Foth & Van Dyke

REPORT

Petroleum Tank Release Corrective Action Report Phase II Savage, Minnesota

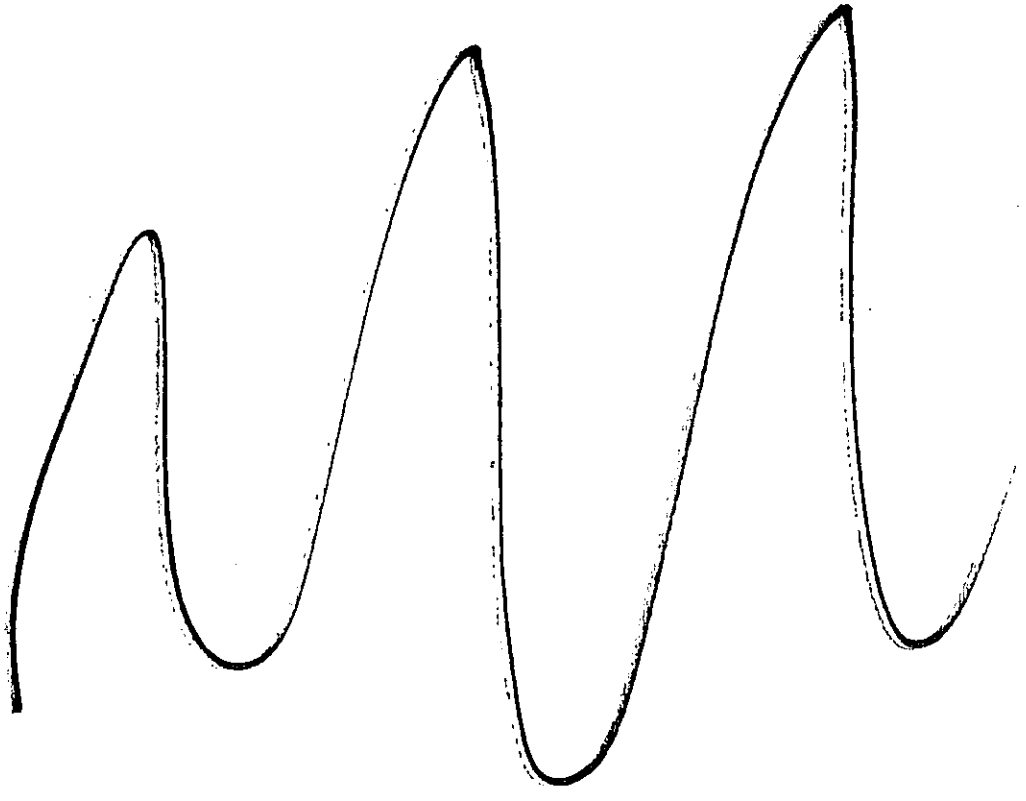
Scope I.D.: 88W79

Waste Management, Inc.
Menomonee Falls, Wisconsin

March 1990

Foth & Van Dyke

10340 Viking Drive, Suite 100
Eden Prairie, MN 55344
612/942-0396
FAX: 612/942-0865



Engineers
Architects
Planners
Scientists

Foth & Van Dyke

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March 12, 1990

Mr. John R. Moeger
Project Leader
Tanks and Spills Section
Hazardous Waste Division
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

Dear Mr. Moeger:

Re: Waste Management of Minnesota, Inc. - Savage
Underground Storage Tank Site Assessment
LEAK #00000990

On behalf of Waste Management of Minnesota, Inc., Foth & Van Dyke is pleased to submit one copy of the report entitled: *"Petroleum Tank Release Corrective Action Report - Phase II."*

We believe that this report will provide the Minnesota Pollution Control Agency with the information necessary to: 1) evaluate hydrogeologic and groundwater quality conditions at the site; and 2) concur with the conclusions developed in this investigation.

In this investigation, Foth & Van Dyke concludes that further groundwater sampling is necessary to document water quality for a period of up to a year at which time further recommendations will be made.

Sincerely,

FOTH & VAN DYKE

Fred J. Doran, P.E.
Senior Hydrogeological Engineer

Kathy Dittman
Project Engineer

FJD/cd
Enclosure

Distribution List

No. of Copies	Sent to:
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1	Mr. Michael Berkopec Waste Management - Savage 12448 Pennsylvania Avenue South Savage, Minnesota 55378
1	Mr. Jack Dowden Waste Management, Inc. Two Westbrook Corporate Center Suite 1000 P.O. Box 7070 Westchester, IL 60154

PETROLEUM TANK RELEASE
CORRECTIVE ACTION REPORT
PHASE II
SAVAGE MINNESOTA FACILITY

Prepared for:

WASTE MANAGEMENT OF MINNESOTA, INC.

Prepared by:

FOTH & VAN DYKE & Associates Inc.
10340 Viking Drive, Suite 100
Eden Prairie, Minnesota 55344

MARCH 1990

Foth & Van Dyke
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1.0 INTRODUCTION

This tank release report presents the results, conclusions, and recommendations of a site assessment for a petroleum tank release performed by Foth & Van Dyke for Waste Management of Minnesota, Inc. (WMMI) at their hauling facility in Savage, Minnesota. The investigation was conducted in the vicinity of a former underground storage tank which contained diesel fuel. WMMI had this tank removed on August 22, 1988. During tank removal, petroleum was observed in the soils and groundwater immediately surrounding the tank. Soils surrounding the tank were also removed and stockpiled on-site. The Minnesota Pollution Control Agency (MPCA) site ID is LEAK#0000990. At the direction of the MPCA, a petroleum tank release investigation report was prepared by Foth & Van Dyke and submitted to the agency. Results of the analyses performed on the samples taken during the initial investigation prompted the Phase II investigation discussed in this report.

The goal of this study is to determine the extent of groundwater contamination, if any, surrounding the fuel tank. During this project, soil borings were performed, monitoring wells installed, and soil and groundwater samples were collected and analyzed. Based on the analytical results, the diesel tank (removed in August 1988) has likely had minor impacts on groundwater quality.

The remainder of this report is divided into the following sections:

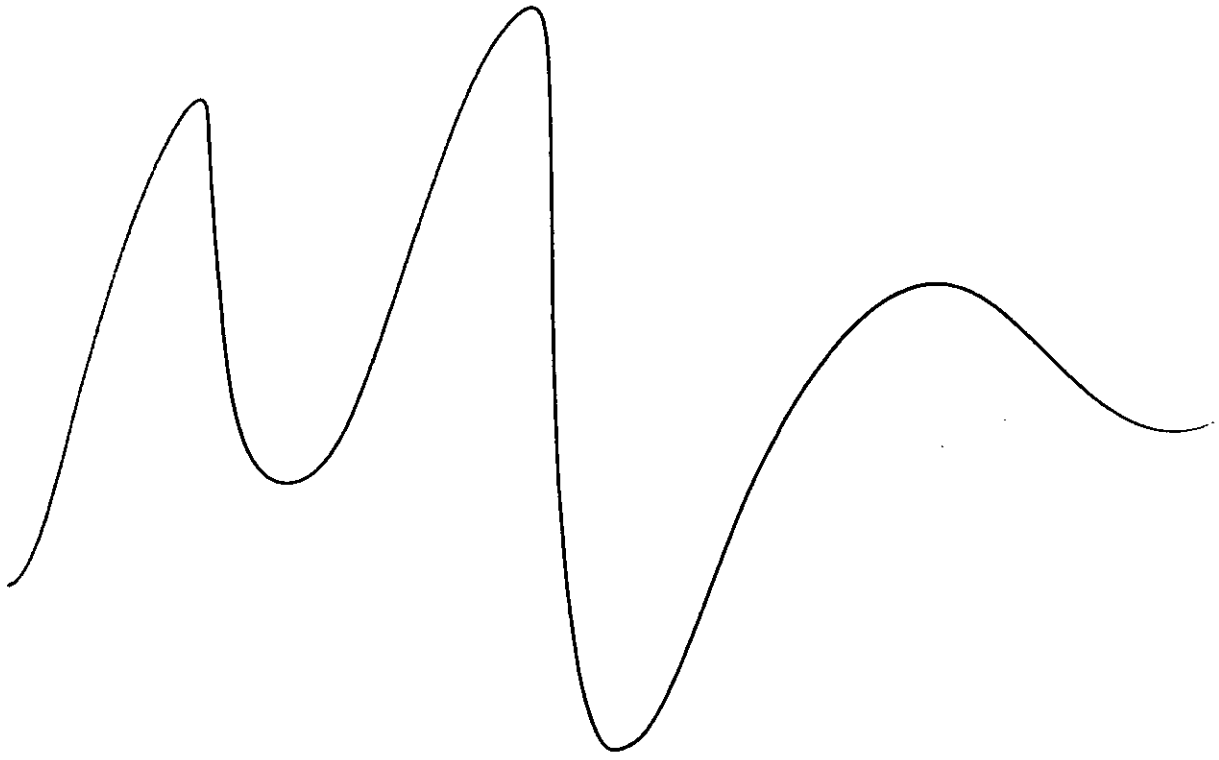
Section 2.0 - Site Description and History

