Remedial Investigation

Preliminary Site Characterization Summary

Waukegan Manufactured Gas and Coke Plant Site Waukegan, Illinois

Appendices 4-A, 4-B, and 4-D through 4-Q

Prepared for North Shore Gas Company

Under the Administrative Order on Consent Re: Remedial Investigation and Feasibility Study for the Waukegan Manufactured Gas and Coke Plant Site Waukegan, Illinois

April 1994

US EPA RECORDS CENTER REGION 5
398648

Barr
Engineering Company

Remedial Investigation

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April 1994

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Appendix 4-A

Soil Boring Logs

Background Soil Borings

Surficial Soil Borings

Soil Borings

Ground Surface Soil Samples

Designated Soil Stock Pile Samples

Soil Boring Logs

Background Soil Borings

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/5/92
DATE COMPLETED: 3/5/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: BS-01
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: ~592

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		POORLY GRADED SAND WITH SILT (SP-SM)- Fine grained, dark brown (1.5 YR 3/2) (Fill)
							0.5'
	0	FS	N	N	SSB		POORLY GRADED SAND (SP)- Fine grained, light brown (7.5 YR 6/4) (Fill)
							4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content In Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/5/92
DATE COMPLETED: 3/5/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: BS-02
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: ~592

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							
	--	--	--	--	G		SANDY ORGANIC SOIL (OL/SM)-Fine grained, black (2.5Y 2/0)
							0.4'
							LEAN CLAY (CL)- Fine grained, dark grayish brown (2.5Y 4/2) moist (Fill)
	2	FS	N	N	G		3.5'
							POORLY GRADED SAND (SP)- Fine grained, light brown (7.5 YR 6/1) moist (Fill)
							4.0'
							E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/5/92
DATE COMPLETED: 3/5/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: BS-03
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: ~589

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		POORLY GRADED SAND WITH TRACE OF SILT (SP TO SP/SM)-Fine grained, dark gray (5Y5/1), moist. Pieces of glass (Fill)
							2.0'
	2	FS	N	N	SSB		MIXED FILL: POORLY GRADED SAND WITH TRACE OF SILT (SP TO SP/SM)-Fine grained dark-gray (5Y 5/1), moist and ORGANIC SOIL (OL), Black (2.5Y 3/0), moist and LEAN CLAY WITH TRACE OF SILT (CL)-Pieces of glass and wood.
							4.0'
5							E.O.B.
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/5/92
DATE COMPLETED: 3/5/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: BS-04
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: ~588

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		POORLY GRADED SAND (SP)- Fine to medium grained, pale brown (10YR 6/3) with a trace of gravel (~2%), moist (Fill)
							2.8'
							Furnace glass, medium to fine sand size, black, moist.
	0	FS	N	N	SSB		3.0' POORLY GRADED SAND (SP)- Fine grained very pale brown (10 YR 7/3), moist (Fill).
5							4.0' E.O.B.
10							
15							
20							
25							
30							

COMMENT: **Oil Content In Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/25/92
DATE COMPLETED: 3/25/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: BS-05
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: ~590

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		SANDY SLAG- Black (5YR 2.5/1) moist (Fill)
							1.4'
	1	FS	N	N	SSB		POORLY GRADED SAND (SP)- Fine grained, pale brown (10YR 6/3) moist, wet at 4.0' (Fill)
							4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/25/92
DATE COMPLETED: 3/25/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: BS-06
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 586.3

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		Sod 0.2'
	O	FS	N	N	SSB		POORLY GRADED SAND (SP)- Fine to medium grained, pale brown.(10YR 6/3) moist (Fill) 4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/25/92
DATE COMPLETED: 3/25/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: BS-07
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 584.8

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							SOD 0.1'
	--	--	--	--	G		POORLY GRADED SAND (SP)- Fine to medium grained, pale brown (10YR 6/3) moist wet below 2'± (Fill)
	75	FS	N	N	SSB		
							4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content In Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/25/92
DATE COMPLETED: 3/25/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: BS-08
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.6

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		POORLY GRADED SAND (SP)- Fine to medium grained, pale brown.(10YR 6/3) moist wet below 3.5' (Alluvium)
	3	FS	N	N	SSB		
5							4.0' E.O.B.
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

Surficial Soil Borings

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/7/92
DATE COMPLETED: 3/7/92
FIELD INSPECTOR: S. Marshik (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SC-01
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 584.4

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		Blacktop Crushed rock base material 0.2' 1.2'
	1.5	FS	N	N	SSB		SILTY SAND TO SAND WITH SILT (SP-SM)- Fine grained, dark gray. (10YR 4/1) moist (Fill) 2.0' POORLY GRADED SAND (SP)- Fine grained, pale brown (10YR 6/3) wet below 2.9'. (Fill) 4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/7/92
DATE COMPLETED: 3/7/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SC-02
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.8

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		Blacktop 0.2' Crushed rock base material 1.2'
	0	FS	N	N	SSB		SILTY SAND (SM)- With gravel, fine grained, black (5YR 5/1) moist (Fill). 2.0' SILTY SAND (SM)- With gravel, fine grained, very dark grayish-brown (10YR 3/2) moist wet below 3.4'. (Fill) 4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/10/92
DATE COMPLETED: 3/10/92
FIELD INSPECTOR: K. French (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-01
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.4

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	N	N	G		POORLY GRADED SAND TO POORLY GRADED SAND WITH SILT (SP TO SP-SM)- Fine to medium subrounded sand, less than 15% angular gravel, brown (10YR 5/3), to very dark grayish brown (10YR 3/2), moist, contains roots (Fill).
							1.5'
	4	FS	T	N	G & SSB		POORLY GRADED SAND WITH SILT (SP-SM)- Fine to medium sand, dark yellowish brown (10yr 4/6), moist to wet at approximately 3.0' (Fill).
							4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content In Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/6/92
DATE COMPLETED: 3/6/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-02
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.3

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							
	--	--	--	--	G		Crushed Rock Base Material 0.4 SILTY SAND (SM)- Fine grained, black (10YR 2/1) moist with some foundry slag clinkers (Fill)
	0.5	FS	N	N	SSB		2.5' POORLY GRADED SAND (SP)- Fine grained, pale brown (10YR 6/3), moist, wet below 3.0' (Fill)
5							4.0' E.O.B.
10							
15							
20							
25							
30							

COMMENT:

Oil Content In Water: N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/6/92
DATE COMPLETED: 3/6/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-03
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.5

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							
	--	--	--	--	G		Crushed Rock Base Material — 0.2'
							SILTY SAND (SM)- Fine grained, black (10YR 2/1) moist. (Fill)
	42	FS	N	N	SSB		2.5' POORLY GRADED SAND (SP)- Fine grained, pale brown (10YR 6/3), moist (Fill)
							4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/6/92
DATE COMPLETED: 3/6/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-04
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 584.8

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							
	--	--	--	--	G		*Crushed Rock Base Material* 0.2' SILTY SAND (SM)- Fine grained, black (10YR 2/1) moist, with some foundry slag clinkers (Fill)
	8	FS	N	N	SSB		2.5' POORLY GRADED SAND WITH SILT (SP-SM)- Fine grained, pale brown (10YR 6/3), moist, with some foundry slag clinkers (Fill)
5							4.0' E.O.B.
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/6/92
DATE COMPLETED: 3/6/92
FIELD INSPECTOR: John Fox (B.E.C.)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-05
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 584.6

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							Crushed rock base material. 0.2'
	--	--	--	--	G		POORLY GRADED SAND (SP-SM)-With a trace of gravel, fine to medium grained, dark gray (5Y4/1), moist (Fill) 2.0'
	150	FS	N	N	N		POORLY GRADED SAND (SP)- With trace of gravel, fine to medium grained, pale brown (10YR 6/3) moist (Fill) 4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/11/92
DATE COMPLETED: 3/11/92
FIELD INSPECTOR: K. French (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-06
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.8

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	N	G		SILTY SAND (SM)- Fine grained, black, oil present (Fill)
							2.5'
	11	FS	M	N	G,SSB		LEAN CLAY WITH SAND (CL-CS)-Dark brown (10YR 4/3) (Fill)
5							4.0' E.O.B.
10							
15							
20							
25							
30							

COMMENT: **Oil Content In Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/10/92
DATE COMPLETED: 3/10/92
FIELD INSPECTOR: K. French (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-07
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 584.7

Depth (Feet)	Nonmethane OVA *Headspace (ppm)*	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		POORLY GRADED SAND WITH SILT (SP-SM)- Fine to medium subrounded sand with less than 15% subangular gravel, olive gray (5Y4/2), moist to wet at approximately 3.0', few roots to approximately 2.0' (Fill).
	O	FS	T	L	SSB		
5							4.0' E.O.B.
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= *Grab*, SSB= *Split - barrel with liner*
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/11/92
DATE COMPLETED: 3/11/92
FIELD INSPECTOR: S. Marshik (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-08
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.5

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		POORLY GRADED SILTY SAND (SP-SM)-Fine to medium grained, black, wet at 3.5' (Fill).
	2	FS	T	N	G,SSB		
5							4.0' E.O.B.
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/11/92
DATE COMPLETED: 3/11/92
FIELD INSPECTOR: S. Marshik (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-09
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 586.9

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		SANDY LEAN CLAY (CL)- With trace of gravel, dark, yellowish, brown (10YR 4/4) (Fill)
	O	FS	N	N	G,SSB		3.9' POORLY GRADED SAND (SP)- Fine to medium grained, brown.(Fill)
							4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/11/92
DATE COMPLETED: 3/11/92
FIELD INSPECTOR: K. French (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-10
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.8

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	N	G		POORLY GRADED SAND TO SAND WITH SILT (SP/SP-SM)- Fine grained, black (Fill)
							3.0'
	2	FS	T	N	G,SSB		SANDY LEAN CLAY (CL-CS)-With trace of gravel, dark yellowish brown (10YR 4/4) (Fill)
							3.25'
							POORLY GRADED SAND (SP)- Fine to medium grained brown (10YR 5/3) (Fill)
							4.0'
							E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/11/92
DATE COMPLETED: 3/11/92
FIELD INSPECTOR: S. Marshik (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-11
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.6

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		POORLY GRADED SAND (SP)- Fine to medium grained, very dark grayish-brown (10YR 3/2) (Fill)
							2.5'
	0	FS	N	N	G,SSB		SANDY LEAN CLAY (CL-CS)-With trace of gravel, dark gray (10YR 4/1) (Fill)
							3.0'
							POORLY GRADED SAND (SP)- Fine grained, light yellowish-brown (10YR 6/4) (Fill)
							4.0'
							E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/11/92
DATE COMPLETED: 3/11/92
FIELD INSPECTOR: S. Marshik (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-12
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 583.9

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		POORLY GRADED SAND (SP)- Fine to medium grained, dark yellowish-brown (10YR 4/6). (Fill)
							2.5'
	O	FS	N	N	G,SSB		POORLY GRADED SAND (SP)- Fine to medium grained, light yellowish-brown (10YR 6/4). (Fill)
							4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/12/92
DATE COMPLETED: 3/12/92
FIELD INSPECTOR: S. Marshik (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-13
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.1

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	N	G		POORLY GRADED SAND TO SILTY SAND (SP-SM)-Fine to medium grained, black (Fill)
							0.5'
							POORLY GRADED SAND (SP)- Fine grained, pale brown (10YR 6/3) (Fill)
	6	FS	N	N	G,SSB		2.5'
							POORLY GRADED SAND (SP)- Fine grained, black, no odor.(Fill)
							2.6'
							POORLY GRADED SAND (SP)- Fine grained, pale brown (10YR 6/3). (Fill)
							4.0'
5							E.O.B.
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/12/92
DATE COMPLETED: 3/12/92
FIELD INSPECTOR: S. Marshik (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-14
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.2

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analyticel Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		COAL FINES, BLACK.
	6	FS	T	N	G SSB		3.5' POORLY GRADED SAND (SP)- Fine to medium grained, grayish-brown (10YR 5/2) (Fill) 4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/7/92
DATE COMPLETED: 3/7/92
FIELD INSPECTOR: S. Marshik (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-15
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.4

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		Gravel base material 0.1' SILTY SAND (SM)-With gravel, fine grained, black (5YR 5/1), moist (Fill) 1.0'
	O	FS	N	N	N		POORLY GRADED SAND (SP)- Trace gravel ,fine grained, light yellowish brown (10YR 6/4) moist (Fill) 4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/7/92
DATE COMPLETED: 3/7/92
FIELD INSPECTOR: S. Marshik (B.E.C.)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-16
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.2

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	T	N	G		Blacktop 0.2 Crushed rock base material 1.0'
	0.5	FS	N	N	SSB		SILTY SAND (SP-SM)- With gravel, fine grained, black (5YR 5/1), moist, with foundry slag. (Fill)
							4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content In Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/7/92
DATE COMPLETED: 3/7/92
FIELD INSPECTOR: S. Marshik (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SS-17
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.1

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	T	N	G		Blacktop Crushed rock base material 0.1' 1.0'
	1	FS	N	N	SSB		SILTY SAND (SM)- With a trace of gravel, black (5YR 5/1), moist (Fill) 2.0' POORLY GRADED SAND (SP)- Fine grained light, brownish gray (10YR 6/2) moist (Fill) 4.0' E.O.B.
5							
10							
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Borehole backfilled with cuttings.

Soil Borings

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/16/92
DATE COMPLETED: 3/18/92
FIELD INSPECTOR: T. Wright-Wells (BEC)
CREW CHIEF: P. Dickinson(WTD)

BORING NO.: SB-03
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.9

Depth (Feet)	OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							
	0	--	N	N	SSB		SILTY SAND (SM)- Medium grained, brown to dark brown sand, with gravel from 0.5 to 1.0' (Fill).
							1.5'
							Coal fines, fine to 1" pieces.
	2.4	--	N	N	SSB		2.5'
							POORLY GRADED SAND (SP)- Medium grained, brown, with a clayey sand lense from 5.0-5.3', moist to wet (Fill)
5	6.2	--	N	N	SSB		5.0'
	30	--	N	N	SSB		POORLY GRADED SAND (SP)- Medium grained, gray (10YR 6/1) with trace rounded pebbles, wet (Alluvium)
							8.0'
	90	--	N	N	SSB		SAND WITH SILT (SP-SM)- Fine grained, dark gray (10YR 4/1), with trace rounded pebbles, wet (Alluvium).
10	34	--	N	N	SSB		11.0'
	8	--	N	N	SSB		SILTY SAND (SM)- Fine to medium grained, dark gray (10YR 4/1) with black mottling throughout, wet (Alluvium)
15	6	--	N	N	SSB		
	160	--	N	L	SSB		
	760	--	N	M	SSB		
20							20.0'
	>1000	--	N	M	SSB		SAND WITH SILT (SP-SM)- Fine to medium grained, gray (10YR 5/1) with a trace black mottling throughout, wet (Alluvium).
	>1000	--	N	M	SSB		
25	>1000	--	N	M	SSB		
	>1000*	--	N	L	SSB		160 ppm nonmethane OVA reading (see Boring Log MW-3D)
							28.5'
	>1000	--	N	M	SSB		SILT WITH CLAY (ML-CL)- Gray (10YR5/1), very dense, low to medium toughness, low to medium plasticity with angular gravel from 28.5-29' moist (Till).
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 6 1/4" I.D. hollow stem auger to 6 feet below grade. Boring was completed using mud rotary. Borehole backfilled with tremied neat cement grout.
* See Boring Log MW-3D for nonmethane OVA reading for this interval

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/16/92
DATE COMPLETED: 3/18/92
FIELD INSPECTOR: T. Wright-Wells (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SB-03
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.9

Depth (Feet)	OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
30							
	28	--	N	N	SSB		SILT WITH CLAY (ML-CL)-Gray (10YR5/1), very dense, low to medium toughness, low to medium plasticity, moist (Till).
	62	--	N	N	SSB		
35	5.7	--	N	N	SSB		
40	0	--	N	N	SSB		
45	>1000	--	N	N	SSB		
50							Boulder, gray dolomite.
55	40	--	N	N	SSB		
60							60 0'

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 6 1/4" I.D. hollow stem auger to 6 feet below grade. Boring was completed using mud rotary. Borehole backfilled with tremied neat cement grout.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/16/92
DATE COMPLETED: 3/18/92
FIELD INSPECTOR: T. Wright-Wells (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SB-03
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.9

Depth (Feet)	OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
60							
65	90	--	N	N	SSB		CLAYEY SILT (CL-ML)- Gray (10YR 4/1), soft to firm, with cobbles at 81-83', 87-89', 92.5 - 93.5' and from 103' to E.O.B; thin sand lenses from 85-85.3' and from 94-94.5', moist. (Till)
70							
75	10	--	N	N	SSB		
80							
85	8	--	N	N	SSB		
90							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 6 1/4" I.D. hollow stem auger to 6 feet below grade. Boring was completed using mud rotary. Borehole backfilled with tremied neat cement grout.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/16/92
DATE COMPLETED: 3/18/92
FIELD INSPECTOR: T. Wright-Wells (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SB-03
RISER PIPE ELEVATION: --
GROUND SURFACE ELEVATION: 585.9

Depth (Feet)	OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
90							CLAYEY SILT (CL-ML)-Gray (10YR4/1), soft to firm, with cobbles at 92.5- 93.5' and from 103' to E.O.B.; thin sand lenses from 94-94.5', moist (Till).
95	54	--	N	N	SSB		
100							
105	6	--	N	N	SSB		
							108.0'
							Dolomite bedrock- gray. Logged from chips.
							109' E.O.B.
110							
115							
120							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 6 1/4" I.D. hollow stem auger to 6 feet below grade. Boring was completed using mud rotary. Borehole backfilled with tremied neat cement grout.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/18/92
DATE COMPLETED: 3/18/92
FIELD INSPECTOR: T. Wright-Wells (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: MW-3D
RISER PIPE ELEVATION: 588.23
GROUND SURFACE ELEVATION: 585.5

Depth (Feet)	OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							See Boring Log SB-03
5							
10							
15							
20							
25	160	P, Ph,V	N	L	SSB		28.0' E.O.B
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 6 1/4" I.D. hollow stem auger. Monitoring well MW-3D installed in borehole.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/20/92
DATE COMPLETED: 3/20/92
FIELD INSPECTOR: T. Wright - Wells (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SB-04
RISER PIPE ELEVATION: 589.06
GROUND SURFACE ELEVATION: 586.1

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							
	2	--	N	N	SSB		SILTY SAND (SM)- Fine to medium grained, brown (Fill).
							0.5'
							Coal fines with limestone gravel.
							1.0'
	2	--	N	N	SSB		POORLY GRADED SAND (SP)- Fine to medium grained brown. (Fill)
5							5.0'
	10	--	N	N	SSB		POORLY GRADED SAND (SP)- Medium grained, gray w/black mottling (10YR 5/1). (Alluvium)
	0	--	N	N	SSB		
10							
	26	--	N	N	SSB		
	75	--	N	N	SSB		
15							
	21	--	N	N	SSB		
	24	--	N	N	SSB		
20							
	7	--	N	N	SSB		
	250	--	N	N	SSB		
25							
	1000	--	N	M	SSB		
	500	--	N	M	SSB		
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 6 1/4" I.D. hollow stem auger. Monitoring well MW-4D installed in borehole.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/20/92
DATE COMPLETED: 3/20/92
FIELD INSPECTOR: T. Wright-Wells (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: SB-04
RISER PIPE ELEVATION: 589.06
GROUND SURFACE ELEVATION: 586.1

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
30							
	1250	P,Ph,V	N	M	SSB		31.0'
							POORLY GRADED GRAVEL (GP)- Medium to coarse grained, grey, wet (Alluvium)
							31.5'
							SILT TO SILT WITH CLAY (ML/ML-CL)-Light gray (10YR 7/1) trace coarse sand, moist (Till)
							32.0'
							E.O.B.
35							
40							
45							
50							
55							
60							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 6 1/4" I.D. hollow stem auger. Monitoring well MW-4D installed in borehole.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/23/92
DATE COMPLETED: 3/23/92
FIELD INSPECTOR: J. Fox (BEC)
CREW CHIEF: B. Loveland (WTD)

BORING NO.: SB-05
RISER PIPE ELEVATION: 588.47
GROUND SURFACE ELEVATION: 585.7

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							
5	0	--	N	N	G		POORLY GRADED SAND (SP)- Fine grained w/a trace of gravel, light brownish grey (10YR 6/2) (Fill)
							5.0'
	20	--	N	N	SSB		POORLY GRADED SAND (SP)-Fine grained, grey (10YR 6/1), wet (Alluvium)
							7.0'
10	5	--	N	N	SSB		POORLY GRADED SAND WITH GRAVEL (SP)-Fine to medium grained, grey (10yr 6/1), wet (Alluvium)
	15	--	N	N	SSB		12.0'
	9	--	N	N	SSB		POORLY GRADED SAND (SP/SP-SM) -W/a trace of silt, fine grained, grey (10yr 5/1) slightly stained or mottled dark grey (10YR 4/1), wet (Alluvium)
15							
	30	--	N	N	SSB		
	12	--	N	N	SSB		
20							
	50	--	N	N	SSB		22.0'
	80	--	N	N	SSB		POORLY GRADED SAND (SP)- Fine to medium grained, dark grey (10YR 4/1), wet (Alluvium)
25							25.5'
	75	P,Ph,V	N	N	SSB		POORLY GRADED GRAVEL (GP)- Medium to coarse grained, grey (10YR 6/1) wet (Alluvium)
							25.7'
							SILT (ML/ML-CL)-With a trace of clay and a trace of coarse sand (<1%), light grey (10YR 7/1) moist (Till).
30							27.0' E O B.

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 6 1/4" I.D. hollow stem auger. Monitoring Well MW-5D installed in borehole.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/24/92
DATE COMPLETED: 3/24/92
FIELD INSPECTOR: T. Wright-Wells (BEC)
CREW CHIEF: B. Loveland (WTD)

BORING NO.: SB-06
RISER PIPE ELEVATION: 588.51
GROUND SURFACE ELEVATION: 585.7

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	--	--	G		POORLY GRADED SAND (SP)- Fine to medium grained, brown (10YR 5/3), with 3" of dark gray sand at 2.5' (Fill)
	0	--	N	N	SSB		
5	3	--	N	N	SSB		
							7.5'
	4	--	N	N	SSB		POORLY GRADED SAND (SP)- Light gray (10YR 6/1) fine to medium grained. (Alluvium)
10							10.0'
	0	--	N	L	SSB		POORLY GRADED SAND (SP)- Dark gray (10YR 4/1) With black mottling.(Alluvium)
	50	--	N	L	SSB		
15							
	10	--	N	L	SSB		
	75	--	N	L	SSB		
20							
	250	--	N	L	SSB		
	150	P, Ph,V	N	M	SSB		
25							Unable to collect analyticals due to lack of sample.
	200	--	N	L	SSB		26.2'
							POORLY GRADED GRAVEL (GP)
							SILT (ML)- Light gray (10YR 7/1) (Till) 26.5'
							27.5' E.O.B.
30							

COMMENT: **Oil Content In Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 6 1/4" I.D. hollow stem auger. Monitoring well MW-6D installed in borehole.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/9/92
DATE COMPLETED: 3/9/92
FIELD INSPECTOR: K. French (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: P-101
RISER PIPE ELEVATION: 588.14
GROUND SURFACE ELEVATION: 585.0

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0							Gravel-Crushed Rock — 0.2'
							SILTY SAND (SM)- Fine to medium sand, black (Fill) — 1.0'
						▽ 2.8'	POORLY GRADED SAND (SP)- Fine to medium rounded sand, less than 10% silt, up to 10% fine gravel, very dark grayish brown (10YR 3/2) to dark grayish brown (10yr 4/2), moist to wet (Alluvium).
5	--	--	N	N	G		
10	--	--	N	N	G		
							14.0' E.O.B.
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Piezometer P-101 installed in borehole.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/12/92
DATE COMPLETED: 3/12/92
FIELD INSPECTOR: K. French (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: P-102
RISER PIPE ELEVATION: 588.52
GROUND SURFACE ELEVATION: 585.6

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	N	N	G		POORLY GRADED SAND (SP)- Medium to coarse subrounded sand, less than 5% silt, very dark gray (7.5 YR3/0) discolored, moist, contains roots (Fill)
							2.0'
							2.6'
5	--	--	N	N	G		POORLY GRADED SAND (SP)- Fine to medium subrounded to rounded sand, less than 10% silt, black (7.5 YR 2/0), discolored, wet to saturated (Alluvium)
10	--	--	T	L	G		
							14.0' E.O.B.
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Piezometer P-102 installed in borehole.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/12/92
DATE COMPLETED: 3/13/92
FIELD INSPECTOR: K. French (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: P-103
RISER PIPE ELEVATION: 589.44
GROUND SURFACE ELEVATION: 586.4

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	N	N	G		POORLY GRADED SAND WITH SILT (SP-SM)- Fine to medium subrounded sand, less than 15% gravel, very dark gray (10YR 3/1), moist, contains roots (Fill)
							1.0'
							POORLY GRADED SAND (SP)- Fine to medium rounded sand, less than 5% silt, dark grayish brown (2.5YR 4/2) to dark gray (10YR 4/1) at 6.0', moist to wet (Alluvium)
5	--	--	N	N	G		
						▽ 5.4	
	--	--	N	N	G		
10							
	--	--	N	N	G		
							14.5'
15							E.O.B.
20							
25							
30							

COMMENT: **Oil Content In Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Piezometer P-103 installed in borehole.

BORING LOG

PROJECT: WCP-RI/FS - Phase I
DATE STARTED: 3/12/92
DATE COMPLETED: 3/12/92
FIELD INSPECTOR: K. French (BEC)
CREW CHIEF: P. Dickinson (WTD)

BORING NO.: P-104
RISER PIPE ELEVATION: 589.07
GROUND SURFACE ELEVATION: 586.0

Depth (Feet)	Nonmethane OVA Headspace (ppm)	Analytical Sample Type	Oil Content in Water	Product Odor	Sampling Method	Profile	DESCRIPTION OF MATERIALS AND REMARKS
0	--	--	T	N	G		POORLY GRADED SAND (SP)- Medium subrounded sand 5-10% silt, black (5Y2.5/1), moist (Fill)
							2.5'
	--	--	M	L	G		3.6'
5							POORLY GRADED SAND (SP)- Fine to medium subrounded to rounded sand, less than 5% silt, black (5Y2.5/1) to very dark gray (7.5 YR 3/0), wet to saturated (Alluvium).
	--	--	T	L	G		
10							
	--	--	T	N	G		
							14.0' E.O.B.
15							
20							
25							
30							

COMMENT: **Oil Content in Water:** N = None, T = Trace, M = Moderate, H = Heavy
Odor: L= Low, M = Moderate, S = Strong, V = Very Strong, P= Petroleum, D= Diesel
Sampling Method: G= Grab, SSB= Split - barrel with liner
Analytical Sample Type: V = VOC's, P=PAHs, M= metals, Ph = Phenol, Pc = PCBs, Pe = Pesticides, A = Arsenic, C= Cyanide, T=TCLP, FS = Full Scan Analyses (V,P,M,Ph,Pc,Pe,C).
Borehole drilled using 3 1/4" I.D. hollow stem auger. Piezometer P-104 installed in borehole.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/1/93
DATE COMPLETED: 9/1/93
FIELD INSPECTOR: K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-07S
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.9 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
5	5 14 14 14	SS/1.7	8.0	N/N	8.1		D/M	FILL	SM	Silty sand (SM). Silty fine subrounded sand. Sample contained root and grass fibers. Gray (10YR5/1). Fill.	5
	1 6 8 8	SS/1.7	7.0	N/N	7.7					Silty sand (SM). About 70% fine to medium subangular to subrounded sand, 20% silt, 10% gravel. Sand and gravel fraction consisted of slag material (rust-colored vesicular glassy material) and concrete fragments. Black (10YR2/1). Fill	
	--									▼ Water level measured at 1.95 ft below ground surface (bgs) through auger after 15 minutes of recovery.	
	1 3 3 5	SS/1.7	30	L/T	7.6		W		SP	Poorly graded sand (SP). Mostly fine angular to subrounded sand sized coal fine material, trace silt sized coal fine material. Black (10YR2/1). Fill.	
	--										
	1 3 3 5	SS/1.5	10	L/N	6.8				SP-SM	Poorly graded sand with silt and gravel (SP-SM). About 60% fine to coarse angular to subrounded sand, 20% fine subrounded gravel, 10% silt. Sand and gravel fraction consisted of slag material. Black (10YR2/1). Fill.	
	--										
10	1 1 3 8	SS/2.0	50	L/T	8.0				SP	Poorly graded sand (SP). Mostly fine angular sand, some coal fine material. Black (10YR2/1). Fill.	10
										Due to formation blowup into the augers, the borehole was drilled to 13 ft bgs so that the monitoring well could be placed at 11.5 ft bgs. Samples were not taken from 11.5 to 13 ft bgs.	
15										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). This borehole was completed as a monitoring well. See Monitoring Well Log MW-07S for details on monitoring well construction.	15
20											20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/30/93
DATE COMPLETED: 8/30/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-08S
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.5 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2 2 6 10	SS/1.2	0	N/N	7.7		D	FILL	SM	Silty sand (SM). About 80% fine subangular to rounded sand, 20% silt, trace gravel. Sand fraction mostly quartz. Sample contained roots and organic fibers. Very dark grayish brown (2.5Y3/2). Fill.	0
	1 3 5 3	SS/1.9	0	N/N	7.7		D/M		SM	Silty sand (SM). About 70% fine subrounded sand, 25% silt, 5% clay, trace medium rounded limestone gravel. Sample contained root fibers. Dark brown (10YR3/3). Fill.	
	--								ML	Silt (ML). Mostly silt, with some clay, trace rounded medium gravel. Dark brown (10YR3/3). Fill.	
5	2 2 5 13	SS/0.8	0.5	N/N	8.0		M		CL/ML	Silty clay (CL/ML). Mostly clay, some silt, trace coarse subangular sand, trace medium subangular gravel. Silty clay exhibited medium plasticity. Fill.	5
	--								SP-SM	Poorly graded sand with silt (SP-SM). About 85% to 90% fine subrounded sand, 10% to 15% silt. Dark yellowish brown (10YR4/6). Lake sediments - beach deposits.	
	7 10 7 10	SS/1.8	1.0	N/N	7.8		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly fine to medium subangular to subrounded sand, trace coarse angular gravel. Sand fraction included quartz and limestone, gravel fraction includes limestone fragments. With 0.2-ft thick lens of silty clay at 7.3 ft below ground surface (bgs). Dark yellowish brown (10YR3/4). Lake sediments - beach deposits.	
	--								SP	◀ Pockets of clayey sand, approximately 1-inch thick, from 9.5 ft to 10.7 ft bgs.	
10	2 2 5 20	SS/2.0	4.0	L/N	8.0				SP	◀Poorly graded sand (SP). Mostly fine subangular to subrounded sand. Dark gray (10YR4/1) at 10.7 ft bgs.	10
	--								SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine to medium subangular to subrounded sand, 10% silt. Brown (10YR5/3).	
	3 24 31 38	SS/2.0	6.0	L/N	8.1				SP	Poorly graded sand (SP). Mostly fine subangular to subrounded sand, trace medium sand, trace silt. Dark gray (10YR4/1).	
15										End of boring at 14.5 feet. Split spoon driven to 14.0 ft bgs.	15
										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10¼" (O.D.) borehole. Split spoon samplers (2" diameter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). This borehole was completed as a monitoring well. See Monitoring Well Log MW-08S for details on monitoring well construction.	
20											20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/27/93
DATE COMPLETED: 8/27/93
FIELD INSPECTOR: K. French / R. Van Allen (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-09S
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.4 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	4 5 100+	SS/0.8	5.0	N/N	6.9		M	FILL	OL	Organic soil (OL). About 80% fine subangular to subrounded sand, 20% clay, trace gravel. Sample contains organic matter and roots. Black (5Y2.5/2). Fill.	0
									SP	Poorly graded sand (SP). About 60% fine sand, 40% coal fines. Black (7.5YR2/0). Fill.	
	5 10 2 1	SS/1.7	2.0	N/N	4.0		M/W			Poorly graded sand (SP). Fine sand, trace silt and gravel. Sand and gravel fractions include concrete, brick, slag fragments and coal fines. Grayish brown (10YR5/2). Fill.	
									ML	Silt (ML). White (2.5Y8/2) silt, trace fine sand. Discolored blue. Sample contains trace fine to medium dark green gray sand at bottom of sample. Fill.	
	--										
5	1 7 15 42	SS/1.8	17	N/N	3.2				SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine to medium sand, 10% silt. Grayish brown (2.5Y5/2) with some bluish green discoloration. Fill.	5
	--										
	1 2 4 5	SS/1.8	14	N/N	5.1		W	LAKE SEDIMENTS - BEACH DEPOSITS	CL	Sandy lean clay (CL). About 60% clay, 20% to 25% fine sand, 10% to 15% silt. Dark grayish brown (2.5Y4/2). Fill.	
										Poorly graded sand (SP). Mostly fine to medium sand. Grayish brown (2.5Y5/2) with some blue green discoloration. Lake sediments - beach deposits.	
	--										
10	1 2 2 10	SS/0.9	15	L/N	5.8				SP	Poorly graded sand (SP). About 90% fine sand, trace medium and coarse sand, 5% silt. Sand fraction includes subangular limestone and iron stained fragments. With 0.2 ft lens of sandy lean clay (CL). Grayish brown (2.5Y4/2) with some grayish blue discoloration.	10
	--										
	3 4 9 26	SS/2.0	20	L/N	6.5					◀Poorly graded sand (SP). Mostly fine to medium sand, trace coarse sand. Grayish brown (2.5Y4/2).	
										◀Poorly graded sand (SP). Mostly fine sand, trace silt. Black (2.5YR2.5/0).	
15										End of boring at 14.0 ft below ground surface (bgs).	15
										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-09S for details on monitoring well construction.	
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/26/93
DATE COMPLETED: 8/27/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-10S
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.7 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	4 8 9	SS/1.8	1.0	N/N	8.0		D	FILL	OL	Organic soil (OL). Black silty sand. Sample contained grass and organic matter, coal fines from 0.2 ft to 0.9 ft below ground surface (bgs). Observed organic odor. Fill.	
	14 9 12	SS/1.3	2.5	N/N	8.0		D/M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). About 85% fine sand, 10% medium sand, trace coarse subrounded sand, <5% silt. Brown (10YR5/3). No discoloration. Lake sediments-beach deposits.	
	12 31 --									▼ Water level measured at 3.4 ft bgs (measured in MW-10D before drilling).	
5	3 9 16	SS/1.8	0.5	N/N	8.5					◀Poorly graded sand (SP). About 80% fine sand, 15% medium sand, trace coarse subrounded sand, <5% silt. Sand fraction mostly quartz and included mafics and carbonates. Brown (10YR5/3). No discoloration.	5
	32 -- 1 17	SS/2.0	2.5	N/N	8.5		W			◀Poorly graded sand (SP). About 90% fine sand, 5% medium angular sand, <5% silt. Sand fraction mostly quartz. Dark brown (10YR4/3). No discoloration.	
	28 56 -- 1										
10	20 33 62	SS/2.0	4.0	N/N	7.5					◀Poorly graded sand (SP). About 100% fine sand, trace medium angular to subrounded sand. Sand fraction mostly quartz and approximately 15% mafics. Dark gray (10YR4/1).	10
	-- 19 30	SS/2.0	7.0	N/N	8.0					◀Poorly graded sand (SP). About 70% to 80% fine sand, 20% to 30% medium subangular to subrounded sand. Very dark brown (10YR4/2). No discoloration.	
	65 38									Due to formation blowup into the augers, the borehole was drilled to 15 ft bgs so that the monitoring well could be placed at 13.39 ft bgs. Samples were not taken from 14 to 15 ft bgs.	
15										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-10S for details on monitoring well construction.	15
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/2/93
DATE COMPLETED: 9/2/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-11S
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.0 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	8 15 15 19	SS/1.2	0	N/N	7.4		M	FILL	SM	Crushed rock, base material. Fill. Silty sand with gravel (SM). About 50% fine sand, 20% silt, 20% gravel and crushed rock, 10% clay. Very dark brown (10YR2/2). No discoloration. Fill.	
	3 9 12 28 --	SS/1.0	8.0	N/N	8.0		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). About 95% fine to medium subrounded sand, 5% silt. Sand fraction mostly quartz, 10% mafics and carbonates. Brown to dark brown (10YR4/3). No discoloration. Lake sediments-beach deposits. ▼ Water level measured at 2.2 ft below ground surface (bgs). (measured in MW-11D before drilling).	
5	3 3 4 5 --	SS/1.4	5.0	N/N	8.0					◀About 90% fine to medium sand, 10% coarse sand, trace fine subrounded gravel from 5.5 to 5.7 ft bgs. Brown (10YR4/3). ◀Poorly graded sand with gravel (SP) lens from 5.9 ft to 6.5 ft bgs. About 45% fine to medium sand, 20% coarse subrounded sand, 30% fine subrounded gravel, trace silt.	5
	2 10 35 38 --	SS/1.4	25	N/N	7.9					◀Poorly graded sand with silt (SP-SM) lens from 8.2 ft to 8.3 ft bgs. About 75% mostly fine, some medium sand, 10% coarse subangular sand, 10% silt, 5% fine to coarse angular gravel. ◀ Poorly graded gravel (GP) lens from 8.45 ft to 8.5 ft bgs. About 100% coarse subangular limestone gravel. ◀Medium sand amount increased from 9.5 ft to 10 ft bgs.	
10	5 8 22 31 --	SS/1.8	25	N/N	7.3				SW	Well graded sand with gravel (SW). About 45% fine to medium sand, 30% fine to coarse subangular gravel, 20% coarse subangular sand, 5% silt. Lake sediments-beach deposits.	10
									SP	Poorly graded sand (SP). About 95% fine subrounded sand, <5% silt. Brown (10YR4/3). Lake sediments-beach deposits.	
	4 6 9 8	SS/2.0	25	N/N	7.4				SP-SM	Poorly graded sand with silt (SP-SM). About 80% fine to medium sand, 10% coarse subangular sand, 10% silt, trace of gravel. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
									SP	Poorly graded sand (SP). About 95% fine sand, <5% silt. Brown (10YR3/3). Lake sediments-beach deposits.	
15										Due to formation blowup into the augers, the borehole was drilled to 14 ft bgs so that the monitoring well could be placed at 11.39 ft bgs. The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-11S for details on monitoring well construction.	15
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/7/93
DATE COMPLETED: 9/7/93
FIELD INSPECTOR: J.deBeer/K.Laufenberg (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-12S
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.2 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 1 4 6	SS/1.4	0	N/N	9.4		D/M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly fine sand, trace medium sand, trace fines as silt. Trace to 5% organic as roots. Approximately 5% angular white shell fragments. Sand fraction consisted mostly of subangular to subrounded quartz. Light yellowish brown (10YR6/4) to brownish yellow (10YR6/8). Lake sediments - beach deposits.	0
	4 6 12 18	SS/1.5	4.0	N/N	8.1					◀Fine laminations of medium to coarse sand, white chert, and angular shell fragments. Sand consisted of dominantly subangular to subrounded quartz, silicified limestone/dolomite, and limestone/dolomite fragments. Yellowish brown (10YR5/4) to light yellowish brown (10YR6/4).	
	19 --										
5	3 6 13 18	SS/1.7	0.5	N/N	8.6					◀Brown (10YR5/3) laminations starting at 5.5 ft below ground surface (bgs). Coarsening downward sequence with increased amount of medium grained limestone fragments to approximately 10%.	5
	-- 3 6 18	SS/1.0	0	N/N	8.7		W			◀Very fine to fine sand, trace medium to coarse sand, trace fine gravel. Color change to dark gray (10YR4/1) to very dark gray (10YR3/1) at 8.5 ft bgs.	
	29 --									◀Mostly very fine to fine sand, 5% medium sand, trace coarse sand, trace silt, 5% to 10% shell fragments. Slight organic odor observed. Very dark grayish brown (10YR3/2).	
10	3 8 20 31	SS/0.8	0.5	N/N	8.9					Color change to dark gray (10YR4/1) at 12 ft bgs.	10
	-- 5 7 17 20	SS/0.6	0	N/N	8.7						
15										Due to formation blowup into the augers, the borehole was drilled to 15 ft bgs so that the monitoring well could be placed at 12.41 ft bgs. Samples were not taken from 14 to 15 ft bgs.	15
										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. Split spoon samplers (2" diameter, 2 ft long standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-12S for details on monitoring well construction.	
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 9/13/93
DATE COMPLETED: 9/13/93
FIELD INSPECTOR: J. de Beer / S. Botts (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-13S
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.1 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 1 2 4	SS/1.5	0	N/N	11.0		D/M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly fine to very fine grained sand with about 5 to 10% medium grained sand, trace coarse sand and fine gravel, trace fines as silt and trace organics as roots (root zone). Grains are mostly subangular to subrounded, flat and consisting of quartz, limestone/dolomite, and chert, with about 5% white, angular shell fragments. Brown to yellow brown (10YR5/3 - 10YR5/4). Lake sediments - beach deposits.	0
	5 8 15 17	SS/1.8	1	N/N	11.1		M/W				
	--									▼ Water level measured at 4.78 ft below ground surface (bgs) in Monitoring Well MW-13D before drilling.	
5	1 5 16 17	SS/1.5	1	N/N	11.1					◀Thin bed of poorly graded medium grained sand at 6 ft bgs.	5
	--										
	5 9 15 21	SS/1.8	2	N/N	--		W			◀Color change to dark grayish brown (10YR4/2). Poorly graded fine sand with thin lenses of poorly graded medium to coarse sand.	
	--									◀Thin bed of poorly graded medium grained sand (About .2 ft thick) at 8.5 ft bgs.	
10	2 5 21 32	SS/2.0	5	N/N	--					◀Color change to dark gray (10YR4/1) at 11 ft bgs.	10
	--									◀Sediment has a swampy odor.	
	5 28 22 32	SS/2.0	3	N/N	--						
15										End of boring at 14 ft bgs.	15
										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. Split spoon samplers (2" diameter, 2 ft long standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2800) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-13S for details on monitoring well construction.	
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 9/13/93
DATE COMPLETED: 9/13/93
FIELD INSPECTOR: J. de Beer / S. Botts (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-14S
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.1 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1	SS/1.5	0	N/N	10.7		D/M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Top 2 inches are fine sandy organic soils containing grass and roots. Dominantly very fine to fine grained sand with about 5% medium grained sand, trace coarse sand and fine gravel, and trace fines as silt. Mostly subangular to subrounded quartz with lesser limestone/dolomite and chert with about 5% angular white shell fragments. Color changes from brown (10YR5/3) at the surface to grayish brown (10YR5/2) with depth. lake sediments - beach deposits.	0
	7										
	13										
	13										
	15	SS/1.7	60	N/N	10.8					▼ Water level measured at 1.78 ft below ground surface (bgs) in Monitoring Well MW-14D before drilling.	
	28										
	31										
	32										
	--									◀Color change to dark gray (10YR4/1) at 4.5 ft bgs.	
5	7	SS/1.9	10	L/N	10.6						5
	15										
	18										
	25										
	--						W			◀Color chang to very dark gray (10YR3/1). Silt content increases to about 5%.	
	8	SS/2.0	13	L/N	10.8						
	9										
	25										
	38										
	--										
10	3	SS/2.0	10	L/N	10.9						10
	8										
	21										
	28										
										Due to formation blowup into the augers, the borehole was drilled to 13.5 ft bgs so that the monitoring well could be placed at 11.5 ft bgs. Samples were not taken from 11.5 to 13.5 ft bgs.	
15										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. Split spoon samplers (2" diameter, 2 ft long standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-14S for details on monitoring well construction.	15
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/1/93
DATE COMPLETED: 9/1/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-15S
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.3 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2	SS/0.8	0	N/N	9.0		M	FILL	OL/OH	Organic soil (OL/OH). Organic clay with root and grass fibers. Black (10YR2/1). Fill.	0
	20									Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt. Sand fraction mostly quartz grains. Brown (10YR4/3). Fill.	
	25								SP-SM		
	24									◀About 75% fine to medium subrounded sand, 15% fine to coarse subangular to subrounded gravel, 10% silt. Gravel fraction included limestone. Brown (10YR4/3). Fill.	
	3	SS/2.0					M/W				
	13		3.0	N/N	7.9		M		CL	Sandy lean clay (CL). About 70% clay, 30% fine to medium sand. Clay is firm. Brown (10YR5/3). Fill.	
	20								SP	Poorly graded sand (SP). Mostly fine subrounded sand. Sand fraction consisted mostly of quartz. Dark brown (10YR3/3). Fill.	
	32										
	--								SM	Silty sand (SM). About 85% fine subangular to subrounded sand, 15% silt, trace coarse gravel. Dark brown (10YR3/3). Fill.	
5	6	SS/1.4					M/W		SP	Poorly graded sand (SP). About 95% fine subangular to subrounded sand, <5% silt. Sand fraction consisted mostly of quartz. Dark brown (10YR3/3) from 4.9 to 5.9 ft below ground surface (bgs), yellowish brown (10YR5/4) from 5.9 to 10.3 ft bgs. Fill.	5
	9		1.0	N/N	8.1						
	18									◀ Observed a light sweet odor from 7.0 to 9.0 ft bgs.	
	22										
	--										
	9	SS/2.0									
	10		2.0	L/N	8.1						
	15										
	18										
	--										
10	13	SS/1.2					W		SM	Silty sand (SM). About 85% fine to medium sand, 15% silt, trace coarse gravel. Sand fraction mostly quartz, gravel fraction consisted of concrete and brick material. Dark yellowish brown (10YR4/4). Fill.	10
	17		0	L/N	8.7						
	30										
	38										
	--										
	10	SS/1.0							SP	Poorly graded sand (SP). Mostly fine subangular to subrounded sand, trace silt. Brown (10YR5/3). Lake sediments - beach deposits.	
	9		4.0	L/N	8.6						
	11										
	16										
15										End of boring at 14.0 ft bgs.	15
										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diameter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-15S for details on monitoring well construction.	
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/14/93
DATE COMPLETED: 9/14/93
FIELD INSPECTOR: J. de Beer / S. Botts (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: P-105
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.2 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
5	2 6 11 13	SSB/1.8	20	N/N	7.8		D	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine grained sand with about 5% medium grained sand, trace coarse sand and fine gravel, and trace fines as silt. Mostly subangular to subrounded quartz with lesser limestone/dolomite and chert with about 5% angular, white shell fragments. Brown to grayish brown (10YR5/3 - 10YR5/2). Lake sediments - Beach deposits.	5
	11 20 22 30	SSB/1.9	30	N/N	7.8					▼ Water level measured at 1.5 ft below ground surface (bgs) after 15 minutes of recovery.	
	-- 7 23 34 36	SSB/2.0	2	N/N	9.0		W				
	-- 13 20 32 50	SSB/1.4	5	N/N	8.9					◀Coarse sand to fine gravel sized coal fragments at 8 ft bgs.	
10	-- 8 8 8 12	SSB/2.0	3	N/N	8.9					◀Switch to the 300 lb hammer to drive the split spoon samplers. ◀Color change to dark gray (10YR4/1) at 11 ft bgs.	10
										Due to formation blowup into the augers, the borehole was drilled to 14 ft bgs so that the piezometer could be placed at 11.5 ft bgs. Samples were not taken from 11.5 to 14 ft bgs.	
15										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 140 lb hammer from 0 to 9 ft bgs, and with a 300 lb hammer from 9.5 to 11.5 ft bgs. Both hammers were operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a piezometer. See the Monitoring Well Log P-105 for details on piezometer construction.	15
20											20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/4/93
DATE COMPLETED: 10/4/93
FIELD INSPECTOR: K. French/K. Mann (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: P-106
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.4 ft MSL

Depth (Feet)	Blows Per 6 In.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2 6 8 8	SSB/1.5	0	N/N	7.2		D	FILL	SM/SC	Silty to clayey sand (SM/SC). About 65% fine to medium sand, 20% silt, 15% clay. Sample contained roots, brick fragments, and crushed rock. Very dark gray brown (10YR3/2). Fill.	0
	4 4 34 32	SSB/1.4	0	N/N	6.9				SM	Silty sand with gravel (SM). About 40% fine gravel, 20% fine to medium sand, 20% silt. Gravel fraction consisted of crushed limestone rock and brick material. Sample contained coal fine material, slag material, and coal fragments. Black (10YR2/1). Fill. ◀Color changed to very dark brown (10YR2/2) at 2.9 ft below ground surface (bgs).	
5	3 27 24 50	SSB/0.6	0	N/N	7.1		D/M		SP	*Poorly graded sand with gravel (SP). About 60% fine to coarse angular* limestone sand, 40% limestone gravel. White (10YR8/1) to light gray (10YR7/1). Fill. Water level at 3.9 ft bgs after 15 minutes recovery with 29.5 ft of auger in borehole.	5
	14 14 15 19	SSB/1.3	1.3	N/N	8.4				GM	Silty gravel with sand (GM). About 50% fine to coarse gravel, 30% mostly fine to medium, 20% silt, trace coarse sand. Gravel fraction consisted of limestone, brick, concrete, and metal fragments. Very dark gray (10YR3/1). Fill.	
10	4 5 10 12	SSB/0.7	1.2	N/N	8.8		W			Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine subrounded sand, trace medium angular sand, 5% to 10% silt, trace to 5% fine gravel. Gravel fraction contained brick and metal fragments. Very dark gray (10YR3/1). Fill.	10
	8 8 12 14	SSB/2.0	57	N/N	8.3				SP/ SP-SM	◀Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 85% fine subrounded sand, 5% to 10% silt, 5% medium to coarse angular sand, trace to 3% fine gravel. Gravel and coarse sand fractions consisted of brick and metal fragments. Sample contained shell fragments. Dark gray (10YR4/1). Fill.	
15	7 9 9 14	SSB/2.0	450	N/N	8.1			LAKE SEDIMENTS-BEACH DEPOSITS		Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine subrounded and medium angular sand, mostly fine sand, 5% to 10% silt. Medium sand fraction consisted of shell fragments. Dark gray (10YR4/1). Lake sediments-beach deposits.	15
	4 4 6 12	SSB/2.0	35	L/N	8.3				SP/ SP-SM		
20	5								SP-SM	Poorly graded sand with silt (SP-SM). Lake sediments-beach deposits.	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/4/93
DATE COMPLETED: 10/4/93
FIELD INSPECTOR: K. French/K. Mann (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: P-106
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.4 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	9 12 18 --	SSB/2.0	37	M/T	9.2			LAKE SEDIMENTS-BEACH DEPOSITS	SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt. Very dark gray (10YR3/1) mottled with black (10YR2/1) siltier zones. Lake sediments-beach deposits.	
	3 8 16 18 --	SSB/1.8	50	M/T	9.0				SM	Silty sand (SM). About 85% fine subrounded sand, 15% silt, trace coarse subrounded flat basaltic sand. Black (10YR2/1). Lake sediments-beach deposits.	
25	3 5 6 10 --	SSB/1.4	75	M/N	9.0		W		SP	Poorly graded sand (SP). About 95% fine subrounded sand, 5% silt. Very dark gray (10YR3/1) to black (10YR2/1). Lake sediments-beach deposits.	25
	9 8 9 12 --	SSB/1.9	25	S/T	8.8				SP-SM	Poorly graded sand with silt (SP-SM). About 90% to 95% fine subrounded sand, 5% to 10% silt trace coarse sand. Very dark gray (10YR3/1) to black (10YR2/1). Lake sediments-beach deposits.	
	7 22 27 22	SSB/1.8	25	N/N	8.7				SP-SM /SM	Poorly graded sand with silt to silty sand (SP-SM/SM). About 85% to 90% fine subrounded sand, 5% to 10% silt. Sample contained silty sand (SM) laminations from 28.0 to 29.0 ft bgs. Black (10YR2/1). Lake sediments-beach deposits.	
30									SP-SM	Poorly graded sand with silt (SP-SM). About 85% to 90% fine subrounded sand, 10% silt, trace to 5% fine to coarse angular limestone gravel. Lake sediments-beach deposits.	30
							M	TILL	CL/ML	Silty lean clay (CL/ML). About 60% clay, 40% silt, trace sand. Clay exhibited low to medium plasticity, low to medium toughness, and slow dilatancy. Firm to hard. Gray (10YR5/1). Till.	
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). This borehole was completed as a piezometer. See the Monitoring Well Log P-106 for details on piezometer construction.	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/3/93
DATE COMPLETED: 9/3/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: P-107
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.9 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	-- -- -- -- -- -- -- -- -- -- -- --	G	0	N/N	8.7		M	FILL	GP	Fill. Crushed limestone, base material. Fill.	
									SP	Poorly graded sand (SP). Mostly fine grained sand. Pale brown (10YR8/3). Fill.	
										◀ NOTE: Split spoon samplers were not driven from 0 to 4 ft below ground surface (bgs) due to presence of electrical lines. Samples were obtained by grab method from 0 to 4 ft bgs.	
5	2 2 6 7	SSB/1.8	5.0	M/N	7.1			LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly fine grained sand. Gray (10YR6/1). Moderate coal tar odor below 4 ft bgs. Lake sediments - beach deposits.	5
	-- 8 11 9 12	SSB/2.0	25	M/N	7.9		W				
10	-- 31 58 -- --	SSB/2.0	150	M/N	8.5				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with about 5 to 10% silt. Gray (10YR6/1).	10
	-- 100 100 100 100	SSB/2.0	400	S/N	8.7	GROUP 5			SP-SM	Poorly graded sand with silt (SP-SM). Mostly fine grained sand with about 5 to 10% silt. Gray (10YR5/1).	
15										Due to formation blowup into the augers, the borehole was drilled to 15 ft bgs so that the monitoring well could be placed at 12.49 ft bgs. Samples were not taken from 13.5 to 15 ft bgs.	15
										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted on a Diedrich truck mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a piezometer. See the Monitoring Well Log P-107 for details on piezometer construction.	
20											2

