REVISED
Facility Investigation Report
RCRA §3013 Administrative Order

Morton International, Inc. Facility
Reading, Ohio
EPA ID No. OHD. 000 724 138

Prepared for:

The Rohm and Haas Co.

Prepared by:

Geomatrix Consultants, Inc.
5725 Highway 290 West Suite 200B
Austin, Texas 78735

September 2004

Project No. 7168

Volume 2 of 2
Appendices

Revised Facility Investigation Report
RCRA §3013 Administrative Order

EPA ID No. OHD. 000 724 138
RCRA Docket No. R3013-5-00-001

Morton International, Inc. Facility
Reading, Ohio

Prepared for:

The Rohm and Haas Co.
Croydon, Pennsylvania

September 2004

Project No. 7168

TABLE OF CONTENTS

1.0 INTRODUCTION **1**

2.0 BACKGROUND INFORMATION **6**

2.1 SETTING 6

2.2 SURFACE WATER HYDROLOGY 8

2.3 REGIONAL GEOLOGY AND HYDROGEOLOGY 9

2.4 SUSPECTED SOURCE AREAS 11

2.4.1 On-Site 11

2.4.2 Off-Site 11

2.4.2.1 The Pristine Superfund Site 12

2.4.2.2 Cincinnati Drum Facility 17

2.4.2.3 Undifferentiated Sources of Impact North Along Mill Creek 18

2.4.2.4 City of Reading 18

3.0 PURPOSE AND OBJECTIVES OF THE INVESTIGATION **19**

4.0 METHODS OF THE INVESTIGATION **22**

4.1 SOIL BORINGS 25

4.1.1 Rotasonic Drilling 26

4.1.2 Direct Push Technique and Hand Auger Borings 26

4.2 MONITORING WELL INSTALLATION AND DEVELOPMENT 30

4.3 GEOPHYSICAL EVALUATION 33

4.4 MILL CREEK RECONNAISSANCE 34

4.5 SOIL SAMPLING 35

4.6 GROUNDWATER SAMPLING 37

4.7 SEEP AND SEDIMENT SAMPLING 41

4.8 SUPPLEMENTAL FI SAMPLING OF MILL CREEK 43

4.9 SAMPLE ANALYSIS 45

4.9.1 Soil Analysis 47

4.9.2 Groundwater Analysis 47

4.9.3 Seep, Sediment and Surface Water Analysis 48

TABLE OF CONTENTS
(Continued)

4.10 GROUNDWATER ELEVATION MEASUREMENTS 48
4.11 AQUIFER TESTING 48
4.11.1 Step-Drawdown Testing 49
4.11.2 Aquifer Response to Water Recovery Well Operation 51
4.11.3 French Drain Pumping Test 52
4.12 COMBINED SEWER SYSTEM INVESTIGATION 53
4.13 ECOLOGICAL RECONNAISSANCE 54
4.14 MONITORING WELL PLUGGING AND ABANDONMENT 55
4.15 SURVEYING 56
5.0 FINDINGS OF INVESTIGATION 58
5.1 SITE HYDROGEOLOGY 58
5.1.1 Upper Aquifer 58
5.1.2 Lower Aquifer 63
5.2 CHARACTERIZATION OF MILL CREEK 64
5.3 CHEMICAL IMPACT TO ENVIRONMENTAL MEDIA 65
5.3.1 Soils 67
5.3.2 Groundwater 72
5.3.3 Surface Water 80
5.3.4 Sediment 82
5.4 SUMMARY OF BASELINE RISK ASSESSMENT FINDINGS 84
5.5 PHYSICAL CHARACTER OF SITE SOILS 85
5.6 CHARACTER OF SUSPECTED SOURCE AREAS 85
5.6.1 Former Impoundments & Drum Storage Area – SWMUs 1 and 3 85
5.6.2 Former Wastewater Storage and Treatment Tanks (SWMUs 2 & 5 and Three Additional Non-SWMU Tanks) 86
5.6.3 Former Swale Area – SWMU 10 87
5.6.4 Suspected Waste Burial Areas 87

TABLE OF CONTENTS
(Continued)

5.6.5 Combined Sewer System – SWMU 12 88
5.7 SOIL BACKGROUND EVALUATION 90
5.8 EVALUATION OF FRENCH DRAIN AND SLURRY WALL INTERIM MEASURES 90
6.0 COMPLETION OF INVESTIGATION OBJECTIVES 92
6.1 INVESTIGATION-SPECIFIC OBJECTIVES 92
6.2 QUALITY ASSURANCE OBJECTIVES 98
7.0 CONCLUSIONS 100
8.0 BIBLIOGRAPHY 103

TABLE OF CONTENTS
(Continued)

LIST OF TABLES

2-1 Summary of Waste Management Areas
4-1 Summary of Monitoring Well Construction
4-2 List of Soil Samples and Target Analyte Lists
4-3 List of Groundwater Samples and Target Analyte Lists
4-4 List of Sediment, Seep, and Surface Water Samples and Target Analyte Lists
4-5 Combined Sewer System Inventory
5-1 Summary of Groundwater Elevations
5-2 Summary of Volatile Organic Detections in Soil and Sediment Samples
5-3 Summary of Semivolatile Organic Detections in Soil and Sediment Samples
5-4 Summary of Pesticide and Polychlorinated Biphenyl Detections in Soil and Sediment Samples
5-5 Summary of Inorganic Detections in Soil and Sediment Samples
5-6 Trench T-1 Samples
5-7 Total Chromium vs. Hexavalent Chromium Summary of Analytical Results
5-8 Summary of Volatile Organic Detections in Groundwater and Seep Samples
5-9 Summary of Semivolatile Organic l Detections in Groundwater and Seep Samples
5-10 Summary of Pesticide and Polychlorinated Biphenyl Detections in Groundwater and Seep Samples
5-11 Summary of Inorganic Chemical Detections in Groundwater and Seep Samples
5-12 Summary of Water Quality Parameter Measurements in Groundwater and Seep Samples
5-13 Summary of Surface Water Analytical Results
5-14 Summary of Geotechnical Results

TABLE OF CONTENTS
(Continued)

LIST OF FIGURES

2-1 Site Location
2-2 Surface Materials and Secondary Containment Map
2-3 Site Vicinity Map
4-1 On-Site Monitoring Well and Soil Sample Location Map
4-2 Mill Creek and Background Sample Location Map
4-3 Supplemental Facility Investigation March-April 2004 Field Activities Locations
5-1 Groundwater Gradient Map – May 27, 2004
5-2 Cross Section Location Map
5-3 Cross Section A – A'
5-4 Cross Section B – B'
5-5 Cross Section C – C'
5-6 Cross Section D – D'
5-7 Cross Section E – E'
5-8 Cross Section F – F'
5-9 Cross Section G – G'
5-10 Cross Section H – H'
5-11 Cross Section I – I'
5-12 On-Site VOCs Detected in Soil
5-13 On-Site SVOCs Detected in Soil
5-14 On-Site PCBs/Pesticides Detected in Soil
5-15 On-Site Inorganic Compounds Detected in Soil
5-16 Former Surface Impoundments – VOCs Detected in Soil
5-17 Former Surface Impoundments – SVOCs Detected in Soil
5-18 Former Surface Impoundments – PCBs/Pesticides Detected in Soil
5-19 Former Surface Impoundments – Inorganic Compounds Detected in Soil
5-20 Confirmation Soil Sampling Results Trench T-1 Excavation
5-21 VOCs Detected in Groundwater and Surface Water
5-22 SVOCs Detected in Groundwater and Surface Water
5-23 PCBs/Pesticides Detected in Groundwater and Surface Water
5-24 Inorganic Compounds Detected in Groundwater and Surface Water
5-25 Off-Site VOCs Detected in Soil and Sediments
5-26 Off-Site SVOCs Detected in Soil and Sediments
5-27 Off-Site PCBs/Pesticides Detected in Soil and Sediments
5-28 Off-Site Inorganics Detected in Soil and Sediments
5-29 Combined Sewer System Investigation

TABLE OF CONTENTS
(Continued)

LIST OF APPENDICES

Appendix A Boring Logs and Monitoring Well Completion Diagrams
Appendix B Target Analyte Lists
Appendix C Aquifer Test Results
Appendix D Quality Assurance/Quality Control
Appendix E June 6, 1979 Cincinnati Milacron Memo, Soil Testing for Tin Contamination

TABLE OF CONTENTS
(Continued)

ACRONYMS AND ABBREVIATIONS

- µg/l - micrograms per liter
- 1,1-DCA - 1,1-dichloroethane
- 1,1-DCE - 1,1-dichloroethene
- 1,2-DCA - 1,2-dichloroethane
- 1,2-DCB - 1,2-dichlorobenzene
- AADD - Annual Average Daily Dose
- AO - Administrative Order
- App. IX-TAL - Appendix IX Target Analyte List
- bgs - below ground surface
- BHC- Benzene Hexachloride
- BKG-TAL - Background Target Analyte List
- BTEX - benzene, toluene, ethylbenzene, and xylenes
- BRA – Baseline Risk Assessment
- CCR – Current Conditions Report
- CDM - Camp Dresser & McKee Inc.
- CLP-TAL - Contract Laboratory Program Target Analyte List
- CSOs - Combined Sewer Outfalls
- CSS - Combined Sewer System
- DDD – Dichlorodiphenyldichloroethane
- DDE – Dichlorodiphenyldichloroethylene
- DDT - Dichlorodiphenyltrichloroethane
- DPT - direct push technique
- EDQL – Environmental Data Quality Limit
- E&E - Ecology and Environment, Inc.
- EM61 - the Geonics EM61 time domain electromagnetic metal detector, a type of electromagnetic survey instrument

TABLE OF CONTENTS
(Continued)

ACRONYMS AND ABBREVIATIONS
(Continued)

- EM31 - the Geonics EM31 terrain conductivity meter, a type of electromagnetic survey instrument
- FI - Facility Investigation
- ft/day - feet per day
- ft/ft - feet per foot
- K - hydraulic conductivity
- LAW - Lower Aquifer Well
- mg/kg - milligrams per kilogram
- MON-TAL – Monitoring Target Analyte List
- MSD - Metropolitan Sewer District
- NPDES - National Pollution Discharge Elimination System
- NPL - National Priorities List
- OEPA - Ohio Environmental Protection Agency
- PAHs - polycyclic aromatic hydrocarbons
- PCBs - polychlorinated biphenyls
- PCE - tetrachloroethene
- PID - photoionization detector
- PRP - Potentially Responsible Party
- PVC - polyvinyl chloride
- QA/QC - quality assurance/quality control
- QAPP - Quality Assurance Project Plan
- RCRA - Resource Conservation and Recovery Act
- RFA - RCRA Facility Assessment
- RFI - RCRA Facility Investigation
- SERA - Screening-Level Ecological Risk Assessment

TABLE OF CONTENTS
(Continued)

ACRONYMS AND ABBREVIATIONS
(Continued)

- SS-TAL - Sediment Target Analyte List
- STL - Severn Trent Laboratories
- SVOCs - Semivolatile Organic Compounds
- SWMUs - Solid Waste Management Units
- T - transmissivity
- TCA - 1,1,1-trichloroethane
- TCE - trichloroethene
- TDS - Total Dissolved Solids
- TSS - Total Suspended Solids
- UA - Upper Aquifer
- UAW - Upper Aquifer Well
- USCS - Unified Soil Classification System
- USEPA - U.S. Environmental Protection Agency
- VOCs - Volatile Organic Compounds

APPENDIX A

BORING LOGS AND MONITORING WELL COMPLETION DIAGRAMS

TABLE OF CONTENTS
APPENDIX A

Well and boring logs are presented in the following order:

B – Off-site Background Soil Sample Location
DP – On-site Soil Sample Location (DPT)
HA – On-Site Shallow Hand Auger Location
STR – Stratigraphic Boring Location (rotasonic)
LAW – Lower Aquifer Monitoring Well Location
UAW – Upper Aquifer Monitoring Well Location

SAMPLE COLUMN SYMBOL KEY

SAMPLE RECOVERED

NO RECOVERY

SAMPLE INTERVAL WITH SAMPLE IDENTIFICATION NUMBER SUBMITTED TO LABORATORY FOR GEOCHEMCIAL OR GEOTECHNICAL ANALYSIS

031101019

PROJECT: Morton Reading FI	**Log of Boring No. B01**
BORING LOCATION: Baseball Field	ELEVATION AND DATUM: Ground 562.17 ft. (MSL)
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 10/9/01 / DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 562.17 ft. (MSL)	PID READING (ppm)	REMARKS
				Grass		
1	100901183			SANDY CLAY (CL): yellowish red (5YR 4/6), moist, ~30% medium sand, ~70% low plastic fines		
2						
3						
4				POORLY GRADED SAND (SP): light yellowish brown (10YR 6/4), dry to moist, ~100% fine sand, trace fines, trace coarse sand	0.0	
5						
6						
7						
8					0.0	
9				Same as above, trace 1" gravel, moist		
10						
11	100901184					
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. B02**	
BORING LOCATION: Baseball Field		ELEVATION AND DATUM: Ground 562.01 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 10/9/01	DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION (NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.)	PID READING (ppm)	REMARKS
				Surface Elevation: Ground 562.01 ft. (MSL)		
				Grass		
1	100901186			SANDY CLAY (CL): dark yellowish brown (10YR 3/6), moist, ~70% low plastic fines, ~30% medium sand, firm		
2						
3						
4					0.0	
				POORLY GRADED SAND (SP): pale brown (10YR 6/3), moist, ~100% fine to medium sand, trace 1" gravel		
5						
6						
7						
8				Same as above	0.0	
9						
10						
11	100901187					
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading Fl	**Log of Boring No. B03**
BORING LOCATION: S. of Hike and Bike Trail	ELEVATION AND DATUM: Ground 551.86 ft. (MSL)
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 10/9/01 / DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation: Ground 551.86 ft. (MSL)		
				Grass		
1	100901188			SANDY CLAY (CL): dark yellowish brown (10YR 3/4), moist, ~80% medium plastic fines, ~20% fine to medium sand, firm		
2						
3						
4					0.0	
5						
6				POORLY GRADED SAND (SP): brown (10YR 4/3), moist, ~90% medium sand, ~10% low plastic fines, trace 1" gravel		
7						
8				Same as above, increase gravel content, trace fines, ~20% gravel 1" - 2"	0.0	
9						
10						
11	100901189					
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. B04**	
BORING LOCATION: S. of Recreation Center		ELEVATION AND DATUM: Ground 556.09 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 10/9/01	DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 556.09 ft. (MSL)	PID READING (ppm)	REMARKS
				Grass		
1	100901191			CLAYEY SAND (SC): brown (10YR 4/3), moist, ~80% medium sand, ~20% fines,		
2	100901190					
3						
4				Same as above, ~100% fine to medium sand, trace fines		
5						
6						
7						
8				Same as above		
9						
10						
11	10090192			Trace 1 - 2" gravel		
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. B05	
BORING LOCATION: E. of Baseball Field	ELEVATION AND DATUM: Ground 563.61 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 10/9/01	DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation: Ground 563.61 ft. (MSL)		
				Grass		
1	100901193			SANDY CLAY (CL): reddish brown (5YR 4/3), moist, ~80% medium plastic fines, ~20% medium sand, firm		
2						
3						
4					0.0	
				Same as above		
5						
6						
7						
				POORLY GRADED SAND (SP): brown (10YR 5/3), moist, ~100% medium sand		
8					0.0	
9						
10						
11	100901194					
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. B06	
BORING LOCATION: Former Mun. Water Supply Field	ELEVATION AND DATUM: Ground 554.57 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 10/9/01	DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 554.57 ft. (MSL)	PID READING (ppm)	REMARKS
				Grass - topsoil black 0" - 8"		
1	100901195			SANDY CLAY (CL): brown (10YR 4/3), moist, ~80% medium plastic fines, ~20% sand, firm, roots (0.5' - 2')		
2						
3						
4				Same as above		
5						
6				Harder than above		
7						
8						
9				Same as above, dark grayish brown		
				Less fines than above, wet		
10						
11	100901196			Saturated		
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading Fl	Log of Boring No. B07	
BORING LOCATION: Former Mun. Water Supply Field	ELEVATION AND DATUM: Ground 556.62 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 10/9/01	DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 556.62 ft. (MSL)	PID READING (ppm)	REMARKS
				Grass 0 - 10" - black material, burnt odor		
1	100901197			SANDY CLAY (CL): dark grayish brown (10YR 4/2), moist, ~85% low plastic fines, ~15% fine sand, hard		
2						
3						
4				Same as above, ~90% medium plastic fines, ~10% sand, dark yellowish brown (10YR 4/4)		
5						
6				Becomes softer, increase sand content		
7						
8				Soft, wet		
9	100901198			Gravel/sand lens at 9' - 9.5'		
10						
11				SANDY LEAN CLAY (CL): dark gray (5Y 4/1), moist, ~80% low plastic fines, ~20% sand, trace gravel, very hard		
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. B08	
BORING LOCATION: Former Mun. Water Supply Field	ELEVATION AND DATUM: Ground 557.24 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 10/9/01	DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 557.24 ft. (MSL)	PID READING (ppm)	REMARKS
				Grass		
1				1 - 1.5': wood - odor - [railroad tie?]	15.5	
2	100901199					
3				SANDY CLAY (CL): brown (10YR 4/3), moist, ~80% low plastic fines, ~20% sand, firm		
4				Dark yellowish borwn (10YR 4/2)		
5						
6						
7				CLAYEY SAND (SC): dark yellowish brown (10YR 4/2), wet, ~80% medium sand, ~20% fines		
8	100901200				0.0	
9				9.5' - 10': sand/gravel lens (6")		
10				SANDY LEAN CLAY (CL) [TILL]: dark gray (5Y 4/2), moist, ~80% low plastic fines, ~20% sand, trace gravel, hard		
11						
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. B09**	
BORING LOCATION: Former Mun. Water Supply Field		ELEVATION AND DATUM: Ground 559.25 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 10/9/01	DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation: Ground 559.25 ft. (MSL)		
				Grass CLAYEY SAND [FILL]: black		
1						
2	100901201					
3				SILT (ML): grayish brown (10YR 5/2), wet, ~90% low plastic fines, ~10% fine sand, soft to firm		
4				SANDY CLAY (CL): brown (10YR 4/2), dry to moist, ~80% low plastic fines, ~20% sand, hard		
5						
6						
7				More plastic than above, firm		
8				Same as above, yellowish brown (10YR 5/4), soft, moist to wet		
9						
10	100901202					
11				CLAYEY SAND (SC): light olive brown (2.5Y 5/3)		
12				2" gravel at 11.5' 11.7' - 12': fine sand Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. B10	
BORING LOCATION: Former Mun. Water Supply Field	ELEVATION AND DATUM: Ground 561.69 ft, (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 10/9/01	DATE FINISHED: 10/9/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 561.69 ft, (MSL)	PID READING (ppm)	REMARKS
				Grass CLAYEY SAND (SC) [FILL]: black, roots		
1						
2	100901203					
3						
4				SILT (ML): dark olive brown (2.5Y 3/3), ~90% low plastic fines, ~10% sand, soft, wet	0.0	
5				SANDY CLAY (CL): dark brown (10YR 3/3), moist, ~80% low plastic fines, ~20% sand, hard		
6						
7				Dark yellowish brown (10YR 4/6)		
8				Same as above	0.0	
9						
10						
11	100901204			Soft, wet		
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP01	
BORING LOCATION: N. of Bldg. 5	ELEVATION AND DATUM: Ground 578.48 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/24/01	DATE FINISHED: 7/24/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 578.48 ft. (MSL)	PID READING (ppm)	REMARKS
				GRAVEL/FILL		
1						
2	072401122	■			29	
				Black discoloration CLAYEY SAND (SP): dark gray (5Y 4/1), moist, ~80% medium sand, ~20% medium plastic fines, firm		
3						
4				Same as above	220	
5						
6					110	
7						
8				Same as above		
9	072401123	■				
10				SANDY CLAY (CL): dark gray, moist, ~80% high plastic fines, 20% fine sand, soft	200	
11						
12						
13				Sand lens, wet at 13' to 13.5'		
				SILT (ML): gray, moist, ~95% medium plastic fines, ~5% fine		
14						

RMRK3

PROJECT: Morton Reading Fl

Log of Boring No. DP01 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				sand, firm			
15				Total Depth: 15 feet below ground surface			
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP02	
BORING LOCATION: N. of Bldg. 5	ELEVATION AND DATUM: Ground 577.99 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/24/01	DATE FINISHED: 7/24/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 577.99 ft. (MSL)	PID READING (ppm)	REMARKS
				GRAVEL/FILL		
1						
2	072401124			CLAYEY SAND (SP): dark gray (5Y 4/1), moist, ~80% medium plastic fines, ~20% fine sand, firm		
3						
4						
5				Dark brown discoloration at 5' to 5.5'		
6						
7						
8						
9	072401125					
10				SANDY CLAY (CL):		
11						
12						
13				CLAYEY SAND (SP); dark gray, wet		
14				SANDY CLAY (CL): grayish brown, ~95% high plastic fines,		

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP02 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				~5% sand, firm			
15				Total Depth: 15 feet below ground surface			
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. DP03**	
BORING LOCATION: E. of Bldg. 1		ELEVATION AND DATUM: Ground 568.60 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 7/24/01	DATE FINISHED: 7/24/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 568.60 ft. (MSL)	PID READING (ppm)	REMARKS
				GRAVEL/FILL		
1						
2	072401126			SANDY CLAY (CL): yellowish brown, moist, ~80% low plastic fines, ~20% medium sand, trace fine gravel, soft	0.0	
3						
4					0.0	
5				Harder than above, increase in gravel content		
6					0.0	
7						
8				POORLY GRADED SAND (SP): brown, moist, ~90% medium sand, ~10% fines, trace gravel		
9	072401127					
10				Increase in gravel content (1" - 2")		
11						
12				SANDY CLAY (CL): light brown, ~90% medium plastic fines, ~10% sand and gravel		
13				POORLY GRADED SAND (SP): light brown, moist, ~95% medium sand, ~5% gravel		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP03 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
15				Total Depth: 15 feet below ground surface			
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

RMRK3

PROJECT: Morton Reading Fl	**Log of Boring No. DP04**
BORING LOCATION: W. of Bldg. 6	ELEVATION AND DATUM: Ground 574.27 ft. (MSL)
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/24/01 / DATE FINISHED: 7/24/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 24.0 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 574.27 ft. (MSL)	PID READING (ppm)	REMARKS
				ASPHALT/FILL		
1						
2					0.0	
3						
4						
5				SANDY LEAN CLAY (CL) [TILL]: dark gray, moist, ~85% medium to high plastic fines, ~15% sand, trace gravel, soft to firm		
6					0.0	
7						
				Harder than above		
8				Same as above, hard		
9						
10					0.0	
				Reddish brown		
11				Gray lens at 11', less gravel		
12				Sand/gravel lens, wet at 12' to 12.5'		
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP04 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL) CONTINUED	0.0	
15				1/2" gray lens at 15'		
16				Softer than above, wet		
17				CLAYEY SILT (ML): gray, moist, ~95% low plastic fines, ~5% fine sand, soft to firm		
18						
19						
20				CLAY (CL): dark gray, ~100% high plasticity fines, wet, soft		
21						
22						Hole swelled shut 19' bgs, bentonite up to surface
23						
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP05	
BORING LOCATION: N. of E. Tank Farm	ELEVATION AND DATUM: Ground 578.64 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/25/01	DATE FINISHED: 7/25/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 578.64 ft. (MSL)	PID READING (ppm)	REMARKS
				GRAVEL/FILL		
1	072401130			SANDY CLAY (CL): yellowish brown, moist, ~80% low plastic fines, ~20% fine to medium sand, soft to firm		
2						
3					0.0	
				More plastic than above		
4				Few dark brown (1/8") laminations, no odor at 5.8' to 6.0'		
5						
6				Gravel lens	0.0	
				SANDY LEAN CLAY (CL) [TILL]: olive brown, moist, ~90% high plastic fines, ~10% fine gravel, trace sand, soft		
7						
8						
9	072401131				0.0	
				Hard		
10						
11				1" Light gray lens		
12					0.0	
13				Dark gray, abundant gravel, fossils at 13' to 13.5'		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP05 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				2" light brown sand seam at 14'			
15				Total Depth: 15 feet below ground surface			
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

RMRK3

PROJECT: Morton Reading Fl	Log of Boring No. DP06	
BORING LOCATION: N.W. fo Bldg. 7	ELEVATION AND DATUM: Ground 575.65 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/25/01	DATE FINISHED: 7/25/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 25.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 575.65 ft. (MSL)	PID READING (ppm)	REMARKS
				GRASS/FILL MATERIAL Few roots		
1				SANDY CLAY (CL) [FILL]: yellowish red (5YR 4/6), moist, ~70% low plastic fines, ~30% medium sand, moist, soft to firm		
2						
3					0.0	
4						
5				Few roots at 5' to 6'		
6				SANDY CLAY (CL) [TILL]: yellowish brown (10YR 5/4), moist, ~80% medium plastic fines, ~20% fine sand, trace gravel, hard	0.0	
7				Increase in gravel content		
8						
9					0.0	
10						
11						
12				Same as above		
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP06 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY CLAY (CL) [TILL]: CONTINUED	0.0	
15						
				Dark gray (5Y 4/1) at 15.5'		
16						Start dual tube method at 16' bgs
17				LEAN CLAY (CL): gray (10YR 5/1), moist to wet, ~90% medium plastic fines, ~10% fine sand, hard 1" Piece of wood at 17.2'		
18					0.0	
				CLAYEY SAND (SC): gray (10YR 5/1), wet, ~80% fine sand, ~20% low plastic fines		
19						
				SANDY CLAY (CL): gray (10YR 5/1), wet, ~80% low plastic fines, ~20% sand, soft Same as above, abundant black laminations No odor at 20' to 21' Silty sand seam, wet at 21' to 21.3'		
20					0.0	
21						
				CLAY (CL): dark gray (5Y 4/1), moist, ~100% high plastic fines, soft to firm, homogeneous		
22						
23						
24						
25				Total Depth: 25 feet below ground surface		
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP07	
BORING LOCATION: Sewer Bldg: 19	ELEVATION AND DATUM: Ground 573.13 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/26/01	DATE FINISHED: 7/26/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 10.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 573.13 ft. (MSL)	PID READING (ppm)	REMARKS
				GRASS/FILL		PID nonfunctional
1						
2						
3				SANDY CLAY (CL): yellowish brown (10YR 5/4), moist, ~70% low plastic fines, ~30% sand/gravel, firm to hard		
4						
5						
6						
7				Wood material at 7'		
8				Same as above, wet		
9	072601132					
10				Total Depth: 10 feet below ground surface		
11						
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP08	
BORING LOCATION: W. of Bldg. 27 (Sewer)	ELEVATION AND DATUM: Ground 569.93 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/26/01	DATE FINISHED: 7/26/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 569.93 ft. (MSL)	PID READING (ppm)	REMARKS
				GRASS/FILL		
1						
2						
3						
4				Same as above - sand gravel/fill		
5				SANDY CLAY (CL): dark grayish brown, moist to wet, ~85% medium plastic fines, ~15% sand, trace gravel, black material throughout, slight odor,		
6	072601133					
7						
8						
9						
10				Some black material, no odor		
11	072601134					
12				CLAY (CL): very dark gray, moist, ~100% medium plastic fines, trace sand, hard, homogeneous Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading Fl	Log of Boring No. DP09	
BORING LOCATION: W. of Bldg 30	ELEVATION AND DATUM: Ground 553.87 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/27/01	DATE FINISHED: 7/27/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 553.87 ft. (MSL)	PID READING (ppm)	REMARKS
				CONCRETE/FILL		
1						
2				SANDY CLAY (CL) [FILL]: dark brown, moist, ~70% low plastic fines, ~30% medium sand, soft to firm		
3					0.0	
4						
5				Gravel, 3" thick		
6						
7				CLAY (CL): dark gray (5Y 4/1), moist, ~100% high plasticity fines, trace sand, homogeneous		
8						
9				POORLY GRADED SAND (SP): dark brown, wet, ~90% medium sand and gravel, ~10% low plastic fines		
10				Black material at 10' to 12'	23.0	
11	072701135					
12				Total Depth: 12 feet below ground surface		
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP10	
BORING LOCATION: E. of Bldg. 30	ELEVATION AND DATUM: Ground 553.59 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/27/01	DATE FINISHED: 7/27/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 553.59 ft. (MSL)	PID READING (ppm)	REMARKS
				CONCRETE/FILL		
1						
2	072701137			CLAYEY SAND (SC): very dark grayish brown (2.5Y 3/2), moist, ~80% medium sand/gravel, ~20% fines, soft, odor		
3						
4						
5				Black discoloration, strong odor at 5' to 15'		
6						
7						
8						
9	072701138					
10	072701136 BLIND			Same as above		
11						
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP10 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL) [TILL]: black, wet, ~80% medium plastic fines, ~20% medium sand, trace gravel, strong odor		
15				Total Depth: 15 feet below ground surface		
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	**Log of Boring No. DP11**
BORING LOCATION: E. of Bldg. 5	ELEVATION AND DATUM: Ground 574.04 ft. (MSL)
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/28/01 / DATE FINISHED: 7/28/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 24.0 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST / COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 574.04 ft. (MSL)	PID READING (ppm)	REMARKS
				CONCRETE/FILL Sand/gravel base material		PID nonfunctional
1						
2				SANDY CLAY (CL) [FILL]: dark yellowish brown (10YR 3/4), moist, ~80% medium plastic fines, ~20% sand, soft		
3						
4						
5				SANDY LEAN CLAY (CL) [TILL]: dark yellowish brown (10YR 4/4), moist, ~80% medium to high plastic fines, ~20% medium sand, trace fine gravel, firm		
6				Olive gray (5Y 5/3) at 6'		
7						
8						
9				Silt lens at 8.8' to 9.2'		
				CLAY (CL): olive (5Y 4/3), moist, ~95% high plastic fines, ~5% fine sand, firm		
10						
				1" Sand lens at 10.5', wet		
11						
				SILTY SAND (SM): olive (5Y 4/3), wet, ~80% fine sand, ~20% low plastic fines		
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP11 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SILTY SAND (SM) CONTINUED		
15						
16						
17						
				CLAY (CL): dark gray (5Y 4/1), moist, ~100% high plastic fines, trace fine sand, soft, homogeneous		
18						
19				Same as above, no sand		
20						
21						
22				Same as above, very soft		
23						
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP12	
BORING LOCATION: N. of Tank Farm (N. End)	ELEVATION AND DATUM: Ground 569.99 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/28/01	DATE FINISHED: 7/28/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 20.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 569.99 ft. (MSL)	PID READING (ppm)	REMARKS
1	072801140			ASPHALT/BASE MATERIAL		PID not functioning properly
2						
3						
4				SANDY CLAY (CL): dark yellowish brown (10YR 3/4), moist, ~80% high plastic fines, ~20% sand, trace gravel, soft to firm		
5					0.0	
6						
7						
8				Same as above, wet		
9	072801141					
10				Medium gravel lens at 9.8' to 10.2'		
				CLAYEY SAND (SC): dark yellowish brown (10YR 3/4), wet, ~60% sand/gravel, ~40% medium plastic fines, firm		
11						
12					0.0	
13				SANDY LEAN CLAY (CL) [TILL]: yellowish brown (10YR 5/4), moist, ~80% medium plastic fines, ~20% medium sand, trace gravel, firm to hard		PID reading moves up ve slowly
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP12 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Quartz-like hard material at 14' to 14.1' SANDY LEAN CLAY (CL) [TILL]: continued	0.0	PID recalibrated
15						
16				CLAYEY SAND (SC) [TILL]: dark yellowish brown (10YR 4/4), damp to dry, ~60% medium sand, ~20% low plastic fines, ~20% gravel		
17					0.0	
18				SANDY CLAY (CL) [TILL]:		
19						
20				Total Depth: 20 feet below ground surface		
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. DP13**	
BORING LOCATION: W. of Building 16		ELEVATION AND DATUM: Ground 556.04 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 7/28/01	DATE FINISHED: 7/29/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 556.04 ft. (MSL)	PID READING (ppm)	REMARKS
				CEMENT/FILL		
1						
2				SANDY CLAY (CL) [FILL]: very dark brown (10YR 2/2), moist, ~70% low plastic fines, ~30% sand, soft, black material at 3'		PID recalibrated
3	072901144				0.0	
4				CLAY WITH GRAVEL (GC) [FILL]: yellow (10YR 7/6), ~70% gravel (1" to 2"), ~30% low plastic fines, odor		
5						
6					Out of Range	
7						
8				CLAYEY SAND (SC): dark brown, wet, ~80% medium sand, ~20% low plastic fines, trace fine gravel, putrid odor, sour		
9					125	
10						
11	072901145			Black discoloration at 11.5' to 13.5'		
12					109	
13				SANDY LEAN CLAY (CL) [TILL]: dark gray (5Y 4/1), moist, ~80% low to medium plastic fines, ~20% sand trace gravel, hard		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP13 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL) [TILL]: continued		
15				Total Depth: 15 feet below ground surface		
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading Fl	Log of Boring No. DP14	
BORING LOCATION: W. of Bldg. 16 (W. of DP13)	ELEVATION AND DATUM: Ground 556.12 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/29/01	DATE FINISHED: 7/29/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 556.12 ft. (MSL)	PID READING (ppm)	REMARKS
				CONCRETE/FILL		
1				SANDY CLAY (CL) [FILL]: dark gray (5Y 4/1), moist, ~80% low plastic fines, ~20% soft to firm		
2					0.0	
3	072901146			Black material at 3' to 3.5', odor		
4				CLAY WITH GRAVEL (GC): yellowish brown (10YR 6/4), dry to moist, ~60% 1" to 2" gravel, ~40% low plastic fines	37.9	
5						
6						
7				Black material	82.8	
8						
9	072901147			CLAYEY SAND (SC): olive gray (5Y 4/2), moist to wet, ~80% medium sand, ~20% low plastic fines, trace gravel Black material at 9.5' to 10.5'		
10					10.2	
11						
12				Black material at 12' to 14.5', strong odor		
13					15.9	
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP14 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
15				SANDY LEAN CLAY (CL) [TILL]: dark gray (5Y 4/1), moist, ~80% low to medium plastic fines, ~20% sand trace gravel, hard Total Depth: 15 feet below ground surface		
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP15	
BORING LOCATION: N. of W. Tank Farm	ELEVATION AND DATUM: Ground 554.48 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/29/01	DATE FINISHED: 7/29/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: Ground 554.48 ft. (MSL)	PID READING (ppm)	REMARKS
1				CONCRETE/FILL		This boring harder to drive than DP13 and DP14
2	072901148					
3				CLAY WITH GRAVEL (GC): yellowish brown (10YR 6/4), dry to moist, ~60% 1" - 2" gravel, ~40% low plastic fines		
4						
5						
6				SANDY CLAY (CL): dark gray, moist, ~75% low plastic fines, ~5% sand, firm, odor	23	
7						
8				CLAYEY SAND (SC): dark gray, ~80% medium sand, ~20% fines, wet, odor		
9	072901149				36	
10				Black material at 9.5' to 15'		
11						
12					15	
13				Strong odor		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP15 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
15				Total Depth: 15 feet below ground surface			
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. DP16**	
BORING LOCATION: N. of W. Tank Farm		ELEVATION AND DATUM: 554.48 ft. (MSL	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 7/30/01	DATE FINISHED: 7/30/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 554.48 ft. (MSL	PID READING (ppm)	REMARKS
				CONCRETE SANDY CLAY [FILL]		
1						
2	073001150			WELL GRADED SAND (SW): brown (10YR 4/3), wet, ~100% sand, trace fines		
3					12	
4						
5						
6					14.2	
7				Black staining at 7' to 13.5', odor		
8				Same as above, strong odor		
9					9.0	
10						
11						
12	073001151			Same as above, very strong organic odor, some gravel	421	
13				SANDY LEAN CLAY (CL) [TILL]: dark gray (5Y 4/1), moist, ~80% low to medium plasticity fines, ~20% sand trace gravel, hard		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP16 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
15				Total Depth: 15 feet below ground surface			
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP17	
BORING LOCATION: N. of W. Tank Farm	ELEVATION AND DATUM: 554.61 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/30/01	DATE FINISHED: 7/30/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 16.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 554.61 ft. (MSL)	PID READING (ppm)	REMARKS
				CONCRETE/BASE MATERIAL		
1				SANDY CLAY (CL) [FILL]: very dark gray (2.5Y 3/1), wet, ~80% medium plastic fines, ~20% sand, trace gravel, soft to firm		
2						
3	073001152			Dark brown staining	0.0	
4				Some gravel at 4'		
5						
6					0.0	
7						
8						
9				POORLY GRADED SAND with CLAY (SC): brown, wet, ~80% medium sand, ~20% low plastic fines, trace gravel, black material at 10' to 14'	1.7	
10						
11						
12					120	
13	073001153			SANDY LEAN CLAY (CL) [TILL]: dark gray (5Y 4/1), moist,		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP17 (cont'd)

Depth (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				~80% low to medium plastic fines, ~20% sand trace gravel, hard		
15						
16				Total Depth: 16 feet below ground surface		
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP18	
BORING LOCATION: N. of Bldg. 40 (Geophys. G)	ELEVATION AND DATUM: 555.42 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/30/01	DATE FINISHED: 7/30/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 555.42 ft. (MSL)	PID READING (ppm)	REMARKS
				ASPHALT - 12" thick GRAVEL/BASE MATERIAL		
1						
2	073001154	■		SANDY CLAY (CL) [FILL]: very dark grayish brown (2.5Y 3/2), moist, ~75% low plastic fines, ~25% sand, trace gravel, firm		
3					0.0	
4				Same as above, brown (10YR 4/3), no gravel		
5						
6					0.0	
7						
8						
9					0.0	
10				WELL GRADED SAND (SW):		
				SILT (ML):		
11						
				WELL GRADED SAND (SW): olive brown (2.5Y 4/4), ~100% sand, trace fines, trace fine gravel		
12					0.0	
13				Becomes more coarse with depth, wet		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP18 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
	073001155					
15				Total Depth: 15 feet below ground surface		
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. DP19**	
BORING LOCATION: N. of Bldg. 40 (Geophys. F)		ELEVATION AND DATUM: 555.53 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 7/30/01	DATE FINISHED: 7/30/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 555.53 ft. (MSL)	PID READING (ppm)	REMARKS
				ASPHALT - 12" thick Gravel base		
1						
2	073001156	■		SANDY CLAY (CL): very dark gray (2.5Y 3/1), moist, ~80% fines, medium plastic, ~20% sand, soft to firm		
3					0.0	
4		☒				
5				Dark grayish brown (2.5Y 4/2), firm to hard		
6					0.0	
7						
8						
9					0.0	
10						
11				SAND/GRAVEL (SW):		
				SILT (ML):		
12				WELL GRADED SAND (SW):	0.0	
13	073001157	■				
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP19 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
15				Total Depth: 15 feet below ground surface		
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI				Log of Boring No. DP20	
BORING LOCATION: Circle (Geophys. Anom. H)				ELEVATION AND DATUM: 553.84 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting				DATE STARTED: 7/30/01	DATE FINISHED: 7/30/01
DRILLING METHOD: Direct Push				TOTAL DEPTH (ft.): 15.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400				DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool				LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA			RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.84 ft. (MSL)	PID READING (ppm)	REMARKS
				GRASS GRAVEL/BASE		
1						
2	073001158			SANDY CLAY (CL): dark yellowish brown (10YR 3/5), ~80% low plastic fines, ~20% sand, soft		
3						
4					0.0	
5						
6				POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), moist, ~90% medium sand, ~10% fines, gravel/clay layer		
7					0.0	
8				30% gravel, trace fines		
9						
10						
11						
12					0.0	
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP20 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
	073001159			POORLY GRADED SAND (SP): continued		
				Medium sand, black, odor at 14.5' to 15'		
15				Total Depth: 15 feet below ground surface		
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP21	
BORING LOCATION: W. of Bldg. 9	ELEVATION AND DATUM: 563.04 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 7/31/01	DATE FINISHED: 7/31/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 24.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST 9.8	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.04 ft. (MSL)	PID READING (ppm)	REMARKS
				CONCRETE		
1				SANDY CLAY (CL): (2.5Y 5/4), light olive brown, moist, ~80% medium plastic fines, ~20% sand, trace gravel, hard		PID nonfunctional
2						
3						
4						
5						
6						
7						
8						
9				Silt lens at 9' - 9.4'		
10				Dark grayish brown, ~95% high plasticity fines, ~5% sand	▽	Groundwater 9.8' bgs
11				1/2" gray laminations at 11' to 12', ~100% high plastic fines		
12				Same as above, wet, some sand and gravel at 12'		
13				CLAYEY SAND (SC): wet, ~70% medium coarse sand, 30% medium plastic fines		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP21 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
15				Very dark grayish brown (2.5Y 3/2) at 15' to 16'		Formation appears to be under pressure, pushed probe back up 2' (probe at 20' to 24')
16				CLAYEY SAND (SC): light olive brown (2.5Y 5/6), saturated, ~70% medium sand, ~30% fines		
17				~30% fines at 17.5' to 18' coarse sand		
18						
19						
20				CLAY (CL): light olive brown (2.5Y 5/4), wet, ~100% high plactic fines, trace fine sand, firm		
21						
22						
23						
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. DP22**	
BORING LOCATION: Between Bldgs. 3A and 10		ELEVATION AND DATUM: 563.68 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 8/1/01	DATE FINISHED: 8/1/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 24.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.68 ft. (MSL)	PID READING (ppm)	REMARKS
				Concrete		
1				CLAY (CL): dark yellowish brown (10YR 4/4), moist, ~90% medium plastic fines, ~10% fine sand, trace gravel, firm		
2						
3					0.0	
4				SANDY CLAY (CL): ~60% low plastic fines, ~40% well graded sand and gravel		
5				CLAY (CL): yellowish brown, moist, ~100% medium - high plastic fines, trace sand, gravel (till)		
6					0.0	
7						
8				Fine gray laminations at 8.5' to 9', weak bedding		
9				SANDY SILT (ML): wet, ~70% low plastic fines, ~30% fine sand, saturated	0.0	
10				CLAY (CL): dark grayish brown (2.5Y 4/2), moist, ~100% high plasticity fines, trace fine sand		
11				Sandy silt lens at 10.8' to 11'		
12						
13				Saturated clay at 12' to 16', appears to be under pressure, zero recovery		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP22 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				CLAY (CL): continued		
15						
16				CLAY (CL): gray (2.5Y 5/1), moist, 100% high plastic fines, homogeneous, firm to soft		
17						
18					0.0	
19						
20				Same as above		
21						
22						
23						
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP23	
BORING LOCATION: Between Bldgs. 10 and 3	ELEVATION AND DATUM: 563.41 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 8/1/01	DATE FINISHED: 8/1/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 24.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.41 ft. (MSL)	PID READING (ppm)	REMARKS
1				SANDY CLAY (CL) [FILL]: olive brown (2.5Y 4/3), moist, ~75% low plastic fines, ~25% sand gravel, soft to firm, odor		
2	080101160					
					0.0	
3						
4				CLAY (CL): light olive brown (5Y 5/4), olive gray laminations (5Y 4/2), ~100% medium plastic fines, trace sand, hard, odor		
5						
6					0.0	
7						
8						
9	080101161				0.0	
10						
11						
12						
13				13' - 13.4' Clayey sand and gravel, dark gray (2.5Y 4/1), wet, homogeneous	0.0	
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP23 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				CLAY (CL): continued		
15						
16						
				CLAYEY SAND (SC): light olive brown (2.5Y 5/4), saturated, ~70% coarse sand, ~30% fines, strong chemical odor		
17						
18					0.0	
				CLAY (CL): gray (2.5Y 5/1), moist to wet, ~100% high plastic fines, soft, homogeneous, odor		
19						
20						
21						
22						
				1" sand lens, wet at 22.5'		
23						
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI				Log of Boring No. DP24	
BORING LOCATION: N.E.of Bldg. 1				ELEVATION AND DATUM: 563.12 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting				DATE STARTED: 8/6/01	DATE FINISHED: 8/6/01
DRILLING METHOD: Direct Push				TOTAL DEPTH (ft.): 24.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400				DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool				LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA			RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.12 ft. (MSL)	PID READING (ppm)	REMARKS
				Concrete		
1				SANDY CLAY (CL) [FILL]: dark yellowish brown (10YR 3/4), moist, ~70% low plastic fines, ~30% sand/gravel, soft to firm		
2						
3					0.0	
4						
5				POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), moist, ~100% medium sand, trace fines, trace gravel		
6					0.0	
7						
8						
9				2" Cobble at 9'	0.0	
				SANDY CLAY (CL): [TILL]: light olive brown (2.5Y 5/4), moist, ~90% medium plastic fines, ~10% sand, trace gravel		
10						
11				POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), moist, ~90% medium sand, ~10% fines, trace fine gravel		
12					0.0	
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP24 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				13.8' 1" - 2" gravel POORLY GRADED SAND (SP): CONTINUED		
15					0.0	
16						
17						
18				SANDY CLAY (CL): dark yellowish brown (10YR 4/4), moist to wet, ~80% fines, ~20% sand, trace gravel, firm		
19				POORLY GRADED SAND (SP): brown (10YR 4/3), moist, ~70% medium sand, ~20% fine gravel, ~10% fines	0.0	
20						
21						
22						
23				Clay 23' - 23.5'		
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP25	
BORING LOCATION: Bldg. 6 Loading Dock	ELEVATION AND DATUM: 575.17 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 8/7/01	DATE FINISHED: 8/7/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 24.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION (NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.) Surface Elevation: 575.17 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1				SANDY CLAY (CL): dark greenish gray (10Y 4/1), ~90% medium plastic fines, ~10% sand, black laminations, soft to firm, odor		
2	080701164 (BLIND DUP)				0.2	
3	080701163					
4				Same as above, trace gravel, wet, odor		Water came up to ~14" bgs at 4' to 8' sample interval
5					0.2	
6						
7	080701165					
8						
9					0.1	
				Yellowish brown (10YR 5/6), firm		
10						
11						
12					0.3	
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP25 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY CLAY (CL): CONTINUED	0.2	
				1" sand gravel layer, gray, wet, odor		
15						
				SILT (ML): gray (10YR 5/1), moist, ~100% low plastic fines, trace fine sand, firm		
16						Hole collapsed at 16' twice move to dual tube at 16', bent rod at 16'
17						
				Fine black laminations at 17.5' to 18.5'	0.3	
18						
				18.5' to 18.8' silty sand, wet		
19				SILTY CLAY (CL): dark gray (10YR 4/1), moist, ~90% low plastic fines, ~10% fine sand, firm		
20				CLAY (CL): gray (2.5Y 5/1), moist, ~100% high plastic fines, soft, homogeneous		
21						
22						
23						Outer casing to 24', water at 22' bgs, pour grout through outer casing
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP26	
BORING LOCATION: W. of E. Tank Farm	ELEVATION AND DATUM: 577.89 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 8/7/01	DATE FINISHED: 8/7/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 24.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 577.89 ft. (MSL)	PID READING (ppm)	REMARKS
		X		Asphalt, fill		PID nonfunctional
1				SANDY CLAY (CL): dark olive gray (5Y 3/2), moist, ~80% low plastic fines, ~20% sand		
2						
3				Brown (10YR 4/3)		
4				Same as above, ~95% fines, ~5% fine sand		
5				Light olive brown (2.5Y 5/4), trace fine gravel		
6						
7						
				Olive (5Y 5/4), wet, ~70% fines, ~30% sand, trace gravel		
8				Moist, ~90% fines, ~10% sand, trace gravel, hard		
9				Light olive brown (2.5Y 5/4)		
10				1" to 2" Gravel at 10.2' to 10.4'		
11						
				SILT (ML): yellowish brown (10YR 5/6) at 11.5' to 11.7'		
12				SANDY CLAY (CL): light olive brown (2.5Y 5/4), wet, ~90% fines, ~10% sand, trace gravel, hard		
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP26 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY CLAY (CL): continued		
15				SANDY CLAY (CL): light olive brown (2.5Y 5/4), wet, ~90% fines, ~10% sand, trace gravel, hard		
16				Same as above, hard		
17						
18						
19				Sand, gravel lens at 19.2' to 19.3'		
20						
21						
22						
23						
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI				Log of Boring No. DP27	
BORING LOCATION: W. of Bldg. 2				ELEVATION AND DATUM: 559.35 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting				DATE STARTED: 8/8/01	DATE FINISHED: 8/8/01
DRILLING METHOD: Direct Push				TOTAL DEPTH (ft.): 24.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400				DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool				LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA			RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 559.35 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt/ gravel base		
1				Sand/gravel fill material		
2						
3				SANDY CLAY (CL): very dark gray (2.5Y 3/1), moist, ~80% low plastic fines, ~20% sand, trace gravel, hard	0.0	
4				Black staining, odor at 4' to 6'		
5						
6						
7						
8				Same as above, soft, no gravel, strong odor, black staining (laminations at 8' to 12'), wet	210	
9						
10						
11						
12				Harder than above Dark brown (10YR 3/3), dry to moist at 12.5' to 13'	218	
13				SANDY LEAN CLAY (CL) [TILL]: dark greenish gray (5GY 3/1), moist, ~80% medium plastic fines, ~20% medium fine sand, trace gravel, dark brown laminations at 13' to 14', hard		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP27 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL) [TILL]: continued	0.0	
15						
16						
17						
18					0.0	Becomes wet at 18.2'
				CLAYEY GRAVEL (GC): dark greenish gray (5GY 4/1), wet to saturated, ~80% fine gravel/coarse sand, ~20% fines		
19						
20						
21				SANDY LEAN CLAY (CL) [TILL]: dark greenish gray (5GY 3/1), moist, ~80% medium plastic fines, ~20% medium fine sand, trace gravel, dark brown laminations at 13' to 14', hard	0.4	
22						
23						
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	**Log of Boring No. DP28**
BORING LOCATION: W. of Bldg. 15	ELEVATION AND DATUM: 578.67 ft. (MSL)
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 8/8/01 / DATE FINISHED: 8/8/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 24.0 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST / COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 578.67 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1				SANDY CLAY (CL) [FILL]: dark brown (10YR 3/3), moist, ~70% fine, ~30% sand, soft		
2					0.0	
3				Dark yellowish brown (10YR 4/4)		
4						
5						
6					0.0	
7				SANDY LEAN CLAY (CL) [TILL]: light olive brown (2.5Y 5/4), moist, ~85% fines, ~15% sand, trace gravel with gray laminations, firm to hard		
8						
9				Dark brown fines (7.5YR 3/3), wet, 1" to 2" gravel	0.0	
10						
11						
12				POORLY GRADED SAND (SP): saturated	0.0	
13				CLAY (CL): dark yellowish brown (10YR 3/4)		
				SILT (ML): dark gray (10YR 4/1), wet, ~100% low plastic fines,		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP28 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				trace fine sand, soft to firm		
15					0.3	
16						
				SILTY SAND (SM): saturated		
17				SILT (ML): dark gray (10YR 4/1), wet, ~100% low plastic fines, trace fine sand, soft to firm		
18						
19				Black laminations at 19' to 19.7'	0.4	
20				SILTY CLAY (CL): dark gray (10YR 4/1), moist, ~100% high plastic fines, firm		
21						
22						
23						
24				Total Depth: 24 feet below ground surface		
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP29	
BORING LOCATION: E. of Tank Vault (E. Tank Farm)	ELEVATION AND DATUM: Ground 578.13 ft. (MSL) (estimated)	
DRILLING CONTRACTOR: Geomatrix	DATE STARTED: 11/9/01	DATE FINISHED: 11/9/01
DRILLING METHOD: Hand Auger	TOTAL DEPTH (ft.): 5.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 3 1/2" Diameter Hand Auger	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Hand Auger	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation: Ground 578.13 ft. (MSL) (estimated)		
				Gravel		
				SANDY CLAY (CL): light brown, moist, ~80% high plastic fines, ~20% medium sand, firm		
1						
2						
3						
4						Note: PID 3.9 ppm at top of borehole when total depth was reached.
5	110901246			Total Depth: 5 feet below ground surface		
6						
7						
8						
9						
10						
11						
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP30	
BORING LOCATION: N.E. Parking Lot	ELEVATION AND DATUM: 562.08 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 12/5/01	DATE FINISHED: 12/5/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 20.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 562.08 ft. (MSL)	PID READING (ppm)	REMARKS
		X		Asphalt/Concrete		
1				POORLY GRADED SAND with GRAVEL (SC) [FILL]		
2						
				2.5' - 3' Clay lens dark olive gray [FILL]		
3				POORLY GRADED SAND (SC) [FILL]: light olive brown (2.5Y 5/6), moist, ~95% medium sand, ~5% gravel (<1/2"), trace fines	0.0	
4						
5						
6				SANDY LEAN CLAY (CL) [FILL]: dark olive gray (5Y 3/2), moist, ~85% medium plastic clay, ~15% sand, trace gravel (1"), soft	0.0	
7						
		X		1" - 2" pieces of asphalt		
8						
9					0.0	
10				CLAY (CL): pale yellow (2.5Y 8/2), moist, ~100% low plastic fines, soft		
11		X		SANDY LEAN CLAY (CL): very dark grayish brown (2.5Y 3/2), moist, ~85% low plastic fines, ~15% gravel and sand		
12					0.0	
13				POORLY GRADED SAND (SP): yellowish brown (10YR 5/4), moist, ~100% medium sand		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP30 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued		
15						
16				Wet		
17						
18					0.0	
19				19' - 19.5' Silt lens - saturated		
20				Total Depth: 20 feet below ground surface		
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP31	
BORING LOCATION: N. Parking Lot	ELEVATION AND DATUM: 561.68 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 12/5/01	DATE FINISHED: 12/5/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 18.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 561.68 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1				SANDY LEAN CLAY (CL) [FILL]: light olive brown (2.5Y 5/3), moist, ~90% medium plastic fines, ~10% sand, trace gravel, soft/firm		
2						
3					0.0	
4						
5						
6					0.0	
7						
8						
9					0.0	
10						
11				Small black (burned?) material (1/2" hard)		
12					0.0	
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP31 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
	120501294			SANDY LEAN CLAY (CL) [FILL]:		
15				Black staining, odor	4.9	
16				POORLY GRADED SAND (SP): olive gray (5Y 5/2), moist, ~100% medium sand, saturated at 17'		
17						
18				Total Depth: 18 feet below ground surface		
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP32	
BORING LOCATION: Parking Lot	ELEVATION AND DATUM: 562.64 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 12/5/01	DATE FINISHED: 12/5/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 16.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 562.64 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1				SANDY CLAY (CL): dark yellowish brown (10YR 4/6), moist, ~90% low plastic fines, ~10% fine sand, firm		
2						
3				Fine gravel at 2.5'	0.0	
4				Dark brown wood material at 3.5' Very pale brown (10YR 8/2) diatemaceous silty clay Same as above [FILL]		
5						
6				Dark grayish brown (2.5Y 4/2)	0.0	
7						
8				SILTY CLAY (CL): [FILL] white (5Y 8/1), moist, ~95% low plastic fines, ~5% very fine sand, blocky, soft (cemented) 1" throughout		
9					0.0	
10						
11						
12				Same as above	0.0	
13				SANDY CLAY (CL): [FILL] dark yellowish brown (10YR 4/4), moist, ~90% low plastic fines, ~10% sand, firm		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP32 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
15				POORLY GRADED SAND (SP): light olive brown (2.5Y 5/3), moist, ~100% medium sand	0.0	
16				Total Depth: 16 feet below ground surface		
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP33	
BORING LOCATION: Parking Lot	ELEVATION AND DATUM: 562.95 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 12/5/01	DATE FINISHED: 12/5/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 16.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 562.95 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1				SANDY CLAY (CL): [FILL]: dark yellowish brown (10YR 4/4), moist, ~80% low plastic fines, ~20% fine sand, firm		
2						
3					0.0	
4				POORLY GRADED SAND (SP): yellowish brown (10YR 5/4), moist, ~100% medium plastic sand, trace fines		
5				5' - 5.5' silt lens		
				5.5' - 6.0' clay lens		
6					0.0	
7						
8						
9					0.0	
10						
11						
12				Same as above		
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP33 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued		
15						
16				Total Depth: 16 feet below ground surface		
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. DP34**	
BORING LOCATION: Parking Lot		ELEVATION AND DATUM: 563.27 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 12/5/01	DATE FINISHED: 12/5/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 16.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.27 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1				SANDY CLAY (CL): [FILL]: dark grayish brown (2.5Y 4/2)		
2				SILTY CLAY (CL): [FILL]: white (2.5Y 8/1), moist, ~95% low plastic fines, ~5% fine sand, blocky, firm, diatomaceous earth		
3					0.0	
4				Same as above		
5						
6					0.0	
7						
8				Same as above		
9					0.0	
10						
11						
12				Same as above	0.0	
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP34 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY CLAY (CL): dark yellowish brown (10YR 4/4), moist, ~80% low plastic fines, ~20% fine sand, trace gravel, soft		
15						
				POORLY GRADED SAND (SP): yellowish brown (10YR 5/4), moist, ~95% medium sand, ~5% gravel, trace fines	0.0	
16				Total Depth: 16 feet below ground surface		
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading Fl	**Log of Boring No. DP35**
BORING LOCATION: Parking Lot	ELEVATION AND DATUM: 562.87 ft. (MSL)
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 12/5/01 / DATE FINISHED: 12/5/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 16.0 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 562.87 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
				Concrete		
1				SANDY CLAY (CL): [FILL] brown (5/3), moist, ~80% low plastic fines, ~20% medium sand, soft		
2						
3					0.0	
4				POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), moist, ~90% medium sand, ~5% fines gravel, trace fines		
5						
6					0.0	
7						
8				Same as above		
9						
10						
11						
12				Same as above		
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP35 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued			
15							
				15.5 - 15.8' Silt lens - wet			
16				Total Depth: 16 feet below ground surface			
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							

RMRK3

PROJECT: Morton Reading Fl	Log of Boring No. DP36	
BORING LOCATION: Parking Lot	ELEVATION AND DATUM: 561.73 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 12/5/01	DATE FINISHED: 12/5/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 21.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 561.73 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1				SANDY CLAY (CL): [FILL]: very dark grayish brown (2.5Y 3/2), moist, ~80% low plastic fines, ~20% medium sand, trace gravel, soft		PID nonfunctional
2						
3						
4				Same as above		
5						
6				Black material <1" (burned?)		
7						
8				Same as above		
9						
10				Reddish brown laminations (iron)		
11						
12				Same as above		
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP36 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY CLAY (CL) [FILL]: continued		
15				Odor		
16				POORLY GRADED SAND (SP): light olive brown (2.5Y 5/3), moist, ~95% medium sand, ~5% fine gravel		
17						
18				Black discoloration, strong odor 17.5-19.5'		
19	120501298					
20				SANDY LEAN CLAY (CL): [TILL]: olive (5Y 4/3), moist, ~85% low plastic fines, ~15% fine sand, trace gravel, hard		
21				Total Depth: 21 feet below ground surface		
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. DP37**	
BORING LOCATION: Western Edge of Parking Lot		ELEVATION AND DATUM: 562.28 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 12/5/01	DATE FINISHED: 12/5/01
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 20.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tool		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 562.28 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt (6 - 8") and Gravel Base (6 - 12")		
1						PID nonfunctional
2						
3						
4				SANDY CLAY (CL) [FILL]: yellowish brown (10YR 5/4), moist, ~85% low plastic fines, ~15% fine sand, firm		
5						
6						
7						
8				Dark brown at 8.8' - 9'		
9				Reddish brown (2.5YR 4/4) at 9' - 9.5'		
10						
11						
12				Dark brown (10YR 3/3)		
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP37 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY CLAY (CL) [FILL]: continues		
15						
16						
17						
				POORLY GRADED SAND (SP): wet		
18	120501297					
19	120501296					
20				Total Depth: 20 feet below ground surface		
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP38	
BORING LOCATION: Parking Lot	ELEVATION AND DATUM: 562.95 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 12/5/01	DATE FINISHED: 12/5/01
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 20.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tool	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 562.95 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1				CLAY (CL) [FILL]: yellowish brown (10YR 5/6), moist, ~90% medium plastic fines, ~10% fine sand, hard		PID nonfunctional
2						
3				Dark yellowish brown (10YR 3/4)		
4						
5				1/2" cobble at 5.5'		
6						
7						
8						Cobble wedged in shoe - zero recovery from 8 to 12'
9						
10						
11						
12						
13						
14				POORLY GRADED SAND (SP): dark grayish brown (2.5Y 4/2),		

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. DP38 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
	120501299			moist, wet, ~100% medium sand Wood material, broken glass, black discoloration, odor at 13.5 - 14'		
15						
16				Same as above		
17						
18						
19				Odor, black discoloration at 19 - 20'		
20				Total Depth: 20 feet below ground surface		
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI		**Log of Boring No. DP39**	
BORING LOCATION: S.W. of Bldg. 30, W. of Fuel Tank		ELEVATION AND DATUM: 553.09 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting		DATE STARTED: 3/5/02	DATE FINISHED: 3/5/02
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 11.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tube		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.09 ft. (MSL)	PID READING (ppm)	REMARKS
				SANDY CLAY (CL) [FILL]: dark brown, moist, ~80% medium plastic fines, ~20% medium sand, soft		
1						
2						
3						
4				Same as above, few roots, 1/2" gravel [FILL]		
5						
6						
7						
8				Same as above		
9						
10	030502300			Black material in shoe (wet) - most likely from groundwater, did not include with sample		
11				Total Depth: 11 feet below ground surface		
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP40	
BORING LOCATION: S.W. of Bldg 30, W. of Fuel Tank	ELEVATION AND DATUM: 553.10 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 3/5/02	DATE FINISHED: 3/5/02
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 6.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tube	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation: 553.10 ft. (MSL)		
				SANDY CLAY (CL) [FILL]: dark brown, moist, ~80% medium plastic fines, ~20% medium sand, soft		
1						
2						
3						
4						
5	030502302					
6	030502301			Total Depth: 6 feet below ground surface		
7						
8						
9						
10						
11						
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP41	
BORING LOCATION: S.W. of Bldg. 30, W. of Fuel Tank	ELEVATION AND DATUM: 553.33 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 3/5/02	DATE FINISHED: 3/5/02
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 6.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tube	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.33 ft. (MSL)	PID READING (ppm)	REMARKS
				SANDY CLAY (CL) [FILL]: dark brown, moist, ~80% medium plastic fines, ~20% medium sand, soft		
1						
2						
3						
4						
5						
6	030502303			Total Depth: 6 feet below ground surface		
7						
8						
9						
10						
11						
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP42	
BORING LOCATION: S.W. of Bldg. 30, W. of Fuel Tank	ELEVATION AND DATUM: 553.15 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 3/5/02	DATE FINISHED: 3/5/02
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 6.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tube	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.15 ft. (MSL)	PID READING (ppm)	REMARKS
				SANDY CLAY (CL) [FILL]: dark brown, moist, ~80% medium plastic fines, ~20% medium sand, soft		
1						
2						
3						
4						
5						
6	030502304			Total Depth: 6 feet below ground surface		
7						
8						
9						
10						
11						
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP43	
BORING LOCATION: S.E. of Bldg. 40	ELEVATION AND DATUM: 563.21 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 3/5/02	DATE FINISHED: 3/5/02
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 1.5	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tube	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.21 ft. (MSL)	PID READING (ppm)	REMARKS
				[FILL] - SANDY CLAY (CL)		
1	030502305	■				
				Total Depth: 1.5 feet below ground surface		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP44	
BORING LOCATION: S.E. of Bldg. 40	ELEVATION AND DATUM: 563.61 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 3/5/02	DATE FINISHED: 3/5/02
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 1.5	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tube	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.61 ft. (MSL)	PID READING (ppm)	REMARKS
				[FILL] - SANDY CLAY (CL)		
1	030202306					
				Total Depth: 1.5 feet below ground surface		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI	**Log of Boring No. DP45**
BORING LOCATION: S.E. of Bldg. 40	ELEVATION AND DATUM: 563.33 ft. (MSL)
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 3/5/02 / DATE FINISHED: 3/5/02
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 1.5 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.
SAMPLING METHOD: Macro Tube	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation: 563.33 ft. (MSL)		
	030502307			SANDY CLAY (CL) [FILL]:		
1						
				Total Depth: 1.5 feet below ground surface		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. DP46	
BORING LOCATION: S.E. of Bldg. 40	ELEVATION AND DATUM: 562.87 ft. (MSL)	
DRILLING CONTRACTOR: H.C. Nutting	DATE STARTED: 3/5/02	DATE FINISHED: 3/5/02
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 1.5	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: Macro Tube	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation: 562.87 ft. (MSL)		
				[FILL]		
1	030502308					
				Total Depth: 1.5 feet below ground surface		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-47**	
BORING LOCATION: ~25 in. S.E. of UAW17-40		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/9/04	DATE FINISHED: 3/9/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST NA / COMPL. NA	24 HRS. NA
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION (NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.)	PID READING (ppm)	REMARKS
				Surface Elevation:		
1	20040309DP47V5N			2" Topsoil SANDY CLAY (CL): yellowish dark brown, moist, ~80% medium plasticity clay with sand and gravel, firm	3.4	Plugged borehole with bentonite cement grout
2				Color to yellowish/light gray		Tremied from bottom to top
3					2.6	
4				Color to orange		
5					2.7	
6				Dark brown mottling		
7				Mottled light gray/yellowish orange, sand/gravel fraction increasing to ~30%, very firm	4.3	
8				LEAN CLAY (CL): mottled, light gray,/orange/light brown, firm		
9	20040309DP47V10N			SANDY CLAY (CL): light orangy gray/brown, ~70 - 80% clay, ~20 - 30% sand/gravel, medium plastic, firm, wet	8.9	
10						
11				LEAN CLAY LENS 10.5 - 11', ~10% fine sand	2.3	
12						
13						
14						
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. DP-48**
BORING LOCATION: ~25 ft. W of UAW17-40	ELEVATION AND DATUM:
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/9/04 / DATE FINISHED: 3/9/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST NA, COMPL. NA, 24 HRS. NA
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION (NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.) Surface Elevation:	PID READING (ppm)	REMARKS
				6" Topsoil		
1				SILTY SAND (SM): black, moist, loose, ~10% silt/clay, trace gravel, sheen	3.6	Plugged borehole with bentonite cement grout
2				SANDY CLAY (CL): light orangish brown, moist, ~70 - 80% low to medium plasticity clay, ~20 - 30% sand/gravel, stiff, cobble 1.5" diameter at 1.6', stiff, coarse sand/gravel lenses at 3.5' and 4.2'		Tremied from bottom to top
3					2.6	
4	20040309DP48V5N			SANDY CLAY (CL): brown to light brown, moist, ~70 - 80% medium plasticity clay, ~20 - 30% fine sand, trace gravel		
5					3.1	
6						
7				CLEAN SAND (SP): light orangish brown, moist, very fine	2.9	
8				SANDY CLAY (CL): light brown, ~80% low plasticity clay, ~20% sand, trace black mottling at 9'		
9	20040309DP48V9.5N			CLEAN SAND (SP): light orangish brown, moist, very fine	3.0	
10				LEAN CLAY (CL): mottled orange.gray, moist, ~90% clay, ~10% fine sand		
11				SANDY CLAY (CL): light brown, ~70 - 80% clay, ~20 - 30% sand/gravel, moist	3.1	
12				Total Depth: 12 feet below ground surface		
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-49**	
BORING LOCATION: ~25 ft. N.E. of UAW17-40		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/9/04	DATE FINISHED: 3/9/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				3" Topsoil		
1				GRAVEL and SAND (GM): dark gray, moist, coarse, very loose, probable fill material		Plugged borehole with bentonite cement grout
2						Tremied from bottom to top
3						
4						
5	20040309DP49V5.5N			SANDY CLAY (CL): light brown, moist, ~80% low to medium plasticity clay, ~20% medium sand, stiff		Borehole caving in at 4.3' bgs
6				Mottled, yellow-orange and gray, ~20 - 30% sand/gravel		
7						
8				Stiff to very stiff		
9						
10	20040309DP49V10N					
11						
12						
13						
14						
15				SANDY CLAY: ~20% fine sandy silt, trace gravel, very stiff, moist, 1.5" diameter subrounded cobble		
16				Total Depth: 15 feet below ground surface		
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-50**	
BORING LOCATION: ~25 ft. N of UAW 04-20		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/10/04	DATE FINISHED: 3/10/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 16.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 11.65 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
				4" Asphalt	0.0	
1				LEAN CLAY (CL): dark gray, moist, ~ 95% medium plasticity clay, ~5% silt/fine sand, medium stiff		Plugged borehole with bentonite cement grout
2						Tremied from bottom to top
3						
4				Rust colored mottling (4 - 7.8") 20 - 30%	0.0	
5				SANDY GRAVEL (GW): dark gray, moist @ 5'		
6				SANDY CLAY (CL): dark gray, moist, ~80% low plasticity clay, ~20% fine to medium sand		
7				black mottling	0.0	
8					0.0	
9				LEAN CLAY (CL): as above, gray with rust colored mottling		
10	20040310DP50V10N			MEDIUM SAND (SP) lens: light brown, moist at 9'		
11				Dark gray with black mottling (~20%), wet, soft (9 - 10')	0.0	
12				COARSE SAND and GRAVEL (SW): gray to dark gray, moist, COBBLE at 11'		
13				FINE to MEDIUM SAND (SP): dark gray, wet, trace gravel, loose		
14				SANDY CLAY (CL): light gray, moist, mottled rust, soft		
15				COARSE SAND and GRAVEL (SW): black staining throughout, loose, wet		
				SANDY CLAY (CL): light gray, ~80 - 90% clay, ~10 - 20% medium sand, trace gravel, moist, top 2" stained black		
16				Total Depth: 16 feet below ground surface		
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-51**	
BORING LOCATION: ~25 ft. N of UAW 04-20		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/10/04	DATE FINISHED: 3/10/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 12.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 11 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
				GRAVEL, likely fill	0.0	
1				LEAN CLAY (CL): dark gray, moist, low plasticity, stiff		Plugged borehole with bentonite cement grout
2					0.0	Tremied from bottom to top
3						
4				Rust colored mottling 4'	0.0	
				SAND (SP): coarse sand with gravel, light gray, moist, loose, subangular gravel, trace silt	0.0	
5					0.0	
				(CL): as above		
6				SANDY CLAY (CL): ~60 - 80% clay, ~20 - 40 sand/gravel (increasing with well depth)	0.0	
7				SAND (SP): coarse sand with gravel, light gray, trace rust colored mottling, round and subrounded gravel	0.0	
8				clay lens at 8'	0.0	
9					0.0	
10	20040310DP51V10N			Cobble	0.0	
11					0.0	
12				Total Depth: 12 feet below ground surface		
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. DP-52**
BORING LOCATION: ~25 ft. SW of UAW 04-20	ELEVATION AND DATUM:
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/10/04 / DATE FINISHED: 3/10/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 16.0 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST 12 ft. / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
	20040310DP52V1-1.5N			Asphalt, gravel bedding (fill) 0 - 1'		
1				LEAN CLAY (CL): dark gray, moist, medium plasticity, stiff, trace fine sand, some mottling, light brown near 4'	19.7	Plugged borehole with bentonite cement grout
2						Tremied from bottom to top
3					22.5	
4	20040310DP52V5N					
5				SAND (SP): light gray, uniform, coarse, ~10 - 20% gravel, trace clay, loose	31.2	
6				SANDY CLAY (CL): gray, 20 - 30% mottled rust color, increasing sand content with depth		
7				FINE TO MEDIUM SAND (SP): light to gray, moist, loose, ~10% gravel	18.0	
8				SAND (SP): uniform, coarse, light gray with yellowish light brown trace rust colored mottling, moist, ~20% gravel 7' - 2" lens of SANDY CLAY (CL): gray, moist, ~20% medium sand		
9				SANDY CLAY as above	8.9	
				MEDIUM SAND (SP): light brown and gray, moist, trace gravel, loose		
10				SAND (SP): coarse sand with gravel, brown and gray, moist, loose		
11				SAND (SP): gray, moist, loose SAND (SP): light to dark gray, moist, coarse sand with ~20% gravel	7.9	
12				FINE TO MEDIUM SAND (SP): dark gray, moist, loose SAND and GRAVEL (SW): black, moist, some rounded gravel, loose		
13				12 - 13' cave in Interbedded sand, gravel, and clay, H_2S odor at 13.5 - 14'		
14				GRAVELY CLAY (GC): black, wet, medium stiffness		
15				SAND CLAY (CL): olive gray, moist, some rust colored mottling, ~20 - 30% sand, ~10% gravel, stiff		
16				Total Depth: 16 feet below ground surface		
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-53**	
BORING LOCATION: T-1		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/10/04	DATE FINISHED: 3/10/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 11 ft.	COMPL. 11.2 ft. / 24 HRS. NA
SAMPLING METHOD: NA		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				Surface Elevation:			
				T-1 sample location for groundwater only - no soil samples collected			
1							2 1/2-in Direct Push Borehole
2							1" Temporary PVC riser at 1 - 10'
3							1" PVC Temporary screen at 10 - 15'
4							Tremied from bottom to top
5							
6							
7							
8				Before sampling, water level measured @ 11.2'			
9							
10							
11					▽ ▼		
12							
13							
14							
15				Total Depth: 15 feet below ground surface			
16							
17							

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-54**	
BORING LOCATION: North of UAW2-20		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/10/04	DATE FINISHED: 3/10/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 2.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST NA; COMPL. NA; 24 HRS. NA	
SAMPLING METHOD: 4-ft x 1 1/2-in Macrocore		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
	20040310DP54V1-1.5N			Asphalt and base		
1				CLAY (CL): brown, moist, medium plasticity, firm		
2				Total Depth: 2 feet below ground surface		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-55**	
BORING LOCATION: Adjacent to UAW10-50		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/10/04	DATE FINISHED: 3/10/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 10.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 4.5 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/2-in Macrocore		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
1	20040310DP55V9N			SAND and GRAVEL FILL SANDY CLAY (CL): reddish brown, moist, ~70% medium plasticity clay, ~30% fine sand, firm		Plugged borehole with bentonite cement grout Tremied from bottom to top
2					0.0	
3						
4				POORLY GRADED SAND (SP): reddish brown, moist, fine sand, soft Saturated below 4.5		
5						
6				SANDY CLAY (CL): reddish brown, moist, ~90% medium plastic clay, ~10% fine sand and gravel, trace calcareous nodules	0.0	
7						
8						
9					0.0	
10				Total Depth: 10 feet below ground surface		
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-56**	
BORING LOCATION: Impoundment area SE corner		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/11/04	DATE FINISHED: 3/11/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 5.8 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No. / Sample / Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
		1" Concrete material and lime base	14.4	
1		GRAVELLY CLAY (GC): dark gray, except top 2', light brown and rust colored mottling 3-4' moist, low plasticity, medium stiff, ~70% clay, ~25% gravel, trace coarse sand, 2' of black and orange staining, possible impoundment material		Plugged borehole with bentonite cement grout
2				Tremied from bottom to top
3			15.4	All PID readings taken from headspace samples - Locations shown in sample column
4				
5		GRAVELLY SAND (SP): orange brown, moist, ~60% fine to medium sand, ~40% gravel Becomes saturated at ~5.8'		
6			11.1	
7				
8				
9		SAND (SP): reddish brown - black - gray, saturated, uniform, medium, clay interbeds at 9.6 - 9.9' and 10.2 - 10.3', gray, saturated, medium plasticity, abundant FeOx staining, layers of soft, black material, possible sludge at 9.5 - 10' and at 11', possible very light sheen on soils at 10.4 - 12'	303	
10				
11			327	
12				
13			295	
14		GRAVELLY SAND (SP): black, saturated, ~80% fine - medium sand, ~20% small gravel, very compact and hard, strong H_2S odor		
15		LEAN CLAY 14.8 - 15' Total Depth: 15 feet below ground surface		
16				
17				

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-56A**	
BORING LOCATION: ~1 ft. N of DP-56		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/15/04	DATE FINISHED: 3/15/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 11.5	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST NA, COMPL. NA, 24 HRS. NA	
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				1" Concrete material and caliche base		
1				GRAVELLY CLAY: dark gray, except top 2', light brown and rust colored mottling 3-4' moist, low plasticity, medium stiff, ~70% clay, ~25% gravel, trace coarse sand, 2' of black and orange staining		Plugged borehole with bentonite cement grout Tremied from bottom to top
2						
3						
4						
5				GRAVELLY SAND (SP): orange brown, moist, ~60% fine to medium sand, ~40% large to small gravel Becomes saturated at ~5.8'		
6						
7						
8						
9	20040315DP56AV9.5-10.5N			FINE SAND (SP): orangish brown, wet, trace dark gray mottling, possible very light sheen, loose Gray cobble		Chemical odor
10				Light gray - brown, ~20% coarse sand/fine grained		
11						
12				Total Depth: 11.5 feet below ground surface		
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-57**	
BORING LOCATION: ~30 ft. N of DP-56		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/11/04	DATE FINISHED: 3/11/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST NA; COMPL. NA; 24 HRS. NA	
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and Base		
1, 2	0945			SAND (graded) (SW): light brown, moist, fine - coarse sand, loose (fill sand) CLAY (CL): dark gray, moist, medium plasticity, soft, very dark staining with chemical odor, cobble blocked sampler at ~3'	6.0	Plugged borehole with bentonite cement grout Tremied from bottom to top
3, 4, 5, 6, 7, 8	0950			GRAVEL and SAND (SP): light brown - reddish brown, moist, ~50% fine to medium sand, ~50% small - large gravel	1.6	All PID readings taken from headspace samples - Locations shown in sample column
9, 10	1000			POORLY GRADED SAND (SP): dark grayish brown, becoming black below 10', saturated medium sand, firm, grades to gravelly sand below 10', ~20% fine gravel, hard	39	
11, 12	1030			Strong H_2S odor, possible organic chemical odor	45	
13, 14	1040			Black staining with very strong odor at 12.5 - 13.5' Light brown poorly graded sand 13.5 - 13.7	0.4	
15, 16, 17				GRAVELLY CLAY (CL): light gray, moist, ~80% medium plasticity clay, ~20% fine gravel Total Depth: 15 feet below ground surface		

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-58**	
BORING LOCATION: ~30 ft. W of DP-57		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/11/04	DATE FINISHED: 3/11/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST NA	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No. / Sample / Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
		Caliche and Caliche Base		
1		GRAVELLY CLAY (CL): dark gray, moist, ~80% medium plasticity clay, ~20% fine to coarse gravel	2.9	
			2.7	Plugged borehole with bentonite cement grout
2		CLAY (CL): olive green - gray, wet, medium plasticity, firm	1.6	Tremied from bottom to top
3			2.4	All PID readings taken from headspace samples - Locations shown in sample column
4		GRAVELLY SAND (SP): brownish gray, locally black, moist, ~50 - 80% fine - medium sand, ~20 - 50% coarse gravel, hard		
5			1.9	
6		Sampler blocked by large rock at 5.8'		
7				
8				
9		Becomes saturated at 8.9' Becomes reddish brown 8.9 - 9.9' and dark gray to black 9.9 - 10.2'		
10		Strong H_2S odor Gradational		
11		POORLY GRADED SAND (SP): black to dark gray - brown, saturated, fine to medium sand with ~20% medium gravel, very strong H_2S odor below 12'	1.9	
12				
13		Strong H_2S and chemical odor	0.2	
14		CLAY (CH): light brown, wet, high plasticity		
15		POORLY GRADED SAND (SP): dark gray - black, wet, compact, strong odor Total Depth: 15 feet below ground surface		
16				
17				

RMRK3

PROJECT: Morton Supplemental FI				Log of Boring No. DP-58A	
BORING LOCATION: ~1 ft. N of DP-58				ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting				DATE STARTED: 3/15/04	DATE FINISHED: 3/15/04
DRILLING METHOD: Direct Push				TOTAL DEPTH (ft.): 11.5	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400				DEPTH TO WATER: FIRST NA	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve				LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA			RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Lime base material		
1				GRAVELLY CLAY (CL): dark gray, moist, ~80% medium plasticity clay, ~20% large - small gravel		Plugged borehole with bentonite cement grout
2				CLAY (CL): olive green - gray, wet, medium plasticity, firm		Tremied from bottom to top
3						
4				GRAVELLY SAND (SP): brownish gray, locally black, moist, ~50 - 80% fine - medium sand, ~20 - 50% coarse gravel, hard		
5						
6						
7						
8	20040315DP58AV8.5-9.5N			GRAVELLY SAND (SP): light gray - brown, dark gray staining (mottled throughout), wet, loose, ~60% medium sand, ~30 - 40% fine gravel, ~10% coarse sand, loose		
9						H_2S odor
10						
11						
12				Total Depth: 11.5 feet below ground surface		
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-59**	
BORING LOCATION: ~30 ft. W of DP56		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/11/04	DATE FINISHED: 3/11/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 12 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
				Concrete		
				GRAVELLY SAND (SP)		
1				SANDY CLAY (CL): olive gray, moist, ~80% clay, stiff, ~20% coarse sand	1.9	Plugged borehole with bentonite cement grout
2				1.5' dark gray discoloration		
				GRAVELLY SAND (SP): light brown and gray (mottled), moist, ~50% sand/gravel, coarse gravel (subangular)		Tremied from bottom to top
3						All PID readings taken from headspace samples - Locations shown in sample column
4						
5						
6						Sample blocked off @ 5.8'
7						
8				Decreasing ~60 - 70% sand, ~20% fine gravel, trace coarse gravel		
9				Clay lens Black discoloration, moist	11.4	
10				Color change to light brown, olive green with black 10.9 - 11.1		
11					86.0	
				Dark gray/green, wet		
12				SANDY CLAY (CL): light brown - light gray, low moist, medium plasticity, stiff, strong H_2S odor	101.5	
13						
14				Chemical odor	12.0	
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-60**	
BORING LOCATION: ~30 ft. W of DP-58		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/11/04	DATE FINISHED: 3/11/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 9.7 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and Lime Base		
1				SANDY CLAY (CL): gray - dark gray, moist, ~90% medium plasticity clay, ~10% fine sand, black staining, 1.2' - 2' firm to soft		Plugged borehole with bentonite cement grout
2		■			3.6	Tremied from bottom to top
3		■		Clay becomes black at 3.0'		All PID readings taken from headspace samples - Locations shown in sample column
4		■		GRAVELLY SAND (SP): black, moist, ~60 - 80% fine - medium sand, ~20 - 40% fine - coarse gravel, compact, very strong H_2S odor	5.7	
5				SANDY GRAVEL (GP): tan - brown, dry, ~80% fine to coarse gravel, fine sand, compact, layer of soft material, possible sludge at 5.5 - 6'		
6		■		CLAYEY SAND (SP): gray, wet, ~60% fine sand, ~40% medium plasticity clay, very strong H_2S and chemical odors	163.5	
7		▨				
8				SANDY GRAVEL (GP): light brown, dry, fine to coarse gravel with ~20% fine sand, minor black staining		
9		■		GRAVELLY SAND (SP): dark brown - black, wet becomes saturated at 9.7', ~80% medium sand , ~20% small - medium gravel, loose, strong H_2S odor	43.7	
10						
11		■			7.3	
12				Below 11.5' sand becomes light gray to black, very compact with no odor		
13						
14						
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. DP-60A**
BORING LOCATION: ~0.5 ft. S of DP-60	ELEVATION AND DATUM:
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/15/04 / DATE FINISHED: 3/15/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 10.0 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and Lime Base		
1				SANDY CLAY (CL): gray - dark gray, moist, ~90% medium plasticity clay, ~10% fine sand, black staining, 1.2' - 2' firm to soft		Plugged borehole with bentonite cement grout
2						Tremied from bottom to top
3				Clay Becomes black at 3.0'		All PID readings taken from headspace samples - Locations shown in sample column
4				GRAVELLY SAND (SP): black, moist, ~60 - 80% fine - medium sand, ~20 - 40% fine to coarse gravel, compact, very strong H_2S odor		
5				SANDY GRAVEL (GP): tan - brown, dry, ~80% large - small gravel, ~30% fine sand, compact, black sludge-like below 5.5'		
6	20040315DP60AV6.6-7.4N			GRAVELLY SAND (SP): olive gray, moist, ~60 - 70% sand, ~40% fine - medium gravel subangular		
7				MEDIUM FINE SAND (SP): olive gray to dark gray, wet, strong chemical odor, loose, trace fine gravel		
8						
9						
10				Total Depth: 10 feet below ground surface		
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-61**	
BORING LOCATION: ~28 ft. S ot DP-60		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/11/04	DATE FINISHED: 3/11/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 8 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and Lime Base		
1				GRAVELLY CLAYEY SAND (SC): dark brown - black moist, ~60% fine sand, ~20% medium plasticity clay, ~20% gravel, heavy black staining below 1.7		Plugged borehole with bentonite cement grout
2		■			184.2	Tremied from bottom to top
3		☒		SANDY GRAVEL (GP): gray - tan, moist, ~90% fine sand, ~10% gravel		Blocked on large rock All PID readings taken from headspace samples - Locations shown in sample column
4						
5		■				
				SAND (SP): light brown, moist,~10% gravel ~90% fine sand	186.1	
6						
7		☒				
8				GRAVELLY SAND (SP): dark brown - black, saturated, ~60 - 90% medium sand, ~10 - 40% fine to coarse gravel, moderately compact	▽	
9		■			150.7	
10				Heavy H_2S odor		
11		■			34.8	
12				GRAVELLY SAND with CLAY (SP): light gray - black, wet, ~80 90% medium sand, ~10 - 20% small gravel, minor amounts of medium plasticity clay, black staining locally 12.2 - 13'		
13		■		Heavy H_2S odor	55.7	
14						
15				Total Depth: 15 feet below		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. DP-61A**
BORING LOCATION: ~1.5 ft. E of DP-61	ELEVATION AND DATUM:
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/15/04 / DATE FINISHED: 3/15/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 9.0 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve	LOGGED BY: T. Jennings/T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
				Concrete and Lime Base		
1				GRAVELLY CLAYEY SAND (SC): dark brown - black, moist, ~60% fine sand, ~20% medium plasticity clay, ~20% gravel, heavy black staining below 1.7'		Plugged borehole with bentonite cement grout
2						Tremied from bottom to top
3				SANDY GRAVEL (GP): gray - tan, moist, ~90% gravel, ~10% fine sand		
4						
5	20040315DP61AV5-6N					
6				SAND (SP): light gray - light brown, wet, loose, 100% medium sand, dark gray discoloration @ 5 1/2', chemical odor		
7					6.8	
8						
9				Total Depth: 9 feet below ground surface		
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. DP-62**
BORING LOCATION: ~90 ft. W of DP-57 (Bldg. 16)	ELEVATION AND DATUM:
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/12/04 / DATE FINISHED: 3/12/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15.0 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST 10.7 ft. / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete		
1				GRAVELLY SAND (SW): well graded, light brown, moist, ~60% sand, ~40% fine well rounded gravel, loose		
				SANDY CLAY (CL): olive gray, moist, ~80% low plasticity clay, ~20% fine sand/gravel	10.4	Plugged borehole with bentonite cement grout
2				SANDY GRAVEL (SW): gray, some light brown, low moist, ~70 - 80% subrounded gravel (coarse), ~20 - 30% fine to coarse sand, loose, possibly fill		Tremied from bottom to top
3						All PID readings taken from headspace samples - Locations shown in sample column
4						
5						
6				SANDY CLAY (CL): gray, moist, ~70 - 80% low plasticity clay, ~20 - 30% fine sand, trace fine gravel	0.4	
7						
8				FINE SAND (SP): dark gray to black, ~80 - 90% sand, ~10 - 20% fine gravel, wet, loose		
9						
					7.4	
10					10.1	
11				Wet		
12				Black staining		
13						
					89.8	
14				Coarse gravel or cobble @ 13.5'		
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-63**	
BORING LOCATION: ~30 ft W. of DP-61		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/12/04	DATE FINISHED: 3/12/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 9 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				2" Concrete		
1		■		SAND (SW) well graded: light brown, ~60 - 70% sand, ~30 - 40% fine rounded gravel, black stained at 1.2', odor at 2.5'	15.6	
				SANDY CLAY (CL): gray, ~70 - 80% low plasticity clay, ~10 - 20% fine sand, trace fine gravel		Plugged borehole with bentonite cement grout
2		■		SANDY GRAVEL (GP): light gray, moist, ~70 - 80% coarse gravel (angular), ~20 - 30% coarse sand	83.8	Tremied from bottom to top
3		╳				All PID readings taken from headspace samples - Locations shown in sample column
4		△				
5		■		White powdery, very fine sand and pieces of medium gravel (light white), dry, crystalline	14.9	
6				SAND (SP) to CLAYEY SAND (SC): to medium stiff, brown/gray, moist, ~80 - 100% fine sand, ~10 - 20% clay decreasing with depth		
7		╳				
8		△				
9		■		Wet, black	30.9	
10				SAND (SP): black, ~60% sand (coarse), ~40% fine gravel, trace coarse gravel, wet, loose		
11						
12		╳		Typical sand grain size declines to fine to medium		
13		■			49.3	
14						
15		╳		Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. DP-64**
BORING LOCATION: ~28 ft. W of DP-63	ELEVATION AND DATUM:
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/12/04 / DATE FINISHED: 3/12/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15.0 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST 7 ft. / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
				Concrete and base material		
1				SANDY GRAVEL (GP): tan - becomes dark brown - black below 2.0', ~90% coarse gravel, ~10% fine sand, black staining below 2'		Plugged borehole with bentonite cement grout
2		■			26.3	Tremied from bottom to top
3		╳				All PID readings taken from headspace samples - Locations shown in sample column
4		■		CLAYEY SILT (ML): dark gray, wet below 7', low - medium plasticity, very strong H_2S and chemical odor	14.3	
5						
6						
7				▽		
8		■			11.4	
				GRAVELLY SAND (SP): black, wet, ~60 - 80% medium sand, ~20 - 40% fine to coarse gravel, possible sludge material at 9 - 9.3', very strong H_2S and chemical odor		
9		■			125.9	
10						
11		╳				
12						
13						
14		■		CLAY (CL): black - dark gray, wet, medium plasticity, very strong odor	128	
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	Log of Boring No. DP-64A	
BORING LOCATION: ~1.5 ft. S of DP-64	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/15/04	DATE FINISHED: 3/15/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve	LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				SANDY GRAVEL (GP): tan - becomes dark brown - black below 2.0', ~90% coarse gravel, ~10% fine sand, black staining below 2'		Plugged borehole with bentonite cement grout
2						Tremied from bottom to top
3						
4				CLAYEY SILT (ML): dark gray, wet below 7', low - medium plasticity, very strong H_2S and chemical odor		
5						
6						
7						
8	20040315DP64AV8.5-9.5N			GRAVELLY SAND (SP): black, wet, strong H_2S odor, ~60% medium sand, ~40% fine to coarse gravel (subangular), loose		
9						
10						
11						
12				Total Depth: 12 feet below ground surface		
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-65**	
BORING LOCATION: ~30 ft. N of DP-64, ~30' W of DP-62		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/12/04	DATE FINISHED: 3/12/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST NA; COMPL. NA; 24 HRS. NA	
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No. / Sample / Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
		Concrete and base material		
1		GRAVELLY SAND (SP): brown - black, wet, ~60% sand, ~40% gravel, moderate H_2S odor	6.6	Plugged borehole with bentonite cement grout
2				Tremied from bottom to top
3		SILTY CLAY (CL): dark gray - black, wet, medium plasticity, soft - firm, may be fill material, black staining, strong odor		All PID readings taken from headspace samples - Locations shown in sample column
4			1.9	
5				
6				
7			10.6	
8				
9		GRAVELLY SAND (SP): black, wet, ~80 - 90% medium sand, ~10 - 20% fine to coarse gravel (localized), possible sludge at 8.8 - 12', strong chemical odor	11.6	
10				
11				
12		Strong Hydrocarbon odor		
13			23.9	
14		CLAY (CL): dark gray - black, wet, medium plasticity, firm		
15		Total Depth: 15 feet below ground surface		
16				
17				

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-66**	
BORING LOCATION: ~30 ft. W of DP-65		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/12/04	DATE FINISHED: 3/12/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 9 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				CLAY (CL): dark gray, moist, medium plasticity, firm		Plugged borehole with bentonite cement grout
2		■		SAND (SW): brown, moist, fine to coarse grained, slightly compact, slight odor	10.8	Tremied from bottom to top
3		╳				All PID readings taken from headspace samples - Locations shown in sample column
4						
5						
6		■			9.6	
7		╳				
8		■				
9		■		Sand becomes dark gray - black Wet at 9'	7.1	
10		■		GRAVELLY SAND (SP): black, wet, ~80% fine - medium sand, ~20% fine gravel, heavy H_2S odor	127.3	
11		╳				
12						
13		■		Heavy staining with strong odor		
14		■		CLAY (CL): dark gray - black, wet, medium plasticity, firm	53.1	
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	Log of Boring No. DP-66A	
BORING LOCATION: ~1.5 ft. NE DP-66	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/15/04	DATE FINISHED: 3/15/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 13.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve	LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				CLAY (CL): dark gray, moist, medium plasticity, firm		Plugged borehole with bentonite cement grout
2				GRADED SAND (SW): brown, moist, fine to coarse grained, slightly compact, slight odor		Tremied from bottom to top
3						
4						
5						
6						
7						
8						
9	20040315DP66AV9.5-10.5N			Sand becomes dark gray - black Wet @ 9'		
10				GRADED SAND (SW): black, wet, very strong H_2S and chemical odor, loose		
11				GRADED SANDY GRAVEL (GW): dark gray, sheen, wet, ~60% fine gravel (rounded), ~40% sand, loose, strong odor as above		
12						
13				Total Depth: 13 feet below ground surface		
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-67**	
BORING LOCATION: ~30 ft. S of DP-66 and ~32 ft. W of DP-64		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/12/04	DATE FINISHED: 3/12/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 9 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				CLAY (CL): tan, moist, medium plasticity, firm		Plugged borehole with bentonite cement grout
2				GRADED SAND (SW): brown, moist - wet, fine - coarse sand, loose, moderate odor of decay	5.4	Tremied from bottom to top
3						All PID readings taken from headspace samples - Locations shown in sample column
4						
5					6.4	
6						
7						
8						
9				Sand becomes black and wet at 9'	30.7	
10				GRAVELLY SAND (SP): black, wet, ~80% medium sand, ~20% fine gravel, clay lens at 9.6 - 9.9'		
11						
12					574	
13						
14				CLAY (CL): dark gray - black, medium plasticity, firm	44.9	
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI				Log of Boring No. DP-67A	
BORING LOCATION: ~1 ft. S of DP-67				ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting				DATE STARTED: 3/15/04	DATE FINISHED: 3/15/04
DRILLING METHOD: Direct Push				TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400				DEPTH TO WATER: FIRST NA	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 1 1/2-in Macrocore (4-ft long) with plastic sleeve				LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA			RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. — Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				CLAY (CL): tan, moist, medium plasticity, firm		Plugged borehole with bentonite cement grout
2				GRADED SAND (SW): brown, moist - wet, fine - coarse sand, loose, moderate odor of decay		Tremied from bottom to top
3						
4						
5						
6						
7						
8						
9				Sand becomes black and wet at 9'		
10				GRAVELLY SAND (SP): black, wet, ~80% medium sand, ~20% fine gravel, clay lens at 9.6 - 9.9'		
11						
12	20040315DP67AV12.3-13.3N			2" FINE SAND (SP): black, wet, loose		
13				SANDY GRAVEL (GW): black, wet, strong H_2S and chemical odor, ~60% fine to coarse gravel, ~40% medium to coarse sand, loose		
14				2" CLAYEY SILT (ML): dark gray, moist, stiff, low plasticity, ~60% silt, ~40% clay		
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-68**	
BORING LOCATION: ~30 ft. W of DP-67		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/12/04	DATE FINISHED: 3/12/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 11.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 10 ft.	COMPL. 9.6 ft. / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				CLAY (CL): tan - brown, moist, medium plasticity, very firm	5.6	Plugged borehole with bentonite cement grout
2				SAND (SW): brown, moist - wet, well-graded, fine to coarse sand, loose		Tremied from bottom to top
3						All PID readings taken from headspace samples - Locations shown in sample column
4						
5						
6					8.2	
7						
8						
9						
10				Wet at 10'	33.5	
				Sand becomes gray then black @ 10 - 10.5', strong H_2S odor		
11				GRAVELLY SAND (SP): black, wet, ~80% medium sand, ~20% fine gravel, hard, refusal at 11'		
				Total Depth: 11 feet below ground surface		
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. DP-69**
BORING LOCATION: ~30 ft. W of DP-65	ELEVATION AND DATUM:
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/12/04 / DATE FINISHED: 3/12/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 11.6 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST 10.5 ft. / COMPL. 9.6 ft. / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
				Concrete and base material		
1				CLAY (CL): dark gray, moist, medium plasticity, firm, friable	8.8	Plugged borehole with bentonite cement grout
2				GRADED SAND (SW): brown, moist - wet, fine to coarse, loose		Tremied from bottom to top
3					9.9	All PID readings taken from headspace samples - Locations shown in sample column
4						
5						
6						
7					11.0	
8						
9				Sand becomes gray to black below 9'	68.0	
10						
11				Wet @ 10.5' GRAVELLY SAND (SP): black		
12				Refusal at 11.6' Total Depth: 11.6 feet below ground surface		
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-70**	
BORING LOCATION: SE Production Terminal, ~60 ft. SSE of DP-68		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/13/04	DATE FINISHED: 3/13/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 8.5 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No. / Sample / Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
		Concrete and base material		
1		CLAY (SAND) (CL): gray, moist, ~80% medium plasticity clay, ~20% medium sand, firm, moderate odor		Plugged borehole with bentonite cement grout
2			3.4	Tremied from bottom to top
3				All PID readings taken from headspace samples - Locations shown in sample column
4				
5		Clay becomes black at 5'		
6		GRAVELLY SAND (SP): black, wet, ~80% medium sand, ~20% fine gravel, compact to hard, strong hydrocarbon odor	6.8	
7				
8				
9		Wet at 8.5'	12.6	
10				
11		Heavy black staining Strong odor, H_2S & organic odor	12.9	
12				
13		Strong odor, H_2S & chemical	10.2	
14		CLAY (CL): dark gray - black, moist - wet, medium plasticity, firm		
15		Total Depth: 15 feet below ground surface		
16				
17				

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. DP-70A**
BORING LOCATION: ~1 ft. W of DP-70	ELEVATION AND DATUM:
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/14/04 / DATE FINISHED: 3/14/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 13.0 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				CLAY (SAND) (CL): gray, moist, ~80% medium plasticity clay, ~20% medium sand, firm, moderate odor		Plugged borehole with bentonite cement grout
2						Tremied from bottom to top
3						
4						
5				Clay becomes black at 5'		
6				GRAVELLY SAND (SP): black, wet, ~80% medium sand, ~20% small gravel, compact to hard, strong hydrocarbon odor		
7						
8				Saturated at 8.5'		
9	20040314DP70AV9-11N(W/ MS/MSD)			GRAVELLY SAND (SP): black, wet, ~60 - 80% fine to medium sand, ~20 - 40% fine gravel, compact, strong H_2S and solvent odor		
10						
11						
12						
13				Total Depth: 13 feet below ground surface		
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-71**	
BORING LOCATION: ~30 ft. N. of DP-70 in E Product Terminal		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/13/04	DATE FINISHED: 3/13/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 8.5 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No. / Sample / Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
		Concrete and base material		
1		CLAY (CL): tan, moist, medium plasticity, firm		Plugged borehole with bentonite cement grout
2		Well graded sand (SW) tan		Tremied from bottom to top
3		SANDY CLAY (CL): dark gray, wet, ~60% medium plasticity clay, ~40% medium sand, soft, strong H_2S odor	1.2	All PID readings taken from headspace samples - Locations shown in sample column
4				
5		GRAVELLY SAND (SP): black, wet, ~60 - 80% medium sand, ~20 - 40% medium to coarse gravel	2.2	
6				
7				
8				
9		Wet at 8.5' Interbedded clay moderately plastic 8.9 - 9.4' Strong H_2S odor	6.9	
10				
11			13.4/10.9	
12				
13		Strong odor	68.0	
14		CLAY (CL): black - dark gray, moist, medium plasticity, firm to stiff		
15		Total Depth: 15 feet below ground surface		
16				
17				

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-72**	
BORING LOCATION: ~30 ft. W of DP-70 in middle of tanker terminal		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/13/04	DATE FINISHED: 3/13/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 9.2 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				CLAYEY SAND (SP): light brown, moist, ~60 - 80% fine - medium sand, ~20 - 40% medium plasticity clay, firm		Plugged borehole with bentonite cement grout
2		■			0.0	Tremied from bottom to top
3		☒				All PID readings taken from headspace samples - Locations shown in sample column
4						
5				GRAVELLY SAND (SP): black, wet, ~60 - 80% medium sand, ~20 - 40% fine to coarse gravel, hard, strong H_2S and chemical odor		
6		■			54.3	
7		☒				
8						
9		■		Saturated at 9.2'	55.9	
10				Strong H_2S and chemical odor		
11		■			213.9	
12		☒		Strong odor, wet		
13		■		GRAVELLY CLAY (CL): dark gray, moist, ~90% low plasticity clay, ~10% fine gravel, very stiff	12.8	
14						
15		☒		Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-72A**	
BORING LOCATION: ~1 ft. W of DP-72		ELEVATION AND DATUM:	
RILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/14/03	DATE FINISHED: 3/14/03
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 9.2 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/2-in Macrocore		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				CLAYEY SAND (SP): light brown, moist, ~60 - 80% fine - medium sand, ~20 - 40% medium plasticity clay, firm		Plugged borehole with bentonite cement grout
2						Tremied from bottom to top
3						
4						
5				GRAVELLY SAND (SP): black, wet, ~60 - 80% medium sand, ~20 - 40% fine to coarse gravel, hard, very strong H_2S and chemical odor		
6						
7						
8						
9				Wet at 9.2'	▽	
10				Strong H_2S and chemical odor		
11						
12	20040314DP72AV12-13N			Strong odor, wet SANDY GRAVEL (GP): ~50% gravel, ~50% medium sand, black, wet, loose, strong H_2S and chemical odor		
13						
14						
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-73**	
BORING LOCATION: ~30 ft. N NE of DP-72, ~28 ft. W of DP-71		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/13/04	DATE FINISHED: 3/14/03
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 8.5 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				GRAVELLY CLAY (CL): black to green, moist, ~90% low plasticity clay, ~10% fine gravel	4.6	Plugged borehole with bentonite cement grout
2				Changes to black and soft, strong H_2S and chemical odors		Tremied from bottom to top
3				Grades to sandy clay	19.0	All PID readings taken from headspace samples - Locations shown in sample column
4				SANDY CLAY (CL): gray - green, wet, ~60% medium plasticity clay, ~40% fine sand, very soft		
5				SAND (SP): black, wet, medium grained, soft, loose, strong odor	20.6	
6				GRAVELLY SAND (SP): black, moist, ~60% medium sand, ~40% small - large gravel, strong H_2S odor		
7						
8				Layer of soft material, possible sludge at 8 - 8.8' Strong H_2S odor Wet at ~8.5'		
9					7.0	
10						
11						
12						
13				Wet, possible sheen, strong odor CLAY (CL): black, dark gray, moist, low plasticity, very stiff	322.0	
14						
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-73A**	
BORING LOCATION: ~1 ft. E of DP-73		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/12/04	DATE FINISHED: 3/12/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				GRAVELLY CLAY (CL): black to green, moist, ~90% low plasticity clay, ~10% fine gravel		Plugged borehole with bentonite cement grout
2				Changes to black and soft, strong H_2S and chemical odors		Tremied from bottom to top
3				Grades to sandy clay		
4				SANDY CLAY (CL): gray - green, wet, ~60% medium plasticity clay, ~40% fine sand, very soft		
5				SAND (SP): black, wet, medium grained, soft, loose, very strong odor		
6				GRAVELLY SAND (SP): black, moist, ~60% medium sand, ~40% small - large gravel, very strong H_2S odor		
7						
8				Layer of soft material, possible sludge at 8 - 8.8' Strong H_2S odor Wet at ~8.5'		
9						
10						
11						
12	20040314DP73AV12-13N			SANDY GRAVEL (GP): black, wet, strong odor, thick black mud or sludge, clay at base		
13						
14						
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. DP-74**
BORING LOCATION: ~30 in. W of DP-68	ELEVATION AND DATUM:
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/13/04 / DATE FINISHED: 3/13/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 12.0 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST 9.5 ft. / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No. / Sample / Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
		Concrete and base material		
1		CLAY (CL): light brown, moist, medium plasticity, very firm - stiff		Plugged borehole with bentonite cement grout
		GRADED SAND (SW): brown, moist - wet, fine to coarse sand, loose		
2		CLAY (CL): black - dark gray, moist, medium plasticity, stiff		Tremied from bottom to top
3			10.0	All PID readings taken from headspace samples - Locations shown in sample column
4		Grades to clayey sand CLAYEY SAND (SC): dark brown - black, moist, ~60% fine sand, ~40% medium plasticity clay, soft, strong odor		
5			20.1	
6		GRAVELLY SAND (SP): black, moist, ~60% fine sand, ~40% fine to coarse gravel, hard	50.5	
7				
8			49.1	
9		CLAY (CL): black to gray, moist, becomes wet at 9.5', firm - very soft, medium plasticity		
10		SANDY GRAVEL (GP): black, wet, ~70% fine gravel, ~30% medium sand, hard, strong odor	41.7	
11				
12		Total Depth: 12 feet below ground surface		Refusal at 12'
13				
14				
15				
16				
17				

RMRK3

Log of Boring No. DP-75

PROJECT:	Morton Supplemental FI
BORING LOCATION:	30 ft. N of DP-74
DRILLING CONTRACTOR:	HC Nutting
DRILLING METHOD:	Direct Push
DRILLING EQUIPMENT:	Geoprobe 5400
SAMPLING METHOD:	4-ft x 1 1/4-in Dual Tube
HAMMER WEIGHT:	NA
DROP:	NA

ELEVATION AND DATUM:			
DATE STARTED: 3/13/04	DATE FINISHED: 3/13/04		
TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface		
DEPTH TO WATER	FIRST 9 ft.	COMPL. NA	24 HRS. NA
LOGGED BY: T. Grygaski			
RESPONSIBLE PROFESSIONAL:		REG. NO.	