Section 3.0 - Site Geology

Section 4.0 - Site Hydrogeology

Section 5.0 - Groundwater Quality

Section 6.0 - Conclusions



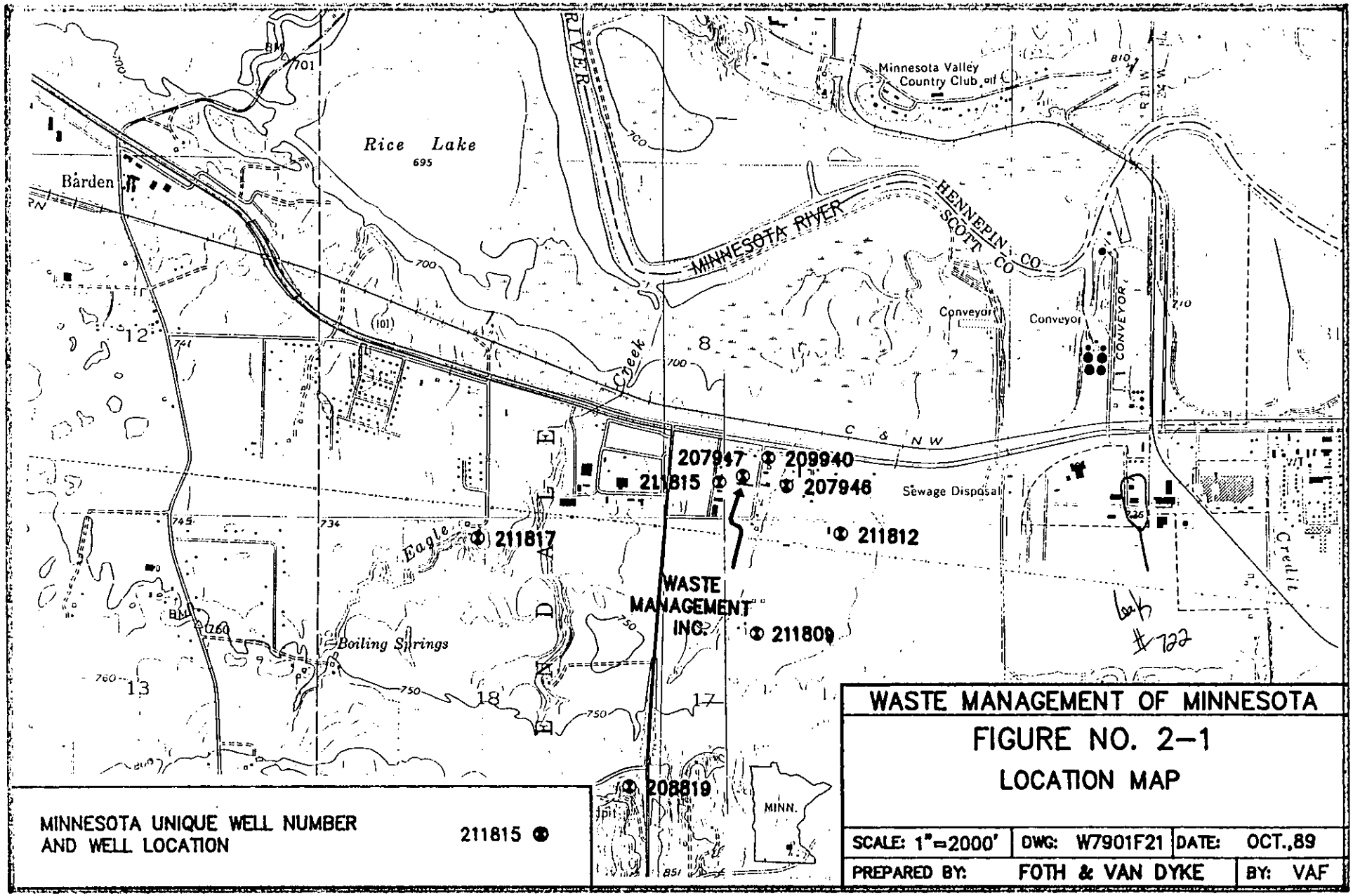
2.0 SITE DESCRIPTION AND HISTORY

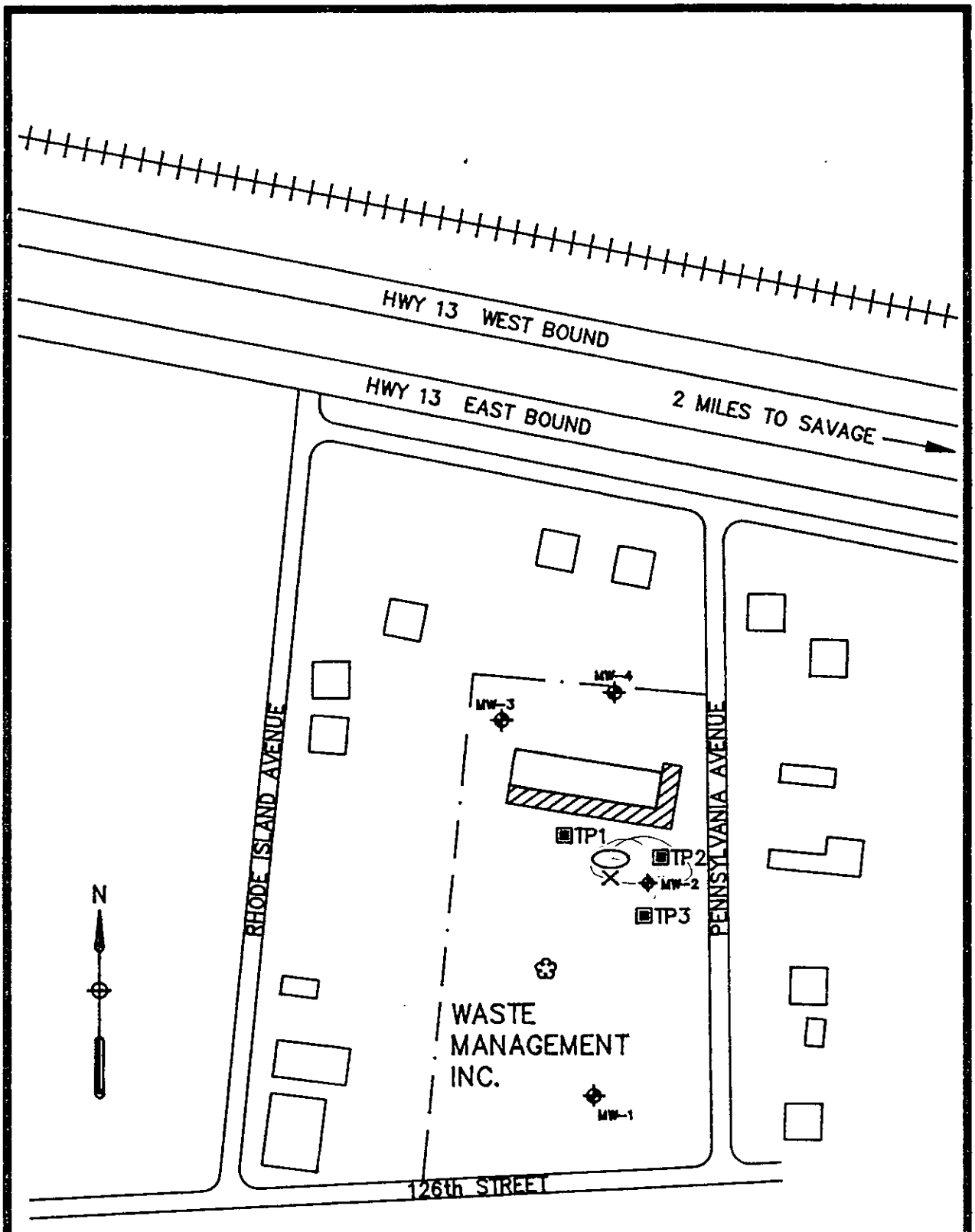
The WMMI hauling facility in Savage, Minnesota is located at 12448 Pennsylvania Avenue South. Figure No. 2-1 indicates the regional location of the facility. Figure No. 2-2 is a site map with sampling locations.

On January 15, 1988, Griggs Contracting performed the certa-tek tank test on the diesel fuel storage tank at the WMMI Savage facility. The tank did not pass the test. Further inspection on April 25, 1988, resulted in the decision to remove the tank.

When the underground fuel tank, which contained diesel fuel, was removed on August 22, 1988, contaminated soils were observed. Contaminated soils (approximately 100 cubic yards) were removed from the excavation and stockpiled on-site. Stockpiled soils were placed on plastic and covered with plastic to protect the site from both infiltration and run-off. Soils from this stockpile were sampled on November 9, 1988. Lead was detected during laboratory analysis. On June 19, 1989, Foth & Van Dyke, on behalf of WMMI, submitted an application to the MPCA to dispose of the excavated soils at a local asphalt plant. This disposal method was approved by the MPCA in their letter of June 29, 1989 to Foth & Van Dyke. Soils were disposed of in early July 1989. This correspondence is presented in Appendix A.

On November 9, 1988, during Foth & Van Dyke's first investigation, three backhoe pits were excavated to a depth of 6 to 7 feet. Water samples and grab soil samples were taken at the maximum depth of each test pit. Figure No. 2-2 shows the locations of the sampling sites (labeled as TP-1 to TP-3). Soil and groundwater samples were analyzed for benzene, ethylbenzene, toluene, xylene (BETX), total hydrocarbons as gasoline, total petroleum hydrocarbons (TPH) as No. 2 fuel oil, and lead.


Rice Lake
695
Bården
RIVER
Minnesota Valley Country Club
MINNESOTA RIVER
HENNEPIN CO
SCOTT CO
Conveyor
Conveyor
CONVEYOR
Creek
C & N W
207947
209940
211815
207946
Sewage Disposal
211817
211812
Eagle
WASTE MANAGEMENT INC.
211809
Boiling Springs
208819
MINN.
12
13
18
17
8
MINNESOTA UNIQUE WELL NUMBER AND WELL LOCATION
211815
WASTE MANAGEMENT OF MINNESOTA
FIGURE NO. 2-1
LOCATION MAP
SCALE: 1"=2000'
DWG: W7901F21
DATE: OCT.,89
PREPARED BY: FOTH & VAN DYKE
BY: VAF



LEGEND

PROPERTY LINE	— — · —
TANK EXCAVATION	⬭
TEST PIT LOCATION	▣
SOIL STORAGE PILE	✿
SAMPLING LOCATION	×
MONITORING WELL	⊕

WASTE MANAGEMENT OF MINNESOTA

FIGURE NO. 2-2

SITE MAP WITH SAMPLING LOCATIONS

SCALE: 1"~220'	DWG: W7901F22	DATE: OCT.,89
PREPARED BY: FOTH & VAN DYKE		BY: VAF

All tested parameters were detected in soil and groundwater samples collected from TP-2. The TP-2 groundwater concentrations of benzene, ethylbenzene, toluene, and total xylene exceeded the Minnesota Department of Health (MDH) Recommended Allowable Limits (RALs). With the exception of lead, none of the tested parameters were detected in soil and groundwater samples collected from TP-1 and TP-3.

Details of Foth & Van Dyke's initial investigation can be found in a March 1989 report entitled "Petroleum Tank Release Corrective Action Report." Based on the findings of this initial report, the Phase II investigation discussed in the remainder of this report was recommended to better define groundwater quality at the facility.

3.0 SITE GEOLOGY

As part of the Phase II investigation, four soil borings were performed on June 22, 1989, at the WMMI Savage facility. Borings were performed with 4.25-inch inside-diameter hollow stem augers. The locations of these borings, labeled MW-1, MW-2, MW-3, MW-4, are shown in Figure No. 2-2. Continuous split spoon samples were taken during drilling. Based on the soil boring observations, site geology in the vicinity of the fuel tank is comprised of layers of clayey silt overlying a gray silty fine to medium grained sand. Bedrock was not encountered. Observations confirm geologic information presented in the March 1989 report. Soil boring logs are provided in Appendix B.

Headspace analysis for volatile organic compounds (VOCs) was performed on each soil sample using the Photovac TIP 1 photoionization detector. This portable instrument measures total ionizables (except for methane) present in the air around the sample. However, the TIP was malfunctioning and the VOC readings obtained were not useful. It should be noted that petroleum-like odors were detected in soil samples from boring MW-2. No soil samples were submitted for laboratory analysis.

4.0 HYDROGEOLOGY

A monitoring well was installed in each boring in order to 1) define groundwater flow direction, 2) determine if petroleum product was present atop the groundwater, and 3) determine groundwater quality. Figure No. 2-2 indicates these monitoring well locations.

Wells were constructed in accordance with MDH regulations. All wells were screened (0.10-inch slot width) to intersect the water table. The water table was present at a depth of four to eight feet within the surface soil deposits. Wells were constructed with two-inch diameter stainless steel. The annular space surrounding the screen was backfilled with medium grained sand. Approximately 1.5 to 2.0 feet of bentonite slurry was placed above the sand. Two feet of neat cement grout was placed above the bentonite. A four-inch diameter steel protective casing was set in the cement. The cement was sloped to prevent the infiltration of surface water. Monitoring well construction details are presented in Appendix B.

After well installation, the top of casing elevation and horizontal location were surveyed by John W. Gorman, Inc. The survey is referenced to the State of Minnesota horizontal and vertical control. Depth to groundwater and product thickness measurements were taken on August 15 to 17, 1989. No free floating product was detected in any of the site wells. Based on survey information and depth to groundwater measurements, groundwater elevations were calculated for each well. These measurements and elevations are summarized in Table No. 4-1.

Based on information obtained from the "Geologic Atlas of Scott County, Minnesota", the potentiometric surface of the surficial deposits is similar to that of the underlying bedrock. This potentiometric surface is close to the ground surface in the area

TABLE NO. 4-1

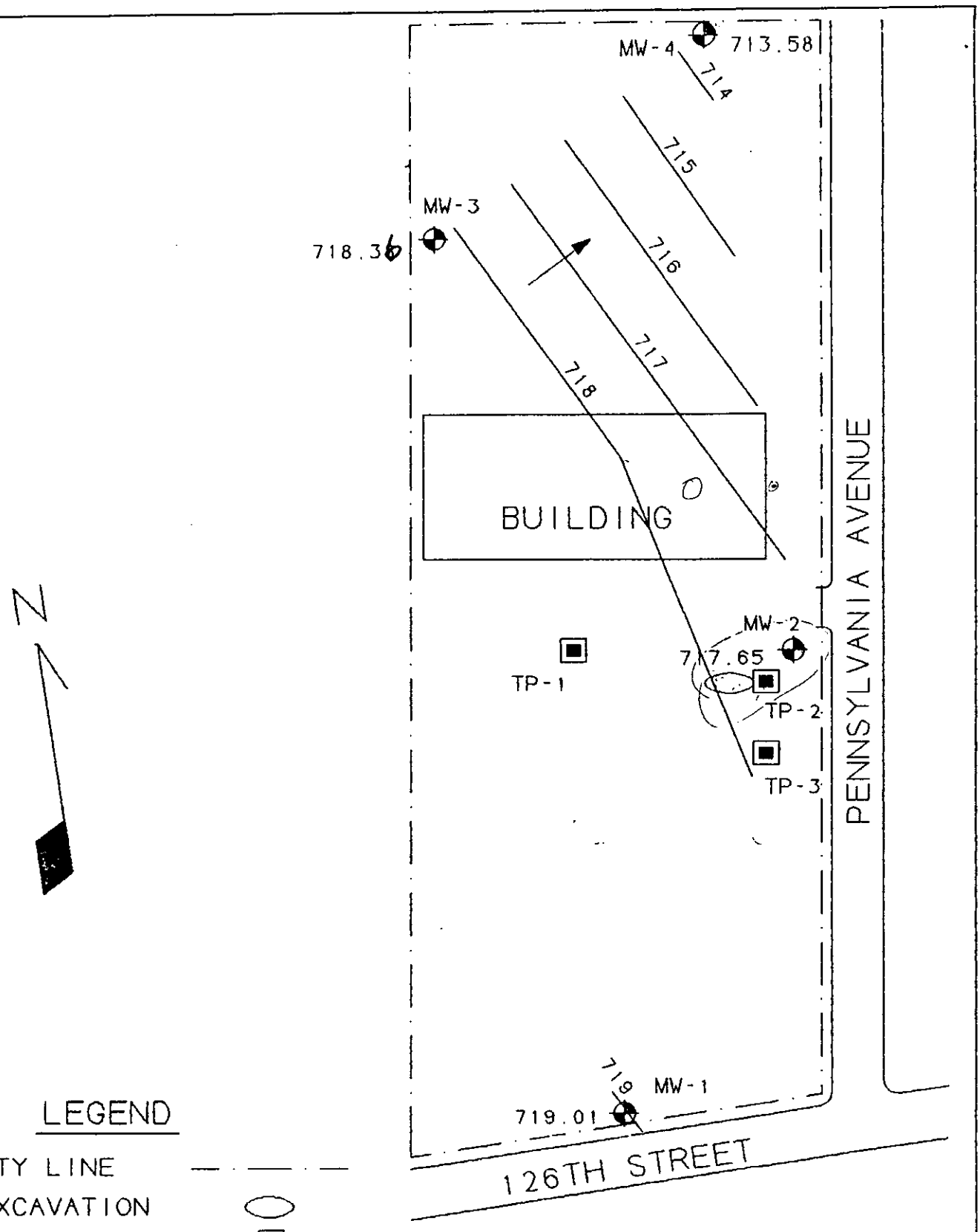
Summary of Groundwater Elevations
August 15 to 17, 1989

Well	Well Casing Top Elevation	Depth to Groundwater	Water Table Elevation
MW-1	732.16	13.15	719.01
MW-2	726.24	8.59	717.65
MW-3	724.46	6.10	718.36
MW-4	721.77	8.19	713.58

Note: Measurements are in feet.

of the Minnesota River. Based on conversations with Minnesota Geological Survey personnel, groundwater is likely discharging from the bedrock into the surficial deposits and no vertical flow from the surficial deposits into the bedrock occurs. Any contamination in the surficial deposits beneath the site would remain in the surficial deposits and discharge into the Minnesota River.

