBE or THC above method detection limits. Low levels of BETX were detected at MW-2. All BETX concentrations were below Minnesota Department of Health (MDH) Recommended Allowable Limits (RALs). THC was also detected at 1600 micrograms per liter (ug/L) at MW-2. MTBE was not found in MW-2. A groundwater quality summary is provided in Table 4. The laboratory analytical report is provided in Appendix K.

TABLE 4

Groundwater Quality Summary

Parameter	Units	RAL	MW-1	MW-2	MW-3
Benzene	ug/L	7	<1.0	2.5	<1.0
Ethyl Benzene	ug/L	680	<1.0	2.2	<1.0
Toluene	ug/L	2420	<1.0	1.8	<1.0
Xylenes, Total	ug/L	680	<1.0	1.9	<1.0
THC as Fuel Oil	ug/L	--[1]	<500	1600[2]	<500

1 - No RAL or other water quality standard exists for this parameter.
2 - The chromatography of the sample is somewhat atypical of the fuel oil standard. Minor amounts of weathered gasoline may also be present.

None of the above-mentioned parameters were present in concentrations above method detection limits in the field blank.

4.0 DISCUSSION AND CONCLUSIONS

4.1 Discussion: Results of the RI and previous investigations indicate that low level petroleum contamination is present near the south and west side of the former UST basin. Analytical results of the water sample/free product sample taken at the water table during tank excavation activities indicated the presence of #2 fuel oil. Analytical results of groundwater collected from MW-2 during the RI indicate that minor amounts of weathered gasoline may also be present. However, while the actual quantity of gasoline and/or fuel oil released, the time the release began and the method of release are unknown, RI results suggest the release was relatively minor. Visual observations of the tanks during excavation activities indicated they were in relatively good condition with only slight oxidation and pitting.

Site soils consist primarily of swamp deposits of lean clay (CL) and organic silt (OL) to a depth of 7 to 10 feet below grade. These deposits are underlain by coarse alluvium of poorly graded sand (SP) to poorly graded sand with silt (SP-SM) to a depth of at least 15 feet. The water table is at approximately 7 to 8 feet below ground surface. Petroleum constituents from the release(s) have migrated into the surrounding soil as well as into the groundwater. Soil sample analyses suggest that soil contamination is present at relatively low levels in the area near the tank basin and therefore can be expected to be limited in extent.

Petroleum constituents were only detected in one well, and that was at levels below Recommended Allowable Limits as set by the Minnesota Department of Health (MDH). Given the low concentrations that were detected in the unconsolidated deposits, it does not appear

likely that significant concentrations of petroleum-related contaminants would have migrated downward to the bedrock units (expected to be 50 feet deep at the site). Furthermore, the low soil and water contaminant concentrations indicate the horizontal extent of contamination is limited as well.

4.2 **Conclusions**: The following conclusions are made with respect to the release at the Mn/DOT Jordan, Minnesota maintenance facility:

- The product released was #2 fuel oil and possibly minor amounts of gasoline.
- The quantity of product released, the time the release began, and the method of release are unknown, although RI results suggest it was a minor amount.
- Residual soil contamination is concentrated near the south and west side of the former UST basin.
- No free product was detected on the water table in the monitoring wells. Free product was present on the water table in the tank basin during tank excavation activities. The product thickness was not recorded and is unknown.
- Dissolved-phase hydrocarbons were detected in monitoring well MW-2. All petroleum compound concentrations were below RAL's.
- There are no potential groundwater receptors which utilize the unconsolidated aquifer and are situated directly downgradient between the site, and the likely surface water discharge points.
- No significant risk of vapor impacts has been identified, nor does it appear likely they are present.

- Based on the low concentrations of soil and groundwater contaminants, the extent of contamination appears to be quite limited.

5.0 RECOMMENDATIONS

It does not appear that the petroleum release will impact drinking water sources of potential groundwater receptors, as no users of the unconsolidated aquifer were identified directly downgradient of the site. Also, since concentrations of petroleum compounds in the groundwater at the downgradient site boundary do not exceed RAL's, the release will not likely pose a threat to Sand Creek and the Minnesota River. Based on these findings, and the low levels of residual petroleum hydrocarbons in the soil, it is our opinion that corrective action is not warranted at this site. We do recommend that quarterly monitoring of the monitoring wells be conducted for a 1 year period.

6.0 REFERENCES

Anderson, H. W., Farrell, D. F., and Broussard, W. L., Water Resources of the Lower Minnesota River Watershed, South-Central Minnesota, U.S. Geological Survey, 1974.

Balaban, N. H. and McSwiggen, P. L., Geologic Atlas, Scott County, Minnesota, Minnesota Geological Survey, 1982.

7.0 GENERAL

Services performed for this project have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is made.

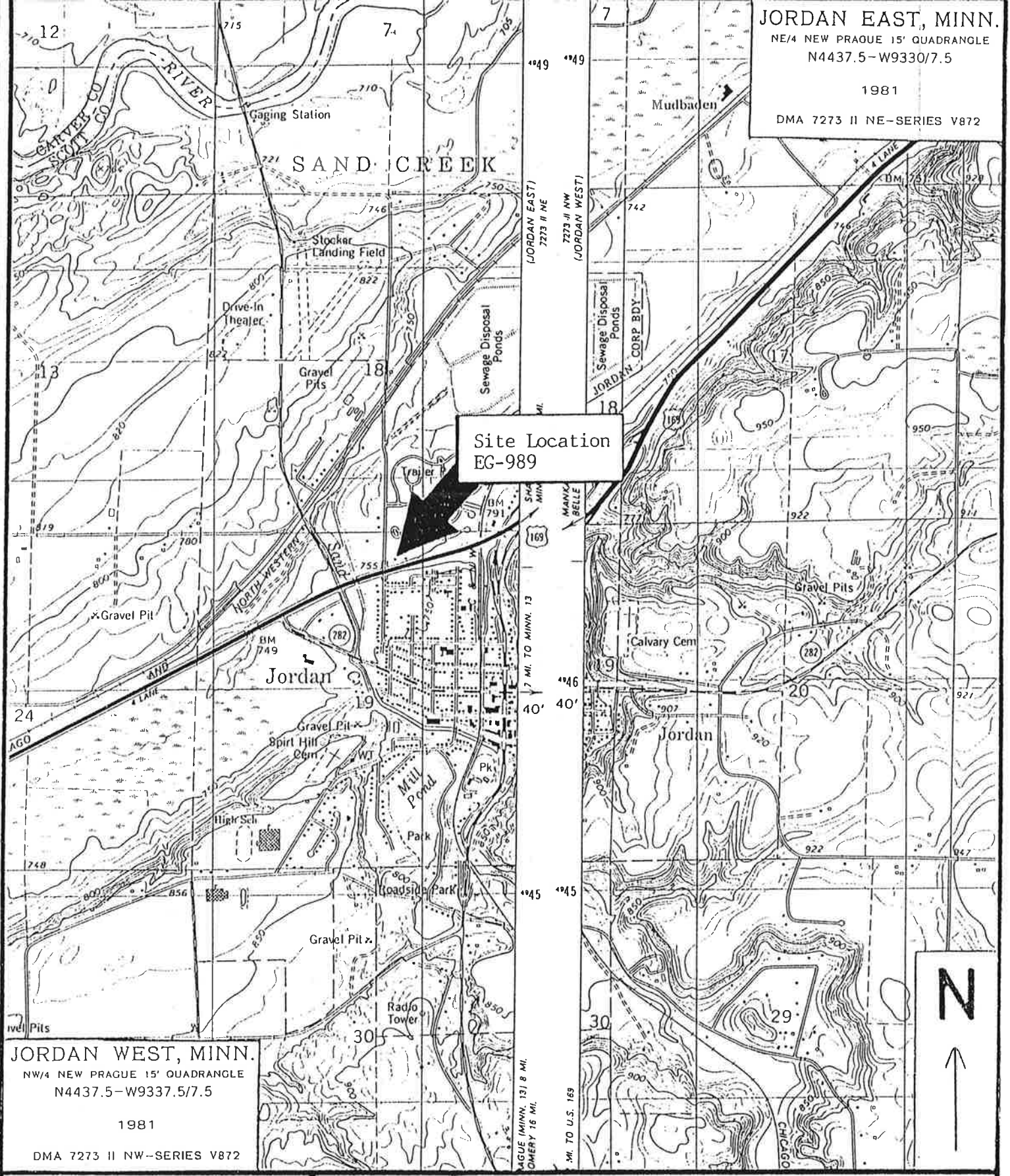

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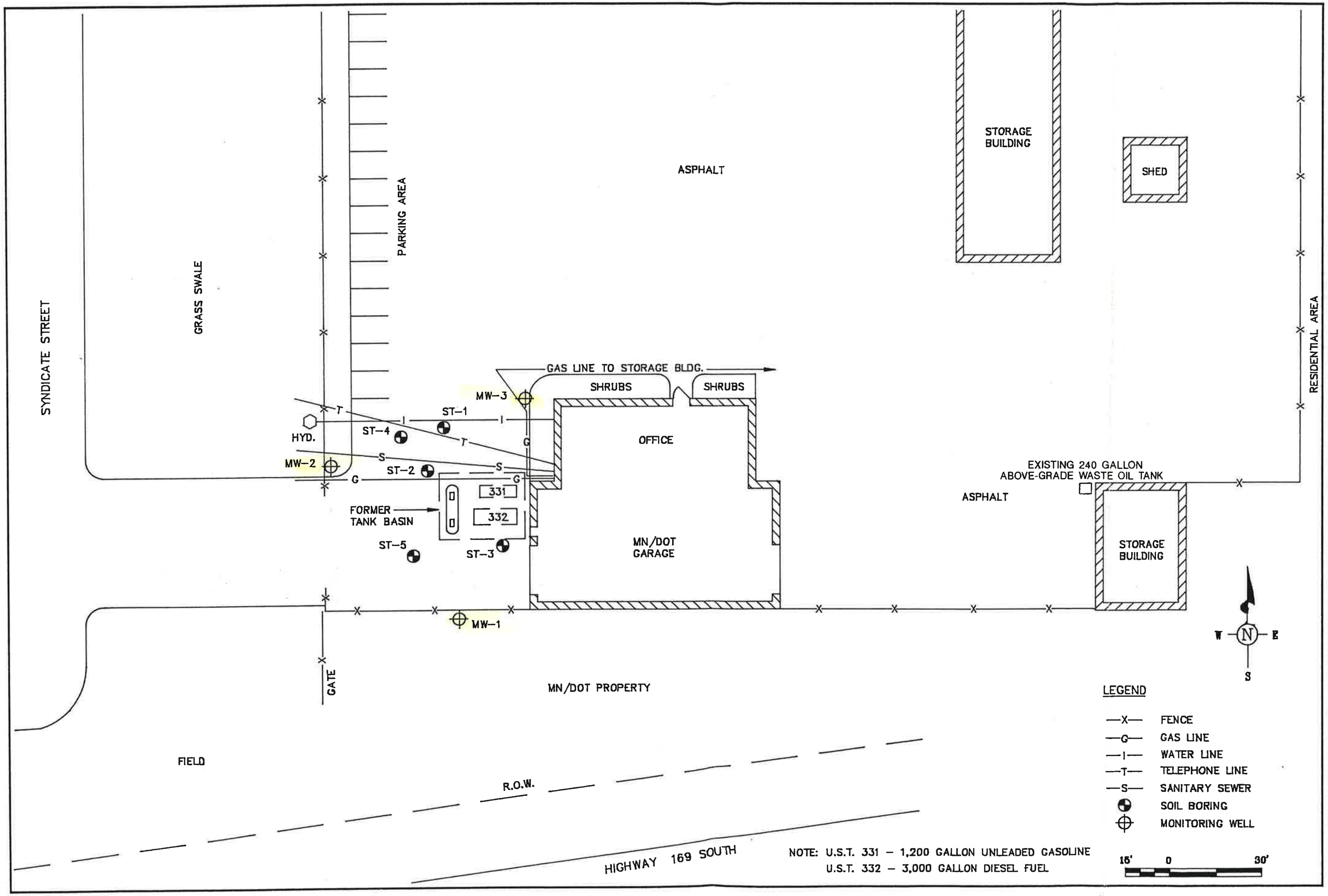
Figure 1
SITE Location Map
UST Remedial Investigation
EG-989

MN Dept. of Transportation
Jordan, MN

Date: 9-11-90	Revised:	Drawn: RCW	Scale: 1"=2000'



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SITE MAP
U.S.T. Remedial Investigation
MN/DOT Jordan Truck Station
Jordan, Minnesota

DRAWN BY: KMR	DWG.No. EG-989
PLOT TIME:	JOB I.D.# EG-989
APP'D BY: TCS	
PLOT SCALE 1:30	

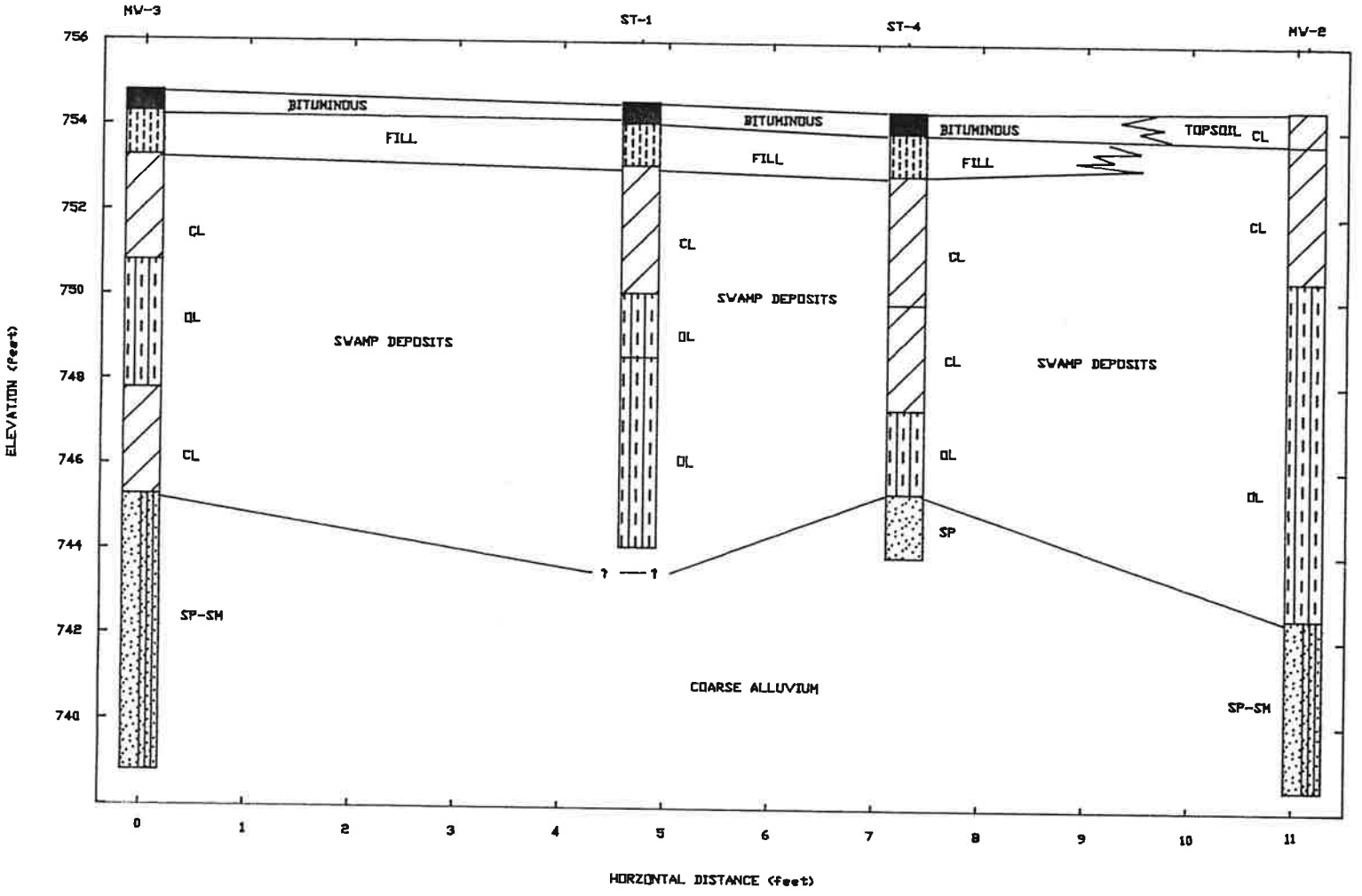
REVISED	
DATE	INT
10-4-90	KMR

SHEET	OF
1	1

SCALE 1"=30'

FIGURE# 2

GEOLOGIC CROSS-SECTION



1' 0 2'

HORIZONTAL SCALE 1"=2'

2' 0 4'

VERTICAL SCALE 1"=4'

REVISED	SHEET
DATE	OF
INT	
SCALE	FIGURE# 3

GEOLOGIC CROSS-SECTION
Remedial Investigation
MN/DOT Maintenance Facility
Jordan, Minnesota

DRAWN BY: MAB	DWG.No. EG-989XS	APP'D BY: RV
	JOB I.D.# EG-989	PLOT SCALE 1=4

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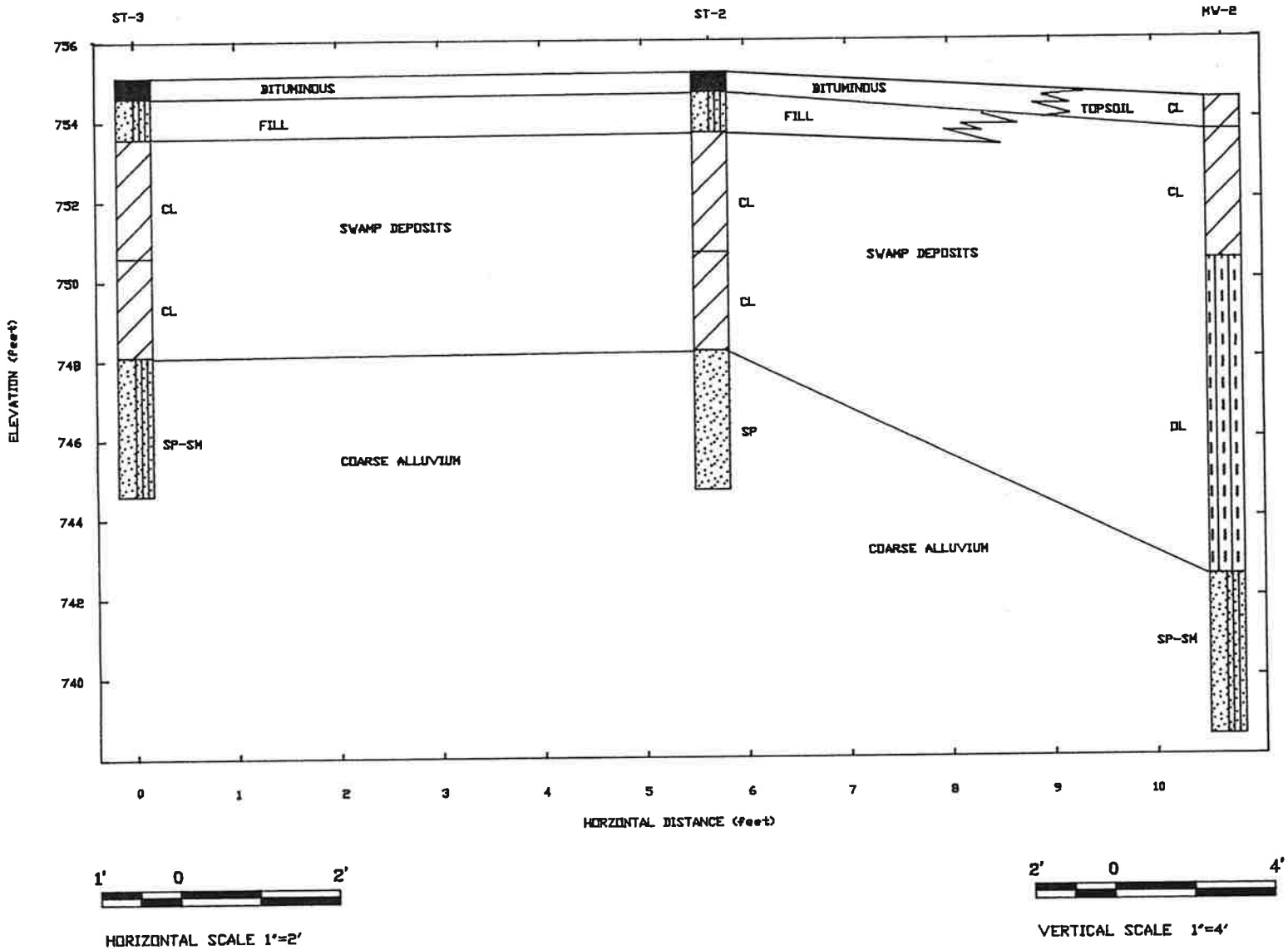
GEOLOGIC CROSS-SECTION



REVISED	SHEET
DATE / INT	OF
SCALE	FIGURE# 4

GEOLOGIC CROSS-SECTION
Remedial Investigation
MN/DOT Maintenance Facility
Jordan, Minnesota

DRAWN BY: MAB	DWG.No. EG-989XS	APP'D BY: RV
	JOB I.D.# EG-989	PLOT SCALE 1:4

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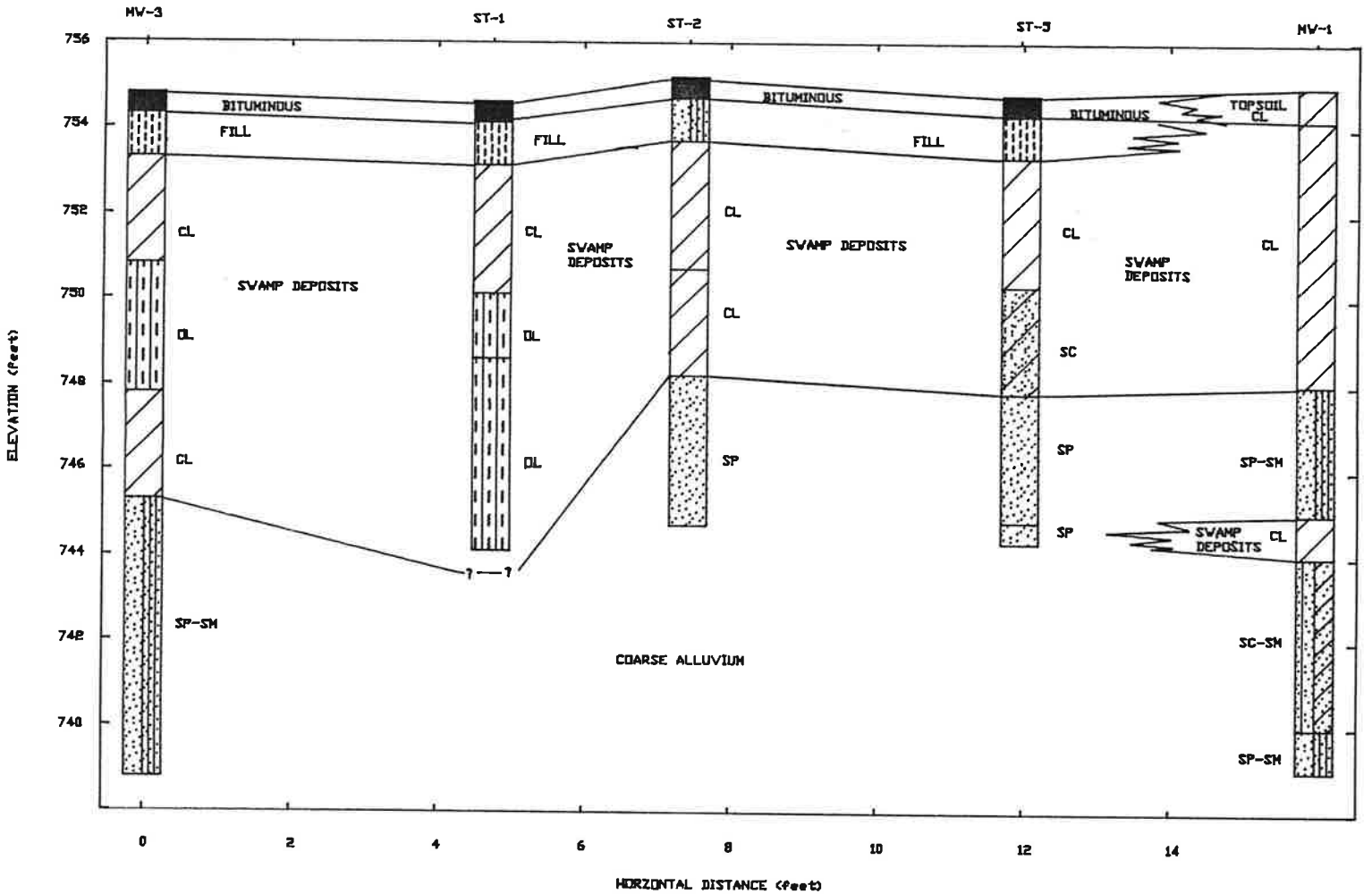
GEOLOGIC CROSS-SECTION



1' 0 2'

HORIZONTAL SCALE 1"=2'

2' 0 4'

VERTICAL SCALE 1"=4'

REVISED	SHEET
DATE / INT	OF
SCALE	FIGURE# 5

GEOLOGIC CROSS-SECTION
Remedial Investigation
MN/DOT Maintenance Facility
Jordan, Minnesota

DRAWN BY: MAB	DWG.No. EG-989XS	APP'D BY: RV
	JOB I.D.# EG-989	PLOT SCALE 1:4

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GROUNDWATER CONTOUR MAP
U.S.T. Remedial Investigation
MN/DOT Jordan Truck Station
Jordan, Minnesota

DRAWN BY: KMR	DWG.No. EG-989
PLOT TIME:	JOB I.D.# EG-989
PLOT SCALE 1:30	APP'D BY: TCS

REVISED	INT
DATE	KMR
10-4-00	

SHEET 1 OF 1
SCALE 1"=30'
FIGURE# 6

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SYNDICATE STREET

GRASS SWALE

PARKING AREA

ASPHALT

STORAGE BUILDING

SHED

RESIDENTIAL AREA

HYD.

MW-2

ST-4

MW-3

ST-1

SHRUBS

SHRUBS

OFFICE

ST-2

331

332

FORMER TANK BASIN

ST-5

ST-3

APPROXIMATE LATERAL EXTENT OF SOIL CONTAMINATION

MN/DOT GARAGE

EXISTING 240 GALLON ABOVE-GRADE WASTE OIL TANK

ASPHALT

STORAGE BUILDING

MW-1

GATE

MN/DOT PROPERTY

FIELD

R.O.W.

HIGHWAY 169 SOUTH

W N E S

LEGEND

—X— FENCE
—G— GAS LINE
—I— WATER LINE
—T— TELEPHONE LINE
—S— SANITARY SEWER
SOIL BORING
MONITORING WELL

NOTE: U.S.T. 331 – 1,200 GALLON UNLEADED GASOLINE
U.S.T. 332 – 3,000 GALLON DIESEL FUEL

15' 0 30'

BRAUN ENVIRONMENTAL LABORATORIES INCORPORATED

SOIL CONTAMINATION MAP
U.S.T. Remedial Investigation
MN/DOT Jordan Truck Station
Jordan, Minnesota

DRAWN BY: KMR
PLOT TIME:
DWG.No. EG-989
JOB I.D.# EG-989
APP'D BY: TCS
PLOT SCALE 1:30

REVISED	
DATE	INT
10-1-90	KMR

SHEET 1 OF 1

SCALE 1"=30'

FIGURE # 7

113115
118567

EXCAVATION REPORT FOR PETROLEUM RELEASE SITES

Minnesota Pollution Control Agency
Tanks and Spills Section
April 25, 1990

The information below should be completed and submitted to the Minnesota Pollution Control Agency (MPCA) Tanks and Spills Section to document excavation of petroleum contaminated soil. Excavations must be done in accordance with the MPCA document "Excavation of Petroleum Contaminated Soil". Preliminary site investigation reports (if conducted) should be included with this report.

Additional pages may be attached. Please type or print clearly.

I. BACKGROUND

A. Site: MN/DOT Maintenance Facility

Street: 705 Syndicate
City, Zip: Jordan, 55352
County: Scott

MPCA Site ID#: LEAK0000 1388

B: Tank Owner/Operator: MN/DOT

Mailing Address:
Golden Valley Office
Street/Box: 2055 North Lilac Drive
City, Zip: Golden Valley, 55422
Telephone: (612) 593-8515

C. Excavating Contractor: MN/DOT

Contact: Calvin Lucas
Telephone: (612) 593-8515
Tank Contractor Certification Number: Tanks removed prior to certification requirement.

D: Consultant: Nova

Contact: Edward A. Radecki
Street/Box: Hazeltine Gates, Suite 420
City, Zip: 1107 Hazeltine Blvd.
Telephone: Chaska, 55318
(612) 448-9393

E. Others on-site during site work (e.g., fire marshal, local officials, MPCA staff, etc.):

Note: If person other than tank owner and/or operator is conducting the cleanup, provide name, address, and relationship to site on a separate attached sheet.

II. DATES

A. Date release reported to MPCA: July 19, 1989

B. Dates site work performed:

Work Performed	Date
Excavation of USTs and contaminated soil	Oct. 20, 1989

III. RELEASE INFORMATION

A. Provide the following information for all tanks which have been removed.

Tank 1: Capacity 1200 gal Type Steel Age 33 years

Condition: Good, Slight oxidation

Product history: Unleaded and regular gasoline.

Approximate quantity of petroleum released, if known:

Unknown

Cause of release:

Unknown

Tank 2: Capacity 3000 gal Type Steel Age 33 years

Condition: Good, Slight oxidation and pitting

Product history:

Diesel fuel throughout history.