DEPTH (feet)	SAMPLES: Sample No. / Sample / Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
		Concrete and base material		
1		CLAY (CL): dark gray, moist, medium plasticity clay with trace sand, stiff	0.0	
		GRADED SAND (SW): light brown/light gray, moist to wet	7.9	Plugged borehole with bentonite cement grout
2		SANDY CLAY (CL): orange brown, moist, ~80 - 90% low to medium plasticity clay, ~10 - 20% fine sand, stiff		Tremied from bottom to top
3				All PID readings taken from headspace samples - Locations shown in sample column
4				
5		Black staining, strong H_2S odor	16.5	
			36.2	
6		GRADED SAND (SW): black, moist, ~60 - 70% medium to coarse sand, ~40% fine gravel (subrounded), strong H_2S odor,		
7				
8				
9		CLAY (CL): dark gray to black, moist	5.6	
		SANDY CLAY (CL): dark gray, wet, ~90% clay, ~10% sand		
10		GRAVELLY SAND (SP)/SANDY GRAVEL (GP): dark gray to black, wet, 50/50 fine gravel/coarse sand, trace fine sand/clay, H_2S odor	4.6	
11		CLAY as at 9.0, trace fine sand		
12		FINE GRAVEL (GP): black, hydrocarbon odor, ~90% rounded fine gravel, ~10% coarse sand, wet		
13			21.5	
14		CLAY (CL): black to gray, ~90% clay, trace fine gravel/sand, moist, stiff		
15		Total Depth: 15 feet below ground surface		
16				
17				

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-76**	
BORING LOCATION: ~30 ft. W of DP-73		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/13/04	DATE FINISHED: 3/13/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 8.8 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No. / Sample / Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
		Concrete and base material		
1		CLAY (CL): dark gray, moist, medium plasticity, stiff		Plugged borehole with bentonite cement grout
		SAND (SW): light brown/gray, moist, loose		
2		SANDY CLAY (CL): olive gray, moist, soft to stiff	17.0	Tremied from bottom to top
3		~80 - 90% clay, ~10 - 20% fine sand		All PID readings taken from headspace samples - Locations shown in sample column
4				
5				
6		Gray/dark gray stain @ 5.5'		
7			7.5	
8			98.0	
9		Coarse sand/fine gravel, moist SAND and GRAVEL: dark gray, wet SANDY CLAY as above	22.0	
10		Transition to gravel		
11		Bright orange staining locally		
12		SANDY GRAVEL (GP): black, wet, strong odor, ~70% fine gravel (rounded), ~30% coarse sand	34.8	
13		CLAY (CL): dark gray to olive gray, ~90% - 100% clay, trace fine gravel, medium plasticity, stiff, moist		
14				
15		Total Depth: 15 feet below ground surface		
16				
17				

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-77**	
BORING LOCATION: ~30 ft. N of DP-76 & ~30 ft. W of DP-75		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/13/04	DATE FINISHED: 3/13/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 10 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				SANDY GRAVEL (GP): tan, dry, ~80% coarse gravel with ~20% fine sand		Plugged borehole with bentonite cement grout
2		■		SANDY CLAY (CL): dark gray - black, moist, ~80% medium plasticity clay, ~20% medium sand, firm, slight odor	31.3	Tremied from bottom to top
3						All PID readings taken from headspace samples - Locations shown in sample column
4				Grades to CLAYEY SAND CLAYEY SAND (SP): dark gray, wet, ~60% medium sand, ~40% medium plasticity clay, soft		
5		■			30.6	
6						
7			╳	GRAVELLY CLAY (CL): tan, moist, ~80% medium plasticity clay, ~20% coarse gravel, very firm, black below 8.5'		
8						
9		■		CLAYEY SAND (SP): black, wet, ~60 - 80% medium sand, ~20 - 40% medium plasticity clay, very soft, heavy staining, strong odor	76.9	
10			╳	Wet below 10'		
11				GRAVELLY SAND (SP): black, wet, ~60% medium sand, ~40% fine gravel, strong H_2S and chemical odor		
12		■			76.2	
13				GRAVELLY CLAY (CL): black and light brown (below 13.9') moist - wet, ~90 - 95% medium plasticity clay, ~5 - 10% fine to medium gravel, very stiff		
14					23.1	
15		■		Total Depth: 15 feet below ground surface		
16						
17						

20040313DP77V14.6-15N

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-78**	
BORING LOCATION: ~30 ft. W of DP-76 (SW corner of grid)		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/14/04	DATE FINISHED: 3/14/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST <8 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material	0.4	
1				GRAVELLY SAND (SP): brown, moist, ~50% fine sand, ~50% coarse gravel		Plugged borehole with bentonite cement grout
2				SANDY GRAVELLY CLAY (CL): grayish green - black, moist, ~60% medium plasticity clay, ~40% sand and fine gravel	0.4	Tremied from bottom to top
3						All PID readings taken from headspace samples - Locations shown in sample column
4				SANDY GRAVELLY CLAY as above - very soft, moderate H_2S odor		
5						Very poor recovery in soft material
6					0.4	
7				Wet at ~8'		
8				SANDY CLAY with GRAVEL (CL): grayish green with black staining locally, wet, ~60% medium plasticity clay, ~30 - 40% medium sand, <5% gravel, very soft, moderate H_2S odor		
9					3.8	
10						
11				GRAVELLY SAND (SP): black, wet, ~60% medium sand, ~40% fine gravel, hard, strong H_2S odor		
12					7.5	
13				GRAVELLY CLAY (CL): black - gray (below 13.8') with black mottling, moist, ~80 low plasticity clay, ~20% fine gravel, very stiff, moderate odor		
14					0.0	
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

Log of Boring No. DP-78A

PROJECT:	Morton Supplemental FI
BORING LOCATION:	~1 ft. W of DP-78
DRILLING CONTRACTOR:	HC Nutting
DRILLING METHOD:	Direct Push
DRILLING EQUIPMENT:	Geoprobe 5400
SAMPLING METHOD:	4-ft x 1 1/2-in Macrocore
HAMMER WEIGHT:	NA
DROP:	NA

ELEVATION AND DATUM:			
DATE STARTED: 3/14/04		DATE FINISHED: 3/14/04	
TOTAL DEPTH (ft.): 12.0		MEASURING POINT: ground surface	
DEPTH TO WATER	FIRST ~8'	COMPL. NA	24 HRS. NA
LOGGED BY: T. Jennings			
RESPONSIBLE PROFESSIONAL:		REG. NO.	

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete and base material		
1				GRAVELLY SAND (SP): brown, moist, ~50% fine sand, ~50% coarse gravel		Plugged borehole with bentonite cement grout
2				SANDY GRAVELLY CLAY (CL): grayish green - black, moist, ~60% medium plasticity clay, ~40% sand and fine gravel		Tremied from bottom to top
3						
4				SANDY GRAVELLY CLAY as above - very soft, moderate H_2S odor		
5						Very poor recovery in soft material
6						
7						
				Wet at ~8'		
8				SANDY CLAY with GRAVEL (CL): grayish green with black staining locally, wet, ~60% medium plasticity clay, ~30 - 40% medium sand, <5% gravel, very soft, moderate H_2S odor		
9	20040314DP78AV9-10N					
10						
11				GRAVELLY SAND (SP): black, wet, ~60% medium sand, ~40% fine gravel, hard, strong H_2S odor		
12				Total Depth: 12 feet below ground surface		
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-79**	
BORING LOCATION: NW Corner of grid, ~30 ft. W of DP-77		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/14/04	DATE FINISHED: 3/14/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST 8.5 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/4-in Dual Tube		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete		
				Base Material		
1				GRAVELLY CLAYEY SAND (SP): black - tan, moist, ~60% fine sand, ~20% medium plasticity clay, ~20% fine to coarse gravel		Plugged borehole with bentonite cement grout
2		■			23.7	Tremied from bottom to top
3						All PID readings taken from headspace samples - Locations shown in sample column
4				Grades to gravelly sandy clay		
5				GRAVELLY SANDY CLAY (CL): gray, moist - wet, ~60% medium plasticity clay, ~30% medium sand, ~10% fine gravel		
6		■			27.5	
7		╳				
8					▽	
9		■		GRAVELLY SAND (SP): black, wet, ~60% medium sand, ~40% fine gravel, hard, strong H_2S and chemical odor	130.2	
10		╳				
11						
12		■			131.0	
13				Strong H_2S odor		
14		■		GRAVELLY CLAY (CL): black, moist - wet, ~80% medium plasticity clay, ~20% fine gravel, very stiff, black staining throughout.	73.5	
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. DP-79A**	
BORING LOCATION: ~1 ft. N of DP-79		ELEVATION AND DATUM:	
RILLING CONTRACTOR: HC Nutting		DATE STARTED: 3/14/04	DATE FINISHED: 3/14/04
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400		DEPTH TO WATER: FIRST NA	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 4-ft x 1 1/2-in Macrocore		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Concrete		
				Caliche Base		
1				GRAVELLY CLAYEY SAND (SP): black - tan, moist, ~60% fine sand, ~20% medium plasticity clay, ~20% fine gravel		Plugged borehole with bentonite cement grout
2						Tremied from bottom to top
3						
4				Grades to gravelly sandy clay		
5				GRAVELLY SANDY CLAY (CL): gray, moist - wet, ~60% medium plasticity clay, ~30% medium sand, ~10% fine gravel		
6						
7						
8						
9				GRAVELLY SAND (SP): black, wet, ~60% medium sand, ~40% fine gravel, hard, strong H_2S and chemical odor		
10						
11						
12	20040314DP79AV12-13N			GRAVELLY SAND (SW)/SANDY GRAVEL (GP): black, wet, graded - fine sand to fine gravel (round to subrounded), loose, strong H_2S odor		
13						
14				GRAVELLY SILT and CLAY: olive gray, stained black to dark gray, moist, ~80% clay and silt, ~20% fine gravel, trace fine sand, stiff		
15				Total Depth: 15 feet below ground surface		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	Log of Boring No. DP-80	
BORING LOCATION: ~10 ft. NE of Bldg. 11 (NE corner)	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: HC Nutting	DATE STARTED: 3/15/04	DATE FINISHED: 3/15/04
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 2.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Geoprobe 5400	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: 4-ft x 1 1/2-in Macrocore	LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
				Concrete		
1	20040315DP80V1N 20040315DP80V1.5N			SANDY CLAY (CL): orange to light brown with black/gray mottling, moist, ~80% low plasticity clay, ~20% fine sand, trace silt		Plugged borehole with bentonite cement grout
2				Total Depth: 2 feet below ground surface		Tremied from bottom to top
3						All PID readings taken from headspace samples - Locations shown in sample column
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. HA-1**
BORING LOCATION: ~75 ft. W of DP-48	ELEVATION AND DATUM:
DRILLING CONTRACTOR: NA	DATE STARTED: 3/14/04 / DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger	TOTAL DEPTH (ft.): 1.5 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: Grab from base of core with trowel.	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
	20040314HA1V1.5N			2" Topsoil		
1				SANDY CLAY (CL): light brown with dark brown mottling, moist, low plasticity, ~80% clay, ~20% fine sand, trace coarse sand/fine gravel		
2				Total Depth: 1.5 feet below ground surface		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. HA-2**	
BORING LOCATION: ~75 ft. W of HA-1		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: NA		DATE STARTED: 3/14/04	DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger		TOTAL DEPTH (ft.): 1.5	MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger		DEPTH TO WATER: FIRST NA	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: Grab from base of core with trowel.		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
	20040314HA2V1.5N			2" Topsoil		
1				SANDY CLAY (CL): brown, moist, low plasticity, ~80% clay, ~20% fine sand, trace coarse sand/fine gravel		
2				Total Depth: 1.5 feet below ground surface		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. HA-3**
BORING LOCATION: ~60 ft. NW of HA-2	ELEVATION AND DATUM:
DRILLING CONTRACTOR: NA	DATE STARTED: 3/14/04 / DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger	TOTAL DEPTH (ft.): 1.5 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: Grab from base of core with trowel.	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
				2" Topsoil		
1	20040314HA3V1.5FD 20040314HA3V1.5H			SANDY CLAY (CL): light brown with dark brown mottling, moist, low plasticity, ~80% clay, ~20% fine sand, trace fine gravel		
2				Total Depth: 1.5 feet below ground surface		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. HA-4**
BORING LOCATION: ~60 ft. NW of HA-3	ELEVATION AND DATUM:
DRILLING CONTRACTOR: NA	DATE STARTED: 3/14/04 / DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger	TOTAL DEPTH (ft.): 1.5 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: Grab from base of core with trowel.	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
	20040314HA4V1.5N			2" Topsoil		
1				SANDY CLAY (CL): light brown with dark brown mottling, moist, low plasticity, ~80% clay, ~20% fine sand, trace fine gravel		
2				Total Depth: 1.5 feet below ground surface		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	Log of Boring No. HA-5	
BORING LOCATION: ~50 ft. NW of HA-4	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: NA	DATE STARTED: 3/14/04	DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger	TOTAL DEPTH (ft.): 1.5	MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: Grab from base of core with trowel.	LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
	20040314HA5V1.5N			2" Topsoil		
1				SANDY CLAY (CL): light brown, moist, ~80% low plasticity clay, ~20% fine sand		
				Total Depth: 1.5 feet below ground surface		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI		**Log of Boring No. HA-6**	
BORING LOCATION: ~20 ft. S of SE Corner of BLDG. 19		ELEVATION AND DATUM:	
DRILLING CONTRACTOR: NA		DATE STARTED: 3/14/04	DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger		TOTAL DEPTH (ft.): 1.5	MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger		DEPTH TO WATER: FIRST NA	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: Grab from base of core with trowel.		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
	20040314HA6V1.5N			2" Topsoil FINE CLAYEY SAND (SP): orange to light brown, moist, ~60% fine sand, ~40% low plasticity clay		
1						
				Total Depth: 1.5 feet below ground surface		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. HA-7**
BORING LOCATION: ~75 ft. N of Bldg 26	ELEVATION AND DATUM:
DRILLING CONTRACTOR: NA	DATE STARTED: 3/14/04 / DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger	TOTAL DEPTH (ft.): 1.5 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA
SAMPLING METHOD: Grab from base of core with trowel.	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
	20040314HA7V1.5N			2" Topsoil		
1				SANDY CLAY (CL): light brown, moist, low plasticity, ~80% clay, ~20% fine sand		
2				Total Depth: 1.5 feet below ground surface		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. HA-8**	
BORING LOCATION: S of Bldg. 12C in between railroad tracks	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: NA	DATE STARTED: 3/14/04	DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger	TOTAL DEPTH (ft.): 1.5	MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: Grab from base of core with trowel.	LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
	20040314HA8V1.5N			2" Topsoil		
1				SANDY CLAY (CL): orange to light brown, moist, ~60% low plasticity clay, ~40% fine sand		
2				Total Depth: 1.5 feet below ground surface		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	**Log of Boring No. HA-9**
BORING LOCATION: SW of Bldg 12 near railroad tracks	ELEVATION AND DATUM:
DRILLING CONTRACTOR: NA	DATE STARTED: 3/14/04 / DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger	TOTAL DEPTH (ft.): 1.5 / MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger	DEPTH TO WATER: FIRST NA, COMPL. NA, 24 HRS. NA
SAMPLING METHOD: Grab from base of core with trowel.	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				Surface Elevation:		
	20040314HA9V1.5N			2" Topsoil		
1				COARSE CLAYEY GRAVEL (GP): gray, moist, ~85% gravel, ~15% clay		
				Total Depth: 1.5 feet below ground surface		
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Supplemental FI	Log of Boring No. HA-10	
BORING LOCATION: E of midway Bldg 26	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: NA	DATE STARTED: 3/14/04	DATE FINISHED: 3/14/04
DRILLING METHOD: Hand Auger	TOTAL DEPTH (ft.): 1.5	MEASURING POINT: ground surface
DRILLING EQUIPMENT: 6-in. x 3-in. Core Auger	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: Grab from base of core with trowel.	LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
	20040314HA10V1.5N			2" Topsoil		
1				SANDY CLAY (CL): light brown with trace dark brown mottling, moist, ~70 - 80% low plasticity clay, ~20 - 30% fine sand		
2				Total Depth: 1.5 feet below ground surface		
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. STR01	
BORING LOCATION: W. of Bldg. 40, S. of Trailer	ELEVATION AND DATUM: 557.26 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/8/01	DATE FINISHED: 3/9/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 119.9	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 8" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 557.26 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt and road base		
1				Sub base - gravel [FILL]		
2						
3	030801001			CLAYEY SAND (SC): Very dark brown (10YR 2/2), moist, ~60% fine to medium sand, ~40% medium to high plastic fines		
4						
5					1.1	
6						
7				POORLY GRADED SAND WITH GRAVEL (SP): Yellowish brown (10YR 5/4), dry to moist, ~80% medium sand, ~20% gravel (1" to 5"), trace fines	0.7	
8						
9				CLAYEY SAND (SC): brown (10YR 5/3), moist, ~60% fine sand, ~40% medium plastic fines		
10						
11				CLAYEY SILT (ML): brown (10YR 5/2), moist, ~100% low to medium plastic fines, firm, massive, laminated, iron-colored (horizontal) discoloration (loess?)		
12				POORLY GRADED SAND (SP): brown (10YR 5/2), dry, ~90% medium to fine sand, ~5% fine gravel, ~5% fines	650	
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR01 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued		
15	030801004				590	
				Increasing gravel with depth		
16						
17					80	
18						
19						
20						
21	030801003			20.5 - 21.25' : Black discoloration , chemical odor observed, moist gravel lense at 21.25'	200	
22				SANDY LEAN CLAY (CL) [TILL]: olive brown (2.5Y 4/3), dry, hard, ~90% high to medium plastic fines, ~10% medium sand, trace fine gravel, massive (no structure), hard		
23						
24				Soft		
25				Very hard, dark greenish gray (5GY 3/1), abundant medium and fine gravel (mafic angular to subrounded), few iron-colored mottles	286	
26						
27						
28						
29	030801005					
30						
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR01 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL): continued		
32						
33				Coarse gravel		
34						
35				Transition from SANDY LEAN CLAY to POORLY GRADED SAND, multiple clay lenses		
36						
37					1.5	
38				POORLY GRADED SAND (SP): dark greenish gray (10Y 4/1), moist, 95% fine sand, 5% low plastic fines		
39						
40						
41				SANDY LEAN CLAY (CL): dark greenish gray (5GY 3/1) ~90% high to medium plastic fines, ~10% medium sand, trace fine gravel, massive (no structure), hard		
42						
43				POORLY GRADED SAND (SP): dark grayish brown (10YR 4/2), moist to wet, ~100% medium grained sand, trace fines, with some gravel		
44						
45					0.9	
46				46'-47' Coarse sand		
47	030901006					
48						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR01 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued		
49						
50						
51						
52						
53						
54				Coarse sand, few gravel, greenish black (10Y 2.5/1)		
55						
				SILT (ML): greenish gray (10Y 5/1), wet, ~100% low plastic fines, laminated, soft, roots present		
56						
57						
				Laminations: organic silts (OH), black (25Y 2.5/1)		
58	030901007				0.6	
59						
60				Increase sand with depth		
61						
62				FAT CLAY (CL): dark greenish gray (5G 4/1), moist, ~100% high plasticity fines, soft		
63				Dark gray (5Y 4/1)		
				POORLY GRADED SAND (SP): olive gray (5Y 4/2), moist, ~95% coarse sand, ~5% fines, loose		
64						
65						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR01 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SILT (ML): dark greenish gray (5GY 4/1), moist, ~100% medium plastic fines (more clay than above)	0.6	
66				66 - 68' clay content increased		
67						
68				~100% low plasticity fines		
69				POORLY GRADED SAND (SP): dark greenish gray, (10Y 4/1) moist, ~100% fine sand, trace fines		
70				~95% fine sand, 5% fines, wet		
71						
72						
73	030901009			72.5 - 73' black (10YR 2/1), chemical odor, no sheen present when wetted, grains appear to be stained, black colored soil immediately above underlying clay. No mobile product observed.	2.8	
74				CLAY (CL): dark greenish gray (10Y 4/1), wet, 100% medium plastic fines, soft, homogeneous		
75				75 - 76' silt lens		
76				White shell fragments (?)		
77	030901008					
78						
79						
80				Hard, few shells (?)		
81						
82						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR01 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				CLAY (CL): continued		
83						
84						
85				POORLY GRADED SAND (SP): dark greenish gray (10Y 3/1), wet, ~100% fine sand, trace low plastic fines		
86						
87				86.5' - 86.75' black, chemical odor, no sheen present when wetted, no mobile product observed		
88	030901010			87.75' - 88' black chemical odor, no sheen present when wetted, no mobile product observed	3.1	
				LEAN CLAY (CL): dark greenish gray (10Y 3/1), moist, ~95% high to medium plastic fines, ~5% medium sand, hard, blocky, massive		
89						
90						
91				Piece of fossiliferous limestone		
92						
93	030901011					
94						
95						
96						
97						
98				POORLY GRADED GRAVEL WITH SAND (GP): olive gray (5Y 5/2), wet, 75% coarse gravel, 20% sand, 5% low plasticity fines		
99						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR01 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED GRAVEL with SAND (GP): continued 1" - 4" subangular - subrounded gravel, fossiliferous	0.6	
100				POORLY GRADED SAND (SP): light olive brown (2.5Y 5/6), wet, 100% medium sand, trace fines		
101						
102						
103					0.0	
104						
105						
106						
107				107' - 109' fine sand		
108						
109				Medium grained sand		
110				SILTY SAND (SM): light olive brown (2.5Y 5/6), wet, uniform, fine laminations, dark organic odor,		
111						
112						
113						
114	030901012				6.8	
115						
116						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR01 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SILTY SAND (SM): continued		
117						
118						
119						
120				Total Depth: 119.9 feet below ground surface		
121						
122						
123						
124						
125						
126						
127						
128						
129						
130						
131						
132						
133						

RMRK3

PROJECT: Morton Reading Fl	Log of Boring No. STR02	
BORING LOCATION: 70' N.W. of Circle	ELEVATION AND DATUM: 552.08 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/12/01	DATE FINISHED: 3/13/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 89.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 8" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 552.08 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1	031301025			Road base - gravel CLAYEY SAND (SC): dark brown (10Y 3/3), moist, 70% fine sand, 30% low plastic fines		
2					0.6	
3						
4						
5				Abundant iron colored mottling Same as above, increase sand with depth	0.6	
6				SILTY SAND (SM): dark grayish brown (10Y 4/2), wet, 90% medium sand, 10% low plastic fines		
7					1.6	
8						
9				Increasing gravel content (1" - 2") with depth	2.0	
10						
11				11 - 13' black staining, strong chemical odor 11.5 - 11.75' clay lens 11.75 - 12' gravel - appears to be liquid saturated with black material		
12	031301026				1.6	
13				SANDY LEAN CLAY (CL): dark olive gray (5Y3/2), wet, 90% medium plastic fines, 10% medium sand, moist, hard, trace gravel		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR02 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL): continued	1.6	
15						
16						
17					0.9	
18						
19				Same as above		
20					0.4	
21						
22	031301027				0.4	
23						
24				Becomes softer with increasing silt content with depth		
25					0.4	
26						
27					0.2	
28						
29				Same as above		
30					0.2	
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR02 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL): continued		
32				Decreasing sand content with depth		
33						
34						
35						
36						
37						
38						
39				SILTY SAND (SM): dark gray (2.5Y 4/1), moist to wet, 85% fine and medium, 15% low plastic fines, sand, trace gravel, sand lens	3.0	
40				SANDY CLAY (CL): dark greenish gray (10Y 4/1), moist, to wet, 90% low plastic fines, 10% fine sand, trace gravel, carbonized wood		
41						
42				SANDY SILT (ML): light olive brown (2.5Y 5/4), 60% low plastic fines, 40% fine sand, moist to wet, trace gravel		
43						
44						
45					0.9	
46						
47				4" layer medium sand		
48						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR02 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY SILT (SM): continued 3" layer gray clay		
49				POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), wet, 90% fine to medium sand, 10% fines		
50						
51						
52				Silt decreases with depth		
53						
54						
55	031301028					
56						
57						
58				Color change, dark grayish brown (2.5Y 4/2), 1/4" - 1/2" black laminations, trace silt		
59					2.5	
60						
61				61 - 62.5' 1" - 2" black laminations	0.0	
62						
63						
64						
65						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR02 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued		
66						
67						
68						
69				Same as above		
70						
71						
72						
73						
74						
75					0.0	
76						
77						
78						
79				Same as above		
80						
81						
82						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR02 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued			
83							
84							
85							
86							
87							
88							
89				Total Depth: 89 feet below ground surface			
90							
91							
92							
93							
94							
95							
96							
97							
98							
99							

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. STR03	
BORING LOCATION: STR03	ELEVATION AND DATUM: 554.53 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/14/01	DATE FINISHED: 3/19/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 69.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 8" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 554.53 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
				Base gravel		
1				SANDY CLAY (CL): greenish black (10Y 2.5/1), dry to moist, 80% low plastic fines, 20% fine sand, hard, strong chemical odor	28.1	
2						
3						
4	031401031			Black staining at 4' SILTY SAND (SM): greenish black		
5				SANDY CLAY (CL): black, wet, 70% low plastic fines, 30% fine to medium sand, gravel abundant sand seep, chemical odor, black staining throughout	15.9	
6						
7						
					12.7	
8						
9				Abundant gravel at 9'		
10					75.4	
11				POORLY GRADED SAND (SP-SM): black, moist, 90% coarse sand, 10% low plastic fines, chemical odor, no liquid observed		
12	031401032			12 - 12.5' fine gravel lens	47.0	
13				SANDY LEAN CLAY (CL) [TILL]: olive (5Y 5/4), ~80% medium to high plastic fines, ~20% medium sand and fine gravel		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR03 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL) [TILL]: continued Some black staining, very hard		
15					3.7	
16	031401033					
17					4.0	
18						
19						
20				Dark greenish gray (10Y 4/1), dry to moist, abundant coarse sand and fine gravel, gravel is angular to subround, various lithologies	2.6	
21						
22					5.1	
23						
24				Blocky, siltier than above		
25					5.5	
26						
27				Abundant cobble		
28						
29				Same as above, cobble at 29'		
30						
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR03 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL) [TILL]: continued		
32						
33						
34				Dark grayish brown (2.5Y 4/2), few gray mottles, increasing sand content, very hard, blocky		
35				Sand seam at 35-35.5'		
36					1.1	
37	031901034					
38						
39				Same as above, increasing silt content		
40						
41						
42				SILT (ML): yellowish brown (10YR 5/4), wet, 95% low plastic fines, 5% fine sand, soft, homogeneous		
43						
44				44 - 46' clay and gravel present, iron discoloration		
45					0.5	
46						
47						
48				Black laminations, no odor, weakly bedded		

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR03 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SILT (ML): continued More clay than above, increasing fine sand content, block discoloration at bottom, organics (?)		
49					0.7	
				POORLY GRADED SAND (SP): yellowish brown (10Y 4/4), wet, 95% fine medium sand, 5% low plastic fines, trace gravel (sandstone)		
50						
51						
52						
53						
54						
55						
56						
57						
58	031901035					
59				59' - 61.5' medium sand		
60						
61						
62				Fine to medium sand		
63						
64						
65						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR03 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued		
66						
67				Black material	0.5	
68						
69				Total Depth: 69 feet below ground surface		
70						
71						
72						
73						
74						
75						
76						
77						
78						
79						
80						
81						
82						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. STR04	
BORING LOCATION: N.W. Fence Main Parking Lot	ELEVATION AND DATUM: 560.27 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/19/01	DATE FINISHED: 3/20/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 109.5	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 8" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 560.27 ft. (MSL)	PID READING (ppm)	REMARKS
				Grass/topsoil		
1	031901036			SANDY CLAY (SC): brown, moist, clay, sand, gravel, soft		
2					2.9	
3						
4						
5					1.0	
6						
7					0.5	
8						
9						
10					1.0	
11						
12				POORLY GRADED SAND (SP): olive brown (2.5Y 4/4), moist, 100% medium sand, trace low plastic fines		
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR04 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
15						
16						
17	031901038			17 - 17.5' black material, chemical odor	3.3	
18	031901037				8.7	
19						
20				19.5 - 20.5' black staining, wet, gravel		
21						
22				21.5' iron discoloration SANDY LEAN CLAY (CL) [TILL]: dark greenish gray (10Y 4/1), moist, hard, ~70% fines, ~30% sand and gravel		
23	031901039				2.0	
24						
25					2.8	
26						
27						
28						
29						
30				Same as above, becomes softer with depth, blocky		
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR04 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
32				95% medium plastic fines, 5% medium sand, few cobbles		
33					2.5	
34						
35						
36						
37				<1" fine gravel seam		
38				1/2" sand seam		
39						
40				~6" clayey gravel 4" cobble present	0.0	
41						
42				SILT (ML): very dark gray (10YR 3/1), moist to dry, ~100% low to medium plastic fines, trace fine sand, few wood chips, firm, no structure apparent	0.7	
43						
44				LEAN CLAY (CL): dark greenish gray (10YR 4/1), hard, dry to moist, 80% fines, 20% fine sand, trace gravel		
45						
46				4" cobble present		
47						
48						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR04 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SILT (ML): dark greenish gray (10Y 4/1), moist, ~100% low plastic fines, weak bedding, homogeneous firm to hard (loess?)		
49						
50				Same as above	2.0	
51						
52						
53						
54	032001040					
55						
56						
57				Increasing clay with depth		
58						
59						
60				Same as above	1.4	
61						
62						
63				Few clay seams 1" - 1 1/4" thick		
64				Weak bedding, slight iron-colored mottling, trace sand, paid dilatency		
65						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR04 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
66				Increasing sand with depth			
67							
68							
69				POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), wet, ~100% fine sand, trace fines, black laminations			
70				Same as above			
71							
72							
73						1.2	
74							
75							
76							
77							
78							
79				1 - 2" gravel with low to medium plastic fines, white mottles (calcium carbonates)			
80				SANDY LEAN CLAY (CL) to LEAN CLAY (CL) [TILL]: dark greenish gray (10Y 3/1), ~70% medium plasticity fines, 30% sand and gravel, very hard, no structure			
81							
82							

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR04 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL): to LEAN CLAY (CL): continued		
83						
84						
85						
86						
87						
88	032001041					
89						
90						
91						
92						
				4" gravel lens		
93				POORLY GRADED SAND (SP): olive brown (2.5Y 4/4), wet, ~100% fine to medium sand, trace fines		
94						
95						
96						
97						
98						
99						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR04 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued			
100							
101							
102							
				Greenish gray (10Y 5/1)			
103							
104							
105							
106							
107							
				Yellowish brown (10YR 5/6), medium grain			
108							
109							
				Total Depth: 109.5 feet below ground surface			
110							
111							
112							
113							
114							
115							
116							

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. STR05	
BORING LOCATION: 30' N. of Bldg. 20	ELEVATION AND DATUM: 556.80 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/10/01	DATE FINISHED: 3/10/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 79.5	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 8" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST	COMPL. / 24 HRS.
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 556.80 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
				Road base material		
1	031001013			SANDY CLAY to CLAYEY SAND (CL-SC): dark grayish brown (2.5Y 4/2), dry, 50% fine sand, 50% fines	0.2	
2				SILTY SAND (SM): olive brown (2.5Y 4/4), moist, 60% fine sand, 40% fines, massive, some mottling of dark organics		
3						
4						
5						
6					0.0	
7	031001015					
8						
9				WELL GRADED SAND (SW): dark yellowish brown (10Y 4/6), fine to coarse sand with gravel and fines, black staining and moisture in gravel	0.0	
10						
11	031001016				0.0	
12				SANDY LEAN CLAY (CL) [TILL]: olive brown (2.5Y 4 /3), dry, ~80% high to medium plastic fines, ~10% medium sand, 10% fine gravel, hard		
13					0.0	
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR05 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL): continued		
15						
16					0.0	
17	031001017					
18						
19						
20					0.0	
21						
22				SILTY SAND (SM): wet, 80% medium sand, 20% fines, uniform	0.0	
23						
24					0.1	
25				WELL GRADED SAND (SW), 1/2" - 1" gravel, 70% gravel, (1/2" - 1"), 20% fines, 10% sand		
26						
27					0.0	
28				CLAYEY SILT (ML): dark greenish gray (10Y 5/1), some sand, gravel		
29				SILTY CLAY (CL): dark greenish gray (10Y 4/1) moist, some sand and gravel (1/2" - 1"), hard		
30					0.7	
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR05 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SILTY CLAY (CL): continued		
32						
33						
34						
35	031001018					
36						
37						
				3" - 4" layer of cobbles at 37.5'		
38						
				SILTY SAND (SM): olive (5Y 4/4), wet, 85% fine sand, 15% fines, chemical odor		
39					0.7	
40						
41				SANDY SILT (ML) dark greenish gray (10Y 4/1), wet, 70% fines, 30% fine sand		
42					7.0	
43						
44						
				SANDY CLAY (CL): greenish black (10Y 2.5/1), with gravel (subangular to rounded)		
45						
46					4.9	
47						
48						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR05 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY CLAY (CL): continued		
49				4" cobble present		
50						
51				Gravel with Sand (GP): interbed 1' thick		
52				SILTY SAND and SANDY SILT (SM/ML): dark greenish brown (10Y 3/1), wet, 50% low plastic fines, 50% fine uniform sand, trace gravel, laminated 1" - 2" black		
53						
54						
55						
56						
57						
58						
59						
60				FINE TO MEDIUM SAND (SP): dark yellowish brown (10YR 3/4), wet, 70% fine sand, 30% medium sand, trace fines		
61						
62						
					3.5	
63						
64						
65				POORLY GRADED SAND WITH SILT (SP-SM): olive brown		

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR05 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				(2.5Y 4/4), wet, 90% fine sand, 10% low plastic fines		
66						
67						
					3.8	
68						
69						
				Same as above		
70						
71						
72						
73						
74						
75						
76						
77					3.9	
78						
79						
				Total Depth: 79.5 feet below ground surface		
80						
81						
82						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. STR06	
BORING LOCATION: 35' S.E. of S.E. Corner Bldg. 7	ELEVATION AND DATUM: 574.66 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/11/01	DATE FINISHED: 3/12/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 139.5	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 8" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 574.66 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
				Road base (gravel)		
1	031101019			CLAYEY SAND (SC): greenish black (10Y2.5/1), transitional color change light gray reddish mottling, yellowish brown (10YR5/6), moist, 60% fine sand, 40% medium plastic fines, hard, trace gravel (1" - 3")	1.8	
2						
3					1.8	
4						
5				SANDY CLAY (CL): light olive brown (2.5YR5/4), light gray mottling, moist to wet, hard, 70% fines, 25% fine sand, 5% gravel (1 -2")	1.8	
6						
7	031101020					
8						
9					1.3	
10					2.5	
11						
12				dark greenish gray (10Y4/1), moist, hard, 90% fines, 10% fine sand, trace gravel	6.1	
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR06 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				4 - 6" cobbles		
15	031101021			SILTY CLAY (CL): moist to wet, 100% medium plastic fines, hard, trace gravel (1") subangular to subrounded	4.4	
16						
17				Olive (5Y5/3), light gray mottling	4.6	
18				Becomes softer with depth		
19						
20				Same as above	8.6	
21						
22					5.6	
23						
24						
25					4.6	
26				1 - 2" sand lens		
27					2.0	
28						
29				Same as above		
30						
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR06 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
32						
33				SANDY CLAY (CL): greenish gray (10YR5/1), moist to wet, hard, 90% low to medium plastic fines, 10% fine sand, trace gravel		
34						
35						
36					10.7	
37						
38				SILT (ML): dark greenish gray (10Y4/1): wet, soft, 100% low plastic fines, massive		
39				39 - 39.5' : 5" cobble		
				Same as above		
40						
41						
42						
43						
44						
45	031101022				9.2	
46						
47						
48						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR06 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
49						
				Same as above		
50						
51						
52						
53						
54						
55					8.3	
56				Increasing hardness with depth		
57						
58						
59						
				Same as above		
60						
61						
62						
63						
64						
65						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR06 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
					9.9	
66						
67						
68						
69						
				Same as above		
70						
71						
72						
73				Becomes harder with depth		
74						
75				POORLY GRADED SAND (SP): yellowish brown (10Y5/4), 80% fine sand, 20% medium sand, trace fines, 6" interbeds of silty clay		
76	031101023				5.4	
77						
78				SANDY CLAY (CL): gray (5Y5/1), 85% low plastic fines, 15% fine sand, trace gravel (1 - 2" diameter), subrounded		
79				SILTY SAND (SM): light olive grown (2.5Y5/4), wet, 70% fine sand, 30% fines, sand gravel interbed at 80.5'		
80				Increasing to WELL GRADED SAND (SW)		
81				SANDY CLAY (CL) [TILL]:, dark gray (5Y4/1), moist, 90% low plastic fines, 10% fine sand, trace gravel 1-2" subangular, hard,	3.0	
82						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR06 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				generally massive with trace fractures SANDY CLAY (CL) [TILL]: continued		
83						
84						
85						
86						
87	031101024					
88						
89						
90						
91						
92						
93						
94						
95						
96						
97					3.0	
98						
99						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR06 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				SANDY CLAY (CL) [TILL]: continued			
100							
101							
102							
103							
104							
105						6.6	
106							
107							
108							
109							
110							
111							
112							
113							
114							
115						6.6	
116							

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR06 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY CLAY (CL) [TILL] continued		
117						
118						
119						
120						
121						
122						
123						
124						
125						
126				SILTY CLAY (CL): gray (5Y5/1), moist, 100% low plastic fines, firm, massive		
127						
128						
129						
130				Same as above, becomes harder with depth, increasing gravel with depth, increasing clay with depth		
131						
132						
133						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR06 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				SILTY CLAY (CL): continued			
134							
135							
				SHALE/MUDSTONE, dark greenish gray (10Y4/1), dry, fractures, 1 - 4" fossiliferous layers			
136							
137							
138							
139							
				Total Depth: 139.5 feet below ground surface			
140							
141							
142							
143							
144							
145							
146							
147							
148							
149							
150							

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. STR07	
BORING LOCATION: Between Western Fenceline the Circle	ELEVATION AND DATUM: 552.00 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/21/01	DATE FINISHED: 3/21/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 89.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 8" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 552.00 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt		
1	032101042			CLAY (CL) [FILL]: black to dark brown, ~95% medium plastic fines, trace gravel, ~5% sand, iron lamination	5.2	
2						
3						
4						
5				GRAVEL WITH CLAY (GP-GC): tan mottling, moist, ~80% gravel, ~20% medium plastic fines, trace medium sand	0.7	
6						
7				POORLY GRADED SAND (SP): dark grayish brown, wet, ~90% medium sand, ~10% fine gravel, 6" silt lens at 7.5 - 8'	0.0	
8						
9				Same as above 9.5' - 10' silt lens		
10					0.0	
11						
12						
13					0.0	
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR07 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued		
15						
16					0.3	
17				16.8' - 18' Black staining, chemical odor		
18	032101043			SANDY LEAN CLAY (CL) [TILL]: dark greenish gray (10Y 4/1), moist, ~90% high plastic fines, ~10% medium sand, trace fine gravel, hard	0.7	
19						
20				4" cobble - fossiliferous		
21						
22					0.0	
23						
24						
25						
26						
27				WELL GRADED SAND (SW): dark greenish gray (10Y 4/1), wet, ~95% sand gravel, ~5% sand	0.0	
28						
29						
30				4" clay lens		
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR07 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				WELL GRADED SAND (SW): continued		
32						
33						
34				3" clay lens		
35				35' - 35.75' lean clay lens		
36						
37						
38					0.0	
39				39' - 39.5' clay seam		
40						
41						
42				Less gravel than above		
43						
44				LEAN CLAY (CL): greenish gray (10Y 5/1), moist, 100% high plastic fines, trace fine sand, soft weak bedding 44 - 45', few black laminations, no odor		
45						
46						
47						
48						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR07 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				LEAN CLAY (CL): continued		
49				SILT (ML): greenish gray (10 Y 5/1), moist, ~100% low plastic fines, soft, abundant roots		
50						
51						
				51.5' - 59' no roots present		
52						
53						
54						
55						
56				56' - 56.5' medium sand seam		
57						
58				Increase in clay content, soft to firm, no roots present		
59						
60				POORLY GRADED SAND (SP): dark greenish gray (10Y 3/1), ~95% medium sand, ~5% low plastic fines		
61						
62				62' - 62.5' silt lens, medium plasticity		
				Increasing fine content		
63						
64						
65						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR07 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued		
66				SILTY SAND (SM): dark gray (5Y 4/1), moist to wet, ~60% fine sand, ~40% low plastic fines, trace gravel, semi-cohesive		
67						
				67.5' - 68' 2 - 4" cobbles		
68						
69				POORLY GRADED SAND (SP): dark greenish gray (10Y4/1), wet, 100% fine sand		
70						
71						
72						
73				Olive (5Y 4/3)		
74						
75					0.0	
76						
77						
				77.5' - 79' black laminations 1/4 - 1/2", no chemical odor		
78						
79				Same as above	0.0	
80				Black laminations continue to 81', no chemical odor	0.0	
81						
82						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR07 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued			
83							
84							
85							
86							
87							
88							
89				Total Depth: 89 feet below ground surface			
90							
91							
92							
93							
94							
95							
96							
97							
98							
99							

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. STR08	
BORING LOCATION: S.W. of Bldg. 24	ELEVATION AND DATUM: 553.73 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/26/01	DATE FINISHED: 3/26/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 79.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 8" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.73 ft. (MSL)	PID READING (ppm)	REMARKS
				Gravel, base material		
1	032601054			LEAN CLAY (CL): very dark gray (5Y 3/1), moist, ~100 medium plastic fines, firm to hard, trace fine gravel		
2					1.2	
3						
4				Becomes softer, more brown in color than above	0.4	
5						
6				POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), moist, ~95% fine to medium sand, ~5% gravel, no odor	16.9	
7						
8						
9				9' - 14.5' Same as above, black staining, wet, chemical odor		
10					29.8	
11						
12	032601056					
13	032601055				40.8	
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR08 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL) [TILL]: dark greenish gray (10Y 4/1), moist, ~85% high plastic fines, ~15% fine sand and gravel, hard		
15						
16						
17	032501057					
18						
19				Same as above		
20						
21						
22						
23						
24						
25						
26						
27						
28				28' - 28.5' sand and gravel (1" - 2")	3.2	
				SILT (ML): dark greenish gray (10Y 3/1), moist, ~100% low to medium plastic fines, homogenous		
29				29.5' - 29.7' - sand lens		
30				30.2' - 30.5' - sand lens		
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR08 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SILT (ML): continued		
32				POORLY GRADED SAND (SP): dark greenish gray (10Y 3/1), moist to wet, ~100% coarse sand, trace fines		
33				SILT (ML): dark greenish gray (10Y 3/1), moist, ~100% low to medium plastic fines, homogeneous		
34						
35						
36						
37						
38						
39				Same as above		
40						
41						
42						
43						
44	032601058					
45					9.6	
				45.5' - 46' Black laminations		
46						
				Dark yellowish brown (10YR 4/4)		
47						
48						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR08 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SILT (ML): continued		
49				Same as above, dark greenish gray		
50						
51						
52						
53				POORLY GRADED SAND (SP): olive brown (2.5Y 4/3), moist to wet, ~95% fine to medium sand, ~5% low plastic fines		
54						
55						
56						
57						
58					8.8	
59				Same as above		
60						
61						
62						
63						
64						
65						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR08 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				POORLY GRADED SAND (SP): continued		
66					5.1	
67						
68						
69				Same as above		
70						
71						
72						
73						
74						
75						
76						
77						
					3.7	
78						
79				Total Depth: 79 feet below ground surface		
80						
81						
82						

RMRK3

PROJECT: Morton Reading Fl	Log of Boring No. STR09	
BORING LOCATION: E. of Main Gate on Inside Fence Line	ELEVATION AND DATUM: 563.94 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 4/4/01	DATE FINISHED: 4/4/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 79.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 6" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.94 ft. (MSL)	PID READING (ppm)	REMARKS
				0' - 17' taken from log of UAW 14-10 Grass		
1				SANDY CLAY (CL) [FILL]		
2					0.0	
3						
4						
5				CLAYEY SAND (SC): dark grayish brown (10YR 4/1), moist to wet	0.0	
6						
7	040401069				0.0	
8						
9				CLAY (CL): yellowish brown (10YR 5/4), moist, ~95% medium plastic fines, ~5% sand and gravel, firm	0.0	
10				POORLY GRADED SAND WITH SILT (SM): dark yellowish brown (10YR9/4), wet, ~80% medium sand and gravel, ~20% medium plastic fines 10.5 - 11.5' clay lens		
11					0.0	
12						
13				LEAN CLAY (CL): olive gray (5Y 4/2), moist, ~80% high plastic fines, ~30% fine sand and gravel, hard		
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR09 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				LEAN CLAY (CL) continued	0.0	
15						
16					0.0	
17				2 - 3" cobble		
18						
19				Same as above		
20						
21					0.0	
22						
23				CLAY (CL): dark gray (5Y 4/1), moist, ~100% high plastic fines, soft to firm, homogeneous		
24					0.0	
25						
26					0.0	
27				Becomes softer with depth		
28						
29				Same as above	0.0	
30						
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR09 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				CLAY (CL): continued		
32						
33						
34						
35					0.0	
36						
37						
38						
39				Same as above		
40						
41						
42						
43						
44					0.0	
45						
46						
47						
48						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR09 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				CLAY (CL) continued		
49				Same as above		
50						
51						
52						
53				Becomes harder		
54						
55				SANDY LEAN CLAY (CL) [TILL]: dark gray (5Y 4/1), dry to moist, ~80% medium plastic fines, ~20% sand and gravel, firm to hard	0.0	
56						
57						
58						
59				Same as above		
60						
61						
62				62 - 62.5' 2 - 3" cobbles		
63						
64				64 - 64.5' sand lens	0.0	
65						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR09 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL) [FILL]: continued		
66						
67						
68						
69				68.5' - 69' : POORLY GRADED SAND WITH GRAVEL (SP) [LENS]: dark gray (5Y 4/1), wet, ~70% medium sand, 25% gravel (1" - 2"), ~5% medium plastic fines		
70				SANDY LEAN CLAY (CL): continued		
71						
72						
73						
74						
75						
76						
77						
78						
79				Total Depth: 79 feet below ground surface		
80						
81						
82						

RMRK3

PROJECT: Morton Reading FI	Log of Boring No. STR10	
BORING LOCATION: N.W. Corner of Bldg. 1	ELEVATION AND DATUM: 559.74 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 4/7/01	DATE FINISHED: 4/7/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 39.0	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: 8" Diameter Outer/ 4" Diameter Inner Casing	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.	
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 559.74 ft. (MSL)	PID READING (ppm)	REMARKS
				Asphalt base		
1	040701074			SAND WITH CLAY (SC) [FILL]: some black material		
2					0.0	
3						
4				SANDY CLAY (SC): very dark gray (2.5Y 3/1), moist, ~80% low plastic fines, ~20% medium sand, firm		
5					0.0	
6						
7				CLAY (CL): olive brown (2.5Y 4/3), moist, ~90% low plastic fines, ~10% fine sand, firm to hard	0.0	
8						
9				Same as above		
10				Olive (5Y 4/3)	0.0	
11	040701075			11' - 11.4' black discoloration, chemical odor, very soft, increasing sand content (30%)	0.8	
12				SANDY LEAN CLAY (CL) [TILL]: olive brown (2.5Y 4/3), moist, ~85% low plastic fines, ~15% sand/gravel, hard	0.4	
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR10 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAN CLAY (CL) [TILL]: continued		
15				Dark greenish gray (10Y 3/1), very hard	0.0	
16						
17					0.0	
18						
19				Same as above		
20					0.0	
21						
22				21.7' - 22' gravel seam		
				22.5' - 22.7' gravel seam, light olive brown (2.5Y 5/4)	0.0	
23						
				4" cobble		
24						
25				2" gravel seam	0.0	
26				1" gravel seam, dark gray (2.5Y 4/1)		
27					0.0	
28				1" coarse sand seam		
29						
30					0.0	
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR10 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY LEAn CLAY (CL) [TILL] continued		
32						
33						
34						
35						
36						
				<1" sand lens		
37						
				3" cobble		
38						
39				Total Depth: 39 feet below ground surface		
40						
41						
42						
43						
44						
45						
46						
47						
48						

RMRK3

PROJECT: Morton Reading FI	**Log of Boring No. STR11**
BORING LOCATION: N.E. Corner of Plant	ELEVATION AND DATUM: 578.24 ft. (MSL)
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 8/20/01 / DATE FINISHED: 8/21/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 120.0 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER / FIRST / COMPL. / 24 HRS.
SAMPLING METHOD: 10' Rotosonic Core	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 578.24 ft. (MSL)	PID READING (ppm)	REMARKS
				Fill Material		
1				CLAYEY SAND (SC): dark brown, wet, ~85% clay, poorly graded fine to medium sand, ~5% calcareous pebbles, loose to slightly firm,	0.0	
2	082001166				0.0	
3						
4						
5						
6	082001169				0.0	
7				SANDY GRAVELLY CLAY (CL): light brown, damp, ~75% clay, ~20% medium sand, ~5% gravel, slightly plastic	0.0	
8	082001168				0.0	
9	082001167			CLAY (CH): grayish brown, damp, stiff, plastic, slightly mottled with dark gray clay	0.0	
10	082001170					
11				Same as above but becomes gray with slight hydrocarbon odor (possibly ambient - no elevated PID reading)		
12					0.0	
13						
14						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR11 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				CLAY (CH): continued		
15					0.0	
16						
17						
					0.0	
18						
19						
20						
21						
22						
					0.0	
23						
24						
25				Same as above, no odor		
26						
27						
28					0.0	
29						
30						
31						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR11 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				CLAY (CH): continued		
32						
33					0.0	
34						
35				Same as above		
36						
37						
38					0.0	
39				SANDY CLAY (CL): grayish brown, wet, ~50% fine sand, ~50% clay, slightly plastic, soft CLAY (CH): yellowish brown, damp, very stiff, very plastic		
40						
41						
42				SANDY GRAVELLY CLAY (CL): yellowish brown, ~70% clay, stiff, ~20% fine to medium sand, ~10% fine gravel (<1/4"), moderately plastic		
43					0.0	
44				SAND (SP): brown, wet to saturated, fine to medium grained, loose		
45						
46						
47				SANDY GRAVELLY CLAY (CL): brown, wet, ~85% clay, ~10% fine sand, ~5% fine gravel, stiff, moderately plastic	0.0	
48						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR11 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SANDY GRAVELLY CLAY (CL): continued		
49				GRAVELLY SAND (SW): brown to dark brown, saturated, fine to medium grained with ~10% fine to very coarse gravel (up to ~4" diameter), loose		
50						
51						
52					0.0	
53	082001171					
54						
55						
56				SANDY GRAVELLY CLAY (CL): greenish gray to dark green, dry to damp, ~70% clay, ~20% very fine to coarse grained sand ~10% gravel, locally <1/4" diameter (granitic), glacial till, very stiff, nonplastic to slightly plastic, very hard		
57						
58					0.0	
59						
60						
61						
62						
63	082001172				0.0	
64				SILTY CLAY (CL): dark gray, wet to saturated, ~70% - 60% clay, ~30% - 40% silt, locally stiff to locally friable, slightly plastic		
65						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR11 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SILTY CLAY (CL): continued		
66						
67						
68						
69						
70					0.0	
71						
72						
73						
74						
75				Same as above		
76						
77	082001173					
78						
79						
80						
81						
82						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR11 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SAND (SP): brown, saturated, very fine to medium grained, loose to moderately compact, well-bedded with silt laminae locally	0.0	
83	082001174					
84						
85						
86				SANDY GRAVELLY CLAY (CL): gray, wet, ~80% clay, ~10% fine to coarse grained sand, ~10% coarse gravel (<2"), stiff, moderately plastic		
87						
88						
89				SILTY CLAY (CL): gray, wet, moderately loose and soft, moderately plastic		
90						
91						
92				SAND (SP): brown, saturated, loose to slightly compact, fine to medium grained		
93						
94						
95						
96						
97						
98						
99						

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR11 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		PID READING (ppm)	REMARKS
				SAND (SP): continued			
100							
101						0.0	
102	082101175						
103							
104							
105				Same as above			No Recovery from 105 to 120 in loose sand
106							
107							
108							
109							
110							
111							
112							
113							
114							
115				Same as above			
116							

RMRK3

PROJECT: Morton Reading FI

Log of Boring No. STR11 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				SAND (SP): continued		
117						
118						
119						
120				Total Depth at 120 feet below ground surface		
121						
122						
123						
124						
125						
126						
127						
128						
129						
130						
131						
132						
133						

RMRK3

PROJECT: Morton Supplemental FI				Log of Boring No. STR-12	
BORING LOCATION: W of Bldg. 21				ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Boart Longyear				DATE STARTED: 3/13/04	DATE FINISHED: 3/13/04
DRILLING METHOD: Rotasonic Drilling				TOTAL DEPTH (ft.): 105.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Truck-mounted Rotasonic				DEPTH TO WATER: FIRST 8 ft.	COMPL. NA / 24 HRS. NA
SAMPLING METHOD: 6" Continuous Core/Plastic Sleeve				LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA			RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
1				Asphalt (1") GRAVEL (GW): gray/light brown, loose, ~90% gravel (~45% coarse, ~45% fine), ~5 - 10% sand		Plugged borehole with bentonite cement grout
2				SANDY CLAY (CL): olive gray, moist, ~80% low plasticity clay, ~20% fine sand		Tremied from bottom to top
3						
4				GRAVELLY CLAY (CL): light brown/gray, moist, ~60% low plasticity clay, ~20% fine gravel, ~20% coarse sand, soft		
5				GRAVELLY SAND (SP)/SANDY GRAVEL (GP): gray, ~50% coarse sand, ~50% fine gravel (round/subrounded)	0.0	
6						
7				FINE SAND (SP): light gray, moist, ~80% fine sand, ~20% fine gravel (rounded), trace coarse gravel (rounded)		
8				Stained black 8 -11', strong H_2S odor, wet	▽	
9						
10					3.7	
11						
12						
13						
14						
15				CLAY (CL-CH): gray, moist, ~90 - 95% medium to high plasticity clay, 5 - 10% fine gravel/coarse sand, occasional coarse gravel, occasional rust-colored staining (small), stiff		
16						
17						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-12 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
18						
19						
20					0.0	
21						
22						
23						
24						
25						
26						
27						
28				Low to medium plasticity, soft, olive-colored and light brown mottling at 28 - 33'		
29						
30					5.0	
31						
32						
33				Back to medium to high plasticity, stiff at 33'		
34					0.3	
35						
36						
37				Dry 37 - 37.5'		

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-12 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
38						
39						
40				Dry 40 - 40.5'		
41				SILTY CLAY (CL): gray, moist, ~60% low plasticity clay, ~40% silt		
42						
43						
44						
45				CLAYEY SILT (ML): gray, moist, ~60% silt, ~40% slight plasticity clay, stiff		
				CLAY (CL): olive gray, wet, 100% low plasticity clay, moderately stiff		
46						
47						
48					0.4	
49						
50						
51						
52						
53						
54						
55					0.6	
56				FINE SAND (SP): light orange brown, wet, sand		
57						
58						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-12 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				FINE SAND (SP): light orange brown, wet, sand	0.0	
59				3" lens of sandy clay, mottled dark brown		
60						
61						
62						
63						
64					0.0	
65						
66						
67						
68						
69						
70					0.3	
71				Dark brown layering, clayey at 70.5'		
72						
73				Dark brown layering at 73'	0.0	
74						
75						
76						
77						
78						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-12 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
				FINE SAND (SP): light orange brown, wet, sand		
80					0.0	
81						
82						
83						
84						
85					0.0	
86						
87						
88						
89						
90					0.2	
91						
92						
93						
94						
95						
96						
97						
98						
99						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-12 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
100				FINE SAND (SP): light orange brown, wet, sand		
				10 - 20% subrounded gravel at 100.5 - 101'		
101					1.6	
102						
103					1.5	
				2" Rust-colored sand		
104						
				6" Gravelly sand, clayey (30% gravel/10% clay)		
105					1.9	
				Total Depth: 105 feet below ground surface		
106						
107						
108						
109						
110						
111						
112						
113						
114						
115						
116						
117						
118						
119						
120						

RMRK3

PROJECT: Morton Supplemental FI	Log of Boring No. STR-13	
BORING LOCATION: Bldg. 27	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 3/9/04	DATE FINISHED: 3/10/04
DRILLING METHOD: Rotasonic Drilling	TOTAL DEPTH (ft.): 105.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Truck-mounted Rotasonic	DEPTH TO WATER: FIRST 3.6 ft. / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: Continuous Core (6-in)	LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION (NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.) Surface Elevation:	PID READING (ppm)	REMARKS
1	20040309UAW27V1.5N			SANDY GRAVELLY CLAY (CL): brown, moist, ~60% medium plasticity clay, ~30% fine - coarse sand, ~10% small gravel, soft, top soil or fill		Plugged borehole with bentonite cement grout
2					0.0	Tremied from bottom to top
3	20040309UAW27V3N					
4				CLAYEY GRAVELLY SAND (SW): light brown, wet, ~60% fine - coarse graded sand, ~20% fine gravel, ~20% medium plasticity clay, very soft		
5	20040309UAW27V5N					
6					0.0	
7	20040309UAW27V7N			SANDY GRAVELLY CLAY (CL): yellowish to orange and gray mottled, dry, ~60 - 80% low plasticity clay, ~10 - 20% fine to coarse sand, ~10 - 20% fine gravel, very stiff		
8						Note on sample numbering: This was originally to be UAW-27. No well was installed and location name was changed to STR13. UAW-27 was subsequently used at another location (adjacent to STR-14).
9						
10	20040309UAW27V10N					
11					0.0	
12	20040309UAW27V12N					
13						
14				SANDY GRAVELLY CLAY as above	0.0	
15	20040309UAW27V15N					
16						
17						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-13 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
18						
19				FAT CLAY (CH): gray, moist - wet, high plasticity, soft		
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						
31						
32						
33				Locally firm		
34						
35						
36						
37				Grades to sandy clay at ~37'		
				SANDY GRAVELLY CLAY (CL): gray, moist - wet, ~80 - 90%		

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-13 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
38				medium plasticity clay, ~10 - 20% fine - coarse sand, ~5% fine gravel, firm		
39				Increases to ~40% fine - coarse sand 39 - 42'		
40						
41						
42				GRAVELLY SAND (SW): gray, wet, ~90% fine to coarse sand, ~10% fine - coarse gravel		
43				SANDY GRAVELLY CLAY as above		
44						
45				GRAVELLY SAND (SW): gray, wet, ~80% fine - coarse sand (well graded), ~20% fine to coarse gravel and cobbles to 5" diameter, loose		
46						
47				SANDY GRAVELLY CLAY as above		
48				GRAVELLY SAND as above		
49				SANDY GRAVELLY CLAY (CL): gray, dry, ~80% low plasticity clay, ~20% fine - coarse sand with fine gravel, very hard -stiff		
50						
51						
52						
53						
54						
55						
56						
57						
58						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-13 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
59						
60						
61				SANDY GRAVELLY CLAY as above with increase in gravel to ~10 - 20%, ~10 - 20% sand, ~60 - 80% low plasticity clay		
62						
63						
64						
65						
66				SANDY GRAVELLY CLAY as above		
67						
68						
69						
70				SANDY GRAVELLY CLAY with increase to ~30% fine sand, wood fragments in sandy zone at 72.		
71						
72						
73						
74						
75				SANDY GRAVELLY CLAY (CL): gray, moist, ~60% medium plasticity clay, ~30 - 40% fine sand, ~5 - 10% fine - medium gravel, firm		
76						
77						
78						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-13 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
80						
81						
82						
83				SANDY GRAVELLY CLAY (CL): gray, moist, ~60 - 80% medium plasticity clay, ~20 - 30% fine sand, <10% fine to medium gravel, firm		
84						
85						
86						
87						
88						
89						
90						
91						
92						
93						
94						
95						
96						
97						
98						
99						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-13 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
100				SANDY GRAVELLY CLAY (CL): as above, gray, moist, ~80% medium plastic clay, ~20% fine sand, <5% gravel, firm		
101						
102						
103						
104						
105				Total Depth: 105 feet below ground surface		
106						
107						
108						
109						
110						
111						
112						
113						
114						
115						
116						
117						
118						
119						
120						

RMRK3

PROJECT: Morton Supplemental FI	Log of Boring No. STR-14	
BORING LOCATION: ~50 ft. S Bldg. 6 (SW Corner), ~10 ft. W Bldg 7 (NW Corner)	ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 3/13/04	DATE FINISHED: 3/13/04
DRILLING METHOD: Rotasonic Drilling	TOTAL DEPTH (ft.): 105.0	MEASURING POINT: ground surface
DRILLING EQUIPMENT: Truck-mounted Rotasonic	DEPTH TO WATER: FIRST NA / COMPL. NA / 24 HRS. NA	
SAMPLING METHOD: 6" Core/Plastic Sleeve	LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	PID READING (ppm)	REMARKS
				Asphalt		
1				GRAVELLY CLAY (CL): brown, moderately moist, ~70% low plasticity clay, ~20 - 30% fine gravel, trace sand/coarse gravel		
2				SANDY CLAY (CL): light brown, moderately moist, low to medium plasticity, stiff		
3						
4						
5				GRAVELLY CLAY (CL/CH): light brown, moisture (low), ~80 - 90% medium to high plasticity clay, ~10 - 30% gravel, ~5 - 10% sand, moderately stiff to stiff		
6						
7					20.1	
8						
9						
10						
11					11.1	
12						
13						
14				FAT CLAY (CH): very stiff at 14 - 15'		
15				No recovery; possible void		
16						
17						

RMRK3

PROJECT: Morton Supplemental Fl

Log of Boring No. STR-14 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
18						
19						
20						
21						
22						
23						
24						
25				LEAN CLAY (CL): gray, moist, 100% low plasticity clay, soft		
26						
27					48.2	
28						
29						
30						
31						
32						
33					22.5	
34						
35						
36						
37						

RMRK3

PROJECT: Morton Supplemental Fl

Log of Boring No. STR-14 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
38						
39					19.0	
40						
41						
42						
43						
44				SAND (SP): light orange brown, wet, 100% fine sand, loose	14.0	
45						
46						
47						
48				SANDY CLAY (CL): light brown/gray, moisture (low), ~70 - 80% clay, ~10 - 20% sand, ~5% fine gravel	24.1	
49						
50						
51				SAND (SP): orange light brown, wet, loose	21.6	
52				GRAVELLY CLAY (CL): gray/light brown, moist, ~80% medium plasticity clay, ~10% sand, ~5 - 10% gravel, stiff		
53				10" SANDY GRAVEL (GW): light gray, dry, ~60% fine to coarse gravel, ~40% coarse sand, loose		
54				GRAVELLY CLAY (CL): as above		
55				SANDY/SILTY CLAY (CL): gray, ~80 - 90% low plasticity clay, ~10 - 20% very fine sand/silt, stiff (low to medium)		
56						
57						
58						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-14 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
59				SANDY/SILTY CLAY (CL): gray, ~80 - 90% low plasticity clay, ~10 - 20% very fine sand/silt, stiff (low to medium)		
60						
61					7.6	
62						
63						
64						
65						
					7.3	
66						
67						
68						
69						
70						
71						
72					0.0	
73						
74						
75						
76						
77						
78						
					0.0	

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-14 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
80						
81						
82						
83					0.0	
84						
85						
86						
87						
88						
89						
90					0.0	
91						
92				SAND (SP): yellowish gray to yellowish orange/light brown, wet, 100% fine sand		
93					0.0	
94						
95						
96						
97						
98					0.0	
99						

RMRK3

PROJECT: Morton Supplemental FI

Log of Boring No. STR-14 (cont'd)

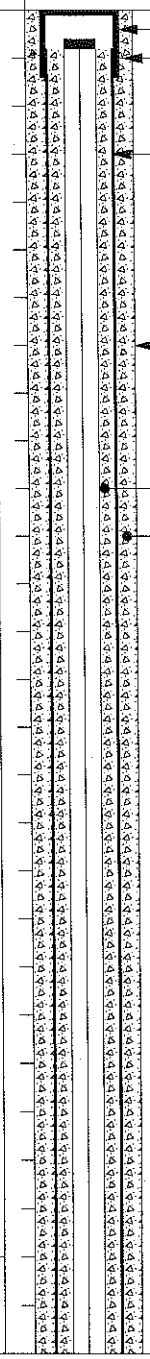
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	PID READING (ppm)	REMARKS
100				SAND (SP): yellowish gray to yellowish orange/light brown, wet, 100% fine sand		
101						
102						
103						
104						
105				Total Depth: 105 feet below ground surface		
106						
107						
108						
109						
110						
111						
112						
113						
114						
115						
116						
117						
118						
119						
120						

RMRK3

PROJECT: Morton Reading FI	**Log of Well No.** LAW05-60 & LAW05-150
BORING LOCATION: ~8' N. of UAW05	GROUND SURFACE ELEVATION AND DATUM: 553.67 (Gmd.) TOC 05-60 553.25 ft. 05-150 553.35 ft. (MSL)
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 3/4/02 / DATE FINISHED: 3/14/02
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 155.0 / SCREEN INTERVAL (ft.): 51-61 143-153
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: NA / CASING: 2" Diameter
SAMPLING METHOD: 4" Diameter Sample Barrel	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.67 (Gmd.) TOC 05-60 553.25 ft. 05-150 553.35 ft. (MSL)
					Description taken from log of UAW05-20 LEAN CLAY (CL) [FILL]: black (2.5Y 2.5/1)
2					
4					Dark brown
6					
					POORLY GRADED SAND (SP): moist, ~90% medium sand, ~10% gravel
8					
10					
12					
					LEAN CLAY (CL) [FILL]:
14					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

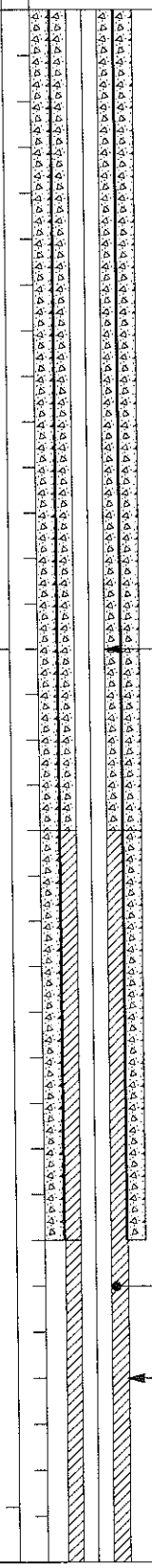
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [FILL]: continued	
16						
18						2" Diameter flush-threaded Sch. 40 PVC riser with O-rings
20						
22						
24						
26						
28						
30						

WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [FILL]: continued	
32						
34						
36						
38					CLAY (CH): gray to grayish brown (10YR 5/2), moist, ~100% high plastic fines, homogeneous, hard	Cement/bentonite grout
40						
42						
44						Medium bentonite chips
46				0.0		8" Diameter borehole
					SILT (ML) LENS at 47.4 - 48'	
48						

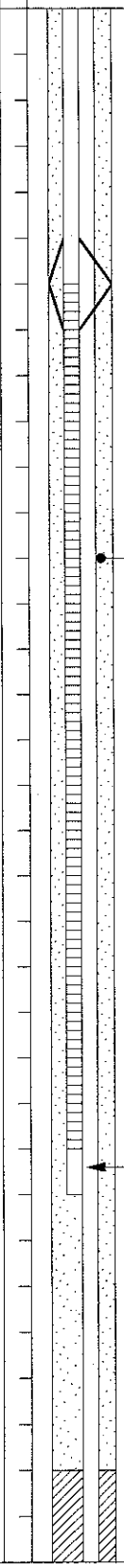


WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
				0.0	SANDY CLAY (CL): grayish brown (10YR 5/2), wet, ~60% medium plastic fines, ~40% coarse sand, trace fine gravel	
50						
					POORLY GRADED SAND (SP): grayish brown (10YR 5/2), ~95% fine to medium sand, ~5% low plastic fines, homogeneous, weak cementation	Centralizer
52						
54					Fines decrease with depth	#6 Global filter pack sand
				0.0	Same as above, ~100% fine to medium sand	
56						
58						
60				0.0		4" End cap
62						
64						

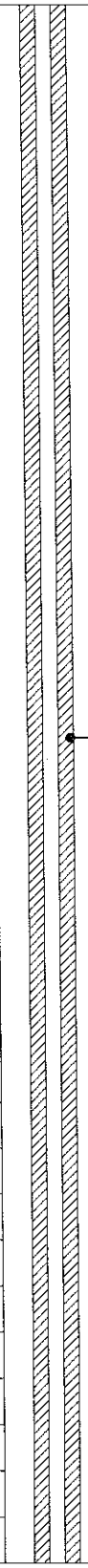


WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	Transition from 8" to 6-1/4" diameter borehole
66				1.3		
68				0.0		
70						
				0.0		
72						Bentonite Chips
74						
				0.0		
76						
78					~90% fine to medium sand, ~10% low plastic fines	
80						
82						



WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
84						
				0.0	84.5 - 85' (silt lens, 1/8" black laminations, no odor)	
86						
					~85% fine to medium sand, ~15% low plastic fines, moderate cementation	
88						
				0.0		
90						
92						
				0.0		
94						
					Same as above	
96						
				1.5	90% medium to fine sand, ~10% fines	
98						

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
				0.0	POORLY GRADED SAND (SP): continued	
100						
102						
104						
					Same as above	
106						
108						
110						
112						
114						
					Same as above	
116						

WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

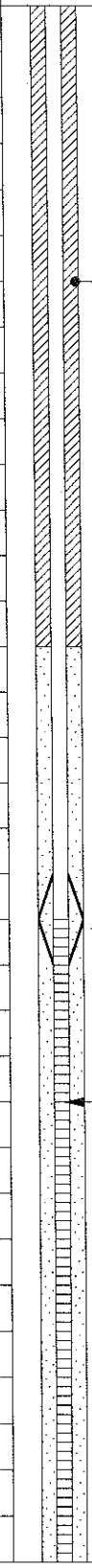
DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
					Darker color with depth (dark grayish brown), loose (sand appears cemented)	
118						
120						
122						
124						
					Same as above, loose	
126						
128						
130						
132						

WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
134						
					Same as above	
136						Medium bentonite chips
					3" Cobbles at 137' - 139', subangular to rounded, fossiliferous	
138						
140						
142						
						Stainless steel centralizer
144					2" Cobbles at 144' - 145', subangular to rounded	
					CLAYEY SAND WITH GRAVEL (SC): grayish brown (10YR 5/2), wet, ~60% medium sand, ~30% medium plastic fines, ~10% gravel (1-2" round	2" Diameter 0.020" slotted stainless steel wraparound screen
146						
					WELL GRADED SAND (SW) WITH GRAVEL: grayish brown (10YR 5/2), wet, ~80% well graded sand, ~15% 1-3" cobbles, ~5% low plastic fines, loose	
148						
150						



PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

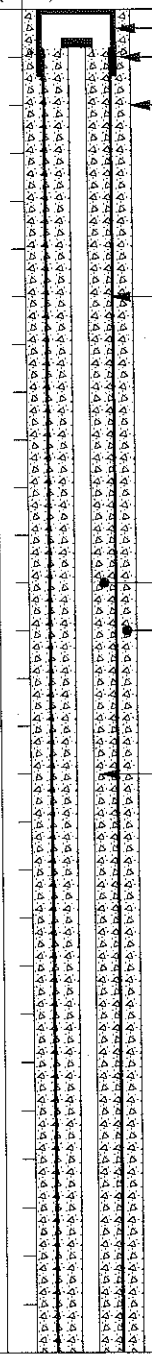
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					WELL GRADED SAND with GRAVEL (SW): continued	
152						4" End cap
					CLAY (CL): dark gray (5Y 4/1), dry, ~90% low plastic fines, ~10% fine sand, homogeneous, very hard	
154					SHALE: greenish gray (5G 6/1), dry, hard	
					Total Depth: 155 feet below ground surface	
156						
158						
160						
162						
164						
166						

WELL3

PROJECT: Morton Reading FI	**Log of Well No. LAW12-60**
BORING LOCATION: ~7' W. of UAW12-20	GROUND SURFACE ELEVATION AND DATUM: 555.78 (Grnd.) TOC 554.89 ft. (MSL)
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 9/4/01 / DATE FINISHED: 9/8/01
RILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 66.0 / SCREEN INTERVAL (ft.): 55-65
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: 52.1' / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Core Barrel	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 555.78 (Grnd.) TOC 554.89 ft. (MSL)
					0'-18' taken from log of UAW12-20 Asphalt Sand and road base material
2					CLAY (CL): black, moist, 100% medium plastic fines, trace gravel, firm, chemical odor, black staining at 4'-15'
4					
6					
8					POORLY GRADED SAND (SP): black, moist, 90% medium sand, 10% gravel 1/2"-1", chemical odor
10					
12					wet
14					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW12-60 (cont'd)

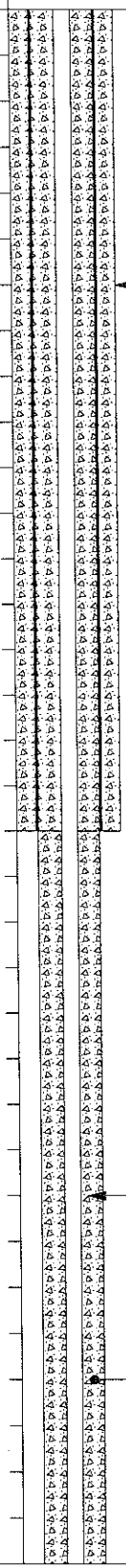
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
					CLAY (CL): dark gray to black, damp, 80% clay, ~10% fine to medium sand, ~10% gravel (<2"), very stiff, moderately plastic	
16						
18					GRAVELLY SAND (SP): black, saturated, ~70% fine to coarse sand, ~30% gravel (<2"), loose, heavy chemical odor	
20						
					CLAY (CL): dark gray, damp, very stiff, moderately plastic	
22						Cement/bentonite grout Cement/bentonite grout
24						
26						
					SANDY GRAVELLY CLAY (CH): dark greenish gray, damp, ~70% clay, ~20% fine to medium sand, ~10% gravel (<1.5"), stiff, very plastic	
28						
30						

WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW12-60 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SANDY GRAVELLY CLAY (CH): continued	
32						
34						15 1/2" Auger hole (10 1/4" ID Augers)
					SANDY GRAVEL (GP): dark gray to reddish brown, saturated, ~70% gravel (<2"), ~30% fine to coarse sand, loose	
36					SILTY CLAY (CL): reddish brown, becomes grayish brown below 39', damp, soft to very stiff, breaks in concoidal pattern locally, moderately plastic	8" Outer casing to 25'; 6" core hole to 40' as pilot hole; Reamed with 15" OD 12 7/8" ID augers
38						
40						
42				0.0		
					CLAYEY SILT (ML): greenish gray, wet, ~80% silt, ~20% clay, compact, slightly plastic	
44						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
					Very clayey with large cobbles 45'-47'	
46						Cement/bentonite grout
					Locally iron staining 47'-52'	
48						



WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW12-60 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAYEY SILT (ML): continued	
				0.0		
50						
52						Bentonite chips
					SAND (SP): reddish brown, saturated to wet, fine to medium grained, loose	
				0.0		
54						
					Same as above	
56						
						15/30 Sand
58						
						4" Diameter wraparound stainless steel screen with 0.020" slots
60						
62						
64						
						0.5' Endcap

WELL3

PROJECT: Morton Reading FI

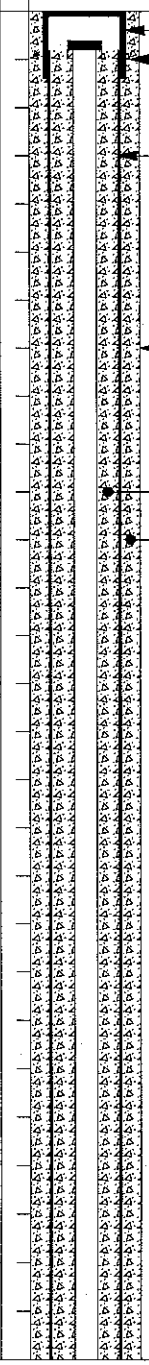
Log of Well No. LAW12-60 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SAND (SP): continued	
66					Total Depth: 66 feet below ground surface	
68						
70						
72						
74						
76						
78						
80						
82						

WELL3

PROJECT: Morton Reading FI		**Log of Well No.** LAW05-60 & LAW05-150	
BORING LOCATION: ~8' N. of UAW05		GROUND SURFACE ELEVATION AND DATUM: 553.67 (Grnd.) TOC 05-60 553.25 ft. 05-150 553.35 ft. (MSL)	
DRILLING CONTRACTOR: Boart Longyear		DATE STARTED: 3/4/02	DATE FINISHED: 3/14/02
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 155.0	SCREEN INTERVAL (ft.): 51-61 143-153
DRILLING EQUIPMENT: Gussbach Sonic		DEPTH TO WATER ATD: NA	CASING: 2" Diameter
SAMPLING METHOD: 4" Diameter Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.67 (Grnd.) TOC 05-60 553.25 ft. 05-150 553.35 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Description taken from log of UAW05-20 LEAN CLAY (CL) [FILL]: black (2.5Y 2.5/1)	Well Vault 12" Steel traffic cover set in concrete Protective steel casing
2						
4						14-1/4" Diameter borehole
					Dark brown	Cement/bentonite grout Cement/bentonite grout
6						
					POORLY GRADED SAND (SP): moist, ~90% medium sand, ~10% gravel	
8						
10						
12						
					LEAN CLAY (CL) [FILL]:	
14						

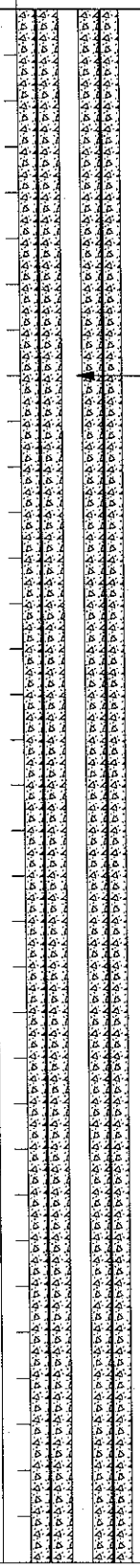


WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [FILL]: continued	
16						
18						2" Diameter flush-threaded Sch. 40 PVC riser with O-rings
20						
22						
24						
26						
28						
30						



WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

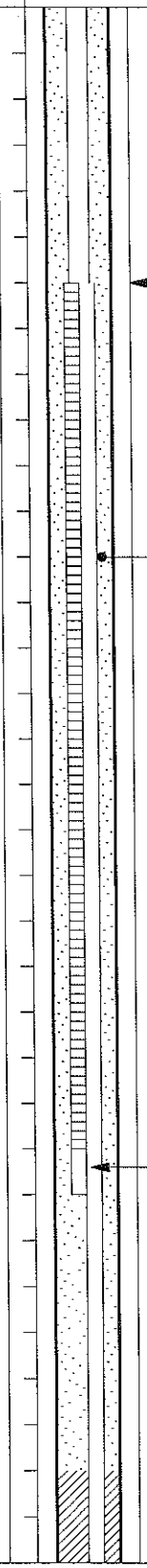
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [FILL]: continued	
32						
34						
36						
38					CLAY (CH): gray to grayish brown (10YR 5/2), moist, ~100% high plastic fines, homogeneous, hard	Cement/bentonite grout
40						
42						
44						Medium bentonite chips
46				0.0		8" Diameter borehole
48					SILT (ML) LENS at 47.4 - 48'	

WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
				0.0	SANDY CLAY (CL): grayish brown (10YR 5/2), wet, ~60% medium plastic fines, ~40% coarse sand, trace fine gravel	
50						
					POORLY GRADED SAND (SP): grayish brown (10YR 5/2), ~95% fine to medium sand, ~5% low plastic fines, homogeneous, weak cementation	Centralizer
52						
54					Fines decrease with depth	#6 Global filter pack sand
				0.0	Same as above, ~100% fine to medium sand	
56						
58						
60				0.0		4" End cap
62						
64						

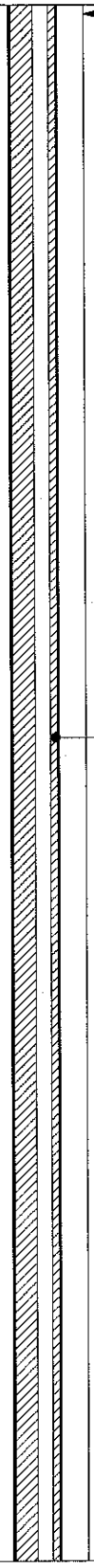


WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	Transition from 8" to 6-1/4" diameter borehole
66				1.3		
68				0.0		
70						
				0.0		
72						Bentonite Chips
74						
				0.0		
76						
78					~90% fine to medium sand, ~10% low plastic fines	
80						
82						

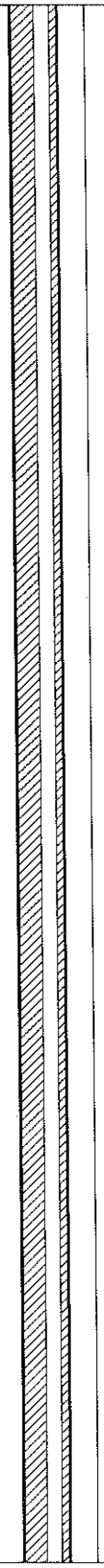


WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
84						
				0.0	84.5 - 85' (silt lens, 1/8" black laminations, no odor)	
86						
					~85% fine to medium sand, ~15% low plastic fines, moderate cementation	
88						
				0.0		
90						
92						
				0.0		
94						
					Same as above	
96						
				1.5	90% medium to fine sand, ~10% fines	
98						



PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

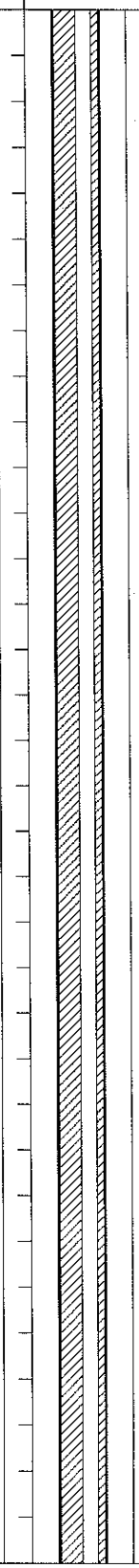
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
				0.0	POORLY GRADED SAND (SP): continued	
100						
102						
104						
					Same as above	
106						
108						
110						
112						
114						
					Same as above	
116						

WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
					Darker color with depth (dark grayish brown), loose (sand appears cemented)	
118						
120						
122						
124						
					Same as above, loose	
126						
128						
130						
132						



PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

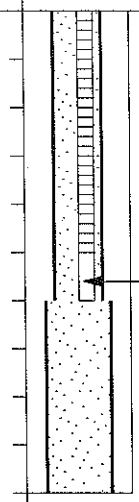
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
134						
					Same as above	
136						Medium bentonite chips
					3" Cobbles at 137' - 139', subangular to rounded, fossiliferous	
138						
140						
142						Stainless steel centralizer
144					2" Cobbles at 144' - 145', subangular to rounded	
					CLAYEY SAND WITH GRAVEL (SC): grayish brown (10YR 5/2), wet, ~60% medium sand, ~30% medium plastic fines, ~10% gravel (1-2" round	2" Diameter 0.020" slotted stainless steel wraparound screen
146						
					WELL GRADED SAND (SW) WITH GRAVEL: grayish brown (10YR 5/2), wet, ~80% well graded sand, ~15% 1-3" cobbles, ~5% low plastic fines, loose	
148						
150						

WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW05-60 & LAW05-150 (cont'd)

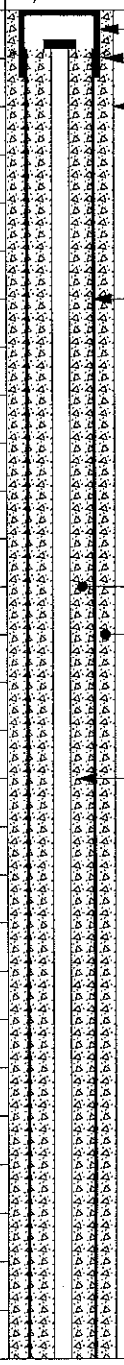
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					WELL GRADED SAND with GRAVEL (SW): continued	
152						4" End cap
					CLAY (CL): dark gray (5Y 4/1), dry, ~90% low plastic fines, ~10% fine sand, homogeneous, very hard	
154					SHALE: greenish gray (5G 6/1), dry, hard	
					Total Depth: 155 feet below ground surface	
156						
158						
160						
162						
164						
166						



WELL3

PROJECT: Morton Reading Fl	**Log of Well No. LAW12-60**
BORING LOCATION: ~7' W. of UAW12-20	GROUND SURFACE ELEVATION AND DATUM: 555.78 (Grnd.) TOC 554.89 ft. (MSL)
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 9/4/01 / DATE FINISHED: 9/8/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 66.0 / SCREEN INTERVAL (ft.): 55-65
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: 52.1' / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Core Barrel	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 555.78 (Grnd.) TOC 554.89 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					0'-18' taken from log of UAW12-20 Asphalt Sand and road base material	Well Vault 12" Steel traffic cover set in concrete 16" Hole
2					CLAY (CL): black, moist, 100% medium plastic fines, trace gravel, firm, chemical odor, black staining at 4'-15'	8" ID 8 5/8" OD Carbon steel casing
4						
6						Cement/bentonite grout Cement/ bentonite grout
8					POORLY GRADED SAND (SP): black, moist, 90% medium sand, 10% gravel 1/2"-1", chemical odor	4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
10						
12					wet	
14						



WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW12-60 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
					CLAY (CL): dark gray to black, damp, 80% clay, ~10% fine to medium sand, ~10% gravel (<2"), very stiff, moderately plastic	
16						
18					GRAVELLY SAND (SP): black, saturated, ~70% fine to coarse sand, ~30% gravel (<2"), loose, heavy chemical odor	
20						
					CLAY (CL): dark gray, damp, very stiff, moderately plastic	
22						Cement/bentonite grout Cement/bentonite grout
24						
26						
					SANDY GRAVELLY CLAY (CH): dark greenish gray, damp, ~70% clay, ~20% fine to medium sand, ~10% gravel (<1.5"), stiff, very plastic	
28						
30						

WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW12-60 (cont'd)

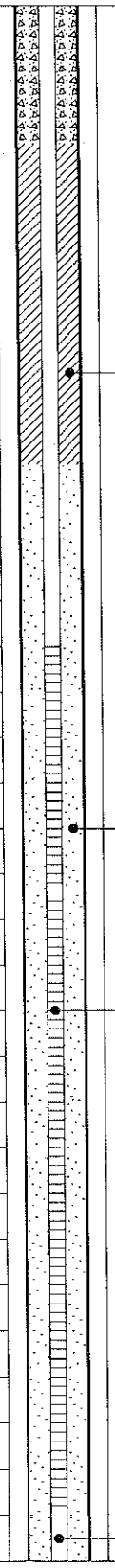
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SANDY GRAVELLY CLAY (CH): continued	
32						
34						15 1/2" Auger hole (10 1/4" ID Augers)
					SANDY GRAVEL (GP): dark gray to reddish brown, saturated, ~70% gravel (<2"), ~30% fine to coarse sand, loose	
36					SILTY CLAY (CL): reddish brown, becomes grayish brown below 39', damp, soft to very stiff, breaks in concoidal pattern locally, moderately plastic	8" Outer casing to 25'; 6" core hole to 40' as pilot hole; Reamed with 15" OD 12 7/8" ID augers
38						
40						
42				0.0		
					CLAYEY SILT (ML): greenish gray, wet, ~80% silt, ~20% clay, compact, slightly plastic	
44						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
					Very clayey with large cobbles 45'-47'	
46						Cement/bentonite grout
					Locally iron staining 47'-52'	
48						

WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW12-60 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAYEY SILT (ML): continued	
				0.0		
50						
52						Bentonite chips
					SAND (SP): reddish brown, saturated to wet, fine to medium grained, loose	
				0.0		
54						
					Same as above	
56						
						15/30 Sand
58						
						4" Diameter wraparound stainless steel screen with 0.020" slots
60						
62						
64						
						0.5' Endcap



WELL3

PROJECT: Morton Reading FI

Log of Well No. LAW12-60 (cont'd)

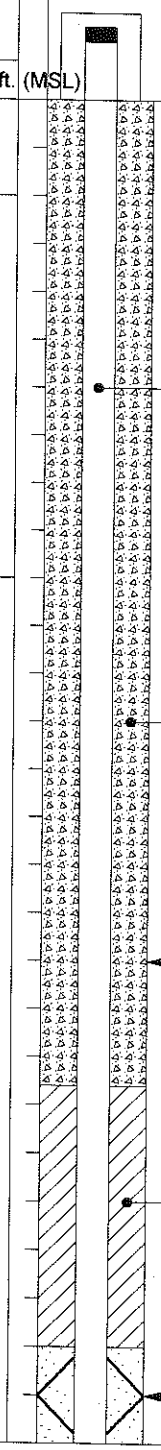
DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SAND (SP): continued	
66					Total Depth: 66 feet below ground surface	
68						
70						
72						
74						
76						
78						
80						
82						

WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW01-30**
BORING LOCATION: ~80 ft. W. of Bldg. 40	GROUND SURFACE ELEVATION AND DATUM: 561.94 (Grnd.) TOC 564.27 ft. (MSL)
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 4/2/01 / DATE FINISHED: 4/2/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 29.0 / SCREEN INTERVAL (ft.): 14 - 29
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 561.94 (Grnd.) TOC 564.27 ft. (MSL)
					Grass, [FILL]:
2	040201063			0.0	SANDY CLAY (CL): dark yellowish brown (10YR 4/4)
4					
				0.0	POORLY GRADED SAND (SP): yellowish brown (10YR 5/4), dry to moist, ~90% fine to medium sand, ~10% gravel
6					
8					
					Same as above
10				0.1	
					11' - 11.2' clay lens
12				0.0	
14					

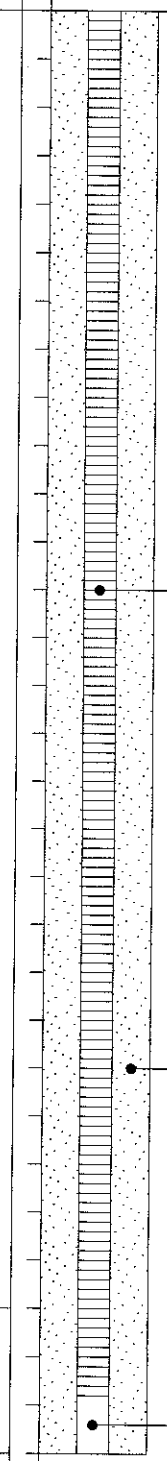
WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



PROJECT: Morton Reading FI

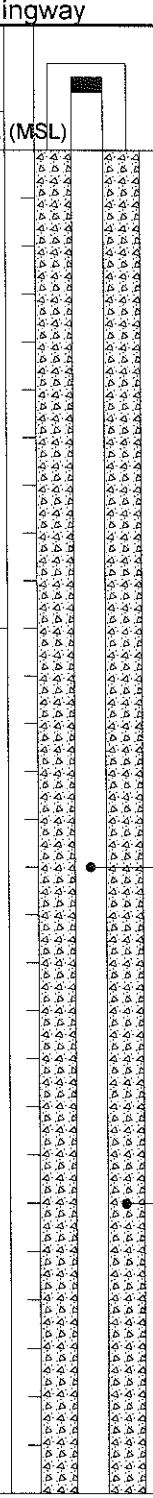
Log of Well No. UAW01-30 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
				0.7		
16						
				0.1		
18						
					Same as above	
20				0.1		4" Diameter stainless steel wraparound screen with 0.020" slots
22						
24						
				0.1		#6 Global filter pack sand
26						
					SANDY CLAY (CL) [TILL]: dark grayish brown (5GY 4/1), moist, ~70% medium plastic fines, ~30% medium sand and gravel, hard	
28						5.25" End cap
					Total Depth: 29 feet below ground surface	
30						



PROJECT: Morton Reading FI		**Log of Well No. UAW01-80**	
BORING LOCATION: ~80 ft. W. of Bldg 40		GROUND SURFACE ELEVATION AND DATUM: 561.91 (Grnd.) TOC 564.18 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 4/2/01	DATE FINISHED: 4/3/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 89.0	SCREEN INTERVAL (ft.): 64.5 - 79.5
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 561.91 (Grnd.) TOC 564.18 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					0'-29' taken from log of UAW01-30 Grass, [FILL]: SANDY CLAY WITH GRAVEL (CL): dark yellowish brown (10YR 4/4) 2' : black material [asphalt]	
2						
4						
				0.0	POORLY GRADED SAND (SP): light olive brown (2.5Y 5/1), dry to moist, ~90% fine to medium sand, ~10% gravel	
6						
8						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
10						Cement/bentonite grout
12						
14						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW01-80 (cont'd)

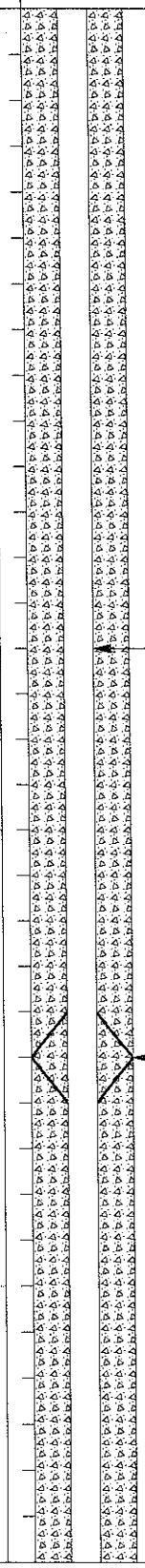
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
16						
18						
					Same as above	
20						8" Borehole
22						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
24						
26						
28					28' 2" to 3" cobbles Very dark gray (5Y 3/1), wet, odor	Cement/bentonite grout
				3.0	29.4' - 29.5' black material, chemical odor	
30				0.2	SANDY LEAN CLAY (CL) [TILL]: dark greenish gray (5GY 4/1), moist, ~85% high plastic, ~15% sand and gravel, hard, 29.5' - 29.8' : dark yellowish brown (10YR 4/4)	

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW01-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SANDY LEAN CLAY (CL) [Till]: continued	
32						
34					Softer than above	
36						
38						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
40					POORLY GRADED SAND (SP) WITH GRAVEL: gray (5Y 5/1), wet, ~95% medium sand with gravel, ~5% low plastic fines, few clay lens (1")	
42						Centralizer
44						
46					FINE SAND (SP): ~100% fine sand, trace fines, dense 47.5' - 48' : silt lens	
48						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW01-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CL) [TILL]: dark greenish gray (10GY 4/1), moist, ~90% medium to high plastic fines ~10% sand/gravel, firm	
50						
52				0.0		
					POORLY GRADED SAND (SP): olive gray (5Y 4/2), wet, ~100% medium sand, trace fines	
54						
56						
58						
					Same as above	
60						
62						Bentonite chips
64						Centralizer

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW01-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
66						
					67' black discoloration, no odor	
					CLAY (CL): greenish gray (5Y 5/1), moist, ~100% medium plastic fines, many fine black laminations, soft to firm	
68						
					POORLY GRADED SAND (SP): olive gray (5 Y 1/2), wet, ~100% medium sand, trace fines	
70					70' - 71' clay lens, 70' - 70.5' black material, no odor	
				0.0		#6 Global filter pack sand
					71.5' - 72' black discoloration	
72						
74						4" Diameter stainless steel wraparound screen with 0.020" slots
					74.5' - 75' silt lens	
76						
				0.0	77.5' - 78' black discoloration	
78					SILT (ML):	
					CLAY (CL): dark greenish gray (5GY 4/1), moist, ~100% medium plastic fines, trace fine sand, soft	5.25" End cap
80						
82						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW01-80 (cont'd)

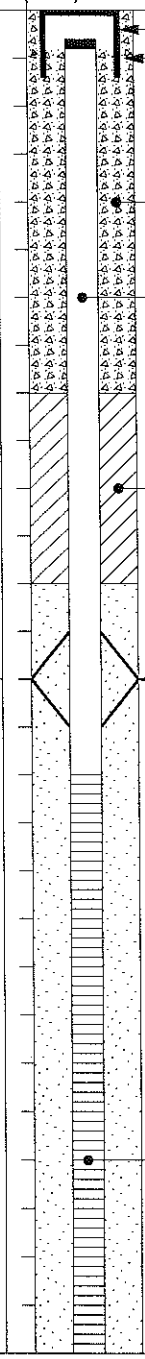
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CL): continued	8" Borehole Bentonite chips
84						
86						4" Borehole
88					POORLY GRADED SAND (SP): dark greenish gray (10Y 4/1), wet, ~100% medium sand, trace fine gravel	
					Total Depth: 89 feet below ground surface	
90						
92						
94						
96						
98						

WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW02-20**
BORING LOCATION: 8' S. of STR07	GROUND SURFACE ELEVATION AND DATUM: 551.99 (Grnd.), (TOC) 551.58 ft. (MSL)
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/21/01 / DATE FINISHED: 3/21/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 19.0 / SCREEN INTERVAL (ft.): 8 - 18
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 551.99 (Grnd.), (TOC) 551.58 ft. (MSL)
					Asphalt [FILL]
					CLAY (CL) [FILL]: dark brown to black, ~95% medium plastic fines, ~5% sand, trace gravel, iron laminations
2					
4					
					GRAVEL WITH CLAY (GP-GC): tan mottling, gravel, moist to wet, ~80% gravel, 1" to 2" ~20% medium plastic fines, trace medium sand
6					
					POORLY GRADED SAND with GRAVEL (SP): dark grayish brown (7.5Y 4/2), wet, ~90% medium sand, ~10% fine gravel, silt lens 7.5 - 8'
8					
10					
12					
14					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

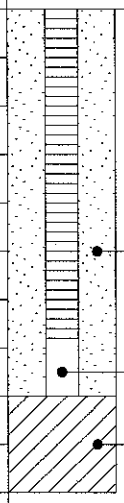


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW02-20 (cont'd)

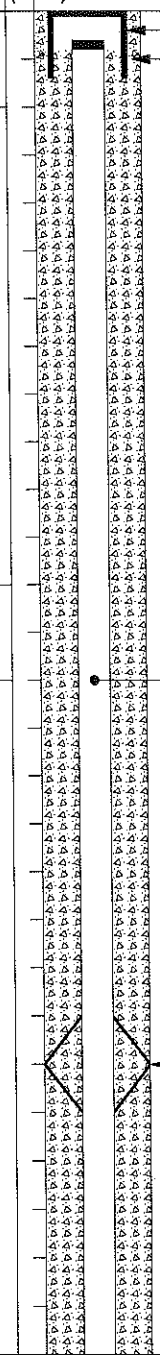
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND with GRAVEL (SP): continued 15 - 17' black staining	
16						#6 Global filter pack sand
				0.5	LEAN SANDY CLAY (CL): [TILL]: dark greenish gray (10Y 4/1), moist, ~90% high plastic fines, ~10% medium sand, trace fine gravel	5.25" End cap
18						Bentonite chips
					Total Depth: 19 feet below ground surface	
20						
22						
24						
26						
28						
30						



WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW02-40**	
BORING LOCATION: 16' South of STR07		GROUND SURFACE ELEVATION AND DATUM: 551.91 (Grnd.) TOC 551.58 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 3/21/01	DATE FINISHED: 3/22/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 47.0	SCREEN INTERVAL (ft.): 31.5 - 46.5
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 551.91 (Grnd.) TOC 551.58 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Asphalt	Well Vault; 12" Steel traffic cover set in concrete
					CLAY (CL) [FILL]: dark brown, ~ 95% medium plasticity fines, ~5% sand, trace gravel, iron lamination	
2						
4						
6					GRAVEL WITH CLAY (GP-GC): tan mottling, moist, ~80% gravel, 1" to 2", ~20% medium plastic fines, trace medium sand	
					POORLY GRADED SAND with GRAVEL (SP): dark grayish brown (7.5Y 4/2), wet, ~90% medium sand, ~10% fine gravel, silt lens 7.5'-8'	4" Diameter Sch. 40 flush-threaded PVC casing with O-rings
8						
10						Centralizer
12						
14						

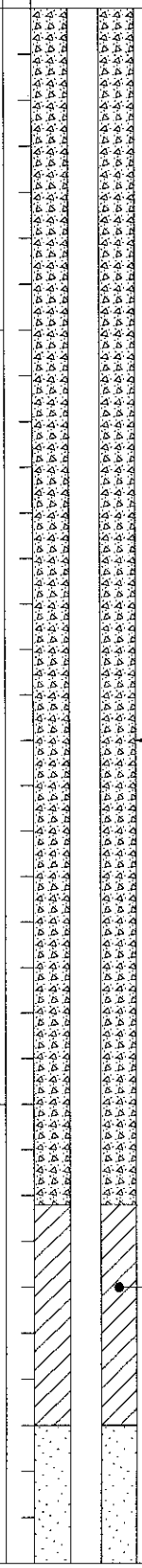


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW02-40 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND with GRAVEL (SP): continued	
16					16' - 18' black material	
18					LEAN SANDY CLAY (CL) [TILL]: dark greenish gray (10Y 4/1), moist, ~90% medium plastic fines, ~10% medium sand, trace fine gravel, hard	
20					20' 4" cobbles, fossiliferous	
22						8" Borehole
24						
26					WELL GRADED SAND (SW): dark greenish gray (10Y 4/1), wet, ~95% gravel, ~5% sand	
28						Bentonite chips
					29' - 29.8' clay lens	
30						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW02-40 (cont'd)

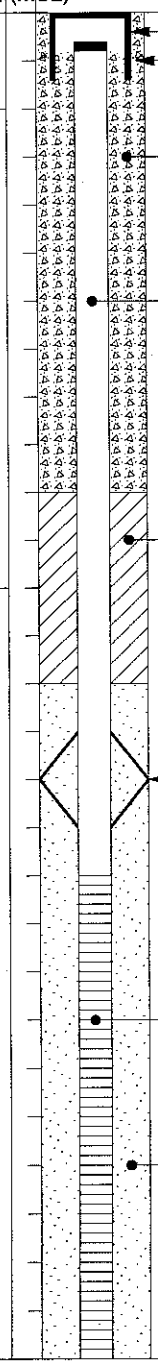
DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					WELL GRADED SAND (SW): continued	Centralizer
32						
34						
					4" clay lens	
36					4" clay lens	
38						
					Same as above	
40						4" Diameter continuous-wrap stainless steel screen with 0.020" slots
42						
						#6 Global filter pack sand
44						
46					CLAY (CL): greenish gray (10Y 5/1), moist, ~100% high plastic fines, trace fine sands, weak bedding, few black laminations, soft, no odor	
						5.25" End cap
					Total Depth: 47 feet below ground surface	
48						

WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW03-20**	
BORING LOCATION: ~70 ft. Northwest of Circle		GROUND SURFACE ELEVATION AND DATUM: 552.20 (Grnd.) TOC 551.96 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 3/23/01	DATE FINISHED: 3/23/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 19.0	SCREEN INTERVAL (ft.): 9 - 19
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 552.20 (Grnd.) TOC 551.96 ft. (MSL)
					Asphalt
2					SANDY CLAY (SC)
4					Iron colored mottling
6					SAND (SP): wet
8					
10					
12					
14					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

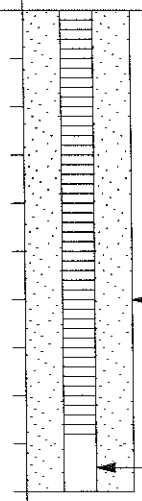


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW03-20 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SAND (SP): with gravel	
					15.5' - 17' black staining	
16						
						8" Borehole
					LEAN CLAY (CL) [TILL]	
18						
						5.25" End cap
					Total Depth: 19 feet below ground surface	
20						
22						
24						
26						
28						
30						



WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW04-20**	
BORING LOCATION: 150' Southwest of Fuel Tank	GROUND SURFACE ELEVATION AND DATUM: 552.44 (Grnd.) TOC 552.19 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/23/01	DATE FINISHED: 3/23/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 19.0	SCREEN INTERVAL (ft.): 9- 19
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

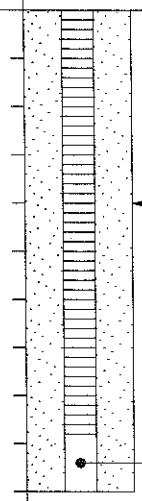
DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation: 552.44 (Grnd.) TOC 552.19 ft. (MSL)	
					Asphalt	Well Vault; 12" Steel traffic cover set in concrete
					LEAN CLAY (CL): dark brown	
2						Cement/bentonite grout
						4" Diameter Sch. 40 flush-threaded PVC casing with O-rings
4						
					Same as above	
6					Iron colored mottling	Bentonite chips
8					Becomes darker in color	Centralizer
					Same as above	
10	032301045				WELL GRADED SAND (SW):	#6 Global filter pack sand
12					11' - 11.6' Silt lens 11.8' - 13.7' black staining	4" Diameter continuous-wrap stainless steel screen with 0.020" slots
					LEAN CLAY (CL) [TILL]	
14						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW04-20 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [TILL]: continued	
16						8" Borehole
18						5.25" End cap
					Total Depth: 19 feet below ground surface	
20						
22						
24						
26						
28						
30						



WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW05-20**	
BORING LOCATION: ~70 ft. W.- S.W. of Bldg. 32	GROUND SURFACE ELEVATION AND DATUM: 553.78 (Grnd.) TOC 553.47 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/23/01	DATE FINISHED: 3/23/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 19.0	SCREEN INTERVAL (ft.): 7 - 17
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.78 (Grnd.) TOC 553.47 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [FILL]: black (2.5Y 2.5/1)	Well Vault 12" Steel traffic cover set in concrete
	032301046					Cement/bentonite grout
2						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
4						
					Dark brown	Bentonite chips
6						
					POORLY GRADED SAND (SP): moist, ~90% medium sand, ~10% gravel	
8						8" Borehole
10						#6 Global filter pack sand
12					10.5' - 13.5' black staining	4" Diameter wraparound stainless steel screen with 0.020" slots
	032301047				LEAN CLAY (CL) [TILL]:	
14						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW05-20 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [TILL]: continued	
16						5.25" End cap
18						Bentonite chips
					Total Depth: 19 feet below ground surface	
20						
22						
24						
26						
28						
30						

WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW06-20**	
BORING LOCATION: ~120 ft. S.W. of Bldg 30, S.E. of French Drain	GROUND SURFACE ELEVATION AND DATUM: 553.51 (Grnd.) TOC 553.25 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/26/01	DATE FINISHED: 3/27/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 19.0	SCREEN INTERVAL (ft.): 9 - 19
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. (Surface Elevation: 553.51 (Grnd.) TOC 553.25 ft. (MSL))	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Cement	Well Vault; 12" Steel traffic cover set in concrete
					Gravel, base material	
2	032601059			0.6	CLAY (CL) [FILL]: dark greenish black (10Y 2.5/1), moist, hard, ~95% medium plastic fines, ~5% fine sand Very dark greenish brown (2.5Y 3/2)	4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
4				0.6		Cement/bentonite grout
					Same as above	
6						Bentonite chips
8				2.5		
				5.0	WELL GRADED SAND (SW): black, wet, chemical odor	8" Borehole
10				10.7		
12	032601060			4.1		4" Diameter satinless steel wraparound screen with 0.020" slots
					LEAN SANDY CLAY (CL) [TILL]:	
14						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW06-20 (cont'd)

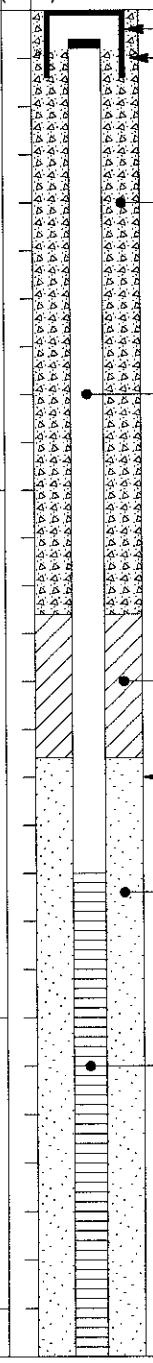
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN SANDY CLAY (CL) [TILL]: continued	
				10.9		
16						
						#6 Global filter pack sand
18				1.7		
						5.25" End cap
					Total Depth: 19 feet below ground surface	
20						
22						
24						
26						
28						
30						

WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW07-20**	
BORING LOCATION: N.W. Corner of Plant		GROUND SURFACE ELEVATION AND DATUM: 554.66 (Grnd) TOC 554.32 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 3/25/01	DATE FINISHED: 3/25/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 19.0	SCREEN INTERVAL (ft.): 9 - 19
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
					Surface Elevation: 554.66 (Grnd) TOC 554.32 ft. (MSL)
					SANDY LEAN CLAY (CL) [FILL]:
2					
4					
					SILTY SAND (SM): black staining at 5.5' - 13.5', chemical odor
6					
8					Abundant gravel
10					
					POORLY GRADED SAND (SP):
12					
					LEAN CLAY (CL) [TILL]:
14					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

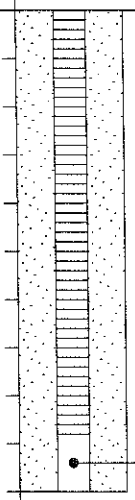


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW07-20 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [TILL]: continued	
16						
18						5.25" End cap
					Total Depth: 19 feet below ground surface	
20						
22						
24						
26						
28						
30						



WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW08-20**	
BORING LOCATION: ~70 ft. W. of Bldg. 32		GROUND SURFACE ELEVATION AND DATUM: 554.55 (Grnd.) TOC 554.20 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 3/24/01	DATE FINISHED: 3/25/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 19.0	SCREEN INTERVAL (ft.): 9 - 19
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 554.55 (Grnd.) TOC 554.20 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					0'-19' taken from log STR03	
					Concrete	Well Vault; 12" Steel traffic cover set in concrete
					Base, gravel	
					SANDY CLAY (CL): greenish black (10Y 2.5/1), dry to moist, ~20% fine sand, ~80% low plastic fines, hard, strong chemical odor	Cement/bentonite grout
2						
						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
4					Black staining at 4 ft.	
					SILTY SAND (SM): greenish black	
					SANDY CLAY (CL): black, wet, ~30% fine to medium sand, ~70% low plastic fines	
6						
8						8" Borehole
10					10.5' - 19.5' black staining, strong chemical odor	
					POORLY GRADED SAND with GRAVEL (SP-SM): black, moist, ~90% coarse sand, ~10% low plastic fines, chemical odor	
12						4" Diameter stainless steel wraparound screen with 0.020" slots
					LEAN SANDY CLAY (CL) [TILL]: olive (5Y 5/4) ~80%	
14						

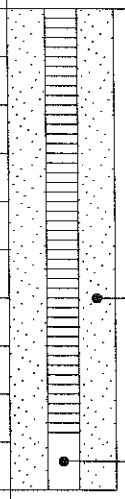
032401053

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW08-20 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					medium to high plastic fines, ~20% medium sand and fine gravel, hard, some black staining	
16					Same as above	
18						#6 Global filter pack sand 5.25" End cap
					Total Depth: 19 feet below ground surface	
20						
22						
24						
26						
28						
30						

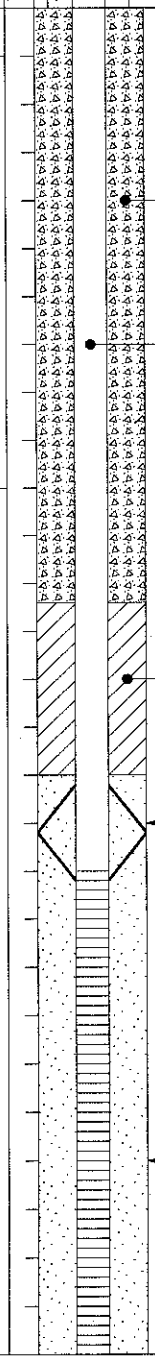


WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW09-20**
BORING LOCATION: S. of Parking Lot	GROUND SURFACE ELEVATION AND DATUM: 563.64 (Grnd) TOC 565.91 ft. (MSL)
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/27/01 / DATE FINISHED: 3/27/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 24.0 / SCREEN INTERVAL (ft.): 9 - 24
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: 12' / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
					Surface Elevation: 563.64 (Grnd) TOC 565.91 ft. (MSL)
					Grass
	032701061				CLAYEY SAND (SC) [FILL]: dark yellowish brown (10YR 3/6), moist, firm, few roots
2					
4					
					POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), moist, ~85% medium fine sand, ~15% low plastic fines, trace gravel
6					
8					
10					
					Less silt than above
12					
14					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

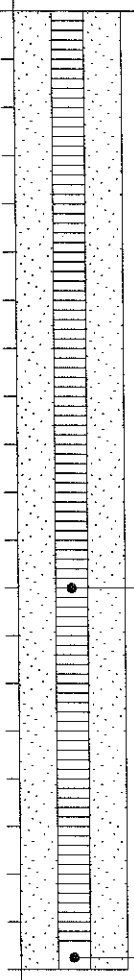


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW09-20 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
16						
	032701062					
18					18.5' - 18.8' clay lens, iron laminations	
20					21' - 21.5' gravel lens	4" Diameter stainless steel wraparound screen with 0.020" slots
22					SANDY LEAN CLAY (CL) [TILL]: dark yellowish brown (10YR 4/4), moist, ~85% high plastic fines, ~15% sand/gravel, hard 22' - 24' dark greenish gray (10Y 4/4), less sand than above	
24					Total Depth: 24 feet below ground surface	0.75" End Cap
26						
28						
30						



WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW09-60**	
BORING LOCATION: S. of Parking Lot		GROUND SURFACE ELEVATION AND DATUM: 563.64 (Grnd.) TOC 566.32 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 3/27/01	DATE FINISHED: 3/28/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 59.0	SCREEN INTERVAL (ft.): 47 - 57
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

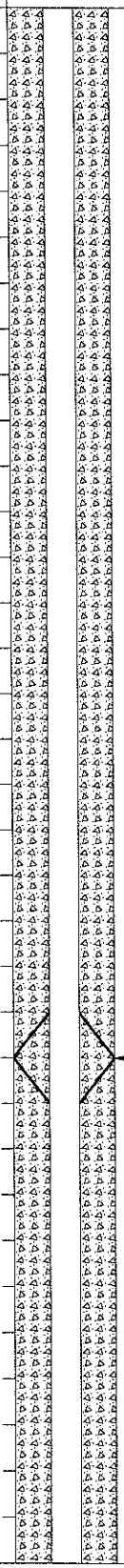
DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.64 (Grnd.) TOC 566.32 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					0'-24' taken from log of UAW 09-20 Grass/topsoil CLAYEY SAND (SC) [FILL]: dark yellowish brown (10YR 3/6), moist, firm, few root	
2						
4						8" Borehole
					POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), moist, ~85% medium fine sand, ~15% low plastic fines, trace gravel	
6						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
8						
					Same as above	
10						
12						
14						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW09-60 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
16						
18						
20						
					LEAN SANDY CLAY (CL) [TILL]: dark yellowish brown (10YR 4/4), moist, ~85% high plastic fines, ~15% sandy gravel, hard 21.5' : dark greenish gray (10Y 4/4)	
22						
24						
					2" - 3" fossiliferous cobbles at 25'	Centralizer
26						
28						
					Same as above	
30						

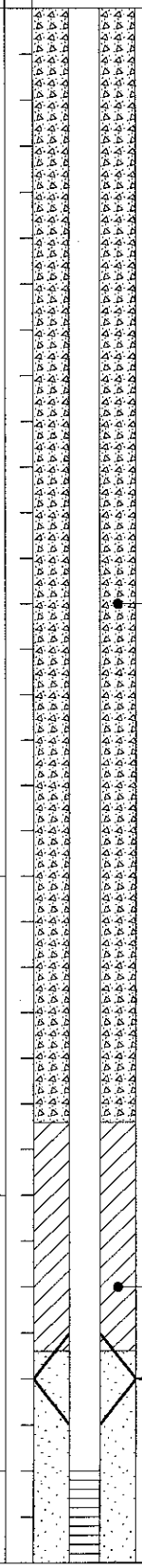


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW09-60 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN SANDY CLAY (CL) [TILL]: continued	
32						
34						
36						
					Becomes softer	Cement/bentonite grout
38						
40						
					SILT (ML): dark gray (5Y 4/1), moist, hard, 100% low plastic fines	
42						
44					SILTY SAND (SM): olive brown (2.5Y 4/3), wet, ~90% fine sand, ~10% fines, silt lens	Bentonite chips
46						Centralizer
					POORLY GRADED SAND (SP): olive brown (2.5Y 4/3), wet, 100% fine medium sand, trace fines	
48						



WELL3

PROJECT: Morton Reading FI

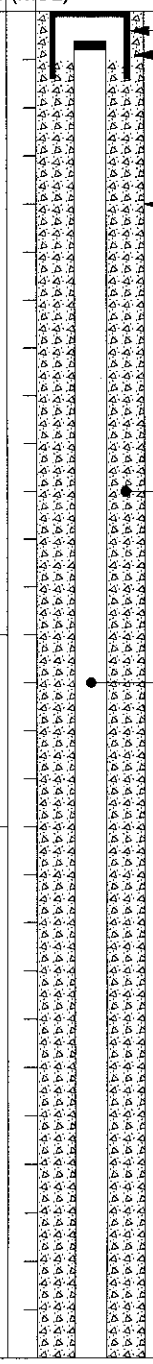
Log of Well No. UAW09-60 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SILT (ML): grayish brown (2.5Y 5/2), with light olive brown (2.5Y 5/6) mottling, moist, 100% low plastic fines, trace fine sand, hard	
50					POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), wet, 100% fine sand, 4" cobbles	
52						8" Borehole
						4" Diameter stainless steel wraparound screen with 0.020" slots
54						
						#6 Global filter pack sand
56					LEAN CLAY (CL) [TILL]: greenish gray (10Y 5/1), moist, hard, 95% high plastic fines, 5% gravel	
						0.75" End cap
						Bentonite chips
58						
						4" Borehole
					58.5' - 58.7' Poorly graded sand	
					Total Depth: 59 feet below ground surface	
60						
62						
64						

WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW10-50**	
BORING LOCATION: N.E. Corner of Plant	GROUND SURFACE ELEVATION AND DATUM: 578.34 (Grnd.) TOC 577.77 ft. (MSL)	
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 8/21/01	DATE FINISHED: 8/22/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 60.0	SCREEN INTERVAL (ft.): 47-57
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: 43'	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Rotasonic Core	LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 578.34 (Grnd.) TOC 577.77 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Fill Material CLAYEY SAND (SC): dark brown, wet, ~85% sand, ~10% clay and poorly graded fine to medium sand, ~5% pebbles, slighty firm, loose, few calcareous pebbles,	Well Vault 12" Steel traffic cover set in concrete
				0.0		
2						8" Borehole
				0.0		
4						
						Cement/bentonite grout
6				0.0		
					GRAVELLY SANDY CLAY (CL): light brown, damp, ~75% clay with ~20% medium sand, and ~5% gravel, slightly plastic	4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
				0.0		
8				0.0		
					CLAY (CH): grayish brown, damp, stiff, plastic, slightly mottled with dark gray clay	
10				0.0		
					Same as above but becomes gray with slight hydrocarbon odor (possibly ambient - no elevated PID reading)	
12				0.0		
				0.0		
14						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW10-50 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CH): continued	
				0.0		
16						
				0.0		
18						Centralizer
20						
22						
				0.0		
24						
					Same as above	8" Borehole
26						
28				0.0		
30						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW10-50 (cont'd)

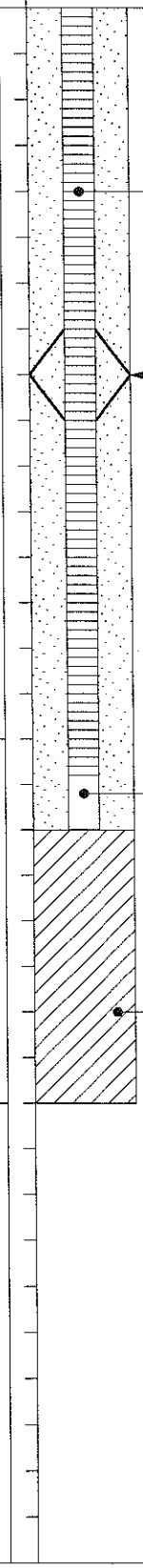
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CH): continued	
32						
				0.0		
34						
					Same as above	
36						
38						
				0.0	SANDY CLAY (CL): grayish brown, wet, ~50% clay with ~50% fine sand, slightly plastic, soft	
					CLAY (CH): yellowish brown, damp, very stiff, very plastic	
40						
					GRAVELLY SANDY CLAY (CL): yellowish brown, stiff, ~70% clay, ~20% fine to medium sand, ~10% fine (<1/4") gravel, moderately plastic	
42						Bentonite chips
				0.0		
					SAND (SP): brown, wet to saturated, medium grained to fine, loose	
44						
46						16-30 Sand
48						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW10-50 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					GRAVELLY SANDY CLAY (CL): brown, wet, ~85% clay with ~10% fine sand, and ~5% fine gravel, moderately plastic, stiff	
					GRAVELLY SAND (SW): brown to dark brown, saturated, ~90% sand fine to medium grained with ~10% fine to very coarse gravel (<1/4"), loose	
50						4" Diameter stainless steel wraparound screen with 0.020" slots
52				0.0		Centralizer
54						
56					GRAVELLY SANDY CLAY (CL): greenish gray to dark green, dry to damp, ~70% clay, ~20% very fine to coarse grained sand, ~10% gravel locally <1/4" diameter (granitic), nonplastic to slightly plastic, glacial till, very hard	6" Stainless steel end cap
58				0.0		Bentonite hole plug
60					Total Depth: 60 feet below ground surface	
62						
64						



WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW10-80**
BORING LOCATION: N.E. Corner of Plant; ~6' E. of UAW10-50	GROUND SURFACE ELEVATION AND DATUM: 578.27 (Grnd.) TOC 577.8 ft. (MSL)
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 9/5/01 / DATE FINISHED: 9/6/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 87.0 / SCREEN INTERVAL (ft.): 76-86
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: 44' / CASING: 4" Diameter PVC
SAMPLING METHOD: 6" X 10' Core Barrel	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

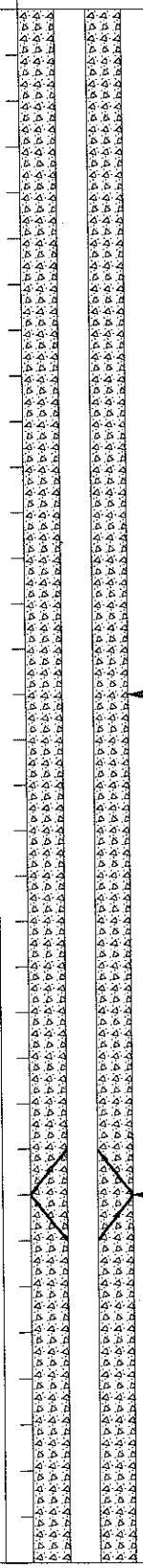
DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 578.27 (Grnd.) TOC 577.8 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Fill material (gravel)	Well Vault 12" Steel traffic cover set in concrete
2				0.0	CLAYEY SAND (SC): dark brown, wet, ~85% fine to medium grained sand, ~10% clay, ~5% calcareous pebbles, loose to slightly firm	
4						
6						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
				0.0	GRAVELLY SANDY CLAY (CL): light brown, damp, ~30% clay, ~50% gravel (<1"), ~20% medium sand slightly, plastic	
8						
					CLAY (CH): grayish brown, damp, stiff, plastic, slightly mottled with dark gray clay	
10					Same as above, becoming gray	
12				0.0		
14						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW10-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CH): continued	
16						
18				0.0		
20						
						8" Borehole
22						
				0.0		
24						
					Same as above	
26						
						Centralizer
28				0.0		
30						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW10-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CH): continued	
32						
34						
36						
						Cement/bentonite grout
38						
					SANDY CLAY (CL): grayish brown, wet, ~50% fine sand, ~50% clay, slightly plastic, ~50% fine sand, soft	
					CLAY (CH): yellowish brown, damp, very stiff, very plastic	
40						
					GRAVELLY SANDY CLAY (CL): yellowish brown, stiff, ~70% clay, ~20% fine to medium sand, and ~10% fine gravel (0.25"), plastic, moderately stiff	
42						
					SAND (SP): brown, wet to saturated, loose, fine to medium grained, loose	
44						
46						
48						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW10-80 (cont'd)

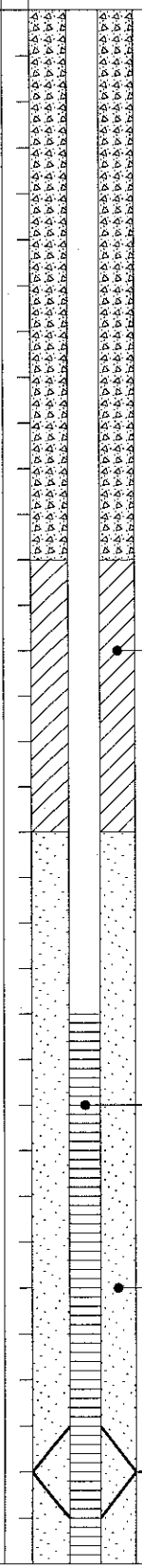
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					GRAVELLY SANDY CLAY (CL): brown, wet, ~85% clay, 10% fine sand, ~5% fine gravel (<0.25"), moderately plastic	
					GRAVELLY SAND (SW): brown to dark brown, saturated,~90% fine to medium grained, ~10% fine to very coarse gravel (up to ~4"), loose	
50						
52						
54						
56					GRAVELLY SANDY CLAY (CL): greenish gray to dark green, dry to damp, ~70% clay, ~20% very fine to coarse grained sand, ~10% gravel (<~4" diameter locally), nonplastic to slightly plastic, very hard	
58						
60						
62						
64					SILTY CLAY (CL): dark gray, wet to saturated, ~70-60% clay ~30-40% silt, slightly plastic	

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW10-80 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SILTY SAND (CL): continued Very large cobbles at 65 - 75' Up to and greater than 6" diameter	
66						
68						
70						
72						Bentonite chips
74						
					Same as above	
76						
						4" Diameter stainless steel wraparound screen with 0.020" slots
78						
						15/30 Sand
80						
						Centralizer
82						

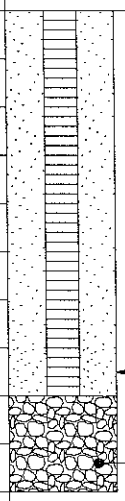


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW10-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SAND (SP): brown, saturated, very fine to medium grained, well bedded with silt laminae locally, loose to moderately campact	
84						
86					GRAVELLY SANDY CLAY	0.5' End cap; Formation material
					Total Depth: 87 feet below ground surface	
88						
90						
92						
94						
96						
98						

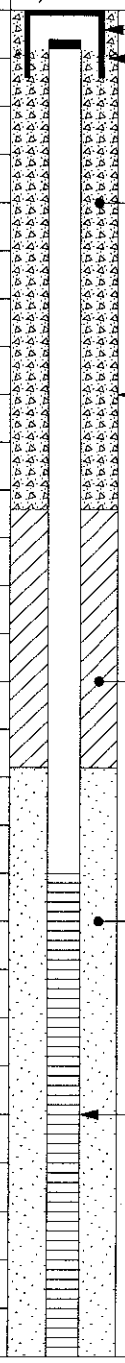


WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW11-10**	
BORING LOCATION: S. of Tank Farm		GROUND SURFACE ELEVATION AND DATUM: 553.83 (Grnd.) TOC 553.48 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 4/17/01	DATE FINISHED: 4/17/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 14.5	SCREEN INTERVAL (ft.): 9 - 14
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: J. Eidem	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.83 (Grnd.) TOC 553.48 ft. (MSL)
					0'-14.5' taken from log of UAW11-40 Concrete
					LEAN CLAY (CL): olive gray (5Y 4/2), moist, ~95% medium plasticity fines, ~5% fine sand, firm, no structure
2					
4					
6					
8					
10					POORLY GRADED SAND (SP): olive (5Y 5/2) dry to moist, ~95% fine and medium sand, ~5% fines with gravel
12					
14					SANDY LEAN CLAY [TILL]: dark gray (2.5Y 4/1), moist, ~70% high to medium plastic fines, ~30% sand

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW11-10 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					and medium gravel, hard, no structure	0.75" End cap
					Total Depth: 14.5 feet below ground surface	
16						
18						
20						
22						
24						
26						
28						
30						

WELL3

PROJECT: Morton Reading FI	Log of Well No. UAW11-40	
BORING LOCATION: S. of Tank Farm	GROUND SURFACE ELEVATION AND DATUM: 553.73 (Grnd.) TOC 553.45 ft (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 4/17/01	DATE FINISHED: 4/17/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 45.0	SCREEN INTERVAL (ft.): 34 - 44
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: J. Eidem	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 553.73 (Grnd.) TOC 553.45 ft (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Concrete	Well Vault; Steel traffic cover set in concrete
2	041701087				LEAN CLAY (CL): olive gray (5Y 4/2), moist, ~95% medium plastic fines, ~5% fine sand, firm, no structure	
4					More sand than above, ~80% fines, ~20% sand	
				1.9	POORLY GRADED SAND (SP): olive (5Y 5/2), dry to moist, ~95% fine and medium sand, ~5% fines few gravel, black (N 2/5) at 6.5' bgs	
6						4" Diameter PVC riser
				1.4		
8						Cement/bentonite grout
10	041701088				6.5' - 14.5' : black discoloration	8" borehole
12						Centralizer
14					SANDY LEAN CLAY (CL) [TILL]: dark gray (2.5Y	

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW11-40 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					4/1), moist, 70% high to medium plastic fines, 30% sand and medium gravel, hard, no structure	
				4.4		
16						
				9.8		
18						
20				6.7		4" Diameter PVC riser
22					Dark greenish gray (5GY 4/1)	
24						
				0.0		Cement/bentonite grout
26						
						8" Diameter borehole
28						
30					CLAY (CL): dark grayish brown (10YR 4/2), moist to wet, firm, 100% high plastic fines, trace fine sand,	Bentonite chips

WELL3

PROJECT: Morton Reading FI

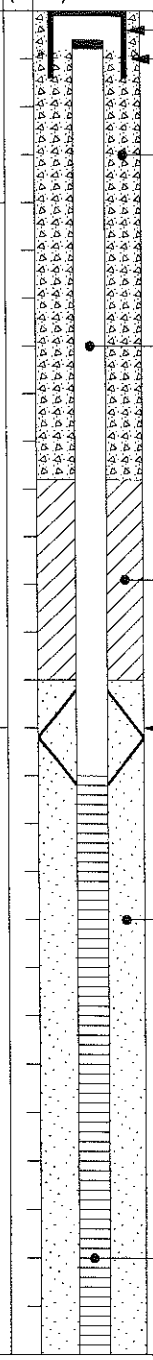
Log of Well No. UAW11-40 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					homogeneous	
32						
						Centralizer
					33.5'-34' olive (5Y 5/6), trace gravel	
34						
				0.0		
36						8" Borehole
					POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), moist to wet, 95% coarse sand, 5% fines	
38					38'-43' fine sand	
						4" Diameter stainless steel continuous wrap screen with 0.020" slots
40						
42					Cobble, coarse sand at contact	#6 Global filter pack sand
					SILT (MC): yellowish brown (10YR 5/4), dry to moist, 100% low plastic fines, few iron colored mottles, hard	
44						0.75" End cap
						Formation material
				0.0	Total Depth: 45 feet below ground surface	
46						
48						

WELL3

PROJECT: Morton Reading FI	Log of Well No. UAW12-20	
BORING LOCATION: N. of Slurry Wall Near Gate	GROUND SURFACE ELEVATION AND DATUM: 555.49 (Grnd.) TOC 555.19 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/24/01	DATE FINISHED: 3/24/01
RILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 18.0	SCREEN INTERVAL (ft.): 8 - 18
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: J. Eidem	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 555.49 (Grnd.) TOC 555.19 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Asphalt Sand and road base material	Well Vault 12" Steel traffic cover set in concrete Cement/bentonite grout
2					CLAY (CL): black, moist, firm, 100% medium plastic fines, firm, trace gravel, chemical odor, black staining at 4 - 15'	4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
4						
6						Bentonite Chips
					POORLY GRADED SAND (SP): black, moist, ~90% medium sand, ~10% 1/2" - 1" gravel, chemical odor	Centralizer
8						
						#6 Global filter pack sand
10						
12	032401049				Wet	4" Diameter stainless steel wraparound 0.020" slots
14						

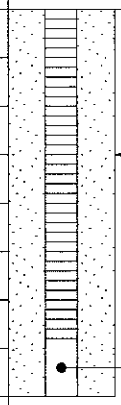


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW12-20 (cont'd)

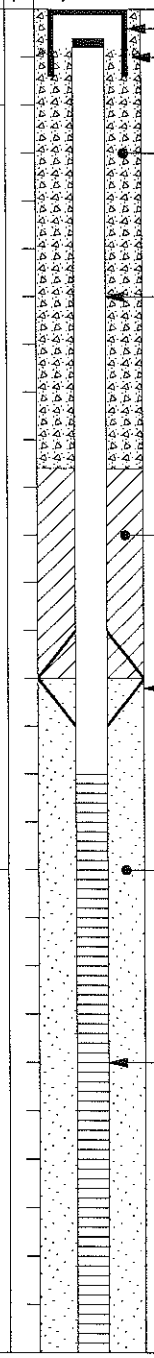
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
16					LEAN CLAY (CL) [TILL]: some black staining up to 15', becomes dark greenish gray (5GY 4/1), moist to dry, ~80% high to medium plastic fines, ~20% sand and gravel, moist to dry, very hard, cobble present at 17'	8" Borehole
18					Total Depth: 18 feet below ground surface	5.25" End cap
20						
22						
24						
26						
28						
30						



WELL3

PROJECT: Morton Reading FI	Log of Well No. UAW13-20	
BORING LOCATION: S. of Slurry Wall Near N. Gate	GROUND SURFACE ELEVATION AND DATUM: 555.86 (Grnd.) TOC 555.54 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 3/24/01	DATE FINISHED: 3/24/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 18.0	SCREEN INTERVAL (ft.): 8 - 18
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 555.86 (Grnd.) TOC 555.54 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					0'-18' taken from log of UAW12-20 Asphalt Sand and road base material	Well Vault 12" Steel traffic cover set in concrete
2	032401050				CLAY (CL): black, moist, firm, 100% medium plastic fines, firm, trace gravel, chemical odor, black staining at 4 - 15'	Cement/bentonite grout
4						4" Diameter Sch. 40 PVC riser with O-rings
6					Black staining at 5 - 15.5' Strong chemical odor	Bentonite chips Centralizer
8						
10					POORLY GRADED SAND (SP): black, moist, ~90% medium sand, ~10% 1/2"-1" gravel, few clay seams, chemical odor	#6 Global filter pack sand
12	032401051				Saturated	4" Diameter stainless steel wraparound screen with 0.020" slots
14						

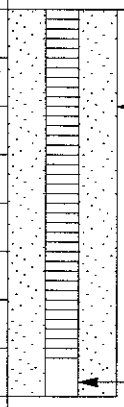


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW13-20 (cont'd)

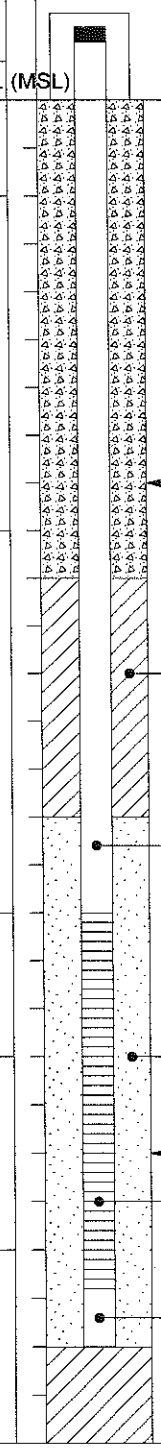
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	8" Borehole
16					LEAN CLAY (CL) [TILL]: some black staining up to 15' becomes dark greenish gray (5GY 4/1), moist to dry, ~80% high to medium plastic fines, ~20% sand and gravel, very hard	
18					Total Depth: 18 feet below ground surface	5.25" End cap
20						
22						
24						
26						
28						
30						



WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW14-10**	
BORING LOCATION: E. of Main Gate on Fence Line		GROUND SURFACE ELEVATION AND DATUM: 564.22 (Grnd.) TOC 566.74 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 4/4/01	DATE FINISHED: 4/4/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 17.0	SCREEN INTERVAL (ft.): 8.5 - 13.5
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 564.22 (Grnd.) TOC 566.74 ft. (MSL)
					Grass
	040401067				SANDY CLAY (CL) [FILL]:
2					
4					
					CLAYEY SAND (SC): dark grayish brown (10YR 4/1), moist to wet
6					
8					
					CLAY (CL): yellowish brown (10YR 5/4), moist, ~95% medium plastic fines, ~5% sand and gravel, firm
10					POORLY GRADED SAND with SILT (SM): dark yellowish brown (10YR 9/4), wet, ~80% medium sand and gravel, ~20% medium plastic fines
12					LEAN CLAY (CL) [TILL]: olive gray (5Y 4/2), moist, ~80% high plastic fines, ~20% fine sand and gravel, hard
14					



WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

WELL3

PROJECT: Morton Reading FI

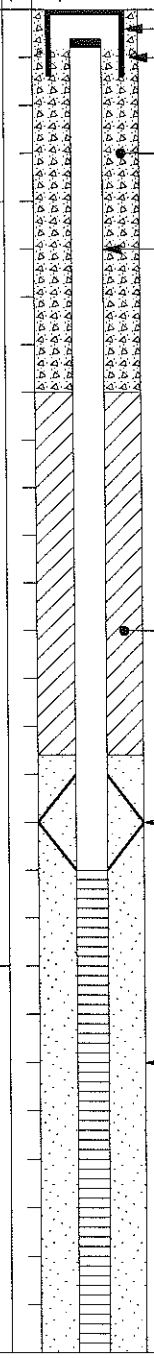
Log of Well No. UAW14-10 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [TILL]: continued more gravel (1'-2") than above	
16					becomes very hard and dry 16'-17' cobble	4" Borehole
					Total Depth: 17 feet below ground surface	
18						
20						
22						
24						
26						
28						
30						

WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW15-20**	
BORING LOCATION: N. of Bldg. 18 (10'-12' S. of UAW15-50)		GROUND SURFACE ELEVATION AND DATUM: 561.65 (Grnd.) TOC 561.34 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 4/9/01	DATE FINISHED: 4/9/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 19.0	SCREEN INTERVAL (ft.): 9 - 19
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation: 561.65 (Grnd.) TOC 561.34 ft. (MSL)	
					0'-19' taken from log of UAW15-50 Asphalt, base material	Well Vault 12" Steel traffic cover set in concrete Cement/bentonite grout
2	040901079 040901080 (duplicate)				SANDY CLAY (SC) [FILL]: very dark gray (5Y 3/1), moist, firm	4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
4						
6						Bentonite chips
8	040901081					Centralizer
10					POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), moist, ~100% fine to medium sand	8" Borehole
12						
14						

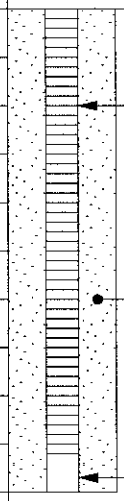


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW15-20 (cont'd)

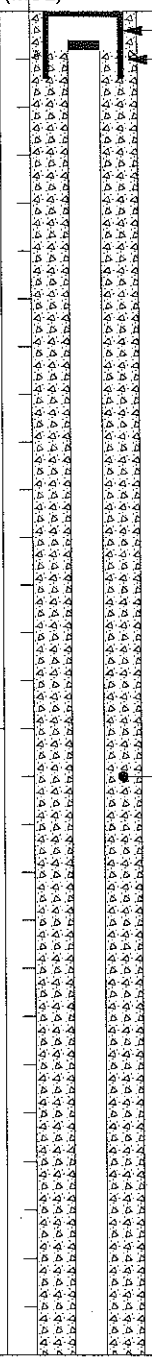
DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	4" Diameter stainless steel wraparound screen with 0.020" slots
16						
					CLAY (CL): dark grayish brown (10YR 4/2), moist, ~100% high plastic fines, homogeneous	#6 Global filter pack sand
18						5.5" End cap
					Total Depth: 19 feet below ground surface	
20						
22						
24						
26						
28						
30						



WELL3

PROJECT: Morton Reading Fl	**Log of Well No. UAW15-50**
BORING LOCATION: N. of Bldg. 18	GROUND SURFACE ELEVATION AND DATUM: 516.31 (Grnd.) TOC 560.96 ft. (MSL)
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 4/8/01 / DATE FINISHED: 4/8/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 59.0 / SCREEN INTERVAL (ft.): 42.3 - 47.3
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 516.31 (Grnd.) TOC 560.96 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Asphalt, base material	Well Vault; 12" Steel traffic cover set in concrete
2				0.0	SANDY CLAY (SC) [FILL]: very dark gray (5Y 3/1), moist, firm	
4						
6				0.0	Dark yellowish brown (10YR 4/4), hard	
8				0.0	POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), moist, ~100% fine to medium sand	Cement/bentonite grout
10					4" Cobbles Coarser than above	
12				0.0		
14						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW15-50 (cont'd)

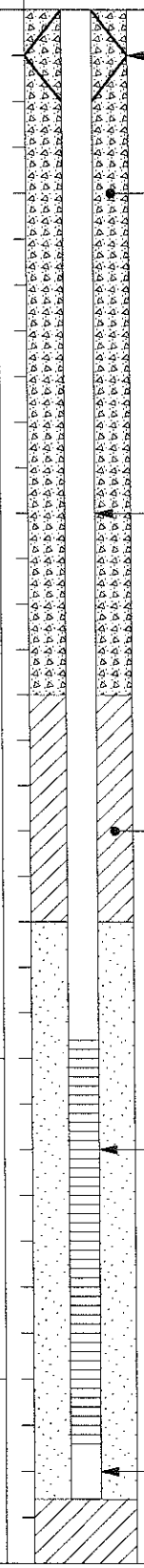
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
				0.0	POORLY GRADED SAND (SP): continued	
					CLAY (CL): dark grayish brown (10YR 4/2), ~100% high plastic fines, moist, homogeneous	
16				0.0		
					Dark gray (10YR 4/1)	
18				0.0		
					Same as above	
20						
22						
24				0.0		Cement/bentonite grout
					Yellowish brown (10YR 5/4)	
26						
				0.0	27' - 27.5' sand lens	
28					POORLY GRADED SAND (SP): yellowish brown (10YR 5/4), moist to wet, ~100% medium sand, trace fines	
				0.0		
30					LEAN SANDY CLAY (CL) [TILL]: dark gray (2.5Y 4/1), ~80% medium plastic fines, ~10% sand gravel, hard	

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW15-50 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
32						Centralizer
						Cement/bentonite grout
34					33.5' - 38' olive brown (2.5Y 4/4)	
36					36.5' - 38.5' abundant 3" to 4" cobbles	4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
38					Dark gray (2.5Y 4/1)	
40						Bentonite chips
42					POORLY GRADED SAND (SP): olive gray (5Y 4/2), wet, ~100% fine to medium sand	
44						4" Diameter stainless steel wraparound screen with 0.020" slots
46					LEAN CLAY (CL): dark gray (5Y 4/1), moist, ~100% medium plastic fines, trace fine sand, hard, homogeneous, fine black laminations	
						5.5" End cap
48						



WELL3

PROJECT: Morton Reading FI

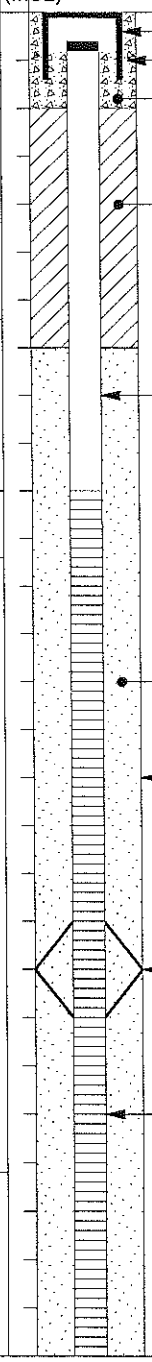
Log of Well No. UAW15-50 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					48' - 48.5' : sand lens white crystal material	8" Borehole
50					SANDY LEAN CLAY (CL) [TILL]: dark greenish gray (5GY 4/1), ~85% medium to high plastic fines, ~15% sand/gravel, very hard <1" sand lens at 50.5'	Bentonite
52						4" Borehole
54						
56						
58						Formation material
					Total Depth: 59 feet below ground surface	
60						
62						
64						

WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW16-10**
BORING LOCATION: ~60 ft. W. of Bldg. 21	GROUND SURFACE ELEVATION AND DATUM: 555.00 (Grnd.) TOC 554.71 ft. (MSL)
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 8/22/01 / DATE FINISHED: 8/22/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 15.5 / SCREEN INTERVAL (ft.): 5 - 15
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: 5.7' / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Core Barrel	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	OVM Reading	DESCRIPTION: NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. (Surface Elevation: 555.00 (Grnd.) TOC 554.71 ft. (MSL))
					Concrete
					Caliche fill
2	08220176			0.0	CLAYEY GRAVELLY SAND (SC): dark brown, ~30% clay plastic, ~10% fine gravel (<1/2"), ~60% fine to medium sand, moist
4				0.0	SANDY CLAY (CH): light brown to brown, wet, soft, very plastic
6	08220177			0.5	CLAYEY SAND (SW/SC): tan to dark brown, damp, ~10% gray clay interbeds and rip up clasts, ~90% fine to coarse sand, loose, moderate hydrocarbon odor
8				1.7	GRAVELLY SAND (SW): black, saturated, ~10% fine gravel (<1/2"), clay as above down to 6.2', ~90% fine to coarse grained sand, loose, heavy hydrocarbon odor, possible free hydrocarbon, intense black staining
				2.4	
10				52.6	
12				38.5	SANDY GRAVELLY CLAY (CL): dark gray, damp, ~20% fine to coarse sand, ~20% gravel (<2"), ~60% gray clay, very stiff, moderately plastic, hydrocarbon staining locally along small fractures
14					



WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

WELL3

PROJECT: Morton Reading FI

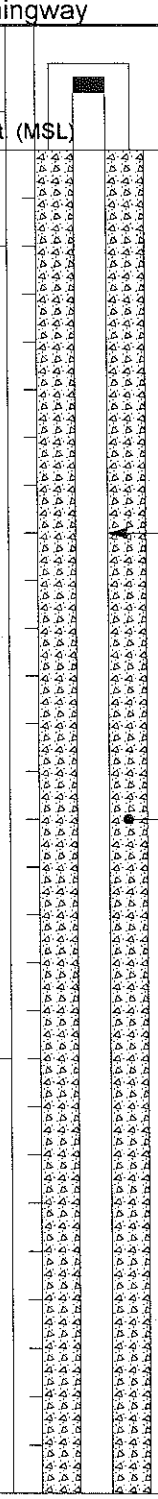
Log of Well No. UAW16-10 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SANDY GRAVELLY CLAY (CL): continued	6" End cap
					Total Depth: 15.5 feet below ground surface	
16						
18						
20						
22						
24						
26						
28						
30						

WELL3

PROJECT: Morton Reading FI	Log of Well No. UAW17-40	
BORING LOCATION: S. of Bldg. 26	GROUND SURFACE ELEVATION AND DATUM: 574.68 (Grnd.) 577.11 TOC, ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 4/5/01	DATE FINISHED: 4/5/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 49.0	SCREEN INTERVAL (ft.): 24.5 - 39.5
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation: 574.68 (Grnd.) 577.11 TOC, ft. (MSL)	
					Grass, [FILL]	
2	040501070			0.0	SANDY CLAY (CL) [FILL]: dark yellowish brown (10YR 4/4), moist, ~80% medium plastic fines, ~20% sand, gravel, firm	
4						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
6	040501071			4.2	4.5' - 5' : black material, odor, metallic object [sheet metal, wire, glass?]	Cement/bentonite grout
8				0.0	9.5' : 4" Cobble	
10				0.3	LEAN CLAY (CL) [TILL]: light olive brown (2.5Y 5/4), moist, ~85% medium plastic fines, ~15% sand/gravel, firm to hard	
12				0.1	Dark greenish gray (10Y 4/1)	
14						

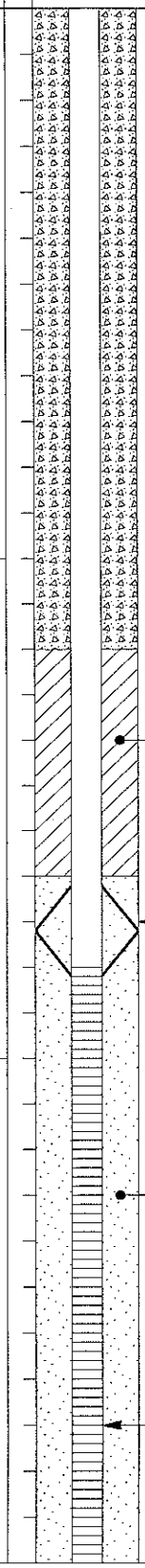


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW17-40 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL) [TILL]: continued	
				0.1		
16						
				0.1		
18					Increasing sand content	
					2" to 3" cobbles	
20				0.0	POORLY GRADED SAND (SP): dark gray (5Y 4/1), wet, 100% fine sand	
22						Bentonite chips
24						Centralizer
					1"-2" gravel, wood 1"x 3"	
26				0.0	POORLY GRADED SAND (SP): olive gray (5Y 4/2), wet, 100% medium to coarse sand	
						#6 Global filter pack sand
28						
						4" Diameter stainless steel wraparound screen with 0.020" slots
30					Same as above	

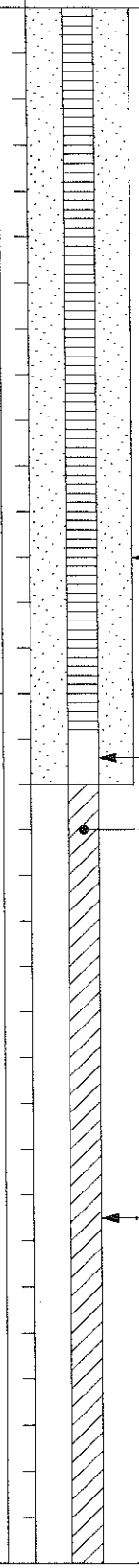


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW17-40 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
32						
34						
36						8" Borehole
38				0.0		
					CLAY (CL): dark gray (2.5Y 4/1), moist, 100% high plastic fines, homogeneous, soft	5.5" End cap
40						Bentonite chips
42						
44						4 " Borehole
				0.0		
46						
48						



WELL3

PROJECT: Morton Reading FI

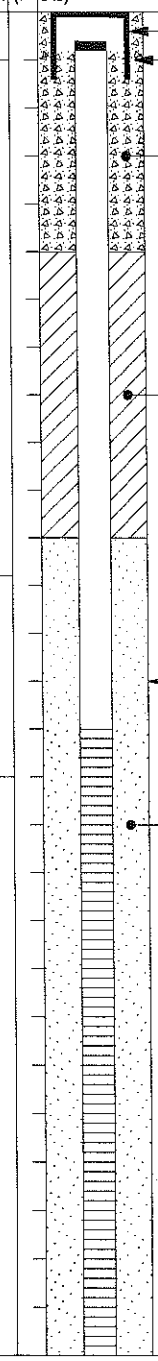
Log of Well No. UAW17-40 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CL): continued	4" Borehole
					Total Depth: 49 feet below ground surface	
50						
52						
54						
56						
58						
60						
62						
64						

WELL3

PROJECT: Morton Reading FI	Log of Well No. UAW18-20	
BORING LOCATION: Near S.W. Corner Bldg. 22	GROUND SURFACE ELEVATION AND DATUM: 556.50 (Grnd.) TOC 556.17 ft. (MSL)	
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 8/23/01	DATE FINISHED: 8/23/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 25.0	SCREEN INTERVAL (ft.): 7.5 - 17.5
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 6" X 10' Core Barrel	LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 556.50 (Grnd.) TOC 556.17 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
				0.5	Concrete	Well Vault; 12" Steel traffic cover set in concrete
					Base/fill material	
	082301178			20.4	SANDY GRAVELLY CLAY (CL): brown, wet, ~60% clay,~30% fine to coarse sand, ~10% fine gravel, soft, moderately plastic	Cement/bentonite grout
2						
				0.0		
4						Bentonite chips
6				0.0	GRAVELLY SAND (SW): brown to gray, wet, ~70% sand, ~30% gravel (<2"), loose, uncemented	8" Borehole
8				4.7	SAND (SW): brown, wet to saturated, fine to coarse grained, loose	16-30 Silica sand
10				0.2	Same as above but black with moderate hydrocarbon odor	
				0.0		
12						
14						

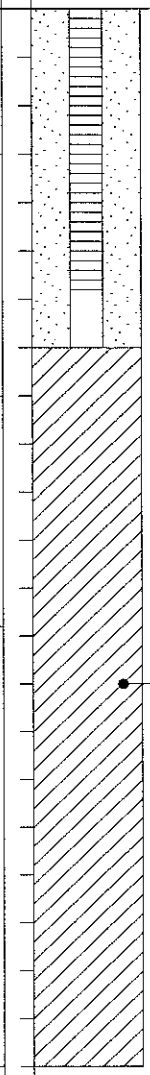


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW18-20 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	082301180			1.7	CLAY (CH): gray, damp, very stiff, very plastic	
16				1.4	SAND (SW): dark brown to black, wet, loose	
18					SANDY GRAVELLY CLAY (CL): gray, damp, ~60% clay, ~20% fine to coarse sand, ~20% gravel (<2"), moderately stiff	
20				0.1	GRAVELLY CLAY (CL): gray to greenish gray, damp, very stiff, moderately plastic, with small green clay clasts and ~5% small (<1/4") gravel	Bentonite chips
22						
24						
					Total Depth: 25 feet below ground surface	
26						
28						
30						



WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW19-80**	
BORING LOCATION: N. of E. Tank Farm		GROUND SURFACE ELEVATION AND DATUM: 578.13 (Grnd.) TOC 580.09 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 4/6/01	DATE FINISHED: 4/7/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 79.0	SCREEN INTERVAL (ft.): 63.5 - 78.5
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 578.13 (Grnd.) TOC 580.09 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Grass	
2	040601072				CLAYEY SAND (SC) [FILL]: dark yellowish brown, (10YR 4/4), moist, 80% medium sand, 20% medium plastic fines, soft	
				0.0	SANDY CLAY (CL) [FILL}: dark yellowish brown (10YR 5.4), moist, 80% medium plastic fines, 20% sand, soft	
4						Cement/bentonite grout
				0.0	LEAN SANDY CLAY (CL) [TILL]: yellowish brown (10YR 5.4), moist, 80% medium high plastic fines, 20% sand and gravel, soft-firm	
6						
				0.0		
8					Less sand than above	
10				0.0	Becomes harder with depth	
12				0.0		
					Dark gray (5Y 4/1), hard	
14						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW19-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	040E01073				LEAN CLAY (CL) [TILL]: continued	
				0.0		
16						
				0.0		
18						
					Same as above	
20						Cement/bentonite grout
				0.0		
22						
24				0.0		
26						
					SILT with SAND and GRAVEL (SM): dark gray (5Y 4/1), wet, 70% low plastic fines, 30% sand and gravel	8" Borehole
				0.0		
28						
					LEAN CLAY (CL) [TILL]: dark gray (5Y 4/1) moist, 90% high plastic fines, 10% sand/gravel, firm to hard	
30						
					CLAY (CL): gray (5Y 5/1), moist, 100% high plastic fines, homogeneous, soft	

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW19-80 (cont'd)

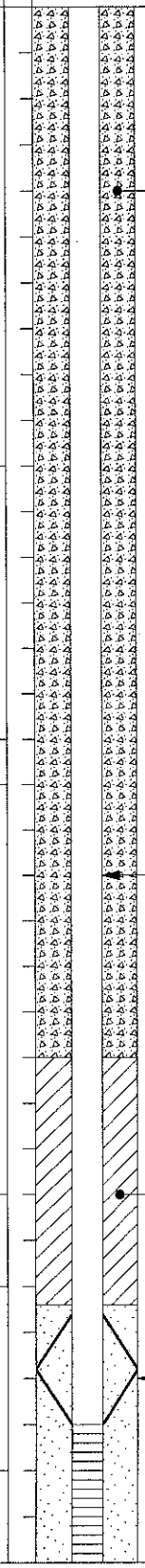
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CL): continued	
32						
						Centralizer
34						
36				0.0		
38						Cement/bentonite grout
					Same as above	
40						
42						
44					Same as above	
46						
				0.0		
48						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW19-80 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CL): continued	
50						Cement/bentonite grout
52						
54				0.0	POORLY GRADED SAND (SP): dark yellowish brown (10YR 4/4), wet, 95% medium sand, 5% low plastic fines	
56					SILT (ML): 56.5'	
					LEAN CLAY (CL) [TILL]: dark gray (5Y 4/1), dry to moist, 85% low plastic fines, 15% sand gravel, very hard	4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
58						
					Same as above	
60						
						Bentonite chips
				0.0	POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), wet, 95% medium to coarse sand, 5% gravel (1"0), trace fines	
62					SILT (ML): light olive brown (2.5Y 5/4), wet, 100% low plastic fines, trace fine sand, soft	
						Centralizer
64					POORLY GRADED SAND (SP): light olive brown 2.5Y 5/4), wet, 95% medium to coarse sand, 5%	



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW19-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					gravel, trace fines	
					65.5-66' silt lens	
66					SILTY SAND (SM): light olive brown (2.5Y 5/4), wet, 80% medium sand, 20% low plast fines	
				0.0		
68						4" Diameter stainless steel wraparound screen with 0.020" slots
					Same as above	
70					abundant 3"-4" cobbles (70'-71.5')	
72					WELL GRADED SAND (SW): yellowish brown (10YR 5/6), wet, 100% sand, trace low plastic fines, trace gravel	
74						
76						
				0.0	CLAY (CL): very dark gray (2.5Y 3/1), dry to moist, 100% medium plast fines, trace fine sand, fine black laminations 77'-78', soft-firm	
78						5.5" End cap
						Formation material
					Total Depth: 79 feet below ground surface	
80						
82						

WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW20-60**	
BORING LOCATION: N.E. Corner of Plant ~60 ft. N. of Bldg. 15		GROUND SURFACE ELEVATION AND DATUM: 576.52 (Grnd) TOC 576.13 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 4/9/01	DATE FINISHED: 4/10/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 64.0	SCREEN INTERVAL (ft.): 46.5 - 61.5
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: E. Mansell	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 576.52 (Grnd) TOC 576.13 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Asphalt, gravel base [FILL]	Well Vault; 12" Steel traffic cover set in concrete
2	040901082			0.0	SANDY CLAY (SC) [FILL]: very dark gray (10YR 3/1) Black material Dark yellowish brown (10YR 4/4), ~70% low plastic fines, ~30% fine to medium sand, soft	
4						Cement/bentonite grout
				0.0		
6						
8						
10	040901083				CLAY (CL): light olive brown (2.5Y 5/3), moist, ~100% medium plastic fines, trace sand, hard	
					SILT (ML): yellowish brown (10YR 5/6), wet, ~100% low plastic fines, trace fine sand, soft	8" Borehole
12				0.0		
14						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW20-60 (cont'd)

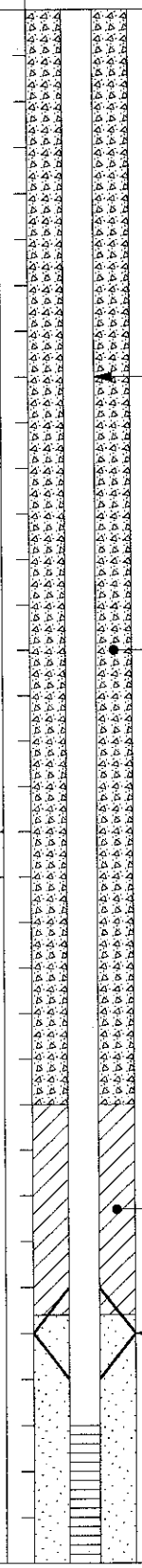
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SILT (ML): continued	
				0.0	CLAY (CL): dark gray (5Y 4/1), moist, ~100% medium plastic fines, soft to firm, homogeneous	
16						
				0.0	Higher plasticity than above.	
18						
					Same as above, high plastic fines, soft	Cement/bentonite grout
20				0.0		
22						
24						
				0.0		Centralizer
26						
28						
					Same as above	
30						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW20-60 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CL): continued	
32					~1" gravel layer 32' - 32.1' Yellowish brown (10YR 5/4), firm to hard	
34					POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), moist, ~100% fine medium sand	4" Diameter Sch. 40 flush-threaded PVC riser O-rings
36						
38					Gravel 38'-38.5' Same as above, trace fines	Cement/bentonite grout
40					SILTY SAND (SM): 40'-40.5'	
					POORLY GRADED SAND (SP): light olive brown (2.5Y 5/4), moist, ~100% fine medium sand	
42				0.0		
44						Bentonite chips
						Centralizer
46						
48						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW20-60 (cont'd)

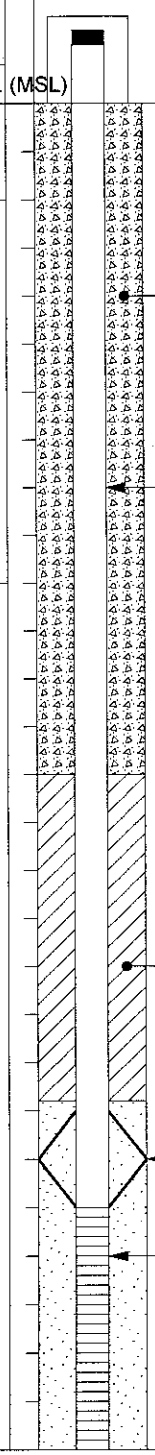
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
50						
52						#6 Global filter pack sand
54						4" Diameter stainless steel wraparound screen with 0.020" slots
56						
					WELL GRADED SAND WITH GRAVEL (SW): yellowish brown (10YR 5/4), wet, ~60% sand, ~40% fine gravel (0 -1"), trace fines	
58						8" Borehole
60					SANDY LEAN CLAY (CL): [TILL]: light olive (2.5Y 5/4), dry to moist, ~80% medium plastic fines, ~20% fine sand/gravel, very hard 3" - 4" cobble at 61.5'	5.5" End cap
62					Dark gray (5Y 4/1)	4" Borehole
						Bentonite chips
64					Total Depth: 64 feet below ground surface	

WELL3

PROJECT: Morton Reading Fl	**Log of Well No. UAW21-30**
BORING LOCATION: S.E. Bldg. 40	GROUND SURFACE ELEVATION AND DATUM: 563.52 (Grnd.) TOC 565.73 ft. (MSL)
DRILLING CONTRACTOR: Bowser Morner	DATE STARTED: 4/10/01 / DATE FINISHED: 4/11/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 27.0 / SCREEN INTERVAL (ft.): 11.5 - 26.5
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing	DEPTH TO WATER ATD: NA / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel	LOGGED BY: E. Mansell
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.52 (Grnd.) TOC 565.73 ft. (MSL)
					Grass [FILL]
2	041101084			0.0	SANDY CLAY (SC) [FILL]: dark yellowish brown, moist, 70% low plastic fines, 30% medium sand, abundant roots
4					
6				0.0	POORLY GRADED SAND (SP): olive brown (2.5Y 4/4), moist to dry, ~95% medium sand, ~5% fine gravel, trace fines, odor?
				0.1	4" silt lens
8					
10	041101085			0.1	Same as above odor? 10-10.5' sandy clay seam [till?] gravel larger than above (1"-2")
12					
14					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



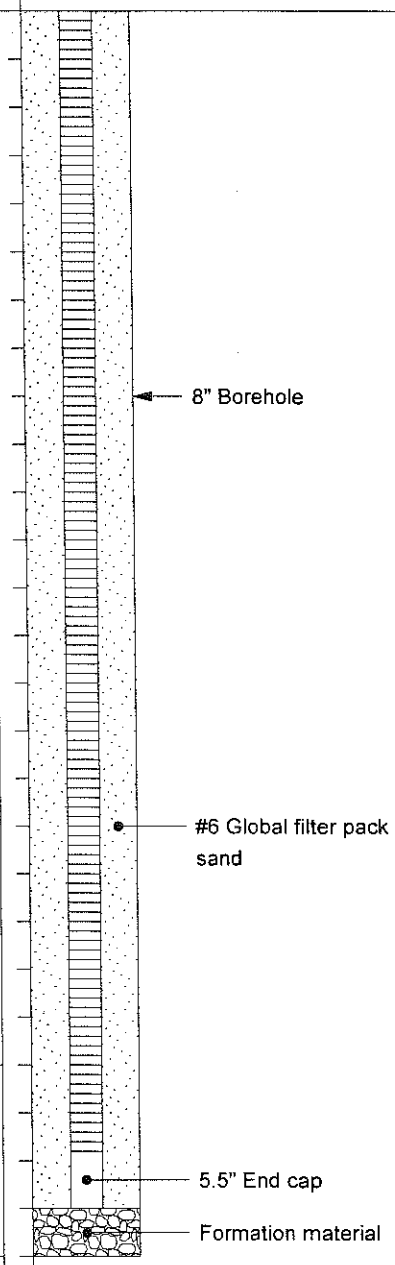
WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW21-30 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
				0.0	POORLY GRADED SAND (SP): continued
16					
18				0.3	
					Same as above
20				0.1	
					21.6 - 22.3' clay seam [till?]
22				0.3	
24					
					24.5 - 25' silty sand (SM) [till]
				0.1	SANDY LEAN CLAY (CL) [TILL]: olive gray (5Y 4/2), dry to moist, ~80% low plastic fines, ~20% sand gravel, hard
26					
					Total Depth: 27 feet below ground surface
28					
30					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW21-80**	
BORING LOCATION: S.E. of Bldg. 40		GROUND SURFACE ELEVATION AND DATUM: 563.32 (Grnd.) TOC 565.47 ft. (MSL)	
DRILLING CONTRACTOR: Bowser Morner		DATE STARTED: 4/16/01	DATE FINISHED: 4/16/01
DRILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 75.0	SCREEN INTERVAL (ft.): 64.5 - 74.5
DRILLING EQUIPMENT: 8" Diameter outer/4" Diameter inner casing		DEPTH TO WATER ATD: NA	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Sample Barrel		LOGGED BY: J. Eidem	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 563.32 (Grnd.) TOC 565.47 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					0-25' taken from log UAW21-30 Grass and topsoil	
2					SANDY CLAY (SC) [FILL]: dark yellowish brown, 70% low plastic fines, 30% medium sand, abundant roots, moist	
4						
6						8" borehole
8						Cement/bentonite grout
10					POORLY GRADED SAND (SP): olive brown, (2.5Y 4/4), moist-dry, 95% medium sand 5% fine gravel, trace fines, possible odor	
12						4" Diameter PVC riser
14						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW21-80 (cont'd)

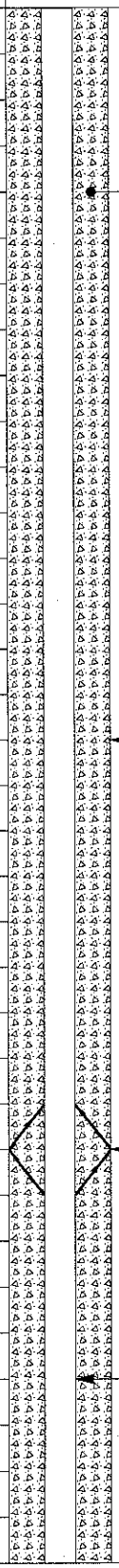
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
16						
18		X				Cement/bentonite grout
20						
22						
						Centralizer
24					LEAN CLAY with SAND (CL) [TILL]: dark grayish brown (2.54 4/2), moist, 80% medium to high plastic fines, 20% medium to coarse sand, trace gravel, hard	
26						
						4" Diameter PVC riser
28						
30						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW21-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY with CLAY (CL) [TILL]: continued	
32					Dark greenish gray (5GY 4/1), firm	Cement/bentonite grout
34						
36						
38						8" Borehole
40						
42						Centralizer
44					POORLY GRADED SAND (SP): greenish gray (10Y 5/1), moist to wet, 95% medium sand, 5% low plastic fines, few cobble	
46						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
48						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW21-80 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued Coarser than above	
50 52					CLAYEY SILT (ML): greenish gray (10Y 5/1), wet, 100% medium to high plastic fines, firm to soft, many small (<1cm) black inclusions (appear to be natural) no odor noticed	
54					SILTY SAND (SM): greenish gray (10Y 5/1), wet, 80% fine sand, 40% low plastic fines, trace fine gravel	
56 58					CLAYEY SILT (ML) [TILL]: greenish gray (10y 5/1), wet to moist, 80% medium placticity fines, 20% medium sand and gravel, firm	
60 62 64					SILT (ML): greenish gray (10Y 5/1), wet, 100% low placitic fines, trace sand, varved 1" thick fine sand seam	Bentonite chips Centralizer

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW21-80 (cont'd)

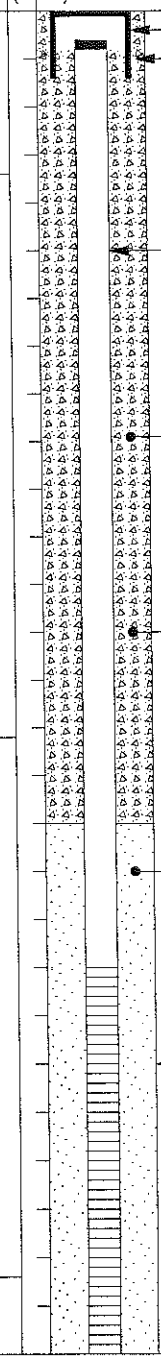
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SILT (ML): continued	
66					CLAY (CL): moist, dark yellowish brown (10YR 4/4), 90% high plastic fines, 10% fine sand	
					POORLY GRADED SAND with SILT (SP-SM): olive brown (2.5Y 4/3), wet, 85% fine sand, 15% low plastic fines, homogeneous	
68						#6 Global filter pack sand
					Siltier than above	
70						
						#4 Diameter continuous wrap-around stainless steel screen with 0.020" slots
72						
					SANDY LEAN CLAY (CL) [TILL]: 70% fine, 30% sand and gravel, firm to hard	
74						5.25" End cap
					Total Depth: 75 feet below ground surface	
76						
78						
80						
82						

WELL3

PROJECT: Morton Reading FI		**Log of Well No. UAW22-20**	
BORING LOCATION: S. of Bldg. 16		GROUND SURFACE ELEVATION AND DATUM: 557.99 (Grnd.) TOC 557.66 ft. (MSL)	
DRILLING CONTRACTOR: Boart Longyear		DATE STARTED: 9/5/01	DATE FINISHED: 9/5/01
RILLING METHOD: Rotasonic		TOTAL DEPTH (ft.): 25.0	SCREEN INTERVAL (ft.): 10-20
DRILLING EQUIPMENT: Gussbach Sonic		DEPTH TO WATER ATD: 12.5'	CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Core Barrel		LOGGED BY: T. Jennings	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway	REG. NO. NA

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 557.99 (Grnd.) TOC 557.66 ft. (MSL)
				0.0	CLAYEY GRAVELLY SAND (SP): reddish brown, wet, ~60% fine to coarse sand, ~30% gravel (<1.5"), ~10% red clay, stiff, plastic, loose
2	090501181			0.0	SANDY GRAVELLY CLAY (CL): gray to grayish brown, damp, ~70% clay, ~20% fine to medium sand, ~10% gravel (<1"), stiff, moderately plastic
4				0.0	
6				0.1	
8				0.0	GRAVELLY SAND (SP): black, wet, ~70% fine to medium sand, ~30% gravel (<1") decreasing in volume downward, loose, moderate chemical odor
10					
12	090501182			0.9	Becomes saturated at 12.5'
14				0.0	CLAY (CL): dark green, damp, stiff, moderately plastic

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

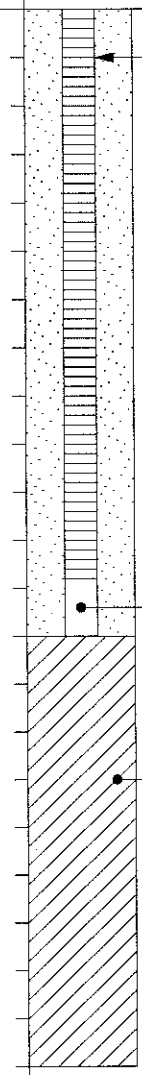


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW22-20 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	SAMPLES Sample	SAMPLES Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					CLAY (CL): continued	4" Diameter stainless steel wraparound screen with 0.020" slots
				0.1	GRAVELLY SAND (SP): black, saturated, ~70-80% fine to medium sand, ~30% - 20% gravel (<1") fining and decreasing downward, loose	
16						
18				0.9		
20						6" End cap
				0.4	SANDY GRAVELLY CLAY (CL): dark gray, damp to wet, ~85% clay, ~10% fine to medium sand, ~5% gravel (<1"), thin sand bed at 21.5' and 23.8', stiff, moderately plastic	
22						Bentonite chips
24						
					Total Depth: 25 feet below ground surface	
26						
28						
30						

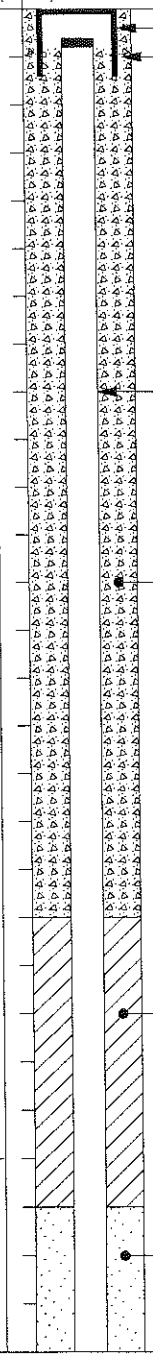


WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW23-20**
BORING LOCATION: ~5' W. of STR10; Near N.W. Corner Bldg.1	GROUND SURFACE ELEVATION AND DATUM: 559.52 (Grnd.) TOC 559.05 ft. (MSL)
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 9/8/01 / DATE FINISHED: 9/8/01
RILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 26.0 / SCREEN INTERVAL (ft.): 15-25
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: 15' / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Core Barrel	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 559.52 (Grnd.) TOC 559.05 ft. (MSL)
					0-26' taken from log of STR10 Asphalt base
				0.7	SAND WITH CLAY (SC) [FILL]: some black material
2					
4				0.0	SANDY CLAY (SC): very dark gray (2.5Y 3/1), moist, ~80% low plastic fines, ~20% medium sand, firm
6					
				0.1	CLAY (CL): olive brown (2.5Y 4/3), moist, ~90% low plastic fines, ~10% fine sand, firm to hard
8					
				0.4	Same as above
10					Olive (5Y 4/3)
				1.0	11 - 11.4' black discoloration, chemical odor, very soft, increasing sand content ~30%
12					SANDY LEAN CLAY (CL) [TILL]: olive brown (2.5Y 4/3), moist, ~85% low plastic fines, ~15% sand and gravel, hard
				0.1	
14					

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

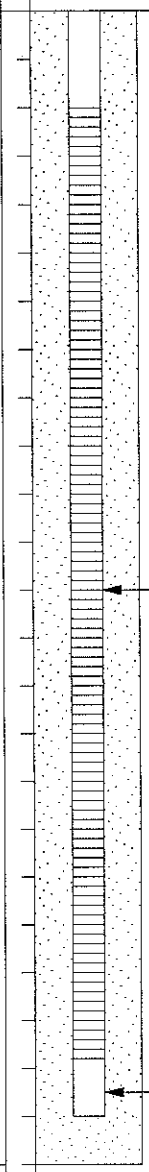


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW23-20 (cont'd)

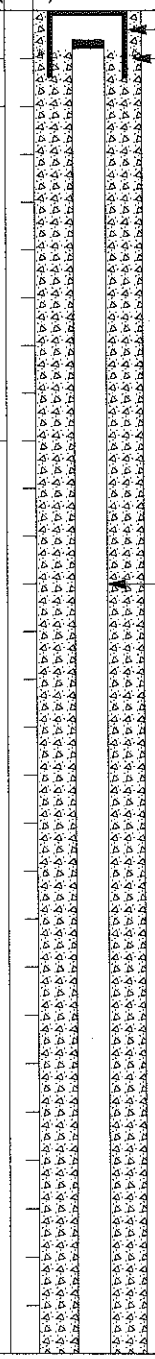
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SANDY LEAN CLAY (CL) [TILL]: continued	
				0.4	Dark greenish gray (10Y 3/1), very hard ~50% fine to medium grained sand at 15 - 15.5'	
16						
18						
					Same as above	
20						4" Diameter stainless steel wraparound screen with 0.020" slots
22				1.2	21.7 - 22' gravel seam	
24				1.0		
						0.5' End cap
26					Total Depth: 26 feet below ground surface	
28						
30						



WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW24-70**
BORING LOCATION: Supply Warehouse (Bldg. 7) Ramp; ~6' N..E of STR06	GROUND SURFACE ELEVATION AND DATUM: 576.37 (Grnd.) TOC 575.9 ft. (MSL)
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 9/6/01 / DATE FINISHED: 6/7/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 82.0 / SCREEN INTERVAL (ft.): 63-73
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: NA / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Core Barrel	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 576.37 (Grnd.) TOC 575.9 ft. (MSL)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					0'-70' taken from log of STR06	
					Asphalt	Well Vault
					Road base (gravel)	12" Steel trafic cover set in concrete
2					CLAYEY SAND (SC): greenish black (10Y 2.5/1), transitional color change light gray reddish mottling, yellowish brown (10YR 5/6), moist, 60% fine sand, 40% medium plastic fines, hard, trace gravel (1" 3")	
4						
					SANDY CLAY (CL): light olive brown (2.5YR 5/4), light gray mottling, moist to wet, hard, 70% fines, 25% fine sand, 5% gravel (1" -2")	
6						4" Diameter Sch. 40 flush-threaded PVC riser with O-rings
8						
10						
12					Dark greenish gray (10Y 4/1), moist, hard, 90% fines, 10% fine sand, trace gravel, hard	
14						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW24-70 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SANDY CLAY (CL): continued	
					SILTY CLAY (CL): moist to wet, 100% medium plastic fines, hard, trace gravel (1") subangular to subrounded	
16						
					Olive (5Y 5/3), light gray mottling	
18					Becomes softer with depth	
					Same as above	
20						
22						
24						Centralizer
26						
28						
					Same as above	
30						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW24-70 (cont'd)

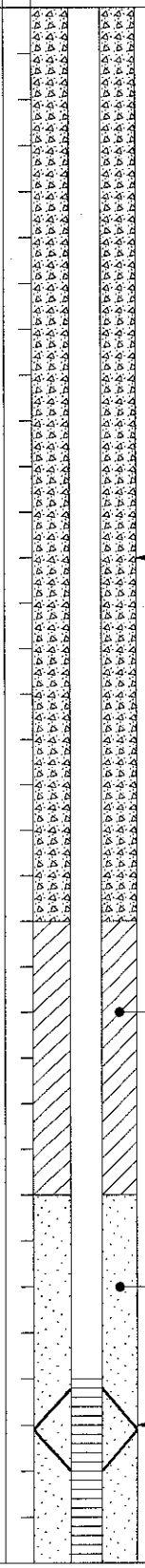
DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SILTY CLAY (CL) continued	
32						
					SANDY CLAY (CL): greenish gray (10 YR 5/1), moist to wet, hard, 90% low to medium plastic fines, 10% fine sand, trace gravel	
34						
36						
						Cement/bentonite grout
38					SILT (ML): dark greenish gray (10Y 4/1): wet, soft, 100% low plastic fines, soft, massive	
40						
42						
44					Same as above	
46						
48						

WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW24-70 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SILT (ML): continued	
					Same as above	
50						
52						
54						8" Borehole
56					Increasing hardness with depth	
58						
						Bentonite chips
					Same as above	
60						
62						15/30 Sand
						Centralizer
64						



WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW24-70 (cont'd)

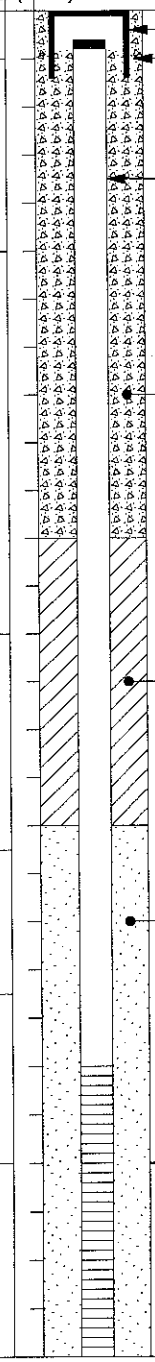
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					SILTY CLAY (CL): continued	
66						
68						4" Diameter stainless steel wraparound screen with 0.020" slots
					Same as above	
70					SAND (SP): brown, saturated, fine to medium grained, locally bedded with thin silt laminae, loose	
72						
					SANDY CLAY (CL): grayish brown, damp, ~80% clay, ~20% fine sand, stiff, moderately plastic	6" End cap
74					SILT (ML): light brown, saturated, ~80-70% low plastic fines, ~20 - 30% fine sand, loose to slightly compact	
76						Bentonite chips
78						
					SILTY CLAY (CL): grayish brown, damp, stiff, moderately plastic	
80					GRAVELLY SAND (SP): grayish brown, wet, ~70% fine to coarse sand, ~30% gravel (<1"), fining downward, loose	
					Total Depth: 82 feet below ground surface	
82						

WELL3

PROJECT: Morton Reading FI	**Log of Well No. UAW25-20**
BORING LOCATION: W. of Bldg. 40; Adjacent to STR01	GROUND SURFACE ELEVATION AND DATUM: 5 61.95 (Grnd.) TOC 556.07 ft. (MSL)
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 9/7/01 / DATE FINISHED: 9/8/01
DRILLING METHOD: Rotasonic	TOTAL DEPTH (ft.): 25.0 / SCREEN INTERVAL (ft.): 11-21
DRILLING EQUIPMENT: Gussbach Sonic	DEPTH TO WATER ATD: 16.5' / CASING: 4" Diameter PVC
SAMPLING METHOD: 10' Core Barrel	LOGGED BY: T. Jennings
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M. Hemingway / REG. NO. NA

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation: 5 61.95 (Grnd.) TOC 556.07 ft. (MSL)
					0-25' taken from log of STR01 Asphalt and road base Sub base - gravel [FILL]
2				0.0	
					CLAYEY SAND (SC): Very dark brown (10YR 2/2), moist, ~100% low to medium plastic fines
4				0.0	
6					
				0.0	POORLY GRADED SAND WITH GRAVEL (SP): Yellowish brown (10YR 5/4), dry to moist, ~80% medium sand, ~20% gravel (1" to 5"), trace fines
8					
					CLAYEY SAND (SC): brown (10YR 5/3), moist, ~60% fine sand, ~40% medium plastic fines
10				0.0	CLAYEY SILT (ML): brown (10YR 5/3), moist, ~60% fine sand, ~40% medium plastic fines, firm, massive, laminated, iron-colored (horizontal) discoloration (loess?)
12					POORLY GRADED SAND (SP): brown (10YR 5/2), dry, ~90% medium to fine sand, ~5% fine gravel, ~5% fines
14				0.0	

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

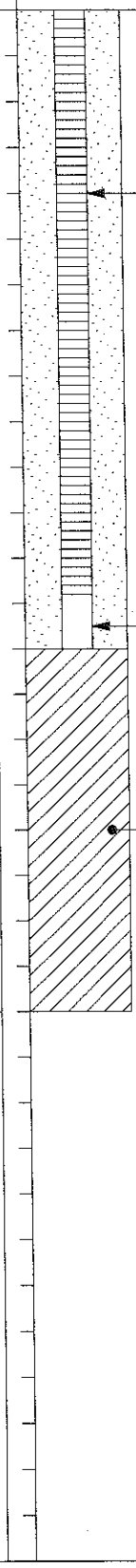


WELL3

PROJECT: Morton Reading FI

Log of Well No. UAW25-20 (cont'd)

DEPTH (feet)	SAMPLES Sample No.	Sample	Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND (SP): continued	
16					Saturated at 16.5'	4" Diameter stainless steel wraparound screen with 0.020" slots
18				0.0		
20						
				2.4	SANDY LEAN CLAY (CL): olive brown (2.5Y 4/3), dry, ~90% high to medium plastic fines, ~10% medium sand, trace fine gravel, massive (no structure), hard	6" End cap
22						Bentonite chips
24				0.0		
					Total Depth: 25 feet below ground surface	
26						
28						
30						

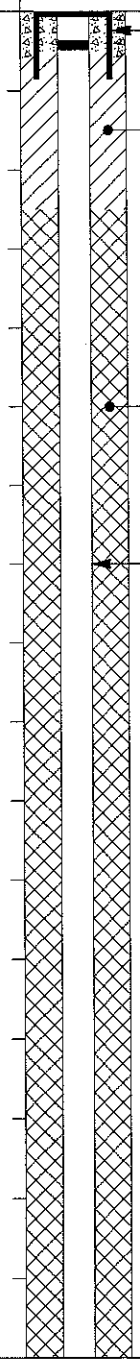


WELL3

PROJECT: Morton Supplemental FI		**Log of Well No. UAW26-70**	
BORING LOCATION: Truck-Mounted Rig, Scissor Crane/Water Truck, Bobcat, Pickup		GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Boart Longyear		DATE STARTED: 3/10/04	DATE FINISHED: 3/13/04
DRILLING METHOD: Rotasonic Drilling		TOTAL DEPTH (ft.): 85.0	SCREEN INTERVAL (ft.): 67.5 - 77.5
DRILLING EQUIPMENT: Truck-mounted Rotasonic		DEPTH TO WATER ATD: NA	CASING:
SAMPLING METHOD: 4" Core (10' Lengths)/ Plastic Sleeves		LOGGED BY: T. Grygaski	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL:	REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:
					Asphalt (2")
					LEAN CLAY LENS (1") (CL): gray, moist, ~90% medium plasticity clay, ~10% fine sand, stiff
					SANDY GRAVEL (GW): light gray, moist, ~80% gravel, ~10% sand, trace silt, loose
					GRAVELLY CLAY (CL): brown, moist, ~50 - 60% low plasticity clay, ~30 - 40% gravel/sand
					SAND (SP): yellowish brown, ~80% medium to coarse sand, ~10% fine gravel, ~10% clay
5					No recovery at 5 - 15', lost or pushed through
10					
15					GRAVELLY CLAY (CL): gray, wet at 15' only, ~80% low plasticity clay, ~15% gravel, ~5% sand, slightly to moderately stiff

