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

MINNESOTA DEPARTMENT OF
TRANSPORTATION

SUPPLEMENTAL APPENDICES

October 30, 1990

RECEIVED
JAN 18 1991
MPCA, HAZARDOUS
WASTE DIVISION

BRAUN™

Table of Contents

Appendix A: Field Notes
Appendix B: Laboratory QA/QC Data

AUGUST 15, 1990

WEATHER: CLEAR SKIES, WIND NE 5 MPH, 70°

8:15 ARRIVE ON-SITE WITH DRILL RIG AND TWO SUPPORT TRUCKS. MEET WITH GARY AND DISCUSS PLACEMENT OF BORINGS AND MONITORING WELLS. LOCATE UTILITIES AROUND FORMER TANK BASIN AND PUMP ISLAND. PLACE ONE WELL EAST OF FENCE, ONE IN GRASS NEAR GATE ENTRANCE.

8:45 BEGIN SETTING UP DRILL RIG ON NORTHSIDE OF TANK BASIN.

LOCATION: MN/DOT MAINTENANCE FACILITY 705; JORDAN, MN.

DATE: 8/15/90

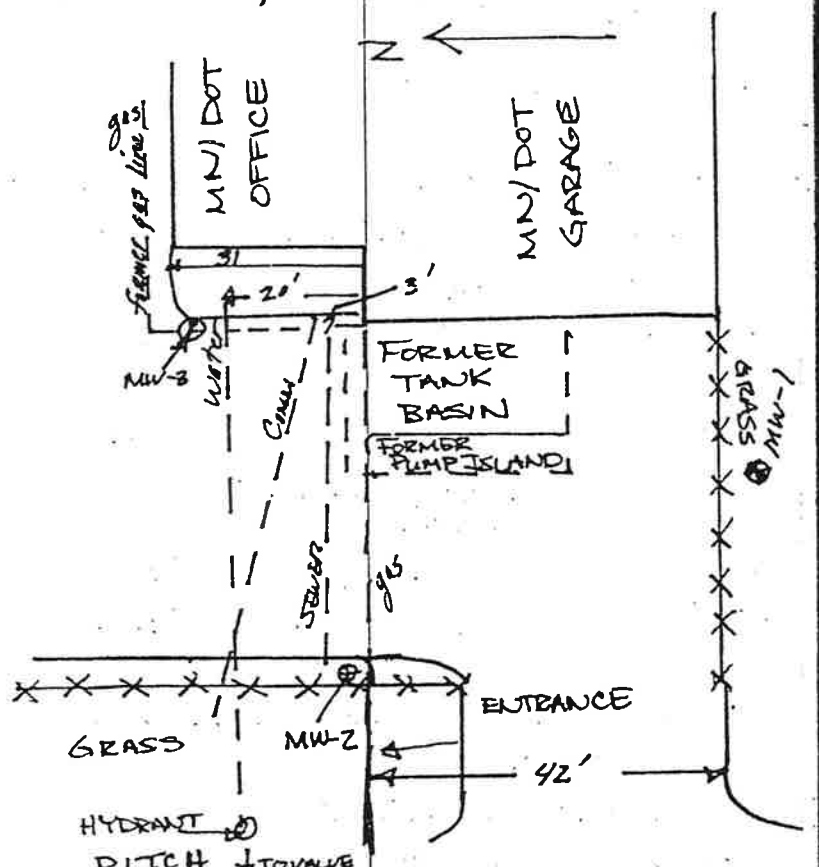
CREW: MIKE NIESEN/STEVE BRAUN

GEOLOGIST: TIM SINGER

BORING I.D. ST-1

ADDRESS: 705 SYNDICATE STREET JORDAN, MN.

AUGUST 15, 1990



9:10 MEET WITH CALE LUCAS AND DISCUSS PLACEMENT OF MONITORING WELLS AND BORINGS.

AUGUST 15, 1990

BORING I.D. ST-1

DEPTH	SOIL	PID READING	HEAD SPACE	COMMENTS
SURFACE (6" BITUM)	SP-SM(F) DK BN MT, W/TR GR	0 PPM	0 ppm	NO ODOR/STAINING
2-3 1/2	SC(F-M)GR, MT W/TR GR	0 PPM	0 ppm	NO ODOR/STAINING
4-5 1/2	SC(F-M)GR, MT W/TR GR (5-5 1/2) ML, BK, MT SANDY	0 ppm	0 ppm	NO ODOR/STAINING
7-8 1/2	MH, DK GR, WT	0 PPM	0 ppm	NO ODOR/STAINING
9-10 1/2	MH, DK GR, WB	0 PPM	0 ppm	NO ODOR/OR STAINING WB AT 10'

SAMPLE TIME: 9:40 am; FILL(Z)
VOA VIALS
DEPTH: 10-11 1/2 FEET
WATER LEVEL: 9 1/2 FT W/ 10 FT HSA
TIME: 9:43.