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/6/93
DATE COMPLETED: 10/6/93
FIELD INSPECTOR: D. Moore (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: P-108
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.6 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 2 6 8	SSB/1.3	0.3	N/N	9.5		D	FILL	SP	Poorly graded sand (SP). Mostly fine to medium grained sand with trace fines as silt, trace shell fragments, trace roots and trace amounts of brick debris. Grayish brown (10YR5/2). Fill.	0
	5 5 6 7 --	SSB/1.9	0.5	N/N	9.6		M			▼ Water level measured at 3.58 ft below ground surface (bgs) after 1 hour of recovery with the augers at 29 ft bgs.	
5	3 8 14 16 --	SSB/1.7	0.8	N/N	9.0						5
	3 4 8 15 --	SSB/1.7	2	N/N	8.8			LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly fine grained subangular to subrounded sand with about 5% fines as silt, and trace shell fragments. Very dark gray (10YR3/1). Lake sediments - beach deposits.	
10	3 5 7 8 --	SSB/1.9	1550	L/N	8.3					Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly very fine to fine grained, subangular to subrounded sand with about 5 to 10% fines as silt, and trace shell fragments. Very dark gray (10YR3/1). Lake sediments - beach deposits.	10
	8 9 12 12 --	SSB/1.8	230	L/T	7.8		W		SP/ SP-SM	◀ Trace amounts of subrounded to rounded gravel from 12 to 14 ft bgs.	
15	5 6 10 13 --	SSB/1.9	340	L/T	8.0				SP	Poorly graded sand (SP). Mostly fine grained sand with about 5% medium to coarse grained sand, trace of shell fragments, and trace debris as wood (drift wood?). Black (10YR2/1). Lake sediments - beach deposits. Phenolic odor.	15
	2 4 11 17 --	SSB/1.7	40	M/T	8.7				SP-SM		
20	5										20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

r:ORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/6/93
DATE COMPLETED: 10/6/93
FIELD INSPECTOR: D. Moore (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: P-108
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.6 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	9	SSB/2.0	52	M/N	8.8				SP-SM	Poorly graded sand (SP). Mostly fine grained sand with about 5% medium to coarse grained sand, trace of shell fragments. Black (10YR2/1). Lake sediments - beach deposits. Phenolic odor.	
	20										
	18										
	--										
	5	SSB/2.0	58	M/N	8.7				SM	Silty sand (SM). Mostly very fine to fine grained sand with about 15% fines as silt, trace medium sand and trace debris as wood (drift wood?). Black (10YR2/1). Lake sediments - beach deposits.	
	7										
	10										
	19										
	--										
25	2	SSB/1.8	75	M/N	8.7		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP-SM	Poorly graded sand with silt (SP-SM). Mostly very fine to fine grained sand with about 5 to 10% fines as silt, about 5% fine to coarse grained gravel, and trace shell fragments. Black (10YR2/1). Lake sediments - beach deposits.	25
	4										
	5										
	7										
	--										
	4	SSB/1.8	38	M/N	8.4					◀ Gravel content increased to about 30% from 28.2 to 29 ft bgs.	
	7										
	4										
	21										
	--										
30	4	SSB/2.0	58	S/N	8.4				ML	Silt (ML). Soft silt exhibiting low toughness and high dilatancy with about 30% fine grained sand, and about 10% subrounded gravel. Black (10YR2/1). Lake sediments - beach depostits.	30
	7										
	28										
	--						M		CL	Lean clay (CL). Hard lean clay exhibiting medium plasticity, medium toughness, and slow dilatancy with about 10% fine to coarse gravel and sand. Gray (10YR5/1). Till.	
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/30/93
DATE COMPLETED: 8/31/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: PW-1
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.4 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2	SSB/1.7	1.0	N/N	8.3		M	FILL	SM	Silty sand (SM). Fine grained sand, silt, trace of gravel. Gravel fraction included limestone fragments, brick material and concrete material. Dark grayish brown (10YR4/2). Fill.	0
	5										
	9										
	7										
	19	SSB/1.5	0.6	N/N	8.9						
	12										
	58										
	100									▼ Water level measured at 4.1 ft below ground surface (bgs) after 15 minutes of recovery.	
	--										
5	56	SSB/0.5	2.2	N/N	9.4						5
	62										
	100										
	--										
	21	SSB/0.7	4.5	L/N	11.0		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine subangular to subrounded sand, 5% to 10% silt. Dark gray (10YR4/1). Lake sediments - beach deposits.	
	21										
	25									◀ Ammonia odor observed in sample from 7 to 9 ft bgs.	
	27										
	--										
10	9	SSB/1.1	9.0	L/T	9.4						10
	9										
	15										
	24										
	--										
	8	SSB/2.0	0	L/N	7.9						
	10										
	15										
	40										
	--										
15	10	SSB/2.0	180	L/N	7.8	GROUP 5					15
	21										
	32										
	39										
	--										
	9	SSB/2.0	106	L/N	7.9						
	22										
	28										
	34										
	--								SP-SM	Poorly graded sand with silt (SP-SM). Description continued on Page 2.	
20	19										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/30/93
DATE COMPLETED: 8/31/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: PW-1
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.4 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	21	SSB/2.0	76	M/T	8.3				SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine subangular to subrounded sand, 10% silt. Dark gray (10YR4/1) with black (10YR2/1), more silty zones in sample. Observed a moderate phenolic odor. Lake sediments - beach deposit.	
	36										
	42										
	--										
	24	SSB/2.0	80	M/T	8.9				SM	Silty sand (SM). About 85% fine subrounded sand, 15% silt. Black (10YR2/1).	
	28										
	34										
	42										
	--										
25	15	SSB/2.0	40	M/T	9.1		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt. Black (10YR2/1).	25
	19										
	25										
	36										
	--										
	0	SSB/2.0	130	S/T	8.4	GROUP 5				Encountered rig chatter at 29.5 ft bgs indicating possible presence of gravel.	
	15										
	15										
	19										
	--										
30	20	SSB/2.0	15	M/T	8.0		D/M	TILL	CL/ML	Silty clay (CL/ML). About 50% to 60% clay, 40% to 50% silt, trace sand. Silty clay exhibited low to medium plasticity. Gray (10YR5/1). Till.	30
	40			N/N					GP	Poorly graded gravel (GP). Mostly fine to coarse subrounded gravel and cobble fragments. Lithology consisted of weathered granite gravel and cobbles. Till.	
	63								CL	◀ Note: Moderate odor and trace sheen observed in gravel unit above. No odor and no sheen observed in clay unit below.	
	79									Lean clay with sand (CL). About 80% clay, 10% coarse subangular sand, 5% medium subangular sand, 5% fine subangular gravel. Clay exhibited slow dilatancy and medium plasticity. Hard. Grayish brown (10YR5/2). Till.	
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig. California samplers (3" diamter split poon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). This borehole was completed as a pilot boring for Pumping Well PW-1. See Monitoring Well Log PW-1 for details on pumping well construction.	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/30/93
DATE COMPLETED: 8/30/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-07D

RISER PIPE ELEVATION: N/A

GROUND SURFACE ELEVATION: 585.0 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
5	3 5 8 7	SSB/1.8	0	N/N	8.7		M	FILL	SM	Mixed fill. About 50% furnace slag material, 40% coal fines, 10% sand. Sand fraction is fine to coarse grained, gravel fraction is medium grained. Black (10YR2/1).	5
	5 3 3 2	SSB/1.7	0	N/N	8.2	GROUP 5					
	3 4 5 7	SSB/2.0	2.0	M/M	7.9					◀ Moderate coal tar odor and moderate sheen in sample at 5.3 to 5.5 ft below ground surface (bgs).	
10	1 2 2 1	SSB/1.8	5.0	N/N	8.0	GROUP 5		LAKE SEDIMENTS - BEACH DEPOSITS		Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with about 5 to 10% silt. Black (10YR2/1). Lake sediments - beach deposits.	10
	7 9 9 11	SSB/1.8	40	N/N	8.2		W			◀Fine to medium grained sand, silt and approximately 1% coarse, subrounded limestone gravel below 9.2 ft bgs. Black (10YR2/1).	
	4 6 5 6	SSB/2.0	20	M/N	8.7				SP/ SP-SM		
15	7 9 8 5	SSB/1.8	95	L/T	8.9						15
	7 8 8 9	SSB/1.9	70	L/N	8.3	GROUP 5					
20	3										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/30/93
DATE COMPLETED: 8/30/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-07D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.0 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	4 3 2 -- 2 1 1 4 -- 1 1 2 1 -- 6 7 8 8 -- 1 5 7 11	SSB/2.0	240	N/N	8.5		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with about 5 to 10% silt. Very dark gray (5YR3/1). lake sediments - beach deposits.	25
		SSB/1.8	125	L/T	8.4						
		SSB/2.0	200	M/N	8.4	GROUP 5				◀ Strong phenol odor below 27 ft bgs.	
		SSB/1.9	250	S/N	8.3						
30		SSB/1.9	70	S/N	8.3	GROUP 5	M	TILL	CL	Silty lean clay (CL). Mostly silt and clay, 5% fine to coarse sand, 2% gravel. Top 0.3 ft of sample is stained dark gray (10YR3/1), rest of sample is gray (10YR5/1). One subhorizontal thin (2 mm aperture) joint at 31 ft bgs with black staining. Till.	30
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-07D for details on monitoring well construction.	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 8/26/93
DATE COMPLETED: 8/27/93
FIELD INSPECTOR: J. de Beer (BARR)
CREW CHIEF: M. Meuller (WTD)

BORING NUMBER: SB-08D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.4 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
5	1 1 3 3	SSB/1.0	0	N/N	9.0		D	FILL	SM	Silty sand (SM). Grass and roots to 0.4 ft. below ground surface. About 65% fine sand, trace medium and trace coarse sand with about 5% organics (roots) and 30% fines as silt. Subrounded grains. Olive brown to light olive brown (2.5Y5/4 - 2.5Y4/4). Fill- top soil.	5
	1 1 2 2	SSB/0.7	0	N/N	8.5		D/M		SP	Poorly graded sand (SP). About 90% fine sand, subangular to subrounded grains, with about 10% organics (roots). Dark brown (10YR3/3). Root zone - fill.	
	2 3 5 7	SSB/1.1	4	N/N	8.4				CL	Lean clay with sand (CL). About 85% fines showing medium plactity, slow dilatancy, and medium toughness with about 15% fine to medium sand, trace coarse sand, subangular to subrounded sand grains. Dark brown (10YR3/3). Fill.	
10	5 7 9 11	SSB/1.8	1.5	N/N	8.4		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly fine sand with about 5% medium and trace coarse grained sand, subangular to subrounded grains composed mostly of quartz, iron stained quartz, and chert with minor gray to black colored grains, probably limestone/dolomite and angular, white colored shell fragments. Massive, no bedding or laminations. Grayish brown (10YR5/2).	10
	1 1 1 2	SSB/2.0	--	N/N	--						
	2 3 6 9	SSB/1.5	6	N/N	8.3					◀ Color change to dark grayish brown (10YR4/2) at 12 ft below ground surface (bgs). Percentage of coarse grained sand generally increases with depth and occurs in varying amounts up to 5%. Trace amounts of fine grained, subangular to subrounded limestone/dolomite gravel occurs variably with depth. Silt content varies upto about 5%.	
15	2 3 5 9	SSB/1.5	2	N/N	9.0	GROUP 5					15
	4 5 5 9	SSB/1.9	58	N/N	8.9						
20	2										20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

FORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 8/26/93
DATE COMPLETED: 8/27/93
FIELD INSPECTOR: J. de Beer (BARR)
CREW CHIEF: M. Meuller (WTD)

BORING NUMBER: SB-08D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.4 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	3 5 8 --	SSB/1.8	700	N/N	8.7					◀ Poorly graded sand (SP). Fine to very fine grained sand with trace amounts of coarse sand and fine gravel. Trace fines as silt and clay. Subangular to subrounded grains, mostly massive with few thick laminations (1cm) of somewhat more clayey, brown colored fine sand.	
	2 1 3 6 --	SSB/1.9	1440	N/N	8.5	GROUP 5					
25	3 4 5 7 --	SSB/1.9	1400	M/N	8.6		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	◀ Poorly graded sand (SP). Fine sand with trace medium and coarse sand, about 5% fine gravel. Split spoon passed through a limestone cobble at 25.5 ft bgs. Dark gray to very dark gray (10YR4/1 - 10YR3/1). Moderate phenolic odor with slight coal tar odor. Black discoloration of soils starts at 28 ft bgs. Very dark gray to black (10YR3/1 - 10YR2/1).	25
	2 3 3 5 --	SSB/1.7	1000	M/N	8.5	GROUP 5					
30	4 12 21 35	SSB/1.8	100	M/N	8.7		D/M	TILL	CL	◀ Rough drilling from 29.5 to 30 ft bgs. Thin fine to coarse gravel layer consisting mostly of black stained limestone/ dolomite. Lean clay with sand. About 5 to 10% fine to medium sand with about 5 to 10% coarse sand and trace amounts of fine gravel in a matrix of hard lean clay exibiting slow dilatancy, very high dry strength, medium plasticity, and low toughness. Clasts are angular to subangular and consist mostly of chert and limestone. Black discoloration diffused into the clay from the above sand layer about 0.2 ft. A 0.2 ft thick layer of fine to coarse gravel is present immediatly above the clay layer. Till. End of boring at 30 ft bgs. Split spoon driven to 31.5 ft bgs.	30
35										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-08D for details on monitoring well construction.	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/25/93
DATE COMPLETED: 8/26/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-09D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.7 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	3 6 9 8	SSB/1.2	10	N/N	7.4		M	FILL	SM	Silty sand (SM). Top 0.1 ft is crushed limestone gravel. About 60% fine sand, 20% coarse angular sand, 20% silt, trace coarse gravel with organic matter and brick fragments. Black (10YR2/1). Fill.	
	1 1 1 1 --	SSB/0.5	1.5	N/N	8.1				SM	0.4-ft thick layer of coal fines with pressed wood. Black (7.5YR2/0). Fill. Silty sand (SM). About 70% to 80% fine to medium sized sand with debris consisting of brick and slag material, 10% coarse angular sand, 10% to 20% silt. Black (7.5YR2/0). Fill. ▼ Water level measured at 3.5 ft below ground surface (bgs) after 15 minutes of recovery with 4.5 ft of auger.	
5	1 1 6 9 --	SSB/1.8	23	N/N	4.2	GROUP 6			ML SP-SM	Silt (ML). About 80% silt, 20% clay, mixed with coal fines. Light gray (5Y7/1). Fill. Poorly graded sand with silt (SP-SM). About 90% fine sand, 10% silt, trace limestone cobbles. Sand fraction included 85% quartz and 15% mafics. Sample contained large pieces of wood. Olive (5Y4/4). Fill.	5
	1 6 5 6 --	SSB/1.3	26	N/N	6.1				SP-SM SP	Poorly graded sand with silt (SP-SM). About 90% fine sand, 10% silt. Brown (10YR5/3) mottled with blue green discoloration. Lake sediments-beach deposits. Poorly graded sand (SP). About 95% fine to medium sand, 5% silt. Brown (10YR5/3). No visible discoloration. Lake sediments-beach deposits.	
10	3 6 7 11 --	SSB/1.1	41	L/N	6.3		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	◀Poorly graded sand (SP) at 10.9 ft bgs. Greater than 95% fine, mostly quartz sand. Black (5Y2.5/1), questionable whether color is natural. No visible oil.	10
	2 7 7 11 --	SSB/1.8	33	L/N	6.5				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine to medium sand, some angular medium grains, 5% to 10% silt. Dark gray (5YR4/1). No visible discoloration. Lake sediments-beach deposits.	
									SP	Poorly graded sand (SP). About 98% fine, mostly quartz sand. Black (5Y2.5/1), questionable whether color is natural. No visible oil. Lake sediments-beach deposits.	
15	2 3 5 12 --	SSB/1.8	34	L/N	6.7				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine to medium sand, some angular medium grains, 5% to 10% silt. Dark gray (5YR4/1). No visible discoloration.	15
									SP	Poorly graded sand (SP). Greater than 95% fine, mostly quartz sand, less than 5% silt. Black (5Y2.5/1), questionable whether color is natural. No visible oil. Lake sediments-beach deposits.	
	6 6 9 10 --	SSB/2.0	50	L/N	6.5				SP-SM	Pooly graded sand with silt (SP-SM). About 90% fine to medium sand. Sand fraction consisted of 70% quartz, 30% mafics and assorted grains. Dark gray (5Y4/1). No visible discoloration. Lake sediments-beach deposits.	
									SP	Poorly graded sand (SP). About 95% fine sand, 5% silt. Black (5Y2.5/1), questionable whether color is natural. No oil visible. Lake sediments-beach deposits.	
20	1								SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM).	20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols; GROUP 6= GROUP 5 + Corrosivity and Reactivity.

r'ORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/25/93
DATE COMPLETED: 8/26/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-09D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.7 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	1 2 8 -- 11 14 16 21 -- 1 2 2 5 --	SSB/2.0	74	L/N	8.1	GROUP 5	W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine sand, mostly quartz, 5% to <10% silt. Black (5Y2.5/1) with very dark gray (5Y3/1) mottling, questionable whether black color is natural. No visible oil. Observed a phenolic odor. Lake sediments-beach deposits.	
		SSB/2.0	45	L/N	8.3				SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine sand, mostly quartz, 10% silt. Black (5Y2.5/1), questionable whether black color is natural. No visible oil. Observed a phenolic odor. Lake sediments-beach deposits.	
		SSB/2.0	28	L/N	8.2				SP	Poorly graded sand (SP). About 95% fine sand, <5% silt. Black (2.5Y2.5/0), questionable whether color is natural. No visible oil. Observed a phenolic odor. Lake sediments-beach deposits.	
	6 6 12 42	SSB/1.8	33	M/N	8.2	GROUP 5			SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine sand, 10% silt. Black (2.5Y2.5/0). No visible oil. Observed a phenolic odor. Lake sediments-beach deposits.	
30	53 40 19 20								GP	Poorly graded gravel with sand (GP). Mostly 2 to 3 inch diameter angular gravel fragments consisting of gray and buff limestone with about 20% fine grained black sand. Black color diffused up to 0.5 inches into the limestone gravel. Observed a phenolic odor. Lake sediments-beach sediments.	30
	8 21 43 69	SSB/1.2	30	L/N	8.5		M	TILL	CL	Note: Till contact at 30.7 ft bgs. First sample from 29.5 to 31.5 ft bgs was unsuccessful. Second attempt was not a representative sample. Drilled to 31.0 ft bgs to obtain sample from 31.0 to 33.0 ft bgs. ◀ Observed phenolic odor from borehole. Lean clay (CL). About 90% clay, 10% silt. Hard, medium toughness, no dilatancy, medium plasticity. Contained fibrous fractures. Dark gray (10YR4/1). Fine sand fraction increased to 30% in bottom 0.8 ft of sample. No visible discoloration, oil or diffusion into fractures. Observed a light phenolic odor from sample. Till.	
										End of boring at 31.5 ft bgs. Split spoon driven to 33.0 ft bgs.	
35										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to a Diedrich D50 drill rig, producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-09D for details on monitoring well construction.	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols; GROUP 6= GROUP 5 + Corrosivity and Reactivity.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 8/25/93
DATE COMPLETED: 8/25/93
FIELD INSPECTOR: J. de Beer (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-10D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.6 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	--							FILL	OL/OH	Organic soil (OL/OH). Grass and roots with fine sand and coal fines. Fill - root zone.	
	1	SSB/1.7	1.5	N/N	8.6		D/M		SP	◀Poorly graded sand (SP) consisting of fine sand sized coal (coal fines). Black. Fill.	
	3									Poorly graded sand (SP). Mostly very fine to fine sand with about 10 % medium grained sand and trace coarse sand. Subangular to subrounded grains. Grayish brown (2.5Y5/2). Fill.	
	2								SW	Well graded sand (SW) consisting of fine gravel to silt sized coal fine sand fine to medium sand with about 10% organics as roots. Fill.	
	4	SSB/1.8	0	N/N	8.2			LAKE SEDIMENTS - BEACH DEPOSITS		Poorly graded sand (SP). Dominantly very fine to fine grained sand with about 5 to 10% medium grained sand, trace coarse grained sand and trace fines as silt. Mostly subangular to subrounded quartz with lesser limestone/dolomite, chert and about 10% angular white shell fragments. Grayish brown to dark grayish brown (10YR5/2 - 10YR4/2). Lake sediments - beach deposits.	
	5									▼ Water level measured at 3.5 ft below ground surface (bgs) after one hour recovery with the augers at 27 ft bgs.	
5	3	SSB/1.4	0	N/N	8.4	GROUP 5					5
	4										
	5										
	6										
	--										
	2	SSB/2.0	0	N/N	8.2						
	5										
	14										
	15										
	--										
	6	SSB/2.0	0	N/N	8.4						
	8										
	11										
10	10						W		SP	◀ Color change to dark gray (10YR4/1) at 11.5 bgs.	10
	--										
	6	SSB/1.8	25	N/N	8.6						
	5										
	11										
	10										
	--										
	4	SSB/1.4	45	L/N	8.8	GROUP 5					
15	3										15
	4										
	4										
	--										
	1									◀ Percentages of coarse and medium sand increase to 5% and 15% respectively at 17 to 19 ft bgs.	
	2	SSB/1.7	32	L/N	8.3						
	2										
	1										
	--										
20	1										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 8/25/93
DATE COMPLETED: 8/25/93
FIELD INSPECTOR: J. de Beer (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-10D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.6 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	1 1 2	SSB/1.7	28	L/N	8.6					Poorly graded sand (SP). Dominantly very fine to fine grained sand with about 5 to 10% medium grained sand, trace coarse grained sand and trace fines as silt. Mostly subangular to subrounded quartz with lesser limestone/dolomite, chert and about 10% angular white shell fragments. Dark gray (10YR4/1). Lake sediments - beach deposits. The split spoon from 19.5 to 21.5 ft bgs had about 15% fine to coares sand sized coke fragments mixed in with the poorly graded sand. ◀ Color change to very dark gray (10YR3/1) associated with slight phenolic and coal tar odor at 22 ft bgs.	
	1 3 3 4	SSB/2.0	30	L/N	8.6						
25	1 4 5 4	SSB/2.0	910	M/N	8.6	GROUP 5	W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	◀ Color change to black (10YR2/1) associated with a moderate coal tar and phenolic odor at 24.5 ft bgs. ◀ Drill rig chattered during drilling to 27 ft bgs. Possibly gravel. Percentage of medium grained sand increased to 25% from 27 to 29 ft bgs. Drill rig stalled while drilling to 29 ft bgs.	25
	4 3 4 5 4	SSB/1.5	390	M/T	8.5						
30	5 11 30	SSB/1.5	190	M/N	8.9		D/M	TILL	CL	Sandy lean clay (CL). Hard lean clay exhibiting moderate plasticity, medium toughness, slow dilatancy and high dry strength with about 30% fine to coarse grained sand. Dark gray to gray (10YR4/1 - 10YR5/1). Till.	30
										End of boring at 31 ft bgs.	
35										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2800) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-10D for details on monitoring well construction.	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/1/93
DATE COMPLETED: 9/1/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-11D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.0 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 2 3 4	SSB/1.2	1.0	N/N	7.4		M	FILL	GP	Crushed rock fill (GP). Fill	
									SM	Silty sand with gravel (SM). Silty fine to medium grained sand with gravel. Sample contains a piece of wood. Very dark gray (10YR3/1). Fill.	
	3 3 7 6 --	SSB/1.8	0	N/N	7.7			LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly fine grained sand. Sample contains a 0.05 ft thick seam of poorly graded medium gravel (GP) at 3.8 ft below ground surface (bgs). Pale brown (10YR6/3). Lake sediments - beach deposits. ▼ Water level measured at 3.0 ft bgs through 6.5 ft of auger.	
5	4 6 7 7 --	SSB/1.8	10	N/N	7.7					Poorly graded sand (SP). Fine to medium grained sand with about 10% fine to medium grained, rounded gravel. Gravel fraction includes limestone and mafic and felsic grains. Pale brown (10YR6/3). Grades to fine to medium grained sand, trace coarse sand, about 4% gravel. Light brownish gray (10YR6/2) below 5 ft bgs.	5
	3 3 6 8 --	SSB/1.8	35	N/N	8.3						
10	3 3 5 6 --	SSB/2.0	30	N/N	8.2		W			◀ Sand is slightly mottled very dark gray (10YR3/1) below 10 ft bgs.	10
	2 3 3 5 --	SSB/2.0	35	N/N	7.4						
15	4 4 5 6 --	SSB/1.8	30	N/N	8.2				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Fine to medium grained sand with about 5 to 10% silt. Light brownish gray (10YR6/2) to grayish brown (10YR5/2) below 18.0 ft bgs. Lake sediments - beach deposits.	15
	3 5 5 7 --	SSB/1.7	15	N/N	8.8						
20	4								SP-SM	Poorly graded sand with silt (SP-SM). Description continued on Page 2.	20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

FORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/1/93
DATE COMPLETED: 9/1/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-11D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.0 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	5 10 113 -- 4 6 6 7 -- 4 3 2 4 -- 12 22 24 --	SSB/1.2 SSB/0.8 SSB/1.0 SSB/1.5	9.0 25 8.0 20	N/N N/N N/N N/N	8.9 8.8 8.0 8.7		W	LAKE SEDIMENTS - BEACH DEPOSITS TILL	SP-SM CL	Poorly graded sand with silt (SP-SM). Fine grained sand with silt. Gray (10YR5/1). Lake sediments - beach deposits. ◀Poorly graded sand with silt and gravel (SP-SM) below 27 ft bgs. Mostly fine grained sand, trace coarse sand, about 15% subangular gravel. Lean clay with sand (CL). Lean clay with, about 20% fine to medium grained sand, trace of subangular gravel. Till. Due to formation blowup into the augers, the borehole was drilled to 28.5 ft bgs so that the monitoring well could be placed at 27.73 ft bgs. The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). *This borehole was completed as a monitoring well. See the Monitoring Well Log MW-11D for details on monitoring well construction.*	25 30 35 40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/2/93
DATE COMPLETED: 9/2/93
FIELD INSPECTOR: J. Fox/K. Laufenberg (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-12D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.2 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 1 2	SSB/1.7	0	N/N	8.2		M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Fine to medium grained sand. Pale brown (10YR6/3). Lake sediments - beach deposits.	0
	1 1 1 3	SSB/1.9	0	N/N	8.9						
5	5 10 11 12	SSB/1.8	0	N/N	8.4					◀ 0.05 ft thick lamination of poorly graded sand (SP), consisting of medium grained sand at 5.5 ft below ground surface (bgs).	5
	7 11 10 12	SSB/1.9	0	N/N	8.3					Color change to gray (10YR5/1) mottled with dark gray (10YR4/1) from 8.7 to 11.5 ft bgs.	
10	2 4 2 5	SSB/1.8	0	N/N	8.4		W			◀ Color change to gray (10YR5/1) below 11.5 ft bgs.	10
	3 7 7 8	SSB/2.0	0.5	N/N	8.3						
15	5 6 5 7	SSB/2.0	3.0	L/N	8.9						15
	5 7 7 8	SSB/2.0	7.0	N/N	8.5						
20	6										20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

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BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/2/93
DATE COMPLETED: 9/2/93
FIELD INSPECTOR: J. Fox/K. Laufenberg (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-12D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.2 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	7 7 8	SSB/2.0	0	N/N	7.7			LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly fine grained sand. Gray (10YR5/1). Lake sediments - beach deposits.	
	-- 7 8 11 10	SSB/2.0	6.0	N/N	8.4				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with about 5% silt. Gray (10YR5/1). Lake sediments - beach deposits.	
25	-- 2 2 3 4	SSB/2.0	0	N/N	8.3		W				25
	-- 5 7 9 8	SSB/2.0	0	N/N	8.3						
30	-- 3 4 4 4	SSB/2.0	13	N/N	8.1						30
	-- 15 22 32 50	SSB/2.0	10	N/N	8.8			TILL	GP	Poorly graded gravel (GP). Mostly coarse subangular to subrounded gravel, with some fine subrounded sand. Gravel is black (10YR2/1), sand is gray (10YR5/1).	
									ML/CL	Clayey silt with sand (ML/CL). About 60% silt, 20% clay, 20% medium to coarse subangular sand, trace gravel. Clayey silt sample is hard. Gray to light gray (10YR6/1). Till.	
35										End of boring at 34 ft bgs.	35
										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2800) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-12D for details on monitoring well construction.	
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/8/93
DATE COMPLETED: 9/8/93
FIELD INSPECTOR: J. de Beer (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-13D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.1 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 1 3 5	SSB/1.5	0	N/N	8.9		D/M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine grained sand with trace amounts of medium grained sand, about 5% organics as roots. Sand is mostly subangular to subrounded quartz with lesser limestone/dolomite and chert. Angular white shell fragments occur upto 5%. Pale brown (10YR8/3). Lake sediments - beach deposits.	0
	2 4 8 12	SSB/2.0	0	N/N	8.3					◀ Color chang to brown (10YR5/3) at 2 ft below ground surface (bgs).	
										▼ Saturated sands at 3.5 ft bgs.	
5	4 6 12 12	SSB/1.5	0	N/N	7.5					◀ Coarsening downward with medium grained sand increasing to about 5% at 5 ft bgs. Fine laminations of medium and coarse sand occur with the mostly massive fine sand.	5
	4 6 10 21	SSB/1.8	0	N/N	7.5					◀ Color change from brown to grayish brown (10YR5/3 to 10YR5/2) at 7 ft bgs.	
10	2 7 15 28	SSB/2.0	10	N/N	7.8		W			◀ Color change to dark gray at 10.8 ft bgs and associated with a faint boggy odor. Possibly a stagnant water area between beach dunes.	10
										◀ Trace amounts of fine gravel begin at 12 ft bgs.	
	4 3 6 18	SSB/2.0	3	N/N	8.1						
15	6 4 8 11	SSB/1.8	5	N/N	9.0					◀ Silt content increases with depth upto about 5% at 14.5 ft bgs.	15
	6 8 2 2	SSB/2.0	40	N/N	9.0						
20	9										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/8/93
DATE COMPLETED: 9/8/93
FIELD INSPECTOR: J. de Beer (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-13D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.1 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	10 15 24 --	SSB/2.0	10	N/N	9.0		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine grained sand with about 5% medium grained sand, trace coarse sand and fine gravel, and about 5% fines as silt. Sand is mostly subangular to subrounded quartz with lesser limestone/dolomite and chert. Angular white shell fragments occur upto 5%. Dark gray (10YR4/1). Lake sediments - beach deposits.	25
	2 2 3 6 --	SSB/1.8	20	N/N	8.8	GROUP 5				◀ Color change to very dark gray (10YR3/1) at 21.5 ft bgs.	
	2 2 6 9 --	SSB/1.9	500	L/N	8.5	GROUP 5				◀ Color change to black (10YR2/1) at 27 ft bgs.	
30	4 5 6 6 --	SSB/1.8	275	S/N	8.3						30
	2 3 8 7 --	SSB/1.9	125	S/N	8.4	GROUP 5				◀ Strong coal tar and phenolic odor at 30 ft bgs.	
	12 7 50/1 --	SSB/1.5	225	S/N	8.2		D/M	TILL	GP	Poorly graded gravel (GP). Dolomite/limestone on top of till.	
									CL	Lean clay with gravel and sand (CL). Hard lean clay exhibiting moderate plasticity, low toughness, no dilatancy and high dry strength, with about 15% fine to coarse and 15% fine to coares gravel. Dark gray (10YR4/1). Till.	
35										End of boring at 34 ft bgs.	35
										The borehole was drilled with a 8¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-13D for details on monitoring well construction.	
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/9/93
DATE COMPLETED: 9/9/93
FIELD INSPECTOR: J. de Beer / J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-14D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.3 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 3 6	SSB/1.7	0	N/N	7.3		M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly very fine to fine sand with about 5 to 10% medium grained sand, trace amounts of coarse sand and fine gravel, trace fines as silt, and about 5% organics as roots. Mostly subangular to subrounded quartz with lesser limestone/dolomite, chert, and about 5% white angular shell fragments. Root zone to 1.5 ft below ground surface (bgs). Brown (10YR5/3). Lake sediments - beach deposits.	0
	12 5 9	SSB/1.8	20	L/N	8.0					▼ Water level measured at 1.7 ft bgs. Color change to grayish brown (10YR5/2) at 2 ft bgs associated with a low coal tar and phenolic odor.	
	12 14 --										
5	5 11 17	SSB/1.9	80	L/N	7.8					◀ Color change to dark grayish brown (10YR4/2) at 4.5 ft bgs.	5
	21 --										
	3 3 7	SSB/1.8	5	L/N	7.8	GROUP 5				◀ Color change to dark gray at 8 ft bgs. Silt content increases to about 5% and varies with depth.	
	14 --										
10	2 3 6	SSB/2.0	0	L/N	8.2		W				10
	10 --										
	3 3 4	SSB/2.0	40	L/N	8.7						
	8 --										
15	3 5 6	SSB/2.0	75	L/N	7.9					◀ Split spoon passed through a dolomite cobble at 15.5 ft bgs.	15
	14 --										
	4 5 9	SSB/2.0	140	L/N	8.4	GROUP 5					
	16 --										
20	5										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/9/93
DATE COMPLETED: 9/9/93
FIELD INSPECTOR: J. de Beer / J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-14D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.3 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	6 9 11	SSB/1.8	110	L/N	8.4		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine sand with about 5% medium grained sand, and trace to about 5% fines as silt. Mostly subanglar to subrounded quartz with lesser limestone/dolomite, chert, and about 5% white angular shell fragments. Dark gray to dark grayish brown (10YR4/1 - 10YR4/2). Lake sediments - beach deposits.	25
	-- 1 2	SSB/1.7	10	L/N	8.4						
	4 5 --									◀ Color change to gray (10YR5/1) at 24.5 ft bgs.	
	5 6 8	SSB/1.8	100	L/N	8.6						
	13 -- 3	SSB/1.7	100	L/N	8.2						
30	6 7 13 -- 7										30
	10 14 19	SSB/1.8	75	L/N	8.5	GROUP 5	D	TILL	GP	Poorly graded gravel (GP). Coarse limestone gravel on top of the till.	
									CL	Sandy lean clay with gravel (CL). Lean clay exhibiting medium plasticity, medium toughness, no dilatancy, and high dry strength with about 30% fine to coarse sand and about 15% fine to coarse gravel. Angular to subrounded sand and gravel. Dark gray (10YR4/1). Till.	
										End of boring at 31.5 ft bgs.	
35										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-14D for details on monitoring well construction.	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/31/93
DATE COMPLETED: 8/31/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-15D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.5 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 3 5 7	SSB/1.8	0	N/N	8.0		M	FILL	OL	Organic soil (OL). Black (10YR2/1), moist organic rich soil. Fill.	0
									SP-SM	Poorly graded sand with silt (SP-SM). Fine to medium grained sand with about 10% silt. Brown (10YR5/3). Fill.	
									CL	Lean clay (CL). Lean clay with trace amounts of sand and gravel. Brown (10YR5/3). Fill.	
	2 6 7 8 --	SSB/1.9	14	N/N	8.0			LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Fine to medium grained sand. Brown (10YR5/3). Top 0.2 ft of sample discolored black. Lake sediments - beach deposits.	
5	2 4 4 6 --	SSB/1.8	30	N/N	8.4					▼ Water level measured at 5.8 ft below ground surface (bgs) with augers at 17 ft bgs.	5
	1 2 8 11 --	SSB/2.0	0	N/N	8.9						
10	2 7 12 15 --	SSB/1.9	10	N/N	8.4		W				10
	2 5 11 13 --	SSB/2.0	10	N/N	8.9				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Fine grained sand with about 5% silt. Dark grayish brown (10YR4/2). Lake sediments - beach deposits.	
15	5 8 11 15 --	SSB/2.0	200	N/N	8.7				SP	Poorly graded sand (SP). Fine grained sand. Grayish brown (10YR5/2). Possible slough in auger.	15
	3 4 7 10 --	SSB/2.0	110	N/N	8.6	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with about 5 to 10% silt. Gray (10YR5/1).	
20	7										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/31/93
DATE COMPLETED: 8/31/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-15D
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.5 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	10 8 7 --	SSB/2.0	150	N/N	8.4		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Fine grained sand with about 5% silt. Gray (10YR5/1). Lake sediments - beach deposits.	
	1 4 4 5 --	SSB/2.0	12	N/N	8.4						
25	3 4 4 7 --	SSB/2.0	65	N/N	8.7				SP	Poorly graded sand (SP). Fine grained sand with a trace coarse grained sand. Dark gray (10YR4/1).	25
	7 12 18 22	SSB/2.0	30	N/N	8.1			TILL	CL	Poorly graded sand with gravel (SP). Mostly sand, about 5% to 10% fine subangular gravel. Gravel fraction composed of limstone. Dark gray (10YR4/1). Lean clay with sand (CL). Mostly lean clay with about to 10% fine to medium grained sand, and a trace of fine gravel. Till.	
30										Due to formation blowup into the augers, the borehole was drilled to 29.5 ft bgs so that the monitoring well could be placed at 29.16 ft bgs. Samples were not taken from 29 to 29.5 ft bgs.	30
35										The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 10¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2800) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090). This borehole was completed as a monitoring well. See the Monitoring Well Log MW-15D for details on monitoring well construction.	35
40											40

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COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/29/93
DATE COMPLETED: 9/29/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-16
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.04 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2 2 3 4	SSB/1.5	0	N/N	7.4		M	FILL	SM	Silty sand (SM). About 70% fine subrounded quartz sand, 20% silt and clay, 10% rounded gravel. Sample contained roots and grass fibers. Black (10YR2/1). Fill. Silty sand (SM). About 80% fine subrounded quartz sand, 15% silt, 5% fine to coarse rounded gravel. Dark yellowish brown (10YR4/8). Sample contained roots. Fill.	0
	3 3 4 4	SSB/1.0	0	N/T	8.2	GROUP 5				Poorly graded sand with silt (SP-SM). About 70% fine, 15% silt, subrounded quartz sand, 10% fine angular limestone sand, 5% fine to coarse angular limestone gravel. Dark gray (10YR4/1). Fill.	
5	-- 1 2 2 2 --	SSB/1.2	18	N/N	8.4				SP-SM	◀Sample contained pockets of coarse sand-sized black and silver-metallic material, wood, and grass fibers at 4.5 to 6.5 feet below ground surface (bgs).	5
	1 1 3 5 --	SSB/1.9	100	L/T	8.5	GROUP 5	W	LAKE SEDIMENTS-BEACH DEPOSITS		Poorly graded sand with silt (SP-SM). About 65% fine subrounded quartz sand, 15% fine subangular limestone sand, 10% to 15% silt, 5% medium to coarse limestone sand. Very dark gray (10YR3/1). Lake sediments-beach sediments.	
10	9 12 18 24 --	SSB/0.5	--	L/T	--				SP-SM	◀Recovery in brass liner only from 9.5 to 11.5 ft sample interval.	10
	10 16 20 29 --	SSB/1.2	40	L/T	7.0					◀Sample contained trace of fine rounded limestone gravel in sample. Color changed to black (10YR2/1) at 12.0 to 14.0 ft bgs.	
15	11 11 21 29 --	SSB/1.9	30	L/T	8.4					Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% fine subrounded quartz sand, 20% fine subangular limestone sand, 5% to 10% silt, trace fine subrounded limestone gravel. Black (10YR2/1). Lake sediments-beach deposits.	15
	10 10 16 21 --	SSB/1.3	5	L/N	8.5	GROUP 5/M12			SP/ SP-SM	◀Sample contained siltier pockets of sand at 17.0 to 19.0 ft bgs.	
20	12								SP	Poorly graded sand (SP). Lake sediments-beach deposits.	20

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COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M12= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/29/93
DATE COMPLETED: 9/29/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-16
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.04 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	13 14 20	SSB/1.5	30	L/N	8.4				SP	Poorly graded sand (SP). About 85% fine subrounded quartz sand, 30% fine subangular limestone sand, <5% silt, trace coarse limestone sand and fine rounded limestone gravel. Black (10YR2/1). Lake sediments-beach deposits.	
	9 13 16 23	SSB/2.0	80	L/N	8.2				SP-SM	Poorly graded sand with silt (SP-SM). About 80% fine subrounded quartz sand, 15% fine lithic sand, 15% fine subangular limestone sand, 10% silt, trace coarse limestone sand. Black (10YR2/1). Lake sediments-beach deposits.	
25	6 9 13 18	SSB/2.0	125	L/N	8.4		W	LAKE SEDIMENTS-BEACH DEPOSITS			25
	10 12 13 19	SSB/2.0	1000	L/N	8.6	GROUP 5			SM	Silty sand (SM). About 60% very fine subrounded quartz sand, 30% silt, 10% very fine subangular limestone sand, trace subangular lithic sand. Black (10YR2/1). Lake sediments-beach deposits.	
30	10 17 22 30	SSB/2.0	350	N/N	7.8		M	TILL	SC	Clayey sand (SC). About 60% fine subrounded quartz sand, 5% fine lithic sand, 35% clay and silt. Grayish brown (10YR5/2).	30
									CL	Lean clay with sand and gravel (CL). About 60% clay, 20% fine to coarse subangular limestone and fine subrounded quartz sand, 20% fine to medium limestone subangular gravel. Grayish brown (10YR5/2). Clay exhibited medium plasticity. Hard. Till.	
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M12= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/29/93
DATE COMPLETED: 9/29/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-17
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.43 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2 5 5	SSB/1.3	0	N/N	8.2			FILL	SM	Silty sand (SM). About 60% fine subrounded quartz sand, 20% fine to coarse subrounded gravel, 20% silt. Gravel fraction included limestone and slag material. Sample contained roots and grass fibers. Brown (10YR5/3). Fill.	0
	6 6 8	SSB/--	--	--	--	GROUP 5				Silty sand (SM). About 60% sand, 20% silt, 20% subrounded gravel- sized slag material. Fill. ◀ No recovery at 2.0 to 4.0 ft below ground surface (bgs). Split spoon driven from 2.0 to 4.0 ft sample interval near the borehole after it was completed to collect Group 5 analytical samples.	
5	7 6 -- 12 7	SSB/1.2	5	N/N	8.2					Silty sand with gravel (SM). About 40% fine subrounded quartz sand, 20% fine to medium subangular limestone sand, 20% fine to medium subrounded gravel-sized slag material, 20% silt, trace cobble-sized concrete in split spoon. Black (10YR2/1). Fill.	5
	7 8 -- 7 8	SSB/2.0	35	N/N	7.7	GROUP 5			SP	Poorly graded sand (SP). About 70% fine subrounded quartz sand, 25% fine angular lithic and limestone sand, <5% silt, trace medium subrounded to subangular sand and fine gravel. Black (10YR2/1). Fill.	
10	14 -- 18 20 22	SSB/1.7	25	L/N	7.8			LAKE SEDIMENTS-BEACH DEPOSITS	SP-SM	Poorly graded sand with silt (SP-SM). About 60% fine subrounded quartz sand, 15% fine to medium angular limestone sand, 10% fine black lithic sand, 10% silt. Black (10YR2/1). Lake sediments-beach deposits.	10
	26 -- 11 19 19	SSB/1.9	20	L/T	7.9					◀ Sample contained trace limestone cobble at 12.0 to 14.0 ft bgs.	
15	21 -- 9 10 13	SSB/2.0	15	L/T	8.3					◀ Sample contained trace coarse rounded limestone gravel. Individual grains are stained black on surface and are buff-colored on the inside.	15
	19 -- 7 12 12	SSB/1.7	10	L/N	8.0	GROUP 5				◀ Sample contained pockets of siltier sand.	
20	16 -- 10								SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM).	20

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COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M13= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/29/93
DATE COMPLETED: 9/29/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-17
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.43 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	14 20 21	SSB/1.5	7.0	N/N	8.9			LAKE SEDIMENTS-BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% fine subrounded quartz sand, 20% fine black lithic sand, 10% fine subangular limestone sand, 5% to 10% silt, trace medium subangular limestone sand. Black (10YR2/1). Lake sediments-beach deposits.	
	8 11 13 16	SSB/1.7	20	L/N	9.0					Poorly graded sand with silt (SP-SM). About 60% fine subrounded quartz sand, 15% fine subangular lithic sand, 10% fine subangular limestone sand, 10% silt, trace medium subangular limestone gravel. Black (10YR2/1). Lake sediments-beach deposits.	
25	15 15 20 26	SSB/2.0	3000	L/T	7.8				SP-SM	◀ Sand fraction became very fine at 24.5 ft bgs.	25
	8 10 16 27	SSB/1.9	1500	L/T	7.7					◀ Sand fraction became finer at 26.0 ft bgs. Trace medium subangular to subrounded limestone sand, no gravel in 27.0 to 29.0 ft sample interval. Black (2.5Y2/0).	
30	18 20 27 36	SSB/1.8	--	L/N	8.2			TILL	SP GP-GM CL	Poorly graded sand (SP). About 85% fine quartz sand, 10% medium subangular to subrounded lithic and limestone sand, <5% silt. Grayish brown (10YR5/2). Lake sediment-beach deposit. Poorly graded gravel with silt (GP-GM). About 60% fine to coarse angular limestone gravel, 20% silt, 20% fine to coarse quartz and angular limestone sand. Grayish brown (10YR5/2). Lean clay (CL). Mostly clay, about 30% silt. Clay exhibited medium plasticity. Hard. Grayish brown (10YR5/2). Till.	30
										End of boring at 29.5 ft bgs. Split spoon driven to 31.3 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M13= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/30/93
DATE COMPLETED: 9/30/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-18
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.93 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 3 3 3	SSB/1.0	1.0	N/N	6.9		M	FILL	SM	Silty sand (SM). About 60% fine subrounded quartz sand, 30% silt, 10% fine to medium subangular limestone sand. Sample contained grass and roots. Dark brown (10YR3/3). Fill. Silty sand (SM). About 60% fine sand-sized coal material, 10% quartz sand, 30% silt-sized coal material, trace subrounded gravel slag material. Black (10YR2/1). Fill.	0
	1 5 5 4	SSB/0.8	1.0	N/T	6.7	GROUP 5			SP	Silty sand (SM). About 45% fine to medium subrounded to subangular sand-sized coal material, 30% fine to coarse subangular limestone sand, 15% silt-sized coal fine material, 10% subrounded quartz sand. Black (10YR2/1). Fill.	
5	1 5 6 10	SSB/2.0	50	L/T	6.5				SM	Silty sand (SM). About 35% fine to medium sand-sized coal material, 30% silt, 20% subrounded quartz sand, 15% fine to medium subangular limestone gravel. Black (10YR2/1). Fill.	5
	3 8 9 9	SSB/2.0	10	L/N	6.8	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% fine subrounded quartz sand, 30% subangular limestone and lithic sand and sand-sized coal material, 5% to 10% silt. Black (10YR2/1). Fill.	
10	13 11 15 19	SSB/2.0	25	L/T	6.9		W		SP-SM	Poorly graded sand with silt (SP-SM). About 55% fine quartz sand, 30% fine subangular sand-sized coal material and fine subangular lithic sand, 15% fine subangular limestone sand, 10% to 15% silt. Black (10YR2/1). Fill. ◀Trace of fine subrounded black limestone gravel at 12.0 to 14.0 ft below ground surface (bgs).	10
	13 14 17 19	SSB/2.0	30	N/N	7.7						
15	9 12 12 20	SSB/2.0	600	N/N	8.5					◀ Sample contained up to 10% medium sand-sized subangular coal material at 14.5 to 16.5 ft bgs.	15
20	2 8 9 10 3	SSB/1.2	600	L/N	8.7	GROUP 5			SP	Poorly graded sand (SP). About 80% very fine quartz sand, 35% fine subangular lithic and limestone sand, 5% silt, trace fine subrounded black limestone gravel. Black (10YR2/1). Lake sediments-beach deposit.	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M13= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/30/93
DATE COMPLETED: 9/30/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-18
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.93 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	7 10 10 --	SSB/1.8	500	N/N	8.0		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 60% very fine quartz sand, 35% fine subangular lithic and limestone sand, 5% silt, trace fine subrounded black limestone gravel. Black (10YR2/1). Lake sediments-beach deposit.	
	9 12 12 18 --	SSB/1.8	500	L/N	8.3				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% very fine subrounded quartz, 30% fine subangular lithic sand, 5% to 10% silt, trace medium subangular limestone sand. Black (10YR2/1). Lake sediments-beach deposits.	
25	10 11 14 19 --	SSB/1.0	250	L/N	8.4					◀Outer portion of sample colored black (10YR2/1), inner portion colored dark gray (10YR4/1).	25
	10 20 26 33 --	SSB/1.2	250	L/N	8.1	GROUP 5/M13					
30	21 22 34 39	SSB/2.0	--	L/N	--		M	TILL	GP	Poorly graded gravel (GP). Mostly fine to coarse angular limestone gravel with cobble-sized angular limestone fragments.	30
									CL	Lean clay (CL). About 80% clay and silt, 20% fine to coarse subangular limestone sand and fine to medium subangular limestone gravel. Clay exhibited medium plasticity. Hard. Grayish brown (10YR5/2). Till.	
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M13= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/30/93
DATE COMPLETED: 9/30/93
FIELD INSPECTOR: K. Laufenberg/D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-19
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.30 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	6 10 16 11	SSB/1.5	0	N/N	7.2		M	FILL	SM	Silty sand (SM). About 60% fine subrounded quartz sand, 30% silt, 10% lithic sand, trace coarse subrounded gravel. Very dark grayish brown (10YR3/2). Fill.	
									SM	Poorly graded gravel (GP) bed from 0.6 to 0.8 ft below ground surface (bgs) Gravel bed consisted of mostly fine to medium angular limestone gravel. Fill.	
	6 9 10 13	SSB/1.2	0	L/N	7.2	GROUP 5	M/W			Silty sand (SM). About 60% fine sand-sized subangular coal fine material, 30% silt-sized coal fines, 10% fine subrounded quartz sand. Black (10YR2/1). Fill.	
									SC	Clayey sand (SC). About 70% fine quartz sand, 30% clay and silt. Dark yellowish brown (10YR4/6). Fill.	
5	2 3 3 8	SSB/1.2	4.0	L/N	7.3					Clayey sand (SC). About 70% fine subrounded quartz sand, 30% clay. Dark gray (10YR4/1). Fill.	5
									SP	Poorly graded sand (SP). About 65% fine subrounded quartz sand, 20% fine subangular lithic sand and fine sand-sized coal material, 15% fine limestone sand, 5% silt, trace medium sand-sized coal material. Black (10YR2/1). Fill.	
	5 5 5 7	SSB/1.5	20	M/N	7.3	GROUP 5			SC	Clayey sand (SC). About 70% fine subrounded quartz sand, 30% clay, trace medium subangular limestone gravel. Dark yellowish brown (10YR4/6). Fill.	
									SP	Poorly graded sand (SP). About 60% fine subrounded quartz sand, 20% fine subangular lithic sand and fine sand-sized coal material, 15% fine limestone sand, 5% silt, trace medium sand-sized coal material. Black (10YR2/1). Fill.	
10	5 6 8 10	SSB/2.0	65	M/N	7.0				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% fine subrounded quartz sand, 20% fine subangular lithic sand, 10% fine subangular limestone sand, 5% to 10% silt. Black (10YR2/1). Fill.	10
	10 11 11 14	SSB/1.9	150	M/N	8.0		W		SP-SM	Poorly graded sand with silt (SP-SM). About 60% fine subrounded quartz sand, 20% fine subangular lithic sand, 10% to 15% silt, 5% fine subangular limestone sand. Mostly black (10YR2/1) with pockets and streaks of dark gray (10YR4/1) to very dark gray (10YR3/1). Sample contained trace 0.5-inch diameter pockets of dark yellow brown clayey sand. Fill.	
15	8 10 14 19	SSB/2.0	15	M/N	7.0			LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 60% very fine subrounded quartz, 25% fine subangular lithic sand, 10% very fine subangular limestone sand, 5% silt. Black (10YR2/1) with pockets of dark gray (10YR4/1) and very dark gray (10YR3/1). Lake sediments-beach deposits.	15
	10 11 13 15	SSB/1.8	10	M/N	7.1	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% very fine subrounded quartz sand, 25% fine subangular lithic sand, 10% very fine subangular limestone sand, 5% to 10% silt. Black (10YR2/1). Lake sediments-beach deposits.	
20	11								SP	Poorly graded sand (SP).	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M14= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/30/93
DATE COMPLETED: 9/30/93
FIELD INSPECTOR: K. Laufenberg/D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-19
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.30 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	11, 19, 21	SSB/2.0	8.0	M/N	7.1		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 60% very fine subrounded quartz sand, 25% fine subangular black lithic sand, 10% fine subangular white limestone sand, 5% silt. Black (10YR2/1). Lake sediments-beach deposits.	
	9, 11, 12, 18	SSB/1.7	6.0	M/N	7.3				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% very fine subrounded quartz sand, 25% fine subangular lithic sand, 10% very fine subangular limestone sand, 5% to 10% silt. Black (10YR2/1). Lake sediments-beach deposits.	
25	5, 9, 11, 18	SSB/2.0	30	M/T	6.9				SP	Poorly graded sand (SP). About 60% very fine subrounded quartz sand, 25% fine subangular black lithic sand, 10% fine subangular white limestone sand, 5% silt. Black (10YR2/1). Lake sediments-beach deposits.	25
	11, 15, 19, 26	SSB/1.7	200	M/T	7.5	GROUP 5/M14	M		SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% very fine subrounded quartz sand, 25% fine subangular lithic sand, 10% very fine subangular limestone sand, 5% to 10% silt. Black (10YR2/1). Lake sediments-beach deposits.	
									GP-GM	Poorly graded gravel with sand and silt (GP-GM). Mostly fine to coarse angular limestone gravel, 25% sand and silt matrix. Black (10YR2/1).	
									CL	Lean clay with sand (CL). About 80% clay and silt, 20% medium to coarse subangular limestone sand. Clay exhibited medium plasticity. Hard. Grayish brown (10YR5/2). Till.	
30										End of boring at 27.0 ft bgs. Split spoon driven to 28.7 ft bgs.	30
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M14= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/4/93
DATE COMPLETED: 10/4/93
FIELD INSPECTOR: J. Fox / D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-20
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.45 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	3 4 6 7	SSB/1.8	2.5	N/T	7.0		M	FILL	SM	Silty sand to poorly graded sand with silt (SM/SP-SM). Mostly fine grained sand with about 10 to 15% fines as silt, and about 10% fine to coarse gravel sized furnace slag material. Black (10YR2/1). Fill.	0
	2 4 4 7	SSB/1.8	4	N/T	7.0	GROUP 5					
	--										
5	3 4 4 8	SSB/1.7	120	M/N	6.9				SP	Poorly graded sand (SP). Mostly fine to medium grained sand with trace amounts of coarse sand and fine gravel. Very dark gray (10YR3/1). Lake sediments - beach deposits.	5
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	8 10 11 12	SSB/1.7	130	M/T	7.0	GROUP 5/M18					
	--										
10	15 20 30 27	SSB/2.0	40	L/T	7.1		W	LAKE SEDIMENTS - BEACH DEPOSITS		Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with trace coarse sand, and about 5 to 10% fines as silt. Very dark gray (10YR3/1). Lake sediments - beach deposits.	10
	--										
	8 11 14 16	SSB/1.8	95	L/T	8.1						
	--										
15	6 8 10 12	SSB/1.8	200	L/N	8.4				SP/ SP-SM	◀ Silt layer (SM) from 14.5 to 14.8 ft below ground surface (bgs).	15
	--										
	11 11 12 15	SSB/2.0	250	L/N	8.8	GROUP 5					
	--										
20	9										20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M18= duplicate sample.

FORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/4/93
DATE COMPLETED: 10/4/93
FIELD INSPECTOR: J. Fox / D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-20
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.45 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	12 14 19	SSB/2.0	2750	L/N	8.8	GROUP 5	W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with trace coarse sand, and about 5 to 10% fines as silt. Very dark gray (10YR3/1). Lake sediments - beach deposits.	25
	14 16 12 12	SSB/2.0	1500	M/N	8.8				SP-SM	Poorly graded sand with silt (SP-SM). Mostly fine grained sand with about 10% fines as silt. Dark gray (10YR5/1). Lake sediments - beach deposits.	
	8 11 12 18	SSB/2.0	400	S/N	8.8						
	10 11 11 13	SSB/2.0	75	M/N	8.8	GROUP 5					
30	10 14 18 23	SSB/2.0	5	N/N	8.8		M	TILL	CL	Silty lean clay (CL). Lean clay with about 50% silt and a trace of sand and gravel. Gray (10YR5/1) with slight discoloration to dark gray (10YR4/1) from 29.50 to 29.51 ft bgs. Till.	30
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M18= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/1/93
DATE COMPLETED: 10/1/93
FIELD INSPECTOR: K. Laufenberg/D. Moore (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-21
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.91 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 3 5 7	SSB/1.7	0	N/N	8.6		M	FILL	SM	Silty sand (SM). About 60% sand, 40% silt. Sample contained roots and grass fibers. Black (10YR2/1). Fill.	0
									SM	Silty sand (SM). About 70% fine subrounded quartz sand, 20% silt, 10% fine subangular limestone and lithic sand. Sample contained roots and grass fibers. Dark yellowish brown (10YR4/6). Fill.	
	4 4 3 2	SSB/1.0	0	N/N	8.7	GROUP 5			SM	Silty sand (SM). About 50% fine subrounded quartz sand, 30% silt, 20% coarse subrounded limestone sand and sand-sized slag and brick material, trace fine to medium subrounded gravel. Black (10YR2/1). Fill.	
5	5 4 5 7	SSB/2.0	150	L/N	8.2				SP	Poorly graded sand (SP). About 50% fine subrounded quartz sand, 20% fine to medium sand-sized coal material, 15% fine subangular limestone sand, 10% medium subrounded lithic sand, <5% silt. Black (10YR2/1) with pockets of very dark gray (10YR3/1). Fill. ◀Trace medium sand-sized subrounded orange-red slag material at 7.0 ft below ground surface (bgs).	5
	2 3 5 6	SSB/1.7	300	L/N	8.2	GROUP 5					
10	1 3 6 8	SSB/1.7	350	L/N	8.2		W		SP	Poorly graded sand (SP). About 60% fine subrounded quartz sand, 20% fine subangular lithic sand, 15% fine subangular white limestone, <5% silt, trace medium subrounded black-stained limestone gravel. Black (10YR2/1). Fill.	10
	3 6 6 7	SSB/2.0	350	L/N	8.4	GS/P GROUP 7				Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% very fine subrounded quartz sand, 20% fine subangular lithic sand, 10% fine subangular white limestone sand, 5% to 10% silt. Black (10YR2/1). Fill.	
15	2 2 3 5	SSB/2.0	50	L/N	7.9				SP/ SP-SM	◀Trace medium sand-sized subrounded orange-red slag material and slightly coarser sand fraction at 14.5 ft bgs.	15
	4 8 9 11	SSB/1.7	40	L/N	7.8	GROUP 5			SP	Poorly graded sand (SP). About 60% fine subrounded quartz sand, 20% fine subangular lithic sand, 15% fine subangular white limestone, 5% silt, trace slag material. Black (10YR2/1). Fill. ◀Poorly graded sand (SP) consists of very fine sand at 17.4 ft bgs.	
20	2										20

r-ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 7= TOC/CEC GEOTECHNICAL SAMPLE TYPES: GS= grain size, P= porosity, A= Atterberg limits, V= vertical permeability. GROUP A= Grainsize/porosity/water content/density/ specific gravity. GROUP B= Same as Group A/Atterberg Limits/hydrom/ vertical perm.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/1/93
DATE COMPLETED: 10/1/93
FIELD INSPECTOR: K. Laufenberg/D. Moore (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-21
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.91 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	2 4 5 -- 3 5 7 11 -- 1 3 4 4 --	SSB/2.0 SSB/2.0 SSB/2.0	50 40 35	L/N L/N L/N	8.1 8.4 8.8		W	FILL	SP	◀Poorly graded sand (SP). Trace medium subangular gray limestone sand, trace medium sand-sized subrounded orange-red slag material. Black (10YR2/1) with pockets of very dark gray (10YR3/1). Fill.	25
								LAKE SEDIMENTS-BEACH SEDIMENTS	SP	Poorly graded sand (SP). About 60% very fine subrounded quartz sand, 20% very fine subangular black lithic sand, 15% very fine to fine limestone sand, 5% silt, trace white shell fragments. Black (10YR2/1). Lake sediments-beach deposits.	
	3 4 4 6 --	SSB/2.0	75	L/N	8.7	GS/P			SP-SM	Poorly graded sand with silt (SP-SM). About 60% fine subrounded quartz sand, 20% fine lithic sand, 10% fine subangular limestone sand, 5% to 10% silt. Black (10YR2/1). Lake sediments-beach deposits.	
									SM	Silty sand (SM). About 50% very fine subrounded quartz sand, 30% silt, 20% very fine lithic sand. Black (10YR2/1). Lake sediments-beach deposits.	
30	13 6 7	SSB/2.0	230	L/N	8.7	GROUP 5			SP	Poorly graded sand (SP). About 60% fine subrounded quartz sand, 20% very fine lithic sand, 15% very fine limestone sand, 5% silt. Black (10YR2/1). Lake sediments-beach deposits.	30
	8 -- -- -- -- -- --	TW/0.5				GS/A/P/V	M	TILL	CL	Lean clay with sand (CL). About 80% fines, mostly clay, 20% fine to coarse subrounded limestone sand, trace fine subrounded limestone gravel. Clay exhibited medium plasticity. Hard. Grayish brown (10YR5/2). Till. ◀Push thin wall sample from 32.0 to 32.5 ft bgs.	
35	4 15 32 32	SSB/1.5				GS/A/P					35
	20 32 33 31	SSB/1.5				GROUP 7				◀Collect till sample with three brass liners in split spoon from 38.5 to 38.5 ft bgs.	
40										End of boring at 38.5 ft bgs. Split spoon driven to 38.5 feet.	40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 7= TOC/CEC GEOTECHNICAL SAMPLE TYPES: GS= grain size, P= porosity, A= Atterberg limits, V= vertical permeability. GROUP A= Grainsize/porosity/water content/density/ specific gravity. GROUP B= Same as Group A/Atterberg Limits/hydrom/ vertical perm.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/27/93
DATE COMPLETED: 9/27/93
FIELD INSPECTOR: J. de Beer/ D. Moore
CREW CHIEF: B. Loveland

BORING NUMBER: SB-22
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.93 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2 5 8 10	SSB/1.4	2	N/N	7.6		D/M	FILL	SP SC	Poorly graded sand (SP). Fine to medium grained sand with grass and roots. Black (10YR2/1). Fill. Clayey sand (SC). Fine to medium sand with clay. Black (10YR2/1). Fill.	0
	4 6 8 9	SSB/1.8	3	N/N	7.8	GROUP 5			SW	Well graded sand (SW). Fine to coarse sand and gravel sized furnace slag with about 10% silt sized fragments and trace organics. Furnace slag fragments are vessicular, glassy, and brown to yellowish brown (10YR5/3 - 10YR5/4) in color. Fill.	
5	2 4 7 6	SSB/1.9	150	L/N	7.8				SP	Poorly graded sand (SP). Mostly black (10YR2/1) colored fine sand sized particles (coal fines or stained native material ?) occurring with about 10% fine to medium sand sized furnace slag particles. Low coal tar odor and oily blebs observed during the sheen test. Fill.	5
	7 10 12 13	SSB/2.0	300	L/T	8.2	GROUP 5			SW	Well graded sand (SW). Fine to coarse sand and gravel sized furnace slag with about 10% silt sized fragments. Furnace slag fragments are vessicular, glassy, and brown to yellowish brown (10YR5/3 - 10YR5/4) in color.	
10	9 15 18 22	SSB/2.0	1500	L/T	8.1		W		SP	Poorly graded sand (SP). Mostly very fine to fine grained quartz sand with about 5% medium grained quartz sand, and about 5% angular, white to gray shell fragments mixed with about 10% fine to medium grained sand sized yellow and reddish brown furnace slag. Low coal tar odor. Oily blebs observed during the sheen test. Black (10YR2/1). Fill.	10
	10 10 8 10	SSB/1.8	500	L/T	8.0				SW	Well graded sand (SW). Mostly fine to coarse grained sand and gravel sized slag with about 20% fine grained quartz sand. Black (10YR2/1). Fill.	
									SP	Poorly graded sand (SP). Mostly very fine to fine grained quartz sand with about 10% fine to medium graine sand sized particles of slag. Black (10YR2/1). Fill.	
15	7 7 8 10	SSB/2.0	1250	L/N	8.5			LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine grained sand with about 5% medium grained sand, about 5% fines as silt, and trace amounts of coarse sand and fine gravel. Mostly subangular to subrounded quartz with lesser limestone / dolomite, chert and about 5% angular white shell fragments. Black (10YR2/1). Lake sediments - beach deposits.	15
	6 14 17 20	SSB/1.8	2000	M/N	8.7	GROUP 5				No recovery from 19.5 to 21.5 ft below ground surface (bgs).	
20	7										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/27/93
DATE COMPLETED: 9/27/93
FIELD INSPECTOR: J. de Beer/ D. Moore
CREW CHIEF: B. Loveland

BORING NUMBER: SB-22
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.93 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	10 15 11 --	SSB/0.0	--	--	--					No recovery from 19.5 to 21.5 ft below ground surface (bgs).	
	16 18 10 25	SSB/1.7	2250	M/N	9.0					Poorly graded sand (SP). Dominantly very fine to fine grained sand with about 5% medium grained sand, about 5% fines as silt, and trace amounts of coarse sand and fine gravel. Mostly subangular to subrounded quartz with lesser limestone / dolomite, chert and about 5% angular white shell fragments. Black (10YR2/1). Lake sediments - beach deposits. Moderate coal tar odor.	
25	-- 13 11 15 24	SSB/2.0	1000	S/N	9.0		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	◀ Strong coal tar odor from 24.5 to 26.5 ft bgs.	25
	-- 10 11 11 18	SSB/1.9	400	M/N	9.0	GROUP 5					
30	-- 7 10 21 25	SSB/1.8	600	N/N	--		D/M	TILL	CL	Sandy lean clay with gravel (CL). Hard lean clay exhibiting high plasticity, moderate toughness, very slow dilatancy, and high dry strength occurring with about 35% fine to coarse angular sand, about 20% fine to coarse angular gravel. Grayish brown (10YR5/2). Till.	30
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: J. Fox / K. Mann (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-23
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.67 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	8	SSB/1.8	0	L/N	8.2		M	FILL	CL	Lean clay (CL). Dark grayish brown (10YR4/2). Fill.	0
	10									Silty sand (SM). Fine to medium grained sand with about 50% fine sand to coarse gravel sized furnace slag material. Black (10YR2/1). Fill.	
	10										
	6										
	4	SSB/1.8	0	L/T	7.7	GROUP 6			SM-GP		
	4										
	4										
	5										
	--										
5	3	SSB/2.0	0	S/M	7.7						5
	4										
	6										
	9									Poorly graded sand (SP). Fine grained sand. Black (10YR2/1). Lake sediments - beach deposits.	
	--										
	5	SSB/1.7	0	L/T	7.8	GROUP 5		LAKE SEDIMENTS - BEACH DEPOSITS	SP		
	4										
	9										
	9										
	--										
10	8	SSB/1.8	4.5	L/T	7.9		W				10
	10										
	17										
	9										
	--									Color change to very dark gray (10YR3/1) below 12 ft below ground surface (bgs).	
	11	SSB/2.0	30	L/N	7.5						
	11										
	16										
	21										
	--										
15	10	SSB/2.0	30	L/N	8.0						15
	10										
	22										
	24									Color change to dark gray (10YR4/1) below 18.5 ft bgs.	
	--										
	6	SSB/2.0	5	L/N	8.0	GROUP 5					
	8										
	12										
	15										
	--										
20	10										20

r-ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 6= GROUP 5 + Corrosivity and Reactivity.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: J. Fox / K. Mann (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-23
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.67 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	14 16 20	SSB/1.9	130	M/N	8.3		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Fine grained sand. Dark gray (10YR4/1). Lake sediments - beach deposits.	25
	9 11 17 22	SSB/2.0	45	S/N	8.5						
	8 8 11 14	SSB/2.0	180	S/N	8.8						
	6 7 18 19	SSB/2.0	310	S/N	8.8				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with about 5 to 10% silt. Dark gray (10YR4/1). Lake sediments - beach deposits.	
30	10 11 24 38	SSB/1.8	50 90	S/N L/N	8.5 8.6	GROUP 5	M	TILL	GP CL	Poorly graded gravel (GP). Fine to coarse grained gravel. Brown (10YR5/3). Lake sediments - beach deposits. Silty lean clay (CL). Lean clay with about 10% fine to coarse sand and about 10% fine to coarse gravel. Grayish brown (10YR3/1). Stained black from 30.5 to 30.6 ft bgs. Till. End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	30
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 6= GROUP 5 + Corrosivity and Reactivity.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/28/93
DATE COMPLETED: 9/28/93
FIELD INSPECTOR: J. de Beer / S. Botts
CREW CHIEF: B. Loveland

BORING NUMBER: SB-24
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.66 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	4 6 8 6	SSB/1.4	0	N/N	6.8		D/M	FILL	OL/OH	Organic soil (OL/OH). Grass and roots - root zone. Fill.	0
									CL	Sandy lean clay with gravel (CL). Soft lean clay exhibiting moderate plasticity, low toughness, no dilatancy and low dry strength. Dark yellowish brown (10YR4/4). Fill.	
	4 4 4 4	SSB/1.3	3	L/N	7.1	GROUP 6			SM	Silty sand (SM). Mostly fine to coarse sand sized coal and coke fragments with about 10 to 15% fines as silt. Black (10YR2/1). Fill consisting of coal and coke fines. Moderate to strong coal tar odor associated with the coal and coke fines.	
5	-- 1 5 7 7	SSB/1.8	35	S/N	6.8				SP	Poorly graded sand (SP). Mostly very fine to fine grained, subangular to subrounded quartz sand with about 5% medium grained sand and 5% light gray angular shell fragments. Black (10YR2/1). Fill.	5
	-- 4 5 5 6	SSB/1.7	30	S/N	7.0	GROUP 5			SM	Silty sand with gravel (SM). Mostly fine to coarse sand and gravel (45% sand, 40% gravel) sized coal and coke fragments with about 15% fines as silt. Black (10YR2/1). Fill consisting of coal and coke fines.	
10	-- 4 4 6 11	SSB/1.9	20	M/N	6.9		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly very fine to fine poorly graded quartz sand with about 5% medium grained sand, trace fines as silt, and about 5% gray angular shell fragments. Black (10YR2/1). Lake sediments - beach deposits.	10
	-- 15 11 12 17	SSB/2.0	20	S/N	8.2					◀ About 10% medium grained sand from 12 to 14 ft below ground surface (bgs).	
15	-- 10 10 13 19	SSB/1.8	28	S/M	8.7					◀ Silt content increases to 5% from 14.5 to 16.5 ft bgs.	15
	-- 15 11 12 17	SSB/1.7	25	S/N	8.7	GROUP 5					
20	-- 2										20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 6= GROUP 5 + Corrosivity and Reactivity. M10= duplicate sample.

r-ORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/28/93
DATE COMPLETED: 9/28/93
FIELD INSPECTOR: J. de Beer / S. Botts
CREW CHIEF: B. Loveland

BORING NUMBER: SB-24
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.66 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	9	SSB/1.8	25	S/N	8.9					Poorly graded sand (SP). Mostly very fine to fine poorly graded quartz sand with about 5% medium grained sand, trace to 5% fines as silt, trace coarse sand and fine gravel and about 5% gray angular shell fragments. Black (10YR2/1). Lake sediments - beach deposits.	
	13										
	20										
	--										
	10	SSB/1.4	30	S/N	9.2						
	13										
	15										
	22										
	--										
25	8	SSB/1.8	125	S/N	9.3		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	◀ Poorly graded coarse sand lamination at 25.5 ft bgs.	25
	10										
	15										
	21										
	--										
	8	SSB/1.7	150	S/N	9.3					Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly very fine to fine grained quartz sand with about 5% medium grained sand, and 5 to 10% fines as silt. Black (10YR2/1). Lake sediments - beach deposits. ◀ Coarse limestone/dolomite gravel at 27.8 ft bgs.	
	9										
	13										
	41								SP/ SP-SM	◀ Drilling action at 29 ft bgs indicates gravel.	
	--										
30	23	SSB/0.8/1.3	50	S/T	9.3	GROUP 5/M10					30
	19										
	24										
	47								GP	Poorly graded gravel (GP). Split spoon passed through a limestone/ dolomite cobble/boulder.	
	--										
	8	SSB/2.0	--	N/N	--		M/W	TILL	CL	Sandy lean clay with gravel (CL). Hard lean clay exhibiting moderate plasticity, moderate toughness, no dilatancy, and high dry strength with about 30% fine to coarse grained angular sand, and about 15% fine to coarse grained angular gravel. Gray (10YR6/1). Till.	
	11										
	13						D				
	25										
										End of boring at 32 ft bgs. Split spoon driven to 34 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmenal Drilling (WTD-715/359-7090).	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 6= GROUP 5 + Corrosivity and Reactivity. M10= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/28/93
DATE COMPLETED: 9/28/93
FIELD INSPECTOR: J. de Beer / D. Moore
CREW CHIEF: B. Loveland

BORING NUMBER: SB-25
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.16 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	6 7 9 8	SSB/1.0	3	N/N	6.4		D/M	FILL	OL/OH	Organic soil (OL/OH). Silty sands with grass and roots. Very dark gray to black (10YR3/1-10YR2/1). Fill with root zone.	0
	3 3 4 5	SSB/1.5	2	N/N	6.4	GROUP 5			CL	Gravelly lean clay with sand (CL). Moderaratly hard lean clay exhibiting low toughness, high plasticity, no dilatancy and moderate dry strength with about 15% sand, and about 25% gravel. Dark yellowish brown (10YR4/6) mottled with black (10YR2/1). Fill.	
5	2 7 11 15	SSB/1.7	7	N/N	6.2				SP	Poorly graded sand (SP). Mostly very fine to fine grained quartz sand with about 5% medium grained sand, trace coarse sand and fine gravel, trace fines as silt, and about 5% white angular shell fragments. Sand grains are flat, subangular to subrounded. Grayish brown (10YR5/2). Fill.	5
	4 8 10 16	SSB/2.0	7	N/N	6.3	GROUP 5			CL	Sandy lean clay (CL). Soft lean clay exhibiting low toughness, high plasticity, slow dilatancy, and low dry strength with about 40% fine grained sand and about 10% gravel. Dark olive gray (5Y3/2). Fill.	
10	4 4 9 16	SSB/0.5	5	N/N	6.4		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly very fine to fine grained quartz sand with about 5% medium grained sand, trace coarse sand and fine gravel, trace fines as silt, and about 5% white angular shell fragments. Sand grains are flat, subangular to subrounded. Black (10YR2/1). Lake sediments - beach deposits.	10
	6 9 11 19	SSB/1.4	8	N/N	6.5					◀ Low coal tar odor, moderate sheen with an oily film forming on the water surface from 14.5 to 18.5 ft below ground surface (bgs).	
15	6 11 14 23	SSB/1.3	7	L/M	6.6					◀ Percentage of fines increases to about 5% at 17 ft bgs continuing to 22 ft bgs.	15
	9 11 16 28	SSB/1.4	8	L/T	8.3	GROUP 5					
20	6										20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

FORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/28/93
DATE COMPLETED: 9/28/93
FIELD INSPECTOR: J. de Beer / D. Moore
CREW CHIEF: B. Loveland

BORING NUMBER: SB-25
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.16 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	15 20 31 --	SSB/1.8	30	L/N	8.6		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly very fine to fine grained quartz sand with about 5% medium grained sand, trace coarse sand and fine gravel, trace fines as silt, and about 5% white angular shell fragments. Sand grains are flat, subangular to subrounded. Black (10YR2/1). Lake sediments - beach deposits.	25
	8 12 17 24 --	SSB/1.5	190	M/N	8.6				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/ SP-SM). Mostly very fine to fine grained quartz sand with about 5% medium grained sand, trace coarse sand and fine gravel, about 5 to 10% fines as silt, and about 5% white angular shell fragments. Sand grains are flat, subangular to subrounded. Black (10YR2/1). Lake sediments - beach deposits. Moderate coal tar odor. ◀ Moderate coal tar odor with a phenolic odor first noticed at 24.5 ft bgs.	
	9 13 18 30 --	SSB/1.8	250	M/N	8.7						
	6 10 27 48 --	SSB/1.8	250	L/N	8.7	GROUP 5			SP	Poorly graded sand (SP). Mostly very fine to fine grained quartz sand with about 5% medium grained sand, trace coarse sand and fine gravel, trace fines as silt, and about 5% white angular shell fragments. Sand grains are flat, subangular to subrounded. Black (10YR2/1). Lake sediments - beach deposits. ◀ Fine grained gravel in bottom of brass liner at 29 ft bgs.	
30	17 25 34 30	SSB/1.5	40	L/N N/N	8.5		D/M	TILL	GP	Poorly graded gravel (GP). Coarse limestone/dolomite gravel with about 25% fine grained sand.	30
									CL	Sandy lean clay with gravel (CL). Hard lean clay exhibiting moderate plasticity, moderate toughness, no dilatancy and high dry strength with about 30% fine to coarse grained sand, and about 15% fine to coarse gravel. Sand and gravel are angular to subangular.	
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/28/93
DATE COMPLETED: 9/28/93
FIELD INSPECTOR: J. de Beer / D. Moore
CREW CHIEF: B. Loveland

BORING NUMBER: SB-26
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.02 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2	SSB/1.7	2	N/N	7.1		D	FILL	OL/OH	Organic soil (OL/OH). Grass and roots- root zone. Fill.	0
	8								SW	Well graded sand (SW) consisting of fine to coarse sand and gravel (65% sand, 15% gravel) sized coal and coke fines and about 10% silt sized coal and coke fines. Black (10YR2/1). Fill.	
	10										
	19								SM	Poorly graded sand with silt and gravel (SP-SM). Mostly fine to medium grained sand with about 20% fine to coarse gravel and about 15% fines as silt. Dark brown (7.5YR3/2). Fill.	
	11	SSB/1.8	2	N/N	7.0	GROUP 5			SW		
	12									Well graded sand (SW) consisting of fine to coarse sand and gravel (65% sand, 15% gravel) sized coal and coke fines and about 10% silt sized coal and coke fines. Black (10YR2/1). Fill.	
	12								SP	Poorly graded sand with silt and gravel (SP-SM). Mostly fine to medium grained sand with about 20% fine to coarse gravel and about 15% fines as silt. Some roots, coal and coke fines mixed in with the sands at 4.5 to 5.2 ft below ground surface (bgs). Old root zone. Dark brown (7.5YR3/2). Fill.	
	--										
5	7	SSB/1.7	6	N/N	6.9			LAKE SEDIMENTS - BEACH DEPOSITS		Poorly graded sand (SP). Mostly very fine to fine grained quartz sand with about 5% medium grained sand, trace coarse sand and fine gravel, trace fines as silt, and about 5% white angular shell fragments. Light brownish gray (10YR8/2). Lake sediments - beach deposits.	5
	8										
	11										
	14										
	--										
	4	SSB/1.1	--	N/N	6.9	GROUP 5				◀ Color change to black (10YR2/1) at 8.2 ft bgs.	
	8										
	11										
	21										
	--									◀ Moderate coal tar odor begins at 9.5 ft bgs.	
10	5	SSB/1.5	4	M/N	6.8		W				10
	11										
	20										
	21										
	--									◀ Percentage of silt varies to 5% from 12 to 14 ft bgs.	
	16	SSB/1.4	4	M/N	7.4				SP		
	11										
	16										
	23										
	--										
15	9	SSB/1.7	4.5	M/N	8.6						15
	13										
	21										
	24										
	--									◀ Percentage of silt varies to 5% from 17 to 19 ft bgs.	
	16	SSB/1.8	5	M/N	8.6	GROUP 5					
	15										
	15										
	20										
	--										
20	10								SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/ SP-SM).	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M11= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/28/93
DATE COMPLETED: 9/28/93
FIELD INSPECTOR: J. de Beer / D. Moore
CREW CHIEF: B. Loveland

BORING NUMBER: SB-26
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.02 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	13 15 21	SSB/1.8	19	M/N	8.8		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/ SP-SM). Mostly very fine to fine grained quartz sand with about 5% medium grained sand, trace coarse sand and fine gravel, about 5 to 10% fines as silt, and about 5% white angular shell fragments. Black (10YR2/1). Coal tar odor. Lake sediments - beach deposits.	
	7 12 16 26	SSB/1.8	30	S/N	8.9				SP	Poorly graded sand (SP). Mostly very fine to fine grained quartz sand with about 5% medium grained sand, trace coarse sand and fine gravel, trace fines as silt, and about 5% white angular shell fragments. The whole spoon from 22 to 24 ft bgs contains alternating very dark gray (10YR3/1) and black (10YR2/1) fine laminations. Strong coal tar and phenolic odor. Lake sediments - beach deposits. ◀ Percentage of silt varies to 5% from 24.5 to 26.5 ft bgs.	
	6 10 14 19	SSB/1.8	70	S/N	8.7						
	9 11 16 30	SSB/1.5	40	S/N	8.8	GP 5/M11			SW SP SW	Well graded sand (SW). Thinly bedded coarse sand and fine gravel (20% medium and 20% fine grained sand) layers with about 5% fines as silt. Gray to black (10YR6/1 - 10YR2/1). Poorly graded sand (SP). Black (10YR2/1) fine to very fine grained sand with about 5% medium grained sand and about 5% fines as silt.	
30	10 16 30 38	SSB/1.7	40	N/N	8.6		D	TILL	SP GP CL	Well graded sand (SW). Thickly bedded lense of coarse sand and fine gravel (20% medium and 20% fine grained sand) with about 5% fines as silt. Gray (10YR6/1). Drilling action indicates that this layer extends down to 29.5 ft bgs. Poorly graded sand with gravel (SP). Mostly coarse sand with about 5% fine grained sand, 10% medium grained sand, about 25% subangular to subrounded gravel, and about 5% fines as silt. Poorly graded gravel (GP). Limestone/dolomite cobble ontop of the till. Sandy lean clay with gravel (CL). Hard lean clay exhibiting high plasticity, moderate toughness, no dilatancy and high dry strength with about 35% fine to coarse grained sand, and about 20% fine to coarse gravel. Sand and gravel are angular to subangular.	30
35										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs. The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmentl Drilling (WTD-715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M11= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/24/93
DATE COMPLETED: 8/25/93
FIELD INSPECTOR: K. French/R. Van Allen (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-27
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.69 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	4 11 17 20	SSB/2.0	0	N/N	9.0		D	FILL	SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine sand, 10% silt, trace coarse gravel. Trace fine debris material. Dark reddish brown (5YR3/2). Fill.	0
	12 30 50 50	SSB/2.0	0	N/N	8.8	GROUP 5				Poorly graded sand (SP). About 95% fine to medium sand, <5% silt. Dark gray brown (2.5YR4/2) to very dark gray brown (2.5YR3/2). Lake sediments-beach deposits. ⧗ Water level measured at 3.7 ft below ground surface (bgs) after 5 minutes of recovery.	
5	-- 15 25 35 40	SSB/2.0	24	M/H	8.5					◀About 70% fine sand, 30% medium to coarse sand, <5% silt, trace coarse gravel. Black (2.5YR2.5/0) discoloration. Brown oil present in sheen test at 5.0 to 6.5 ft bgs.	5
	-- 22 32 40 52	SSB/1.8	154	S/H	--	GROUP 5				◀About 95% fine to medium sand, <5% silt. Sample appeared to be 80% to 100% saturated with brown oil from 7 to 9 ft bgs. Black (2.5YR2.5/0) discoloration.	
10	-- 25 30 42 72	SSB/1.8	104	M/H	--		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	◀ Sample appeared to be 50% to 70% saturated with brown oil from 9.5 to 11.5 ft bgs.	10
	-- 19 25 25 37	SSB/1.3	105	M/H	--					◀About 95% fine to medium sand, <5% silt from 12 to 14 ft bgs. Sample appeared to be <30% saturated with oil. Discolored very dark gray (10YR3/1).	
15	-- 28 60 35 29	SSB/1.1	66	L/T	9.2					◀ Discolored very dark gray (7.5YR3/0) from 14.5 to 16.5 ft bgs. Trace oil sheen.	15
	-- 31 80 100+ -- --	SSB/1.2	76	M/H	--	GROUP 5				◀ Sample appeared to be 30% to 50% saturated with brown oil from 17 to 19 ft bgs.	
20	28										20

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COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/24/93
DATE COMPLETED: 8/25/93
FIELD INSPECTOR: K. French/R. Van Allen (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-27
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.69 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	55 70 81 -- 55 72 100+ -- -- 64 100+ -- -- -- 56 68 100+ -- --	SSB/1.7 SSB/1.5 SSB/0.8 SSB/1.4	400 320 132 272	M/H M/H M/H L/M	-- -- -- --	GROUP 5	W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). About 95% fine to medium sand, <5% silt. Brown oil was present in sample. Discolored very dark gray (7.5YR3/0). Lake sediments-beach deposits ◀ Trace of fine subrounded gravel from 20.5 to 21.5 ft bgs.	25
30	18 40 42 28	SSB/1.3	50	L/N	8.9		M	TILL	SP SM GP-GM CL	Poorly graded sand with gravel (SP). About 60% to 70% fine sand, 30% to 40% fine to coarse angular gravel mostly limestone. Lake sediments-beach deposits. ◀ Encountered difficulties in sampling due to blow up in auger. Drill out blow up with 3 5/8-inch diameter tricone bit to 29.5 ft bgs. Silty sand with gravel (SM). About 70% fine sand, 15% silt, 15% fine to coarse angular to subrounded gravel. Very dark gray (7.5YR3/0). Lake sediments-beach deposits. Poorly graded gravel with silt and sand (GP-GM). About 70% fine to coarse angular limestone and subrounded assorted gravel fragments, 20% fine sand, 10% silt. Very dark gray (7.5YR3/0). Lean clay (CL). About 100% clay. Clay exhibited medium strength, no dilantancy, and medium to high toughness. Hard, with small irregular fractures. No discoloration, no oil in fractures. Dark gray (5YR4/1). Till. End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	30
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck-mounted drill rig. California samplers (3" diamter split poon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 140 lb hammer from 0 to 29 ft bgs, and with a 300 lb hammer from 29.5 to 31.5 ft bgs. Both hammers were operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). The borehole was grouted with tremied Quick Gel bentonite grout mixed at one 50 lb bag to 65 gallons of water.	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner) TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/29/93
DATE COMPLETED: 9/29/93
FIELD INSPECTOR: K. Laufenberg/D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-28
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.64 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2, 6, 8, 11	SSB/1.8	0	N/T	8.3		M	FILL	SM	Silty sand (SM). About 80% fine subrounded quartz sand and fine to medium subangular limestone sand, 20% silt, trace medium subrounded gravel. Dark gray brown (10YR4/2). Fill.	0
	6, 11, 21, 21	SSB/1.9	2.0	N/T	7.9	GROUP 5				Silty sand (SM). About 70% fine to coarse sand-sized black coal and silver, metallic-appearing material, 20% silt, 10% quartz sand. Black (10YR2/1). Fill. ◀ Trace fine to coarse gravel-sized coal and silver, metallic- appearing material at 2.0 to 4.0 ft below ground surface (bgs). ◀ Sample contained about 20% medium subangular limestone gravel at 4.5 to 5.0 ft bgs.	
5	10, 13, 14, 16	SSB/1.5	52	S/H	7.6					Poorly graded sand (SP). About 95% fine subrounded sand, mostly quartz, <5% silt. Sample saturated with oil and contained oil blebs. Discolored to a black-brown (10YR2/1). Sample exhibited a rainbow sheen during sheen test. Fill.	5
	4, 8, 9, 10	SSB/2.0	20	M/H	7.4	GROUP 5			SP	◀ Poorly graded sand (SP). About 75% fine subrounded quartz sand, 10% fine to medium subangular lithic sand, 10% fine subangular limestone sand, <5% silt. Sample contains more coal material from 7.0 to 7.5 ft bgs. Sample is grayish brown (10YR5/2) with black (10YR2/1) discoloration. Fill.	
10	9, 16, 18, 22	SSB/1.3	65	M/H	7.1					◀ Trace medium subrounded limestone gravel. Sample is very dark gray (10YR3/1) from 9.5 to 10.0 ft bgs with black discoloration. Sample exhibited a rainbow sheen during sheen test. ◀ Sample is grayish brown (10YR5/2) from 10.0 to 11.5 feet bgs. Trace medium sand-sized and medium to coarse gravel-sized coal material.	10
	10, 18, 20, 30	SSB/1.8	15	M/T	7.0		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 90% fine subrounded quartz sand, 5% coarse subangular to rounded lithic sand, <5% silt. Dark gray (10YR4/1). Lake sediments-beach deposits.	
15	10, 11, 23, 32	SSB/1.7	25	M/M	8.9					◀ Poorly graded sand (SP). About 60% fine subrounded quartz sand, 30% fine subangular lithic sand, 5% fine subangular limestone sand, <5% silt. Very dark gray (10YR3/1). Lake sediments-beach deposits.	15
	11, 11, 19, 25	SSB/1.2	20	M/T	9.0	GROUP 5			SP/ SP-SM	Poorly graded sand with silt (SP/SP-SM). About 85% fine subrounded quartz sand and fine subangular lithic sand, 15% silt, trace fine subangular limestone sand. Dark gray (10YR4/1) to very dark gray (10YR3/1). Lake sediments-beach deposits.	
20	8								SP	Poorly graded sand (SP).	20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

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BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/29/93
DATE COMPLETED: 9/29/93
FIELD INSPECTOR: K. Laufenberg/D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-28
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.64 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	10 14 19	SSB/1.7	16	L/T	9.0					Poorly graded sand (SP). About 95% very fine subrounded quartz sand and very fine black lithic sand, 5% silt. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
	11 11 22 29	SSB/2.0	25	L/N	9.0		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	◀Trace of coarse subrounded sand and fine subangular limestone gravel at 22.0 to 24.0 ft bgs. Sand is dark gray (10YR4/1).	
25	6 10 13 20	SSB/2.0	1150	M/T	8.9				SP-SM	Poorly graded sand with silt (SP-SM). About 90% very fine quartz and lithic sand, 10% silt. Black (10YR2/1). Lake sediments-beach deposits.	25
	8 36 20 23	SSB/1.1	1400	M/M	9.0	GROUP 5			SP GP-GM CL	Poorly graded sand (SP). About 95% fine subrounded quartz sand and fine subangular lithic sand, 5% silt. Dark gray (10YR3/1). Lake sediments-beach deposits. Poorly graded gravel with silt (GP-GM). About 50% fine to coarse subangular white limestone gravel, 25% fine to coarse subangular sand and fine subrounded quartz sand, 25% silt. Silt fraction thinnly bedded around gravel fragments. Sample contained a shell fragment. Lean clay (CL). Mostly clay with trace subangular coarse sand. Clay exhibited medium plasticity. Hard. Grayish brown. Till.	
30										End of boring at 27.0 ft bgs. Split spoon driven to 28.1 ft bgs.	30
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/30/93
DATE COMPLETED: 9/30/93
FIELD INSPECTOR: K. Laufenberg/D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-29
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 606.52 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 2 3 3	SSB/1.7	0	N/N	7.9		M	FILL	SP	Poorly graded sand (SP). About 80% fine subrounded quartz sand, 20% fine subangular limestone sand, 15% fine subangular lithic sand, 5% silt. Yellowish brown (10YR5/4). Fill.	0
	2 5 7 9 --	SSB/1.6	0	N/T	7.7	FS			SM	Silty sand (SM). About 70% fine to coarse sand-sized subangular coal material, 30% silt-sized coal material. Black (10YR2/1). Fill.	
5	3 3 3 3 --	SSB/1.8	0	N/N	7.5				SM	Silty sand with gravel (SM). About 40% fine to coarse sand-sized coal material, 30% silt, 25% fine gravel-sized coal material, 5% fine subangular limestone sand, trace brick gravel. Black (10YR2/1) with pockets of red-stained sand. Fill. ◀Trace of fine to medium subrounded slag gravel at 7.0 to 7.5 ft below ground surface (bgs).	5
	5 3 4 4 --	SSB/1.7	1.5	N/N	7.8	GROUP 5			SP-SM	Poorly graded sand with silt (SP-SM). About 70% fine subrounded quartz sand, 10% to 15% silt, 10% fine to medium subangular to subrounded gravel, 5% fine to medium subangular limestone sand. Black (10YR2/1). Fill.	
10	2 5 13 18 --	SSB/1.8	4.0	N/N	7.8		W		SP	Poorly graded sand (SP). About 80% fine subrounded quartz sand, 20% lithic sand, 15% fine to medium subangular limestone sand, <5% silt, trace fine subrounded black limestone gravel. Very dark gray (10YR3/1). Fill. ◀Sample contained medium gravel-sized subangualar, platy, orange-red coal material at 12.0 to 14.0 ft bgs.	10
	12 13 13 12 --	SSB/1.9	3.0	N/N	7.7						
15	5 5 8 11 --	SSB/1.7	0	L/N	7.3			LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 80% fine subrounded quartz sand, 20% fine subangular lithic sand, 15% fine to medium subangular limestone sand, 5% silt, trace medium subrounded black-stained limestone gravel. Very dark gray (10YR3/1). Lake sediments-beach deposits.	15
	15 15 20 22 --	SSB/1.8	400	L/N	8.7	GROUP 5			SP-SM	Poorly graded sand with silt (SP-SM). About 80% fine subrounded quartz sand, 15% fine subangular lithic sand, 10% to 15% silt, 10% fine subangular limestone sand, trace medium subangular limestone sand. Very dark gray (10YR3/1) to black (10YR2/1). Lake sediments-beach deposits.	
20	10										20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols, FS= Full Scan analysis.

r:ORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/30/93
DATE COMPLETED: 9/30/93
FIELD INSPECTOR: K. Laufenberg/D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-29
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 606.52 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	11 14 19 / 11 12 12 12 / 10 5 15 26	SSB/1.8 / SSB/1.5 / SSB/1.7	550 / 600 / 200	L/N / M/N / L/N	8.9 / 8.9 / 8.5	GROUP 5	W	LAKE SEDIMENTS-BEACH DEPOSITS / TILL	SP-SM / SM / CL	Poorly graded sand with silt (SP-SM). About 60% very fine subrounded quartz sand, 15% very fine subangular lithic sand, 10% to 15% silt, 10% very fine subangular limestone sand, trace medium subangular limestone sand. Very dark gray (10YR3/1) to black (10YR2/1). Lake sediments-beach deposits. Silty sand (SM). About 70% medium to coarse subrounded sand, 30% silt, trace limestone gravel. Lake sediment-beach deposits. Lean clay with sand (CL). About 80% clay and silt, 20% fine to coarse subrounded limestone sand, trace fine to medium subrounded limestone gravel. Dark gray (10YR4/1). Till. End of boring at 24.5 ft bgs. Split spoon driven to 26.2 ft bgs.	25
30											30
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

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COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols, FS= Full Scan analysis.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-30

RISER PIPE ELEVATION: N/A

GROUND SURFACE ELEVATION: 602.08 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 2 2 2	SSB/1.2	0	N/N	9.0		D	FILL-DREDGE SPOILS	SP	Poorly graded sand (SP). About 95% fine subrounded sand, <5% silt, trace medium to coarse subangular sand. Sand fraction consisted mostly of quartz, 10% to 15% miscellaneous lithologies. Brown (10YR5/3). Fill-dredge spoils.	0
	3 3 5 6	SSB/1.8	0	N/N	8.7				ML	Silt (ML). About 95% to 100% silt, trace to 5% fine subrounded sand, trace medium to coarse sand. Medium to coarse sand fraction consisted mostly of coal fragments and small wood pieces. Silt exhibited low plasticity and low toughness. Fill-dredge spoils.	
5	2 1 1 1	SSB/1.8	0	N/N	8.2	FS				◀Coal seam, 0.01-ft thick, at 7.9 ft below ground surface (bgs).	5
	1 1 1 1	SSB/1.3	0	N/N	8.6						
10	1 3 3 3	SSB/1.7	0	N/N	7.8		M		SP	Poorly graded sand (SP). About 95% fine subrounded sand, <5% silt, trace angular medium sand. Sand fraction consisted of 85% quartz, 15% shell fragments, basalts and miscellaneous lithologies. Fill-dredge spoils.	10
	2 5 7 11	SSB/1.8	0	N/N	7.9						
15	3 5 6 7	SSB/1.8	0	N/N	8.1	FS/M17				◀Sample contained trace coarse sand and fine subangular to subrounded gravel from 14.5 to 16.5 ft bgs.	15
	1 3 7 12	SSB/1.9	0	N/N	8.0			FILL	COAL	Coal and coal fine bed. Black (10YR2/1).	
20	6					FS			SP	Poorly graded sand (SP). Fill.	20

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COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. FS= Full Scan analysis. M17= duplicate sample. GEOTECHNICAL SAMPLE TYPES: G= grain size.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-30
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 602.08 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	18	SSB/1.8	0	N/N	7.9	FS	M/W	FILL	SP	Poorly graded sand (SP). About 95% fine to medium subangular to subrounded sand, <5% silt. Sand fraction consisted of 85% quartz, 15% mafic and miscellaneous lithologies. Brown (10YR5/3). Fill.	
	20										
	22										
	--										
	3	SSB/1.8	0	N/T	7.8				SM	Silty sand (SM). About 60% to 70% fine subrounded sand, 30% to 40% silt, trace coarse subangular sand. Black (10YR2/1). Fill.	
	5										
	7								SP	Poorly graded sand (SP). About 95% fine to medium subangular sand, trace coarse sand, 5% silt. Sample contained small coal fragments. Fill.	
	8										
	--										
25	3	SSB/1.9	3.0	N/N	7.8	GROUP 5				◀Poorly graded sand (SP) at 24.5 ft bgs. About 75% fine subrounded sand, 20% medium subangular sand, <5% silt. Medium sand fraction included basalt and feldspathic lithologies. Sample contained small coal fragments. Very dark grayish brown (10YR3/2). Fill.	25
	6										
	7										
	10										
	--										
	4	SSB/2.0	5.0	N/N	8.0	GS		LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 75% fine subrounded sand, 20% medium subangular sand, <5% silt. Medium sand fraction included basalt and feldspathic lithologies. Very dark grayish brown (10YR3/2). Lake sediments-beach deposits. ◀Sample contained a 0.01-ft thick silt layer at 27.8 ft bgs.	
	5										
	11										
	13									◀Poorly graded sand (SP) at 27.7 ft bgs. About 95% fine subrounded sand, trace to 5% medium subangular sand, <5% silt, trace coarse sand. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
	--										
30	3	SSB/1.8	3.0	N/N	8.0		W			◀Silt laminations at 30.6 ft bgs.	30
	4										
	4										
	7										
	--										
	9	SSB/2.0	50	L/T	8.2				SP	◀Poorly graded sand (SP) at 32.0 ft bgs. About 85% fine subrounded sand, 10% medium subangular sand, trace coarse sand, <5% silt. Sand fraction included 80% quartz, 20% shell fragments, mafics, and feldspathics. Very dark gray (10YR3/1) to black (10YR2/1). Lake sediments-beach deposits.	
	9										
	10										
	12										
	--										
35	3	SSB/1.8	40	M/T	8.1	GROUP 5					35
	4										
	10										
	16								SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt, trace fine subrounded basaltic gravel. Black (10YR2/1). Lake sediments-beach deposits.	
	--										
	2	SSB/2.0	70	S/T	8.6				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine subrounded sand, 5% to 10% silt, trace coarse sand. Black (10YR2/1). Lake sediments-beach deposits.	
	4										
	5										
	7										
	--										
40	6										40

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COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. FS= Full Scan analysis. M17= duplicate sample. GEOTECHNICAL SAMPLE TYPES: G= grain size.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-30
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 602.08 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
45	6 7 9 -- 6 10 20 24	SSB/2.0 SSB/2.2	110 35	S/T S/T	8.5 8.6	GS GROUP 5	W M	TILL	SP/ SP-SM SM CL	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine subrounded sand, 5% to 10% silt, trace coarse sand. Black (10YR2/1). Lake sediments-beach deposits. Silty sand with gravel (SM). About 50% fine to medium subangular to subrounded sand, 15% coarse subangular sand, 20% fine to coarse subangular to subrounded gravel, 15% silt. Black (10YR2/1). Lake sediments-beach deposits. Lean clay (CL). About 90% clay, 10% silt, trace coarse angular to subangular sand. Clay exhibited no dilatancy, very high dry strength, medium plasticity, and high toughness. Hard. Gray (10YR5/1) with black discoloration from 42.8 to 43.4 ft bgs. Till. End of boring at 42.0 ft bgs. Split spoon driven to 44.0 ft bgs.	45
50											50
55										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	55
60											60

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. FS= Full Scan analysis. M17= duplicate sample. GEOTECHNICAL SAMPLE TYPES: G= grain size.

r ORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-31

RISER PIPE ELEVATION: N/A

GROUND SURFACE ELEVATION: 604.07 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 1 1 1	SSB/1.3	0	N/N	8.3		D/M	FILL-DREDGE SPOILS	SP	Poorly graded sand (SP). About 80% fine subrounded sand, 10% to 15% medium subangular sand, <5% silt, trace coarse sand, trace fine subangular to subrounded gravel. Sand fraction consisted of 90% quartz and 10% mafic and miscellaneous lithologies. Sample contained root fibers. Brown (10YR5/3). Fill-dredge spoils.	0
	2 1 1 2	SSB/1.7	0	N/N	8.4					◀ Sample from 2.0 to 4.0 ft below ground surface (bgs) contained coal pieces.	
5	3 4 7 9	SSB/1.9	0	N/N	8.4	GROUP FS	M			◀Sample from 4.5 to 6.5 ft bgs contained coarse coal gravel pieces.	5
	2 5 6 7	SSB/1.8	0	N/N	8.2		M/W		SP-SM	Poorly graded sand with silt (SP-SM). About 70% fine subrounded sand, 10% to 15% medium subangular sand, 10% silt, trace to 5% fine subrounded quartz and basalt gravel. Dark grayish brown (10YR4/2). Fill-dredge spoils.	
10	1 3 2 3	SSB/1.6	10	N/N	7.6				SM	Silty sand (SM). About 70% fine subrounded sand, 30% silt, trace fine angular gravel. Black (10YR2/1). Fill-dredge spoils.	10
	1 2 5 8	SSB/1.8	0	N/N	8.3				SP	Poorly graded sand (SP). About 90% fine subrounded sand, 5% medium sand, <5% silt. Brown (10YR5/3). Fill-dredge spoils.	
15	2 4 5 4	SSB/1.8	0	N/N	8.2	GROUP FS	M		SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine subrounded sand, 5% to 10% silt, trace fine to coarse gravel. Sample contained coal fragments. Brown (10YR5/3) mottled with very dark brown (10YR2/2). Fill-dredge spoils.	15
	2 5 6 7	SSB/1.4	0	N/N	8.2				SP	Poorly graded sand (SP). About 90% fine subrounded sand, 5% medium angular sand, <5% silt. Sand fraction consisted of 95% quartz and 5% mafic and feldspathic lithologies. Bottom of sampler contained a large fragment of weathered concrete . Fill-dredge spoils.	
20	4										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP FS= Full scan analysis. M19= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-31
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 604.07 ft MSL

Depth (Feet)	Blows Per 6 In.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	9 9 13 --	SSB/1.8	0	N/N	7.4		M		SP COAL SM	Coal with coal fines. Black. Silty sand (SM). About 50% coarse sand, 30% fine to medium sand, 15% silt, 5% fine gravel. Coarse sand and gravel fractions consisted of coal furnace slag material. Black (10YR2/1). Fill.	
	6 6 5 6 --	SSB/1.4	0	N/N	6.9	GROUP FS	W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 75% fine subrounded sand, 20% medium subangular sand, <5% silt. Coarser grains consisted of shell fragments, quartz, and mafic and feldspathic lithologies. Brown (10YR5/3). Lake sediments-beach deposits. ◀Color changed to dark grayish brown (10YR4/2) at 24.5 to 26.5 ft bgs.	
25	2 3 4 7 --	SSB/1.5	0	N/N	7.0						25
	3 5 7 10 --	SSB/1.4	1.0	N/N	7.2	GROUP 5				Poorly graded sand (SP). About 95% fine subrounded sand, <5% silt. Sand fraction consisted of 75% quartz and 25% mafic and feldspathic lithologies. Very dark gray (10YR3/1). Lake sediments-beach deposits. ◀Sample contained trace medium sand-sized angular shell fragments beginning at 29.5 ft bgs.	
30	4 5 11 17 --	SSB/1.8	4.0	N/N	7.1						30
	4 8 10 17 --	SSB/1.8	14	N/N	7.1				SP		
35	2 5 8 13 --	SSB/2.0	28	N/N	7.1						35
	4 4 8 13 --	SSB/1.9	300	N/N	7.4	GROUP 5					
40	3										40

r-ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP FS= Full scan analysis. M19= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-31
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 604.07 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
45	3	SSB/1.7	300	L/N	7.6		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 95% fine subrounded sand, <5% silt. Very dark gray (10YR3/1). Lake sediments-beach deposits.	45
	8									Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt, trace coarse angular sand, trace fine angular to subangular gravel. Coarse sand and gravel fraction consisted of mostly mafic clasts. Black (10YR2/1). Lake sediments-beach deposits.	
	12										
	--										
	5	SSB/2.0	800	S/N	8.3	GROUP 5			SP-SM		
	12										
	20										
	28									◀Sample contained approximately 30% fine gravel at 44.0 ft bgs.	
	--										
	12	SSB/2.0	350	M/T	8.2				GM	Silty gravel (GM). About 40% coarse angular black stained dolomite or limestone gravel, 35% fine sand, 15% silt, 10% medium to coarse sand. Black (10YR2/1). Lake sediments-beach deposits.	
	9							GLACIAL DEPOSITS	ML/CL	Clayey silt (ML/CL). About 70% silt, 30% clay. Clayey silt exhibited low toughness, rapid dilatancy, and low plasticity. Black (10YR2/1). Glacial deposits.	
	10										
	27										
	25	SSB/1.5	200	S/T	8.1	GROUP 5/M19			SP-SM /SM	Poorly graded sand with silt to silty sand (SP-SM/SM). About 85% to 90% fine to medium sand, 10% to 15% silt, trace coarse sand, trace fine angular gravel. Black (10YR2/1). Glacial deposits.	
	41										
	100+								SM	Silty sand with gravel (SM). About 45% fine to medium sand, 20% coarse angular limestone or dolomite gravel, 20% coarse angular sand, 15% silt. Black (10YR2/1). Glacial deposits.	
	--										
	--						M	TILL			
50	11	SSB/2.0	20	N/N	8.2				CL	Lean clay (CL). Mostly clay, trace coarse sand. Clay exhibited medium toughness, medium plasticity, no dilatancy, and high dry strength. Firm. Clay contained minute horizontal fractures. Gray (10YR5/1). Till.	50
	20										
	20										
	22										
										End of boring at 49.5 ft bgs. Split spoon driven to 51.5 ft bgs.	
55										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	55
60											60

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP FS= Full scan analysis. M19= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/13/93
DATE COMPLETED: 9/13/93
FIELD INSPECTOR: K. French/J. Fox (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-32
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.27 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	6	SSB/0.8	0	N/N	7.0		M	FILL	SM	Silty sand (SM). Sample contained organic soil and roots. Fill.	0
	10									Lean clay with sand and gravel (CL). Sample consistsed of mixed fill with some brick pieces. Fill.	
	13										
	12										
	3	SSB/1.0	0	N/T	7.0	GROUP 5/M3			CL	◀Lean clay with sand (CL) at 2.0 ft below ground surface (bgs). About 80% fines, mostly clay, 15% to 20% medium to coarse sand. Clay exhibited medium toughness, medium plasticity, and no dilatancy. Sample contained pieces of brick. Very dark brown (10YR2/2). Fill.	
	4										
	5										
	1										
	--									▼Water level is 5.0 ft bgs after 7 minutes of recovery with 7 ft of auger.	
5	1	SSB/1.2	4.0	N/N	7.0						5
	2										
	6										
	10								SP-SM	Poorly graded sand with silt (SP-SM). About 10% silt, 90% fine to medium subangular to subrounded sand, mostly fine sand. Pale brown (10YR6/3). Lake sediments-beach deposits.	
	--										
	1	SSB/1.4	0	N/N	6.5	GROUP 5	W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About <5% silt, 95% fine to medium subrounded sand. Sand fraction consisted of mostly quartz sand, 15% mafic and lithic sand. Lake sediments-beach deposits.	
	6										
	9								SP	Poorly graded sand (SP). About <5% silt, 75% coarse sand, 10% fine subangular to subrounded gravel, 15% fine to medium sand.	
	11									Poorly graded sand (SP). About <5% silt, 95% fine to medium, mostly fine quartz sand. Yellowish brown (10YR5/4). Lake sediments-beach deposits.	
	--										
10	9	SSB/2.0	25	N/N	6.5						10
	10										
	16										
	32										
	--									◀Color change to brown (10YR5/3) at 12.0 ft bgs.	
	9	SSB/1.2	15	N/N	6.5	GS					
	11										
	31										
	39								SP		
	--										
15	21	SSB/2.0	35	L/N	7.0					◀Sand fraction consisted of about 80% fine quartz sand, 20% mafic, limestone, and lithic sand. Sample discolored dark grayish brown (10YR4/2) at 14.5 ft bgs.	15
	25										
	38										
	42										
	--									◀Sample discolored to a very dark gray (10YR3/1) at 17.0 ft bgs.	
	19	SSB/1.5	15	M/T	6.5	GROUP 5					
	20										
	24										
	24										
	--										
20	9								SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM).	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols, M3= duplicate sample. GEOTECHNICAL SAMPLE TYPES: GS= grain size.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/13/93
DATE COMPLETED: 9/13/93
FIELD INSPECTOR: K. French/J. Fox (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-32
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.27 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	11 22 28 --	SSB/1.2	28	M/T	6.5			LAKE SEDIMENTS-BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine very fine subrounded to rounded sand, mostly quartz, 5% to 10% silt. Sample discolored very dark gray (10YR3/1). Lake sediments-beach deposits.	
	9 12 16 20 --	SSB/1.5	27	S/T	7.0				SP-SM /SM	Poorly graded sand with silt to silty sand (SP-SM/SM). About 85% to 90% very fine rounded sand, 10% to 15% silt. Sample discolored very dark gray (10YR3/1). Lake sediments-beach deposits.	
25	2 6 8 16 --	SSB/1.5	23	S/T	7.0	GS				◀Sample is discolored black (10YR2/1) at 24.5 to 30.1 ft bgs.	25
	2 7 9 11 --	SSB/1.4	30	M/N	7.0	GROUP 5	W				
30	2 20 18 19 --	SSB/1.8	17	S/N	7.0			GLACIAL DEPOSITS	GM	Silty gravel with sand (GM). About 40% coarse subangular to angular limestone gravel, 40% fine sand, 15% to 20% silt. Lake sediments- beach deposits.	30
	29 31 46 32 --	SSB/1.8	40	M/N	7.5				ML	Silt (ML). About 100% silt, trace fine sand. Sample discolored black (10YR2/1). Glacial deposits. ◀Silty sand (SM) lens at 32.8 to 33.2 ft bgs. About 80% to 85% fine to medium sand, 15% to 20% silt.	
35	28 39 50 81 --	SSB/1.8	25	L/N	7.0				SM	Silty sand (SM). About 80% medium to coarse subangular to angular sand, 20% silt. Sand fraction consisted of limestone and mafic sand. Glacial deposits.	35
									ML	Silt (ML). About 100% silt, trace coarse limestone gravel. Black (10YR2/1). Glacial deposits.	
	50 30 32 81 --	SSB/1.8	80	M/T	8.7	GROUP 5	M	TILL	SM	Silty sand (SM). About 80% medium to coarse subangular to angular sand, 15% to 20% silt. Sand fraction consisted of limestone and mafic sand. Glacial deposits.	
									CL	Lean clay with sand and silt (CL). About 70% clay, 15% silt, 15% medium to coarse sand, trace coarse gravel. Clay exhibited medium toughness, medium plasticity, and no dilatancy. Till	
									ML	Silt (ML). About 100% silt, trace coarse limestone gravel. Black (10YR2/1). Till.	
40	19								CL	Lean clay with sand (CL). Till.	40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols, M3= duplicate sample. GEOTECHNICAL SAMPLE TYPES: GS= grain size.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/13/93
DATE COMPLETED: 9/13/93
FIELD INSPECTOR: K. French/J. Fox (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-32
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.27 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	26 30 48	SSB/1.4	50	M/T	8.6		M	TILL	CL	Lean clay with sand (CL) from 39.5 to 40.6 ft bgs. About 85% fines, mostly clay, 15% fine to coarse sand. Clay exhibited medium to high toughness, medium plasticity, no dilatancy. Hard. Black (10YR2/1). Till. ◀Lean clay (CL) from 40.6 to 41.5 ft bgs. About 100% fines, mostly clay, trace sand. Clay exhibited medium to high toughness, medium plasticity, and no dilantancy. Black (10YR2/1) to gray (10YR5/1) at spoon bottom. Till. End of boring at 39.5 ft bgs. Split spoon driven to 41.5 ft bgs.	
45										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	45
50											50
55											55
60											60

r:ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols, M3= duplicate sample. GEOTECHNICAL SAMPLE TYPES: GS= grain size.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/14/93
DATE COMPLETED: 9/14/93
FIELD INSPECTOR: J. Fox / S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-33
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.11 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2 7 13 13	SSB/1.5	0	N/T	7.8		M	FILL	SM	Silty sand (SM). Fine grained sand with silt, slightly organic and containing pieces of furnace slag, brick, and concrete. Black (10YR2/1). Fill.	0
	18 15 20 25	SSB/0.4	0	L/N	8.5	GROUP 5					
5	-- 2 6 7 9	SSB/1.3	160	S/H	7.4					Poorly graded sand (SP). Fine grained sand, stained black (10YR2/1) containing golden brown oil in the pore spaces. Strong coal tar odor. Oily blebs detected with the sheen test. Lake sediments - beach sands.	5
	-- 1 4 6 9	SSB/1.7	120	S/H	7.5	GROUP 5		LAKE SEDIMENTS - BEACH DEPOSITS	SP		
10	-- 2 6 9 13	SSB/1.8	160	S/H	7.0		W			Poorly graded sand (SP). Medium grained sand. Very dark gray (10YR3/1). Oil coated grains.	10
	-- 7 8 9 13	SSB/2.0	150	S/H	6.7	GS					
15	-- 6 11 11 20	SSB/2.0	110	S/H	6.8					◀ Color change to dark gray (10YR4/1) below 17 ft bgs.	15
	-- 14 15 20 28	SSB/2.0	50	S/M	7.8	GROUP 5					
20	-- 9										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GEOTECHNICAL SAMPLE TYPES: G= grain size.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/14/93
DATE COMPLETED: 9/14/93
FIELD INSPECTOR: J. Fox / S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-33
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.11 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	14	SSB/2.0	75	S/T	8.2		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand to poorly graded and with silt (SP/ SP-SM). Fine grained sand with about 5 to 10% fines as silt. Gray (10YR5/1). Lake sediments - beach deposits.	
	24										
	31										
	--										
	19	SSB/2.0	115	M/M	8.5	GS			SP/ SP-SM		
	24										
	36										
	40										
	--										
25	21	SSB/2.0	50	M/T	8.6				SP	Poorly graded sand (SP). Fine grained sand. Dark gray (10YR4/1).	25
	25										
	20										
	19										
	--										
	7	SSB/2.0	44	M/T	8.5	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Fine grained sand with about 5 to 10% fines as silt. Gray (10YR5/1).	
	20										
	28									◀ Drilling action indicates gravel at 29 ft bgs.	
	15										
	--										
30	9	SSB/2.0	21	M/T	8.6						30
	15		9	L/N	--		M	TILL	CL	Silty lean clay (CL). Lean clay with trace amounts of fine to coarse sand and gravel. Grayish brown (10YR5/2). Till.	
	15										
	14										
										End of boring at 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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rORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GEOTECHNICAL SAMPLE TYPES: G= grain size.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/6/93
DATE COMPLETED: 10/6/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-34
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.55 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
5	3 6 8 15	SSB/1.8	0	M/T	8.0		M	FILL	SM	Silty sand (SM). About 75% fine subrounded sand, 15% silt, 10% fine to coarse gravel. Gravel fraction included brick material. Sample contained root fibers. Very dark grayish brown (10YR3/2). Fill.	5
	6 8 5 3	SSB/1.8	10.5	M/M	7.4	GP 6/B/S			SM	Silty sand (SM). About 65% sand-sized coal material, 20% fine to coarse gravel, 15% silt. Gravel fraction consisted of brick and slag material. Silt and sand fractions consisted mostly of coal fine material. Black (10YR2/1). Fill.	
	--									◀Sample appeared saturated with brown oil at 4.5 to 5.8 ft below ground surface (bgs).	
	1 1 1 7	SSB/1.8	593	M/H	7.6				ML	Silt (ML). Mostly silt, stained black, possibly an industrial pond deposit. Fill.	
	--										
	4 6 10 17	SSB/1.4	315	M/H	7.3	GP 5/B		LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly fine sand. Sample appeared to be saturated with oil. Black (10YR2/1). Lake sediments-beach deposits.	
10	--										10
	4 8 11 16	SSB/2.0	315	M/H	7.6					◀Poorly graded sand (SP) in sample from 9.5 to 11.5 ft bgs. About 95% fine sand, <5% silt, trace medium to coarse sand. Thin film of brown oil washed out of sample. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
	--										
	5 10 14 19	SSB/1.5	215	M/H	6.9		W			◀Increased percentage of oil in sample from 12.0 to 14.0 ft bgs. Sample appeared to be approximately 30% saturated with oil.	
15	--										15
	10 12 15 20	SSB/1.5	38	M/H	7.2					◀Sample from 14.5 to 16.5 ft bgs exhibited heavy rainbow sheen during sheen test. Less oil washed out of sample.	
	--										
	10 11 11 14	SSB/2.0	90	M/H	7.0	GP 5/B/S				◀Sample from 17.0 to 19.0 ft bgs exhibited heavy rainbow sheen during sheen test.	
20	-- 13										20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 6= GROUP 5 + Corrosivity and Reactivity. B= sulfur bacteria. S= sulfide, sulfate, iron.

FORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/6/93
DATE COMPLETED: 10/6/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-34
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.55 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	14 16 19	SSB/1.7	118	M/H	7.4		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 95% fine sand, <5% silt. Sample exhibited heavy sheen during sheen test and contained trace oil blebs. Very dark gray (10YR3/1). Lake sediments-beach deposits.	25
	8 10 12 15	SSB/1.2	79	L/N	7.6				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine sand, 5% to 10% silt, trace medium sand. Black (10YR2/1). Lake sediments-beach deposits.	
	10 10 12 12	SSB/1.8	35	L/N	7.5						
	9 11 12 15	SSB/1.8	37	L/T	8.2	GP 5/B/S					
30	10 26 30 41	SSB/1.8	18	L/N	8.4		M	TILL	CL	Lean clay with sand and gravel (CL). About 65% clay, 15% fine to coarse angular gravel, 15% fine sand, 5% coarse angular sand. Clay exhibited medium toughness, medium plasticity, high dry strength, and no dilatancy. Hard. Gray (10YR5/1) with black discoloration diffused into clay along horizontal fractures in clay. Till.	30
	22 26 38 42	SSB/2.0	15	L/N	8.4		W		CL/ML	Silty lean clay (CL/ML). About 60% clay, 40% silt. Clay exhibited low to medium toughness, low to medium plasticity, and slow dilatancy. Soft. Gray (10YR5/1). Till.	
							M		CL	Lean clay (CL). About 100% clay, trace coarse angular sand. Clay exhibited medium toughness, low to medium plasticity, and no dilatancy. Firm. Gray (10YR5/1). Till.	
35										End of boring at 32.0 ft bgs. Split spoon driven to 34.0 ft bgs.	35
										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	
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rORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 6= GROUP 5 + Corrosivity and Reactivity. B= sulfur bacteria. S= sulfide, sulfate, iron.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/21/93
DATE COMPLETED: 9/21/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-35
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.8 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	7 10 13 14	SSB/1.0	0	L/T	8.8		D	FILL	SM	Blacktop and crushed rock base. Fill. Silty sand (SM). About 60% fine to coarse subangular to rounded sand, 30% silt, 10% limestone and rust-colored brick and slag material. Black (10YR2/1). Fill.	
	5 10 14 19 --	SSB/1.7	0.2	N/T	9.2	GP 6/B/S	D/M		SP	Poorly graded sand (SP). About 90% fine to medium subrounded sand, 5% fine to coarse subrounded gravel slag material, <5% silt. Dark yellowish brown (10YR3/8) with pockets of very dark gray (10YR2/1). Fill.	
5	4 6 9 14 --	SSB/2.0	1.0	L/T	7.9				SM	Silty sand (SM). About 70% fine to coarse subangular limestone to subrounded quartz sand, 15% silt, 15% fine subangular limestone gravel. Very dark grayish brown (10YR3/2). Fill. ◀Silty sand (SM) with increased silt content to 20%. Sample contained dark-colored lithic fragments. Discolored black (10YR2/1) at 5.5 ft below ground surface (bgs). Fill.	5
	5 6 8 11 --	SSB/1.8	10	N/M	8.3	GP 5/B/S				◀Silty sand (SM) with increased silt content to 30% and trace fine limestone gravel at 7.0 ft bgs. Black (10YR2/1). Fill.	
10	15 12 18 35 --	SSB/2.0	4.0	N/N	8.5			LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 95% fine subrounded sand, mostly quartz, 5% silt. Black (10YR2/1). Lake sediments-beach deposits.	10
	10 10 17 20 --	SSB/2.0	3.5	N/T	8.4		W			◀Trace fine angular limestone sand at 12.0 ft bgs.	
15	24 8 11 13 --	SSB/2.0	8.0	N/N	8.6						15
	12 10 19 23 --	SSB/2.0	10	L/N	9.2	GP 5/B/S			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 5% to 10% silt, 90% very fine sand, mostly quartz, trace fine angular limestone sand. Black (10YR2/1). Lake sediments-beach deposits.	
20	22										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 6= GROUP 5 + Corrosivity and Reactivity. B= sulfur bacteria. S= sulfide, sulfate, iron. M7= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/21/93
DATE COMPLETED: 9/21/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-35
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.8 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	20 27 31 --	SSB/2.0	20	M/N	9.3		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 5% to 10% silt, 90% very fine sand, mostly quartz, trace fine angular limestone sand. Black (10YR2/1) with pockets of very dark gray (10YR3/1). Lake sediments-beach deposits.	25
	22 13 13 18 --	SSB/1.8	16	M/N	9.2				SP-SM	Poorly graded sand with silt (SP-SM). About 90% very fine subrounded sand, mostly quartz, 10% silt. Black (10YR2/1). Lake sediments- beach deposits.	
	10 10 18 21 --	SSB/2.0	40	L/N	9.1				SP	Poorly graded sand (SP). About 95% very fine subrounded sand, mostly quartz, <5% silt, trace very fine angular lithic sand. Black (10YR2/1). Lake sediments-beach deposits.	
30	10 15 20 27 --	SSB/2.0	50	M/N	9.0	GP 5/B/S/M7			SP-SM	Poorly graded sand with silt (SP-SM). About 90% very fine subrounded quartz sand, 10% silt, trace medium subrounded lithic gravel. Black (10YR2/1). Lake sediments-beach deposits.	30
	35 82 100 --	SSB/2.0	25	S/N	9.0				GP-GM	Poorly graded gravel with sand and silt (GP-GM). Mostly subangular fine to coarse limestone gravel, 10% silt, 15% fine quartz sand and fine to coarse subangular limestone sand.	
									CL	Lean clay (CL). Mostly clay, 10% ot 15% silt. Clay exhibited medium plasticity. Hard. Gray (10YR5/1). Till.	
										◀Note: Split spoon was driven a second time from 31.5 ft to 32.0 ft bgs to verify presence of till. End of boring at 29.5 ft bgs. Split spoon driven to 32.0 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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r-ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GROUP 6= GROUP 5 + Corrosivity and Reactivity. B= sulfur bacteria. S= sulfide, sulfate, iron. M7= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/21/93
DATE COMPLETED: 9/21/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-36
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.64 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 3 4 5	SSB/1.5	2.0	N/N	8.8		M	FILL	ML	Sandy silt (ML). About 70% silt, 20% fine rounded sand, 10% medium rounded sand. Sample contained roots and grass fibers. Very dark brown (10YR2/2). Fill.	0
									SM	Silty sand (SM). About 60% fine to coarse subrounded sand, 20% fine to medium subrounded gravel, 20% silt. Sand and gravel fractions included slag material. Black (10YR2/1). Fill.	
	2 6 9 18	SSB/1.4	2.5	N/T	8.6	GROUP 5				Clayey silt with sand and gravel (ML). Very dark brown (10YR2/2). Fill.	
										Silty sand (SM). About 75% fine to coarse subrounded and subangular sand, 15% silt, 10% fine to medium subangular gravel. Sand fraction included quartz, limestone and slag material. Black (10YR2/1). Fill.	
5	-- 1 4 7 9	SSB/1.7	0	L/T	7.8				SP	Poorly graded sand (SP). About 95% fine subrounded sand, mostly quartz, 5% silt. Black (10YR2/1). Fill.	5
	-- 1 4 8 9	SSB/1.7	0.5	N/T	8.3	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 75% fine to coarse subrounded quartz sand and subangular limestone sand, 15% fine to coarse subangular to subrounded limestone gravel, 5% to 10% silt. Very dark gray (10YR3/1). Fill.	
10	-- 14 16 19 20	SSB/2.0	2.0	N/N	7.8		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 95% fine subrounded sand, mostly quartz, 5% silt, trace rounded limestone gravel, trace fine angular shell fragments. Sample contained a piece of wood. Dark gray (10YR4/1). Lake sediments-beach deposits.	10
	-- 14 11 15 17	SSB/2.0	6.0	N/T	8.1					◀ Poorly graded sand (SP). Sample contained trace medium rounded gravel at 12.0 ft bgs. Very dark gray (10YR3/1).	
15	-- 11 10 13 21	SSB/2.0	10	N/T	8.1					◀ Poorly graded sand (SP). Sample contained wood fragments.	15
	-- 13 17 23 28	SSB/2.0	5.0	N/N	8.8	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% fine sand, mostly quartz, 5% to 10% silt. Very dark gray (10YR3/1). Lake sediments-beach deposit.	
20	-- 21										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/21/93
DATE COMPLETED: 9/21/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-36
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.64 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	24 30 31 --	SSB/2.0	15	N/N	8.9			LAKE SEDIMENTS-BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% fine sand, mostly quartz, 5% to 10% silt. Very dark gray (10YR3/1). Lake sediments-beach deposits. ◀ Trace wood fragments at 19.5 to 21.5 ft bgs.	
	19 20 26 34 --	SSB/2.0	20	N/N	8.5				SP-SM	Poorly graded sand with silt (SP-SM). About 85% very fine sand, mostly quartz, 15% silt. Black (10YR2/1). Lake sediments-beach deposits.	
25	11 13 10 15 --	SSB/2.0	50	M/T	9.2		W		SP	Poorly graded sand (SP). About 95% fine rounded sand, mostly quartz, 5% silt. Black (10YR2/1). Lake sediments-beach deposits.	25
	8 8 10 19 --	SSB/2.0	55	M/T	9.2						
30	9 10 14 36	SSB/2.0	30	S/N	9.0	GROUP 5	D/M		SP-SM	Poorly graded sand to poorly graded sand with silt (SP-SM). About 90% fine sand, mostly quartz, 5% to 10% silt. Black (10YR2/1). Lake sediments-beach deposits.	30
									GP	Poorly graded gravel (GP). Mostly coarse angular limestone gravel with fine quartz and limestone sand matrix.	
									CL	Silty clay (CL). About 60% clay, 40% silt. Clay exhibited low to medium plasticity. Hard. Gray (10YR4/1) to dark gray (10YR3/1) along fractures. Till.	
										End of boring at 29.5 ft bgs. Split spoon was driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/21/93
DATE COMPLETED: 9/21/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-37

RISER PIPE ELEVATION: N/A

GROUND SURFACE ELEVATION: 586.16 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	1	SSB/12	0	N/N	8.3		M	FILL	OH	Organic soil (OH). Mostly silt organic soil, trace sand. Sample contained roots. Very dark brown (10YR2/2). Fill.	
	2 5 7						D		SM	Silty sand (SM). About 80% fine sand, 15% to 20% silt. Dark brown (10YR3/3). Fill.	
	3 3 6 8	SSB/1.4	0	N/N	8.8	GROUP 5	M		SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 60% fine to medium subangular to subrounded sand, mostly medium, 30% coarse subangular to subrounded sand, 5% to 10% silt. Sample contained a 0.05-ft thick coal seam at 3.5 ft below ground surface (bgs). Very dark gray (10YR2/1). Fill.	
	--									◀Trace of coarse concrete gravel at 4.5 ft bgs.	
5	6 5 9 10	SSB/1.5	0	N/N	8.2					Poorly graded sand (SP). About 95% fine subrounded quartz sand, <5% silt. Grayish brown (10YR4/2). Lake sediments- beach deposits.	5
	--									◀Poorly graded sand (SP) at 7.0 ft bgs. About 95% fine subrounded sand, <5% silt. Sand fraction consisted of 70% quartz and 30% other lithologies. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
	2 5 7 13	SSB/1.4	0	N/N	8.3	GROUP 5		LAKE SEDIMENTS-BEACH DEPOSITS			
	--									◀Trace of medium angular sand at 9.5 to 10.3 ft bgs.	
10	11 10 19 26	SSB/1.9	1.0	N/N	8.8					◀Poorly graded sand with gravel (SP) bed at 10.3 to 10.5 ft bgs. Sample consisted of about 85% sand, 30% fine to coarse subangular to subrounded gravel, 5% silt. Gravel fraction consisted of basalt and other igneous lithologies.	10
	--									◀Sample contained medium sand and angular shell fragments at 12.0 to 14.0 ft bgs.	
	15 15 20 23	SSB/1.9	3.0	N/N	9.2		W		SP		
	--									◀Trace medium and coarse sand from 14.5 to 19.5 ft bgs.	
15	10 19 22 32	SSB/2.0	5.0	N/N	8.9						15
	--									◀Observed a phenolic odor at 17.0 ft bgs.	
	11 15 20 26	SSB/2.0	6.0	L/N	9.2	GROUP 5/M6					
	--										
20	24								SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM).	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M6= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/21/93
DATE COMPLETED: 9/21/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-37
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.16 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	20 25 33	SSB/2.0	7.0	N/N	9.4				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine subrounded sand, trace coarse sand, 5% to 10% silt. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
	9 10 15 23	SSB/1.8	20	L/N	9.3				SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt. Very dark gray (10YR3/1). Lake sediments- beach deposits. ◀Trace coarse sand and fine gravel from 22.0 ft to 26.5.0 ft bgs. Observed a phenolic odor.	
25	13 16 17 19	SSB/1.8	8.0	L/N	9.3		W	LAKE SEDIMENTS-BEACH DEPOSITS		◀Observed a phenolic odor at 24.5 ft bgs.	25
	6 8 10 12	SSB/0.5	20	M/N	9.1				SP-SM /SM	Poorly graded sand with silt to silty sand (SP-SM/SM). About 85% to 90% fine subrounded sand, 10% to 15% silt. Very dark gray (7.5YR3/0). Observed a phenolic odor. Lake sediments-beach deposits. ◀Trace coarse angular sand and shell fragments at 29.0 to 31.0 ft bgs. Very dark gray (10YR3/1).	
30	17 20 28 31	SSB/2.0	65	M/N	9.0						30
	24 33 48 62	SSB/2.2	80	S/N	9.0	GROUP 5	M	TILL	GP-GM CL	Poorly graded gravel with sand and silt (GP-GM). About 40% to 45% fine to coarse subangular gravel, 25% fine to medium sand, 15% coarse subangular sand, 15% silt. Black (10YR2/1). Observed a phenolic odor. Lake sediments-beach deposits. Lean clay (CL). About 70% clay, 30% silt. Clay exhibited low to medium plasticity and slow dilatancy. Firm to hard. Till.	
35										End of boring at 32.0 ft bgs. Split spoon driven to 34.0 ft bgs. The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. MB= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 9/23/93
DATE COMPLETED: 9/23/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-38
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.63 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1	SSB/1.5	2.5	N/T	8.2		M	FILL	ML/CL	Sandy clayey silt (ML/CL). About 40% silt, 40% fine subrounded quartz sand, 20% clay. Sample contained grass and roots. Very dark gray (10YR3/1). Fill.	0
	2								SP	Poorly graded sand (SP). About 95% fine subrounded quartz sand, <5% silt. Brown (10YR5/3). Fill.	
	10										
	10								SM	Silty sand with gravel (SM). About 60% fine to coarse subrounded to subangular sand, 20% subrounded gravel, 20% silt. Fine sand fraction consisted of quartz and slag material. Very dark grayish brown (10YR3/2). Fill.	
	4	SSB/1.5				GROUP 5					
	5		0	N/T	8.9				SP	Poorly graded sand (SP). About 95% fine subrounded quartz sand, <5% silt. Brown (10YR5/3). Fill.	
	6										
	7										
	--										
5	2	SSB/1.2									5
	2		0	N/N	8.6				CL	Sandy lean clay (CL). About 60% clay, 30% fine to coarse subrounded to subangular sand, 10% silt, trace fine gravel. Clay exhibited medium plasticity and slow dilatancy. Soft to firm. Sand fraction consisted of quartz and limestone. Olive (5Y5/4). Fill.	
	2									◀Sample contained subrounded limestone cobbles and wood pieces at 7.0 ft below ground surface (bgs).	
	5										
	--										
	2	SSB/1.5				GROUP 5/M8					
	10		3.0	N/N	8.6		M/W		SP	Poorly graded sand (SP). About 80% fine subrounded quartz sand, 10% angular limestone sand, 5% coarse angular sand, <5% silt. Brown (10YR4/3). Fill.	
	10										
	11										
	--										
10	13	SSB/2.0						LAKE SEDIMENTS-BEACH DEPOSITS			10
	17		3.0	N/N	8.6				SP	Poorly graded sand (SP). About 70% fine subrounded quartz sand, 20% fine subangular lithic sand, 5% white angular shell fragments, 5% silt. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
	20										
	23										
	--										
	9	SSB/2.0									
	10		0	L/N	8.9					Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 80% fine subrounded quartz sand, 10% fine angular sand, trace subangular medium sand, 5% to 10% silt, trace fine subrounded limestone gravel. Sample contained trace fine angular shell fragments. Black (10YR2/1). Lake sediments-beach deposits.	
	14										
	19										
	--										
15	6	SSB/2.0					W				15
	10		0.5	L/N	9.1				SP/ SP-SM		
	22										
	29										
	--									◀Sample contained trace coarse subrounded limestone gravel at 17.0 ft bgs.	
	19	SSB/2.0				GROUP 5					
	25		1.5	N/N	9.0						
	25										
	33										
	--										
20	9								SP-SM	Poorly graded sand with silt (SP-SM). Lake sediments-beach deposits.	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M8= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 9/23/93
DATE COMPLETED: 9/23/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-38
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 587.63 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	11 15 22	SSB/2.0	2.0	N/N	9.1		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP-SM	Poorly graded sand with silt (SP-SM). About 85% fine subrounded quartz sand, 10% silt, 5% fine subangular limestone sand, trace coarse subrounded limestone sand. Sample contained shell fragments and pockets of siltier sand. Black (10YR2/1). Lake sediments- beach deposits.	25
	12 15 19 25	SSB/2.0	4.0	L/N	9.3						
	12 17 20 28	SSB/2.0	7.0	L/N	9.1					◀Sand fraction graded to very fine at 27.0 to 28.5 ft bgs.	
	12 14 15 24	SSB/2.0	7	L/N	8.6						
30	11 12 13 18	SSB/1.9	15	L/N	7.7	GROUP 5			SM	Silty sand (SM). About 80% very fine quartz sand, 20% silt. Black (10YR2/1). Lake sediments-beach deposits.	30
	14 21 32 40	SSB/2.0	20	N/N	8.3		M	TILL	GM CL/ML	Silty gravel with sand (GM). About 60% fine to coarse angular to rounded limestone gravel, 20% silt, 20% fine to coarse quartz and limestone sand. Black (10YR2/1). Silty lean clay (CL/ML). About 70% clay, 30% silt. Clay exhibited medium plasticity. Hard. Gray (10YR5/1) discolored very dark gray (10YR3/1) along fractures. Till.	
35										End of boring at 32.0 ft bgs. Split spoon driven to 34.0 ft bgs.	35
										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	
40											40

r-ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M8= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/17/93
DATE COMPLETED: 9/17/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-39
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.67 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	3	SSB/1.7	0	N/N	8.2		M	FILL	SC	Clayey sand with gravel (SC). About 60% clayey sand matrix, 40% crushed limestone rock base. Fill.	0
	3								SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine to medium sand, 10% to 15% silt. Yellowish brown (10YR5/4). Fill.	
	6										
	11										
	4	SSB/1.3	0	N/N	9.1	GROUP 5				Silty sand with gravel (SM). About 30% fine to coarse gravel, 30% coarse sand, 25% fine to medium sand, 15% silt. Sample contained wood, coal, brick, and slag material. Fill.	
	12										
	13										
	15										
	--										
5	4	SSB/1.1	20	S/H	8.2				SM	◀Trace of oil washing out of sample from 4.5 to 8.0 ft below ground surface (bgs).	5
	6										
	9										
	12										
	--										
	9	SSB/1.4	400	M/M	8.0	GROUP 5	W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 95% fine to medium sand, mostly fine subrounded sand, 5% silt. Black (10YR2/1). Lake sediments-beach deposits.	
	9										
	11										
	14										
	--										
10	3	SSB/1.8	90	S/T	7.6					◀Poorly graded gravel with sand (GP) layer from 10.2 to 10.4 ft bgs. Gravel layer consisted of about 60% fine to coarse gravel, 35% fine to medium sand, 5% silt. Gravel fraction included basalt and red sandstone clasts.	10
	10										
	18										
	25										
	--										
	8	SSB/1.5	100	M/T	8.0					◀Samples from 12.0 to 16.5 ft bgs contained trace coarse and angular sand and shell fragments.	
	13										
	27										
	32										
	--									◀Sample from 14.5 to 16.5 ft bgs contained stringers of silt.	
15	10	SSB/1.9	170	S/N	9.1					◀Gravel seam from 15.3 to 15.4 ft bgs.	15
	10										
	21										
	30										
	--										
	12	SSB/2.0	150	S/T	9.0	GROUP 5			SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt, trace to 5% medium sand. Sample discolored black (10YR2/1). Lake sediments-beach deposits.	
	15										
	20										
	24										
	--										
20	8								SP-SM /SM	Poorly graded sand with silt to silty sand (SP/SP-SM).	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/17/93
DATE COMPLETED: 9/17/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-39
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.67 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	10 18 22	SSB/2.0	150	S/T	9.3				SP-SM /SM	Poorly graded sand silt to silty sand (SP-SM/SM). About 85% to 90% fine subrounded sand, 10% to 15% silt, trace to 5% medium sand, trace fine to coarse gravel. Sample discolored black (10YR2/1). Lake sediments-beach deposits.	
	9 8 21 38	SSB/2.0	144	S/T	8.9					Poorly graded sand with silt (SP-SM). About 90% fine sand, 10% silt, trace coarse sand, trace fine gravel. Sample discolored black (10YR2/1). Lake sediments-beach deposits.	
25	3 15 15 21	SSB/2.0	125	S/T	9.1		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP-SM		25
	9 19 22 34	SSB/2.0	125	S/T	9.2						
30	22 100 60 70	SSB/2.3	70	S/T	9.3	GROUP 5	M	TILL	GM	Silty gravel with sand (GM). About 60% fine to coarse angular gravel, 20% fines, 20% fine to coarse sand. Gravel fraction included 0.25-ft diameter clasts of limestone and basalt. Fine fraction consisted mostly of silt. Black (10YR2/1). Lake sediments-beach deposits.	30
									SC	Clayey sand (SC). About 60% medium to coarse angular to subangular sand, 25% fines, mostly clay, 10% coarse angular sand, 5% fine angular gravel. Very dark gray (10YR3/1). Till.	
									CL	Lean clay (CL). About 95% clay, 5% fine to medium sand, trace fine gravel. Clay exhibited medium toughness, medium plasticity, and no dilatancy. Hard. Gray (10YR5/1) with black staining on fractures. Till.	
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/7/93
DATE COMPLETED: 10/7/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-40
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.18 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	3	SSB/1.8	10	M/N	7.4		M	FILL	SM	Crushed rock to 0.2 ft below ground surface (bgs). Fill.	
	4									Silty sand (SM). About 15% to 20% silt, 80% to 85% fine to medium sand, trace to 5% gravel. Gravel fraction included rock and brick material. Black (10YR2/1). Fill.	
	11										
	10									◀Sample from 2.0 to 4.0 ft bgd contained coal fragments and coal fines.	
	16	SSB/1.4	25	M/T	7.5	GROUP 5					
	24										
	36									◀Sample contained weathered concrete and large limestone rock fragments at 3.7 to 4.0 ft bgs.	
	49										
	--										
5	32	SSB/0.5	25	M/T	8.5				SM	◀No recovery from first attempt at 4.5 to 6.5 ft bgs sample interval due to concrete. Soil boring was moved 3 feet from borehole. Silty sand with gravel (SM). About 60% fine to medium sand, 20% fine to coarse gravel, 20% silt. Sand and gravel fraction included brick material, crushed rock, and coal fragments. Black (10YR2/1). Fill.	5
	100										
	--										
	--										
	--										
	2	SSB/0.2	110	M/H	9.5		W		SM/SC	Silty sand to clayey sand (SM/SC). About 60% fine to medium sand, 20% fine to coarse gravel, trace to 20% silt, trace to 20% clay. Sample exhibited a brown oil. Fill.	
	7										
	7										
	9										
	--									◀Sample from 9.5 to 11.5 ft bgs contained large fragments of wood, brick, and limestone rock. Sample appeared to be approximately 20% saturated with brown oil.	
10	6	SSB/1.3	525	M/H	8.2	GROUP 5		LAKE SEDIMENTS-BEACH DEPOSITS			10
	8										
	12										
	15								SP	Poorly graded sand (SP). About <5% silt, 95% fine subrounded sand, trace angular medium sand, trace fine to coarse basaltic gravel. Medium sand consisted mostly of shell fragments. Black (10YR2/1). Lake sediments-beach deposits.	
	--										
	9	SSB/1.7	850	M/T	8.1						
	11										
	16										
	17										
	--										
15	10	SSB/2.0	725	M/T	8.4				SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt, trace medium sand-sized angular shell fragments. Black (10YR2/1). Lake sediments-beach deposits.	15
	11										
	15										
	22										
	--										
	9	SSB/2.0	220	L/T	8.2	GROUP 5					
	14										
	16										
	22										
	--										
20	10								SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Lake sediments-beach deposits.	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/7/93
DATE COMPLETED: 10/7/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-40

RISER PIPE ELEVATION: N/A

GROUND SURFACE ELEVATION: 586.18 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	13, 15, 16, --, 12, 14, 17, 22, --, 11, 16, 24, 20, --, 60, 100+, --, --, --, 100+, --, --, --	SSB/1.8; SSB/1.8; SSB/2.0; SSB/none; SSB/none	135; 120; 140; --; --	L/T; M/T; S/N; --; --	8.6; 8.8; 9.0; --; --	GROUP 5	W	*LAKE SEDIMENTS-BEACH DEPOSITS*	SP/ SP-SM; SP	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine subrounded sand, 5% to 10% silt, trace medium sand-sized angular shell fragments. Black (10YR2/1). Lake sediments-beach deposits.	25
										Poorly graded sand (SP). About 5% silt, 95% fine subrounded sand, trace coarse basaltic sand. Black (10YR2/1). Lake sediments- beach deposits.	
										◀The split spoon barrel from the sample interval from 27.0 to 29.0 ft bgs could not be opened because the bottom of the barrel was bent.	
										◀Due to an obstruction at approximately 29.0 ft bgs, a sample could not be obtained with a 3" diameter split spoon. Completed Soil Boring SB56 near SB40 for collecting analytical samples from the 27.0 to 29.0 ft bgs interval above the till.	
30										End of boring at 29.5 ft bgs.	30
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

rORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/16/93
DATE COMPLETED: 9/16/93
FIELD INSPECTOR: K. French/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-41
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.12 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2 8 20 19	SSB/1.8	0	N/T	7.4		D/M	FILL	SM	Silty sand (SM). Sand fraction consisted of fine sand, with roots and organic matter. Very dark brown (10YR2/2). FILL	0
									SM	Silty sand (SM). Sand fraction consisted of fine silty sand. Sample contained about 10% coarse gravel and brick, crushed rock, coal fines, and cinders. Black (10YR2/1). FILL	
	7 9 11 14	SSB/1.4	0	N/T	7.4	GROUP 5					
	--										
5	8 14 16 22	SSB/1.1	0	L/T	7.4	GS	M	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 95% fine to medium subrounded sand, mostly fine, <5% silt. Sand fraction included about 90% quartz and 10% mafic and lithic sand. Yellowish brown (10YR5/4). Lake sediments-beach deposits.	5
	--										
	3 6 8 12	SSB/1.5	16	S/M	8.5	GROUP 5/M5				◀Sample discolored very dark gray (10YR3/1) at 7.0 to 9.0 ft below ground surface (bgs).	
	--										
10	8 12 18 23	SSB/2.0	380	S/N	8.0					◀Sample contained broken shell fragments and trace fine gravel at 9.5 to 11.5 ft bgs.	10
	--										
	12 15 25	SSB/2.0	150	S/T	8.3	GS	W			Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine to medium subangular to subrounded sand, 5% to 10% silt, trace coarse sand and fine gravel. Discolored dark gray (10YR3/1). Lake sediments-beach deposits.	
	--										
15	12 18 22 26	SSB/2.0	0	M/T	8.4				SP/ SP-SM	◀Sample discolored black (10YR2/1).	15
	--										
	14 18 25 32	SSB/2.0	140	S/T	9.2	GROUP 5				◀Sample discolored black (10YR2/1).	
	--										
20	8								SP-SM /SM	Poorly graded sand with silt to silty sand (SP-SM/SM). About 85% to 90% fine subrounded to rounded sand, 10% to 15% silt. Black (10YR2/1). Lake sediments-beach deposits.	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GEOTECHNICAL SAMPLE TYPES: GS= grain size. M5= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/16/93
DATE COMPLETED: 9/16/93
FIELD INSPECTOR: K. French/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-41
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.12 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	9	SSB/1.5	250	M/T	9.2				SP-SM /SM	Poorly graded sand with silt to silty sand (SP-SM/SM). About 85% to 90% fine subrounded to rounded sand, 10% to 15% silt. Black (10YR2/1). Lake sediments-beach deposits.	
	11										
	14									◀Sample contained 0.2-ft thick silty sand (SM) lenses in 19.5 to 21.5 ft bgs sample interval.	
	--										
	10	SSB/1.4	140	M/N	9.1	GS	W	LAKE SEDIMENTS-BEACH DEPOSITS	SM	Silty sand (SM). About 85% fine subrounded to rounded sand, 15% silt. Sample discolored black (10YR2/1). Lake sediments-beach deposits.	
	11										
	16										
	22										
	--										
25	3	SSB/1.2	34	S/T	9.2						25
	14										
	15										
	23										
	--									◀Silty sand (SM) from 27.0 to 29.0 ft bgs. Sample exhibited a heavy sheen in sheen test. Sample discolored black (10YR2/1). No oil present in pore spaces. Coarse sand present in bottom of spoon.	
	5	SSB/1.6	50	S/H	8.7	GROUP 5					
	8										
	10									◀Silty sand (SM) consisted of about 50% fine sand, 25% coarse sand, 15% silt, 10% fine to coarse gravel at 28.6 ft bgs.	
	26										
	12	SSB/1.4	--	S/H	--				GM	Silty gravel (GM). About 50% coarse limestone angular gravel, 30% fine sand, 15% to 20% silt. Black (10YR2/1). Sample contained brown oil in pore spaces. Strong odor and heavy sheen in sand and gravel deposits above the till.	
30	26						M	TILL	CL		30
	50									Lean clay with sand (CL). About 90% clay, 5% to 10% fine to medium sand, trace coarse sand and gravel. Clay exhibited high toughness, medium plasticity and no dilatancy. Hard. Gray (10YR5/1) with trace black staining along fractures from 28.9 to 29.1 ft bgs. Till.	
	100									End of boring at 29.0 ft bgs. Split spoon driven to 30.0 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

r-ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GEOTECHNICAL SAMPLE TYPES: GS= grain size. M5= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/23/93
DATE COMPLETED: 9/23/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-42
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.56 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 2 6 9	SSB/1.7	0	N/N N/T	8.7		M	FILL	SP	Poorly graded sand (SP). About 85% fine subrounded quartz sand, 10% subangular limestone sand, trace medium to coarse sand, trace coarse subrounded gravel, 5% silt. Sample contained roots and grass fibers. Yellowish brown (10YR5/4). Fill.	0
									SM	Silty sand (SM). About 60% fine to coarse subrounded to subangular sand, 30% silt, 10% fine to coarse gravel. Coarse sand and gravel fractions consisted of slag material. Fine sand fraction consisted mostly of quartz. Sample contained roots and grass fibers. Black (10YR2/1) to Dark brownish gray (10YR2/2). Fill.	
	10 12 15 19	SSB/1.1	0	N/T	10.3	GP 5/P			SM	Silty sand with gravel (SM). About 40% fine to coarse subangular to subrounded sand, 30% coarse subangular limestone gravel, 30% silt. Sand fraction consisted of quartz and limestone. Black (10YR2/1). Fill.	
5	9 11 15 20	SSB/1.5	1.5	L/T	8.6			LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 60% fine subrounded quartz sand, 35% fine subangular lithic sand, 5% silt, trace fine subangular limestone sand, trace shell fragments. Black (10YR2/1). Lake sediments-beach deposits.	5
	6 6 8 12	SSB/1.8	0	L/N	9.5	GROUP 5				◀ Trace coarse subangular limestone gravel at 7.0 to 9.0 ft below ground surface (bgs).	
10	7 10 14 21	SSB/2.0	3	L/N	9.3		W			◀ No gravel in sample at 9.5 to 11.5 ft bgs.	10
	10 19 21 26	SSB/2.0	50	L/T	8.3						
15	21 18 22 32	SSB/2.0	20	L/T	8.6					◀ Sample contained small pockets of very dark brown (10YR2/2) siltier sand at 14.5 to 16.5 ft bgs.	15
	14 15 15 21	SSB/2.0	7.0	L/T	9.1	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 65% fine subrounded quartz sand, 25% fine lithic subrounded sand, trace fine angular limestone sand, 5% to 10% silt, trace medium and coarse subangular limestone sand. Black (10YR2/1). Lake sediments-beach deposits.	
20	22										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. P= PEST/PCB.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/23/93
DATE COMPLETED: 9/23/93
FIELD INSPECTOR: K. Laufenberg/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-42
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.56 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	28 29 38 --	SSB/2.0	7.0	L/T	9.3					Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 85% fine subrounded quartz sand and subangular lithic sand, 5% to 10% silt, 5% medium subangular limestone sand. Sample contained grass fibers. Black (10YR2/1). Lake sediments- beach deposits.	
	15 20 24 31 --	SSB/2.0	4.0	L/T	9.8				SP/ SP-SM	◀ Trace medium to coarse subangular limestone and lithic sand and trace fine subangular limestone gravel at 23.0 to 24.0 ft bgs.	
25	11 18 24 29 --	SSB/2.0	35	M/T	8.5		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 70% very fine subrounded quartz sand, 25% very fine subangular lithic sand, 5% silt. Black (10YR2/1). Lake sediments-beach deposits.	25
	9 32 100 50	SSB/2.0	100	M/N	8.5	GROUP 5			SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine subrounded quartz sand and subangular lithic sand, 10% silt, trace medium subangular to subrounded limestone sand, trace medium subangular limestone gravel. Black (10YR2/1). Lake sediments-beach deposits.	
									GP-GM	Poorly graded gravel with silt (GP-GM). About 35% medium subangular limestone gravel, 30% fine to coarse subangular limestone sand, 5% fine subrounded quartz sand, 30% silt. Black (10YR2/1).	
30	45 53 100 --	SSB/0.8	--	M/N	--		M	TILL	CL	Lean clay (CL). Mostly clay, trace medium subangular limestone sand. Clay exhibited medium plasticity. Hard. Dark gray (10YR4/1) to very dark gray (10YR3/1). Till.	30
										End of boring at 29.0 ft bgs. The final split spoon sample was driven from 29.0 to 29.8 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. P= PEST/PCB.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/15/93
DATE COMPLETED: 9/15/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-43
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.05 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	2	SSB/2.0	0	N/N	8.2		M	FILL	SM	Silty sand (SM). Fine grained sand with about 20% silt. Pale brown (10YR6/3). Fill.	0
	4									Coal in coal fines matrix. Black (10YR2/1). Fill.	
	10								FILL		
	16										
	3	SSB/1.8	0	N/N	8.5	GROUP 5					
	7										
	12									Poorly graded sand (SP). Fine to medium grained sand. Pale brown (10YR6/3). Lake sediments - beach deposits.	
	16										
	--										
5	3	SSB/1.8	1	N/N	8.9		W	LAKE SEDIMENTS - BEACH DEPOSITS			5
	9										
	11										
	14										
	--										
	2	SSB/1.8	1	L/N	8.4	GROUP 5				◀ Trace amounts of well rounded coarse sand and angular shell fragments occur with fine to medium sand. Color change to dark gray (10YR4/1) below 7 ft below ground surface (bgs).	
	4										
	9										
	22										
	--								SP		
10	10	SSB/2.0	3	M/N	8.6						10
	11										
	19									◀ Moderate coal tar odor below 11 ft bgs.	
	26										
	--										
	12	SSB/2.0	1	M/N	9.1						
	22										
	28										
	36										
	--										
15	21	SSB/1.9	2	L/N	9.2						15
	36										
	24										
	29										
	--										
	10	SSB/1.8	3	L/T	9.3	GROUP 5/M4			SP-SM	Poorly graded sand with silt (SP-SM). Fine grained sand with about 10 % silt and trace amounts of shell fragments. Dark gray (10YR4/1). Lake sediments - beach deposits.	
	19										
	21										
	32										
	--										
20	6										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M4= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/15/93
DATE COMPLETED: 9/15/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-43

RISER PIPE ELEVATION: N/A

GROUND SURFACE ELEVATION: 586.05 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	8 16 16	SSB/1.8	90	L/N	9.0		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP-SM	Poorly graded sand with silt (SP-SM). Fine grained sand with about 10% silt and trace amounts of shell fragments. Dark gray (10YR4/1). Lake sediments - beach deposits.	
	8 13 20 18	SSB/1.9	>1000	M/N	8.3				SP	Poorly graded sand (SP). Fine grained sand with trace amounts of shell fragments. Dark gray (10YR4/1). Lake sediments - beach deposits.	
25	8 13 19 22	SSB/1.9	130	M/N	8.3				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Fine grained sand with about 5 to 10% fines as silt, trace amounts of subrounded coarse sand and gravel, and trace angular shell fragments. Dark gray (10YR4/1). Lake sediments - beach deposits.	25
	8 22 100	SSB/1.4	60	L/N	8.9	GROUP 5					
30	10 15 21 34	SSB/1.2	50	N/N	9.2		M	TILL	ML/ ML-CL	Silt with clay (ML/ML-CL). Silt with some clay and trace sand and gravel. Grayish brown (10YR5/2). Till.	30
										End of boring at 29.5 ft bgs. Split spoon was driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

r:ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M4= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/20/93
DATE COMPLETED: 9/20/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-44
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.18 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	1	SSB/1.7	0	N/T	7.3		M	FILL	SP	Poorly graded sand (SP). About 95% fine to medium subrounded sand, <5% silt. Sample contained organic matter and roots. Brown (10YR5/3). Fill.	
	5									Silty sand (SM). Silty sand consisted of coal fragments, coal fines, slag and cinders. Sample contained roots. Black (10YR2/1). Fill.	
	9										
	9										
	5	SSB/1.5	2.0	L/T	6.8	Gp 5/P/B/S			SM		
	5										
	7										
	8										
	--										
5	2	SSB/1.4	2.0	L/T	6.8					◀ Sample consisted of about 60% cinders at 5.1 to 5.4 ft below ground surface (bgs).	5
	4										
	9									Poorly graded sand (SP). About 95% fine to medium subangular to subrounded sand, 5% silt, trace coarse sand. Sand fraction consisted of about 80% quartz, 20% mafics, limestone, shell fragment sand miscellaneous lithologies. Yellowish brown (10YR5/4). Lake sediments-beach deposits.	
	10									◀Poorly graded sand (SP) from 7.0 to 9.0 ft below ground surface (bgs). About 85% fine to medium subangular to subrounded sand, 3% to 5% fine subrounded disc-shaped gravel, <5% silt. Gray (10YR4/1) with stringers of black silt. Lake sediments-beach deposits.	
	--										
	5	SSB/1.5	1.0	L/N	6.8	GP 5/B/S					
	9										
	17										
	20										
	--										
10	15	SSB/1.5	25	L/T	7.0						10
	11										
	18										
	20										
	--										
	13	SSB/1.7	75	L/N	7.1	GP 7/B/S/A	W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	◀Poorly graded sand (SP). About 95% fine to medium subrounded to subangular sand, 5% silt. Sand fraction consisted of 85% to 90% quartz and 10% to 15% other lithologies. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
	11										
	11										
	16										
	--										
15	12	SSB/2.0	150	L/N	8.3					◀Sample is dark gray (10YR4/1) mottled very dark gray (10YR3/1) at 14.5 to 16.5 ft bgs.	15
	11										
	17										
	19										
	--										
	15	SSB/2.0	200	L/N	9.0	GP 5/B/S				◀Sample contained a 0.2-ft thick lens of poorly graded sand with silt (SP-SM) from 17.8 tp 17.8 ft bgs. Poorly graded sand with silt lens is very dark gray (10YR3/1).	
	20										
	22										
	19										
	--										
20	24										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GEOTECHNICAL SAMPLE TYPES: A= Grainsize/porosity/vertical permeability. AL= Atterberg limits. GROUP 7= CEC, TOC. S= sulfide, sulfate, iron. B= sulfur bacteria. P= pest/PCB.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/20/93
DATE COMPLETED: 9/20/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-44
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.18 ft MSL

Depth (Feet)	Blows Per 6 In.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	20 26 33 --	SSB/2.0	400	L/N	9.0		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand with silt (SP-SM). About 90% fine sand, 10% silt, trace medium sand. Very dark gray (10YR3/1). Lake sediments- beach deposits.	25
									SP-SM		
	12 14 18 26 --	SSB/1.8	950	M/T	9.0	BETX			SP	Poorly graded sand (SP). About 95% fine to medium subrounded to subangular sand. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
									SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine sand, 10% silt, trace medium sand. Very dark gray (10YR3/1). Lake sediments- beach deposits.	
	3 10 18 20 --	SSB/1.8	300	M/T	9.0	GP 7/A			SP-SM /SM	Poorly graded sand with silt to silty sand (SP-SM/SM). About 85% to 90% fine subrounded sand, 10% to 15% silt. Sample contained many shell fragments. Black (7.5R2.5/0). Lake sediments-beach deposits.	
	3 32 60 62 --	SSB/2.1	150	M/N	9.1	GP 5/B/S			GP-GM /GM	Poorly graded gravel with silt and sand to silty gravel with sand (GP-GM/GM). About 50% coarse angular and disc-shaped limestone gravel up to 0.24-ft diameter, 35% fine to medium sand, 10% to 15% silt. Black.	
30	19 18 20 24 --	SSB/1.2	5.0	N/N	9.5	GROUP 7	M	TILL	CL	Lean clay (CL). About 95% clay, 5% fine to medium sand, trace coarse sand and gravel. Clay exhibited medium toughness, medium plasticity, and no dilatancy. Hard. No discoloration, dark gray (10YR4/1). Till. ◀Sample contained trace sand and gravel at 29.5 to 31.5 ft bgs. Color change to gray (10YR5/1). Clay sample tended to break along horizontal fractures.	30
	-- -- -- -- --	TW/1.4	--	--	--					◀Thin wall sample obtained from 33.0 to 34.4 ft bgs. No vertical fractures visible at end of thin wall tube.	
35	-- -- -- -- -- --	TW/1.2	0	N/N	9.7	A/AL				◀Thin wall sample obtained from 36.0 to 37.2 ft bgs. Lean clay (CL) exhibited medium toughness, medium plasticity, and no dilatancy. Firm. Sample contained trace sand. No discoloration, gray (10YR5/1). No vertical fractures visible at end of thin wall tube.	35
40										End of boring at 38.0 ft bgs. Thin wall pushed to 37.2 ft bgs.	40

The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-716/360-7090).

r-ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GEOTECHNICAL SAMPLE TYPES: A= Grainsize/porosity/vertical permeability. AL= Atterberg limits. GROUP 7= CEC, TOC. S= sulfide, sulfate, iron. B= sulfur bacteria. P= pest/PCB.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/27/93
DATE COMPLETED: 9/27/93
FIELD INSPECTOR: J. de Beer / S. Botts
CREW CHIEF: B. Loveland

BORING NUMBER: SB-45
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.91 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
5	1 3 3 3	SSB/1.4	0	N/N	6.1		M	FILL	SM	Silty sand (SM). Mostly fine to coarse sand sized angular coal fragments with about 5% fine to coarse gravel sized coal fragments and about 15% silt sized coal fines. Black (10YR2/1). Fill.	5
	5 6 6 6	SSB/0.8	--	L/--	--	GROUP 5				Poor recovery from 2 to 4 ft beolw ground surface (bgs). All of the sample was sent for analysis. Head space, pH, and sheen test were not conducted.	
	-- 7 10 12 15	SSB/1.2	25	M/H	6.0					◀ Heavy rainbow sheen and oily blebs from 4.5 to 6.5 ft bgs. Coal tar odor. ◀ Reddish brown colored vessicular, glassy slag fragments, wire and other debris from 5.5 to 6.5 ft bgs.	
10	-- 9 9 8 10	SSB/2.0	25	M/T	7.7	GROUP 5		LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly very fine to fine grained sand with about 5% medium grained sand, trace coarse sand and fine gravel, and about 5% fines as silt. Dominantly subangular to subrounded quartz with lesser limestone/dolomite, chert and about 5% angular, white shell fragments. Very dark gray to black (10YR3/1 - 10YR2/1). Lake sediments - beach deposits.	10
	-- 2 8 11 14	SSB/1.8	1000	L/N	7.4		W				
	-- 7 12 21 29	SSB/2.0	1100	L/N	7.9						
15	-- 9 12 18 21	SSB/2.0	1250	M/N	8.8						15
	-- 6 13 11 15	SSB/1.8	1150	--/M	8.7	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly very fine to fine grained sand with about 5% medium grained sand, about 5% coarse grained sand, trace fine gravel, and about 5 to 10% fines as silt. Flat subangular to subrounded grains with about 5% white angular shell fragments. Mottled dark gray to black (10YR4/1 - 10YR2/1). Lake sediments - beach deposits.	
20	-- 6										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. MG= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/27/93
DATE COMPLETED: 9/27/93
FIELD INSPECTOR: J. de Beer / S. Botts
CREW CHIEF: B. Loveland

BORING NUMBER: SB-45
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.91 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	14	SSB/1.2	700	M/N	8.8				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly very fine to fine grained sand with about 5% medium grained sand, about 5% coarse grained sand, trace fine gravel, and about 5 to 10% fines as silt. Flat subangular to subrounded grains with trace amounts of white angular shell fragments. Mottled dark gray to black (10YR4/1 - 10YR2/1). Lake sediments - beach deposits. Phenolic odor.	
	20										
	26										
	--										
	7	SSB/1.5	450	M/N	8.9				SP	Poorly graded sand (SP). Mostly very fine to fine sand with about 5% fines as silt. Grains are mostly subangular to subrounded quartz grins with about 5% white angular shell fragments.	
	11										
	14										
	21										
	--										
25	4	SSB/1.8	275	S/N	8.9		W			◀ Wire in split spoon at 25.5 ft bgs. ◀ Poorly graded sand consisting of 75% medium to coarse grained sand with about 10% fine gravel, and 5% fines as silt from 25.7 to 28.2 ft bgs. Mostly flat subangular grains of silty limestone/dolomite. Grins have a gold colored stain on them that washes away with a mist of water, producing an olive green colored rinsate.	25
	16										
	20										
	21										
	--										
	8	SSB/1.8	350	M/H	8.9			LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Very fine to fine grained sand with trace medium grained sand, and 10% fines as silt.	
	10										
	9								ML	Silt (ML). Silt exhibiting fast dilatancy, no plasticity, no consistancy, and no dry strength. Black (10YR2/1).	
	34								GP	Poorly graded gravel (GP). Coarse to fine limestone/dolomite gravel.	
	--										
30	24	SSB/1.8	40	M/T	9.0	GROUP 5/MS	D		SP	Poorly graded sand (SP). Very fine to fine grained sand. Black (10YR 2/1).	30
	29			M/N					SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Fine to very fine grained sand with about 10% fines as silt. Black (10YR2/ 1).	
	40			M/N					GP	Poorly graded gravel (GP). Coarse grained limestone/dolomite gravel.	
	63			N/N					CL	Sandy lean clay with gravel (CL). Hard lean clay exhibiting moderate plasticity, moderate toughness, no dilatancy, and high dry strength with about 40% fine to coarse grained angular sand, and about 20% fine to coarse grained angular gravel. Gray with black motteling from contamination (10YR8/1 - 10YR2/1).	
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. MS= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/7/93
DATE COMPLETED: 10/7/93
FIELD INSPECTOR: D. Moore
CREW CHIEF: M. Mueller

BORING NUMBER: SB-46
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.38 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	8 12 19 15	SSB/8.7	0.5	N/N	8.7		M	FILL	TAR	Tar. Hard, black.	
									SM	Silty sand with gravel (SM). Fine to coarse grained sand with about 20% fines as silt, and about 20% limestone gravel and brick fragments. Very dark grayish brown (10YR3/2) with a 2 inch seam of yellow (10YR7/8) limestone debris. Fill.	
	4 3 1 3	SSB/0.6	--	--	--				TAR	Hard tar. Black.	
									SM	Silty sand (SM). Mostly fine sand with about 20% medium to coarse grained sand and gravel and about 20% fines as silt in a tarry matrix. Black (2.5YR3/0). Fill. (The interval from 2 to 4 ft below ground surface (bgs) was taken from a second borehole placed about 5 ft from SB46 in order to get enough recovery for the analytical samples.)	
5	1 1 1 10	SSB/0.7	17	S/H M/L	8.4				SP-SM	Poorly graded sand with silt (SP-SM). Mostly fine grained sand with about 10% fines as silt and about 5% shell fragments. Brown (10YR5/3). Lake sediments - beach deposits.	5
	2 5 8 10	SSB/0.1	--	L/N	--		W	LAKE SEDIMENTS - BEACH DEPOSITS		◀ Low recovery from 7 to 9 ft bgs. Analytical sample taken from 9.5 to 11.5 ft bgs.	
10	4 8 13 14	SSB/1.9	160	M/L	8.2	GROUP 5				Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with about 5 to 10% fines as silt, about 5% shell fragments and trace amounts of medium to coarse sand. Very dark gray (7.5YR3/0). Light napthalene odor.	10
	3 6 8 10	SSB/2.0	490	L/N	8.3				SP/ SP-SM	◀ Fine gravel increases to about 5% form 12 to 14 ft bgs. Penolic odor.	
15	4 9 11 13	SSB/2.0	1000	L/T	8.2						15
	2 4 7 11	SSB/2.0	640	L/N	8.5				SP	Poorly graded sand (SP). Mostly fine grained sand with trace amounts of shell fragments, trace silt and trace medium graine sand. Very dark gray (7.5YR3/0). Lake sediments - beach deposits.	
20	3					GS					20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M20= duplicate sample. GEOTECHNICAL SAMPLE TYPES: GS= grain size.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/7/93
DATE COMPLETED: 10/7/93
FIELD INSPECTOR: D. Moore
CREW CHIEF: M. Mueller

BORING NUMBER: SB-46
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.38 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	4 8 12 --	SSB/2.0	960	L/N	8.6	GS				Poorly graded sand (SP). Mostly fine grained sand with trace amounts of shell fragments, trace silt and trace medium graine sand. Very dark gray (7.5YR3/0). Lake sediments - beach deposits.	
	2 1 6 10 --	SSB/2.0	890	M/T	8.6				SP		
25	2 2 6 8 --	SSB/1.7	500	M/T	8.9		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP-SM	Poorly graded sand with silt (SP-SM). Mostly fine grained sand with about 5 to 10% fines as silt, and about 5% shell fragments. Black (7.5YR2/0). Lake sediments - beach deposits.	25
	1 3 5 9 --	SSB/1.8	510	S/N	9.0	GS			SM	Silty sand (SM). Mostly fine grained sand with about 15% fines as silt and about 5% shell fragments. Black (7.5YR2/0). Lake sediments - beach deposits.	
30	6 14 18 20	SSB/2.0	--	S/N S/M	8.9	GROUP 5	M	TILL	CL	Lean clay (CL). Hard lean clay exhibiting medium plasticity, medium toughness, and slow dilatancy with about 15% sand and gravel. Gray (7.5YR5/0). Till.	30
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M20= duplicate sample. GEOTECHNICAL SAMPLE TYPES: GS= grain size.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/6/93
DATE COMPLETED: 10/6/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-47
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.74 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	2 2 4 4	SSB/1.4	0	N/N	9.0		M	FILL	SP	Crushed rock base material to 0.2 ft below ground surface (bgs). Poorly graded sand (SP). About 95% fine subrounded sand, <5% silt, trace gravel. Brown (10YR5/3). Fill.	
	8 7 7 5	SSB/0.9	0	L/T	8.9	GROUP 5			SM	Silty sand (SM). About 80% fine to medium sand, 25% coarse subangular to subrounded sand, 15% silt. Coarse sand fraction consisted of mostly slag material and contained some brick material. Fill.	
5	2 3 3 6	SSB/2.0	8.0	N/N	8.2		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP	Poorly graded sand (SP). About 95% fine subrounded sand, <5% silt, trace medium to coarse angular sand. Yellowish brown (10YR5/4). Lake sediments-beach deposits. ◀Color changed to dark grayish brown (10YR4/2) and sample contained trace fine angular gravel beginning at 7.0 ft bgs.	5
	8 4 5 4	SSB/1.8	15	N/N	8.0	GROUP 5					
10	14 7 7 5	SSB/1.8	25	L/N	8.1						10
	12 6 6 6	SSB/1.3	150	L/N	8.4						
15	10 6 5 5	SSB/1.3	5500	M/T	8.4				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine subrounded sand, 5% to 10% trace medium angular sand. Very dark brown (10YR2/2). Lake sediments-beach deposits. ◀Color changed to black (10YR2/1) at 14.5 ft bgs. ◀Sample contained 0.01-ft thick silt laminations every 0.3 to 0.4 ft from 17.0 to 22.0 ft bgs.	15
	9 11 10 14	SSB/1.8	3500	M/T	8.4	GROUP 5					
20	9										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/6/93
DATE COMPLETED: 10/6/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-47
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.74 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	11 15 20	SSB/1.4	2500	S/N	8.7				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 5% to 10% silt, 90% to 95% fine subrounded sand, trace medium angular sand. Very dark brown (10YR2/2). Lake sediments-beach deposits.	
	11 15 17 21	SSB/1.6	100	S/T	8.9					Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt, trace medium angular sand. Medium sand fraction consisted of mostly shell fragments. Black (10YR2/1). Lake sediments-beach deposits.	
25	12 13 16 22	SSB/1.7	500	S/N	9.1				SP-SM	◀Sample contained very fine sand at 24.5 ft bgs.	25
	9 11 15 19	SSB/1.8	700	S/T	8.9	BETX	W	LAKE SEDIMENTS-BEACH DEPOSITS			
30	12 16 31 52	SSB/2.0	600	V/N	9.2				SP	Poorly graded sand (SP). About 95% very fine subrounded sand, <5% silt, trace medium angular sand. Medium sand fraction consisted of shell fragments. Very dark gray (10YR3/1). Lake sediments- beach deposits.	30
	16 19 26 34	SSB/2.0	300	V/T	9.0	GROUP 5	M		GC CL	Clayey gravel with sand (GC). About 40% fine to coarse angular gravel, 30% fine to medium subangular to subrounded sand, 20% clay, 10% coarse angular sand. Sand and gravel fraction consisted mostly of limestone or dolomite. Gravel-sized clasts were mostly disc-shaped with diameters up to 0.25 ft. Lake sediments-beach deposits.	
35										Lean clay with sand (CL). About 80% clay, 20% fine to medium angular sand, trace coarse angular sand, trace fine angular gravel. Clay exhibited medium to high toughness, medium plasticity, and high dry strength. Hard. Gray (10YR5/1) with non black discoloration. Till.	35
										End of boring at 32.0 ft bgs. Split spoon driven to 34.0 ft bgs.	
										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	
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COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

, ORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/22/93
DATE COMPLETED: 9/22/93
FIELD INSPECTOR: K. French/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-48
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.48 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
5	7 7 11 10	SSB/1.4	0	N/N	9.0		M D	FILL	OH	Organic soil (OH). Silty organic soil with organic matter and roots. Very dark brown (10YR2/2). Fill.	5
	3 6 8 4	SSB/0.8	0	N/N	9.4	GROUP 5	M		SM	Silty sand (SM). Sample consisted of about 50% fine to coarse angular gravel, 30% fine to coarse sand, 20% silt. Gravel fraction included brick, crushed rock, cinders, and slag material mixed with chunks of sandy silt. Black (10YR2/1). Fill.	
	1 3 6 9	SSB/1.4	2.0	N/T	7.3				SP SM SP	Poorly graded sand (SP). About 95% fine sand, 5% silt, trace medium coarse sand. Pale brown (10YR6/3) to dark gray (10YR4/1) at 5.8 ft below ground surface (bgs). Fill.	
	4 6 6 9	SSB/2.0	0	N/N	7.4	GROUP 5			ML	Silty sand with gravel (SM). About 45% fine to medium sand, 20% fine gravel, 20% silt, 15% coarse angular sand. Gravel and sand fractions consisted mostly of brick. Dark gray (10YR4/1). Fill.	
10	17 16 17 19	SSB/2.0	7.0	N/N	8.0		W	LAKE SEDIMENTS-BEACH DEPOSITS		Poorly graded sand (SP). About 95% fine to medium sand, 5% silt. Fill.	10
	17 20 23 29	SSB/2.0	10	N/N	8.8	GS/P/V/GP 7			SP	Silt with sand (ML). About 80% silt, 20% fine to medium sand. Very dark grayish brown (10YR3/2). Fill.	
15	16 20 25 31	SSB/2.0	20	L/N	9.2					Poorly graded sand (SP). About 95% fine subrounded sand, <5% silt, trace medium angular sand. Dark grayish brown (10YR4/2). Lake sediments-beach deposits.	15
	10 20 19 26	SSB/1.8	25	L/N	9.4	GROUP 5			SP/ SP-SM	◀Sample contained trace coarse sand from 9.5 ft 11.5 bgs. Very dark gray (10YR3/1) mottled yellowish brown (10YR5/4).	
20	16									◀Sample contained trace coarse sand-sized angular shell fragments 12.0 ft bgs. Very dark grayish brown (10YR3/2) mottled yellowish brown (10YR5/4).	20
										◀Color change to very dark gray (10YR3/1) mottled black (10YR2/1) at 14.5 ft bgs.	
										Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine to medium subrounded sand (85% quartz, 15% other lithologies), 5% to 10% silt, trace medium angular sand and coarse subangular sand. Very dark gray (10YR3/1). Lake sediments-beach deposits.	