A contour map of water table elevation is presented in Figure No. 4-1. Based on this interpretation, local groundwater flow is generally to the northeast toward the Minnesota River.



LEGEND

- PROPERTY LINE
- TANK EXCAVATION
- TEST PIT LOCATION
- MONITORING WELL
- WATER TABLE CONTOUR 717
- GROUNDWATER FLOW DIRECTION

WASTE MANAGEMENT OF MINNESOTA

FIGURE NO. 4-1

SITE WATER TABLE CONTOUR MAP

SCALE: 1" = 100'	DWG. NO: W7901F41	DATE: 1/17/90
PREPARED BY: FOTH & VAN DYKE		BY: EJD

5.0 GROUNDWATER QUALITY

A total of four groundwater samples were collected from monitoring wells MW-1, MW-2, MW-3, and MW-4 on August 15 to 17, 1989. Precision Environmental Services was contracted to develop, stabilize, and sample the wells.

These samples were then conveyed, using chain of custody procedures, to SERCO Laboratories of St. Paul, Minnesota for analysis. Each sample was analyzed for VOCs (halogenated and non-halogenated), dissolved lead, and TPH as gasoline and No. 2 fuel oil. A summary of the chemical analyses performed on the samples is presented in Table No. 5-1. Appendix C provides the complete analytical results for the groundwater sampling.

On February 16, 1990, another round of groundwater samples were collected by Foth & Van Dyke personnel using MPCA recommended guidelines.

Samples were conveyed using chain of custody procedures to SERCO Laboratories. Samples were analyzed for BETX, TPH as gasoline and No. 2 fuel oil, and dissolved lead. A summary of results is also provided in Table No. 5-1. Original laboratory and chain of custody documentation are provided in Appendix C.

Analytical results for benzene, ethylbenzene, toluene, and xylene were below the MDH RALs for the first round of samples. Other detected parameters listed in Table No. 5-1 for the first round of samples are also below MDH RALs. The analytical results from the second round of sampling indicated that benzene exceeded the RAL in MW-2. No other parameter concentrations exceeded the RALs. In fact, the only other parameter detected was xylene in MW-2. Mw-2 is downgradient of the tank excavation.

Based on these results, the diesel fuel tank and contaminated soils removed on August 22, 1988 have had a minor impact

TABLE NO. 5-1

Summary of Groundwater Quality

Parameter (ug/l)	Wells								Detection Limit	MDH RAL
	MW-1*	MW-1**	MW-2*	MW-2**	MW-3*	MW-3**	MW-4*	MW-4**		
Benzene	<1.0	<5.0	<1.0	14	<1.0	<5.0	2.3	<5.0	1.0/5.0	7.0
1,4-Dichlorobenzene	<1.0	NA	1.7	NA	<1.0	NA	<1.0	NA	1.0	75.0
1,1-Dichloroethane	<0.1	NA	1.4	NA	0.5	NA	0.6	NA	0.1	810.0
1,2-Dichloroethane	<0.1	NA	0.3	NA	<0.1	NA	<0.1	NA	0.1	3.8
1,2-Dichloroethylene	<0.1	NA	<0.1	NA	1.1	NA	1.9	NA	0.1	70.0
Tetrachloroethylene	<0.2	NA	0.4	NA	1.0	NA	<0.2	NA	0.2	6.6
Tetrahydrofuran	<0.5	NA	<0.5	NA	<0.5	NA	9.5	NA	.5.0	154.0
1,1,1-Trichloroethane	<0.5	NA	1.0	NA	<0.5	NA	<0.5	NA	0.5	200.0
Trichloroethylene	<0.5	NA	<0.5	NA	1.4	NA	<0.5	NA	0.5	31.0
Xylenes	<1.0	<5.0	<1.0	6.0	<1.0	<5.0	<1.0	<5.0	1.0/5.0	400.0
+Lead	3	<100	14	<100	3	<100	22	<100	2/100	20.0

Note: Parameters listed are above method detection limits. Appendix C provides complete analytical results.

NA = Not Analyzed

+ = The second round of samples were inadvertently analyzed at a higher detection limit. Future samples will be analyzed at the lower detection value.

* = Testing performed August 15-17, 1989

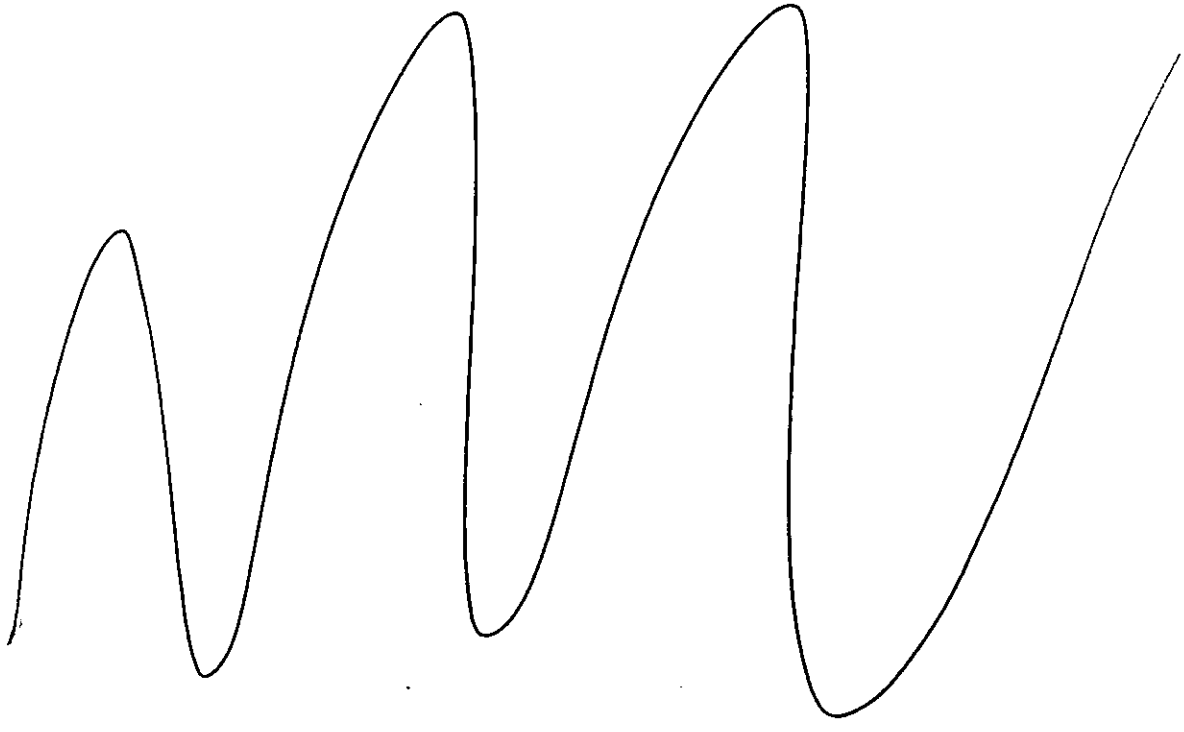
** = Testing performed February 16, 1990

RAL = Recommended Allowable Limit

on groundwater quality within the water table aquifer. However, further investigative or remedial work is not recommended near the location of the former diesel tank at this time. Groundwater monitoring should be continued on a quarterly basis for one year to document any water quality changes if they occur.

why?

Samples collected from the four site wells, should be analyzed for BETX, TPH as gasoline and No. 2 fuel oil, and dissolved lead. Monitoring results will be forwarded to the MPCA after each quarter. A letter report will be drafted, after the final sampling round, to discuss the significance of the monitoring results and to make further recommendations, if necessary.



6.0 CONCLUSIONS

The following are conclusions of this site assessment performed at the WMMI Savage facility:

1. On January 15, 1988 the tank at the Savage facility failed the Certa-tek tank test administered by Griggs Contracting, Inc. An inspection on April 25, 1989 resulted in the decision to remove the tank.

2. On August 22, 1988, WMMI removed the tank and stockpiled the surrounding contaminated soil at the facility. Disposal of these soils at a local asphalt plant was approved by the MPCA on June 29, 1989. Soils were disposed of in early July 1989.

3. During the initial investigation, soil and groundwater samples were taken. BETX and lead were detected in soil and groundwater near the tank location. These results prompted a Phase II investigation.

4. During the Phase II investigation, four soil borings were performed and four monitoring wells (MW-1 to MW-4) were installed. The soil borings were completed on June 22, 1989. Observations made during this activity indicate a site geology consisting of clayey silt overlying a fine to medium grained, grayish sand unit.

5. Four water table monitoring wells were installed on June 22, 1989. No free floating product was measured atop the groundwater in any of the site wells.

6. Based on groundwater elevation measurements, groundwater flow beneath the site is to the northeast toward the Minnesota River. Gradients are likely from the bedrock into the

surficial deposits which in turn discharge to the Minnesota River.

7. Groundwater samples collected on August 15 to 17, 1989 from the four monitoring wells did not contain detectable concentrations of ethylbenzene, toluene, xylenes, and TPH as gasoline or as No. 2 fuel oil. Benzene was detected in MW-4 at 2.3 ug/l, a level which is below the MDH RAL. Lead (22 ug/l) was detected in excess of the RAL (20 ug/l) in MW-4. MW-4 is side gradient to the tank location.

8. Groundwater samples collected on February 16, 1990 from the four monitoring wells did not contain detectable concentrations of ethylbenzene, toluene, and TPH as gasoline or No. 2 fuel oil. Benzene was detected in MW-2 at 14.0 ug/l, a level exceeding the MDH RAL. Xylene was also detected in MW-2 at a level below the MDH RAL. MW-2 is downgradient of the tank excavation.