Approximate quantity of petroleum released, if known:

Unknown

Cause of release:

Unknown

Tank 3: Capacity _____ Type _____ Age _____

Condition: _____

Product history:

Approximate quantity of petroleum released, if known:

Cause of release:

B. Provide the following information for all existing tanks.

Tank No.	Capacity	Contents	Type	Age

C. If the release was associated with the lines or dispensers, briefly describe the problem:

Unknown

D. If the release was a surface spill, briefly describe the problem:

Unknown

IV. EXCAVATION

A. Dimensions of excavation: 28' x 31'

B. Original tank backfill material (sand, gravel, etc.): Coarse sand and gravel.

C. Native soil type (clay, sand, etc.): 7 feet of silty clay with sand underlain by coarse sand and gravel.

D. Quantity of contaminated soil removed (cubic yards): 160

E. Was ground water encountered or was there evidence of a seasonally high ground water table? At what depth?

10 feet

F. If a soil boring was necessary (as indicated in part VI of "Excavation of Petroleum Contaminated Soil" for sand and silty sand native soils) describe the soil analytical and soil vapor headspace results. Attach the boring logs and laboratory results to this report.

G. If ground water was encountered or if a soil boring was conducted, was there evidence of ground water contamination? Specify, e.g., free product (specify thickness), product sheen, ground water in contact with petroleum contaminated soil, water analytical results, etc.

Free product (thickness unknown) on water table. Contaminated soil is in contact with groundwater.

H. Was bedrock encountered in the excavation? At what depth?

No

I. Were there other unique conditions associated with this site? If so, explain.

No

V. SAMPLING

A. Briefly describe the field methods (including use of a photoionization detector) used to distinguish contaminated from uncontaminated soil:

Visual examination for discoloration; fresh soil surface and jar headspace soil vapor monitoring using PID. Vapor concentrations above background were considered contaminated.

B. List soil vapor headspace analysis results. Indicate sampling locations using sample codes (with sampling depths in parentheses), e.g. SV-1 (2'), SV-2 (10'), etc. Samples that were taken at different depths at the same location should be labeled SV-1A (2'), SV-1B (4'), SV-1C (6'), etc. These should correspond with the codes on the site map in part VI.

Sample Code	Soil Type	Reading, ppm	Sample Code	Soil Type	Reading, ppm
Basin Bottom Tank 331	Coarse sand & gravel	70	Soil Stockpile East Side	Coarse sand & gravel	60
Basin Bottom Tank 332		50	Soil Stockpile West Side		40
East Wall Tank 331		1			
East Wall Tank 332		15			
East Wall Excavation Center		4			
Basin Bottom Between Tanks		150			
Soil Stockpile North Side		60			
Soil Stockpile South Side		50			

C. Briefly describe the soil sampling and handling procedures used:

Soil placed in sterile 40 ml, VOA glass vials. Three samples collected at each sampling point. Samples collected by inserting vials directly into soil. Vials immediately capped and placed on ice.

D. List the appropriate soil sample analytical results below (refer to the MPCA document "Soil and Ground Water Analysis at Petroleum Release Sites"). If the petroleum was not gasoline or fuel oil attach a separate table. Code the samples (with sampling depths in parentheses) SS-1 (8'), SS-2 (4'), etc. These should correspond with the codes on the site map in part VI.

Sample Code	THC as gas or FO ppm	Benzene ppm	Ethyl-benzene ppm	Toluene ppm	Xylene ppm	MTBE ppm	Lead ppm
Basin Bottom Tank 331	1600	<0.020	2.3	<0.020	2.0	<0.040	
Basin Bottom Tank 332	21	<0.005	0.022	<0.005	0.055	<0.010	
Stockpile	130	0.028	0.072	0.23	0.82	<0.020	

NOTE: ATTACH COPIES OF LABORATORY REPORTS AND CHAIN OF CUSTODY FORMS.

VI. FIGURES

Attach the following figures to this report:

1. Site location map
2. Site map(s) drawn to scale illustrating the following:
   a. location (or former location) of all present and former tanks, lines, and dispensers
   b. location of other structures (buildings, canopies, etc.)
   c. adjacent city, township, or county roadways
   d. final extent of excavation
   e. location of soil vapor analyses (e.g. SV-1), soil samples (e.g. SS-1), and soil borings (e.g. SB-1). Also, attach all boring logs.
   f. north arrow and map legend

VII. SUMMARY

Briefly summarize evidence indicating whether or not additional investigation is necessary at the site, as discussed in part VI of the MPCA document "Excavation of Petroleum Contaminated Soil".

RI has been performed on site.

Information obtained from Tank Excavation Report prepared by Nova Environmental Services, Inc.

VIII. CONSULTANT (OR OTHER) PREPARING THIS REPORT

Company Name: Braun Environmental Laboratories, Inc.
Street/Box: 6800 South TH-169, P.O. Box 39108
City, Zip: Minneapolis, 55439
Telephone: (612) 941-5600
Contact: Ron Weaver

Signature: Ronald C. Weaver Date: 10-12-90

If additional investigation is not required at the site, please mail this form and all necessary attachments to:

Minnesota Pollution Control Agency
Attention: (Project Manager)
Hazardous Waste Division
Tanks and Spills Section
520 Lafayette Road
St. Paul, Minnesota 55155

If additional investigation is required at the site, this form should be included as a section in the Remedial Investigation/Corrective Action Design report. Excavation reports which indicate that a remedial investigation (RI) is necessary will not be reviewed by MPCA staff until the RI has been completed.

HYDROGEOLOGIC SETTING AND GROUND WATER CONTAMINATION CHARACTERIZATION
PETROLEUM RELEASE SITES

Minnesota Pollution Control Agency
Tanks and Spills Section
May 21, 1990

This worksheet should be completed for all sites which have ground water contamination. It has several purposes. It summarizes remedial investigation (RI) results and conclusions for use by Minnesota Pollution Control Agency (MPCA) staff when reviewing the site to determine whether corrective action will be required to remediate ground water contamination. It also provides supplementary information on investigation, design and reporting requirements (presented in bold type) for sites which have ground water contamination. This worksheet and all other relevant MPCA documents should be reviewed when developing RI work plans to ensure that all RI requirements and objectives will be met during the investigation.

Answers to the following questions should be based on the results of the ground water receptor survey, RI activities, and published geologic literature. The questions should be answered in the space provided. Attach additional sheets if necessary.

1. Identify and describe the geologic units in which ground water has been impacted by the petroleum release. What is the thickness (or estimated thickness) and estimated lateral extent of the impacted unit?

   The impacted unit at the MN/DOT Jordan, MN facility is the surficial unconsolidated aquifer consisting of clay & silt w/sand & gravel underlain by till & peat. The thickness of the unit is estimated at 50 feet. The extent of the unit is defined to the east & south by the valley walls, about 2/5 and 4/5 mile away, respectively. The northern and western extent is defined by terrace deposits located about 4/5 and 3/10 mile away, respectively.

At all sites with ground water monitoring wells, the RI must include in-situ hydraulic conductivity testing (slug tests are usually adequate), and provide estimates of the ground water velocity in the impacted unit.

2. What is the hydraulic conductivity and estimated ground water velocity in the impacted unit?

   The estimated hydraulic conductivity of the impacted unit ranges from 2.25×10^{-4} cm/sec to 1.4×10^{-2} cm/sec. The groundwater velocity ranges from 2.25×10^{-6} cm/sec to 1.4×10^{-4} cm/sec.

3. What is the maximum concentration of benzene and total hydrocarbons detected on the site? (parts per billion [ppb] units)

   Benzene 2.5 (Well No. MW-2, Date 8-20-90)
   Total Hydrocarbons 1600 (Well No. MW-2, Date 8-20-90)

4. What is the maximum concentration of benzene and total hydrocarbons detected at or beyond the property boundary? (ppb units)

   Benzene 2.5 (Well No. MW-2, Date 8-20-90)
   Total Hydrocarbons 1600 (Well No. MW-2, Date 8-20-90)

5. What is the maximum additive recommended allowable limit (RAL) for volatile hydrocarbons (VOCs) detected at or beyond the site boundaries? (ratio) 0.366.

The additive RAL for VOCs is calculated as follows:

$$\frac{\text{Concentration A}}{\text{RAL for A}} + \frac{\text{Concentration of B}}{\text{RAL for B}} + \text{the appropriate ratio for each VOC which was detected} = \text{Additive RAL}$$

6. Do sources of contamination (including contaminated soil) remain at the site? (Yes/No).....| YES |
If Yes, briefly describe.
Low level contamination detected in several borings located near former tank basin. Maximum xylene and THC concentrations in soil were 5.5 and 1600 mg/kg, respectively.

7. Is municipal water supply available at the site and within one mile downgradient of the site? (Yes/No).....| NO |
(See attached page)

8. Are there presently any water wells which use the impacted aquifer located within one half mile downgradient of the site, or one mile downgradient of the site if the aquifer material is fractured? (Yes/No).....| NO |

9. Are there any plans for ground water development in the impacted aquifer within one half mile downgradient of the site, or one mile downgradient of the site if the aquifer material is fractured? (Yes/No).....| NO |
(See attached page)

If you answered No to questions 8 and 9, please skip to question 10 and continue.

If you answered yes to question 8 or 9, and the additive RAL for VOCs is greater than one at or beyond the site boundary, corrective action will likely be required to remediate ground water contamination at the site. The RI report should include a proposed Corrective Action Design to meet the folloving cleanup goal and compliance. point.

Cleanup goal: Additive RAL for VOCs of less than one and 1 part per million total hydrocarbons.

Compliance point: At and beyond the site boundaries.

At some LUST sites corrective actions may not be technically capable of achieving remediation to RALs. For a discussion of the options which should be considered when designing corrective actions for sites of this type please see the attached MPCA "Corrective Action Design for Ground Water Remediation to RALs" document.

Stop here if you answered Yes to question 8 or 9.

10. Are there nonpotable water supply wells which use the impacted unit downgradient of the site? (Yes/No).....| NO |

11. Does the plume currently discharge to surface water? If yes, what is the estimated width of the plume at the shore of the surface water body, and what are the estimated concentrations of the following contaminants at the shore of the surface water body: (The estimation method should be described in the text of the RI report.)

Benzene _____, Ethyl Benzene _____, Toluene _____, Xylenes _____, Total Hydrocarbons _____ No

If the answer to question number 11 is yes, the use category of the surface water body should also be determined, in accordance with Minn. Rules ch. 7050, and reported.

12. Does the plume have a projected point of entry to surface water? (Yes/No).....| NO |
If yes, what is the distance from the downgradient edge of the plume to the surface water body?

If you ansvered yes to question 12, the RI report should characterize the hydrogeologic conditions and land use between the site and the surface water body, and should assess the potential for the plume to discharge to surface water and the likelihood of future ground water use in the vicinity of the plume.

13. Is the impacted unit a bedrock aquifer? (Yes/No).....| NO |

14. Has contamination from the site impacted a quaternary surficial or buried aquifer that is presently used as a drinking water aquifer anywhere within a two mile radius of the site? (Yes/No).....| NO |

Stop here if you answered yes to question 13 or 14. If you answered no to both questions 13 and 14, please continue.

15. Identify and describe the uppermost drinking water aquifer in the site vicinity. What is the depth to the top of the uppermost drinking water aquifer? What is the water level in the uppermost drinking aquifer?
The uppermost drinking water unit is the Franconia Formation. The depth to the top of the aquifer is estimated to be 50 feet. The water level is likely 50 feet below the land surface.

16. Is there a confining unit between the impacted unit and the uppermost drinking water aquifer? What is its thickness and extent?
Yes, the St. Lawrence Formation is a confining unit. Where uneroded this formation is 45 to 60 feet thick. This formation is absent immediately north of the site. The site is also underlain by about 40 feet of peat and till (Balaban and McSwiggen 1982).

17. Is the uppermost drinking water aquifer a karst unit or a sole source aquifer?

No

18. Are there any existing or abandoned wells within approximately 1,000 feet downgradient of the site?

No (See attached page)

19. Are there any other site specific conditions which increase the risk of cross contamination from the impacted unit to a drinking water aquifer?

No

20. Based on the answers to questions 14 through 18 and any other site specific information available, summarize and assess the risk of cross contamination from the impacted unit to the uppermost drinking water aquifer.
Based on availabe data (lack of wells or other potential conduits in immediate vicinity of site) it is our opinion that the risk of cross contamination is remote.

7. City of Jordan personnel indicate that no municipal supply wells are located at the site or within one mile downgradient of the site.

9. City of Jordan personnel indicate that a new supply well is being developed about 1/4 mile upgradient of the site. This well is expected to be completed, as are all existing city supply wells, in the Dresbach aquifer. No additional supply wells are proposed.

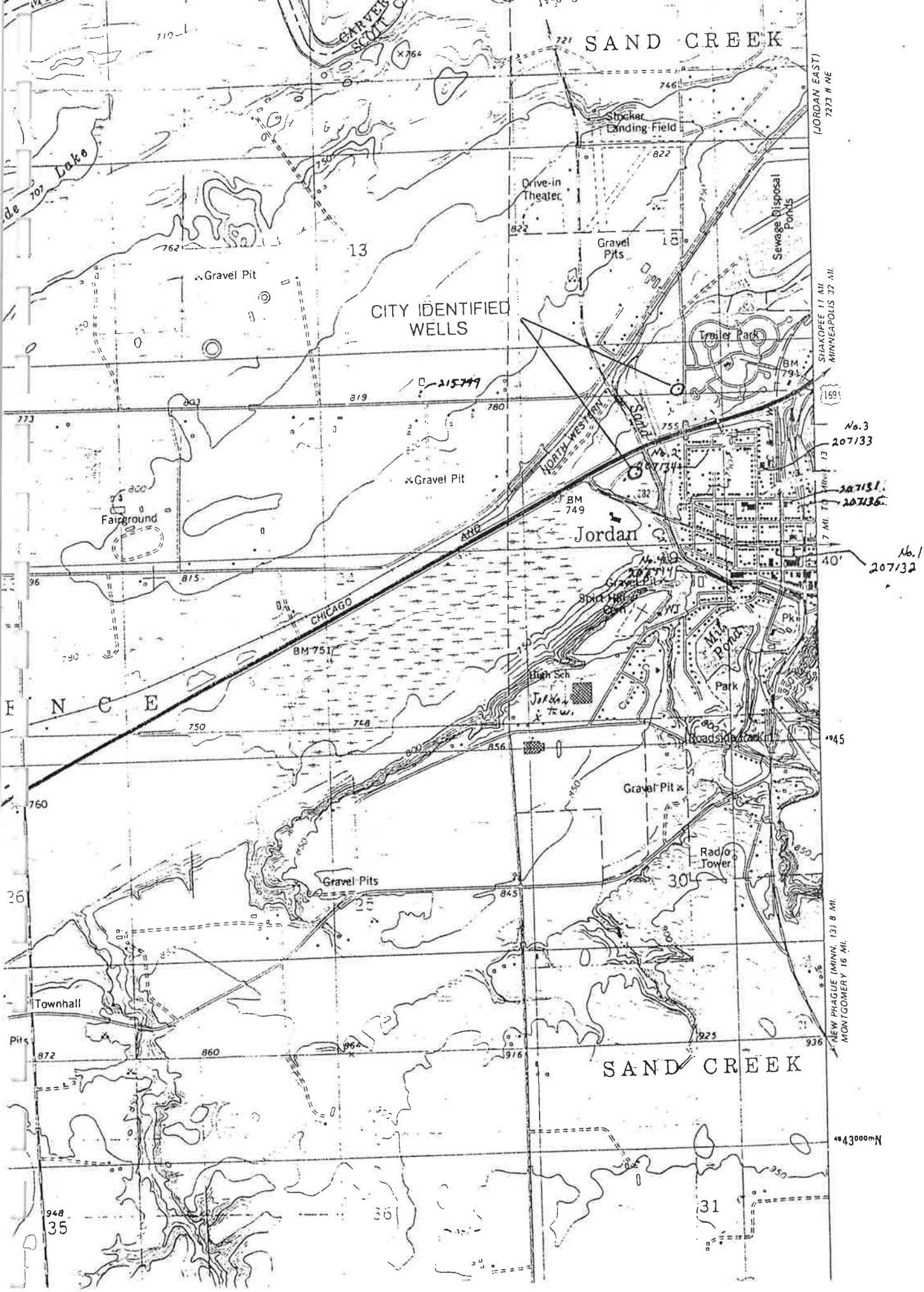
18. No wells were identified to be within 1,000 feet directly downgradient of the site according to discussions with city of Jordan personnel and local well drillers. Two wells were identified to be about 500 and 1,000 feet from the site in radially downgradient directions.

MGS Water Well Records Summary
Receptor Survey Data

Minnesota Unique Well #	Ground Surface Elevation (ft)	Well Base Elevation (ft)	Casing Base Elevation (ft)	Water Level Elevation (ft)	Aquifer	Use
207132	748	386	530	730	Dresbach	Public Supply
207135	760	473	UN	UN	Dresbach	UN
207134	753	117	501	733	Dresbach	Public Supply
207133	755	191	534	749	Dresbach	Public Supply
207131	760	215	400	750	Dresbach	UN
207994	755	<195	385	UN	Dresbach	Public Supply
207429	845	600	744	754	UN	UN
215799	810	600	660	UN	Franconia	UN
215800	820	545	645	750	Franconia	UN
216171	945	709	717	736	Franconia	UN
212290	905	658	682	719	Franconia	UN
207419	735	561	581	709	Franconia	UN
207418	745	587	621	UN	Franconia	UN

UN = Unknown; data not available

BRAUN™


SAND CREEK
Stocker Landing Field
Drive-in Theater
Sewage Disposal Ponds
Gravel Pits
Gravel Pit
CITY IDENTIFIED WELLS
Trailer Park
BM 791
SHAKOPEE 11 MI
MINNEAPOLIS 32 MI.
(JORDAN EAST) 7273 II NE
No.3 207133
No.2 207134
207131
207136
No.1 207132
NORTH-WESTERN
Fairground
BM 749
Jordan
CHICAGO
BM 751
Spirit Hill
Mill Pond
Park
High Sch
Roads
Radio Tower
Townhall
Pits
SAND CREEK
NEW PRAGUE (MINN. 13) 8 MI.
MONTGOMERY 16 MI.
4945
4943000mN
13
30
31
35
36

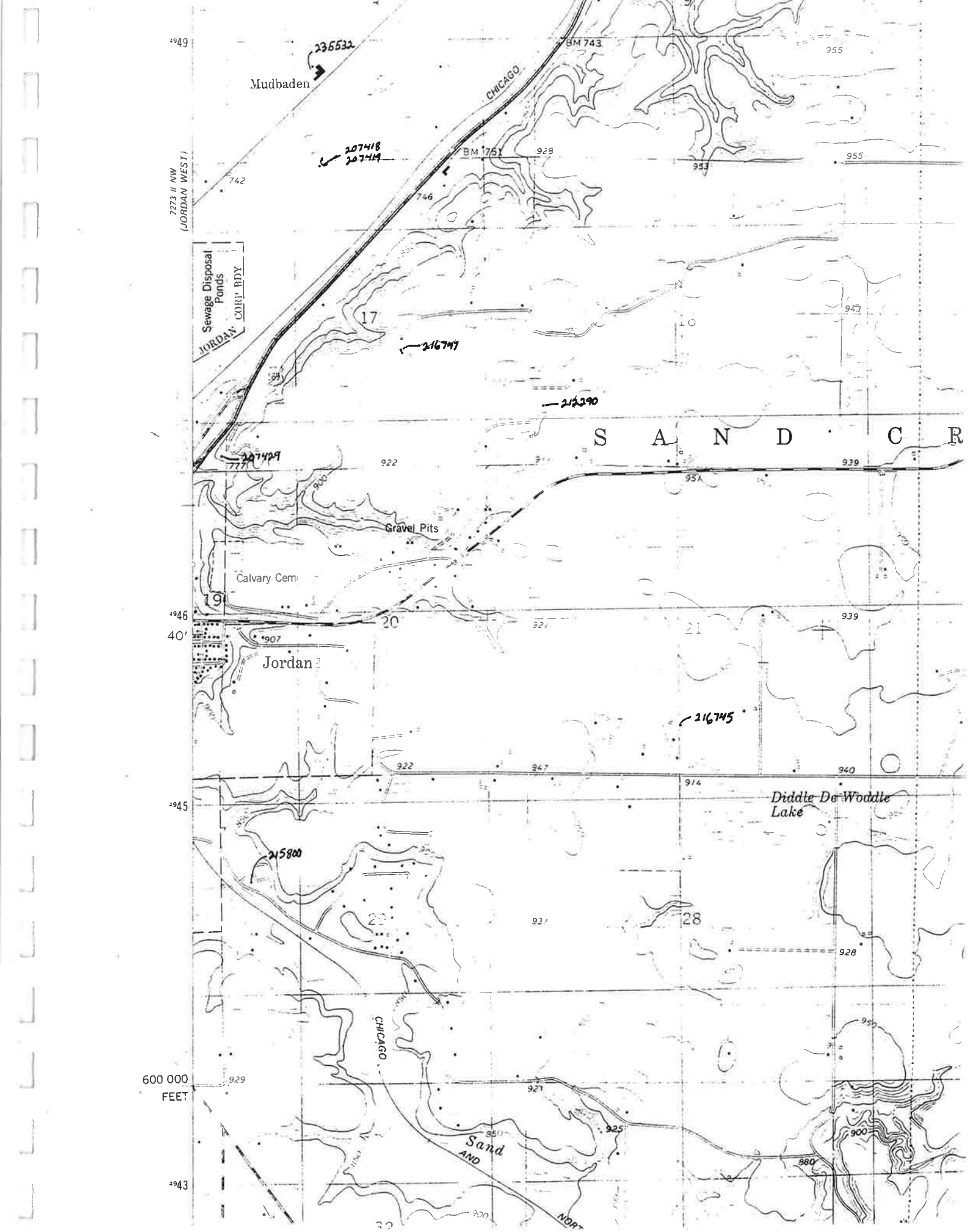
EG-989
Mn/DOT - Jordan, MN

Groundwater Receptor Survey
Telephone Log

Date	Name	Telephone Number	Remarks
10-2-90	Ms. Fox (Jordan)	(612)492-2535	Provided information regarding all municipal supply wells. Indicated a new supply well is being developed at Fourth and Varner, approximately 1/4 mile upgradient of the site.
11-30-90	Ms. Fox (Jordan)	(612) 492-2535	Indicated that 30 residents are not on city water. Provided street names and locations where these residents live. Mentioned that residents in trailer park, located adjacent to the site, are on city water. Recommended that we contact Hartmann Well Company and Kaderlik Well Drilling.
12-13-90	George Kaderlik Sr. (Kaderlik Well Drilling)	(507) 744-2504	No unregistered wells in Jordan that he is aware of.
12-13-90	Dave Hartmann (Hartmann Well Co.)	(612) 758-2202	Estimated there are 50 to 100 unregistered wells in Jordan. All homes constructed prior to 1975, the year in which a city water supply was developed, have a well. Wells are completed in unconsolidated materials and likely have not been properly abandoned. Could not specifically identify any wells in proximity to the Mn/Dot facility.
12-13-90	Jeff Schultz (J-K Well Drilling and Pump Repair)	(612)445-7465	No unregistered wells in Jordan that he's aware of.
12-13-90	Ms. Geib (Geib Well Co.)	(612) 964-5251	Left a message with Ms. Geib requesting that Erwin Geib contact Braun (Ron Weaver) regarding his knowledge of unregistered wells in Jordan. No response was received to this message.

RW:lgj9\LOGLIST.DEC

BRAUN


4949
Mudbaden
236532
CHICAGO
BM 743
955
207418
207419
BM 1751
928
953
955
7273 II NW
(JORDAN WEST)
742
746
Sewage Disposal Ponds
JORDAN CORP BDY
17
216747
212290
S A N D C R
943
922
939
777
951
Gravel Pits
Calvary Cem
19
4946
40'
20
21
939
907
Jordan
216745
922
947
940
914
4945
Diddle De Woddle Lake
215800
29
931
28
928
CHICAGO
600 000 FEET
929
927
950
925
900
880
Sand
AND
4943
900
NORT

U. S. DEPT. OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

114-23-19ADCdcA

In 13.1 31

Elev. 760±15

Lat-Long by, RWN 1Dec69

MASTER CARD

Record by D. M. BARON Source of data [illegible] Date 1970 Map NEW PRAGUE 15'

State MINNESOTA 27 County (or town) SCOTT 70

11195

Latitude: 44 40 00 N Longitude: 093 53 30 Sequential number:

Lat-long accuracy: 2 T. 114 N, R. 23 W Sec. 19, NE ¼, NE ¼, SE ¼ OK

Local well number: 114N23W19DAA Other number: WELL #1 S & M

Local use: NO CARTHY WELL CO Owner or name: Co. Well

Owner or name: JORDAN Address:

Ownership: (C) County, (F) Fed Gov't, (M) City, (N) Corp or Co, (P) Private, (S) State Agency, (W) Water Dist P

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (E) Power, (F) Fire, (H) Dom, (I) Irr, (M) Ind, (N) P S, (P) Rec, (S) Stock, (T) Instic, (U) Unused, (V) Repressure, (W) Recharge, (X) Desal-P S, (Y) Desal-other, (Z) Other W

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Res, (O) Obs, (P) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (Z) Destroyed W

DATA AVAILABLE: Well data Freq. W/L meas.: Field aquifer char.

Hyd. lab. data: 114-23-19 AdcdcA

Qual. water data; type: elev. 765±5

Freq. sampling: Pumpage inventory: yes no period:

Aperture cards: 90-B yes

Log data:

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well 362 ft Meas. (ept) accuracy 3

Depth cased: (first perf.) 218 ft Casing type: Steel ; Diam. 12 in

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (O) open end, (P) perf., screen, (S) sd. pt., (T) shored, (W) open hole, (Z) other

Method Drilled: (A) air rot, (B) bored, (C) cable, (D) dug, (H) hyd rot., (J) jetted, (P) air percussion, (R) reverse rotary, (T) trenching, (V) driven, (W) drive wash, (Z) other

Date Drilled: 9 28 Pump intake setting: ft

Driller: McCarthy name address

Lift (type): (A) air, (B) bucket, (C) cent, (J) jet, (L) multiple, (cent.), (M) multiple, (turb.), (N) none, (P) piston, (R) rot, (S) submerg, (T) turb, (Z) other Deep Shallow

Power (type): diesel, (ele) nat gas, LP gas, gasoline, hand, wind; H.P. Trans. or meter no.

Descrip. MP Third [illegible] above below LSD, Alt. MP

Alt. LSD: 720 Accuracy: (source) QUAD, 15', 20FT. CI

Water Level 18 ft above below MP; Ft above below LSD 18 Accuracy:

Date meas: Yield: 200 gpm Method determined

Drawdown 20 ft Accuracy: 5 Pumping period hrs

QUALITY OF WATER DATA: Iron ppm Sulfate ppm Chloride ppm Hard. ppm

Sp. Conduct K x 10^6 Temp. °F Date sampled

Taste, color, etc. hand. good.

Punched

elgl: 535 460

ems: 452, 5 447

1 - ☐ Address Verification
2 - ☐ Name on Mailbox
3 - ☐ Lot-Block
4 - ☐ Plat Book
5 - ☑ Info From Owner
6 - ☐ [illegible]
7 - ☐ Other
☐ Can't Locate State Why

Well No. 114-23-19 dcdcA

Formations Color, Hard or Soft	Thickness of Formation	Depth in Feet From	Depth in Feet To	Casing Diam.	Water Conditions Found
Fill Drift Alluvium	21	0	21	12"	Caving to 150'
St Lawrence Dolomite	57	36	93	12" to 10"	10" Casing 150' to 310'
Franconia Sh & Ss	174	93	267	10"	SL & Fm 712 (1977)
Ironton Ss	75	215	290		Dec 532 (1977)
Galesville Ss	9	290	299		Dec 1977
Eau Claire Sh	5	299	303		
Ironton and Galesville Ss	59	303	362		
Eau Claire Sh	147				

Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development

I hereby certify that, to the best of my knowledge, the data presented in this statement is a true and correct representation of conditions encountered in the construction of this well.

Dated at _____ this _____ day of _____, 19__.

(Firm Name) _____

By _____

Title _____

New Prague Quad V

2-59)

MINNESOTA CONSERVATION DEPARTMENT
DIVISION OF WATERS

WELL LOG STATEMENT

OK

File No. (2) SCH 1

Well No. 114/23 - 19 1da

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Location of Well Jordan Well #1

South Jordan

County City or Town Rice #2 Nd Sts. Intersection of Rice #2 Nd Sts.

Describe Further by Lot, Block, Nearest Highway, Street and Number
NW¼, NE¼SE¼ Sec. 19

Locate Well on Plat of Section

Sec. 19

Twp. 114-23

Range 23 W

Drilled for: Jordan

Address

Date of Completion 1928

Site
Upland, Valley, Hillside, Etc.

Type of Well Drilled
Dug, Driven, Bored, Drilled

Drill Rig Used
Solid Tool, Jet, Rotary

Diameter: Top 12 Bottom 10

Depth of Well 362'

Ground Elevation 748
Sea Level Datum or Give Distance Above or Below R. R., Highway, Lake, Etc.

Height of Casing Above Ground

Quality of Water Hard
(Hard or Soft, Fresh or Salty, Etc.)

Temperature of Water

Was Laboratory Analysis Made? Yes - Chemical Water Test

For What Purpose Will Water Be Used?

Is Well Pumped? Yes Pump Capacity 100 GPM

Was Well Sealed on Completion?

Does Well Overflow Without Pumping?
Yes or No

Natural Flow GPM

What Pressure, or Head, at Ground Level?

Principal Aquifer Penetrated

Driller Municipal Well Co.

Address

REPORT OF FINAL PUMPING TEST

Date of Test

Duration of Test Hrs. Min.

Rate of Pumping 200 GPM

Static Water Level 18 Ft.

748
18
730

Water Level While Pumping 38 Ft.