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



WELL3

PROJECT: Morton Supplemental FI

Log of Well No. UAW26-70 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					COARSE SAND AND GRAVEL (SW) (TILL): light brown, high moisture, loose	
20						
					SAND (SP): light brown, high moisture, ~90% fine to medium sand, ~10% fine gravel, loose	4" Diameter Sch. 40 PVC riser
					SAND (SP): as above but 20% fine to medium gravel	
					SANDY CLAY (CH): gray, moist, very stiff, ~85% clay, ~10% coarse sand, ~5% fine gravel	
25						
						Bentonite cement grout
30						
					GRAVELLY CLAY (CL): gray, moist, ~70% low plasticity clay, ~20 - 30% fine gravel, <10% coarse sand	
35						
					Some rust-colored mottling at 35.5'	
					Texture increases to very stiff	

WELL3

PROJECT: Morton Supplemental FI

Log of Well No. UAW26-70 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
40					Dry, fine to coarse angular gravel, light gray (~3" lens) CLAY (CL): as above	4" Diameter Sch. 40 PVC riser
					LEAN CLAY (CH): purplish light brown, 100% medium to high plasticity clay	Bentonite cement grout
					SAND (SP): light brown, ~80% fine to medium sand, ~20% fine gravel, moist, loose GRAVELLY CLAY (CL): gray, very stiff as above	
45					GRAVEL and CLAY (CL): ~45% clay, ~45% gravel, ~10% fine sand GRAVELLY CLAY (CL): gray, moist, ~70% medium plasticity clay, ~20 - 30% gravel, trace sand	
50						8" Borehole
55					6" lens LEAN CLAY (CL): brownish gray, moist, 100% clay 2" cobble: light gray, dry, hard Color change to gray	

WELL3

PROJECT: Morton Supplemental FI

Log of Well No. UAW26-70 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
60					LEAN CLAY (CL): as above, but low plasticity	Bentonite chips
65						#6 Global filter pack sand
70					SAND (SP): gray, wet, 100% fine sand, loose	Stainless steel screen with 0.020" slots
75					GRAVELLY CLAY (CL): gray, moist, ~85% medium plasticity clay, ~10% fine gravel, ~5% coarse sand, stiff	3" PVC plug
					SAND (SP): gray, wet, ~90% medium sand, ~10%	

WELL3

PROJECT: Morton Supplemental FI

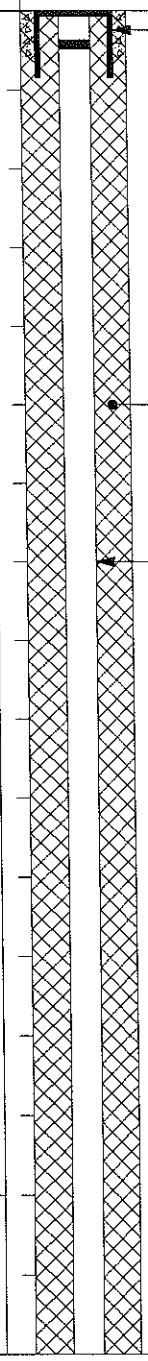
Log of Well No. UAW26-70 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					fine gravel, loose GRAVELLY CLAY (CL): as above	
80						
85					Total Depth: 85 feet below ground surface	
90						
95						

WELL3

PROJECT: Morton Supplemental FI	**Log of Well No. UAW27-50**
BORING LOCATION: ~10 ft. N of STR-14 (NW of Bldg 7, SW of Bldg 6)	GROUND SURFACE ELEVATION AND DATUM:
DRILLING CONTRACTOR: Boart Longyear	DATE STARTED: 3/12/04 / DATE FINISHED:
DRILLING METHOD: Rotasonic Drilling	TOTAL DEPTH (ft.): 50.0 / SCREEN INTERVAL (ft.): 38 - 48
DRILLING EQUIPMENT: Truck-mounted Rotasonic	DEPTH TO WATER ATD: NA / CASING:
SAMPLING METHOD: 6" Core/Plastic Sleeve	LOGGED BY: T. Grygaski
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Asphalt	Well Vault
					GRAVELLY CLAY (CL): brown, moist, ~70% low plasticity clay, ~20 - 30% fine gravel, trace sand/coarse gravel	
					SANDY CLAY (CL): light brown, moist, low to medium plasticity, stiff	
5					GRAVELLY CLAY (CL/CH): light brown, moist, ~70 - 90% medium to high plasticity clay, ~10 - 30% fine gravel (subrounded to angular), ~5 - 10% coarse sand, moderately stiff to stiff	Grout to surface (tremied from bottom to top) 4" Diameter Sch. 40 PVC riser
10						
15					LEAN CLAY (CL): gray, moist, 100% low plasticity clay, soft	



WELL3

PROJECT: Morton Supplemental FI

Log of Well No. UAW27-50 (cont'd)

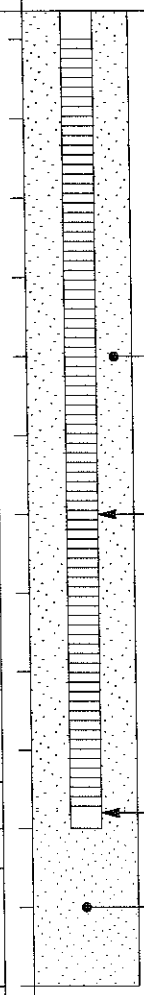
DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/ Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					LEAN CLAY (CL): gray, moist, 100% low plasticity clay, soft	
20						4" Diameter Sch. 40 PVC riser; Bentonite cement grout
25						3/8" Bentonite chips
30						
35						#6 Global filter pack sand

WELL3

PROJECT: Morton Supplemental FI

Log of Well No. UAW27-50 (cont'd)

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/Foot	OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
40					FAT CLAY (CL): orange light brown, moist, 100% high plasticity clay, stiff	
					SAND (SP): orange light brown, wet, 100% fine sand, loose	
					SAND (SP): orange light brown/gray, wet, ~90% medium sand, ~10% fine sand, trace fine gravel	Bentonite cement grout
					SAND (SP): as above	Stainless steel screen with 0.020" slots
45					SANDY GRAVELLY CLAY (CL): light brown, moist, ~80% clay, ~10% sand, ~10% gravel	
					FAT GRAVELLY CLAY (CH): gray, moist, ~70 - 80% high plasticity clay, ~20 - 30% gravel, stiff	3" PVC plug
					SANDY GRAVEL (GW): light gray/brown, dry	
					GRAVELLY CLAY (CL): gray, moist, ~80% medium plasticity clay, ~10% gravel, stiff to medium stiff	60% gravel, 40% sand
50					Total Depth: 50 feet below ground surface	Collapse below screen
55						



WELL3

APPENDIX B

TARGET ANALYTE LISTS

TABLE OF CONTENTS
APPENDIX B

Table B-1	Contract Laboratory Program (CLP) Target Analyte List
Table B-2	Appendix IX Target Analyte List
Table B-3	Geotechnical and General Water Quality Parameters
Table B-4	Target Analyte List Sediment and Seep Analysis
Table B-5	Background Soil Sampling Target Analyte List
Table B-6	Monitoring Target Analyte List
Table B-7	CLP Target Analyte List +
Table B-8	Appendix IX Target Analyte List +
Table B-9	Chromium Speciation

TABLE B-1
CONTRACT LABORATORY PROGRAM (CLP)
TARGET ANALYTE LIST
Morton International, Inc.
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
Inorganic Constituents		
Aluminum	(Total)	6010B
Antimony	(Total)	6010B
Arsenic	(Total)	6010B
Barium	(Total)	6010B
Beryllium	(Total)	6010B
Cadmium	(Total)	6010B
Calcium	(Total)	6010B
Chromium	(Total)	6010B
Cobalt	(Total)	6010B
Copper	(Total)	6010B
Cyanide	57-12-5	9012A
Iron	(Total)	6010B
Lead	(Total)	6010B
Magnesium	(Total)	6010B
Manganese	(Total)	6010B
Mercury	(Total)	7471A/7470A
Nickel	(Total)	6010B
Potassium	(Total)	6010B
Selenium	(Total)	6010B
Silver	(Total)	6010B
Sodium	(Total)	6010B
Sulfide	18496-25-8	376.1
Thallium	(Total)	6010B
Vanadium	(Total)	6010B
Zinc	(Total)	6010B
Volatile Organic Constituents		
Acetone	67-64-1	8260B
Benzene	71-43-2	8260B
Bromochloromethane	74-97-5	8260B
Bromodichloromethane	75-27-4	8260B
Bromoform; Tribromomethane	75-25-2	8260B
Bromomethane; Methyl bromide	74-83-9	8260B
Carbon disulfide	75-15-0	8260B
Carbon tetrachloride	56-23-5	8260B
Chlorobenzene	108-90-7	8260B
Chloroethane; Ethyl chloride	75-00-3	8260B
Chloroform	67-66-3	8260B
Cyclohexane	110-82-7	8260B
Dibromochloromethane; Chlorodibromomethane	124-48-1	8260B
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	8260B
1,2-Dibromoethane; Ethylene dibromide (EDB)	106-93-4	8260B
Dichlorodifluoromethane	75-71-8	8260B
1,1-Dichloroethane (1,1-DCA)	75-34-3	8260B
1,2-Dichloroethane; Ethylene dichloride	107-06-2	8260B
1,1-Dichloroethene; 1,1-Dichloroethylene; Vinylidene chloride	75-35-4	8260B
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2	8260B
trans-1,2-Dichloroethene; trans-1,2-Dichloroethylene	156-60-5	8260B
1,2-Dichloropropane	78-87-5	8260B
cis-1,3-Dichloropropene	10061-01-5	8260B
trans-1,3-Dichloropropene	10061-02-6	8260B
Ethylbenzene	100-41-4	8260B

TABLE B-1
CONTRACT LABORATORY PROGRAM (CLP)
TARGET ANALYTE LIST
Morton International, Inc.
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
2-Hexanone	591-78-6	8260B
Isopropylbenzene; cumene	98-82-8	8260B
Methyl acetate	79-20-9	8260B
Methyl chloride; Chloromethane	74-87-3	8260B
Methyl cyclohexane	108-87-2	8260B
Methylene chloride; Dichloromethane	75-09-2	8260B
Methyl ethyl ketone; 2-Butanone; MEK	78-93-3	8260B
4-Methyl-2-pentanone; Methyl isobutyl ketone (MIBK)	108-10-1	8260B
Methyl tert-butyl ether	1634-04-4	8260B
Styrene	100-42-5	8260B
1,1,2,2-Tetrachloroethane	79-34-5	8260B
Tetrachloroethylene; Perchloroethylene; Tetrachlorethene (PCE)	127-18-4	8260B
Toluene	108-88-3	8260B
1,1,1-Trichloroethane; Methylchloroform	71-55-6	8260B
1,1,2-Trichloroethane	79-00-5	8260B
Trichloroethylene; Trichloroethene	79-01-6	8260B
Trichlorofluoromethane	75-69-4	8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	8260B
Vinyl chloride	75-01-4	8260B
Xylene (total)	1330-20-7	8260B
Semivolatile Organic Constituents		
Acenaphthene	83-32-9	8270C
Acenaphthylene	208-96-8	8270C
Acetophenone	98-86-2	8270C
Anthracene	120-12-7	8270C
Atrazine	1912-24-9	8270C
Benzaldehyde	100-52-7	8270C
Benzo[a]anthracene; Benzanthracene	56-55-3	8270C
Benzo[b]fluoranthene	205-99-2	8270C
Benzo[k]fluoranthene	207-08-9	8270C
Benzo[ghi]perylene	191-24-2	8270C
Benzo[a]pyrene	50-32-8	8270C
1,1'-Biphenyl	92-52-4	8270C
Bis(2-chloroethoxy)methane	111-91-1	8270C
Bis(2-chloroethyl)ether	111-44-4	8270C
Bis(2-ethylhexyl) phthalate	117-81-7	8270C
4-Bromophenyl phenyl ether	101-55-3	8270C
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	8270C
Caprolactam	105-60-2	8270C
Carbazole	86-74-8	8270C
4-Chloroaniline; p-Chloroaniline	106-47-8	8270C
4-Chloro-3-methylphenol; p-Chloro-m-cresol	59-50-7	8270C
2-Chloronaphthalene	91-58-7	8270C
2-Chlorophenol	95-57-8	8270C
4-Chlorophenyl phenyl ether	7005-72-3	8270C
Chrysene	218-01-9	8270C
o-Cresol; 2-Methylphenol	95-48-7	8270C
p-Cresol; 4-Methylphenol	106-44-5	8270C
Dibenz[a,h]anthracene	53-70-3	8270C
Dibenzofuran	132-64-9	8270C
Di-n-butyl phthalate	84-74-2	8270C

TABLE B-1
CONTRACT LABORATORY PROGRAM (CLP)
TARGET ANALYTE LIST
Morton International, Inc.
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
1,2-Dichlorobenzene; o-Dichlorobenzene	95-50-1	8270C
1,3-Dichlorobenzene; m-Dichlorobenzene	541-73-1	8270C
1,4-Dichlorobenzene; p-Dichlorobenzene	106-46-7	8270C
3,3'-Dichlorobenzidine	91-94-1	8270C
2,4-Dichlorophenol	120-83-2	8270C
Diethyl phthalate	84-66-2	8270C
2,4-Dimethylphenol	105-67-9	8270C
Dimethyl phthalate	131-11-3	8270C
4,6-Dinitro-2-methylphenol; 4,6-Dinitro-o-cresol	534-52-1	8270C
2,4-Dinitrophenol	51-28-5	8270C
2,4-Dinitrotoluene	121-14-2	8270C
2,6-Dinitrotoluene	606-20-2	8270C
Di-n-octyl phthalate	117-84-0	8270C
Fluoranthene	206-44-0	8270C
Fluorene	86-73-7	8270C
Hexachlorobenzene	118-74-1	8270C
Hexachlorobutadiene	87-68-3	8270C
Hexachlorocyclopentadiene	77-47-4	8270C
Hexachloroethane	67-72-1	8270C
Indeno(1,2,3-cd)pyrene	193-39-5	8270C
Isophorone	78-59-1	8270C
2-Methylnaphthalene	91-57-6	8270C
Naphthalene	91-20-3	8270C
2-Nitroaniline; o-Nitroaniline	88-74-4	8270C
3-Nitroaniline; m-Nitroaniline	99-09-2	8270C
4-Nitroaniline; p-Nitroaniline	100-01-6	8270C
Nitrobenzene	98-95-3	8270C
2-Nitrophenol; o-Nitrophenol	88-75-5	8270C
4-Nitrophenol; p-Nitrophenol	100-02-7	8270C
N-Nitrosodiphenylamine	86-30-6	8270C
N-Nitrosodi-n-propylamine; N-Nitrosodipropylamine; Di-n-propylnitrosamine	621-64-7	8270C
2,2'-Oxybis(1-chloropropane)	108-60-1	8270C
Pentachlorophenol	87-86-5	8270C
Phenanthrene	85-01-8	8270C
Phenol	108-95-2	8270C
Pyrene	129-00-0	8270C
1,2,4-Trichlorobenzene	120-82-1	8270C
2,4,5-Trichlorophenol	95-95-4	8270C
2,4,6-Trichlorophenol	88-06-2	8270C
Polychlorinated Biphenyl Aroclors		
Aroclor 1016	12674-11-2	8082
Aroclor 1221	11104-28-2	8082
Aroclor 1232	11141-16-5	8082
Aroclor 1242	53469-21-9	8082
Aroclor 1248	12672-29-6	8082
Aroclor 1254	11097-69-1	8082
Aroclor 1260	11096-82-5	8082
Organochlorine Pesticides		
Aldrin	309-00-2	8081A
alpha-BHC	319-84-6	8081A
beta-BHC	319-85-7	8081A

TABLE B-1
CONTRACT LABORATORY PROGRAM (CLP)
TARGET ANALYTE LIST

Morton International, Inc.
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
delta-BHC	319-86-8	8081A
gamma-BHC (Lindane)	58-89-9	8081A
alpha-Chlordane	5103-71-9	8081A
gamma-Chlordane	5103-74-2	8081A
4,4'-DDD	72-54-8	8081A
4,4'-DDE	72-55-9	8081A
4,4'-DDT	50-29-3	8081A
Dieldrin	60-57-1	8081A
Endosulfan I	959-98-8	8081A
Endosulfan II	33213-65-9	8081A
Endosulfan sulfate	1031-07-8	8081A
Endrin	72-20-8	8081A
Endrin aldehyde	7421-93-4	8081A
Endrin ketone	53494-70-5	8081A
Heptachlor	76-44-8	8081A
Heptachlor epoxide	1024-57-3	8081A
Methoxychlor	72-43-5	8081A
Toxaphene	8001-35-2	8081A

Notes:

1 Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

2 Chemical Abstracts Service registry number (CAS RN). Where "Total" is entered, all species that contain this element are included.

3 Analytical methods refer to analytical procedure numbers used in the U.S. Environmental Protection Agency (USEPA) publication, SW-846, "Test Methods for Evaluating Solid Waste," Current Edition.

Contract Laboratory Program Target Analyte List developed from the USEPA Superfund Contract Laboratory Program. Available from Internet url: http://www.epa.gov/superfund/programs/clp/target.htm

TABLE B-2
APPENDIX IX TARGET ANALYTE LIST
Morton International, Inc.
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
Inorganic Constituents		
Antimony	(Total)	6010B
Arsenic	(Total)	6010B
Barium	(Total)	6010B
Beryllium	(Total)	6010B
Cadmium	(Total)	6010B
Chromium	(Total)	6010B
Cobalt	(Total)	6010B
Copper	(Total)	6010B
Cyanide	57-12-5	9012A
Lead	(Total)	6010B
Mercury	(Total)	7471A/7470A
Nickel	(Total)	6010B
Selenium	(Total)	6010B
Silver	(Total)	6010B
Sulfide	18496-25-8	376.1
Thallium	(Total)	6010B
Vanadium	(Total)	6010B
Zinc	(Total)	6010B
Volatile Organic Constituents		
Acetone	67-64-1	8260B
Acetonitrile; Methyl cyanide	75-05-8	8260B
Acrolein	107-02-8	8260B
Acrylonitrile	107-13-1	8260B
Benzene	71-43-2	8260B
Bromodichloromethane	75-27-4	8260B
Bromoform; Tribromomethane	75-25-2	8260B
Bromomethane; Methyl bromide	74-83-9	8260B
Carbon disulfide	75-15-0	8260B
Carbon tetrachloride	56-23-5	8260B
Chlorobenzene	108-90-7	8260B
Chloroethane; Ethyl chloride	75-00-3	8260B
Chloroform	67-66-3	8260B
Chloroprene	126-99-8	8260B
3-Chloropropene; 3-Chloro-1-propene; Allyl chloride	107-05-1	8260B
Dibromochloromethane; Chlorodibromomethane	124-48-1	8260B
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	8260B
1,2-Dibromoethane; Ethylene dibromide (EDB)	106-93-4	8260B
Dibromomethane; Methylene bromide	74-95-3	8260B
trans-1,4-Dichloro-2-butene	110-57-6	8260B
Dichlorodifluoromethane	75-71-8	8260B
1,1-Dichloroethane (1,1-DCA)	75-34-3	8260B
1,2-Dichloroethane; Ethylene dichloride	107-06-2	8260B
1,1-Dichloroethene; 1,1-Dichloroethylene; Vinylidene chloride	75-35-4	8260B
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2	8260B
trans-1,2-Dichloroethene; trans-1,2-Dichloroethylene	156-60-5	8260B
1,2-Dichloropropane	78-87-5	8260B
cis-1,3-Dichloropropene	10061-01-5	8260B
trans-1,3-Dichloropropene	10061-02-6	8260B
Ethylbenzene	100-41-4	8260B
Ethyl methacrylate	97-63-2	8260B
2-Hexanone	591-78-6	8260B
Isobutyl alcohol	78-83-1	8260B

TABLE B-2
APPENDIX IX TARGET ANALYTE LIST
Morton International, Inc.
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
Methacrylonitrile	126-98-7	8260B
Methyl chloride; Chloromethane	74-87-3	8260B
Methylene chloride; Dichloromethane	75-09-2	8260B
Methyl ethyl ketone; 2-Butanone; MEK	78-93-3	8260B
Methyl iodide; Iodomethane	74-88-4	8260B
Methyl methacrylate	80-62-6	8260B
4-Methyl-2-pentanone; Methyl isobutyl ketone (MIBK)	108-10-1	8260B
Propionitrile; Ethyl cyanide	107-12-0	8260B
Styrene	100-42-5	8260B
1,1,1,2-Tetrachloroethane	630-20-6	8260B
Tetrachloroethylene; Perchloroethylene; Tetrachlorethene (PCE)	127-18-4	8260B
Toluene	108-88-3	8260B
1,1,1-Trichloroethane; Methylchloroform	71-55-6	8260B
1,1,2-Trichloroethane	79-00-5	8260B
Trichloroethylene; Trichloroethene	79-01-6	8260B
Trichlorofluoromethane	75-69-4	8260B
1,2,3-Trichloropropane	96-18-4	8260B
Vinyl acetate	108-05-4	8260B
Vinyl chloride	75-01-4	8260B
Xylene (total)	1330-20-7	8260B
Semivolatile Organic Constituents		
Acenaphthene	83-32-9	8270C
Acenaphthylene	208-96-8	8270C
Acetophenone	98-86-2	8270C
2-Acetylaminofluorene; 2-AAF	53-96-3	8270C
4-Aminobiphenyl	92-67-1	8270C
Aniline	62-53-3	8270C
Anthracene	120-12-7	8270C
Aramite	140-57-8	8270C
Benzo[a]anthracene; Benzanthracene	56-55-3	8270C
Benzo[b]fluoranthene	205-99-2	8270C
Benzo[k]fluoranthene	207-08-9	8270C
Benzo[ghi]perylene	191-24-2	8270C
Benzo[a]pyrene	50-32-8	8270C
Benzyl alcohol	100-51-6	8270C
Bis(2-chloroethoxy)methane	111-91-1	8270C
Bis(2-chloroethyl)ether	111-44-4	8270C
Bis(2-chloro-1-methylethyl) ether; 2,2-Di-chlorodiisopropyl ether	108-60-1	8270C
Bis(2-ethylhexyl) phthalate	117-81-7	8270C
4-Bromophenyl phenyl ether	101-55-3	8270C
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	8270C
4-Chloroaniline; p-Chloroaniline	106-47-8	8270C
Chlorobenzilate	510-15-6	8270C
4-Chloro-3-methylphenol; p-Chloro-m-cresol	59-50-7	8270C
2-Chloronaphthalene	91-58-7	8270C
2-Chlorophenol	95-57-8	8270C
4-Chlorophenyl phenyl ether	7005-72-3	8270C
Chrysene	218-01-9	8270C
m-Cresol; 3-Methylphenol	108-39-4	8270C
o-Cresol; 2-Methylphenol	95-48-7	8270C
p-Cresol; 4-Methylphenol	106-44-5	8270C
Dibenz[a,h]anthracene	53-70-3	8270C
Dibenzofuran	132-64-9	8270C

TABLE B-2
APPENDIX IX TARGET ANALYTE LIST
Morton International, Inc.
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
Di-n-butyl phthalate	84-74-2	8270C
1,2-Dichlorobenzene; o-Dichlorobenzene	95-50-1	8270C
1,3-Dichlorobenzene; m-Dichlorobenzene	541-73-1	8270C
1,4-Dichlorobenzene; p-Dichlorobenzene	106-46-7	8270C
3,3'-Dichlorobenzidine	91-94-1	8270C
2,4-Dichlorophenol	120-83-2	8270C
2,6-Dichlorophenol	87-65-0	8270C
Diethyl phthalate	84-66-2	8270C
O,O-Diethyl O-2-pyrazinyl phosphorothioate; Thionazin	297-97-2	8270C
Dimethoate	60-51-5	8270C
p-(Dimethylamino)azobenzene	60-11-7	8270C
7,12-Dimethylbenz[a]anthracene	57-97-6	8270C
3,3-Dimethylbenzidine	119-93-7	8270C
alpha, alpha-Dimethylphenethylamine	122-09-8	8270C
2,4-Dimethylphenol	105-67-9	8270C
Dimethyl phthalate	131-11-3	8270C
1,2-Dinitrobenzene; o-Dinitrobenzene	528-29-0	8270C
m-Dinitrobenzene; 1,3-Dinitrobenzene	99-65-0	8270C
4,6-Dinitro-2-methylphenol; 4,6-Dinitro-o-cresol	534-52-1	8270C
2,4-Dinitrophenol	51-28-5	8270C
2,4-Dinitrotoluene	121-14-2	8270C
2,6-Dinitrotoluene	606-20-2	8270C
Di-n-octyl phthalate	117-84-0	8270C
1,4-Dioxane	123-91-1	8270C
Diphenylamine	122-39-4	8270C
Disulfoton	298-04-4	8270C
Ethyl methanesulfonate	62-50-0	8270C
Famphur	52-85-7	8270C
Fluoranthene	206-44-0	8270C
Fluorene	86-73-7	8270C
Hexachlorobenzene	118-74-1	8270C
Hexachlorobutadiene	87-68-3	8270C
Hexachlorocyclopentadiene	77-47-4	8270C
Hexachloroethane	67-72-1	8270C
Hexachloropropene	1888-71-7	8270C
Indeno(1,2,3-cd)pyrene	193-39-5	8270C
Isophorone	78-59-1	8270C
Isosafrole	120-58-1	8270C
Methapyrilene	91-80-5	8270C
3-Methylcholanthrene	56-49-5	8270C
Methyl methanesulfonate	66-27-3	8270C
2-Methylnaphthalene	91-57-6	8270C
Naphthalene	91-20-3	8270C
1,4-Naphthoquinone	130-15-4	8270C
1-Naphthylamine	134-32-7	8270C
2-Naphthylamine	91-59-8	8270C
2-Nitroaniline; o-Nitroaniline	88-74-4	8270C
3-Nitroaniline; m-Nitroaniline	99-09-2	8270C
4-Nitroaniline; p-Nitroaniline	100-01-6	8270C
Nitrobenzene	98-95-3	8270C
2-Nitrophenol; o-Nitrophenol	88-75-5	8270C
4-Nitrophenol; p-Nitrophenol	100-02-7	8270C
4-Nitroquinoline 1-oxide	56-57-5	8270C

TABLE B-2
APPENDIX IX TARGET ANALYTE LIST
Morton International, Inc.
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
N-Nitrosodi-n-butylamine	924-16-3	8270C
N-Nitrosodiethylamine	55-18-5	8270C
N-Nitrosodimethylamine	62-75-9	8270C
N-Nitrosodiphenylamine	86-30-6	8270C
N-Nitrosodi-n-propylamine; N-Nitrosodipropylamine; Di-n-propylnitrosamine	621-64-7	8270C
N-Nitrosomethylethylamine	10595-95-6	8270C
N-Nitrosomorpholine	59-89-2	8270C
N-Nitrosopiperidine	100-75-4	8270C
N-Nitrosopyrrolidine	930-55-2	8270C
5-Nitro-o-toluidine	99-55-8	8270C
Pentachlorobenzene	608-93-5	8270C
Pentachloronitrobenzene	82-68-8	8270C
Pentachlorophenol	87-86-5	8270C
Phenacetin	62-44-2	8270C
Phenanthrene	85-01-8	8270C
Phenol	108-95-2	8270C
p-Phenylenediamine	106-50-3	8270C
Phorate	298-02-2	8270C
2-Picoline	109-06-8	8270C
Pronamide	23950-58-5	8270C
Pyrene	129-00-0	8270C
Pyridine	110-86-1	8270C
Safrole	94-59-7	8270C
Sulfotepp; Tetraethyl dithiopyrophosphate	3689-24-5	8270C
1,2,4,5-Tetrachlorobenzene	95-94-3	8270C
2,3,4,6-Tetrachlorophenol	58-90-2	8270C
o-Toluidine	95-53-4	8270C
1,2,4-Trichlorobenzene	120-82-1	8270C
2,4,5-Trichlorophenol	95-95-4	8270C
2,4,6-Trichlorophenol	88-06-2	8270C
O,O,O-Triethyl phosphorothioate	126-68-1	8270C
1,3,5-Trinitrobenzene; sym-Trinitrobenzene	99-35-4	8270C
Polychlorinated Biphenyl Aroclors		
Aroclor 1016	12674-11-2	8082
Aroclor 1221	11104-28-2	8082
Aroclor 1232	11141-16-5	8082
Aroclor 1242	53469-21-9	8082
Aroclor 1248	12672-29-6	8082
Aroclor 1254	11097-69-1	8082
Aroclor 1260	11096-82-5	8082
Organochlorine Pesticides		
Aldrin	309-00-2	8081A
alpha-BHC	319-84-6	8081A
beta-BHC	319-85-7	8081A
delta-BHC	319-86-8	8081A
gamma-BHC (Lindane)	58-89-9	8081A
Chlordane	57-74-9	8081A
Chlorobenzilate	510-15-6	8081A
4,4'-DDD	72-54-8	8081A
4,4'-DDE	72-55-9	8081A
4,4'-DDT	50-29-3	8081A
Diallate	2303-16-4	8081A

TABLE B-2
APPENDIX IX TARGET ANALYTE LIST
Morton International, Inc.
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
Dieldrin	60-57-1	8081A
Endosulfan I	959-98-8	8081A
Endosulfan II	33213-65-9	8081A
Endosulfan sulfate	1031-07-8	8081A
Endrin	72-20-8	8081A
Endrin aldehyde	7421-93-4	8081A
Heptachlor	76-44-8	8081A
Heptachlor epoxide	1024-57-3	8081A
Isodrin	465-73-6	8081A
Kepone	143-50-0	8081A
Methoxychlor	72-43-5	8081A
Toxaphene	8001-35-2	8081A
Dioxins/Furans		
Total Hexachlorodibenzo-*p* -dioxin; HxCDD	34465-46-8	8280A
Total Hexachlorodibenzofuran; HxCDF	55684-94-1	8280A
Total Pentachlorodibenzo-*p* -dioxin; PeCDD	36088-22-9	8280A
Total Pentachlorodibenzofuran; PeCDF	30402-15-4	8280A
2,3,7,8-Tetrachlorodibenzo-*p* -dioxin; TCDD	1746-01-6	8280A
Total Tetrachlorodibenzo-*p* -dioxin; TCDD	41903-57-5	8280A
Total Tetrachlorodibenzofuran; TCDF	55722-27-5	8280A

Notes:

1 Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

2 Chemical Abstracts Service registry number (CAS RN). Where "Total" is entered, all species that contain this element are included.

3 Analytical methods refer to analytical procedure numbers used in the U.S. Environmental Protection Agency (USEPA) publication, SW-846, "Test Methods for Evaluating Solid Waste," Current Edition.

Appendix IX Target Analyte List developed from Title 40 of the Code of Federal Regulations, Part 264, Appendix IX.

TABLE B-3
GEOTECHNICAL AND GENERAL WATER QUALITY PARAMETERS
Morton International, Inc.
Reading, Ohio

PARAMETER	METHOD REFERENCE
GEOTECHNICAL	
Atterberg Limits	ASTM D4318
Moisture content	ASTM D2216
Cation Exchange Capcity (CEC)	SW-846 9081
pH	ASTM D2976
Grain size distribution (Sieve Analysis)	ASTM D421, 422
Total Organic Carbon (TOC)	Walkley Black
GENERAL WATER QUALITY	
Total Suspended Solids (TSS)	40 CFR Part 136 160.2
Alkalinity/Bi-carbonate/Carbonate	40 CFR Part 136 310.1
Ammonia-Nitrogen (NH_3^-)	40 CFR Part 136 350.1
Nitrate/Nitrite (NO_3^- / NO_2^-)	40 CFR Part 136 353.2
Phosphate (PO_4^{-3})	40 CFR Part 136 365.2
Phosphorous	40 CFR Part 136 365.2
Total Dissolved Solids (TDS)	40 CFR Part 136 160.1
Calcium (total and dissolved)	SW-846 6010B
Chloride	40 CFR Part 325.3 or 300.0
Ferric Iron (Fe^{+2})	SM SW-846 3500 FE-D
Ferrous Iron (Fe^{+3})	SM SW-846 3500 D
Iron (total and dissolved)	SW-846 6010B
Magnesium (total and dissolved)	SW-846 6010B
Potassium (total and dissolved)	SW-846 6010B
Sodium (total and dissolved)	SW-846 6010B
Total Organic Carbon (TOC)	40 CFR Part 136 415.1 / ASTM D2974

Notes:
ASTM = American Society of Testing and Materials.
CFR = Code of Federal Regulations.
Analytical methods refer to analytical procedure numbers used in the U.S. Environmental Protection Agency (USEPA) publication, SW-846, "Test Methods for Evaluating Solid Waste," Current Edition.

Table B-4
Target Analyte List Sediment and Seep Analysis
Morton International, Inc.
Reading, Ohio

1,1-Dichloroethane	Endrin
1,2-Dichloroethane	Endrin aldehyde
Acetone	Endrin ketone
Benzene	Heptachlor
Bromodichloromethane	Heptachlor epoxide
Carbon disulfide	Isodrin
Chlorobenzene	Aluminum
Chloroform	Antimony
Chloroethane	Arsenic
Dichlorodifluoromethane	Barium
Ethylbenzene	Beryllium
Methylcyclohexane	Cadmium
Methylene chloride	Calcium
Toluene	Chromium
Xylenes (total)	Cobalt
1,2-Dichlorobenzene	Copper
1,4-Dichlorobenzene	Cyanide, Total
2-Methylphenol	Iron
4-Methylphenol	Lead
Aniline	Magnesium
Benzaldehyde	Manganese
Aldrin	Mercury
alpha-Chlordane	Nickel
alpha-BHC	Potassium
beta-BHC	Selenium
delta-BHC	Sodium
4,4'-DDD	Sulfide
4,4'-DDE	Thallium
4,4'-DDT	Tin
Dieldrin	Vanadium
Endosulfan I	Zinc
Endosulfan II	

Table B-5
Background Soil Sampling
Target Analyte List
Morton International, Inc.
Reading, Ohio

Volatile Organic Compounds	PCBs
1,1,1-Trichloroethane	Aroclor 1016
1,1,2-Trichloro-1,2,2-trifluoroethane	Aroclor 1242
1,1,2-Trichloroethane	Aroclor 1260
1,1-Dichloroethane	**Organochlorine Pesticides**
1,1-Dichloroethene	Aldrin
1,2-Dichloroethane	alpha-Chlordane
cis-1,2-Dichloroethene	alpha-BHC
trans-1,2-Dichloroethene	beta-BHC
1,2-Dichloroethene (total)	delta-BHC
Acetone	4,4'-DDD
Benzene	4,4'-DDE
Bromodichloromethane	4,4'-DDT
Bromoform	Dieldrin
2-Butanone	Endosulfan I
Carbon disulfide	Endosulfan II
Chlorobenzene	Endrin
Chloroform	Endrin aldehyde
Cyclohexane	Endrin ketone
Dibromochloromethane	Heptachlor
Dichlorodifluoromethane	Heptachlor epoxide
Ethylbenzene	Isodrin
Methylcyclohexane	Methoxychlor
Methylene chloride	**Metals**
Tetrachloroethene	Aluminum
Toluene	Antimony
Trichloroethene	Arsenic
Vinyl chloride	Barium
Xylenes (total)	Beryllium
Semivolatile Organic Compounds	Cadmium
1,2-Dichlorobenzene	Calcium
1,3-Dichlorobenzene	Chromium
1,4-Dichlorobenzene	Cobalt
2-Methylphenol	Copper
4-Methylphenol	Cyanide, Total
Aniline	Iron
Benzaldehyde	Lead
bis(2-Ethylhexyl) phthalate	Magnesium
Benzo(a)anthracene	Manganese
Benzo(a)pyrene	Mercury
Benzo(b)fluoranthene	Nickel
Benzo(ghi)perylene	Potassium
Benzo(k)fluoranthene	Selenium
Carbazole	Silver
Chrysene	Sodium
Dibenz(a,h)anthracene	Sulfide
Dibenzofuran	Thallium
Fluoranthene	Tin
Fluorene	Vanadium
Indeno(1,2,3-cd)pyrene	Zinc
Phenanthrene	
Pyrene	

TABLE B-6
MONITORING TARGET ANALYTE LIST
Morton Facility
Reading, Ohio

Volatile Organic Constituents		Semivolatile Organic Constituents	
1,1-Dichloroethane	8260B	1,2-Dichlorobenzene	8270C
1,2-Dichloroethane	8260B	1,4-Dichlorobenzene	8270C
Acetone	8260B	2-Methylphenol	8270C
Benzene	8260B	4-Methylphenol	8270C
Bromodichloromethane	8260B	Aniline	8270C
Carbon disulfide	8260B	Benzaldehyde	8270C
Chlorobenzene	8260B	**Inorganics**	
Chloroform	8260B	Aluminum	6010B
Chloroethane	8260B	Antimony	6010B
Dichlorodifluoromethane	8260B	Arsenic	6010B
Ethylbenzene	8260B	Barium	6010B
Methylcyclohexane	8260B	Beryllium	6010B
Methylene chloride	8260B	Cadmium	6010B
Toluene	8260B	Calcium	6010B
Xylenes (total)	8260B	Chromium	6010B
Organochlorine Pesticides		Cobalt	6010B
Aldrin	8081A	Copper	6010B
alpha-Chlordane	8081A	Cyanide, Total	9012A
alpha-BHC	8081A	Iron	6010B
beta-BHC	8081A	Lead	6010B
delta-BHC	8081A	Magnesium	6010B
4,4'-DDD	8081A	Manganese	6010B
4,4'-DDE	8081A	Mercury	7471 / 7470A
4,4'-DDT	8081A	Nickel	6010B
Dieldrin	8081A	Potassium	6010B
Endosulfan I	8081A	Selenium	6010B
Endosulfan II	8081A	Sodium	6010B
Endrin	8081A	Sulfide	6010B
Endrin aldehyde	8081A	Thallium	6010B
Endrin ketone	8081A	Tin	6010B
Heptachlor	8081A	Vanadium	6010B
Heptachlor epoxide	8081A	Zinc	6010B
Isodrin	8081A		

TABLE B-7
CONTRACT LABORATORY PROGRAM TARGET ANALYTE LIST (CLP-TAL+)
VOCs, SVOCs + Aniline, Pesticides, PCBs, Metals + Tin
TARGET ANALYTE LIST
Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
Inorganic Constituents		
Aluminum	(Total)	6010B
Antimony	(Total)	6010B
Arsenic	(Total)	6010B
Barium	(Total)	6010B
Beryllium	(Total)	6010B
Cadmium	(Total)	6010B
Calcium	(Total)	6010B
Chromium	(Total)	6010B
Cobalt	(Total)	6010B
Copper	(Total)	6010B
Cyanide	57-12-5	9012A
Iron	(Total)	6010B
Lead	(Total)	6010B
Magnesium	(Total)	6010B
Manganese	(Total)	6010B
Mercury	(Total)	7471A/7470A
Nickel	(Total)	6010B
Potassium	(Total)	6010B
Selenium	(Total)	6010B
Silver	(Total)	6010B
Sodium	(Total)	6010B
Sulfide	18496-25-8	376.1
Tin	(Total)	6010B
Thallium	(Total)	6010B
Vanadium	(Total)	6010B
Zinc	(Total)	6010B
Volatile Organic Constituents		
Acetone	67-64-1	8260B
Benzene	71-43-2	8260B
Bromochloromethane	74-97-5	8260B
Bromodichloromethane	75-27-4	8260B
Bromoform; Tribromomethane	75-25-2	8260B
Bromomethane; Methyl bromide	74-83-9	8260B
Carbon disulfide	75-15-0	8260B
Carbon tetrachloride	56-23-5	8260B
Chlorobenzene	108-90-7	8260B
Chloroethane; Ethyl chloride	75-00-3	8260B
Chloroform	67-66-3	8260B
Cyclohexane	110-82-7	8260B
Dibromochloromethane; Chlorodibromomethane	124-48-1	8260B
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	8260B
1,2-Dibromoethane; Ethylene dibromide (EDB)	106-93-4	8260B
Dichlorodifluoromethane	75-71-8	8260B
1,1-Dichloroethane (1,1-DCA)	75-34-3	8260B
1,2-Dichloroethane; Ethylene dichloride	107-06-2	8260B
1,1-Dichloroethene; 1,1-Dichloroethylene; Vinylidene chloride	75-35-4	8260B
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2	8260B
trans-1,2-Dichloroethene; trans-1,2-Dichloroethylene	156-60-5	8260B
1,2-Dichloropropane	78-87-5	8260B

TABLE B-7
CONTRACT LABORATORY PROGRAM TARGET ANALYTE LIST (CLP-TAL+)
VOCs, SVOCs + Aniline, Pesticides, PCBs, Metals + Tin
TARGET ANALYTE LIST
Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical
cis-1,3-Dichloropropene	10061-01-5	8260B
trans-1,3-Dichloropropene	10061-02-6	8260B
Ethylbenzene	100-41-4	8260B
2-Hexanone	591-78-6	8260B
Isopropylbenzene; cumene	98-82-8	8260B
Methyl acetate	79-20-9	8260B
Methyl chloride; Chloromethane	74-87-3	8260B
Methyl cyclohexane	108-87-2	8260B
Methylene chloride; Dichloromethane	75-09-2	8260B
Methyl ethyl ketone; 2-Butanone; MEK	78-93-3	8260B
4-Methyl-2-pentanone; Methyl isobutyl ketone (MIBK)	108-10-1	8260B
Methyl tert-butyl ether	1634-04-4	8260B
Styrene	100-42-5	8260B
1,1,2,2-Tetrachloroethane	79-34-5	8260B
Tetrachloroethylene; Perchloroethylene; Tetrachlorethene (PCE)	127-18-4	8260B
Toluene	108-88-3	8260B
1,1,1-Trichloroethane; Methylchloroform	71-55-6	8260B
1,1,2-Trichloroethane	79-00-5	8260B
Trichloroethylene; Trichloroethene	79-01-6	8260B
Trichlorofluoromethane	75-69-4	8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	8260B
Vinyl chloride	75-01-4	8260B
Xylene (total)	1330-20-7	8260B
Semivolatile Organic Constituents		
Acenaphthene	83-32-9	8270C
Acenaphthylene	208-96-8	8270C
Acetophenone	98-86-2	8270C
Aniline	62-53-3	8270C
Anthracene	120-12-7	8270C
Atrazine	1912-24-9	8270C
Benzaldehyde	100-52-7	8270C
Benzo[a]anthracene; Benzanthracene	56-55-3	8270C
Benzo[b]fluoranthene	205-99-2	8270C
Benzo[k]fluoranthene	207-08-9	8270C
Benzo[ghi]perylene	191-24-2	8270C
Benzo[a]pyrene	50-32-8	8270C
1,1'-Biphenyl	92-52-4	8270C
Bis(2-chloroethoxy)methane	111-91-1	8270C
Bis(2-chloroethyl)ether	111-44-4	8270C
Bis(2-ethylhexyl) phthalate	117-81-7	8270C
4-Bromophenyl phenyl ether	101-55-3	8270C
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	8270C
Caprolactam	105-60-2	8270C
Carbazole	86-74-8	8270C
4-Chloroaniline; p-Chloroaniline	106-47-8	8270C
4-Chloro-3-methylphenol; p-Chloro-m-cresol	59-50-7	8270C
2-Chloronaphthalene	91-58-7	8270C
2-Chlorophenol	95-57-8	8270C
4-Chlorophenyl phenyl ether	7005-72-3	8270C
Chrysene	218-01-9	8270C
o-Cresol; 2-Methylphenol	95-48-7	8270C

TABLE B-7
CONTRACT LABORATORY PROGRAM TARGET ANALYTE LIST (CLP-TAL+)
VOCs, SVOCs + Aniline, Pesticides, PCBs, Metals + Tin
TARGET ANALYTE LIST
Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical
p-Cresol; 4-Methylphenol	106-44-5	8270C
Dibenz[a,h]anthracene	53-70-3	8270C
Dibenzofuran	132-64-9	8270C
Di-n-butyl phthalate	84-74-2	8270C
1,2-Dichlorobenzene; o-Dichlorobenzene	95-50-1	8270C
1,3-Dichlorobenzene; m-Dichlorobenzene	541-73-1	8270C
1,4-Dichlorobenzene; p-Dichlorobenzene	106-46-7	8270C
3,3'-Dichlorobenzidine	91-94-1	8270C
2,4-Dichlorophenol	120-83-2	8270C
Diethyl phthalate	84-66-2	8270C
2,4-Dimethylphenol	105-67-9	8270C
Dimethyl phthalate	131-11-3	8270C
4,6-Dinitro-2-methylphenol; 4,6-Dinitro-o-cresol	534-52-1	8270C
2,4-Dinitrophenol	51-28-5	8270C
2,4-Dinitrotoluene	121-14-2	8270C
2,6-Dinitrotoluene	606-20-2	8270C
Di-n-octyl phthalate	117-84-0	8270C
Fluoranthene	206-44-0	8270C
Fluorene	86-73-7	8270C
Hexachlorobenzene	118-74-1	8270C
Hexachlorobutadiene	87-68-3	8270C
Hexachlorocyclopentadiene	77-47-4	8270C
Hexachloroethane	67-72-1	8270C
Indeno(1,2,3-cd)pyrene	193-39-5	8270C
Isophorone	78-59-1	8270C
2-Methylnaphthalene	91-57-6	8270C
Naphthalene	91-20-3	8270C
2-Nitroaniline; o-Nitroaniline	88-74-4	8270C
3-Nitroaniline; m-Nitroaniline	99-09-2	8270C
4-Nitroaniline; p-Nitroaniline	100-01-6	8270C
Nitrobenzene	98-95-3	8270C
2-Nitrophenol; o-Nitrophenol	88-75-5	8270C
4-Nitrophenol; p-Nitrophenol	100-02-7	8270C
N-Nitrosodiphenylamine	86-30-6	8270C
N-Nitrosodi-n-propylamine; N-Nitrosodipropylamine; Di-n-propylnitrosamine	621-64-7	8270C
2,2'-Oxybis(1-chloropropane)	108-60-1	8270C
Pentachlorophenol	87-86-5	8270C
Phenanthrene	85-01-8	8270C
Phenol	108-95-2	8270C
Pyrene	129-00-0	8270C
1,2,4-Trichlorobenzene	120-82-1	8270C
2,4,5-Trichlorophenol	95-95-4	8270C
2,4,6-Trichlorophenol	88-06-2	8270C
Polychlorinated Biphenyl Aroclors		
Aroclor 1016	12674-11-2	8082
Aroclor 1221	11104-28-2	8082
Aroclor 1232	11141-16-5	8082
Aroclor 1242	53469-21-9	8082
Aroclor 1248	12672-29-6	8082
Aroclor 1254	11097-69-1	8082
Aroclor 1260	11096-82-5	8082

TABLE B-7
CONTRACT LABORATORY PROGRAM TARGET ANALYTE LIST (CLP-TAL+)
VOCs, SVOCs + Aniline, Pesticides, PCBs, Metals + Tin
TARGET ANALYTE LIST
Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical
Organochlorine Pesticides		
Aldrin	309-00-2	8081A
alpha-BHC	319-84-6	8081A
beta-BHC	319-85-7	8081A
delta-BHC	319-86-8	8081A
gamma-BHC (Lindane)	58-89-9	8081A
alpha-Chlordane	5103-71-9	8081A
gamma-Chlordane	5103-74-2	8081A
4,4'-DDD	72-54-8	8081A
4,4'-DDE	72-55-9	8081A
4,4'-DDT	50-29-3	8081A
Dieldrin	60-57-1	8081A
Endosulfan I	959-98-8	8081A
Endosulfan II	33213-65-9	8081A
Endosulfan sulfate	1031-07-8	8081A
Endrin	72-20-8	8081A
Endrin aldehyde	7421-93-4	8081A
Endrin ketone	53494-70-5	8081A
Heptachlor	76-44-8	8081A
Heptachlor epoxide	1024-57-3	8081A
Methoxychlor	72-43-5	8081A
Toxaphene	8001-35-2	8081A

Notes:

1 Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

2 Chemical Abstracts Service registry number (CAS RN). Where "Total" is entered, all species that contain this element are included.

3 Analytical methods refer to analytical procedure numbers used in the U.S. Environmental Protection Agency (USEPA) publication, SW-846, "Test Methods for Evaluating Solid Waste," Current Edition.

Contract Laboratory Program Target Analyte List developed from the USEPA Superfund Contract Laboratory Program. Available from Internet url: http://www.epa.gov/superfund/programs/clp/target.htm

TABLE B-8
APPENDIX IX TARGET ANALYTE LIST (APP IX-TAL +)
VOCs, SVOCs, Pesticides, PCBs, Metals + Tin
Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
Inorganic Constituents		
Antimony	(Total)	6010B
Arsenic	(Total)	6010B
Barium	(Total)	6010B
Beryllium	(Total)	6010B
Cadmium	(Total)	6010B
Chromium	(Total)	6010B
Cobalt	(Total)	6010B
Copper	(Total)	6010B
Cyanide	57-12-5	9012A
Lead	(Total)	6010B
Mercury	(Total)	7471A/7470A
Nickel	(Total)	6010B
Selenium	(Total)	6010B
Silver	(Total)	6010B
Sulfide	18496-25-8	376.1
Tin	(Total)	6010B
Thallium	(Total)	6010B
Vanadium	(Total)	6010B
Zinc	(Total)	6010B
Volatile Organic Constituents		
Acetone	67-64-1	8260B
Acetonitrile; Methyl cyanide	75-05-8	8260B
Acrolein	107-02-8	8260B
Acrylonitrile	107-13-1	8260B
Benzene	71-43-2	8260B
Bromodichloromethane	75-27-4	8260B
Bromoform; Tribromomethane	75-25-2	8260B
Bromomethane; Methyl bromide	74-83-9	8260B
Carbon disulfide	75-15-0	8260B
Carbon tetrachloride	56-23-5	8260B
Chlorobenzene	108-90-7	8260B
Chloroethane; Ethyl chloride	75-00-3	8260B
Chloroform	67-66-3	8260B
Chloroprene	126-99-8	8260B
3-Chloropropene; 3-Chloro-1-propene; Allyl chloride	107-05-1	8260B
Dibromochloromethane; Chlorodibromomethane	124-48-1	8260B
1,2-Dibromo-3-chloropropane; DBCP	96-12-8	8260B
1,2-Dibromoethane; Ethylene dibromide (EDB)	106-93-4	8260B
Dibromomethane; Methylene bromide	74-95-3	8260B
trans-1,4-Dichloro-2-butene	110-57-6	8260B
Dichlorodifluoromethane	75-71-8	8260B
1,1-Dichloroethane (1,1-DCA)	75-34-3	8260B
1,2-Dichloroethane; Ethylene dichloride	107-06-2	8260B
1,1-Dichloroethene; 1,1-Dichloroethylene; Vinylidene chloride	75-35-4	8260B
cis-1,2-Dichloroethylene; cis-1,2-Dichloroethene	156-59-2	8260B
trans-1,2-Dichloroethene; trans-1,2-Dichloroethylene	156-60-5	8260B
1,2-Dichloropropane	78-87-5	8260B
cis-1,3-Dichloropropene	10061-01-5	8260B
trans-1,3-Dichloropropene	10061-02-6	8260B

TABLE B-8
APPENDIX IX TARGET ANALYTE LIST (APP IX-TAL +)
VOCs, SVOCs, Pesticides, PCBs, Metals + Tin
Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical
Ethylbenzene	100-41-4	8260B
Ethyl methacrylate	97-63-2	8260B
2-Hexanone	591-78-6	8260B
Isobutyl alcohol	78-83-1	8260B
Methacrylonitrile	126-98-7	8260B
Methyl chloride; Chloromethane	74-87-3	8260B
Methylene chloride; Dichloromethane	75-09-2	8260B
Methyl ethyl ketone; 2-Butanone; MEK	78-93-3	8260B
Methyl iodide; Iodomethane	74-88-4	8260B
Methyl methacrylate	80-62-6	8260B
4-Methyl-2-pentanone; Methyl isobutyl ketone (MIBK)	108-10-1	8260B
Propionitrile; Ethyl cyanide	107-12-0	8260B
Styrene	100-42-5	8260B
1,1,1,2-Tetrachloroethane	630-20-6	8260B
Tetrachloroethylene; Perchloroethylene; Tetrachlorethene (PCE)	127-18-4	8260B
Toluene	108-88-3	8260B
1,1,1-Trichloroethane; Methylchloroform	71-55-6	8260B
1,1,2-Trichloroethane	79-00-5	8260B
Trichloroethylene; Trichloroethene	79-01-6	8260B
Trichlorofluoromethane	75-69-4	8260B
1,2,3-Trichloropropane	96-18-4	8260B
Vinyl acetate	108-05-4	8260B
Vinyl chloride	75-01-4	8260B
Xylene (total)	1330-20-7	8260B
Semivolatile Organic Constituents		
Acenaphthene	83-32-9	8270C
Acenaphthylene	208-96-8	8270C
Acetophenone	98-86-2	8270C
2-Acetylaminofluorene; 2-AAF	53-96-3	8270C
4-Aminobiphenyl	92-67-1	8270C
Aniline	62-53-3	8270C
Anthracene	120-12-7	8270C
Aramite	140-57-8	8270C
Benzo[a]anthracene; Benzanthracene	56-55-3	8270C
Benzo[b]fluoranthene	205-99-2	8270C
Benzo[k]fluoranthene	207-08-9	8270C
Benzo[ghi]perylene	191-24-2	8270C
Benzo[a]pyrene	50-32-8	8270C
Benzyl alcohol	100-51-6	8270C
Bis(2-chloroethoxy)methane	111-91-1	8270C
Bis(2-chloroethyl)ether	111-44-4	8270C
Bis(2-chloro-1-methylethyl) ether; 2,2-Di-chlorodiisopropyl ether	108-60-1	8270C
Bis(2-ethylhexyl) phthalate	117-81-7	8270C
4-Bromophenyl phenyl ether	101-55-3	8270C
Butyl benzyl phthalate; Benzyl butyl phthalate	85-68-7	8270C
4-Chloroaniline; p-Chloroaniline	106-47-8	8270C
Chlorobenzilate	510-15-6	8270C
4-Chloro-3-methylphenol; p-Chloro-m-cresol	59-50-7	8270C
2-Chloronaphthalene	91-58-7	8270C
2-Chlorophenol	95-57-8	8270C
4-Chlorophenyl phenyl ether	7005-72-3	8270C

TABLE B-8
APPENDIX IX TARGET ANALYTE LIST (APP IX-TAL +)
VOCs, SVOCs, Pesticides, PCBs, Metals + Tin
Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical
Chrysene	218-01-9	8270C
m-Cresol; 3-Methylphenol	108-39-4	8270C
o-Cresol; 2-Methylphenol	95-48-7	8270C
p-Cresol; 4-Methylphenol	106-44-5	8270C
Dibenz[a,h]anthracene	53-70-3	8270C
Dibenzofuran	132-64-9	8270C
Di-n-butyl phthalate	84-74-2	8270C
1,2-Dichlorobenzene; o-Dichlorobenzene	95-50-1	8270C
1,3-Dichlorobenzene; m-Dichlorobenzene	541-73-1	8270C
1,4-Dichlorobenzene; p-Dichlorobenzene	106-46-7	8270C
3,3'-Dichlorobenzidine	91-94-1	8270C
2,4-Dichlorophenol	120-83-2	8270C
2,6-Dichlorophenol	87-65-0	8270C
Diethyl phthalate	84-66-2	8270C
O,O-Diethyl O-2-pyrazinyl phosphorothioate; Thionazin	297-97-2	8270C
Dimethoate	60-51-5	8270C
p-(Dimethylamino)azobenzene	60-11-7	8270C
7,12-Dimethylbenz[a]anthracene	57-97-6	8270C
3,3-Dimethylbenzidine	119-93-7	8270C
alpha, alpha-Dimethylphenethylamine	122-09-8	8270C
2,4-Dimethylphenol	105-67-9	8270C
Dimethyl phthalate	131-11-3	8270C
1,2-Dinitrobenzene; o-Dinitrobenzene	528-29-0	8270C
m-Dinitrobenzene; 1,3-Dinitrobenzene	99-65-0	8270C
4,6-Dinitro-2-methylphenol; 4,6-Dinitro-o-cresol	534-52-1	8270C
2,4-Dinitrophenol	51-28-5	8270C
2,4-Dinitrotoluene	121-14-2	8270C
2,6-Dinitrotoluene	606-20-2	8270C
Di-n-octyl phthalate	117-84-0	8270C
1,4-Dioxane	123-91-1	8270C
Diphenylamine	122-39-4	8270C
Disulfoton	298-04-4	8270C
Ethyl methanesulfonate	62-50-0	8270C
Famphur	52-85-7	8270C
Fluoranthene	206-44-0	8270C
Fluorene	86-73-7	8270C
Hexachlorobenzene	118-74-1	8270C
Hexachlorobutadiene	87-68-3	8270C
Hexachlorocyclopentadiene	77-47-4	8270C
Hexachloroethane	67-72-1	8270C
Hexachloropropene	1888-71-7	8270C
Indeno(1,2,3-cd)pyrene	193-39-5	8270C
Isophorone	78-59-1	8270C
Isosafrole	120-58-1	8270C
Methapyrilene	91-80-5	8270C
3-Methylcholanthrene	56-49-5	8270C
Methyl methanesulfonate	66-27-3	8270C
2-Methylnaphthalene	91-57-6	8270C
Naphthalene	91-20-3	8270C
1,4-Naphthoquinone	130-15-4	8270C
1-Naphthylamine	134-32-7	8270C

TABLE B-8
APPENDIX IX TARGET ANALYTE LIST (APP IX-TAL +)
VOCs, SVOCs, Pesticides, PCBs, Metals + Tin
Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical
2-Naphthylamine	91-59-8	8270C
2-Nitroaniline; o-Nitroaniline	88-74-4	8270C
3-Nitroaniline; m-Nitroaniline	99-09-2	8270C
4-Nitroaniline; p-Nitroaniline	100-01-6	8270C
Nitrobenzene	98-95-3	8270C
2-Nitrophenol; o-Nitrophenol	88-75-5	8270C
4-Nitrophenol; p-Nitrophenol	100-02-7	8270C
4-Nitroquinoline 1-oxide	56-57-5	8270C
N-Nitrosodi-n-butylamine	924-16-3	8270C
N-Nitrosodiethylamine	55-18-5	8270C
N-Nitrosodimethylamine	62-75-9	8270C
N-Nitrosodiphenylamine	86-30-6	8270C
N-Nitrosodi-n-propylamine; N-Nitrosodipropylamine; Di-n-propylnitrosamine	621-64-7	8270C
N-Nitrosomethylethylamine	10595-95-6	8270C
N-Nitrosomorpholine	59-89-2	8270C
N-Nitrosopiperidine	100-75-4	8270C
N-Nitrosopyrrolidine	930-55-2	8270C
5-Nitro-o-toluidine	99-55-8	8270C
Pentachlorobenzene	608-93-5	8270C
Pentachloronitrobenzene	82-68-8	8270C
Pentachlorophenol	87-86-5	8270C
Phenacetin	62-44-2	8270C
Phenanthrene	85-01-8	8270C
Phenol	108-95-2	8270C
p-Phenylenediamine	106-50-3	8270C
Phorate	298-02-2	8270C
2-Picoline	109-06-8	8270C
Pronamide	23950-58-5	8270C
Pyrene	129-00-0	8270C
Pyridine	110-86-1	8270C
Safrole	94-59-7	8270C
Sulfotepp; Tetraethyl dithiopyrophosphate	3689-24-5	8270C
1,2,4,5-Tetrachlorobenzene	95-94-3	8270C
2,3,4,6-Tetrachlorophenol	58-90-2	8270C
o-Toluidine	95-53-4	8270C
1,2,4-Trichlorobenzene	120-82-1	8270C
2,4,5-Trichlorophenol	95-95-4	8270C
2,4,6-Trichlorophenol	88-06-2	8270C
O,O,O-Triethyl phosphorothioate	126-68-1	8270C
1,3,5-Trinitrobenzene; sym-Trinitrobenzene	99-35-4	8270C
Polychlorinated Biphenyl Aroclors		
Aroclor 1016	12674-11-2	8082
Aroclor 1221	11104-28-2	8082
Aroclor 1232	11141-16-5	8082
Aroclor 1242	53469-21-9	8082
Aroclor 1248	12672-29-6	8082
Aroclor 1254	11097-69-1	8082
Aroclor 1260	11096-82-5	8082
Organochlorine Pesticides		
Aldrin	309-00-2	8081A
alpha-BHC	319-84-6	8081A

TABLE B-8
APPENDIX IX TARGET ANALYTE LIST (APP IX-TAL +)
VOCs, SVOCs, Pesticides, PCBs, Metals + Tin
Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical
beta-BHC	319-85-7	8081A
delta-BHC	319-86-8	8081A
gamma-BHC (Lindane)	58-89-9	8081A
Chlordane	57-74-9	8081A
Chlorobenzilate	510-15-6	8081A
4,4'-DDD	72-54-8	8081A
4,4'-DDE	72-55-9	8081A
4,4'-DDT	50-29-3	8081A
Diallate	2303-16-4	8081A
Dieldrin	60-57-1	8081A
Endosulfan I	959-98-8	8081A
Endosulfan II	33213-65-9	8081A
Endosulfan sulfate	1031-07-8	8081A
Endrin	72-20-8	8081A
Endrin aldehyde	7421-93-4	8081A
Heptachlor	76-44-8	8081A
Heptachlor epoxide	1024-57-3	8081A
Isodrin	465-73-6	8081A
Kepone	143-50-0	8081A
Methoxychlor	72-43-5	8081A
Toxaphene	8001-35-2	8081A

Notes:

1 Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

2 Chemical Abstracts Service registry number (CAS RN). Where "Total" is entered, all species that contain this element are included.

3 Analytical methods refer to analytical procedure numbers used in the U.S. Environmental Protection Agency (USEPA) publication, SW-846, "Test Methods for Evaluating Solid Waste," Current Edition.

Appendix IX Target Analyte List developed from Title 40 of the Code of Federal Regulations, Part 264, Appendix IX.

TABLE B-9
CHROMIUM SPECIATION ANALYSIS

Morton Facility
Reading, Ohio

Common name[1]	CAS RN [2]	Analytical Method [3]
Total Chromium	Total	6010B
Hexavalent Chromium	18540-29-9	3060A/7196A

Notes:

1 *Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.*

2 *Chemical Abstracts Service registry number (CAS RN). Where "Total" is entered, all species that contain this element are included.*

3 *Analytical methods refer to analytical procedure numbers used in the U.S. Environmental Protection Agency (USEPA) publication, SW-846, "Test Methods for Evaluating Solid Waste," Current Edition.*

APPENDIX C

AQUIFER TEST RESULTS

TABLE OF CONTENTS
APPENDIX C

Table C-1 Summary of Step-Test Results
Table C-2 Calculated Flow Velocities in Groundwater

Supporting Documentation

- Aquifer Tests - Purpose and Methods
- Calculation Sheets – Specific Capacity for Each Step
- Calculation Sheets – Saturated Thickness and Aquifer Type and Penetration
- Calculation Sheets – Select/Determine Correct Specific Capacity and Calculate T and K
- Calculation Sheets – Effects of Pumping Step Tests on Aquifers above and below Test Zone
- Calculation Sheets – Estimated Groundwater Flow Rate
- Calculation Sheets – Calculate T from Semilog Plot

Chart - Water Level Changed During Pristine Pumping (Water level data collected in May 30, 2001 to June 26, 2001). See discussion in Section 4.11.2 of this Revised FI Report.

Table C-1
Summary of Step-Test Results
Morton International, Inc.
Reading, OH

Pumped Well	Vertical Response Observation Well	Flow Rate Steps (gpm)	Maximum Drawdown (ft)	Specific Capacity (gpm/ft)	Estimated Transmissivity (gal/day-ft)	Saturated Thickness (ft) Confined or Unconfined Percent Penetrated	Estimated Hydraulic Conductivity (ft/day)	Response Observed In Observation Well?
UAW02-20	UAW02-40	2.0	0.49	4.08	5000	6.3	106	no
		5.0	1.36	3.68		unconfined		
		9.5	3.01	3.16		100%		
UAW02-40	UAW02-20	3.0	0.22	13.64	46500	19.6	317	no
		6.0	0.24	25.00		confined		
		7.5	0.26	28.85		72%		
		9.5	0.4	23.75				
UAW20-60	EPA-2	2.0	6.76	0.30	280	21.7	1.7	no
		2.5	14.18	0.18		unconfined		
		3.0	20.95	0.14		52%		

Table C-2
Calculated Flow Velocities of Groundwater
Morton International, Inc.
Reading, Ohio

Test Well	Zone of Upper Aquifer	Estimate Hydraulic Conductivity (ft/day)	Effective Porosity (dimensionless)	Hydraulic Gradient (ft/ft)	Horizontal Flow Rate (ft/day)
UAW02-20	20-foot	106	25%	0.019	8.1
UAW02-40	40-foot	317	25%	0.0019	2.4
UAW20-60	60-foot	1.7	25%	0.0019	0.013

Subject	Aquifer Tests – Rohm & Haas – Reading, OH	Project No.	7168A
By	MB	Checked By	RDC RDC
Task No.	Aquifer Test		
File No.	1		
Date	3/12/02	Date	5-3-02
Sheet	1 of 1		

Purpose:

- Measure properties of aquifer materials.
- Determine effect of pumping on water levels in underlying/overlying aquifers.
- Estimate groundwater flow rates.

Data:

- Pumping step tests of selected wells, December 5-7, 2001.

Method:

- Calculate specific capacity of wells at each step. (File 2)
- Determine saturated thickness of aquifer, confined/unconfined character, and fraction penetrated by test well. (File 3)
- Estimate transmissivity (T) and hydraulic conductivity (K) from specific capacity and saturated thickness. (File 4)
- Examine data from observation wells for evidence of effects of pumping underlying/overlying aquifer. (File 5)
- Estimate groundwater velocity. (File 6)
- Estimate T from recovery-period data, if sufficient data available. (File 7)

Caveats:

- Additional drawdown due to well inefficiency/skin effect will reduce measured sp. cap and underestimate T.
- Partial penetration will cause additional drawdown, reduce measured sp. cap and underestimate T.

Subject Specific Capacity For Each Step | Project No. 7169
By MGB | Checked By RDC | Task No. Aquifer Test
File No. 7
Date 3/7/02 | Date 5-3-02 | Sheet 1 of 6

Method: use drawdown at end of each step and flow rate for step to calculate Sp. Cap.

Well VAW 02-20 Step test of Dec 5, 2001

$$\text{Sp. Cap} = \frac{\text{Flow Rate of well}}{\text{drawdown}}$$

use final drawdown at that associated rate

1st Step: Flow rate = 2.0 gpm
Drawdown = 0.49 ft at end of period

specific capacity at end of 1st Step =

$$\text{Sp. Cap.}(1) = \frac{2.0}{0.49} = \underline{4.08 \text{ gpm/ft}}$$

2nd Step Flow Rate = 5.0 gpm
Drawdown = 1.36 ft

$$\text{sp. cap}(2) = \frac{5}{1.36} = \underline{3.68 \text{ gpm/ft}}$$

3rd St Flow Rate = 9.5 gpm
Drawdown = 3.01

$$\text{Sp. Cap.}(3) = \frac{9.5}{3.01} = \underline{3.16 \text{ gpm/ft}}$$

Subject: Specific Capacities From Step Tests

Project No. 7169

By: MEB

Checked By: RDC

Task No.

File No.

Date: 3/7/02

Date: 5-3-02

Sheet 2 of 6

Specific Capacity VAW 02-40

Step Test of Dec. 7, 2001 (2nd)

1st Step: Flow Rate = 3.0

Drawdown = 0.22 ft

sp Cap (1) = $\frac{3}{0.22}$ = 13.64 gpm/ft

2nd Step: Flow Rate = 6 gpm

Drawdown = 0.24

Sp. Cap (2) = $\frac{6}{0.24}$ = 25 gpm/ft

3rd Step: Flow Rate = 7.5 gpm

Drawdown = 0.26

Sp. Cap (3) = $\frac{7.5}{0.26}$ = 28.85 gpm/ft

4th Step: Flow rate = 9.5 gpm

Drawdown = 0.4 ft

Sp. Cap. (4) = $\frac{9.5}{0.4}$ = 23.75 gpm/ft

Subject Specific Capacities From Step Tests

Project No. 7169

By MGB

Checked By RDC

Task No.

File No.

Date 3/7/02

Date 5-3-02

Sheet 3 of 6

Specific Capacity VAW 20-60

Step Test of Dec. 6, 2001

1st Step: Flow Rate = 2 gpm

Drawdown = 6.76

Sp. Cap (1) = $\frac{2}{6.76}$

Sp. Cap. (1) = 0.3 gpm/ft

2nd Step: Flow Rate = 2.5 gpm

Drawdown = 14.18

Sp. Cap (2) = $\frac{2.5}{14.18}$

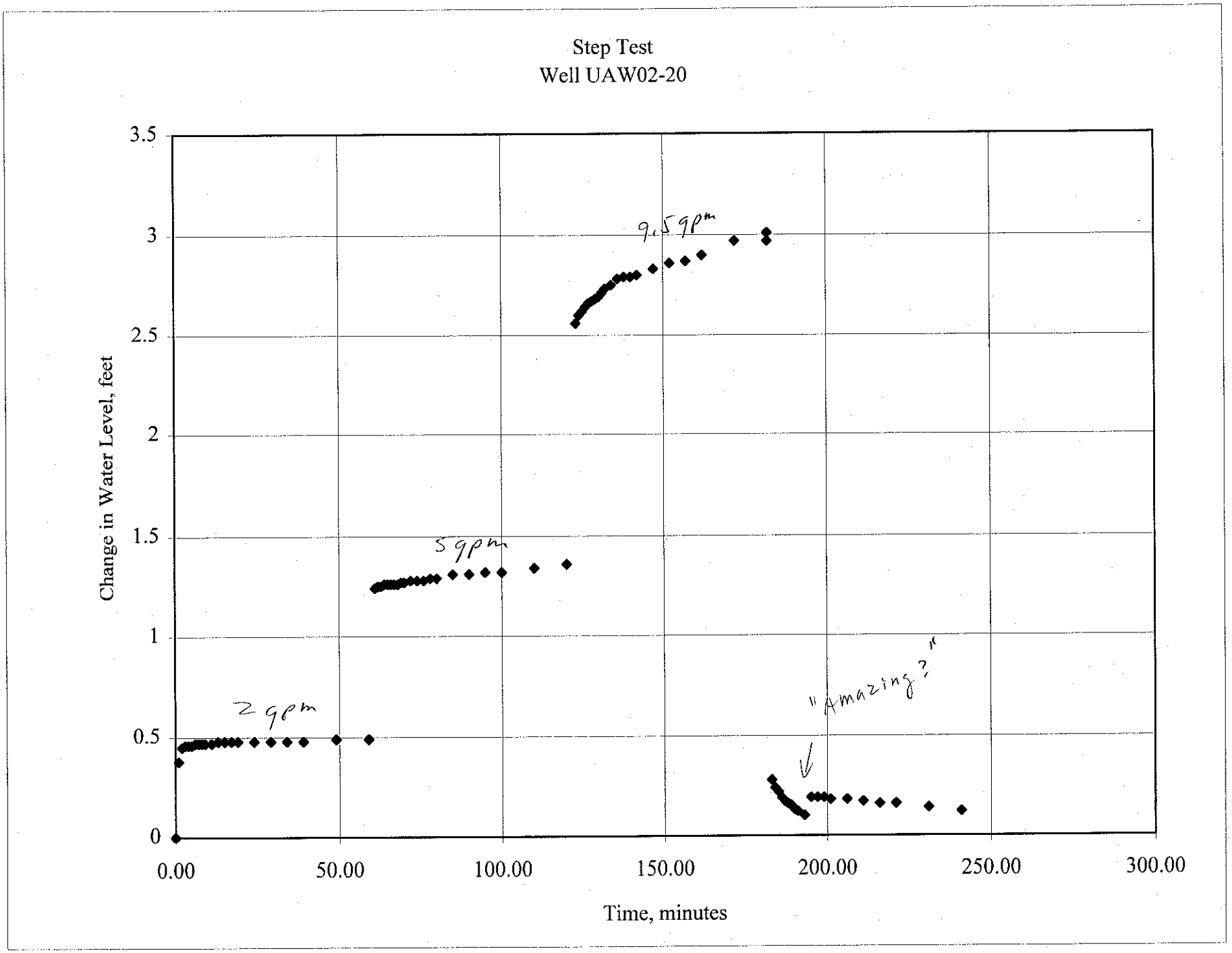
Sp. Cap. (2) = 0.176 gpm/ft

3rd Step: Flow Rate = 3.0 gpm

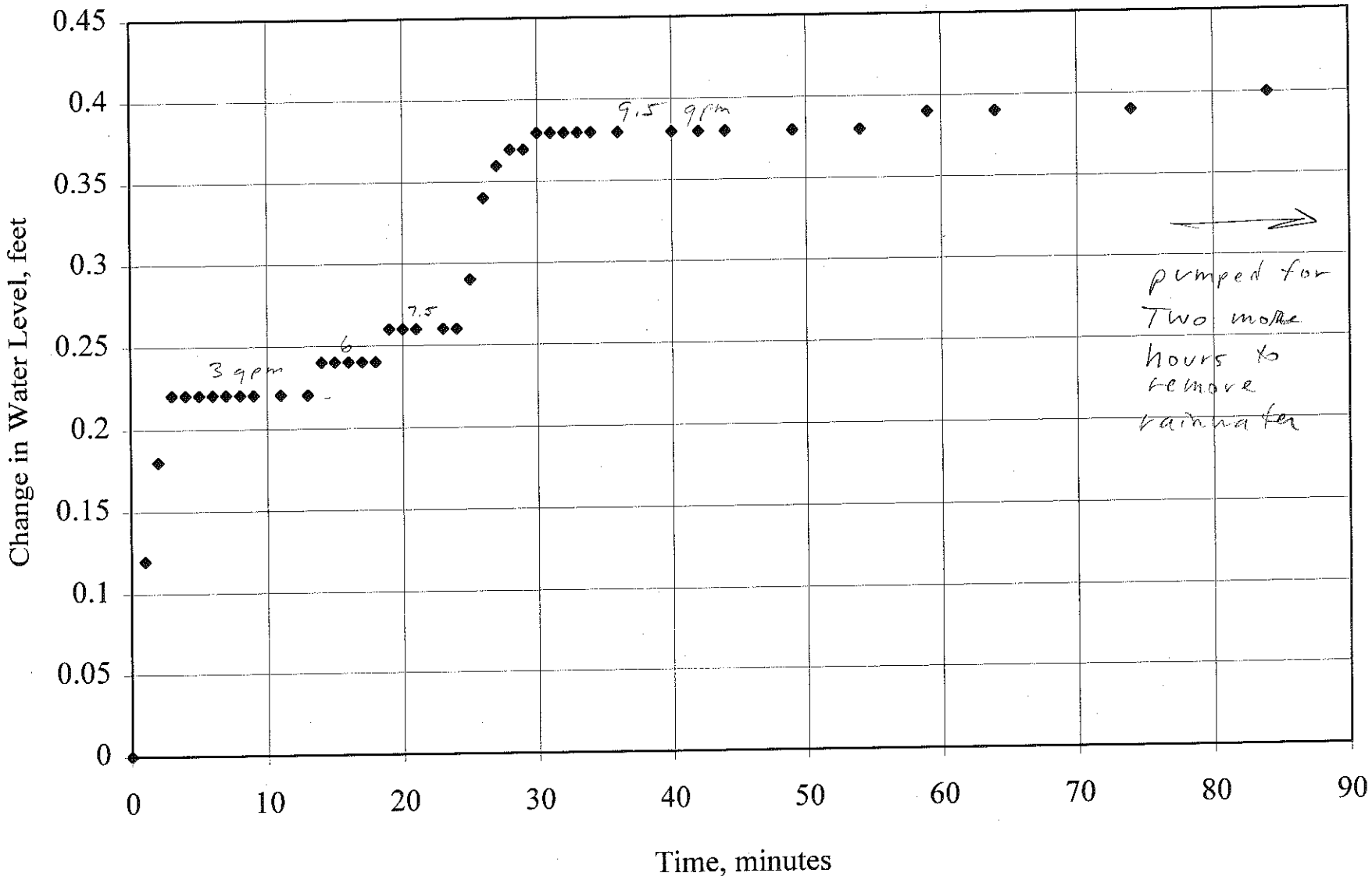
Drawdown = 20.95

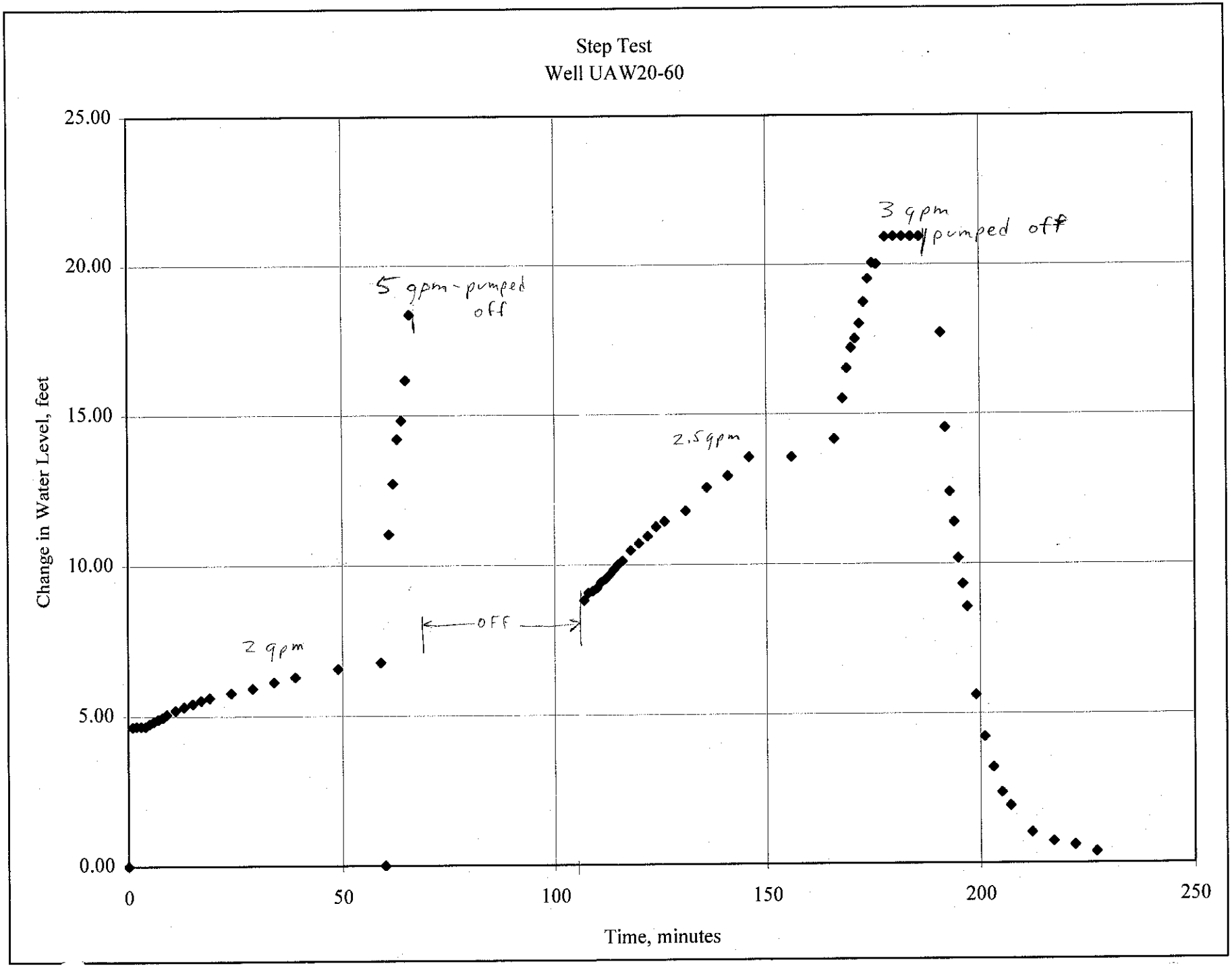
Sp. Cap (3) = $\frac{3}{20.95}$ =

Sp. Cap. (3) = 0.143


Step Test
Well UAW02-20
Change in Water Level, feet
Time, minutes
3.5
3
2.5
2
1.5
1
0.5
0
0.00
50.00
100.00
150.00
200.00
250.00
300.00
2 gpm
5 gpm
9.5 gpm
"Amazing?"

Step Test
Well UAW02-40 (2nd)




Step Test
Well UAW20-60
Change in Water Level, feet
Time, minutes
25.00
20.00
15.00
10.00
5.00
0.00
0
50
100
150
200
250
2 gpm
5 gpm - pumped off
OFF
2.5 gpm
3 gpm
pumped off

Subject Saturated Thickness and Aquifer Type and Penetration

Project No. 7169

Task No. Aquifer Test

File No. (3)

By MEB

Checked By RDC

Date 3/12/02

Date 5-3-02

Sheet 1 of 11

SATURATED THICKNESS

Well UAW02-20

Screen Position ≅ 8 to 18 ft BGL (Log attached)

Top of Sand 7 ft BGL (Log of STR07)
Bottom of Sand 18 ft BGL
DTW - ranged from 11.7 to 14.7 ft BTOC (inside screen)

Conclusion: • Fully Penetrating Well
• Unconfined Aquifer

Saturated Thickness = Depth to Bottom of Sand - Static Water Level

= 18 - 11.7

= 6.3 ft

Well UAW 02-40

Screen Position ≅ 31.5 - 46.5 ft

Top Sand = 26 ft BGL

Bottom Sand = 45.6 ft BGL

DTW Ranged From 14.1 - 14.5 BTOC (Above Screen and Top of Sand)

Penetration: $\frac{45.6 - 31.5}{45.6 - 26} = \frac{14.1}{19.6} = 0.72$

Conclusions:

- Well Penetrates 72% of the Sand
- Confined Aquifer

Saturated Thickness:

= 45.6 - 26

= 19.6 ft

Subject Saturated Thickness, Aquifer Type, Penetration Project No. 7169

By MGB Checked By RDC Task No.

File No.

Date 3/12/02 Date 5-3-02 Sheet 2 of 11

Well VAW 20 - 60

screen Position — 46.5 - 61.5 ft BGL

Top of Sand - 34 ft Bgl
Bottom of Sand - 60 ft BGL } 26 ft

DTW - 38.29 BTOC

$$\text{penetration} = \frac{60-46.5}{60-34} = \frac{13.5}{26} = 52\%$$

Water Level is below top of SAND (Natural Level may be higher when Lower zone is not being pumped)

Conclusion:

- Aquifer Unconfined (at time of test)
- Well is partially penetrating

Saturated Thickness = 38.29 - 60 = 21.71 ft

3 of 11

PROJECT: MORTON READING	**Log of Well No.** UAW02-20
BORING LOCATION: 8' SOUTH ~~UAW02~~ STR07	ELEVATION AND DATUM: ~~UAW02~~ (8' SOUTH)
DRILLING CONTRACTOR: BOWSER MORNER	DATE STARTED: 3-21-01 / DATE FINISHED:
DRILLING METHOD: ROTASONIC	TOTAL DEPTH: 19 (BORING) / SCREEN INTERVAL: 8'-18'
DRILLING EQUIPMENT: 4" ø INNER ROD, 8" ø OUTER	DEPTH TO WATER: FIRST NM / COMPL. NM / CASING:
SAMPLING METHOD: 10' SAMPLE BARREL / PLASTIC SLEEVE	LOGGED BY: E. MANSELL
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: M HEMINGWAY / REG. NO.

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/Foot	OVM Reading (ppm)	DESCRIPTION — NAME (USCS Symbol): color, moist, % by weight., plast., consistency, structure, cementation, react. w/HCl, geo. inter. — Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
1					SEE ~~UAW02~~ STR07	CEMENT BENTONITE GROUT
2						
3						
4						3.9
5						BENTONITE CHIPS
6						5.9' bgs
7						CENTRALIZER
8						4" DIAMETER SCH 40 PVC CASING WITH FLUSH THREADED
9						
10						
11						
12						
13				1		4" DIAMETER CONTINUOUS WRAP STAINLESS STEEL SCREEN WITH 0.020 SLOTS
14						
15					← BLACK STAINING	#6 GLOBAL FILTER PACK SAND
16						
17				0.5	TILL AT 17'	
18						18
19						BENTONITE CHIPS 19

50# bags of sand: ~~IIII~~ III $\frac{1}{3}$

50 lbs bag of bent. $1\frac{1}{2}$

GROUT - 12.8 lbs/gal

ALT. screen measurements

END CAP 5" to perforated

~~SCREEN~~ 9' 7" slots

7' 7" PVC RISER

Project No.	Geomatrix Consultants	Figure

W-1 (12/95)

W-1 (Blank)

STR07

PROJECT: MORTON READING		Log of Well No. ~~VAW07~~	
BORING LOCATION:		TOP OF CASING ELEVATION: ft	DATUM: NGVD
DRILLING CONTRACTOR: BOWSER-MORNER		DATE STARTED: 3-21-01	DATE FINISHED: 3-21-01
DRILLING METHOD: ROTASONIC		TOTAL DEPTH: ~~feet bgs~~ 89 ?	SCREEN INTERVAL:
DRILLING EQUIPMENT: ROTASONIC 8" OUTER CASING 4"-INNER		DEPTH TO WATER: FIRST / COMPL.	CASING:
SAMPLING METHOD: 10' SAMPLE BARREL		LOGGED BY: ERIK MANSELL	
HAMMER WEIGHT: NA	DROP: NA	RESPONSIBLE PROFESSIONAL: ~~C. Hekkanen~~	REG. NO. ~~PE 19953~~

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/6 inches	OVM (ppm)	DESCRIPTION (NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.) — Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
1			032101042		ASPHALT	
2					CLAY [FILL]? BLACK	
3					DK BROWN CLAY [FILL?], 95% MED PLAST FINES, TRACE GRAVEL, 5% SAND, IRON? LAMINATIONS	
4						
5					GRAVEL WITH CLAY, TAN MOTTLING 1-2" GRAVEL, MOIST TO WET, 80% GRAVEL, 20% MED PLAST FINES, TRACE MED SAND, WITH GRAVEL	
6						
7					POORLY GRADED SAND (SP), DK GRAYISH BROWN, WET, 6" SILT LENSE @ 7.5'-8' (10YR 2.5Y 4/2) 10% 1" GRAVEL, 90% MED SAND,	
8						
9					SAME AS ABOVE 9.5'-10' - SILT LENSE	
10						
11						Sand Tapped By VAW02-20
12						
13						
14						

WELL_OVM M4132.GPJ (6/98)

Project No. 7169 | Geomatrix Consultants | 1/6 | Figure

STR07

PROJECT:

Log of Well No. ~~MW02~~

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/ 6 inches	OVM (ppm)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					POORLY GRADED SAND WITH GRAVEL (SP) CONT.	
15						DK GRAY REDUCING WATER
16						
17			032101043		BLACK STAINING, CHEMICAL ODOR (16.8'-18')	
18		■			SANDY LEAN CLAY (CL) [TILL], DK GREENISH GRAY (10Y 4/1), MOIST, HARD, 90% HIGH PLAST FINES, 10% MED SAND, TRACE FINE GRAVEL	
19						
20					20' - 4" COBBLE - FOSSILIFEROUS SAME AS ABOVE	
21						
22						
23						
24						
25						
26						
27					WELL GRADED SAND (SW), DK GREENISH GRAY (10Y 4/1), WET 95% SAND GRAVEL, 5% SAND	
28						
29						
					4" CLAY LENSE @ 30'	
31						

WELL_OVM M4132.GPJ IF

Project No. 7169 | Geomatrix Consultants | 2/6 | Figure 1

SLR07

PROJECT:

Log of Well No. ~~HAW02~~

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/6 inches	OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					WELL GRADED SAND (SW) CONT.	
32						
33						
34					3" CLAY LENSE @ 34'	
35					35'-35.75' LEAN CLAY LENSE	
36						
37						
39					39-39.5' CLAY SEAM	
40						
41						
42					LESS GRAVEL THAN ABOVE	
43						
44					LEAN CLAY (CL), GREENISH GRAY (10Y 5/1), SOFT, MOIST, 100% HIGH PLAST. FINES, TRACE FINE SAND, WEAK BEDDING 44.5'-45', FEW BLK. LAMINATIONS, NO ODOR	
45						
46						
47						
48						

WELL_OVM M4132.GPJ (6/98)

7 of 11

PROJECT: MORTON READING	Log of Well No. UA-W02-4C
BORING LOCATION: 16' SOUTH OF STR07	TOP OF CASING ELEVATION: ft / DATUM: NGVD
DRILLING CONTRACTOR: BENSER MORNIE	DATE STARTED: 3-21-01 / DATE FINISHED: 3-22-01
DRILLING METHOD: ROTASONIC	TOTAL DEPTH: feet bgs 47 / SCREEN INTERVAL: 31.5 - 46.5
DRILLING EQUIPMENT: 8 3/4" OUTER CASING, 4" Ø INNER CASING	DEPTH TO WATER: FIRST NM, COMPL. NM / CASING:
SAMPLING METHOD: 10' SAMPLE BARREL	LOGGED BY: ERIK MANSELL
HAMMER WEIGHT: NA / DROP: NA	RESPONSIBLE PROFESSIONAL: ~~S. Hokkanen~~ / REG. NO. ~~RE 10053~~

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/6 inches	OVM (ppm)	DESCRIPTION (NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.)	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					Surface Elevation:	
					SEE DESCRIPTIONS FROM STR07 UAW02-4D (16' SOUTH)	
1						
2					DK BROWN FILL	
3						
4					BROWN CLAY	
5						
6					CTR	
					SOME GRAVEL	4" DIAMETER, SCH FLUSH THREADED PVC CASING WITH O-RING
7					SAND (SP) POORLY GRADED	
8						
9						
10						
11						CENTRALIZER
12						
13						
14						

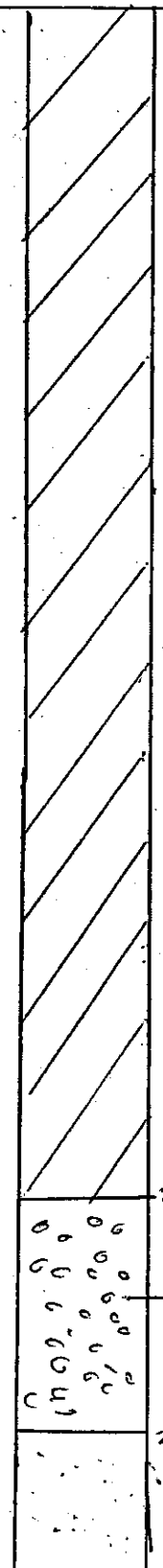
WELL_OVM M4132.GPJ (6/98)

Project No. 7169 | Geomatrix Consultants | 1/2 | Figure

PROJECT:

Log of Well No. UAW02-40

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/6 inches	OVM (ppm)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
15						
16					BLACK MATERIAL	
17						
18					CLAY (CL) [TILL]	
19						
20						
22						
23						
24						
25						
26					WELL GRADED SAND (SW)	
27						27.1
28						BENTONITE CHIPS
29					CLAY LENSE 29-29.8'	
30						29.5
31						



2/3

WELL_OVM M4132.GPJ (6/98)

Project No. 7169 | Geomatrix Consultants | Figure (cont.)

PROJECT: MORTON READING

Log of Well No. UAW02-40

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Blows/6 inches	OVM (ppm)	DESCRIPTION NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
					WELL GRADED SAND (SW) CONT.	CENTRALIZER
32						31.5 TOS
33						
34						
35					4" CLAY LENSE	
36					4" CLAY LENSE	
37						
38						
39					SAME AS ABOVE (SW)	
40						4" DIAMETER CONTINUOUS WRAP STAINLESS STEEL SCREEN WITH 0.02 SLOTS
41						
42					4 - 12.9#/gal - First return @ 12.3 lb/gal 5 - 13.0#/gal	GROUT batch → 1 - 12.6 lbs/gal 2 - 12.9 lbs/gal approx. batch = 10 lbs bent, 3x 47 lbs, 15 gallons H_2O 3 - 12.8 lbs/gal 50 lb SAND
43						#6 GLOBAL FILTER PACK SAND
44						1 - 50 lb bag bentonite chips
45					SAME AS ABOVE	
46				45.6	CLAY (CL) ~~[illegible]~~ ERM SOFT	
47					~700 gallons ~350 pumped out	END CAP — 5" - BOT TO SLOTS SCREEN — 9' 7" SLOTS - 4' 7" SLOTS
48						36.5 BOS 5" END CAP TD 8" ϕ @ 47'
49					TD BORING (4") @ 49'	

WELL_OVM M4132.GPJ (6/98)

Project No. 7169 | Geomatrix Consultants | Figure (cont.)

3/3

PROJECT:

Log of Well No. VAW 20-60

DEPTH (feet)	SAMPLES: Sample No.	Sample	Blows/6 inches	OVM (ppm)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
32					1" GRAVEL LAYER 32-32.1'	
					YELLOWISH BROWN (10YR 5/4), FIRM TO HARD	
33						
34					POORLY GRADED SAND (SP): LT OLIVE BROWN (2.5Y 5/4), MOIST, ~100% FINE/MED SAND, TR	
35						4" DIA. SCH 40 FLUSH-THREADED PVC RISER WITH O-RINGS
36						
37						
38					1" GRAVEL 38'-38.5'	CEMENT BENTONITE GROUT
39					SAME AS ABOVE, TRACE FINES	
40					40'-40.5' SILTY SAND (SM)	
41						
42						
43						
44						BENTONITE CHIPS
45						45.3' CENTRALIZER
46						
48						

WELL_OVM M4132.GPJ (6/98)

Project No. 7169 | Geomatrix Consultants | Figure (cont.)

11 of 11

PROJECT: MORTON READING

Log of Well No. VAW20-60

DEPT. (feet)	SAMPLES: Sample No.	Sample	Blows/6 inches	OVM (ppm)	DESCRIPTION: NAME (USCS Symbol): color, moist, % by weight, plast., structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
1500 EMPTY 300 GALLONS					POORLY GRADED SAND (SP) CONT.	
49					SAME AS ABOVE	
1530 EMPTY 300 gallons 50						
51						
52						#6 GLOBAL FILTER PACK SAND
53						
54						
55						4" DIA. STAINLESS STEEL WRAP-AROUND SCREEN WITH 0.020" SLOTS
56					? ?	
57					WELL GRADED SAND WITH GRAVEL (SW): YELLOWISH BROWN (10YR 5/4), WET, ~60% SAND, ~40% GRAVEL (0-1"), TRACE FINES	
58						SCREEN 10' 5'
59					SAME AS ABOVE	
60					SANDY LEAN CLAY (CL) [TILL]: LT OLIVE BROWN (2.5Y 5/4); ~80% MED PLAST FINES, ~20% FINE SAND & GRAVEL, VERY HARD, DRY - MOIST	5.5" END CAP
61					61.5' - 3"-4" COBBLE	61.5' - 8" DIA DRILL CASING
62					(OK GRAY 5Y 4/1)	
63					1430 EMPTY 200 gal. 0915 · 125 gal	WELL MATERIALS: 50 lb. bag SAND 1-50 lb BAG OF CHIPS; BENTONITE PELLETS 1-BAG, 50 lb
					TD 4-10-01 0745 - START WELL INSTALLATION 0922 - GROUT TO SURFACE	GROUT: BATCH: 8-47 lb PORTLAND ~30 gal water ~20 lbs bentonite gel
					GROUT TREMIE PIPE SET @ 40' BGS	GROUT BATCH 1 - 13.3 lbs/gal 2 - 13.2 lbs/gal
65						

WELL_OVM M4132.GPJ (6/98)

Project No. 7169 | Geomatrix Consultants | Figure (cont.)

Subject Select/Determine Correct Sp. Cap and Calculate T, K.

By MEB Checked By RDC

Date 3/12/02 Date 5-3-02

Project No. 7169

Task No. Aquifer Test

File No. (4)

Sheet 1 of 9

Estimate T, K from Sp. Capacity

Method: 1. Plot sp. capacity vs. drawdown from each step of step test.

2. project the trend to 0.0 drawdown to find MAXIMUM specific capacity if system is Unconfined

3. use Walton's (1980) equation to Find T that yields that sp. cap. given time, well radius, and storage coefficient.
Assume storage coeff (unconfined) = 0.2 (dim)
Assume storage coeff (confined) = 0.001 (dim)
Assume time = total pumping time

4. Estimate K from T and saturated thickness

Well VAW 02-20

Maximum Specific Capacity = 4.2 gpm/ft (see Attached Chart)

Estimated Transmissivity (Trial and error using Walton's equation - see attached Table)

$$\boxed{T = 5{,}000 \text{ gpd/ft}}$$ at $C_s = 0.2$ (assumed)

Estimated hydraulic Conductivity

$$K = \frac{T}{b}$$

where K = hydraulic conductivity (gpd/ft²)
T = Transmissivity (gpd/ft)
b = Saturated Thickness (ft)

at well VAW 02-20, sat thickness = 6.3 ft (From File (3))

$$K = \frac{5000}{6.3}$$

$$\boxed{K \cong 793.6 \text{ gpd/ft}^2}$$ or $\boxed{106 \text{ ft/day}}$

Subject Determine Sp. Cap. Calculate T, K

Project No. 7169

By MRB

Checked By RDC

Task No.

File No.

Date 3/12/02

Date 5-3-02

Sheet 2 of 9

Well VAW02-40

Specific capacity measured at highest Flow Rate (9.5 gpm) probably most accurate
This is a confined aquifer w/ Cs = 0.001 (assumed)
Specific Capacity = 23.5 gpm/ft

$$T = 46{,}500 \text{ gpd/ft}$$

(From attached Table, trial and error using Naltons equation)

Estimated K
At well VAW 02-40; Sat Thickness = 19.6 ft
(From File ③)

$$K = \frac{T}{b}$$

$$K = \frac{46{,}500}{19.6 \text{ ft}}$$

$$K \cong 2{,}370 \frac{\text{gpd}}{\text{ft}^2} \times \frac{1}{7.48} \frac{\text{ft}^3}{\text{gal}}$$

$$K = 317 \text{ ft/day}$$

Note: values may be slightly underestimated since well has only 72% penetration
(File ③)

Subject Determine Sp. Cap. Calculate T, K | Project No. 7169

By MEB | Checked By RDC | Task No.