10:00 SET UP ON ST-2; WEST SIDE OF TANK BASIN.

AUGUST 15, 1990

AUGUST 15, 1990

BORING I.D: ST-2

DEPTH	SOIL	PID READING	HEADSPACE	COMMENTS
SURFACE (6" BITUMINOUS)	SP-SM(F-M) BN, MT W/GR CL(S) GY, BN MT	0 PPM		2 PPM READING IN BORING TO 2½ FT
2½-4	CL(S) DK GR, MT W/GR (3½-4)	0PPM	1 PPM	NO ODOR OR STAINING
5-6½	MH, DK GR, MT W/SEAM OF SP(VF-F)	0PPM	17 PPM	NO ODOR OR STAINING ½" LENS SP-(VF-F) DK GRAY, WT.
7½-9	SP(M-C) GR, WB W/GR (8-9 FT)	15PPM	120 PPM	— WB SP(M-C) HAS SL. ODOR OF GASOLINE NO VISIBLE PRODUCT
10-11½	SP(M-C) GR, WB GP(WITH M-C) SAND WB, GR	15-20PPM	150 PPM	— WB GP HAS SLIGHT ODOR OF GASOLINE NO VISIBLE PRODUCT
				— PID READING WITH AUGER REMOVED 40 PPM (OPEN HOLE)
10:10	SAMPLE TIME: 10:10 DEPTH: 7½ FT.			
10:15	COMPLETE DRILLING. REMOVE ALL FLIGHTS OF AUGER.			

AUGUST 15, 1990

BORING I.D. ST-3

DEPTH:	SOIL	PID READING	HEADSPACE	COMMENTS.
SURFACE (6" BITUMINOUS)	SP-SM(M-C) DK BN, MT W/GR	0 PPM	8 PPM (2½-4)	NO ODOR OR STAINING
2½-4 FT	CL(W/S) DK BN, MT, MOTTLED YELLOW (3½-4) CL(W/S) DK GR MT, MOTTLED	0 PPM	14 PPM (5-6½)	NO ODOR OR STAINING
5-6½ FT	(5-6) SP-SM(VF) GR, MT (6-6½) ML, GR, MT	1 PPM	2 PPM (7½-9)	(5-6) SLIGHT GASOLINE ODOR
7½-9 FT	(7½-8 FT) MH, BK, WT (8-9) SP(M-C) WB, W/GR	0 PPM		— SLIGHT GASOLINE ODOR NO FREE PRODUCT VISIBLE.
10-11½	GP(GR) WB	10 PPM	70 PPM	— SLIGHT GASOLINE ODOR. NO FREE PRODUCT VISIBLE.

10:30 BEGIN DRILLING AT ST-3.
10:40 SAMPLE TIME. FILL (2) VOA'S
10:50 SAMPLE TIME: FILL (2) VOA'S. USE FOR ANALYSIS.
11:00 CALL RON WEAVER AND INFORM HIM OF PROGRESS.

AUGUST 15, 1990

BORING I.D: MW-1

DEPTH:	SOIL	PID READINGS	HEADSPACE	COMMENTS
SURFACE	(0-1) SP-SM(VF-F) BK, DRY (1-2½) CL(W/S) BRN, MT, MOTTLED WITH RUST	0 PPM	—	NO ODOR OR STAINING
2½-4	CL(W/S) BN, MT MOTTLED W/ RUST	0 PPM	0 PPM	NO ODOR OR STAINING
5-6½	SP(VF-F) GR, MT (5-7) LAGEY C.GR & COBS	0PPM	0 PPM	NO ODOR OR STAINING
7½-9	SP(M-C) GR, WB W/GR	0PPM	0 PPM	NO ODOR OR STAINING; NO FREE PRODUCT.
10-11½	(10-11) CL(S) DK BN WB, W/GR (11-11½) SP(M-C) GR WB	0PPM	0 PPM	NO ODOR OR STAINING; NO FREE PRODUCT.
12½-14	CL(S) DK BN, WB W/TR GR	0PPM	0 PPM	NO ODOR OR STAINING NO FREE PRODUCT
15-16½	SP-SM(M-C) LT BN, WB, W/TR GR	0PPM	0PPM	

11:30 SAMPLE TIME: FILL (2) VOA'S AT ~~12~~ 7.5 FT.

11:45-12:30 LUNCH

12:30 SAMPLE AT 12½-14 FT.

12:40 COMPLETE DRILLING MW-1. PREPARE TO INSTALL WELL.

AUGUST 15, 1990

12:40 WATER LEVEL 9 1/2 FT BELOW GROUND SURFACE WITH 15 FT HSA.

12:45 LOWER WELL SCREEN AND RISER INTO BORING.
USE;
(1) 10FT 2" STAINLESS STEEL WELL SCREEN (JOHNSON)
(1) 5 FT 2" BLACK IRON RISER.
(1) 2 FT 2" BLACK IRON RISER, (1) CAP (2) COUPLINGS
TOTAL LENGTH: WELL SCREEN AND RISER EQUALS 17.5 FT.