Drawdown 20 Ft.

Time Required for Recovery

Expected Average Yield Gal. per day

If Other Tests were Made, Give Details on Another Sheet.

Were Measurements Made of Effect on Other Nearby Wells During Test? Give Details.

Sandstone Aquifer - Jordan Formation

WELL LOG

Geologic Formations Kind, Color, Hard or Soft	Thickness of Formation	Depth in Feet From	Depth in Feet To	Casing Diam.	Water Conditions Found
Dr. f-	QUAT	0	36	CLAY, DRIFT	T/
St. Lawrence? Dolomite	CBDL 5	36	41	10 3/4" DLM	T/ 214
Shale	GRNT 174	41	215	10" SHLE	SHLE
S. S.	CBDL 75	215	290	SNDS	T/ 235 Dr. 533(147)
Gray shale	8	290	298	SHLE	T/ 160
Dresbach? S. S.	CECR 5	295	303	SNDS	
Red shale	59	303	362	SHLE	
					B/ 362
750 750 / 295 362 / 50 388					50 A wtr
					CIGL-CECR
					7
					Ft
				Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development	

I hereby certify that, to the best of my knowledge, the data presented in this statement is a true and correct representation of conditions encountered in the construction of this well.

Dated at _____ this _____ day of _____, 19__.

(Firm Name) _____

By _____

Title _____

W 97-41
(Rev. 1-68)

MINNESOTA CONSERVATION DEPARTMENT
DIVISION OF WATERS

WELL LOG STATEMENT

OK

	Director	
	Publ.	
	Ground W.	

Well No. 114-23 dac

Mail Report Promptly To Director, Division Of Waters, Centennial Office Bldg., St. Paul 1, Minn.

Location of Well (address) R.F.D.

County City or Town

Describe Further by Lot, Block, Nearest Highway.

Locate Well on Plat of Section

Sec. New Prague

Twp. Quad

Range X

Drilled for: M+ St. Louis

Address Cadiway

Driller

Address

Date of Completion

REPORT OF FINAL PUMPING TEST

Type of well Depth Hrs. Min. Date
Dug, Driven, Bored, Drilled

Casing diameter inch, from to Rate of Pumping GPM

inch, from to Static Water Level Ft. Above / Below land surface

inch, from to Water Level While Pumping Ft.

CODED

Screen: Length Diameter Slot size Use: Domestic ☐ Industrial ☐ Irrigation ☐

Pump: Type Horsepower Public supply ☐ Commercial ☐ Stock ☐

WELL LOG

Geologic Formations Kind, Color, Hard or Soft	Depth in Feet From	Depth in Feet To	Geologic Formations Kind, Color, Hard or Soft	Depth in Feet From	Depth in Feet To
QUUU	0	112	DRFT		
COLF	112	210	SHLE, DLMT		
CIGL	210	285	SNDS		
CLCR	285	287	SHLE		
			Aquifer unknown		
			No county record		

WELL SCHEDULE

U. OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

20713-F

114-23-19 ABCADC

Elev. 750 ± 10

MASTER CARD

Lat-Long by RWN 1Dec69

Record by D. M. DAVIS — Source of data A. Collins — Date 1972 — Map NEW PRAGUE 15

11194

State MINNESOTA [27] — County (or town) SCOTT [20]

Latitude: 44 41 12 N — Longitude: 093 37 58 — Sequential number:

Lat-long accuracy: 2 — T. 114 N, R 23 W, Sec 19, SW¼, NW¼, NE¼

Local well number: 114N23W19ABC — Other number: #2 B & M

Local use: ART COLLINS — Owner or name: JORDAN

Owner or name: JORDAN — Address: 4th & Wood

Ownership: (C) County, (F) Fed Gov't, (A) City, (N) Corp or Co, (P) Private, (S) State Agency, (W) Water Dist — [M]

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (E) Power, (F) Fire, (H) Dom, (I) Irr, (M) Med, (N) Ind, (P) P S, (R) Rec, (S) Stock, (T) Instit, (U) Unused, (V) Repressure, (W) Recharge, (X) Desal-P S, (Z) Desal-other, Other — [P]

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Res, (O) Obs, (P) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (Z) Destroyed — [W]

DATA AVAILABLE: Well data [ ] — Freq. W/L meas.: [Ø] — Field aquifer char. [ ]

Hyd. lab. data: [ ]

Qual. water data; type: [ ]

Freq. sampling: [ ] — Pumpage inventory: [ ] yes / no, period: [ ]

Aperture cards: [ ] yes

Log data: [ ]

WELL-DESCRIPTION CODE

SAME AS ON MASTER CARD — Depth drilled: [ ] ft — [7 8 2] Meas. rep. — [6]

Depth cased; (first perf.) [ ] ft — type: [ ] — Diam. [1 2] in — accuracy

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (O) open end, (P) perf., screen, sd. pt., (T) open, (W) [ ], (X) [ ], (Z) other [ ]

Method Drilled: (A) air rot, (B) bored, (C) cable, (D) dug, (H) hyd rot., (J) jetted, (P) air percussion, (R) reverse rotary, (T) trenching, (V) driven, (W) drive wash, (Z) other [ ]

Date Drilled: [9 4 2] — Pump intake setting: [ ] ft

Driller: A. Collins (name), [ ] (address)

Lift (type): (A) air, (B) bucket, (C) cent, (J) jet, (L) multiple (cent.), (M) multiple (turb.), (N) none, (P) piston, (R) rot, (S) submerg, (T) turb, (Z) other [ ] — Deep / Shallow [ ]

Power (type): diesel, elec, nat gas, gasoline, hand, LP gas, wind; H.P. [ ] — Trans. or meter no. [ ]

Descrip. MP [ ] ft above / below LSD, Alt. MP [ ]

Alt. LSD: 750 [7 5 0] — Accuracy: (source) QUAD, 15', 20FT. CT. [4]

Water Level [20] ft above / below MP; Ft above / below LSD [2 0] — Accuracy: [ ] [6]

Date meas: [ ] — Yield: [2 5 0] gpm — Method determined [ ]

Drawdown: [2 8] ft — Accuracy: [ ] — Pumping period [6] hrs [5]

WATER DATA: Iron [ ] ppm — Sulfate [ ] ppm — Chloride [ ] ppm — Hard. [ ] ppm

Sp. Conduct. [ ] x 10^6 — Temp. [ ] °F — Date sampled [ ]

Taste, color, etc.

LOCATED BY

1 - [ ] Address Verification

2 - [ ]

3 - [ ]

4 - [ ] Plat Book

5 - [✓] Info. From Owner

6 - [ ] Info. From Neighbor

7 - [ ] Other

[ ] Can't Locate State Why

114-23-19 Abdbcd

elev. 753±5'

90-B Punched

Gamma logged 1-11-88

Ems: 365, 155, 210

Well No. 114-23-19 Abdbcd

Latitude-longitude ____ S
d m s d m s

GEOLOGIC CARD

SAME AS ON MASTER CARD [1-19] Physiographic Province: _____ [20-21] 12 Section: _____

[22] 6 Drainage Basin: _____ [23-25] 28V Subbasin: _____ [26] 3

Topo of well site: (D) depression, (C) stream channel, (E) dunes, (F) flat, (H) hilltop, (K) sink, (L) swamp, (Q) offshore, (P) pediment, (S) hillside, (T) terrace, (U) undulating, (V) valley flat _____ [27]

MAJOR AQUIFER: _____ system, _____ series [28-29] _____ aquifer, formation, group [30-31]

Lithology: _____ [32-33] Origin: _____ [34] Aquifer Thickness: _____ ft

[35-37] Length of well open to: _____ ft [38-40] Depth to top of: _____ ft [41-43]

MINOR AQUIFER: _____ system, _____ series [44-45] _____ aquifer, formation, group [46-47]

Lithology: _____ [48-49] Origin: _____ [50] Aquifer Thickness: _____ ft

[51-53] Length of well open to: _____ ft [54-56] Depth to top of: _____ ft [57-59]

Intervals Screened: _____

Depth to consolidated rock: _____ ft [60-63] Source of data: _____ [64]

Depth to basement: _____ ft [65-68] Source of data: _____ [69]

Surficial material: _____ [70-71] Infiltration characteristics: _____ [72]

Coefficient Trans: _____ gpd/ft [73-75] Coefficient Storage: _____ [76-78]

Coefficient Perm: _____ gpd/ft^2; Spec cap: _____ gpm/ft; Number of geologic cards: _____ [79]

1957 - 553' well depth.
deepened.

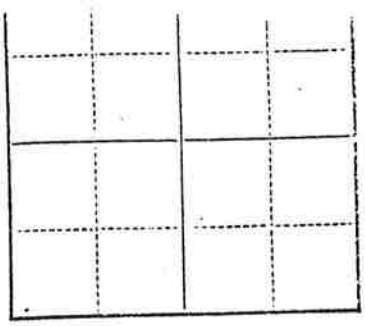
Well No. 1144-23-19 ABC

GPO 857-700

...MENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

RECORD OF WELL

No. 2



Locate well on plat of section.

1. Location: State Minnesota County Scott
   Nearest P. O. ____ Direction from P. O. ____
   Distance from P. O. ____ miles; NE ¼ sec. 19, T. 114N, R. 23W
   If in city, give street and number 6th street north of city
   6 blocks north

2. Owner: Jordan Address ____
   Driller: Art Collins Address 50 miles east of Jordan

3. Situation: Is well on upland, in valley, or on hillside? ____

4. Elevation of top of well: ____ ft. (Above or below) the level of ____ (Sea, depot, lake, or stream)

5. Type of well: drilled (Dug, driven, bored, or drilled); kind of drilling rig used ____ (Solid tool, jetting, rotary, etc.)

6. Depth of well: 252 ft.; year in which well was finished 1949
   Does well enter rock? yes; if so, at what depth? ____ ft.; kind of rock ____

7. Diameter: At top 10 inches; at bottom ____ inches.

8. Principal water bed: St. Lawrence (Gravel, sand, ... or rock. If rock, state kind)
   Depth to principal water bed ____ ft.; thickness of bed ____ ft.
   If other water supplies were found, give depth to each ____

9. Casings: Kind steel; size 10; length 252 ft.; between depths of 0 and 252 ft.
   Kind ____; size ____; length ____ ft.; between depths of ____ and ____ ft.
   Kind ____; size ____; length ____ ft.; between depths of ____ and ____ ft.
   Packers (if any): Depth at which packers were used ?; kind ____
   Screen or Strainer: Was well finished with screen? No; kind of screen ____;
   length of screen ____ ft.; diameter ____ inches; size of openings ____

10. Head: Does well at present overflow without pumping? No; did it overflow when new? No;
    if flowing, give pressure ____ lb. per sq. inch; or height water will rise in a pipe ____ ft. above surface;
    original pressure or head ____; if not flowing, give water level in well 20 ft. below surface.

11. Pump: Is the well pumped? yes; kind of pump American (Layne);
    size or capacity of pump 250; kind of power Electric

12. Yield: Natural flow at present (if any) ____ gallons per minute; original flow ____ gallons per minute;
    well has been pumped at 250 gallons per minute continuously for 5 hours;
    28' drawdown
    quantity of water ordinarily obtained from well ____ gallons per day.

13. Use: For what purpose is the water used? Public Supply

14. Quality of the water: Good (Hard or soft, fresh or salty, etc.); is there an analysis? State

15. Cost of well, not including pump: ? Temperature of water ____ ° F.

Name of person filling blank M. J. Ruppert, Water Superintendent
by B. L. Grubish

Date 1/17/52 Address Jordan, Minnesota

4—3642

On the back of this sheet give the record of the beds through which the well passes and any other facts not given above.

KIRWIN M.S THESIS

340
Jordan
114.23
City Well, Scott County Alt: 750'? TD: 636'

		Depth (in feet)	Thickness (in feet)	
Drift	QUUU	0-45 DRFT	45	
St. Lawrence	CSTL	45-80 SLSN, DLMT	35	T/715
Franconia	CFRN	80-245 DLMT SNDS	165	T/[illegible]
~~Galesville-Woodhill~~		~~not identified~~		
Eau Claire	CDRE	SLSN, SHLE 245-385	140	T/[illegible]
Mt. Simon				
No record	CMTS	385-512 NACD		T/37
Coarse, buff sandstone		512-540 SNDS	155	
~~Fond du Lac~~				
Red sandstone and siltstone	PSC	540-563 SNDS, SLSN		T/2
		563-636 96 NACD		

#2 w-11

150 / 215 / 365 . 150 / 510 / 510

Aquifer
CMTS—PSC

Trenton w/ Galesville not present. [illegible]

2-591

MINNESOTA CONSERVATION DEPARTMENT
DIVISION OF WATERS

WELL LOG STATEMENT

MAIL REPORT PROMPTLY TO DIRECTOR, DIVISION OF WATERS, STATE OFFICE BLDG., ST. PAUL 1, MINN.

Location of Well Well #3

County Ramsey City or Town

Describe Further by Lot, Block, Nearest Highway, Street and Number
SW¼ NE¼ NE¼ between 11th & 16th Sts

Locate Well on Plat of Section

Sec. 11
Twp. 29N
Range R23W

Drilled for: Farm
Address Farm

Driller Kaye Wells
Address

Date of Completion Jan 1950

Site
Upland, Valley, Hillside, Etc.

Type of Well Drilled
Dug, Driven, Bored, Drilled

Drill Rig Used
Solid Tool, Jet, Rotary

Diameter: Top 20" Bottom 24"

Depth of Well 563.6

Ground Elevation 770±
Sea Level Datum or Give Distance Above or Below R. R., Highway, Lake, Etc.

Height of Casing Above Ground

Quality of Water Hard
(Hard or Soft, Fresh or Salty, Etc.)

Temperature of Water

Was Laboratory Analysis Made? No

For What Purpose Will Water Be Used?

Is Well Pumped? Yes Pump Capacity 500 GPM
Turbine

Was Well Sealed on Completion?

Does Well Overflow Without Pumping?
Yes or No

Natural Flow GPM

What Pressure, or Head, at Ground Level?

Principal Aquifer Penetrated

REPORT OF FINAL PUMPING TEST

Date of Test 1950

Duration of Test 8 Hrs. Min.

Rate of Pumping 900 GPM

Static Water Level 6' (1954) Ft. → 764

Water Level While Pumping 46 Ft.

Drawdown 40 Ft.

Time Required for Recovery

Expected Average Yield Gal. per day

If Other Tests were Made, Give Details on Another Sheet.

Were Measurements Made of Effect on Other Nearby Wells During Test? Give Details.

114-23-19 AACC 16

elev. 765±5' USGS

LOCATED BY 90-B

1 - ☐ Address Verification
2 - ☐ Name on Mailbox
3 - ☐ Lot-Block
4 - ☐ Plat Book
5 - ☑ Info. From Owner
6 - ☐ Info. From Neighbor
7 - ☐ Other
☐ Can't Locate State Why

Elgl: 535 468 67
Emp: 485 453

WELL 168

Geologic Formations Kind, Color, Hard or Soft	Thickness of Formation	Depth in Feet From	Depth in Feet To	Casing Diam.	Water Conditions Found
Drift — Clay	3	0	3	24"	
Drift — Clay & Gravel	25	8	33	24"	20" Casing No. 1
Drift — Boulders	7	33	40	24"	
Drift — Sandstone	2	40	42	24"	
Prairie du Chien & Franconia — Shale & L.S.	183	42	225	16" to 221'	728 (113)
Franconia — S.S. & Shale	67	225	292	24"	545 (287)
Franconia — Shale & L.S.	8	242	300	Open hole	
Eau Claire — Red Shale	35	300	335		
Eau Claire — S.S.	10	335	345		
Eau Claire — Shale	15	345	360		
Mt. Simon — S.S.	152	360	512		
Mt. Simon — Shale	6	512	518		258 (51)
Hinckley — S.S.	25	518	543		
Hinckley — Shale	20.6	543	563.6		
					Indicate Size, Type, & Location of Any Screens, Gravel Packs, Grouting, or Other Development

I hereby certify that, to the best of my knowledge, the data presented in this statement is a true and correct representation of conditions encountered in the construction of this well.

Dated at _____ this _____ day of _____, 19___.

(Firm Name) _____

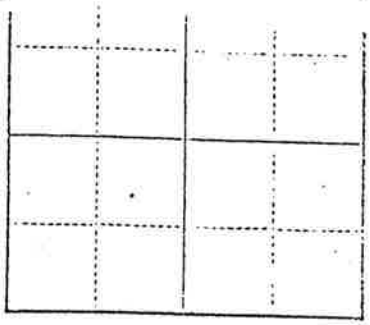
By _____

Title _____

GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

Not Plotted

RECORD OF WELL No. 3



Locate well on plat of section.

Location: State Minnesota County Scott

Nearest P. O. ..... Direction from P. O. .....

Distance from P. O. ..... miles; NE ¼ sec. 19, T. 114N, R. 23W

If in city, give street and number Warner

2. Owner: Jordon Address .....

Driller: Keys Well Co. Address St. Paul, Minnesota

3. Situation: Is well on upland, in valley, or on hillside? .....

4. Elevation of top of well: ..... ft. (Above or below) the level of ..... (Sea, depot, lake, or stream)

5. Type of well: drilled (Dug, driven, bored, or drilled); kind of drilling rig used ..... (Solid tool, jetting, rotary, etc.)

6. Depth of well: 558 ft.; year in which well was finished 1950

Does well enter rock? yes; if so, at what depth? 180± ft.; kind of rock ?

7. Diameter: At top 24 inches; at bottom 16 inches.

8. Principal water bed: St. Lawrence (Gravel, sand, clay, or rock. If rock, state kind)

Depth to principal water bed ..... ft.; thickness of bed ..... ft.

If other water supplies were found, give depth to each Step Point

9. Casings: Kind steel; size 24; length ~~300~~ 321 ft.; between depths of ..... and ..... ft.

Kind steel; size 16; length ? ft.; between depths of ..... and ..... ft.

Kind ..... ; size ..... ; length ..... ft.; between depths of ..... and ..... ft.

Packers (if any): ~~Depth at which packers were used~~ ? ; kind .....

Screen or Strainer: Was well finished with screen? no; kind of screen .....;

length of screen ..... ft.; diameter ..... inches; size of openings .....

10. Head: Does well at present overflow without pumping? no; did it overflow when new? no;

if flowing, give pressure ..... lb. per sq. inch; or height water will rise in a pipe 14-18 ft. above surface;

original pressure or head .....; if not flowing, give water level in well ..... ft. below surface.

11. Pump: Is the well pumped? yes; kind of pump Layne;

size or capacity of pump 550; kind of power electric

12. Yield: Natural flow at present (if any) none gallons per minute; original flow ..... gallons per minute;

well has been pumped at 550 gallons per minute continuously for 5 hours; 24' drawdown

quantity of water ordinarily obtained from well ..... gallons per day.

13. Use: For what purpose is the water used? PS

14. Quality of the water: hard (Hard or soft, fresh or salty, etc.); is there an analysis? state

15. Cost of well, not including pump: ..... Temperature of water ..... ° F.

Name of person filling blank M. J. Ruppert W. Supt. by BLG

Date 1-17-52 Address Jordon, Minnesota

On the back of this sheet give the record of the beds through which the well passes and any other facts not given above. 16—65665-1

OK 14 13 1

U. S. DEPT. OF THE INTERIOR — GEOLOGICAL SURVEY — WATER RESOURCES DIVISION

WELL SCHEDULE

Published

Lat-Long by RWN 1Dec69

MASTER CARD

Record by D. M. BARON Source of data Keys Well Co. Date ~~1950~~ Map NEW PRAGUE 15'

11192

State [ ] [ ] County (or town) SCOTT [ ] Sequential number: [ ]

Latitude: 44 [ ] [ ] [ ] N Longitude: 093 [ ] [ ] [ ] W

Lat-long accuracy: [ ] T. 114 S, R. 23W Sec. 19, SW ¼, NE ¼, NE ¼

Local well number: 114N23W19ACC 1 Other number: #5 B & M

Local use: KEYS WELL CO Owner or name: JORDAN

Owner or name: JORDAN Address: [ ]

Ownership: (C) County, (F) Fed Gov't, (M) City, (N) Corp or Co, (P) Private, (S) State Agency, (W) Water Dist [M]

Use of water: (A) Air cond, (B) Bottling, (C) Comm, (D) Dewater, (E) Power, (F) Fire, (H) Dom, (I) Irr, (M) Med, (N) Ind, (P) P S, (R) Rec, (S) Stock, (T) Instit, (U) Unused, (V) Repressure, (W) Recharge, (X) Desal-P S, (Y) Desal-other, (Z) Other [H]

Use of well: (A) Anode, (D) Drain, (G) Seismic, (H) Heat Res, (O) Obs, (P) Oil-gas, (R) Recharge, (T) Test, (U) Unused, (W) Withdraw, (X) Waste, (Z) Destroyed [W]

DATA AVAILABLE: Well data [ ] Freq. W/L meas.: [ ] Field aquifer char. [ ]

Hyd. lab. data: [ ]

Qual. water data; type: [ ]

Freq. sampling: [ ] Pumpage inventory: yes / no, period: [ ]

Aperture cards: [ ] yes

Log data: [ ]

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 563.6 ft 564 Meas. (est) accuracy [3]

Depth cased: (first perf.) [ ] ft 221 Casing type: [ ]; Diam. [ ] in 32 42

Finish: (C) porous concrete, (F) gravel w. (perf.), (G) gravel w. (screen), (H) horiz. gallery, (O) open end, (P) perf., screen, (S) sd. pt., (T) shored, (W) open hole, (Z) other [ ]

Method Drilled: (A) air rot, (B) bored, (C) cable, (D) dug, (H) hyd rot., (J) jetted, (P) air percussion, (R) reverse rotary, (T) trenching, (V) driven, (W) drive wash, (Z) other [ ]

Date Drilled: [ ] 950 Pump intake setting: [ ] ft [ ]

Driller: Keys Well Co. (name) (address)

Lift (type): (A) air, (B) bucket, (C) cent, (J) jet, (L) multiple, (cent.) (M) multiple, (turb.) (N) none, (P) piston, (R) rot, (S) submerg, (T) turb, (Z) other [ ] Deep / Shallow [ ]

Power (type): diesel, elec, gas, gasoline, hand, gas, wind; H.P. [ ] Trans. or meter no. [ ]

Descrip. MP [ ] ft above / below LSD, Alt. MP [ ]

Alt. LSD: [ ] 770 Accuracy: (source) QUAD. 15' 20 FT. CT. [4]

Water Level [ ] ft above / below MP; Ft above LSD [ ] Accuracy: [ ]

Date meas: [ ] 650 Yield: [ ] gpm 900 Method determined [ ]

Drawdown: [ ] ft 40 Accuracy: [ ] Pumping period [ ] hrs [ ]

QUALITY OF WATER DATA: Iron .99 ppm Sulfate 98 ppm Chloride 0 ppm Hard. 377 ppm

Sp. Conduct [ ] K x 10^6 Temp. [ ] °F Date sampled [ ]

Taste, color, etc. Hard

Punched

Well No.

A22
Jordan City Well No. 3
114.23.19a
Scott County

Driller: Keyes
Alt: 750'?

TD: 563.6'

	Depth (in feet)	Thickness (in feet)
Quaternary Drift	0-42	42
St. Lawrence-Franconia	42-225	183
Galesville-Woodhill-Eau Claire		
Sandstone and shale	225-292	
Shale and limestone	292-300	
Red shale	300-335	
Sandstone	335-345	
Shale	345-360	135
Mt. Simon		
Sandstone	360-512	
Shale	512-513	
Sandstone	513-540	
Feldspathic sandstone, white to light buff; coarse to very coarse grained, well sorted; very well rounded, high sphericity; quartz dominant, 20% light yellow-orange grains (feldspar?), 1% dark grains	540-543	183
Fond du Lac		
Feldspathic sandstone, brick red, with fine grained green blotches; medium grained, grains range through sand size, 20% silty matrix, poorly sorted; well rounded, moderate to high sphericity; quartz 90%, feldspar 10%, dark grains minor; moderately calcareous	543-545	
Feldspathic sandstone, brick red; fine to medium grained, silt matrix, poorly sorted; well rounded, moderate sphericity; quartz 90%, feldspar 10%, dark grains 1%, moderately calcareous	545-550	

	Depth (in feet)	Thickness (in feet)
Feldspathic sandstone, brick red; fine grained, grains up to coarse sand size, few silt partings, poorly sorted; subrounded, moderate sphericity; quartz 90%, orthoclase 10%, moderately calcareous, 1% of the rock chips is bright whitish green.....	553-555	
Quartz sandstone, brick red; medium to coarse grained, poorly sorted; well rounded, moderate to high sphericity; quartz 95%, orthoclase 5%, 1/2% muscovite flakes, fine grained; minor green patches.....	555-560	
Feldspathic sandstone, brick red with 1/10% green spots; medium grained, few silt partings, poorly sorted; subrounded to rounded, moderate sphericity; quartz 90%, orthoclase 10%, dark grains 1-2%.....	560-563.6	20.6

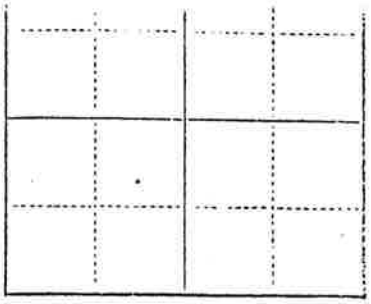
The Fond du Lac formation here is a fairly mature sediment. Quartz is dominant. Although the sorting is not well developed, roundness and sphericity are high. The Mt. Simon apparently lies directly on the Fond du Lac, and the Hinckley is absent. Compare to the log of the Jordan City Well (636 feet deep).

Aquifer

CIGL - PY-C

GEOLOGICAL
WATER RESOURCES

RECORD OF WELL No. 3



Locate well on plat of section.

Location: State Minnesota County Scott

Nearest P. O. _____ Direction from P. O. _____

Distance from P. O. _____ miles; _____ ¼ sec. _____, T. 114 N, R. 23 W

If in city, give street and number _____

2. Owner: City of Jordan Address Jordan, Minnesota

Driller: Keys Well Drilling Co. Address St. Paul, Minn.

3. Situation: Is well on upland, in valley, or on hillside? _____

Elevation of top of well: _____ ft. _____ (Above or below) the level of _____ (Sea, depot, lake, or stream)

5. Type of well: drilled (Dug, driven, bored, or drilled); kind of drilling rig used _____ (Solid tool, jetting, rotary, etc.)

Depth of well: 563.6 ft.; year in which well was finished June 1950

Does well enter rock? _____; if so, at what depth? _____ ft.; kind of rock _____

7. Diameter: At top 24 inches; at bottom 23 inches.

Principal water bed: _____ (Gravel, sand, clay, or rock. If rock, state kind)

Depth to principal water bed _____ ft.; thickness of bed _____ ft.

If other water supplies were found, give depth to each _____

Casings: Kind Steel; size 24"; length 42' 8" ft.; between depths of 0 and 42'8" ft.

Kind Steel; size 16"; length 179'4" ft.; between depths of 42'8" and 220 ft.

Kind _____; size _____; length _____ ft.; between depths of _____ and _____ ft.

Packers (if any): Depth at which packers were used _____; kind _____

Screen or Strainer: Was well finished with screen? no; kind of screen _____;

length of screen _____ ft.; diameter _____ inches; size of openings _____

10. Head: Does well at present overflow without pumping? _____; did it overflow when new? _____;

if flowing, give pressure _____ lb. per sq. inch; or height water will rise in a pipe _____ ft. above surface;

original pressure or head _____; if not flowing, give water level in well _____ ft. below surface.

11. Pump: Is the well pumped? _____; kind of pump _____;

size or capacity of pump _____; kind of power _____

12. Yield: Natural flow at present (if any) _____ gallons per minute; original flow _____ gallons per minute;

well has been pumped at _____ gallons per minute continuously for _____ hours;

quantity of water ordinarily obtained from well _____ gallons per day.

13. Use: For what purpose is the water used? _____

14. Quality of the water: _____ (Hard or soft, fresh or salty, etc.); is there an analysis? _____

Cost of well, not including pump: _____ Temperature of water _____° F.

Name of person filling blank _____

Date _____ Address _____

On the back of this sheet give the record of the beds through which the well passes and any other facts not given above.

KIND OF ROCK OR OTHER MATERIAL (Give color and tell whether hard or soft)	DEPTH, IN FEET		THICKNESS, IN FEET	REMARKS (Especially information as to water found)
	From—	To—		
Clay	[illegible]	8	8	
Clay and sand	[illegible]	33	25	
Hardpan	[illegible]	40	7	
Soapstone	[illegible]	42	2	
Shale and limestone	[illegible]	225	183	
Sandstone and shale	[illegible]	292	67	
Shale and limestone	[illegible]	300	8	
Red shale	[illegible]	335	35	
Sandstone	[illegible]	345	10	
Shale	[illegible]	360	15	
Sandstone	[illegible]	512	152	
Shale	[illegible]	518	6	
Sandstone	[illegible]	543	25	
Shale	[illegible]	563.6	20.6	

Source of data: Print of driller's log by Toltz, King and Day, Inc. in files of Minnesota Geological Survey.

U. S. GOVERNMENT PRINTING OFFICE 8—9042

WELL RECORD

KEYS WELL DRILLING COMPANY

WATER PRODUCERS

SAINT PAUL, MINNESOTA

OK

Owner JORDAN CO-OP

Location Jordan, Minnesota

Well No. 1 Size 16 x 10 Total Depth 545' Type Jordan

Date Completed May, 1954

Driller J. Scanlon

DRILLERS LOG

3	to 0		Pipe above rock
0	to 5		clays
5	to 27		gravel
27	to 75		limerock
75	to 210		limerock & shale
298	to 311		red shale
311	to 336		shale
336	to 354		sandstone & shale
354	to 545		sandrock
	to		
	to		
	to		
	to		
	to		

WELL MATERIALS

30'8" ' of 16 " diameter of Outer Casing

182 ' of 13 " diameter of Open Hole

360 ' of 10 " diameter of Inner Casing

bell to 15" hole

' of " diameter of Open Hole

' to Mix grout (yds.) (Sacks)

" diameter Screen

RECORD OF TEST PUMPING

Water Level 9'6" ft. from 150'

673 GPM 20' D.D Hours

517 GPM 25' D.D. Hours

GPM D.D. Hours

GPM D.D. Hours

GPM D.D. Hours

Remarks:

Inventor & Golesville

PERMANENT PUMP DATA

Mfg. Type Serial No.