Date 3/12/02 | Date 5-3-02 | File No.

Sheet 3 of 9

Well VAW20-60

Maximum specific capacity = 0.36 gpm/ft

(in an unconfined aquifer, sp. capacity declines with increasing flow rate. Therefore, Theoretical sp. cap. at 0 flow was used.)

Sp. Cap = 0.36 gpm/ft (Actual sp. cap. is higher since well partially penetrating)

- Estimated transmissivity (Trial & Error using walton's equation - see attached Table)

$$\boxed{T = 280 \text{ gpd/ft}}$$ at $c_s = 0.2$ (assumed)

(Actual T is higher since well is partially penetrating)

- Estimated Hydraulic Conductivity

$$K = \frac{T}{b}$$

Saturated Thickness at well VAW20-60 = 21.71 ft (From File 3)

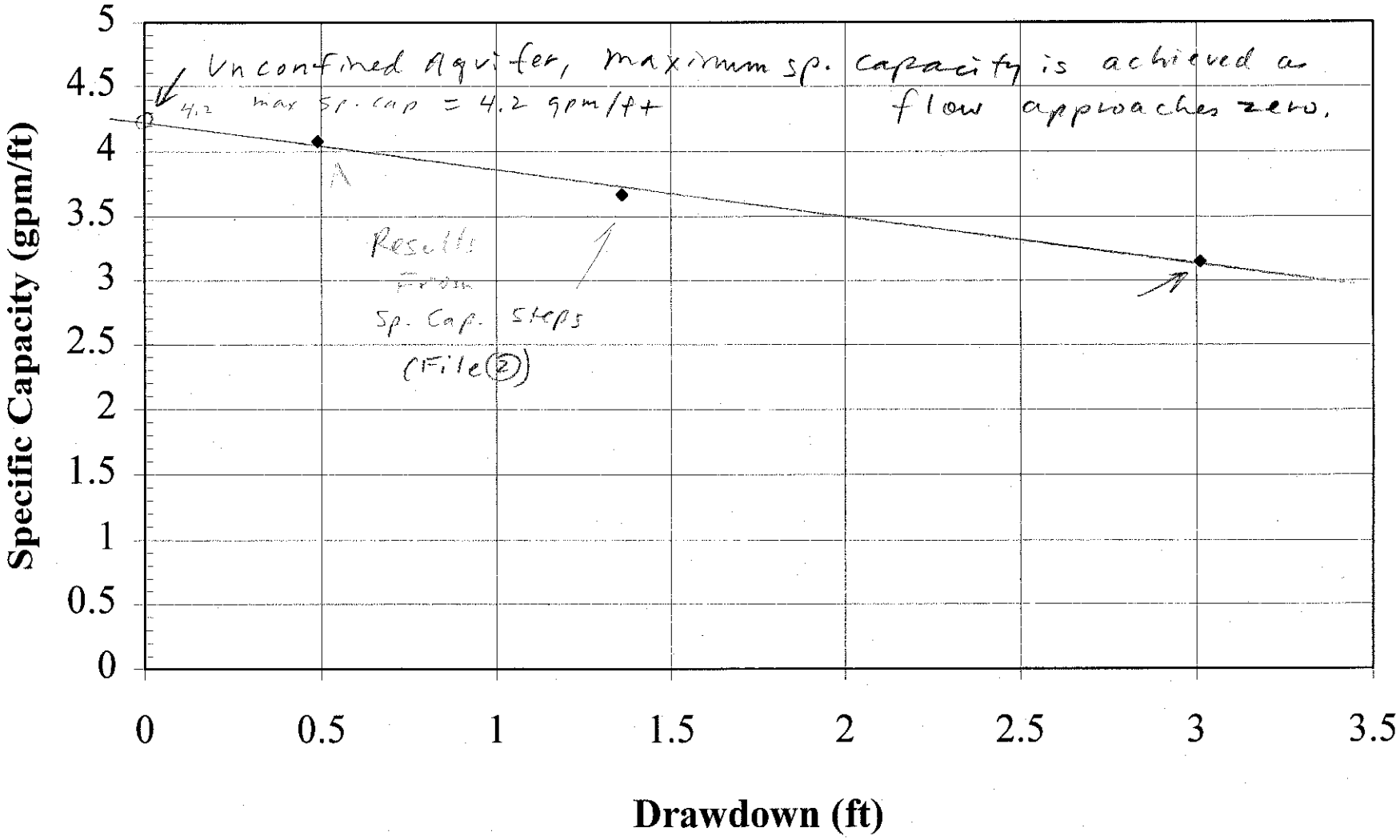
(well penetrates only ≈ 2% of this) (File 3)

$$K = \frac{280}{21.71} = 12.9 \text{ gpd/ft}^2$$

$$K = \frac{12.9}{7.48}\left(\frac{\text{gal}}{\text{day-ft}^2}\right)\left(\frac{\text{ft}^3}{\text{gal}}\right) = 1.7 \text{ ft/day}$$

(Actual K is higher since well is partially penetrating)

Well UAW02-20 Sp. Cap vs. Drawdown

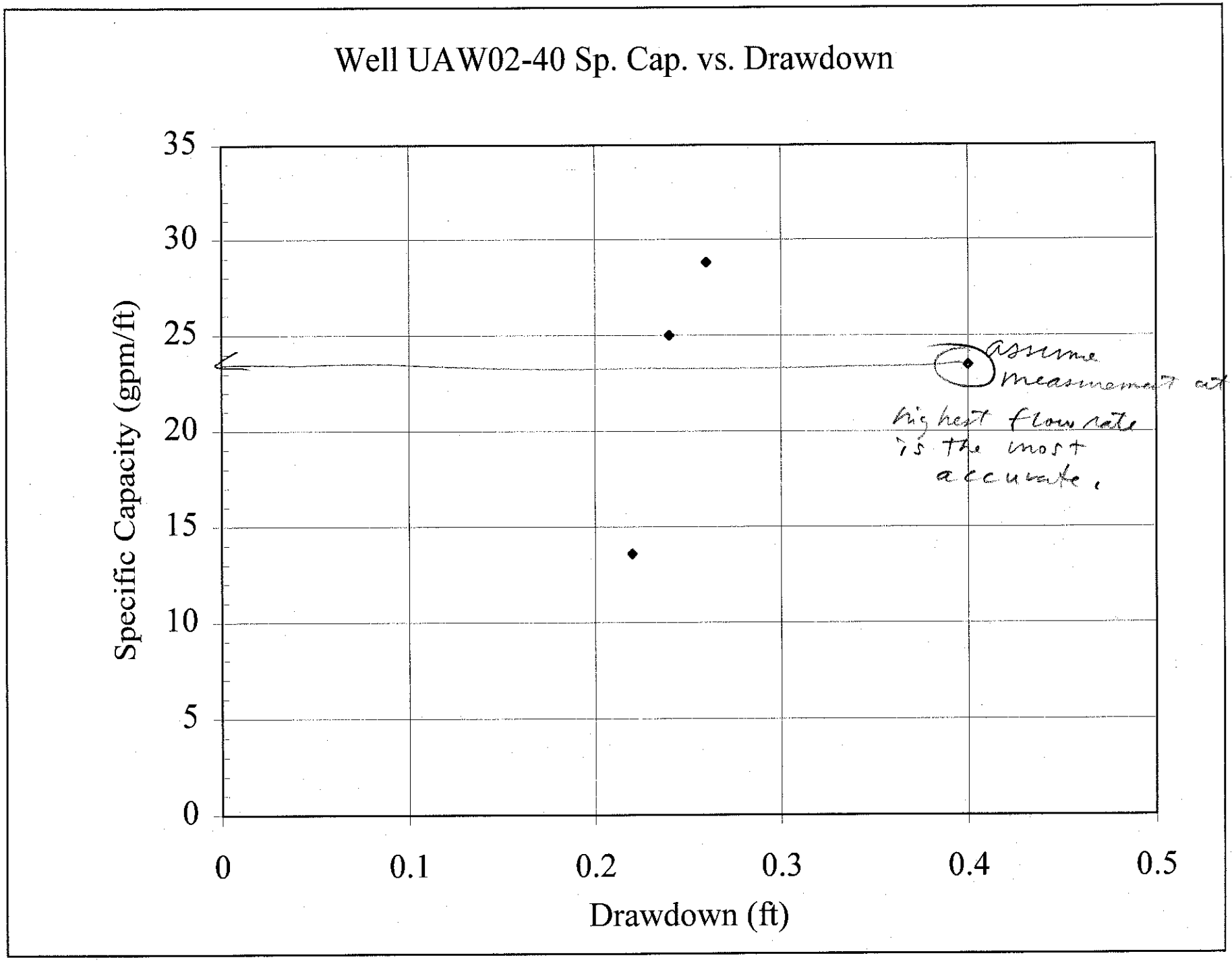


10^0 10^1 10^2 10^3

1 10 100 1000

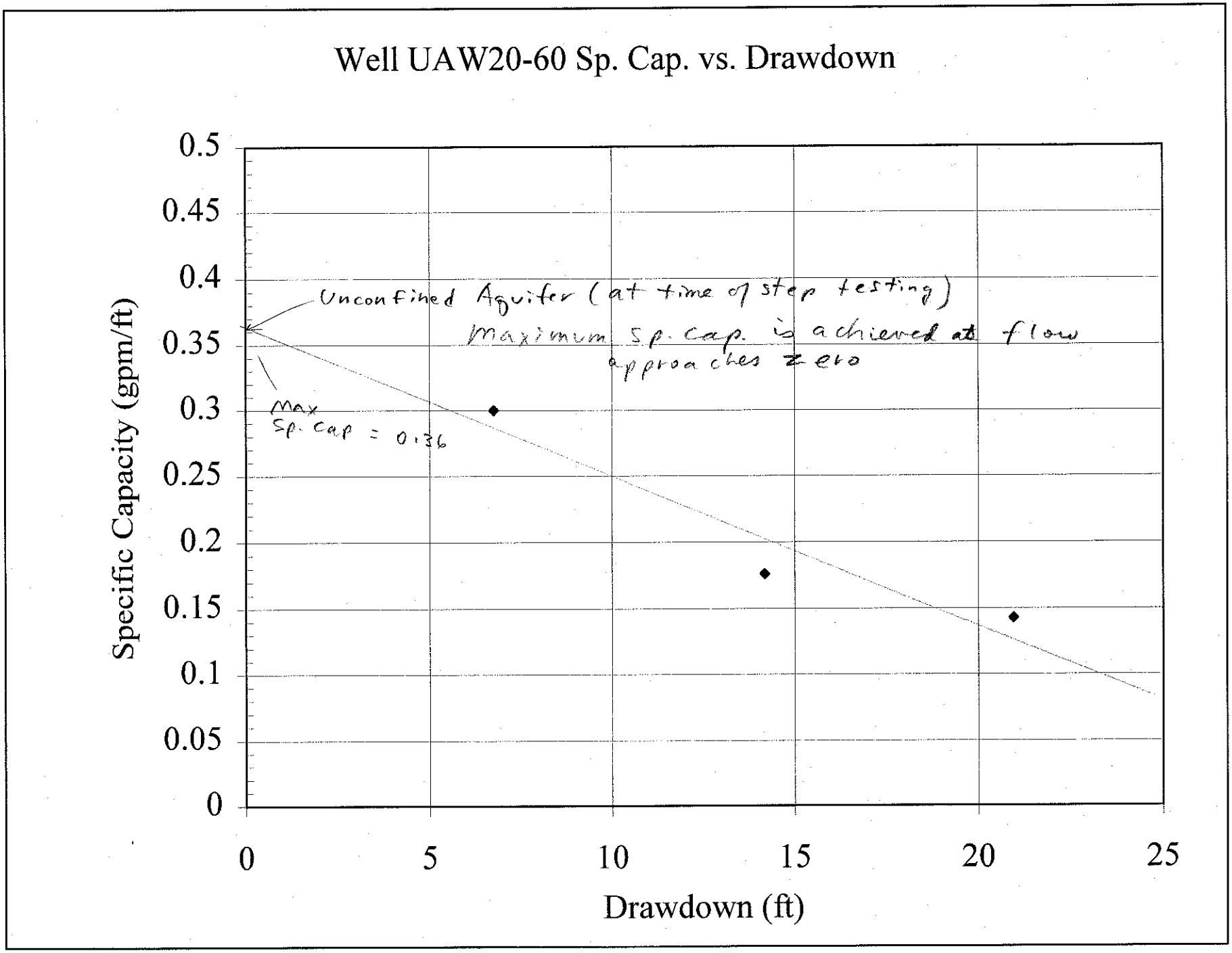
Well UAW02-20					
Equation for Specific Capacity: (Walton, 1970)					
q_s=T/(264log(Tt/2693r^{2}C$_s$)-65.5)					
				Unconfined	
Sp. Cap.	**Trans.**	**time**	**well radius**	**Storativity**	**Apparent**
q_s	**T**	**t**	**r**	**C_s**	**Ratio**
gpm/ft	**gpd/ft**	**min**	**ft**	**dimensionless**	**T/q_s**
3.87	4600	180	0.166	0.2	1188
3.95	4700	180	0.166	0.2	1190
4.03	4800	180	0.166	0.2	1192
4.10	4900	180	0.166	0.2	1195
4.18	**5000**	**180**	**0.166**	**0.2**	**1197**
4.25	5100	180	0.166	0.2	1199
4.33	5200	180	0.166	0.2	1202
4.40	5300	180	0.166	0.2	1204
Note this equation does not account for reduction of saturated thickness					
in unconfined aquifer wells.					

Walton, W., Ground Water Resource Evaluation, McGraw-Hill, New York, 1970


Well UAW02-40 Sp. Cap. vs. Drawdown
Specific Capacity (gpm/ft)
35
30
25
20
15
10
5
0
0
0.1
0.2
0.3
0.4
0.5
Drawdown (ft)
assume measurement at highest flow rate is the most accurate.

649

Well UAW02-40					
Equation for Specific Capacity: (Walton, 1970)					
$q_s=T/(264\log(Tt/2693r^2C_s)-65.5)$					
				Confined	
Sp. Cap.	**Trans.**	**time**	**well radius**	**Storativity**	**Apparent**
q_s	**T**	**t**	**r**	C_s	**Ratio**
gpm/ft	**gpd/ft**	**min**	**ft**	**dimensionless**	T/q_s
20.45	40000	84	0.166	0.001	1956
22.85	45000	84	0.166	0.001	1969
23.33	46000	84	0.166	0.001	1972
23.57	**46500**	**84**	**0.166**	**0.001**	**1973**
23.81	47000	84	0.166	0.001	1974
24.28	48000	84	0.166	0.001	1977
24.76	49000	84	0.166	0.001	1979
25.24	50000	84	0.166	0.001	1981


Well UAW20-60 Sp. Cap. vs. Drawdown
Specific Capacity (gpm/ft)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
5
10
15
20
25
Drawdown (ft)
Unconfined Aquifer (at time of step testing)
Maximum Sp. Cap. is achieved at flow approaches zero
Max Sp. Cap = 0.36

8 of 9

Well UAW20-60					
Equation for Specific Capacity: (Walton, 1970)					
$q_s=T/(264\log(Tt/2693r^2C_s)-65.5)$					
				Unconfined	
Sp. Cap.	**Trans.**	**time**	**well radius**	**Storativity**	**Apparent**
q_s	**T**	**t**	**r**	C_s	**Ratio**
gpm/ft	**gpd/ft**	**min**	**ft**	**dimensionless**	T/q_s
0.32	250	87	0.166	0.2	770
0.34	260	87	0.166	0.2	775
0.35	270	87	0.166	0.2	779
0.36	**280**	87	**0.166**	**0.2**	**783**
0.37	290	87	0.166	0.2	787
0.38	300	87	0.166	0.2	791
0.39	310	87	0.166	0.2	795
0.40	320	87	0.166	0.2	799
Note this equation does not account for reduction of saturated thickness					
in unconfined aquifer wells.					

Subject: Effects of Pumping Step Tests on Aquifers above + Below Test Zone

By: MEB

Checked By: RDC

Date: 3/12/02

Date: 5-3-02

Project No. 7169

Task No. Aquifer Test

File No. 5

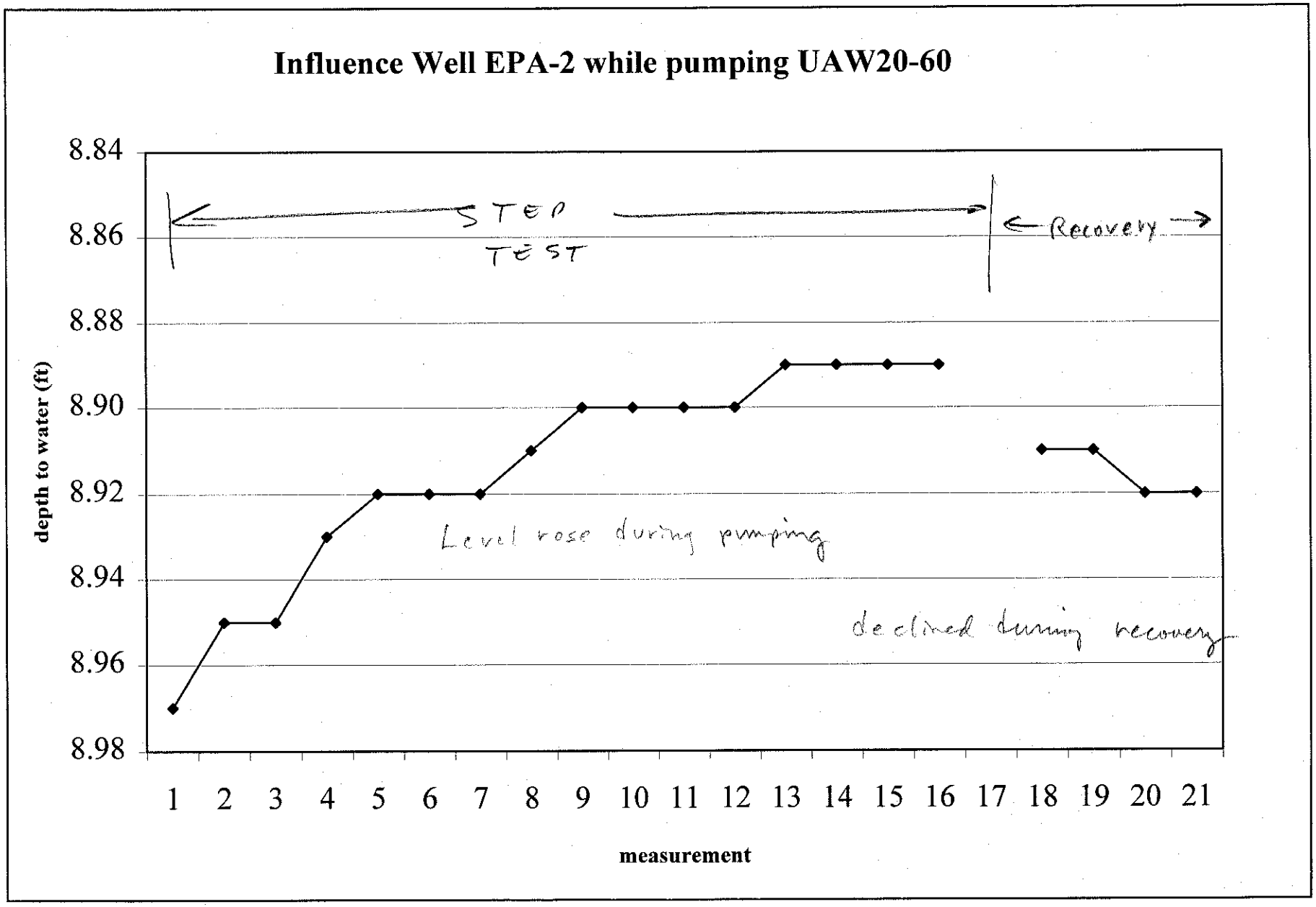
Sheet 1 of 2

The attached plot is the only instance during step Testing of December 2001 where water levels in an vertically adjacent well experience significant change.

The Plot shows water levels rising during pumping and declining during Recovery.

This is the opposite of what would be expected.

It is concluded that <u>no effect</u> was observed in adjacent zones.


Influence Well EPA-2 while pumping UAW20-60
depth to water (ft)
8.84
8.86
8.88
8.90
8.92
8.94
8.96
8.98
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
measurement
STEP TEST
Recovery
Level rose during pumping
declined during recovery

292

Subject: Estimated Groundwater Flow Rate

Project No. 7169

By: MEB

Checked By: RDL

Task No. Aquifer Test

File No. 6

Date: 4/16/2002.

Date: 5-3-02

Sheet 1 of 3

Purpose: Estimate horizontal groundwater flow rate using results of step-drawdown tests.

Method: Use Darcy's Law to estimate flow rate

Data: Hydraulic Conductivity values from step-drawdown test Transmissivities (File 4)

Gradient from water levels measured on November 16, 2001. (See attached map)

Assume: Effective porosity is 25%

Calculation

Well VAW 02-20

$K = 106$ ft/day = hydraulic conductivity

$i = 0.019$ ft/ft = gradient

$\phi = 0.25$ = porosity

$$\bar{v} = \frac{Ki}{\phi} = \frac{(106)(0.019)}{0.25} \frac{ft}{day} \frac{ft}{ft} = \boxed{\bar{v} = 8.1 \text{ ft/day}}$$

$$\boxed{\bar{v} = 2{,}940 \text{ ft per year}}$$

Subject Estimated Groundwater Flow Rate

Project No. 7169

By

Checked By RDC

Task No.

File No.

Date

Date 5-3-02

Sheet 2 of 3

Well VAW 02-40

$k = 317$ ft/day

$i = 0.0019$

$\phi = 0.25$

$$\bar{V} = \frac{ki}{\phi} = \frac{(317)(0.0019)}{0.25} = \boxed{2.4 \text{ ft/day}}$$

$$\boxed{\bar{V} = 8.80 \text{ ft/year}}$$

Well VAW 20-60

$k = 1.7$ ft/day

$i = 0.0019$

$\phi = 0.25$

$$\bar{V} = \frac{ki}{\phi} = \frac{(1.7)(0.0019)}{(.25)}$$

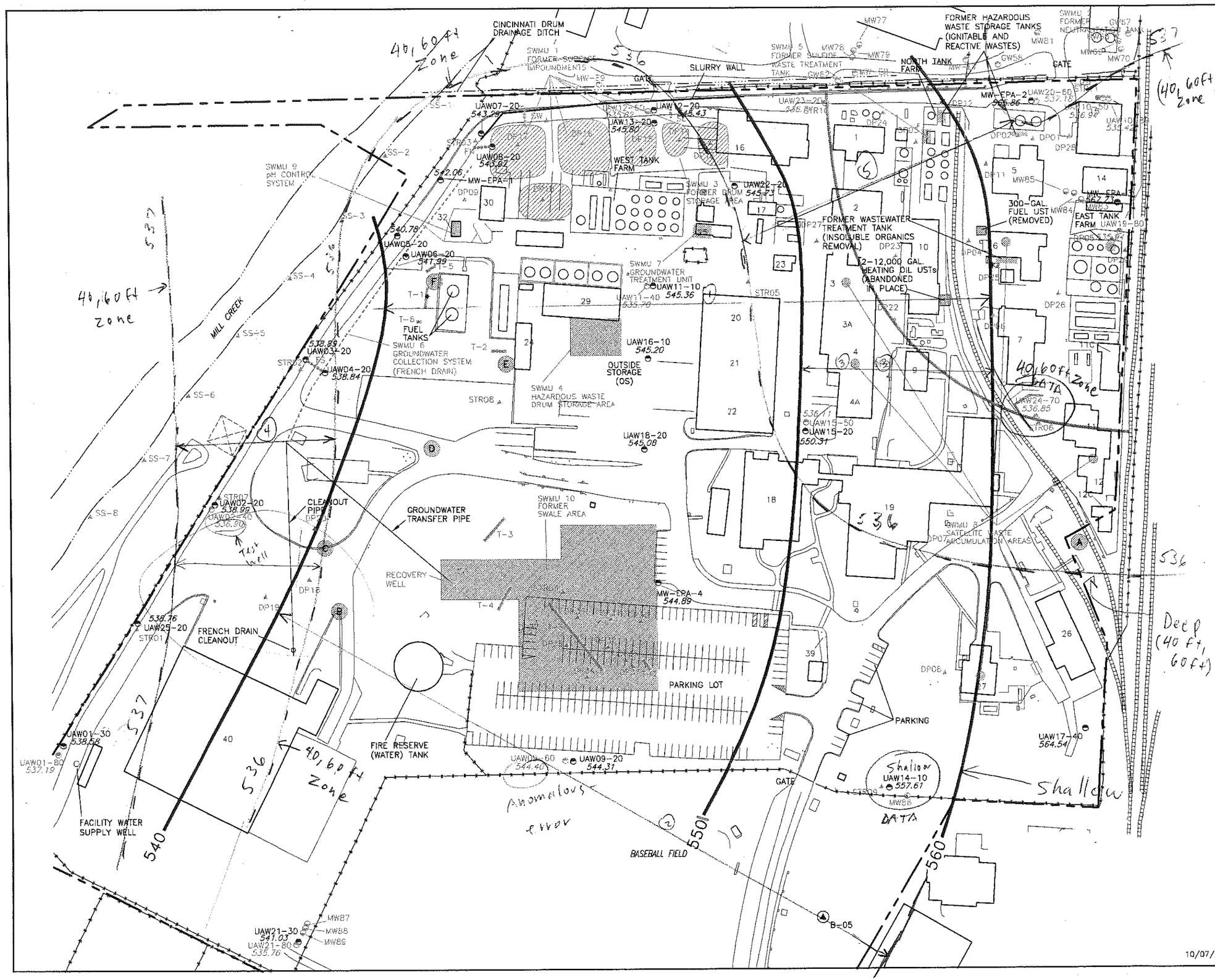
$$\boxed{V = 0.013 \text{ ft/day}}$$

$$\boxed{V = 4.7 \text{ ft/year}}$$

3 of 5

Base Map Source: Abercrombie & Associates, Inc.
May 2001

gradient Measurements



Base Map Source: Abercrombie & Associates, Inc.
May 2001

0 80 160
APPROXIMATE SCALE (FEET)

-N-

20-ft Zone

gradient $= \frac{20}{1040} = 0.019$ (1)

$= \frac{20}{1160} = 0.017$ (2)

$= \frac{10}{332} = 0.03$ (3)

EXPLANATION

GROUNDWATER ELEVATION CONTOUR

APPROXIMATE NORTH AND EAST EXTENT OF UPPER SAND

40-foot, 60-foot Zones

$= \frac{1}{276} = 0.0036$ (4)

$= \frac{1}{520} = 0.0019$ (5)

IMPOUNDMENT - (FROM 1980 AERIAL PHOTO)

UAW21-BD — MONITORING WELL LOCATION AND IDENTIFICATION NUMBER (MAY 2001)

STR09 — SOIL BORING LOCATION AND IDENTIFICATION NUMBER (MAY 2001)

SS-2 — STREAM STATION LOCATION (JUNE 2001)

PLUGGED AND ABANDONED (MAY 2001)

MW-EPA-1 — UPPER AQUIFER MONITORING WELL LOCATION AND IDENTIFICATION NUMBER (PRC, 1993)

MORTON FACILITY PROPERTY BOUNDARY

LOCATION OF REPORTED WASTE BURIAL

RECOVERY WELL LOCATION (APPENDIX IX ANALYSIS)

GW5D — PRISTINE SHALLOW AQUIFER MONITORING WELL LOCATION AND IDENTIFICATION NUMBER

MW71 — PRISTINE LOWER AQUIFER MONITORING WELL LOCATION AND IDENTIFICATION NUMBER

NOTES:
1. BASED ON FIELD INDICATIONS OF CHEMICAL IMPACT, TWO SAMPLES FROM DP23 WERE SUBMITTED FOR GEOCHEMICAL ANALYSIS
2. ALL ANALYTICAL PARAMETERS WERE IN ACCORDANCE WITH THE CONTRACT LABORATORY PARAMETERS (CLP) LIST, UNLESS OTHERWISE INDICATED

GROUNDWATER ELEVATIONS NOVEMBER 16, 2001

PREPARED FOR

ROHM AND HAAS CO.
READING, OHIO

GEOMATRIX	Project No.	FIGURE

Subject Calculate T From Semilog Plot

Project No. 7169

By MEB

Checked By RDC

Task No. Aquifer Test

File No. (7)

Date 3/12/02

Date 5-3-02

Sheet 1 of 4

Estimate T from transient water level data in Recovery period

Method: Theis recovery plot

$$T = \frac{264Q}{\Delta s}$$

where T = transmissivity (gpd/ft)

Q = final flow rate of well gpm

Δs = slope of semilog trend (ft per log cycle)

(Theis, C.V., 1935, The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using ground-water storage, Trans. Am. Geophysical Union, p. 519-524.)

Well UAW 02-20

$$T = \frac{264Q}{\Delta s}$$

$$T = \frac{(264)(9.5)}{0.26}$$

$$\boxed{T = 9{,}600 \text{ gpd/ft}}$$

(vs. 5,000) from sp. cap.

slope estimated using last data point and 0.0 drawdown at "infinite" recovery time

Well UAW 02-40

No usable recovery data

Subject Calculate T from Semilog Plot

Project No. 7169

By MEB

Checked By RDC

Task No.

File No.

Date 3/12/02

Date 5-3-02

Sheet 2 of 4

Well VAW 20-60

$$T = \frac{264Q}{\Delta s}$$

$$T = \frac{(264)(13)}{0.72}$$

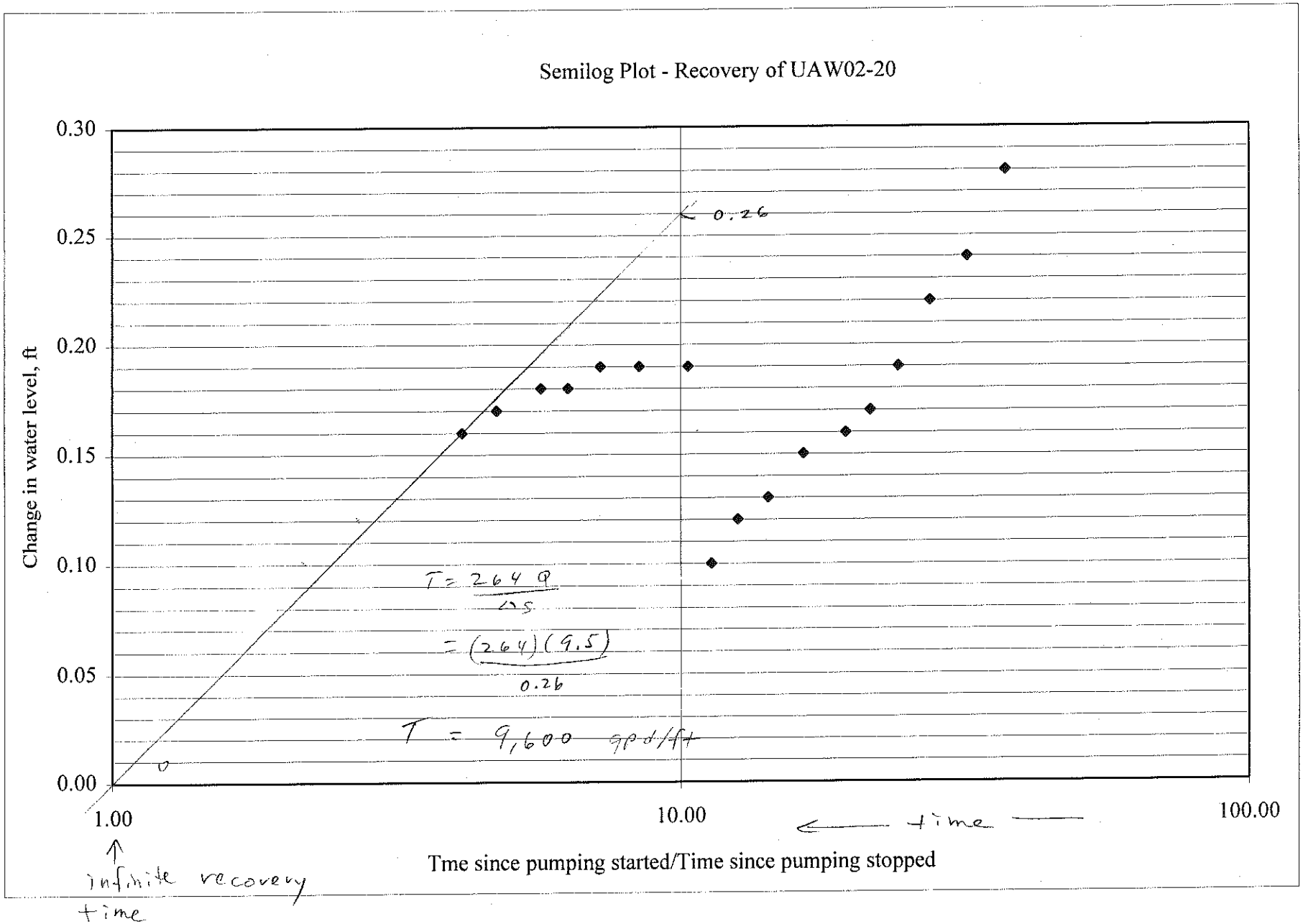
$$\boxed{T = 1{,}100 \text{ gpd/ft}}$$

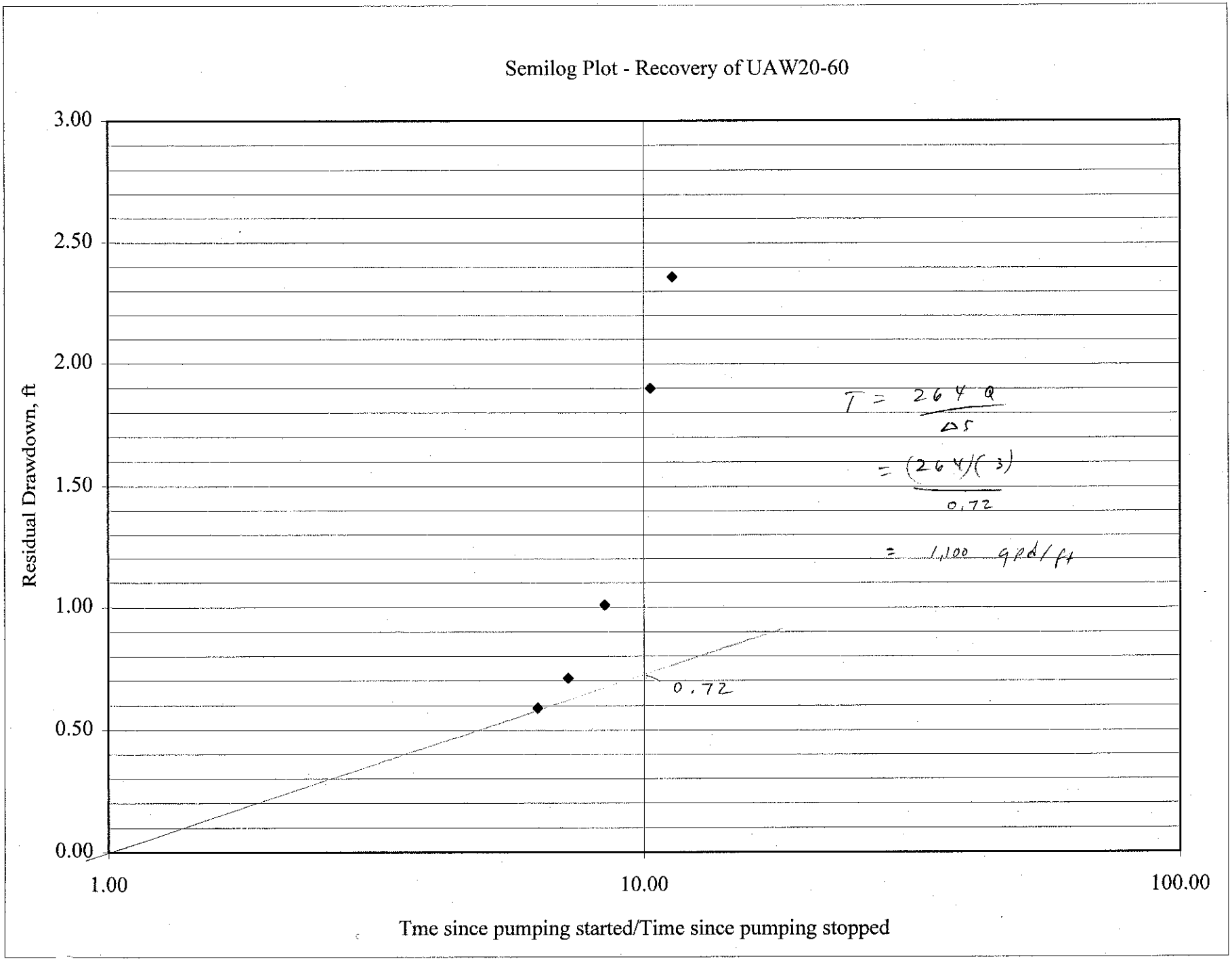
(vs. 280 from sp. cap.)

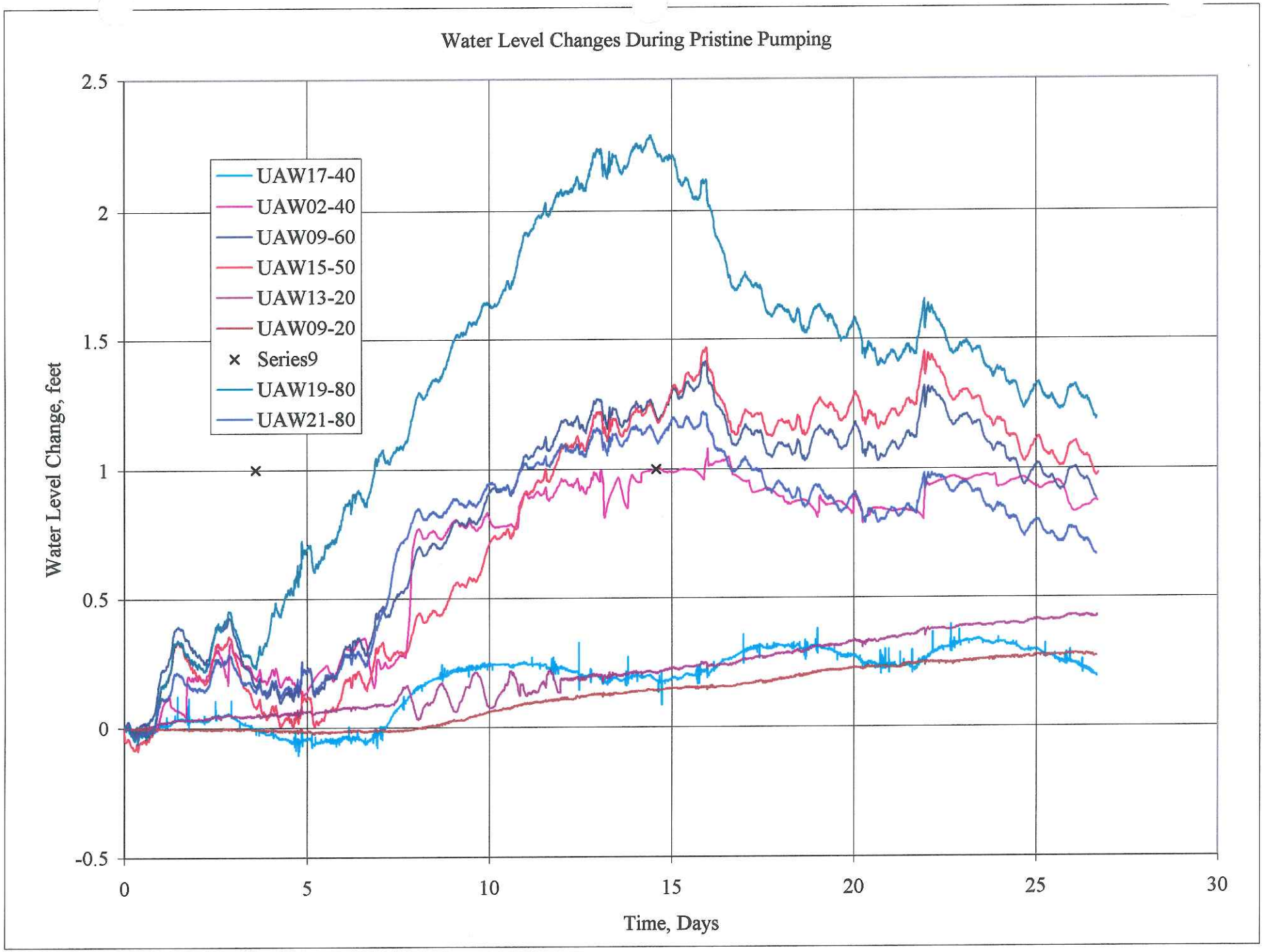
Slope estimated using last data point and 0.0 drawdown at "infinite" recovery time

Caveats

- Approximation made: Final flow rate applied to entire flow period, not just final step.
- T from sp. cap. can be affected by well efficiency
- T from semilog plot used data not sufficient to define true straight-line slope
- well was partially penetrating


Semilog Plot - Recovery of UAW02-20
Change in water level, ft
0.30
0.25
0.20
0.15
0.10
0.05
0.00
1.00
10.00
100.00
Tme since pumping started/Time since pumping stopped
0.26
T = 264 Q / ΔS
= (264)(9.5) / 0.26
T = 9,600 gpd/ft
time
infinite recovery time


Semilog Plot - Recovery of UAW20-60
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Residual Drawdown, ft
1.00
10.00
100.00
Tme since pumping started/Time since pumping stopped
0.72
T = 264 Q / Δs
= (264)(3) / 0.72
= 1,100 gpd/ft


Water Level Changes During Pristine Pumping
Water Level Change, feet
Time, Days
2.5
2
1.5
1
0.5
0
-0.5
0
5
10
15
20
25
30
UAW17-40
UAW02-40
UAW09-60
UAW15-50
UAW13-20
UAW09-20
Series9
UAW19-80
UAW21-80

APPENDIX D

QUALITY ASSURANCE/QUALITY CONTROL

TABLE OF CONTENTS

D.1.0 OVERVIEW **1**

D.2.0 FIELD QUALITY CONTROL **2**

D.2.1 PRECISION 2

D.2.2 ACCURACY 3

D.2.3 EQUIPMENT AND TRIP BLANKS 3

D.2.4 FIELD PROCEDURES 4

D.2.5 DOCUMENTATION 6

D.3.0 LABORATORY QUALITY CONTROL **7**

D.3.1 GEOTECHNICAL ANALYSIS 7

D.3.2 LABORATORY ANALYTICAL PROCEDURES 7

D.3.3 DATA VALIDATION 7

D.4.0 PROJECT COMPLETENESS ASSESSMENT **10**

D.4.1 FIELD MEASURED PARAMETERS 10

D.4.2 ANALYTICAL DATA 10

TABLES

D-1 Duplicate Soil and Sediment Samples, Volatile Organics Detections
D-1A Supplemental FI - Duplicate Soil and Sediment Samples, Volatile Organics Detections
D-2 Duplicate Soil and Sediment Samples, Semivolatile Organic Detections
D-2A Supplemental FI - Duplicate Soil and Sediment Samples, Semivolatile Organic Detections
D-3 Duplicate Soil and Sediment Samples, Pesticides and PCB Detections
D-3A Supplemental FI - Duplicate Soil and Sediment Samples, Pesticides and PCB Detections
D-4 Duplicate Soil and Sediment Samples, Inorganic Chemical Detections
D-4A Supplemental FI - Duplicate Soil and Sediment Samples, Inorganic Chemical Detections
D-5 Duplicate Groundwater Samples, Volatile Organic Detections
D-5A Supplemental FI - Duplicate Groundwater Samples, Volatile Organic Detections
D-6 Duplicate Groundwater Samples, Semivolatile Organic Detections

TABLE OF CONTENTS
(Continued)

D-6A Supplemental FI - Duplicate Groundwater Samples, Semivolatile Organic Detections
D-7 Duplicate Groundwater Samples, Pesticides and PCB Detections
D-7A Supplemental FI - Duplicate Groundwater Samples, Pesticides and PCB Detections
D-8 Duplicate Groundwater Samples, Inorganic Chemical Detections
D-8A Supplemental FI - Duplicate Groundwater Samples, Inorganic Chemical Detections
D-9 Summary of Detection in Project Equipment Blanks
D-9A Supplemental FI - Summary of Detection in Project Equipment Blanks
D-10 Summary of Detections in Trip Blanks
D-10A Supplemental FI - Summary of Detections in Trip Blanks

TABLE OF CONTENTS
(Continued)

ATTACHMENTS

QA Field Audit Report #1
QA Field Audit Report #2
QA Field Audit Report #3
Logs of Variance, Nonconformance, or Clarification
Severn Trent Laboratories Letter Dated April 19, 2002
Severn Trent Laboratories Letter Dated August 11, 2004
Quality Assurance Review Dated October 5, 2001
Quality Assurance Review Dated September 25, 2001
Quality Assurance Review Dated May 10, 2002
Quality Assurance Review Dated July 22, 2004
Quality Assurance Review Dated August 27, 2004

Appendix D

Quality Assurance/Quality Control Report

D.1.0 OVERVIEW

The guidelines and requirements for quality assurance/quality control (QA/QC) relating to the Facility Investigation (FI) at the Morton facility are provided in the Quality Assurance Project Plan [QAPP, Appendix A of the FI Work Plan (Geomatrix, 2000b)]. The QAPP was prepared in accordance with the U.S. Environmental Protection Agency (USEPA) Region 5 policy and was conditionally approved by the USEPA as an attachment to the FI Work Plan.

As a matter of procedure, all deviations from the FI Work Plan were documented during the project. Deviations are grouped into three types; variances, nonconformances, and clarifications. When field or related conditions dictated a change from practices specified in the FI Work Plan, this was logged as a variance. A nonconformance report was generated for activities that failed to comply with the requirements of the FI Work Plan through error, miscommunication, or oversight. A clarification report was generated for activities that required additional explanation beyond the description in the FI Work Plan. Documentation of variances, non-conformances, and clarifications are included in this Appendix.

QA/QC procedures for the FI are divided into Field Quality Control and Laboratory Quality Control. Field Quality Control addresses the QA/QC procedures implemented by the Geomatrix field crew. Laboratory Quality Control pertains to the QA/QC procedures implemented by Severn Trent Laboratories (STL) and the data validation performed by Environmental Standards Inc.

D.2.0 FIELD QUALITY CONTROL

D.2.1 PRECISION

Precision is an expression of the degree to which two or more measurements are in agreement. Precision of sample collection procedures was evaluated by the collection of duplicate samples in the field. Duplicate samples are collected, analyzed, and compared to the original sample results to check for sampling and analytical reproducibility. The results of the duplicates are summarized in Tables D-1/D-1A through D-8/D-8A. The relative percent difference (RPD) was calculated for each duplicate set using the following formula:

$$RPD = \frac{2(S_1 - S_2)}{S_1 + S_2} \times 100$$

where S_1 = sample result

S_2 = duplicate result

The general RPD goal for the FI was 30 percent, although it was noted in the QAPP that this was a guideline, rather than a rigorous target. The great majority of duplicate analyses met this goal. There were a small number of outliers (i.e., outside the 30 percent goal), typically in soil samples and in the metals results in groundwater. The inherent variability in the soil matrix makes reproducibility of results more difficult. Variations in groundwater metals concentrations are likely attributable to the effect of water turbidity and the tendency of metals to sorb on solids. There was one exception to this typical situation; the duplicate groundwater samples collected from UAW19-80 on November 12, 2001 had large variations with both VOC and inorganic parameters. On a whole, however, the precision observed through the evaluation of duplicate samples for the project was good, and typical for an environmental investigation.

D.2.2 ACCURACY

Accuracy is the degree of agreement between an observed value and an accepted reference or true value. The accuracy of field measurements was assessed through instrument calibration standards and repetition of measurement results throughout the project. Field instruments measuring pH, dissolved oxygen, turbidity, and specific conductance were utilized as part of the investigation. The Geomatrix field crew calibrated field instrumentation each day the instrument was utilized. The calibration records, which were provided in the quarterly Progress Reports, document the daily field calibration of equipment against standards for pH, dissolved oxygen, turbidity, and specific conductance. A review of these records indicates that there was good equipment accuracy and achievement of the project goals specified in Table A3-3 of the QAPP. However, as noted in Nonconformance Log 018, consistent field calibration does not preclude performance problems with field instrumentation.

As specified in the QAPP, it was not a requirement to evaluate water level measurements for accuracy and precision in the field. A comparison of water level measurements from the various rounds of readings, however, indicated one suspect reading in November 2001 at UAW09-60 (Nonconformance Log 019). It is suspected that this inconsistency was due to operator error and does not reflect any problems with field instrumentation.

D.2.3 EQUIPMENT AND TRIP BLANKS

Equipment and trip blanks were collected in accordance with specifications of the QAPP. Equipment blanks are used to assess the potential for contamination resulting from field equipment, field procedures, or ambient conditions. Trip blanks are used to assess the potential for contamination of samples during sample shipment and storage.

Tables D-9 and D-9A summarizes the results of project equipment blanks. With the exception of a few compounds, the majority of detections in the equipment blanks were qualified as estimated (i.e. at concentrations less than the reporting limit). The low

concentrations measured in the equipment blanks suggest that ambient conditions may be slightly impacting project samples, or that decontamination procedures were not always completely effective. The impact to project samples is minimal, but more rigorous decontamination is recommended for all non-dedicated sampling equipment. The concentrations measured in the equipment blanks are low, and, as noted above, at concentrations less than the reporting limit.

Tables D-10 and D-10A summarizes the results of project trip blanks. With the exception of two detections of methylene chloride at a concentration of 1.1 micrograms per liter (ug/l), all of the detections in trip blanks were estimated (i.e., at concentrations less than the reporting limit). Many of the compounds detected in project trip blanks were also reported in the associated laboratory method blank, as indicated by the data qualifier "B." Based on this qualifier, the acetone, methylene chloride, and trichloroethene observed in trip blanks are likely derived from laboratory contamination. The estimated detections of 2-butanone and carbon disulfide in trip blanks may be attributable to ambient conditions in either the laboratory setting or to some effect of the sample shipment procedure. Based on the extremely low concentrations observed, however, these results are not considered to indicate a systematic problem with the sampling or analytical program.

D.2.4 FIELD PROCEDURES

The procedures specified in the FI Work Plan, including the QAPP and the Field Operating Procedures (FOPs), were adhered to during the investigation, with the exceptions noted on the attached Variance Log or Nonconformance Reports. The following FOP categories are most relevant to data quality:

- Field Instrument Calibration and Maintenance
- Soil Sampling
- Groundwater Sampling
- Surface Water and Sediment Sampling

- Decontamination
- Documentation Requirements for Drilling and Well Installation
- Sampling, Labeling, Storage, and Shipment

Three QA/QC Field Audits were performed by Geomatrix QA auditors to verify that procedures required by the QAPP were being followed. QA/QC Field Audits were conducted from May 7 to 8, 2001, from November 9 to 11, 2001, and from March 10 to 11, 2004. Although none of the audits identified any significant breach in conformance to the FOPs, the audits did result in the implementation of real-time enhancements to the FI field program. Specifically, the QA auditor recommended improvements to sample chain-of-custody documentation procedures, sample shipment logistics, sample security and labeling practices, and quality assurance sampling frequency. Copies of QA/QC Field Audit Reports, originally submitted to the USEPA with Quarterly Progress Reports, have been included with this Appendix.

D.2.5 DOCUMENTATION

Documentation of field activities was performed throughout the duration of the fieldwork. Field personnel regularly maintained the following documentation:

- Daily Field Record Logs summarizing all field activities
- Daily Health and Safety Meeting Records
- Sample Control Logs
- Chain-of-Custody Records and associated Federal Express Air Bills
- Well Sampling and/or Development Records
- Sample Collection Records

Documentation procedures were reviewed and enhanced during the field audits by the QA Auditors, as described in Section D.2.4.

D.3.0 LABORATORY QUALITY CONTROL

D.3.1 GEOTECHNICAL ANALYSIS

The standard methods used for geotechnical analyses are widely recognized and are published by the American Society for Testing and Materials (ASTM) (see Section A3.1 of the QAPP). Laboratory precision for geotechnical parameters is assessed through the strict adherence to ASTM protocols and other applicable standards or guidelines for each parameter. No deviations from the standardized methods by the laboratory were identified or reported.

D.3.2 LABORATORY ANALYTICAL PROCEDURES

STL performed analytical procedures in accordance with the QAPP and as specified in the "Severn Trent Laboratory Quality Manual and Standard Operating Procedures" (STL, 2000). There were no significant deviations from the Data Quality Objectives (DQOs) as presented in the QAPP. All analytical data were provided in electronic format to Rohm and Haas by STL. These data were electronically transferred to a database to avoid potential errors from manual transcription.

D.3.3 DATA VALIDATION

Laboratory analytical data validation was performed in accordance with Section A9.2.2, *Procedures Used to Validate Laboratory Data* of the QAPP as set forth in the FI Work Plan (Geomatrix, 2000b). The third party validator, Environmental Standards, validated at least ten percent of the analytical data for each sample matrix. Data reports were selected for validation by Geomatrix to ensure that representative sets of environmental media were evaluated from the different phases of sampling. Validation of the analytical data included an assessment of data precision and accuracy. The following is a list of the typical data quality parameters that were examined:

- Holding Times
- Surrogate Recoveries (accuracy)

- Matrix Spike/Matrix Spike Duplicates for organics and Duplicates for inorganics (precision)
- Calibration
- Blanks
- Instrument Performance Checks
- Internal Standards
- Compound Identification
- Compound Quantitation and Reported Detection Limits
- System Performance

Environmental Standards performed a comprehensive review and generated five separate validation reports, entitled:

- Quality Assurance Review of Samples Collected on March 11, 13 and 14, 2001
- Quality Assurance Review of Samples Collected on May 8, 2001
- Quality Assurance Review of Samples Collected on November 8, 9, and 10, 2001
- Quality Assurance Review of Samples Collected on March 14, 15, and 25, 2004 and on April 5, 6, and 7, 2004
- Quality Assurance Review of Samples Collected on March 25, 26, 2004

Copies of the written summary from each report are included with this Appendix; complete copies of the Data Validation Reports are maintained in the project files.

In general, data reviewed were considered to be valid and useable with appropriate qualifiers. Environmental Standards deemed that STL had provided sufficient quality

control summary forms and supporting raw data to allow for complete validation of the data. The data review identified mostly minor and correctable deficiencies. Environmental Standards qualified some of the acetone, bis(2-ethylhexyl)phthalate, and a few metals detections as non-detect. Environmental Standards also designated a small number of non-detect results as unreliable. In response to a review of data deemed unreliable by Environmental Standards, the STL Quality Assurance (QA) Manager submitted an additional technical explanation in a letters dated April 19, 2002 and August 11, 2004. STL's QA Manager disagreed with these designations on the basis of STL's use of SW846 procedures – not CLP procedures – and on the laboratory's own conclusions using aggressive re-extraction practices and review of other laboratory control samples. Copies of STL correspondence are included with this Appendix. The outcome of the Environmental Standards validation and the STL review did not add any new chemical detections to the original data set, and the project data are considered to be valid and usable with the appropriate qualifiers.

D.4.0 PROJECT COMPLETENESS ASSESSMENT

Data completeness is a measurement of the amount of valid data obtained from a prescribed measurement system, as compared to that expected and required to meet the project goals. More specifically, completeness is defined as the percentage of valid results, based on the actual vs. proposed number of samples. The QAPP goal for data completeness for field and laboratory measurements is 90 percent.

D.4.1 FIELD MEASURED PARAMETERS

Table A1-4 of the QAPP summarizes the project Field Parameters. Completeness of field measured parameters is determined by assessing the quality and adequacy of data collected during the FI. As stated above, field equipment was calibrated on a daily basis and all field calibration measurements met project goals. Groundwater samples collected from monitoring wells that were micro-purged were field analyzed for dissolved oxygen, pH, specific conductance, and temperature. For monitoring wells that were bailed, however, these field parameters were not collected. Furthermore, during the initial FI (2000/2001) the exact accuracy of groundwater pH measured in the field is in question, as described in Nonconformance Log 018. For the initial FI, it is estimated that the completeness for the groundwater field measurements is 75 percent due to the suspected problems with the pH meter. For the 2004 Supplemental FI (2004), however, the completeness objective of 90 percent for the groundwater field parameters was achieved.

The soil samples, however, were field screened as planned with an organic vapor meter, and the completeness of this field parameter is 100 percent.

D.4.2 ANALYTICAL DATA

Completeness of analytical data is determined by comparing the number of valid samples collected and analyzed to the number of possible or planned samples. The FI was performed in a phased approach, with the addition of new sample locations and sample analyses on an ongoing basis. As noted in the variance logs, these additional samples added to the overall data set proposed in the FI Work Plan. All of the soil, groundwater,

sediment, surface water, and seep samples that were collected were analyzed by STL. STL analyzed each sample for the specified target analyte list requested, including geochemical and geotechnical parameters. The results were determined to be valid and a completeness of 100 percent was achieved for the all matrices sampled during the FI.

Table D-1
Duplicate Soil and Sediment Samples
Volatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1-Dichloroethane	1,2-Dichloroethane	1,2-Dichloroethene (total)	2-Butanone	Acetone	Acrylonitrile	Benzene	Bromodichloromethane	Carbon disulfide	Chlorobenzene	Chloroform	Chloromethane	cis-1,2-Dichloroethene	Cyclohexane	Dichlorodifluoromethane	Ethylbenzene	Iodomethane	Isopropylbenzene
DP10-10'	7/27/2001	<0.27	<0.27	<0.27	0.17 J B	<1.1	<5.3	<0.27	<0.27	0.18 J	<0.27	<0.27	<0.27	<0.13	NA	<0.27	0.13 J	<0.27	NA
DP10-10' (Dup)	7/27/2001	<0.27	<0.27	<0.27	0.17 J B	<1.1	<5.3	<0.27	<0.27	0.095 J	<0.27	<0.27	<0.27	<0.13	NA	<0.27	0.084 J	<0.27	NA
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.82	0.00	0.00	0.00	0.00	NA	0.00	42.99	0.00	NA
DP25-2.5'	8/7/2001	<0.0053	<0.0053	<0.0053	<0.021	0.0045 J	NA	<0.0053	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.0027	<0.011	<0.0053	<0.0053	NA	<0.0053
DP25-2.5' (Dup)	8/7/2001	<0.0047	<0.0047	<0.0047	<0.019	0.0032 J	NA	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0094	<0.0024	<0.0094	<0.0047	<0.0047	NA	<0.0047
RPD		0.00	0.00	0.00	0.00	33.77	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00
STR04-17.5'	3/19/2001	<0.0052	<0.0052	<0.0052	<0.021	0.0076 J	NA	<0.0052	<0.0052	<0.0052	<0.0052	<0.0052	<0.01	<0.0026	<0.01	<0.0052	<0.0052	NA	<0.0052
STR04-17.5' (Dup)	3/19/2001	<0.0046	<0.0046	<0.0046	<0.019	<0.019	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0023	<0.0093	<0.0046	<0.0046	NA	<0.0046
RPD		0.00	0.00	0.00	0.00	85.71	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00
STR08-13'	3/26/2001	<0.24	<0.24	<0.24	<0.96	3.2	NA	<0.24	<0.24	0.38	<0.24	<0.24	<0.48	<0.12	<0.48	<0.24	<0.24	NA	<0.24
STR08-13' (Dup)	3/26/2001	<0.23	<0.23	<0.23	<0.94	5.9	NA	<0.23	<0.23	0.29	0.079 J	<0.23	<0.47	<0.12	<0.47	<0.23	<0.23	NA	<0.23
RPD		0.00	0.00	0.00	0.00	59.34	NA	0.00	0.00	26.87	100.94	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00
STR11-9'	8/20/2001	<0.0045	<0.0045	<0.0045	<0.018	<0.018	NA	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0089	<0.0022	<0.0089	<0.0045	<0.0045	NA	<0.0045
STR11-9' (Dup)	8/20/2001	<0.0047	<0.0047	<0.0047	<0.019	<0.019	NA	<0.0047	<0.0047	<0.0047	<0.0047	<0.0047	<0.0093	<0.0023	<0.0093	<0.0047	<0.0047	NA	<0.0047
RPD		0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00
UAW15-20-2'	4/9/2001	<0.0043	<0.0043	<0.0043	0.008 J	0.028	NA	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	<0.0086	<0.0022	<0.0086	<0.0043	<0.0043	NA	<0.0043
UAW15-20-2' (Dup)	4/9/2001	<0.0046	<0.0046	<0.0046	0.019	0.075	NA	<0.0046	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0023	<0.0093	<0.0046	<0.0046	NA	<0.0046
RPD		0.00	0.00	0.00	81.48	91.26	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00
B04-1.5'	10/9/2001	<0.0054	<0.0054	<0.0054	<0.022	0.0044 J B	NA	<0.0054	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.0027	<0.011	<0.0054	<0.0054	NA	<0.0054
B04-1.5' (Dup)	10/9/2001	<0.0055	<0.0055	<0.0055	<0.022	0.005 J B	NA	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	<0.011	<0.0027	<0.011	<0.0055	<0.0055	NA	<0.0055
RPD		0.00	0.00	0.00	0.00	12.77	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00
SS-5 ~25' South	10/11/2001	<0.0057	<0.0057	NA	NA	0.0083 J	NA	<0.0057	<0.0057	<0.0057	0.0043 J	<0.0057	NA	NA	NA	<0.0057	<0.0057	NA	NA
SS-5 (Dup).	10/11/2001	<0.0059	<0.0059	NA	NA	0.0067 J	NA	<0.0059	<0.0059	<0.0059	0.0037 J	<0.0059	NA	NA	NA	<0.0059	<0.0059	NA	NA
RPD		0.00	0.00	NA	NA	21.33	NA	0.00	0.00	0.00	15.00	0.00	NA	NA	NA	0.00	0.00	NA	NA
CS7 (Dup)	3/6/2002	<0.0059	<0.0059	NA	NA	<0.024	NA	<0.0059	<0.0059	<0.0059	<0.0059	<0.0059	NA	NA	NA	<0.0059	<0.0059	NA	NA
CS7	3/6/2002	<0.0055	<0.0055	NA	NA	<0.022	NA	<0.0055	<0.0055	<0.0055	<0.0055	<0.0055	NA	NA	NA	<0.0055	<0.0055	NA	NA
RPD		0.00	0.00	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	NA	NA	NA	0.00	0.00	NA	NA

Table D-1
Duplicate Soil and Sediment Samples
Volatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	Methyl acetate	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride	Xylenes (total)
DP10-10'	7/27/2001	NA	NA	<0.27	<0.27	2.4	<0.27	<0.27	0.32 J
DP10-10' (Dup)	7/27/2001	NA	NA	<0.27	<0.27	3.8	<0.27	<0.27	0.2 J
RPD		NA	NA	0.00	0.00	45.16	0.00	0.00	46.15
DP25-2.5'	8/7/2001	<0.011	<0.011	<0.0053	<0.0053	<0.0053	<0.0053	<0.011	<0.011
DP25-2.5' (Dup)	8/7/2001	<0.0094	<0.0094	<0.0047	<0.0047	<0.0047	<0.0047	<0.0094	<0.0094
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STR04-17.5'	3/19/2001	<0.01	<0.01	<0.0052	<0.0052	<0.0052	<0.0052	<0.01	<0.01
STR04-17.5' (Dup)	3/19/2001	<0.0093	<0.0093	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0093
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STR08-13'	3/26/2001	<0.48	<0.48	<0.24	<0.24	<0.24	<0.24	<0.48	<0.48
STR08-13' (Dup)	3/26/2001	<0.47	<0.47	<0.23	<0.23	<0.23	<0.23	<0.47	<0.47
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STR11-9'	8/20/2001	<0.0089	<0.0089	<0.0045	<0.0045	<0.0045	<0.0045	<0.0089	<0.0089
STR11-9' (Dup)	8/20/2001	<0.0093	<0.0093	<0.0047	0.0016 J	<0.0047	<0.0047	<0.0093	<0.0093
RPD		0.00	0.00	0.00	95.08	0.00	0.00	0.00	0.00
UAW15-20-2'	4/9/2001	<0.0086	<0.0086	<0.0043	<0.0043	<0.0043	<0.0043	<0.0086	<0.0086
UAW15-20-2' (Dup)	4/9/2001	<0.0093	<0.0093	<0.0046	<0.0046	<0.0046	<0.0046	<0.0093	<0.0093
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B04-1.5'	10/9/2001	<0.011	<0.011	<0.0054	<0.0054	<0.0054	<0.0054	<0.011	<0.011
B04-1.5' (Dup)	10/9/2001	<0.011	<0.011	<0.0055	<0.0055	<0.0055	<0.0055	<0.011	<0.011
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SS-5 ~25' South	10/11/2001	NA	<0.011	<0.0057	NA	<0.0057	NA	NA	<0.011
SS-5 (Dup).	10/11/2001	NA	0.0011 J	<0.0059	NA	<0.0059	NA	NA	<0.012
RPD		NA	163.64	0.00	NA	0.00	NA	NA	0.00
CS7 (Dup)	3/6/2002	NA	<0.012	<0.0059	NA	<0.0059	NA	NA	<0.012
CS7	3/6/2002	NA	<0.011	<0.0055	NA	<0.0055	NA	NA	<0.011
RPD		NA	0.00	0.00	NA	0.00	NA	NA	0.00

Notes:

RPD = Relative Percent Difference.

J = Estimated result; result is less than reporting limit.

B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

NA indicates chemical was not on the target analyte list for that sample.

See Appendix B for the complete target analyte lists.

Table D-1A
Supplemental FI
Duplicate Soil and Sediment Samples
Volatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample ID	Sample Date	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethan	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichloropropane	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,2-Dichloropropane	2-Butanone	2-Butanone (MEK)	2-Hexanone	4-Methyl-2-pentanone	4-Methyl-2-pentanone (MIBK)	Acetone	Acetonitrile	Acrolein	Acrylonitrile	Allyl chloride	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane
CS-6A	3/25/2004	<0.0079	<0.0079	NA	NA	<0.0079	<0.0079	<0.0079	<0.0079	<0.016	NA	<0.0079	<0.0079	<0.0079	NA	<0.031	<0.031	NA	<0.031	<0.031	<0.16	<0.16	<0.16	<0.016	<0.0079	NA	<0.0079	<0.0079	<0.0079
CS-6A BLIND DUP	3/25/2004	<0.0066	<0.0066	NA	NA	<0.0066	<0.0066	<0.0066	<0.0066	<0.013	NA	<0.0066	<0.0066	<0.0066	NA	<0.026	<0.026	NA	<0.026	<0.026	<0.13	<0.13	<0.13	<0.013	<0.0066	NA	<0.0066	<0.0066	<0.0066
RPD		0	0	NA	NA	0	0	0	0	0	NA	0	0	0	NA	0	0	NA	0	0	0	0	0	0	0	NA	0	0	0
DP61A-5-6'	3/15/2004	NA	<0.82	<0.82	<0.82	<0.82	<0.82	<0.82	NA	<1.6	<0.82	NA	<0.82	<0.82	<3.3	NA	<3.3	<3.3	NA	1 J B	NA	NA	NA	NA	<0.82	<0.82	<0.82	<0.82	<0.82
DP61A-5-6' BLIND DUP	3/15/2004	NA	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	NA	<1.9	<0.93	NA	<0.93	<0.93	<3.7	NA	<3.7	<3.7	NA	1.1 J B	NA	NA	NA	NA	<0.93	<0.93	<0.93	<0.93	<0.93
RPD		NA	0	0	0	0	0	0	NA	0	0	NA	0	0	0	NA	0	0	NA		NA	NA	NA	NA	0	0	0	0	0

Table D-1A
Supplemental FI
Duplicate Soil and Sediment Samples
Volatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample ID	Sample Date	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Chloroprene	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dibromomethane	Dichlorodifluoromethane	Ethyl methacrylate	Ethylbenzene	Iodomethane	Isobutyl alcohol	Isopropylbenzene	Methacrylonitrile	Methyl acetate	Methyl methacrylate	Methyl tert-butyl ether	Methylcyclohexane	Methylene chloride	Propionitrile	Styrene	Tetrachloroethene
CS-6A	3/25/2004	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0039	<0.0079	NA	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.31	NA	<0.0079	NA	<0.0079	NA	NA	<0.0079	<0.031	<0.0079	<0.0079
CS-6A BLIND DUP	3/25/2004	<0.0066	<0.0066	<0.0066	<0.0066	<0.0066	<0.0066	<0.0066	<0.0033	<0.0066	NA	<0.0066	<0.0066	<0.0066	<0.0066	<0.0066	<0.0066	<0.26	NA	<0.0066	NA	<0.0066	NA	NA	<0.0066	<0.026	<0.0066	<0.0066
RPD		0	0	0	0	0	0	0	0	0	NA	0	0	0	0	0	0	0	NA	0	NA	0	NA	NA	0	0	0	0
DP61A-5-6'	3/15/2004	<0.82	<0.82	<0.82	<0.82	<0.82	<0.82	NA	<0.41	<0.82	<1.6	<0.82	NA	<0.82	NA	<0.82	NA	NA	<0.82	NA	<1.6	NA	<3.3	<1.6	<0.82	NA	<0.82	<0.82
DP61A-5-6' BLIND DUP	3/15/2004	<0.93	<0.93	<0.93	<0.93	<0.93	<0.93	NA	<0.47	<0.93	<1.9	<0.93	NA	<0.93	NA	<0.93	NA	NA	<0.93	NA	<1.9	NA	<3.7	<1.9	<0.93	NA	<0.93	<0.93
RPD		0	0	0	0	0	0	NA	0	0	0	0	NA	0	NA	0	NA	NA	0	NA	0	NA	0	0	0	NA	0	0

Table D-1A
Supplemental FI
Duplicate Soil and Sediment Samples
Volatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample ID	Sample Date	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	trans-1,4-Dichloro-2-butene	Trichloroethene	Trichlorofluoromethane	Vinyl acetate	Vinyl chloride	Xylenes (total)
CS-6A	3/25/2004	<0.0079	<0.0039	<0.0079	<0.0079	<0.0079	<0.0079	<0.016	<0.0079	<0.016
CS-6A BLIND DUP	3/25/2004	<0.0066	<0.0033	<0.0066	<0.0066	<0.0066	<0.0066	<0.013	<0.0066	<0.013
RPD		0	0	0	0	0	0	0	0	0
DP61A-5-6'	3/15/2004	<0.82	<0.41	<0.82	NA	<0.82	<0.82	NA	<0.82	<1.6
DP61A-5-6' BLIND DUP	3/15/2004	<0.93	<0.47	<0.93	NA	<0.93	<0.93	NA	<0.93	<1.9
RPD		0	0	0	NA	0	0	NA	0	0

Notes:
RPD = Relative Percent Difference.
J = Estimated result; result is less than reporting limit.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-2
Duplicate Soil and Sediment Samples
Semivolatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	2,4-Dimethylphenol	2-Methylnaphthalene	2-Methylphenol	3-Methylphenol	4-Methylphenol	Acenaphthene	Acenaphthylene	Aniline	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	bis(2-Ethylhexyl) phthalat	Carbazole	Chrysene	Di-n-octyl phthalate	Dibenz(a,h)anthracene	Dibenzofuran	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Phenol	Pyrene
DP10-10'	7/27/2001	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	1.5	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
DP10-10' (Dup)	7/27/2001	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	0.89 J	NA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.05	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DP25-2.5'	8/7/2001	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	NA	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
DP25-2.5' (Dup)	8/7/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STR04-17.5'	3/19/2001	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	NA	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
STR04-17.5' (Dup)	3/19/2001	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	0.18 J	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STR08-13'	3/26/2001	0.34 J	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
STR08-13' (Dup)	3/26/2001	0.31 J	<0.38	<0.38	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	NA	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38	<0.38
RPD		9.23	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STR11-9'	8/20/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
STR11-9' (Dup)	8/20/2001	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	NA	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39	<0.39
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UAW15-20-2'	4/9/2001	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	NA	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37	<0.37
UAW15-20-2' (Dup)	4/9/2001	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	NA	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B04-1.5'	10/9/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	0.06 J	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35
B04-1.5' (Dup)	10/9/2001	<0.35	<0.35	<0.35	<0.35	<0.35	<0.35	NA	<0.35	<0.35	<0.35	<0.35	<0.35	0.063 J	0.076 J	0.1 J	0.072 J	<0.35	<0.35	<0.35	0.082 J	<0.35	<0.35	<0.35	0.15 J	<0.35	<0.35	<0.35	0.096 J	<0.35	0.14 J
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	138.98	128.64	111.11	131.75	0.00	141.46	0.00	124.07	0.00	0.00	0.00	80.00	0.00	0.00	0.00	113.90	0.00	85.71
SS-5 ~25' South	10/11/2001	0.17 J	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-5 (Dup).	10/11/2001	0.2 J	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RPD		16.22	NA	0.00	NA	NA	0.00	NA	0.00	NA	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CS7	3/6/2002	<0.41	NA	<0.41	NA	NA	<0.41	NA	<0.41	NA	NA	<0.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CS7(Dup)	3/6/2002	<0.4	NA	<0.4	NA	NA	<0.4	NA	<0.4	NA	NA	<0.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RPD		0.00	NA	0.00	NA	NA	0.00	NA	0.00	NA	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
RPD = Relative Percent Difference.
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.

NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-2A
Supplemental FI
Duplicate Soil and Sediment Samples
Semivolatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	1,1'-Biphenyl	1,2,4,5-Tetrachlorobenzene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,2-Dinitrobenzene	1,3,5-Trinitrobenzene	1,3-Dichlorobenzene	1,3-Dinitrobenzene	1,4-Dichlorobenzene	1,4-Dioxane	1,4-Naphthoquinone	1-Naphthylamine	2,2'-oxybis(1-Chloropropane)	2,3,4,6-Tetrachlorophenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dichlorophenol	2,6-Dinitrotoluene	2-Acetylaminofluorene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Naphthylamine	2-Nitroaniline	2-Nitrophenol	2-Picoline	3,3'-Dichlorobenzidine	3,3'-Dimethylbenzidine	3-Methylcholanthrene	3-Methylphenol	3-Nitroaniline
CS-6A	3/25/2004	NA	<0.42	<0.42	<0.42	<0.42	<2	<0.42	<0.42	<0.42	<0.42	<2	<0.42	NA	<2	<0.42	<0.42	<0.42	<0.42	<2	<0.42	<0.42	<0.42	<4.2	<0.42	<0.42	<0.42	<0.42	<0.42	<2	<0.42	<0.83	<2	<2	<0.83	<0.42	<2
CS-6A BLIND DUP	3/25/2004	NA	<0.41	<0.41	<0.41	<0.41	<2	<0.41	<0.41	<0.41	<0.41	<2	<0.41	NA	<2	<0.41	<0.41	<0.41	<0.41	<2	<0.41	<0.41	<0.41	<4.1	<0.41	<0.41	<0.41	<0.41	<0.41	<2	<0.41	<0.82	<2	<2	<0.82	<0.41	<2
RPD		NA	0	0	0	0	0	0	0	0	0	0	0	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DP61A-5-6'	3/15/2004	<1.6	NA	<1.6	<1.6	NA	NA	<1.6	NA	<1.6	NA	NA	NA	<1.6	NA	<1.6	<1.6	<1.6	<1.6	<7.7	<1.6	NA	<1.6	NA	<1.6	<1.6	<1.6	<1.6	NA	<7.7	<1.6	NA	<7.7	NA	NA	NA	<7.7
DP61A-5-6' BLIND DUP	3/15/2004	<7.9	NA	<7.9	<7.9	NA	NA	<7.9	NA	<7.9	NA	NA	NA	<7.9	NA	<7.9	<7.9	<7.9	<7.9	<38	<7.9	NA	<7.9	NA	<7.9	<7.9	<7.9	<7.9	NA	<38	<7.9	NA	<38	NA	NA	NA	<38
RPD		0	NA	0	0	NA	NA	0	NA	0	NA	NA	NA	0	NA	0	0	0	0	0	0	NA	0	NA	0	0	0	0	NA	0	0	NA	0	NA	NA	NA	0

Table D-2A
Supplemental FI
Duplicate Soil and Sediment Samples
Semivolatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	4,6-Dinitro-2-methylphenol	4-Aminobiphenyl	4-Bromophenyl phenyl ether	4-Chloro-3-methylphenol	4-Chloroaniline	4-Chlorophenyl phenyl ether	4-Methylphenol	4-Nitroaniline	4-Nitrophenol	4-Nitroquinoline-1-oxide	5-Nitro-o-toluidine	7,12-Dimethylbenz(a)anthracene	a,a-Dimethylphenethylamine	Acenaphthene	Acenaphthylene	Acetophenone	Aniline	Anthracene	Aramite	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzyl alcohol	bis(2-Chloro-1-methylethyl) ether	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl) ether	bis(2-Ethylhexyl) phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chlorobenzilate
CS-6A	3/25/2004	<2	<2	<0.42	<0.42	<0.42	<0.42	<0.42	<2	<2	<4.2	<0.83	<0.83	<2	<0.42	<0.42	<0.42	<0.42	0.033 J	<0.83	NA	NA	0.087 J	0.1 J	0.14 J	0.067 J	0.054 J	<0.42	<0.42	<0.42	<0.42	0.034 J	<0.42	NA	NA	<0.42
CS-6A BLIND DUP	3/25/2004	<2	<2	<0.41	<0.41	<0.41	<0.41	<0.41	<2	<2	<4.1	<0.82	<0.82	<2	<0.41	<0.41	<0.41	<0.41	0.037 J	<0.82	NA	NA	0.11 J	0.12 J	0.13 J	0.07 J	0.09 J	<0.41	<0.41	<0.41	<0.41	0.03 J	<0.41	NA	NA	<0.41
RPD		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11.43	0	NA	NA	23.35	18.18	7.33	4.38	50.00	0	0	0	0	12.50	0	NA	NA	0
DP61A-5-6'	3/15/2004	<7.7	NA	<1.6	<1.6	<1.6	<1.6	<1.6	<7.7	<7.7	NA	NA	NA	NA	<1.6	<1.6	<1.6	<1.6	<1.6	NA	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	NA	NA	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	NA
DP61A-5-6' BLIND DUP	3/15/2004	<38	NA	<7.9	<7.9	<7.9	<7.9	<7.9	<38	<38	NA	NA	NA	NA	<7.9	<7.9	<7.9	<7.9	<7.9	NA	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	NA	NA	<7.9	<7.9	<7.9	<7.9	<7.9	<7.9	NA
RPD		0	NA	0	0	0	0	0	0	0	NA	NA	NA	NA	0	0	0	0	0	NA	0	0	0	0	0	0	0	NA	NA	0	0	0	0	0	0	NA

Table D-2A
Supplemental FI
Duplicate Soil and Sediment Samples
Semivolatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Dimethoate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Diphenylamine	Disulfoton	Ethyl methanesulfonate	Famphur	Fluoranthene	Fluorene	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Hexachloropropene	Indeno(1,2,3-cd)pyrene	Isophorone	Isosafrole	Methapyrilene	Methyl methanesulfonate	Naphthalene	Nitrobenzene	N-Nitrosodiethylamine	N-Nitrosodimethylamine	N-Nitrosodi-n-butylamine	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	N-Nitrosomethylethylamine	N-Nitrosomorpholine	N-Nitrosopiperidine
CS-6A	3/25/2004	0.16 J	<0.42	<0.42	<0.42	<0.83	<0.42	<0.42	<0.42	<0.42	<2	<0.42	<4.2	0.37 J	<0.42	<0.42	<0.42	<2	<0.42	<4.2	0.06 J	<0.42	<0.83	<2	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42	<0.42
CS-6A BLIND DUP	3/25/2004	0.18 J	<0.41	<0.41	<0.41	<0.82	<0.41	<0.41	<0.41	<0.41	<2	<0.41	<4.1	0.4 J	<0.41	<0.41	<0.41	<2	<0.41	<4.1	0.06 J	<0.41	<0.82	<2	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41	<0.41
RPD		11.76	0	0	0	0	0	0	0	0	0	0	0	7.79	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DP61A-5-6'	3/15/2004	<1.6	<1.6	<1.6	<1.6	NA	<1.6	<1.6	<1.6	NA	NA	NA	NA	<1.6	<1.6	<1.6	<1.6	<7.7	<1.6	NA	<1.6	<1.6	NA	NA	NA	<1.6	<1.6	NA	NA	NA	<1.6	<1.6	NA	NA	NA
DP61A-5-6' BLIND DUP	3/15/2004	<7.9	<7.9	<7.9	<7.9	NA	<7.9	<7.9	<7.9	NA	NA	NA	NA	<7.9	<7.9	<7.9	<7.9	<38	<7.9	NA	<7.9	<7.9	NA	NA	NA	<7.9	<7.9	NA	NA	NA	<7.9	<7.9	NA	NA	NA
RPD		0	0	0	0	NA	0	0	0	NA	NA	NA	NA	0	0	0	0	0	0	NA	0	0	NA	NA	NA	0	0	NA	NA	NA	0	0	NA	NA	NA

Table D-2A
Supplemental FI
Duplicate Soil and Sediment Samples
Semivolatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	N-Nitrosopyrrolidine	O,O,O-Triethyl phosphorothioate	o-Toluidine	p-Dimethylaminoazobenzene	Pentachlorobenzene	Pentachloronitrobenzene	Pentachlorophenol	Phenacetin	Phenanthrene	Phenol	Phorate	p-Phenylene diamine	Pronamide	Pyrene	Pyridine	Safrole	Tetraethyldithiopyrophosphate	Thionazin
CS-6A	3/25/2004	<0.42	<2	<0.83	<0.83	<0.42	<2	<0.42	<0.83	0.23 J	<0.42	<2	<4.2	<0.83	0.26 J	<0.83	<0.83	<2	<2
CS-6A BLIND DUP	3/25/2004	<0.41	<2	<0.82	<0.82	<0.41	<2	<0.41	<0.82	0.2 J	<0.41	<2	<4.1	<0.82	0.28 J	<0.82	<0.82	<2	<2
RPD		0	0	0	0	0	0	0	0	13.95	0	0	0	0	7.41	0	0	0	0
DP61A-5-6'	3/15/2004	NA	NA	NA	NA	NA	NA	<1.6	NA	<1.6	<1.6	NA	NA	NA	<1.6	NA	NA	NA	NA
DP61A-5-6' BLIND DUP	3/15/2004	NA	NA	NA	NA	NA	NA	<7.9	NA	<7.9	<7.9	NA	NA	NA	<7.9	NA	NA	NA	NA
RPD		NA	NA	NA	NA	NA	NA	0	NA	0	0	NA	NA	NA	0	NA	NA	NA	NA

Notes:
RPD = Relative Percent Difference.
J = Estimated result; result is less than reporting limit.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-3
Duplicate Soil and Sediment Samples
Pesticides and PCB
Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-Chlordane	beta-BHC	Chlorobenzilate	Dieldrin	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-Chlordane	Heptachlor epoxid	Isodrin	Methoxychlor	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260
DP10-10'	7/27/2001	<0.2	<0.2	<0.2	<0.2	NA	<0.2	<0.38	<0.2	<0.2	<0.2	<0.2	<0.2	NA	NA	<0.2	<0.38	<0.38	<3.8	<3.8	<3.8	<3.8	<3.8
DP10-10' (Dup)	7/27/2001	<0.0039	<0.0039	<0.0039	<0.0039	NA	0.0038 J	<0.0075	<0.0039	<0.0039	<0.0039	<0.0039	<0.0039	NA	NA	<0.0039	<0.0075	<0.0075	<0.38	<0.38	<0.38	<0.38	<0.38
RPD		0.00	0.00	0.00	0.00	NA	192.54	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DP25-2.5'	8/7/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0041	<0.041	<0.041	<0.041	<0.041	<0.041
DP25-2.5' (Dup)	8/7/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0037	<0.037	<0.037	<0.037	<0.037	<0.037
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00
STR04-17.5'	3/19/2001	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.004	<0.04	<0.04	<0.04	<0.04	<0.04
STR04-17.5' (Dup)	3/19/2001	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	<0.0019	NA	<0.0036	<0.036	<0.036	<0.036	<0.036	<0.036
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00
STR08-13'	3/26/2001	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	NA	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	NA	<0.037	<0.037	<0.037	<0.037	<0.037	<0.037
STR08-13' (Dup)	3/26/2001	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	NA	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	<0.039	NA	<0.075	<0.038	<0.038	<0.038	<0.038	<0.038
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00
STR11-9'	8/20/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
STR11-9' (Dup)	8/20/2001	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	NA	<0.0039	<0.039	<0.039	<0.039	<0.039	<0.039
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00
UAW15-20-2'	4/9/2001	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	<0.0038	NA	<0.0073	<0.037	<0.037	<0.037	<0.037	<0.037
UAW15-20-2' (Dup)	4/9/2001	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	NA	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	<0.0037	NA	<0.0073	<0.036	<0.036	<0.036	<0.036	<0.036
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00
B04-1.5'	10/9/2001	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	NA	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0071	<0.0071	<0.035	<0.035	<0.035	<0.035	<0.035
B04-1.5' (Dup)	10/9/2001	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	NA	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0036	<0.0071	<0.0071	<0.035	<0.035	<0.035	<0.035	<0.035
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SS-5 ~25' South	10/11/2001	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	NA	<0.021	<0.021	NA	<0.021	<0.021	<0.021	NA	<0.021	<0.041	NA	NA	NA	NA	NA	NA
SS-5 (Dup)	10/11/2001	<0.021	<0.021	<0.021	<0.021	<0.021	<0.021	NA	<0.021	<0.021	NA	<0.021	<0.021	<0.021	NA	<0.021	<0.041	NA	NA	NA	NA	NA	NA
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	NA	0.00	0.00	0.00	NA	0.00	0.00	NA	NA	NA	NA	NA	NA
CS7	3/6/2002	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0041	NA	NA	NA	NA	NA	NA
CS7(Dup)	3/6/2002	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.0021	NA	<0.0021	<0.0021	<0.0021	NA	<0.0021	<0.004	NA	NA	NA	NA	NA	NA
RPD		0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	NA	0.00	0.00	0.00	NA	0.00	0.00	NA	NA	NA	NA	NA	NA

Notes:
RPD = Relative Percent Difference.
J = Estimated result; result is less than reporting limit.
PG = The percentage difference between the original and confirmation analyses is greater than 40%.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-3A
Supplemental FI
Duplicate Soil and Sediment Samples
Pesticides and PCB Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample ID	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	beta-BHC	Chlordane (technical)	Chlorobenzilate	delta-BHC	Diallate
CS-6A	3/25/2004	<0.0043	0.0018 J	<0.0043	<0.0043	<0.0043	NA	<0.042	<0.042	<0.042	<0.042	0.06	<0.042	<0.042	0.0046	<0.043	0.024 J	<0.0043	0.029 J
CS-6A BLIND DUP	3/25/2004	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	NA	<0.041	<0.041	<0.041	<0.041	0.015 J	<0.041	<0.041	<0.0042	<0.042	<0.042	<0.0042	<0.082
RPD		0	80.00	0	0	0	NA	0	0	0	0	120.00	0	0	9.09	0	54.55	0	95.50
DP61A-5-6'	3/15/2004	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.21	NA	NA	<0.21	NA
DP61A-5-6' BLIND DUP	3/15/2004	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.2	NA	NA	<0.2	NA
RPD		0	0	0	0	0	0	0	0	0	0	0	0	0	0	NA	NA	0	NA

Table D-3A
Supplemental FI
Duplicate Soil and Sediment Samples
Pesticides and PCB Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample ID	Sample Date	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor	Heptachlor epoxide	Isodrin	Kepone	Methoxychlor	Toxaphene
CS-6A	3/25/2004	0.024	<0.0043	<0.0043	<0.0043	<0.0043	<0.0043	NA	<0.0043	NA	<0.0043	<0.0043	<0.0083	<0.083	0.0056 J	<0.17
CS-6A BLIND DUP	3/25/2004	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	NA	<0.0042	NA	<0.0042	<0.0042	<0.0082	<0.082	0.004 J	<0.17
RPD		140.43	0	0	0	0	0	NA	0	NA	0	0	0	0	33.33	0
DP61A-5-6'	3/15/2004	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	<0.21	NA	NA	<0.4	<8.1
DP61A-5-6' BLIND DUP	3/15/2004	<0.2	<0.2	<0.2	<0.2	0.095 J	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA	NA	<0.4	<8
RPD		0	0	0	0	75.41	0	0	0	0	0	0	NA	NA	0	0

Notes:
RPD = Relative Percent Difference.
J = Estimated result; result is less than reporting limit.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-4
Duplicate Soil and Sediment Samples
Inorganic Chemical Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample Location	Sample Date	Acid-insoluble Sulfide	Acid-Soluble Sulfide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide, Total	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
DP10-10'	7/27/2001	NA	1400	NA	<1.2	0.74 B	13.9 B	0.091 B	0.25	NA	7.9	3.7 B	5.3	<0.58	NA	2.9	NA	NA	0.09 B	7.8	NA	<0.58	<0.58	NA	<1.2	531	5.7 B	100
DP10-10' (Dup)	7/27/2001	NA	820	NA	<1.1	1.2	8.2 B	0.1 B	0.18 B	NA	6.9	3.4 B	6.8	0.25 B	NA	2.7	NA	NA	0.046 B	7.8	NA	<0.57	<0.57	NA	<1.1	273	6.5	49.1
RPD		NA	52.25	NA	0.00	47.42	51.58	9.42	32.56	NA	13.51	8.45	24.79	79.52	NA	7.14	NA	NA	64.71	0.00	NA	0.00	0.00	NA	0.00	64.18	13.11	68.28
DP25-2.5'	8/7/2001	NA	<62	14100	<1.2	8.8	100	0.55 B	6.5	2690	15	7.6	16.2	<0.62	20100	10.2	2290	297	0.024 B	15.4	890	0.53 B	<0.62	574 B	1.5	NA	25.8	54.6
DP25-2.5' (Dup)	8/7/2001	NA	<56	6530	<1.1	6.1	49.4	0.27 B	0.33	110000	9.6	6.3	13.9	0.56	15900	6.9	27900	404	<0.11	15.8	1160	0.66	<0.56	428 B	2.7	NA	12.2	39.9
RPD		NA	0.00	73.39	0.00	36.24	67.74	68.29	180.67	190.45	43.90	18.71	15.28	10.17	23.33	38.60	169.66	30.53	128.36	2.56	26.34	21.85	0.00	29.14	57.14	NA	71.58	31.11
DP40-6' (Dup)	3/5/2002	NA	NA	6070 J	<1.1	2.7	39.4	0.31 B	0.13 B	39000 J	8.1	5.1 B	8.2	NA	11400	6.3	18300	277	0.016 B	9.1	518 B J	<0.57	NA	63.3 B	1.4	3.7 B J	10.3	31
DP40-6'	3/5/2002	NA	NA	5670 J	<1.1	4.8	37	0.35 B	0.2 B	83500 J	9.2	5 B	7.7	NA	14500	6.4	40500	301	0.035 B	8.9	583 J	<0.57	NA	103 B	1.2	4 B J	15.1	29
RPD		NA	NA	6.81	0.00	56.00	6.28	12.12	42.42	72.65	12.72	1.98	6.29	NA	23.94	1.57	75.51	8.30	74.51	2.22	11.81	0.00	NA	47.75	15.38	7.79	37.80	6.67
STR04-17.5'	3/19/2001	760	NA	2780	<1.2	3	12.8 B	<0.61	0.13 B	119000	4.8	2.7 B	8.1	<0.61	7050	5.6	26200	259	0.026 B	7	661	<0.61	<0.61	202 B	0.98 B	NA	8.8	28.4
STR04-17.5' (Dup)	3/19/2001	550	NA	1750	<1.1	2.6	11.9 B	0.077 B	0.16 B	162000	5.2	2.6 B	7.7	0.21 B	7110	5.1	38800	318	<0.11	6.6	334 B	<0.54	<0.54	258 B	0.83 B	NA	6.7	41.1
RPD		32.06	NA	45.47	0.00	14.29	7.29	155.17	20.69	30.60	8.00	3.77	5.06	97.56	0.85	9.35	38.77	20.45	123.53	5.88	65.73	0.00	0.00	24.35	16.57	NA	27.10	36.55
STR08-13'	3/26/2001	280	NA	4460	<1.1	4.2	34.6	0.13 B	0.063 B	150000	9.4 L	5.2 B	9.7	<0.56	13400	5.9 L	41700	587	<0.11	10.5 L	1010	<0.56	<0.56	311 B	2.6	NA	10.9	38.8 MBD
STR08-13' (Dup)	3/26/2001	290	NA	3360	<1.1	3.5	25.9	0.12 B	<0.23	146000	6.8	3.5 B	6.5	0.29 B	9380	4.3	24200	414	<0.11	7.8	1020	<0.57	<0.57	240 B	1.5	NA	7.4	25.3 MBD
RPD		3.51	NA	28.13	0.00	18.18	28.76	8.00	113.99	2.70	32.10	39.08	39.51	63.53	35.29	31.37	53.11	34.57	NA	29.51	0.99	0.00	0.00	25.77	53.66	NA	38.25	42.12
STR11-9'	8/20/2001	NA	<120	10200	<1.2	19.4	54.7	0.51 B	0.15 B	35400	15	14.8	23.9	<0.59	36200	12.1	12600	317	0.012 B	36.1	1890	0.57 B	<0.59	<586	<1.2	NA	20.9	79.1
STR11-9' (Dup)	8/20/2001	NA	<120	10200	<1.2	11.8	56.9	0.57 B	0.29	54500	14.4	10	21.4	<0.59	25300	13.1	14400	279	<0.12	28.4	1960	0.42 B	<0.59	72.5 B	<1.2	NA	21.5	65
RPD		NA	0.00	0.00	0.00	48.72	3.94	11.11	63.64	42.49	4.08	38.71	11.04	0.00	35.45	7.94	13.33	12.75	163.64	23.88	3.64	30.30	0.00	155.96	0.00	NA	2.83	19.57
UAW15-20-2'	4/9/2001	26 B	NA	5910	<1.1	5.5	45.8	0.21 B	0.093 B	1530	7.5	5.8	9.7	<0.55	10400 MBB	13	1120	257	0.016 B	9.7	576	0.56	0.9	470 B	<1.1	NA	16	36
UAW15-20-2' (Dup)	4/9/2001	<55	NA	5940	<1.1	6.2	55.1	0.21 B	0.093 B	4310	7.6	5.8	10.3	<0.55	11400 MBB	11.2	1210	530	0.017 B	9.9	594	0.58	1.9	483 B	0.94 B	NA	16.1	37.4
RPD		71.60	NA	0.51	0.00	11.97	18.43	0.00	0.00	95.21	1.32	0.00	6.00	0.00	9.17	14.88	7.73	69.38	6.06	2.04	3.08	3.51	71.43	2.73	15.69	NA	0.62	3.81
B04-1.5'	10/9/2001	NA	<54	1870	<1.1	4	9.8 B J	<0.54	0.16 B	86600	3.7	2.8 B	7.3	<0.54	5760	4.1	31100	191 J	0.0098 B	6.5	368 B	<0.54	<0.54	69.2 B	1.5	0.93 B J	6.2	22.3
B04-1.5' (Dup)	10/9/2001	NA	<53	2200	<1.1	3.7	11.4 B J	<0.53	0.16 B	97000	3.7	2.9 B	6.8	<0.53	5980	4.3	36200	198 J	<0.11	6.2	387 B	<0.53	<0.53	66.6 B	1.2	0.97 B J	6.7	21.6
RPD		NA	0.00	16.22	0.00	7.79	15.09	0.00	0.00	11.33	0.00	3.51	7.09	0.00	3.75	4.76	15.16	3.60	167.28	4.72	5.03	0.00	0.00	3.83	22.22	4.21	7.75	3.19
SS-5 ~25' South	10/11/2001	NA	95	3370	<1.2	3.9	37.2	0.18 B	0.27	65700	9.6	4.2 B	11.3	<0.62	9740	12.5	12600	283	<0.12	9.8	486 B	<0.62	NA	175 B	<1.2	4.9 B J	9.3	38.9
SS-5 (Dup)	10/11/2001	NA	100	3870	<1.2	3.8	30.4	0.21 B	0.23 B	67000	15.3	4.5 B	9.3	<0.62	10400	14.1	14900	260	0.011 B	10	529 B	<0.62	NA	196 B	<1.2	3.9 B J	10.4	46.7
RPD		NA	5.13	13.81	0.00	2.60	20.12	15.38	16.00	1.96	45.78	6.90	19.42	0.00	6.55	12.03	16.73	8.47	166.41	2.02	8.47	0.00	NA	11.32	0.00	22.73	11.17	18.22
CS7	3/6/2002	NA	NA	1690 J	<1.2	3.3	16.8 B	0.12 B	0.16 B	114000 J	5.6	2.5 B	4.9	NA	7480	7.2	30100	380	0.028 B	5.5	290 B J	<0.62	NA	162 B	1.7	3.9 B J	6.6	29.9
CS7 (Dup)	3/6/2002	NA	NA	2160 J	<1.2	4.7	42.6	0.18 B	0.16 B	123000 J	6	3.3 B	4.4	NA	9920	7.5	37800	650	0.012 B	5.7	344 B J	<0.61	NA	145 B	2	4 B J	9.3	24.8
RPD		NA	NA	24.42	0.00	35.00	86.87	40.00	0.00	7.59	6.90	27.59	10.75	NA	28.05	4.08	22.68	52.43	80.00	3.57	17.03	0.00	NA	11.07	16.22	2.53	33.96	18.65

Notes:
RPD = Relative Percent Difference.
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
B = Estimated result; result is less than reporting limit.
L = Serial dilution of a digestate in the analytical batch indicates that physical and chemical interferences are present.
MBD = This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.
MBB = This analyte is present at a reportable level in the associated method blank but is less than 5% of the sample amount.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-4A
Supplemental Facility Investigation
Duplicate Soil and Sediment Samples
Inorganic Chemical Detections
Morton International, Inc.
Reading, Ohio
Units: mg/kg

Sample ID	Sample Date	Acid-Soluble Sulfide	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Cyanide, Total	Hexavalent Chromium	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Tin	Vanadium	Zinc
CS-6A	3/25/2004	NA	NA	<1.3	4.5	14 B	0.12 B	0.24 B	NA	5.1 J	3.1 B	5.9	NA	<1	NA	6.2	NA	NA	0.017 B	5.6	NA	<0.63	<0.63	NA	<1.3	2.7 B J	6.3	27.5
CS-6A BLIND DUP	3/25/2004	NA	NA	<1.2	3.4	20.6 B	0.14 B	0.2 B	NA	5.2 J	2.7 B	4.3	NA	<1	NA	5.2	NA	NA	0.018 B	4.7 B	NA	<0.62	<0.62	NA	<1.2	3.1 B J	5.9 B	20.8
RPD		NA	NA	0	27.85	38.15	15.38	18.18	NA	1.94	13.79	31.37	NA	0	NA	17.54	NA	NA	5.71	17.48	NA	0	0	NA	0	13.79	6.56	27.74
DP61A-5-6'	3/15/2004	NA	257 J	<1.2	1.2	15.5 B	<0.6	0.14 B	40900 J	0.56 B	1.2 B	12.6	NA	NA	127	3.3	48.2 B J	3.7	0.048 B	1.3 B	161 B J	<0.6	<0.6	357 B	0.47 B J	186 J	0.57 B	1.5 B
DP61A-5-6' BLIND DUP	3/15/2004	NA	234 J	<1.2	1.9	12.9 B	<0.6	0.63	34500 J	0.54 B	2.1 B	10.9	NA	NA	132	6.1	44.9 B J	4.7	0.049 B	2.2 B	163 B J	<0.6	<0.6	350 B	<1.2	522 J	0.46 B	2.4
RPD		NA	9.37	0	45.16	18.31	0	127.27	16.98	3.64	54.55	14.47	NA	NA	3.86	59.57	7.09	23.81	2.06	51.43	1.23	0	0	1.98	0	94.92	21.36	46.15
HA3-1.5'	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.1 B J	NA	NA
HA3-1.5' BLIND DUP	3/14/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.3 B J	NA	NA
RPD		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	86.49	NA	NA

Notes:
RPD = Relative Percent Difference.
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
B = Estimated result; result is less than reporting limit.
See Appendix B for the complete target analyte lists.