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GEOTECHNICAL SAMPLE TYPES: GS= grain size, P= porosity, V= vertical permeability. GROUP 7= CEC, TOC. AL= Atterberg limits.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/22/93
DATE COMPLETED: 9/22/93
FIELD INSPECTOR: K. French/S. Botts (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-48
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 586.48 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	20 19 31	SSB/1.7	75	L/N	9.1		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% to 95% fine to medium subrounded sand (85% quartz, 15% other lithologies), 5% to 10% silt, trace medium angular sand and coarse subangular sand. Very dark gray (10YR3/1). Lake sediments-beach deposits.	
	6 6 9 11	SSB/1.3	600	S/N	8.8				SP-SM	Poorly graded sand with silt (SP-SM). About 90% fine subrounded sand, 10% silt. Black (10YR2/1). Phenolic odor present in sample. Lake sediments-beach deposits.	
25	2 2 4 6	SSB/1.5	850	S/T	9.4	BETX			SP	Poorly graded sand (SP). About 95% very fine subrounded quartz sand, 5% silt, trace coarse sand-sized shell fragments. Black (10YR2/1). Phenolic odor present in sample. Lake sediments-beach deposits.	25
	5 5 7 11	SSB/1.7	625	S/T	9.3	GS/P/V/GP 7			SP-SM	Poorly graded sand with silt (SP-SM). About 90% very fine subrounded sand, 10% silt. Black (10YR2/1). Phenolic odor present in sample. Lake sediments-beach deposits.	
30	21 40 100 114	SSB/2.2	425	S/T	9.2	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). About 90% very fine subrounded sand, 5% to 10% silt. Black (10YR2/1). Phenolic odor present in sample. Lake sediments-beach deposits.	30
									GM	Silty sandy gravel (GM). About 50% fine to coarse angular gravel, 20% fine to medium sand, 15% coarse subangular sand, 15% silt. Coarse gravel fraction consisted of disc-shaped limestone gravel clasts up to 0.25-ft diameter clasts.	
		SSB/1.4	30	N/N	9.1		M	TILL	CL	Sandy lean clay (CL). About 70% fines, mostly clay, 25% fine to medium sand, 5% coarse subangular sand, trace fine to coarse gravel. Clay exhibited low to medium toughness, medium plasticity, and no dilatancy. Sample contained horizontal fractures. Gray (10YR5/1). Till. ◀Sample showed black staining on horizontal fractures to to 33.1 ft bgs.	
35		TW/0.9	10	N/N	9.0	GS/P/V/AL			CL	Lean clay (CL). Mostly clay, 5% fine to medium sand, trace coarse sand. Clay exhibited very high dry strength, medium toughness, medium plasticity, and no dilatancy. Gray (10YR5/1). Till. ◀Sample contained trace coarse gravel and no discoloration at 34.5 ft bgs. Thin wall tube was pushed from 34.5 to 36.5 ft bgs.	35
		SSB/1.0	40	N/N	9.3	GROUP 7				◀Sand and gravel fractions decreased to trace amounts at 37.0 ft bgs.	
										End of boring at 37.0 ft bgs. Split spoon driven to 39.0 ft bgs.	
40											40

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. GEOTECHNICAL SAMPLE TYPES: GS= grain size, P= porosity, V= vertical permeability. GROUP 7= CEC, TOC. AL= Atterberg limits.

FORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: J. Fox / K. Mann
CREW CHIEF: B. Loveland

BORING NUMBER: SB-49
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.58 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	-- 6 8 8	SSB/1.9	0	N/N	8.5		M	FILL	FILL / GP	Black top, asphalt concrete. Fill. Crushed limestone base material. Fill.	0
	6 8 10 11	SSB/1.8	0	N/N	8.1	GROUP 5					
5	-- 9 11 11 17	SSB/1.8	0	N/N	7.9		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Fine to medium grained sand. Pale brown (10YR6/3). Lake sediments - beach deposits. ▼ Water level at approximately 4 ft below ground surface (bgs).	5
	-- 2 6 6 10	SSB/2.0	0	N/N	7.8	GROUP 5					
10	-- 9 12 14 15	SSB/1.9	0.5	N/N	7.9						10
	-- 11 13 16 21	SSB/2.0	3.5	N/N	7.6						
15	-- 6 8 8 9	SSB/2.0	750	N/N	8.1					◀ Color change to gray (10YR5/1) below 15.0 ft bgs.	15
	-- 5 6 6 9	SSB/1.8	580	N/N	8.1	GROUP 5					
20	-- 11								SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Fine grained sand with about 5% fines as silt. Gray (10YR5/1).	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: J. Fox / K. Mann
CREW CHIEF: B. Loveland

BORING NUMBER: SB-49

RISER PIPE ELEVATION: N/A

GROUND SURFACE ELEVATION: 584.58 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	14 18 22	SSB/1.8	1500	N/N	8.1		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Fine grained sand with about 5% fines as silt. Gray (10YR5/1).	
	5 7 12 15	SSB/1.8	2090	M/N	8.9					◀ Color change to very dark gray (10YR3) at 24.5 ft bgs.	
25	2 10 13 17	SSB/2.0	350	S/N	9.0	GROUP 5					25
	22 36 44 58	SSB/2.0	850 10	S/N L/N	8.9 8.6		M	TILL	GP CL-ML	Poorly graded gravel (GP). Mostly fine to coarse grained gravel, angular to subangular limestone and mafic lithic clasts. Brown (10YR5/3). Till. Sandy silty lean clay (CL). Lean clay with about 20% silt, 12% gravel and about 12% sand. Grayish brown (10YR5/2). Till. Discolored dark gray to black from 28.1 to 28.2 ft bgs.	
30										End of boring at 27 ft bgs. Split spoon driven to 29 ft bgs.	30
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

, ORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: J. Fox / D. Moore
CREW CHIEF: B. loveland

BORING NUMBER: SB-50
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 578.46 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	6 12 18 10	SSB/2.0	4	N/N	8.3		M	FILL	GP	Poorly graded gravel (GP). Crushed limestone base material. Fill.	
									SP	Poorly graded sand (SP). Fine to medium grained sand. Pale brown (10YR8/5). Fill.	
	10 11 6 5	SSB/1.0	--	S/H	8.4	GROUP 5			TAR	Tar. Plastic. Black (10YR2/1).	
	-- 3 3 3 7	SSB/0.5	185	S/H	8.1				GP	Poorly graded gravel (GP). composed of fine to coarse gravel and coarse sand sized furnace slag, saturated with black (10YR2/1), plastic tar. Tar composes about half of the matrix. Fill.	
5	-- 4 6 10 12	SSB/1.0	--	S/T	7.6	GROUP 5/M18			GP-SP		5
	-- 12 13 14 16	SSB/2.0	35	M/T	7.6		W		SP	Poorly graded sand (SP). Fine grained sand. Dark gray (10YR4/1). Fill. ◀ Poorly graded sand (SP-GP). Fine to medium grained sand with about 50% coarse sand to fine gravel sized furnace slag at 9 ft below ground surface (bgs). Dark gray (10YR4/1). Fill.	
10	-- 11 11 14 18	SSB/2.0	20	L/N	7.8					◀ Percentage of furnace slag decreases with depth to about 5% from 12 to 17 ft (bgs). Color varies from gray to dark gray (10YR5/1 to 10YR4/1).	10
	-- 9 11 15 20	SSB/1.2	10	L/N	7.9						
15	-- 6 8 9 11	SSB/1.8	20	L/N	8.3	GROUP 5			SP	Poorly graded sand (SP). Mostly fine grained sand with trace amounts of coarse sand, fine gravel and white, angular shell fragments. Dark gray (10YR4/1). Lake sediments - beach deposits.	15
	-- 6								SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM).	
20											20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M18= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/5/93
DATE COMPLETED: 10/5/93
FIELD INSPECTOR: J. Fox / D. Moore
CREW CHIEF: B. loveland

BORING NUMBER: SB-50
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 578.46 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	6 8 13 -- 10 10 13 14 -- 10 11 11 18 -- 8 11 23 18 -- 25 30 52 63	SSB/1.7	300	L/N	8.2	GROUP 5	W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly fine grained sand with about 5 to 10% fines as silt and trace angular shell fragments. Lake sediments - beach deposits.	25
		SSB/1.8	1300	L/N	8.8						
		SSB/2.0	500	L/N	9.0						
		SSB/2.0	350	L/N	8.8					◀ Limestone cobbles at 28.5 ft bgs.	
30		SSB/0.4	--	N/N	--		M	TILL	CL	Silty lean clay (CL). Contains minor amounts of sand and gravel. Grayish brown (10YR5/2). Till.	30
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
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r:ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols. M18= duplicate sample.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/16/93
DATE COMPLETED: 9/16/93
FIELD INSPECTOR: J. de Beer / J. Fox
CREW CHIEF: M. Mueller

BORING NUMBER: SB-51-HP
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.69 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 1 2	SSB/1.4	0	N/N	9.1		D/M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine sand with about 5% medium sand, trace coarse sand, trace fine and coarse gravel, trace fines as silt and trace organics as roots (root zone). Mostly subangular to subrounded quartz sand with lesser dolomite/limestone and chert with about 5% white, angular shell fragments. Brown (10YR5/3). Lake sediments - beach deposits.	0
	2 3 4 5 8	SSB/1.8	0	N/N	8.6				ML	Silt (ML), showing no toughness, no plasticity, fast dilatancy, and low strength. Contains about 5% fine sand. About .2 ft thick, extending from 2 ft to 2.2 ft below ground surface (bgs). Lake sediments - stagnant water deposit.	
5	-- 5 8 13 15	SSB/1.8	2	N/N	8.4						5
	-- 4 4 12 18	SSB/1.8	0	N/N	8.9	GROUP 5				◀Poorly graded very fine to fine sand with about 10 to 15% medium grained sand, about 5% coarse sand, trace fine gravel, trace fines as silt, and about 5% white, angular shell fragments. Lake sediments - storm event beach deposit.	
10	-- 13 13 15 17	SSB/2.0	10	L/N	8.9		W		SP	◀Color changes from brown (10YR5/3) to dark gray (10YR4/1) at 9.5 ft bgs.	10
	-- 3 5 3 10	SSB/1.8	20	L/N	8.9					◀Dark grayish brown (10YR4/2) from 12 to 14 ft bgs.	
15	-- 7 11 15 22	SSB/2.0	60	L/N	9.0					◀Gray to dark gray (10YR5/1 - 10YR4/1). Coarse sand and fine gravel increase to about 5% at 14.5 ft bgs.	15
	-- 7 4 8 15	SSB/2.0	90	L/N	8.6					■ Silt content increases to about 5% and coarse sand and fine gravel decrease to trace amounts.	
20	-- 2										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 2= Ammonia/Arsenic (III, V)/As/Cd/Pb /Se/Hg/Thiocyanate/PAH/Phenols/Cyanide total and amenable/weak acid dissassociable cyanide/VOCs/CLP/TCL for ground water. GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/PAH/Phenols for soils.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/16/93
DATE COMPLETED: 9/16/93
FIELD INSPECTOR: J. de Beer / J. Fox
CREW CHIEF: M. Mueller

BORING NUMBER: SB-51-HP
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.69 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	2 5 8 -- 3 2 1 5 -- 1 1 3 9 -- 3 4 8 10 -- -- -- -- -- -- -- -- -- --	SSB/2.0	150	L/N	9.1	GROUP 5	W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine sand with about 5% medium sand, trace coarse sand, trace fine and coarse gravel, about 5% fines as silt. Mostly subangular to subrounded quartz sand with lesser dolomite/limestone and chert with about 5% white, angular shell fragments. Gray to dark gray (10YR5/1 - 10YR4/1). Lake sediments - beach deposits. ◀Color varies from brown to dark gray (10YR5/3 - 10YR4/1) from 22 to 24 ft bgs. Dark gray from 24.5 to 29 ft bgs.	25
		SSB/2.0	150	L/N	8.4						
		SSB/2.0	0	L/N	8.4						
		SSB/1.9	3000	M/N	8.6	GROUP 5					
30		HP/--	--	--	--	GROUP 2				End of boring at 29 ft bgs. A Hydropunch 2 sampler was driven from 29 to about 33 ft bgs. The tip of the Hydropunch 2 sampler was driven into the till (sandy lean clay with gravel- CL) which is in contact with the beach sands at about 33 ft bgs. The sampler was pulled back about 1.5 ft to expose the No. 10 slot polypropylene screen, and water samples were taken with a pencil bailer. The steel point and the screen were left in the ground when the AW rods and augers were removed. Tremied Quick Gel bentonite grout was used to backfill the borehole as the drill tools were removed.	30
								TILL	CL	Till. Inferred based on resistance to drive sampler and local depth to the till on the beach.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a ORV Mobil B-57 ATV drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 2= Ammonia/Arsenic (III, V)/As/Cd/Pb /Se/Hg/Thiocyanate/PAH/Phenols/Cyanide total and amenable/weak acid dissassociable cyanide/VOCs/CLP/TCL for ground water. GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/PAH/Phenols for soils.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 9/15/93
DATE COMPLETED: 9/15/93
FIELD INSPECTOR: J. de Beer / K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-52-HP
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.40 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 1 1 2	SSB/1.4	0	N/N	7.8		M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine sand with about 5% medium grained sand, trace coarse sand and fine gravel, trace fines as silt, and trace organics as roots. Mostly flat, subangular to subrounded quartz with lesser limestone/dolomite and chert, and about 5% angular, white shell fragments, and about 5% black colored grains of coal. Pale brown (10YR6/3). Lake sediments - Beach deposits with a root zone in the upper 2 ft.	0
	3 4 8 9	SSB/1.8	40	N/N	7.1						
5	-- 2 4 8	SSB/1.5	2.5	N/N	7.6					◀Fines increase to about 5% silt from 4.5 to 6.5 ft below ground surface (bgs).	5
	13 -- 2 4 8	SSB/1.8	0	N/N	7.8					◀Coarser, poorly graded, thinly bedded (about .2 ft thick) sand lense at about 8.2 ft bgs. Dominantly medium to coarse sand with lesser fine sand, and containing about 5% angular, white shell fragments, 5% black, angular to subangular coal (Lignite) fragments.	
10	11 -- 6 5 6	SSB/1.5	1	N/N	7.8	GROUP 5	W			◀Color change to grayish brown (10YR5/2) at 11 ft bgs.	10
	12 -- 7 7	SSB/1.7	0	L/N	8.3					◀Split spoon passed through a thin (<1mm) piece of metal (Tin or aluminium). The color changed to dark gray (10YR3/1) and black (10YR2/1) in the soils above and below the piece of metal.	
15	10 18 -- 4 3 7	SSB/1.7	4	L/N	8.3					◀Grayish brown (10YR5/2) colored sands at 14.5 ft bgs.	15
	10 -- 4 4 8	SSB/1.7	8	L/N	8.5	GROUP 5				◀Color change to dark grayish brown (10YR4/2) and dark gray (10YR4/1) at 17 ft bgs. ◀Silt (ML) seam about 1 inch thich at 18 ft bgs, exhibiting no toughness, no plasticity, fast dilatancy, and low strength. Has a low coal tar odor.	
20	12 -- 8									◀Color change to grayish brown (10YR5/2) at 20 ft bgs .	20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 2= Ammonia/Arsenic (III, V)/As/Cd/Pb /Se/Hg/Thiocyanate/PAH/Phenols/Cyanide total and amenable/weak acid dissassociable cyanide/VOCs/CLP/TCL for ground water. GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/PAH/Phenols for soils.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 9/15/93
DATE COMPLETED: 9/15/93
FIELD INSPECTOR: J. de Beer / K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-52-HP
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.40 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	9 12 13 -- 1 1 4 8 -- 3 4 6 7 -- 4 7 9 12 -- 1 2 3 3 -- 4 4 5 8	SSB/0.5	2	L/N	8.5		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	◀Color change from grayish brown to dark gray (10YR4/1) at 22 ft bgs.	25
		SSB/2.0	0	L/N	8.3						
		SSB/1.8	2	L/N	8.4						
		SSB/1.9	3	L/N	8.6				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Very fine to fine sand grained with about 5% medium grained sand, trace coare sand and fine gravel, and about 5 to 10% fines as silt.	
30		SSB/1.5	0	M/N	8.5				SP	Poorly graded sand (SP). Very fine to fine grained sand with about 5% medium and, 5% fines as silt and trace coarse sand.	30
									SP/ SP-SM	poorly graded sand to poorly graded sand with silt (SP/SP-SM). Same as lense above.	
		SSB/2.0/HP	10	M/N	8.3	GROUP 2.5			SP	Poorly graded sand (SP). Same as above.	
							D/M		CL	Sandy lean clay with gravel (CL). Lean clay showing medium to high toughness, high dry strength, moderate plasticity, no to very slow dilatancy, with about 30% fine to coarse sand and about 15% fine to coarse, angular gravel. Till.	
35										End of boring at 32 ft bgs. Split spoon driven to 34 ft bgs.	35
										A second borehole, placed 5 ft south of the pilot borehole, was drilled down to 29 ft bgs. The Hydropunch 2 sampler was driven from 29 to 33.5 ft bgs with the steel point lodging into the till. The sampler was pulled back about 1.5 ft to expose the No. 10 slot polypropylent screen, and water samples were taken with a pencil bailer. The steel point and the screen were left in the ground when the AW rods and augers were removed. Tremied Quick Gel bentonite grout was used to backfill both the pilot borehole and the hydropunch borehole as the drill tools were removed.	
										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted on an ORV Mobil B-57 ATV drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr= 812/832-2800) geologist and the borehole was drilled by WTD Environmental Drilling (WTD = 715/350-7000).	
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r:\ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 2= Ammonia/Arsenic (III, V)/As/Cd/Pb /Se/Hg/Thiocyanate/PAH/Phenols/Cyanide total and amenable/weak acid dissassociable cyanide/VOCs/CLP/TCL for ground water. GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/PAH/Phenols for soils.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/16/93
DATE COMPLETED: 9/16/93
FIELD INSPECTOR: J. de Beer / J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-53-HP
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.93 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 1 1	SSB/1.5	0	N/N	8.4		D/M	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine sand with about 5% medium grained sand, trace fines as silt, and trace organics as roots. Mostly subangular to subrounded quartz grains with lesser limestone/dolomite and chert, and about 5% angular, white shell fragments. Pale brown (10YR6/3). Lake sediments - beach deposits.	0
	2 5 5 8 12	SSB/1.7	0	N/N	7.6					◀ Color change to dark brown (10YR3/3). Medium grained sand increases to about 10% from 2 to 7 ft below ground surface (bgs).	
5	2 4 8 7	SSB/1.8	1	N/N	7.7					◀ Color change to brown (10YR5/3) at 4.5 ft bgs. Black colored medium to coarse sand sized grains of coal (Lignite) occur from 4.5 to 6.5 ft bgs.	5
	5 6 10 13	SSB/1.8	0	N/N	7.5	GROUP 5				◀ Percentage of medium grained sand drops to about 5%.	
10	4 4 7 10	SSB/1.5	2	L/N	7.6		W			◀ Color change to grayish brown (10YR5/2) occurrs with fine laminations of medium grained sand with white shell fragments at 8 ft bgs.	10
	3 3 5 9	SSB/1.8	0	L/N	8.2					◀ Color change to dark gray (10YR4/1) at 12 ft bgs.	
15	7 6 13 18	SSB/1.9	2	N/N	8.1						15
	6 12 13 15	SSB/1.9	0	L/N	8.4						
20	6										20

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COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 2= Ammonia/Arsenic (III, V)/As/Cd/Pb /Se/Hg/Thiocyanate/PAH/Phenols/Cyanide total and amenable/weak acid dissassociable cyanide/VOCs/CLP/TCL for ground water. GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/PAH/Phenols for soils.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/16/93
DATE COMPLETED: 9/16/93
FIELD INSPECTOR: J. de Beer / J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-53-HP
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 584.93 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	12 13 15 --	SSB/1.8	5	L/N	8.8		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Dominantly very fine to fine sand with about 5% medium grained sand, about 5% fines as silt. Mostly subangular to subrounded quartz grains with lesser limestone/dolomite and chert, and about 5% angular, white shell fragments. Dark gray (10YR4/1). Lake sediments - beach deposits.	25
	5 6 7 14 --	SSB/1.7	7	L/N	8.6						
	1 2 4 6 --	SSB/1.9	0	L/N	8.9					◀ Trace amounts of fine gravel at 27 ft bgs.	
	4 3 5 8 --	SSB/2.0	7	L/N	9.2	GROUP 5					
30	-- -- -- -- -- -- -- --	HP	--	--	--	GROUP 2				End of boring at 29 ft bgs. A Hydropunch 2 sampler was driven from 29 to about 33 ft bgs. The tip of the Hydropunch 2 sampler was driven into the till (sandy lean clay with gravel- CL) which is in contact with the beach sands at about 33 ft bgs. The sampler was pulled back about 1.5 ft to expose the No. 10 slot polypropylene screen, and water samples were taken with a pencil bailer. The steel point and the screen were left in the ground when the AW rods and augers were removed. Tremied Quick Gel bentonite grout was used to backfill the borehole as the drill tools were removed.	30
								TILL	CL	Till. Inferred based on resistance to drive sampler and local depth to the till on the beach.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a ORV Mobil B-57 ATV drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split spoon with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 2= Ammonia/Arsenic (III, V)/As/Cd/Pb /Se/Hg/Thiocyanate/PAH/Phenols/Cyanide total and amenable/weak acid dissassociable cyanide/VOCs/CLP/TCL for ground water. GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/PAH/Phenols for soils.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/7/93
DATE COMPLETED: 10/7/93
FIELD INSPECTOR: D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-54
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION:

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	--	--	--	--	--		--		--	Boring advanced to 4.5 feet below ground surface (bgs) prior to collecting first sample. Grab samples were taken from the augers.	
5		GRAB	7	N/N	7.9		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly fine grained sand. Gray brown color. Lake sediments - beach deposits.	5
		GRAB	55	L/T	7.1					◀ Color change to black at 7 ft bgs.	
10										End of boring at 9 ft bgs.	10
										This boring was advanced to collect an uncontaminated, native soil sample for evaluation of the slurry wall containment technology. The sample collected from 7 to 9 ft bgs was discolored black, had a low odor and trace sheen. Therefore, the boring was terminated and backfilled with tremmied bentonite slurry. A new boring location was chosen, and designated SB-57.	
15										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	15
20											20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/2/93
DATE COMPLETED: 10/2/93
FIELD INSPECTOR: D. Moore (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-55
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION:

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	-- -- -- --									This boring was placed about 4 ft southwest of SB-46 so as to obtain an analytical sample for the interval 2 to 4 ft below ground surface (bgs). For a description of the soil from 0 to 2 ft bgs, please see SB-46.	
	10 8 3 2	SSB/0.6	17	S/H	7.9	GROUP 5	M	FILL	SM	Hard tar. Black. Fill. Silty sand (SM). About 40% fine grained sand, 20% medium to coarse sand and fine gravel, about 20% fines as silt in a tarry matrix. Black (2.5YR3/0). Fill.	
										End of boring at 4 ft bgs.	
5											5
										The recovery from the split spoon was enough to fill the brass liner only. To collect more sample, a flight auger was advanced through the same interval and the sample was collected from the auger. The 0 to 2 ft bgs interval was reamed out to insure the integrity of the 2 to 4 ft bgs sample.	
10											10
15										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a ORV Mobil B-57 ATV drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD - 715/359-7090).	15
20											20

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

, ORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/7/93
DATE COMPLETED: 10/7/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-56
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 583.40 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
										NOTE: Soil Boring SB56 was completed to obtain an analytical sample from above the till near SB40. Samples were not collected from ground surface to 22.0 ft below ground surface (bgs). See the boring log from SB40 for the description of materials down to 22.0 ft bgs.	
5											5
10											10
15											15
20											20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/7/93
DATE COMPLETED: 10/7/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: M. Mueller (WTD)

BORING NUMBER: SB-56
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 583.40 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	10 14 9 11 --	SSB/none								◀No recovery from the sample interval from 22.0 to 24.0 ft bgs.	
25	2 4 6 7 --	SSB/1.4	85	S/T	8.6		W	LAKE SEDIMENTS-BEACH DEPOSITS	SP-SM	Poorly graded sand with silt (SP-SM). About 80% fine subrounded sand, 10% silt, trace medium angular sand. Black (10YR2/1). Lake sediments-beach deposits.	25
	16 77 74 --	SSB/1.5	65	S/T	8.6	GROUP 5			GM	Silty gravel with sand (GM). About 80% fine to coarse angular to subrounded gravel, 15% fine to medium sand, 15% silt, 10% coarse angular sand. Coarse sand and gravel fractions consisted of limestone or dolomite, and basaltic lithologies. Black (10YR2/1). Lake sediments-beach deposits.	
30	16 32 41 --	SSB/1.5	25	N/N	8.5		M	TILL	CL	Lean clay (CL). About 90% clay, 10% fine to medium angular sand, trace subrounded to subangular gravel. Clay exhibited medium toughness, medium plasticity, no dilatancy, and high dry strength. Gray (10YR5/1) with no discoloration. Till.	30
										End of boring at 28.5 ft bgs. Split spoon driven to 30.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a ORV Mobil B-57 ATV drill rig producing a 8¼" (O.D.) borehole. California samplers (3' diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr- 612/832-2800) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

, ORM30 rev.12/21/93 JAB

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/7/93
DATE COMPLETED: 10/7/93
FIELD INSPECTOR: D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-57
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.62 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
5	--	NO SAMPLE	--	--	--				SP-SM	This borehole was drilled to collect a sample for the technology testing of the slurry wall design remedial option. The borehole was advanced to 22 ft below ground surface (bgs) with a 4¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck-mounted drill rig producing a 8¼" (O.D.) borehole. A California sampler (3" diameter split spoon sampler with a 6" brass liner retained in the bottom of the sampler) was driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by Wisconsin Test Drilling (WTD-715/359-7090). Samples were not taken from 0 to 22 ft bgs.	5
10	--		--	--	--						10
15	--		--	--	--						15
20	--		--	--	--						20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/7/93
DATE COMPLETED: 10/7/93
FIELD INSPECTOR: D. Moore (Barr)
CREW CHIEF: B. Loveland (WTD)

BORING NUMBER: SB-57
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.62 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
	-- -- -- --	NO SAMPLE	--	--	--						
	8 10 12 14	SSB/1.5	7	N/N	8.3	GROUP 5	W		SP-SM	Poorly graded sand with silt (SP-SM). Mostly fine grained sand with about 10% medium grained sand, about 10 to 15% fines as silt and about 5% white shell fragments. Dark olive gray (5Y3/2P). Lake sediments - beach deposits.	
										End of boring at 22 ft bgs. Split spoon driven to 24 ft bgs.	
25											25
30											30
35											35
40											40

r-ORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 11/2/93
DATE COMPLETED: 11/2/93
FIELD INSPECTOR: J. de Beer (Barr)
CREW CHIEF: P. Dickenson (WTD)

BORING NUMBER: SB-58
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION:

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
5	--	NO SAMPLE	--		--					Please see the boring log for Soil Boring SB-57 for details on the subsurface. The purpose of this boring was to obtain samples of the oily sands present in this location for technology testing studies. Grab samples were taken from a depth of 5 to 10 ft below ground surface (bgs) and placed in clean, new 5 gallon buckets. Oily sands were present beginning at 4 ft bgs. Two borings were placed to obtain the sample volume necessary to fill six 5 gallon buckets. The second boring was placed 2 feet east of the first boring.	5
	--		--		--						
	--	GRAB	--	S/H	--						
10	--		--	S/H	--						10
15										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a BK-81 truck-mounted drill rig producing a 8¼" (O.D.) borehole. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by Wisconsin Test Drilling (WTD-715/359-7090).	15
20											2

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 11/1/93
DATE COMPLETED: 11/1/93
FIELD INSPECTOR: J. de Beer / D. Moore (Barr)
CREW CHIEF: P. Dickenson (WTD)

BORING NUMBER: SB-59
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION:

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	-- -- -- --	GRAB	--	N/N	--		M	FILL	FILL	Concrete. Fill. Augers turned through concrete.	0
									CL	Lean clay (Cl). Dark gray (10YR4/1). Fill. A split spoon was not pounded from 0 to 2 ft below ground surface (bgs).	
	3 7 11 14	SSB/1.9	5	N/N	8.3	GROUP 5				Sandy lean clay (CL). Lean clay with about 30% fine to coarse grained sand, trace gravel and wood debris. Gray (10YR5/1) mottled with yellowish brown (10YR5/4). Fill. ◀ Wood encountered from 2.7 to 2.8 ft bgs.	
	-- 2 5 8 13	SSB/1.7	110	L/N	8.5				SP	Poorly graded sand (SP). Mostly very fine to fine grained sand with about 5% medium grained sand and about 5% white angular shell fragments. Grayish brown (10YR5/2). Fill consisting of beach sands with wood fragments. ◀ Color change from grayish brown to brown (10YR5/2 - 10YR5/3) at 4.5 ft bgs. ◀ Wood encountered from 5.2 to 5.3 ft bgs.	5
5	-- 8 8 13 14	SSB/1.4	35	L/N	8.5	GROUP 5				◀ Coarse sand fraction increases to 5% from 7 to 9 ft bgs. Color change to very dark gray (10YR3/1) at 7 ft bgs.	
	-- 5 9 11 13	SSB/2.0	40	M/N	8.5					◀ Medium sand increases to about 5% and silt occurs in trace amounts beginning at 9.5 ft bgs.	
10	-- 13 14 21 26	SSB/2.0	325	M/N	7.9		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly very fine to fine grained sand with about 5% medium grained sand, trace fines as silt and about 5% white angular shell fragments. Sand grains are subangular to subrounded. Dark gray to very drak gray (10YR4/1 - 10YR3/1). Lake sediments - beach deposits. Moderate coal tar odor.	10
	-- 14 16 19 21	SSB/2.0	250	S/N	8.2					◀ Dark gray (10YR4/1) at 14.5 ft bgs. ◀ Color change to very dark gray (10YR3/1) at 15.5 ft bgs. Silt content increases to about 5%.	
15	-- 16 29 32 35	SSB/2.0	300	S/N	8.9	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly very fine to fine grained sand with about 5% fine grained gravel, about 5% coarse sand and about 5 to 10% fines as silt. Gray (10YR5/1). Lake sediments - beach deposits.	15
20	-- 5										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 11/1/93
DATE COMPLETED: 11/1/93
FIELD INSPECTOR: J. de Beer / D. Moore (Barr)
CREW CHIEF: P. Dickenson (WTD)

BORING NUMBER: SB-59
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION:

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	7 8 13 -- 4 4 6 8 -- 19 21 14 23 -- 34 43 80 -- --	SSB/2.0 SSB/2.0 SSB/1.9 SSB/1.8	1100 1400 1000 100	M/N S/N S/N S/N	8.3 8.5 8.3 8.9	GROUP 5	W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM GP SP	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly very fine to fine grained sand with about 5% fine grained gravel, about 5% coarse sand about 5 to 10% fines as silt, and about 1% white angular shell fragments. Dark gray (10YR5/1). Lake sediments - beach deposits. ◀ Strong mustard smell encountered at 22 ft bgs. Poorly graded gravel (GP). Fine to coarse grained limestone/ dolomite gravel. Poorly graded sand (SP). Very fine to fine grained subrounded to subangular sand. Lake sediments - beach deposits.	25
30	21 39 65 45	SSB/2.0	125	S/N	8.8		M	TILL	CL	Sandy lean clay with gravel (CL). Hard lean clay exhibiting high toughness, moderate plasticity, no dilatancy, and high dry strength with about 35% fine to coarse grained sand and about 15% fine to coarse grained gravel. Gray (10YR5/1). Till	30
										End of boring at 29.5 ft bgs. Split spoon driven to 31.5 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a BK-81 truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 11/2/93
DATE COMPLETED: 11/2/93
FIELD INSPECTOR: J. de Beer / D. Moore (Barr)
CREW CHIEF: P. Dickenson (WTD)

BORING NUMBER: SB-60
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.74 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
0	1 3 4 5	SSB/1.7	0	N/N	8.1		D	FILL	SP	Poorly graded sand (SP). Mostly very fine to fine grained sand with about 5% medium grained sand, trace coarse grained sand with roots (root zone). Grayish brown (10YR5/2). Fill consisting of beach sand.	0
	5 5 5 6 --	SSB/1.0	--	N/N	8.1	GROUP 5	M		SW	Well graded sand (SW). Mostly coal and coke fines consisting of fine to coarse sand, with about 10% fine to coarse grained gravel and about 10% fines as silt. Black (10YR2/1). Fill.	
5	1 2 5 6 --	SSB/1.8	175	L/N	7.8				SP	Poorly graded sand (SP). Mostly very fine to fine grained sand with about 5% medium grained sand, trace coarse sand and fine gravel, trace fines as silt, and about 5% white angular shell fragments. Oil sheen is heavy from 5.5 to 5.7 ft below ground surface (bgs). Fill consisting of beach sands. Coal tar odor.	5
	8 10 12 15 --	SSB/1.9	220	L/M	7.8	GROUP 5			SW	Well graded sand (SW). Mostly fine grained sand and fine grained sand to coarse grained gravel sized furnace slag, coal, and coke fines. Coal and coke fines are mostly silt sized to medium grained sand sized. Black (10YR2/1).	
10	4 4 8 10 --	SSB/1.1	40	L/T-H	7.6			LAKE SEDIMENTS - BEACH DEPOSITS	SP	Poorly graded sand (SP). Mostly very fine to fine grained sand with about 5% medium grained sand, trace coarse sand and fine gravel, and about 5% white angular shell fragments. Patchy oily content gives trace to heavy sheen depending on where the sheen test is conducted. Very dark gray (10YR3/1). Lake sediments - beach deposits.	10
	8 5 16 18 --	SSB/1.2	9	M/T-H	7.6		W			◀ Silt content increases to about 5% at 12 ft bgs.	
15	5 5 10 16 --	SSB/1.7	125	M/N	7.6						15
	16 18 24 37 --	SSB/1.3	20	L/N-M	8.5	GROUP 5			SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM).	
20	9										20

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

BORING LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 11/2/93
DATE COMPLETED: 11/2/93
FIELD INSPECTOR: J. de Beer / D. Moore (Barr)
CREW CHIEF: P. Dickenson (WTD)

BORING NUMBER: SB-60
RISER PIPE ELEVATION: N/A
GROUND SURFACE ELEVATION: 585.74 ft MSL

Depth (Feet)	Blows Per 6 in.	Sample Type/ Recovery (Ft.)	Non-Meth Org Vap Headspace (ppm)	Odor/Sheen	Soil pH	Analytical Sample Types	Moisture Content	Lithologic Unit	ASTM Soil Classification	DESCRIPTION OF MATERIALS AND REMARKS	Depth (Ft)
25	12 18 24 --	SSB/1.4	20	L/N-M	8.8		W	LAKE SEDIMENTS - BEACH DEPOSITS	SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly very fine to fine grained sand with trace amounts of coarse sand, about 5% medium grained sand, about 5 to 10% fines as silt and about 5% white angular shell fragments. Oil sheen test results vary with test specimen location due to the patchy nature of soil oil content. Black (10YR2/1). Lake sediments - beach deposits.	25
	18 14 16 25 --	SSB/1.8	20	L/N	8.9				SP-SM	Poorly graded sand with silt (SP-SM). Mostly very fine to fine grained sand with about 10% fines as silt and about 5% white angular shell fragments. Black (10YR2/1). Lake sediments - beach deposits.	
	11 9 11 12 --	SSB/1.5	50	M/N	8.8				SP/ SP-SM	Poorly graded sand to poorly graded sand with silt (SP/SP-SM). Mostly very fine to fine grained sand with about 5 to 10% fines as silt and about 5% white angular shell fragments. Black (10YR2/1). Lake sediments - beach deposits.	
30	13 11 14 19	SSB/2.0	5	S/N	8.8	GROUP 5	M		SP-SM	Poorly graded sand with silt (SP-SM). Mostly very fine to fine grained sand with about 10% fines as silt and about 5% white angular shell fragments. Black (10YR2/1). Lake sediments - beach deposits. Phenolic odor.	30
									GP	Poorly graded gravel (GP). Fine to coarse grained limestone/dolomite gravel.	
									CL	Sandy lean clay with gravel (CL). Hard lean clay exhibiting high toughness, moderate to high plasticity, no dilatancy and high dry strength with about 30% fine to coarse grained sand, and about 15% fine to coarse grained gravel. Gray (10YR5/1) with black (10YR2/1) stained fractures. Till.	
										End of boring at 27 ft bgs. Split spoon driven to 29 ft bgs.	
35										The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to a BK-81 truck-mounted drill rig producing a 8¼" (O.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090).	35
40											40

FORM30 rev.12/21/93 JAB

COMMENTS: SAMPLE METHOD: G=grab; SSB= split barrel with brass liner; SS= split spoon (no liner); TW= thin wall; HP= hydropunch water sample. ODOR: L= low; M= modorate; S= strong; VS= very strong; P= petroleum; D= diesel. SHEEN: N= none; T= trace; M= moderate; H= heavy. MOISTURE: D= dry; M= moist; W= wet. ANALYTICAL SAMPLE TYPES: GROUP 5= As/Cd/Pb/Se/Hg/tot. Cyanide/BETX/ PAH/Phenols.

Ground Surface Soil Samples

GROUND SURFACE SOIL SAMPLE DESCRIPTIONS

LOCATION	GROUND SURFACE ELEVATION (FT)	NORTHING COORDINATE	EASTING COORDINATE	DEPTH (FT)	ASTM	DESCRIPTION	COLOR
GROUND SURFACE SOIL SAMPLES							
GS01	--	--	--	0-0.5	SM/OL	Silty sand/organic soil.	Dark brown
GS02	--	--	--	0-0.5	OL/CL	Organic soil/silty clay.	Dark brown
GS03	585.70	4851.400	5910.600	0-0.5	SM	Silty sand with gravel.	Black
GS04	--	--	--	0-0.5	SP	Poorly graded sand.	Light brown
GS05	585.00	4841.930	5599.200	0-0.5	SM	Silty sand with organics.	--
GS06	585.10	4844.400	5298.300	0-0.5	--	Crushed limestone base material.	--
GS07	584.86	4779.875	5750.660	0-0.5	SM	Silty sand.	Blue at surface; black
GS08	585.20	4467.900	5686.800	0-0.5	SM	Silty sand with gravel, organics, and brick material.	Black
GS09	585.70	4453.000	5268.800	0-0.5	SP-SM	Poorly graded sand with silt.	--
GS10	606.50	4179.800	5011.800	0-0.5	SP	Poorly graded sand.	Brown
GS11	586.80	4148.300	5575.500	0-0.5	SM	Silty sand with gravel and clinkers.	Black
GS12	586.50	4149.200	5218.100	0-0.5	SP	Poorly graded sand.	Brown and black
GS13	602.08	3937.700	4939.900	0-0.5	SP-SM	Poorly graded sand with silt.	Dark brown
GS14	604.07	4043.700	5068.300	0-0.5	SP	Poorly graded sand, dredge spoils.	Brown
GS15	585.80	3775.700	5543.700	0-0.5	SM	Silty sand with slag.	Dark grayish brown
GS16	585.80	3772.500	5238.200	0-0.5	--	Coal fines.	Black
GS17	582.80	3765.800	4927.800	0-0.5	SP-SM	Poorly graded sand with silt.	Brown

Designated Soil Stock Pile Samples

DESIGNATED SOIL STOCKPILE SOIL SAMPLE DESCRIPTIONS

LOCATION	GROUND SURFACE ELEVATION (FT)	NORTHING COORDINATE	EASTING COORDINATE	DEPTH (FT)	ASTM	DESCRIPTION	COLOR
Designated Soil Stock Stockpile Soil Samples							
DS01	591.49	4366.497	5115.679	0-2.15 (EOB)	SP-SM	Poorly graded sand with silt. Fine grained sand with moderate coal tar odor.	Dark gray (10YR4/1)
DS02	591.11	4280.310	5112.539	0-0.6	SP-SM	Poorly graded sand with silt.	Very dark gray (10YR3/1)
				0.6-0.8	SP	Poorly graded sand with about 5% gravel. Gravel mostly coal material.	
				0.8-2.0	SP	Poorly graded sand. Mostly fine sand with 0.5-in. diameter pockets of soil bound by viscous coal tar.	
				2.0-2.5 (EOB)	SP	Poorly graded sand. Coarser sand below 2.0 ft.	
DS03	592.21	4317.622	5189.087	0-0.2	SP-SM	Poorly graded sand with silt. Trace gravel.	Very dark gray (10YR3/1)
				0.2-2.3 (EOB)	SP	Poorly graded sand with about 5% gravel. Gravel mostly coal and slag fragments. Increased gravel fraction below 1.5 ft.	

Appendix 4-B

Survey Notes

TABLE 4B-1

PHASE I INVESTIGATION SURVEY SUMMARY
WAUKEGAN MANUFACTURED GAS AND COKE PLANT
AUGUST 20, 1992

SOIL SAMPLES	ELEVATION	LOCATION COORDINATES		SURVEY BOOK PAGE
		NORTH	EAST	
SS-01	585.4	4971.8	5553.3	26
SS-02	585.3	4920.5	5392.1	4/40
SS-03	585.5	4934.9	5206.2	4/40
SS-04	584.8	4737.9	5064.3	4/40
SS-05	584.6	4740.8	5266.9	4/40
SS-06	585.8	4733.2	5529.7	28
SS-07	584.7	4727.4	5665.5	27
SS-08	585.5	4527.0	5627.6	27
SS-09	586.9	4348.0	5505.0	27
SS-10	585.8	4176.9	5363.0	28
SS-11	585.6	4047.1	5235.5	32
SS-12	583.9	3835.7	5001.2	32
SS-13	585.1	3840.3	5193.6	32
SS-14	585.2	3788.1	5389.9	30
SS-15	585.4	3647.0	5272.4	33
SS-16	585.2	3649.8	5075.4	33
SS-17	585.1	3653.1	4865.6	33
SC-01	584.4	3599.4	5600.9	33
SC-02	585.8	4263.4	5828.9	33
BS-06	586.3	5146.6	4955.6	36
BS-07	584.8	5128.7	5525.8	36
BS-08	585.6	5444.6	6198.8	37
SB-03	585.9	4975.8	5528.3	41

TABLE 4B-1 (Cont.)

PHASE I INVESTIGATION SURVEY SUMMARY
WAUKEGAN MANUFACTURED GAS AND COKE PLANT
AUGUST 20, 1993

MONITORING WELL	ELEVATION			LOCATION COORDINATES		SURVEY BOOK PAGE
	GROUND	CASING	RISER	NORTH	EAST	
MW-3D	585.5	588.23	588.23	4961.8	5552.0	21/26
MW-3S	585.2	588.31	588.24	4971.8	5553.3	21/26
MW-4D	586.1	589.07	589.06	4118.3	5874.1	34/39
MW-4S	586.2	589.29	589.17	4109.5	5870.6	34/39
MW-5D	585.7	588.49	588.47	3807.9	4811.6	22/32
MW-5S	585.4	587.91	587.89	3802.6	4811.1	23/32
MW-6D	585.7	588.56	588.51	4442.1	4921.0	23/28
MW-6S	585.7	588.48	588.45	4431.7	4920.3	23/28
P-101	585.0	588.21	588.14	4994.2	5036.0	36/41
P-102	585.6	588.57	588.52	4963.9	5958.3	21/26
P-103	586.4	589.47	589.44	4004.9	5467.3	29/39
P-104	586.0	589.10	589.07	4499.9	5574.5	22/27
Existing 1D	585.8	587.74	587.62	4412.7	5326.1	6/24
Existing 1S	586.0	587.83	587.76	4418.1	5328.4	6/24

Bench Mark (BM): "X" on seawall northwest corner of slip at Larson Marine, 7 feet east of and 41 feet south of Larson Marine storage building.
EL. given = 584.65 Coordinate: 4675N, 4939E

BM was established by Mid-America Survey Company in 1988 for Canonie and Hi Tech.

Elevations are USGS mean sea level datum elevations.

TABLE 4B-2

PHASE II INVESTIGATION SURVEY SUMMARY
WATER LEVEL MEASURING POINTS

MONITORING POINT	LOCATION		ELEVATIONS			SURVEY BOOK PAGE	COMMENTS
	NORTHING	EASTING	GROUND	CASING	RISER		
MONITORING WELLS							
MW-1D	4412.7	5326.1	585.8	587.74	587.62	6/24	Existing well
MW-1S	4418.1	5328.4	586.0	587.83	587.76	6/24	Existing well
MW-3D	4961.8	5552.0	585.5	588.23	588.23	21/26	
MW-3S	4971.8	5553.3	585.2	588.31	588.24	21/26	
MW 4D	4118.3	5874.1	586.1	586.20	585.93	54	Well height changed
MW 4S	4109.5	5870.6	586.3	586.41	586.16	54	Well height changed
MW-5D	3807.9	4811.6	585.7	588.49	588.47	22/32	
MW-5S	3802.6	4811.1	585.4	587.91	587.89	22/32	
MW-6D	4442.1	4921.0	585.7	588.56	588.51	23/28	
MW-6S	4431.7	4920.3	585.7	588.48	588.45	23/28	
MW-7D	4553.8	5902.0	585.0	588.29	588.14	58	
MW-7S	4545.0	5899.8	584.9	588.08	587.78	59	
MW-8D	3583.5	5874.5	586.4	586.43	586.09	60	
MW-8S	3583.6	5879.7	586.5	586.57	586.43	60	
MW-9D	4206.1	5696.0	585.7	588.64	588.65	58	
MW-9S	4212.2	5693.6	585.4	588.52	588.49	58	
MW-10D	3694.6	5226.3	585.6	588.63	588.60	57	
MW-10S	3695.5	5233.1	585.7	588.57	588.58	57	
MW-11D	5002.3	5048.2	585.0	588.01	587.98	62	
MW-11S	5002.9	5042.6	585.0	587.95	587.83	62	
MW-12D	3977.0	6257.9	586.2	586.28	586.01	55	
MW-12S	3983.4	6257.1	586.2	586.22	586.03	55	
MW-13D	4388.9	6274.9	587.1	587.24	586.90	53, 54	
MW-13S	4389.8	6269.4	587.1	587.24	586.95	54	
MW-14D	4937.9	6213.3	584.3	584.30	584.05	53	
MW-14S	4931.6	6213.7	584.1	584.32	583.92	53	
MW-15D	5193.1	5540.3	585.5	585.61	585.39	52, 62	
MW-15S	5190.5	5531.4	585.3	585.48	585.33	52	

TABLE 4B-2

PHASE II INVESTIGATION SURVEY SUMMARY
WATER LEVEL MEASURING POINTS

MONITORING POINT	LOCATION		ELEVATIONS			SURVEY BOOK PAGE	COMMENTS
	NORTHING	EASTING	GROUND	CASING	RISER		
MONITORING WELLS							
MW-1D	4412.7	5326.1	585.8	587.74	587.62	6/24	Existing well
MW-1S	4418.1	5328.4	586.0	587.83	587.76	6/24	Existing well
MW-3D	4961.8	5552.0	585.5	588.23	588.23	21/26	
MW-3S	4971.8	5553.3	585.2	588.31	588.24	21/26	
MW 4D	4118.3	5874.1	586.1	586.20	585.93	54	Well height changed
MW 4S	4109.5	5870.6	586.3	586.41	586.16	54	Well height changed
MW-5D	3807.9	4811.6	585.7	588.49	588.47	22/32	
MW-5S	3802.6	4811.1	585.4	587.91	587.89	22/32	
MW-6D	4442.1	4921.0	585.7	588.56	588.51	23/28	
MW-6S	4431.7	4920.3	585.7	588.48	588.45	23/28	
MW-7D	4553.8	5902.0	585.0	588.29	588.14	58	
MW-7S	4545.0	5899.8	584.9	588.08	587.78	59	
MW-8D	3583.5	5874.5	586.4	586.43	586.09	60	
MW-8S	3583.6	5879.7	586.5	586.57	586.43	60	
MW-9D	4206.1	5696.0	585.7	588.64	588.65	58	
MW-9S	4212.2	5693.6	585.4	588.52	588.49	58	
MW-10D	3694.6	5226.3	585.6	588.63	588.60	57	
MW-10S	3695.5	5233.1	585.7	588.57	588.58	57	
MW-11D	5002.3	5048.2	585.0	588.01	587.98	62	
MW-11S	5002.9	5042.6	585.0	587.95	587.83	62	
MW-12D	3977.0	6257.9	586.2	586.28	586.01	55	
MW-12S	3983.4	6257.1	586.2	586.22	586.03	55	
MW-13D	4388.9	6274.9	587.1	587.24	586.90	53, 54	
MW-13S	4389.8	6269.4	587.1	587.24	586.95	54	
MW-14D	4937.9	6213.3	584.3	584.30	584.05	53	
MW-14S	4931.6	6213.7	584.1	584.32	583.92	53	
MW-15D	5193.1	5540.3	585.5	585.61	585.39	52, 62	
MW-15S	5190.5	5531.4	585.3	585.48	585.33	52	

TABLE 4B-2 (Cont.)

PHASE II INVESTIGATION SURVEY SUMMARY
WATER LEVEL MEASURING POINTS

MONITORING POINT	LOCATION		ELEVATIONS			SURVEY BOOK PAGE	COMMENTS
	NORTHING	EASTING	GROUND	CASING	RISER		
PIEZOMETERS							
P-101	-	-	-	-	-		Abandoned
P-102	4963.9	5958.3	585.6	588.57	588.52	21/26	
P-103	4004.9	5467.3	586.4	589.47	589.44	29/39	
P-104	4499.9	5574.5	586.0	589.10	589.07	22/27	
P-105	3940.7	6144.7	584.2	584.32	583.96	54	
P-106	4015.4	5442.8	586.4	589.66	589.60	57	
P-107	4533.8	5244.5	584.9	585.26	584.41	61	
P-108	4006.2	5475.3	586.6	589.56	589.52	57	
PW-1	4004.9	5443.4	586.4	589.00		58	
OTHER MEASURING POINTS							
W-5	6353.4	4712.1	586.2	589.66	587.86	65	
W-6	5943.6	4669.4	586.4	589.67	589.80	66	
W-4C	6307.3	5217.1	584.6	585.99	586.41	65	
W-4B	6306.5	5214.2	584.5	586.04	586.39	65	
W-4A	6306.5	5210.9	584.6	586.44	586.45	65	
W-13	5700.4	6259.0	585.4	587.73	587.63	46, 63	AKA Z-1
W-12	5842.4	6311.7	583.7	585.99	585.81	47, 63	AKA Z-2
W-2C	6280.7	6451.5	584.1	586.69	586.80	64	AKA Z-8
W-2B	6279.6	6455.2	584.1	586.97	586.74	63	AKA Z-9
W-2A	6278.5	6458.2	584.1	586.10	586.22	63	AKA Z-10
STILLING WELLS							
SW-1	4675.8	4938.6			584.56	52	
SW-2	4536.2	5244.6			585.52	61	
STAFF GAUGES							
SG-1						65	582.78 @ Reading 1.42
SG-2						64	582.77 @ Reading 1.50
SG-3						53	582.54 @ Reading 1.35

TABLE 4B-2 (Cont.)

PHASE II INVESTIGATION SURVEY SUMMARY
WATER LEVEL MEASURING POINTS

MONITORING POINT	LOCATION		ELEVATIONS			SURVEY BOOK PAGE	COMMENTS
	NORTHING	EASTING	GROUND	CASING	RISER		
SHORTH SHORE SANITARY DISTRICT PONDS							
NSSD-1	7085.4	4575.8	596.93				North Pond, southwest of corner of concrete rim on west side
NSSD-2	6729.8	4479.5	596.36				Middle Pond, southwest corner of concrete rim on west side
NSSD-3	6499.1	4416.9	596.32				South Pond, southwest corner of concrete rim on west side

TABLE 4B-3

PHASE II INVESTIGATION SURVEY SUMMARY
SOIL BORINGS

MONITORING POINT	LOCATION		GROUND ELEVATION	SURVEY NOTEBOOK PAGE	COMMENTS
	N	E			
SB 16	4963.668	5796.473	586.04	Electronic notes	
SB 17	4764.010	5946.575	585.43	Electronic notes	
SB 18	4791.216	5805.076	584.93	Electronic notes	
SB 19	4779.706	5623.834	585.30	Electronic notes	
SB20	4648.658	5787.783	584.45	Electronic notes	
SB 21	4555.519	5782.155	584.91	Electronic notes	
SB 22	4419.919	5868.364	584.93	Electronic notes	
SB 23	4415.153	5767.210	585.67	Electronic notes	
SB 24	4431.890	5623.203	585.66	Electronic notes	
SB 25	4426.059	5517.050	586.16	Electronic notes	
SB 26	4404.263	5401.268	586.02	Electronic notes	
SB 27	4387.417	5314.937	584.69	Electronic notes	
SB 28	4453.352	5269.065	585.64	Electronic notes	
SB 29	4179.815	5011.838	606.52	Electronic notes	
SB 29	4327.858	4916.194	585.59	Electronic notes	
SB 30	3937.691	4939.930	602.08	Electronic notes	
SB 31	4043.698	5068.311	604.07	Electronic notes	
SB 32	4195.203	5462.467	587.27	Electronic notes	
SB 33	4196.519	5534.175	587.11	Electronic notes	
SB 34	4197.430	5611.569	586.55	Electronic notes	
SB 35	4206.7	5736.7	585.8	Electronic notes, (72)	
SB 36	4207.623	5849.721	585.64	Electronic notes	
SB 37	4202.612	5911.775	586.16	Electronic notes	
SB 38	3942.691	5884.453	587.63	Electronic notes	
SB 39	3944.252	5696.580	586.67	Electronic notes	
SB 40	3943.470	5578.147	586.18	Electronic notes	
SB 41	3934.673	5456.534	586.12	Electronic notes	
SB 42	3947.494	5355.036	586.56	Electronic notes	
SB 43	3956.409	5286.388	586.05	Electronic notes	
SB 44	3735.823	5319.410	585.18	Electronic notes	

TABLE 4B-3 (Cont.)