1:15 COMPLETE ADDING BENTONITE SEAL.
USE (4) BAGS SILICA SAND FILTER PACK FROM 15FT TO 4FT.
USE (1/2) PAIL 1/4" BENTONITE TABLETS. BENTONITE SEAL FROM 4FT TO 3FT.

AUGUST 15, 1990

1:15 (CONT)
INSTALL 5FT PROTECTIVE STEEL CASING.

1:30 COMPLETE AUGERING BORINGS FOR BUMPER POSTS.

1:40 BEGIN MIXING GROUT.

1:50 COMPLETE GROUTING BORING TO SURFACE. GROUT (3) 4" STEEL BUMPER POSTS.
USE (3) BAGS PORTLAND AND 2% BENTONITE POWDER.

2:05 MOBILIZE TO MW-2. PREPARE TO DRILL. SET UP JUST NORTH OF GATE (MAIN ENTRANCE) IN GRASSY AREA.

AUGUST 15, 1990

BORING I.D. MW-2

DEPTH	SOIL	PID READING	HEADSPACE	COMMENTS
SURFACE (TOPSOIL)	CL(W/S) BK, MT	0 PPM	—	NO ODOR OR STAINING.
2 1/2 - 4 FT	CL(S) DK BN, MT W/TR GR	0 PPM	0 PPM	NO ODOR OR STAINING
5 - 6 1/2	ML(SANDY) VF, DK GR, MT	0 PPM	0 PPM	NO ODOR OR STAINING
7 1/2 - 9	ML (SANDY) VF DK GR, WB	0 PPM	0 PPM	NO ODOR OR STAINING NO FREE PRODUCT.
10 1/2 - 11	ML, (SANDY) VF DK GR, WB W/ LA WOOD FRAGMENTS	0 PPM	0 PPM	NO ODOR OR STAINING; NO FREE PRODUCT.
12 1/2 - 14	WOOD FRAGMENTS (SAMPLER PLUGGED) SP(M) GR, WB?	0 PPM	2 PPM	NO ODOR OR STAINING; NO FREE PRODUCT.
15 - 16 1/2	SP-SM (M-C) WB W/GR	0 PPM	0 PPM	NO ODOR NO STAINING; NO FREE PRODUCT.

AUGUST 15, 1990

2:40 SAMPLE TIME; FILL (2) VOA'S AT MW-2 7.5FT.

2:50 COMPLETE DRILLING. PREPARE TO INSTALL MONITORING WELL. WATER LEVEL 9.0FT WILL 15FT HSA.

3:00 INSTALL WELL SCREEN AND RISER INTO BORING. USE
(1) 10FT 2" STAINLESS STEEL WELL SCREEN (JOHNSON)
(1) 5.5FT 2" BLACK IRON RISER
(1) 2 FT 2" BLACK IRON RISER
2 COUPLINGS
1 CAP
- MW-2 IS 35FT WEST OF TANK BASIN.
- MW-1 IS 25FT SOUTH OF TANK BASIN.

3:20 FILTER PACK INSTALLED TO 4FT. USED 4 BAGS OF SAND. INSTALLED BENTONITE SEAL TO 3FT. USED 1/2

AUGUST 15, 1990

3:20 (CONT) PAIL 1/4" BENTONITE TABLETS 5 FT STEEL CASING INSTALLED.
PUT EQUIPMENT AWAY.

3:35 RETURN TO MINNEAPOLIS OFFICE.

4:15-4:30 TIM TURN SOIL SAMPLES INTO LABORATORY.

AUGUST 16, 1990
WEATHER: CLEAR SKIES, WIND CALM, 70°

8:15 TIM, MIKE B AND MIKE N. ARRIVE ON-SITE. PREPARE TO GROUT BORING MW-2

8:30 COMPLETE AUGERING BORINGS FOR (3) STEEL BUMPER POST. BEGIN MIXING GROUT.

8:45 COMPLETE INSTALLING (3) STEEL BUMPER POSTS (4"). GROUTE BORING TO SURFACE, USE 2 1/2 BAGS OF PORTLAND AND 2% GROUT.

AUGUST 16, 1990

BORING I.D. MW-3

DEPTH	SOIL	PID READING	HEADSPACE	COMMENTS
SURFACE (6" BITUMINOUS)	SP-SM(F) BN, MT CL(M/S)	0 PPM	—	
2½-4	CL(S) DK BN, BK MOTTLED RED MT, W/TR GR	0 PPM	0 PPM	NO ODOR OR STAINING
5-6½	ML(OL) DK GR, MT	0 PPM	0 PPM	NO ODOR OR STAINING
7½-9	CL(S) DK GR, WB	0 PPM	0 PPM	NO ODOR OR STAINING NO FREE PRODUCT.
10-11½	SP(M-C) YL BN, WB W/BR	0 PPM	0 PPM	NO ODOR OR STAINING NO FREE PRODUCT
12½-14	SP(M-C) YL BN, WB W/TR GR	0 PPM	0 PPM	NO ODOR OR STAINING NO FREE PRODUCT.
15-16½	SP(M-C) YL BN, WB W/TR GR WITH LENSES SC-SM, YL	0 PPM	0 PPM	NO ODOR OR STAINING NO FREE PRODUCT.
9:20	SAMPLE TIME. FILL(2) VOA'S FROM SAMPLE AT 7½ FT.			
9:40	COMPLETE DRILLING TO 15FT. PREPARE TO INSTALL MONITORING WELL.			