Table D-5
Duplicate Groundwater Samples
Volatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample Location	Sample Data	1,1,1-Trichloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	1,2-Dichloroethene (total)	2-Butanone	4-Methyl-2-pentanone (MIBK)	Acetone	Benzene	Bromodichloromethane	Bromoform	Carbon disulfide	Chlorobenzene	Chloroform	cis-1,2-Dichloroethene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane	Ethylbenzene	Isopropylbenzene	Methylcyclohexane	Methylene chloride	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	Trichloroethene	Vinyl chloride	Xylenes (total)
UAW02-20	5/7/2001	<1	<1	<1	0.74 J	<1	0.42 J	<1	<10	<10	<10	0.49 J	<1	<1	<1	32	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<2	<1
UAW02-20 (Dup)	5/7/2001	<1.2	<1.2	<1.2	0.67 J	<1.2	0.44 J	<1.2	<12	NA	<12	0.47 J	<1.2	<1.2	<1.2	31	<1.2	<0.62	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<0.62	<1.2	<2.5	<1.2
RPD		0.00	0.00	0.00	9.93	0.00	4.65	0.00	0.00	NA	0.00	4.17	0.00	0.00	0.00	3.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UAW07-20	5/8/2001	<2	NA	<2	1.6 J	<2	<2	<2	<20	NA	<20	2.1	<2	<2	2.4	39	<2	<1	NA	<2	<4	4.4	NA	NA	<2	<2	3.5	<1	<2	<4	13
UAW07-20 (Dup)	5/8/2001	<2.5	NA	<2.5	1.5 J	<2.5	<2.5	<2.5	<25	NA	<25	1.8 J	<2.5	<2.5	1.1 J	38	<2.5	<1.2	NA	<2.5	<5	4.3	NA	NA	<2.5	<2.5	3.6	<1.2	<2.5	<5	13
RPD		0.00	0.00	0.00	6.45	0.00	0.00	0.00	0.00	NA	0.00	15.38	0.00	0.00	74.29	2.60	0.00	0.00	NA	0.00	0.00	2.30	NA	NA	0.0	0.0	2.8	0.0	0.0	0.0	0.0
UAW16-10	10/12/2001	<120	<120	<120	<120	<120	<120	<120	<1200	NA	8000	<120	<120	<120	<120	23 J	<120	<62	<120	<120	<120	<120	<120	<120	<120	<120	<120	<62	<120	<250	<120
UAW16-10 (Dup)	10/12/2001	<100	<100	<100	<100	<100	<100	<100	<1000	NA	6500	<100	<100	<100	<100	24 J	<100	<50	<100	<100	<100	<100	<100	<100	<100	<100	<100	<50	<100	<200	<100
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	20.69	0.00	0.00	0.00	0.00	4.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UAW19-80	11/12/2001	0.25 J	<1	<1	4.8	0.29 J	33	1.3	<10	NA	1.3 J B	<1	<1	<1	<1	<1	12	1.3	<1	<1	<1	<1	<1	<1	<1	<1	0.36 J	<0.5	<1	<2	<1
UAW19-80 (Dup)	11/12/2001	13	<5	<5	9.8	<5	140	13	<50	NA	6.3 J B	<5	<5	<5	<5	3.3 J	3.7 J	13	<5	<5	<5	<5	<5	<5	<5	15	<5	<2.5	2.7 J	<10	<5
RPD		200.00	0.00	0.00	68.49	178.07	123.70	163.64	0.00	NA	131.58	0.00	0.00	0.00	0.00	106.98	105.73	163.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	175.00	173.13	0.00	91.89	0.00	0.00
UAW20-60	11/14/2001	94	4.5 J	4.2 J	52	10 J	310	95	<110	NA	7.8 J	<11	<11	<11	<11	<11	39	92	<11	<11	<11	<11	<11	<11	8 J B	20	<11	2.5 J	7 J	<22	<11
UAW20-60 (Dup)	11/14/2001	98	4.8 J	<11	58	11	320	100	<110	NA	<110	<11	<11	<11	<11	<11	41	99	<11	<11	<11	<11	<11	<11	7.8 J B	20	<11	1.8 J	7.9 J	<22	<11
RPD		4.17	6.45	89.47	10.91	9.52	3.17	5.13	0.00	NA	173.51	0.00	0.00	0.00	0.00	0.00	5.00	7.33	0.00	0.00	0.00	0.00	0.00	0.00	2.53	0.00	0.00	32.56	12.08	0.00	0.00
LAW05-150	3/16/2002	<20	NA	<20	25	<20	450	30	<200	<100	<200	<20	<20	<20	<20	<20	<20	26	NA	<20	<40	<20	NA	NA	<20	<20	<20	4 J	<20	<40	<20
LAW05-150 (Dup)	3/16/2002	<20	NA	<20	24	<20	450	30	<200	<100	<200	<20	<20	<20	<20	<20	<20	26	NA	<20	<40	<20	NA	NA	<20	<20	<20	4.6 J	<20	<40	<20
RPD		0.00	NA	0.00	4.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	NA	NA	0.00	0.00	0.00	13.95	0.00	0.00	0.00

Notes:
RPD = Relative Percent Difference.
J = Estimated result; result is less than reporting limit.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-5A
Supplemental FI
Duplicate Groundwater Samples
Volatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample ID	Sample Date	1,1,1,2-Tetrachloroethane	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloro-1,2,2-trifluoroethane	1,1,2-Trichloroethane	1,1-Dichloroethane	1,1-Dichloroethene	1,2,3-Trichloropropane	1,2-Dibromo-3-chloropropane	1,2-Dibromoethane	1,2-Dibromoethane (EDB)	1,2-Dichloroethane	1,2-Dichloropropane	2-Butanone	2-Butanone (MEK)	2-Hexanone	4-Methyl-2-pentanone	4-Methyl-2-pentanone (MIBK)	Acetone	Acetonitrile	Acrolein	Acrylonitrile	Allyl chloride	Benzene	Bromochloromethane	Bromodichloromethane	Bromoform	Bromomethane	Carbon disulfide	Carbon tetrachloride	Chlorobenzene	Chloroethane	Chloroform	Chloromethane	Chloroprene	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dibromomethane	Dichlorodifluoromethane	Ethyl methacrylate	Ethylbenzene	Iodomethane
UAW05-20	3/28/2004	NA	<20	<20	<20	<20	<20	<20	NA	<40	<20	NA	<20	<20	<200	NA	<200	<200	NA	<200	NA	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	580	<20	<20	<20	NA	<10	<20	<20	<20	NA	<20	NA	<20	NA
UAW05-20 BLIND DUP	3/28/2004	NA	<17	<17	<17	<17	<17	<17	NA	<33	<17	NA	<17	<17	<170	NA	<170	<170	NA	<170	NA	NA	NA	NA	<17	<17	<17	<17	<17	<17	<17	540	<17	<17	<17	NA	<8.3	<17	<17	<17	NA	<17	NA	<17	NA
RPD		NA	0	0	0	0	0	0	NA	0	0	NA	0	0	0	NA	0	0	NA	0	NA	NA	NA	NA	0	0	0	0	0	0	0	7.14	0	0	0	NA	0	0	0	0	NA	0	NA	0	NA
UAW11-40	4/6/2004	NA	6.9	<1	<1	<1	4.5	<1	NA	<2	<1	NA	7.3	<1	<10	NA	<10	<10	NA	<10	NA	NA	NA	NA	<1	<1	<1	<1	<1	<1	<1	2.4	<1	<1	<1	NA	5.2	<1	<1	<1	NA	<1	NA	<1	NA
UAW11-40 BLIND DUP	4/6/2004	NA	6.6	<1	<1	<1	4.5	<1	NA	<2	<1	NA	7.2	<1	<10	NA	<10	<10	NA	<10	NA	NA	NA	NA	<1	<1	<1	<1	<1	<1	<1	2.3	<1	<1	<1	NA	5.1	<1	<1	<1	NA	<1	NA	<1	NA
RPD		NA	4.44	0	0	0	0.00	0	NA	0	0	NA	1.38	0	0	NA	0	0	NA	0	NA	NA	NA	NA	0	0	0	0	0	0	0	4.26	0	0	0	NA	1.94	0	0	0	NA	0	NA	0	NA
WS-6A	3/25/2004	<1	0.4 J	NA	NA	<1	<1	<1	<1	<2	NA	<1	<1	<1	NA	<10	<10	NA	<5	5.4 J	<20	<20	<20	<2	<1	NA	<1	<1	<2	<1	<1	<1	<2	0.26 J	<2	<1	<0.5	<1	NA	<1	<1	<2	<1	<1	<1
WS-6A BLIND DUP	3/25/2004	<1	0.4 J	NA	NA	<1	<1	<1	<1	<2	NA	<1	<1	<1	NA	<10	<10	NA	<5	5.8 J	<20	<20	<20	<2	<1	NA	<1	<1	<2	<1	<1	<1	<2	0.23 J	<2	<1	<0.5	<1	NA	<1	<1	<2	<1	<1	<1
RPD		0	0.00	NA	NA	0	0	0	0	0	NA	0	0	0	NA	0	0	NA	0	7.14	0	0	0	0	0	NA	0	0	0	0	0	0	0	12.24	0	0	0	0	NA	0	0	0	0	0	0

Table D-5A
Supplemental FI
Duplicate Groundwater Samples
Volatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample ID	Sample Date	Isobutyl alcohol	Isopropylbenzene	Methacrylonitrile	Methyl acetate	Methyl methacrylate	Methyl tert-butyl ether	Methylcyclohexane	Methylene chloride	Propionitrile	Styrene	Tetrachloroethene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	trans-1,4-Dichloro-2-butene	Trichloroethene	Trichlorofluoromethane	Vinyl acetate	Vinyl chloride	Xylenes (total)
UAW05-20	3/28/2004	NA	<20	NA	<200	NA	<100	<20	<20	NA	<20	<20	<20	<10	<20	NA	<20	<20	NA	<20	<20
UAW05-20 BLIND DUP	3/28/2004	NA	<17	NA	<170	NA	<83	<17	<17	NA	<17	<17	<17	<8.3	<17	NA	<17	<17	NA	<17	<17
RPD		NA	0	NA	0	NA	0	0	0	NA	0	0	0	0	0	NA	0	0	NA	0	0
UAW11-40	4/6/2004	NA	<1	NA	<10	NA	<5	<1	<1	NA	<1	20	<1	<0.5	<1	NA	2.2	<1	NA	<1	<1
UAW11-40 BLIND DUP	4/6/2004	NA	<1	NA	<10	NA	<5	<1	<1	NA	<1	21	<1	<0.5	<1	NA	2.1	<1	NA	<1	<1
RPD		NA	0	NA	0	NA	0	0	0	NA	0	4.88	0	0	0	NA	4.65	0	NA	0	0
WS-6A	3/25/2004	<50	NA	<1	NA	<1	NA	NA	<1	<4	<1	<1	<1	<0.5	<1	<1	0.24 J	<2	<2	<2	<1
WS-6A BLIND DUP	3/25/2004	<50	NA	<1	NA	<1	NA	NA	<1	<4	<1	<1	<1	<0.5	<1	<1	0.25 J	<2	<2	<2	<1
RPD		0	NA	0	NA	0	NA	NA	0	0	0	0	0	0	0	0	4.08	0	0	0	0

Notes:
RPD = Relative Percent Difference.
J = Estimated result; result is less than reporting limit.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-6
Duplicate Groundwater Samples
Semivolatile Organic Detections
Morton International, Inc.
Reading,Ohio
Units: µg/L

Sample Location	Sample Date	1,1'-Biphenyl	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,4-Dioxane	2,4-Dichlorophenol	2,4-Dimethylphenol	2-Chlorophenol	2-Methylphenol	4-Methylphenol	Acenaphthene	Aniline	Benzaldehyde	bis(2-Ethylhexyl) phthalat	Butyl benzyl phthalate	Caprolactam	Di-n-octyl phthalate	Dimethyl phthalate	Fluorene	Phenol
UAW02-20	5/7/2001	<10	<10	12	<10	3.7 J	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	<10	<10
UAW02-20 (Dup)	5/7/2001	<10	<10	11	<10	3.5 J	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	<10	<10
RPD		0.00	0.00	8.70	0.00	5.56	NA	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UAW07-20	5/8/2001	NA	<100	37 J	<100	<100	<100	<100	<100	<100	<100	<100	<100	150	NA	<100	<100	NA	<100	<100	<100	<100
UAW07-20 (Dup)	5/8/2001	NA	<25	34	<25	<25	<25	<25	<25	<25	<25	<25	<25	44	NA	<25	<25	NA	<25	<25	<25	<25
RPD		NA	0.00	8.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	109.28	NA	0.00	0.00	NA	0.00	0.00	0.00	0.00
UAW16-10	10/12/2001	<10	<10	6.9 J	<10	12	NA	<10	<10	<10	<10	2.4 J #	<10	NA	<10	<10	<10	19	<10	<10	<10	<10
UAW16-10 (Dup)	10/12/2001	<10	<10	6.2 J	<10	11	NA	<10	<10	<10	<10	3.4 J #	<10	NA	<10	<10	<10	17	<10	<10	<10	<10
RPD		0.00	0.00	10.69	0.00	8.70	NA	0.00	0.00	0.00	0.00	34.48	0.00	NA	0.00	0.00	0.00	11.11	0.00	0.00	0.00	0.00
UAW19-80	11/12/2001	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	<10	<10
UAW19-80 (Dup)	11/12/2001	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	<10	<10
RPD		0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UAW20-60	11/14/2001	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	<10	<10
UAW20-60 (Dup)	11/14/2001	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	<10	<10
RPD		0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LAW05-150	3/16/2002	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA	<10	<10	NA	<10	<10	<10	<10
LAW05-150 (Dup)	3/16/2002	NA	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	NA	<10	<10	NA	<10	<10	<10	<10
RPD		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	NA	0.00	0.00	0.00	0.00

Notes:
RPD = Relative Percent Difference.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
J = Estimated result; result is less than reporting limit.
# = Co-Elution of 3-Methylphenol and 4-Methylphenol.

NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-6A
Supplemental FI
Duplicate Groundwater Samples
Semivolatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample ID	Sample Date	1,1'-Biphenyl	1,2,4,5-Tetrachlorobenzene	1,2,4-Trichlorobenzene	1,2-Dichlorobenzene	1,2-Dinitrobenzene	1,3,5-Trinitrobenzene	1,3-Dichlorobenzene	1,3-Dinitrobenzene	1,4-Dichlorobenzene	1,4-Dioxane	1,4-Naphthoquinone	1-Naphthylamine	2,2'-oxybis(1-Chloropropane)	2,3,4,6-Tetrachlorophenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,4-Dinitrotoluene	2,6-Dichlorophenol	2,6-Dinitrotoluene	2-Acetylaminofluorene	2-Chloronaphthalene	2-Chlorophenol	2-Methylnaphthalene	2-Methylphenol	2-Naphthylamine	2-Nitroaniline	2-Nitrophenol	2-Picoline	3,3'-Dichlorobenzidine	3,3'-Dimethylbenzidine	3-Methylcholanthrene	3-Methylphenol	3-Nitroaniline	4,6-Dinitro-2-methylphenol	4-Aminobiphenyl	4-Bromophenyl phenyl ether	4-Chloro-3-methylphenol	4-Chloroaniline	4-Chlorophenyl phenyl ether
UAW05-20	3/28/2004	<25	NA	<25	91	NA	NA	<25	NA	44	NA	NA	NA	<25	NA	<25	<25	<25	<25	<120	<25	NA	<25	NA	<25	<25	<25	<25	NA	<120	<25	NA	<120	NA	NA	NA	<120	<120	NA	<25	<25	<25	<25
UAW05-20 BLIND DUP	3/28/2004	<40	NA	<40	95	NA	NA	<40	NA	47	NA	NA	NA	<40	NA	<40	<40	<40	<40	<200	<40	NA	<40	NA	<40	<40	<40	<40	NA	<200	<40	NA	<200	NA	NA	NA	<200	<200	NA	<40	<40	<40	<40
RPD		0.00	NA	0.00	4.30	NA	NA	0.00	NA	6.59	NA	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	NA	0.00	0.00	0.00	0.00	NA	0.00	0.00	NA	0.00	NA	NA	NA	0.00	0.00	NA	0.00	0.00	0.00	0.00
UAW11-40	4/6/2004	<10	NA	<10	<10	NA	NA	<10	NA	<10	NA	NA	NA	<10	NA	<10	<10	<10	<10	<50	<10	NA	<10	NA	<10	<10	<10	<10	NA	<50	<10	NA	<50	NA	NA	NA	<50	<50	NA	<10	<10	<10	<10
UAW11-40 BLIND DUP	4/6/2004	<10	NA	<10	<10	NA	NA	<10	NA	<10	NA	NA	NA	<10	NA	<10	<10	<10	<10	<50	<10	NA	<10	NA	<10	<10	<10	<10	NA	<50	<10	NA	<50	NA	NA	NA	<50	<50	NA	<10	<10	<10	<10
RPD		0.00	NA	0.00	0.00	NA	NA	0.00	NA	0.00	NA	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	NA	0.00	0.00	0.00	0.00	NA	0.00	0.00	NA	0.00	NA	NA	NA	0.00	0.00	NA	0.00	0.00	0.00	0.00
WS-6A	3/25/2004	NA	<10	<10	<10	<10	<50	<10	<10	<10	<10	<50	<10	<10	<50	<10	<10	<10	<10	<50	<10	<10	<10	<100	<10	<10	<10	<10	<10	<50	<10	<20	<50	<50	<20	<10	<50	<50	<50	<10	<10	<10	<10
WS-6A BLIND DUP	3/25/2004	NA	<10	<10	<10	<10	<50	<10	<10	<10	<10	<50	<10	<10	<50	<10	<10	<10	<10	<50	<10	<10	<10	<100	<10	<10	<10	<10	<10	<50	<10	<20	<50	<50	<20	<10	<50	<50	<50	<10	<10	<10	<10
RPD		NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table D-6A
Supplemental FI
Duplicate Groundwater Samples
Semivolatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample ID	Sample Date	4-Methylphenol	4-Nitroaniline	4-Nitrophenol	4-Nitroquinoline-1-oxide	5-Nitro-o-toluidine	7,12-Dimethylbenz(a)anthracene	a,a-Dimethylphenethylamine	Acenaphthene	Acenaphthylene	Acetophenone	Aniline	Anthracene	Aramite	Atrazine	Benzaldehyde	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(ghi)perylene	Benzo(k)fluoranthene	Benzyl alcohol	bis(2-Chloroethoxy)methane	bis(2-Chloroethyl) ether	bis(2-Ethylhexyl) phthalate	Butyl benzyl phthalate	Caprolactam	Carbazole	Chlorobenzilate	Chrysene	Dibenz(a,h)anthracene	Dibenzofuran	Diethyl phthalate	Dimethoate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate	Diphenylamine	Disulfoton	Ethyl methanesulfonate	Famphur	Fluoranthene	Fluorene
UAW05-20	3/28/2004	<25	<120	<120	NA	NA	NA	NA	<25	<25	<25	<25	<25	NA	<25	<25	<25	<25	<25	<25	<25	NA	<25	<25	<25	<25	<25	<25	NA	<25	<25	<25	<25	NA	<25	<25	<25	NA	NA	NA	NA	<25	<25
UAW05-20 BLIND DUP	3/28/2004	<40	<200	<200	NA	NA	NA	NA	<40	<40	<40	<40	<40	NA	<40	<40	<40	<40	<40	<40	<40	NA	<40	<40	<40	<40	<40	<40	NA	<40	<40	<40	<40	NA	<40	<40	<40	NA	NA	NA	NA	<40	<40
RPD		0.00	0.00	0.00	NA	NA	NA	NA	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	NA	NA	NA	NA	0.00	0.00
UAW11-40	4/6/2004	<10	<50	<50	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	NA	<10	<10	<10	NA	NA	NA	NA	<10	<10
UAW11-40 BLIND DUP	4/6/2004	<10	<50	<50	NA	NA	NA	NA	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	<10	<10	NA	<10	<10	<10	<10	NA	<10	<10	<10	NA	NA	NA	NA	<10	<10
RPD		0.00	0.00	0.00	NA	NA	NA	NA	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	NA	NA	NA	NA	0.00	0.00
WS-6A	3/25/2004	<10	<50	<50	<100	<20	<20	<50	<10	<10	<10	<10	<10	<20	NA	NA	<10	<10	<10	<10	<10	<10	<10	<10	0.78 J	<10	NA	NA	<10	<10	<10	<10	<10	<20	<10	<10	<10	<10	<50	<10	<100	<10	<10
WS-6A BLIND DUP	3/25/2004	<10	<50	<50	<100	<20	<20	<50	<10	<10	<10	<10	<10	<20	NA	NA	<10	<10	<10	<10	<10	<10	<10	<10	0.58 J	<10	NA	NA	<10	<10	<10	<10	<10	<20	<10	<10	<10	<10	<50	<10	<100	<10	<10
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.41	0.00	NA	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table D-6A
Supplemental FI
Duplicate Groundwater Samples
Semivolatile Organic Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample ID	Sample Date	Hexachlorobenzene	Hexachlorobutadiene	Hexachlorocyclopentadiene	Hexachloroethane	Hexachloropropene	Indeno(1,2,3-cd)pyrene	Isophorone	Isosafrole	Methapyrilene	Methyl methanesulfonate	Naphthalene	Nitrobenzene	N-Nitrosodiethylamine	N-Nitrosodimethylamine	N-Nitrosodi-n-butylamine	N-Nitrosodi-n-propylamine	N-Nitrosodiphenylamine	N-Nitrosomethylethylamine	N-Nitrosomorpholine	N-Nitrosopiperidine	N-Nitrosopyrrolidine	O,O,O-Triethyl phosphorothioate	o-Toluidine	p-Dimethylaminoazobenzene	Pentachlorobenzene	Pentachloronitrobenzene	Pentachlorophenol	Phenacetin	Phenanthrene	Phenol	Phorate	p-Phenylene diamine	Pronamide	Pyrene	Pyridine	Safrole	Tetraethyldithiopyrophosphate	Thionazin
UAW05-20	3/28/2004	<25	<25	<120	<25	NA	<25	<25	NA	NA	NA	<25	<25	NA	NA	NA	<25	<25	NA	NA	NA	NA	NA	NA	NA	NA	NA	<25	NA	<25	<25	NA	NA	NA	<25	NA	NA	NA	NA
UAW05-20 BLIND DUP	3/28/2004	<40	<40	<200	<40	NA	<40	<40	NA	NA	NA	<40	<40	NA	NA	NA	<40	<40	NA	NA	NA	NA	NA	NA	NA	NA	NA	<40	NA	<40	<40	NA	NA	NA	<40	NA	NA	NA	NA
RPD		0.00	0.00	0.00	0.00	NA	0.00	0.00	NA	NA	NA	0.00	0.00	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00	NA	0.00	0.00	NA	NA	NA	0.00	NA	NA	NA	NA
UAW11-40	4/6/2004	<10	<10	<50	<10	NA	<10	<10	NA	NA	NA	<10	<10	NA	NA	NA	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10	NA	<10	<10	NA	NA	NA	<10	NA	NA	NA	NA
UAW11-40 BLIND DUP	4/6/2004	<10	<10	<50	<10	NA	<10	<10	NA	NA	NA	<10	<10	NA	NA	NA	<10	<10	NA	NA	NA	NA	NA	NA	NA	NA	NA	<10	NA	<10	<10	NA	NA	NA	<10	NA	NA	NA	NA
RPD		0.00	0.00	0.00	0.00	NA	0.00	0.00	NA	NA	NA	0.00	0.00	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.00	NA	0.00	0.00	NA	NA	NA	0.00	NA	NA	NA	NA
WS-6A	3/25/2004	<10	<10	<50	<10	<100	<10	<10	<20	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<50	<20	<20	<10	<50	<10	<20	<10	<10	<50	<100	<20	<10	<20	<20	<50	<50
WS-6A BLIND DUP	3/25/2004	<10	<10	<50	<10	<100	<10	<10	<20	<50	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<50	<20	<20	<10	<50	<10	<20	<10	<10	<50	<100	<20	<10	<20	<20	<50	<50
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes:
RPD = Relative Percent Difference.
J = Estimated result; result is less than reporting limit.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-7
Duplicate Groundwater Samples
Pesticides and PCB Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample Location	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	beta-BHC	delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane	Heptachlor	Heptachlor epoxide	Isodrin	Aroclor 1242
UAW02-20	5/7/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<1
UAW02-20 (Dup)	5/7/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<1
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00
UAW07-20	5/8/2001	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	0.19 J	0.13 J	<0.25	<0.25	NA	<0.25	<0.25	<0.25	<0.5	<1
UAW07-20 (Dup)	5/8/2001	<0.5	<0.5	<0.5	<0.5	<0.5	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.35 J	NA	<0.5	<0.5	<0.5	<1	<10
RPD		0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	89.86	117.46	0.00	33.33	NA	0.00	0.00	0.00	0.00	0.00
UAW16-10	10/12/2001	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<25	<25	<25	<25	<2.5	<2.5	<2.5	<2.5	<2.5	NA	130 J
UAW16-10 (Dup)	10/12/2001	<2.5	<10	<10	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	<2.5	NA	<100
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	26.09
UAW19-80	11/12/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<1
UAW19-80 (Dup)	11/12/2001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<1
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00
UAW20-60	11/14/2001	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	<1
UAW20-60 (Dup)	11/14/2001	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<1
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00
LAW05-150	3/16/2002	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.1	<1
LAW05-150 (Dup)	3/16/2002	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.1	<1
RPD		0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00

Notes:
RPD = Relative Percent Difference.
J = Estimated result; result is less than reporting limit.
PG = The percentage difference between the original and confirmation analyses is greater than 40%.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-7A
Supplemental FI
Duplicate Groundwater Samples
Pesticides and PCB Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample ID	Sample Date	4,4'-DDD	4,4'-DDE	4,4'-DDT	Aldrin	alpha-BHC	alpha-Chlordane	Aroclor 1016	Aroclor 1221	Aroclor 1232	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	beta-BHC	Chlordane (technical)	Chlorobenzilate	delta-BHC	Diallate	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulfate	Endrin	Endrin aldehyde	Endrin ketone	gamma-BHC (Lindane)	gamma-Chlordane	Heptachlor	Heptachlor epoxide	Isodrin	Kepone	Methoxychlor	Toxaphene
UAW05-20	3/28/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<1	<1	<1	<1	<1	<1	<0.05	NA	NA	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	<0.1	<2
UAW05-20 BLIND DUP	3/28/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<1	<1	<1	<1	<1	<1	<0.05	NA	NA	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	<0.1	<2
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00	0.00
UAW11-40	4/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<1	<1	<1	<1	<1	<1	<0.05	NA	NA	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	<0.1	<2
UAW11-40 BLIND DUP	4/6/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<1	<1	<1	<1	<1	<1	<1	<0.05	NA	NA	<0.05	NA	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	NA	<0.1	<2
RPD		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	NA	0.00	0.00
WS-6A	3/25/2004	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<1	<1	<1	<1	<1	<1	<1	<0.05	<0.5	<0.25	<0.05	<1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	NA	<0.05	<0.05	<0.1	<1	<0.1	<2
WS-6A BLIND DUP	3/25/2004	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<1	<1	<1	<1	<1	<1	<1	<0.05	<0.5	<0.25	<0.05	<1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	NA	<0.05	<0.05	<0.1	<1	<0.1	<2
RPD		0.00	0.00	0.00	0.00	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	NA	0.00	NA	0.00	0.00	0.00	0.00	0.00	0.00

Notes:
RPD = Relative Percent Difference.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-8
Duplicate Groundwater Samples
Inorganic Chemical Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample Location	Sample Date	Aluminum	Aluminum-DISS	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Calcium-DISS	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Iron	Iron-DISS	Lead	Lead-DISS	Magnesium	Magnesium-DISS	Manganese	Manganese-DISS	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium
UAW02-20	5/7/2001	49.1 B	NA	<10	NA	3.9 B	NA	400	NA	<5	NA	<2	NA	331000	316000	3.3 B	NA	<7	NA	<25	NA	<10	4200	641	<3	NA	58700	59200	892	NA	<0.2	NA	27.1 B	NA	6670
UAW02-20 (Dup)	5/7/2001	61.2 B	NA	<10	NA	6.1 B	NA	395	NA	<5	NA	<2	NA	316000	302000	22.6	NA	<7	NA	<25	NA	<10	4480	659	<3	NA	56200	53400	869	NA	<0.2	NA	47.2	NA	6600 L
RPD		21.94	NA	0.0	NA	44.00	NA	1.26	NA	0.0	NA	0.0	NA	4.64	4.53	149.03	NA	0.0	NA	0.0	NA	0.0	6.45	2.77	0.0	NA	4.35	10.30	2.61	NA	0.0	NA	54.10	NA	1.06
UAW07-20	5/8/2001	NA	NA	<10	NA	<10	NA	90.3 B	NA	<5	NA	<2	NA	466000	453000	1.6 B	NA	<7	NA	<25	NA	<10	270	<100	<3	NA	58000	57200	NA	NA	<0.2	NA	2.5 B	NA	11500
UAW07-20 (Dup)	5/8/2001	NA	NA	<10	NA	4.6 B	NA	95.8 B	NA	<5	NA	0.32 B	NA	496000	479000	<5	NA	<7	NA	<25	NA	<10	303	<100	<3	NA	61600	60400	NA	NA	<0.2	NA	2.3 B	NA	12100
RPD		NA	NA	0.0	NA	73.97	NA	5.91	NA	0.0	NA	144.83	NA	6.24	5.58	103.03	NA	0.0	NA	0.0	NA	0.0	11.52	0	0.0	NA	6.02	5.44	NA	NA	0.0	NA	8.33	NA	5.08
UAW16-10	10/12/2001	98.3 B	NA	<10	NA	24.9	NA	55.5 B	NA	<5	NA	<2	NA	223000	226000	7	NA	1.9 B	NA	<25	NA	<10	1300	1570	<3	NA	38900	39900	2760	NA	<0.2	NA	17.1 B	NA	7420 J
UAW16-10 (Dup)	10/12/2001	98.6 B	NA	<10	NA	23.2	NA	55.1 B	NA	<5	NA	<2	NA	221000	226000	6.9	NA	1.8 B	NA	<25	NA	<10	1250	1250	<3	NA	38200	39400	2740	NA	<0.2	NA	17.5 B	NA	7310 J
RPD		0.30	NA	0.0	NA	7.07	NA	0.72	NA	0.0	NA	0.0	NA	0.90	0.00	1.44	NA	5.41	NA	0.0	NA	0.0	3.92	22.70	0.0	NA	1.82	1.26	0.73	NA	0.0	NA	2.31	NA	1.49
UAW19-80	11/12/2001	1010 J	NA	<10	NA	<10	NA	113 B	NA	<5	NA	<2	NA	177000	186000	19.6	NA	1.4 B	NA	12.4 B	NA	<10	1700	<100	<3	NA	52700	55400	60.9	NA	<0.2	NA	14.1 B	NA	2020 B
UAW19-80 (Dup)	11/12/2001	65.4 B J	NA	<10	NA	<10	NA	25.4 B	NA	<5	NA	0.62 B	NA	358000	349000	11.8	NA	13.3	NA	12.1 B	NA	<10	<100	<100	<3	NA	81600	79200	1190	NA	<0.2	NA	66.3	NA	5960
RPD		175.67	NA	0.0	NA	0.0	NA	126.59	NA	0.0	NA	105.34	NA	67.66	60.93	49.68	NA	161.90	NA	2.45	NA	0.0	177.78	0.0	0.0	NA	43.04	35.36	180.53	NA	0.0	NA	129.85	NA	98.75
UAW20-60	11/14/2001	<200	NA	<10	NA	<10	NA	26.5 B	NA	<5	NA	0.3 B	NA	446000	430000	<5	NA	2.3 B	NA	5.8 B	NA	2.9 B	<100	<100	<3	NA	124000 J	120000 J	303	NA	<0.2	NA	8.7 B	NA	3640 B
UAW20-60 (Dup)	11/14/2001	70.6 B J	NA	2.8 B	NA	<10	NA	26.1 B	NA	<5	NA	0.33 B	NA	436000	431000	<5	NA	2.2 B	NA	5.3 B	NA	1.9 B	175	<100	<3	NA	123000 J	121000 J	303	NA	<0.2	NA	8.9 B	NA	3550 B L
RPD		95.64	NA	112.50	NA	0.0	NA	1.52	NA	0.0	NA	9.52	NA	2.27	0.23	0.0	NA	4.44	NA	9.01	NA	41.67	54.55	0.0	0.0	NA	0.81	0.83	0.0	NA	0.0	NA	2.27	NA	2.50
LAW05-150	3/16/2002	NA	NA	<10	NA	6.2 B	NA	94.3 B	NA	0.55 B	NA	<2	NA	NA	NA	<5	NA	<7	NA	<25	NA	<10	NA	NA	<3	NA	NA	NA	NA	NA	0.35	NA	<40	NA	NA
LAW05-150 (Dup)	3/16/2002	NA	NA	<10	NA	4.6 B	NA	94.7 B	NA	<5	NA	<2	NA	NA	NA	<5	NA	<7	NA	<25	NA	<10	NA	NA	<3	NA	NA	NA	NA	NA	0.16 B	NA	<40	NA	NA
RPD		NA	NA	0.0	NA	29.63	NA	0.42	NA	160.36	NA	0.0	NA	NA	NA	0.0	NA	0.0	NA	0.0	NA	0.0	NA	NA	0.0	NA	NA	NA	NA	NA	74.51	NA	0.0	NA	NA

Table D-8
Duplicate Groundwater Samples
Inorganic Chemical Detections
Morton International, Inc.
Reading, Ohio
Units: μg/L

Sample Location	Sample Date	Potassium-DISS	Selenium	Selenium-DISS	Silver	Sodium	Sodium-DISS	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
UAW02-20	5/7/2001	6130	<5	NA	<5	496000	446000	7.2 B	NA	NA	NA	<1000	37.3	NA	<20	NA
UAW02-20 (Dup)	5/7/2001	6280 L	<5	NA	<5	475000	452000	8.5 B	NA	NA	NA	1800	39.2	NA	<20	NA
RPD		2.42	0.0	NA	0.0	4.33	1.34	16.56	NA	NA	NA	57.14	4.97	NA	0.0	NA
UAW07-20	5/8/2001	10800	<5	NA	<5	413000	397000	10.6	NA	866	NA	5800	3.2 B	NA	12.4 B	NA
UAW07-20 (Dup)	5/8/2001	11600	<5	NA	<5	432000	417000	8.3 B	NA	1010	NA	7500	3.9 B	NA	<20	NA
RPD		7.14	0.0	NA	0.0	4.50	4.91	24.34	NA	15.35	NA	25.56	19.72	NA	0.0	NA
UAW16-10	10/12/2001	7400 J	<5	NA	<5	277000	276000	5.5 B J	NA	NA	NA	3900	59.3	NA	<20	NA
UAW16-10 (Dup)	10/12/2001	7360 J	<5	NA	<5	275000	278000	8.6 B J	NA	NA	NA	6300	59.1	NA	<20	NA
RPD		0.54	0.0	NA	0.0	0.72	0.72	43.97	NA	NA	NA	47.06	0.34	NA	0.0	NA
UAW19-80	11/12/2001	1850 B	<5	NA	<5	58700	59400	10.3 J	NA	NA	NA	<1000	1 B	NA	<20	NA
UAW19-80 (Dup)	11/12/2001	5750	<5	NA	<5	261000	254000	8.2 B J	NA	NA	NA	<1000	<7	NA	<20	NA
RPD		102.63	0.0	NA	0.0	126.56	124.19	22.70	NA	NA	NA	0	150.00	NA	0.0	NA
UAW20-60	11/14/2001	3530 B	<5	NA	<5	139000	134000	13.8	NA	NA	NA	1600	<7	NA	<20	NA
UAW20-60 (Dup)	11/14/2001	3610 B	<5	NA	<5	137000	137000	10.3	NA	NA	NA	1800	<7	NA	<20	NA
RPD		2.24	0.0	NA	0.0	1.45	2.21	29.05	NA	NA	NA	11.76	0.0	NA	0.0	NA
LAW05-150	3/16/2002	NA	<5	NA	<5	NA	NA	<10	NA	<100	NA	<1000	<7	NA	<20	NA
LAW05-150 (Dup)	3/16/2002	NA	<5	NA	<5	NA	NA	<10	NA	<100	NA	<1000	<7	NA	59.6	NA
RPD		NA	0.0	NA	0.0	NA	NA	0.0	NA	0.0	NA	0.0	0.0	NA	99.50	NA

Notes:
RPD = Relative Percent Difference.
B = Estimated result; result is less than reporting limit.
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
L = Serial dilution of a digestate in the analytical batch indicates that physical and chemical interferences are present.
MBB = This analyte is present at a reportable level in the associated method blank but is less than 5% of the sample amount.
MBD = This analyte is present in the associated method blank at an amount that is less than two times the reporting limit.
MBE = This analyte is present in the associated method blank.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-8A
Supplemental FI
Duplicate Groundwater Samples
Inorganic Chemical Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample ID	Sample Date	UM_A	Aluminum	Antimony	Antimony-DISS	Arsenic	Arsenic-DISS	Barium	Barium-DISS	Beryllium	Beryllium-DISS	Cadmium	Cadmium-DISS	Calcium	Chromium	Chromium-DISS	Cobalt	Cobalt-DISS	Copper	Copper-DISS	Cyanide, Total	Hexavalent Chromium	Iron	Lead	Lead-DISS	Magnesium	Manganese	Mercury	Mercury-DISS	Nickel	Nickel-DISS	Potassium	Selenium	Selenium-DISS	Silver
UAW05-20	3/28/2004	UG/L	102 B J	<10	NA	2.9 B	NA	59.3 B	NA	<5	NA	<2	NA	273000	2.6 B	NA	<7	NA	2.9 B J	NA	<10	NA	948	<3	NA	42500	820 J	<0.2	NA	4.3 B	NA	2640 B J	<5	NA	<5
UAW05-20 BLIND DUP	3/28/2004	UG/L	121 B J	<10	NA	2.7 B	NA	63.7 B	NA	<5	NA	<2	NA	295000	4.2 B	NA	<7	NA	3.3 B J	NA	<10	NA	1090	<3	NA	45700	873 J	<0.2	NA	7.6 B	NA	2870 B J	<5	NA	<5
RPD			17.04	0.00	NA	7.14	NA	7.15	NA	0.00	NA	0.00	NA	7.75	47.06	NA	0.00	NA	12.90	NA	0.00	NA	13.94	0.00	NA	7.26	6.26	0.00	NA	55.46	NA	8.35	0.00	NA	0.00
UAW11-40	4/6/2004	UG/L	65.4 B J	<10	NA	<10	NA	26.5 B J	NA	<5	NA	0.31 B	NA	353000	8.5	NA	9.3	NA	6 B	NA	<10	<20	100	<3	NA	73300 J	966	<0.2	NA	53.1	NA	6040 J	<5	NA	<5
UAW11-40 BLIND DUP	4/6/2004	UG/L	48.1 B J	<10	NA	<10	NA	25.9 B J	NA	<5	NA	0.41 B	NA	346000	7.7	NA	8.6	NA	4.9 B	NA	<10	<20	92.8 B	<3	NA	71200 J	903	<0.2	NA	49.3	NA	5920 J	<5	NA	<5
RPD			30.48	0.00	NA	0.00	NA	2.29	NA	0.00	NA	27.78	NA	2.00	9.88	NA	7.82	NA	20.18	NA	0.00	0.00	7.47	0.00	NA	2.91	6.74	0.00	NA	7.42	NA	2.01	0.00	NA	0.00
WS-6A	3/25/2004	UG/L	NA	NA	<10	NA	<10	NA	53 B J	NA	0.76 B J	NA	<2	NA	NA	<5	NA	<7	NA	5.9 B J	<10	<20	NA	NA	<3	NA	NA	NA	<0.2	NA	<40	NA	NA	<5	NA
WS-6A BLIND DUP	3/25/2004	UG/L	NA	NA	<10	NA	3.6 B	NA	56 B J	NA	0.69 B J	NA	<2	NA	NA	<5	NA	1.2 B	NA	6.5 B J	<10	<20	NA	NA	<3	NA	NA	NA	0.04 B J	NA	<40	NA	NA	<5	NA
RPD			NA	NA	0.00	NA	94.12	NA	5.50	NA	9.66	NA	0.00	NA	NA	0.00	NA	141.46	NA	9.68	0.00	0.00	NA	NA	0.00	NA	NA	NA	133.33	NA	0.00	NA	NA	0.00	NA

Table D-8A
Supplemental FI
Duplicate Groundwater Samples
Inorganic Chemical Detections
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample ID	Sample Date	Silver-DISS	Sodium	Thallium	Thallium-DISS	Tin	Tin-DISS	Total Sulfide	Vanadium	Vanadium-DISS	Zinc	Zinc-DISS
UAW05-20	3/28/2004	NA	149000	<10	NA	99.9 B	NA	5000	0.81 B	NA	<20	NA
UAW05-20 BLIND DUP	3/28/2004	NA	162000	5.2 B J	NA	107	NA	2200	0.92 B	NA	<20	NA
RPD		NA	8.36	63.16	NA	6.86	NA	77.78	12.72	NA	0.00	NA
UAW11-40	4/6/2004	NA	285000	7.3 B	NA	62.2 B	NA	640 B	<7	NA	<20	NA
UAW11-40 BLIND DUP	4/6/2004	NA	278000	7.3 B	NA	51.7 B	NA	800 B	<7	NA	<20	NA
RPD		NA	2.49	0.00	NA	18.44	NA	22.22	0.00	NA	0.00	NA
WS-6A	3/25/2004	<5	NA	NA	<10	NA	<100	<1000	NA	<7	NA	15.3 B
WS-6A BLIND DUP	3/25/2004	<5	NA	NA	6.8 B	NA	<100	1400	NA	<7	NA	23.1
RPD		0.00	NA	NA	38.10	NA	0.00	33.33	NA	0.00	NA	40.63

Notes:
RPD = Relative Percent Difference.
B = Estimated result; result is less than reporting limit.
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
NA indicates chemical was not on the target analyte list for that sample.
See Appendix B for the complete target analyte lists.

Table D-9
Summary of Detection in Project Equipment Blanks
Morton International, Inc.
Reading, Ohio

		Volatile Organic Compounds (VOCs)								Semivolatile Organic Compounds (SVOCs)			Pesticides		Inorganics															
Sample Date	Sample Type	1,2-Dichloroethane	2-Butanone	Acetone	Chloroform	Chloromethane	Methylene chloride	Tetrachloroethene	Toluene	4-Methylphenol	bis(2-Ethylhexyl) phthalate	Diethyl phthalate	beta-BHC	Endrin	Aluminum	Antimony	Beryllium	Cadmium	Calcium	Calcium-DISS	Copper	Cyanide, Total	Iron	Magnesium	Magnesium-DISS	Manganese	Mercury	Potassium	Thallium	Total Sulfide
3/14/2001	Equipment Blank	<1	<10	<10	<1	<2	<1	<1	<1	<10	<10	<10	<0.05	<0.05	NA	<10	<5	<2	NA	NA	<25	<10	NA	NA	NA	NA	<0.2	NA	<10	<1000
4/4/2001	Equipment Blank	<1	<10	<10	<1	<2	<1	<1	<1	<10	5.1 J	<10	<0.05	<0.05	33.3 B	<10	0.65 B	<2	609 B	NA	<25	<10	159	108 B	NA	5 B	<0.2	181 B	<10	<1000
4/17/2001	Equipment Blank	<1	<10	<10	<1	<2	<1	<1	<1	<10	<10	<10	<0.05	<0.05	38.5 B	<10	<5	<2	345 B	NA	<25	<10	<100	93.6 B	NA	1.3 B	0.11 B	<5000	<10	<1000
5/4/2001	Equipment Blank	<1	<10	<10	<1	<2	<1	<1	<1	<10	<10	<10	<0.05	<0.05	53.1 B	4 B	<5	<2	<5000	NA	<25	4 B	<100	<5000	NA	<15	<0.2	170 B	<10	1100
7/28/2001	Equipment Blank	<1	<10	1.6 J	<1	<2	<1	<1	<1	<10	5 J B	1.4 J	<0.05	<0.05	43.3 B	<10	<5	<2	<5000	NA	<25	<10	<100	41.7 B	NA	<15	<0.2	182 B J	5.4 B	<1000
8/7/2001	Equipment Blank	<1	0.7 J	3.3 J	<1	0.27 J	<1	<1	<1	<10	<10	<10	<0.05	<0.05	<200	<10	<5	<2	<5000	NA	<25	<10	<100	<5000	NA	1.2 B	<0.2	<5000	<10	1200
8/23/2001	Equipment Blank	<1	<10	1.4 J B	<1	<2	<1	<1	<1	<10	<10	1.2 J	<0.05	<0.05	<200	<10	<5	<2	455 B	NA	<25	<10	224	99.3 B	NA	8.3 B	<0.2	<5000	5.3 B	<1000
10/9/2001	Equipment Blank	<1	<10	1.1 J	<1	<2	<1	<1	<1	<10	<10	<10	<0.05	<0.05	<200	<10	<5	<2	<5000	NA	<25	<10	<100	<5000	NA	<15	<0.2	<5000	8.9 B	2000
10/12/2001	Equipment Blank	0.38 J	0.78 J	1.1 J	<1	<2	<1	0.31 J	<1	<10	<10	1.3 J	<0.05	<0.05	36.7 B	<10	<5	<2	254 B	NA	<25	<10	<100	55.3 B	NA	<15	<0.2	180 B J	8 B J	2300
11/8/2001	Equipment Blank	<1	1.4 J	0.94 J B	0.28 J	<2	0.41 J	<1	0.22 J	<10	<10	<10	<0.05	<0.05	63 B J	<10	<5	<2	<5000	NA	<25	<10	<100	<5000	NA	<15	<0.2	161 B J	<10	1300 J
11/11/2001	Equipment Blank	<1	1.6 J	3.1 J B	<1	<2	<1	<1	0.22 J	1.7 J #	<10	<10	<0.05	<0.05	<200	<10	<5	<2	<5000	314 B J	<25	<10	<100	<5000	75.5 B	<15	<0.2	53 B	<10	<1000
11/14/2001	Equipment Blank	<1	0.82 J	2.4 J	<1	<2	<1	<1	<1	<10	<10	<10	<0.05	<0.05	<200	2.5 B	<5	0.71 B	<5000	NA	6 B	2.5 B	<100	33.1 B J	NA	<15	<0.2	<5000	7.9 B	1100
3/5/2002	Equipment Blank	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	89.3 B J	<10	<5	<2	<5000	NA	<25	NA	<100	84.9 B J	NA	<15	<0.2	266 B J	<10	NA
3/6/2002	Equipment Blank	<1	NA	1.4 J B	<1	NA	<1	NA	<1	<10	NA	NA	0.0088 J	0.014 J	108 B J	<10	<5	<2	<5000	NA	27.7	NA	<100	86.9 B J	NA	<15	<0.2	284 B J	<10	NA
3/16/2002	Equipment Blank	<1	NA	1.1 J	<1	<2	0.44 J	<1	<1	<10	<10	<10	<0.05	<0.05	NA	<10	<5	<2	NA	NA	<25	<10	NA	NA	NA	NA	0.07 B	NA	<10	<1000

Notes VOCs, SVOCs and Pesticide Results:
J = Estimated result; result is less than reporting limit.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
NA indicates chemical was not on the target analyte list for that sample.

Notes for Inorganic Results:
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
B = Estimated result; result is less than reporting limit.

Table D-9A
Supplemental FI
Summary of Detection in Project Equpment Blanks
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample Date	Sample ID	Aluminum	Beryllium	bis(2-Ethylhexyl) phthalate	Chlorobenzene	Copper	Magnesium	Mercury	Methylene chloride	Potassium	Thallium	Total Sulfide
3/11/2004	20040311CINEB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3/14/2004	20040314CINEB	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3/15/2004	20040315CINEB	<200	<5	<10	<1	<25	79.1 B J	0.048 B	5.6	263 B J	7.4 B J	<1000
3/26/2004	20040326CINEB	NA	0.65 B J	<10	<1	5 B J	NA	0.084 B J	<1	NA	<10	<1000
3/28/2004	20040328CINEB	51.2 B J	<5	<10	7.1	<25	<5000	<0.2	<1	161 B J	<10	1000
4/6/2004	20040406CINEB	<200	<5	12	<1	<25	93.1 B J	<0.2	<1	278 B J	<10	1400

NA indicates chemical was not on the target analyte list for that sample.
<5 indicates constituent not detected at or above indicated detection limit

Notes VOCs, SVOCs, and Pesticide Results:
J = Estimated result; result is less than reporting limit.
B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

Notes for Inorganic Results:
J = Method blank contamination. The associated method blank contains the target analyte at a reportable level.
B = Estimated result; result is less than reporting limit.

Table D-10
Summary of Detections in Trip Blanks
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample Date	Sample Type	2-Butanone	Acetone	Carbon disulfide	Methylene chloride	Trichloroethene
3/8/2001	Trip Blank	<10	<10	<1	<1	<1
3/9/2001	Trip Blank	<10	<10	<1	0.34 J	<1
3/10/2001	Trip Blank	<10	<10	<1	<1	<1
3/11/2001	Trip Blank	<10	<10	<1	<1	<1
3/13/2001	Trip Blank	<10	<10	<1	<1	<1
3/14/2001	Trip Blank	<10	<10	<1	<1	<1
3/19/2001	Trip Blank	<10	<10	<1	<1	<1
3/21/2001	Trip Blank	<10	<10	<1	<1	<1
3/23/2001	Trip Blank	<10	<10	<1	<1	<1
3/26/2001	Trip Blank	<10	<10	<1	<1	<1
3/27/2001	Trip Blank	<10	<10	<1	<1	<1
4/2/2001	Trip Blank	<10	<10	<1	<1	<1
4/4/2001	Trip Blank	<10	<10	<1	<1	<1
4/5/2001	Trip Blank	<10	<10	<1	<1	<1
4/6/2001	Trip Blank	<10	<10	<1	<1	<1
4/7/2001	Trip Blank	<10	<10	<1	0.58 J B	<1
4/9/2001	Trip Blank	<10	<10	<1	<1	<1
4/11/2001	Trip Blank	<10	<10	<1	<1	<1
4/17/2001	Trip Blank	<10	<10	<1	<1	<1
5/4/2001	Trip Blank	<10	<10	<1	<1	<1
5/5/2001	Trip Blank	<10	<10	<1	1.1	<1
5/7/2001	Trip Blank	<10	<10	<1	0.37 J	<1
5/8/2001	Trip Blank	<10	<10	<1	<1	<1
7/24/2001	Trip Blank	<10	<10	<1	<1	0.15 J B
7/25/2001	Trip Blank	1.6 J	<10	<1	0.37 J B	0.14 J B
7/27/2001	Trip Blank	1.4 J	<10	<1	0.36 J	<1
7/28/2001	Trip Blank	<10	<10	<1	<1	<1
7/29/2001	Trip Blank	0.86 J	<10	<1	<1	<1
8/1/2001	Trip Blank	<10	<10	<1	<1	<1
8/7/2001	Trip Blank	<10	<10	<1	0.42 J	<1
8/22/2001	Trip Blank	<10	<10	<1	<1	<1
8/23/2001	Trip Blank	<10	<10	<1	0.38 J B	<1
9/5/2001	Trip Blank	<10	<10	<1	0.4 J B	<1
10/9/2001	Trip Blank	<10	<10	<1	<1	<1
10/10/2001	Trip Blank	<10	<10	<1	<1	<1
10/11/2001	Trip Blank	NA	0.64 J B	0.33 J	0.35 J B	NA
10/12/2001	Trip Blank	<10	<10	<1	0.56 J	<1
10/13/2001	Trip Blank	<10	<10	<1	<1	<1
11/8/2001	Trip Blank	NA	<10	<1	0.45 J B	<1
11/9/2001	Trip Blank	<10	<10	<1	0.5 J	0.2 J B
11/10/2001	Trip Blank	NA	<10	0.24 J	0.34 J	<1
11/10/2001	Trip Blank	<10	<10	<1	0.37 J	<1
11/11/2001	Trip Blank	<10	<10	<1	0.38 J	<1

Table D-10
Summary of Detections in Trip Blanks
Morton International, Inc.
Reading, Ohio
Units: μg/L

Sample Date	Sample Type	2-Butanone	Acetone	Carbon disulfide	Methylene chloride	Trichloroethene
11/13/2001	Trip Blank	NA	<10	<1	<1	<1
11/14/2001	Trip Blank	<10	<10	<1	0.37 J B	<1
11/15/2001	Trip Blank	NA	<10	<1	<1	<1
11/15/2001	Trip Blank	<10	<10	<1	<1	<1
11/16/2001	Trip Blank	NA	<10	<1	<1	<1
3/6/2002	Trip Blank	NA	1.4 J B	<1	0.41 J	NA
3/16/2002	Trip Blank	NA	<10	<1	<1	<1

Notes:

J = Estimated result; result is less than reporting limit.

B = Method blank contamination. The associated method blank contains the target analyte at a reportable level.

NA indicates chemical was not on the target analyte list for that sample.

Table D-10A
Supplemental Facility Investigation
Summary of Detections in Trip Blanks
Morton International, Inc.
Reading, Ohio
Units: µg/L

Sample Date	Client ID	1,1-Dichloroethene	2-Butanone (MEK)	Acetone	Methylene chloride	Toluene
3/10/2004	20040310CINTB	NA	NA	NA	NA	<1
3/11/2004	20040311CINTB	NA	NA	NA	NA	<1
3/15/2004	20040315CINTB	<1	NA	<10	<1	<1
3/17/2004	20040317CINTB	<1	NA	<10	<1	<1
3/24/2004	20040324CINTB	<1	NA	<10	<1	<1
3/25/2004	20040325CINTB	0.39 J	1.9 J	6.1 J	1.1	0.31 J
3/26/2004	20040326CINTB	<1	1.8 J	3.8 J	<1	<1
3/27/2004	20040327CINTB	<1	NA	<10	<1	<1
3/29/2004	20040329CINTB	<1	NA	<10	<1	<1
3/30/2004	20040330CINTB	<1	NA	<10	<1	<1
3/31/2004	20040331CINTB	<1	NA	<10	<1	<1
4/6/2004	20040406CINTB	<1	NA	<10	<1	<1
4/7/2004	20040407CINTB	<1	NA	<10	<1	<1

Notes:

J = Estimated result; result is less than reporting limit.

NA indicates chemical was not on the target analyte list for that sample.

<10 =Indicates constituent not detected at or above indicated detection limit.

FACILITY INVESTIGATION (FI)
QA Field Audit Report
Report #1
Rohn and Hass Company

Site Visit: May 7 – 8, 2001

Field Audit Conducted by: Richard Frappa – FI QA Officer

AUDIT REPORT

A site visit was conducted on May 7-8, 2001 to audit field activities during the FI at the Rohn and Haas Company, Morton International, Inc. facility in Reading, Ohio. The purpose of the audit was to: 1. verify that established procedures described in the Quality Assurance Project Plan (QAPP) dated November 2000 are being followed; and, 2. identify the need for corrective actions, if necessary. The field audit involved: conducting interviews of field staff; identifying field procedures not in conformance with the Work Plan or QAPP; assessing the completeness of daily records; evaluating field equipment calibration records; reviewing sample tracking, chain of custody, and sample security procedures; and assessing the proper frequency of sample field quality control checks.

INTERVIEWS

The following Geomatrix staff were on-site and interviewed during the field audit:

Tim Jennings – Field Team Leader
Erik Mansell – Sample Collection Specialist
Charles Young – Sample Collection Specialist

Field activities were observed and each staff member was interviewed to identify non-conformance with field procedures specified with the Work Plan and QAPP.

FI Activities Performed During Audit

The first round of groundwater sampling activities were ongoing during the audit. Sampling activities were initiated on May 4 and were completed on May 9, 2001. Conformance with sampling procedures presented in the QAPP and satisfaction of data quality objectives were evaluated while observing sampling activities at the following

groundwater monitoring wells: UAW-20-60, UAW-02-20, UAW-02-40, UAW –04-20, UAW-3-20, and UAW7-20. During the audit, Mr. Todd Quillen of TechLaw, Inc. was providing oversite on behalf of the U.S. EPA.

Completeness of Daily Records

Daily records documenting field activities, borehole logs, well construction logs, equipment calibration records, sample control logs, and chain of custody records were reviewed for completeness. All records, including telephone conversation logs and meeting minutes, are maintained in three-ring binders located in the on-site Geomatrix field trailer. Daily records for the FI were complete.

Corrective Action - None required.

Field Equipment Calibration Records

Prior to and at the time of the audit, the following field equipment was in use: photoionization detector (PID); an electronic water level sounder, and instruments to measure field measured parameters for groundwater samples (i.e., pH meter, specific conductance meter, dissolved oxygen meter, and turbidimeter. Field equipment calibration records were present for each day of equipment usage and reviewed. Calibration results were consistent with instrument calibration parameters identified in the equipment operation manuals and maintenance SOPs.

Corrective Action - None required.

Sample Tracking, Chain of Custody and Sample Security and Labeling

The integrity of sample collection during the FI was assessed through evaluating sample tracking and chain of custody records, as well as, sample security and bottle labeling procedures. Current procedures are adequate to ensure the integrity of samples collected thus far in the FI.

Corrective Actions – None required.

Collection of Field Quality Control Checks

Field quality control (QC) samples include the collection of blind duplicate samples, matrix spike (MS) and matrix spike duplicate (MSD) samples, field equipment blanks for VOC and SVOC analysis, and inclusion of trip blanks with each cooler containing samples to be analyzed for VOCs. Greater than 20 groundwater samples were to be collected during the

sampling round necessitating the collection of two blind duplicate samples, two MS and MSD samples, and two field equipment blank samples. A review of the sample control logs and chain of custody forms indicated that one set of QC samples were collected for analysis of TCL organic parameters. It was recommended that the second set of QC samples be analyzed for Appendix IX parameters since sampling and analyses for these compounds was to occur on May 9, 2001. Therefore, an adequate number of field quality control samples were collected during the first groundwater sampling event.

Corrective Action – None required.

FIELD AUDIT CONCLUSION

Procedures practiced by Geomatrix field staff are in conformance with the QAPP and sufficient to achieve project data quality objectives.

FACILITY INVESTIGATION (FI)

Morton International Inc.

Reading, Ohio

QA Field Audit Report
Report #2

Site Visit: November 9 to 11, 2001

Field Audit Conducted by: Anne Haikola

AUDIT REPORT

A site visit was conducted from November 9 to 11, 2001 to audit field activities during the FI at the Rohn and Haas Company, Morton International, Inc. facility in Reading, Ohio. The purpose of the audit was to:

1) Verify that established procedures, including Field Operating Procedures, described in the Quality Assurance Project Plan (QAPP) dated November 2000 are being followed; and
2) Identify the need for corrective actions, if necessary.

The field audit involved: conducting interviews of field staff; identifying field procedures not in conformance with the Work Plan or QAPP; assessing the completeness of daily records; evaluating field equipment calibration records; reviewing sample tracking, chain of custody, and sample security procedures; and assessing the proper frequency of sample field quality control checks.

INTERVIEWS

The following Geomatrix staff were on-site and interviewed during the field audit:

Erik Mansell – Field Team Leader
Charles Young – Sample Collection Team
Julie So– Sample Collection Team

Field activities were observed and each staff member was interviewed to identify non-conformance with field procedures specified with the Work Plan and QAPP.

During the audit, Mr. Ron Lantzy with Rohm and Haas was present and Mr. Todd Quillen of TechLaw, Inc. was providing oversight on behalf of the U.S. Environmental Protection Agency (USEPA).

FI Activities Performed During Audit

Two primary FI activities were ongoing during the field audit.

- The second complete round of groundwater sampling activities was initiated on November 8, 2001 and completed on November 16, 2001. Conformance with sampling procedures presented in the QAPP and satisfaction of data quality objectives were evaluated while observing sampling activities at the following groundwater monitoring wells: UAW17-40, UAW02-40, UAW02-20, UAW11-10, UAW21-80.

- Trenching at geophysical anomalies located in the vicinity of Anomaly "I" and the Former Swale Area. Conformance with trenching procedures and satisfaction of data quality objectives were evaluated while observing trenching activities at T-5, T-6, and T-7.

- Soil samples were collected in conjunction with trenching and facility investigation requirements. Conformance with sampling procedures presented in the QAPP and satisfaction of data quality objectives were evaluated while observing collection of the following soil samples: DP29-5, T-6-3, T-6-7.5, T-6-10,

Completeness of Daily Records

Daily records documenting field activities, equipment calibration records, sample control logs, and chain of custody records were reviewed for completeness. Daily records for the FI were complete.

Corrective Action - None required.

Field Equipment Calibration Records

The following field equipment was in use during the audit: photoionization detector (PID); Oxygen Meter, H_2S gas meter, an electronic water level sounder, and instruments to measure field parameters for groundwater samples (i.e., pH meter, specific conductance meter, dissolved oxygen meter, and turbidimeter). Field equipment calibration records were present for each

day of equipment usage and reviewed. Calibration results were consistent with instrument calibration parameters identified in the equipment operation manuals and maintenance SOPs.

Corrective Action - None required.

Sample Tracking, Chain of Custody and Sample Security and Labeling

The integrity of sample collection during the FI was assessed through evaluating sample tracking and chain of custody records, as well as, sample security and bottle labeling procedures. The sample team maintained up to date sample tracking records, and samples were secured from collection to receipt by the laboratory. Each bottle was clearly labeled, and packed coolers were secured with custody tape. Based on these observations, current procedures are adequate to ensure the integrity of samples collected in the FI.

However, minor errors were found on the chain of custody forms documenting the number of groundwater sample containers. While the correct number and volume of sample containers were provided to the laboratory, the tally of bottles varied and was, therefore, inaccurate throughout the chain-of-custody documentation.

> ***Corrective Actions*** – The sample team should implement a structured inventory check between the sample bottles and the contents of each sample cooler prior to signing the chain of custody form and securing the samples for final shipment. For this groundwater sampling program, three groundwater samples can typically be packed within two sample coolers. If the sample team plans ahead, the contents of each cooler can be pre-determined, thereby streamlining the completion of chain of custody records. To facilitate the procedure, the sample team could complete the chain of custody records at the time of sample collection, then do a final inventory check back in the office trailer, as part of the sample packing procedure. To summarize this three-step approach: 1) plan sampling and sample cooler needs for the day 2) complete chain of custody documentation at the time of sample collection and keep bottle sets organized for final packing. 3) At the end of the day, while re-packing each cooler with fresh ice for final shipment, double-check the number of sample bottles against the chain of custody.
>
> ***Impact on FI Data Objectives*** – The laboratory received the correct number and volume of sample bottles for the required analyses. Therefore, there is no impact to the quality of the data.

Collection of Field Quality Control Checks

Field quality control (QC) samples include the collection of blind duplicate samples, matrix spike (MS) and matrix spike duplicate (MSD) samples, field equipment blanks, and inclusion of trip blanks with each cooler containing samples to be analyzed for VOCs. Logistical coordination for the laboratory dictates that MS/MSD samples be collected for each media (soil or water) within the first day of sampling and at increments of 1 MS/MSD per 20 samples thereafter, so that laboratory batch QC be performed on project samples.

A review of the sample control logs, chain of custody forms, and STL laboratory log-in documentation indicated the following:

- Blind duplicates and field blanks were being collected at the prescribed frequency.

- While trip blanks are regularly included with each cooler containing samples analyzed for VOCs, there was an oversight on the 11/8/01 shipment. The field sampling team did not include a trip blank with the sample cooler, even though it was indicated on the chain-of-custody records. A report of this discrepancy was generated by STL.

- As of 11/9/01, the sample teams had yet to collect an MS/MSD sample for laboratory batch QC. At the direction of the QA auditor, an MS/MSD for groundwater was collected on 11/10/01.

Corrective Action – Regarding the oversight of the trip blank in the 11/8/01 sample shipment: Field personnel to review recommended procedure in the Sample Tracking, Chain of Custody and Sample Security and Labeling discussion above.

Impact on FI Data Objectives – Regarding the oversight of the trip blank in the 11/8/01 sample shipment: The purpose of the trip blank is to determine if a batch of samples is being exposed during sample handling and shipment to volatile organics that might contaminate the environmental samples. Based on the many batches of samples submtited to the laboratory, and the results from the 11/8/01 samples, it does not appear that evaluation of a trip blank would be required to determine if there is cross contamination biasing the sample batch. Therefore, there is no impact to the quality of the data.

FIELD AUDIT CONCLUSION

While there are opportunities to improve field practices, the procedures observed during the QA audit are in conformance with the QAPP and sufficient to achieve project data quality objectives.

SUPPLEMENTAL FACILITY INVESTIGATION (FI)
Morton International Inc.
Reading, Ohio
QA Field Audit Report
Report #3

Site Visit: March 10 – 11, 2004

Field Audit Conducted by: Anne Haikola, Geomatrix Consultants, Inc.

A site visit was conducted from March 10 to 11, 2004 to audit field activities during the Supplemental FI at the Rohm and Haas Company, Morton International, Inc. facility in Reading, Ohio. The purpose of the audit was to:

1) Verify that established procedures, including Field Operating Procedures, described in the Quality Assurance Project Plan (QAPP) dated November 2000 are being followed;

2) Verify that the scope of work and additional Field Operating Procedures, described in the Supplemental Facility Investigation Work Plan dated December 2003 are being implemented correctly;

3) Identify the need for corrective actions, if necessary; and

4) Evaluate the impact relative to project data quality objectives.

The field audit involved: conducting interviews of field staff; observing field procedures and evaluating conformance with the Supplemental FI Work Plan or QAPP; assessing the completeness of daily records; evaluating field equipment calibration records; reviewing sample tracking, chain of custody, and sample security procedures; and assessing the proper frequency of sample field quality control checks.

I. INTERVIEWS

The following Geomatrix staff was onsite and interviewed during the field audit:

Tim Jennings – Field Team Leader
Charles Young – Field Team
Tanya Grygaski– Field Team

Field activities were observed and each staff member was interviewed to evaluate conformance with field procedures specified with the Supplemental FI Work Plan and QAPP.

During the audit, Mr. Carl Coker with Rohm and Haas was present.

II. SUPPLEMENTAL FI ACTIVITIES PERFORMED DURING AUDIT

The primary Supplemental FI activities during the field audit period were:

- A direct push technique (DPT) rig was being used for the collection of soil samples and one groundwater sample. The locations sampled prior to and during the QA audit were: DP47 to DP61. Conformance with DPT sampling procedures and satisfaction of work plan objectives were evaluated through observation of the field work and review of the associated field documentation.
- A rotasonic drilling rig was on site and used to gather deep stratigraphic information and for the installation of Deep Upper Aquifer monitoring well(s). Prior to and during the QA audit, rotasonic drilling was performed at UAW26, STR13, and STR14. Conformance with rotasonic drilling procedures and satisfaction of work plan objectives were evaluated through observation of the field work and review of the associated field documentation.
- Soil samples were collected for chemical analysis. Satisfaction of work plan objectives and conformance with sample collection, handling, labeling, documentation, and custody procedures were evaluated through observation of the field work and review of the associated field documentation.
- One groundwater sample was collected using the DPT rig. Satisfaction of work plan objectives and conformance with sample collection, handling, labeling, documentation, and custody procedures were evaluated through observation of the field work and review of the associated field documentation.

III. AUDIT REPORT

Records documenting daily field activities, equipment calibration records, sample control logs, and chain of custody records were reviewed for accuracy and completeness. A summary of the QA auditor's review follows.

Daily Field Records

As part of the project, the Geomatrix standard Daily Field Reports are completed by the field team. Each member or one person working as a team is responsible for documenting the field investigation activities in a chronological order. The Daily Field Reports were being maintained by the field team and appeared to be in order at the time of the review, with a few exceptions. Record of sampling details at locations DP51 and DP52 were not included in any of the reports. It was also noted that the daily field records did not include a discussion of the field logic used to select locations for analytical sample collection, as specified in the work plan.

Corrective Action – The following recommendations were made to improve the documentation practices of the field team. Given the multi-tasking nature of field work, it was recommended that each individual on the field team maintain a separate log of their daily activities. Logistically, the different members worked both together and independently at various times of the day. Having everyone maintain a record would ensure that all field tasks were documented at the end of the day. It was also recommended that the daily field records cross reference the applicable sections of the Supplemental FI Work Plan. For instance, at locations where sample depths were to be selected based on field indications of impact, a discussion of the field impact observations and the logic for the final decision of sample collection should be clearly stated.

Impact on Project Data Objectives – The corrective action was a recommendation to make the daily field records more comprehensive. All of the field records - boring logs, sample collection logs, chain of custodies - however, complement one another and collectively provide a complete narrative. There is no negative impact on the project data objectives.

Field Equipment Calibration Records

The following field equipment was in use during the audit: two photoionization detector units (PIDs). Field equipment calibration records were present for each day of equipment

usage. Each day the initial calibration for each PID was in conformance with the calibration standard. There were, however, details missing from the daily calibration reports. The field team indicated that there were problems with one of the two PIDs causing PID readings to not be recorded during the drilling of UA26. The details of this problem and the re-calibration of equipment were not recorded on the calibration log. Additionally, the instrument operating procedures indicate that the equipment should be calibrated twice a day, if the equipment is in use for the full day. While the field team may have been performing this second calibration, the calibration log was not being updated. The bottom portion of the calibration log was also being left blank.

Corrective Action – The field team member responsible for calibration was directed to do the following:

- Document any problems with a specific piece of equipment on the appropriate calibration log.
- When in use for the full day, perform a second calibration and document on the daily field calibration sheet for the specific piece of equipment.
- Complete the bottom portion of the field instrument calibration sheet with the information about the person performing the calibration, the source of the calibration standard, and the date(s) equipment used, and any other miscellaneous comments about equipment performance.

Impact on Project Data Objectives – The PID readings are used as a field screening tool to measure organic vapors in soil samples. On the actual day in question, the majority of the sampling was for lithologic data gathering or for soil sampling for inorganic metals (not compounds that would produce organic vapors). Incomplete documentation of calibration procedures and the fact that not every sample was field screened will, therefore, not have any negative impact on the project data objectives.

Sample Tracking, Chain of Custody and Sample Security and Labeling

The integrity of sample collection during the audit period was assessed through evaluating sample tracking and chain of custody records, as well as sample security and bottle labeling procedures. At the end of each day, around 1600, a local STL representative obtains custody of the samples and prepares them for overnight shipment to the lab. The sample team maintained up to date sample tracking records, and samples

were secured from collection to receipt by the STL representative. Based on these observations, current procedures are adequate to ensure the integrity of samples collected.

However, minor errors were found with the documentation procedures. The trip blank from the 3/10/2004 shipment was missing on the chain of custody, but was included in the cooler. This trip blank had not received a proper Rohm and Haas sample ID. This indicated that proper sample relinquishing procedures were not being followed. The laboratory was contacted and instructed to log the trip blank as 20040310CINTB.

On at least one occasion, a number was transposed on the sample label and did not match the information provided on the chain of custody record. For example the sample time for 20040310DP55V9N was listed on the sample label as 1735, but on the chain of custody was entered as 1755. The laboratory was contacted and instructed that the correct time should be 1735.

Corrective Actions – The field team was directed to include a trip blank with every sample shipment containing samples for VOC analysis. The trip blank must be labeled with a unique sample ID consistent with the Rohm and Haas sample ID nomenclature. The Geomatrix field team was given a checklist to assist with the daily sample handling, documentation, and QA/QC sampling requirements. Field personal were also advised to review the Rohm and Haas sample nomenclature documentation and the applicable Geomatrix field operating procedures related to Sample Tracking, Chain of Custody and Sample Security and Labeling discussion above.

In accordance with sample relinquishing practices, the Geomatrix field team representative and the STL representative should verify that they are relinquishing and receiving the exact samples and number of bottles/jars indicated on the COC by taking an inventory of the labeled samples. The STL representative was provided with the Rohm and Haas sample nomenclature documentation and the issue of proper relinquishing procedures was discussed with the STL project manager. The Geomatrix field team was given a checklist to assist with the daily sample handling, documentation, and QA/QC sampling requirements.

Impact on Project Data Objectives – The laboratory received the correct number of bottles/jars and volume of sample for the required analyses. Any documentation discrepancies were resolved between the STL Project Manager and the Field Team Leader so that the proper nomenclature and sampling requests were consistent with the

Supplemental FI Work Plan scope of work. Therefore, there is no negative impact to the quality of the data.

Collection of Field Quality Control Checks

Field quality control (QC) samples include the collection of blind duplicate samples, matrix spike (MS) and matrix spike duplicate (MSD) samples, field equipment blanks, and inclusion of trip blanks with each cooler containing samples to be analyzed for VOCs. Logistical coordination for the laboratory dictates that MS/MSD samples be collected for each media (soil or water) within the first few days of sampling and at increments of 1 MS/MSD per 20 samples thereafter, so that laboratory batch QC is performed on project samples.

A review of the sample control logs, chain of custody forms, and STL laboratory log-in documentation indicated the following:

- Blind duplicates and field equipment blanks were being collected at the prescribed frequency.
- Trip blanks were being included with sample shipments as the prescribed frequency.
- As of 3/10/04, the sample team had not yet collected any MS/MSD samples. The laboratory was able to select one of the samples submitted for the appropriate metals MS/MSD. For the toluene analysis MS/MSD, the field team collected samples in accordance with Rohm and Haas nomenclature and field operating procedures from the DP50 location.

Impact on Project Data Objectives – The laboratory was able to run batch QC on project samples. The sample team was ultimately able to collect the appropriate number of QC samples at the appropriate frequency. Therefore, there is no negative impact to the quality of the data.

IV. FIELD AUDIT CONCLUSION

While there are opportunities to improve field documentation practices, the procedures observed during the QA audit are in conformance with the QAPP and sufficient to achieve project data quality objectives.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 001 (Number logs sequentially throughout the course of the FI field operations)

Date 3/31/01

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

- [x] **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.
- [ ] **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.
- [ ] **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: 5.2

Relevant Location(s): STR01

Description of Action or Occurrence:
Although the Work Plan specifies that soil samples for geochemical analysis will be collected above the water table or 15 feet depth, samples were collected for CLP-TAL analysis from depths of ~73 and ~88 feet from STR01.

Rationale or Reason for Action or Occurrence:
Presence of staining in sand layers at these depths, which suggested the presence of possible chemical impact.

Impact on FI Data Objectives:
The logged variance will add to the total data set, so it should increase the completeness of the data obtained. No negative impacts are anticipated.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 002 (Number logs sequentially throughout the course of the FI field operations)

Date 3/31/01

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

[✓] **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

[ ] **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

[ ] **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: 4.1, 4.3, 4.3, and 5.2

Relevant Locations: (UAW03, UAW04 and STR02), (UAW05 and UAW06), (UAW07 and UAW08), (UAW12 and UAW13)

Description of Action or Occurrence:
The Work Plan specifies that two soil samples for geochemical analysis will be collected at each well pair or cluster location. For locations along the French drain/slurry wall, typical installations consisted of a well cluster on the downgradient side of the French drain/slurry wall, and a single well on the upgradient side. At these locations, the geochemical soil sampling approach will consist of the collection of three samples:

- One sample from the upper 3 feet of soils;
- One sample from the upper 15 feet or above the water table, upgradient of the French drain/slurry wall; and
- One sample from the upper 15 feet or above the water table, downgradient of the French drain/slurry wall.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 002 [cont'd]

Rationale or Reason for Action or Occurrence:
The single soil from the upper 3 feet will be representative of surface soil conditions at that cluster/pair location. The samples on either side of the French drain/slurry wall will aid in evaluating the effectiveness of that system.

Impact on FI Data Objectives:
The logged variance will add to the total data set, so it should increase the completeness of the data obtained. The collection of the pair of subsurface samples will better support the objective of evaluating existing interim measures at the Morton Facility. No negative impacts are anticipated.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 003 (Number logs sequentially throughout the course of the FI field operations)

Date **3/31/01**

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: A3.2

Relevant Sample(s): UAW12-20-12', UAW13-20-1.5', UAW13-20-11.5', and UAW08-20-8'

Description of Action or Occurrence:
Although the QAPP specifies that trip blanks will accompany each batch of sample containers to the laboratory, the sample cooler from March 24, 2001 was shipped without trip blanks. This cooler contained soil samples UAW12-20-12', UAW13-20-1.5', UAW13-20-11.5', and UAW08-20-8'

Rationale or Reason for Action or Occurrence:
Error on the part of field personnel. Corrective action: Change in procedure, with placement of trip blanks into cooler prior to drilling and sampling. Regular checking of cooler contents prior to sealing by Field Team Leader.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 003 [cont'd]

Impact on FI Data Objectives:
The purpose of trip blanks is to measure possible volatile cross-contamination derived from the ambient conditions encountered during the round-trip of sample containers from the lab, to the project site, and back to the lab. In accordance with the QAPP, one trip blank should go with every shipment. However, given the large number of trip blanks anticipated for the overall FI, it will be possible to correlate the potential cross contamination of this shipment with the results of other project trip blanks. Therefore, the omission of one trip blank should not have a significant impact on assessment of the accuracy of the data. In addition, preliminary results from trip blanks for the FI received to date have been non-detect for all analytes.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 004 (Number logs sequentially throughout the course of the FI field operations)

Date **3/31/01**

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: Table A4-2

Relevant Sample(s): UAW12-20-12', UAW13-20-1.5', UAW13-20-11.5', and UAW08-20-8'

Description of Action or Occurrence:
Although the QAPP specifies that a separate sample jar will be used for dioxin/furan analysis of soil samples under the App IX-TAL, a dioxin/furan container was not filled or shipped or requested on the chain-of-custody for samples UAW12-20-12', UAW13-20-1.5', UAW13-20-11.5', and UAW08-20-8.'

Rationale or Reason for Action or Occurrence:
Error on the part of field personnel. Corrective Action: Discussion with the analytical laboratory, which confirmed that they would be able to use soil from other containers to meet dioxin/furan analytical needs. Regular review of containers and chain-of-custody records by the Field Team Leader, to confirm correct sample container use and analytical request.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 004 [cont'd]

Impact on FI Data Objectives:
The purpose of providing a separate jar for the dioxin/furan analysis is procedural and not dictated by QA/QC protocols. STL's California laboratory performs the dioxin/furan analysis, while the remaining analyses are performed by the North Canton, Ohio laboratory. Shipment of separate bottle sets facilitates sample distribution to the appropriate analysts. The requisite analysis will still be performed, so no impact on FI data objectives is anticipated.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 005 (Number logs sequentially throughout the course of the FI field operations)

Date 3/31/01

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

- [x] **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.
- [ ] **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.
- [ ] **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: 4.1, Figures 4-1, 4-2, and 4-3

Relevant Location(s): STR07 and STR08

Description of Action or Occurrence:
Although the Work Plan specifies that six stratigraphic borings were to be advanced during Phase 1 of the FI, two additional stratigraphic borings were advanced (STR07 and STR08) in order to close data gaps identified during Phase 1 drilling, and improve planning for well installation.

Rationale or Reason for Action or Occurrence:
Complexity of Morton Facility shallow subsurface (i.e., Upper Aquifer).

Impact on FI Data Objectives:
The logged variance will add to the total data set, so it should increase the completeness of the data obtained. No negative impacts are anticipated.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 006 (Number logs sequentially throughout the course of the FI field operations)

Date 3/31/01

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

- [x] **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.
- [ ] **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.
- [ ] **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: 4.1; Figures 4-1, 4-2, and 4-3, Table 9-1

Relevant Locations: Obsolete monitoring wells

Description of Action or Occurrence:
Although the Work Plan specifies that the plugging and abandonment of existing monitoring wells was to be performed during Phase 1, this activity has been rescheduled for Phase 2.

Rationale or Reason for Action or Occurrence:
Simplification of Phase 1 activities.

Impact on FI Data Objectives:
The plugging and abandonment is not considered time critical and generates no data. No impact on FI data objectives is anticipated.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 007 (Number logs sequentially throughout the course of the FI field operations)

Date 3/31/01

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

- [x] **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.
- [ ] **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.
- [ ] **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: 4.1, 4.2; Figures 4-1, 4-2, 4-3

Relevant Location(s): Reported Waste Burial Areas B, C, and F, and the Former Swale Area (SWMU 10)

Description of Action or Occurrence:
Although the Work Plan specifies that no surface geophysical survey was to be performed at suspected waste burial area F, because of the presence of a tank berm, a survey was performed in the area adjacent to the berm. Geophysical survey coverage at Areas B, C, and F, and at the former Swale Area (SWMU 10) was also increased above that specified in the Work Plan.

Rationale or Reason for Action or Occurrence:
Field reconnaissance confirmed that Area F was more accessible to geophysical survey than previously believed. The geophysical survey in Areas B, C, and F, and at the Former Swale Area were expanded where possible to increase the data generated on possible waste burial.

Impact on FI Data Objectives:
The logged variance will add to the total data set, so it should increase the completeness of the data obtained. No negative impacts are anticipated.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 008 (Number logs sequentially throughout the course of the FI field operations)

Date 3/31/01

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: 4.1, 4.3, 4.3, and 5.2

Relevant Sample(s): UAW12-20-2.5', UAW08-20-2', and UAW04-20-2'

Description of Action or Occurrence:
As stated in the Work Plan and further clarified in Log No. 002, in the case of well pairs or well clusters location, one sample will be collected at that location from the upper 3 feet of soils. However, on three occasions the field team inadvertently collected two samples from the 0 to 3 feet depth interval, and included the extra samples in shipments to the laboratory.

Rationale or Reason for Action or Occurrence:
Error on the part of field personnel. Corrective action: Directed the laboratory not to analyze the extra samples. Review of the Work Plan scope of work prior to sample collection and again prior to sample shipment to verify that all objectives and criteria have been met.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 008 [cont'd]

Impact on FI Data Objectives:
The laboratory was able to comply with request to not analyze the extra samples. No impact on FI data objectives is anticipated.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 009 (Number logs sequentially throughout the course of the FI field operations)

Date 3/31/01

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: A5.1

Relevant Sample(s): STR01-3', STR01-15', STR01-21', and STR01-29.

Description of Action or Occurrence:
A copy of the chain-of-custody was not shipped with the sample cooler.

Rationale or Reason for Action or Occurrence:
Error on the part of field personnel. Corrective Action: Faxed a copy of the chain-of-custody record to the analytical laboratory, followed by a mailed hard copy. Regular inventory of all contents before sealing the sample coolers for shipment by the Field Team Leader.

Impact on FI Data Objectives:
No impact on FI data objectives is anticipated.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 010 (Number logs sequentially throughout the course of the FI field operations)

Date 3/31/01

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: 4.1, 4.2; Figures 4-1, 4-2, 4-3

Relevant Sample(s): UAW04-20-10', UAW05-20-1.5', and UAW05-20-13'

Description of Action or Occurrence:
Given the schedule of work, which routinely includes weekends, samples collected on Fridays were intended to be delivered via overnight carrier to the laboratory on Saturday. This would allow extraction for VOCs of the soil samples collected on Friday within or close to the 48-hour timeframe specified by USEPA Region 5 guidance. Samples shipped on Friday, March 23, 2001, however, were not marked for Saturday delivery, and were not received by the laboratory until Monday, March 26, 2001.

Rationale or Reason for Action or Occurrence:
Error on the part of field personnel. Corrective Action: Discussion with the analytical laboratory, in order to expedite extraction to minimize the exceedence of the recommended 48 hours. Regular review of shipping waybills by the Field Team Leader, to confirm correct designation of shipping time.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 010[cont'd]

Impact on FI Data Objectives:
The logged non-conformance increased the hold time on the designated samples, and so may affect the accuracy of VOC analysis for those samples. It should be noted, however, that the samples were in zero headspace containers in a chilled cooler during this hold time (samples were still at 4.1 °C at the time of their receipt by the laboratory). In addition, they were collected from borings being used for monitoring well installation. This means that groundwater samples will be collected from the affected locations, and may be used to verify the soil sampling results. Preliminary results for VOCs from the affected samples are consistent with other samples from the same area of the Morton Facility. On balance, the reduction in sample accuracy is anticipated to be minimal, and is not anticipated to significantly affect the overall FI objectives.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 011 (Number logs sequentially throughout the course of the FI field operations)

Date **3/31/01**

Completed by Mark P. Hemingway

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☐ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☑ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: A5.1

Relevant Sample(s): volatile organic analyses of soil samples

Description of Action or Occurrence:
Encore samples will be preserved by the laboratory by freezing in water.

Rationale or Reason for Action or Occurrence:
Based on testing of the first shipments of Encore soil samples for volatile organic analyses, it was determined that the soil samples from the subject property reacted strongly with the sodium bisulfate preservative. This occurred due to the natural abundance of calcareous materials in the soil from the subject property and surrounding areas. The analytical method allows for preservation by freezing when soil samples effervesce. Additionally the analyte list contains many compounds that the laboratory found either perform poorly and erratically in the sodium bisulfate matrix or do not respond sufficiently for analysis. It was determined that the consistent approach of freezing all the project samples in water would be the best approach.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 011 [cont'd]

Impact on FI Data Objectives:
No impact on FI data objectives is anticipated. The preservation method is consistent with analytical methodology.

Project Manager Signature: _____
Project Name: Phase 1 FI Field Activities
Project Number: 7169

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 012 (Number logs sequentially throughout the course of the FI field operations)

Date 7/29/01

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: 5.6

Relevant Sample(s): 072901142 –Sample from the Recovery Well

Description of Action or Occurrence:
A groundwater sample (072901142) collected on July 29, 2001 was mistakenly sent to the lab for the CLP-TAL analysis suite. This sample should have been sent in for the Appendix IX analysis suite. The laboratory was contacted on July 31, 2001 to change the analyses requested from CLP-TAL analysis, to the Appendix IX analysis. The laboratory changed the analysis requested and had enough sample volume to proceed with the Appendix IX analysis.

Rationale or Reason for Action or Occurrence:
Oversight by the sampling personnel. Corrective Action: Personnel to review the FI Work Plan for analytical requirements.

Impact on FI Data Objectives:
No impact on FI data objectives is anticipated.

Project Manager Signature: _____
Project Name: Phase 2 FI Field Activities
Project Number: 7443

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 013 (Number logs sequentially throughout the course of the FI field operations)

Date 7/11/01

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

- [x] **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.
- [ ] **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.
- [ ] **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: 5:13

Relevant Sample(s): Not Applicable

Description of Action or Occurrence:
Based on field conditions encountered during initial work, Geomatrix recommended modifications to the investigation approach of the CSS evaluation. Geomatrix outlined the scope and rationale for the revised CSS evaluation in a letter to the USEPA dated July 11, 2001.

Rationale or Reason for Action or Occurrence:
Camera survey of the sewer was slow and difficult, and it was determined that camera evaluation of the all sewer lines was not an efficient investigation method.

Impact on FI Data Objectives:
No impact on FI data objectives is anticipated. The revised CSS evaluation approach will meet the objectives put forward in the FI Work Plan and the requirements of the Administrative Order.

Project Manager Signature: _____
Project Name: Phase 2 FI Field Activities
Project Number: 7443

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 014 (Number logs sequentially throughout the course of the FI field operations)

Date **10/10/01**

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: A.10.1.1

Relevant Sample(s): Not applicable

Description of Action or Occurrence:
Section A.10.1.1 states that the Geomatrix QA Officer will conduct an internal audit of field activities at least once every three months.

Rationale or Reason for Action or Occurrence:
Oversight by the management personnel. Corrective Action: Personnel to review the FI Work Plan and Quality Assurance Project Plan. Audit to be scheduled.

Impact on FI Data Objectives:
No impact on FI data objectives is anticipated. While an internal field audit was not performed this quarter, internal Geomatrix staff have reviewed the field documentation from the months of July to September 2001. The daily field records, sampling records, field measurements and other field documentation have been completed in accordance with Quality Assurance protocols.

An internal field audit is scheduled for the November 2001 groundwater sampling.

Project Manager Signature: _____
Project Name: Phase 2 FI Field Activities
Project Number: 7443

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 015 (Number logs sequentially throughout the course of the FI field operations)

Date **10/10/01**

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

- [x] **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.
- [ ] **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.
- [ ] **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: Sections 5.1 and 5.2

Relevant Sample(s): DP04, DP06, DP11, DP21, DP22, DP24, DP26, DP27, and DP28

Description of Action or Occurrence:
Ten borings were completed in the northeastern portion of the plant (DP04, DP06, DP11, DP21, DP22, DP23, DP24, DP26, DP27, and DP28). Two soil samples were collected for geochemical analysis from DP23. The activities were beyond the original scope of work.

Rationale or Reason for Action or Occurrence:
These borings were completed to gain a better understanding of the shallow (<25-foot depth) lithology, particularly the shallow sand in the northeastern portion of the plant. Prior to boring at these locations, the amount of shallow lithologic data in this area was limited.

Soil samples from DP23 were submitted for chemical analysis because of field indications of chemical impact.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 015 [cont'd]

Impact on FI Data Objectives:
The logged variance will add to the understanding of the lithology and to the total data set, so it should increase the completeness of the data obtained. No negative impacts are anticipated.

Project Manager Signature: _____
Project Name: Phase 2 FI Field Activities
Project Number: 7443

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 016 (Number logs sequentially throughout the course of the FI field operations)

Date **1/11/02**

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

[✓] **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

[ ] **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

[ ] **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: Field Operating Procedure – Monitoring Well Development and Groundwater Sampling

Relevant Sample(s): UAW10-50, UAW10-80 and UAW24-70

Description of Action or Occurrence:
Recovery of development water from newly installed wells was less in volume than required by the Work Plan (at least two well volumes plus any volume of water lost during drilling). Wells involved include: UAW10-50, UAW10-80 and UAW24-70.

Rationale or Reason for Action or Occurrence:
The procedure used to install the subject wells involved advancing six-inch outer casing from the surface to the target depth. Core samples were not removed because the stratigraphy had already been established by stratigraphic tests at these locations. Thick clay sequences are present at all of these locations – the result is that the high water pressure and stress placed on the formation by this drilling technique fractured the clay and the vast majority of water used in the drilling was lost in the clays – not the sands in which the wells are screened. Some water returns to the surface occurred during drilling.

Although some formation damage did likely occur due to introduction of fines from overlying clays, the poor transmissivity of the sands at these locations is contributing to low flow from these wells. This low flow character prevented

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 016 [cont'd]
removal of the prescribed volume of water during development; however, the volume of water lost in the screened sand was less than one half the volume removed during development.

Impact on FI Data Objectives:
Samples from these wells are apparently representative of aquifer waters, based on the behavior of field parameters during development and purging. Given this, there should be no impact on FI data objectives.

Project Manager Signature: _____
Project Name: Phase 2 FI Field Activities
Project Number: 7443

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 017 (Number logs sequentially throughout the course of the FI field operations)

Date 1/11/02

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

[✓] **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

[ ] **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

[ ] **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: Field Operating Procedure – Monitoring Well Development and Groundwater Sampling

Relevant Sample(s): LAW-12-60

Description of Action or Occurrence:
Development of monitoring well LAW-12 -60– pH levels in development water were elevated, possibly indicative of grout contamination.

Rationale or Reason for Action or Occurrence:
After extensive development pH levels decreased to 7.5, and the well was sampled for Phase 2 while pH levels were in the ambient range. When the well was sampled in Phase 3, pH levels were again elevated, and the well had to be purged extensively in order to lower the pH to the ambient range.

The likely cause of the elevated pH is communication between the screened interval and the grout annular seal of the well. The mode of this communication is not known, but may include infiltration of grout fluids through the lower portion of the overlying clay stratum. The effect may attenuate naturally with time; in the interim, however, it will be necessary to utilize a modified purging method to obtain representative samples.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 017 (cont'd)

The following procedure should be used as long as elevated pH persists: Start by attempting to follow standard micro-purge procedures. If the pH is elevated, increase flow rate and macro-purge until pH is lowered to the ambient range. When ambient values for pH are obtained, stop the pump, allow the well to recover to static level, then proceed with standard micro-purge procedures.

Impact on FI Data Objectives:
The Phase 2 and 3 samples from this well are apparently representative of aquifer waters, based on the behavior of field parameters during development and purging. Given this, there should be no impact on FI data objectives.

Project Manager Signature: _____
Project Name: Phase 2 FI Field Activities
Project Number: 7443

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 018 (Number logs sequentially throughout the course of the FI field operations)

Date 3/20/02

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: Field Operating Procedures – Calibration and Maintenance of Field Meters, Monitoring Well Development, and Groundwater Sample Collection

Relevant Sample(s): see attached table

Description of Action or Occurrence:
USEPA requested that Geomatrix review the pH values from the well sampling and development records. Based on this review, it was determined that the pH readings may reflect the use of a temperamental pH meter.

Rationale or Reason for Action or Occurrence:
The attached table summarizes the final pH values for each well, at the conclusion of the pre-sampling purging or the initial well development. These final pH values reflect the stable reading obtained in accordance with our Field Operating Procedures. Given this, they should be data that is most representative of aquifer conditions. Most of the pH values are in the range of 5.5 to 7. This is consistent with normal pH values for natural surface waters or shallow groundwaters, which tend to be slightly acidic. This acidity generally reflects natural acids from organic matter or the dissolution of carbon dioxide.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

Note that every well in the table exhibits at least one reading in this normal range. This strongly suggests that the relatively small number of readings below this range probably reflect a fluctuating response from the pH meter, and not actual groundwater pH. Such meters, unfortunately, do tend to be somewhat temperamental under field conditions. We do not believe these lower pH values reflect actual acidic conditions in the subsurface.

To address this issue with field measurements, we will make the following modifications to the field operating procedures and the request for sample analysis:

- In the event that the pH readings for a given well are not within the range of 5.5 to 7.5, the pH meter will be recalibrated and the well will continue to be micro-purged.
- pH calibration solutions will be replaced at the beginning of each sampling event.
- Laboratory measurement of pH in groundwater samples will be added to the request for analysis submitted to Severn Trent Laboratories (STL).

Impact on FI Data Objectives:

The primary purpose of collecting pH measurements is to determine that the groundwater pH, in addition to the parameters of specific conductance, temperature, and turbidity, is stable, ensuring that fresh formation water is sampled. While the exact pH readings may not accurately represent groundwater pH, the measurements are adequate to evaluate change in pH. Additionally, the other field measurements are also used to determine groundwater stabilization prior to sampling. Given this, there should be no impact on FI data objectives.

Project Manager Signature: _____

Project Name: Phase 2 FI Field Activities

Project Number: 7443

pH Summary
Morton International, Inc.
Reading, Ohio

	pH		
Well ID	Sample Event 1 (May 2001)	Sample Event 2 (October 2001)	Sample Event 3 (November 2001)
MW-EPA-1	6.55	NA	6.96
MW-EPA-3	6.67	NA	6.26
MW-EPA-4	6.44	NA	6.29
UAW01-30	4.94	NA	7.18
UAW01-80	6.25	6.45	5.70
UAW02-20	6.27	NA	6.95
UAW02-40	6.65	NA	7.36
UAW03-20	6.02	NA	7.54
UAW04-20	5.58	NA	7.36
UAW05-20	7.5	6.87	NA
UAW06-20	6.96	6.81	NA
UAW07-20	6.79	NA	6.92
UAW08-20	7.09	NA	NA
UAW09-20	6.60	NA	5.01
UAW09-60	6.58	NA	5.43
UAW10-50	NA	7.18	NA
UAW10-80	NA	7.48	NA
UAW11-10	7.23	NA	7.36
UAW11-40	6.24	NA	5.17
UAW12-20	5.71	NA	6.61
LAW12-60	NA	7.40	7.51
UAW13-20	4.33	NA	6.51
UAW14-10	6.87	NA	5.05
UAW15-20	6.82	NA	7.32
UAW15-50	7.07	NA	7.96
UAW16-10	NA	6.98	6.40
UAW17-40	6.97	NA	5.41
UAW18-20	NA	7.39	7.05
UAW19-80	6.76	NA	5.21
UAW20-60	6.42	NA	6.43
UAW21-80	4.67	NA	7.45
UAW22-20	NA	6.81	NA
UAW23-20	NA	6.89	6.53
UAW24-70	NA	7.03	7.66
UAW25-20	NA	6.71	6.48

NA Data not available, well not sampled this event.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 019 (Number logs sequentially throughout the course of the FI field operations)

Date 5/3/02

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: Field Operating Procedures – Groundwater Level Measurement

Relevant Sample(s): UAW09-60, water level reading on 11/16/2001

Description of Action or Occurrence:
The water level reading recorded on 11/16/01 at UAW09-60 is anomalous.