Capacity GPM TDH

Motor Make Type

40 H. P. 220 Volts Ph. RPM

ft. in Col. pipe in Shaft

ft. 8 in Bowls 11 Stages MC Type

10 ft. 6 in suction pipe &

127 ft. Total Length of Pump

ft. in. drop pipe & No. Cable

ft. in. air line

in. Pitless ft. bury Scarlet

headshaft - 1-3/16"

CODED

new bowls 3/3/62 included in pump data

added: 30' C & S 2/28/63 included in above.

Not the same well as the "old" creamery well

D

#4

207994

elev. 755±5'

90-B

Jordan Municipal Well #4

Taken over from Jordan Co-op Creamery, 1971

Elev. 755 ft.

SNDS	Jordan sandstone	JDN	0-20	T/75
SHLE	St. Lawrence Shale	CCTN	20-200	T/7
SHLE	Franconia Shale	CDDF		
SNDS	& Sandstones		200-300	T/
SNDS	Dresbach sandstone	CDRE		T/
SHLE	& Shale		300-560	
SNDS	Hinckley sandstone	PCHK	560-	

Casing: 10" to 370 ft.

AQUIFER

CDRE-CHTS

Pumped at 425 G.P.M.

50

Located West of Varner street on south bank of sand Creek.

Data from files of State Health Dept.

Edre: 450, 260
190

CODED

207429

114-23-18 DDDDAA

Elev ~4815

WELL SITE 114-23-18 DDDDAA

SE 1/4 - Sec. 18 - Sand Creek Twp. Aug 3-71

WELL OWNER DATE

James D. Preiss # 166-B-1M

WELL SIZE 4" INCHES (Y) SCREEN SIZE OKONITE

WELL DEPTH 225 FEET CASING DEPTH 101 FEET

WATER LEVEL 91 FT (MSL) FT TO WATER G.P.M. 15

PUMP MAKE & H.P. 3/4hp Aermotor Submerge Pump

LOG OVER

COPIED

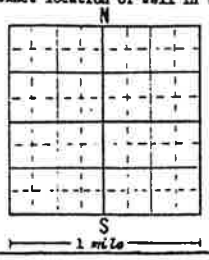
742 142?

tsl: 600

County Jasa | Fraction ¼ ¼ ¼ | Section Number | Township Number N. or S. | Range Number E. or W.

Distance and Direction from Road Intersections or Street Address and City of Well Location

Show exact location of well in section grid with "X." Sketch map of well location.



obs well: 845 742 103

1742

2. FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
[illegible] + GRAVEL	SAND, GRVL	RFUU	0	103
Broken Limestone	DLMT	CSTL	103	106
Sandy Limestone	DLMT	Hard	106	245
		CSTL F		
		AQUIFER		
		QBOU - CSTL		

103
742

245

CODED

Use a second sheet, if needed.

5. REMARKS, ELEVATION, SOURCE OF DATA, etc.

IMPORTANT: FILE WITH DEED - WELL OWNER COPY

3. PROPERTY OWNER'S NAME

Address [illegible]

4. WELL DEPTH (completed) 245 ft. | Date of Completion 7-24-71

5.
1 ☐ Cable tool 4 ☐ Reverse 7 ☐ Driven 10 ☐ Dug
2 ☐ Hollow rod 5 ☐ Air 8 ☐ Bored 11 ☐ _____
3 ☐ Rotary 6 ☐ Jetted 9 ☐ Power Auger

6. USE
1 ☐ Domestic 4 ☐ Public Supply 7 ☐ Industry
2 ☐ Irrigation 5 ☐ Air Conditioning 8 ☐ Commercial
3 ☐ Test Well 6 ☐ _____

7. CASING
DIAM. OD,? Threaded ☐ 1 Welded ☐ 2
Black ☐ 2 Galv. ☐ 4
4 in. to 101 ft. depth
_____ in. to _____ ft. depth
_____ in. to _____ ft. depth

HEIGHT: Above/Below
Surface _____ ft.
Weight _____ lbs./ft.
Drive Shoe? Yes ___ No ___

8. SCREEN
Make _____
Type _____ Dia. _____
Slot/Gauze _____ Length _____
Set between _____ ft. and _____ ft.
_____ ft. and _____ ft.
_____ ft. and _____ ft.

Or open hole
from _____ ft. to _____ ft.

FITTINGS:

9. STATIC WATER LEVEL
51 ft. ☑ below land surface ☐ above Date Measured _____

10. PUMPING LEVEL (below land surface)
_____ ft. after _____ hrs. pumping _____ g.p.m.
_____ ft. after _____ hrs. pumping _____ g.p.m.

11. WELL HEAD COMPLETION
1 ☐ Pitless adapter 2 ☐ Basement offset 3 ☐ At least 12" above grade

12. Well grouted?
☐ Yes ☐ No Cu. Yds. _____
1 ☐ Neat cement 2 ☐ Bentonite 3 ☐ _____
Depth: from _____ ft. to _____ ft.
from _____ ft. to _____ ft.

13. Nearest source of possible contamination
_____ feet _____ direction _____ type
Well disinfected upon completion? Yes ☐ No ☐

14. PUMP
Date installed _____
☐ Not installed
Manufacturer's Name _____
Model Number _____ HP 7.5 Volts _____
Length of drop pipe _____ ft. capacity _____ g.p.m.
Material of drop pipe _____
Type: 1 ☑ Submersible 3 ☐ L.S. Turbine 5 ☐ Reciprocating
2 ☐ Jet 4 ☐ Centrifugal 6 ☐ _____

16. WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

_____
Licensee Business Name License No.

Address _____

Signed _____ Date _____
Authorized Representative

_____
Name of Driller

7/74 30M

215799

Jordan Greenhouse

Eugene Provost — owen Wolff Eugene Pearson Pulp 25-60

4" 0 to 150 elev 810

SAND 0 to 28 QFCG SAND

CLAY 28 to 125 QTCG CLAY

SAND 125 to 132 QFCG SAND

Limestone AND SANDSTONE 132-210 CFRN DLMT

Aquifer CFRN-CFRN

1 new 4" well
210 ft. deep
150 ft. @ 4.25 637.50
balance 60 ft. @ 2.12 127.20
Sand 15 hr. 37.00
wire (wholesale 29.00
15 ft. 3/4" pipe 131 ft. @ 45 38.95
2 ft. 1" pipe 15 ea 2.20
fittings
Paid SNDS Inc 1400.00
full

about 130 ft. lift. First 25 ft. sand then sand again at 125 ft Limestone 132 ft. Sandstone below.

810
132
678

page 6

STATE OF MINNESOTA
DEPARTMENT OF HEALTH

WATER WELL RECORD

Minnesota Statutes 156A.01-.08

for Water Sample

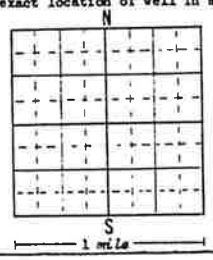
1. LOCATION OF WELL

County Name	Fraction	Section Number	Township Number	Range Number
Scott	¼ ¼ ¼		N. or S.	E. or W.

Distance and Direction from Road Intersections or Street Address and City of Well Location

Jordan Mn Sawmill Rd.

Show exact location of well in section grid with "X." Sketch map of well location.



Co Rd 61 : 21
East ½ mile
on Co Rd 61
114-23-29bcbda

3. PROPERTY OWNER'S NAME

Address Richard Ames 492-2537 stable 492-6590

4. WELL DEPTH (completed) 275 ft. Date of Completion 1-18-74

5. 1☐ Cable tool 2☐ Hollow rod 3☐ Rotary 4☐ Reverse 5☐ Air 6☐ Jetted 7☐ Driven 8☐ Bored 9☐ Power Auger 10☐ Dug 11☐

6. USE 1☐ Domestic 2☐ Irrigation 3☐ Test Well 4☐ Public Supply 5☐ Air Conditioning 6☐ 7☐ Industry 8☐ Commercial

7. CASING DIAM. 4 in. to 175 ft. depth; Threaded ☐1 Black ☐2 Welded ☐3 Galv. ☐4

HEIGHT: Above/Below Surface ft. Weight lbs./ft. Drive Shoe? Yes No

8. SCREEN Make Type Slot/Gauze Set between ft. and ft. Dia. Length FITTINGS: Or open hole from ft. to ft.

9. STATIC WATER LEVEL 70 ft. ☐ below land surface ☐ above Date Measured

10. PUMPING LEVEL (below land surface)
ft. after hrs. pumping g.p.m.
ft. after hrs. pumping g.p.m.

11. WELL HEAD COMPLETION 1☐ Pitless adapter 2☐ Basement offset 3☐ At least 12" above grade

12. Well grouted? ☐ Yes ☐ No Cu. Yds.
1☐ Neat cement 2☐ Bentonite 3☐
Depth: from ft. to ft.
from ft. to ft.

13. Nearest source of possible contamination
feet direction type
Well disinfected upon completion? Yes ☐ No ☐

14. PUMP
Date installed ☐ Not installed
Manufacturer's Name
Model Number HP 1 Volts
Length of drop pipe 105 ft. capacity g.p.m.
Material of drop pipe
Type: 1☐ Submersible 2☐ Jet 3☐ L.S. Turbine 4☐ Centrifugal 5☐ Reciprocating 6☐

16. WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

GENZ & RYAN
License Business Name License No.

Address

Signed Date
Authorized Representative

Name of Driller

2. FORMATION LOG

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Gravel QTCG			0	40
Sandstone			40	275
↓ rewrite				
Sandstone	CJDN		40	50
Sandstone	CUDF		40	275
Aquifer	CFRN-CFRN			
elev 914 ± 10				
110				
50	710			
160				
6				
300				

Use a second sheet, if needed.

15. REMARKS, ELEVATION, SOURCE OF DATA, etc.

WORK COPY

DEPARTMENT OF HEALTH

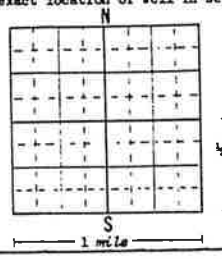
WATER WELL RECORD for water supplies
Minnesota Statutes 156A.01-.08

1. LOCATION OF WELL

County Name	Fraction	Section Number	Township Number	Range Number
Scott	¼ ¼ ¼		N. or S.	E. or W.

Distance and Direction from Road Intersections or Street Address and City of Well Location
East of Jordan on 282 1½ mile then 1mi North

Show exact location of well in section grid with "X." Sketch map of well location.



114-23-17 dbcabb

elev 945

3. PROPERTY OWNER'S NAME
Address Joe Lackner

4. WELL DEPTH (completed) ft. | Date of Completion

5. 1 Cable tool 2 Hollow rod 3 Rotary 4 Reverse 5 Air 6 Jetted 7 Driven 8 Bored 9 Power Auger 10 Dug 11 ____

6. USE
1 Domestic 2 Irrigation 3 Test Well 4 Public Supply 5 Air Conditioning 6 ____ 7 Industry 8 Commercial

7. CASING DIAM.
Threaded 1 Welded 3 Black 2 Galv. 4
4 in. to 228 ft. depth
____ in. to ____ ft. depth
____ in. to ____ ft. depth
HEIGHT: Above/Below
Surface ____ ft.
Weight ____ lbs./ft.
Drive Shoe? Yes ____ No ____

8. SCREEN
Make ____
Type ____ Dia. ____
Slot/Gauze ____ Length ____
Set between ____ ft. and ____ ft.
____ ft. and ____ ft.
____ ft. and ____ ft.
Or open hole from 228 ft. to 236 ft.
FITTINGS:

9. STATIC WATER LEVEL
209 ft. ☒ below land surface ☐ above Date Measured ____

10. PUMPING LEVEL (below land surface)
____ ft. after ____ hrs. pumping ____ g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11. WELL HEAD COMPLETION
1 Pitless adapter 2 Basement offset 3 At least 12" above grade

12. Well grouted?
Yes No Cu. Yds. ____
1 Neat cement 2 Bentonite 3 ____
Depth: from ____ ft. to ____ ft.
from ____ ft. to ____ ft.

13. Nearest source of possible contamination
100 feet N direction Septic type
Well disinfected upon completion? Yes ☑ No ☐

14. PUMP
Date installed ____
Not installed
Manufacturer's Name ____
Model Number ____ HP ____ Volts ____
Length of drop pipe ____ ft. capacity ____ g.p.m.
Material of drop pipe ____
Type: 1 Submersible 2 Jet 3 T.S. Turbine 4 Centrifugal 5 Reciprocating 6 ____

2. FORMATION LOG

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Clay QTCG	CLAY		0	80
Sand QFCG	SAND		80	120
Clay QTCG	CLAY		120	130
Clay + some sand QTCG	CLAY SAND		130	228
Limestone CSTL DLMT	T/717		228	235
Soap CFRN ← SHLE	Green T/710	very hard	235	236
Aquifr CSTL - CSTL				

Use a second sheet, if needed.

15. REMARKS, ELEVATION, SOURCE OF DATA, etc.

16. WATER WELL CONTRACTOR'S CERTIFICATION
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

HARTMANN WELL CO.
Licensee Business Name — License No.

Address ____

Signed ____ Date ____
Authorized Representative

Name of Driller

WORK COPY

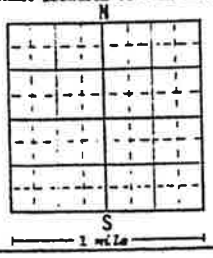
5/75 30M

County Name: SCOTT | Fraction: C¼ C¼ B¼ | Section Number: 16 | Township Number: 114 N. or S. | Range Number: 23 E. or W.

Distance and Direction from Road Intersections or Street Address and City of Well Location

1 MILE E 1/2 MILE N. OF JORDAN

Show exact location of well in section grid with "X." Sketch map of well location.



Permit # 241-B-11
212290
114-23-16CCBBCC
Elev. 905 ± 10
WN 135

2. FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
DRIFT (CLAY)	CLAY	QTCG	0	100
FINE SAND	SAND ob.	QFCG	100	215
SOAPSTONE	CLAY	QFCG	215	220
LIMESTONE SANDY	DLMT YELLOW	CSTL	220	245
SHALE	SHALE	CSLF	245	247
905, 115 690		Est: 685 25 CSLF 660		
		AQUIFER		
905 905 245		CSTL-CSTK		
245 660		CSLF (shale)		
905 215 690				
905 205				

CODED

Use a second sheet, if needed.

15. REMARKS, ELEVATION, SOURCE OF DATA, etc.

LOST CIRCULATION AT 225 FT.

IMPORTANT: FILE WITH DEED - WELL OWNER COPY

3. PROPERTY OWNER'S NAME: RICHARD HARTMAN — SC1198 T90-2 BLUELINE

Address

4. WELL DEPTH (completed): 247 ft. — Date of Completion: 1972

5. 1 ☐ Cable tool 2 ☐ Hollow rod 3 ☐ Rotary 4 ☐ Reverse 5 ☐ Air 6 ☐ Jetted 7 ☐ Driven 8 ☐ Bored 9 ☐ Power Auger 10 ☐ Dug 11 ☐ ____

6. USE: 1 ☐ Domestic 2 ☐ Irrigation 3 ☐ Test Well 4 ☐ Public Supply 5 ☐ Air Conditioning 6 ☐ ____ 7 ☐ Industry 8 ☐ Commercial

7. CASING DIAM. — Threaded ☐1 Welded ☐3 Black ☐2 Galv. ☐4
4 in. to 223 ft. depth
____ in. to ____ ft. depth
____ in. to ____ ft. depth
HEIGHT: Above/Below Surface ____ ft. Weight ____ lbs./ft. Drive Shoe? Yes ___ No ___

8. SCREEN — Or open hole from ____ ft. to ____ ft.
Make ____ Type ____ Dia. ____ Slot/Gauze ____ Length ____ FITTINGS:
Set between ____ ft. and ____ ft.
____ ft. and ____ ft.
____ ft. and ____ ft.

9. STATIC WATER LEVEL: 186 (714) ft. ☐ below land surface ☐ above — Date Measured ____

10. PUMPING LEVEL (below land surface)
____ ft. after ____ hrs. pumping ____ g.p.m.
____ ft. after ____ hrs. pumping ____ g.p.m.

11. WELL HEAD COMPLETION: 1 ☐ Pitless adapter 2 ☐ Basement offset 3 ☐ At least 12" above grade

12. Well grouted? ☐ Yes ☐ No — Cu. Yds. ____
1 ☐ Neat cement 2 ☐ Bentonite 3 ☐ ____
Depth: from ____ ft. to ____ ft.
from ____ ft. to ____ ft.

13. Nearest source of possible contamination
____ feet ____ direction ____ type
Well disinfected upon completion? Yes ☐ No ☐

14. PUMP — Date installed ____ ☐ Not installed
Manufacturer's Name ____
Model Number ____ HP 1 Volts ____
Length of drop pipe ____ ft. capacity ____ g.p.m.
Material of drop pipe ____
Type: 1 ☐ Submersible 2 ☐ Jet 3 ☐ L.S. Turbine 4 ☐ Centrifugal 5 ☐ Reciprocating 6 ☐ ____

16. WATER WELL CONTRACTOR'S CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

____ License Business Name ____ License No.
Address ____
Signed ____ Date ____ Authorized Representative
____ Name of Driller

7/74 30M

207419

114-23-8 CDCCCC

Elev. 735 ±10

OW 1-1 .158

OK W/PD

Keefe 1970 Well - Jordan

Bernard Keefe 492-2209

B. W. KEEFE

JOB LOCATION NO. OF JORDAN.

114-23-8 CDCCCC El. 735 ±10

4", 174 FT. 154 FT. CASING, NO SCREEN.

TEST PUMPED 50 G.P.M., WATER LEVEL 26 FT. (709)

PITLESS.

WELL LOG

0 - 18 SAND GRVL	18	SAND & GRAVEL	BROWN	QFCG
18 - 40 COBL GRVL	22	STONES & GRAVEL	BROWN	QFCG
40 - 55 COBL ROCK	15	STONES & ROCKS (HARD)	BROWN	QFCG
55 - 138 SAND, GRVL	93	SAND & GRAVEL	BROWN	QFCG
138 - 174 SHLE 36 SNDY		SHALE	GREEN, WHITE	CFRN
		T/597 ±10		T/597

OW

CFRN

WELL COMPLETED FEB 13, 1970

DRILLING TIME 2 DAYS

DRILLED WITH ROTARY BY RAGER & KEEL

REMARKS: DRILLING WAS VERY TOUGH, USED ALOT OF BENTONITE, PUMPED GOOD.

CODED

Aquifer

? CFRN - CFRU

tfrn: 597 36?
561

735
138
597

735
174
561

20718

114-23-8CDCCCA

Elev. 745 ± 10

Bernard Keefe, Jordan, 492-2204

Keefe

B.W. Keefe #72 Well

Location: North of Jordan

114-23-8CDCCCA

4" 158 Ft., 124 Ft. Casing; No Screen;

Test Pumped: Water Level

Well Log

QFUU	0-8	SAND Sand	Brown
QFUU	8-38	Cobl, GRVL Stone + Gravel	Brown
QFUU	38-110	SAND, GRVL Sand + Gravel	Brown
QFUU	110-116	Cobl, GRVL Stone + Gravel	Brown
CFRN	116-158	SHLE Shale	Green

T/624

Well Completed: June 22, 1972

Drilling Time: 2 Days

Drilled By: Ken + Maurice

Remarks: Drilling tough, used a lot bentonite

CODED

Aquifer

2 CFRN - CFR

cfm: 629 587

31/145/116/629

145 156

ORGANIC VAPOR FIELD DATA SHEET

Boring Identification MW-1 Project No. EG-989 Date 8-15-90

Weather Conditions clear skies, wind NE at 5 mph, 70 degrees F

Auger Steam Cleaned? Yes X No

Sampler Cleamed Between Samples: Yes X No Method Trisodium Phosphate/Water

Detector: OVA HNu: 10.2eV X Calibration: Gas benzene (24.3 ppm)
11.7eV Date 8-14-90

Depth (feet)	Auger (ppm)	Spoon (ppm)	Head Space (ppm)	Notes/Geology
surface	0			
2.5-4.0		0	0	
5.0-6.5		0	0	
7.5-9.0		0	0	
10-11.5		0	0	
12.5-14		0	0	
15-16.5		0	0	

BRAUN™

ORGANIC VAPOR FIELD DATA SHEET

Boring Identification MW-2 Project No. EG-989 Date 8-15-90

Weather Conditions clear skies, wind NE at 5 mph, 70 degrees F

Auger Steam Cleaned? Yes X No

Sampler Cleamed Between Samples: Yes X No Method Trisodium Phosphate/Water

Detector: OVA HNu: 10.2eV X Calibration: Gas benzene (24.3 ppm)
11.7eV Date 8-14-90

Depth (feet)	Auger (ppm)	Spoon (ppm)	Head Space (ppm)	Notes/Geology
surface	0			
2.5-4.0		0	0	
5.0-6.5		0	0	
7.5-9.0		0	0	
10-11.5		0	0	
12.5-14		0	2	
15-16.5		0	0	

BRAUN™

ORGANIC VAPOR FIELD DATA SHEET

Boring Identification MW-3 Project No. EG-989 Date 8-16-90

Weather Conditions clear skies, wind calm, 70 degrees F

Auger Steam Cleaned? Yes X No

Sampler Cleamed Between Samples: Yes X No Method Trisodium Phosphate/Water

Detector: OVA HNu: 10.2eV X Calibration: Gas benzene (24.3 ppm)
11.7eV Date 8-14-90

Depth (feet)	Auger (ppm)	Spoon (ppm)	Head Space (ppm)	Notes/Geology
surface	0			
2.5-4.0		0	0	
5.0-6.5		0	0	
7.5-9.0		0	0	
10-11.5		0	0	
12.5-14		0	0	
15-16.5		0	0	

BRAUN™

ORGANIC VAPOR FIELD DATA SHEET

Boring Identification ST-1 Project No. EG-989 Date 8-15-90

Weather Conditions clear skies, wind NE at 5 mph, 70 degrees F

Auger Steam Cleaned? Yes X No

Sampler Cleamed Between Samples: Yes X No Method Trisodium Phosphate/Water

Detector: OVA HNu: 10.2eV X Calibration: Gas benzene (24.3 ppm)
11.7eV Date 8-14-90

Depth (feet)	Auger (ppm)	Spoon (ppm)	Head Space (ppm)	Notes/Geology
surface	0			
2.5-4.0		0	0	
5.0-6.5		0	0	
7.5-9.0		0	0	
10-11.5		0	0	

ORGANIC VAPOR FIELD DATA SHEET

Boring Identification ST-2 Project No. EG-989 Date 8-15-90

Weather Conditions clear skies, wind NE at 5 mph, 70 degrees F

Auger Steam Cleaned? Yes X No

Sampler Cleamed Between Samples: Yes X No Method Trisodium Phosphate/Water

Detector: OVA HNu: 10.2eV X Calibration: Gas benzene (24.3 ppm)
11.7eV Date 8-14-90

Depth (feet)	Auger (ppm)	Spoon (ppm)	Head Space (ppm)	Notes/Geology
surface	0			
2.5-4.0		0	1	
5.0-6.5		0	17	
7.5-9.0		15	120	slight gasoline odor
10-11.5		20	150	slight gasoline odor

BRAUN

ORGANIC VAPOR FIELD DATA SHEET

Boring Identification ST-3 Project No. EG-989 Date 8-15-90

Weather Conditions clear skies, wind NE at 5 mph, 70 degrees F

Auger Steam Cleaned? Yes X No

Sampler Cleamed Between Samples: Yes X No Method Trisodium Phosphate/Water

Detector: OVA HNu: 10.2eV X Calibration: Gas benzene (24.3 ppm)
11.7eV Date 8-14-90

Depth (feet)	Auger (ppm)	Spoon (ppm)	Head Space (ppm)	Notes/Geology
surface	0			
2.5-4.0		0	8	
5.0-6.5		1	14	slight gasoline odor
7.5-9.0		0	2	slight gasoline odor
10-11.5		0	70	slight gasoline odor

BRAUN

ORGANIC VAPOR FIELD DATA SHEET

Boring Identification ST-4 Project No. EG-989 Date 8-16-90

Weather Conditions clear skies, wind calm, 70 degrees F

Auger Steam Cleaned? Yes X No

Sampler Cleamed Between Samples: Yes X No Method Trisodium Phosphate/Water

Detector: OVA HNu: 10.2eV X Calibration: Gas benzene (24.3 ppm)
11.7eV Date 8-14-90

Depth (feet)	Auger (ppm)	Spoon (ppm)	Head Space (ppm)	Notes/Geology
surface	0			
2.5-4.0		0	0	
5.0-6.5		0	4	slight gasoline odor
7.5-9.0		0	0	
10-11.5		0	2	slight gasoline odor

BRAUN

ORGANIC VAPOR FIELD DATA SHEET

Boring Identification ST-5 Project No. EG-989 Date 8-16-90

Weather Conditions clear skies, wind calm, 70 degrees F

Auger Steam Cleaned? Yes X No

Sampler Cleamed Between Samples: Yes X No Method Trisodium Phosphate/Water

Detector: OVA HNu: 10.2eV X Calibration: Gas benzene (24.3 ppm)
11.7eV Date 8-14-90

Depth (feet)	Auger (ppm)	Spoon (ppm)	Head Space (ppm)	Notes/Geology
surface	0			
2.5-4.0		0	4	
5.0-6.5		0	11	
7.5-9.0		0	3	strong gasoline odor
10-11.5		2	30	slight gasoline odor; gasoline film

BRAUN

METHODS

1.1. Soil Boring and Monitoring Well Location: Monitoring well MW-1 was placed in the assumed upgradient flow direction while wells MW-2 and MW-3 were placed in the assumed downgradient flow direction (see Figure 2). Soil borings ST-1 through ST-5 were placed in proximity to the former tank basin as shown in Figure 2. Surface elevations of the borings were referenced to the benchmark which is the top nut of the fire hydrant located north of the driveway. The benchmark elevation is 755.63 feet NGVD.

1.2. Boring Logs: Log of Boring Sheets indicating the depths and descriptions of the various soil strata, the penetration resistances, and water level information are provided in Appendix G. The depths shown as changes between the strata are approximate. The actual changes may be transitional, and the depths of the transitions likely vary horizontally.

1.3 Soil Classification: Soils encountered in the borings were visually and manually classified in the field by the crew chief in accordance with ASTM D 2487 "Unified Soils Classification System" and ASTM D 2488 "Recommended Practice for Visual and Manual Description of Soils". A copy of ASTM D 2487 is attached. All samples were then returned to the laboratory for review of the field classifications by an environmental geologist. Representative samples will remain in our Minneapolis office for a period of 60 days to be available for examination.

1.4. Soil Vapor Monitoring: During the field investigation, soil samples were visually examined by an environmental professional for staining or other signs of apparent contamination. In addition, soils were scanned for the presence of organic vapors using a photoionization detector (PID). The PID was equipped with a 10.2 eV lamp and was calibrated to a benzene standard. The PID was used to test fresh surfaces of soil retrieved in the split-barrel samples, to test bore hole cuttings brought to the surface during drilling, and to perform jar headspace analysis outlined in "Interim Guidelines - Jar Headspace Analytical Screening Procedure" (MPCA, February 15, 1989). The Organic Vapor Field Data Sheets are provided in Appendix E.

1.5 Monitoring Well Installation: The monitoring wells were installed in accordance with the Minnesota Department of Health Water Well Construction Code. The monitoring well materials consist of 2-inch diameter, black iron riser pipe and a 10-foot long, 2-inch diameter, 0.010-inch slot stainless steel screen. Silica sand was placed around the screen as a filter pack, and a bentonite seal was placed above the filter pack. The annular space above the seal was grouted with neat cement placed through a tremie pipe. A protective pipe with a locking cap was placed over the riser pipe and embedded into the cement seal at the surface. Three bumper posts were installed around the monitoring well for additional protection. Monitoring well construction diagrams are provided in Appendix G.

1.6 Groundwater Measurements: Groundwater measurements were taken in the monitoring wells on August 20, 1990. Measurements were taken with chalked steel tape within 0.01 feet in reference to the top of the riser pipe. Elevations corresponding to top-of-riser-pipe are provided on the monitoring well field data sheets provided in Appendix K.

1.7 Stabilization Tests: An initial stabilization test was conducted at each well according to procedures described in "Procedures for Groundwater Monitoring", Minnesota Pollution Control Agency guidelines, December, 1986. The tests consisted of pumping the wells until the water

exhibited consistent pH, temperature and conductivity readings. Once these criteria were met, groundwater samples were then collected for laboratory analysis.

1.8 Groundwater Sampling Procedures: Groundwater sampling was conducted according to procedures described in "Procedures for Groundwater Monitoring: Minnesota Pollution Control Agency guidelines", December, 1986. Following completion of the stabilization tests, each well was sampled using a ®Teflon bailer. The bailer was cleaned with methanol and rinsed with deionized water between successive sample collections to guard against possible cross contamination. Samples were collected using a clean ®Teflon bailer, placed in clean, VOA glass screw-top vials having Teflon®-lined caps, labeled, and were transported to our laboratory under refrigerated conditions using Braun Chain-of-Custody procedures.

1.9 Chemical Analysis: All analyses were performed using EPA or other recognized standard procedures. Data have been reviewed prior to release and all quality control guidelines have been met. Specific information on standard operating procedures, detection limits, and quality control measures is available upon request.