AUGUST 16, 1990

10:10 COMPLETE INSTALLING WELL SCREEN AND RISER PIPE. USE
(1) 10 FT 2" STAINLESS STEEL WELL SCREEN
(1) 5.5 FT 2" BLACK IRON RISER
(1) 2 FT 2" BLACK IRON RISER.
(2) COUPLINGS
(1) CAP
(1) STEEL PROTECTIVE CASING (5')
(4) BAGS SILICA SAND
(1/2) PAIL 1/4" BENTONITE TABLETS

FILTER PACK FROM 15.0 FT TO 4.0 FT.
BENTONITE SEAL FROM 4.0 FT TO 3.0 FT.

10:15 AUGER BORINGS FOR (3) STEEL BUMPER POSTS.

10:30 DRILL INTO UNMARKED 1½" GAS SERVICE LINE. SHUT OFF VALVE AT METER NEXT TO BUILDING. LINE RUNS TO SHED AT BACK OF PROPERTY.

AUGUST 16, 1990

10:30 (CONT) REMOVE 1½" COPPER PIPE ON BORING SOUTH OF MONITORING WELL #3 AT 3 FT IN BORING FOR BUMPER POST.

10:45 GROUT BUMPER POSTS AND MONITORING WELL.

10:55 – 11:15 LUNCH

11:15 CALL RON WEAVER LET HIM KNOW HIT GAS SERVICE LINE, INFORM HIM OF PROGRESS.

11:30 SET UP AT ST-4. BEGIN AUGERING TO 2½ FT.

AUGUST 16, 1990

BORING I.D: ST-4

DEPTH	SOIL	PID READING	HEADSPACE	COMMENTS
SURFACE (6" BITUMINOUS)	CL(S) DK BN, BK MT, W/TR GR	OPPM	—	NO ODOR, NO STAINING
2½-4	(2½-4) CL(S) GR, DK GR MT, W/TR GR, MOTTLED YL (TIP) OL, BK, MT	OPPM	OPPM	NO ODOR, NO STAINING
5-6½	OL, BK, W/TR SHELLS, MT	OPPM	4 PPM	SLIGHT GASOLINE ODOR, NO STAINING
7½-9	OL, DK GR, W ROOTS (FIBERS) WB	OPPM	0 PPM	NO ODOR OR STAINING.
10-11½	SP(M-C) GR, WB	OPPM	2 PPM	SLIGHT GASOLINE ODOR NO STAINING, NO FREE PRODUCT

10:50 WATER LEVEL 7½ FT WITH 10 FT HSA. BEGIN REMOVING ALL FLIGHTS OF AUGER.

AUGUST 16, 1990

BORING I.D. - ST-5

DEPTH	SOIL	PID READING	HEADSPACE	COMMENTS
SURFACE (6" BITUMINOUS	SP-SM(F-M)MT,BN W/GR SC-SM(F-M)MTBN	0 PPM	—	NO ODOR OR STAINING
2½ - 4	CL(S)GR, DK GR, MT, W/TR GR	0 PPM	4 PPM	NO ODOR OR STAINING
5 - 6½	SC-SM(VF)GR MT	0 PPM	11 PPM	NO ODOR OR STAINING
7½ - 9	SP(F-M)GR, WB W/TR WOOD FRAGMENTS	0 PPM	3 PPM	NO ODOR OR STAINING NO FREE PRODUCT
10 - 11½	1) NO RETURN	5 PPM IN AUGER		— STRONG GASOLINE ODOR
	2) GP, GR, WB	2 PPM	30 PPM	— SLIGHT GASOLINE ODOR, GASOLINE FILM

12:20 NO RETURN FROM SAMPLER AT 10 - 11½ FT. POUND SAMPLER AGAIN.

12:25 WATER LEVEL 8.0 FT WITH 10 FT HSA. REMOVE ALL FLIGHTS OF AUGER.

AUGUST 16, 1990

BORING	DEPTH TO GW	TIME
ST-1	8.9FT*	1:10
ST-2	C.I. 8.5FT*	1:12
ST-3	C.I. 8.4FT*	1:13
ST-4	9.0FT*	1:14
ST-5	8.0 FT	12:25

* TAPE MISSING 2 FT.

1:20 MIX GROUT. TREMIE GRAUT ST-5, ST-3.