PHASE II INVESTIGATION SURVEY SUMMARY
SOIL BORINGS

MONITORING POINT	LOCATION		GROUND ELEVATION	SURVEY NOTEBOOK PAGE	COMMENTS
	N	E			
SB 45	3747.394	5404.662	584.91	Electronic notes	
SB 46	3751.432	5606.018	586.38	Electronic notes	
SB 47	3752.257	5674.475	586.74	Electronic notes	
SB 48	3735.406	5798.198	586.48	Electronic notes	
SB 49	3605.113	5683.933	584.58	Electronic notes	
SB 50	3640.416	5456.683	578.46	Electronic notes	
SB 51	4444.340	6567.752	584.69	Electronic notes	
SB 52	3949.720	6604.963	584.40	Electronic notes	
SB 53	3559.663	6614.235	584.93	Electronic notes	
SB 56	3553.023	5459.355	583.40	Electronic notes	
SB 57	3701.789	5225.423	585.62	Electronic notes	
SB 60	4664.673	5613.398	585.74	Electronic notes	

TABLE 4B-4

PHASE II INVESTIGATION SURVEY SUMMARY
GROUND SURFACE AND DESIGNATED SOIL STOCKPILE SAMPLING POINTS

MONITORING POINT	LOCATION		GROUND ELEVATION	SURVEY BOOK PAGE	COMMENTS
	N	E			
GS 01					Off-site at BS1
GS 02					Off-site at BS2
GS 04					Off-site at BS4
GS 03	4851.400	5910.600	585.70	Electronic notes	
GS 05	4841.930	5599.200	585.00	Electronic notes	
GS 06	4844.400	5298.300	585.10	Electronic notes	
GS 07	4779.875	5750.660	584.86	Electronic notes	
GS 08	4467.900	5686.800	585.20	Electronic notes	
GS 09	4453.000	5268.800	585.70	Electronic notes	
GS 10				Electronic notes	Collected at SB 29
GS 11	4148.300	5575.500	586.80	Electronic notes	
GS 12	4149.200	5218.100	586.50	Electronic notes	
GS 13				Electronic notes	Collected at SB 30
GS 14				Electronic notes	Collected at SB 31
GS 15	3775.700	5543.700	585.80	Electronic notes	
GS 16	3772.500	5238.200	585.80	Electronic notes	
GS 17	3765.800	4927.800	582.80	Electronic notes	Moved by JMF
DS 01	4366.497	5115.679	591.49	Electronic notes	
DS 02	4280.310	5112.539	591.11	Electronic notes	
DS 03	4317.622	5189.087	592.21	Electronic notes	

GS = Ground surface samples
DS = Designated soil stockpile samples

TABLE 4B-5

SURFACE WATER SAMPLING POINT LOCATIONS

MONITORING POINT	SITE GRID LOCATION		GEOGRAPHIC (MEASURED) LOCATION	
	NORTHING	EASTING	LATITUDE	LONGITUDE
SW-01	5470.31	6928.43	N 4222.171	W 8748.778
SW-02	4010.91	7036.40	N 4221.956	W 8748.753
SW-03	2823.03	6518.15	N 4221.781	W 8748.873
SW-04	5178.43	7796.51	N 4222.128	W 8748.577
SW-05	4296.00	7463.96	N 4221.998	W 8748.654
SW-06	2626.18	7122.78	N 4221.752	W 8748.733
SW-07	1960.96	7386.23	N 4221.654	W 8748.672
SW-08	1974.54	5516.19	N 4221.656	W 8749.105
SW-09	2354.66	4449.45	N 4221.712	W 8749.352
SW-10	3495.03	4721.53	N 4221.880	W 8749.289
SW-11	4506.43	4833.82	N 4222.029	W 8749.263
SW-12	4472.49	4976.34	N 4222.024	W 8749.230

NOTE:
REVISED NAME
AUGUST 26, 992
PAGES 25 & 38

WAUKEGAN
COKE ~~HARBOR TRUST~~ PLANT

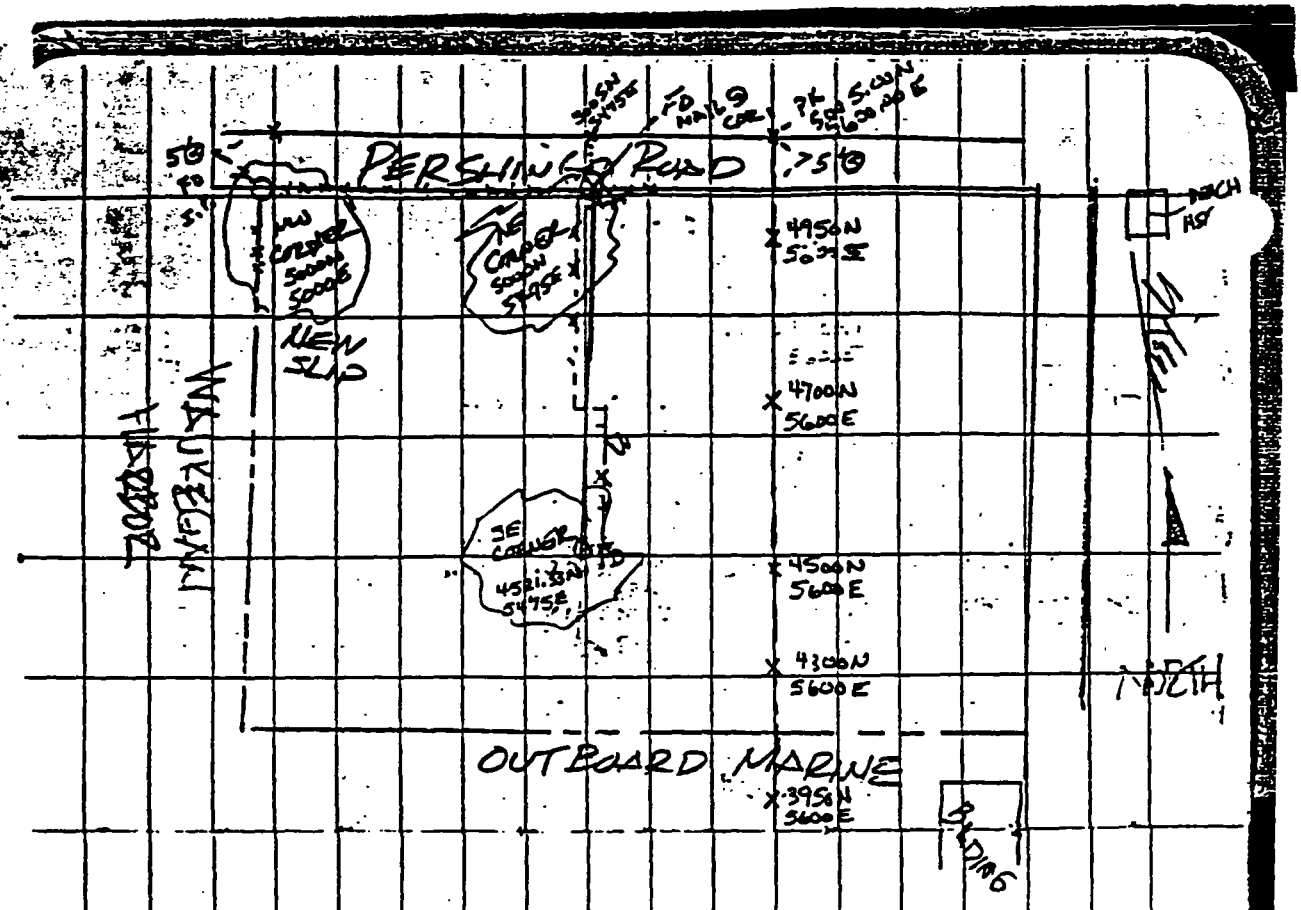
DATE: FEB ~~24~~ 25, 1992

WEATHER: CLOUDY COLD 35°/CHANGE RAIN

CREW: DERRICK MITCHELL
JIM STABERG
~~STEVE M~~

INST: LIETZ TOTAL STATION SET

PURPOSE: 1) SET BASELINE & CONTROL
2) LOCATE SOIL BORINGS
3) LOCATE TEST TRENCH
4) LOCATE EXISTING & PROPOSED MONITORING WELLS



SETUP ON 5005 @ LINE @ 5005N ; SET PK NAIL 175'E ON 5005N LINE. SETUP ON PK NAIL 5005N 5600E SET: BASELINE, TIED INTO SE CORNER. (PG 3) 4521.24N 5474.79E -0.09N -0.21E FROM PLAT. PLAN INFO FROM THE PLAT SURVEY BY: MID AMERICA SURVEY COMPANY / GIVEN COORD. FROM MID AMERICA SURVEY.

2-27-92: SETUP ON POINT 5005N 5375E SITE WEST AND SET POINT 5005N 5036.2E, SETUP ON POINT 5005N 5036.2E AND TIED INTO THE NW. CORNER OF PLAT SURVEY.

ATTACHED I.P. OUR COORD. = 5000.05N 5000.42E / GIVEN 5000N 5000E.

PT NO	NORTHING	EASTING	VERT DIST	HT ROD	ELEV	DESCRIPTION
1	5000.00	5475	—	—		⊼ SET-UP POINT A (property
2	4521.33	5475	—	—		BACK SIGHT B (PROPERTY LINE
3	—	—				TBM =
4	6067.8	4862.9				CHECK NW COR BEACH HOUSE
5	6059.5	4809.5				CHECK SW " " "
6						Horiz Dist 495.0 (SET 1)
7	5975.7	4936.7				TEST TRENCH TT-1
8	5806.5	4874.6				" " TT-1
9	5923.9	4583.3				" " TT-2
10	5795.8	4712.1				" TT-2
11	5600.3	4918.1				SOIL BORING SB-1
12	5665.6	4727.5				" " SB-7
13						
14						
15						
16						
17						

VOID

②

PT NO	NORTHING	EASTING	D VERT	HT ROD	ELEV	H DIST	H. ∡	DESCRIPTION			(3)
18											2-25-92
19											⊼ JHS ⊔ JHS
20											∅ DNK
21	5000.05	5000.12	GIVEN CONTROL			(+0.05N, +0.12E)		(5000N, 5000E) NW CORNER (FD PINCHED I.P.)			
22	4521.26	5474.79	"	"		(-0.07N, +0.21E) 499.43	194-30-11	(4521.33N, 5475E) NE CORNER (FD NAIL) (PG.1)			
23	4500	5600	SET CONTROL ON SITE				SET BRIDGE SPIKE				*BRIDGE SPIKE = LARGE NAIL about 1' LONG
24	4400	5600	"	"	" "			" "			
25	4950	5600	"	"	" "			" "			
26	4300	"	"	"	" "			" "			
27	3950	"	"	"	" "			" "			
28	4000.26	5752.32	CHECK INTO OUR COORD POINTS			(+0.01N, -1.13E) 1016.23	194-22-45	NW	BLDING	COR.	GIVEN CROOD. 4000.27N 5753.45E
29	4000.24	5841.17	GIVEN FROM PLAN	" "		(-0.13N, +0.44E) 1033.30	161-30-10	NE	BLDING	COR	4000.27N 5841.61E
30	4808.59	6059.95		" "		(-0.93N, +0.42E) 500.13	113-07-25	SW	BEACH HSE. BLDING	COR.	4809.52N 6059.53E
31	4862.24	6067.65		" "		(-0.68N, -0.14E) 488.90	106-58-32	NW	BEACH HSE. BLDING	COR.	4862.72N ~~6113.24~~ 6067.79E
32	3800	5600	SET CONTROL ON SITE				SET BRIDGE SPIKE				
33	3700	5600	"	"			"	" "			
34	3600	5600	"	" (PK)*		IN CENTER OF PARKING LOT					

	NORTHING	EASTING	DESCRIPTION	
				(4)
			(1) POINT 4500N 5600E	
			BACKSIGHT = NORTH	
1.	4918.1	5602.3	SB-1	HUB - PINK RIBBON LATH
2	4920.5	5392.1	SB-2	
3	4934.9	5206.2	SB 3	
4	4737.9	5064.3	SB 4	
5	4740.8	5266.9	SB 5	
6	4736.3	5460.6	SB 6	
7	4727.5	5665.6	SB 7	
8.	~~4528.1~~ 4410.4	5627.8	SB 8	
9	4350.2	5503.6	SB 9	
10	4175.1	5367.3	SB 10	
11	4046.4	5233.3	SB 11	
12	3835.0	4999.9	SB 12	

	NORTHING	EASTING			H. DIST	DESCRIPTION (S)
13	3840.3	5193.7				SB-13 HUB: PINK RIBBON LATH
14	3785.9	5390.1				SB-14 " " " "
15	3646.9	5270.9				SB-15 " " " "
16	3650.0	5075.1	(PK) *	PAINTED ORANGE " "		SB-16 " " " "
17	3653.1	4865.8	(PK) *	on a yellow parking line. hard to see. 4th stall from end.		SB-17 " " " "
18	4972.7	5036.1	* SET	UNDER FRONT OF BOAT (PAINTED HUB) MIDDLE		P-101 BLUE RIBBON LATH
19	4962.9	5958.4		MARK ON FENCE APPROX LOCATION 27 @ SOUTH		P-102 " " " "
19A	4005.2	5467.6				P-103 " " "
19B	4498.9	5574.1				P-104 " " "
20	4969.9	5530.0				MW-3D BLUE RIBBON LATH
21	4968.8	5560.8				MW-3S " " "
22	4139.5	5879.1				MW-4D " " "
23	4109.4	5870.7				MW-4S " " "
24	3842.4	4835.8				MW-5D " " "
25	3872.5	4846.2				MW-5S " " "

	NORTHING	EASTING					DESCRIPTION				⑥
	4408.1	4924.5									
26	~~4412.66~~ 4408.1	~~5326.14~~ 4924.5					44 MW-6D: HUB			BLUE RIBBON CATH	
27	~~4418.09~~ ~~4441.0~~ 4441.0	~~5328.39~~ ~~4929.7~~ 4929.7					MW-6S: "			" "	
										GIVEN	COORD.
28	4418.09	5328.39					LOCATED	EASTING	MW-1S	4416.11	~~4402.87~~ ~~5315.78~~ 5315.78
29	4412.66	5326.14					"	"	MW-1D	4402.87 ~~5315.78~~	5309.92
30	4936.7	5975.65	4874.6	5806.5			TEST TRENCH		-1	HUB: RED & YELLOW RIBBON	
31	4712.1	5795.8	4587.3	5923.7			"		2		
32	4520.9	5719.1	4347.3	5717.8					3		
33	4537.6	5553.8	4507.6	5519.2					4		
34	4516.4	5295.5	4441.1	5251.6					5		
35	4488.6	4962.8	4442.5	5036.8					6		
36	4272.5	5643.7	4218.9	5701.0					7		
37	4152.8	5613.0	4136.3	5697.8					8	X	
38	4201.1	5500.9	4133.9	5487.6					9		
39	4093.1	5648.9	4095.8	5683.3 ~~5647.5~~					10		

	NORTHING	EASTING					DESCRIPTION		
							~~CORNER OF 9 "C" WALL~~ ~~END OF FENCE @ PIER~~		
40	4453.5	4899.0				LOCATED	CORNER	FENCE	@ "C" WALL
41	4474.9	5177.1					"	"	
42	4497.0	5175.2					"	"	
									2-27-9
43	4013.6	5647.3	3976.4	5646.6			TEST TRENCH -		11
44	4019.9	5584.3	3996.3	5549.7					12
45	4022.5	5492.5	4021.0	5443.5					13
46	3957.0	5630.3	3915.4	5578.8					14
47	3887.6	5638.5	NO HUB / LATH APPROX. 3873.3	5567.5	★				15
48	3952.3 ? ~~5411.7~~	5411.7 ~~3952.3~~	3919.7	5400.1					16
49	3957.5	5387.9	3909.1	5333.7					17
50	3768.8	5626.5	3765.1	5602.3					18
51	3797.3 ~~39~~	5579.1	3732.4	5555.9					19
52	3738.1	5601.0	3674.9	5585.8	(PK.) ★				20
53	3726.3	5537.8	3682.1	5570.7					21
54	3847.3	5344.8	3845.6	5284.1					22

	NORTHING	EASTING								
										(8) 2-27-92
55	3973.6	5562.2	3930.3	5548.6		TEST TRENCH-23				
						LOCATION OF TRAILERS ON SITE				
	4194.4	5677.4				NW CORNER				
	4194.3	5701.0				NE "				
	4134.0	5676.7				SW "				
	4167.2	5653.7								
	↓	↓				NE CORNER				
	4167.1	5625.3				NW "				
	4158.9	5625.4				SW "				
	4150.5	5608.5				NW CORNER				
	4138.6	5608.6				SW "				
	4151.0	5654.8				NE "				

	NORTHING	EASTING					LOCATION OF TRAILERS					⑨ 2-27-72
	4106.3	5655.0					SE	CORNER				
	4106.1	5614.3					SW	"				
	4116.4	5614.3					NW	"				
	4107.4	5681.9					NW	CORNER				
	4099.1	5681.7					SW	"				
	4098.7	5697.8					SE	"				

(10)

3-5-9

OVERCAST 40° LITE RAIN

JWF

Paul Dickenson (WTD)

- Set 90° - 50' (S) Hubs FROM SB-23. W/ Right angle gun
- Set one 100' (S) Hub ON LINE W/ (S) 50' SOUTH
- Levels on all hubs TBM = SOUTH 50' (S)

	HI	BS	FS	ELEV	
TBM	103.54	3.54	~~103.54~~	100.0	SOUTH 50' ⊢ (S) HUB
SB-23			5.87	97.67	
HUB(TP)			4.48	99.06	N. 50' ⊢ (S) HUB
BS	103.89	4.83			
TBM			3.89	100.0	SAB
TBM-2			2.34	101.55	SOUTH 100' ⊢ (S) HUB ON FENCE
	ERROR	IN	LOOP	0.00'	

(12)

3/26/92

JMF, WWM/TWW

RUN LEVEL LOOP

OF WELLS & PIEZOMETERS

BM @ NORTH SIDE OF

LARSEN SLIP. ——

"X" in LARSEN ON

SEEWALL.

40° RAIN GREY

HAIL, SUNNY (5 min.),

SLEET, MORE RAIN.

HEAVY SNOW WITH

ACCUMULATION.

WELL & PIEZ: P-101, MW-6S, MW-6D,

MW-1 NORTH, MW-1 SOUTH, P-104,

P-102, MW-3S, MW-3D,

P-103, MW-4S, MW-4D.

	HI	BS	FS	ELEV.					
BM	589.42	4.77		584.65	"X" ON SEAWALL @ CARLSEN				
TP			5.24	(584.18)					
BS	589.58	5.40							
TP			4.98	584.6					
BS	589.73	5.13							
TP			4.84	584.89					
BS	590.09	5.20							
P-101		5.2	5.1	584.99 (585.0)	GROUND				
P-101			1.89	588.20	TOR	=TP			
BS	590.05	1.85							
TP			5.41	584.64					
BS	589.26	4.62							
TP			5.05	584.21					
BS	589.21	5.00							
BM			4.53	584.68					
LOOP ERROR =			0.03						

	HI	BS	FS	ELEV	
BM	589.89	5.24		584.65	"X" ON SEAWALL - @ CARSON
MW-6S			4.1	585.79	GROUND
MW-6S			1.42	588.47	TOR
BS	590.13	1.66			SAA - Leg Kick
MW-6D			4.4	585.73	Ground
MW-6D			1.61	588.52	TOR
BM			5.49	584.64	"X" SAB
Loop Error =			0.01		
MW-6S	589.97 ✓	1.50		588.47	TOR - TBM
MW-1			3.8	586.17	Ground } South well
MW-1			2.31	587.66 ✓	TOR } South well
BS MW-1	590.46 ✓	2.80			[illegible] } SAA [illegible]
MW-1			4.5	585.96 ✓	GROUND } [illegible]
MW-1			2.67	587.79 ✓	TOR } North well
BS	591.24	3.45			
P-104			5.2	586.04	Ground
P-104			2.13	589.11	TOR

	HI	BS	FS	ELEV
BS	590.21	1.10		
TP			5.24	584.97
BS	590.95	5.98		
P-102			5.4	585.55
R102			2.39	588.56
BS	591.50	2.94		
MW-35			6.3	
MW-35			3.21	588.29
BS	590.60	2.37		
MW-31			5.3	
MW-31			2.39	588.27
BS	590.60	2.33		
TP			5.29	585.31
BS	590.21	4.90		
TP			5.44	584.77
BS	589.50	4.73		
TP.			5.04	584.46
BS	590.09	5.63		

P-104 TOR

RANDOM PT.

↓

GROUND

TOR

↓

GROUND

TOR

↓

@ SB-6

↓

RANDOM PT.

	HI	BS	FS	ELEV						
BM			5.47	584.62	"X" ON SEA WALL @ LARSEN					584.65
(Loop Error .03)										
BM	589.50	4.85		584.65	SAA					
			4.98	(584.52)	H2O measurement POINT ↑ BACK					
BM		4.85			(15'W of BM)					
					(H2O @ 4.49 Below PT					
							3/26/02 230 PM			
							584.52			
							4.49			
							(580.03')	= H2O in new slip.		

	HI	BS	FS	ELEV	
TBM	591.93	4.14		587.79	MW-1 (NORTH)
P+103			5.3		GROUND
P-103			2.45	589.48	TOR
BS	592.02	2.54			↓
TBM			4.21	587.78	SAA
Loop Error = 0.01					
TBM	589.40	2.32		587.48	TOR @ P-103
MW-1S		5.[illegible]	5.5		GROUND
MW-1S		2.[illegible]	2.57	587.23	TOR
BS	589.19	1.96			↓
MW-1D			5.1		GROUND
MW-1D			2.03	587.16	TOR
TBM			1.72	587.47	SAA P-103 TOR
Loop Error = 0.01					

3/27/92

JMF / TWW

Level loop on wells & piezometers

Including:

MW-55, MW-5D

P-cloudy 30°

WINDY.

	HI	BS	FS	ELEV.	
TBm	589.58	2.10		587.48	TOR P-103
TP			6.54	583.04	RANDOM PT
BS	587.57	4.53			↓
~~IP~~		↓			X
~~BS~~					X
MW-5D			3.9		GROUND
MW-5D			1.04	586.53	Riser
BS-	587.83	1.30			↓ LEG KICK
MW-5S			4.5		Ground
MW-5S			1.89	585.94	Riser
BS	587.68	1.74			↓ LEG KICK
TP			4.65	583.03	RANDOM PT.
BS	588.86	5.83			↓
TBm			1.36	587.50	TOR P-103
Loop Error = 0.02					

RENTAL EQUIPMENT:

INSTRUMENT = TOPCON GTS 3C

HIEGHT PRISM: DOWN = 4.91
1 UP = 8.65
2 UP = 12.50

LEVEL = AT-F2

WAUKEGAN HARBOR TRUST

4-14-92

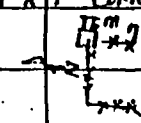
J Shaheen — Overcast
D. Mitchell — 40°
10-15 mPH

1) RAW LEVEL LOOP ON-SITE:
MW-3S, MW-3D, MW-6S, MW-6D,
MW-5S, MW-5D, P-102, P-104

4-14-92 JHS WILL INSTALL MSL ELEVATION at a later date.

(21)

	+	HI	−	ELEV		LEVEL LOOP INTO ON SITE MW. 5' 4-14-92
						ELEVATION ON MW-3D RISER IS ON PAGE 41
						ELEVATION = 588.23
	2.21	590.44			588.23	MW-3D 2" STEEL RISER
			4.9	585.5		GRO.
			2.21	588.23		CASING
			5.2	585.2		GRO. MW-35 ~~(STEEL 2")~~
			2.13	588.31		CASING "
TP1			2.20	588.24		RISER " (2" STEEL RISER)
	3.345	591.59				
			6.0	585.6		GRO. P-102
			3.02	588.57		CASING "
TP2			3.07	588.52		RISER " (PVC 1¼" RISER)
	2.44	590.96				
TP3			5.545	585.41	585.42	SPK 9 STA. 4700N 5600E (PG 40)
	5.65	591.06				

	+	HI	−	ELEV		LEVEL LOOP CONT.				4-14-92
		591.06								
			5.1	586.0		GRO	P-104			
			1.96	589.10		CASING	"			
TP4			1.99	589.07		RISER	"	(1 1/4" PVC RISER)		
	1.93	591.00								
TP5			5.25	585.75		SPK @ STA.	4500N	5600E		
	6.23	591.98								
TP6			5.51	586.47		SPK @ STA.	3950N	5600E	(BENT)	
	4.17	590.64								
TP7			2.15	588.49		NE COR.	OF 4'X4' CONC.	SLAB	HOLDING	
	0.98	589.47				FENCE.				
			~~4.2~~ 3.8	585.7		GRO.	MW-5D			
			~~1.56~~ 0.98	588.49		CASING	"			
TP8			1.00	588.47		RISER	"	(2" STEEL)		
	0.70	589.17								

	+	HI	−	ELEV		LEAD CO-OP - CONT.				(23) 4-14-92
		589.17								
			3.8	585.4		GRO	MW-5S			
			1.26	587.91		CASING	"			
TP9			1.28	587.89		RISER	"	(2" STEEL)		
	2.13	590.02								
TP10			4.52	585.50		HARBOR WALL				
	6.125	591.63								
			5.9	585.7		GRO.	MW-6S			
			3.15	588.48		CASING	"			
TP11			3.18	588.45		RISER	"	(2" STEEL)		
	2.49	590.94								
			5.2	585.7		GRO.	MW-6D			
			2.38	588.56		CASING	"			
TP12			2.43	588.51		RISER	"	(2" STEEL)		
	2.63	591.14								

	+	HI	−	ELEV		LEVEL LOOP CONT..				4-14-92
		591.14								
			5.3	585.8		GRO.		MW-1D MOST SOUTHERLY		(CONST [illegible])
			3.40	587.74		CASING		"		
TP13			3.52	587.62		RISER		"		(2" STEEL)
	3.36	590.98								
			5.0	586.0		GRO		MW-1S MOST NORTHERLY OF 2		
			3.15	587.83		CASING		"		
TP14			3.22	587.76		RISER		"		(2" STEEL)
	4.07	591.83								
TP15			6.41	585.42	585.42	SPR 9	STA 4[illegible]00N 5[illegible]00N			(TP 3)
	4.78	590.20								
TP16			1.965	588.23	588.23	RISER	MW-3D	✓		

CORE PLANT RI/FS

WHEELABRATOR ~~[illegible]~~

4-15-92

("TAX DAY"!!)

J. Stahura

D. Mitchell

50°

CONCRETE

RAIN (ON & OFF)

5-10 MPH

1) Location of on site T.I. trenches, Bridges, wells & Piezometers.

2) Location of off-site Borings and wells. Also BMs.

	Noth	EAST	Coordinates Northing	Coordinates Easting		Description	V.DIST	Prism	ELEV
						ON-SITE LOCATIONS		H=591.25	
1	0	0	4500	5600		TBM/ X @ 4500N 5600E	Measure up 5.50	—	(PG.22) 585.75
2	200	0	4700	5600		BS TBM/ 4700N 5600E	—	4.90	(PG.24) 585.42
3	335.7	50.4	4836	5650		TT-00B	-1.5	"	584.9 ~~584.9~~
4	301	5.0	4801	5605		TT-00B	-1.5	"	584.9
5	420	-1.0 ~~-1.0~~	4920.0	5599.0		SS-1	-1.0 ~~-1.2~~	"	585.4
6	461.8	-48.0	4961.8	5552.0		MW-3D	-0.7	"	85.7
7	471.8	-46.7	4971.8	5553.3		MW-3S	2.8	up 1 8.65	85.4
8	362.6	178.3	4863	5778		TT-1	-0.9	4.90	85.5
9	437.2	375	4937	5975		TT-1	-0.9	"	85.5
10	463.9	358.3 ~~463.9~~	4963.9	5958.3		P-102	-0.7	"	85.7
11	269	179	4769	5779		TT-00A	-1.3	"	85.1
12	243	186	4743	5786		TT-00A	-1.3	"	85.1
13	274	160.3	4774	5760		LATH WITH TAPE MARKED	-1.5	"	84.9
14	289	154	4654	5754		DANGER AREA	-1.3	"	85.1
15	297	140	4797	5740		"	-1.3	"	85.1
16	276	141	4776	5741		"	-1.2	"	85.2

X @ 4500N 5600E BS: NORTH T-R 4-15-92 (26)

4-15-92 (27)

	NORTH	EAST	NORTHING	EASTING	DESCRIPTION			V. DIST	PRISM	ELEV.
						ON SITE LOCATIONS				
17	226	189	4726	5789	TT-2			-1.6	4.90	84.8
18	88	317	4588	5917	TT-2			-1.8	"	84.6
19	-4.0	243	4496	5843	BARRELS (16) ex			-1.1	"	85.3
20	-18	244	4482	5844	"			-1.0	"	85.4
21	-20	238	4480	5838	"			-1.0	"	85.4
22	-3.0	233	4497	5833	"			-1.2	"	85.2
23	37	119	4537	5719	TT-3			-1.4	"	85.0
24	-153	118	4347	5718	TT-3			-1.0	"	85.4
25	-103	125	4397	5725	TT-03W			-1.1	"	85.3
26	-79	-97	4421	5503	TT-03W			0.1	"	86.5
27	-152	-95	43480	5505.0	SS-9			0.5	"	86.9
28	-0.1	-25.5	4499.9	5574.5	P-104			-0.2	"	86.2
29	7.4	-81	4507	559	TT-4			0.3	"	86.7
30	43	-35	4543	5565	TT-4			-0.1	"	86.3
31	27	27.6	4527	5627.6	SS-8			-0.9	"	85.5
32	227.4	65.5	4727.4	5665.5	SS-7			-1.7	"	84.7

4-15-92 (28)

	NORTH	EAST	NORTHING	EASTING		DESCRIPTION			V. DIST	PRISM	ELEV
						ON-SITE LOCATIONS					
33	200	0	4700	5600	585.45	TBM 4700N	5600E	MIL	-0.9	4.90	(AG.24) 585.42
34	233.2	-70.3	4733.2	5529.7		SS-6			-0.6	"	85.8
35	-225	41	4275	5641		TT-7			-0.8	"	85.6
36	-281	101	4219	5701		TT-7			-1.7	"	85.2
37	-234	-115	4266	5485		TT-00C			0.6	"	87.0
38	-163	0	4337	5600		TT-00C			-0.1	"	86.3
39	-5.0	-316	4495	5284		TT-5			-1.1	"	85.3
40	-69	-369	4431	5231		TT-5			-0.8	"	85.6
41	-68.3	-679.7	4431.7	4920.3		MW-6S			-0.8	"	85.6
42	-57.9	-679.0	4442.1	4921.0		MW-6D			-0.6	"	85.8
43	-107	-637	4393	4963		TT-6	?		-1.2	"	85.2
44	-47	-638	4453	4962		TT-6	?		-1.0	"	85.4
45	-22	-326	4478	5274		TT-05E			-0.4	"	86.0
46	-93	-158	4407	5442		TT-05E	?		-0.5	"	85.9
47	-323.1	-237.0	4176.9	5363.0		SS-10			-0.6	"	85.8
4											

4-13-92 (29)

	NORTH	EAST	NORTHING	EASTING		DESCRIPTION		VDIST	PRISM	ELEV
						ON SITE LOCATIONS				
48	-478.0	-106.1	4022	5494		~~55 0~~ TT-13		0.2	4.90	86.6
49	-464.0	-176	4036	5424		TT-13		-0.0	"	86.4
50	-495.1	-132.7	4004.9	5467.3		P-103		0.4	"	86.8
51	-570	-50	3930	5550		TT-23		-0.7	"	85.7
52	-524	-37	3976	5563		TT-23		-0.6	"	85.8
53	-518	-62	3982	5538		TT-12		-0.3	"	86.1
54	-482	-16	4018	5584		TT-12		0.1	"	86.5
55	-584	-21	3916	1684		TT-14		-0.7	"	85.7
56	-628	-35	3872	5565		TT-15		-0.5	"	85.9
57	-548	-188	3952	5412		TT-16		-0.2	"	86.2
58	-595	-202	3905	5398		TT-16		-0.8	"	85.6
59	-591	-266	3909	5334		TT-17		-0.6	"	85.8
60	-537	-208	3963	5392		TT-17		0.0	"	86.4
61	-653	-255	3847	5345		TT-22		-1.1	"	85.3
62	-655	-323	4177	5277		TT-22		-1.1	"	85.3

4-15-92 (30)

	NORTH	EAST	NORTHING	EASTING	DESCRIPTION	V. DIST.	PRISM	ELEV
					ON SITE LOCATIONS			
63	-609	-301	3891	5299	TT-22N	0.0	4.90	86.4
64	-662	-298	3838	5302	TT-22N	-0.8	"	85.6
65	-711.9	-210.1	3788.1	5389.9	SS-14	-1.5	"	84.9
66	-682	-179	3818	5421	TT-00D	-1.2	"	85.2
67	-792	-188	3708	5412	TT-00D	-1.5	"	84.9
68	-682	-179	3818	5421	TT-19W	-1.1	"	85.3
69	-723	-28	3777	5572	TT-19W	-0.4	"	86.0
70	-698	-19	3802	5581	TT-19	-0.2	"	86.2
71	-767	-43	3733	5557	TT-19	-0.1	"	86.3
72	-773	-62	3727	5538	TT-21	-0.9	"	85.5
73	-782	-53	3718	5547	TT-21 @ FOOTING (FOUNDATION)	0.1	"	86.5
74	-810	-35	3690	5565	TT-21 "	-0.2	"	86.2
75	-818	-29	3682	5571	TT-21	-1.1	"	85.3
76	-817	-12	3683	5588	TT-20	0.1	"	86.5
77	-800	0.0 -0.5	3700	5600	SPIK 3700N 5600E	0.2	"	86.6
78	-761	5.0	3739	5605	TT-20	-0.1	"	86.3

4-15-92 (31)

	NORTH	EAST	NORTHING	EASTING	DESCRIPTION	V. DIST	PRISM	ELEV
					ON-SITE LOCATIONS			
79	-292	71	4208	5671	TT 108A	-0.8	4.90	85.6
80	-298	24	4202	5624	TT-8A	-0.1	"	86.3
81	0.0	-315	4500	5285	SGT CONTROL HUB 9	-0.9	"	85.5
					STA: 4500N 5285E			

	NORTH	EAST	NORTHING	EASTING		DESCRIPTION			V.DIST	PRISM	ELEV
1	7	—	3800	5600					5.2	—	586.38
2	700	0	4500	5600					2.82	* UP 1 8.65	(PG.22) 585.75
3	403	-99	4203	5501			TT-9		0.5	4.90	87.2
4	334	-115	4134	5485			TT-9		0.1	"	86.8
5	214	48	4014	5648			TT-11		-0.4	"	86.3
6	163	43	3963	5643			TT-11		-0.3	"	86.4
7	101	92	3901	5692			TT-15		0.0	"	86.7
8	-31	26	3769	5626			TT-18		-0.2	"	86.5
9	-24	-29	3776	5571			TT-18		-0.7	"	86.0
10	163	34	3963	5634			TT-14		-0.2	"	86.5
11	40.3	-406.4	3840.3	5193.6			SS-13		-1.6	"	85.1
12	35.7	-598.8	3835.7	5001.2			SS-12		1.0	* UP 1 8.65	83.9
13	2.6	-788.4	3802.6	4811.6			MW-5S		2.7	* UP 1 8.65	85.6
14	7.9	-788.9	3807.9	4811.1			MW-5D		2.5	* UP 1 8.65	85.4
15	247.1	-364.5	4047.1	5235.5			SS-11		-1.1	4.90	85.6
16	150	0	3950.0	5600.0	586.45	TBM	SPK @ 3950N 5600E		-0.23	"	(PG.22) 586.47

X @ 3800N 5600E BS: NORTH T-R 4/5-92 (32)

exact Locations HI = 591.58

	NORTH	EAST	NORTHING	EASTING
#17	463.4	228.9	4263.4	5828.9
#18	-200.6	0.9	3599.4	5600.9
#19	-153.0	-327.6	3647.0	5272.4
#20	-150.2	-524.6	3649.8	5075.4
#21	-146.9	-734.4	3653.1	4865.6

- LOCATION CONT. pt.

DESCRIPTION		V. DIST.	PRISM	ELEV
OFF-SITE LOCATIONS				
SC-02	BIT. PARKING LOT.	-0.9	4.90	85.8
SC-01	"	-2.3	"	84.4
SS-15	GRAVEL LOT	-1.3	"	85.4
SS-16	BIT. PARKING LOT	-1.5	"	85.2
SS-17	"	6.0	up 2 12.50	85.1

	NORTH	EAST	NORTHING	EASTING	DESCRIPTION		T-R V.DIST.	PRISM	ELEV
					OFF-SITE LOCATIONS				HI = 591.77
1			3950	5600	TBM X9	3950N 5600E	5.3	—	(PG. 22) 586.47
2	168.3	274.1	4118.3	5874.1		MW-4D	-0.7	4.91	86.2
3	159.5	270.6	4109.5	5870.6		MW-4S	—	—	

X9 3951N 5600E BS: NORTH T-R 4-15-92 (54)

TG 4500N 5285E BS: NORTH

	NORTH	EAST	NORTHING	EASTING	DESCRIPTION					
					T-R					4-15-92
0	"		4500.0	5285.0	T LARSON MARINE AREA					
1	198.8	-88.7	4698.8	5196.3	TBM MARK IS THE TOP OF SHEET PILE / ELEV MARKED					
					"A" TBM ON SEAWALL			585.52		
2	174.8	-346.4	4674.8	4938.6	BENCH MARK X ON SEAWALL			"		
					NW CORNER SEAWALL			ELEV MARKED 584.65		
					20'± WEST OF "SHED"			"		
3	155.8	-317.1	4655.8	4967.9	NE COR "SHED"					
4	147.6	-318.4	4647.6	4966.6	SE " "					
5	216.1	-338.6	4716.1	4946.4	SE COR.	STORAGE	BLDING	LARSEN MARINE"		
6	234.3	-437.2	4734.3	4847.8	SW "	"	"	"	"	
7	176.6	-345.9	4676.6	4939.1	NW COR.	SLIP	(SHEET PILE)			
8	103.4	-368.3	4603.4	4924.7	SW "	"	" "			
9	106.2	-316.2	4606.2	4968.8	SE "	"	" "			
10	161.3	-304.4	4661.3	4980.6	NE "	"	" "			

	OFF-SITE COORDINATES				DESCRIPTION	VDIST	PRISM	ELEV
	NORTH	EAST						
0	—	—	5005	5036	TBM ⊼ @ 5005N, 5036E	5.35	—	584.66 (PG 41)
1	0.0	563.97	5005	5600	SPK @ 5005N, 5600E	−0.32	4.91	84.8
2	123.7	489.8	5128.7	5525.8	BS-07	7.32	4P2 12.50	84.8
3	141.6	−80.38	5146.6	4955.6	BS-06	1.21	4.91	86.73
4	−10.8	−0.0	4994.2	5036	P-101	—	"	
5	0.0	1045.00	5005	6081	SET SPK. 5005N, 6081 6	1.62	"	586.72

⊼ @ 5005N, 5034E 1045 BS: EAST AZM: 90° T-R 4-15-92 (36)

HI: 590.01

OFF-SITE LOCATIONS

⊼ @ 5005N, 6081E BS: WEST T-R (37)

AZM: 270° 1-15-92

	NORTH	EAST	NORTING	EASTING	DESCRIPTION	V DIST	PRISM	ELEV
							HI=592.07	
1	—	—	5005	6081	⊼ @ 5005N, 6081E	5.35	—	(PG.36) 586.72
2	0.0	-1045.00	5005	5036 ~~6081~~	TBM SPK @ 5005N, 5036E	-2.56	4.91	(PG.41) 584.66
[illegible]	439.6	117.8	5444.6	6198.8	BS=08	-1.6	"	85.6
4	-864.8	-203.3			BS ?	-1.2	"	

WAUKEGAN ~~HARBOR, PART~~
COKE PLANT RI/FS

BENCH MARK INFO:

BM USED — "X" ON SEAWALL, NW CORNER OF SUP. at Larson Marine e 7' east of, & 41' SOUTH of; Larson Marine storage bldng, at slip. EL. GIVEN = 584.65
COORD: 4675N, 4939E

4-16-92

J. Staberg
D. Mitchell

OTHER INFO
RAINING/FOGGY
50°
5-10 KNOTS

NOTE: THIS BM is used by Canonie and Hi Tech. It was set by Mid American Survey Co. 1-7-88. Mid America Survey Co. came off of a USGS BM. to establish elevation. (FAX sheet from Mid America 4-16-92 JHS)

1) Levels into MW-45, MW-40, P-103.

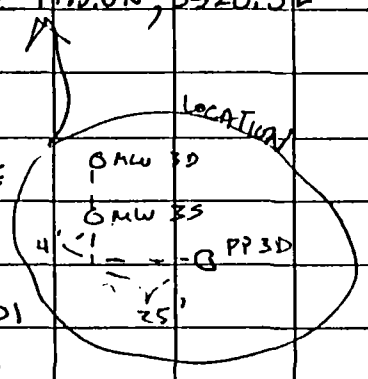
2) LEVELS INTO SITE LEVEL LOOP FROM USGS BM. THIS IS THE BM USED BY CANONIE.

TBM — "Λ" on sheetpile marking TBM
EL. GIVEN = 585.52
COORD; 4699N, 5196E

	+	HI	−	ELEV		LEVEL	LOOP	INTO P103, MW 4D, & MW 4S			4-16-92
					586.47	TBM	FK @	3950N 5000E		(FG.22)	
	5.49	591.96									
			5.6	586.4			GEO	P.103			
			2.49	589.47			CASING	"			
TP1			2.52	589.44			RISER	"		(1¼ PVC)	
	2.44	591.88									
TP2			6.04	585.84							
	5.57	591.41									
			5.2	586.2			GEO	MW 4S			
			2.12	589.29			CASING	"			
TP3			2.24	589.17			RISER	"		(2" steel)	
	2.26	591.43									
			5.3	586.1			GEO	MW 4D			
			2.34	589.07			CASING	"			
TP4			2.37	589.06			RISER	"		(2" steel)	
	2.79	591.85									
			5.43	586.45	586.47	TBM	FK				

	+	HI	−	ELEV		
					584.62	LEVEL LOOP P.101, SS: 2,3,4 & 5, PP: 3D 4-16-92
						X ON SEAWALL GIVEN EL = 584.62
	5.30	589.92				
TP1			5.43	584.49		Mark "BASE" on SEA WALL (14' WEST OF X)
	5.60	590.09				
			5.3	584.8		~~SS: B~~ F
			5.5	584.6		~~SS: 5~~
			4.8	585.3		~~SS: 2~~ (2' WEST OF ORIGINAL)
TP2			4.58 ~~4.63~~ 4.	585.51		ON SEAWALL ~~585.52~~
	4.77	590.28				
TBM TP3			4.74	585.49	585.52	"A" MARK ON SEAWALL BM GIVEN EL = 585.52
	4.63	590.12				
			5.505	584.62	584.62	X ON SEAWALL ✓
TP4			5.05	585.07		ROCK
	5.27	590.34				
			4.8	585.5		~~SS: 3~~
TP5			4.925	585.42		SPIKE 47.00N 56.00E
	4.86	590.28				

	+	HI	−	ELEV		
		590.28	4.4	585.9		PP-13D 4975.8N, 5528.3E
TP6			2.045	588.23		BISCK MW-3D
	1.56	589.79				
TP7			5.13	584.66		SIVO 5005N, 5036E
	5.445	590.11				
			5.1	585.0		GRO P-101
			1.90	588.21		CASING "
TP8			1.965	588.14		RISER "
	1.95	590.09				
TP9			5.27	584.82		
	5.28	590.10				
TBM11			5.49	584.61	584.62 ✓	X IN SIDEWALL ✓



4-16-92

~~CONTROL~~

~~HERB~~ ~~LAST~~ ELEV / [illegible] SOUTH PARTNER PLANT

INSTRUMENT:

SET 3B

SDR 33

R 1/1 S

8-16-93

J. Stockberg

D. Mitchell

SDR PT #	NORTH	CONTROL EAST	ELEV
1	5005	5600	
2	4950	"	
3	4700	"	
4	4500	"	
5	4300	"	
6	4950	"	
7	3800	"	
8	3700	"	
9	3650	"	

1) FOUND CONTROL

2) SET SOIL BORINGS

(43)

8-16-93

SDR PT #	NORTH	EAST	CONTROL SDR. ELEV	SDR DESCRIPTION					
1	5005	5600	584.97		PK	"RESET"			
2	4950	"	585.12		SPK PK	"FD"			
3	4700	"	585.31		SPK	"FD"-BENT - RESET			
4	4500	"	585.81		SPK	"FD"			
5	4300	"	586.45		SPK	"FD"			ALL ON SITE 2-8
6	3950	"	586.35		SPK	"FD"	BENT - RESET		
7	3800	"	586.44		SPK	"FD"			
8	3700	"	~~586.55~~ 581.59		SPK	"FD"			
9	3650	"	585.07		PK SPK	~~"FD"~~ RESET			
	3600	"	~~585.07~~		---	DESTROYED			
50	4675	4939	GIVEN 584.65		"X"	ON SEAWALL (PG.38)			
60	-0.03 11999.97	-0.18 5474.82	585.46		NAIL	"FD" (PG.1)	Viking Parking Rd.		
61									

(44)

CONTROL SDR

	NORTH	EAST	SDR ELEV	DESCRIPTION
10	4427.68	4905.19	585.92	ON-SITE, ALONG PIER. TP SPK 10 (NORTH COR.)
11	4294.85	6117.34	588.16	LAWN - OVERLOOKING (BEACH) TP SPK 11
12	4500.00	6000.06	586.86	(BEACH PARKING LOT) TP SPK 12
13	3841.91	5224.34	585.50	SOUTH-ON-SITE TP SPK 13
14	5161.97	6116.78 ~~6161.~~	586.55	AT ENT. OUTBOARD MARINE CO. TP SPK 14
15	6285.23	6397.10	585.56 ~~586.11~~	ALONG DITCH TP SPK 15

NOTES SAFETY 8-16-93

HAD TAILGATE MEETING:

JAS, DAM, JMF, & JAB

SURVEYORS LEVEL 1D.

HARDHAT: ONLY WHEN

ACTIVATY.

GLASSES

STEEL TOE BOOTS/COVERS

Control SDR

3-17-93

CODE	DESCRIPTION			SDR PT #							
SB	Soil Borings			1005 ~~2005~~							
GS	Ground Surface Sample GS			3005 ~~3005~~							
MW	Monitoring Well MW			300's	1300						
P	Piezometer P			400's							
HB	Hydropunch HB Boring			451							
TT	Test Trenches			1099 - 1106							
	X SECTION		"NAILS"	ALONG DITCH							
	NORTH ~~6303~~	EAST	EL. SDR	EL LEVEL-LOOP							
	6303	4800	~~584.64~~	584.09							
	6303	5300 ~~5800~~	~~585.04~~	584.49							
	6300	5800 ~~6100~~	~~585.67~~	585.12							
	~~6300~~ ~~6295~~	6100 ~~6350~~	~~584.90~~	584.35							
	6295	6350 ~~6500~~	~~585.84~~	585.29							
	6293	6500	584.80	584.25							
	6259	6571	587.84	587.29							
	6117	6675	5839	583.35							

(K6)

	+	HI	−	ELEV	GIVEN						5-20-93
					584.65	"X" on SEA WALL (PG. 38)					
	5.85	590.50				SEE NOTES (PG. 38)					
TP 1	4.70 ~~4.55~~	590.15 ~~589.95~~	5.05	585.45		BELL SYS. M.H EAST RIM					
			5.03	585.12 ~~584.95~~	SDR 584.97	PK	5005N	5600E	(PG. 43)		
TBM 2	5.28	591.91 ~~592.00~~	3.52 ~~3.26~~	586.63 ~~586.72~~		CONC. NORTH CORNER. GUARD SHACK					
						@ THE END OF PERISHING RD / ENTRANCE					
						TO OMC & BEACH					
			5.37	586.54 ~~586.63~~	SDR 586.55	SPK.	#14	5161.97N	6116.78E	(PG. 44)	
							Z-1 (omc)				
			6.6	585.3			GRO.				
			4.19	587.72			4" CASING				
TP 3	3.52	591.14 ~~591.23~~ ~~590.62~~	4.29	587.62 ~~587.71~~			2" ALUM RISER				

5-20-93

	+	HI	−	ELEV						
		591.14					Z-2			(OMC)
			7.5	583.6			GRO.			
			5.18	585.96			4" CASING			
TP4			5.36	585.78			2" ALUM. RISER			
	5.09	590.87								(OMC)
						*	MW-14		3' CONC. TUBE	
			5.4	585.47			GRO			
			1.50	589.37			4" BOX ALUM.	CASING		
TP5			1.56	589.31			2" ALUM PVC	RISER		
	1.12	590.43								(OMC)
						*	MW-15		3' CONC. TUBE	
			4.5	585.9			GRO.			
			2.08	588.35			4" Box x Alum.	CASING		
TP6		593.01	2.02	588.41			1" PVC 2" ALUM	RISER		
	4.60	~~592.99~~								
					NOTE	*	BARE NAME & NUMBER.			

	+	HI	-	ELEV							
		593.01					★	MW-16		3' conc.	(omc)
			7.3	585.7				GRD			
			4.68	588.33				4" Box	Alum	CASING	
TP7			4.68	588.33				1" PVC.	RISER		
	4.76	593.09									
							★	MW-17		3' conc	(omc)
			8.8	584.29				GRD			
			5.86	587.23				4" Box	Alum	CASING	
TP8			6.00	587.09				2"	Alum	RISER	
	5.74	592.83									
			8.59	584.24	SDR 584.21						
			7.27	585.56 ~~585.09~~	SDR 586.11		NAIL	#15	N6285.23	E6397.10	(PG.44)
			7.55	585.28	SDR 585.84		NAIL		N6295	E6350	
			8.51	584.32 586.16	SDR 584.90		NAIL		N6301	E6100	
TP9			6.67	~~585.44~~	585.73	WRITTEN ON POLE	SMITH BOLT	(SEE NOTE PG.51) BASE OF HUGE POWER POLE			
	5.00	591.16									
						NOTE					
						★ BARR NAME & NUMBER					

5-20-93

Stone	+	HI	−	ELEV							
		591.16									
			6.05	585.11	585.67		NAIL	63'OAN 58 00E			
						★	MW-13	/ 3' CONC			(OMC)
TP 9			5.9	585.3				GRO			
			3.34	587.82				4" Alum CASING			
TP 10			3.50	587.66				1" PVC RISER			
	2.73	590.39									
						★	MW-12	/ 3' CONC.			(OMC)
TP 9			5.4	585.0				GRO			
			3.14	587.25				4" Alum CASING			
			3.32	587.07				2" Alum RISER			
	3.31	590.38									
TP 11			5.45	584.93 ~~584.44~~	584.58	TBM	(SEE NOTE PG. 51) NORTH END CONC SLAB				
	5.54	590.47					HUGE POWER POLE				
						NOTE ★	BARR NAME & NUMBER				

	+	HI	−	ELEV	
		590.47			
			4.9	585.6	
			1.81	588.66	
TP12			1.81	588.66	
	2.27	590.93			
			5.1	585.8	
			2.44	588.49	
TP13			2.41	588.52	
	2.63	591.15			
TP 14			3.57	~~587.03~~ ~~587.06~~ 587.58	587.62
	~~4.13~~ 4.13	591.71			
TP15			5.11	~~86.40~~ ~~586.08~~ 586.60	586.63
	~~3.52~~ 3.46	590.06			
			4.14 ~~4.70~~	~~85.52~~ ~~84.45~~ 585.42	585.45
	5.21	590.63			
TBM			6.01	584.62	584.65
					VS 0.03

(50)
5-20-93

★ MW-11 /3' conc (OMC)
GRO
4" Alum CASING
~~4"~~ 3" Alum RISER

★ MW-10A /3' conc (OMC)
GRO
4" Alum CASING
1" PVC RISER

RISER 2-1 (TP3, PG.46)

CONC SHACK (TBM2, PG.46)

MH (TP1, PG.46)

TBM

~~NOTE~~ BARR NAME & NUMBER

5-23-93

WAUKEGAN:

NOTE: Didn't match Found 13-49-003 JSL 52
tbms along ditch.
What we used is DATE: NOV 1, 1993
described on pg. 38, It WEATHER: SUNNY, 38°, 0-10mph
checked in earlier survey.
Found tbms along ditch: CREW: DAM & RJD
I don't know who set?
Elevations were written on
huge power poles. INST: BC1 SOKKIA LEVEL

Future: I would suggest purpose:
double check our bm on
sea wall. This would
take, at most, half a day.