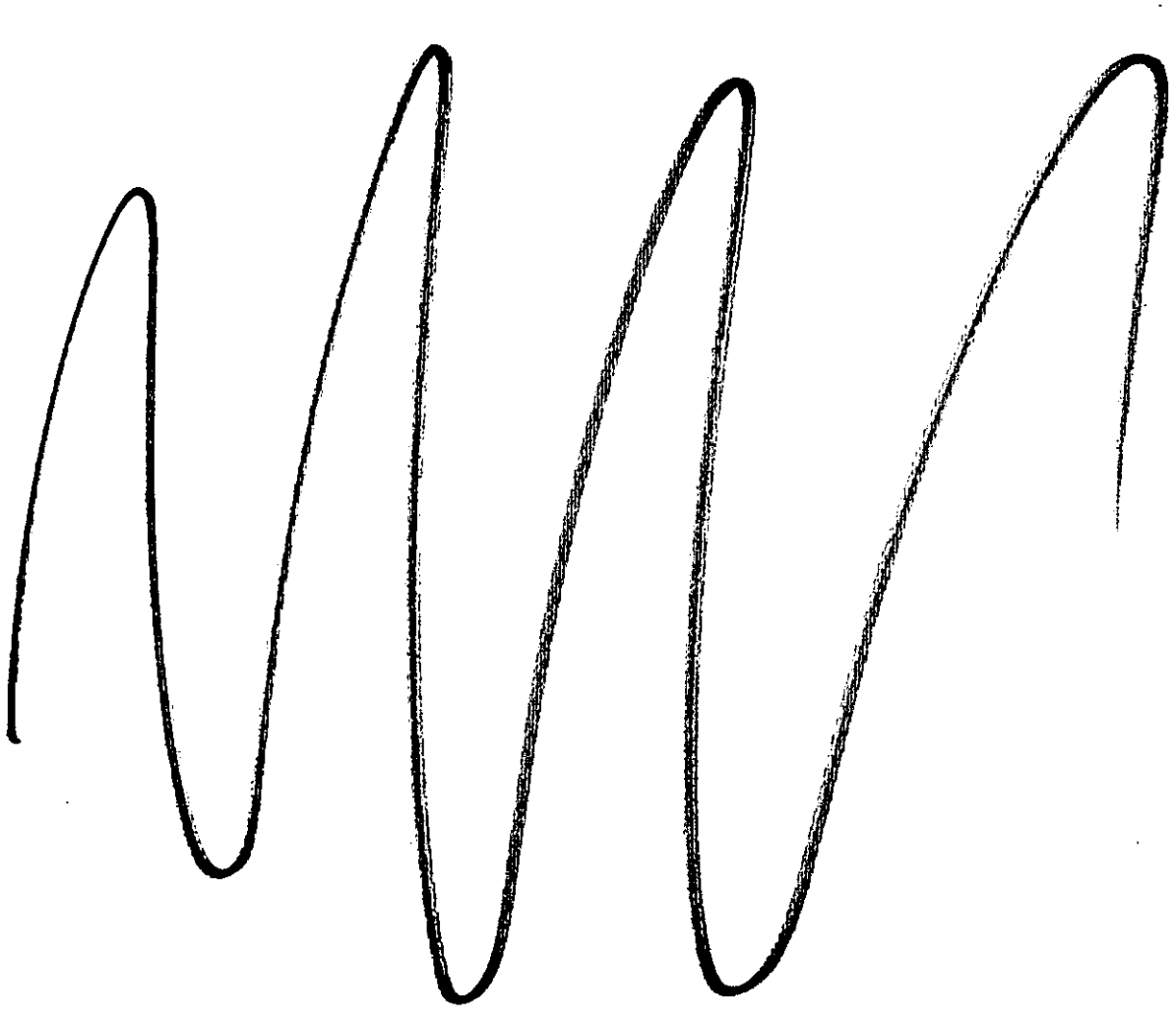
9. Based on the results of this Phase II investigation, the diesel fuel tank and contaminated soils beneath the tank, removed on August 22, 1988, have slightly impacted groundwater quality in the water table aquifer at the Savage facility.

10. Based on the results of this investigation, Foth & Van Dyke recommends that the four site groundwater wells be sampled quarterly for the next year beginning in May 1990. Samples should be analyzed for BETX, TPH for gasoline and No. 2 fuel oil, and dissolved lead. Results will be submitted to the MPCA after each sampling event and a letter report will be drafted at the end of the monitoring period summarizing the results and presenting recommendations.

APPENDIX A

WMMI - Savage

MPCA Soil Treatment Application Approval



Minnesota Pollution Control Agency
520 Lafayette Road, Saint Paul, Minnesota 55155
Telephone (612) 296-6300

Celebrate MINNESOTA 1990

copies to Rick Poyer
Mike Berkopec
Craig Johansen

June 29, 1989

Mr. David Kuechenmeister
Foth and Van Dyke
6474 City West Parkway
Eden Prairie, Minnesota 55344

Dear Mr. Kuechenmeister:

Re: Approval of Petroleum Contaminated Soil Treatment at Asphalt Concrete Plant
Site: Waste Management, Inc., Savage, Minnesota
Site ID#: LEAK00000990

Your application dated June 8, 1989, for treatment of 100 cubic yards of petroleum contaminated soil from the above site is hereby approved by staff of the Minnesota Pollution Control Agency (MPCA) subject to the following conditions:

1. Soils will be treated by the C.S. McCrossan Company asphalt plant in Maple Grove, Minnesota.
2. Protection from both infiltration and runoff shall be provided to contaminated soils stored prior to treatment.
3. Soil treatment will be completed by August 1, 1989.
4. Treated soils shall be incorporated into asphalt or used as road base.
5. MPCA staff shall be notified by mail when soil treatment is completed.

Failure to comply with the conditions of this approval may result in enforcement actions against either or both the generator of the contaminated soil or the facility operators. Failure to comply may also result in refusal by the MPCA to approve of similar applications for contaminated soil treatment by the facility or generator in the future.

Please contact me at 612/296-7974, if you have questions about this approval or cannot meet any of the above conditions. Thank you.

Sincerely,

John R. Moeger

John R. Moeger
Project Leader
Tanks and Spills Section
Hazardous Waste Division

Asphalting Disposal Permission Granted

Louis Chamberlain

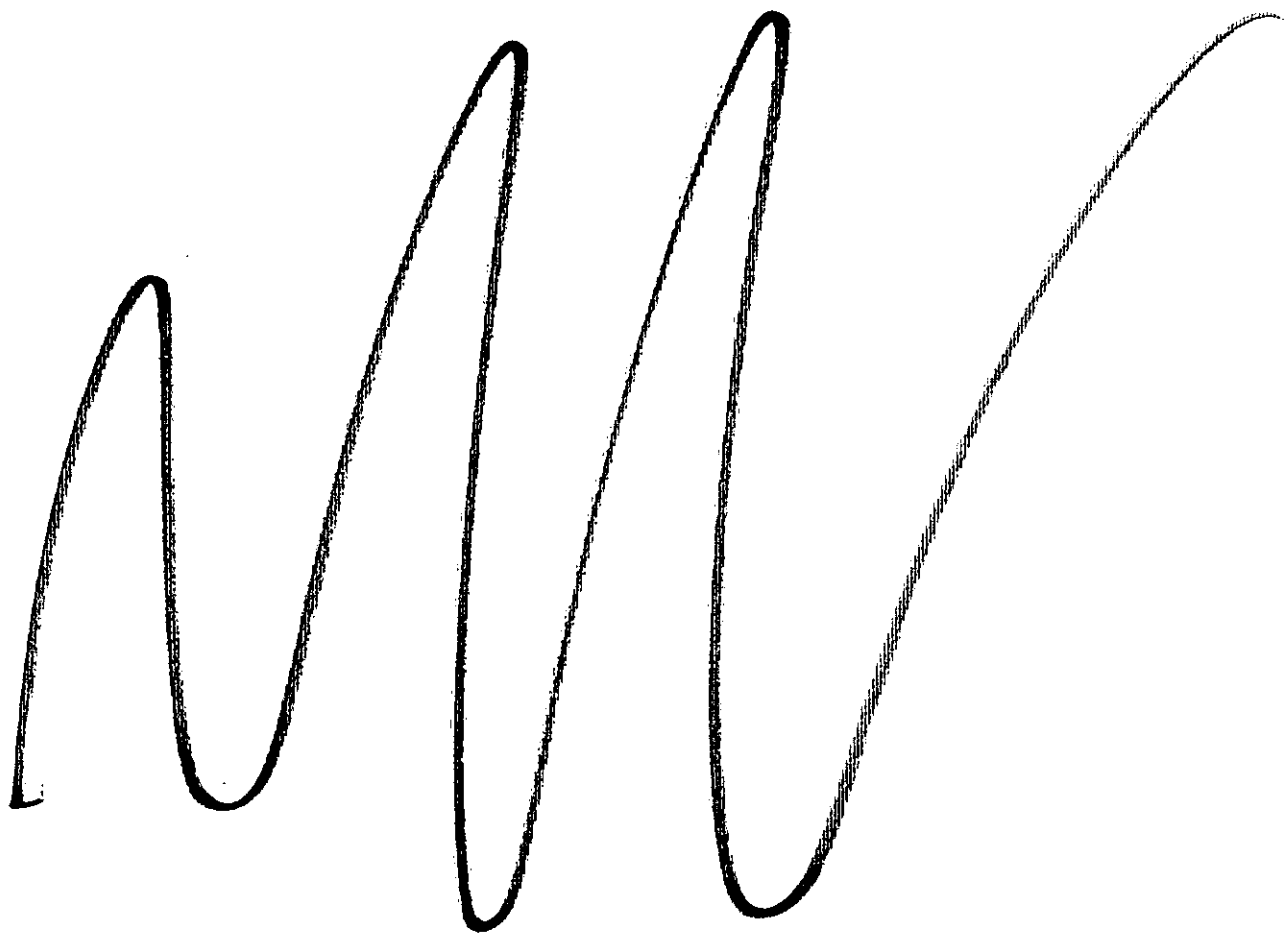
Louis Chamberlain, Supervisor
Waste Incineration
Air Quality Division

JRM:smm
cc: Bob Dongoske, C.S. McCrossan Company

APPENDIX B

WMMI - Savage

Soil Boring Logs and
Monitoring Well Construction Details



Sheet 1 of 1

[redacted] SUR[redacted] ELE[redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] ME [redacted] SUL[redacted] TS, [redacted] [redacted] [redacted] WATER LEVEL OBSERVATIONS

TECHNICIAN _____
DRILLER KS
HELPER KK
RIG NO. 750

BORING STARTED 6-22-89
BORING COMPLETED 6-22-89
STATION On
OFF SET 0

2083 East Center Circle
Minneapolis, Minnesota 55441
612-559-1859

CASING USED HSA SIZE 4.25

WL: 8' WS OR WD
WL: _____ BCR _____ ACR
WL: _____ AB _____ Hr.AB
WL: _____ 24 Hr. AB

PROJECT NO. 2089 BORING NO. MW-1 PROJECT Foth and Van Dyke WEATHER Cloudy

Sample No.	Depth or Elevation From	To	Drilling/Sampling Method	PENETRATION RECORD Split Spoon Blows 6"	6"	6"	6" (2 Feet)	R Length Recovered in Feet	▲ Strata Change	NOTES: Sample Description
S-1	0	2	SS	2	2	2	2	2.0	1.75	Black sandy topsoil to Brown silty sand at 1.75'
S-2	2	4	SS	2	2	3	4	2.0	2.0	Light brown fine sand
S-3	4	6	SS	2	3	3	4	2.0	0	Same
S-4	6	8	SS	3	2	3	4	2.0	0	Light brown fine sand
S-5	8	10	SS	3	2	2	4	2.0	0	Same, Wet
S-6	13	15	SS	4	2	2	3		13.0	Gray silty fine to medium sand, Wet
										End of boring 15'
										Monitoring well set at 15'

ABBREVIATIONS

A.S.-Auger Sample
S.T.-Shelby Tube
S.S.-Split Spoon
D.B.-Diamond Bit
S.A.-Solid Stem Auger
H.S.A.-Hollow Stem Auger
R.B.-Rock Bit
W.S.-While Sampling
W.D.-While Drilling
B.C.R.-Before Casing Removal
A.C.R.-After Casing Removal
A.B.-After Boring

DRILL CREW CHECK LIST

Topsoil Thickness _____
Fill Thickness _____
CAVE IN LEVEL:
While Drilling and Sampling _____
After Boring Completion _____
WATER LOSS:
At _____ To _____
Percent Loss _____
At _____ To _____
Percent Loss _____
BOULDERS OR OBSTRUCTIONS:
At _____ To _____
AT _____ To _____
ARTESIAN PRESSURE:
Depth _____
Height of Soil Rise In Casing _____

DRILLER SIGNATURE

GME CONSULTANTS, INC.
2083 East Center Circle
Minneapolis, Minnesota 55441
612-559-1859

Sheet ____ of ____

TECHNICIAN ____
DRILLER KJS
HELPER KHK
RIG NO 750

SURFACE ELEV. ____
BORING STARTED ____
BORING COMPLETED ____
STATION ____
OFF SET ____

CASING USED ____ SIZE ____

WATER LEVEL OBSERVATIONS
WL: 7' WS OR WD
WL: ____ BCR ____ ACR
WL: ____ AB ____ Hr.AB
WL: ____ 24 Hr. AB

PROJECT NO. 2089 BORING NO. MW-2 PROJECT Foth and Van Dyke WEATHER Cloudy

Sample No.	Depth or Elevation From	To	Drilling/Sampling Method	Split Spoon Blows 6"	6"	6"	6"	R Length Recovered in Feet	▲ Strata Change	NOTES: Sample Description
S-1	0	2	SS	9	3	4	4	2.0	θ	Brown silty fine sand with gravel, black organics at tip of spoon
S-2	2	4	SS	4	4	5	6	1.5	2.0	Black organics and green silty fine sand
S-3	4	6	SS	4	5	5	4	1.5	θ	Green silty fine sand
S-4	6	8	SS	3	3	4	4	2.0	6.0	Gray silty fine sand, Wet, fuel smell
S-5	8	10	SS	3	2	2	4	2.0	θ	Same
S-6	11	13	SS	1	3	3	3	2.0	θ	Gray silty fine sand, Wet
S-7	13	15	SS	5	6	4	10	2.0	θ	Same

(Penetration record: ← 2 Feet →)

End of boring 15'
Monitoring well set at 14'

ABBREVIATIONS
A.S.-Auger Sample
S.T.-Shelby Tube
S.S.-Split Spoon
D.B.-Diamond Bit
S.A.-Solid Stem Auger
H.S.A.-Hollow Stem Auger
R.B. Rock Bit
W.S.-While Sampling
W.D.-While Drilling
B.C.R. Before Casing Removal
A.C.R. After Casing Removal
A.B.-After Boring