1:30 MIX GRAUT. GROUT ST-1, ST-2 ST-4. BRING ASPHALT PATCH TO FILL IN GROUTED BORINGS ON FRIDAY. USE (7) BAGS OF PORTLAND.

2:15 LEAVE SITE FOR OFFICE.

3:15 LOG SOIL SAMPLES INTO LABORATORY. PLACE GEOLOGY SAMPLES ON SHELVES IN BUILDING #2.

AUGUST 17, 1990

WEATHER: PARTLY CLOUDY, WIND CALM, 70°

8:25 ARRIVE ON-SITE. DRIVE TO MW-1; PREPARE TO DEVELOPE WELL.

MONITORING WELL #	DEPTH TO GW	DEPTH TO FP	TIME
MW-1	10.43'	NONE	8:37

(NO FILM OR ~~SHEEN~~ TO WATER)

8:42 BEGIN DEVELOPING WELL. WELL BAILS DRY AFTER 2 GALLONS.

9:30 COMPLETE BAILING 15 GALLONS FROM MW-1. WATER REMAINS CLOUDY. CANNOT BAIL DRY.

MONITORING WELL #	DEPTH TO GW	DEPTH TO FP	TIME
MW-2	9.91FT	NONE	9:38

10:05 COMPLETE BAILING 15 GALLONS FROM MW-2. CANNOT BAIL WELL DRY. WATER REMAINS CLOUDY. NO SMELL OR FILM/SHEEN TO WATER.

AUGUST 17, 1990

MONITORING WELL #	DEPTH TO GW	DEPTH TO FP	TIME
MW-3	9.92 FT	NONE	10:15

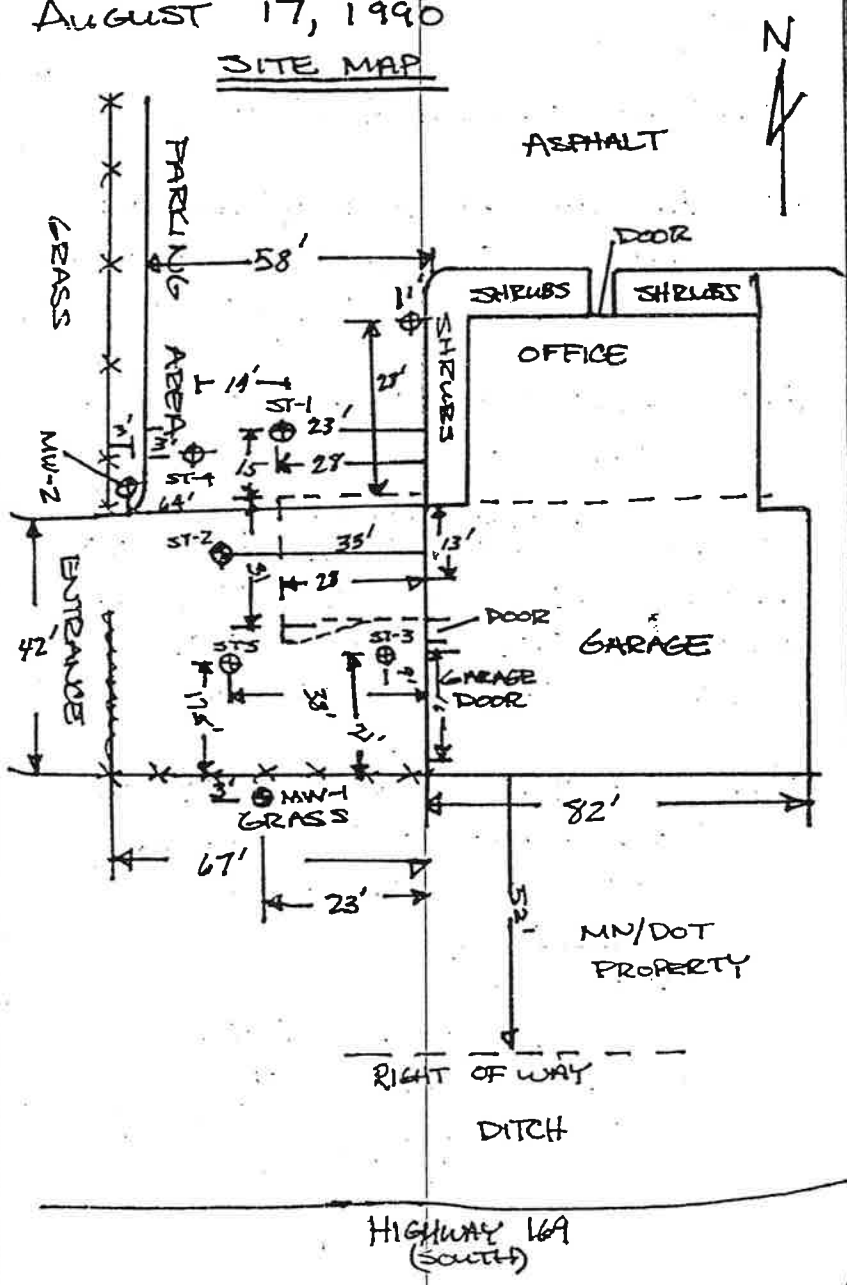
11:45 CAL INFORMS ME THAT HIGHWAY CREW WILL PATCH BORINGS WITH HOT MIX TO BRING TO SURFACE.