Rationale or Reason for Action or Occurrence:
Based on prior water level measurements at UAW09-60 and also the water level measurements collected from the pressure transducer (Troll™) installed for a month at this well, the depth to water measurement collected on 11/16/01 is an error. It is believed that the field team mis-read the water level by an increment of ten and that the depth to water reading should have been 31.92 feet bgs (not 21.92 feet bgs, as recorded on field documentation).

Impact on FI Data Objectives:
There is no impact to FI data objectives.

Project Manager Signature: _____
Project Name: Phase 2 FI Field Activities
Project Number: 7443

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 020 (Number logs sequentially throughout the course of the FI field operations)

Date 1/7/2004

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: Field Operating Procedures – Groundwater Sample Collection

Relevant Sample(s): UAW15-50, November 17, 2003.

Description of Action or Occurrence:
While purging UAW15-50, a ball-point pen inadvertently fell into the monitoring well. Attempts to remove the pen were unsuccessful.

Rationale or Reason for Action or Occurrence:
The ball-point pen bounced off the pavement and entered the well. The occurrence was accidental. While attempts were made to retrieve the pen at the time of sampling, they were unsuccessful.

Impact on FI Data Objectives:
There should be no long term impact on data quality, well use or FI objectives related to this incident. Prior to the next sampling of the well, a plan will be developed to remove the pen. Special retrieval equipment will be used as needed. After the pen has been retrieved, the well will be thoroughly purged prior to sample collection. The water chemistry data from UAW15-50 will continue to be monitored to determine if there are any effects from the pen ink.

Project Manager Signature: _____
Project Name: November 2003 Groundwater Sampling
Project Number: 7168

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 021 (Number logs sequentially throughout the course of the FI field operations)

Date **4/9/2004**

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☑ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☐ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: Field Operating Procedures – Sample Labeling, Storage and Shipment.

Relevant Sample(s): 20040309DP47V10N
20040311DP53AV12.5

Description of Action or Occurrence:
The sample team members listed two different sample times for the same unique sample. This occurred when collecting and documenting soil sample 20040309DP47V10N and groundwater sample 20040311DP53AV12.5.

Rationale or Reason for Action or Occurrence:
The sample team members were filling jars and bottles from the same sample location at slightly different times and decided to reflect that on the sample documentation. Per standard sampling procedures, a unique sample must have the same sample time to be considered the same sample. A lag between the actual filling of jars and samples should not cause the assignment of a different sample time.

The sample team was instructed on the correct sample nomenclature protocols and field operating procedures.

The laboratory was contacted and directed to consider the sample as one sample collected at the earliest time listed.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

Impact on FI Data Objectives:
There is no impact on data quality. The appropriate corrections have been made in the Geomatrix and STL databases and moving forward just one time will be entered for a unique sample.

Project Manager Signature: _____
Project Name: Supplemental FI, March 2004
Project Number: 7168

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

No. 022 (Number logs sequentially throughout the course of the FI field operations)

Date 4/9/2004

Completed by Anne M. Haikola

Purpose of this Log: To document actions which were not specified in the FI Work Plan, including their basis, cause, and impact on project objectives.

This Log addresses a: (Select One)

☐ **Variance**: A deliberate action which varies from the Work Plan, selected based on unanticipated field conditions, identification of an improved approach, or other conscious rationale.

☐ **Nonconformance**: A deviation from Work Plan procedures which was unintended, but occurred due to oversight or miscommunication. Please indicate any corrective action taken under Rationale or Reason for Action or Occurrence, below.

☑ **Clarification**: An action which was generally described in the Work Plan, but which required a decision to be made about how it would be specifically implemented.

Pertinent Section(s) of FI Work Plan or QAPP: Field Operating Procedures – Sample Labeling, Storage and Shipment.

Relevant Sample(s): STR13, STR14, UAW27, UAW28

Description of Action or Occurrence:
The Supplemental FI Work Plan indicated that three new Deep Upper Aquifer wells would be installed, if sands from this zone were present. The well numbers were pre-established in the work plan and followed the sequential numbering previously established. In the work plan, these locations were identified as UAW26, UAW27, UAW28. Based on field findings, however, the proposed well at UAW27 was not installed, based on the absence of Deep Upper Aquifer sands at this location. This location was renamed STR13.

The well at the proposed UAW28 location, therefore was renamed UAW27to follow the sequential numbering convention. It should also be noted that stratigraphic boring STR14 was installed adjacent to this UAW27 location.

Rationale or Reason for Action or Occurrence:
The nomenclature changes associated with these locations have been incorporated in the Geomatrix database and the Rohm and Haas SMP file.

LOG OF VARIANCE, NONCONFORMANCE, OR CLARIFICATION

Impact on FI Data Objectives:
While potentially confusing to someone reviewing the field notes or the Rohm and Haas SMP file, the final reports will reflect the actual locations. There is no impact on data quality objectives.

Project Manager Signature: _____
Project Name: Supplemental FI, March 2004
Project Number: 7168

April 19, 2002

SEVERN TRENT SERVICES

STL North Canton
4101 Shuffel Drive NW
North Canton, OH 44720-6961

Tel: 330 497 9396
Fax: 330 497 0772
www.stl-inc.com

Ms. Anne Haikola
Geomatrix Consultants, Inc.
5725 Highway 290 W
Suite 200-B
Austin, TX 78735

Dear Ms. Haikola,

This letter is in response to the Quality Assurance review performed by Environmental Standards for Geomatrix Consultants. The lab SDGs referenced were A1C130135 and A1E090157. The following discussions are in answer to the rejected data found in the reports.

The analyses for acrolein, acetonitrile, propionitrile, and isobutanol in samples 050801115, 050801116, 050801119, TB (COC035534), and TB (COC035535) should be considered unreliable, and the "not-detected" results for these compounds in the aforementioned samples have been flagged "R" on the data summary tables. Very low RRFs (<0.05) were reported for these compounds in the associated initial and/or continuing calibrations.

The analyses for acrolein, acetonitrile, propionitrile, and isobutanol in samples 031401030, 031401031, 031401032, and TB (COC032206) should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low relative response factors (RRFs <0.050) were observed for these compounds in the associated initial and/or continuing calibration standards. It should be noted that the RRFs are a function of not only the instrument response for the compound, but also of the instrument response for the associated internal standard. If the laboratory had used an internal standard that more closely matched the instrument response for the target compound, the RRFs would have been acceptable and data would not be affected.

The analysis for 4-nitroquinoline-1-oxide in sample 031401030 should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. A very low (<0.05) average relative response factor was observed for this compound in the associated initial multipoint calibration. It should be noted that the RRFs are a function of not only the instrument response for the compound, but also of the instrument response for the associated internal standard. If the laboratory had used an internal standard that more closely matched the instrument response for the target compound, the RRFs would have been acceptable and data would not be affected.

These four volatile compounds are soluble in water and have poor purge efficiency. The lab employs industry standard IS's for the Mass-Spec method. Using an internal standard that is also a poor purger or poor responder does not increase the efficiency of the purge, it just inflates the RRF. Data was not rejected based on the analysis, rather on the choice of internal standard. The minimum RRF is a CLP requirement and these are not CLP analytes, so they may not meet criteria.

The analysis for 4-chloroaniline in sample 031301029, for hexachlorocyclopentadiene in the reanalysis of sample 031301029, and for hexachlorocyclopentadiene in sample 031401030 should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low percent recoveries (<10%) were observed for these compounds in the associated LCS analyses.

The analyses for 4-chloroaniline in samples 050801113, 05080114, 050801117, 050801118, and 050801120 and for hexachlorocyclopentadiene in samples 050801115, 050801116, and 050801119 should be considered unreliable and the "not-detected" results for these compounds in the aforementioned samples have been flagged "R" on the data summary tables. Very low recoveries (%R<10%) for these compounds were observed in the associated LCS analyses.

At the time of analysis, we were having trouble with 4-chloroaniline recovering in the aqueous LCS. Hexachlorocyclopentadiene never recovers well in a full-analyte spike aqueous matrix. When the Army requested full-analyte spikes, (our first client to request this), an exception was given for hexachlorocyclopentadiene as most labs that they talked to had the same problem. Obviously, this is a problem beyond lab control. For our MDL studies, we extract hexachlorocyclopentadiene by itself to avoid the problem.

The analysis for all acid compounds in samples 031301029 and 031301029-RE should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<10%) were reported for the acid surrogate compound phenol-d_5 in the initial analysis and the re-extraction/reanalysis of the sample for semi-volatile organic compounds.

The lab analyzed the sample, noticed the low recovery, and then re-extracted the sample. The re-extraction confirmed the original analysis. While I realize this did not get the phenol-d_5 above 10%, it is the lab's viewpoint that a matrix effect was limiting the phenol recovery.

The analyses for carbonate alkalinity in all samples, except sample 050801116, should be considered unusable, and the "not-detected" results have been flagged "R" on the data summary tables. Furthermore, the reported positive results for bicarbonate alkalinity and total alkalinity in all samples, except sample 050801116, should be considered estimated and have been flagged "J" on the data summary tables. Very low recoveries (<30%) were observed for total alkalinity in the associated MS/MSD analyses.

The analyses for total phosphorus in samples 050801117 and 050801118 should be considered unusable and the "not-detected" results have been flagged "R" on the data summary tables. Furthermore, the reported positive results for total phosphorus in samples 050801114, 050801120, 050801113, 050801119, and 050801115 should be considered estimated and have been flagged "J" on the data summary tables. Very low recoveries (<30%) were observed for total phosphorus in the MS/MSD analyses.

The rejection of alkalinity and phosphorus was based on low MS/MSD recoveries. The lab policy is if the lab QC (LCS, LCSD, Blank and CCV) is in control, then the MS/MSD is indicative of the matrix and is beyond lab control.

Some of the correctable deficiencies that need to be addressed in the reports are:

In general, for the organic sections, the Initial Calibration can be a mixture of different ICALs for different analytes. An example is the pesticide fraction where the normal pesticides are analyzed and another curve is analyzed for Kepone, and Isodrin. The dates may not correlate with the date of the ICAL, as both ICALs may not be analyzed on the same date.

All detections added by the validators were below our MDLs and are not reportable.

SEVERN TRENT SERVICES

STL North Canton

Our policy is to report the lower of the numbers for the 8000 methods. If in the future you would like the higher number reported, it can be done.

For the 8000 series, the grand mean approach is utilized to ensure that the CCV passes criteria.

I hope this answers some of your questions concerning the data validation reports. If I can be of further assistance, do not hesitate to give me a call at (330) 966-8284.

Sincerely,

Beth Lambert

Beth Lambert
Quality Assurance Manager

SEVERN TRENT STL

STL North Canton
4101 Shuffel Drive NW
North Canton, OH 44720

Tel: 330 497 9396 Fax: 330 497 0772
www.stl-inc.com

August 11, 2004

Ms. Anne Haikola
Geomatrix Consultants, Inc.
5725 Highway 290 W
Suite 200-B
Austin, TX 78735

Dear Ms. Haikola,

This letter is in response to the Quality Assurance review performed by Environmental Standards for Geomatrix Consultants. The lab SDGs referenced were A4C160242, A4D070211, and A4C250199. The following discussions are in answer to the rejected and or qualified data found in the reports.

> *The analyses for chloroethane in all soil samples of SDG A4C160242 should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. A very low relative response factor (RRF<0.050) was observed for chloroethane in the associated CCV standard.*

The 8260 method has no criteria set for an acceptable RRF for the method. This criterion comes from the CLP analyses. While it is understood that the extrapolation of CLP requirements through the use of the national functional guidelines will occur between the two methods; some of the criterion are not actually represented as SW 846 method requirements. The ACTUAL CLP method requirement is that the RRF meet or exceed 0.01. The national functional guidelines state: "The criteria employed for technical data review purposes are different than those used in the method. The laboratory must meet a minimum RRF criterion of 0.01. However, for data review purposes the greater than 0.05 criterion is applied to all volatile compounds." It goes on to list chloroethane as a volatile target compound that exhibits poor response.

> *The analyses for acrolein, acetonitrile, propionitrile, and isobutyl alcohol in all SDG A4C250199 samples should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low relative response factors (RRF<0.050) were observed for these compounds in the associated initial and continuing calibration standards.*

These four volatile compounds are soluble in water and have poor purge efficiency. The minimum RRF as stated before is a factor from CLP and is not a requirement under SW 846. Even with that discrepancy, the list for compounds under CLP is very narrow in focus. To utilize the national functional guidelines for a method that it is not written for on analytes that are not part of the CLP compound list introduces a lot of variability into the validation.

> *The analyses for famfur in SDG A4C250199 sample 20040325CS-5AN should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. A very low correlation coefficient (<0.90) was observed for famfur in the calibration curve generated from the associated initial calibration standards.*

Famfur is a known compound that responds very poorly to the analysis process. The following section in our SOP discusses this compound.

> 10.4.7.2 Note: Several compounds do not respond well by this method (poor linearity). These compounds are famphur, benzenethiol, kepone and 2,4-toluenediamine. If these compounds are requested by a client and hits are found, alternate standards or methods will be needed for more

accurate quantitation. Sensitivity as demonstrated by the low standard is demonstrated by the low standard is sufficient to demonstrate a non-detect.

The analyses for bromochloromethane in SDG A4C160242 sample 20040314DP70AV9-11N should be considered unreliable, and the "not-detected" result has been flagged "R" on the data tables. A very low recovery (<30%) was observed for bromochloromethane in the associated MS/MSD analyses.

Bromochloromethane was not spiked into the sample. The recovery would have been zero.

The analyses for hexachlorocyclopentadiene; 2,4-dinitrophenol; 4-nitrophenol; pentachlorophenol; and 4,6-dinitro-2-methylphenol in SDG A4C160242 sample 20040314DP70AV9-11N should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<10%) were observed for these compounds in the associated MS/MSD analyses.

The national functional guidelines state that " No action is taken on MS/MSD data alone." This sample was analyzed at a 4X dilution, which could cause some of the poor responder to be less than the detection limit and report as ND. Rejecting data based on a CLP requirement extrapolated to a diluted sample and basing it on that decision alone runs counter to the national functional guidelines.

The analyses for aniline and dimethylphthalate in SDG A4D070211 sample 20040406MW-EPA-4V18N should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<10%) were observed for these compounds in the associated MS/MSD analyses.

The raw data was reviewed again and detections were found for these analytes in the MS/MSD for these analytes. The %R for the aniline was 5.8% and 14.2% in the MS/MSD. The recovery for dimethylphthalate was 8.3% and 24%. Since the national functional guidelines state that qualification should not be based on the MS/MSD alone rejection for these analytes in the sample seems extreme.

The analyses for bromochloromethane in all SDG A4C160242 samples should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<30%) were observed for bromochloromethane in the associated LCS/LCSD analyses.

Bromochloromethane was not included in the analyte spike. A representative group which is extensive is spiked into the LCS and MS/MSD. CLP and 8260 requirements are that a representative mix is spiked for evaluation.

The analysis for 4,4'-DDT in SDG A4C250199 sample 20040325WS-5AN should be considered unreliable, and the "not-detected" result has been flagged "R" on the data tables. A very low recovery (<10%) was observed for 4,4'-DDT in the associated matrix spike analysis.

The MS/MSD had recoveries of 5% and 40% for the MS/MSD. Since the national functional guidelines state that qualification should not be based on the MS/MSD alone rejection for these analytes in the sample seems extreme.

The analysis for vinyl acetate in SDG A4C250199 sample 20040325WS-5AN should be considered unreliable, and the "not-detected" result has been flagged "R" on the data tables. A very low recovery (<30%) was observed for vinyl acetate in the associated matrix spike analysis.

Vinyl Acetate is not spiked into the MS/MSD samples.

The analyses for all semivolatile compounds in SDG A4D070211 sample 20040406UAW11-40V38N should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. This sample was reextracted 8 days beyond the holding time of 7 days from sample collection to extraction.

The sample was re-extracted due to surrogate deficiencies. The original data could not be reported as the lab could only report one analysis. If needed the original data with the low surrogates can be reported to eliminate a large portion of the rejected data.

> *The quantitation limits for all semivolatile acid compounds in SDG A4D070211 sample 20040406UAW09-60V52N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<QC limit) were observed for two or more of the semivolatile acid surrogate compounds in this sample.*

The sample was re-extracted outside of hold time. Due to reporting of one analysis the additional analysis could not be reported. The best data was reported.

> *The quantitation limits for all semivolatile compounds quantitated with the internal standard 1,4-dichlorobenzene-d_4 in SDG A4C160242 sample 20040314DP70AV9-11N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, any reported positive results for semivolatile compounds quantitated with the internal standard 1,4-dichlorobenzene-d_4 in SDG A4C160242 sample 20040314DP70AV9-11N should be considered estimated and have been flagged "J" on the data tables. A low area count (<50% of the corresponding area count in the associated CCV standard) was observed for the internal standard 1,4-dichlorobenzene-d_4 in the semivolatile analysis of this sample.*

The sample was re-analyzed. The re-analysis confirmed the low internal standard response. The low IS is considered a matrix effect and is outside the control of the lab. Additionally 8270 does not impose IS recovery limits on the samples. The requirement is a CLP requirement.

> *The quantitation limits for all semivolatile compounds quantitated with the internal standards naphthalene-d_8 and acenaphthene-d_{10} in SDG A4C160242 sample 20040314DP78AV9-10N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, any reported positive results for semivolatile compounds quantitated with internal standard naphthalene-d_8 or acenaphthene-d_{10} in sample 20040314DP78AV9-10N should be considered estimated and have been flagged "J" on the data tables. Low area counts (<50% of the corresponding area counts in the associated CCV standard) were observed for the internal standards naphthalene-d_{10} in the semivolatile analysis of this sample.*

The lab reanalyzed the extract. All internal standards in the re-analysis met the 50-200% requirement. This analysis is documented on page 522 and page 523. The analysis that has the internal standards in control could be reported to lessen the qualification of data. Only one analysis was reported due to reporting constraints of only one analysis per sample be reported.

I hope this answers some of your questions concerning the data validation reports. If I can be of further assistance or if you would like the additional analyses as discussed in this letter, do not hesitate to give me a call at (330) 966-8284.

Sincerely,

Beth Lambert

Beth Lambert
Quality Assurance Manager

ENVIRONMENTAL STANDARDS

Setting the Standards for Innovative Environmental Solutions

October 5, 2001

Mr. Mark P. Hemingway
Principal Hydrogeologist
Geomatrix Consultants
1214 West Sixth Street
Suite 201
Austin, TX 78703

Dear Mr. Hemingway:

Enclosed is the quality assurance review for the soil and aqueous samples collected on March 11, 13, and 14, 2001, as part of the Morton – Reading, Ohio Project. Organic sample data were qualified as unreliable due to calibration issues, surrogate compound recoveries, and very low laboratory control sample recoveries. In addition, organic sample data were qualified as estimated due to calibration issues, low laboratory control sample recoveries and imprecision, and reported results below the quantitation limit. Inorganic sample data were qualified as estimated due to blank contamination, contract-required detection limit standard recoveries, matrix spike/matrix spike duplicate recoveries, laboratory control sample/laboratory control sample duplicate recoveries, and instrumental bias observed in the method blanks.

With respect to data package deliverables, the laboratory provided sufficient quality control summary forms and supporting raw data to allow for complete validation of the data. Only minor correctable deficiencies were noted during the review of the data.

If you have any questions or comments, or if we can be of further assistance, please feel free to call.

Sincerely,

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist II/
Project Manager

Sincerely,

Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

DJL/RJV:hm/hb
Enc.

ENVIRONMENTAL STANDARDS
www.EnvStd.com
1140 Valley Forge Road, P.O. Box 810, Valley Forge, PA 19482-0810 ■ 610-935-5577 ■ OffNPL@EnvStd.com
1111 Kennedy Place, Suite 2, Davis, CA 95616 ■ 530-758-1903 ■ ENVSTDWEST@AOL.com
Copper Bend Centre, 956 South 59th Street, Belleville, IL 62223 ■ 618-257-3800 ■ MIDWEST@EnvStd.com

Setting the Standards for Innovative
Environmental Solutions

QUALITY ASSURANCE REVIEW

OF SAMPLES COLLECTED ON MARCH 11, 13, AND 14, 2001

AS PART OF THE MORTON – READING, OHIO

PROJECT

October 5, 2001

Prepared for:

GEOMATRIX CONSULTANTS
1214 West Sixth Street
Suite 201
Austin, TX 78703

Prepared by:

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

ENVIRONMENTAL STANDARDS
www.EnvStd.com
1140 Valley Forge Road, P.O. Box 810, Valley Forge, PA 19482-0810 ■ 610-935-5577 ■ OffNPL@EnvStd.com
1111 Kennedy Place, Suite 2, Davis, CA 95616 ■ 530-758-1903 ■ ENVSTDWEST@AOL.com
Copper Bend Centre, 956 South 59th Street, Belleville, IL 62223 ■ 618-257-3800 ■ MIDWEST@EnvStd.com

TABLE OF CONTENTS

Introduction

Section 1 **Quality Assurance Review**

A. Organic Data

B. Inorganic Data and General Chemistry Data

C. Conclusions

Section 2 **Analytical Results**

Section 3 **Organic Data Support Documentation**

Section 4 **Inorganic and General Chemistry Data Support Documentation**

Section 5 **Project Chain-of-Custody Records and Case Narratives**

Section 6 **Project Correspondence**

Introduction

This quality assurance (QA) review is based upon a rigorous examination of the data generated from the analyses of the samples collected on March 11, 13, and 14, 2001, as part of the Morton – Reading, Ohio Project. The samples included in this QA review are presented on Table 1. The laboratory was requested to prepare a detailed data package to substantiate the reported analytical results. The data package that was prepared allowed for the performance of a comprehensive review.

This review has been performed with guidance from the "National Functional Guidelines for Organic Data Review" (US EPA, October 1999) and the "National Functional Guidelines for Inorganic Data Review" (US EPA, February 1994).

The reported analytical results are presented as a summary of the data in Section 2. Data were examined to determine the usability of the analytical results and compliance relative to the analytical requirements specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition" (SW-846) and the Quality Assurance Project Plan Facility Investigation RCRA §3013 Administrative Order for the Morton International, Inc. Facility located in Reading, Ohio. Qualifier codes have been placed next to the results to enable the data user to quickly assess the qualitative and/or quantitative reliability of any result. Details of this QA review are presented in Section 1 of this report. This critical QA review identifies data quality issues for specific samples and specific evaluation criteria. The data qualifications allow the data user to best understand the usability of the analysis results. Data not qualified in this report should be considered valid based on the quality control (QC) criteria that have been reviewed.

TABLE 1

SAMPLES THAT HAVE UNDERGONE

A RIGOROUS QUALITY ASSURANCE REVIEW

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Matrix	Date Sample Collected	Parameter(s) Analyzed
031101019	A1C130135-001	A1C130135	Soil	3/11/01	V, SVOA, Pest, PCB, M[1], CN, AIS
031101020	A1C130135-002	A1C130135	Soil	3/11/01	pH, TOC
031101020DUP (Laboratory Duplicate)	A1C130135-002DUP	A1C130135	Soil	3/11/01	pH
031101021	A1C130135-003	A1C130135	Soil	3/11/01	V, SVOA, Pest, PCB, M[1], CN, AIS
031101022	A1C130135-004	A1C130135	Soil	3/11/01	pH, TOC
Trip Blank (COC032203)	A1C130135-007	A1C130135	Aq	3/11/01	V
031101023	A1C130135-005	A1C130135	Soil	3/11/01	pH, TOC
031101024	A1C130135-006	A1C130135	Soil	3/11/01	pH, TOC
031101024DUP (Laboratory Duplicate)	A1C130135-006DUP	A1C130135	Soil	3/11/01	pH, TOC
031301025	A1C140189-001	A1C130135	Soil	3/13/01	V, SVOA, Pest, PCB, M[1], CN, AIS
031301025MS (Matrix Spike)	A1C140189-001MS	A1C130135	Soil	3/13/01	AIS
031301025SD (Matrix Spike Duplicate)	A1C140189-001SD	A1C130135	Soil	3/13/01	AIS
031301026	A1C140189-002	A1C130135	Soil	3/13/01	V, SVOA, Pest, PCB, M[1], CN, AIS
031301027	A1C140189-003	A1C130135	Soil	3/13/01	pH, TOC
031301028	A1C140189-004	A1C130135	Soil	3/13/01	pH, TOC

TABLE 1 (Cont.)

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Matrix	Date Sample Collected	Parameter(s) Analyzed
031301028DUP (Laboratory Duplicate)	A1C140189-004DUP	A1C130135	Soil	3/13/01	pH
031301029	A1C140189-005	A1C130135	Aq	3/13/01	V, SVOA, Pest, PCB, M[1], CN, AIS
031301029-RE (Reanalysis)	A1C140189-005	A1C130135	Aq	3/13/01	SVOA
Trip Blank (COC032205)	A1C140189-006	A1C130135	Aq	3/13/01	V
031401030	A1C150207-001	A1C130135	Aq	3/14/01	V*, SVOA*, Pest*, PCB, M[2], CN, S
Trip Blank (COC032206)	A1C150207-002	A1C130135	Aq	3/14/01	V*
031401031	A1C150207-003	A1C130135	Soil	3/14/01	V*, SVOA*, Pest*, PCB, D/F, M[2], CN, AIS
031401031MS (Matrix Spike)	A1C150207-003MS	A1C130135	Soil	3/14/01	D/F
031401031MSD (Matrix Spike Duplicate)	A1C150207-003MSD	A1C130135	Soil	3/14/01	D/F
031401032	A1C150207-004	A1C130135	Soil	3/14/01	V*, SVOA*, Pest*, PCB, D/F, M[2], CN, AIS
031401033	A1C150207-005	A1C130135	Soil	3/14/01	pH, TOC
031401033DUP (Laboratory Duplicate)	A1C150207-005DUP	A1C130135	Soil	3/14/01	pH, TOC

NOTES:

V - TCL Volatile Organic Compounds by SW-846 Method 8260B.
V* - Appendix IX Volatile Organic Compounds by SW-846 Method 8260B.
SVOA - TCL Semivolatile Organic Compounds by SW-846 Method 8270C.
SVOA*- Appendix IX Semivolatile Organic Compounds by SW-846 Method 8270C.

TABLE 1 (Cont.)

NOTES (Cont.):

Pest	-	TCL Organochlorine Pesticides by SW-846 Method 8081A.
Pest*	-	Appendix IX Organochlorine Pesticides by SW-846 Method 8081A.
PCB	-	PCBs (specifically, Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) by SW-846 Method 8082.
D/F	-	2,3,7,8-Tetrachlorodibenzo-*p*-dioxin and Select Total Dioxins and Furans by SW-846 Method 8280A.
M^1	-	TAL Metals by SW-846 Methods 6010B and 7471A.
M^2	-	Select Metals (specifically, TAL metals plus tin and minus aluminum, calcium, iron, magnesium, manganese, potassium, and sodium) by SW-846 Methods 6010B and 7471A.
CN	-	Cyanide by SW-846 Method 9012A.
AIS	-	Acid-insoluble Sulfide by SW-846 Method 9030A.
S	-	Total Sulfide by MCAWW Method 376.1.
TOC	-	Total Organic Carbon by EPA Method 415.1.
pH	-	pH by SW-846 Method 9045C.
Aq	-	Aqueous.

Section 1 Quality Assurance Review

A. Organic Data

The organic analyses of eight soil samples and six aqueous samples were performed by Severn Trent Laboratories, Inc. of North Canton, Ohio. Seven samples were analyzed for TCL volatile organic compounds by SW-846 Method 8260B; four samples (including QC samples) were analyzed for Appendix IX Volatile Organic Compounds by SW-846 Method 8260B; six samples were analyzed for TCL Semivolatile Organic Compounds by SW-846 Method 8270C; three samples (including QC samples) were analyzed for Appendix IX Semivolatile Organic Compounds by SW-846 Method 8270C; five samples (including QC samples) were analyzed for TCL Organochlorine Pesticides by SW-846 Method 8081A; three samples were analyzed for Appendix IX Organochlorine Pesticides by SW-846 Method 8081A; and eight samples (including QC samples) were analyzed for PCBs (specifically, Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) by SW-846 Method 8082. In addition, four samples were analyzed for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, total tetrachlorodibenzo-*p*-dioxins (TCDD), total pentachlorodibenzo-*p*-dioxins (PeCDD), total hexachlorodibenzo-*p*-dioxins (HxCDD), total tetrachlorodibenzo-*p*-furans (TCDF), total pentachlorodibenzo-*p*-furans (PeCDF), and total hexachlorodibenzo-*p*-furans (HxCDF) by the STL facility in West Sacramento, California. These analyses are indicated on Table 1 and the analytical results are summarized in Section 2 of this report.

The findings offered in this report are based upon a rigorous review of holding times, blank analysis results, system monitoring compound recoveries, blank spike recoveries and precision, initial and continuing calibrations, target compound matching quality, analytical sequence, retention times, gas chromatography/mass spectroscopy (GC/MS) tuning and mass calibration, internal standard performance, quantitation of positive results, and overall system performance.

A few deficiencies were identified as detailed below. The Environmental Standards, Inc. (Environmental Standards) data reviewer has edited the laboratory-reported data and QC summary forms based on the deficiencies and comments listed in this QA review. Furthermore, the Environmental Standards data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support these edits in the Organic Data Support Documentation (Section 3) of this review. The following deficiencies and comments do not necessarily affect data usability. Usability is addressed in the subsequent Organic Data Qualifiers section.

Correctable Deficiencies

1. In the volatile fraction, the laboratory incorrectly reported the initial calibration dates, times, and/or file IDs on several of the calibration summary forms.

2. For the semivolatile fraction, the initial calibration starting date and time reported on the Initial Calibration Data summary forms (Form VIs) and the associated Continuing Calibration Compounds summary forms (Form VIIs) for instrument A4HP7 did not correspond to the starting calibration dates and times in the associated raw data. In addition, the initial calibration file names reported on the Form VI did not match the raw data file names.

3. For the pesticide and PCB fractions, the initial calibration dates and times reported on the Initial Calibration Data forms, the associated Continuing Calibration Compounds forms, and on the associated Pesticide Analytical Sequence summaries (Form VIIIs) did not correspond to the calibration dates and times from the associated raw data.

4. For the pesticide fraction, the laboratory did not report the Performance Evaluation Mixtures (PEMs) analyzed on 3/16/01 at 00:46 and on 3/18/01 at 12:42 on the associated Form VIIIs.

5. For the pesticide fraction, the laboratory did not perform alternate calibration for the compounds 4,4′-DDT and methoxychlor that exhibited relative standard deviations (RSDs) greater than 20% for the calibration factors from the initial calibration analyzed on 3/26/01. According to SW-846 Method 8081A (Section 7.4.5.3), if the RSD of the calibration factor is greater than 20%, the analyst must use a calibration curve or a non-linear calibration model for quantitation. The compounds 4,4′-DDT and methoxychlor were not detected in the project samples; therefore, qualification of data was not warranted due to this issue.

6. For the pesticide fraction, the laboratory reported the concentration for kepone on the Continuing Calibration Compounds summary form for the continuing calibration analyzed on 3/18/01 at 11:58 as "0.00423 ng". According to the raw data, the concentration for kepone for the continuing calibration analyzed on 3/18/01 at 11:58 is 0.05979 ng. The data reviewer recalculated the percent drift for kepone on the aforementioned Continuing Calibration Compounds summary form based on the raw data. Qualification of data due to this issue is addressed in the subsequent Organic Data Qualifiers section.

7. For the pesticide and PCB fractions, the laboratory did not report the RPDs between LCS and LCSD results on the Check Sample Duplicate Recovery forms. The data reviewer was able to calculate the RPDs from the data provided. All RPDs for the target compounds were acceptable.

8. For the pesticide fraction, the laboratory reported the lower of the endrin aldehyde results obtained from the two chromatographic columns used for analysis for sample 031401032. According to SW-846 Method 8000 (Section 7.10.4.2), if the RPD between the results obtained from separate chromatographic columns is greater than 40% and there is no

evidence of chromatographic problems, the higher result should be reported. Qualification of data due to this issue is addressed in the subsequent Organic Data Qualifiers section.

9. The laboratory reported an incorrect date of analysis on the summary report for sample 031401032 for the dioxin and furan analyses. The summary form indicates that the sample was analyzed on 3/22/01; however, the raw data indicate that this sample was analyzed on 3/23/01.

10. The laboratory used an acceptance range of 1.24-1.78 for the mass ratios for 1,2,3,7,8-pentachlorodibenzo-*p*-dioxin and 1,2,3,7,8-PeCDF. According to SW-846 Method 8280A (Table 9), the laboratory should have used an acceptance range of 1.32-1.78. The data reviewer reviewed all mass ratios and determined that all ratios were within the method criterion.

11. The laboratory analyzed closing calibration standards as part of the analytical run for dioxins and furans, but the results of these continuing calibrations were not summarized on quality control forms. The data reviewer summarized the results of the closing calibration standards and used the results to qualify data if necessary.

Noncorrectable Deficiencies

1. The sample cooler received by the laboratory on 3/14/01 had a temperature of 1.2°C according to the STL Cooler Receipt Form. The laboratory did not indicate that any samples were received frozen or that any sample containers were broken; therefore, qualification of data was not warranted due to this deficiency.

2. In the volatile fraction, the results for several target compounds were outside of the control limits in the blank spike/blank spike duplicate analyses and the laboratory did not reanalyze the associated samples. According to SW-846 Method 8000B (Section 8.7.4), the laboratory should correct the system and reanalyze the associated samples when blank spike results are outside of the control limits. The impact on data usability due to the out of control blank spike results is addressed in the subsequent Organic Data Qualifiers section.

3. In the volatile fraction, En Core® samples 031101019 and 031101021 were received by the laboratory approximately 1 hour beyond the recommended holding time. According to SW-846 Method 5035 (Section 6.2.1.8), En Core® samples should be transferred into a 40-mL vial with methanol, bisulfate, and water within 48 hours of collection. Samples 031101019 and 031101021 were collected on 3/11/01 at 0930 and 0955, respectively. The samples were received by the laboratory at 1030 on 3/13/01. The samples were analyzed within the required 14 days of collection; therefore, qualification of data was not warranted due to this deficiency.

4. For the semivolatile fraction, the laboratory analyzed samples after invalid initial calibration curves (*i.e.*, coefficient of determination [COD] < 0.99) were generated for the compounds 2-nitrophenol, fluorene, 2,4-dinitrophenol *a,a*-dimethylphenethylamine; *p*-phenylenediamine; and hexachlorocyclopentadiene in the initial calibration initiated on 3/06/01 at 17:32 on instrument A4HP9. In addition, the laboratory analyzed samples after invalid initial calibration curves (COD < 0.99) were generated for the compounds *a,a*-dimethylphenethylamine; *p*-phenylenediamine; and 3,3′-dimethylbenzidine in the initial calibration initiated on 3/21/01 at 09:24 on instrument A4HP9. According to SW-846 Method 8000B (Section 7.5.3), when a non-linear curve is utilized, the COD must be greater than or equal to 0.99. Data were not affected by this issue because positive results were not reported for these compounds in the project samples.

5. For the pesticide fraction, the laboratory analyzed samples after invalid calibration verifications (*i.e.*, percent differences and/or percent drifts > 15%) analyzed on 3/16/01 at 12:12, on 3/18/01 at 11:58, on 3/19/01 at 01:13, on 3/19/01 at 10:46, on 3/19/01 at 14:28, on 3/19/01 at 14:50, and on 3/22/01 at 11:24. According to SW-846 Method 8081A (Section 7.5.2.3), if the calibration response for an analyte is not within ±15%, a new initial calibration must be prepared. Qualification of data due to this issue is addressed in the subsequent Organic Data Qualifiers section.

Comments

1. In the volatile fraction, sample Trip Blank (COC032205; collected on 3/13/01) was not requested for volatile organic analysis on the Chain-of-Custody Record. The data reviewer assumed that the request for volatile organic analysis of this sample was inadvertently omitted.

2. In the volatile fraction, the laboratory did not perform MS/MSD analyses on any of the project samples; therefore, the data reviewer could not evaluate the accuracy and precision of the analytical method relative to the project-specific sample matrices.

3. The quantitation limits for volatile organic compounds in sample 031401031 are elevated due to the increased extract and injection volumes used for analysis.

4. For the semivolatile fraction, the laboratory did not apply an alternate initial calibration option (*i.e.*, linear or quadratic) when the RSD for the compound famphur was greater than 15% in the initial calibration performed on instrument A4HP9 on 3/21/01 from 09:24 to 15:15. According to SW-846 Method 8270C (Section 7.3.7.1), alternate calibration options must be applied for any compound with a RSD greater than 15%. There were no reported positive results for famphur; consequently, qualification of data was not warranted due to this issue.

5. For the semivolatile fraction, the laboratory reported the compounds 2,2′-oxybis(1-chloropropane); 1,3-dinitrobenzene; and thionazin on the Form I's and these same compounds as bis(2-chloroisopropyl)ether, *m*-dinitrobenzene, and zinophos, respectively, on the Initial Calibration Data and Continuing Calibration Compounds summaries. The data reviewer reported these compounds on the data tables as the compounds were reported on the Form I's.

6. For the semivolatile fraction, the laboratory analyzed a 24-ppb continuing calibration standard on instrument A4HP6 on 3/20/01 at 08:12. The same instrument analyzed a 16-ppb continuing calibration standard in an associated sequence. All other instruments utilized 16-ppb continuing calibrations. There is no true "midpoint" standard concentration to utilize for continuing calibration standards because there were six standards analyzed in the initial calibration.

7. For the semivolatile fraction, sample 031401032 was analyzed at a 50-fold dilution due to matrix interference. The quantitation limits in this sample were raised accordingly.

8. For the semivolatile fraction, the laboratory did not report acetophenone; atrizine; benzaldehyde; 1,1′-biphenyl; and caprolactum in the LCS analyses. According to the laboratory, these compounds are not in the LCS spiking mixture and, therefore, are not on the LCS forms. The laboratory is in the process of adding these five compounds to the spiking solution.

9. For the pesticide fraction, sample 031301026 was analyzed at a five-fold dilution, sample 031401031 was analyzed at a four-fold dilution, and sample 031401032 was analyzed at a 40-fold dilution due to matrix interferences in these samples. The quantitation limits for these samples were raised accordingly.

10. For the pesticide fraction, Environmental Standards requested a number of deliverables (related to the Case Narratives, initial calibrations, and RT windows) that were missing from the data package. The laboratory's responses to these requests have been included in the Project Correspondence (Section 6).

11. For the pesticide fraction, the laboratory appeared to have quantitated the PEM analyzed on the secondary column on 3/19/01 at 21:51 against an incorrect method file. Upon Environmental Standards' inquiry, the laboratory stated that there was a software error and confirmed that the aforementioned PEM was quantitated against the correct method file.

12. For the PCB fraction, sample 031401032 was analyzed at a 50-fold dilution due to matrix interference. Sample 031401030 was analyzed at a five-fold dilution due to a high concentration of a target compound. The quantitation limits in these samples were raised accordingly.

With respect to data usability, the principal areas of concern are calibration issues, low blank spike recoveries and imprecision, and reported results below the quantitation limit. Based on a rigorous review of the data provided, the following organic data qualifiers are offered. The following organic data usability issues represent an interpretation of the QC results obtained for the project samples. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Organic Data Qualifiers

- Although not qualified due to blank contamination, the positive results for acetone in samples 031101019, 03130126, and 031401032, and for methylene chloride in samples 031301025 and 031301026 should be used with caution. These compounds are very common laboratory contaminants and were observed in the aforementioned samples at low concentrations.

- The analyses for acrolein, acetonitrile, propionitrile, and isobutanol in samples 031401030, 031401031, 031401032, and Trip Blank (COC032206) should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low relative response factors (RRFs <0.050) were observed for these compounds in the associated initial and/or continuing calibration standards. It should be noted that the RRFs are a function of not only the instrument response for the compound but also of the instrument response for the associated internal standard. If the laboratory had used an internal standard that more closely matched the instrument response for the target compound, the RRFs would have been acceptable and data would not be affected.

- The analysis for 4-chloroaniline in sample 031301029, for hexachlorocyclopentadiene in the reanalysis of sample 031301029, and for hexachlorocyclopentadiene in sample 031401030 should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low percent recoveries (<10%) were observed for these compounds in the associated LCS analyses.

- The analysis for 4-nitroquinoline-1-oxide in sample 031401030 should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. A very low (<0.05) average relative response factor was observed for this compound in the associate initial multipoint calibration. It should be noted that the RRFs are a function of not only the instrument response for the compound but also of the instrument response for the associated internal standard. If the laboratory had used an internal standard that more closely matched the instrument response for the target compound, the RRFs would have been acceptable and data would not be affected.

- The analysis for all acid compounds in samples 031301029 and 031301029-RE should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<10%) were reported for the acid surrogate compound phenol-d_5 in the initial analysis and the reextraction/reanalysis of the sample for semivolatile organic compounds.

- The analysis for kepone in sample 031401030 should be considered unreliable, and the "not-detected" result has been flagged "R" on the data tables. A very high percent drift (>90%) was observed for kepone in the associated continuing calibration standard analysis.

- The quantitation limit for acetone in sample Trip Blank (COC032203) may be higher than reported, and the "not-detected" result has been flagged "UJ" on the data tables. A high percent drift (>20%), coupled with a decrease in instrument sensitivity, was obtained between the observed and expected concentrations in the associated continuing calibration standard.

- The quantitation limits for dichlorodifluoromethane in samples 031101019 and 031101021 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. A high percent difference (%D>20%), coupled with a decrease in instrument sensitivity, was obtained between the average RRF of the initial calibration and the RRF in the associated continuing calibration.

- The quantitation limits for acetone and acrolein in samples 031401030 and Trip Blank (COC032206) may be higher than reported, and the "not-detected" results have been flagged "UJ" (unless previously flagged "R") on the data tables. High %Ds (>20%), coupled with decreases in instrument sensitivity, were obtained between the average RRFs of the initial calibration and the RRFs in the associated continuing calibration.

- The quantitation limits for dichlorodifluoromethane and *trans*-1,3-dichloropropene in sample Trip Blank (COC032203) and for propionitrile, methylmethacrylate; 1,1,1,2-tetrachloroethane; and acetonitrile in sample 03141032 should be considered estimated, and the "not-detected" results have been flagged "UJ" on the data tables (unless previously flagged "R"). High percent differences in the direction of increased instrument sensitivity were observed for these compounds in the associated continuing calibration standard analyses. The quantitation limits for the compounds in the aforementioned samples may be acceptable as reported because the bias was in the direction of increased instrument sensitivity.

- The quantitation limits for acetone in samples 031101021 and 031301025; 2-butanone in samples 031101019 and 031101021; 2-butanone, 4-methyl-2-pentanone, and 2-hexanone in samples 031301025 and 031301026; and bromomethane, chloroethane, and carbon disulfide in sample 031401031 may be higher than reported, and the "not-detected" results

have been flagged "UJ" on the data tables. In addition, the reported positive results for acetone in samples 031101019 and 031301026 should be considered estimated and have been flagged "J" on the data tables. Low recoveries (<70%) were observed for these compounds in the associated LCS analyses.

- The reported positive result for acetone in sample 031301026 should be considered estimated and has been flagged "J" on the data tables. A high relative percent difference (>40%) was observed between the results for acetone in the associated LCS analyses.

- The quantitation limit for 3-nitroanaline in sample 031301029 and for diethylphthalate and dimethylphthalate in sample 031401030 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (10%<%R<50%) were observed for these compounds in the associated LCS analyses.

- The quantitation limit for 4-nitrophenol in sample 031401030 should be considered estimated, and the "not-detected" result has been flagged "UJ" on the data tables (unless previously flagged "R"). A high percent difference (>20%) in the direction of increased instrument sensitivity was observed for this compound in the associated continuing calibration standard analysis. The quantitation limit for the compound in the aforementioned sample may be acceptable as reported because the bias was in the direction of increased instrument sensitivity.

- The quantitation limits for the compounds in the following samples may be higher than reported, and the "not-detected" results have been flagged "UJ" (unless previously flagged "R") on the data tables. High %Ds (>20%), coupled with decreases in instrument sensitivity, were observed for these compounds in the associated continuing calibration standards.

Compounds	Sample(s) With Biased Low Quantitation Limits ("UJ")
hexachlorocyclopentadiene; 3,3′-dimethylbenzidine; *p*-phenylenediamine; *a,a*-dimethyl-phenethylamine; 7,12-dimethylbenz(a)anthracene; and famphur	031401030
bis(2-chloroethyl)ether	031301025 and 031301026
4-nitrophenol and *a,a*-dimethyl-phenethylamine	031401031 and 031401032

- The reported positive result for endrin aldehyde in sample 031401032 should be considered estimated and has been flagged "J" on the data tables. A high difference (>±RL) was observed between the results obtained from the two chromatographic columns used in the analysis of this sample.

- The quantitation limits for the compounds in the following samples may be higher than reported, and the "not-detected" results have been flagged "UJ" (unless previously flagged "R") on the data tables. High %Ds (>15%), coupled with decreases in instrument sensitivity, were observed for these compounds in the associated continuing calibration standards.

Compound(s)	Sample(s) With Biased Low Quantitation Limits ("UJ")
isodrin	031401030
kepone and diallate	031401030, 031401031, and 031401032

- Per US EPA reporting requirements, all positive results reported at levels less than the quantitation limits (adjusted for dilutions) should be considered estimated and have been flagged "J" on the data tables.

A complete support document of this organic QA review is provided in Section 3 of this report.

B. Inorganic and General Chemistry Data

The general chemistry analyses of 19 solid samples (including QC samples) and two aqueous samples were performed by Severn Trent Laboratories, Inc. of North Canton, Ohio. Eight samples were analyzed for target analyte list (TAL) and select metals by SW-846 Methods 6010B and 7470A/7471A; eight samples were analyzed for cyanide by SW-846 Method 9012A; eight samples (including QC samples) were analyzed for acid-insoluble sulfide by SW-846 Method 9030A; two samples were analyzed for total sulfide by MCAWW Method 376.1; all samples were analyzed for pH by SW-846 Method 9045C; and eight samples were analyzed for total organic carbon by the MSA Walkley-Black Method. These analyses are indicated on Table 1. The analytical results are summarized in Section 2 of this report.

The findings offered in this report are based upon a rigorous review of holding times, blank analysis results, LCS results and recoveries, contract-required detection limit (CRDL) standard recoveries, interference check standard results and recoveries, serial dilution results, initial and continuing calibrations, analytical sequence, and quantitation of positive results.

A few deficiencies were identified as detailed below. The Environmental Standards data reviewer has edited the laboratory-reported data and QC summary forms based on the deficiencies and comments listed in this QA review. Furthermore, the Environmental Standards data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support these edits in the Inorganic Data Support Documentation (Section 4) of this review. The following deficiencies and comments do not necessarily affect data usability. Usability is addressed in the subsequent Organic Data Qualifiers section.

Correctable Deficiencies

1. The laboratory reported the spike amounts for silver, cobalt, chromium, and vanadium as "0.050," "0.50," "0.20," and "0.50," respectively, on the Laboratory Control Sample Data Report (Form VII) for LCS A1C150000-092. According to the raw data, the correct spike amounts for silver, cobalt, chromium, and vanadium are 50.0 µg/L, 500 µg/L, 200 µg/L, and 500 µg/L, respectively.

2. The laboratory did not calculate serial dilution percent differences on the Serial Dilution RPD Report (Form IX) for the positive results observed. The data reviewer calculated the percent differences, and all the percent differences were outside of acceptance criteria; however, the original sample results were less than 50 × the instrument detection limit (IDL). Qualification of data was not warranted due to this issue.

3. The laboratory reported the sample results for barium, beryllium, and zinc as "ND" (not-detected) on the Total Metals Analytical Summary Form (Form I) for sample 031401030. According to the raw data, the correct sample results for barium, beryllium, and zinc are 0.60 µg/L, 0.31 µg/L, and 3.1 µg/L, respectively.

4. In the cyanide fraction, the laboratory did not summarize the results or recoveries for the initial and continuing calibration verifications (ICVs/CCVs), the initial and continuing calibration blanks (ICBs/CCBs), and CRDL standards. The data reviewer was able to evaluate the ICV/CCV, ICB/CCB, and CRDL standards results based on the raw data provided. All results were within acceptance criteria; consequently, qualification of data was not warranted due to this issue.

5. In the cyanide fraction, the laboratory reported the QC sample analyzed in position 40 as "CCV" on the raw data for the analytical sequences performed on 3/23/01, 3/25/01, and 3/27/01. According to the raw data, the QC sample analyzed in position 40 was a CCB.

Noncorrectable Deficiency

- One sample cooler was received at STL-North Canton at a temperature of 1.2°C. According to SW-846 (Section 2, Table 2-36), aqueous samples are to be preserved at a temperature of 4±2°C. STL-North Canton did not indicate that any samples were frozen or that any sample containers were broken; therefore, qualification of data was not warranted due to this issue.

Comments

1. The laboratory did not provide summary forms for the CRDL standard analyses. CRDL standard true values were reported in the mercury raw data but were not reported for the ICP metals fraction. Upon Environmental Standard's request, the laboratory stated that nominal spike concentrations for the ICP target analytes in the CRDL standards would be provided. This information was not provided by the laboratory; consequently, the data reviewer could not evaluate ICP metals data usability on the basis of CRDL standard results and recoveries.

2. The laboratory did not report the concentrations for several or all the interference analytes (aluminum, calcium, iron, and magnesium) on the Interference Check Standard summary forms (Form IVs) for the metals analytical sequences performed on 3/22/01; this omission was presumably because these analytes were not target analytes. The data reviewer obtained the essential ICP interferent information from the raw data provided and reviewed the concentrations of these analytes to determine any possible impact on data quality.

3. The laboratory did not record final volumes for the project or QC samples on the Metals Prep Logs; however, final volume information was reported on the Metals Preparation Summary sheet.

4. The laboratory did not provide the instrument runlog (Form XIV) for the ICP analytical sequence performed on 3/19/01. Upon Environmental Standard's request, the instrument runlog was provided and has been included in Section 6.

5. Sample 031301026 was analyzed at a 10-fold dilution due to high concentrations of the target compounds calcium and magnesium.

With respect to data usability, the principal areas of concern are blank contamination, significant negative instrument bias, low CRDL standard recoveries, low recoveries in MS/MSD analyses, and low recoveries in the LCS/LCSD analyses. Based on a rigorous review of the data provided, the following inorganic data qualifiers are offered. The following organic data usability issues represent an interpretation of the QC results obtained for the project samples. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Inorganic Data Qualifiers

- Due to trace level presence of the following analytes in the associated laboratory blanks, the positive results for the following analytes in the samples listed below should be considered "not-detected"; consequently, these results have been flagged "U*" on the data tables.

Analyte(s)	Sample With Result(s) Qualified as "Not-Detected"
beryllium	031301026
aluminum and manganese	031301029
barium, beryllium, and zinc	031401030
tin	031401031

- The detection limits for copper in samples 031301029 and 031401030 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, the reported positive result for aluminum in sample 031301029 should be considered estimated and has been flagged "J" on the data tables (unless previously flagged "U*"). Significant negative instrument bias (>2× the IDL) was observed for aluminum and copper in the associated laboratory blanks. Furthermore, the concentrations of aluminum and copper in the aforementioned samples were significantly less than the observed negative bias.

- The detection limits for mercury in samples 031301029 and 031401030 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<85%) were observed for mercury in the associated CRDL standard analyses.

- The detection limit for acid-insoluble sulfide in sample 031301025 may be higher than reported, and the "not-detected" result has been flagged "UJ" on the data tables. In addition, the reported positive results for acid-insoluble sulfide in samples 031301026, 031401031, and 031401032 should be considered estimated and have been flagged "J" on

the data tables. Low recoveries (10%<%R<75%) were observed for acid-insoluble sulfide in the associated MS/MSD analyses.

- The detection limit for total sulfide in sample 031301029 may be higher than reported, and the "not-detected" result has been flagged "UJ" on the data tables. Low recoveries (10%<%R<80%) were observed for total sulfide in the associated LCS/LCSD analyses.

- The detection limits for cyanide in samples 031301029 and 031401030 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. A low recovery (10%<%R<80%) was observed for cyanide in the associated LCS analysis.

A complete support document of this organic QA review is provided in Section 4 of this report.

C. Conclusions

This QA review has identified several aspects of the data that required qualification. The analytical data should be considered acceptable for use unless otherwise indicated in the QA review. In order to use any of the data, the data user should understand the qualifications and limitations specified in this QA review. The Project Chain-of-Custody Records are presented in Section 5. Project Correspondence is presented in Section 6.

Report prepared by:

Thomas H. Weinmann
Quality Assurance Chemist

Report reviewed by:

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist II

Report reviewed and approved by:

Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

(610) 935-5577

Date: 10/5/01

w:\geomatrix\rohm haas\dv\y1071626\final\report2.doc

ENVIRONMENTAL STANDARDS

Setting the Standards for Innovative Environmental Solutions

September 25, 2001

Mr. Mark P. Hemingway
Principal Hydrogeologist
Geomatrix Consultants
1214 West Sixth Street
Suite 201
Austin, TX 78703

Dear Mr. Hemingway:

Enclosed is the quality assurance review for the aqueous samples collected on May 8, 2001, as part of the Morton – Reading, Ohio Project. Organic data were qualified as unreliable due to calibration issues and very low laboratory control sample recoveries. In addition, organic data were qualified as estimated due to calibration issues, a low laboratory control sample recovery, low recoveries in the matrix spike/matrix spike duplicate analyses, high surrogate compound recoveries, imprecision of reported results from two separate chromatographic columns, and reported results less than the quantitation limit. For the inorganics analyses, sample data were qualified as unreliable due to very low matrix spike/matrix spike duplicate recoveries. Inorganic data were qualified as estimated due to instrumental interferences and low matrix spike/matrix spike duplicate recoveries.

With respect to data package deliverables, the laboratory provided sufficient quality control summary forms and supporting raw data to allow for complete validation of the data. Several deficiencies were noted during the review of the data.

If you have any questions or comments, or if we can be of further assistance, please feel free to call.

Sincerely,

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist II/
Project Manager

Sincerely,

David R. Blyer Sr.

Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

DJL/RJV:hm
Enc.

ENVIRONMENTAL STANDARDS
www.EnvStd.com
1140 Valley Forge Road, P.O. Box 810, Valley Forge, PA 19482-0810 ■ 610-935-5577 ■ OffNPL@EnvStd.com
1111 Kennedy Place, Suite 2, Davis, CA 95616 ■ 530-758-1903 ■ ENVSTDWEST@AOL.com
Copper Bend Centre, 956 South 59th Street, Belleville, IL 62223 ■ 618-257-3800 ■ MIDWEST@EnvStd.com

Setting the Standards for Innovative
Environmental Solutions

QUALITY ASSURANCE REVIEW

OF SAMPLES COLLECTED ON MAY 8, 2001

AS PART OF THE MORTON – READING, OHIO

PROJECT

September 25, 2001

Prepared for:

GEOMATRIX CONSULTANTS
1214 West Sixth Street
Suite 201
Austin, TX 78703

Prepared by:

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

TABLE OF CONTENTS

Introduction

Section 1 Quality Assurance Review

A. Organic Data

B. Inorganic Data

C. General Chemistry Data

Section 2 Analytical Results

Section 3 Organic Data Support Documentation

Section 4 Inorganic and General Chemistry Data Support Documentation

Section 5 Project Chain-of-Custody Records and Case Narratives

Section 6 Project Correspondence

Introduction

This quality assurance (QA) review is based upon a rigorous examination of the data generated from the analyses of the samples collected on May 8, 2001, as part of the Morton – Reading, Ohio Project. The samples included in this QA review are presented on Table 1. The laboratory was requested to prepare a detailed data package to substantiate the reported analytical results. The data package that was prepared allowed for the performance of a comprehensive review.

This review has been performed with guidance from the "National Functional Guidelines for Organic Data Review" (US EPA, October 1999) and the "National Functional Guidelines for Inorganic Data Review" (US EPA, February 1994).

The reported analytical results are presented as a summary of the data in Section 2. Data were examined to determine the usability of the analytical results and compliance relative to the analytical requirements specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition" (SW-846) and the Quality Assurance Project Plan Facility Investigation RCRA §3013 Administrative Order for the Morton International, Inc. Facility in Reading, Ohio. Qualifier codes have been placed next to the results to enable the data user to quickly assess the qualitative and/or quantitative reliability of any result. Details of this QA review are presented in Section 1 of this report. This critical QA review identifies data quality issues for specific samples and specific evaluation criteria. The data qualifications allow the data user to best understand the usability of the analysis results. Data not qualified in this report should be considered valid based on the quality control (QC) criteria that have been reviewed.

TABLE 1

SAMPLES THAT HAVE UNDERGONE

A RIGOROUS QUALITY ASSURANCE REVIEW

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Date Sample Collected	Parameter(s) Analyzed
050801114	A1E090157-001	A1E090157	5/08/01	V, SVOA, Pest, PCB, M^1, M^*, OP, Alk, Cl, CN, FeII, FeIII, NO_3/NO_2, NH_4, P, TDS, TOC, SO_4, TSS
050801114S (Matrix Spike)	A1E090157-001	A1E090157	5/08/01	Cl, CN, NH_4, NO_3/NO_2, P, TOC
050801114D (Matrix Spike Duplicate)	A1E090157-001	A1E090157	5/08/01	Cl, CN, NH_4, NO_3/NO_2, P, TOC
050801114DUP (Laboratory Duplicate)	A1E090157-001	A1E090157	5/08/01	TDS, TSS
050801117	A1E090157-002	A1E090157	5/08/01	V, SVOA, Pest, PCB, M^1, M^*, OP, Alk, Cl, CN, FeII, FeIII, NO_3/NO_2, NH_4, P, TDS, TOC, SO_4, TSS
050801117S (Matrix Spike)	EC3LM1CW EC3LM1CX A1E090157-002	A1E090157	5/08/01	Pest PCB M^1, M^*, NO_3/NO_2
050801117D (Matrix Spike Duplicate)	EC3LM1CV EC3LM1C0 A1E090157-002	A1E090157	5/08/01	Pest PCB M^1, M^*, NO_3/NO_2
Trip Blank (COC035524)	A1E090157-003	A1E090157	5/08/01	V
050801118	A1E090157-004	A1E090157	5/08/01	V, SVOA, Pest, PCB, M^1, M^*, OP, Alk, Cl, CN, FeII, FeIII, NO_3/NO_2, NH_4, P, TDS, TOC, SO_4, TSS
050801120	A1E090157-005	A1E090157	5/08/01	V, SVOA, Pest, PCB, M^1, M^*, OP, Alk, Cl, CN, FeII, FeIII, NO_3/NO_2, NH_4, P, TDS, TOC, SO_4, TSS

TABLE 1 (Cont.)

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Date Sample Collected	Parameter(s) Analyzed
Trip Blank (COC035525)	A1E090157-006	A1E090157	5/08/01	V
050801113	A1E090157-007	A1E090157	5/08/01	V, SVOA, Pest, PCB, M^1, M^*, OP, Alk, Cl, CN, FeII, FeIII, NO_3/NO_2, NH_4, P, TDS, TOC, SO_4, TSS
Trip Blank (COC035523)	A1E090157-008	A1E090157	5/08/01	V
050801119	A1E090157-009	A1E090157	5/08/01	V*, SVOA*, Pest*, PCB, D/F, M^2, M^*, OP, Alk, Cl, CN, FeII, FeIII, NO_3/NO_2, NH_4, P, TDS, TOC, SO_4, TSS
050801119DUP (Laboratory Duplicate)	A1E090157-009	A1E090157	5/08/01	TDS, TSS
050801116	A1E090157-010	A1E090157	5/08/01	V*, SVOA*, Pest*, PCB, D/F, M^2, CN, SO_4
Trip Blank (COC035523)	A1E090157-011	A1E090157	5/08/01	V*
050801115	A1E090157-012	A1E090157	5/08/01	V*, SVOA*, Pest*, PCB, D/F, M^2, M^*, OP, Alk, Cl, CN, FeII, FeIII, NO_3/NO_2, NH_4, P, TDS, TOC, SO_4, TSS
050801115S (Matrix Spike)	EC3PT1DV EC3PT1DX EC3PT1D1 A1E090157-012	A1E090157	5/08/01	V* SVOA* D/F FeII, FeIII, OP, Alk
050801115D (Matrix Spike Duplicate)	EC3PT1DW EC3PT1DO EC3PT1D2 A1E090157-012	A1E090157	5/08/01	V* SVOA* D/F FeII, FeIII, OP, Alk

TABLE 1 (Cont.)

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Date Sample Collected	Parameter(s) Analyzed
050801115DUP (Laboratory Duplicate)	A1E090157-012	A1E090157	5/08/01	Alk
Trip Blank (COC035534)	A1E090157-013	A1E090157	5/08/01	V*

NOTES:

V - TCL Volatile Organic Compounds by SW-846 Method 8260B.
V* - Appendix IX Volatile Organic Compounds by SW-846 Method 8260B.
SVOA - TCL Semivolatile Organic Compounds by SW-846 Method 8270C.
SVOA*- Appendix IX Semivolatile Organic Compounds by SW-846 Method 8270C.
Pest - TCL Organochlorine Pesticides by SW-846 Method 8081A.
Pest* - Appendix IX Organochlorine Pesticides by SW-846 Method 8081A.
PCBs - PCBs (specifically, Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) by SW-846 Method 8082.
D/F - 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin and select total dioxins and furans by SW-846 Method 8280A.
M^1 - Total TAL Metals by SW-846 Methods 6010B and 7470A.
M^2 - Select Total Metals (specifically, TAL Metals including tin and minus manganese and aluminum) by SW-846 Methods 6010B and 7470A.
M^* - Dissolved Metals (specifically, calcium, iron, potassium, magnesium, and sodium) by SW-846 Method 6010B.
OP - Phosphorus as orthophosphate by EPA Method 365.2.
Alk - Bicarbonate alkalinity, carbonate alkalinity, and total alkalinity by EPA Method 310.1.
Cl - Chloride by EPA Method 300.0A.
CN - Total cyanide by SW-846 Method 9012A.
FeIII - Ferric Iron by Standard Methods for the Evaluation of Water and Waste, 18th Edition Method 3500-FE D.
FeII - Ferrous Iron by Standard Methods for the Evaluation of Water and Waste, 18th Edition Method 3500-FE D.
NO_3/NO_2 - Nitrate-Nitrite by EPA Method 353.2.
NH_4 - Nitrogen as ammonia by EPA Method 350.3.
P - Total phosphorus by EPA Method 365.2.
TDS - Total dissolved solids by EPA Method 160.1.
TOC - Total organic carbon by EPA Method 415.1.
SO_4 - Total sulfide by EPA Method 376.1.
TSS - Total Suspended Solids by EPA Method 160.2.

Section 1 Quality Assurance Review

A. Organic Data

The organic analyses of 17 aqueous samples (including QC samples) were performed by Severn Trent Laboratories, Inc. of North Canton, Ohio (STL-Ohio). Eight samples were analyzed for TCL volatile organic compounds by SW-846 Method 8260B; six samples (including QC samples) were analyzed for Appendix IX Volatile Organic Compounds by SW-846 Method 8260B; five samples were analyzed for TCL Semivolatile Organic Compounds by SW-846 Method 8270C; five samples (including QC samples) were analyzed for Appendix IX Semivolatile Organic Compounds by SW-846 Method 8270C; seven samples (including QC samples) were analyzed for TCL Organochlorine Pesticides by SW-846 Method 8081A; three samples were analyzed for Appendix IX Organochlorine Pesticides by SW-846 Method 8081A; and nine samples (including QC samples) were analyzed for PCBs (specifically, Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) by SW-846 Method 8082. In addition to the analyses performed by STL-Ohio, five samples were analyzed for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin; total tetrachlorodibenzo-*p*-dioxins (TCDD); total pentachlorodibenzo-*p*-dioxins (PeCDD); total hexachlorodibenzo-*p*-dioxins (HxCDD); total tetrachlorodibenzo-*p*-furans (TCDF); total pentachlorodibenzo-*p*-furans (PeCDF); and total hexachlorodibenzo-*p*-furans (HxCDF) by the STL facility in West Sacramento, California. These analyses are specified on Table 1 and the analytical results are summarized in Section 2 of this report.

The findings offered in this report are based upon a rigorous review of holding times, blank analysis results, system monitoring compound recoveries, matrix spike/matrix spike duplicate (MS/MSD) analysis accuracy and precision, laboratory control sample (LCS) recoveries, initial and continuing calibrations, target compound matching quality, analytical sequence, retention times (RTs), gas chromatography/mass spectroscopy (GC/MS) tuning and mass calibration, internal standard performance, quantitation of positive results, and overall system performance.

A few deficiencies were identified as detailed below. The Environmental Standards, Inc. (Environmental Standards) data reviewer has edited the laboratory-reported data and QC summary forms based on the deficiencies and comments listed in this QA review. Furthermore, the Environmental Standards data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support these edits in the Organic Data Support Documentation (Section 3) of this review. The following deficiencies and comments do not necessarily affect data usability. Usability is addressed in the subsequent Organic Data Qualifiers section.

Correctable Deficiencies

1. For the volatile fraction, the laboratory reported the initial calibration date and time on the Initial Calibration Data forms and the associated Continuing Calibration Compounds forms as "08-JAN-20001 11:39." According to the associated Volatile Organic GC/MS Tuning and Mass Calibration – BFB (Form V), the initial calibration date/time for the volatile initial calibration is 4/12/01 at 11:17.

2. For the volatile fraction, the laboratory did not report a positive result for 4-methyl-2-pentanone on the results summary (Form I) for sample 050801120. In addition, the laboratory did not report positive results for acetone on the associated Form I's for samples 050801114 and 050801119. According to the raw data, 4-methyl-2-pentanone was detected in sample 050801120 and acetone was detected in samples 050801114 and 050801119. These positive results were added to the data summary tables in Section 2 of this quality assurance review.

3. For the semivolatile fraction, the laboratory did not report a positive result for benzo(g,h,i)perylene on the Form I for sample 050801117. In addition, the laboratory did not report positive results for dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene in sample 050801120; for 1,3-dichlorobenzene in sample 05080113, and for bis(2-ethylhexyl)phthalate in sample 050801116. According to the raw data, benzo(g,h,i)perylene was detected in sample 050801117, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene were detected in sample 050801120, 1,3-dichlorobenzene was detected in sample 050801113, and bis(2-ethylhexyl)phthalate was detected in sample 050801116. These positive results were added to the data summary tables in Section 2 of this quality assurance review.

4. For the semivolatile fraction, the laboratory did not apply an alternate initial calibration option (*i.e.,* linear or quadratic) for the target compound famphur. The relative standard deviation (%RSD) of the relative response factors (RRFs) in the initial calibration for this compound was greater than 15%. According to SW-846 Method 8270C (Section 7.3.7.1), alternate calibration options must be applied for any compound with a %RSD greater than 15%. Qualification of data due to this issue was not warranted because positive results for famphur were not observed in the associated samples.

5. For the pesticide fraction, the reported initial calibration dates and times on the Initial Calibration Data forms and the associated Continuing Calibration Compounds forms did not correspond to the calibration dates and times reported on the associated Pesticide Analytical Sequence summaries (Form VIIIs) or the raw data.

6. For the pesticide fraction, the laboratory reported the initial calibration date on the Form VIIIs associated with the samples analyzed on 5/12/01 and 5/18/01 as "03/24/01." According to the raw data, the initial calibration date is 5/12/01.

7. For the pesticide fraction, the laboratory did not perform alternate calibration for the compound chlorobenzilate, which exhibited a %RSD greater than 20% in the associated initial calibration. According to SW-856 Method 8081A (Section 7.4.5.3), if the RSD of the calibration factor is greater than 20%, the analyst must use a calibration curve or a non-linear calibration model for quantitation. Chlorobenzilate was not detected in the project samples; therefore, qualification of data was not warranted.

8. For the pesticide fraction, the laboratory consistently reported the lower results from the results obtained from the two chromatographic columns used for analysis. According to SW-846 Method 8000 (Section 7.10.4.2), if the relative percent difference (RPD) between the results obtained from separate chromatographic columns is greater than 40% and there is no evidence of chromatographic problems, the higher result should be reported. The table below lists a comparison of the positive results obtained from the two chromatographic columns used for analysis. Qualification of data due to this issue is addressed in the Organic Data Qualifiers section.

Sample	Compound	Reported Result (µg/L)	Alternate Column Result (µg/L)	RPD
050801120	aldrin	0.42	0.49	15%
	delta-BHC	0.11	0.17	43%
	dieldrin	0.054	0.45	158%
	endrin	0.043	0.044	2%
	heptachlor	0.10	0.25	79%
050801113	dieldrin	0.11	0.19	53%
	endosulfan II	0.13	0.18	32%
050801119	endrin aldehyde	0.35	0.61	51%
050801115	dieldrin	0.19	0.19	0%
	endosulfan II	0.13	0.19	38%

9. For the pesticide fraction, the laboratory reported a positive result for endosulfan I and a "not-detected" result for dieldrin in sample 050801115. The raw data indicate a "not-detected" result for endosulfan I and a positive result for dieldrin in this sample. The positive result for dieldrin and the "not-detected" result for endosulfan I were added to the data summary tables presented in Section 2 of this quality assurance review.

10. For the PCB fraction, the laboratory reported the initial calibration start date and time on the Initial Calibration Data forms for the initial calibration analyzed on 5/02/01 and the associated Continuing Calibration Compounds forms as "12-AUG-2000 01:28." According to the raw data, the initial calibration start date/time is 5/02/01 at 15:00.

11. The laboratory reported an incorrect date of analysis on the Method Blank Report, the Laboratory Control Sample Data Report, and the Laboratory Control Sample Evaluation Report for the dioxins and furans analysis. These summary forms indicate that the method blank and laboratory control sample were analyzed on 5/18/01; however, the raw data indicate that these quality control samples were analyzed on 5/17/01.

12. The laboratory used an acceptance range of 1.24-1.78 for the mass ratios for 1,2,3,7,8-pentachlorodibenzo-*p*-dioxin and 1,2,3,7,8-PeCDF. According to SW-846 Method 8280A (Table 9), an acceptance range of 1.32-1.78 should be used. The data reviewer reviewed all mass ratios and determined that all ratios were within method criteria.

13. The laboratory analyzed closing calibration standards as part of the dioxin and furan analytical sequence, but the results of these continuing calibrations were not summarized on quality control forms. The data reviewer summarized the results of the closing calibration standards on Microsoft Excel spreadsheets and used these results to qualify data if necessary.

14. The laboratory analyzed a second-source calibration check standard after the initial calibration of the GC/MS for the dioxin and furan analyses. The laboratory used an incorrect relative response factor (RRF) for the quantitation of the result for 1,2,3,4,7,8-HxCDD in the calibration check standard; consequently, the reported percent difference (%D) for the compound was incorrect. The data reviewer recalculated the RRF and %D for the compound using the correct RRF. The %D for the compound was within the acceptance range for the analysis (*i.e.*, <30%).

15. For the second-source standard analyzed after the initial calibration for the dioxin and furan analyses, the laboratory used an incorrect peak area for the quantitation of the RRF for the labeled compound C_{13}-1,2,3,6,7,8-HxCDD. The peak integrated for the calculation had an RT of 36.403 minutes; however, this peak area was also used for the calculation of the RRF for C_{13}-1,2,3,7,8,9-HxCDD. A review of the RTs for the two labeled compounds revealed that this peak was actually C_{13}-1,2,3,7,8,9-HxCDD, and the peak for C_{13}-1,2,3,6,7,8-HxCDD had an RT of approximately 36.120 minutes. The acceptability of the RRF for C_{13}-1,2,3,6,7,8-HxCDD in the second-source standard could not be evaluated.

Noncorrectable Deficiencies

1. For the volatile fraction, the Case Narrative stated that the pH of sample 050801120 was greater than 2. According to SW-846 Chapter 4 (Table 4-1), volatile organic analysis samples must be preserved to a pH ≤2. Sample 05081120 was analyzed within 7 days of sample collection; therefore, qualification of data due to this issue is not warranted.

2. For the pesticide fraction, the laboratory analyzed samples after invalid calibration verifications (*i.e.*, percent difference and/or percent drifts > 15%) analyzed on 5/13/01 at 02:33, on 5/18/01 at 12:16, and on 5/18/01 at 12:37. According to SW-846 Method 8081A (Section 7.5.2.3), if the response for an analyte is not within ±15%, a new initial calibration must be prepared. Qualification of data due to this issue is addressed in the Organic Data Qualifiers section.

Comments

1. For the volatile fraction, sample 050801118 was analyzed at a five-fold dilution, sample 050801120 was analyzed at a 500-fold dilution, sample 050801113 was analyzed at a 50-fold dilution, sample 050801119 was analyzed at a two and one half-fold dilution, and sample 050801115 was analyzed at a two-fold dilution due to high concentrations of target compounds. The quantitation limits for these samples were raised accordingly.

2. According to Method 8260B (Section 7.4.7) and Method 8270C (Section 7.4.6), the laboratory is required to compare the internal standard area counts and RTs in the continuing check standard against those in the mid-point standard of the initial calibration. The laboratory did not provide documentation that this check had been performed. The data reviewer compared the internal standard area counts and RTs between the initial and continuing calibration standards. All RTs for the internal standards in the continuing calibration standard were within the method-specified QC range of ±30 seconds from the RTs in the initial calibration standard, and the area counts for the internal standards in the continuing calibration standard were within the limits of –50% to +100% of the area counts of the initial calibration standard.

3. For the volatile fraction, the laboratory did not report all of the target compounds on the LCS, MS, and MSD QC summary forms and on the associated Form I's. Upon Environmental Standards' inquiry, the laboratory responded that all compounds in the spiking solution could not be reported on the aforementioned LCS, MS, and MSD QC summary forms due to software limitations.

4. For the semivolatile fraction, sample 050801120 was analyzed at a 50-fold dilution, sample 050801119 was analyzed at a two and one half-fold dilution, and sample 050801115 was analyzed at a 10-fold dilution due to high levels of tentatively identified compounds (TICs) in these samples. Sample 050801113 was analyzed at a 12.5-fold due to high concentrations of target compounds. The quantitation limits for these samples were raised accordingly.

5. For the semivolatile fraction, the laboratory reported the compound 2,2'-oxybis(1-chloropropane) on the Form I's and as bis(2-chloroisopropyl)ether on the Initial Calibration Data and Continuing Calibration Compounds summaries. The data reviewer reported this compound on the data summary tables as reported on the Form I's.

6. For the semivolatile fraction, all target compounds were not in the spiking standard for the associated LCS; consequently, the data reviewer could not evaluate laboratory performance separately from matrix effects for the compounds not included in the LCS.

7. For the semivolatile fraction, the laboratory did not provide the extraction logs for samples 050801113, 050801114, 050801117, 050801118, and 050801120 in the data package provided for review. Upon Environmental Standards' request, the laboratory provided these data.

8. For the pesticide fraction, a number of deliverables related to the initial calibrations and RT windows were not included in the data package provided for review. Upon Environmental Standards' request, the laboratory provided these data. Copies of the requested information are presented in Project Correspondence (Section 6) of this quality assurance review.

9. For the pesticide fraction, samples 050801113 and 050801115 were analyzed at five-fold dilutions, and sample 050801119 was analyzed at a 10-fold dilution due to matrix interferences in these samples. The quantitation limits for these samples were raised accordingly.

10. For the PCB fraction, sample 050801119 was analyzed at a 10-fold dilution due to matrix interference. The quantitation limits for this sample were raised accordingly.

11. For the PCB fraction, the laboratory quantitated the continuing calibration standards analyzed on 5/13/01 at 19:51 and on 5/14/01 at 09:01 and at 13:30 on instrument HP2 using method file HP2PCBF.m. The associated initial calibration was updated to method file HP2PCBR.m. Upon Environmental Standards' request, the laboratory requantitated the aforementioned continuing calibration standards and regenerated the associated forms.

12. As stated in the Case Narrative, the dioxin and furan analyses were performed by STL's West Sacramento, California, facility.

13. The field sampling team submitted several trip blanks to the laboratory for volatile organic analysis. All of these field quality control samples were labeled identically ("Trip Blank"). The data reviewer has used the Chain-of-Custody record numbers to differentiate the trip blanks in this report and on the data summary tables in Section 2 of this QA review.

With respect to data usability, the principal areas of concern are calibration issues, low LCS recoveries, low matrix spike/matrix spike duplicate recoveries, high surrogate compound recoveries, imprecision of results reported from two separate chromatographic columns, and reported results less than the quantitation limit. Based on a rigorous review of the data provided, the following organic data qualifiers are offered. The following organic data usability issues represent an interpretation of the QC results obtained for the project samples. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Organic Data Qualifiers

- Although not qualified due to blank contamination, the positive results for methylene chloride in sample 05080114, for acetone in samples 050801114 and 050801119, and for bis(2-ethylexyl)phthalate in sample 05081116 should be used with caution. These compounds are common laboratory contaminants and were detected in the samples at low concentrations.

- The analyses for acrolein, acetonitrile, propionitrile, and isobutanol in samples 050801115, 050801116, 050801119, TB (COC035534), and TB (COC035535) should be considered unreliable, and the "not-detected" results for these compounds in the aforementioned samples have been flagged "R" on the data summary tables. Very low RRFs (< 0.05) were reported for these compounds in the associated initial and/or continuing calibrations.

- The analyses for 4-chloroaniline in samples 050801113, 050801114, 050801117, 050801118, and 050801120 and for hexachlorocyclopentadiene in samples 050801115, 050801116, and 050801119 should be considered unreliable, and the "not-detected" results for these compounds in the aforementioned samples have been flagged "R" on the data summary tables. Very low recoveries (%R<10%) for these compounds were observed in the associated LCS analyses.

- The analysis for acetone in all samples should be considered unreliable, and the "not-detected" results have been flagged "R" on the data summary tables. In addition, the positive results for acetone in all samples should be considered estimated and have been flagged "J" on the data summary tables. A very high %D (>90%) was reported for

acetone in the continuing calibration standard associated with the volatile organics analysis of the project samples.

- The quantitation limits for acrolein and vinyl acetate in samples 050801115, 050801116, 050801119, TB (COC035534), and TB (COC035535) may be higher than reported, and the "not-detected" results for these compounds have been flagged "UJ" on the data summary tables (unless previously flagged "R"). High percent differences or drifts (>20%) in the direction of decreased instrument sensitivity were observed for these compounds in the associated continuing calibration standard analyses.

- The quantitation limits for acetonitrile in samples 050801115, 050801116, 050801119, TB (COC035534), and TB (COC035535) may be higher than reported, and the "not-detected" results for these compounds have been flagged "UJ" on the data summary tables (unless previously flagged "R"). A high %D (>20%) in the direction of increased instrument sensitivity was observed for this compound in the associated continuing calibration standard analysis. The quantitation limits for acetonitrile in the aforementioned samples may be acceptable as reported because the bias was in the direction of increased instrument sensitivity.

- The quantitation limits for bis(2-ethylhexyl)phthalate, hexachlorocyclopentadiene, and famphur in samples 050801115, 050801116, and 050801119 may be higher than reported, and the "not-detected" results for these compounds have been flagged "UJ" on the data summary tables (unless previously flagged "R"). In addition, the reported positive result for bis(2-ethylhexyl)phthalate in sample 050801116 should be considered estimated and has been flagged "J" on the data summary tables. High %Ds (>25%) were observed for these compounds in the associated continuing calibration standard analyses.

- The quantitation limits for styrene in samples 050801114, 050801117, TB (COC035524), 050801118, TB (COC035525), 050801113, TB (COC035523), and 050801120 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data summary tables. A low recovery (<85%) was observed for styrene in the associated LCS analysis.

- The quantitation limits for methylene chloride and vinyl chloride in sample 050801115 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data summary tables. Low recoveries (%R<QC Limits) were observed for these compounds in the associated MS and/or MSD analyses.

- The reported positive results for aniline and 1,2-dichlorobenzene in sample 0050801119 should be considered estimated and have been flagged "J" on the data summary tables. A high recovery (%R>112%) was observed for the base/neutral surrogate compound nitrobenzene-d_5 in this sample.

- The reported positive results for *delta*-BHC, heptachlor, aldrin, and dieldrin in sample 050801120 should be considered estimated and have been flagged "J" on the data summary tables. High differences (>±RL) were observed between the results obtained from the two chromatographic columns used for the analysis of this sample.

- The reported positive results for *delta*-BHC, aldrin, and endrin in sample 050801120 should be considered estimated and have been flagged "J" on the data summary tables. A high recovery (%R>130%) was observed for the surrogate compound tetrachloro-*m*-xylene (TCMX) on the chromatographic column from which the results for *delta*-BHC, aldrin, and endrin were reported in sample 050801120.

- The quantitation limits for the compounds in the following samples may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. High %Ds (>15%), coupled with decreases in instrument sensitivity, were observed for these compounds in the associated continuing calibration standards.

Compound(s)	Samples With Biased Low Quantitation Limits ("UJ")
endrin aldehyde	050801114, 050801116, 050801117, 050801118, and 050801120
kepone and chlorobenzilate	050801116, 050801119, and 050801115
isodrin and diallate	050801119 and 050801115

- Per US EPA reporting requirements, all positive results reported at levels less than the quantitation limits (adjusted for dilutions) should be considered estimated and have been flagged "J" on the data tables.

A complete support document of this organic QA review is provided in Section 3 of this report.

B. Inorganic and Wet Chemistry Data

The inorganic analyses of 17 aqueous samples (including QC samples) were performed by Severn Trent Laboratories, Inc. of North Canton, Ohio. Seven samples were analyzed for target analyte list (TAL) metals by SW-846 Methods 6010B and 7470A; three samples were analyzed for select total TAL Metals (specifically, TAL metals including tin and excluding manganese and aluminum) by SW-846 Methods 6010B and 7470A; nine samples were analyzed for dissolved metals (specifically, calcium, iron, potassium, magnesium, and sodium) by SW-846 Method 6010B; nine samples were analyzed for phosphorus as orthophosphate by EPA Method 365.2; ten samples were analyzed for bicarbonate alkalinity, carbonate alkalinity, and total alkalinity by EPA Method 310.1;

nine samples were analyzed for chloride by EPA Method 300.0A; nine samples were analyzed for total cyanide by SW-846 Method 9012A; nine samples were analyzed for ferric iron and ferrous iron by Standard Method for the Evaluation of Water and Waste, 18th Edition Method 3500-FE D; eleven samples were analyzed for nitrate-nitrite by EPA Method 353.2; nine samples were analyzed for nitrogen as ammonia by EPA Method 350.3; nine samples were analyzed for total phosphorus by EPA Method 365.2; nine samples were analyzed for total dissolved solids by EPA Method 160.1; nine samples were analyzed for total organic carbon by EPA Method 415.1; eight samples were analyzed for total sulfide by EPA Method 376.1; and nine samples were analyzed for total suspended solids by EPA Method 160.2. These analyses are indicated on Table 1 and the analytical results are summarized in Section 2 of this QA review.

The findings offered in this report are based upon a rigorous review of holding times, blank analysis results, laboratory control sample (LCS) recoveries, MS/MSD recoveries and precision, laboratory duplicate precision, contract-required detection limit (CRDL) standard results, initial and continuing calibration checks, inductively coupled plasma (ICP) serial dilution results, ICP interference checks, analytical sequence, quantitation of positive results, and instrument sensitivity and selectivity. The analytical results for the samples are provided as a summary of the data in Section 2 of this QA review.

A few issues were identified as detailed below. The Environmental Standards data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support these edits in the Inorganic and General Chemistry Data Support Documentation (Section 4) of this QA review. The following comments do not necessarily affect data usability. Usability is addressed in the subsequent Inorganic and General Chemistry Data Qualifiers section.

Comments

1. The laboratory utilized the same QC samples (method blank and LCS) for the total and dissolved metal analyses. The laboratory should have prepared QC samples for each analysis performed. The data reviewer was unable to determine if the QC samples had been filtered.

2. The laboratory did not provide summary forms for the CRDL standard analyses. Environmental Standards requested this information, but the laboratory did not provide a summary form or the true concentrations (for ICP analytes); therefore, the CRDL standards for ICP analytes could not be evaluated.

3. The laboratory did not record final volumes for the project or QC samples on the Metals Prep Logs; however, final volume information was reported on the Metals Preparation Summary sheet.

4. The laboratory analyzed a laboratory duplicate for sample 050801119 but did not report the result on the Sample Duplicate Evaluation Report summary form. The data reviewer was able to evaluate the result from the raw data.

5. The laboratory did not include a background analysis for ferrous iron for sample 050801117. According to the Sepctrophotometric Logsheet, a background sample had been analyzed for all samples except sample 050801117. The data reviewer was unable to determine why the laboratory did not analyze a background sample.

6. The laboratory did not include the raw data for the total phosphorus analyses. Upon Environmental Standards' request, the laboratory provided the missing data (included in Section 6).

With respect to data usability, the principal areas of concern are blank contamination, low matrix spike/matrix spike duplicate recoveries, interferences observed in the ICP analysis of the samples, and large negative instrument responses in calibration blanks. Based on a rigorous review of the data provided, the following inorganics data qualifiers are offered. The following inorganic data usability issues represent an interpretation of the QC results obtained for the project samples. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Inorganic and General Chemistry Data Qualifiers

- Due to trace-level presence of the following analytes in the associated preparation blanks and calibration blanks, these analytes should be considered "not-detected" in the samples listed below and have been flagged "U" on the data summary tables. It should be noted that dilution factors were taken into account when evaluating blank contamination.

Analyte(s)	Sample(s) With Positive Results Qualified as "Not-Detected" ("U")
cadmium and beryllium	050801114 (Total)
cadmium	050801117 (Total)
cadmium, chromium, and barium	050801118 (Total)
aluminum	050801113 (Total)
cadmium and barium	050801119 (Total)
tin, calcium, and magnesium	050801116 (Total)

Analyte(s)	Sample(s) With Positive Results Qualified as "Not-Detected" ("U")
chromium, barium, zinc, and iron	050801115 (Total)
nitrogen as ammonia	050801114 and 050801117
nitrate-nitrite	050801113

- The analyses for carbonate alkalinity in all samples, except sample 050801116, should be considered unusable, and the "not-detected" results have been flagged "R" on the data summary tables. Furthermore, the reported positive results for bicarbonate alkalinity and total alkalinity in all samples, except sample 050801116, should be considered estimated and have been flagged "J" on the data summary tables. Very low recoveries (<30%) were observed for total alkalinity in the associated MS/MSD analyses.

- The analyses for total phosphorus in samples 050801117 and 050801118 should be considered unusable and the "not-detected" results have been flagged "R" on the data summary tables. Furthermore, the reported positive results for total phosphorus in samples 050801114, 050801120, 050801113, 050801119, and 050801115 should be considered estimated and have been flagged "J" on the data summary tables. Very low recoveries (<30%) were observed for total phosphorus in the MS/MSD analyses.

- The detection limits for vanadium in sample 050801117 and for zinc in samples 050801117, 050801118, 050801113, and 050801119 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data summary tables. Furthermore, the positive results for vanadium in samples 050801118, 050801113, 050801119, and 05080115 and for zinc in sample 050801115 should be considered estimated and have been flagged "J" (unless previously flagged "U") on the data summary tables. High negative responses (with absolute values greater than twice the instrument detection limit [IDL]) were observed in the ICSA/AB standards analysis associated with the project samples, and these samples displayed a high level (greater than 50% of the concentration in the ICSA/AB standard) of one or more of the interference analytes (*i.e.*, calcium, magnesium, iron, or aluminum).

- The detection limits for aluminum in samples 050801117 and 050801120 may be higher than reported, and the "not-detected" results for aluminum have been flagged "UJ" on the data summary tables. In addition, the positive result for aluminum in sample 050801118 should be considered estimated and has been flagged "J" on the data summary tables. High negative responses (with absolute values greater than twice the IDL) were observed for aluminum in the associated method blanks.

- The reported positive results for nitrogen as ammonia in samples 050801114, 050801117, 050801118, 050801120, 050801113, 050801119, and 050801115 should be considered estimated and have been flagged "J" (unless previously flagged "U") on the data summary tables. Low recoveries (<75%) were observed for nitrogen as ammonia in the associated MS/MSD analyses.

A complete support documentation for the inorganic and general chemistry data validation is presented in Section 4 of the QA review.

C. Conclusions

This QA review has identified several aspects of the data that required qualification. The analytical data should be considered acceptable for use unless otherwise indicated in the QA review. In order to use any of the data, the data user should understand the qualifications and limitations specified in this QA review. The Project Chain-of-Custody Records and Case Narratives are presented in Section 5. Project Correspondence is presented in Section 6.

Report prepared by:

Glenn S. Esler
Quality Assurance Chemist

Report prepared by:

for

Gwendolyn M. Hallquist
Quality Assurance Chemist

Report reviewed by:

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist III

Report reviewed and approved by:

for:

Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

(610) 935-5577

Date: 9-25-01

w:\geomatrix\rohm haas\dv\y1071626\final\report1.doc

ENVIRONMENTAL STANDARDS

Setting the Standards for Innovative Environmental Solutions

May 10, 2002

Mr. Mark P. Hemingway
Principal Hydrogeologist
Geomatrix Consultants, Inc.
5725 Highway 290 West
Suite 200-B
Austin, TX 78735

Dear Mr. Hemingway:

Enclosed is the quality assurance review for the soil and aqueous samples collected on November 8, 9, and 10, 2001, as part of the Morton – Reading, Ohio, Project. Organic sample data were qualified as unreliable due to calibration issues and surrogate compound recoveries. In addition, organic sample data were qualified due to blank contamination, calibration issues, low laboratory control sample recoveries, low surrogate compound recoveries, and reported results below the quantitation limit. Inorganic sample results were qualified as unreliable due to very low matrix spike/matrix spike duplicate recoveries. In addition, inorganic sample data were qualified due to blank contamination, contract-required detection limit standard recoveries, matrix spike/matrix spike duplicate recoveries and precision, and ICP interferences.

With respect to data package deliverables, the laboratory provided sufficient quality control summary forms and supporting raw data to allow for complete validation of the data. Only minor correctable deficiencies were noted during the review of the data.

If you have any questions or comments, or if we can be of further assistance, please feel free to call.

Sincerely,

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist II/
Project Manager

Sincerely,

Rick J. Forman for:
Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

DJL/RJV:hm
Enc.

1140 Valley Forge Road • P.O. Box 810 • Valley Forge, PA 19482-0810
T: 610-935-[illegible] • F: 610-935-5583 • www.envstd.com • solutions@envstd.com

QUALITY ASSURANCE REVIEW

OF SAMPLES COLLECTED ON NOVEMBER 8, 9, AND 10, 2001

AS PART OF THE MORTON – READING, OHIO

PROJECT

May 10, 2002

Prepared for:

GEOMATRIX CONSULTANTS, INC.
5725 Highway 290 West
Suite 200-B
Austin, TX 78735

Prepared by:

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

TABLE OF CONTENTS

Introduction

Section 1 Quality Assurance Review

A. Organic Data

B. Inorganic Data and General Chemistry Data

C. Conclusions

Section 2 Analytical Results

Section 3 Organic Data Support Documentation

Section 4 Inorganic and General Chemistry Data Support Documentation

Section 5 Project Chain-of-Custody Records and Case Narratives

Introduction

This quality assurance (QA) review is based upon a rigorous examination of the data generated from the analyses of the samples collected on November 8, 9, and 10, 2001, as part of the Morton – Reading, Ohio, Project. The samples included in this QA review are presented on Table 1. The laboratory was requested to prepare a detailed data package to substantiate the reported analytical results. The data package that was prepared allowed for the performance of a comprehensive review.

This review has been performed with guidance from the "National Functional Guidelines for Organic Data Review" (US EPA, October 1999) and the "National Functional Guidelines for Inorganic Data Review" (US EPA, February 1994).

The reported analytical results are presented as a summary of the data in Section 2. Data were examined to determine the usability of the analytical results and compliance relative to the analytical requirements specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition" (SW-846) and the Quality Assurance Project Plan Facility Investigation RCRA §3013 Administrative Order for the Morton International, Inc. Facility located in Reading, Ohio. Qualifier codes have been placed next to the results to enable the data user to quickly assess the qualitative and/or quantitative reliability of any result. Details of this QA review are presented in Section 1 of this report. This critical QA review identifies data quality issues for specific samples and specific evaluation criteria. The data qualifications allow the data user to best understand the usability of the analysis results. Data not qualified in this report should be considered valid based on the quality control (QC) criteria that have been reviewed.

TABLE 1

SAMPLES THAT HAVE UNDERGONE

A RIGOROUS QUALITY ASSURANCE REVIEW

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Matrix	Date Sample Collected	Parameter(s) Analyzed
110801236	A1K090129-001	1K09129	Soil	11/08/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
110801236MS (Matrix Spike)	A1K090129-001	1K09129	Soil	11/08/01	M, AS
110801236MSD (Matrix Spike Duplicate)	A1K090129-001	1K09129	Soil	11/08/01	M, AS
110801237	A1K090129-002	1K09129	Soil	11/08/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
110801237RE (Reanalysis)	A1K090129-002	1K09129	Soil	11/08/01	SVOA
110801238	A1K090129-003	1K09129	Soil	11/08/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
TRIP BLANK (COC#076403)	A1K090129-004	1K09129	Aq	11/08/01	V
110801239	A1K090129-005	1K09129	Soil	11/08/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
110801240	A1K090129-006	1K09129	Soil	11/08/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
110801241	A1K090129-007	1K09129	Soil	11/08/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
110901242	A1K100125-001	1K09129	Soil	11/09/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
110901243	A1K100125-002	1K09129	Soil	11/09/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
110901244	A1K100125-003	1K09129	Soil	11/09/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
110901245	A1K100125-004	1K09129	Soil	11/09/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
111001247	A1K120177-001	1K09129	Soil	11/10/01	V, SVOA, Pest, PCB, D/F, M, CN, AS

TABLE 1 (Cont.)

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Matrix	Date Sample Collected	Parameter(s) Analyzed
111001247MS (Matrix Spike)	A1K120177-001	1K09129	Soil	11/10/01	AS, CN
111001247MSD (Matrix Spike Duplicate)	A1K120177-001	1K09129	Soil	11/10/01	AS, CN
111001248	A1K120177-002	1K09129	Soil	11/10/01	V, SVOA, Pest, PCB, D/F, M, CN, AS
TRIP BLANK (COC#076412)	A1K120177-003	1K09129	Aq	11/10/01	V

NOTES:

V - Appendix IX Volatile Organic Compounds by SW-846 Method 8260B.
SVOA - Appendix IX Semivolatile Organic Compounds by SW-846 Method 8270C.
Pest - Appendix IX Organochlorine Pesticides by SW-846 Method 8081A.
PCB - PCBs (specifically, Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) by SW-846 Method 8082.
D/F - 2,3,7,8-Tetrachlorodibenzo-*p*-dioxin and Select Total Dioxins and Furans by SW-846 Method 8280A.
M - Select Metals (specifically, silver, cadmium, chromium, antimony, arsenic, barium, lead, beryllium, selenium, thallium, cobalt, copper, nickel, tin, vanadium, zinc, and mercury) by SW-846 Methods 6010B and 7471A.
CN - Cyanide by SW-846 Method 9012A.
AS - Acid-soluble Sulfide by SW-846 Method 9030A.
Aq - Aqueous.

Section 1 Quality Assurance Review

A. Organic Data

The organic analyses of 13 soil samples and two aqueous trip blanks were performed by Severn Trent Laboratories, Inc. (STL) of North Canton, Ohio. Fourteen samples were analyzed for Appendix IX volatile organic compounds by SW-846 Method 8260B; 13 samples (including QC samples and reanalyses) were analyzed for Appendix IX Semivolatile Organic Compounds by SW-846 Method 8270C; 12 samples were analyzed for Appendix IX Organochlorine Pesticides by SW-846 Method 8081A; and 12 samples (including QC samples) were analyzed by SW-846 Method 8280A for PCBs (specifically, Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) by SW-846 Method 8082. In addition, 12 soil samples were analyzed by SW-846 Method 8280A for 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, total tetrachlorodibenzo-*p*-dioxins (TCDD), total pentachlorodibenzo-*p*-dioxins (PeCDD), total hexachlorodibenzo-*p*-dioxins (HxCDD), total tetrachlorodibenzo-*p*-furans (TCDF), total pentachlorodibenzo-*p*-furans (PeCDF), and total hexachlorodibenzo-*p*-furans (HxCDF) by the STL facility in West Sacramento, California. All analyses are indicated on Table 1 and the analytical results are summarized in Section 2 of this report.

The findings offered in this report are based upon a rigorous review of holding times, blank analysis results, system monitoring compound recoveries, blank spike (laboratory control sample) recoveries and precision, initial and continuing calibrations, target compound matching quality, analytical sequence, retention times (RTs), gas chromatography/mass spectroscopy (GC/MS) tuning and mass calibration, internal standard performance, quantitation of positive results, and overall system performance.

A few deficiencies were identified as detailed below. The Environmental Standards, Inc. (Environmental Standards) data reviewer has edited the laboratory-reported data and QC summary forms based on the deficiencies and comments listed in this QA review. Furthermore, the Environmental Standards data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support these edits in the Organic Data Support Documentation (Section 3) of this review. The following deficiencies and comments do not necessarily affect data usability. Usability is addressed in the subsequent Organic Data Qualifiers section.