DRILL CREW CHECK LIST
Topsoil Thickness ____
Fill Thickness ____
CAVE IN LEVEL:
While Drilling and Sampling ____
After Boring Completion ____
WATER LOSS:
At ____ To ____
Percent Loss ____
At ____ To ____
Percent Loss ____
BOULDERS OR OBSTRUCTIONS:
At ____ To ____
AT ____ To ____
ARTESIAN PRESSURE:
Depth ____
Height of Soil Rise In Casing ____

DRILLER SIGNATURE

[redacted] [redacted] [redacted] [redacted] SUR[redacted] ELEV[redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] ME [redacted] SUL[redacted] TS, [redacted] [redacted] [redacted] [redacted] [redacted] [redacted]

Sheet ____ of ____

TECHNICIAN ____
DRILLER KJS
HELPER KHK
RIG NO 750

BORING STARTED 6-22-89
BORING COMPLETED 6-22-89
STATION On
OFF SET 0

2083 East Center Circle
Minneapolis, Minnesota 55441
612-559-1859

CASING USED HSA SIZE 4.25

WATER LEVEL OBSERVATIONS
WL: 4' WS OR WD
WL: ____ BCR ____ ACR
WL: ____ AB ____ Hr.AB
WL: ____ 24 Hr. AB

PROJECT NO. 2089 BORING NO. MW-3 PROJECT Foth and Van Dyke WEATHER Cloudy

Sample No.	Depth or Elevation From	To	Drilling/Sampling Method	PENETRATION RECORD Split Spoon Blows 6"	6"	6"	6" (2 Feet)	R Length Recovered in Feet	▲ Strata Change	NOTES: / Sample Description
S-1	0	2	SS	2	2	2	2	.5	0	Black organic topsoil
S-2	2	4	SS	2	2	2	2	2.0	2.0	Rust clayey silt, Wet
S-3	4	6	SS	3	3	4	5	1.5	4.0	Gray silty fine sand, Wet
S-4	6	8	SS	2	2	4	6	2.0	0	Same
S-5	8	10	SS	4	6	6	9	2.0	0	Gray silty fine sand, Wet
S-6	13	15	SS	4	6	6	5	2.0	0	Same
										End of boring 15'
										Monitoring well set at 15'

ABBREVIATIONS
A.S.-Auger Sample
S.T.-Shelby Tube
S.S.-Split Spoon
D.B.-Diamond Bit
S.A.-Solid Stem Auger
H.S.A.-Hollow Stem Auger
R.B.-Rock Bit
W.S.-While Sampling
W.D.-While Drilling
B.C.R. Before Casing Removal
A.C.R.-After Casing Removal
A.B.-After Boring

DRILL CREW CHECK LIST

Topsoil Thickness ____
Fill Thickness ____
CAVE IN LEVEL:
While Drilling and Sampling ____
After Boring Completion ____
WATER LOSS:
At ____ To ____
Percent Loss ____
At ____ To ____
Percent Loss ____
BOULDERS OR OBSTRUCTIONS:
At ____ To ____
AT ____ To ____
ARTESIAN PRESSURE:
Depth ____
Height of Soil Rise In Casing ____

DRILLER SIGNATURE

[redacted] [redacted] [redacted] [redacted] SUR[redacted] ELEV[redacted] [redacted] [redacted] [redacted] [redacted] [redacted] [redacted] ME [redacted] SUL[redacted] TS, [redacted] [redacted] [redacted] [redacted] [redacted] [redacted]

Sheet ____ of ____

TECHNICIAN ____
DRILLER KJS
HELPER KHK
RIG NO. 750

BORING STARTED 6-22-89
BORING COMPLETED 6-22-89
STATION On
OFF SET 0

2083 East Center Circle
Minneapolis, Minnesota 55441
612-559-1859

CASING USED HSA SIZE 4.25

WATER LEVEL OBSERVATIONS
WL: 4' WS OR WD
WL: ____ BCR ____ ACR
WL: ____ AB ____ Hr.AB
WL: ____ 24 Hr. AB

PROJECT NO. 2089 BORING NO. MW-4 PROJECT Foth and Van Dyke WEATHER Cloudy

Sample No.	Depth or Elevation From	To	Drilling/Sampling Method	PENETRATION RECORD. Split Spoon Blows 6"	6"	6"	6" (2 Feet)	R Length Recovered in Feet	▲ Strata Change	NOTES: Sample Description
S-1	0	2	SS	2	2	2	2	1.0	0	Black organic topsoil
S-2	2	4	SS	2	3	3	3	1.5	2.0	Gray clayey silt, moist
S-3	4	6	SS	2	3	3	3	1.0	0	Same
S-4	6	8	SS	1	2	3	4	2.0	7.0	Very sily, very fine sand, grayish yellow
S-5	8	10	SS	2	2	3	3	2.0	0	Same
S-6	13	15	SS	4	6	6	9	2.0	14.5	Gray silt and yellow sand, Wet
										End of boring 15'
										Monitoring well set at 15'

ABBREVIATIONS
A.S.-Auger Sample
S.T.-Shelby Tube
S.S.-Split Spoon
D.B.-Diamond Bit
S.A.-Solid Stem Auger
H.S.A.-Hollow Stem Auger
R.B.-Rock Bit
W.S.-While Sampling
W.D.-While Drilling
B.C.R.-Before Casing Removal
A.C.R.-After Casing Removal
A.B.-After Boring

DRILL CREW CHECK LIST

Topsoil Thickness ____
Fill Thickness ____
CAVE IN LEVEL:
While Drilling and Sampling ____
After Boring Completion ____
WATER LOSS:
At ____ To ____
Percent Loss ____
At ____ To ____
Percent Loss ____
BOULDERS OR OBSTRUCTIONS:
At ____ To ____
AT ____ To ____
ARTESIAN PRESSURE:
Depth ____
Height of Soil Rise In Casing ____

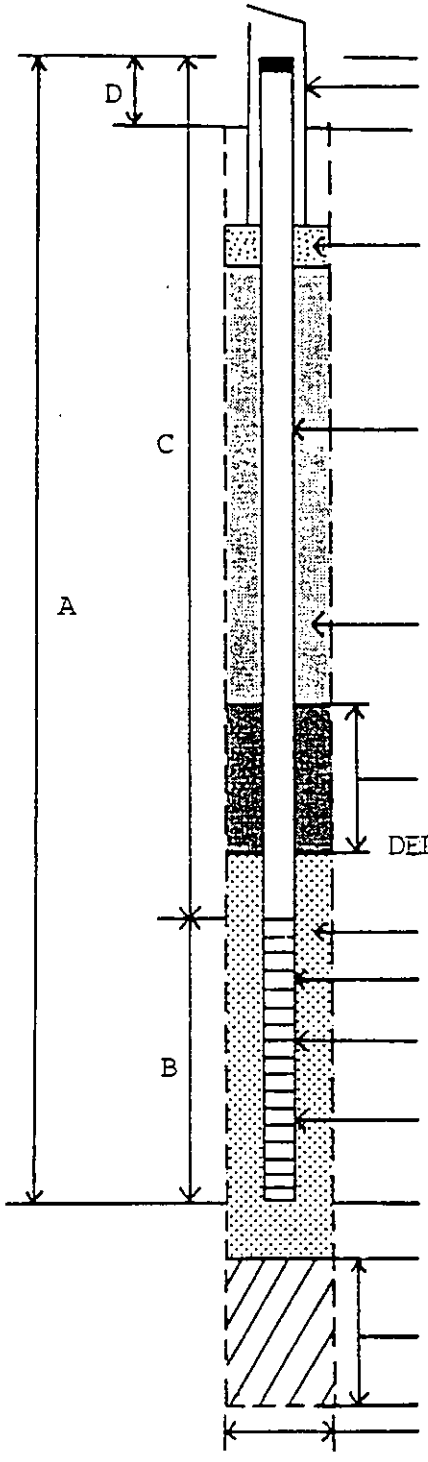
DRILLER SIGNATURE

A = total length of well 18'
B = length of well screen 10'
C = length of riser pipe 8'
D = stick-up at surface 3'

Minnesota Unique Well No. 452974

MONITORING WELL MW-1
DATE INSTALLED 6-22-89
DRILLER/RIG KS 750
GROUND SURFACE ELEV.

WATER LEVELS
8'



ELEVATION OF TOP OF RISER PIPE PROTECTION PIPE	4" I.D. Locking casing
THICKNESS AND TYPE OF SURFACE SEAL	1'6" Neat Cement Grout
DIAMETER AND TYPE OF RISER PIPE	2" L.C. Steel
TYPE OF BACKFILL AROUND RISER PIPE	2' Neat Cement Grout
THICKNESS AND TYPE OF SEAL	1'6" Bentonite Slurry
DEPTH TO TOP OF FILTER SAND	3'6"
TYPE OF FILTER AROUND SCREEN	#30 Red Flint
TYPE OF WELL SCREEN	Stainless Steel
SLOT SIZES	#10
DIAMETER AND LENGTH OF SCREEN	2"-10' Continuous
DEPTH TO BOTTOM OF MONITORING WELL	15'
DEPTH TO BOTTOM OF FILTER SAND	15'
THICKNESS AND TYPE OF SEAL	e
DIAMETER AND DEPTH OF BOREHOLE	8" X 15'

Monitoring well Log
Waste Management Inc.
Foth and Van Dyke and Associates
Savage, Minnesota

GME CONSULTANTS, INC.
2083 EAST CENTER CIRCLE
MINNEAPOLIS, MINNESOTA 55441

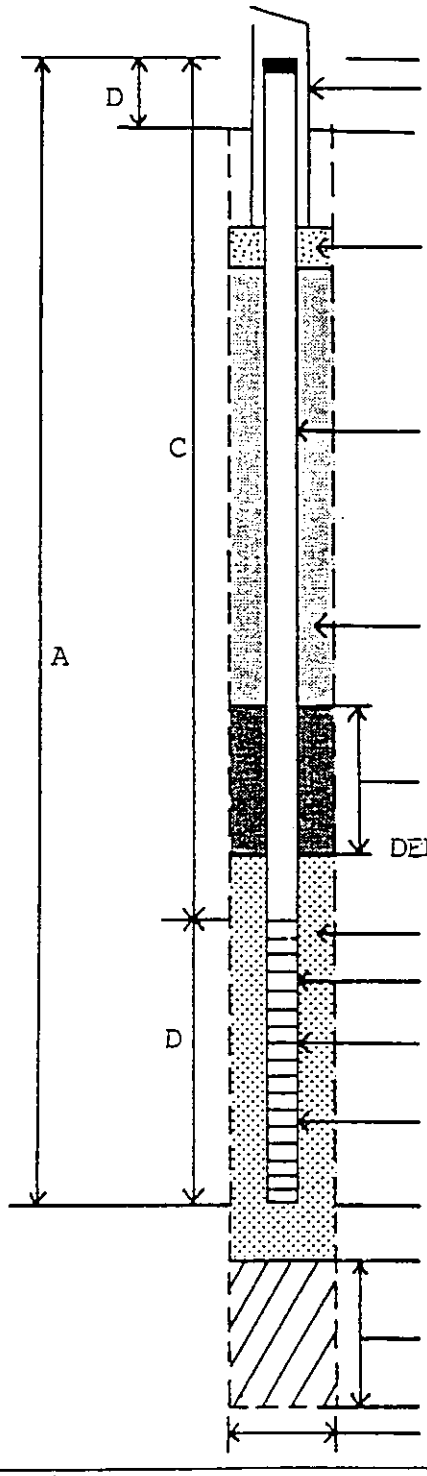
CMP	JAN	6-24-89	2089

A = total length of well 17'
B = length of well screen 10'
C = length of riser pipe 7'
D = stick-up at surface 3'

Minnesota Unique Well No. 452973

MONITORING WELL MW-2
DATE INSTALLED 6-22-89
DRILLER/RIG KS 750
GROUND SURFACE ELEV.