1.10 Soil Sampling: Five soil samples were collected from the borings by an environmental geologist for chemical analysis. The soil samples with the highest PID readings in each boring (ST-1 through ST-5) were selected for chemical analysis. The samples were placed in clean-VOA glass, screw-top vials with Teflon®-lined caps, labeled and transported to our laboratory under refrigerated conditions using Braun Chain-of-Custody procedures.

MONITORING WELL PERMIT
MINNESOTA DEPARTMENT OF HEALTH
WELL MANAGEMENT UNIT

DATE OF APPLICATION: August 8, 1990
DATE ISSUED: August 14, 1990

PERMIT NUMBER: 1175
UNIQUE WELL NUMBER(S): 510118

In the matter of the application of Braun Environmental Laboratories, Inc., for a permit to construct one monitoring well located at the SW¼ of the NW¼ of the NE¼ of Section 19, Range 23W, Township 114N, (705 Syndicate) Jordan, Scott County, Minnesota.

Pursuant to Minnesota Statutes, Chapter 103I, and on the basis of statements and information contained in the permit application and supporting materials, permission is hereby granted, to Braun Environmental Laboratories, Inc., to construct a groundwater monitoring well located on property described as the SW¼ of the NW¼ of the NE¼ of Section 19, Range 23W, Township 114N, (705 Syndicate) Jordan, Scott County, Minnesota.

GENERAL PROVISIONS

1. This permit shall not release the permittee from any liability or obligation imposed by State law or local ordinances relating thereto and shall remain in force subject to all conditions and limitations now or hereafter imposed by law.

2. No changes shall be made in construction materials, construction procedures, or well location specified in submitted documents without permission previously obtained from the Commissioner of Health.

3. The permittee shall allow inspection by the Minnesota Department of Health (MDH) during well construction.

4. No liability shall be imposed upon or incurred by the State of Minnesota or any of its officers, agents, or employees, officially or personally, on account of the granting hereof or on account of any damage to any person or property resulting from any act or omission of the permittee or any of its agents, employees, or contractors relating to any matter hereunder. This permit shall not be construed as estopping or limiting any legal claims or right of action of any person other than the State against the permittee, its agents, employees, or contractors for violation of, or failure to comply with the provisions of the permit or applicable provisions of the law.

5. Wells shall be constructed, maintained and abandoned in accordance with the requirements of the Minnesota Water Well Construction Code.

LOG OF BORING

BRAUN ENVIRONMENTAL LABS.

PROJECT: **EG-989**
U.S.T. REMEDIAL INVESTIGATION

MnDOT/Jordan Truck Station
705 Syndicate Street
Jordan, Minnesota

BORING: **MW-1**

LOCATION:
23 feet west and 3 feet south of southwest corner of garage.

DATE: **8/15/90** SCALE: **1" = 4'**

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	H-Nu READINGS Split Spoon (ppm)	Jar Headspace
755.0	0.0						
754.2	0.8	CL	LEAN CLAY with SAND, with Roots, black, moist. (Topsoil)			0* (surface)	
		CL	LEAN CLAY with SAND, with trace Gravel, gray mottled with yellow and red, moist, medium to very stiff. (Swamp Deposit)	6		0 (2.5-4.0')	0
				17		0 (5.0-6.5')	0
748.0	7.0						
		SP SM	POORLY GRADED SAND with SILT, medium- to coarse-grained, with trace Gravel and layers of Cobbles, gray, waterbearing, dense. (Coarse Alluvium)	13		0 (7.5-9.0')	0
745.0	10.0			17		0 (10.0-11.5')	0
744.0	11.0	CL					
		SC SM	SANDY LEAN CLAY, with Gravel, dark brown, waterbearing, very stiff. (Swamp Deposit)	11		0 (12.5-14')	0
740.0	15.0		CLAYEY SILTY SAND, medium- to coarse-grained, with Gravel, yellow brown, waterbearing, medium dense. (Coarse Alluvium)	8		0 (15.0-16.5')	0
739.0	16.0	SP SM	POORLY GRADED SAND with SILT, medium- to coarse-grained, with Gravel, yellow brown, waterbearing, loose. (Coarse Alluvium)				

*PID reading from auger cuttings to 2.5 feet.

Minnesota Unique Well Number: 510118

END OF BORING

Water level down 9.5 feet with 15.0 feet of hollow-stem auger in the ground.

Monitoring well installed to 14.8 feet.

Water level elevation 747.22 feet on 8/20/90.

Drilling Method: 6 1/4" Hollow-stem augers

Drill Crew Chief: Mike Niesen

Field Inspector: Tim Singer

Licensed Monitoring Well Engineer: Paul Nelson

MN Unique
Well Number 510118

MONITORING WELL FIELD DATA SHEET

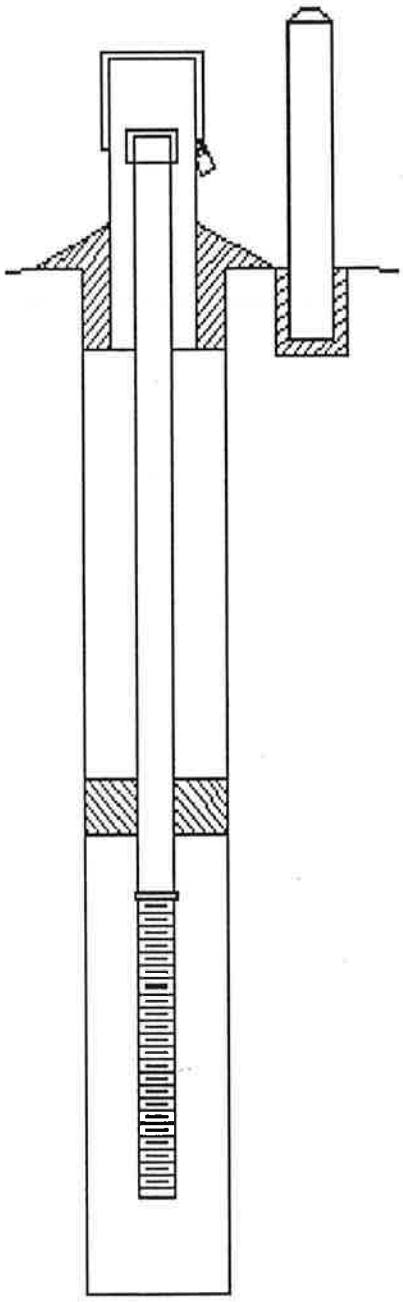
CLIENT Minnesota DOT PROJECT NUMBER EG-989 LOCATION Jordan, MN
WELL NUMBER MW-1 WELL LOCATION See site map.
CREW MN/SB/TCS B.M. LOCATION AND ELEV. (±0.01') Top of operating nut from fire hydrant
DATE OF INSTALLATION 8/15/90 North of driveway.

Stick up above ground (to 0.1') 2.8'
Top of riser pipe (w/o cap) Elev.(± 0.01') 757.78'

Ground Surface Elev. (±0.1') 755.0'

Approximate water level before installation 9.5'

Approximate depth to first water encountered in drilling 7.5'



Depth to top of Seal 3.0'
Depth to bottom of Seal 4.0'
Depth to top of Screen 4.8'

Depth to bottom of Screen 14.8'
Depth to bottom of Boring 16.0'

Method of Advance:
HSA 0-16' I.D. 6 1/4"
Casing ____ I.D. ____
Tricone ____ O.D. ____

BUMPER POST: PROTECTIVE COVER:
4"x4"x7' Wood ____ Type 4" steel
4"x7' Black Length 5'
capped steel 3 Lock # 2106

NEAT CEMENT GROUT ABOVE SEAL:
Amount of material used (lb) 294
Proportions: bentonite 2% cement 98%

RISER PIPE:
Type black iron
Diameter 2"
Total Length 7.5'
Sections used 1-5.5'; 1-2.0'
Couplings 2
Cap: Yes X No ____

SEAL MATERIAL:
Type of material used bentonite pellets
Amount of material used (lb) 33

FILTER MATERIAL:
Type of material used #20 silica sand
Amount of material used (lb) 350

SCREEN:
Type stainless steel
Slot Size 0.010"
Length 1-10'
Diameter 2"
Plug/Point plug

Remarks: ____

Completed by: TSC/mab

BRAUN

STATE OF MINNESOTA — DEPARTMENT OF HEALTH

WATER WELL RECORD

Minnesota Statutes 156A.01-.08

MINNESOTA UNIQUE WELL NO. for Water Sample: 610118

1. LOCATION OF WELL

County Name: Scott — MW-1

Township Name	Township Number	Range Number	Section No.	Fraction
Sand Creek	114 (N or S)	23 (E or W)	19	NW ¼ NW ¼ NE ¼

Numerical Street Address and City of Well Location or Distance from Road Intersection: 705 Syndicate Street, Jordon, MN 55352

Show exact location of well in section grid with "X." (N, W, E, S; ½ mi.; 1 mile)

Addition Name:

Block Number:

Lot Number:

Sketch map of well location.

2. PROPERTY OWNER'S NAME: Minnesota Department of Transportation

Mailing Address if different than property address indicated above: Minnesota Department of Transportation, 2055 N. Lilac Drive, Golden Valley, MN 55422

3. FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Lean Clay w/Sand	Black		0	0.8
Sandy Lean Clay	Gray	Medium to Stiff	0.8	7.0
Sandy Lean Clay	Dark Brown	Very Stiff	7.0	11.0
Silty Sand w/Gravel	Yellowish Brown	Loose to med.dense	11.0	15.0

Use a second sheet, if needed

4. WELL DEPTH (completed): 17.5 ft. — Date of Completion: 8-15-90

5. DRILLING METHOD: ☐ Cable Tool ☐ Reverse ☐ Driven ☐ Dug ☐ Hollow Rod ☐ Air ☒ Bored ☐ _____ ☐ Rotary ☐ Jetted ☐ Power Auger

6. DRILLING FLUID: None

7. USE: ☐ Domestic ☒ Monitoring ☐ Heat Pump ☐ Irrigation ☐ Public ☐ Industry ☐ Test Well ☐ Municipal ☐ Commercial ☐ Air Conditioning ☐ _____

8. CASING: ☒ Black ☒ Threaded ☐ Welded ☐ Plastic ☐ _____

HEIGHT: Above/Below Surface 2.7 ft. Drive Shoe? Yes ___ No X

		HOLE DIAM.
2.0 in. to 7.5 ft.	Weight ___ lbs./ft.	12 in. to 15 ft.
___ in. to ___ ft.	Weight ___ lbs./ft.	___ in. to ___ ft.
___ in. to ___ ft.	Weight ___ lbs./ft.	___ in. to ___ ft.

9. SCREEN: Make Johnson — Type Stainless Steel — Diam. 2" — Slot/Gauze .010 — Length 10.0' — Set between 4.8 ft. and 14.8 ft. — Or open hole from ___ ft. to ___ ft. — FITTINGS: None

10. STATIC WATER LEVEL: 7.86 ft. ☒ below ☐ above land surface — Date Measured 8-10-90

11. PUMPING LEVEL (below land surface): N/A

___ ft. after ___ hrs. pumping ___ g.p.m.

___ ft. after ___ hrs. pumping ___ g.p.m.

12. HEAD WELL COMPLETION: ☐ Pitless adapter manufacturer ___ Model ___ ☐ Basement offset ☒ At least 12" above ground ☐ Plastic casing protection ___

13. WELL GROUTED? ☒ Yes ☐ No

☒ Neat Cement ☒ Bentonite ☐ _____

Grout material	from	to	ft. cu. yds.
Portland	3.0	0.0	.087
Bentonite	4.0	3.0	

14. NEAREST SOURCES OF POSSIBLE CONTAMINATION: 25.0 feet N direction Petroleum type

Well disinfected upon completion? ☐ Yes ☒ No

15. PUMP: Date installed ___ ☒ Not installed

Manufacturer's name ___

Model number ___ HP ___ Volts ___

Length of drop pipe ___ ft. Capacity ___ g.p.m.

Material of drop pipe ___

Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ Centrifugal ☐ _____

16. ABANDONED WELLS: Unused well on property? ☐ Yes ☒ No

Sealed ☐ Permanent ☐ Temporary ☐ Not sealed

17. REMARKS, ELEVATION, SOURCE OF DATA, etc.

MW-1 installed to 14.8 feet below ground level.

IMPORTANT: 010118

18. WATER WELL CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Braun Environmental Laboratories, Inc. 0077
Licensee Business Name *License No.*

Address 6800 S. T.H. 169, Minneapolis, MN 55435

Signed [signature] *Authorized Representative* Date 9-10-90

Mike Niesen Date 8-15-90
Name of Driller

5/74 30M
7/76 30M

MONITORING WELL PERMIT
MINNESOTA DEPARTMENT OF HEALTH
WELL MANAGEMENT UNIT

DATE OF APPLICATION: August 8, 1990 **PERMIT NUMBER: 1176**
DATE ISSUED: August 14, 1990 **UNIQUE WELL NUMBER(S): 510119**

In the matter of the application of Braun Environmental Laboratories, Inc., for a permit to construct one monitoring well located at the SW¼ of the NW¼ of the NE¼ of Section 19, Range 23W, Township 114N, (705 Syndicate) Jordan, Scott County, Minnesota.

Pursuant to Minnesota Statutes, Chapter 103I, and on the basis of statements and information contained in the permit application and supporting materials, permission is hereby granted, to Braun Environmental Laboratories, Inc., to construct a groundwater monitoring well located on property described as the SW¼ of the NW¼ of the NE¼ of Section 19, Range 23W, Township 114N, (705 Syndicate) Jordan, Scott County, Minnesota.

GENERAL PROVISIONS

1. This permit shall not release the permittee from any liability or obligation imposed by State law or local ordinances relating thereto and shall remain in force subject to all conditions and limitations now or hereafter imposed by law.

2. No changes shall be made in construction materials, construction procedures, or well location specified in submitted documents without permission previously obtained from the Commissioner of Health.

3. The permittee shall allow inspection by the Minnesota Department of Health (MDH) during well construction.

4. No liability shall be imposed upon or incurred by the State of Minnesota or any of its officers, agents, or employees, officially or personally, on account of the granting hereof or on account of any damage to any person or property resulting from any act or omission of the permittee or any of its agents, employees, or contractors relating to any matter hereunder. This permit shall not be construed as estopping or limiting any legal claims or right of action of any person other than the State against the permittee, its agents, employees, or contractors for violation of, or failure to comply with the provisions of the permit or applicable provisions of the law.

5. Wells shall be constructed, maintained and abandoned in accordance with the requirements of the Minnesota Water Well Construction Code.

LOG OF BORING

BRAUN ENVIRONMENTAL LABS.

PROJECT: **EG-989**
U.S.T. REMEDIAL INVESTIGATION

MnDOT/Jordan Truck Station
705 Syndicate Street
Jordan, Minnesota

BORING: **MW-2**

LOCATION:
64 feet west and 3 feet north of northwest corner of garage.

DATE: **8/16/90** SCALE: **1" = 4'**

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	H-Nu READINGS Split Spoon (ppm) Jar Headspace
754.5	0.0					
753.7	0.8	CL	LEAN CLAY with SAND, with Roots, black, moist. (Topsoil)			0* (surface)
750.5	4.0	CL	SANDY LEAN CLAY, with trace Gravel, yellow brown, moist, rather soft. (Swamp Deposit)	4		0 (2.5-4.0') 0
742.5	12.0	OL	SANDY ORGANIC SILT, with layer of very fine-grained Sand, with layer of Gravel at 11.5 feet, gray to dark gray, moist to wet to waterbearing, rather stiff to soft. (Swamp Deposit)	9		0 (5.0-6.5') 0
				2		0 (7.5-9.0') 0
				3		0 (10.0-11.5') 0
738.5	16.0	SP SM	POORLY GRADED SAND with SILT, medium- to coarse-grained, with Wood fragments, with trace Gravel, dark gray to yellow brown, waterbearing, loose to medium dense. (Coarse Alluvium)	10		0 (12.5-14') 2
				12		0 (15.0-16.5') 0
			END OF BORING			

Water level down 9.0 feet with 15.0 feet of hollow-stem auger in the ground.

Monitoring well installed to 15.0 feet.

Water level elevation 747.04 feet on 8/20/90.

Drilling Method: 6 1/4" Hollow-stem augers

Drill Crew Chief: Mike Niesen

Field Inspector: Tim Singer

Licensed Monitoring Well Engineer: Paul Nelson

*PID reading from auger cuttings to 2.5 feet.

Minnesota Unique Well Number: 510119

MN Unique
Well Number 510119

MONITORING WELL FIELD DATA SHEET

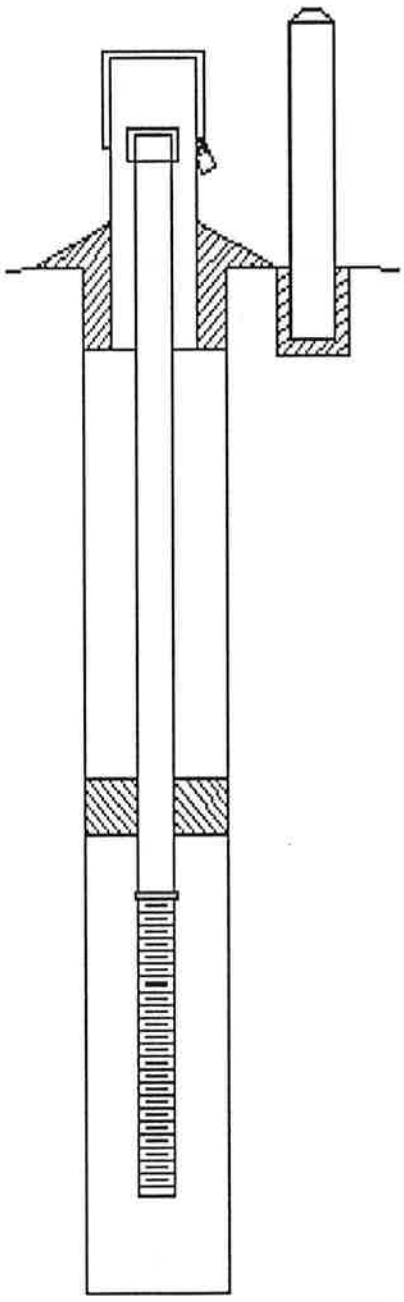
CLIENT Minnesota DOT PROJECT NUMBER EG-989 LOCATION Jordan, MN
WELL NUMBER MW-2 WELL LOCATION See site map.
CREW MN/MB/TCS B.M. LOCATION AND ELEV. (±0.01') Top of operating nut from fire hydrant
DATE OF INSTALLATION 8/15/90-8/16/90 North of driveway.

Stick up above ground (to 0.1') 2.6'
Top of riser pipe (w/o cap) Elev.(± 0.01') 757.08'

Ground Surface Elev. (±0.1') 754.5'

Approximate water level before installation 9.0'

Approximate depth to first water encountered in drilling 10.0'



Depth to top of Seal 3.0'
Depth to bottom of Seal 4.0'
Depth to top of Screen 5.0'

Depth to bottom of Screen 15.0'
Depth to bottom of Boring 16.0'

Method of Advance:
HSA 0-16' I.D. 6 1/4"
Casing ____ I.D. ____
Tricone ____ O.D. ____

BUMPER POST: PROTECTIVE COVER:
4"x4"x7' Wood ____ Type 4" steel
4"x7' Black Length 5'
capped steel 3 Lock # 2106

NEAT CEMENT GROUT ABOVE SEAL:
Amount of material used (lb) 294
Proportions: bentonite 2% cement 98%

RISER PIPE:
Type black iron
Diameter 2"
Total Length 7.5'
Sections used 1-5.5'; 1-2.0'
Couplings 2
Cap: Yes X No

SEAL MATERIAL:
Type of material used bentonite pellets
Amount of material used (lb) 33

FILTER MATERIAL:
Type of material used #20 silica sand
Amount of material used (lb) 300

SCREEN:
Type stainless steel
Slot Size 0.010"
Length 1-10'
Diameter 2"
Plug/Point plug

Remarks:

Completed by: TSC/mab

BRAUN

WATER WELL RECORD

Minnesota Statutes 156A.01-.08

MINNESOTA UNIQUE WELL NO. for Water Sample: 510119

1. LOCATION OF WELL

County Name: Scott

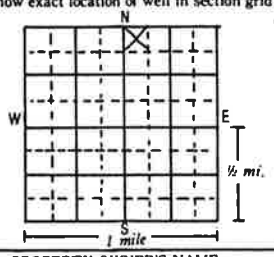
MW-2

Township Name	Township Number	Range Number	Section No.	Fraction
Sand Creek	114 (N/S)	23 (E/W)	19	NW ¼ NW NE ¼

Numerical Street Address and City of Well Location or Distance from Road Intersection.

705 Syndicate Street, Jordan, MN 55352

Show exact location of well in section grid with "X."

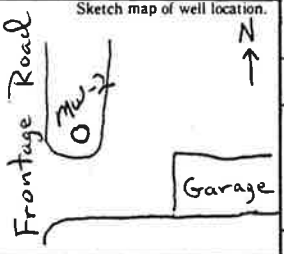


Addition Name

Block Number

Lot Number

Sketch map of well location.



2. PROPERTY OWNER'S NAME: Minnesota Department of Transportation

Mailing Address if different than property address indicated above: Minnesota Department of Transportaion, 2055 N. Lilac Golden Valley, MN 55422

3. FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Lean Clay W/Sand	Black		0.0	0.8
Sandy Lean Clay	Yellowish Brown	Rather Soft	0.8	4.0
Organic Silt	Dark Gray	Soft	4.0	12.0
Silty Sand	Yellowish Brown	Med. Dense	12.0	15.0

Use a second sheet, if needed

4. WELL DEPTH (completed): 17.5 ft. Date of Completion: 8-16-90

5. DRILLING METHOD: ☐ Cable Tool ☐ Reverse ☐ Driven ☐ Dug ☐ Hollow Rod ☐ Air ☒ Bored ☐ _____ ☐ Rotary ☐ Jetted ☐ Power Auger

6. DRILLING FLUID: None

7. USE: ☐ Domestic ☒ Monitoring ☐ Heat Pump ☐ Irrigation ☐ Public ☐ Industry ☐ Test Well ☐ Municipal ☐ Commercial ☐ Air Conditioning ☐ _____

8. CASING: ☒ Black ☒ Threaded ☐ Galv. ☐ Welded ☐ Plastic ☐

HEIGHT: Above/Below Surface 2.5 ft. Drive Shoe? Yes ~~X~~ No X

2.0 in. to 7.5 ft. Weight _____ lbs./ft.

_____ in. to _____ ft. Weight _____ lbs./ft.

_____ in. to _____ ft. Weight _____ lbs./ft.

HOLE DIAM.: 12 in. to 15 ft. ___ in. to ___ ft. ___ in. to ___ ft.

9. SCREEN: Make Johnson Type Stainless Steel Diam. 2" Slot/Gauze .010 Length 10.0' Set between 5.0 ft. and 15.0 ft.

Or open hole from _____ ft. to _____ ft.

FITTINGS: None

10. STATIC WATER LEVEL: 7.54 ft. ☒ below ☐ above land surface Date Measured 8-20-90

11. PUMPING LEVEL (below land surface) N/A

_____ ft. after _____ hrs. pumping _____ g.p.m.

_____ ft. after _____ hrs. pumping _____ g.p.m.

12. HEAD WELL COMPLETION

☐ Pitless adapter manufacturer _____ Model _____

☐ Basement offset ☒ At least 12" above ground

☐ Plastic casing protection _____

13. WELL GROUTED? ☒ Yes ☐ No

☒ Neat Cement ☒ Bentonite ☐ _____

Grout material Portland from 3.0 to 0.0 ft. cu. yds. .087

Bentonite 4.0 3.0

14. NEAREST SOURCES OF POSSIBLE CONTAMINATION

32.0 feet E direction Petroleum type

Well disinfected upon completion? ☐ Yes ☒ No

15. PUMP

Date installed _____ ☒ Not installed

Manufacturer's name _____

Model number _____ HP _____ Volts _____

Length of drop pipe _____ ft. Capacity _____ g.p.m.

Material of drop pipe _____

Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating ☐ Jet ☐ Centrifugal ☐ _____

16. ABANDONED WELLS

Unused well on property? ☐ Yes ☒ No

Sealed ☐ Permanent ☐ Temporary ☐ Not sealed

17. REMARKS, ELEVATION, SOURCE OF DATA, etc.

MW-2 installed to 15.0 feet below ground level.

IMPORTANT: 010119

18. WATER WELL CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Braun Environmental Laboratories, Inc. 0077
Licensee Business Name License No.

Address 6800 S. T.H. 169, Minneapolis, MN 55435

Signed _____ Date 9-10-90
Authorized Representative

Mike Niesen Date 8-16-90
Name of Driller

5/74 30M
7/76 30M
7/78 20M

MONITORING WELL PERMIT
MINNESOTA DEPARTMENT OF HEALTH
WELL MANAGEMENT UNIT

DATE OF APPLICATION: August 8, 1990
DATE ISSUED: August 14, 1990

PERMIT NUMBER: 1177
UNIQUE WELL NUMBER(S): 510120

In the matter of the application of Braun Environmental Laboratories, Inc., for a permit to construct one monitoring well located at the SW¼ of the NW¼ of the NE¼ of Section 19, Range 23W, Township 114N, (705 Syndicate) Jordan, Scott County, Minnesota.

Pursuant to Minnesota Statutes, Chapter 103I, and on the basis of statements and information contained in the permit application and supporting materials, permission is hereby granted, to Braun Environmental Laboratories, Inc., to construct a groundwater monitoring well located on property described as the SW¼ of the NW¼ of the NE¼ of Section 19, Range 23W, Township 114N, (705 Syndicate) Jordan, Scott County, Minnesota.

GENERAL PROVISIONS

1. This permit shall not release the permittee from any liability or obligation imposed by State law or local ordinances relating thereto and shall remain in force subject to all conditions and limitations now or hereafter imposed by law.

2. No changes shall be made in construction materials, construction procedures, or well location specified in submitted documents without permission previously obtained from the Commissioner of Health.

3. The permittee shall allow inspection by the Minnesota Department of Health (MDH) during well construction.

4. No liability shall be imposed upon or incurred by the State of Minnesota or any of its officers, agents, or employees, officially or personally, on account of the granting hereof or on account of any damage to any person or property resulting from any act or omission of the permittee or any of its agents, employees, or contractors relating to any matter hereunder. This permit shall not be construed as estopping or limiting any legal claims or right of action of any person other than the State against the permittee, its agents, employees, or contractors for violation of, or failure to comply with the provisions of the permit or applicable provisions of the law.

5. Wells shall be constructed, maintained and abandoned in accordance with the requirements of the Minnesota Water Well Construction Code.

LOG OF BORING

BRAUN ENVIRONMENTAL LABS.

PROJECT: EG-989
U.S.T. REMEDIAL INVESTIGATION

MnDOT/Jordan Truck Station
705 Syndicate Street
Jordan, Minnesota

BORING: MW-3

LOCATION:
27 feet north and 1 foot west of northwest corner of garage.

DATE: 8/16/90 SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	H-Nu READINGS (ppm) Split Spoon	Jar Headspace
754.8	0.0						
754.3	0.5		Bituminous.			0* (surface)	
753.3	1.5	CL	FILL: POORLY GRADED SAND with SILT, fine-grained, with Gravel, brown, moist.	5		0 (2.5-4.0')	0
750.8	4.0	OL	LEAN CLAY with SAND, gray, moist, rather soft. (Swamp Deposit)	7		0 (5.0-6.5')	0
747.8	7.0	CL	ORGANIC SILT with SAND, black, moist, medium. (Swamp Deposit)	2		0 (7.5-9.0')	0
745.3	9.5	SP SM	SANDY LEAN CLAY, with trace Gravel, dark brown, moist, soft. (Swamp Deposit)	14		0 (10.0-11.5')	0
738.8	16.0		POORLY GRADED SAND with SILT, medium- to coarse-grained, with Gravel, with layer of Silty Clayey Sand, yellow brown, waterbearing, medium dense to loose. (Coarse Alluvium)	8 12		0 (12.5-14') 0 (15.0-16.5')	0 0

END OF BORING

Water level down 9.0 feet with 15.0 feet of hollow-stem auger in the ground.

Monitoring well installed to 15.0 feet.

Water level elevation 747.11 feet on 8/20/90.

Drilling Method: 6 1/4" Hollow-stem augers

Drill Crew Chief: Mike Niesen

Field Inspector: Tim Singer

Licensed Monitoring Well Engineer: Paul Nelson

*PID reading from auger cuttings to 2.5 feet.

Minnesota Unique Well Number: 510120

MN Unique
Well Number 510120

MONITORING WELL FIELD DATA SHEET

CLIENT Minnesota DOT PROJECT NUMBER EG-989 LOCATION Jordan, MN
WELL NUMBER MW-3 WELL LOCATION See site map.
CREW MN/MB/TCS B.M. LOCATION AND ELEV. (±0.01') Top of operating nut from fire hydrant
DATE OF INSTALLATION 8/16/90 North of driveway.