DAS

	+	HI	−	ELEV	GIVEN	
	5.41	590.06			584.65	TBM = "X" SEAWALL
TP1			5.50	584.56		= STILLING WELL #1
	5.71	590.27				
TP2			5.60	584.67		= ROAD
	6.01	590.68				
TP3			5.69	584.99		= PK NAIL N5005, E5600
	5.86	590.85				
			5.4	585.5		= 15D GROUND
			5.24	585.61		= 15D CASING
TP4			5.46	585.39		= 15D RISER
	4.79	590.18				
			4.9	585.3		= 15S GROUND
			4.70	585.48		= 15S CASING
TP5			4.85	585.33		= 15S RISER
	5.25	590.58				
TP6			5.59	584.99		= PK NAIL N5005, E5600

	+	HI	−	ELEVATION	GIVEN				
	6.71	591.70							
TP 7			5.16	586.54	586.55	TP SPIKE 14	N 5161.97	E 6116.78	
	4.22	590.76							
TP 8			8.22	582.54		— WATER SURFACE		STREAM GAUGE #3 (1.35 GAGE READING)	
	8.08	590.62							
			6.3	584.3		— 14 D GROUND			
			6.32	584.30		— 14 D CASING			
TP 9			6.57	584.05		— 14 D RISER			
	6.36	590.41							
			6.3	584.1		— 14 S GROUND			
			6.09	584.32		— 14 S CASING			
TP 10			6.49	583.92		— 14 S RISER			
	7.70	591.62							
TP 4			4.80	586.82	586.86	— PK NAIL N 4500		E 6000	
	6.10	592.92							
			5.8	587.1		— 13 D GROUND			
			5.68	587.24		— 13 D CASING			

	+	HI	−	ELEV							
TP12			6.02	586.90		−13D	RISER				
	6.34	593.24									
			6.1	587.1		−13S	GROUND				
			6.80	587.24		−13S	CASING				
TP13			6.29	586.95		−13S	RISER				
	5.81	592.76									
			6.7	586.1		−4D	GROUND				
			6.56	586.20		−4D	CASING				
TP14			6.83	585.93		−4D	RISER				
	5.82	591.75									
			5.5	586.3		−4S	GROUND				
			5.34	586.41		−4S	CASING				
TP15			5.51	586.14		−4S	RISER				
	6.46	592.62									
			8.4	584.2		−P-105	GROUND				
			8.30	584.32		−P-105	CASING				
TP16			8.66	583.96		−P-105	RISER				

	+	HI	−	ELEV	GIVEN					
	8.75	592.71								
[redacted]			6.5	586.2		−12D	GROUND			
			6.43	586.28		−12D	CASING			
TP			6.70	586.01		−12D	RISER			
	6.90	592.91								
			6.7	586.2		−12S	GROUND			
			6.69	586.22		−12S	CASING			
TP			6.88	586.03		−12S	RISER			
	6.34	592.37								
TP			6.40	585.91		− CDR	CONC	SLAB		
	5.56	591.53								
TBM			5.19	586.34	586.35	− N	3950	E	5600	
				VS 0.01						

WAUKEGAN

DATE: 1-2-93

WEATHER: RAINY, CLOUDY, 43°, 10-20mph T

CREW: DAM & BOD

INST: BCI SOKKIA LEVEL

PURPOSE: RUN LEVEL LOOP TO CHECK ELEVATION OF RISERS AND GROUND

	+	HI	−	ELEV	GIVEN			—	+	
	4.39	590.74			586.35	TP	SPIKE	N 3950	E 5690	
			5.1	585.6		MW-10D	GROUND			T
			2.11	588.63		MW-10D	CASING			
TP1			2.14	588.60		MW-10D	RISER			
	1.93	590.53								
			4.8	585.7		MW-10S	GROUND			
			1.96	588.57		MW-10S	CASING			T
TP2			1.95	588.58		MW-10S	RISER			
	3.06	591.64								
			5.2	586.99		P-106	GROUND			
			1.98	589.46		P-106	CASING			T
TP3			2.04	589.60		P-106	RISER			
	1.77	591.37								
			4.8	586.6		P-109	GROUND			
			1.81	589.56		P-109	CASING			T
TP4			1.85	589.58		P-109	RISER			

	+	HI	—	ELEV	GIVEN					
	2.36	591.86								
			5.5	586.4		— PW-1	GROUND			
T_{PS}			2.88	589.00		— PW-1	CASING			
				—		— PW-1	NO RISER			
$T_{\ }$	3.55	592.55								
			6.9	585.7		— MW-9D	GROUND			
			3.91	588.64		— MW-9D	CASING			
T_{P8}			3.90	588.65		— MW-9D	RISER			
	3.69	592.34								
			6.9	585.4		— MW-9S	GROUND			
			3.82	588.52		— MW-9S	CASING			
T_{P7}			3.85	588.49		— MW-9S	RISER			
$T_{\ }$	2.38	590.87								
			5.9	585.0		— MW-7D	GROUND			
			2.58	588.29		— MW-7D	CASING			
T_{P6}			2.73	588.14		— MW-7D	RISER			
T_{P6}	2.78	590.92								

	+	HI	−	ELEV	GIVEN					59
			6.0	584.9		— MW-7S GROUND				
			2.84	588.08		— MW-7S CASING				
TP 9			3.14	587.78		— MW-7S RISER				
	3.11	590.89								
			4.43	586.46	585.42	— TP 5	N 4500	E 5600		

	+	HI	—	ELEV	GIVEN						
	6.62	591.58			583.96	- P-105 RISER					
			5.2	586.4		- MW-8D GROUND					
			5.15	586.43		- MW-8D CASING					
			5.49	586.09		- MW-8D RISER					
	5.38	591.47									
			5.0	586.5		- MW-8S GROUND					
			4.90	586.57		- MW-8S CASING					
			5.04	586.43		- MW-8S RISER					
	5.22	591.65									
			7.69	583.96							
					0.00						

+	HI	—	ELEV	GIVEN						61
5.87	590.52			584.65	TBM = "X" SEAWALL					
		5.6	584.9		— P-107 GROUND					
		5.26	585.26		— P-107 - CASING					
		6.11	584.41		— P-107 RISER					
6.00	590.41									
		4.89	585.52		— STILLING WELL #2					
4.67	590.11									
		9.44	580.75		— WATER SURFACE @ HARBOR					
		5.52	584.67	584.65	TBM = "X" SEAWALL					
			+0.02							

	+	HI	—	ELEV	GIVEN					
	5.05	590.44			585.39	MW-15D RISER				
			5.46	585.0		- MW-11D GROUND				
			2.43	588.01		- MW-11D CASING				
			2.46	587.98		- MW-11D RISER				
	2.24	590.22								
			5.2	585.0		- MW-11S GROUND				
			2.27	587.95		- MW-11S CASING				
			2.31	587.83		- MW-11S RISER				
	2.55	590.38								
			5.00	585.38	585.39	- MW-15D RISER				

	+	Hi	−	Elev	Given						
							(49)	584.97			(63)
	4.71	591.26			586.55	TP	N	5161.97	E	6116.78	
			5.9	585.1		— Z-1	GROUND				
			3.53	587.73		— Z-1	CASING				
Typ1			3.63	587.63		— Z-1	RISER				
	2.48	590.11									
			6.4	583.7		— Z-2	GROUND				
			4.12	585.99		— Z-2	CASING				
			4.30	585.81		— Z-2	RISER				
	6.65	592.46									
			8.4	584.1		— Z-8	GROUND				
			5.77	586.69		— Z-8	CASING				
			5.66	586.80		— Z-8	RISER				
	7.71	594.51									
			10.4	584.1		— Z-9	GROUND				
			7.54	586.97		— Z-9	CASING				
			7.77	586.74		— Z-9	RISER				

+	HI	—	ELEV	GIVEN			—	—	—	
6.88	593.62									
		9.58	584.1		— Z-10	GROUND				
		7.52	586.10		— Z-10	CASING				
		7.40	586.22		— Z-10	RISER				
5.17	591.39									
		8.62	587.77		— WATER SURFACE				STREAM GAGE #2 (1.50) GAGE READING	
8.39	591.16				GAGE @ BEND NEAR BEACH					
		4.95	586.21		— Z-10	RISER				
4.93	591.14									
		4.92	586.22		— BOLT W/ "X" ON POWER POLE NEAREST					
					CLOSED HWY ON OMC PROPERTY					
4.74	590.96									
		5.94	585.02	584.50	— N. EDGE OF CONC FOOTING OF POWER POLE					
4.52	589.54									

+	HI	−	ELEV	GIVEN
		6.76	582.78	WATER SURFACE (1.42) READING STREAM GAUGE #1
6.51	589.29			
		4.71	584.6	– GREEN WELL (EAST) GROUND
		3.30	585.99	– GREEN WELL (EAST) CASING
		2.88	586.41	– GREEN WELL (EAST) RISER
3.20	589.61			
		5.1	584.5	– GREEN WELL (CENTER) GROUND
		3.57	586.09	– GREEN WELL (CENTER) CASING
		3.22	586.39	– GREEN WELL (CENTER) RISER
3.15	589.54			
		4.9	584.6	– GREEN WELL (WEST) GROUND
		3.10	586.44	– GREEN WELL (WEST) CASING
		3.09	586.45	– GREEN WELL (WEST) RISER
3.69	590.14			
		3.9	586.2	– EPA WELL (NEXT TO NSSP POND) GROUND
		0.48	589.66	– EPA WELL CASING
		2.28	587.86	– EPA WELL RISER (NOTE: 1.80 FT TO CASING)

	+	HI	−	ELEV	GIVEN	
	7.00	594.86				
			8.5	586.4		– EPA WELL (NEXT TO GROUND DOCK #3 OMC PLANT #2)
			5.17	589.67		– EPA WELL CASING NORTH WEST END
			5.06	589.80		– EPA WELL RISER
	1.36	591.16				
			2.56	588.60		– TNH NEAR ROAD NORTH OF TANKS @ RR.
	2.14	590.79				
			2.66	588.06		– TOP SOUTH BOLT ON LIGHT POLE NEAR DOCK #2
	2.86	590.92				
			4.38	586.54	586.55	– TP SPIKE
					VS 0.01	

(67)

WAUKEGAN

NOV 4, 1993

	+	HI	−	ELEV	GIVEN	
	2.05	589.91			587.86	EPA NSSD RISER NEAR POND N.W. CORNER (PAGE)
			1.46	588.45		— FENCE POST
	1.55	590.00				
			2.14	587.86	587.86	— EPA NSSD RISER
	11.26	599.71			588.45	FENCE POST
TP1			2.67	597.04		— SW COR. SOUTH NSSD POND #3
	3.85	600.89				
TP2			3.80	597.09		SW COR CENTER NSSD POND #2
	4.21	601.30				
TP3			4.22	597.08		— SW COR NORTH NSSD POND #1
	3.95	601.03				
TP4			11.15	589.88		— MW 4 RISER (N.E. OF SERVICE POND) NEAR CENTER NSSD POND #2
	3.63	593.51				

	+	HI	−	ELEV	GIVEN	
			7.43	586.68		– TAR PIT POND WATER SURFACE
TPS			5.25	588.25		– Asphalt service road
	5.30	593.56				
			2.65	590.91	590.39	– "X" MARKED ON CONC FOOTING ON POWER POLE
			5.11	588.45	588.45	– FENCE POST

NORTH SHORE

13/49-003-JSL-

WAUKEGAN MANUFACTURED GAS AND COKE PLANT SITE

MISC. SURVEY NOTES

11-29-93

TO

12-3-93

JXL

S I

DDM

11-29-93

30°

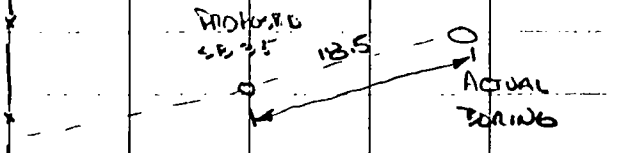
SUNNY

CALM

- ELEVATION OF SB-35 & LOCATION FROM PROPOSED

	HI	ELEV	-	ELEV		
MW-9S	2.53	591.02		588.49	TOR	MW-9S ELEVATION = 588.49 TOP of Riser
PROPOSED			5.21	585.81		
ACTUAL SB-35			5.16	585.86		
MW-9D			2.36	588.66	588.65 ✓	MW9D ELEV = 588.65 TOR

DISTANCE FROM PROPOSED SB-35
TO ACTUAL BORE HOLE = 18.5 ft
ON LINE BETWEEN MW9D AND
PROPOSED SB 35



11-29-93

35°

SUNNY

CALM

- BRUCH LOOP FROM W5 TO TAR PIT WELLS

	HI	ELEV	−	ELEV		
W-5	3.54	591.40		587.86	TOR	W-5 ELEV. = 587.86 TOR
TP1			3.88	587.52		SET TEMPORARY BM @ FENCE
W-5			3.54	587.86	✓	CHECK SHOT
TP2	5.30	589.87	6.83	584.57		
W-4A			3.37	586.50	+0.05	W4A ELEV = 586.45 TOR
W-4B			3.42	586.45	+0.06	W4B ELEV = 586.39 TOR
W-4C			3.41	586.46	+0.05	W4C ELEV = 586.41 TOR

	HI	ELEV	–	ELEV		
TP 1	5.50	593.02		587.52		TOW N SIDE OF CMC FENCE
MW-4S			3.14	589.88	+0.51	MW-4S ELEV = 589.37 TOR
MW-4D			3.15	589.87	+0.53	MW-4D ELEV = 589.34 TOR
TP1			5.50	587.52	✓	

11-30-93

35°

Cloudy

W ≤ 10-15

- ELEVATION OF OMC

L-2B

CANOPY SAMPLER

JOHN VALLEJO

263-1100

(90) (77)

	HI	ELEV	-	ELEV		
W-12	5.04	590.85		585.81		W-12 ELEV = 585.81 TOR
L-2B			4.95	585.90		
W-13			3.14	~~587.71~~	+0.08	W-13 ELEV = 587.63 TOR

WELL	L-2B			
WATER	SURFACE		4.91	
TOTAL	DEPTH		126.90	UN-ADJ.
WELL	L-1			
WATER	SURFACE		N D	
TOTAL	DEPTH		5.30	UN-ADJ.

— THE LEVEL WAS CHECKED AFTER THIS SETUP AND FOUND TO BE OUT OF ADJUSTMENT. SINCE W-12 & L-2B WERE THE SAME DISTANCE FROM A, THE ELEV OF L-2B IS CONSIDERED GOOD & W-13 TO BE DISREGARDED

JKL

(78)

11-30-93

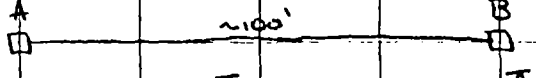
35°

Cloudy

W @ 0-15

TWO PEG TEST ON LEVEL

100' BETWEEN SHOTS



	HI	—
A	5.325	
B	4.67	4.07
A		5.61
	10.00	9.68

THIS LEVEL NEEDS TO BE ADJUSTED

79

11-30-93

35°

Cloudy

W S 10-15

- CHECK ELEVATION OF WELLS W5 & W4C

EQUAL DISTANCE SIGHTS & SHORT DISTANCES WERE USED FOR THIS LOOP

15
40

	HI	ELEV	-	ELEV						
W-5	2.025	589.89		587.86		W-5	ELEV =	587.86	TOR	
TP	5.23	589.76	5.36	584.53						
W-4C	3.52	589.92	3.36	586.40	-0.01	W-4C	ELEV =	586.41	TOR	
TP	5.32	589.83	5.405	584.51						
W-5			1.97	587.86	✓					
	16.095		16.095							

(A) (81)

11-30-93

35°

Cloudy

W 5 10-15

- Check loop to TAR Pit Site

	HI	ELEV	-	ELEV							
W 5	3.34	591.20		587.86			W-5	ELEV =	587.86	TOR	
TP 1	5.23	593.67	2.76	588.44							
TP 2	5.42	593.71	5.38	588.29							
MW-4D	3.76	593.66	3.81	589.90	+0.56	589.89 ADJ	MW-4D	ELEV =	589.34	TOR	
MW-4S	3.72	593.61	3.77	589.89	+0.52	589.88 ADJ	MW-4S	ELEV =	589.37	TOR	
TP 2B	5.44	593.72	5.33	588.28							
TP 1B	2.98	591.41	5.29	588.43							
W5			3.53	587.88	+0.02						
	+ 29.89		-29.87		+ 0.02						

11-30-93

35°

Cloudy

W S 10-15

- ELEVATION OF TEST TRACK # 29 AND # 30

	HI	ELEV	–	ELEV					
MW-75	2.95	590.73		587.78		MW-75	ELEV	587.78	TOC
# 29			5.28	585.45					
# 30			4.94	585.79					

;Project Name: WAUKEGAN

;Project Number: 13/49-003JSL
;Job Description: COMBINED SURVEY
;File Name: 11-15-93.DAT
;Date: 11-15-93
;Surveyed By:

Corrected by JMF 12/15/93

;

;PT	N	E	ELEV	DESC
4	4500.000	5600.000	585.81	TP SPK 4
8	3700.000	5600.000	581.39	TP SPK 8
50	4675.085	4938.717	584.67	TBM SEAWALL
1	5004.948	5600.007	584.97	TP PK 1
1000	4999.659	5469.856	585.55	PK FD
5	4300.030	5600.002	586.45	TP SPK 5
6	3950.020	5600.003	586.35	TP SPK 6
7	3799.990	5600.003	586.44	TP SPK 7
9	3650.004	5600.000	585.07	TP SPK 9
2	4949.950	5600.002	585.12	TP SPK 2
3	4700.010	5599.998	585.31	TP SPK 3
1002	4762.866	5953.870	585.16	0117
207	4779.875	5750.660	584.86	GS 7 SET JMF
1003	4964.179	5795.706	586.01	0116
1004	4774.905	5627.889	585.35	0119
1005	4787.011	5802.485	585.02	0118
1006	4647.396	5784.546	584.43	0120
1007	4555.207	5782.717	584.86	0121
1008	4418.902	5867.453	585.12	0122
1009	4417.201	5761.208	585.56	0123
1010	4431.172	5621.933	585.70	0124
1011	4425.142	5511.295	586.21	0125
135	4206.700	5736.700	585.80	SB 35
1012	4403.866	5401.216	586.18	0126
1013	4374.184	5332.248	585.82	0127
1014	4459.792	5289.705	585.73	0128
1016	4413.069	4913.291	585.97	GRD
10	4427.678	4905.194	585.92	TP SPK 10
1018	4194.868	5460.545	587.21	0132
1019	4196.980	5533.021	587.14	0133
1020	4198.316	5610.207	586.66	0134
1021	4207.435	5738.859	585.77	0135
1022	4204.490	5859.531	585.89	0136
1023	4201.468	5925.962	586.41	0137
1024	3940.048	5901.241	587.00	0138
11	4294.848	6117.335	588.16	TP SPK 11
12	4500.000	6000.060	586.86	TP SPK 12
1175	6124.814	5788.541	590.46	MW 9196
107	4558.680	5917.442	584.76	SB 7
1025	4572.710	6022.914	586.88	0201
1026	4761.677	6060.505	586.44	0051
203	4851.400	5910.600	585.70	GS 03
205	4841.930	5599.200	585.00	GS 05
~~1207~~	~~4642.200~~	~~5653.400~~	~~585.60~~	~~GS 07~~ NOT USED
208	4467.900	5686.800	585.20	GS 08
211	4148.300	5575.500	586.80	GS 11
209	4453.000	5268.800	585.70	GS 09
212	4149.200	5218.100	586.50	GS 12
1027	4851.392	5910.603	585.67	0203
1028	4584.770	5925.975	584.91	0307
1029	4555.465	5923.387	585.50	1307

1030	4842.538	5599.200	585.03	0205
1031	4643.008	5653.706	585.60	1207
1032	4467.823	5687.010	585.17	0208
1033	4233.339	5704.976	585.40	0309
1034	4205.327	5701.977	585.52	1309
1035	4148.453	5575.513	586.80	0211
1036	4149.421	5217.935	586.49	0212
1037	4453.005	5268.808	585.65	0209
214	4053.400	5103.800	600.30	GS 14
215	3775.700	5543.700	585.80	GS 15
216	3772.500	5238.200	585.80	GS 16
217	3765.800	4927.800	582.80	GS 17
301	4572.800	6023.400	586.90	CMW 1
60	4999.967	5474.821	585.39	PK FD IP
304	3618.000	5219.300	585.40	CMW 4
305	3634.800	5099.300	585.20	CMW 5
1038	3943.629	5705.058	587.21	0139
1039	3951.937	5585.752	586.35	0140
1040	3933.832	5459.333	586.38	0141
1041	3940.445	5352.509	586.39	0142
1042	3950.299	5285.844	586.15	0143
1043	4053.485	5103.407	600.25	0214
13	3841.908	5224.338	585.50	TP SPK 13
1044	3751.134	5316.422	588.01	0144
1045	3695.431	5247.162	585.83	0310
1046	3695.579	5218.080	585.81	1310
1047	3772.540	5238.777	585.75	0216
1048	3748.353	5405.751	584.99	0145
1049	3751.430	5610.140	586.54	0146
1050	3753.042	5674.515	586.68	0147
1051	3775.778	5543.876	585.84	0215
213	4147.100	4952.000	600.10	GS 13
1052	4145.811	4952.254	600.12	0213
210	4342.100	4943.400	586.10	GS 10
1054	4343.041	4942.980	586.10	0210
206	4844.400	5298.300	585.10	GS 06
1055	4245.272	5050.840	587.12	TOE
1056	4269.007	5031.443	587.16	TOE
1057	4254.773	4970.329	585.46	TOE
1058	4186.692	4931.312	585.40	TOE
1059	4115.975	4886.598	585.24	TOE
1060	4044.918	4849.857	585.88	TOE
1061	3975.694	4842.947	586.46	TOE
1062	3952.403	4851.127	586.21	TOE
1063	4526.012	5330.158	585.26	0407
1064	4844.768	5297.538	585.14	0206
1065	4366.497	5115.679	591.49	DS 1
1066	4280.310	5112.539	591.11	DS 2
1067	4317.622	5189.087	592.21	DS 3
1068	4394.766	5330.058	585.71	GRD
1070	4395.348	5328.813	585.80	1069
1071	4374.395	5329.136	585.83	0127
1072	3766.523	4926.654	582.84	0217
1073	4403.899	6143.356	585.40	0313
1074	4369.603	6142.874	585.02	1313
1075	3966.913	6132.201	584.44	0312
1076	3932.425	6131.622	584.54	1312
1077	3807.413	6258.627	584.62	0453
1078	3978.191	6262.048	586.29	0452
1079	4426.419	6261.075	586.35	0451

1080	4941.461	6196.573	585.32	0314
1081	4914.255	6195.892	583.83	1314
153	4194.300	6001.800	586.90	CSB 3
154	3943.200	5984.700	586.80	CSB 4
155	3736.900	5996.600	586.10	CSB 5
158	3736.500	5890.700	586.40	CSB 8
303	3470.800	5899.700	590.40	CMW 3
302	3626.900	5993.600	586.00	CMW 2
1082	4194.206	6001.803	586.89	0153
1083	3942.952	5984.695	586.80	0154
1084	3737.599	5996.608	586.09	0155
1085	3626.865	5993.596	586.01	0302
1086	3472.219	5902.549	590.38	0303
1087	3608.965	5893.201	586.70	0308
1088	3734.256	5890.374	586.42	0158
3092	6729.795	4479.487	596.36	COR NSSD 2
156	3551.700	5697.700	584.00	CSB 6
157	3552.200	5459.300	583.50	CSB 7
1090	3716.031	5804.845	586.10	0148
1091	3607.579	5682.585	584.56	0149
1092	3551.757	5697.647	583.98	0156
1093	3640.121	5455.648	585.55	0150
1094	3552.611	5459.865	583.50	0157
1095	3618.081	5220.506	585.43	0304
1096	3634.804	5099.171	585.21	0305
152	4761.900	6060.900	586.40	CSB 2
1097	5194.262	5547.989	585.48	0315
1098	5022.132	5803.593	585.08	0101
1107	3808.562	5479.757	585.23	1106
1108	3785.227	5520.029	585.82	1105
1109	4230.989	5674.623	585.56	1104
1110	4624.068	5854.005	584.76	1102
1111	4669.837	5900.470	585.07	1101
1112	4449.939	5197.532	585.84	1100
1113	4449.999	5132.004	585.89	1099
1114	3878.315	4874.011	584.32	TOE
1115	3817.364	4917.717	584.32	TOE
1116	3868.588	4984.885	584.25	TOE
1117	3914.333	5070.705	585.04	TOE
1118	3975.284	5080.958	586.18	TOE
1119	4066.501	5150.911	586.35	TOE
1120	4155.260	5151.901	586.89	TOE
1121	4228.244	5060.545	587.68	TOE
1122	4219.165	5011.808	603.18	TOP
1123	4200.357	5012.272	606.83	TOP
1124	4142.887	4979.896	607.35	TOP
1125	4163.560	4978.046	600.71	BRK
1126	4151.476	4937.757	600.40	BRK
1127	4097.746	4908.339	601.55	BRK
1128	3990.242	4884.406	596.29	BRK
1129	3924.225	4913.253	600.53	BRK
1130	4017.820	4910.252	599.12	BRK
1131	4091.788	4938.208	600.33	BRK
1132	4086.742	4948.353	605.92	TOP
1133	3992.918	4920.470	603.51	TOP
1134	3909.298	4936.785	602.17	TOP
1135	3970.327	5044.459	601.78	TOP
1136	4055.039	5101.851	600.97	TOP
1137	4124.244	5105.901	600.43	TOP
1138	4089.351	5033.575	606.13	GRD

14	5161.973	6116.780	586.55	TP SPK 14
15	6285.234	6397.097	585.56	TP SPK 15
1139	6298.825	6007.746	585.25	GRD END SHEETPLE
1140	6323.844	4720.515	582.86	GRD END DITCH
1141	6302.659	4795.723	584.19	GRD
1142	6303.061	4800.002	584.11	NAIL XSEC 4800
1143	6302.997	5299.972	584.49	NAIL XSEC 5300
1144	6300.026	5800.031	585.11	NAIL XSEC 5800
1145	6299.993	6099.960	584.34	NAIL XSEC 6100
1146	6298.949	6085.238	586.16	TBM FD
1147	6295.092	6350.101	585.28	NAIL XSEC 6350
1148	6294.306	6485.739	583.48	FEN END
1149	6292.927	6500.049	584.24	NAIL XSEC 6500
1150	6259.008	6571.069	587.29	NAIL XSEC 6571
1151	6288.346	6454.772	583.88	GRD END RIPRAP
1152	6280.645	6451.526	584.29	MW Z 8
1153	6279.565	6455.158	584.09	MW Z 9
1154	6278.522	6458.179	584.09	MW Z 10
1155	6259.467	6452.721	584.18	MW 17
1156	6259.107	6424.205	584.78	MW 16
1157	5990.370	6318.848	585.68	MW 14
1158	6013.585	6321.511	585.42	MW 15
1159	5842.430	6311.703	583.63	MW Z 2
1160	5831.509	6307.670	583.88	MW 3
1161	5700.388	6259.042	585.31	MW Z 1
1162	6289.113	5669.218	585.14	MW 13
1163	6287.322	5632.532	584.58	MW 12
1164	5757.557	6289.305	583.76	FEN
1165	6117.025	6674.741	583.37	NAIL XSEC 6674
1166	5978.909	6747.631	582.51	GRD
1167	5942.838	6731.617	582.54	GRD
1168	5953.385	6828.032	582.80	GRD
1169	5954.103	6835.701	581.66	WS LAKE
1170	5963.485	6820.593	582.28	WS DITCH
1171	6138.888	6718.965	584.11	NAIL XSEC
1172	6292.426	6620.487	585.14	NAIL XSEC
1173	5956.702	5631.097	585.45	MW 11
1174	5956.098	5662.635	585.38	MW 10A
151	5022.300	5805.600	585.10	CSB 1
3000	4533.849	5244.514	585.35	P 107
3001	4536.212	5244.592	585.49	STW 2
3002	4675.804	4938.591	584.50	STW 1
3003	5193.049	5540.337	585.58	MW 15D
3004	5190.470	5531.354	585.22	MW 15S
3005	4206.128	5695.985	585.90	MW 9D
3006	4212.244	5693.617	585.77	MW 9S
3007	4272.635	5643.364	585.31	TT 25
3008	4222.985	5696.794	585.33	TT 25
3009	4415.153	5767.210	585.67	SB 23
3010	4419.919	5868.364	584.93	SB 22
3011	4553.789	5901.987	585.07	MW 7D
3012	4544.969	5899.790	585.44	MW 7S
3013	4630.474	5853.788	584.56	TT 26
3014	4680.632	5902.669	585.09	TT 26
3015	4764.010	5946.575	585.43	SB 17
3016	4963.668	5796.473	586.04	SB 16
3017	4779.706	5623.834	585.30	SB 19
3018	4791.216	5805.076	584.93	SB 18
3019	4648.658	5787.783	584.45	SB 20
3020	4555.519	5782.155	584.91	SB 21

3021	4664.673	5613.398	585.74	~~SB ?~~ SB-60
3022	4431.890	5623.203	585.66	SB 24
3023	4426.059	5517.050	586.16	SB 25
~~3024~~	~~4370.106~~	~~5466.384~~	~~586.30~~	~~SB 25?~~ NOT USED
3025	4404.263	5401.268	586.02	SB 26
3026	4387.417	5314.937	584.69	SB 27
3027	4453.352	5269.065	585.64	SB 28
3028	4442.745	5213.788	585.65	TT 27
3029	4441.277	5160.429	585.59	TT 27
3030	4327.858	4916.194	585.59	~~SB 45?~~ SB-29
3031	4043.698	5068.311	604.07	SB 31
3032	3937.691	4939.930	602.08	SB 30
3033	4179.815	5011.838	606.52	SB 29
3034	3956.409	5286.388	586.05	SB 43
3035	3947.494	5355.036	586.56	SB 42
3036	4015.379	5442.768	586.65	P 106
3037	4004.868	5443.384	589.26	PW 1
3038	4195.203	5462.467	587.27	SB 32
3039	4196.519	5534.175	587.11	SB 33
3040	4197.430	5611.569	586.55	SB 34
3041	4298.166	5612.256	586.37	GRD SOFT TAR
3042	4006.217	5475.278	586.78	P 108
3043	4290.086	5595.854	586.23	GRD HARD TAR
3044	3934.673	5456.534	586.12	SB 41
3045	3943.470	5578.147	586.18	SB 40
3046	3944.252	5696.580	586.67	SB 39
3047	3752.257	5674.475	586.74	SB 47
3048	3751.432	5606.018	586.38	SB 46
3049	3761.644	5509.372	585.46	GRD HARD TAR
3050	3822.312	5421.833	585.09	GRD SOFT TAR
3051	3747.394	5404.662	584.91	SB 45
3052	3735.823	5319.410	585.18	SB 44
3053	3694.603	5226.338	585.71	MW 10D
3054	3695.455	5233.127	585.80	MW 10S
3055	3701.789	5225.423	585.62	~~SB ?~~ SB-57
3056	3766.119	5433.147	585.05	TT 24
3057	3807.733	5436.265	585.14	TT 24
3058	4207.623	5849.721	585.64	SB 36
3059	4109.216	5870.623	586.38	MW 4S
3060	4118.198	5874.100	586.24	MW 4D
3061	3735.406	5798.198	586.48	SB 48
3062	3605.113	5683.933	584.58	SB 49
3063	3553.023	5459.355	583.40	SB 56
3064	3640.416	5456.683	578.46	SB 50
3065	4937.860	6213.313	584.32	MW 14D
3066	4931.643	6213.701	584.31	MW 14S
3067	4388.884	6274.855	587.26	MW 13D
3068	4389.839	6269.391	587.26	MW 13S
3069	3949.720	6604.963	584.40	HB 52
3070	3559.663	6614.235	584.93	HB 53
3071	4444.340	6567.752	584.69	HB 51 JAB
3072	3977.023	6257.936	586.36	MW 12D
3073	3983.446	6257.061	586.29	MW 12S
3074	3940.650	6144.678	584.18	P 105
3075	3583.504	5874.475	586.44	MW 8D
3076	3583.562	5879.685	586.48	MW 8S
3077	3942.691	5884.453	587.63	SB 38
3078	4202.612	5911.775	586.16	SB 37
3079	5041.467	6143.352	584.95	~~STRG 1~~ STRG 3
45	6137.302	6235.426	591.77	TP 45

3080	5002.346	5048.237	585.14	MW 11D
3081	5002.860	5042.623	585.29	MW 11S
~~3082~~	~~5112.347~~	~~5276.773~~	~~585.11~~	~~SB ?~~ NOT USED
3083	5943.550	4669.437	586.05	MW EPA OMC
3084	6353.422	4712.062	586.09	MW EPA NSSD
3085	6306.504	5210.862	584.43	MW GREEN WEST
3086	6306.514	5214.188	584.45	MW GREEN CTR
3087	6307.333	5217.055	583.94	MW GREEN EAST
3088	6311.658	5382.016	584.90	~~STRG 2~~ STRG 1
3089	6249.552	6597.324	592.78	~~STRG 3~~ STRG 2
3090	7085.421	4575.795	596.93	COR NSSD 1
3091	6499.058	4416.934	596.32	COR NSSD 3

Appendix 4-C

Analytical Laboratory Data

(left out intentionally because of size)

Appendix 4-D

Test Trench Logs

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-00A SHEET 1 OF 1

TEST PIT WALL LOG

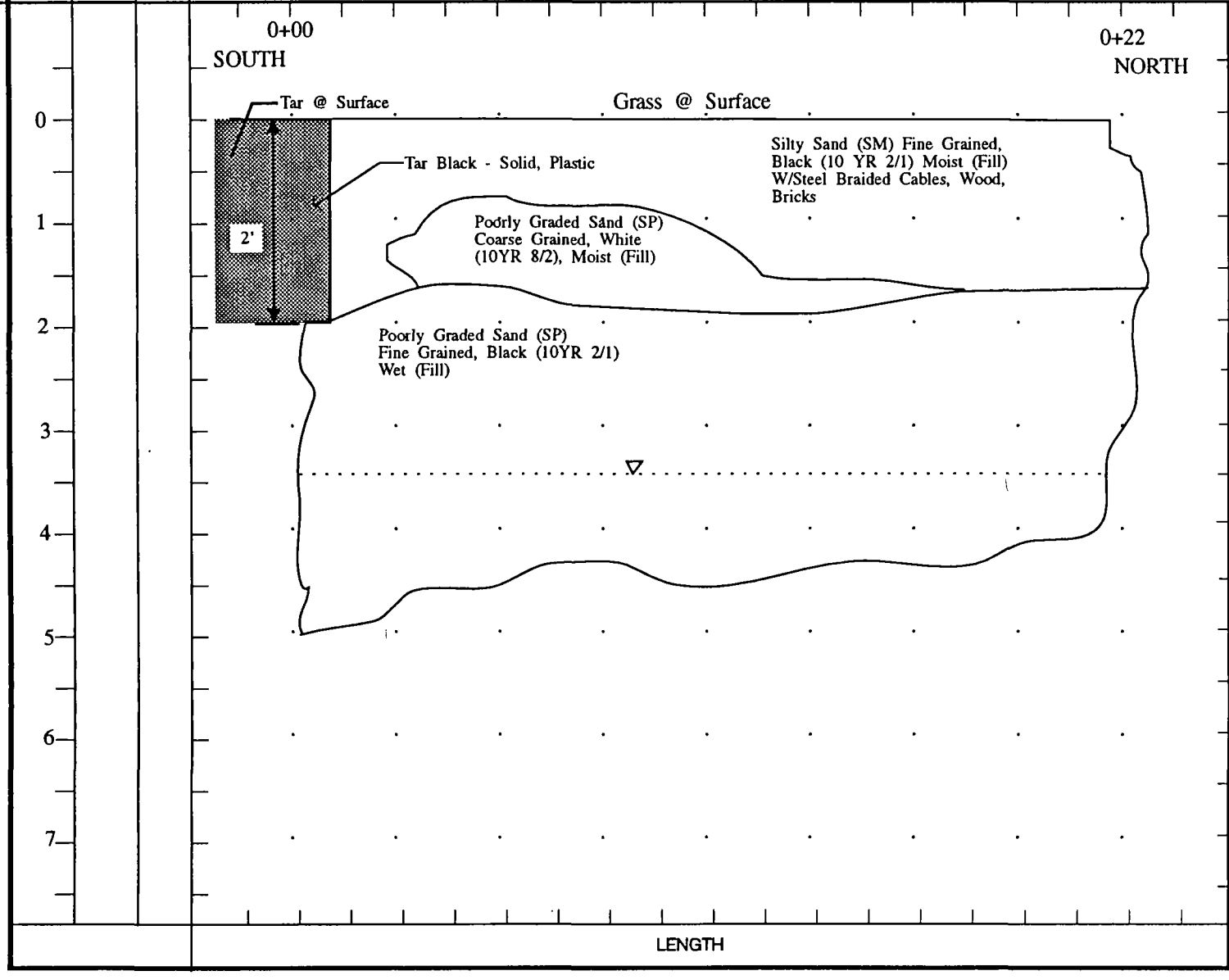
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/11/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 22' WIDTH 3-4' DEPTH 4-5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-00B | SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant | LOCATION Waukegan, IL. | MAP OF NW WALL OF PIT

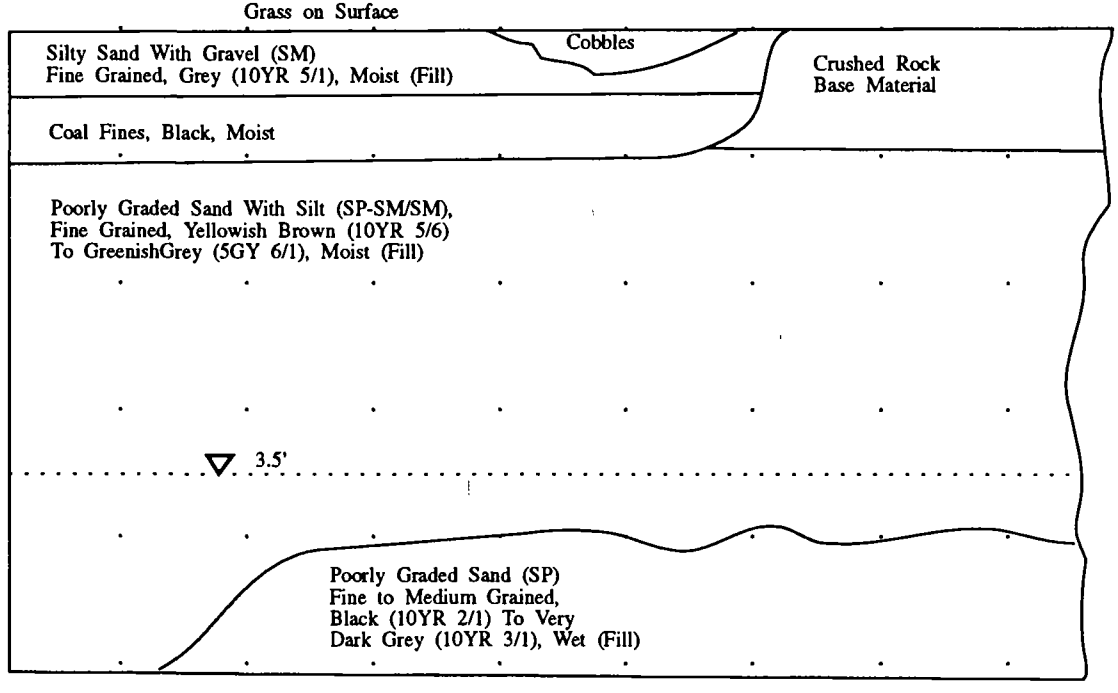
ELEVATION _____ | CONTRACTOR Kirshoffer | DATE EXCAVATED 3/11/92

WATER LEVEL AND DATE _____ | EXCAVATION METHOD B-Hoe | LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 50' WIDTH 3-4' DEPTH 5' | REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+00 SOUTHEAST | 0+10 | 0+20 | 0+30 | 0+40 NORTHWEST



0 1 2 3 4 5 6 7

LENGTH

COMMENTS

No Sheen on Groundwater

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-00C SHEET 1 OF 3

TEST PIT WALL LOG

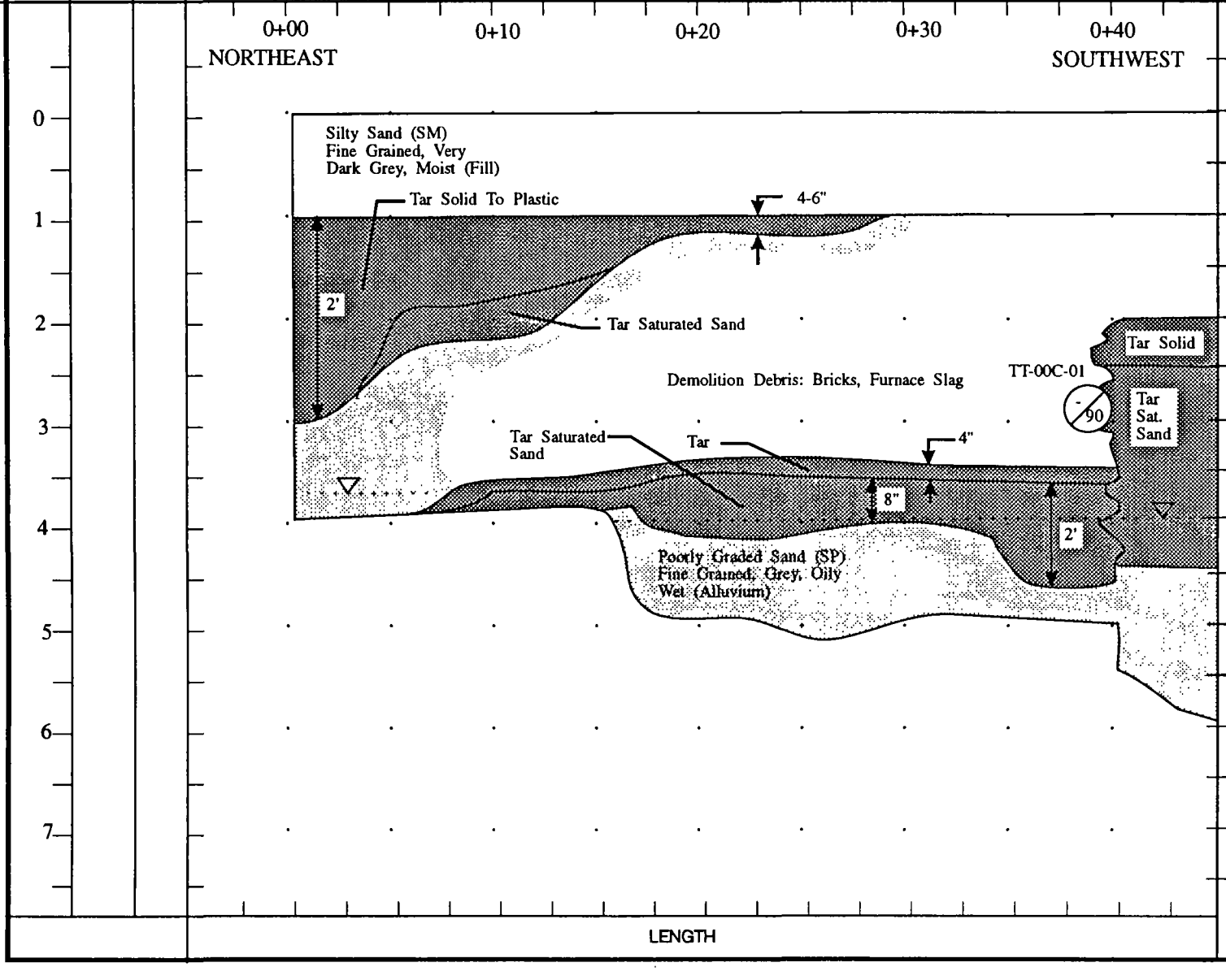
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF SE WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/20/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 100' WIDTH 3-4' DEPTH 4-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Sheen on Groundwater With Golden-Brown Oily Blebs

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-00C SHEET 2 OF 3

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF SE WALL OF PIT

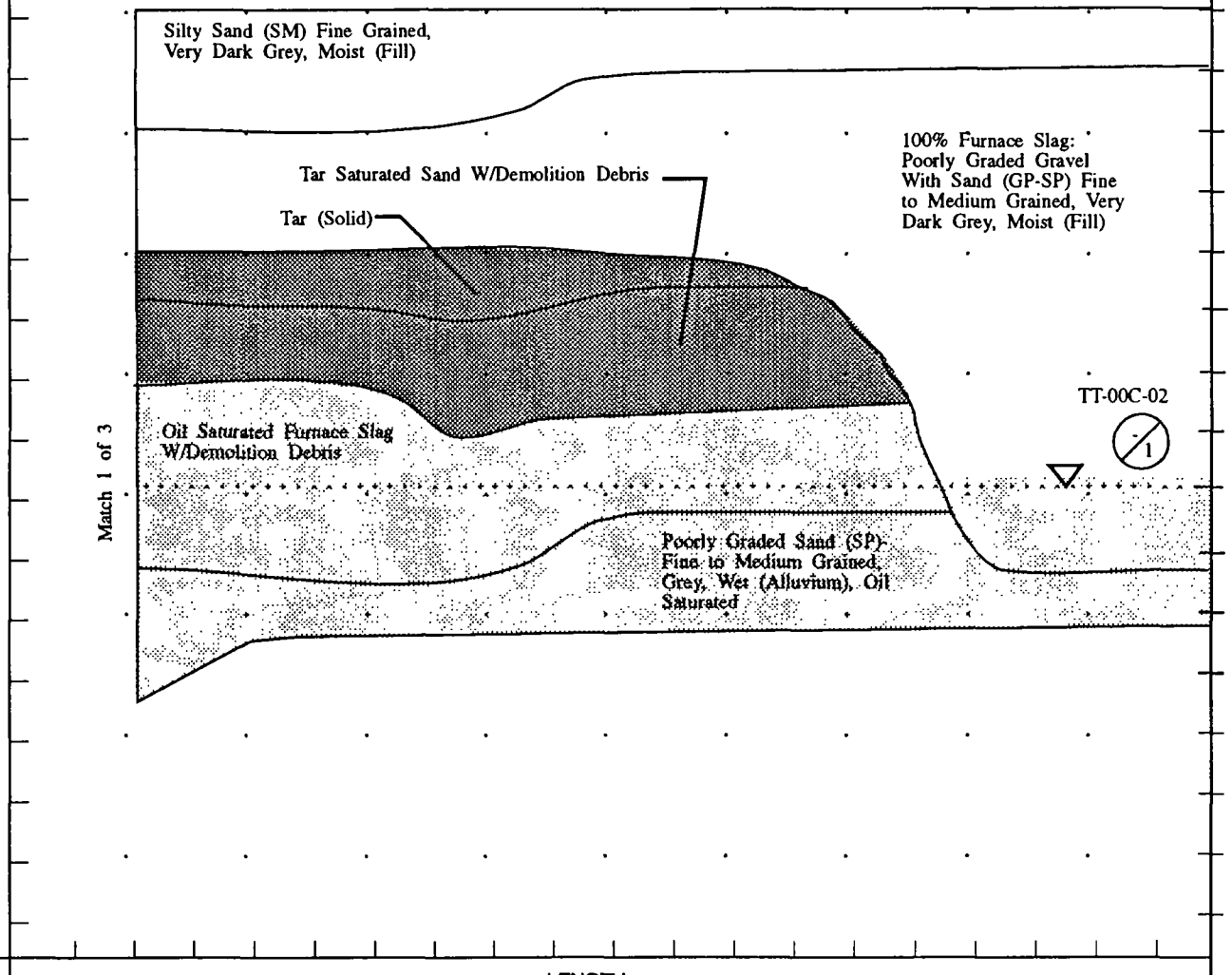
ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/20/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 100' WIDTH 3-4' DEPTH 4-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+40 NORTHEAST 0+50 0+60 0+70 0+80 SOUTHWEST



LENGTH

COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Sheen on Groundwater With Golden-Brown Oily Blebs

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-00C SHEET 3 OF 3

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF SE WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/20/92

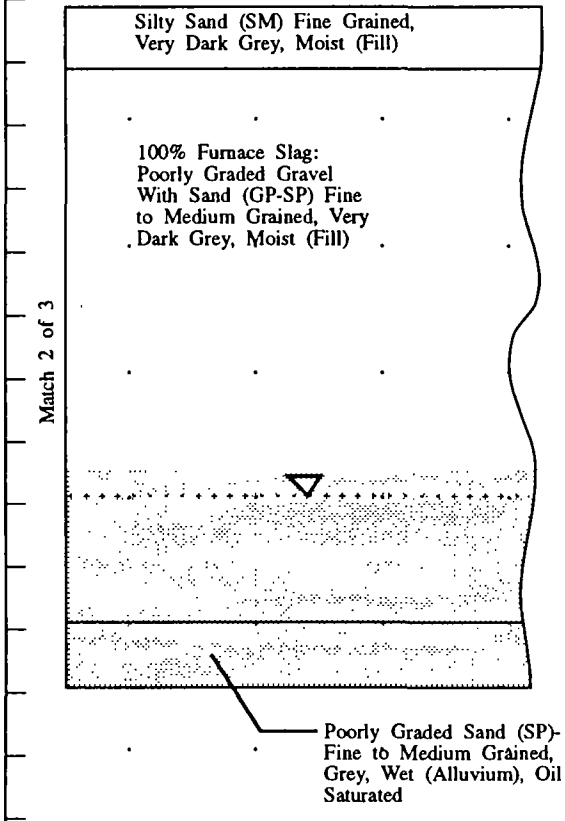
WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 100' WIDTH 3-4' DEPTH 4-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+80 0+90 1+00 1+10 1+20

NORTHEAST SOUTHWEST



0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Sheen on Groundwater With Brown Oily Blebs

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-00D | SHEET 1 OF 3

TEST PIT WALL LOG

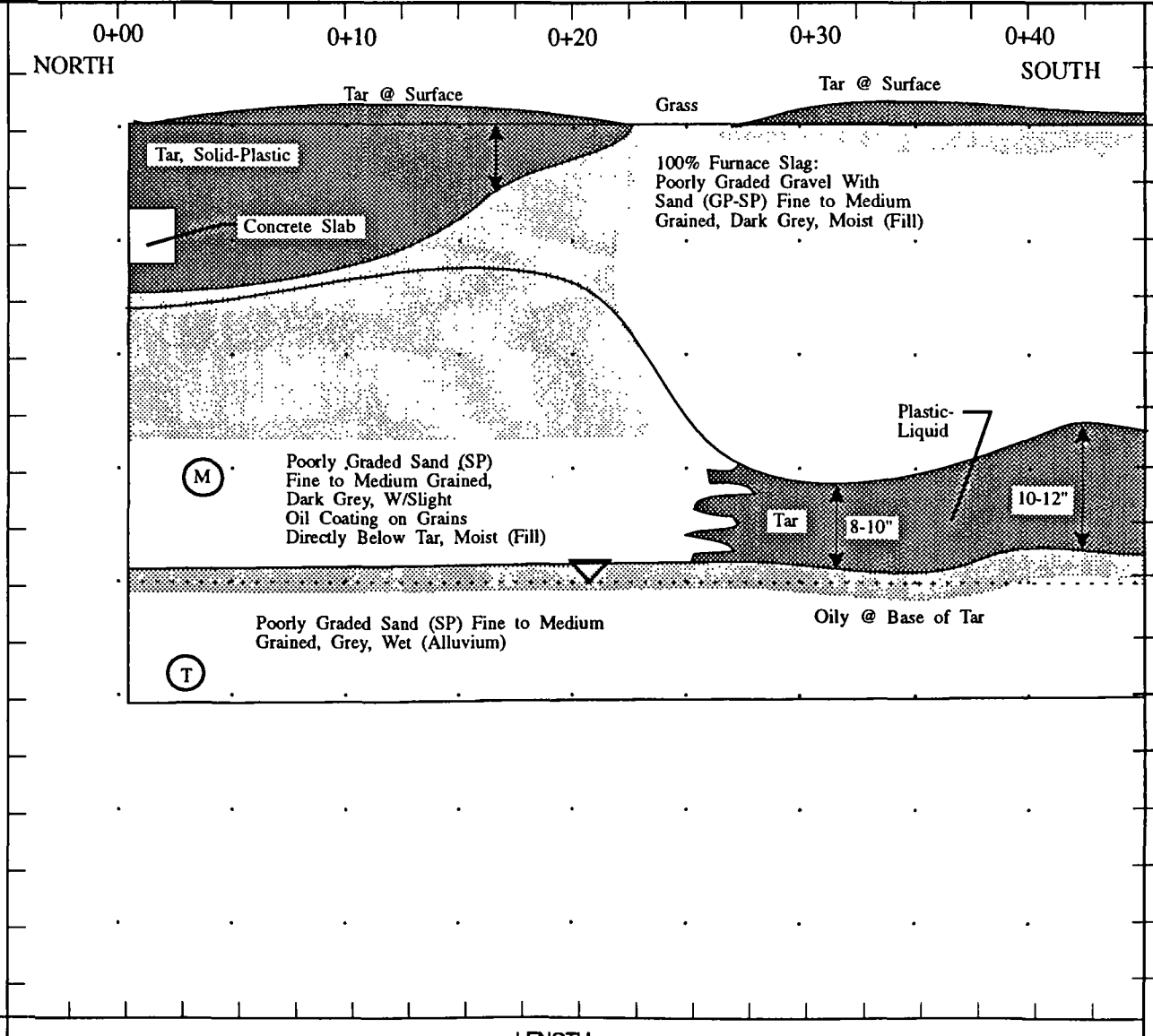
PROJECT Northshore Gas Waukegan Coke Plant | LOCATION Waukegan, IL. | MAP OF W WALL OF PIT

ELEVATION _____ | CONTRACTOR Kirshoffer | DATE EXCAVATED 3/20/92

WATER LEVEL AND DATE _____ | EXCAVATION METHOD B-Hoe | LOGGER JMF

APPROXIMATE DIMENSIONS | LENGTH 100' | WIDTH 3-4' | DEPTH 5' | REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER, INTERVAL



COMMENTS

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Oil Sheen on Groundwater With a Trace of Golden Brown Oily Blebs

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-00D SHEET 2 OF 3

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/20/92

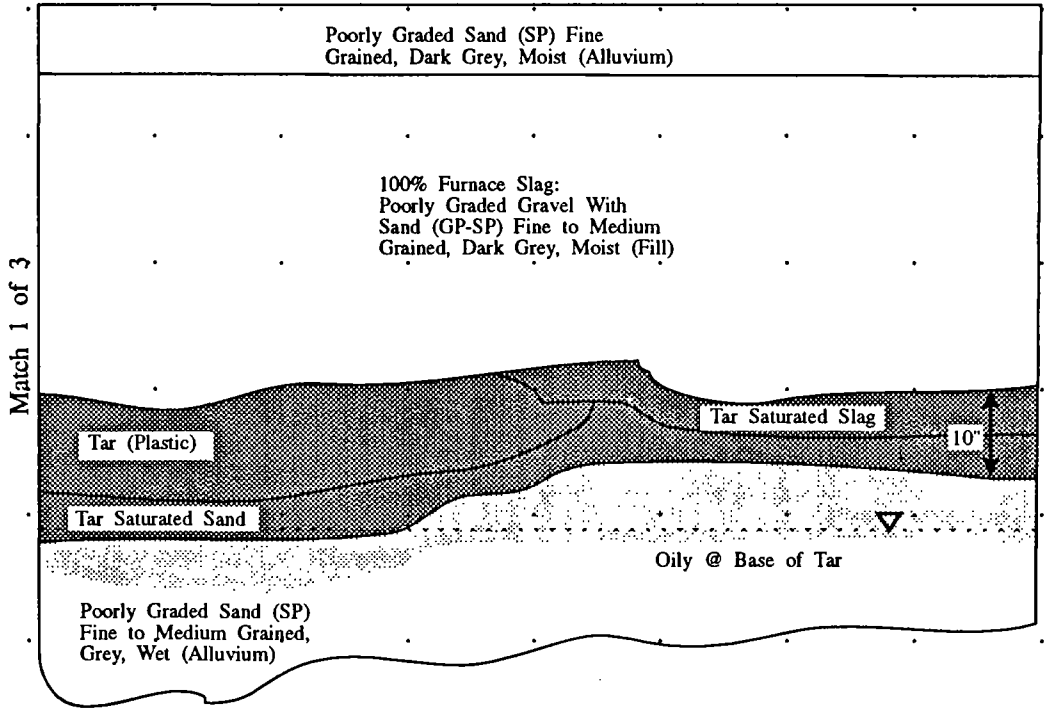
WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 100' WIDTH 3-4' DEPTH 5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+40 0+50 0+60 0+70 0+80

NORTH SOUTH



0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Oil Sheen on Groundwater With a Trace of Golden Brown Oily Blebs

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-00D SHEET 3 OF 3

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/20/92

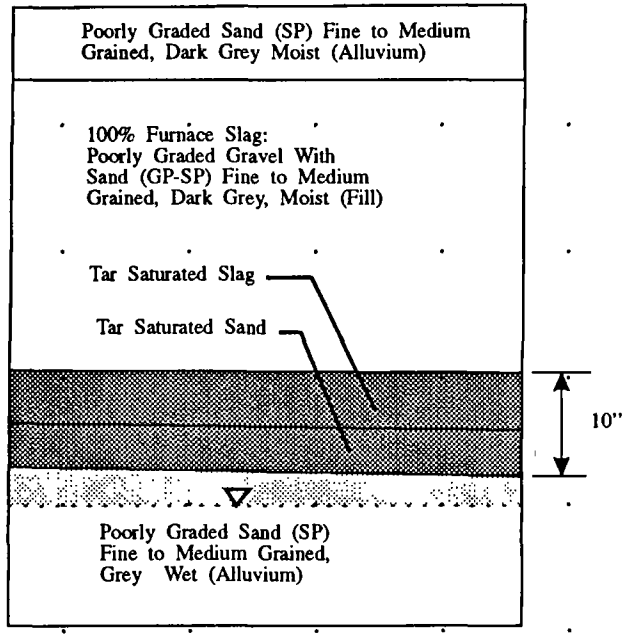
WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 100' WIDTH 3-4' DEPTH 5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+80 0+90 1+00 1+10 1+20

NORTH SOUTH



Match 2 of 3

0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Oil Sheen on Groundwater With a Trace of Golden Brown Oily Blebs.