WATER LEVELS
7'



ELEVATION OF TOP OF RISER PIPE PROTECTION PIPE	4" I.D. Locking Casing
THICKNESS AND TYPE OF SURFACE SEAL	1'6" Neat Cement Grout
DIAMETER AND TYPE OF RISER PIPE	2" L.C. Steel
TYPE OF BACKFILL AROUND RISER PIPE	2' Neat Cement Grout
THICKNESS AND TYPE OF SEAL	1'6" Bentonite Slurry
DEPTH TO TOP OF FILTER SAND	3'
TYPE OF FILTER AROUND SCREEN	#30 Red Flint
TYPE OF WELL SCREEN	Stainless Steel
SLOT SIZES	#10
DIAMETER AND LENGTH OF SCREEN	2"-10' Continuous
DEPTH TO BOTTOM OF MONITORING WELL	14'
DEPTH TO BOTTOM OF FILTER SAND	14'
THICKNESS AND TYPE OF SEAL	e
DIAMETER AND DEPTH OF BOREHOLE	8" X 14'

Monitoring Well Log
Waste Management Inc.
Foth and Van Dyke and Associates
Savage, Minnesota

GME CONSULTANTS, INC.
2083 EAST CENTER CIRCLE
MINNEAPOLIS, MINNESOTA 55441

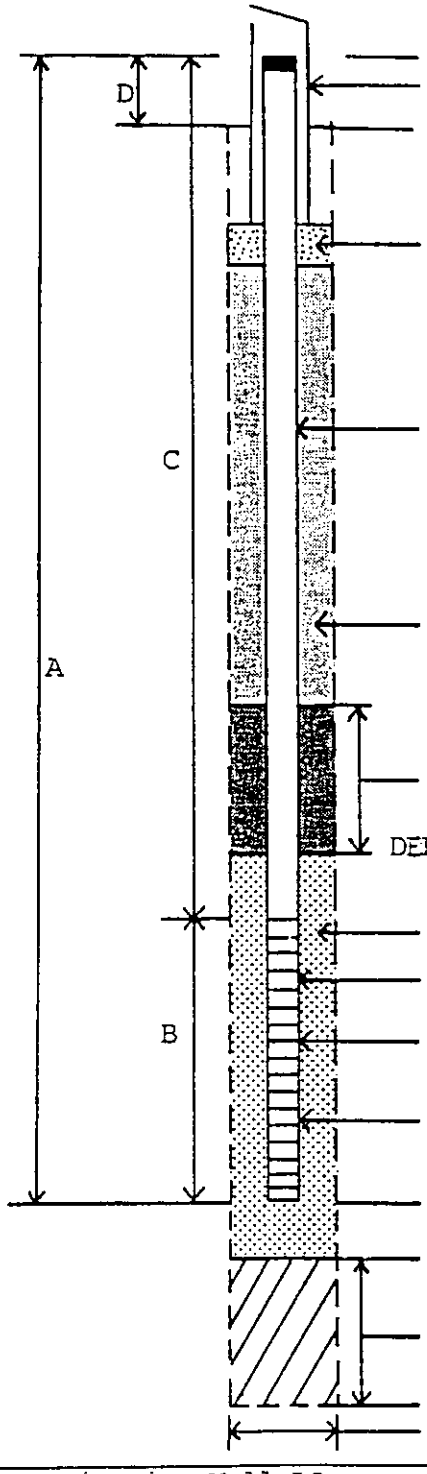
CMP	JAN	6-24-89	2089

A = total length of well 18'
B = length of well screen 10'
C = length of riser pipe 8'
D = stick-up at surface 3'

Minnesota Unique Well No. 457640

MONITORING WELL MW-3
DATE INSTALLED 6-22-89
DRILLER/RIG KS 750
GROUND SURFACE ELEV.

WATER LEVELS
4'



ELEVATION OF TOP OF RISER PIPE PROTECTION PIPE	4" I.D. Locking Casing
THICKNESS AND TYPE OF SURFACE SEAL	2' Neat Cement Grout
DIAMETER AND TYPE OF RISER PIPE	2" L.C. Steel
TYPE OF BACKFILL AROUND RISER PIPE	Neat Cement Grout
THICKNESS AND TYPE OF SEAL	2' Bentonite Slurry
DEPTH TO TOP OF FILTER SAND	4'
TYPE OF FILTER AROUND SCREEN	#30 Red Flint
TYPE OF WELL SCREEN	Stainless Steel
SLOT SIZES	#10
DIAMETER AND LENGTH OF SCREEN	2"-10' Continuous
DEPTH TO BOTTOM OF MONITORING WELL	15'
DEPTH TO BOTTOM OF FILTER SAND	15'
THICKNESS AND TYPE OF SEAL	0
DIAMETER AND DEPTH OF BOREHOLE	8" X 15'

Monitoring Well LOg
Waste Management Inc.
Foth and Van Dyke and Associates
Savage, Minnesota

GME CONSULTANTS, INC.
2083 EAST CENTER CIRCLE
MINNEAPOLIS, MINNESOTA 55441

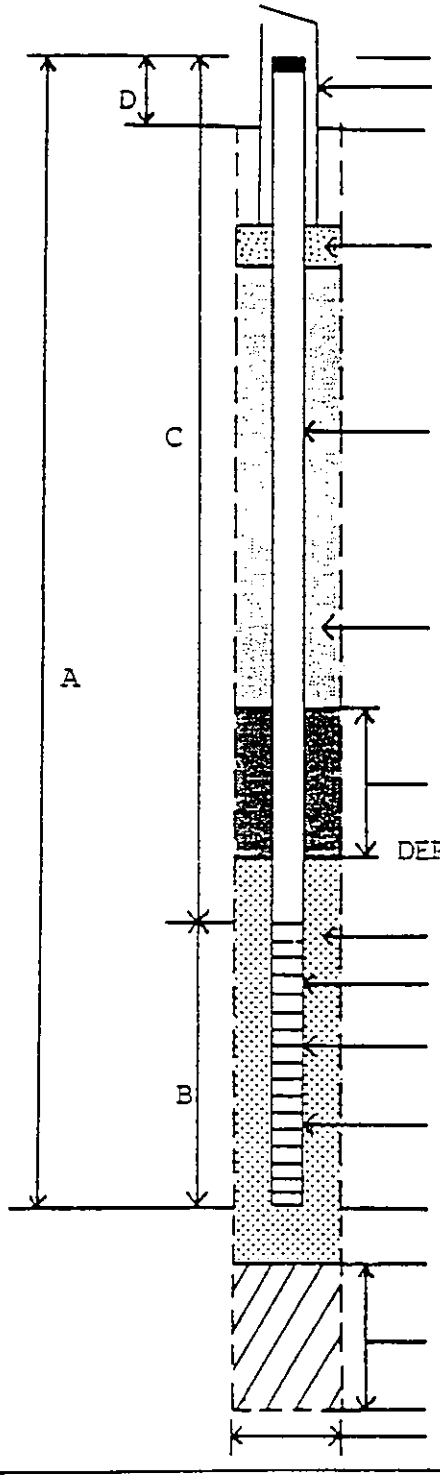
CMP	JAN	6-24-89	2089

A = total length of well 17'6"
B = length of well screen 10'
C = length of riser pipe 7'6"
D = stick-up at surface 3'

Minnesota Unique Well No. 452975

MONITORING WELL MW-4
DATE INSTALLED 6-22-89
DRILLER/RIG KS 750
GROUND SURFACE ELEV.

WATER LEVELS
4'



ELEVATION OF TOP OF RISER PIPE PROTECTION PIPE	4" I.D. Locking Casing
THICKNESS AND TYPE OF SURFACE SEAL	2' Neat Cement Grout
DIAMETER AND TYPE OF RISER PIPE	2" L.C. Steel
TYPE OF BACKFILL AROUND RISER PIPE	Neat Cement Grout
THICKNESS AND TYPE OF SEAL	2' Bentonite Slurry
DEPTH TO TOP OF FILTER SAND	6'
TYPE OF FILTER AROUND SCREEN	#30 Red Flint
TYPE OF WELL SCREEN	Stainless Steel
SLOT SIZES	#10
DIAMETER AND LENGTH OF SCREEN	2"-10' Continuous
DEPTH TO BOTTOM OF MONITORING WELL	14.5'
DEPTH TO BOTTOM OF FILTER SAND	14.5'
THICKNESS AND TYPE OF SEAL	e
DIAMETER AND DEPTH OF BOREHOLE	8" X 14.5'

Monitoring Well Log
Waste Management Inc.
Foth and Van Dyke and Associates
Savage, Minnesota

GME CONSULTANTS, INC.
2083 EAST CENTER CIRCLE
MINNEAPOLIS, MINNESOTA 55441

GMP	JAN	6-24-89	2089

WATER WELL RECORD
Minnesota Statutes 156A.01-.08

MINNESOTA UNIQUE WELL NO.
for Water Sample

452374

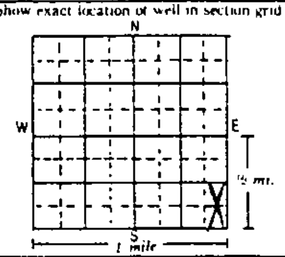
1. LOCATION OF WELLS

County Name: Scott

Township Name	Township Number	Range Number	Section No.	Fraction
	115 (N)	21 (W)	8	SE SE E½

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

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



Sketch map of well location

Addition Name / Block Number / Lot Number

2. PROPERTY OWNER'S NAME

Waste Management Inc.

Address: 12448 Pennsylvania Ave South, Savage

3. FORMATION LOG

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Sandy topsoil	Black	Loose	0	1.75
Silty Sand	Brown	Loose	1.75	2
Fine Sand	Lt. Brown	Loose	2	13
Fine to medium Sand	Gray	Loose	13	15

Use a second sheet, if needed

4. WELL DEPTH (completed): 15' ft.

Date of Completion: 6-22-89

5. DRILLING METHOD

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. DRILLING FLUID: None

7. USE

1☐ Domestic 4☒ Monitoring 8☐ Heat Pump
2☐ Irrigation 5☐ Public 9☐ Industry
3☐ Test Well 6☐ Municipal 10☐ Commercial
7☐ Air Conditioning 11☐ ______

8. CASING

1☒ Black 4☐ Threaded
2☐ Galv. 5☐ Welded
3☐ Plastic 6☐

HEIGHT: Above/Below Surface 3 ft.
Drive Shoe? Yes___ No___

2 in. to 0 ft. Weight ______ lbs./ft.
______ in. to ______ ft. Weight ______ lbs./ft.
______ in. to ______ ft. Weight ______ lbs./ft.

HOLE DIAM.: 8 in. to 15 ft.

9. SCREEN

Make: Johnson
Type: Continuous Dia. ______
Slot/Gauze: 10 Length: 10
Set between 5 ft. and 15 ft.
FITTINGS:

Or open hole from ______ ft. to ______ ft.

10. STATIC WATER LEVEL

8 ft. ☒ below ☐ above land surface Date Measured 6-22-89

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

1☐ Pitless adapter, manufacturer N/A model ______
2☐ Basement offset 3☐ At least 12" above ground
4☐ Plastic casing protection ______

13. WELL GROUTED?

☒ Yes ☐ No
1☒ Neat Cement 2☒ Bentonite 3☐

Grout material	from	to	ft. cu. yds.
NEAT CEMENT	1.5	3.5	
BENTONITE	3.5	5	

14. NEAREST SOURCES OF POSSIBLE CONTAMINATION

______ feet ______ direction Warehouse type

Well disinfected upon completion? ☐ Yes ☐ No

15. PUMP

Date installed N/A ☐ 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 3☐ L.S. Turbine 5☐ Reciprocating
2☐ Jet 4☐ Centrifugal 6☐ ______

16. EXISTING WELLS

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

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

Site MW-1

18. WATER WELL CONTRACTORS CERTIFICATION

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

GME Consultants, Inc.
License Business Name License No.

Address: 14000 21st Ave N. Mpls, MN

Signed ______ Date ______
Authorized Representative

Kevin Smith Date ______
Name of Driller

5/74 306
7/76 306
7/78 306

WATER WELL RECORD

Minnesota Statutes Chapter 156A

452973

LOCATION OF WELL

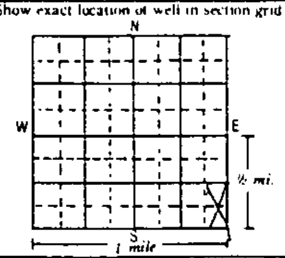
County Name: Scott

Township Name	Township Number	Range Number	Section No.	Fraction
	115 [✓ N]	2 [✓ W]	8	SE SE E½

1. WELL DEPTH (completed) 14' ft. Date of Completion 6/22/89

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

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



Addition Name
Block Number
Lot Number

5. DRILLING METHOD

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. DRILLING FLUID None

7. USE

1☐ Domestic [✓ 4 Monitoring] 8☐ Heat Pump
2☐ Irrigation 5☐ Public 9☐ Industry
3☐ Test Well 6☐ Municipal 10☐ Commercial
7☐ Air Conditioning 11☐ ________

8. CASING

[✓ 1 Black] 4☐ Threaded
2☐ Galv. 5☐ Welded
3☐ Plastic 6☐

HEIGHT: Above/Below Surface 3 ft.
Drive Shoe? Yes___ No___

2 in. to 7 ft. Weight ______ lbs./ft.
______ in. to ______ ft. Weight ______ lbs./ft.
______ in. to ______ ft. Weight ______ lbs./ft.

HOLE DIAM.
8 in. to 14 ft.
___ in. to ___ ft.
___ in. to ___ ft.