12:45 COMPLETE BAILING MW-3. REMOVE 9.0 GALLONS. WATER REMAINS CLOUDY. NO FILM VISIBLE; NO ODOR OF GASOLINE

12:55 LEAVE FOR OFFICE

AUGUST 17, 1990

SITE MAP



August 20, 1990

WEATHER: OVERCAST, WIND CALM, 60°

7:00-9:15 LOAD UP FIELD EQUIPMENT. PREPARE TO PERFORM SLUG TESTS AND SAMPLE MW-1, MW-2 AND MW-3.

9:50 ARRIVE ON-SITE. BEGIN TAKING WATER LEVELS.

WELL #	DEPTH TO GW	DEPTH TO FP	TIME	WELL DEPTH
MW-1	10.56	NONE	10:08	17.5'
MW-2	10.04	NONE	10:03	17.5'
MW-3	10.14	NONE	9:57	17.5'

10:35 COMPLETE INSTALLING PSI CABLE AND SLUG POLE TO LEVEL ABOVE GROUNDWATER.

SLUG TEST

MONITORING

WELL #	XD	TIME	
MW-3	6.61	10:36	
MW-3	6.61	10:38	BEGIN TEST
MW-3	8.28	10:52	
MW-3	8.22	11:27	
MW-3	8.21	11:40	END FALLING HEAD TEST

10:50 COMPLETE SETTING UP EQUIPMENT AT MW-1. PREPARE TO STABILIZE WELL.

MW #	pH	(umhos) Cond	(C) Temp	Cumulative Gallons
MW-1	6.83	1020	16.0	1.0 CLOUDY
MW-1	6.87	990	14.3	2.0 CLOUDY
MW-1	6.22	1010	14.1	3.0 CLOUDY
MW-1	6.97	1040	14.8	4.0 CLOUDY-CLEAR
MW-1	6.91	1050	14.5	5.0 CLEAR
MW-1	6.84	1050	14.0	6.0 Clear

COMMENTS: WATER CLEAR; NO ODOR OR FILM OBSERVED ON GROUNDWATER

11:45 SAMPLE MW-1. FILL (6) VOA'S. PARAMETERS: VOC'S, MTBE, THC (gas & fuel oil)

AUGUST 20, 1990

RISING HEAD TEST - MW-3

MONITORING WELL #	XD	TIME	
MW-3	8.21	11:40	BEGIN RISING HEAD TEST
MW-3	8.09	12:01	
MW-3	8.16	12:34	
MW-3	8.17	12:41	END RISING HEAD TEST

MONITORING WELL # MW-2	pH	(umhos) COND	(C) TEMP	CUMULATIVE GALLONS	
	7.22	1630	18.2	1.0	MUDDY
MW-2	7.24	1640	17.7	2.0	
MW-2	7.24	1510	16.7	3.0	
MW-2	7.34	1500	16.6	4.0	
MW-2	7.49	1580	16.6	5.0	
MW-2	7.67	1540	16.5	6.0	MUDDY CLEAR

12:37 COMPLETE STABILIZING MW-2. WATER REMAINED MUDDY-CLEAR WITH SLIGHT GASOLINE ODOR.

1:05 COMPLETE SAMPLING MW-2. SAMPLE TIME 1:00. FILL (6) VOA'S.

AUGUST 20, 1990

1:12 WATER LEVEL AT MW-1; 10.58 FT. PREPARE TO BEGIN SLUG TEST.

FALLING HEAD TEST - MW-1

MONITORING WELL #	XD	TIME	
MW-1	5.99	1:29	START FALLING HEAD TEST
MW-1	7.60	1:39	
MW-1	7.60	1:56	
MW-1	7.60	2:08	
		2:10	END FALLING HEAD TEST

1:55 FILL FIELD BLANKS. FILL (3) VOA'S THRU 1 FT BAILER WITH DE-IONIZED (ULTRA PURE) WATER.

RISING HEAD TEST - MW-1

MONITORING WELL #	XD	TIME	
MW-1	7.60	2:09	START RISING ~~FALLING~~ HEAD TEST
MW-1	7.60	2:36	
MW-1	7.60	2:40	END ~~FALLING~~ RISING HEAD TEST

AUGUST 20, 1990

2:00 WATER LEVEL AT 10.15 FT IN MW-3. PREPARE TO STABILIZES WELL.