Stick up above ground (to 0.1') 2.5'
Top of riser pipe (w/o cap) Elev.(± 0.01') 757.25'

Ground Surface Elev. (±0.1') 754.8'

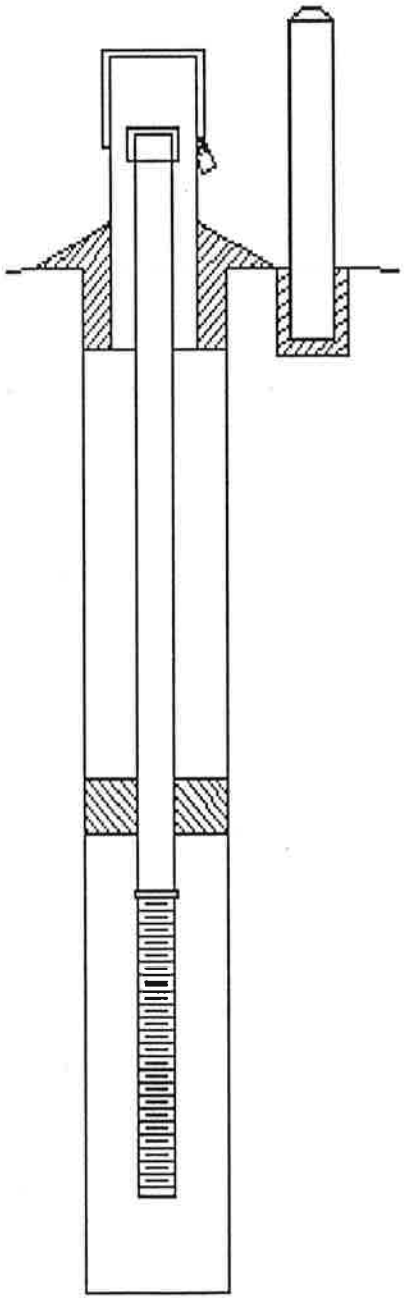
Approximate water level before installation 10.0'

Approximate depth to first water encountered in drilling 7.5'

Depth to top of Seal 3.0'
Depth to bottom of Seal 4.0'
Depth to top of Screen 5.0'

Depth to bottom of Screen 15.0'
Depth to bottom of Boring 16.0'

Method of Advance:
HSA 0-16' I.D. 6 1/4"
Casing I.D.
Tricone O.D.



BUMPER POST: PROTECTIVE COVER:
4"x4"x7' Wood Type 4" steel
4"x7' Black Length 5'
capped steel 3 Lock # 2106

NEAT CEMENT GROUT ABOVE SEAL:
Amount of material used (lb) 294
Proportions: bentonite 2% cement 98%

RISER PIPE:
Type black iron
Diameter 2"
Total Length 7.5'
Sections used 1-5.5'; 1-2.0'
Couplings 2
Cap: Yes X No

SEAL MATERIAL:
Type of material used bentonite pellets
Amount of material used (lb) 33

FILTER MATERIAL:
Type of material used #20 silica sand
Amount of material used (lb) 350

SCREEN:
Type stainless steel
Slot Size 0.010"
Length 1-10'
Diameter 2"
Plug/Point plug

Remarks:

Completed by: TSC/mab

BRAUN

STATE OF MINNESOTA — DEPARTMENT OF HEALTH

WATER WELL RECORD

Minnesota Statutes 156A.01-.08

MW-3

MINNESOTA UNIQUE WELL NO. for Water Sample: 510120

1. LOCATION OF WELL

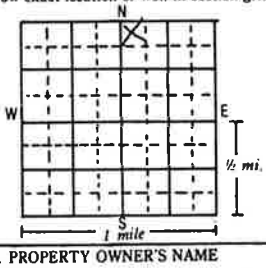
County Name: Scott

Township Name: Sand Creek | Township Number: 114 (N/S) | Range Number: 23 (E/W) | Section No.: 19 | Fraction: NW ¼ NW ¼ NE ¼

Numerical Street Address and City of Well Location or Distance from Road Intersection.

705 Syndicate Street, Jordan, MN 55352

Show exact location of well in section grid with "X."

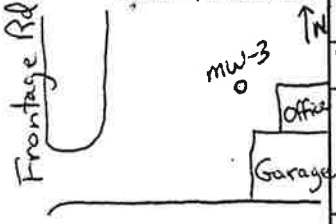


Addition Name

Block Number

Lot Number

Sketch map of well location.



2. PROPERTY OWNER'S NAME

Minnesota Department of Transportation

Mailing Address if different than property address indicated above. Minnesota Department of Transportation, 2055 Lilac Dr. Golden Valley, MN 55422

3. FORMATION LOG

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Bituminous	Black		0.0	0.5
Silty Sand W/Gravel	Brown		0.5	1.5
Lean Clay W/Sand	Gray	Rather Soft	1.5	4.0
Organic Silt W/Sand	Black	Med.	4.0	7.0
Sandy Lean Clay	Dark Brown	Soft	7.0	9.5
Silty Sand W/Gravel	Yellowish Brown	Med. Dense	9.5	15.0

Use a second sheet, if needed

4. WELL DEPTH (completed): 17.5 ft. | **Date of Completion**: 8-16-90

5. DRILLING METHOD

☐ Cable Tool ☐ Reverse ☐ Driven ☐ Dug
☐ Hollow Rod ☐ Air ☒ Bored ☐ _____
☐ Rotary ☐ Jetted ☐ Power Auger

6. DRILLING FLUID: None

7. USE

☐ Domestic ☒ Monitoring ☐ Heat Pump
☐ Irrigation ☐ Public ☐ Industry
☐ Test Well ☐ Municipal ☐ Commercial
☐ Air Conditioning ☐ _____

8. CASING

☒ Black ☒ Threaded
☐ Galv. ☐ Welded
☐ Plastic ☐

HEIGHT: Above/Below Surface 2.5 ft.
Drive Shoe? Yes ___ No X

2.0 in. to 7.5 ft. Weight _____ lbs./ft.
_____ in. to _____ ft. Weight _____ lbs./ft.
_____ in. to _____ ft. Weight _____ lbs./ft.

HOLE DIAM.: 12 in. to 15 ft. ___ in. to ___ ft. ___ in. to ___ ft.

9. SCREEN

Make: Johnson
Type: Stainless Steel | Diam.: 2"
Slot/Gauze: .010 | Length: 10.0'
Set between 5.0 ft. and 15.0 ft.
Or open hole from _____ ft. to _____ ft.
FITTINGS: None

10. STATIC WATER LEVEL: 7.74 ft. ☒ below ☐ above land surface | Date Measured: 8-20-90

11. PUMPING LEVEL (below land surface): N/A

_____ ft. after _____ hrs. pumping _____ g.p.m.
_____ ft. after _____ hrs. pumping _____ g.p.m.

12. HEAD WELL COMPLETION

☐ Pitless adapter manufacturer _____ Model _____
☐ Basement offset ☒ At least 12" above ground
☐ Plastic casing protection _____

13. WELL GROUTED? ☒ Yes ☐ No

☒ Neat Cement ☒ Bentonite ☐ _____

Grout material	from	to	ft. cu. yds.
Portland	3.0	0.0	.087
Bentonite	4.0	3.0	

14. NEAREST SOURCES OF POSSIBLE CONTAMINATION

28.0 feet S direction Petroleum type

Well disinfected upon completion? ☐ Yes ☒ No

15. PUMP

Date installed _____ ☒ Not installed
Manufacturer's name _____
Model number _____ HP _____ Volts _____
Length of drop pipe _____ ft. Capacity _____ g.p.m.
Material of drop pipe _____
Type: ☐ Submersible ☐ L.S. Turbine ☐ Reciprocating
☐ Jet ☐ Centrifugal ☐ _____

16. ABANDONED WELLS

Unused well on property? ☐ Yes ☒ No
Sealed ☐ Permanent ☐ Temporary ☐ Not sealed

17. REMARKS, ELEVATION, SOURCE OF DATA, etc.

MW-3 installed to 15.0 feet below ground level.

IMPORTANT: 010120

18. WATER WELL CONTRACTOR CERTIFICATION

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Braun Environmental Laboratories, Inc. 0077
Licensee Business Name *License No.*

Address 6800 S. T.H. 169, Minneapolis, MN 55435

Signed _____ Date 9-10-90
Authorized Representative

Mike Niesen Date 8-16-90
Name of Driller

5/74 30M
7/76 30M

LOG OF BORING

BRAUN ENVIRONMENTAL LABS.

PROJECT: EG-989
U.S.T. REMEDIAL INVESTIGATION

MnDOT/Jordan Truck Station
705 Syndicate Street
Jordan, Minnesota

BORING: ST-1

LOCATION:
23 feet west and 18 feet north of northwest corner of garage.

DATE: 8/15/90

SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	H-Nu READINGS Split Spoon (ppm)	Jar Headspace
754.6	0.0						
754.1	0.5		Bituminous.			0* (surface)	
753.1	1.5	CL	FILL: POORLY GRADED SAND with SILT, fine-grained, with Gravel, dark brown, moist.	13		0 (2.5-4.0')	0
750.1	4.5	OL	LEAN CLAY with SAND, gray mottled with yellow and red, moist, stiff. (Swamp Deposit)	8		0 (5.0-6.5')	0
748.6	6.0	OL	ORGANIC SILT with SAND, brown black, moist, medium. (Swamp Deposit)	2		0 (7.5-9.0')	0
744.1	10.5		ORGANIC SILT, with layer of Sand, dark gray, wet to waterbearing, soft to very soft. (Swamp Deposit)	WH/ 1		0 (10.0-11.5')	0

END OF BORING

Water level down 9.5 feet with 10.0 feet of hollow-stem auger in the ground.

Water level down 6.9 feet after 24 hours.

Boring then grouted.

Drilling Method: 3 1/4" Hollow-stem augers

Drill Crew Chief: Mike Niesen

Field Inspector: Tim Singer

*PID reading from auger cuttings to 2.5 feet.

Soil sample taken at 10.0 feet for chemical analysis.

LOG OF BORING

BRAUN ENVIRONMENTAL LABS.

PROJECT: **EG-989**
U.S.T. REMEDIAL INVESTIGATION

MnDOT/Jordan Truck Station
705 Syndicate Street
Jordan, Minnesota

BORING: **ST-2**

LOCATION:
33 feet west and 5 feet north of northwest corner of garage.

DATE: **8/15/90** SCALE: **1" = 4'**

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	H-Nu READINGS Split Spoon (ppm) Jar Headspace
755.2	0.0					
754.7	0.5		Bituminous.			0* (surface)
753.7	1.5		FILL: POORLY GRADED SAND with SILT, fine-grained, with Gravel, brown, moist.	12		0 (2.5-4.0') 1
750.7	4.5	CL	LEAN CLAY with SAND, with trace Gravel, gray mottled with yellow and red, moist, rather stiff. (Swamp Deposit)	7		0 (5.0-6.5') 17
748.2	7.0	SP	SANDY LEAN CLAY, with layer of Sand, gray mottled with yellow and red, moist, medium. (Swamp Deposit)	9		15 (7.5-9.0') 120 Slight gasoline odor.
744.7	10.5		POORLY GRADED SAND, medium- to coarse-grained, with layer of Gravel, yellow-gray, waterbearing, loose to medium dense. (Coarse Alluvium)	11		20 (10.0-11.5') 150 Strong gasoline odor.

*PID reading from auger cuttings to 2.5 feet.

END OF BORING

Water level down 7.5 feet with 10.0 feet of hollow-stem auger in the ground.

Water level not encountered to cave-in depth of 6.5 feet after 24 hours.

Boring then grouted.

Soil sample taken at 7.5 feet for chemical analysis.

Drilling Method: 3 1/4" Hollow-stem augers

Drill Crew Chief: Mike Niesen

Field Inspector: Tim Singer

LOG OF BORING

BRAUN ENVIRONMENTAL LABS.

PROJECT: EG-989
U.S.T. REMEDIAL INVESTIGATION

MnDOT/Jordan Truck Station
705 Syndicate Street
Jordan, Minnesota

BORING: ST-3

LOCATION:
21 feet north and 9 feet west of southwest corner of garage.

DATE: 8/15/90

SCALE: 1" = 4'

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	H-Nu READINGS (ppm) Split Spoon	Jar Headspace
755.1	0.0						
754.6	0.5		Bituminous.			0* (surface)	
753.6	1.5		FILL: POORLY GRADED SAND with SILT, fine-grained, with Gravel, brown, moist.	10		0 (2.5-4.0')	8
750.6	4.5	CL	LEAN CLAY with SAND, gray, moist, rather stiff. (Swamp Deposit)	9		1 (5.0-6.5') Slight gasoline odor.	14
748.1	7.0	SP SM	SANDY LEAN CLAY, with layer of Sand, gray mottled with yellow, moist, rather stiff. (Swamp Deposit)	13		0 (7.5-9.0') Slight gasoline odor.	2
744.6	10.5		POORLY GRADED SAND with SILT, medium- to coarse-grained, with layer of Lean Clay, with Gravel, yellow-brown, waterbearing, medium dense. (Coarse Alluvium)	17		10 (10.0-11.5') Slight gasoline odor.	70

END OF BORING

Water level down 8.0 feet with 10.0 feet of hollow-stem auger in the ground.

Water level not encountered to cave-in depth of 6.4 feet after 24 hours.

Boring then grouted.

Drilling Method: 3 1/4" Hollow-stem augers

Drill Crew Chief: Mike Niesen

Field Inspector: Tim Singer

*PID reading from auger cuttings to 2.5 feet.

Soil sample taken at 10.0 feet for chemical analysis.

LOG OF BORING

BRAUN ENVIRONMENTAL LABS.

PROJECT: **EG-989**
U.S.T. REMEDIAL INVESTIGATION

MnDOT/Jordan Truck Station
705 Syndicate Street
Jordan, Minnesota

BORING: **ST-4**

LOCATION:
42 feet west and 12 feet north of northwest corner of garage.

DATE: **8/16/90**

SCALE: **1" = 4'**

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	H-Nu READINGS (ppm) Split Spoon	Jar Headspace
754.4	0.0						
753.9	0.5		Bituminous.			0* (surface)	
752.9	1.5	CL	FILL: POORLY GRADED SAND with SILT, fine-grained, with Gravel, brown, moist.	11		0 (2.5-4.0')	0
749.9	4.5	CL	LEAN CLAY with SAND, with layer of Organic Clay, gray, moist, rather stiff. (Swamp Deposit)	7		0 (5.0-6.5')	4
747.4	7.0	OL	SANDY LEAN CLAY, with Plant fibers, dark gray mottled with yellow and red, moist, medium. (Swamp Deposit)	WH/2		0 (7.5-9.0')	0
745.4	9.0	SP	ORGANIC SILT, with Plant fibers, dark gray mottled with yellow and red, wet to waterbearing, soft. (Swamp Deposit)	10		0 (10.0-11.5')	2
743.9	10.5		POORLY GRADED SAND, medium- to coarse-grained, with layer of Gravel, dark gray, waterbearing, loose. (Coarse Alluvium)				

Slight gasoline odor.

Slight gasoline odor.

*PID reading from auger cuttings to 2.5 feet.

Soil sample taken at 7.5 feet for chemical analysis.

END OF BORING

Water level down 7.5 feet with 10.0 feet of hollow-stem auger in the ground.

Water level down 7.0 feet after 2 hours.

Boring then grouted.

Drilling Method: 3 1/4" Hollow-stem augers

Drill Crew Chief: Mike Niesen

Field Inspector: Tim Singer

LOG OF BORING

BRAUN ENVIRONMENTAL LABS.

PROJECT: **EG-989**
U.S.T. REMEDIAL INVESTIGATION

MnDOT/Jordan Truck Station
705 Syndicate Street
Jordan, Minnesota

BORING: **ST-5**

LOCATION:
38 feet west and 17.5 feet north of southwest corner of garage.

DATE: **8/16/90** SCALE: **1" = 4'**

(See Report and Standard Plates for evaluation and descriptive terminology.)

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	H-Nu READINGS Split Spoon (ppm)	Jar Headspace
754.8	0.0						
754.3	0.5		Bituminous.			0* (surface)	
753.3	1.5	CL	FILL: POORLY GRADED SAND with SILT, fine-grained, with Gravel, brown, moist.	14		0 (2.5-4.0')	4
750.3	4.5	SC	LEAN CLAY with SAND, with trace Gravel, gray, moist, stiff. (Swamp Deposit)	6		0 (5.0-6.5')	11
747.8	7.0	SP	CLAYEY SAND, very fine- to fine-grained, with layer of Sand, gray, moist, loose. (Swamp Deposit)	3		0 (7.5-9.0')	3
744.8	10.0	SP	POORLY GRADED SAND, fine- to medium-grained, with layer of Clayey Sand, gray, waterbearing, very loose. (Coarse Alluvium)	18		2 (10.0-11.5')	30
744.3	10.5		POORLY GRADED SAND, fine- to medium-grained, with layer of Gravel, dark gray, waterbearing, medium dense. (Coarse Alluvium)				

Slight gasoline odor.
Slight gasoline film.
*PID reading from auger cuttings to 2.5 feet.

Soil sample taken at 10.0 feet for chemical analysis.

END OF BORING

Water level down 8.0 feet with 10.0 feet of hollow-stem auger in the ground.

Boring immediately grouted.

Drilling Method: 3 1/4" Hollow-stem augers

Drill Crew Chief: Mike Niesen

Field Inspector: Tim Singer

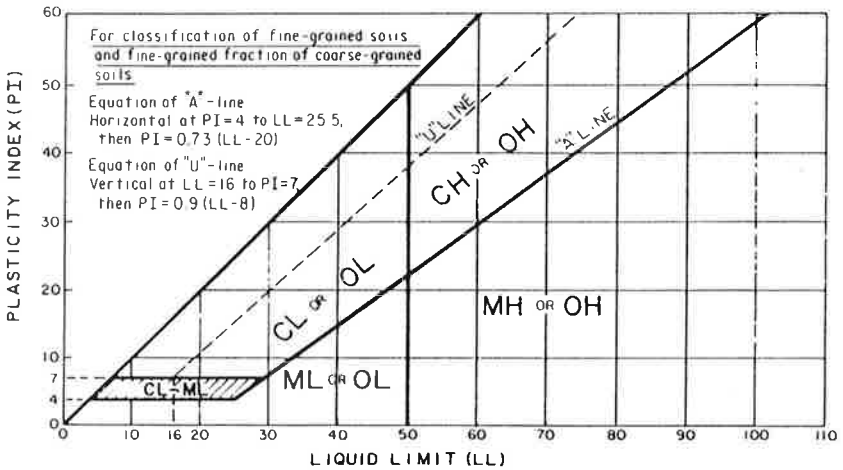
Descriptive Terminology

Designation D 2487 — 83

Standard Test Method for CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

CRITERIA FOR ASSIGNING GROUP SYMBOLS AND GROUP NAMES USING LABORATORY TESTS [a]				SOIL CLASSIFICATION	
				GROUP SYMBOL	GROUP NAME [b]
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	GRAVELS More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS Less than 5% fines [c]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [e]	GW	Well-graded gravel [f]
			$C_u < 4$ and/or $1 > C_c > 3$ [e]	GP	Poorly graded gravel [f]
		GRAVELS WITH FINES More than 12% fines [c]	Fines classify as ML or MH	GM	Silty gravel [f,g,h]
			Fines classify as CL or CH	GC	Clayey gravel [f,g,h]
	SANDS 50% or more of coarse fraction passes No. 4 sieve	CLEAN SANDS Less than 5% fines [d]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [e]	SW	Well-graded sand [i]
			$C_u < 6$ and/or $1 > C_c > 3$ [e]	SP	Poorly graded sand [i]
		SANDS WITH FINES More than 12% fines [d]	Fines classify as ML or MH	SM	Silty sand [g,h,i]
			Fines classify as CL or CH	SC	Clayey sand [g,h,i]
FINE-GRAINED SOILS 50% or more passed the No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50%	inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k,l,m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k,l,m]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [k,l,m,n] Organic silt [k,l,m,o]
	SILTS AND CLAYS Liquid limit 50% or more	inorganic	PI plots on or above "A" line	CH	Fat clay [k,l,m]
			PI plots below "A" line	MH	Elastic silt [k,l,m]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [k,l,m,p] Organic silt [k,l,m,q]
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

a. Based on the material passing the 3-in (75-mm) sieve.
b. If field sample contained cobbles and/or boulders, add "with cobbles and/or boulders" to group name.
c. Gravels with 5 to 12% fines require dual symbols
   GW-GM well graded gravel with silt
   GW-GC well graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
d. Sands with 5 to 12% fines require dual symbols
   SW-SM well graded sand with silt
   SW-SC well graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
e. $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
f. If soil contains ≥ 15% sand, add "with sand" to group name.
g. If fines classify as CL-ML, use dual symbol GC-GM, SC-SM.
h. If fines are organic, add "with organic fines" to group name.
i. If soil contains ≥ 15% gravel, add "with gravel" to group name.
j. If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
l. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
m. If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI < 4 or plots below "A" line.
p. PI plots on or above "A" line.
q. PI plots below "A" line.



LABORATORY TESTS

DD	Dry Density, pcf	OC	Organic Content, %
WD	Wet Density, pcf	S	Percent of Saturation, %
MC	Natural Moisture Content, %	SG	Specific Gravity
LL	Liquid Limit, %	C	Cohesion
PL	Plastic Limit, %	Ø	Angle of Internal Friction
PI	Plasticity Index, %	qu	Unconfined Compressive Strength

PARTICLE SIZE IDENTIFICATION

Boulders	over 12"
Cobbles	3" to 12"
Gravel	
Coarse	¾" — 3"
Fine	No. 4 — ¾"
Sand	
Coarse	No. 4 — No. 10
Medium	No. 10 — No. 40
Fine	No. 40 — No. 200
Silt	No. 200 — .005 mm
Clay	less than .005 mm

RELATIVE DENSITY OF COHESIONLESS SOILS

very loose	0 — 4 BPF
loose	5 — 10 BPF
medium dense	11 — 30 BPF
dense	31 — 50 BPF
very dense	50+ BPF

CONSISTENCY OF COHESIVE SOILS

very soft	0 — 1 BPF
soft	2 — 3 BPF
rather soft	4 — 5 BPF
medium	6 — 8 BPF
rather stiff	9 — 12 BPF
stiff	13 — 16 BPF
very stiff	17 — 30 BPF
hard	30+ BPF

DRILLING NOTES

Standard penetration test borings were advanced by 3¼" or 6¼" I.D. hollow-stem augers unless noted otherwise. Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube).

Power auger borings were advanced by 4" or 6" diameter, continuous-flite, solid stem augers. Soil classification and strain depths are inferred from disturbed samples augered to the surface and are therefore somewhat approximate. Power auger borings are designated by the prefix "B".

Hand probings were advanced manually with a 1½" diameter probe and are limited to the depth from which the probe can be manually withdrawn. Hand probings are indicated by the prefix "H".

SAMPLING — All samples are taken with the standard 2" O.D. split tube sampler, except where noted. TW indicates thin-wall (undisturbed) sample.

BPF — Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler is set 6" into undisturbed soil below the hollow-stem auger. Driving resistances are then counted for second and third 6" increments and added to get BPF. Where they differ significantly, they are reported in the following form — 2/12 for the second and third 6" increments respectively.

WH — WH indicates that sampler penetrated soil under weight of hammer and rods alone, driving not required.

NOTE — All tests run in accordance with applicable ASTM standards.

BRAUN™

WELL	K FT/MIN	K CM/SEC
MW-1		
FALLING HEAD	9.2E-03	4.6E-03
RISING HEAD	8.6E-03	4.3E-03
MW-2		
FALLING HEAD	2.6E-02	1.3E-02
RISING HEAD	2.9E-02	1.5E-02
MW-3		
FALLING HEAD	6.8E-04	3.4E-04
RISING HEAD	2.1E-04	1.1E-04

BRAUN™

EG-989 MW-1
FALLING HEAD
SE1000B
Environmental Logger
08/21 07:59
Unit# 00707 Test# 1
INPUT 1: Level (F)

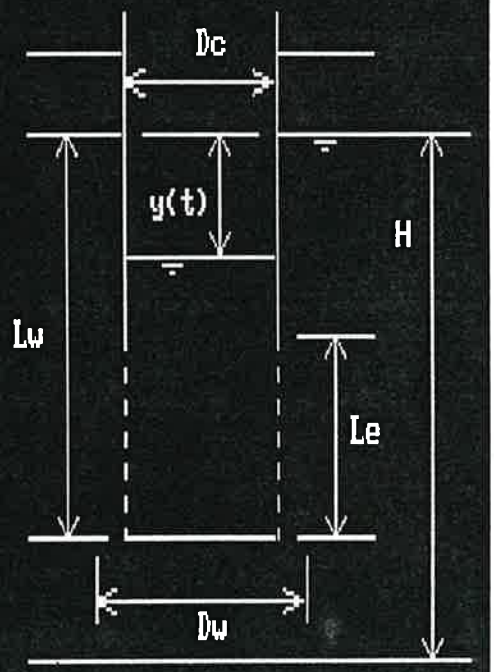
Reference 0.00
Scale factor 10.14
Offset - 0.09

Step# 0 08/20 12:18

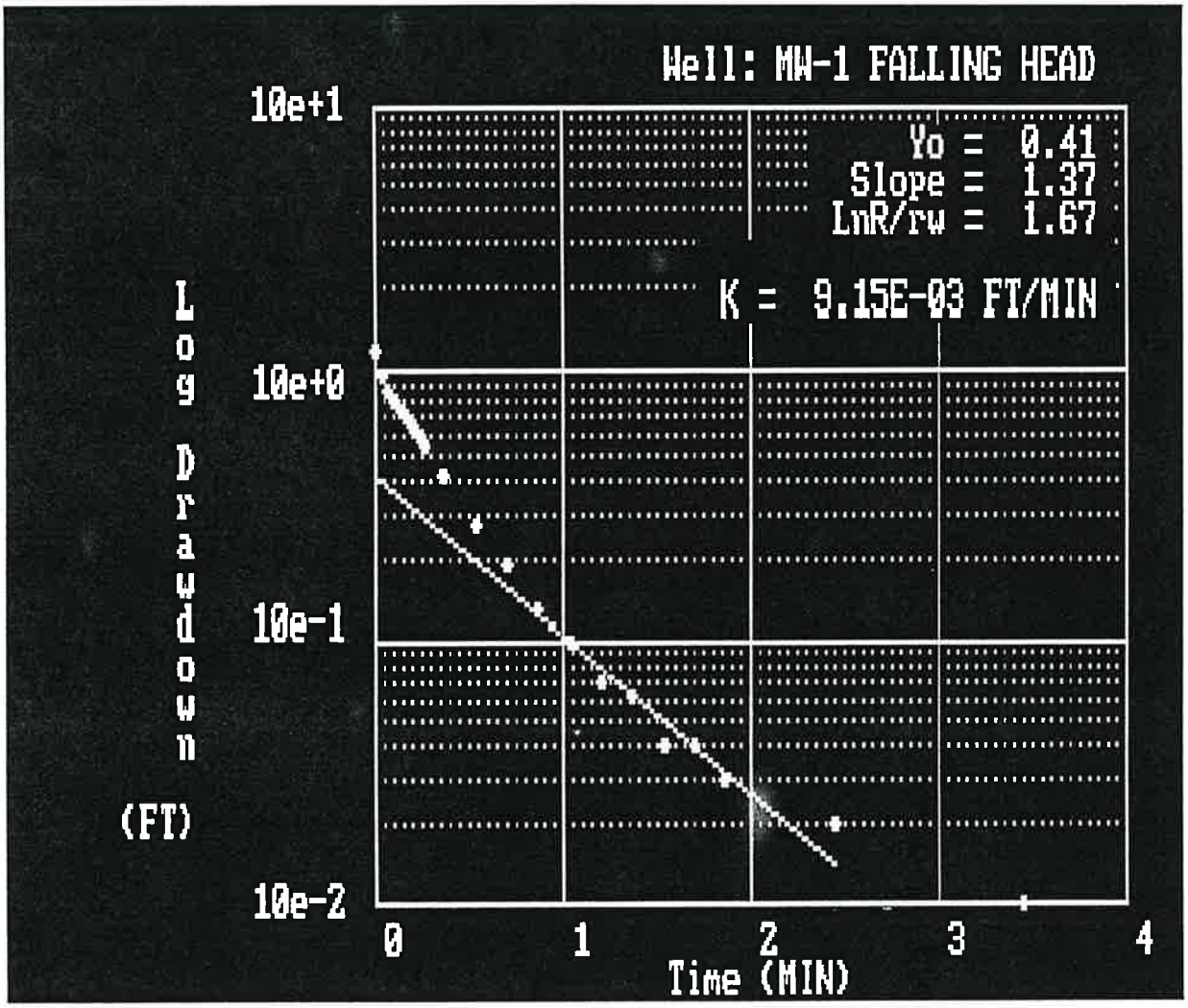
Elapsed Time	Value
0.0000	7.60
0.0033	7.60
0.0066	7.60
0.0099	7.61
0.0133	7.79
0.0166	8.06
0.0200	8.22
0.0233	8.44
0.0266	8.55
0.0300	8.41
0.0333	8.54
0.0500	8.82
0.0666	8.44
0.0833	8.58
0.1000	8.52
0.1166	8.47
0.1333	8.43
0.1500	8.40
0.1666	8.36
0.1833	8.33
0.2000	8.30
0.2166	8.28
0.2333	8.25
0.2500	8.22
0.2666	8.20
0.2833	8.18
0.3000	8.15
0.3166	8.13
0.3333	8.11
0.4167	8.01
0.5000	7.93
0.5833	7.87
0.6667	7.83
0.7500	7.79
0.8333	7.76
0.9167	7.73
1.0000	7.72
1.0833	7.70
1.1667	7.69
1.2500	7.67
1.3333	7.66
1.4166	7.66
1.5000	7.65
1.5833	7.64
1.6667	7.64
1.7500	7.64
1.8333	7.63
1.9167	7.63
2.0000	7.63
2.5000	7.62
3.0000	7.61
3.5000	7.61
4.0000	7.61
4.5000	7.60
5.0000	7.60
5.5000	7.60
6.0000	7.60
6.5000	7.60
7.0000	7.60
7.5000	7.60
8.0000	7.60
8.5000	7.60
9.0000	7.60
9.5000	7.60
10.0000	7.60
12.0000	7.60
14.0000	7.60
16.0000	7.60
18.0000	7.60
20.0000	7.60
22.0000	7.60
24.0000	7.60
26.0000	7.60
28.0000	7.60
30.0000	7.60
32.0000	7.60
34.0000	7.60
36.0000	7.60
38.0000	7.60
40.0000	7.60