2. PROPERTY OWNER'S NAME
Waster Management Inc.
Address
12448 Pennsylvania Ave S, Savage

3. FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Fine Sand	Brown	Loose	0	2
fine Sand & org.	Green	med dense	2	6
Silty fine Sand	Green	Loose	6	15

Use a second sheet, if needed

9. SCREEN
Make JOHNSON
Type CONTINUOUS Dis. ______
Slot/Gauze 10 Length 10
Set between 4 ft. and 14 ft.
FITTINGS:

Or open hole from ______ ft. to ______ ft.

10. STATIC WATER LEVEL
7 ft. [✓ below] ☐ above land surface Date Measured 6-22-89

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 N/A
1☐ Pitless adapter, manufacturer ______ model ______
2☐ Basement offset 3☐ At least 12" above ground
4☐ Plastic casing protection ______

13. WELL GROUTED?
[✓ Yes] ☐ No
[✓ 1 Neat Cement] [✓ 2 Bentonite] 3☐ ______

Grout material	from	to	ft. cu. yds.
NEAT CEMENT	.5	2.5	
BENTONITE	2.5	4	

14. NEAREST SOURCES OF POSSIBLE CONTAMINATION
______ feet ______ direction WAREHOUSE type
Well disinfected upon completion? ☐ Yes ☐ No

15. PUMP N/A
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 3☐ L.S. Turbine 5☐ Reciprocating
2☐ Jet 4☐ Centrifugal 6☐ ______

16. EXISTING WELLS
Unused well on property? ☐ Yes [✓ No]
Abandoned ☐ Permanent ☐ Temporary ☐ Not sealed

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

SITE MW-2

18. WATER WELL CONTRACTORS CERTIFICATION
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

GME CONSULTANTS INC
Licensee Business Name License No.
Address 4000 21st Ave N, Mpls MN

Signed ______ Date ______
Authorized Representative

KEVIN SMITH ______ Date ______
Name of Driller

WATER WELL RECORD

Minnesota Statutes Chapter 156A, 01–08

MINNESOTA UNIQUE WELL NO. for Water Sample: 457542

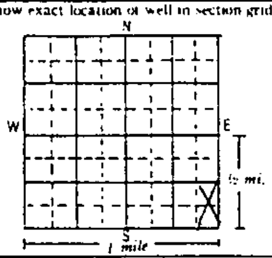
1. LOCATION OF WELL

County Name				
Scott				
Township Name	**Township Number**	**Range Number** (E or W)	**Section No.**	**Fraction**
	115 N	21 W	8	SE SE E½

4. WELL DEPTH (completed): 15' ft. **Date of Completion:** 6-22-89

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

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



Addition Name
Block Number
Lot Number

5. DRILLING METHOD

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. DRILLING FLUID: None

7. USE

1☐ Domestic 4☒ Monitoring 8☐ Heat Pump
2☐ Irrigation 5☐ Public 9☐ Industry
3☐ Test Well 6☐ Municipal 10☐ Commercial
7☐ Air Conditioning 11☐ ______

2. PROPERTY OWNER'S NAME: Waste Management Inc

Address: 12448 Pennsylvania Ave S, Savage

3. FORMATION LOG

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Organic topsoil	Black	Loose	0	2
Clayey Silt	Rust	Soft	2	4
Silty Fine Sand	Gray	Loose	4	15

Use a second sheet, if needed

8. CASING

1☒ Black 4☐ Threaded 2☐ Galv. 5☐ Welded 3☐ Plastic 6☐

HEIGHT: Above/Below Surface 3 ft.

Drive Shoe? Yes___ No___

2 in. to 8 ft. Weight ______ lbs./ft.
______ in. to ______ ft. Weight ______ lbs./ft.
______ in. to ______ ft. Weight ______ lbs./ft.

HOLE DIAM.: 8 in. to 15 ; ___ in. to ___ ; ___ in. to ___

9. SCREEN

Make: Johnson
Type: Continuous Dia. ______
Slot/Gauze: 10 Length: 10
Set between 5 ft. and 15 ft. FITTINGS:

Or open hole from ______ ft. to ______ ft.

10. STATIC WATER LEVEL

4 ft. ☒ below ☐ above land surface Date Measured 6-22-89

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 N/A

1☐ Pitless adapter, manufacturer ______ model ______
2☐ Basement offset 3☐ At least 12" above ground
4☐ Plastic casing protection ______

13. WELL GROUTED?

☒ Yes ☐ No
1☒ Neat Cement 2☒ Bentonite 3☐ ______

Grout material	from	to	ft. cu. yds.
Neat Cement	1.5	3.5	
Bentonite	3.5	5	

14. NEAREST SOURCES OF POSSIBLE CONTAMINATION

______ feet ______ direction Warehouse type

Well disinfected upon completion? ☐ Yes ☐ No

15. PUMP

Date installed: N/A ☐ 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 3☐ L.S. Turbine 5☐ Reciprocating
2☐ Jet 4☐ Centrifugal 6☐ ______

16. EXISTING WELLS

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

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

SITE MW-3

18. WATER WELL CONTRACTORS CERTIFICATION

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

CME Consultants, Inc
Licensee Business Name License No.

Address: 1400 21st Ave N, Mpls, MN

Signed ______ Authorized Representative Date ______

Kevin Smith
Name of Driller Date ______

5774 306
7776 306
7778 306
2782

WATER WELL RECORD
Minnesota Statutes Chap. 156

452375

1. LOCATION OF WELL

County Name	Township Name	Township Number	Range Number	Section No.	Fraction	4. WELL DEPTH (completed)	Date of Completion
Scott		115	21	8	SE SE E¼	14'6" ft.	6-22-89

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

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

Addition Name / Block Number / Lot Number

5. DRILLING METHOD
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. DRILLING FLUID: None

7. USE
1☐ Domestic 2☐ Irrigation 3☐ Test Well 4☒ Monitoring 5☐ Public 6☐ Municipal 7☐ Air Conditioning 8☐ Heat Pump 9☐ Industry 10☐ Commercial 11☐

2. PROPERTY OWNER'S NAME
Waste Management Inc.
Address
12448 Pennsylvania Ave S, Savage

8. CASING
☒ Black 2☐ Galv. 3☐ Plastic 4☐ Threaded 5☐ Welded 6☐
HEIGHT: Above/Below Surface 3 ft. Drive Shoe? Yes ___ No ___
2 in. to 7.5 ft. Weight ___ lbs./ft.
HOLE DIAM. 8 in. to 14.5

3. FORMATION LOG

FORMATION LOG	COLOR	HARDNESS OF FORMATION	FROM	TO
Organic topsoil	Black	loose	0	2
Clayey Silt	Gray	Loose	2	7
Silty, very fine sand	yellow	Loose	7	14.5
Silt & sand	Gray & yellow	Med. dense	14.5	15

Use a second sheet, if needed

9. SCREEN
Make JOHNSON
Type CONTINUOUS Dia. ___
Slot/Gauze ___ Length ___
Set between 4.5 ft. and 14.5 ft.
FITTINGS:
Or open hole from ___ ft. to ___ ft.

10. STATIC WATER LEVEL
7 ft. ☒ below ☐ above land surface. Date Measured 6-22-89

11. PUMPING LEVEL (below land surface)
N/A ft. after ___ hrs. pumping ___ g.p.m.

12. HEAD WELL COMPLETION — N/A
1☐ Pitless adapter, manufacturer ___ model ___
2☐ Basement offset 3☐ At least 12" above ground
4☐ Plastic casing protection ___

13. WELL GROUTED?
☒ Yes ☐ No
☒ Neat Cement 2☒ Bentonite 3☐
Grout material ___ from ___ to ___ ft. cu. yds.
NEAT CEMENT .5 2.5
BENTONITE 2.5 4.5

14. NEAREST SOURCES OF POSSIBLE CONTAMINATION
___ feet ___ direction WAREHOUSE type
Well disinfected upon completion? ☐ Yes ☐ No

15. PUMP
Date installed N/A ☐ 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☐ L.S. Turbine 4☐ Centrifugal 5☐ Reciprocating 6☐

16. EXISTING WELLS
Unused well on property? ☐ Yes ☒ No
Abandoned ☐ Permanent ☐ Temporary ☐ Not sealed

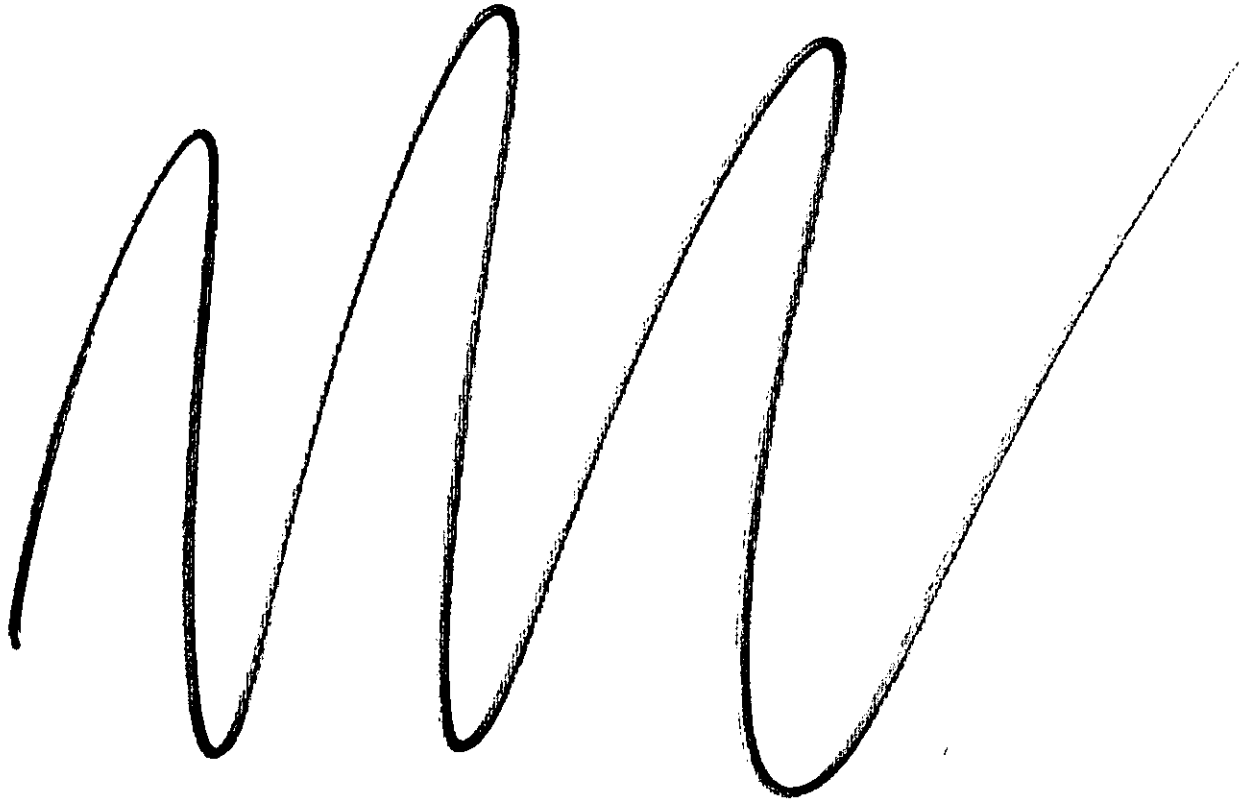
17. REMARKS, ELEVATION, SOURCE OF DATA, etc.
SITE MW-4

18. WATER WELL CONTRACTORS CERTIFICATION
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
EME CONSULTANTS, INC
Licensee Business Name — License No.
Address 4000 21st Ave N, Mpls, MN
Signed ___ Authorized Representative Date ___
Kevin Smith
Name of Driller Date ___