MONITORING WELL #	pH	COND	TEMP	CUMULATIVE GALLONS	
MW-3	6.76	1300	18.6	1.0	MUDDY
MW-3	7.12	1370	17.3	2.0	MUDDY
MW-3	7.24	1310	17.5	3.0	MUDDY CLEAR
MW-3	7.39	1320	18.0	4.0	CLEAR

2:54 COMPLETE STABILIZING MW-3. WATER TURNED CLEAR. NO ODOR OR GASOLINE FILM VISIBLE. REMOVE SUBMERSIBLE PUMP FROM WELL. PREPARE TO SAMPLE.

3:15 SAMPLE MW-3. FILL (6) VOA'S

MONITORING WELL #	XD	TIME	
MW-2	6.62	3:33	START FALLING HEAD TEST
MW-2	7.98	3:43	
MW-2	7.97	3:55	
MW-2	7.97	4:03	END FALLING HEAD TEST

AUGUST 20, 1990

MONITORING WELL #	XD	TIME	
MW-2	7.97	4:03	BEGIN RISING HEAD TEST
MW-2	7.97	4:13	
MW-2	7.97	4:22	
MW-2	7.97	4:32	END RISING HEAD TEST

4:40 COMPLETE PUTTING EQUIPMENT AWAY. LEAVE FOR MINNEAPOLIS

5:15 ARRIVE AT OFFICE. LOG SAMPLES INTO LABORATORY.

5:45 COMPLETE PUTTING FIELD EQUIPMENT AWAY.

TOTAL MILEAGE: 46 MILES

VEHICLE: B7

REPORT NO. 11039

METHOD BLANK SUMMARY
FOR VOLATILE ORGANIC COMPOUNDS

Compound	MDL (µg/l)	Run No. 52	62
Acetone	50	2.07	1.90
MEK	5.0	1.78	0.45
Benzene	1.0	0.08	
MIBK	5.0	0.66	
Toluene	1.0	0.22	0.18
M-P Xylene	1.0	0.18	0.16
O-Xylene	1.0		0.12
E Benzene	1.0	0.06	

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REPORT NO. 11039

METHOD BLANK SUMMARY
FOR TOTAL HYDROCARBON COMPOUNDS

Compound	MDL (µg/l)	H:E02395	I:E02404	J:E02412
Total Hydrocarbons as gasoline	100	<100	<100	<100
Total Hydrocarbons as fuel oil	500	<500	<500	<500

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REPORT NO. 11039

MATRIX SPIKE/MATRIX SPIKE DUPLICATE DATA

Compound	Spike 1 % Recovery	Spike 2 % Recovery	Matrix Spike Duplicate Relative % Difference
Total Hydrocarbons as Gasoline	108	87	21
Total Hydrocarbons as Gasoline	81	84	3.6
Chloromethane	124	124	0
Vinyl Chloride	118	120	2
Bromomethane	114	120	6
Chloroethane	119	120	1
Dichlorofluoromethane	98	102	3
1,1,2-Trichlorotrifluoroethane	102	98	4
Allylchloride	101	102	1
1,2-Dichloroethylene (<is)	103	116	12
1,1-Dichloro-1-propene	114	107	6
Dibromomethane	106	102	4
Dichloroacetonitrile	114	113	1
1,3-Dichloro-1-propane	93	104	11
1,2-Dibromoethane	97	104	7
1,1,1,2-Tetrachloroethane	107	99	8
1,2,3-Trichloropropane	115	108	6
Pentachloroethane	112	113	1
Ethyl Ether	101	89	13
Acetone	102	84	19
Methyl Tertiary Butyl Ether	101	117	15

REPORT NO. 11039

MATRIX SPIKE/MATRIX SPIKE DUPLICATE DATA

Compound	Spike 1 % Recovery	Spike 2 % Recovery	Matrix Spike Duplicate Relative % Difference
Methyl Ethyl Ketone	102	80	24
Tetrahydrofuran	96	112	17
Methyl Isobutyl Ketone	101	101	0
M,P-Xylene	101	101	0
O-Xylene	104	101	3
Cumene	102	110	8
Vinyl Chloride	124	105	16
1,1-Dichloroethylene	106	111	5
Chloroform	82	91	10
1,1,1-Trichloroethane	102	108	6
Carbon Tetrachloride	107	113	6
1,2-Dichloroethane	81	104	25
1,1,2-Trichloroethylene	89	102	14
Bromodichloromethane	91	106	15
Chlorodibromomethane	101	98	3
Bromoform	73	63	15
Benzene	96	100	4
1,4-Dichlorobenzene	90	88	2

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METHODOLOGY

Log-In	Method	Analysis Type
11013	SW3810 Modified	Soil BETX-THC
11017	SW3810 Modified	Soil BETX-THC
11039	SW5030 MDH 465C	Water-THC Water - Volatile Organic Compounds

SW = EPA SW846 3rd. Edition, Test Methods for Evaluating Solid Waste. Physical/Chemical Methods.

MDH = Minnesota Department of Health Method 465C.