BRAUN

```
      Well designation ? MW-1 FALLING HEAD

Input all data in consistent units.

       Well depth (Lw) ? 6.9
    Screen length (Le) ? 10
Saturated thickness (H) ? 40
   Casing diameter (Dc) ? .17
  Drilled diameter (Dw) ? 1
Porosity of filter pack ? .3
       Units of length ? FT
         Units of time ? MIN

Input time vs drawdown by Keyboard
   or ASCII File (K/F) ? F

Include drive, file name and extension

    Test data file name ? A:\EG989\1F.DAT
```



BRAUN™


Well: MW-1 FALLING HEAD
Yo = 0.41
Slope = 1.37
LnR/rw = 1.67
K = 9.15E-03 FT/MIN
10e+1
10e+0
10e-1
10e-2
Log Drawdown
(FT)
0
1
2
3
4
Time (MIN)

BRAUN™

EG-989 MW-1
RISING HEAD
SE1000B
Environmental Logger
08/21 08:00

Unit# 00707 Test# 1

INPUT 1: Level (F)

Reference 0.00
Scale factor 10.14
Offset - 0.09

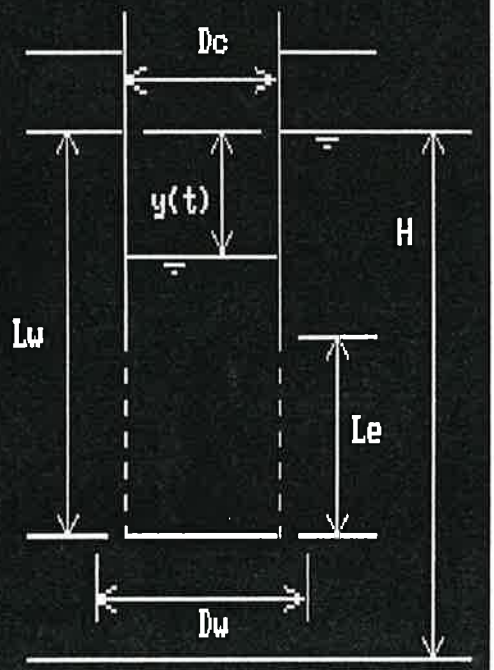
Step# 1 08/20 12:58

Elapsed Time	Value
0.0000	7.39
0.0033	7.41
0.0066	6.98
0.0099	7.10
0.0133	7.41
0.0166	6.58
0.0200	6.68
0.0233	6.71
0.0266	6.30
0.0300	6.27
0.0333	6.31
0.0500	6.39
0.0666	6.45
0.0833	6.48
0.1000	6.52
0.1166	6.55
0.1333	6.58
0.1500	6.61
0.1666	6.64
0.1833	6.67
0.2000	6.69
0.2166	6.72
0.2333	6.74
0.2500	6.76
0.2666	6.78
0.2833	6.81
0.3000	6.82
0.3166	6.84
0.3333	6.87
0.4167	6.95
0.5000	7.03
0.5833	7.10
0.6667	7.15
0.7500	7.21
0.8333	7.25
0.9167	7.29
1.0000	7.33
1.0833	7.36
1.1667	7.39
1.2500	7.41
1.3333	7.43
1.4166	7.45
1.5000	7.46
1.5833	7.47
1.6667	7.49
1.7500	7.50
1.8333	7.51
1.9167	7.52
2.0000	7.53
2.5000	7.56
3.0000	7.57
3.5000	7.58
4.0000	7.59
4.5000	7.59
5.0000	7.59
5.5000	7.60
6.0000	7.60
6.5000	7.60
7.0000	7.60
7.5000	7.60
8.0000	7.60
8.5000	7.60
9.0000	7.60
9.5000	7.60
10.0000	7.60
12.0000	7.60
14.0000	7.60
16.0000	7.60
18.0000	7.60
20.0000	7.60
22.0000	7.60
24.0000	7.60
26.0000	7.60
28.0000	7.60
30.0000	7.60

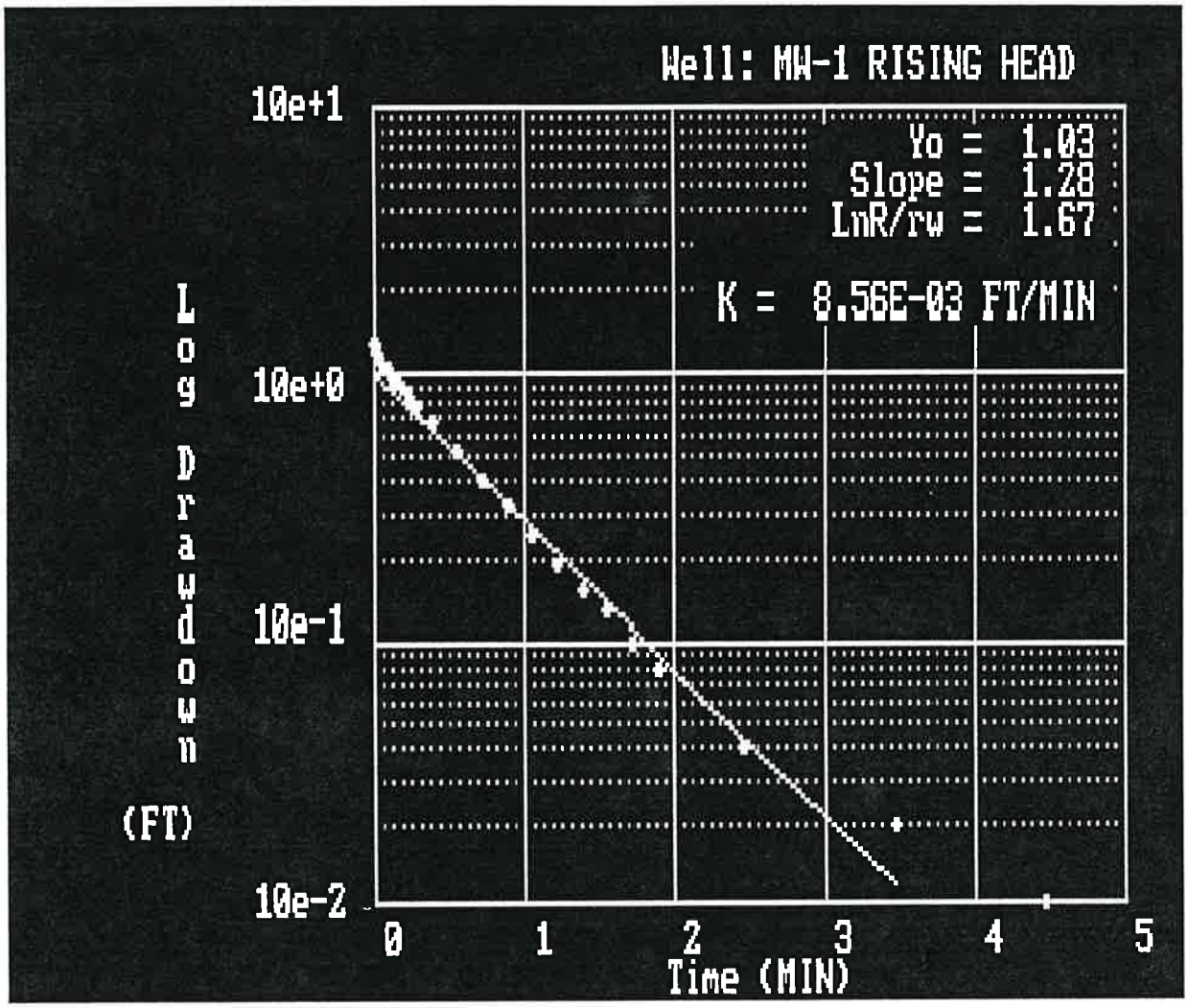
END

BRAUN™

```
      Well designation ? MW-1 RISING HEAD

Input all data in consistent units.

       Well depth (Lw) ? 6.9
    Screen length (Le) ? 10
Saturated thickness (H) ? 40
   Casing diameter (Dc) ? .17
  Drilled diameter (Dw) ? 1
Porosity of filter pack ? .3
        Units of length ? FT
          Units of time ? MIN

Input time vs drawdown by Keyboard
    or ASCII File (K/F) ? F

Include drive, file name and extension

    Test data file name ? A:\EG989\1R.DAT
```



BRAUN™


Well: MW-1 RISING HEAD
Yo = 1.03
Slope = 1.28
LnR/rw = 1.67
K = 8.56E-03 FT/MIN
10e+1
10e+0
10e-1
10e-2
Log Drawdown (FT)
0
1
2
3
4
5
Time (MIN)

BRAUN

EG-989 MW-2
FALLING HEAD
SE1000B
Environmental Logger
08/21 08:01

Unit# 00707 Test# 2

INPUT 1: Level (F)

Reference 0.00
Scale factor 10.14
Offset - 0.09

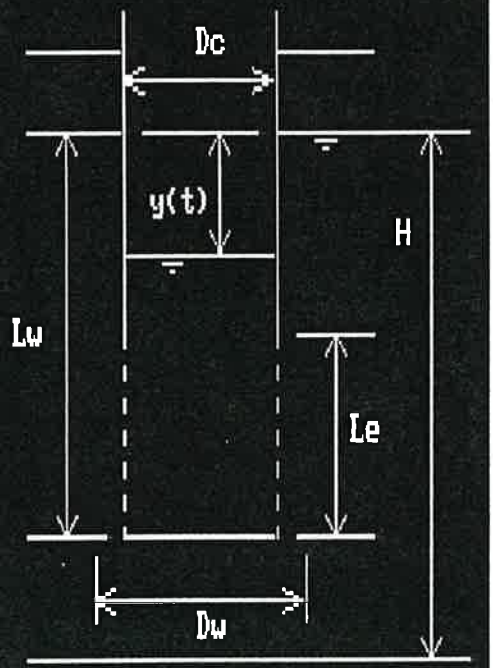
Step# 0 08/20 14:22

Elapsed Time	Value
0.0000	7.97
0.0033	7.97
0.0066	7.98
0.0099	7.99
0.0133	8.22
0.0166	8.45
0.0200	8.80
0.0233	9.19
0.0266	9.09
0.0300	8.94
0.0333	9.06
0.0500	9.00
0.0666	8.82
0.0833	8.64
0.1000	8.57
0.1166	8.60
0.1333	8.51
0.1500	8.46
0.1666	8.42
0.1833	8.38
0.2000	8.34
0.2166	8.31
0.2333	8.29
0.2500	8.26
0.2666	8.24
0.2833	8.22
0.3000	8.20
0.3166	8.19
0.3333	8.17
0.4167	8.11
0.5000	8.07
0.5833	8.05
0.6667	8.03
0.7500	8.02
0.8333	8.01
0.9167	8.00
1.0000	7.99
1.0833	7.99
1.1667	7.99
1.2500	7.99
1.3333	7.99
1.4166	7.99
1.5000	7.98
1.5833	7.98
1.6667	7.98
1.7500	7.98
1.8333	7.98
1.9167	7.98
2.0000	7.98
2.5000	7.98
3.0000	7.98
3.5000	7.98
4.0000	7.98
4.5000	7.98
5.0000	7.98
5.5000	7.98
6.0000	7.98
6.5000	7.98
7.0000	7.98
7.5000	7.98
8.0000	7.98
8.5000	7.98
9.0000	7.98
9.5000	7.98
10.0000	7.97
12.0000	7.98
14.0000	7.97
16.0000	7.98
18.0000	7.98
20.0000	7.98
22.0000	7.97
24.0000	7.97
26.0000	7.97
28.0000	7.98
30.0000	7.78

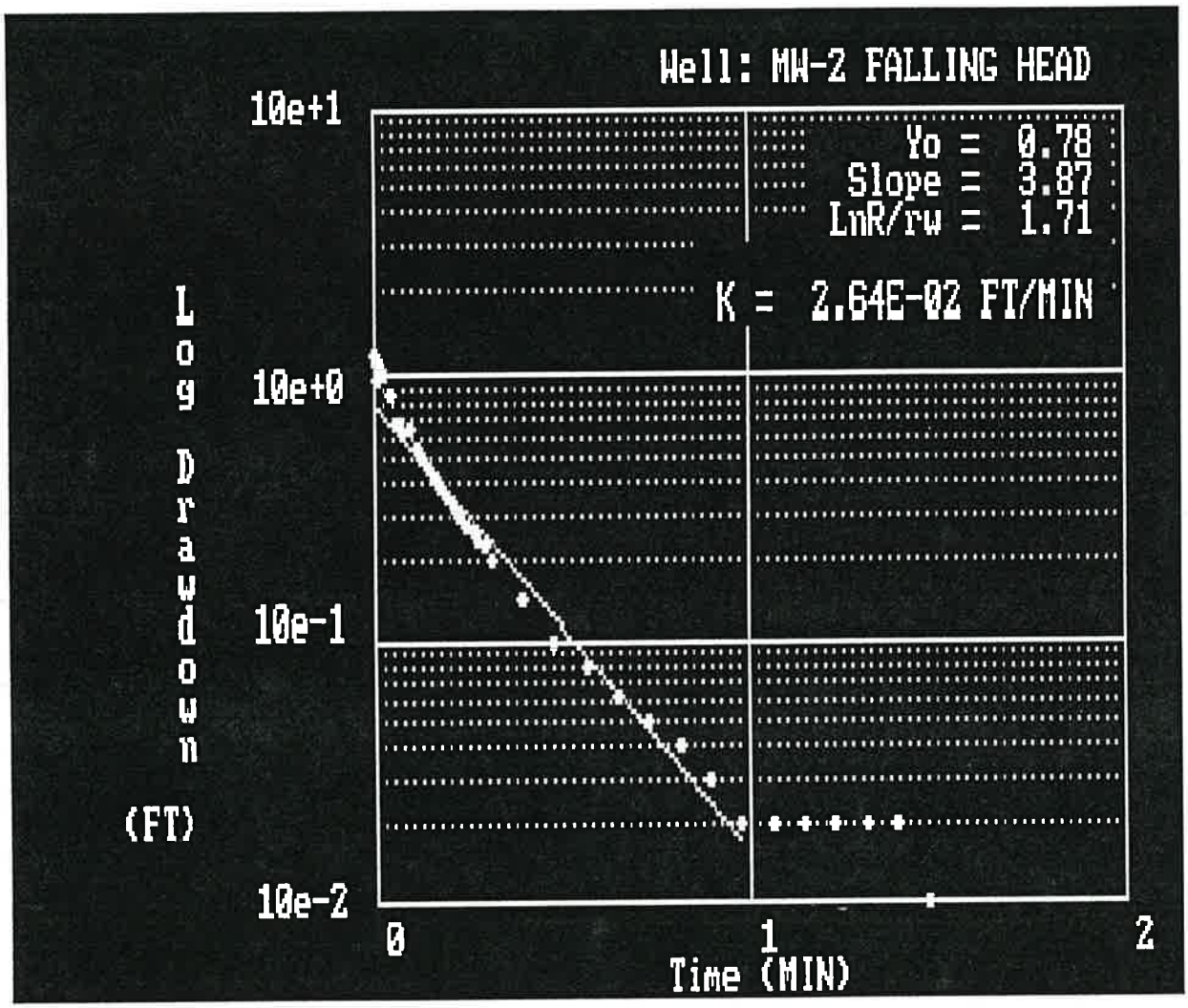
END

BRAUN™

```
      Well designation ? MW-2 FALLING HEAD

Input all data in consistent units.

       Well depth (Lw) ? 7.5
    Screen length (Le) ? 10
Saturated thickness (H) ? 40
   Casing diameter (Dc) ? .17
  Drilled diameter (Dw) ? 1
Porosity of filter pack ? .3
       Units of length ? FT
         Units of time ? MIN

Input time vs drawdown by Keyboard
   or ASCII File (K/F) ? F

Include drive, file name and extension

    Test data file name ? A:\EG989\2F.DAT
```



BRAUN™


Well: MW-2 FALLING HEAD
Yo = 0.78
Slope = 3.87
LnR/rw = 1.71
K = 2.64E-02 FT/MIN
10e+1
10e+0
10e-1
10e-2
Log Drawdown
(FT)
0
1
2
Time (MIN)

BRAUN™

EG-989 MW-2
RISING HEAD
SE1000B
Environmental Logger
08/21 08:02

Unit# 00707 Test# 2

INPUT 1: Level (F)

Reference 0.00
Scale factor 10.14
Offset - 0.09

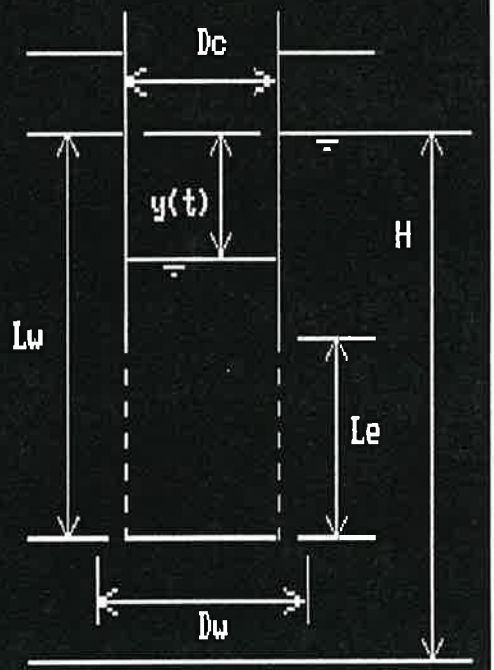
Step# 1 08/20 14:52

Elapsed Time	Value
0.0000	7.78
0.0033	7.75
0.0066	7.11
0.0099	8.08
0.0133	7.66
0.0166	6.61
0.0200	7.42
0.0233	6.92
0.0266	6.42
0.0300	6.56
0.0333	6.60
0.0500	6.73
0.0666	6.85
0.0833	6.96
0.1000	7.04
0.1166	7.12
0.1333	7.19
0.1500	7.26
0.1666	7.32
0.1833	7.37
0.2000	7.41
0.2166	7.47
0.2333	7.50
0.2500	7.54
0.2666	7.58
0.2833	7.61
0.3000	7.64
0.3166	7.66
0.3333	7.68
0.4167	7.78
0.5000	7.83
0.5833	7.87
0.6667	7.90
0.7500	7.92
0.8333	7.93
0.9167	7.94
1.0000	7.95
1.0833	7.95
1.1667	7.96
1.2500	7.96
1.3333	7.96
1.4166	7.96
1.5000	7.97
1.5833	7.97
1.6667	7.97
1.7500	7.97
1.8333	7.97
1.9167	7.97
2.0000	7.97
2.5000	7.97
3.0000	7.97
3.5000	7.97
4.0000	7.97
4.5000	7.97
5.0000	7.97
5.5000	7.97
6.0000	7.97
6.5000	7.97
7.0000	7.97
7.5000	7.97
8.0000	7.97
8.5000	7.97
9.0000	7.97
9.5000	7.97
10.0000	7.97
12.0000	7.97
14.0000	7.97
16.0000	7.97
18.0000	7.97
20.0000	7.97
22.0000	7.97
24.0000	7.97
26.0000	7.97
28.0000	7.97

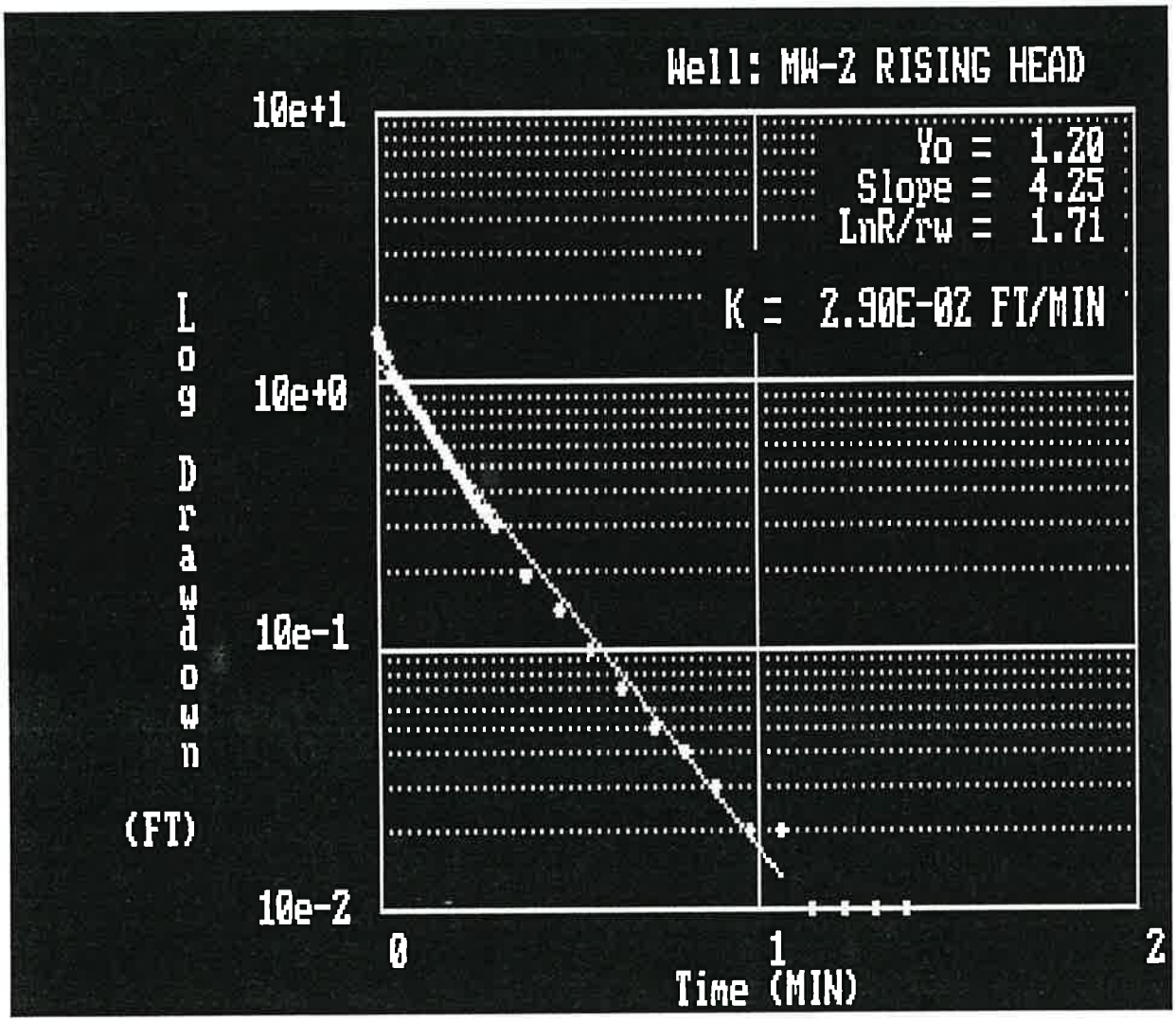
END

BRAUN™

```
      Well designation ? MW-2 RISING HEAD

Input all data in consistent units.

        Well depth (Lw) ? 7.5
     Screen length (Le) ? 10
Saturated thickness (H) ? 40
   Casing diameter (Dc) ? .17
  Drilled diameter (Dw) ? 1
Porosity of filter pack ? .3
        Units of length ? FT
          Units of time ? MIN

Input time vs drawdown by Keyboard
    or ASCII File (K/F) ? F

Include drive, file name and extension

    Test data file name ? A:\EG989\2R.DAT
```



BRAUN™


Well: MW-2 RISING HEAD
10e+1
10e+0
10e-1
10e-2
Log Drawdown (FT)
Yo = 1.20
Slope = 4.25
LnR/rw = 1.71
K = 2.90E-02 FT/MIN
0
1
2
Time (MIN)

BRAUN™

EG-989 MW-3
FALLING HEAD
SE1000B
Environmental Logger
08/21 07:56

Unit# 00707 Test# 0

INPUT 1: Level (F)

Reference 0.00
Scale factor 10.14
Offset - 0.09

Step# 0 08/20 09:26

Elapsed Time	Value
0.0000	8.22
0.0033	8.22
0.0066	8.22
0.0099	8.44
0.0133	8.62
0.0166	8.61
0.0200	8.86
0.0233	8.84
0.0266	8.61
0.0300	9.24
0.0333	9.44
0.0500	9.73
0.0666	9.21
0.0833	9.15
0.1000	9.09
0.1166	9.04
0.1333	9.00
0.1500	8.97
0.1666	8.94
0.1833	8.91
0.2000	8.88
0.2166	8.86
0.2333	8.84
0.2500	8.83
0.2666	8.81
0.2833	8.80
0.3000	8.78
0.3166	8.77
0.3333	8.76
0.4167	8.71
0.5000	8.68
0.5833	8.65
0.6667	8.63
0.7500	8.61
0.8333	8.60
0.9167	8.59
1.0000	8.58
1.0833	8.57
1.1667	8.56
1.2500	8.55
1.3333	8.55
1.4166	8.54
1.5000	8.53
1.5833	8.53
1.6667	8.52
1.7500	8.51
1.8333	8.51
1.9167	8.50
2.0000	8.50
2.5000	8.47
3.0000	8.45
3.5000	8.43
4.0000	8.41
4.5000	8.39
5.0000	8.38
5.5000	8.37
6.0000	8.36
6.5000	8.35
7.0000	8.34
7.5000	8.33
8.0000	8.32
8.5000	8.32
9.0000	8.31
9.5000	8.30
10.0000	8.30
12.0000	8.29
14.0000	8.28
16.0000	8.27
18.0000	8.26
20.0000	8.25
22.0000	8.25
24.0000	8.25
26.0000	8.24
28.0000	8.24
30.0000	8.24
32.0000	8.23
34.0000	8.23
36.0000	8.23

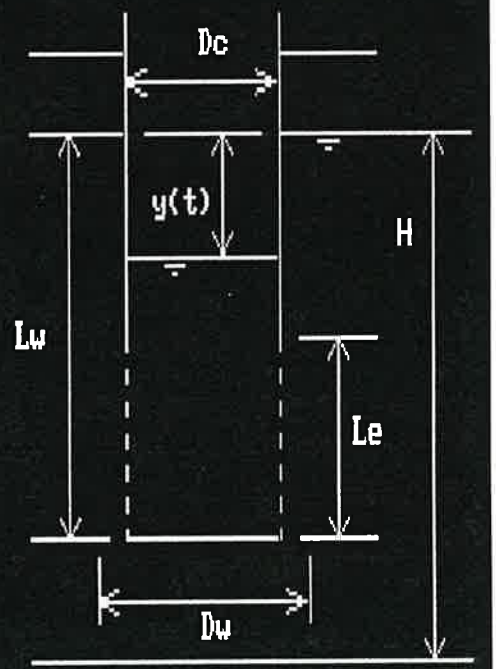
BRAUN

Elapsed Time	Value
38.0000	8.22
40.0000	8.22
42.0000	8.22
44.0000	8.22
46.0000	8.22
48.0000	8.22
50.0000	8.22
52.0000	8.22
54.0000	8.21
56.0000	8.21
58.0000	8.21
60.0000	8.21
62.0000	8.21
64.0000	8.06

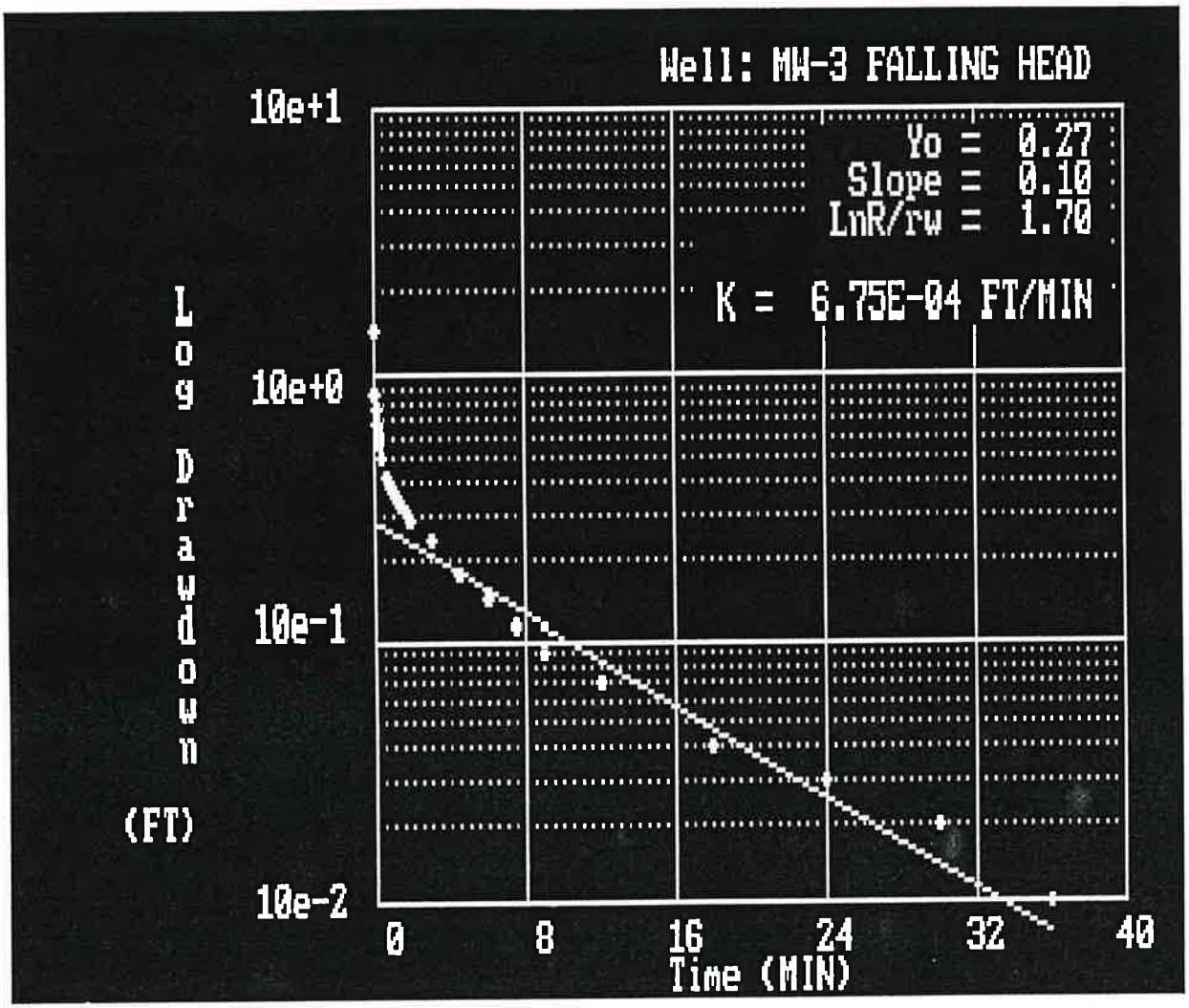
END

BRAUN™

```
      Well designation ? MW-3 FALLING HEAD

Input all data in consistent units.

       Well depth (Lw) ? 7.4
    Screen length (Le) ? 10
Saturated thickness (H) ? 40
   Casing diameter (Dc) ? .17
  Drilled diameter (Dw) ? 1
Porosity of filter pack ? .3
       Units of length ? FT
         Units of time ? MIN

Input time vs drawdown by Keyboard
    or ASCII File (K/F) ? F

Include drive, file name and extension

    Test data file name ? A:\EG989\3F.DAT
```