APPENDIX C

WMMI - Savage

Groundwater Analytical Results



SERCO Laboratories

1931 West County Road C2. St. Paul. Minnesota 55113 (612) 636-7173

LABORATORY ANALYSIS REPORT NO: 1875 PAGE 1
08/31/89

Foth & Van Dyke
6474 City West Parkway
Eden Prairie, MN 55344

Mr. Randall Sipple

DATE COLLECTED: ~~08/15-16/89~~
DATE RECEIVED: 08/17/89
COLLECTED BY: CLIENT
PICKED UP BY: CLIENT
SAMPLE TYPE: WATER

Project: 88W79-3

SERCO SAMPLE NO:		53459	53469	53479	53489	53509
SAMPLE DESCRIPTION:		MW-1 C159-GW7 #63089	MW-2 #63189	MW-3 #63289	MW-4 #63389	FIELD BLANK #63589
ANALYSIS:	RAL					
Chloromethane, ug/L	—	<1.0	<1.0	<1.0	<1.0	-
Dichlorodifluoromethane, ug/L	1400	<1.0	<1.0	<1.0	<1.0	-
Vinyl chloride, ug/L	0.15	<1.0	<1.0	<1.0	<1.0	-
Bromomethane, ug/L	0.003	<1.0	<1.0	<1.0	<1.0	-
Chloroethane, ug/L	—	<1.0	<1.0	<1.0	<1.0	-
Dichlorofluoromethane, ug/L	—	<1.0	<1.0	<1.0	<1.0	-
Methylene Chloride, ug/L	48.0	<9.0	<9.0	<9.0	<9.0	-
Trichlorofluoromethane, ug/L	2100.0	<1.0	<1.0	<1.0	<1.0	-
Allyl chloride, ug/L	0.002	<0.2	<0.2	<0.2	<0.2	-
1,1 Dichloroethylene, ug/L		<0.1	<0.1	<0.1	<0.1	-
1,1 Dichloroethane, ug/L	810.0	<0.1	1.4	0.5	0.6	-
1,2 Dichloroethylene, trans, ug/L	70.0	<0.1	<0.1	1.1	1.9	-
1,2 Dichloroethylene, cis, ug/L	70.0	<0.1	<0.1	<0.1	<0.1	-
Chloroform, ug/L	57.0	<0.5	<0.5	<0.5	<0.5	-
1,1,2 Trichlorotrifluoroethane, ug/L		<5.0	<5.0	<5.0	<5.0	-
1,2 Dichloroethane, ug/L	3.8	<0.1	0.3	<0.1	<0.1	-
Dibromomethane, ug/L	0.005	<0.2	<0.2	<0.2	<0.2	-
1,1,1 Trichloroethane, ug/L	200.0	<0.5	1.0	<0.5	<0.5	-
Carbon tetrachloride, ug/L	2.7	<0.1	<0.1	<0.1	<0.1	-
Bromodichloromethane, ug/L	140	<0.1	<0.1	<0.1	<0.1	-
Dichloroacetonitrile, ug/L	~	<0.2	<0.2	<0.2	<0.2	-

Approved by: DW < means "not detected at this level". 1 mg = 1000 ug. continued

Member

SERCO Laboratories

1931 West County Road C2, St. Paul, Minnesota 55113 (612) 636-7173

LABORATORY ANALYSIS REPORT NO: 1875 PAGE 2
08/31/89

SERCO SAMPLE NO: / SAMPLE DESCRIPTION: / ANALYSIS:	RAC	53459 MW-1 C159-GW7 #63089	53469 MW-2 #63189	53479 MW-3 #63239	53489 MW-4 #63389	53509 FIELD BLANK #63589
2,3 Dichloro-1-propylene, ug/L	-	<0.2	<0.2	<0.2	<0.2	-
1,2 Dichloropropane, ug/L	5.6	<0.2	<0.2	<0.2	<0.2	-
1,1 Dichloro-1-propylene, ug/L	-	<0.2	<0.2	<0.2	<0.2	-
1,3 Dichloro-1-propylene, trans, ug/L	-	<0.2	<0.2	<0.2	<0.2	-
Trichloroethylene, ug/L	31	<0.5	<0.5	1.4	<0.5	-
1,3 Dichloropropane, ug/L	2.0	<0.2	<0.2	<0.2	<0.2	-
Dibromochloromethane, ug/L	-	<0.2	<0.2	<0.2	<0.2	-
1,1,2 Trichloroethane, ug/L	14	<0.1	<0.1	<0.1	<0.1	-
1,3 Dichloro-1-propylene, cis, ug/L	-	<0.2	<0.2	<0.2	<0.2	-
1,2 Dibromoethane, ug/L	0.005	<0.2	<0.2	<0.2	<0.2	-
2 Chloroethylvinyl ether, ug/L	-	<0.2	<0.2	<0.2	<0.2	-
Bromoform, ug/L	140	<0.2	<0.2	<0.2	<0.2	-
1,1,1,2 Tetrachloroethane, ug/L	~~360~~	<0.1	<0.1	<0.1	<0.1	-
1,2,3 Trichloropropane, ug/L	-	<0.2	<0.2	<0.2	<0.2	-
1,1,2,2 Tetrachloroethane, ug/L	2.0	<0.2	<0.2	<0.2	<0.2	-
Tetrachloroethylene, ug/L		<0.2	0.4	1.0	<0.2	-
Pentachloroethane, ug/L		<0.2	<0.2	<0.2	<0.2	-
Chlorobenzene, ug/L	300	<1.0	<1.0	<1.0	<1.0	-
Acetone, ug/L		<100	<100	<100	<100	-
Tetrahydrofuran, ug/L		<5.0	<5.0	<5.0	9.5	-
Methyl ethyl ketone, ug/L		<5.0	<5.0	<5.0	<5.0	-

Approved by: < means "not detected at this level". 1 mg = 1000 ug. continued

SERCO Laboratories

1931 West County Road C2, St. Paul, Minnesota 55113 (612) 636-7173

LABORATORY ANALYSIS REPORT NO: 1875 PAGE 3
08/31/89

SERCO SAMPLE NO:	53459	53469	53479	53489	53509
SAMPLE DESCRIPTION:	MW-1 C159-GW7 #63089	MW-2 #63189	MW-3 #63289	MW-4 #63389	FIELD BLANK #63589
ANALYSIS:					
Benzene, ug/L	<1.0	<1.0	<1.0	2.3	-
Methyl isobutyl ketone, ug/L	<5.0	<5.0	<5.0	<5.0	-
Toluene, ug/L	<1.0	<1.0	<1.0	<1.0	-
Ethylbenzene, ug/L	<1.0	<1.0	<1.0	<1.0	-
Cumene, ug/L	<1.0	<1.0	<1.0	<1.0	-
m-Xylene, ug/L	<1.0	<1.0	<1.0	<1.0	-
o,p-Xylene, ug/L	<1.0	<1.0	<1.0	<1.0	-
1,3 Dichlorobenzene, ug/L	<1.0	<1.0	<1.0	<1.0	-
1,2 Dichlorobenzene, ug/L	<1.0	<1.0	<1.0	<1.0	-
1,4 Dichlorobenzene, ug/L	<1.0	1.7	<1.0	<1.0	-
Ethyl ether, ug/L	<10	<10	<10	<10	-
Lead, mg/L as Pb	0.003	0.014	0.003	0.022	-
Methyl Tertiary Butyl Ether, mg/L	<0.01	<0.010	<0.010	<0.010	-
FID Scan, mg/L, as gasoline	<0.50	<0.50	<0.50	<0.50	-
FID Scan, mg/L, as #2 fuel oil	<2.0	<2.0	<2.0	<2.0	-

Approved by: < means "not detected at this level". 1 mg = 1000 ug. continued

SERCO Laboratories

1931 West County Road C2, St. Paul, Minnesota 55113 (612) 636-7173

All analyses were performed using EPA or other accepted methodologies. Samples that may be of an environmentally hazardous nature will be returned to you. Other samples will be stored for 30 days from the date of this report, then disposed of by SERCO Laboratories. Please contact me if other arrangements are needed.

Report submitted by,

Diane J. Anderson
Project Manager

< means "not detected at this level". 1 mg = 1000 ug.

PRECISION ENVIRONMENTAL	CHAIN OF CUSTODY RECORD	No. 89-251 Page 1 of 3

Client: Foth + Van Dyke	Project Title: Waste Management - SAVAGE
Address: 6474 City West Pkwy	Project Number: C159-GW7
City, State Zip: EDEN PRAIRIE, MN	Contact: Randall Sipple

Item No.	Sample No.	Sample Description	Matrix	Date Collected	Containers
1	63089	MW-1	WATER	8/15/89	4
2	63189	MW-2	WATER	8/17/89	4
3	63289	MW-3	WATER	8/16/89	4
4	63389	MW-4	WATER	8/16/89	4
5	63489	Travel Blank	WATER	8/16/89	1
6	63589	Field Blank (HOLD)	WATER	Serco	3
7					
8					
9					
10					

Samples Collected by: TJH	Delivered by: JAL	Date Delivered: 8/17/89

Destination: Serco	Send Original Report To:	Send Copy Report To:
Contact: Diane Anderson	Randall Sipple FVD	
Date Due:		
Analysis Cost:	NA	NA

Analysis	Units	1	2	3	4	5	6	7	8	9	10
VOC's (See Attachment)		✓	✓	✓	✓						
Lead		✓	✓	✓	✓		HOLD				
MTBE		✓	✓	✓	✓						
TPH as Gas		✓	✓	✓	✓						
TPH as #2 Diesel		✓	✓	✓	✓						

Item No.	Relinquished by	Received by	Date	Airbill or Manfest No.
1-6	Julie LaVigne	[signature]	8/17/81	NA

Original Copy - Samples | Yellow Copy - Data | Pink Copy - Data Processing

Form Completed by: JJG	Date Completed: 8/17/89	Present On-site: JMM TJH

SERCO Laboratories

1931 West County Road C2. St. Paul. Minnesota 55113 (612) 636-7173

LABORATORY ANALYSIS REPORT NO: 387 PAGE 1
02/23/90

Foth & Van Dyke
10340 Viking Dr. Ste. 100
Eden Prairie, MN 55344

DATE COLLECTED: 02/16/90
DATE RECEIVED: 02/16/90
COLLECTED BY : CLIENT
DELIVERED BY : CLIENT
SAMPLE TYPE : GROUNDWATER

Attn: Victoria Freidmann

SERCO SAMPLE NO:	10550	10560	10570	10580
SAMPLE DESCRIPTION:	MW1	MW2	MW3	MW4
ANALYSIS:	88W79 Savage	88W79 Savage	88W79 Savage	88W79 Savage
FID Scan, mg/L, as #2 Fuel Oil	<2.0	<2.0	<2.0	<2.0
FID Scan, mg/L, as gasoline	<0.50	<0.50(A)	<0.50	<0.50
Benzene, mg/L	<0.005	0.014	<0.005	<0.005
Ethyl Benzene, mg/L	<0.005	<0.005	<0.005	<0.005
Toluene, mg/L	<0.005	<0.005	<0.005	<0.005
Xylene, mg/L	<0.005	0.006	<0.005	<0.005
Lead, filtered, mg/L as Pb	<0.1	<0.1	<0.1	<0.1

SERCO SAMPLE NO:	10590	10600
SAMPLE DESCRIPTION:	TB	FB
ANALYSIS:	88W79 Savage	88W79 Savage
FID Scan, mg/L, as #2 Fuel Oil	<2.0	<2.0
FID Scan, mg/L, as gasoline	<0.50	<0.50
Benzene, mg/L	<0.005	<0.005
Ethyl Benzene, mg/L	<0.005	<0.005
Toluene, mg/L	<0.005	<0.005
Xylene, mg/L	<0.005	<0.005

(A) Sample may contain an amount of this parameter below the detection limit.

< means "not detected at this level". 1 mg = 1000 ug.

Member

SERCO Laboratories

1931 West County Road C2. St. Paul. Minnesota 55113 (612) 636-7173

All analyses were performed using EPA or other accepted methodologies. Samples that may be of an environmentally hazardous nature will be returned to you. Other samples will be stored for 30 days from the date of this report, then disposed of by SERCO LABORATORIES. Please contact me if other arrangements are needed.

Report submitted by,

Diane J. Anderson

Diane J. Anderson
Project Manager

< means "not detected at this level". 1 mg = 1000 ug.

CHAIN OF CUSTODY

Client: Foth & Van Dyke Scope I.D.: 88W79
Project: SAVAGE Page:
Prepared by: V. Friedmann Date: 2/16/90
Sampler(s): Victoria Friedmann & Kathy Wittman Date:
(Signature)

Sta. No.	Date	Time	Comp	Grab	Station Location	Serial Tag Number	No. of Containers	Lab Numbers	TPH as gas	TPH as #2 fuel	BETX	Lead			Remarks
—	2/13/90	—	—	—	—	—	15 VOC vials								} Provided by carrier 2/14/90 DJA SERCO
—	2/13/90	—	—	—	—	—	3 Trip Blanks with laboratory pure water.								
—	2/13/90	—	—	—	—	—	4 metals bottles (blue label) HNO_3 preservative								
MW1	2/16/90	930				MW1	4		X	X	X	X			
MW2	2/16/90	1345				MW2	4		X	X	X	X			
MW3	2/16/90	1100				MW3	4		X	X	X	X			
MW4	2/16/90	1315				MW4	4		X	X	X	X			Metals samples
TB	2/16/90	—			Trip Blank		3		X	X	X	~~X~~ No			were filtered
FB	2/16/90	1200			Field Blank (Bailer)		3		X	X	X	~~X~~			and preserved.

	Signature	Company	Date	Time	Carrier
Relinquished By:	Diane Anderson (SERCO) →	SERCO Labs	2/14/90		EnRoute
Received By:	Victoria A. Friedmann	Foth & Van Dyke	2/14/90		
Relinquished By:	Victoria A. Friedmann	Foth & Van Dyke	2/16/90	3:45	
Received By:	Brenda J. Wagner (SERCO)	SERCO	2/16/90	3:45	
Relinquished By:					
Received by Lab:					

Foth & Van Dyke

Remarks:
4 SS Bailers also provided.
DJA 2/14/90

FORM # 384 GEM (Rev. 5/88)