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REPORT NO. 11013
11017
11039

ANALYSES

Method	Log-In Numbers	Date Analyzed	Time of Analysis	Analyst
SW3810 Modified	11013-1 11013-2 11013-3	08/16/90 08/16/90 08/16/90	19:33:23 18:54:49 18:16:03	B. Maki
SW3810 Modified	11017-1 11017-2	09/06/90 09/06/90	17:43:49 14:57:05	B. Maki
SW5030	11039-1 11039-2 11039-3 11039-5	08/29/90 08/29/90 08/31/90 08/29/90	11:27:26 13:23:24 14:19:38 14:58:23	B. Heck
MDH 465C	11039-1 11039-2 11039-3 11039-5	08/27/90 08/27/90 08/26/90 08/27/90	02:17:31 01:18:07 20:22:14 00:18:42	T. Baumgart

LRO:nlb4\EG-989.Sep

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Method Detection Limits

09/19/90 LABORATORY REPORT NO: 88888

PROJECT: E90-XXX
COLLECTED:
RECEIVED:
SAMPLE MATRIX:

ATTENTION:

Method Detection Limits for Volatile Organic Compounds and Total Hydrocarbons

	BRAUN I.D.:	88888-01	88888-02
	CLIENT I.D.:	Sample #1	Sample #2
PARAMETER	--UNITS--		
Chloromethane	ug/L	<5.0	-
Bromomethane	ug/L	<5.0	-
Vinyl Chloride	ug/L	<1.0	-
Dichlorodifluoromethane	ug/L	<5.0	-
Chloroethane	ug/L	<1.0	-
Dichlorofluoromethane	ug/L	<5.0	-
Methylene Chloride	ug/L	<5.0	-
Trichlorofluoromethane	ug/L	<1.0	-
1,1-Dichloroethylene	ug/L	<1.0	-
Allyl Chloride (3-Chloropropene)	ug/L	<1.0	-
1,1-Dichloroethane	ug/L	<1.0	-
1,2-Dichloroethylene (cis & trans)	ug/L	<0.2	-
Chloroform	ug/L	<1.5	-
1,1,2-Trichlorotrifluoroethane	ug/L	<5.0	-
1,2-Dichloroethane	ug/L	<0.3	-
Dibromomethane	ug/L	<5.0	-
1,1,1-Trichloroethane	ug/L	<2.0	-
Carbon Tetrachloride	ug/L	<1.6	-
Bromodichloromethane	ug/L	<0.3	-
2,3-Dichloro-1-propene	ug/L	<0.2	-
Dichloroacetonitrile	ug/L	<0.3	-
1,1-Dichloro-1-propene	ug/L	<0.5	-
1,2-Dichloropropane	ug/L	<1.0	-
trans-1,3-Dichloro-1-propene	ug/L	<0.2	-
1,1,2-Trichloroethylene	ug/L	<0.2	-
1,3-Dichloropropane	ug/L	<1.0	-
1,1,2-Trichloroethane	ug/L	<1.2	-
Chlorodibromomethane	ug/L	<2.5	-
cis-1,3-Dichloro-1-propene	ug/L	<0.5	-
1,2-Dibromoethane	ug/L	<0.2	-

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

Quality control data reviewed: _____

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PARAMETER	--UNITS--	BRAUN I.D.: 88888-01 CLIENT I.D.: Sample #1	88888-02 Sample #2
2-Chloroethyl Vinyl Ether	ug/L	<5.0	-
Bromoform	ug/L	<0.5	-
1,1,1,2-Tetrachloroethane	ug/L	<0.5	-
Pentachloroethane	ug/L	<1.0	-
Tetrachloroethylene	ug/L	<1.0	-
1,1,2,2-Tetrachloroethane	ug/L	<1.2	-
1,2,3-Trichloropropane	ug/L	<1.0	-
Chlorobenzene	ug/L	<1.0	-
1,3-Dichlorobenzene	ug/L	<1.5	-
1,2-Dichlorobenzene	ug/L	<0.2	-
1,4-Dichlorobenzene	ug/L	<0.2	-
Acetone	ug/L	<50	-
Tetrahydrofuran	ug/L	<5.0	-
Ethyl Ether	ug/L	<1.0	-
Methyl Ethyl Ketone	ug/L	<5.0	-
Methyl Isobutyl Ketone	ug/L	<5.0	-
Cumene	ug/L	<3.0	-
Benzene	mg/Kg	-	<0.3
Benzene	ug/L	<1.0	-
Toluene	mg/Kg	-	<0.3
Toluene	ug/L	<1.0	-
Ethyl Benzene	mg/Kg	-	<0.3
Ethyl Benzene	ug/L	<1.0	-
Xylenes, Total	mg/Kg	-	<0.3
Xylenes, Total	ug/L	<1.0	-
Total Hydrocarbons as Gasoline	mg/Kg	-	<1.0
Total Hydrocarbons as Gasoline	ug/L	<100	-
Total Hydrocarbons as Fuel Oil	mg/Kg	-	<1.0
Total Hydrocarbons as Fuel Oil	ug/L	<500	-

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

Quality control data reviewed: _____

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