BRAUN™


Well: MW-3 FALLING HEAD
Yo = 0.27
Slope = 0.10
LnR/rw = 1.70
K = 6.75E-04 FT/MIN
10e+1
10e+0
10e-1
10e-2
Log Drawdown (FT)
0
8
16
24
32
40
Time (MIN)

BRAUN™

EG-989 MW-3
RISING HEAD
SE1000B
Environmental Logger
08/21 07:57

Unit# 00707 Test# 0

INPUT 1: Level (F)

Reference 0.00
Scale factor 10.14
Offset - 0.09

Step# 1 08/20 10:30

Elapsed Time	Value
0.0000	8.05
0.0033	7.58
0.0066	7.79
0.0099	8.52
0.0133	7.48
0.0166	6.97
0.0200	7.71
0.0233	6.98
0.0266	7.21
0.0300	6.83
0.0333	6.76
0.0500	6.67
0.0666	6.70
0.0833	6.73
0.1000	6.75
0.1166	6.78
0.1333	6.80
0.1500	6.82
0.1666	6.84
0.1833	6.86
0.2000	6.88
0.2166	6.89
0.2333	6.91
0.2500	6.93
0.2666	6.95
0.2833	6.96
0.3000	6.98
0.3166	6.99
0.3333	7.01
0.4167	7.08
0.5000	7.15
0.5833	7.21
0.6667	7.27
0.7500	7.33
0.8333	7.38
0.9167	7.43
1.0000	7.47
1.0833	7.51
1.1667	7.55
1.2500	7.59
1.3333	7.62
1.4166	7.64
1.5000	7.67
1.5833	7.69
1.6667	7.71
1.7500	7.73
1.8333	7.75
1.9167	7.76
2.0000	7.78
2.5000	7.83
3.0000	7.87
3.5000	7.90
4.0000	7.92
4.5000	7.94
5.0000	7.95
5.5000	7.97
6.0000	7.97
6.5000	7.98
7.0000	7.99
7.5000	8.00
8.0000	8.01
8.5000	8.01
9.0000	8.02
9.5000	8.03
10.0000	8.03
12.0000	8.05
14.0000	8.06
16.0000	8.07
18.0000	8.08
20.0000	8.09
22.0000	8.10
24.0000	8.11
26.0000	8.12
28.0000	8.12
30.0000	8.13
32.0000	8.13
34.0000	8.14
36.0000	8.14

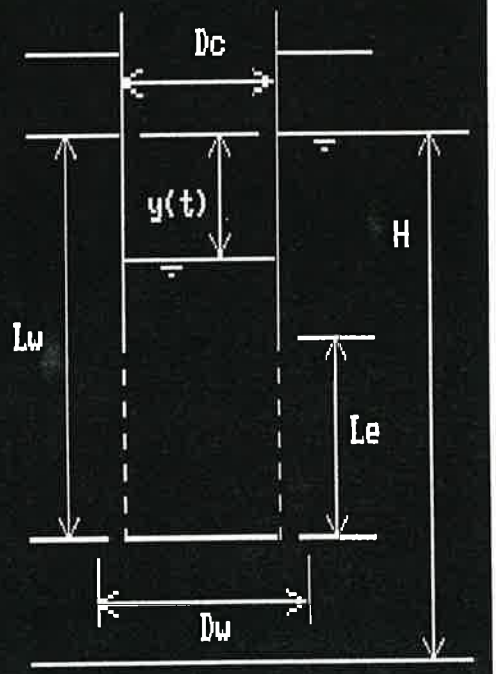
BRAUN™

Elapsed Time	Value
38.0000	8.14
40.0000	8.15
42.0000	8.15
44.0000	8.15
46.0000	8.15
48.0000	8.16
50.0000	8.16
52.0000	8.16
54.0000	8.16
56.0000	8.17
58.0000	8.17
60.0000	8.17

END

BRAUN™

```
      Well designation ? MW-3 RISING HEAD

Input all data in consistent units.

       Well depth (Lw) ? 7.4
     Screen length (Le) ? 10
Saturated thickness (H) ? 40
   Casing diameter (Dc) ? .17
  Drilled diameter (Dw) ? 1
Porosity of filter pack ? .3
        Units of length ? FT
          Units of time ? MIN

Input time vs drawdown by Keyboard
    or ASCII File (K/F) ? F

Include drive, file name and extension

    Test data file name ? A:\EG989\3R.DAT
```



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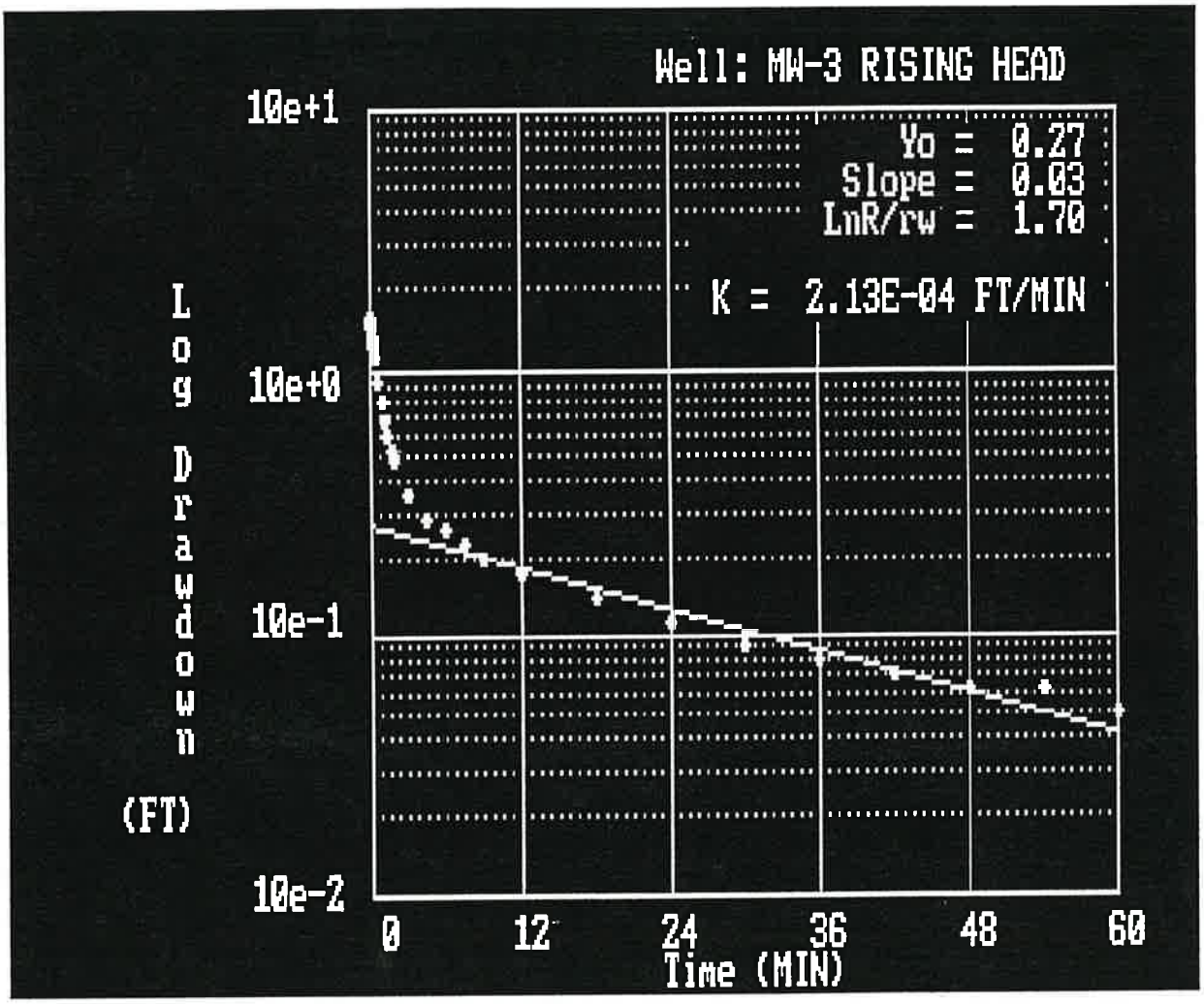
Well: MW-3 RISING HEAD
Yo = 0.27
Slope = 0.03
LnR/rw = 1.70
K = 2.13E-04 FT/MIN
10e+1
10e+0
10e-1
10e-2
Log Drawdown (FT)
0
12
24
36
48
60
Time (MIN)

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Minneapolis, Minnesota 55439
Phone 612/941-5600 Fax: 612/942-4844

BRAUN ENVIRONMENTAL LABORATORIES

Quality Services Since 1957

August 29, 1990

Minnesota Dept. of Transportation
Attn: Mr. Glenn Heapy
Room G-20 Transportation Bldg.
John Ireland Blvd.
St. Paul, MN 55155

Project #: E90-295/EG-989/
11013

Dear Mr. Heapy,

Braun Environmental Laboratories, Inc. is pleased to provide our report for the analysis you requested. Data for the following sample(s) are enclosed:

Your I.D. Number/Description	Work Requested
Soil Samples	Organic Analyses

All samples were analyzed according to EPA or other standard methods. Any anomalies which were encountered in this analysis are referenced on the laboratory report. Method references and quality control information are available upon request.

If you have any questions or need additional information regarding this report or other Braun Environmental Laboratories services please contact us.

Very truly yours,

BRAUN ENVIRONMENTAL LABORATORIES, INC.

Linda C. Crawford
Organic Supervisor

Anne L. Ochs
Laboratory Manager

LCC/ALO:pre

cc: Mr. Calvin Lucas - District 5

Attachment

Minnesota Department of
Transportation
Transportation Building
St. Paul MN 55155

PROJECT: EG-989
COLLECTED: Braun 08/15/90
RECEIVED: 08/15/90
SAMPLE MATRIX: Soil

	BRAUN I.D.:	11013-01	11013-02	11013-03
	CLIENT I.D.:	ST-1 10 Ft	ST-2 7.5 Ft	ST-3 10 Ft
PARAMETER	--UNITS--			
Methyl Tertiary Butyl Ether	mg/Kg	<1.0	<1.0	<1.0
Benzene	mg/Kg	<0.3	<0.3	<0.3
Toluene	mg/Kg	<0.3	<0.3	<0.3
Ethyl Benzene	mg/Kg	<0.3	<0.3	0.5
Xylenes, Total	mg/Kg	<0.3	0.5	0.6
Total Hydrocarbons as Gasoline	mg/Kg	<1.0	a	a
Total Hydrocarbons as Fuel Oil	mg/Kg	<1.0	490	630

*******FOOTNOTES********
a = Total Hydrocarbons calculated as fuel oil.

< = less than: compound not detected at or above indicated detection limit
- = Analysis not requested

Quality control data reviewed: _____

BRAUN™

ADDENDUM: 11013

Parameter	Date Analyzed
BETX/THCs	08/16/90
MTBE	08/16/90

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6800 South TH-169
Shipping & Recieving - Bldg. #2
Edina, MN. 55435
(612) 941-5600

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CHAIN OF CUSTODY RECORD

Client Name, Address, Phone
MINNESOTA DEPARTMENT OF TRANSPORTATION
2055 N. LILAC DRIVE
GOLDEN VALLEY, MN 55422

Report to: MR. CALVIN LUCAS

Samplers: TCS

Project #/Department # EG-989

Verbal Results To:

Copy of Report To:

Project Manager: RON WEAVER

Samples Returned To:

Samples Retained By:

Log-In #	Sample #	Sample Description	Collection Date	Collection Time	Sample Matrix Air	Sample Matrix Liq.	Sample Matrix Sol.	Type/# of Containers VOA	GENERAL	METALS	NUTRIENTS	PEST/PCB	CHAR TUBE	OTHER	Analysis/Remarks
11013	-1	ST-1 10 FT	8/15/90	9:40			X	2							BETX/THC (gas-fuel oil)
	-2	ST-2 7 1/2 FT	8/15	10:10			X	2							MTBE
	-3	ST-3 10 FT	8/15	10:50			X	2							↓
	-4	MW-1 7.5FT	8/15	11:30			X	2							HOLD
	-5	MW-2 7.5FT	8/15	9:40			X	2							HOLD

C-219

Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time	Received By:
Tim Singer	8/15/90	4:35					
Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time	Received By:
Relinquished By:	Date	Time	Received For Laboratory By:	Date	Time	Comments:	
			M. Nafe	8-15-90	4:35	copies KF 8-15-90	

White Copy - Client Yellow Copy - Laboratory Pink Copy - Originating Department F:CHAIN

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Minneapolis, Minnesota 55439
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BRAUN ENVIRONMENTAL LABORATORIES

Quality Services Since 1957

September 10, 1990

Minnesota Deptartment of Transportation
Attn: Mr. Glenn Heapy
Room G-20 Transportation Bldg.
St. Paul, Mn 55155

Project #: E90-295/EG-989/
11017

Dear Mr. Heapy,

Braun Environmental Laboratories, Inc. is pleased to provide our report for the analysis you requested. Data for the following sample(s) are enclosed:

Your I.D. Number/Description	Work Requested
Soil Samples	Organic Analyses

All samples were analyzed according to EPA or other standard methods. Any anomalies which were encountered in this analysis are referenced on the laboratory report. Method references and quality control information are available upon request.

If you have any questions or need additional information regarding this report or other Braun Environmental Laboratories services please contact us.

Very truly yours,

BRAUN ENVIRONMENTAL LABORATORIES, INC.

Linda C. Crawford

Linda C. Crawford
Organic Supervisor

Anne L. Ochs
Laboratory Manager

LCC/ALO:crb

Attachment

Minnesota Department of
Transportation
Transportation Building
St. Paul MN 55155

PROJECT: EG-989
COLLECTED: Braun 08/16/90
RECEIVED: 08/16/90
SAMPLE MATRIX: Soil

	BRAUN I.D.:	11017-01	11017-02
	CLIENT I.D.:	ST-4 7.5 Ft.	ST-5 10 Ft.
PARAMETER	--UNITS--		
Methyl Tertiary Butyl Ether	mg/Kg	<1.0	<1.0
Benzene	mg/Kg	<0.3	<0.3
Toluene	mg/Kg	<0.3	<0.3
Ethyl Benzene	mg/Kg	<0.3	<0.3
Xylenes, Total	mg/Kg	<0.3	5.5
Total Hydrocarbons as Gasoline	mg/Kg	<1.0	a
Total Hydrocarbons as Fuel Oil	mg/Kg	<1.0	1600

*******FOOTNOTES********
a = Total Hydrocarbons calculated as fuel oil.

< = less than: compound not detected at or above indicated detection limit
- = Analysis not requested

Quality control data reviewed: _____

BRAUN

ADDENDUM: 11017

Parameter	Date Analyzed
BETX/THCs	08/17/90

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6800 South TH-169
Shipping & Recieving - Bldg. #2
Edina, MN. 55435
(612) 941-5600

BRAUN

CHAIN OF CUSTODY RECORD

Client Name, Address, Phone	Verbal Results To:	Type/# of Containers	Samples Returned To:
MINNESOTA DEPARTMENT OF TRANSPORTATION 2055 NORTH LILAC DR. GOLDEN VALLEY, MN 55422	Copy of Report To:	VOA / GENERAL / METALS / NUTRIENTS / PEST/PCB / CHAR TUBE / OTHER	Samples Retained By:
Report to: MR. CALVIN LUCAS			
Samplers: TCS	Project Manager: RON WEAVER		
Project #/Department # ME90-295 EG-989			

Log-In #	Sample #	Sample Description	Collection Date	Collection Time	Sample Matrix Air	Liq.	Sol.	VOA	GENERAL	METALS	NUTRIENTS	PEST/PCB	CHAR TUBE	OTHER	Analysis/Remarks
11017	-1	ST-4 7 1/2 FT	8/16/90	11:45			X	2							BETX/THC (gas - fuel oil)
	-2	ST-5 10 FT	8/16	12:25			X	2							MTBE
	-3	MW-3 7 1/2 FT	8/16	9:20			X	2							HOLD

Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time	Received By:
Tim Briggs	8/16/90	3:15					
Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time	Received By:
Relinquished By:	Date	Time	Received For Laboratory By: M. Daigle	Date: 8/16/90	Time: 3:15	Comments: copied 8-16-90 MW	

White Copy - Client Yellow Copy - Laboratory Pink Copy - Originating Department F:CHAIN

WATER SAMPLING DATA

Project Number EG-989 Crew Tim Singer Date 8/20/90

Location Mn/DOT Maintenance Facility, Jordan, MN Well Number MW-1

Weather Conditions overcast, 60 - 65 degrees F

Depth to Water (ft.) 10.56 Well Depth (ft.) 17.50 Well Volume (gallons) 1.15

Purging Method: Pump Johnson-Keck Type submersible Diameter (inches) 1.7
Decontamination Procedure Methanol and ultra-pure water

Bailer: Length (ft.)_____ Material_____ Diameter (inches)_____

Sampling Method: Bailer: Length (ft.) 4 Material teflon Diameter (inches) 1.7
Dedicated: Yes_____ No X Lab Cleaned: Yes X No_____

Previously Stabilized: Yes_____ No X Well Volumes Purged_____

Previously Developed: Yes X No_____

Time	Cum. Vol. (gallons)	Temp. (C)	pH	Conduc. (umhos/cm)	Comments (color, odor, etc)
	1.0	16.0	6.83	1020	muddy
	2.0	14.3	6.87	990	muddy
	3.0	14.1	6.22	1010	muddy
	4.0	14.8	6.97	1040	muddy-clear
	5.0	14.5	6.91	1050	clear
	6.0	14.0	9.84	1050	clear; no gasoline odor or film

Additional Notes: Bailed 15 gallons on 8/17/90.

BRAUN

WATER SAMPLING DATA

Project Number EG-989 Crew Tim Singer Date 8/20/90

Location Mn/DOT Maintenance Facility, Jordan, MN Well Number MW-2

Weather Conditions overcast, 60 - 65 degrees F

Depth to Water (ft.) 10.04 Well Depth (ft.) 17.50 Well Volume (gallons) 1.24

Purging Method: Pump Johnson-Keck Type submersible Diameter (inches) 1.7
Decontamination Procedure Methanol and ultra-pure water

Bailer: Length (ft.)_____ Material_____ Diameter (inches)_____

Sampling Method: Bailer: Length (ft.) 4 Material teflon Diameter (inches) 1.7
Dedicated: Yes_____ No X Lab Cleaned: Yes X No_____

Previously Stabilized: Yes_____ No X Well Volumes Purged_____

Previously Developed: Yes X No_____

Time	Cum. Vol. (gallons)	Temp. (C)	pH	Conduc. (umhos/cm)	Comments (color, odor, etc)
	1.0	18.2	7.22	1630	muddy
	2.0	17.7	7.24	1640	muddy
	3.0	16.7	7.24	1510	muddy
	4.0	16.6	7.34	1500	muddy
	5.0	16.6	7.49	1580	muddy
	6.0	16.5	7.67	1540	muddy-clear; slight gasoline odor; no film

Additional Notes: Cannot bail well dry. Bailed 15 gallons on 8/17/90.

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WATER SAMPLING DATA

Project Number EG-989 Crew Tim Singer Date 8/20/90

Location Mn/DOT Maintenance Facility, Jordan, MN Well Number MW-3

Weather Conditions overcast, 60 - 65 degrees F

Depth to Water (ft.) 10.14 Well Depth (ft.) 17.50 Well Volume (gallons) 1.22

Purging Method: Pump Johnson-Keck Type submersible Diameter (inches) 1.7
Decontamination Procedure Methanol and ultra-pure water

Bailer: Length (ft.)_____ Material_____ Diameter (inches)_____

Sampling Method: Bailer: Length (ft.) 4 Material teflon Diameter (inches) 1.7
Dedicated: Yes_____ No X Lab Cleaned: Yes X No_____

Previously Stabilized: Yes_____ No X Well Volumes Purged_____

Previously Developed: Yes X No_____

Time	Cum. Vol. (gallons)	Temp. (C)	pH	Conduc. (umhos/cm)	Comments (color, odor, etc)
	1.0	18.6	6.76	1300	muddy
	2.0	17.3	7.12	1370	muddy
	3.0	17.5	7.24	1310	muddy-clear
	4.0	18.0	7.39	1320	clear; no gasoline odor or film

Additional Notes: Bailed 9 gallons on 8/17/90. Bailed dry after 2 gallons purged from well; slow recharge.

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Minneapolis, Minnesota 55439
Phone 612/941-5600 Fax: 612/942-4844

BRAUN ENVIRONMENTAL LABORATORIES

Quality Services Since 1957

September 18, 1990

Minnesota Deptartment of Transportation
Attn: Mr. Glenn Heapy
Transportation Building, Room G-20
St. Paul, MN 55155

Project #: E90-295/EG-989/
11039

Dear Mr. Heapy,

Braun Environmental Laboratories, Inc. is pleased to provide our report for the analysis you requested. Data for the following sample(s) are enclosed:

Your I.D. Number/Description	Work Requested
Aqueous Samples	Organic Analyses

All samples were analyzed according to EPA or other standard methods. Any anomalies which were encountered in this analysis are referenced on the laboratory report. Method references and quality control information are available upon request.

If you have any questions or need additional information regarding this report or other Braun Environmental Laboratories services please contact us.

Very truly yours,

BRAUN ENVIRONMENTAL LABORATORIES, INC.

Linda C. Crawford
Organic Supervisor

Anne L. Ochs
Laboratory Manager

LCC/ALO:crb

cc: Mr. Calvin Lucas/MNDOT

Attachment

Minnesota Department of
Transportation
Transportation Building
St. Paul MN 55155

PROJECT: EG-989
COLLECTED: Braun 08/20/90
RECEIVED: 08/20/90
SAMPLE MATRIX: Aqueous

	BRAUN I.D.:	11039-01	11039-02	11039-03	11039-05
	CLIENT I.D.:	MW-1	MW-2	MW-3	Field Blank
PARAMETER	--UNITS--				
Chloromethane	ug/L	<5.0	<5.0	<5.0	<5.0
Bromomethane	ug/L	<5.0	<5.0	<5.0	<5.0
Vinyl Chloride	ug/L	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane	ug/L	<5.0	<5.0	<5.0	<5.0
Chloroethane	ug/L	<1.0	<1.0	<1.0	<1.0
Dichlorofluoromethane	ug/L	<5.0	<5.0	<5.0	<5.0
Methylene Chloride	ug/L	<5.0	<5.0	<5.0	<5.0
Trichlorofluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	ug/L	<1.0	<1.0	<1.0	<1.0
Allyl Chloride (3-Chloropropene)	ug/L	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene (cis & trans)	ug/L	<0.2	<0.2	<0.2	<0.2
Chloroform	ug/L	<1.5	<1.5	<1.5	<1.5
1,1,2-Trichlorotrifluoroethane	ug/L	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane	ug/L	<0.3	<0.3	<0.3	<0.3
Dibromomethane	ug/L	<5.0	<5.0	<5.0	<5.0
1,1,1-Trichloroethane	ug/L	<2.0	<2.0	<2.0	<2.0
Carbon Tetrachloride	ug/L	<1.6	<1.6	<1.6	<1.6
Bromodichloromethane	ug/L	<0.3	<0.3	<0.3	<0.3
2,3-Dichloro-1-propene	ug/L	<0.2	<0.2	<0.2	<0.2
Dichloroacetonitrile	ug/L	<0.3	<0.3	<0.3	<0.3
1,1-Dichloro-1-propene	ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0
1,3-Dichloro-1-propene (trans)	ug/L	<0.2	<0.2	<0.2	<0.2
1,1,2-Trichloroethylene	ug/L	<0.2	<0.2	<0.2	<0.2
1,3-Dichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	ug/L	<1.2	<1.2	<1.2	<1.2
Chlorodibromomethane	ug/L	<2.5	<2.5	<2.5	<2.5
1,3-Dichloro-1-propene (cis)	ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dibromoethane	ug/L	<0.2	<0.2	<0.2	<0.2

< = less than: compound not detected at or above indicated detection limit
- = Analysis not requested

Quality control data reviewed: _____

BRAUN™

PARAMETER	--UNITS--	BRAUN I.D.: 11039-01 CLIENT I.D.: MW-1	11039-02 MW-2	11039-03 MW-3	11039-05 Field Blank
2-Chloroethyl Vinyl Ether	ug/L	<5.0	<5.0	<5.0	<5.0
Bromoform	ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	ug/L	<0.5	<0.5	<0.5	<0.5
Pentachloroethane	ug/L	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene	ug/L	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	ug/L	<1.2	<1.2	<1.2	<1.2
1,2,3-Trichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene	ug/L	<1.5	<1.5	<1.5	<1.5
1,2-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2	<0.2
1,4-Dichlorobenzene	ug/L	<0.2	<0.2	<0.2	<0.2
Acetone	ug/L	<50	<50	<50	<50
Tetrahydrofuran	ug/L	<5.0	<5.0	<5.0	<5.0
Ethyl Ether	ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone	ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	<5.0	<5.0
Cumene	ug/L	<3.0	<3.0	<3.0	<3.0
Methyl Tertiary Butyl Ether	ug/L	<1.0	<1.0	<1.0	-
Benzene	ug/L	<1.0	2.5	<1.0	<1.0
Toluene	ug/L	<1.0	1.8	<1.0	<1.0
Ethyl Benzene	ug/L	<1.0	2.2	<1.0	<1.0
Xylenes, Total	ug/L	<1.0	1.9	<1.0	<1.0
Total Hydrocarbons as Gasoline	ug/L	<100	a	<100	-
Total Hydrocarbons as Fuel Oil	ug/L	<500	1600 f	<500	-

*******FOOTNOTES********

a = Total Hydrocarbons calculated as fuel oil.

f = The chromatography of the sample is somewhat atypical of the fuel oil standard.

< = less than: compound not detected at or above indicated detection limit

- = Analysis not requested

Quality control data reviewed: LRO

BRAUN

ADDENDUM: 11039

Parameter	Date Analyzed
VOCs	08/22-08/25/90
THCs	08/29/90

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Braun Environmental Laboratories, Inc.
6800 South TH-169
Shipping & Recieving - Bldg. #2
Edina, MN. 55435
(612) 941-5600

BRAUN

CHAIN OF CUSTODY RECORD

Client Name, Address, Phone
MINNESOTA DEPARTMENT OF TRANSPORTATION
2055 NORTH LILAC DR.
GOLDEN VALLEY, MN 55427

Report to: MR. CALVIN LUCAS

Samplers: TCS

Project #/Department # EG-989

Verbal Results To:

Copy of Report To:

Project Manager: RON WEAVER

Samples Returned To:

Samples Retained By:

Log-In #	Sample #	Sample Description	Collection Date	Collection Time	Sample Matrix Air	Liq.	Sol.	Type/# of Containers VOA	GENERAL	METALS	NUTRIENTS	PEST/PCB	CHAR TUBE	OTHER	Analysis/Remarks
11039	-1	MW-1	8/20/90	11:45		X		6							VOC'S/MTBE/THC (gas & fuel oil)
	-2	MW-2	8/20/90	1:00		X		6							↓ ↓ ↓
	-3	MW-3	8/20/90	3:15		X		6							
	-4	TRIP BLANK	8/20/90	9:05		X		3							
	-5	FIELD BLANK	8/20/90	1:15		X		3							VOC'S

Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time	Received By:
Tim Duigan	8/20/90	5:25					
Relinquished By:	Date	Time	Received By:	Relinquished By:	Date	Time	Received By:
Relinquished By:	Date	Time	Received For Laboratory By: C. Hess	Date 8-20-90	Time 17:30	Comments:	

White Copy - Client Yellow Copy - Laboratory Pink Copy - Originating Department F:CHAIN

c: dr 8/22

BRAUN ENVIRONMENTAL LABORATORIES, INC.

Water Level Measurements Record

Date: 8-20-90

Project No. EG-989 Project: MN/DOT - Jordan

Measurements Taken By: Tim Singer Measuring Device: Steel Tape

Weather Conditions: Sky: Overcast Wind: Speed Calm Direction From: - Temp.: 60-65 degrees

Well Number	Time	Well Depth	Measuring Point(MP)	MP Elevation	Depth to GW	GW Elevation	Depth to FP	FP Elevation	Locked?	Comments Below?
MW-1	10:08	17.50'	TOC	757.78	10.56	747.22	None		Yes	
MW-2	10:03	17.50'	TOC	757.08	10.04	747.04	None		Yes	Slight gas odor/No film
MW-3	9:57	17.50'	TOC	757.25	10.14	747.11	None		Yes	Slow Recharge

Comments (Well condition, deviation from SOPs or other conditions, etc.): _____

If site elevation reference datum is assumed:

Location: _____

Assumed elevation: _____

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