Correctable Deficiencies

1. In the volatile fraction, the laboratory reported incorrect initial calibration dates, times, and/or file IDs on several of the calibration summary forms.

2. In the volatile, semivolatile, and pesticide fractions, the laboratory did not record the relative percent differences (RPDs) between the recoveries for the compounds in the LCS/LCSD analyses. The data reviewer evaluated the RPDs for the target compounds and determined that the RPDs were less than 35%; therefore, data qualification was not warranted.

3. In the PCB fraction, the laboratory did not calculate the RPDs between the results for the LCS/LCSD analyses associated with samples 111001247 and 111001248. The data reviewer edited the SW846 8082 Check Sample Duplicate Recovery summary form (Form 3) to include the RPDs, which are within the acceptance limits.

4. In the dioxin/furan analysis, the laboratory technician made many hand-written changes to the Dioxin/Furan Review Sheets for the project samples but did not indicate the date the changes were made or his/her initials.

5. In the dioxin/furan analysis of sample 111001248, the laboratory reported a detection limit of "0.32 ng/g" for total hexachloro-substituted furans. According to the chromatogram and Signal to Noise Report for the sample, however, it appears that hexachloro-substituted furans are present in the sample, along with a diphenyl ether interference. The laboratory should have reported an estimated maximum probable concentration (EMPC) instead of a detection limit. The data reviewer flagged the detection limit "EMPC" on the data tables.

6. In the semivolatile fraction, high percent relative standard deviations (%RSDs>15%) were observed for famphur in the initial calibrations performed on 11/6-11/7/01 and 11/15-11/16/01 on instrument A4HP8. The laboratory used the average relative response factors (RRFs); a calibration curve should have been used in both initial calibrations for this compound (SW-846 Method 8000, Section 7.5). No positive results for these compounds were observed in the project samples; therefore, qualification of data was not warranted. No positive result for this compound was observed in the project samples; therefore, qualification of data was not warranted.

7. In the pesticide fraction, high %RSDs (>20%) were observed for *delta*-BHC and 4,4'-DDD in the initial calibration performed on 11/13-11/14/01 on instrument A2HP3 and for chlorobenzilate in the initial calibration performed on 11/20/01 on instrument A2HP5. The laboratory used the average RRFs; calibration curves (or another alternative method of quantitation) should have been used in both initial calibrations for these compounds (SW-846 Method 8000, Section 7.5). No positive results for these compounds were observed in the project samples; therefore, qualification of data was not warranted.

Noncorrectable Deficiencies

1. In the volatile fraction, the laboratory did not spike the LCS with all the analytes of interest. According to Method 8260B (Section 8.4.3) and Method 8000B (Section 8.4.1), the LCS should be spiked with all target analytes.

2. In the volatile fraction, the laboratory analyzed all matrix spike blank samples before the method blank analysis. According to SW-846 Method 8260B (Section 8.4.1), before processing any samples, the analyst should demonstrate, through the analysis of a method blank, that interferences from the analytical system, glassware, and reagents are under control.

3. According to the Nonconformance Memo submitted with the data package, the custody seal on the cooler in which the samples were shipped was broken. The memo, however, states that a strap around the cooler was intact; therefore the integrity of the samples was probably not compromised.

4. In the semivolatile fraction, a low recovery of the surrogate compound 2,4,6-tribromophenol was observed in sample 110801238. The laboratory did not reextract and reanalyze the sample. According to SW-846 Method 8000B (Section 8.6.2.4), if a surrogate recovery is not within specified limits and no instrument problem has been found, the sample must be reextracted and reanalyzed. Qualification of data due to this deficiency is addressed in the subsequent Organic Data Qualifiers section.

5. In the semivolatile fraction, low Coefficients of Determination (CODs) were observed for methapyriline and 4-nitroquinoline-1-oxide in the initial calibration performed on 11/15-11/16/01 on instrument A4HP8. According to SW-846 Method 8000B (Section 8.3.2), the COD for a non-linear curve must be ≥0.99. No positive results for these compounds were observed in the project samples; therefore, qualification of data was not warranted.

6. In the pesticide fraction, a high breakdown (>15%) of endrin was observed in the performance evaluation mixture (PEM) performed on 11/14/01 at 16:12 on column "B" of instrument A2HP3. According to SW-846 Method 8081A (Section 8.4.6), if degradation of either DDT or endrin exceeds 15%, injector maintenance should be completed and the instrument should be recalibrated. Qualification of data was not warranted.

7. In the pesticide fraction, high percent differences (%Ds>15%), coupled with increasing sensitivity, were observed for toxaphene, isodrin, technical chlordane, chlorobenzilate, and diallate in the continuing calibration verifications (CCVs) performed on 11/14/01 and 11/15/01 on instrument A2HP3 and on 11/21/01 on instrument A2HP5. According to SW-846 Method 8081A (Section 7.5.2.3), if the %D exceeds ±15%, the laboratory is required to check the operating conditions and reinject another CCV; if the reinjection fails criteria, the instrument must be recalibrated. No reported positives were observed for the aforementioned compounds; therefore, qualification of data was not warranted.

8. In the pesticide fraction, high percent differences (%D>15%), coupled with decreasing sensitivity, were observed for kepone in the CCVs performed on 11/14/01 and 11/15/01 on instrument A2HP3 and on 11/21/01 on instrument A2HP5. According to SW-846 Method 8000B (Section 7.7.2), the %D must be less than ±15% before sample analyses may take place. Qualification of data is addressed in the subsequent Organic Data Qualifiers section.

Comments

1. In the PCB fraction, the laboratory did not provide any confirmation data for the reported positive results in samples 110801240 and 111001248. The laboratory stated in the Case Narrative that confirmation is only performed down to the reporting limit (RL). The

reported positive results in samples 110801240 and 111001248 are below the RL. Although the method requires confirmation of positive results on a second column or by another means, such as MS, the client was informed of the laboratory's practice of not confirming results below the RL and concluded that the low-level results are acceptable as reported because PCBs are not a contaminant of concern for this project.

2. In the PCB fraction, the laboratory did not provide RT window summaries. The data reviewer used the associated raw data to evaluate the RTs for the reported positive results in the samples relative to the RT windows established by the initial calibration and found the RTs to be within the acceptance limits.

3. In the volatile fraction, the laboratory did not perform MS/MSD analyses on any of the project samples; therefore, the data reviewer could not evaluate the accuracy and precision of the analytical method relative to the project-specific sample matrices.

4. According to Method 8260B (Section 7.4.7), the laboratory is required to compare the internal standard area counts and RTs in the continuing check standard against those in the mid-point standard of the initial calibration. The laboratory did not provide documentation that this check had been performed. The data reviewer compared the internal standard area counts and RTs between the initial and continuing calibration standards. All RTs for the internal standards in the continuing calibration standard were within the method-specified QC range of ±30 seconds from the RTs in the initial calibration standard, and the area counts for the internal standards in the continuing calibration standard were within the limits of –50% to +100% of the area counts of the initial calibration standard.

5. The laboratory used 25 µL/5 mL per injection for sample 110801236 due to the presence of high levels of target compounds. In addition, the laboratory analyzed samples 110801239, 110801240, and 111001248 using 100 µL/5mL per injection due to the presence of high levels of target compounds. The laboratory raised the quantitation limits for all compounds on the analytical result summaries (Form I's) accordingly.

6. In the dioxin/furan analysis, the laboratory did not provide any mass calibration and tuning data for the mass spectrometer used for the analysis.

With respect to data usability, the principal areas of concern are blank contamination, calibration issues, low blank spike recoveries, low surrogate compound recoveries, and reported results below the quantitation limit. Based on a rigorous review of the data provided, the following organic data qualifiers are offered. The following organic data usability issues represent an interpretation of the QC results obtained for the project samples. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Organic Data Qualifiers

- Due to trace-level presence of the following compounds in the trip blanks and/or laboratory blanks, the reported positive results for these compounds in the samples listed should be considered "not-detected" and have been flagged "U*" on the data tables. When the reported result for the compound was less than the sample-specific quantitation limit, the data reviewer raised the reported result to the quantitation limit and flagged the result "U*". It should be noted that dilution factors, sample weights, and percent solids were taken into consideration when evaluating blank contamination.

Compound(s)	Sample(s) With Qualitatively Questionable Positive Results ("U*")
acetone	110801236, 110801237, 110801238, 110801239, 110801240, 110801241, 110901242, 110901243, 110901244, 110901245, 111001247, and 111001248
toluene, 2-butanone, and xylenes (total)	110801239
methylene chloride, tetrachloroethene, and xylenes (total)	111001248
methylene chloride	110801239, 110801240, 110901242, 110901244, 110901245, and 111001247

- The analyses for the following compounds in the samples indicated should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low (<0.050) average relative response factors were observed for these compounds in the associated initial multipoint calibration and/or CCV standards.

Compounds	Samples With Unreliable Analyses ("R")
acetonitrile and propionitrile	110801236, 110901243, 111001247, and 111001248
acrolein and isobutanol	110801236, 110901243, 111001248, 111001247, 110801237, 110801238, 110801241, 110901242, 110901244, 110901245, 110801239, and 110801240
acrolien, acetonitrile, propionitrile, and isobutanol	Trip Blank (COC#076403) and Trip Blank (COC#076412)

- The analyses for all acid semivolatile compounds in samples 110801237 and 110801237RE should be considered unreliable and have been flagged "R" on the data tables. Very low recoveries (<10%) were observed for the surrogate 2,4,6-tribromophenol in these sample analyses.

- The quantitation limits for all acid semivolatile compounds in sample 110801238 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. A low recovery (10%<%R<30%) was observed for the surrogate 2,4,6-tribromophenol in these sample analyses.

- The quantitation limits for all volatile compounds in samples 110801236, 110801239, and 110801240 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables (unless previously flagged "R"). In addition, the reported positive results for volatile compounds in these samples should be considered estimated and have been flagged "J" on the data tables (unless previously flagged "U*"). Low recoveries (10%<%R< 70%) were observed for two or more volatile surrogate compounds in the samples.

- The quantitation limits for the following compounds in the samples listed below may be higher than reported, and the "not-detected" results for these compounds have been flagged "UJ" on the data tables (unless previously flagged "R"). In addition, the positive results for acetone in sample 111001248 and for chloromethane in sample 110801236 should be considered estimated and have been flagged "J" on the data tables (unless previously flagged "U*"). High %Ds (>20%), coupled with decreases in instrument sensitivity, were obtained in the associated continuing calibrations.

Compounds	Sample(s) With Biased Low Quantitation Limits ("UJ")
dichlorodifluoromethane, bromomethane, chloroethane, acrolein, and vinyl acetate	110801236
dichlorodifluoromethane, chloromethane, bromomethane, chloroethane, acrolein, and vinyl acetate	110901243
bromomethane, chloroethane, and carbon tetrachloride	111001248
dichlorodifluoromethane, chloromethane, bromomethane, chloroethane, and acrolein	111001247
bromomethane, chloroethane, propionitrile, and isobutanol	110801237, 110801238, 110801241, 110901242, 110901244, and 110901245
chloroethane, trichlorofluoromethane, acrolein, and propionitrile	Trip Blank (COC#076412)
bromomethane and trichlorofluoromethane	110801239 and 110801240

- The quantitation limits for the following semivolatile compounds in the samples listed below may be higher than reported, and the "not-detected" results have been flagged "UJ" (unless previously flagged "R") on the data tables. High %Ds (>20%), coupled with a decrease in instrument sensitivity, were obtained between the average RRFs of the initial calibration and the RRFs from the associated CCV standards.

Compound(s)	Sample(s) With Biased Low Quantitation Limits ("UJ")
bis(2-chloro-1-methylethyl) ether, *a,a*-dimethylphenethylamine, 4-nitroaniline, and *p*-phenylenediamine	110801236, 110801237, 110801238, 110801239, 110801240, 110801241, 110901242, 110901243, 110901244, and 110901245
methapyriline	All validated samples

- The quantitation limits for the following semivolatile compounds in the samples listed below may be higher than reported, and the "not-detected" results have been flagged "UJ" (unless previously flagged "R") on the data tables. Low recoveries (10≤%R<50%) were observed for these compounds in the associated LCS and/or LCSD analyses.

Compound(s)	Sample(s) With Biased Low Quantitation Limits ("UJ")
2,4-dinitrophenol, 4-chloroaniline, and 4,6-dinitro-2-methylphenol	110801236, 110801237, 110801238, 110801239, 110801240, 110801241, 110901242, 110901243, 110901244, and 110901245
2,4-dinitrophenol	110801237RE
3,3′-dichlorobenzidine	All validated samples

- The quantitation limits for the following compounds in the samples listed below may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<70%) were observed for these compounds in the associated LCS and/or LSCD analyses.

Compound(s)	Sample(s) With Biased Low Quantitation Limits (Flagged "UJ")
bromomethane, dibromochloromethane, bromoform, chloroethane, and *trans*-1,3-dichloropropene	110801236, 110801239, and 110801240
chloromethane	110901243
chloromethane, vinyl chloride, chloroethane, and carbon disulfide	111001248
acetone	Trip Blank (COC#076403) and Trip Blank (COC#076412)

- The reported positive results for acetone in samples 110801237, 110801238, 110801241, 110901242, 110901244, 110901245, 111001247, and 111001248 should be considered estimated and have been flagged "J" on the data tables (unless

previously flagged "U*"). High recoveries (>130%) were observed for acetone in the associated LCS and/or LCS duplicate samples.

- The quantitation limits for kepone in all samples, except samples 111001247 and 111001248, may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. High %Ds (>15%), coupled with a decrease in instrument sensitivity, were obtained between the true concentrations from the initial calibrations and the observed concentrations in the associated CCV standards.

- The quantitation limits for endrin aldehyde in all samples, except samples 110801236, 111001247, and 111001248, may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. High %Ds (>15%), coupled with a decrease in instrument sensitivity, were obtained between the average RRFs of the initial calibration and the RRFs from the associated CCV standards.

- The positive result for endrin in sample 110801237 should be considered estimated and has been flagged "J" on the data tables. A high %D (>40%) was observed between the positive results for the compound in the two-column pesticide analysis of the sample.

- Per US EPA reporting requirements, all positive results reported at levels less than the quantitation limits (adjusted for dilutions) should be considered estimated and have been flagged "J" on the data tables.

A complete support document of this organic QA review is provided in Section 3 of this report.

B. Inorganic and General Chemistry Data

The inorganic and general chemistry analyses of 16 solid samples (including QC samples) were performed by STL of North Canton, Ohio. Fourteen samples (including QC samples) were analyzed for select metals by SW-846 Methods 6010B and 7471A; 14 samples (including QC samples) were analyzed for cyanide by SW-846 Method 9012A; and 16 samples (including QC samples) were analyzed for acid-soluble sulfide by SW-846 Method 9030A. These analyses are indicated on Table 1. The analytical results are summarized in Section 2 of this report.

The findings offered in this report are based upon a rigorous review of holding times, blank analysis results, LCS results and recoveries, matrix spike/matrix spike duplicate recoveries and precision, contract-required detection limit (CRDL) standard recoveries, interference check standard results and recoveries, serial dilution results, initial and continuing calibrations, analytical sequence, and quantitation of positive results.

A few deficiencies were identified as detailed below. The Environmental Standards data reviewer has edited the laboratory-reported data and QC summary forms based on the deficiencies and comments listed in this QA review. Furthermore, the Environmental Standards data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support these edits in the Inorganic and General Chemistry Data Support Documentation (Section 4) of

this review. The following deficiencies and comments do not necessarily affect data usability. Usability is addressed in the subsequent Inorganic and General Chemistry Data Qualifiers section.

Correctable Deficiencies

1. The laboratory did not calculate the serial dilution percent difference for thallium on the Serial Dilution RPD Report (Form IX). The data reviewer calculated the percent difference for thallium. Qualification of data was not warranted due to this issue.

2. In the sulfide fraction, the laboratory reported the true value on the Sulfide Logsheet for the LCS analyzed on 11/14/01 as "11,000 mg/kg". According to the Sulfide Logsheet for 11/16/01 and the associated Laboratory Control Sample Data Report, the true value for the LCS analyzed on 11/14/01 is 1000 mg/kg.

3. In the cyanide fraction, the laboratory did not summarize the results or recoveries for the initial and continuing calibration verifications (ICVs/CCVs), the initial and continuing calibration blanks (ICBs/CCBs), and the CRDL standards. The data reviewer was able to evaluate the ICV/CCV, ICB/CCB, and CRDL standards results based on the raw data provided. All results were within acceptance criteria; consequently, qualification of data was not warranted due to this issue.

Noncorrectable Deficiency

- Several sample coolers were received at STL North Canton at a temperature less than 2.0°C. According to SW-846 (Section 2, Table 2-36), samples are to be preserved at a temperature of 4±2°C. STL North Canton did not indicate that any samples were frozen or that any sample containers were broken; therefore, qualification of data was not warranted due to this issue.

Comments

1. The laboratory did not report the concentrations for the interference analytes (aluminum, calcium, iron, and magnesium) on the Interference Check Standard summary forms (Form IVs) for the metals analytical sequences; this omission was presumably because these analytes were not target analytes. The data reviewer obtained the essential ICP interferent information from the raw data provided. Qualification of data due to ICP interferences is address in the subsequent Inorganic and General Chemistry Data Qualifiers section.

2. The laboratory did not record final volumes for the project or QC samples on the Metals Prep Logs; however, the data reviewer was able to determine the final volume based on the reported positive results.

3. Sample 110801236 was analyzed at a 100-fold dilution due to high concentrations of lead and tin. Sample 110801237 was analyzed at a 100-fold dilution due to a high concentration of tin.

With respect to data usability, the principal areas of concern are blank contamination; ICP interferences; low, very low, and high recoveries in the MS and/or MSD analyses; imprecision in the MS/MSD analyses; and low and high recoveries in the CRDL standard analyses. Based on a rigorous review of the data provided, the following inorganic data qualifiers are offered. The following inorganic data usability issues represent an interpretation of the QC results obtained for the project samples. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Inorganic and General Chemistry Data Qualifiers

- Due to trace level presence of the following analytes in the associated laboratory blanks, the positive results for the following analytes in the samples listed below should be considered "not-detected"; consequently, these results have been flagged "U*" on the data tables. It should be noted that dilution factors and sample weights were taken into consideration when evaluating blank contamination.

Analyte	Samples With Result(s) Qualified as "Not-Detected"
beryllium	110801236, 110801237, 110801239, 110801240, 110801241, and 110901242
mercury	110801236, 110801238, 110801240, 110801241, 110901242, 110901243, 110901244, 111001247, and 111001248
cadmium	110801238, 110801239, 110801241, 110901243, 110901244, 110901245, and 111001248
selenium	110801238, 110801239, 110801240, 110801241, 110901243, 110901244, and 110901245
tin	110801238, 110801239, 110801241, 110901242, 110901243, 110901244, 110901245, 111001247, and 111001248

- The analyses for antimony and selenium in all validated samples should be considered unreliable and have been flagged "R" (unless previously flagged 'U*") on the data tables. In addition, the reported positive results for these analytes in the validated samples should be considered estimated and have been flagged "J" on the data tables. Very low recoveries (%R<30%) were observed for antimony and selenium in the associated MS and/or MSD analyses.

- The reported positive result for zinc in sample 110801236 should be considered estimated and has been flagged "J" on the data tables. Zinc was observed to be present in the ICP interference check sample ICSA solution at a concentration greater than two-times the IDL, indicating a possible positive interference in the presence of high levels of interferents. High levels of ICP interferent(s) (instrument level > 50% of the true value of the ICSA solution) were observed in sample 110801236.

- The reported positive result for tin in sample 110801239 should be considered estimated and has been flagged "J" (unless previously flagged "U*") on the data tables. Tin was observed to be present in the ICP interference check sample ICSA solution at a negative concentration with an absolute value greater than two-times the IDL, indicating a possible negative interference in the presence of high levels of interferents. High levels of ICP interferent(s) (instrument level > 50% of the true value of the ICSA solution) were observed in sample 110801239.

- The detection limits for the following analytes in the samples listed below may be higher than reported, and the "not-detected" results have been flagged "UJ" (unless previously flagged 'U*" or "R") on the data tables. In addition, the reported positive results for the following analytes in the samples listed below should be considered estimated and have been flagged "J" on the data tables. Low recoveries (30≤%R<75%) were observed for these analytes in the associated MS and/or MSD analyses.

Analytes	Samples With Biased Low Detection Limits ("UJ") and/or With Estimated Positive Results ("J")
antimony, cadmium, silver, arsenic, thallium, and mercury	All validated samples

- The reported positive result for silver in sample 110801236 should be considered estimated and has been flagged "J" on the data tables. A high recovery (>125%) was observed for silver in the associated MSD analysis.

- The reported positive result for silver in sample 110801236 should be considered estimated and has been flagged "J" on the data tables. A high relative percent difference (>40%) was observed for silver in the associated MS/MSD analyses.

- The positive results for antimony in samples 110801240 and 110901242 and for thallium in sample 110801239 should be considered estimated and have been flagged "J" on the data tables. In addition, the detection limits for thallium in samples 110801237, 110801238, 110801240, 110801241, 110901242, 110901243, 110901244, 110901245, 111001247, and 111001248 may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. A low recovery (<85%) for thallium and a high recovery (>115%) for antimony were reported in the CRDL standards associated with the project samples.

A complete support document of this inorganic and general chemistry QA review is provided in Section 4 of this report.

C. Conclusions

This QA review has identified several aspects of the data that required qualification. The analytical data should be considered acceptable for use unless otherwise indicated in the QA review. In order to use any of the data, the data user should understand the qualifications and limitations specified in this QA review. The Project Chain-of-Custody Records and Case Narratives are presented in Section 5. Project Correspondence is presented in Section 6.

Report prepared by:

Thomas H. Weinmann
Quality Assurance Chemist

Report prepared by:

Glenn S. Esler
Quality Assurance Chemist

Report prepared by:

Kathyryn A. Donahower
Quality Assurance Chemist

Report prepared by:

Steven J. Lennon
Quality Assurance Chemist

Report reviewed by:

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist II

Report reviewed and approved by:

Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

Date: 5/10/02

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

(610) 935-5577

ENVIRONMENTAL STANDARDS

Setting the Standards for Innovative Environmental Solutions

July 22, 2004

Mr. Mark P. Hemingway
Principal Hydrogeologist
Geomatrix Consultants, Inc.
5725 Highway 290 West
Suite 200-B
Austin, TX 78735

Dear Mr. Hemingway:

Enclosed is the quality assurance review for the soil and aqueous samples collected on March 14, 15, and 25, 2004, and on April 5, 6, and 7, 2004, as part of the Morton – Reading, Ohio, Project. Organic sample data were qualified as unreliable due to calibration issues and very low matrix spike/matrix spike duplicate and laboratory control sample/laboratory control sample duplicate recoveries. In addition, organic sample data were qualified due to blank contamination, calibration issues, low matrix spike/matrix spike duplicate recoveries, high and low laboratory control sample/laboratory control sample duplicate recoveries, low internal standard area counts, dual-column imprecision, and reported results below the quantitation limit. Inorganic sample results were qualified due to blank contamination, high and low contract-required detection limit standard recoveries, low matrix spike/matrix spike duplicate recoveries, ICP interferences, and serial dilution imprecision.

With respect to data package deliverables, the laboratory provided sufficient quality control summary forms and supporting raw data to allow for complete validation of the data. Only minor correctable deficiencies were noted during the review of the data.

If you have any questions or comments, or if we can be of further assistance, please feel free to call.

Sincerely,

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist II/
Project Manager

Sincerely,

David R. Bly for:
Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

DJL/RJV:hm
Enc.

1140 Valley Forge Road • P.O. Box 810 • Valley Forge, PA 19482-0810
T: 610-935-5577 • F: 610-935-5583 • www.envstd.com • solutions@envstd.com

QUALITY ASSURANCE REVIEW

OF SAMPLES COLLECTED ON MARCH 14, 15, AND 25, 2004

AND ON APRIL 5, 6, AND 7, 2004

AS PART OF THE MORTON – READING, OHIO

PROJECT

July 22, 2004

Prepared for:

GEOMATRIX CONSULTANTS, INC.
5725 Highway 290 West
Suite 200-B
Austin, TX 78735

Prepared by:

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

TABLE OF CONTENTS

Introduction

Section 1 **Quality Assurance Review**

A. Organic Data

B. Inorganic and General Chemistry Data

C. Conclusions

Section 2 **Analytical Results**

Section 3 **Organic Data Support Documentation**

Section 4 **Inorganic and General Chemistry Data Support Documentation**

Section 5 **Project Chain-of-Custody Records and Case Narratives**

Introduction

This quality assurance (QA) review is based upon a rigorous examination of the data generated from the analyses of the samples collected on March 14 and 15, 2004, as part of the Morton – Reading, Ohio, Project. The samples included in this QA review are presented on Table 1. The laboratory was requested to prepare a detailed data package to substantiate the reported analytical results. The data package that was prepared allowed for the performance of a comprehensive review.

This review has been performed with guidance from the "National Functional Guidelines for Organic Data Review" (US EPA, October 1999) and the "National Functional Guidelines for Inorganic Data Review" (US EPA, July 2002).

The reported analytical results are presented as a summary of the data in Section 2. Data were examined to determine the usability of the analytical results and compliance relative to the analytical requirements specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition" (SW-846), "Methods for the Chemical Analysis of Waters and Waste," (MCAWW), and the Quality Assurance Project Plan Facility Investigation RCRA §3013 Administrative Order for the Morton International, Inc. Facility located in Reading, Ohio. Qualifier codes have been placed next to the results to enable the data user to quickly assess the qualitative and/or quantitative reliability of any result. Details of this QA review are presented in Section 1 of this report. This critical QA review identifies data quality issues for specific samples and specific evaluation criteria. The data qualifications allow the data user to best understand the usability of the analysis results. Data not qualified in this report should be considered valid based on the quality control (QC) criteria that have been reviewed.

TABLE 1

SAMPLES THAT HAVE UNDERGONE

A RIGOROUS QUALITY ASSURANCE REVIEW

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Matrix	Date Sample Collected	Parameter(s) Analyzed
20040315CINTB (Trip Blank)	A4C160242-001	A4C160242	Aq	3/15/04	V
20040314DP70AV9-11N	A4C160242-002	A4C160242	Soil	3/14/04	V, SVOA, Pest, PCB, M*
20040314DP70AV9-11NMS (Matrix Spike)	A4C160242-002MS	A4C160242	Soil	3/14/04	V, SVOA, Pest, PCB, M*
20040314DP70AV9-11NMSD (Matrix Spike Duplicate)	A4C160242-002MSD	A4C160242	Soil	3/14/04	V, SVOA, Pest, PCB, M*
20040314DP73AV12-13N	A4C160242-003	A4C160242	Soil	3/14/04	V, SVOA, Pest, PCB, M*
20040314DP78AV9-10N	A4C160242-004	A4C160242	Soil	3/14/04	V, SVOA, Pest, PCB, M*
20040314DP78AV9-10NDL (Dilution)	A4C160242-004DL	A4C160242	Soil	3/14/04	SVOA
20040314DP72AV12-13N	A4C160242-005	A4C160242	Soil	3/14/04	V, SVOA, Pest, PCB, M*
20040314DP79AV12-13N	A4C160242-006	A4C160242	Soil	3/14/04	V, SVOA, Pest, PCB, M*
20040315DP58AV8.5-9.5N	A4C160242-007	A4C160242	Soil	3/15/04	V, SVOA, Pest, PCB, M*
20040315DP56AV9.5-10.5N	A4C160242-008	A4C160242	Soil	3/15/04	V, SVOA, Pest, PCB, M*
20040315CINEB (Equipment Blank)	A4C160242-009	A4C160242	Aq	3/15/04	V, SVOA, Pest, PCB, M*, CN, S^{-2}, Cr^{+6}
20040315CINEBMS (Matrix Spike)	A4C160242-009MS	A4C160242	Aq	3/15/04	Cr^{+6}
20040315CINEBMSD (Matrix Spike Duplicate)	A4C160242-009MSD	A4C160242	Aq	3/15/04	Cr^{+6}
20040315CINBLIND	A4C160242-010	A4C160242	Soil	3/15/04	V, SVOA, Pest, PCB, M*
20040315DP66AV9.5-10.5N	A4C160242-015	A4C160242	Soil	3/15/04	V, SVOA, Pest, PCB, M*
20040315DP60AV6.6-7.4N	A4C160242-016	A4C160242	Soil	3/15/04	V, SVOA, Pest, PCB, M*
20040406CINTB (Trip Blank)	A4D070211-001	A4D070211	Aq	4/6/04	V
20040405UAW14-10V13N	A4D070211-004	A4D070211	Aq	4/5/04	V, SVOA, Pest, PCB, M* pH, CN, S^{-2}

TABLE 1 (Cont.)

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Matrix	Date Sample Collected	Parameter(s) Analyzed
20040406UAW09-60V52N	A4D070211-005	A4D070211	Aq	4/6/04	V, SVOA, Pest, PCB, M* pH, CN, S^{-2}
20040406MW-EPA-4V18N	A4D070211-008	A4D070211	Aq	4/6/04	V, SVOA, Pest, PCB, M* pH, Cr^{+6},CN, S^{-2}
20040406MW-EPA-4V18NMS (Matrix Spike)	A4D070211-008MS	A4D070211	Aq	4/6/04	V, SVOA, Pest, PCB, M*
20040406MW-EPA-4V18NMSD (Matrix Spike Duplicate)	A4D070211-008MSD	A4D070211	Aq	4/6/04	V, SVOA, Pest, PCB, M*
20040406CINBlind (Field Duplicate of 20048406UAW11-40038N)	A4D070211-010	A4D070211	Aq	4/6/04	V, SVOA, Pest, PCB, M* pH, Cr^{+6},CN, S^{-2}
20040406UAW11-40V38N	A4D070211-011	A4D070211	Aq	4/6/04	V, SVOA, Pest, PCB, M* pH, Cr^{+6},CN, S^{-2}
20040406CINEB (Equipment Blank)	A4D070211-012	A4D070211	Aq	4/6/04	V, SVOA, Pest, PCB, M* pH, Cr^{+6},CN, S^{-2}
20040407CINTB (Trip Blank)	A4D080137-002	A4D080137	Aq	4/7/04	V
20040407UAW18-20V15N	A4D080137-004	A4D080137	Aq	4/7/04	V, SVOA, Pest, PCB, M* pH, CN, S^{-2}
20040407UAW15-20V14N	A4D080137-005	A4D080137	Aq	4/7/04	V, SVOA, Pest, PCB, M* pH, CN, S^{-2}
20040325CS-5AN	A4C260187-010	A4C250199	Soil	3/25/04	V, SVOA, Pest, PCB, M, Cr^{+6}
20040325CS-5ANMS (Matrix Spike)	A4C260187-010MS	A4C250199	Soil	3/25/04	V, SVOA, Pest, PCB, M
20040325CS-5ANMSD (Matrix Spike Duplicate)	A4C260187-010MSD	A4C250199	Soil	3/25/04	V, SVOA, Pest, PCB, M
20040325CINTB (Trip Blank)	A4C260187-001	A4C250199	Aq	3/25/04	V
20040325WS-6AN	A4C260187-005	A4C250199	Aq	3/25/04	V, SVOA, Pest, PCB, M, CN, pH, Cr^{+6}, S^{-2}
20040325WS-5AN	A4C260187-007	A4C250199	Aq	3/25/04	V, SVOA, Pest, PCB, M, CN, pH, S^{-2}

TABLE 1 (Cont.)

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Matrix	Date Sample Collected	Parameter(s) Analyzed
20040325WS-5ANMS (Matrix Spike)	A4C260187-007MS	A4C250199	Aq	3/25/04	V, SVOA, Pest, PCB, M, CN, S^{-2}
20040325WS-5ANMSD (Matrix Spike Duplicate)	A4C260187-007MSD	A4C250199	Aq	3/25/04	V, SVOA, Pest, PCB, M
20040325WS-5ANDUP (Laboratory Duplicate)	A4C260187-007DUP	A4C250199	Aq	3/25/04	CN, pH, S^{-2}

NOTES:

V - Volatile Organic Compounds by SW-846 Method 8260B. (34 analyses)
SVOA - Semivolatile Organic Compounds by SW-846 Method 8270C. (31 analyses)
Pest - Organochlorine Pesticides by SW-846 Method 8081A. (30 analyses)
PCB - PCBs (specifically, Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) by SW-846 Method 8082. (30 analyses)
M - Select Metals (specifically, silver, cadmium, cobalt, chromium, antimony, arsenic, barium, lead, beryllium, selenium, thallium, copper, nickel, tin, vanadium, zinc, and mercury) by SW-846 Methods 6010B and 7470A/7471A. (7 analyses)
M* - Select Metals (specifically, aluminum, silver, calcium, cadmium, cobalt, chromium, antimony, arsenic, barium, lead, beryllium, iron, selenium, thallium, copper, magnesium, manganese, nickel, potassium, sodium, tin, vanadium, zinc, and mercury) by SW-846 Methods 6010B and 7470A/7471A. (23 analyses)
CN - Cyanide by SW-846 Method 9012A. (13 analyses)
S^{-2} - Total Sulfide by Methods for Chemical Analysis of Water and Wastes (MCAWW) Method 376.1. (13 analyses)
Cr^{+6} - Hexavalent Chromium by SW-846 Method 7196A. (9 analyses)
pH - pH by MCAWW Method 150.1. (11 analyses)
Aq - Aqueous.

Section 1 Quality Assurance Review

A. Organic Data

The organic analyses of 15 soil samples and 19 aqueous samples (including QC samples) were performed by Severn Trent Laboratories, Inc. (STL) of North Canton, Ohio. Including QC samples, 34 samples were analyzed for volatile organic compounds by SW-846 Method 8260B; 31 samples (including a dilution) were analyzed for semivolatile organic compounds by SW-846 Method 8270C; 30 samples were analyzed for organochlorine pesticides by SW-846 Method 8081A; and 30 samples were analyzed for PCBs (specifically, Aroclor-1016, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260) by SW-846 Method 8082. All analyses are indicated on Table 1, and the analytical results are summarized in Section 2 of this report.

The findings offered in this report are based upon a rigorous review of holding times, blank analysis results, system monitoring compound recoveries, matrix spike/matrix spike duplicate (MS/MSD) recoveries and precision, blank spike (laboratory control sample/laboratory control sample duplicate [LCS/LCSD]) recoveries and precision, initial and continuing calibrations, target compound matching quality, analytical sequence, retention times (RTs), gas chromatography/mass spectroscopy (GC/MS) tuning and mass calibration, internal standard performance, quantitation of positive results, and overall system performance.

A few deficiencies were identified as detailed below. The Environmental Standards, Inc. (Environmental Standards) data reviewer has edited the laboratory-reported data and QC summary forms based on the deficiencies and comments listed in this QA review. Furthermore, the Environmental Standards data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support these edits in the Organic Data Support Documentation (Section 3) of this review. The following deficiencies and comments do not necessarily affect data usability. Usability is addressed in the subsequent Organic Data Qualifiers section.

Correctable Deficiencies

1. In the volatile fraction, the laboratory did not summarize all target compounds on the SW846 8260B Matrix Spike/Matrix Spike Duplicate Recovery summaries or the SW846 8260B Check Sample Recovery summaries. In addition, the laboratory did not report relative percent differences (RPDs) between the LCS and LCSD results on the SW846 8260B Check Sample Recovery summaries. The data reviewer used the raw data to evaluate the results for all target compounds in the MS/MSD and LCS/LCSD analyses. The impact on data usability due to results outside of the acceptance criteria is addressed in the subsequent Organic Data Qualifiers section.

2. In the semivolatile fraction, the laboratory did not summarize all target compounds on the SW846 8270C Matrix Spike/Matrix Spike Duplicate Recovery summaries or the SW846 8270C Check Sample Recovery summaries. In addition, the laboratory did not report RPDs between the LCS and LCSD results on the SW846 8270C Check Sample Recovery summaries. The data reviewer used the raw data to evaluate the results for all target compounds in the MS/MSD and LCS/LCSD analyses. The impact on data usability due to

results outside of the acceptance criteria is addressed in the subsequent Organic Data Qualifiers section.

3. In the volatile, semivolatile, and PCB fractions, the laboratory reported incorrect initial calibration dates, times, and/or file IDs on several of the calibration summary and analytical sequence forms.

4. In the pesticide fraction, the laboratory did not summarize the breakdown percentages of endrin and 4,4′-DDT for the performance evaluation mixtures (PEMs). The data reviewer used the raw data to evaluate the PEMs; all breakdown percentages were within the acceptance limits.

5. In the pesticide and PCB fractions, the laboratory did not provide RT window summaries. According to SW-846 Method 8000B (Section 7.6), RT windows should be established as ±3 times the standard deviation of the mean absolute RT of three standard analyses over a 72-hour period. The data reviewer used the raw data to evaluate the RTs for the reported positive results for pesticides; all RTs were within the default RT window (0.03 minutes) defined by the method. Positive results for PCBs were not detected in the project samples.

6. In the pesticide fraction, the laboratory did not summarize all target compounds on the SW846 8081A Matrix Spike/Matrix Spike Duplicate Recovery summaries or the SW846 8081A Check Sample Recovery summaries. In addition, the laboratory did not report RPDs between the LCS and LCSD results on the SW846 8081A Check Sample Recovery summaries. The data reviewer used the raw data to evaluate the results for all target compounds in the MS/MSD and LCS/LCSD analyses. The impact on data usability due to results outside of the acceptance criteria is addressed in the subsequent Organic Data Qualifiers section.

Noncorrectable Deficiencies

1. Collection dates and times were not recorded on the Chain-of-Custody Record for samples 20040315CINTB and 20040315CINBLIND. According to the STL Cooler Receipt Form, these samples were logged with a collection date of 3/15/04 per the sample IDs and container labels.

2. According to the STL Cooler Receipt Form and Case Narrative, the En Core® containers for the MS/MSD samples associated with sample 20040314DP70AV9-11N were not processed within the required holding time due to a sample receiving oversight. SW-846 Method 5035 (Section 6.2.1.8) states that En Core samples should be transferred to a soil sample container or analyzed within 48 hours. The laboratory noted in the Case Narrative that Anne Haikola of Geomatrix Consultants, Inc. was informed of the situation and instructed the laboratory to proceed with the analyses. The impact on data usability due to MS/MSD results outside of the acceptance limits is addressed in the subsequent Organic Data Qualifiers section.

3. According to the STL Cooler Receipt Form, one of the sample coolers was received at "0.1°C." SW-846 Chapter 4 (Table 4-1) indicates that organic samples should be preserved at 4°C. The laboratory did not indicate that any samples were damaged; therefore, qualification of data was not warranted due to this issue.

4. In the pesticide fraction, high average percent differences (%Ds>15%) were observed in the continuing calibration verification (CCV) standards analyzed on 3/31/04 at 3:29, 9:46, and 10:31 on both analytical columns of instrument a2hp9. According to SW-846 Method 8081A (Section 7.5.2.3), if the average %D exceeds 15%, corrective action must be taken or the instrument must be recalibrated. The laboratory did not correct the system or recalibrate the instrument. The impact on data usability due to the high %Ds is addressed in the subsequent Organic Data Qualifiers section.

5. In the pesticide and PCB fractions, the laboratory did not include the surrogate compounds tetrachloro-*m*-xylene and decachlorobiphenyl in the initial calibration verification (ICV) standards. According to SW-846 Method 8000B (Section 7.6.8), surrogates should be added to all samples, blanks, and QC samples. The surrogates were included in the CCV standards that bracketed the project samples; therefore, qualification of data was not warranted due to this issue.

6. In the PCB fraction, high recoveries for both surrogate compounds were observed in samples 20040314DP73AV12-13N and 20040314DP78AV9-10N. According to SW-846 Method 8000B (Section 8.6.2.4), if a surrogate recovery is not within specified limits and no instrument problem has been found, the sample must be reextracted and reanalyzed. The laboratory did not reextract and reanalyze these samples. The recoveries for both surrogates were above the upper acceptance limit, indicating a high bias, and positive result for PCBs were not detected in these samples; therefore, qualification of data was not warranted due to this issue.

7. In the semivolatile fraction, low recoveries for two acid surrogate compounds were observed in sample 20040406UAW09-60V52N. According to SW-846 Method 8000B (Section 8.6.2.4), if a surrogate recovery is not within specified limits and no instrument problem has been found, the sample must be reextracted and reanalyzed. The laboratory did not reextract and reanalyze this sample. The impact on data usability due to the low surrogate recoveries is addressed in the subsequent Organic Data Qualifiers section.

8. In SDG A4D070211, sample 20040406UAW11-40V38N was reextracted 8 days beyond the 7-day sample holding time from collection to extraction (SW-846 Table 4-1). The impact on data usability due to the exceeded holding time is addressed in the subsequent Organic Data Qualifiers section.

Comments

1. According to the STL Cooler Receipt Form, one of the sample coolers was received at "2.8°C." SW-846 Chapter 4 (Table 4-1) indicates that organic samples should be preserved at 4°C. It is generally acceptable for samples to be stored within the range of 4±2°C and the laboratory did not indicate that any samples were damaged; therefore, qualification of data was not warranted due to this issue.

2. The following samples were analyzed at the initial dilutions listed below for the compounds indicated due to high levels of target compounds and/or matrix interferences. The quantitation limits for the compounds in these samples have been adjusted accordingly.

Sample	Compounds	Dilution Factor
20040315DP60AV6.6-7.4N	all volatile compounds	1.25×
	all semivolatile compounds	20×
	all pesticide compounds	50×
20040315CINBLIND	all volatile compounds	2.86×
	all semivolatile compounds	20×
	all pesticide compounds	100×
20040314DP70AV9-11N	all semivolatile compounds	4×
	all pesticide compounds	100×
20040314DP73AV12-13N	all volatile compounds	6.67×
	all semivolatile compounds	20×
	all pesticide compounds	100×
20040314DP72AV12-13N	all semivolatile compounds	20×
	all pesticide compounds	100×
20040315DP56AV9.5-10.5N	all volatile compounds	50×
	all semivolatile compounds	400×
	all pesticide compounds	200×
	all PCBs	10×
20040315DP58AV8.5-9.5N	all semivolatile and pesticide compounds	50×
20040315DP66AV9.5-10.5N	all semivolatile compounds	50×
	all pesticide compounds	100×
	all PCBs	10×
20040314DP78AV9-10N	all volatile and semivolatile compounds except 1,2-dichlorobenzene	100×
	all pesticide compounds	50×
20040314DP79AV12-13N	all semivolatile compounds	100×
	all pesticide compounds	50×

Sample	Compounds	Dilution Factor
20040407UAW1520V14N	all volatile compounds	5×

3. The result for 1,2-dichlorobenzene in sample 20040314DP78AV9-10N was reported from a 2000-fold dilution analysis because the result for this compound exceeded the instrument calibration range in the original analysis. The quantitation limit for 1,2-dichlorobenzene in this sample has been raised accordingly.

With respect to data usability, the principal areas of concern are blank contamination, calibration issues, low matrix spike recoveries, high and low blank spike recoveries, low internal standard area counts, dual-column imprecision, and reported results below the quantitation limit. Based on a rigorous review of the data provided, the following organic data qualifiers are offered. The following organic data usability issues represent an interpretation of the QC results obtained for the project samples. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Organic Data Qualifiers

- Due to the trace-level presence of acetone in the associated laboratory blanks, the reported positive results for acetone in all SDG A4C160242 soil samples and in SDG A4C250199 samples 20040325WS-6AN and 20040325WS-5AN should be considered "not-detected" and have been flagged "U*" on the data tables. When the reported result for acetone was less than the sample-specific quantitation limit, the data reviewer raised the reported result to the quantitation limit and flagged the result "U*". It should be noted that dilution factors, sample weights, and percent solids were taken into consideration when evaluating blank contamination.

- Due to the trace-level presence of bis(2-ethylhexyl)phthalate in an associated laboratory blank, the reported positive results for bis(2-ethylhexyl)phthalate in SDG A4C160242 samples 20040314DP78AV9-10N, 20040314DP72AV12-13N, and 20040315DP56AV9.5-10.5N should be considered "not-detected" and have been flagged "U*" on the data tables. When the reported result for bis(2-ethylhexyl)phthalate was less than the sample-specific quantitation limit, the data reviewer raised the reported result to the quantitation limit and flagged the result "U*". It should be noted that dilution factors, sample weights, and percent solids were taken into consideration when evaluating blank contamination.

- Although there is no reason to question the reported positive results for bis(2-ethylhexyl)phthalate in SDG A4C160242 sample 20040314DP70AV9-11N and SDG A4C250199 samples 20040325WS-5AN and 20040325WS-6AN, this compound is a very common laboratory and/or field contaminant. In addition, the reported results for this compound in these samples represent low-level, on-column detections. Accordingly, extreme caution should be exercised if these results are to be used in a decision-making process, such as risk assessment.

- The analyses for chloroethane in all soil samples of SDG A4C160242 should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. A very low relative response factor (RRF<0.050) was observed for chloroethane in the associated CCV standard.

- The analyses for famfur in SDG A4C250199 sample 20040325CS-5AN should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. A very low correlation coefficient (<0.90) was observed for famfur in the calibration curve generated from the associated initial calibration standards.

- The analyses for famfur and 1,4-naphthoquinone in SDG A4C250199 samples 20040325WS-5AN and 20040325WS-6AN should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low correlation coefficients (<0.90) were observed for 1,4-naphthoquinone and famfur in the calibration curves generated from the associated initial calibration standards. In addition, famfur was not detected in the CCV standard associated with the samples.

- The analyses for acrolein, acetonitrile, propionitrile, and isobutyl alcohol in all SDG A4C250199 samples should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low relative response factors (RRF<0.050) were observed for these compounds in the associated initial and continuing calibration standards.

- The analysis for bromochloromethane in SDG A4C160242 sample 20040314DP70AV9-11N should be considered unreliable, and the "not-detected" result has been flagged "R" on the data tables. A very low recovery (<30%) was observed for bromochloromethane in the associated MS/MSD analyses.

- The analyses for hexachlorocyclopentadiene; 2,4-dinitrophenol; 4-nitrophenol; pentachlorophenol; and 4,6-dinitro-2-methylphenol in SDG A4C160242 sample 20040314DP70AV9-11N should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<10%) were observed for these compounds in the associated MS/MSD analyses.

- The analyses for aniline and dimethylphthalate in SDG A4D070211 sample 20040406MW-EPA-4V18N should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<10%) were observed for these compounds in the associated MS/MSD analyses.

- The analyses for bromochloromethane in all SDG A4C160242 samples should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<30%) were observed for bromochloromethane in the associated LCS/LCSD analyses.

- The analyses for dimethylphthalate in SDG A4C250199 samples 20040325WS-5AN and 20040325WS-6AN should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<10%) were observed for dimethylphthalate in the associated LCS analysis.

- The analysis for 4,4′-DDT in SDG A4C250199 sample 20040325WS-5AN should be considered unreliable, and the "not-detected" result has been flagged "R" on the data tables. A very low recovery (<10%) was observed for 4,4′-DDT in the associated matrix spike analysis.

- The analysis for vinyl acetate in SDG A4C250199 sample 20040325WS-5AN should be considered unreliable, and the "not-detected" result has been flagged "R" on the data tables. A very low recovery (<30%) was observed for vinyl acetate in the associated matrix spike analysis.

- The analyses for hexachlorocyclopentadiene; dimethylphthalate; and 3,3′-dichlorobenzidine in SDG A4C160242 sample 20040315CINEB should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. Very low recoveries (<10%) were observed for these compounds in the associated LCS/LCSD analyses.

- The analyses for all semivolatile compounds in SDG A4D070211 sample 20040406UAW11-40V38N should be considered unreliable, and the "not-detected" results have been flagged "R" on the data tables. This sample was reextracted 8 days beyond the holding time of 7 days from sample collection to extraction.

- In SDG A4C160242, the reported positive results for endrin in samples 20040314DP78AV9-10N, 20040314DP79AV12-13N, 20040315DP56AV9.5-10.5N, 20040315CINBLIND, and 20040315DP66AV9.5-10.5N; for endrin aldehyde in sample 20040314DP73AV12-13N; for methoxychlor in sample 20040315DP56AV9.5-10.5N; and for 4,4′-DDD in samples 20040314DP73AV12-13N and 20040315DP60AV6.6-7.4N should be considered estimated and have been flagged "J" on the data tables. High percent relative standard deviations (%RSDs>20%) were observed for these compounds in the associated initial calibration.

- The quantitation limits for *trans*-1,3-dichloropropene and bromoform in SDG A4C160242 samples 20040315CINTB and 20040315CINEB may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. High %Ds (>20%), coupled with decreases in instrument sensitivity, were observed for these compounds in the associated CCV standard.

- The quantitation limits for dichlorodifluoromethane and bromoform in all SDG A4C160242 soil samples may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. High %Ds (>20%), coupled with decreases in instrument sensitivity, were observed for these compounds in the associated CCV standard.

- The quantitation limits for the following volatile organic compounds in the in SDG A4D070211 samples listed below may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. High %Ds (>20%), coupled with decreases in instrument sensitivity, were observed for these compounds in the associated CCV standards.

Compound(s)	Samples With Estimated Quantitation Limits ("UJ")
acetone, carbon disulfide, chloroethane, chloromethane, and trichlorofluoromethane	20040406CINTB, 20040405UAW14-10V13N, 20040406UAW09-60V52N, and 20040406MW-EPA-4V18N
acetone, chloromethane, dichlorodifluoromethane, and trichlorofluoromethane	20040406CINBLIND, 20040406UAW11-40V38N, and 20040406CINEB
cyclohexane	20040407CINTB, 20040407UAW18-20V15N, and 20040407UAW15-20V14N

- The quantitation limits for 2,4-dinitrophenol and 4,6-dinitro-2-methylphenol in SDG A4D070211 sample 20040406UAW11-40V38N may be higher than reported, and the "not-detected" results have been flagged "UJ" (unless previously flagged "R") on the data tables. A high %D (>20%), coupled with a decrease in instrument sensitivity, was observed for these compounds in the associated CCV standard.

- The quantitation limits for benzaldehyde in SDG A4C160242 samples 20040315CINBLIND and 20040315DP60AV6.6-7.4N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, the reported positive result for benzaldehyde in SDG A4C160242 sample 20040314DP70AV9-11N should be considered estimated and has been flagged "J" on the data tables. A high %D (>20%), coupled with a decrease in instrument sensitivity, was observed for benzaldehyde in the associated CCV standard.

- The quantitation limits for bromoform; *cis*-1,3-dichloropropene; *trans*-1,3-dichloropropene, vinyl acetate; and 1,2-dibromo-3-chloropropane in SDG A4C250199 samples 20040325WS-5AN and 20040325WS-6AN may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables (unless previously flagged "R"). High %Ds (>20%), coupled with decreases in instrument sensitivity, were observed for these compounds in the associated CCV standard.

- The quantitation limits for 4-nitroquinoline-1-oxide and famfur in SDG A4C250199 sample 20040325CS-5AN may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables (unless previously flagged "R"). High %Ds (>20%), coupled with decreases in instrument sensitivity, were observed for these compounds in the associated CCV standard.

- In SDG A4C160242, the quantitation limits for benzaldehyde, hexachlorocyclopentadiene, and benzo(k)fluoranthene in samples 20040314DP78AV9-10N, 20040314DP79AV12-13N, 20040315DP58AV8.5-9.5N, and 20040315DP56AV9.5-10.5N and for hexachlorocyclopentadiene and benzo(k)fluoranthene in samples 20040314DP73AV12-13N, 20040314DP72AV12-13N, and 20040315DP66AV9.5-10.5N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, the reported positive results for benzaldehyde in samples 20040314DP73AV12-13N, 20040314DP72AV12-13N, and 20040315DP66AV9.5-10.5N should be considered estimated and have been flagged "J" on the data tables. High %Ds (>20%), coupled with decreases in instrument sensitivity, were observed for these compounds in the associated CCV standard.

- The reported positive results for all pesticide compounds in all SDG A4C160242 samples, with the exception of methoxychlor in samples 20040314DP73AV12-13N, 20040314DP78AV9-10N, 20040315DP56AV9.5-10.5N, and 20040315DP60AV6.6-7.4N, should be considered estimated and have been flagged "J" on the data tables. High %Ds (>20%), coupled with increases in instrument sensitivity, were observed for these compounds in the associated CCV standards.

- The quantitation limits for dichlorodifluoromethane, bromomethane, 2-butanone, and 2-hexanone in SDG A4C160242 sample 20040314DP70AV9-11N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, the reported positive results for acetone, carbon disulfide, and methylcyclohexane in SDG A4C160242 sample 20040314DP70AV9-11N should be considered estimated and have been flagged "J" (unless previously flagged "U*") on the data tables. Low recoveries (<70%) were observed for these compounds in the associated MS/MSD analyses.

- The quantitation limits for acetone, dichlorodifluoromethane, trichlorofluoromethane, and methyl *tert*-butyl ether in SDG A4D070211 sample 20040406MW-EPA-4V18N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<70%) were observed for these compounds in the associated MS/MSD analyses.

- The quantitation limits for benzaldehyde; 4-chloroaniline; 4-chloro-3-methylphenol; 2-chlorophenol; 1,2-dichlorobenzene; 1,3-dichlorobenzene; 1,4-dichlorobenzene; 2,4-dichlorophenol; diethyl phthalate; 2,4-dimethylphenol; 2,6-dinitrotoluene; hexachlorobutadiene; hexachlorocyclopentadiene; hexachloroethane; 2-methylphenol; 4-methylphenol; naphthalene; 4-nitrophenol; phenol; 1,2,4-trichlorobenzene; and 2,4,6-trichlorophenol in SDG A4D070211 sample 20040406MW-EPA-4V18N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<50%) were observed for these compounds in the associated MS/MSD analyses.

- The quantitation limits for aniline; 4-chloroaniline; 2,4,6-trichlorophenol; *N*-nitrosodiphenylamine; 3,3′-dichlorobenzidine; and 4-nitroaniline in SDG A4C160242 sample 20040314DP70AV9-11N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<50%) were observed for these compounds in the associated MS/MSD analyses.

- The quantitation limits for 2,4-dinitrophenol; 4,6-dinitro-2-methylphenol; pentachlorophenol; and 1,4-dioxane in SDG A4C250199 sample 20040325CS-5AN may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<50%) were observed for these compounds in the associated LCS analyses.

- The quantitation limits for endosulfan sulfate and endosulfan I in all SDG A4C250199 samples should be considered biased low, and the "not-detected" results have been flagged "UJ" on the data tables. High %Ds (>15%) in the direction of decreased instrument sensitivity were reported for these compounds in the associated ICV analysis.

- The quantitation limits for *delta*-BHC, endosulfan sulfate, endrin aldehyde, kepone, and chlorobenzilate in all SDG A4C250199 samples should be considered biased low, and the "not-detected" results have been flagged "UJ" on the data tables. High %Ds (>15%) in the direction of decreased instrument sensitivity were reported for these compounds in the associated CCV analyses.

- The quantitation limit for *gamma*-BHC in SDG A4C250199 sample 20040325WS-5AN may be higher than reported, and the "not-detected" result has been flagged "UJ" on the data tables. Low recoveries (<50%) were observed for *gamma*-BHC in the associated MS/MSD analyses.

- The quantitation limits for *gamma*-BHC; aldrin; and 4,4′-DDT in SDG A4C250199 sample 20040325CS-5AN may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<50%) were observed for these compounds in the associated MSD analysis.

- The quantitation limits for pyridine; 2,4-dimethylphenol; diethylphthalate; and 3,3-dichlorobenzidine in SDG A4C250199 samples 20040325WS-5AN and 20040325WS-6AN may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<50%) were observed for these compounds in the associated LCS analyses.

- The quantitation limits for 2-butanone; *trans*-1,3-dichloropropene; 2-hexanone; and 1,2-dibromo-3-chloropropane in SDG A4C250199 sample 20040325WS-5AN may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<70%) were observed for these compounds in the associated MS/MSD analyses.

- The quantitation limit for pentachlorophenol in SDG A4C250199 sample 20040325CS-5AN may be higher than reported, and the "not-detected" result has been flagged "UJ" on the data tables. A low recovery (<50%) was observed for pentachlorophenol in the associated MSD analysis.

- The quantitation limits for vinyl acetate and 2-hexanone in SDG A4C250199 samples 20040325WS-5AN and 20040325WS-6AN may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables (unless previously flagged "R"). Low recoveries (<70%) were observed for these compounds in the associated LCS analysis.

- The quantitation limits for 2-butanone, acetone, and acrolein in SDG A4C250199 sample 20040325CS-5AN may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables (unless previously flagged "R"). Low recoveries (<70%) were observed for these compounds in the associated MS/MSD analyses. In addition, a low recovery (<70%) was observed for acetone in the LCS analysis associated with SDG A4C250199 solid samples.

- The quantitation limits for dichlorodifluoromethane, acetone, 2-butanone, and 2-hexanone in SDG A4C160242 samples 20040315CINTB and 20040315CINEB may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<70%) were observed for these compounds in the associated LCS/LCSD analyses.

- The quantitation limits for 2-butanone and 2-hexanone in SDG A4C160242 samples 20040314DP70AV9-11N, 20040314DP73AV12-13N, 20040314DP78AV9-10N, 20040314DP72AV12-13N, and 20040314DP79AV12-13N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. A low recovery (<70%) was observed for these compounds in the associated LCSD analysis.

- The quantitation limits for 2-butanone and 2-hexanone in SDG A4C160242 samples 20040315DP58AV8.5-9.5N, 20040315DP56AV9.5-10.5N, 20040315CINBLIND, 20040315DP66AV9.5-10.5N, and 20040315DP60AV6.6-7.4N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, the reported positive results for acetone in these samples should be considered estimated and have been flagged "J" on the data tables. Low recoveries (<70%) were observed for these compounds in the associated LCS analysis.

- The quantitation limits for aniline; 1,2-dichlorobenzene; 1,3-dichlorobenzene; 1,4-dichlorobenzene; hexachloroethane; 2,4-dimethylphenol; 4-chloroaniline; hexachlorobutadiene; 3-nitroaniline; and diethylphthalate in SDG A4C160242 sample 20040315CINEB may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (<50%) were observed for these compounds in the associated LCS/LCSD analyses.

- The quantitation limits for 2,4-dimethylphenol and benzo(k)fluoranthene in all SDG A4C160242 soil samples and for aniline in SDG A4C160242 samples 20040314DP70AV9-11N, 20040314DP72AV12-13N, 20040315DP58AV8.5-9.5N, 20040315DP56AV9.5-10.5N, 20040315CINBLIND, 20040315DP66AV9.5-10.5N, and 20040315DP60AV6.6-7.4N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, the reported positive results for aniline in SDG A4C160242 samples 20040314DP73AV12-13N, 20040314DP78AV9-10N, and 20040314DP79AV12-13N should be considered estimated and have been flagged "J" on the data tables. Low recoveries (<50%) were observed for these compounds in the associated LCS analysis.

- The reported positive result for endrin aldehyde in SDG A4C160242 sample 20040314DP73AV12-13N should be considered estimated and has been flagged "J" on the data tables. A high recovery (>135%) was observed for endrin aldehyde in the associated LCS analysis.

- The quantitation limits for all semivolatile acid compounds in SDG A4D070211 sample 20040406UAW09-60V52N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. Low recoveries (< QC limit) were observed for two or more of the semivolatile acid surrogate compounds in this sample.

- The quantitation limits for all semivolatile compounds quantitated with the internal standard 1,4-dichlorobenzene-d_4 in SDG A4C160242 sample 20040314DP70AV9-11N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, any reported positive results for semivolatile compounds quantitated with the internal standard 1,4-dichlorobenzene-d_4 in SDG A4C160242 sample 20040314DP70AV9-11N should be considered estimated and have been flagged "J" on the data tables. A low area count (<50% of the corresponding area count in the associated CCV standard) was observed for the internal standard 1,4-dichlorobenzene-d_4 in the semivolatile analysis of this sample.

- The quantitation limits for all semivolatile compounds quantitated with the internal standards naphthalene-d_8 and acenaphthene-d_{10} in SDG A4C160242 sample 20040314DP78AV9-10N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, any reported positive results for semivolatile compounds quantitated with internal standard naphthalene-d_8 or acenaphthene-d_{10} in sample 20040314DP78AV9-10N should be considered estimated and have been flagged "J" on the data tables. Low area counts (<50% of the corresponding area counts in the associated CCV standard) were observed for the internal standards naphthalene-d_8 and acenaphthene-d_{10} in the semivolatile analysis of this sample.

- The reported positive results for the following compounds in the SDG A4C160242 samples listed below should be considered estimated and have been flagged "J" on the data tables. High %Ds (>40% when both results were >5× the quantitation limit [QL]) or differences (>2× the QL when one or both results were <5× the QL) were observed

between the positive results for these compounds in the dual-column pesticide analysis of these sample.

Compound	Sample(s) With Estimated Positive Results ("J")
endrin aldehyde	20040314DP73AV12-13N
endosulfan I	20040315DP66AV9.5-10.5N
endosulfan II	20040314DP78AV9-10N and 20040315DP56AV9.5-10.5N
methoxychlor	20040314DP78AV9-10N and 20040315DP56AV9.5-10.5N
gamma-chlordane	20040314DP72AV12-13N
endosulfan sulfate	20040314DP79AV12-13N
endrin	20040314DP79AV12-13N, 20040315DP56AV9.5-10.5N, and 20040315DP66AV9.5-10.5N
4,4'-DDT	20040315DP56AV9.5-10.5N
endrin ketone	20040315DP60AV6.6-7.4N

- One field duplicate pair was included with the samples selected for validation. Sample 20040406CINBLIND was identified as the field duplicate of sample 20040406UAW11-40V38N. In general, acceptable precision and sample representativeness were demonstrated by the correlation observed between the results in the field duplicate pair. The criteria used to assess field duplicate precision were as follows: if one or both results in the field duplicate pair are less than 5× the RL, the absolute difference between the results must be less than the 2× the RL; or if both results are greater than 5× the RL, the RPD must not exceed 40%. A complete comparison of the field duplicate results has been included in Section 3.

- Per US EPA reporting requirements, all positive results reported at levels less than the quantitation limits (adjusted for dilutions) should be considered estimated and have been flagged "J" on the data tables.

A complete support document of this organic QA review is provided in Section 3 of this report.

B. Inorganic and General Chemistry Data

The inorganic and general chemistry analyses of 15 soil samples and 18 aqueous samples (including QC samples) were performed by STL of North Canton, Ohio. Including QC samples, 30 samples were analyzed for select metals by SW-846 Methods 6010B and 7470A/7471A; 13 samples were analyzed for cyanide by SW-846 Method 9012A; 13 samples were analyzed for total sulfide by Methods for Chemical Analysis of Water and Wastes (MCAWW) Method 376.1; 11 samples were analyzed for pH by MCSWW Method 150.2; and nine samples were analyzed for hexavalent chromium by SW-846 Method 7196A. These analyses are indicated on Table 1. The analytical results are summarized in Section 2 of this report.

The findings offered in this report are based upon a rigorous review of holding times, blank analysis results, MS/MSD recoveries and precision, LCS recoveries, contract-required detection limit (CRDL) standard recoveries, interference check standard results and recoveries, serial dilution results, initial and continuing calibrations, analytical sequence, and quantitation of positive results.

A few deficiencies were identified as detailed below. The Environmental Standards data reviewer has edited the laboratory-reported data and QC summary forms based on the deficiencies and comment listed in this QA review. Furthermore, the Environmental Standards data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support these edits in the Inorganic and General Chemistry Data Support Documentation (Section 4) of this review. The following deficiencies and comment do not necessarily affect data usability. Usability is addressed in the subsequent Inorganic and General Chemistry Data Qualifiers section.

Correctable Deficiencies

1. In the cyanide and hexavalent chromium fractions, the laboratory did not summarize the results or recoveries for the calibration verification standards or the calibration blanks. The data reviewer used the raw data to evaluate the calibration verification standards or the calibration blanks and all results were within the acceptance limits; therefore, qualification of data was not warranted due to this issue.

2. The laboratory reported dilution factors of "1" rather than 5 on the analytical sequence summaries for the ICP serial dilution analyses.

3. In SDG A4C250199, the laboratory reported a positive result for mercury of "0.011 mg/Kg" in sample 200403255CS-5AN; however, the raw data for the sample analysis show that mercury was not detected in the sample at a concentration greater than the instrument detection limit (0.10 µg/L). Mercury should be considered "not detected" in the sample.

4. In SDG A4C250199, the laboratory reported a concentration of "0.4 µg/L" for barium in the continuing calibration blank analyzed on 4/1/04 at 17:27. The raw data show that the true concentration of barium in this blank was 0.3 µg/L. Similarly, the laboratory reported a concentration of "0.3 µg/L" for beryllium in the continuing calibration blank analyzed on 3/30/04 at 03:01. The raw data show that the true concentration of beryllium in this blank was 0.2 µg/L

Noncorrectable Deficiencies

1. A collection date and time was not recorded on the Chain-of-Custody Record for sample 20040315CINBLIND. According to the STL Cooler Receipt Form, this sample was logged with a collection date of 3/15/04 per the sample ID and container label.

2. According to the STL Cooler Receipt Form, one of the sample coolers was received at "0.1°C." SW-846 Chapter 3 (Table 3-1) indicates that mercury and hexavalent chromium samples should be preserved at 4±2°C. The laboratory did not indicate that any samples were damaged; therefore, qualification of data was not warranted due to this issue.

Comments

1. The results for calcium in all soil samples, except samples 20040315CINBLIND and 20040315DP60AV6.6-7.4N, were reported from five-fold dilution analyses due to high concentrations of calcium.

2. The results for sodium in SDG A4D070211 samples 20040407UAW18-20V15N and 20040407UAW15-20V14N were reported from five-fold and 10-fold dilution analyses, respectively, due to high concentrations of sodium.

With respect to data usability, the principal areas of concern are blank contamination, ICP interferences, low MS/MSD recoveries, high and low CRDL standard recoveries, and serial dilution imprecision. Based on a rigorous review of the data provided, the following inorganic and general chemistry data qualifiers are offered. The following inorganic and general chemistry data usability issues represent an interpretation of the QC results obtained for the project samples. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Inorganic and General Chemistry Data Qualifiers

- Due to trace level presence of the following analytes in the associated laboratory and/or field blanks, the reported positive results for the following analytes in the samples listed below should be considered "not-detected" and have been flagged "U*" on the data tables. It should be noted that dilution factors and sample weights were taken into consideration when evaluating blank contamination.

Analyte	Sample(s) With Positive Results Qualified as "Not-Detected" ("U*")
aluminum	20040406CINBLIND, 20040406UAW11-40V38N, and 20040407UAW18-20V15N
beryllium	20040325CS-5AN, 20040314DP78AV9-10N, 20040314DP72AV12-13N, 20040315DP58AV8.5-9.5N, and 20040315DP66AV9.5-10.5N
cadmium	20040314DP73AV12-13N, 20040314DP72AV12-13N, and 20040315DP56AV9.5-10.5N
cobalt	20040406MW-EPA-4V18N
copper	20040406CINBLIND, 20040406UAW11-40V38N, and 20040407UAW15-20V14N

Analyte	Sample(s) With Positive Results Qualified as "Not-Detected" ("U*")
magnesium	20040315DP56AV9.5-10.5N and 20040315CINBLIND
potassium	20040315DP56AV9.5-10.5N and 20040405UAW14-10V13N
sodium	20040315DP60AV6.6-7.4N
thallium	20040314DP70AV9-11N, 20040314DP73AV12-13N, 20040314DP78AV9-10N, 20040314DP72AV12-13N, 20040314DP79AV12-13N, 20040315DP58AV8.5-9.5N, 20040315DP66AV9.5-10.5N, 20040315DP60AV6.6-7.4N, 20040406UAW09-60V52N, 20040406MW-EPA-4V18N, 20040406CINBLIND, 20040406UAW11-40V38N, 20040407UAW18-20V15N, and 20040407UAW15-20V14N
tin	20040325CS-5AN
vanadium	20040407UAW18-20V15N
total sulfide	20040406UAW09-60V52N, 20040406MW-EPA-4V18N, 20040406CINBLIND, 20040406UAW11-40V38N, 20040407UAW18-20V15N, and 20040407UAW15-20V14N
mercury	20040314DP70AV9-11N, 20040314DP72AV12-13N, 20040314DP79AV12-13N, and 20040315DP58AV8.5-9.5N

- The reporting limit for copper in SDG A4D070211 samples 20040405UAW14-10V13N, 20040406UAW09-60V58N, 20040406MW-EPA-4V18N, and 20040407UAW18-20V15N may be higher than reported, and have been flagged "UJ" on the data tables. Significant negative instrument bias (absolute value of concentration > twice the IDL) was observed for copper in the associated initial calibration blank and/or continuing calibration blank analyses.

- The reporting limits for mercury in all SDG A4D070211 samples may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. A low recovery (<75%) was observed for mercury in the associated CRDL standard analysis.

- The reporting limit for antimony in sample 20040315CINEB may be higher than reported, and the "not-detected" result has been flagged "UJ" on the data tables. A low recovery (<85%) was observed for antimony in the associated CRDL standard analysis.

- The reported positive results for arsenic, beryllium, and copper in SDG A4C250199 sample 20040325CS-5AN, for cobalt in sample 20040315DP56AV9.5-10.5N, and for thallium in samples 20040314DP70AV9-11N, 20040314DP73AV12-13N, 20040314DP78AV9-10N, 20040314DP72AV12-13N, 20040314DP79AV12-13N, 20040315CINEB, 20040315DP58AV8.5-9.5N, 20040315DP66AV9.5-10.5N, and 20040315DP60AV6.6-7.4N should be considered estimated and have been flagged "J" (unless previously flagged "U*") on the data tables. High recoveries (>115%) were observed for these analytes in the associated CRDL standard analyses.

- The reported positive results for cobalt in SDG A4C160242 sample 20040315DP56AV9.5-10.5N; for manganese in samples 20040315DP56AV9.5-10.5N, 20040315CINBLIND, and 20040315DP60AV6.6-7.4N; and for zinc in SDG A4C160242 sample 20040315CINBLIND should be considered estimated and have been flagged "J" on the data tables. These analytes were observed to be present in the ICP interference check sample ICSA solution at concentrations greater than 2× the IDL, indicating an interference in the presence of high levels of interferents. High levels of ICP interferents (instrument level of interferent > 50% of the true value of the ICSA solution) were observed in these samples.

- In SDG A4D070211, the reported positive results for copper, cadmium, and cobalt in samples 20040406CINBLIND and 20040406UAW11-40V38N; and for copper, cobalt, and zinc in sample 20040407UAW15-20V14N should be considered estimated and have been flagged "J" (unless previously flagged "U*" on the data tables). These analytes were observed to be present in the ICP interference check sample ICSA solution at concentrations greater than 2× the IDL, indicating an interference in the presence of high levels of interferents. High levels of ICP interferents (instrument level of interferent > 50% of the true value of the ICSA solution) were observed in these samples.

- In SDG A4D070211, the reporting limits for lead and vanadium in samples 20040406CINBLIND, 20040406UAW11-40V38N, and 20040407UAW15-20V14N may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. These analytes were observed to be present in the ICP interference check sample ICSA solution at negative concentrations with absolute vales greater than 2× the IDL, indicating a negative interference in the presence of high levels of interferents. High levels of ICP interferents (instrument level of interferent > 50% of the true value of the ICSA solution) were observed in these samples.

- In SDG A4D070211, the reporting limits for total sulfide in sample 20040405UAW14-10V13N may be higher than reported, and the "not-detected" result has been flagged "UJ" on the data tables. In addition, the reported positive results for total sulfide samples 20040406UAW09-60V52N, 20040406MW-EPA-4V18N, 20040406CINBLIND, 20040406UAW11-40V38N, 20040406CINEB, 20040407UAW18-20V15N, and 20040407UAW15-20V14N should be considered estimated and have been flagged "J" (unless previously flagged "U*") on the data tables. Low recoveries (<75%) were observed for these analytes in the associated MS/MSD analyses.

- The reporting limits for antimony, selenium, and tin in all soil samples may be higher than reported, and the "not-detected" results have been flagged "UJ" on the data tables. In addition, any reported positive results for these analytes in the soil samples should be considered estimated and have been flagged "J" on the data tables. Low recoveries (<75%) were observed for these analytes in the associated MS/MSD analyses.

- The reporting limit for antimony in SDG A4C250199 sample 20040325CS-5AN should be considered biased low and has been flagged "UJ" on the data tables. Low recoveries (<75%) were reported for antimony in the associated MS/MSD analyses.

- The reported positive results for magnesium and potassium in all soil samples should be considered estimated and have been flagged "J" (unless previously flagged "U*") on the data tables. High %Ds (>10%) were observed for these analytes in the associated serial dilution analysis.

- One field duplicate pair was included with the samples selected for validation. Sample 20040406CINBLIND was identified as the field duplicate of sample 20040406UAW11-40V38N. In general, acceptable precision and sample representativeness were demonstrated by the correlation observed between the results in the field duplicate pair. The criteria used to assess field duplicate precision were as follows: if one or both results in the field duplicate pair are less than 5× the RL, the absolute difference between the results must be less than the 2× the RL; or if both results are greater than 5× the RL, the RPD must not exceed 40%. A complete comparison of the field duplicate results have been included in Section 4.

A complete support document of this inorganic and general chemistry QA review is provided in Section 4 of this report.

C. Conclusions

This QA review has identified several aspects of the data that required qualification. The analytical data should be considered acceptable for use unless otherwise indicated in the QA review. In order to use any of the data, the data user should understand the qualifications and limitations specified in this QA review. The Project Chain-of-Custody Records and Case Narratives are presented in Section 5.

Report prepared by:

Thomas H. Weinmann
Quality Assurance Chemist

Report prepared by:

Steven J. Lennon
Quality Assurance Chemist

Report reviewed by:

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist II

Report reviewed and approved by:

Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

Date: 7-22-04

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

(610) 935-5577

ENVIRONMENTAL STANDARDS

Setting the Standards for Innovative Environmental Solutions

August 27, 2004

Mr. Mark P. Hemingway
Principal Hydrogeologist
Geomatrix Consultants, Inc.
5725 Highway 290 West
Suite 200-B
Austin, TX 78735

Dear Mr. Hemingway:

Enclosed is the revised quality assurance review for the aqueous samples collected on March 25 and 26, 2004, as part of the Morton – Reading, Ohio, Project. The report incorporates all filtered aqueous samples specified in the e-mail from Ms. Anne Haikola from your office. Inorganic sample results were qualified due to blank contamination and high contract-required detection limit standard recoveries.

With respect to data package deliverables, the laboratory provided sufficient quality control summary forms and supporting raw data to allow for complete validation of the data. Only minor correctable deficiencies were noted during the review of the data.

If you have any questions or comments, or if we can be of further assistance, please feel free to call.

Sincerely,

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist II/
Project Manager

Sincerely,

Rick J Foman for:

Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

DJL/RJV:hm
Enc.

1140 Valley Forge Road • P.O. Box 810 • Valley Forge, PA 19482-0810
T: 610-935-5577 • F: 610-935-5583 • www.envstd.com • solutions@envstd.com

QUALITY ASSURANCE REVIEW

OF SAMPLES COLLECTED ON MARCH 25 AND 26, 2004

AS PART OF THE MORTON – READING, OHIO

PROJECT

August 27, 2004

Prepared for:

GEOMATRIX CONSULTANTS, INC.
5725 Highway 290 West
Suite 200-B
Austin, TX 78735

Prepared by:

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

TABLE OF CONTENTS

Introduction

Section 1 **Quality Assurance Review**

A. Inorganic Data

B. Conclusions

Section 2 **Analytical Results**

Section 3 **Inorganic Data Support Documentation**

Section 4 **Project Chain-of-Custody Records and Case Narratives**

Introduction

This quality assurance (QA) review is based upon a rigorous examination of the data generated from the analyses of the samples collected on March 25 and 26, 2004, as part of the Morton – Reading, Ohio, Project. The samples included in this QA review are presented on Table 1. The laboratory was requested to prepare a detailed data package to substantiate the reported analytical results. The data package that was prepared allowed for the performance of a comprehensive review.

This review has been performed with guidance from the "National Functional Guidelines for Inorganic Data Review" (US EPA, July 2002).

The reported analytical results are presented as a summary of the data in Section 2. Data were examined to determine the usability of the analytical results and compliance relative to the analytical requirements specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition" (SW-846) and the Quality Assurance Project Plan Facility Investigation RCRA §3013 Administrative Order for the Morton International, Inc. Facility located in Reading, Ohio. Qualifier codes have been placed next to the results to enable the data user to quickly assess the qualitative and/or quantitative reliability of any result. Details of this QA review are presented in Section 1 of this report. This critical QA review identifies data quality issues for specific samples and specific evaluation criteria. The data qualifications allow the data user to best understand the usability of the analysis results. Data not qualified in this report should be considered valid based on the quality control (QC) criteria that have been reviewed.

TABLE 1

SAMPLES THAT HAVE UNDERGONE

A RIGOROUS QUALITY ASSURANCE REVIEW

Geomatrix Consultants Sample Number	Laboratory Sample Number	SDG	Matrix	Date Sample Collected	Parameter Analyzed
20040325WS-6AN	A4C260187-005	A4C250199	Aq	3/25/04	M
20040325WS-5AN	A4C260187-007	A4C250199	Aq	3/25/04	M
20040325WS-5ANMS (Matrix Spike)	A4C260187-007MS	A4C250199	Aq	3/25/04	M
20040325WS-5ANMSD (Matrix Spike Duplicate)	A4C260187-007MSD	A4C250199	Aq	3/25/04	M
20040325WS-1AN	A4C260187-003	A4C250199	Aq	3/25/04	M
20040326WS-2AN	A4C270118-006	A4C250199	Aq	3/26/04	M
20040326WS-3AN	A4C270118-004	A4C250199	Aq	3/26/04	M
20040326WS-4AN	A4C270118-002	A4C250199	Aq	3/26/04	M
20040325CINBLIND-2 (Field Duplicate of 20040325WS-6AN)	A4C260187-009	A4C250199	Aq	3/25/04	M

NOTES:

M - Select Metals (specifically, silver, cadmium, cobalt, chromium, antimony, arsenic, barium, lead, beryllium, selenium, thallium, copper, nickel, tin, vanadium, zinc, and mercury) by SW-846 Methods 6010B and 7470A. (9 analyses)

Aq - Aqueous.

Section 1 Quality Assurance Review

A. Inorganic Data

The inorganic analyses of five aqueous samples (including a field QC sample) were performed by Severn Trent Laboratories (STL) of North Canton, Ohio. All samples were analyzed for select metals by SW-846 Methods 6010B and 7470A. These analyses are indicated on Table 1. The analytical results are summarized in Section 2 of this report.

The findings offered in this report are based upon a rigorous review of holding times, blank analysis results, MS/MSD recoveries and precision, laboratory control sample (LCS) recoveries, contract-required detection limit (CRDL) standard recoveries, interference check standard results and recoveries, serial dilution results, initial and continuing calibrations, analytical sequence, field duplicate precision, and quantitation of positive results.

A few deficiencies were identified as detailed below. The Environmental Standards data reviewer has edited the laboratory-reported data and QC summary forms based on the deficiencies listed in this QA review. Furthermore, the Environmental Standards data reviewer has included copies of all relevant raw data, QC forms, and other documentation needed to support these edits in the Inorganic Data Support Documentation (Section 3) of this review. The following deficiencies do not necessarily affect data usability. Usability is addressed in the subsequent Inorganic Data Qualifiers section.

Correctable Deficiencies

1. The laboratory reported dilution factors of "1" (rather than 5) on the analytical sequence summaries for the ICP serial dilution analyses.

2. The laboratory reported a concentration of "0.4 µg/L" for barium in the continuing calibration blank analyzed on 4/1/04 at 17:27. The raw data show that the true concentration of barium in this blank was 0.3 µg/L. Similarly, the laboratory reported a concentration of "0.3 µg/L" for beryllium in the continuing calibration blank analyzed on 3/30/04 at 03:01. The raw data show that the true concentration of beryllium in this blank was 0.2 µg/L

3. The laboratory analyzed a reporting limit standard (CRDL) on 3/30/04 at 11:55 for the ICP analysis but did not report this analysis on the associated Contract Required Detection Limit Standard summary (page 4475 of the data package). The data reviewer hand-entered the information on the form and qualified data based on the results of this CRDL analysis.

Noncorrectable Deficiencies

1. A collection date and time was not recorded on the Chain-of-Custody Record for sample 20040325CINBLIND-2. According to the STL Cooler Receipt Form, this sample was logged with a collection date of 3/25/04 per the sample ID and container label.

2. According to the STL Cooler Receipt Form, the sample coolers were received at temperatures less than 2°C. SW-846 Chapter 3 (Table 3-1) indicates that mercury samples should be preserved at 4±2°C. The laboratory did not indicate that any samples were damaged; therefore, qualification of data was not warranted due to this issue.

With respect to data usability, the principal areas of concern are blank contamination and high CRDL standard recoveries. Based on a rigorous review of the data provided, the following inorganic data qualifiers are offered. The following inorganic data usability issues represent an interpretation of the QC results obtained for the project samples. Accordingly, the following data usability issues should not necessarily be construed as an indication of laboratory performance.

Inorganic Data Qualifiers

- Due to trace-level presence of arsenic, beryllium, cobalt, copper, and mercury in the associated laboratory and/or field blanks, the reported positive results for arsenic, beryllium, cobalt, copper, and mercury in all samples should be considered "not-detected" and have been flagged "U*" on the data tables. It should be noted that dilution factors and sample weights were taken into consideration when evaluating blank contamination.

- The positive results for mercury, beryllium, and copper in all samples should be considered estimated and have been flagged "J" on the data tables (unless previously flagged "U*"). High recoveries (>115%) were reported for mercury, beryllium, and copper in the associated CRDL standard analyses.

- One field duplicate pair was included with the samples selected for validation. Sample 20040325CINBLIND-2 was identified as the field duplicate of sample 20040325WS-6AN. In general, acceptable precision and sample representativeness were demonstrated by the correlation observed between the results in the field duplicate pair. The criteria used to assess field duplicate precision were as follows: if one or both results in the field duplicate pair are less than 5× the RL, the absolute difference between the results must be less than the 2× the RL; or if both results are greater than 5× the RL, the RPD must not exceed 40%. A complete comparison of the field duplicate results have been included in Section 3.

A complete support document of this inorganic and general chemistry QA review is provided in Section 3 of this report.

B. Conclusions

This QA review has identified several aspects of the data that required qualification. The analytical data should be considered acceptable for use unless otherwise indicated in the QA review. In order to use any of the data, the data user should understand the qualifications and limitations specified in this QA review. The Project Chain-of-Custody Records and Case Narratives are presented in Section 4.

Report prepared by:

Donald J. Lancaster, M.S.
Senior Quality Assurance Chemist II

Report reviewed by:

Thomas H. Weinmann
Quality Assurance Chemist

Report reviewed and approved by:

Rock J. Vitale for:
Rock J. Vitale, CEAC, CPC
Technical Director of Chemistry/
Principal

Date: 8/27/04

ENVIRONMENTAL STANDARDS, INC.
1140 Valley Forge Road
P.O. Box 810
Valley Forge, PA 19482-0810

(610) 935-5577

APPENDIX E

June 6, 1979 Cincinnati Milacron Memo, Soil Testing for Tin Contamination

CINCINNATI MILACRON

Memo

To C. L. Adams
J. L. Hanley
T. G. Kugele
R. C. Witman

From P. A. Bautista

Location ANALYTICAL LAB

Date June 6, 1979

Subject SOIL TESTING FOR TIN CONTAMINATION

cc: G. E. Schaaf
J. A. Mazzei

This is an interim report on the survey of Cincinnati Milacron Chemicals soil contamination with tin metal. Analysis on re-samples of the Millcreek areas is pending. We are also planning on a comprehensive series of sampling this June, 1979, in order to complete the survey. Your comments and suggestions are requested.

from CLA file

Paul A. Bautista

Paul A. Bautista

PAB/mew

Enclosure

CINCINNATI
MILACRON

SOIL TESTING FOR TIN CONTAMINATION OF CINCINNATI MILACRON CHEMICALS INC. ENVIRONMENT

Extensive sampling of the soil in the general vicinity of the Research Lab, Buildings 12, 26 and 27 was undertaken in 1976 followed by another less extensive series in 1978. Complete test results are now available pointing to contamination of the surface soil to levels of 100-1000 ppm tin in the soil. Leaching into the subsurface regions did not occur, as a rule, as indicated by the low levels of 1-10 ppm in the core samples taken 6-12" below the surface. Normal levels of tin in soil is less than 5 ppm.

The sources of contaminations are run-off wastes from leaks developing on the aqueous tin chloride transfer pipes feeding into the tin tank farms; these pipes run mainly along the east fence line. Other sources are storage drums piled between Buildings 12 and 26, washings from replaced tin lines during maintenance operations, spills from kettles at Building 27 when rupture discs break and hosing down of contaminated building floors in cases of accidental spills.

The tin levels decreased appreciably from 500-1000 ppm at most locations in 1976 to 100-500 ppm in 1978. This is true in location Nos. 4, 5, 6, 7, 8 and 9. See Table I for a comparative evaluation. Most of the top soil in these areas were replaced after the 1976, but prior to 1978, samplings. Illustrations of tin distribution found during the two sampling periods are found on Figures 1 and 2.

Four points along the Millcreek bank were also sampled in 1976, which are at levels of 20-500 ppm, more or less evenly distributed in the surface and subsurface areas. See Figure 3 for a more complete illustration and more thorough information.

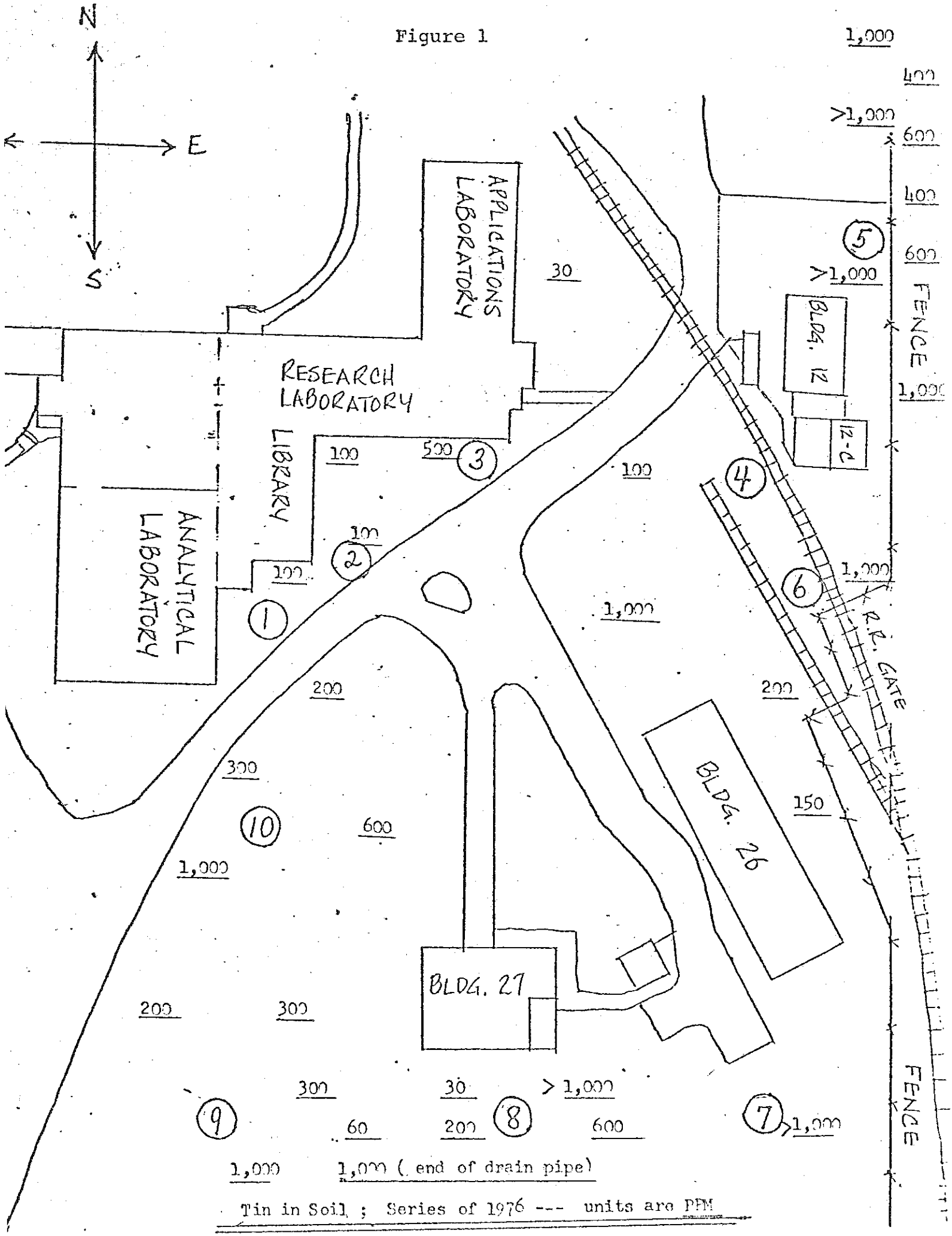
TABLE I

Soil Testing for Tin at

Cincinnati Milacron Chemicals Inc.

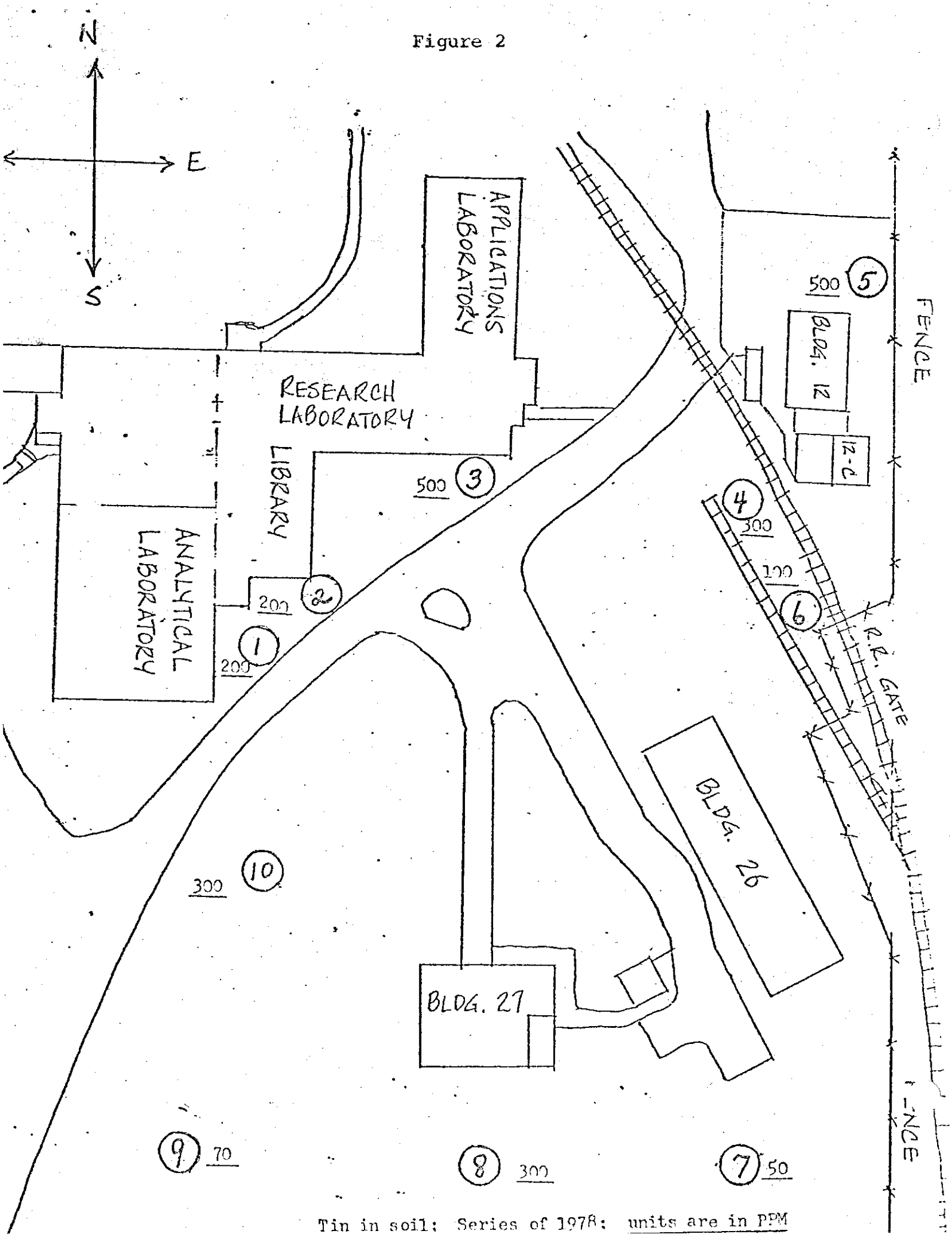
Location No.	Concentration of Tin in Soil (ppm)	
	1976	1978
1. South of Research Lab	100	200
2. South of Research Lab	100	200
3. South of Research Lab	500	500
4. South of Bldg. 12	1000	500
5. North of Bldg. 12	>1000	500
6. North of R.R. Gate	1000	100
7. Southeast of Bldg. 27	>1000	50
8. South of Bldg. 27	30-300	300
9. Southwest of Bldg. 27	1000	70
10. West of Bldg. 27	200-300	300
Others:		
East of Applications Lab	30	No Sample Taken
East of Bldg. 12 (Beyond Fence)	600-1000	No Sample Taken
Area Between Bldgs. 12 & 26	200-1000	100-300
North of Bldg. 27	600	No Sample Taken

Figure 1



Tin in Soil ; Series of 1976 --- units are PPM

Figure 2



Tin in soil: Series of 1978: units are in PPM

Figure 3

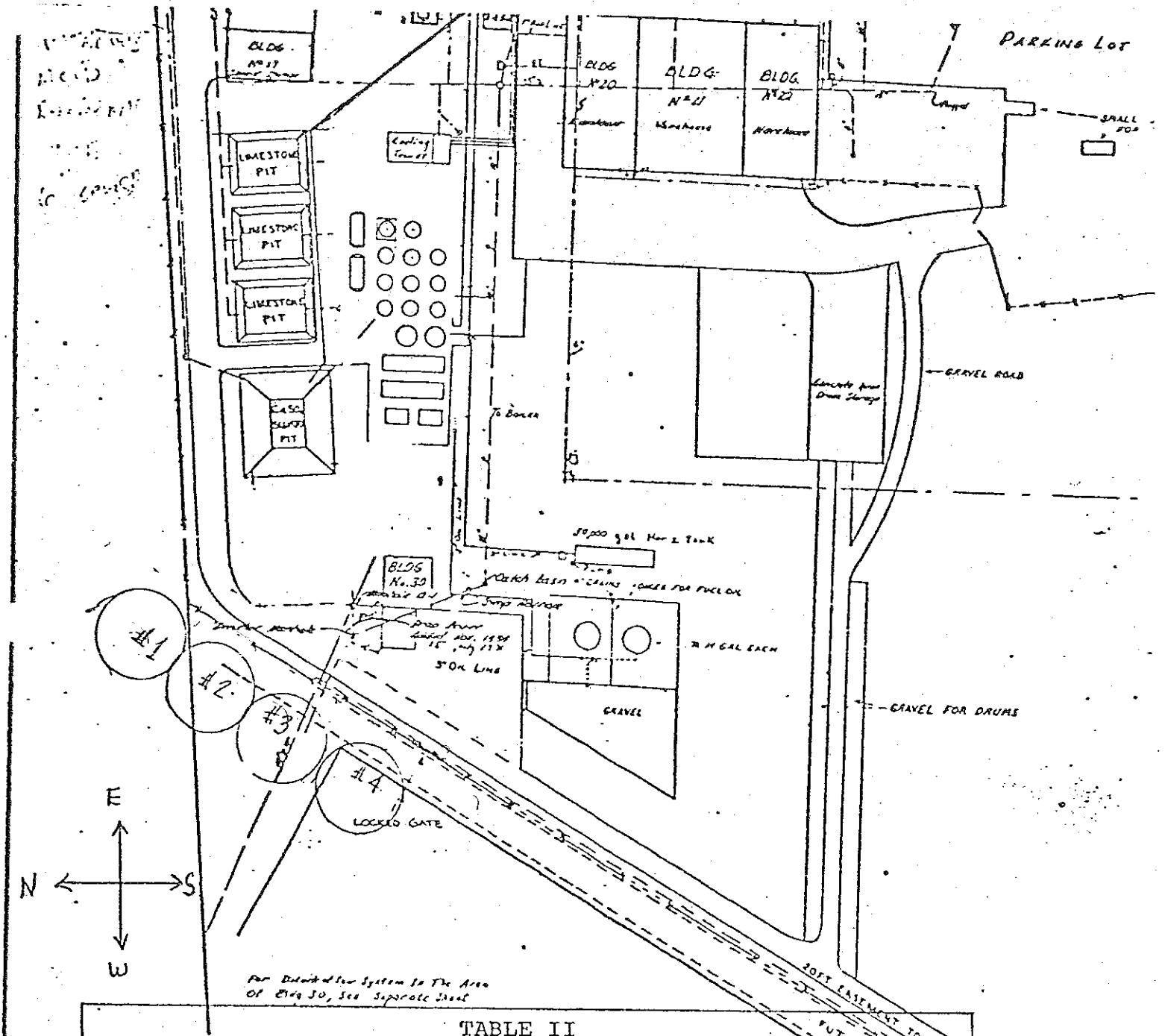


TABLE II

Soil Samples From the Millcreek Taken Approximately Two Feet Above the Water Line

Sample No.	Surface Sample	Core Sample, 12" Below Surface
1	20 ppm tin	10 ppm tin
2	500 ppm tin	500 ppm tin
3	200 ppm tin	200 ppm tin
4	50 ppm tin	20 ppm tin