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-01 SHEET 1 OF 5

TEST PIT WALL LOG

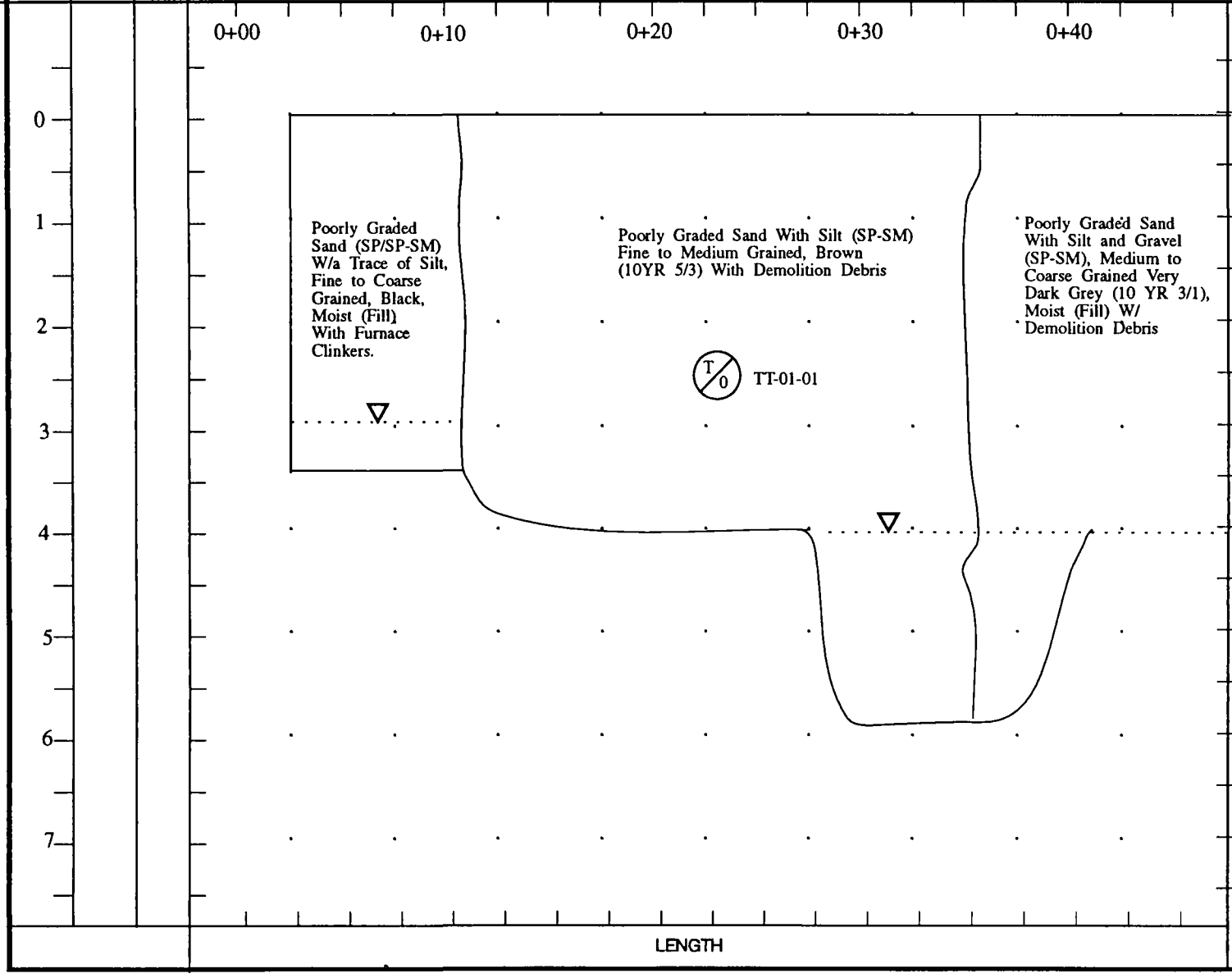
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NW WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshhoffer DATE EXCAVATED 3-6-92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 220' WIDTH 3-4' DEPTH 1 - 6 1/2' REMARKS _____

ELEVATION / DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

Moderate To Heavy Sheen on Groundwater

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-01 SHEET 2 OF 5

TEST PIT WALL LOG

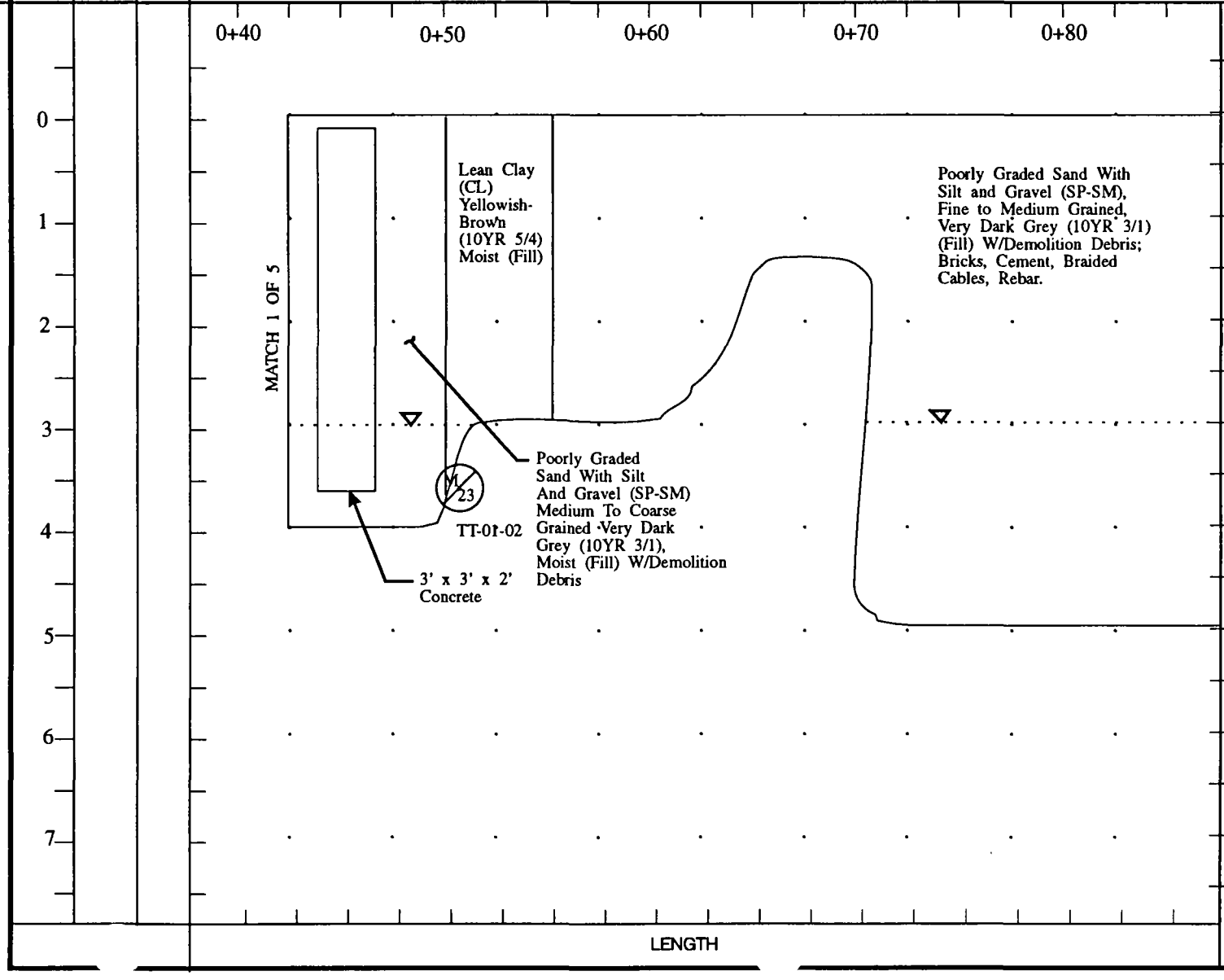
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NW WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshhoffer DATE EXCAVATED 3-9-92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 220' WIDTH 3-4' DEPTH 1 - 6 1/2' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE TYPE AND NUMBER | SAMPLE INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-01 SHEET 3 OF 5

TEST PIT WALL LOG

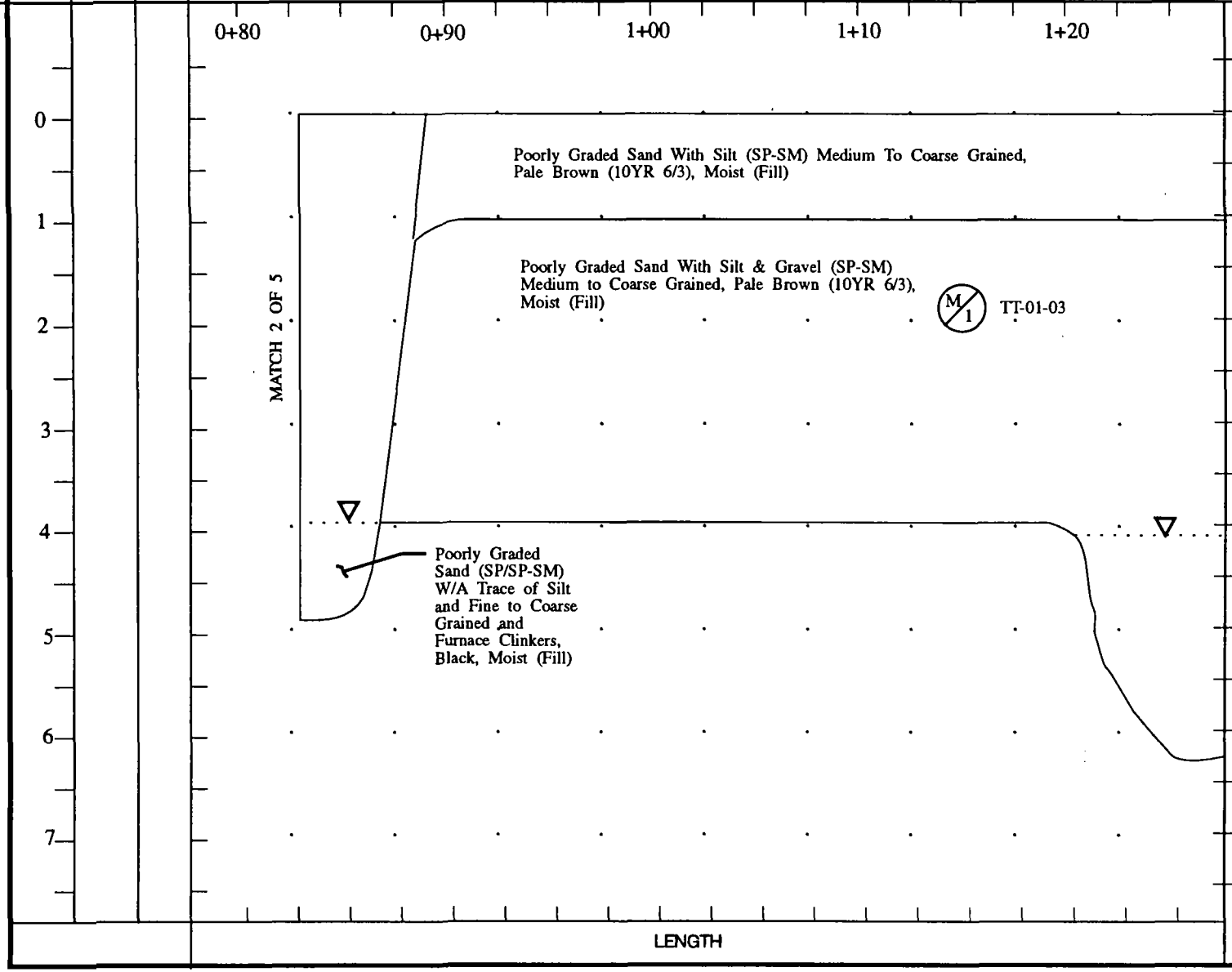
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NW WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshhoffer DATE EXCAVATED 3-6-92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 220' WIDTH 3-4' DEPTH 1 - 6 1/2' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10 — Headspace Reading, ppm

Moderate Sheen on Groundwater

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-01 SHEET 4 OF 5

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NW WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshhoffer DATE EXCAVATED 3-6-92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 220' WIDTH 3-4' DEPTH 1-6 1/2' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

1+30 1+40 1+50 1+60 1+70

0 1 2 3 4 5 6 7

Poorly Graded Sand With Silt (SP-SM)
Medium To Coarse Grained, Pale Brown
(10YR 6/3), Moist (Fill)

Root Zone

Poorly Graded Sand With Silt and Gravel (SP-SM)
Fine to Medium Grained, Black, Moist (Fill)

Poorly Graded Sand
With Silt and Gravel (SP-SM)
Coarse Grained, Black, Moist
(Fill) With Tar Chunks, Rebar.

MATCH 3 OF 5

TT-01-04
M/80

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-01 SHEET 5 OF 5

TEST PIT WALL LOG

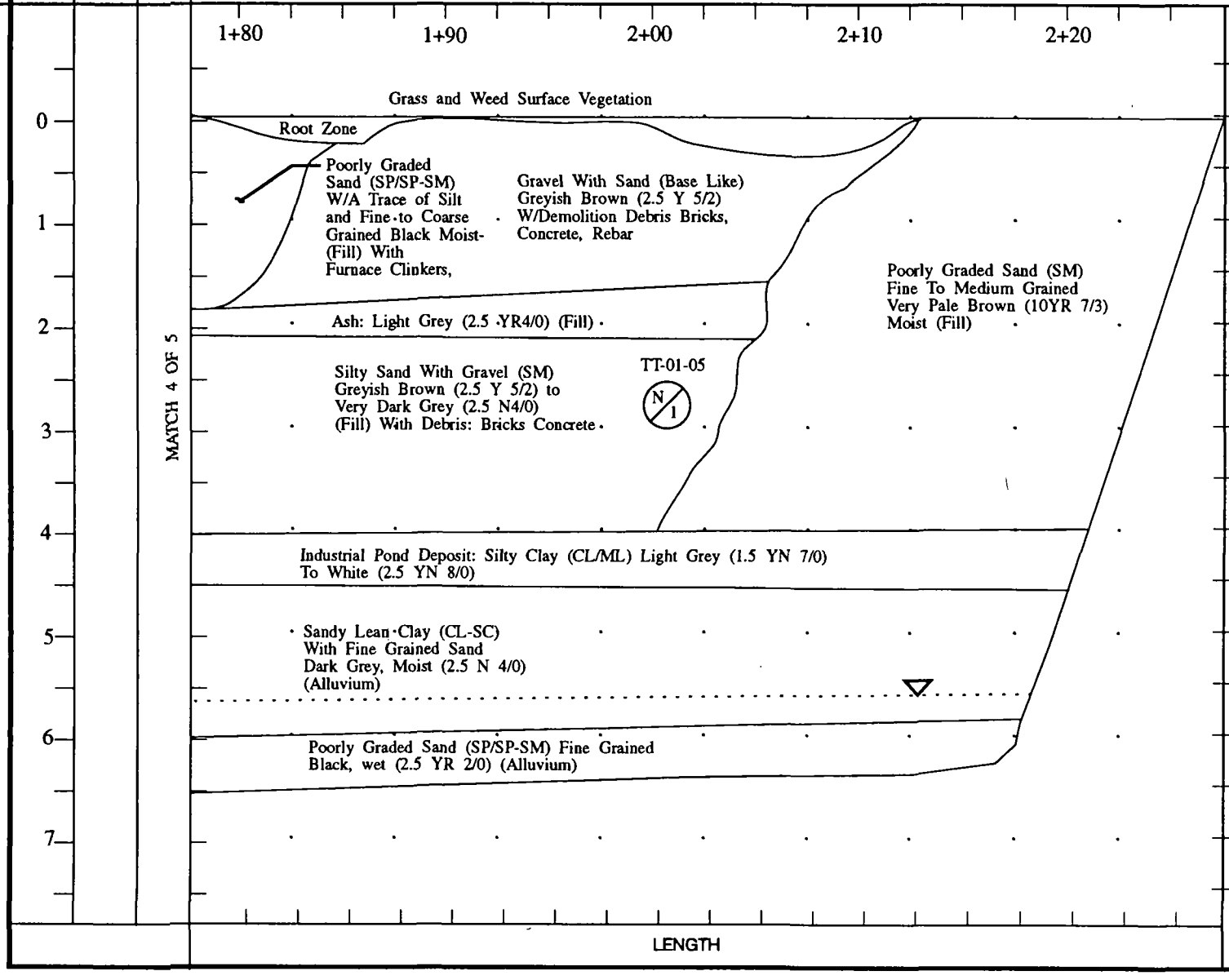
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshhoffer DATE EXCAVATED 3-9-92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 220' WIDTH 3-4' DEPTH 1 - 6 1/2' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

Moderate Sheen on Groundwater

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-02 SHEET 1 OF 5

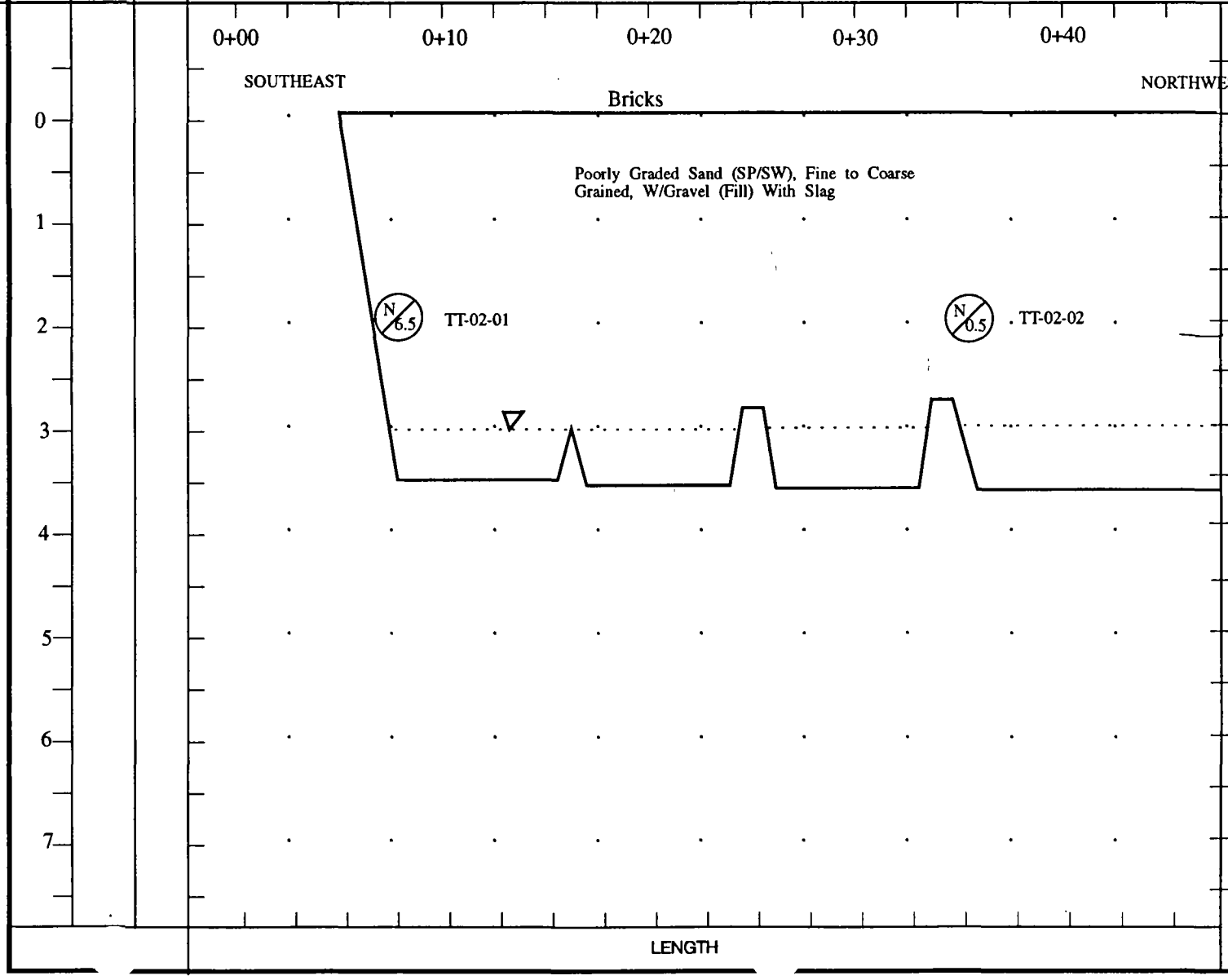
TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NE WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/5/92

WATER LEVEL AND DATE 3' EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 185' WIDTH 3-4' DEPTH 3-3.5' REMARKS _____



COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10

Headspace Reading, ppm

Trace Sheen on Groundwater Between 0+24 and 0+33NW.

Moderate Sheen on Groundwater Between 0+35 and 0+4NW.

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-02 SHEET 2 OF 5

TEST PIT WALL LOG

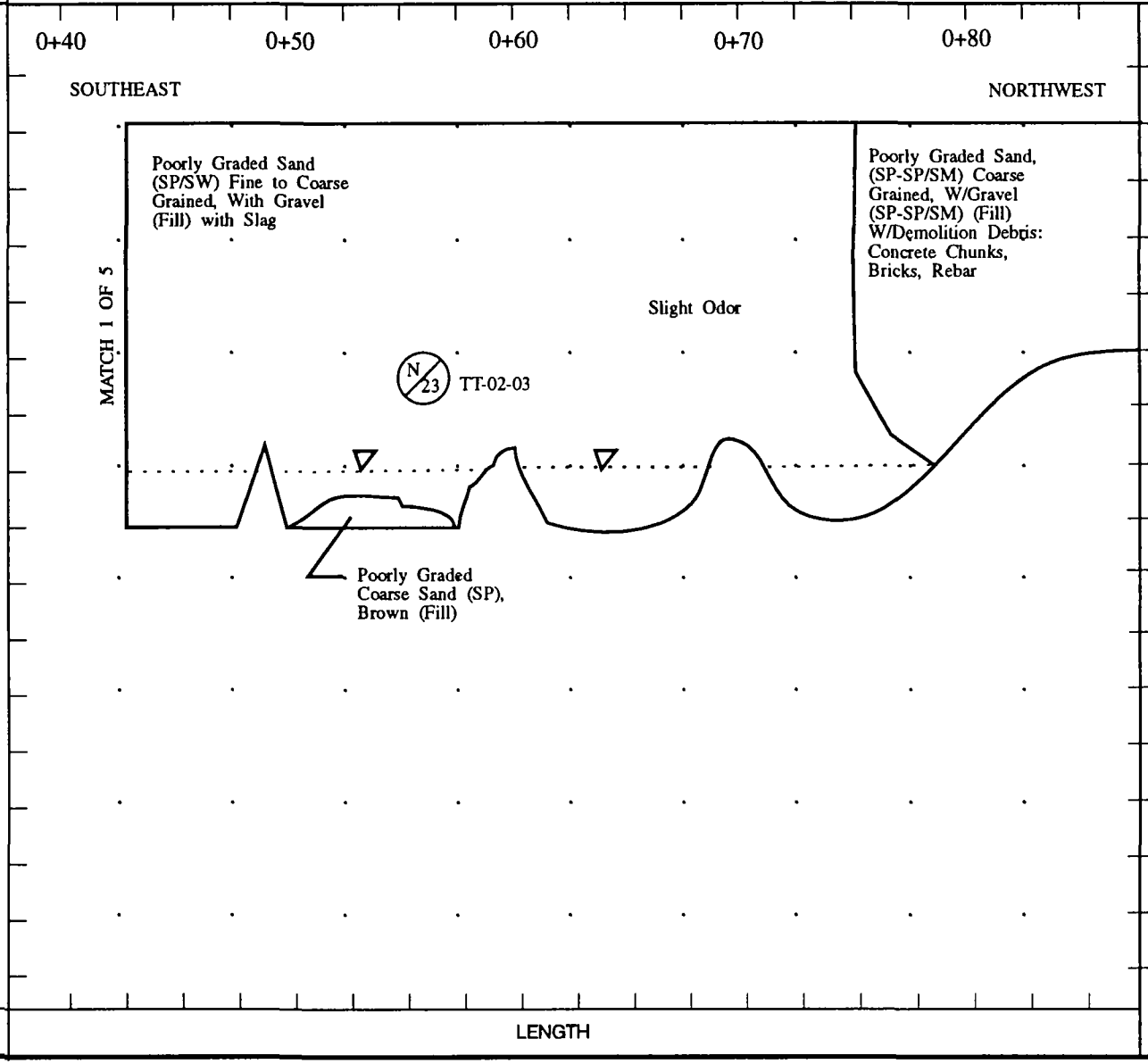
PROJECT Northshore Gas Waukegan Coke Plant | LOCATION Waukegan, IL. | MAP OF NE WALL OF PIT

ELEVATION _____ | CONTRACTOR Kirshoffer | DATE EXCAVATED 3/5/92

WATER LEVEL AND DATE 3' | EXCAVATION METHOD B-Hoe | LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 185' WIDTH 3-4' DEPTH 3-3.5' | REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

Moderate Sheen on Groundwater Between 0+60 and 0 +70 NW

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-02 SHEET 3 OF 5	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NE WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/5/92

WATER LEVEL AND DATE 3' EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 185' WIDTH 3-4' DEPTH 3-3.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+80 0+90 1+00 1+10 1+20

SOUTHEAST NORTHWEST

0 1 2 3 4 5 6 7

MATCH 2 OF 5

Poorly Graded Sand (SP-SP/SM), Coarse-Grained, With Demolition Debris: Concrete Chunks, Bricks, Rebar

M/90 TT-02-04

LENGTH

COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10

Headspace Reading, ppm

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-02 SHEET 4 OF 5

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NE WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/5/92

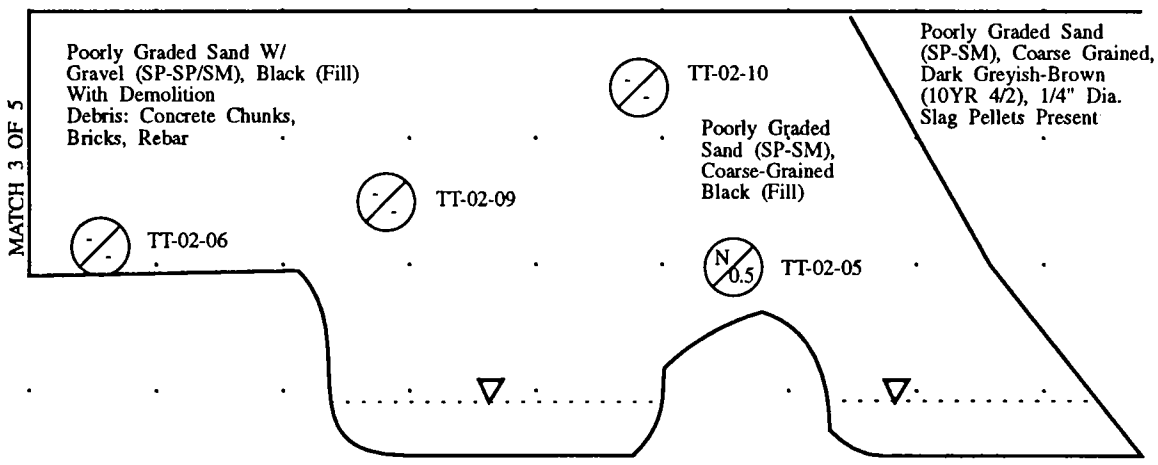
WATER LEVEL AND DATE 3' EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 185' WIDTH 3-4' DEPTH 3-3.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

1+20 1+30 1+40 1+50 1+60

SOUTHEAST NORTHWEST



0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Moderate Sheen on Groundwater Between 1+35 and 1+68 NW Streaks Present.

Heavy Sheen on Groundwater Between 1+53 and 1+68 NW Blotches present.

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-02 SHEET 5 OF 5

TEST PIT WALL LOG

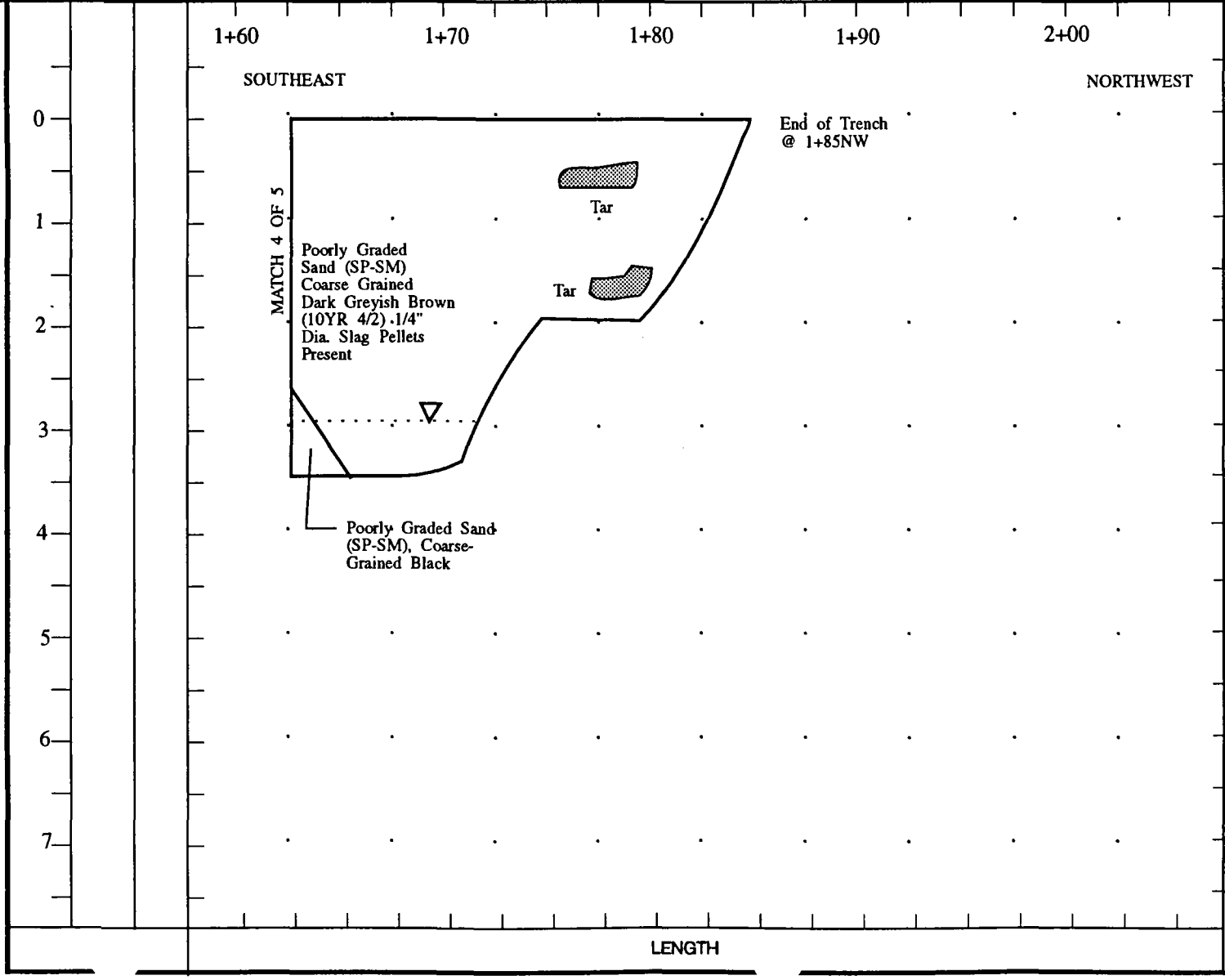
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NE WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/5/92

WATER LEVEL AND DATE 3' EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 185' WIDTH 3-4' DEPTH 3-3.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10 — Headspace Reading, ppm

This log is "Backwards" -Stationing was from Right to Left.

Heavy Sheen on Groundwater Between 1+53 and 1+68 NW Blotches present.

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-03 SHEET 1 OF 5

TEST PIT WALL LOG

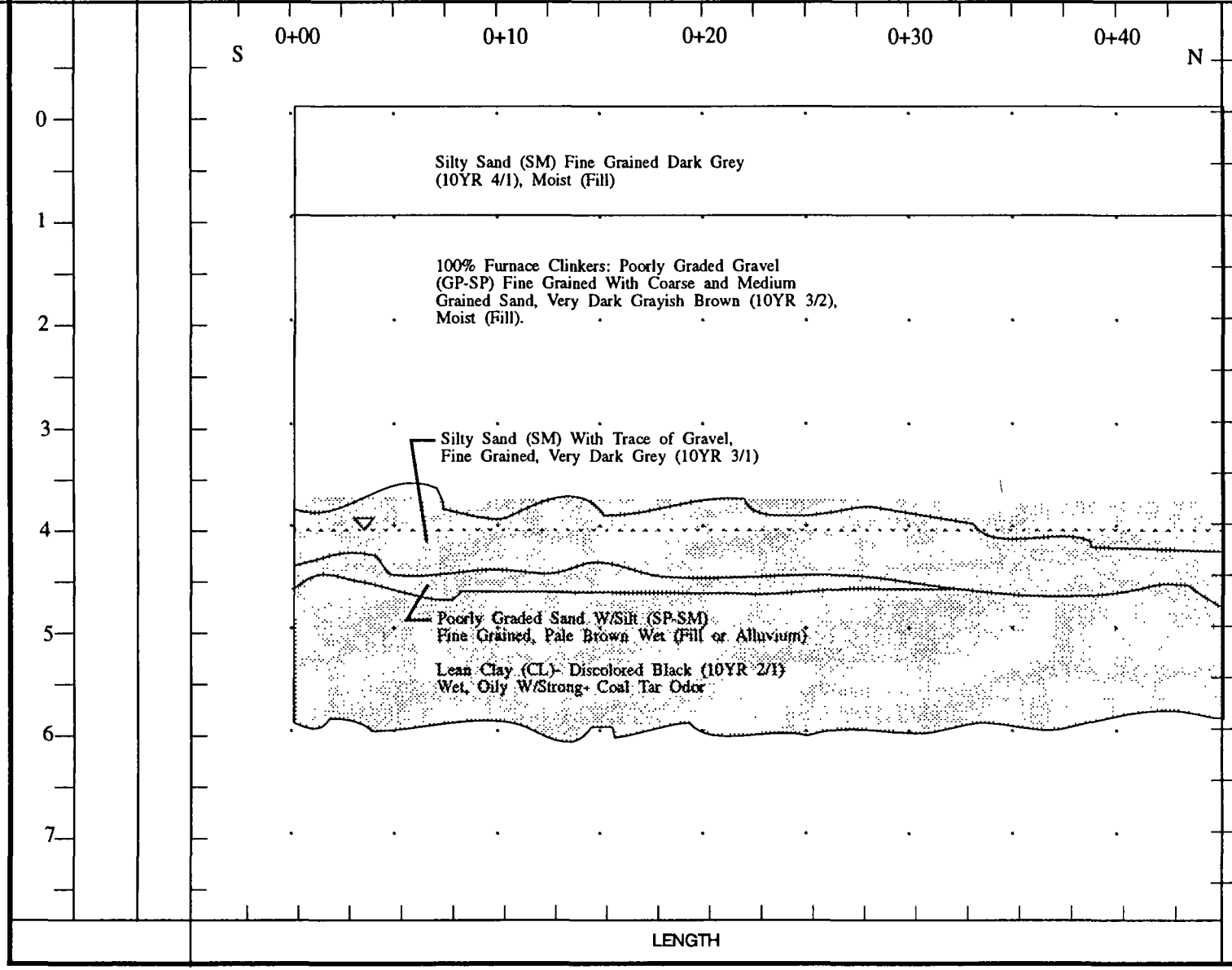
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3-10-92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 185 WIDTH 3-4' DEPTH 6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Rainbow Sheen on Groundwater

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-03 SHEET 2 OF 5

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant | LOCATION Waukegan, IL. | MAP OF W WALL OF PIT

ELEVATION _____ | CONTRACTOR Kirshoffer | DATE EXCAVATED 3-10-92

WATER LEVEL AND DATE _____ | EXCAVATION METHOD B-Hoe | LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 185 WIDTH 3-4' DEPTH 5' | REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

S 0+40 0+50 0+60 0+70 0+80 N

0 1 2 3 4 5 6 7

MATCH 1 OF 5

Silty Sand (SM)- Fine Grained, Dark Gray (10YR 4/1), Moist (Fill)

100% Furnace Clinkers: Poorly Graded Gravel (GP-SP) Fine Grained, With Coarse and Medium Sand, Very Dark Grayish Brown, (10YR 3/2), Moist (Fill)

Silty Sand (SM/ML)- Fine Grained, Discolored Black (10YR 3/1), Moist (Fill) W/Pieces of Glass, Wood

TT-03-01

H/22

Lean Clay Black Interbedded With Silt Laminations White (Industrial Pond Deposit)

Lean Clay (CL) Discolored Black (10YR 3/1) Wet, Oily (Golden Brown-Greenish Brown), Strong Coal Tar Odor (Alluvium).

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Rainbow Sheen On Groundwater W/Golden Brown Oily Blebs

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-03 SHEET 3 OF 5

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3-10-92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 185 WIDTH 3-4' DEPTH 5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

S 0+80 0+90 1+00 1+10 1+20 N

COMMENTS

0 1 2 3 4 5 6 7

MATCH 2 OF 5

Silty Sand (SM)- Fine Grained, Dark Gray (10YR 4/1), Moist (Fill)

100% Furnace Clinkers: Poorly Graded Gravel (GP-SP) Fine Grained With Coarse and Medium Sand, Very Dark Greyish Brown (10YR 3/2) (Fill)

Silty Sand (SM/ML) Fine Grained, Discolored Black (10YR 3/1) Moist. (Fill) W/Pieces of Glass, Wood (Fill)

Lean Clay (CL) Black (10YR 3/1) Interbedded W/Silt (ML). White, Moist (Industrial Pond Deposit)

Lean Clay (CL) Black Wet, Oily (Golden Brown-Greenish Brown, Strong Coal Tar Odor). (Fine Alluvium)

Poorly Graded Sand W/Silt (SP-SM) Fine Grained, Discolored Black, Wet (Alluvium)

2" SS Pipe Full of Very Viscous Black Tar (SW-NE Orientation)

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

LENGTH

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-03 SHEET 4 OF 5

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/10/92-3/11/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 185 WIDTH 3-4' DEPTH 6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

S 1+20 1+30 1+40 1+50 1+60 N

0 1 2 3 4 5 6 7

MATCH 3 OF 5

Silty Sand (SM) Fine Grained, Black (10 YR 2/2)
Moist (Fill)

100% Furnace Clinkers: Poorly Graded Gravel (GP-SP)
Fine Grained With Coarse and Medium Sand, Very Dark
Greyish Brown (10YR 3/2), Moist (Fill)

Lean Clay (CL)- Black (10YR 3/1)
Wet Interbedded W/ Silt (ML)
White (10YR 8/2), Moist (Industrial Pond Deposit)

T/5 TT-03-02 ▽

Lean Clay (CL)
Brown (10YR 5/3)
Moist (Alluvium)

Poorly Graded Sand W/Silt
(SP-SM) Fine Grained, Discolored
Black, Wet (Alluvium)

Poorly Graded Sand
(SP) Fine to Medium
Grained, Pale Brown
(10YR) Moist.

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-03 SHEET 5 OF 5

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

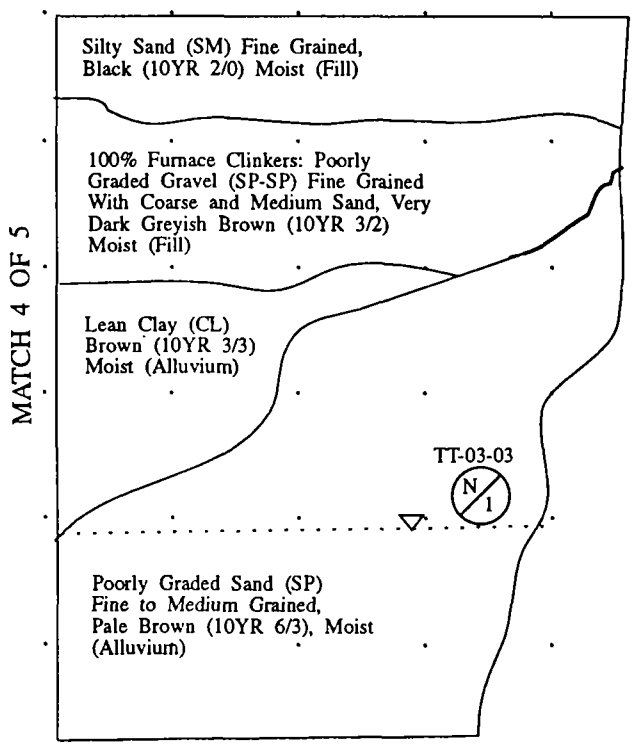
ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/11/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 185 WIDTH 3-4' DEPTH 6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

S 1+70 1+80 N



End of Trench 1+85

0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10

Headspace Reading, ppm

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-03W SHEET 1 OF 5

TEST PIT WALL LOG

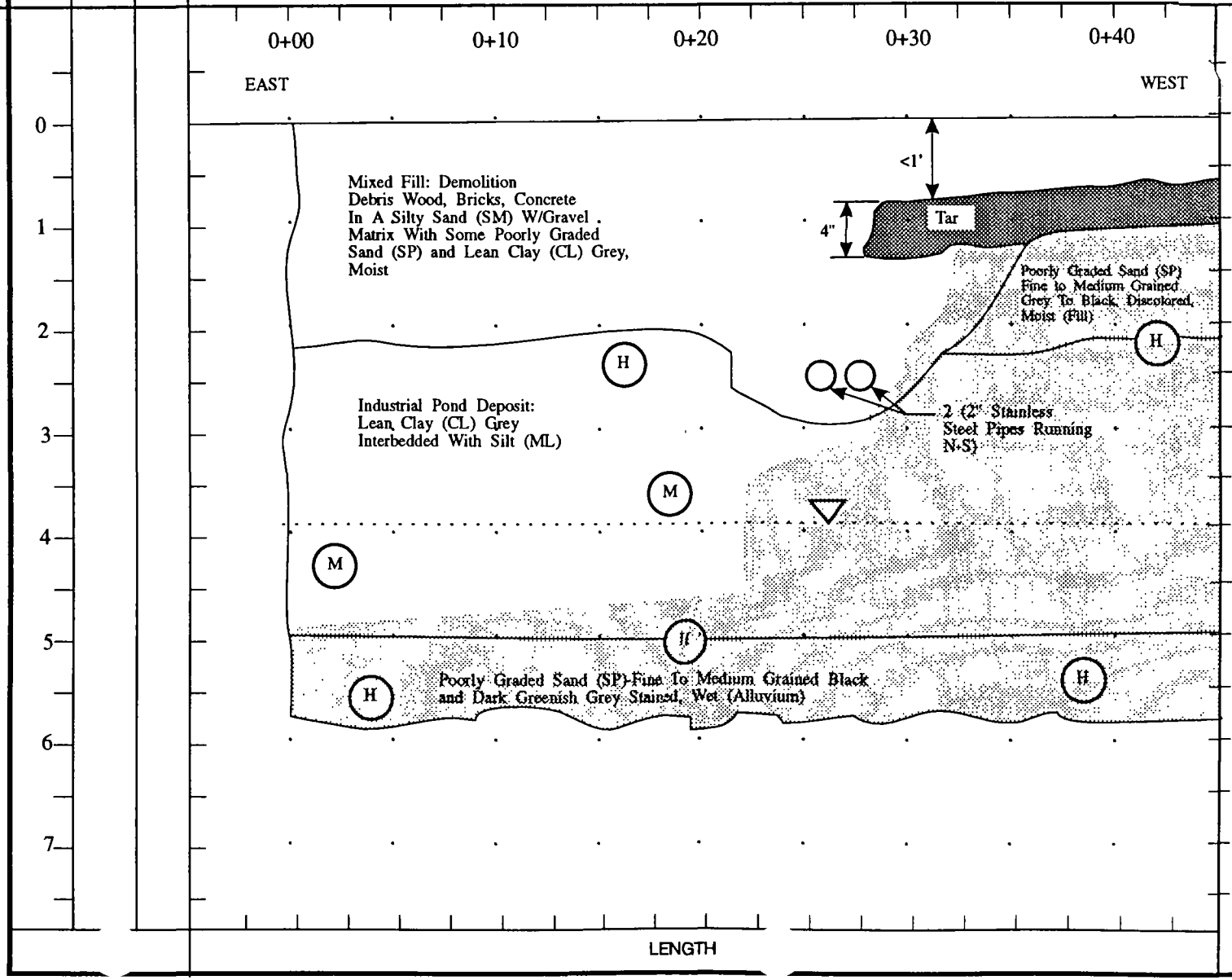
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/13/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 210 WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Oil Sheen on Groundwater W/ Golden Brown- Green Oily Blebs

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-03W SHEET 2 OF 5

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/13/92

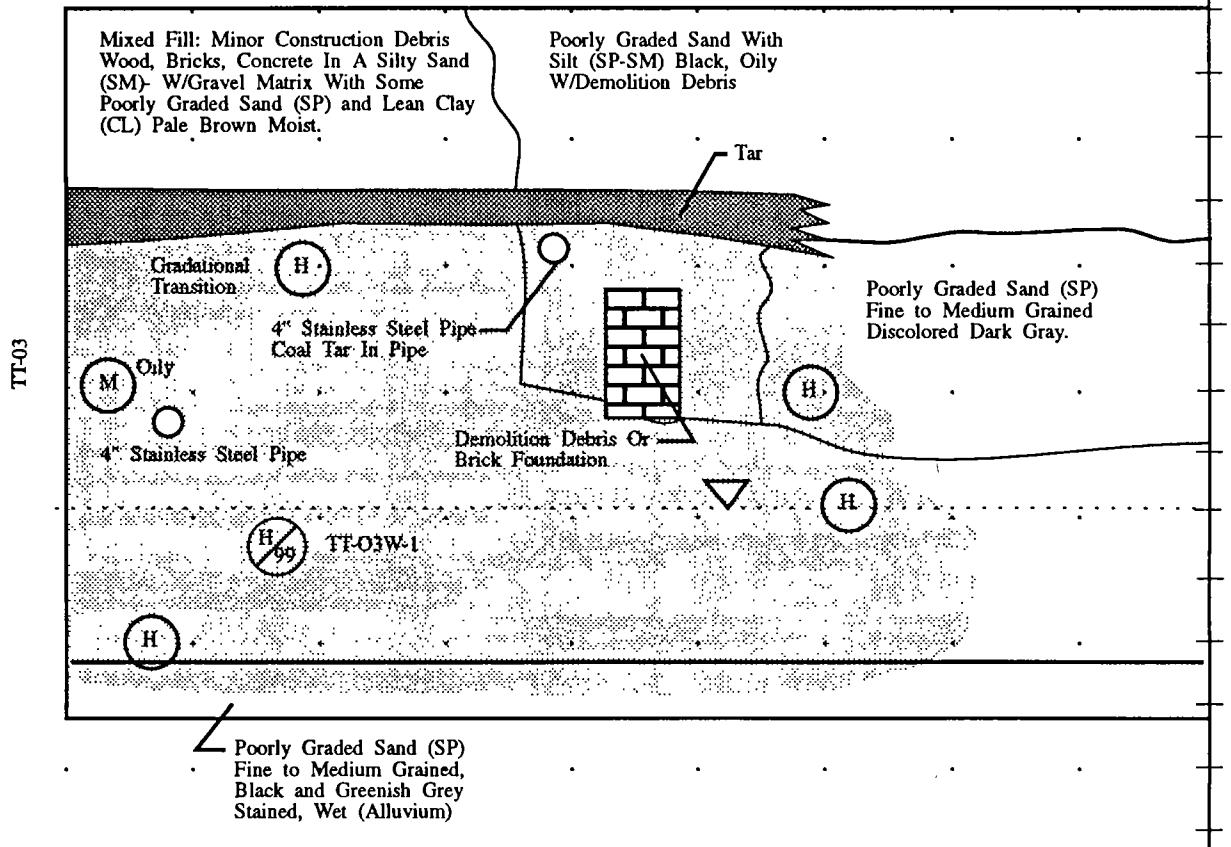
WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 210 WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+40 0+50 0+60 0+70 0+80

EAST WEST



0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Heavy Oil Sheen on Groundwater With a Trace of Golden Brown Oily Blebs

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-03W | SHEET 3 OF 5

TEST PIT WALL LOG

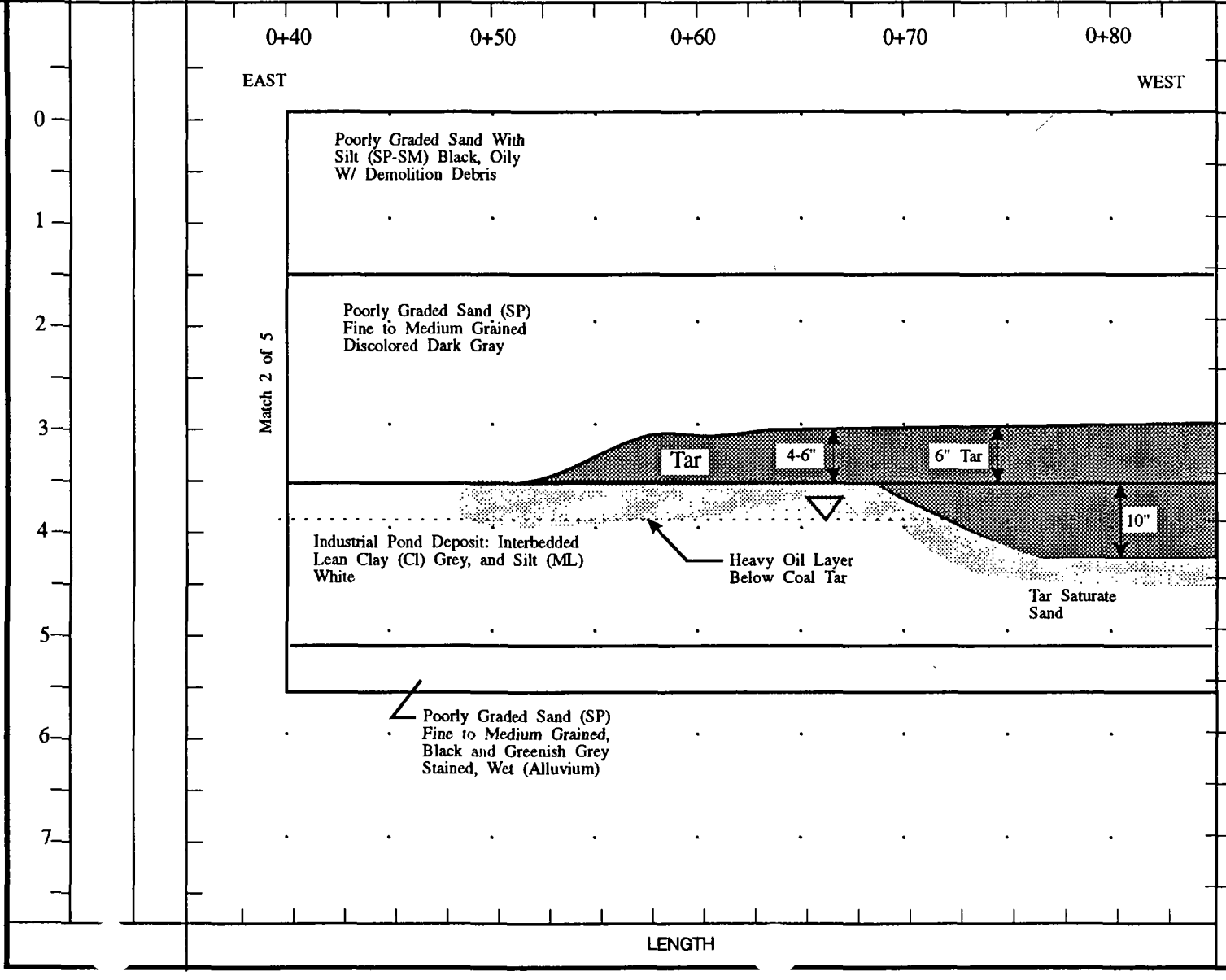
PROJECT Northshore Gas Waukegan Coke Plant | LOCATION Waukegan, IL. | MAP OF S WALL OF PIT

ELEVATION _____ | CONTRACTOR Kirshoffer | DATE EXCAVATED 3/13/92

WATER LEVEL AND DATE _____ | EXCAVATION METHOD B-Hoe | LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 210 WIDTH 3-4' DEPTH 5-6' | REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER, INTERVAL



COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10

Headspace Reading, ppm

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Groundwater @ 3.8' With Heavy Rainbow Sheen and Golden Brown Oily Blebs

Pore Spaces Filled W/Oil In Zone Directory Below Coal Tar, Sand Laminations In Pond Deposit and Sand @ Base of Trench.

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-03W SHEET 4 OF 5	**TEST PIT WALL LOG**

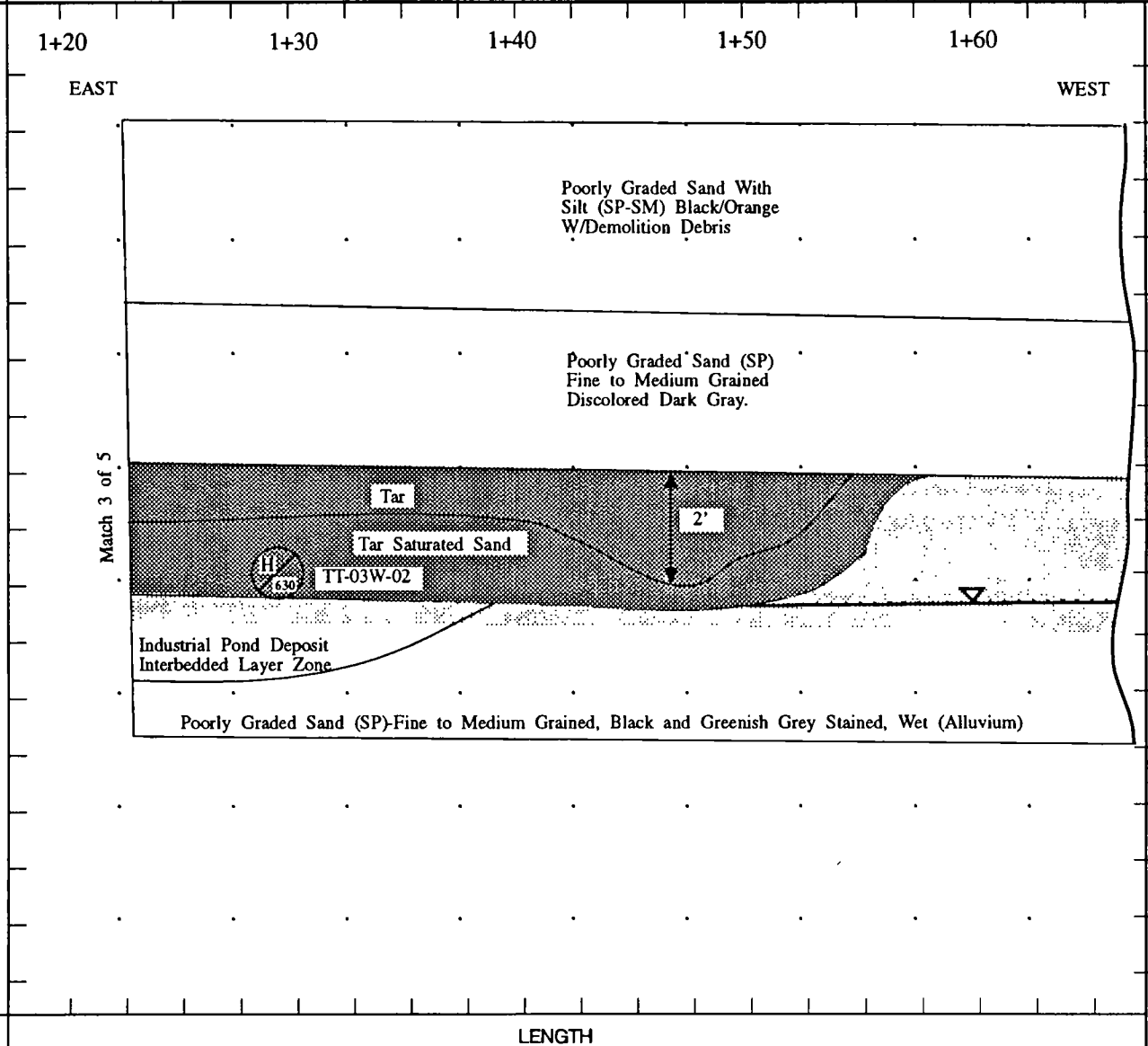
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/13/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 210 WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

End Of Trench @ 1+70'

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Groundwater @ 4' W/Heavy Rainbow Sheen Oily Blebs.

Porespaces Filled W/Oil: Oily Zone @ Base Of Coal Tar Saturated Sand and in Sand Below and In Interbedded Layer

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-03W SHEET 5 OF 5	**TEST PIT WALL LOG**

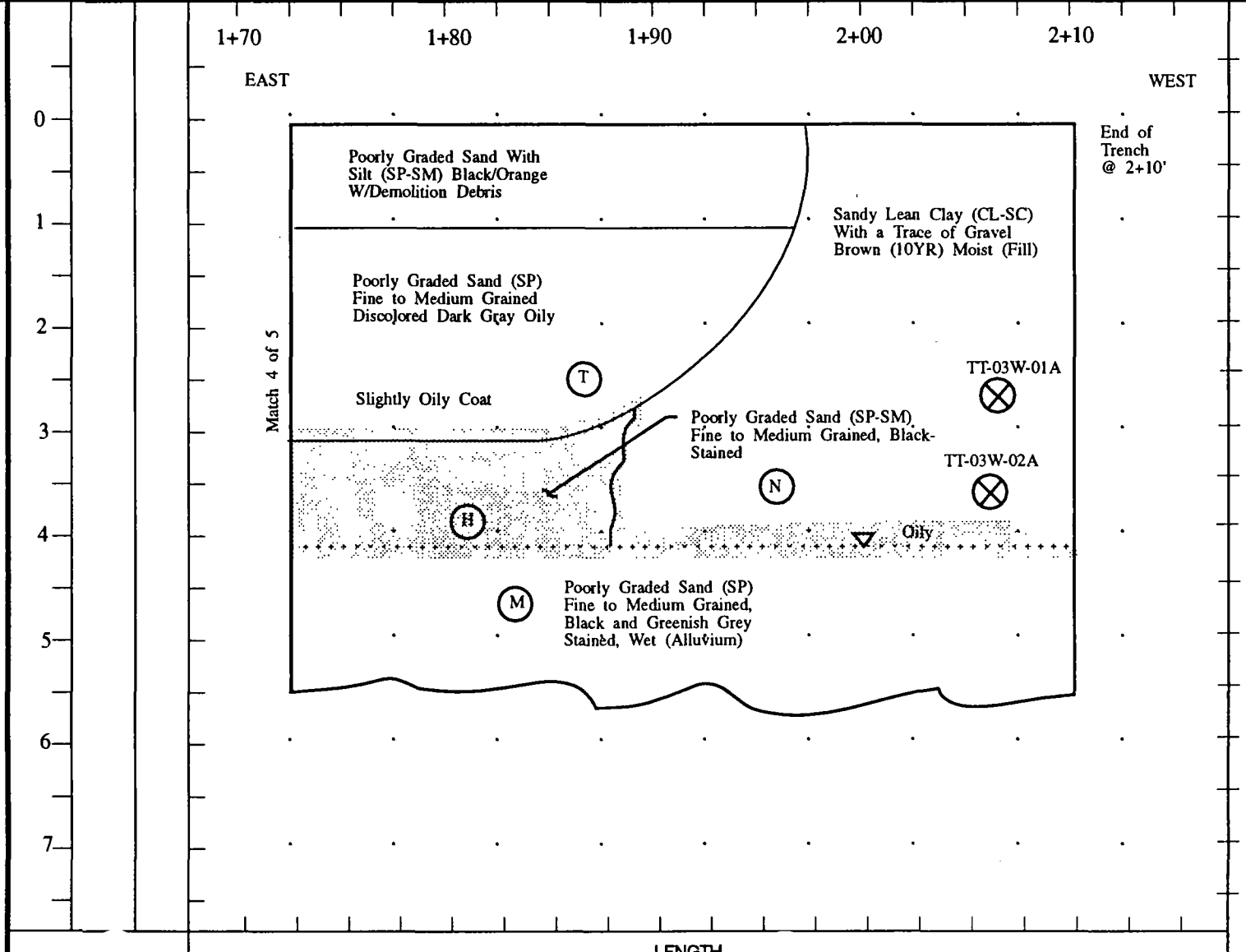
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/13/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 210 WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

- (N) - None
- (T) - Trace
- (M) - Moderate
- (H) - Heavy

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Groundwater @ 4' W/Moderate Oil Sheen

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-04 SHEET 1 OF 1	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NW WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/5/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 45 WIDTH 3-4' DEPTH 3-7' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+00 0+10 0+20 0+30 0+40

SOUTHWEST NORTHEAST

0 1 2 3 4 5 6 7

Crushed Rock Base Material W/Demolition Debris: Steel Beam

Silty Sand (SM) W/Demolition Debris: Bricks, Concrete, Wood, Steel Bars.

Poorly Graded Sand (SP) Fine To Medium Grained, Pale Brown (10YR 6/3), Moist (Fill)

Sandy Lean Clay (CL) Olive Grey (5Y 5/2) Moist (Fill)

N/0.5

TT-04-01

Sandy Lean Clay (CL) Olive Grey (5Y 5/2) Moist (Fill)

TT-04-02 M/3

TT-04-03 -/-

Poorly Graded Sand (SP) Fine Grained Dark Grey (10YR 4/1), Wet (Alluvium)

Poorly Graded Sand (SP) Fine Grained Dark Grey (10YR 4/1), Wet (Alluvium)

LENGTH

COMMENTS

End of Trench @ 0 +45

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

Moderate Sheen On Ground Water 0+00 to 0+25; Heavy Sheen 0+25 to End of Trench.

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-05 SHEET 1 OF 2	**TEST PIT WALL LOG**

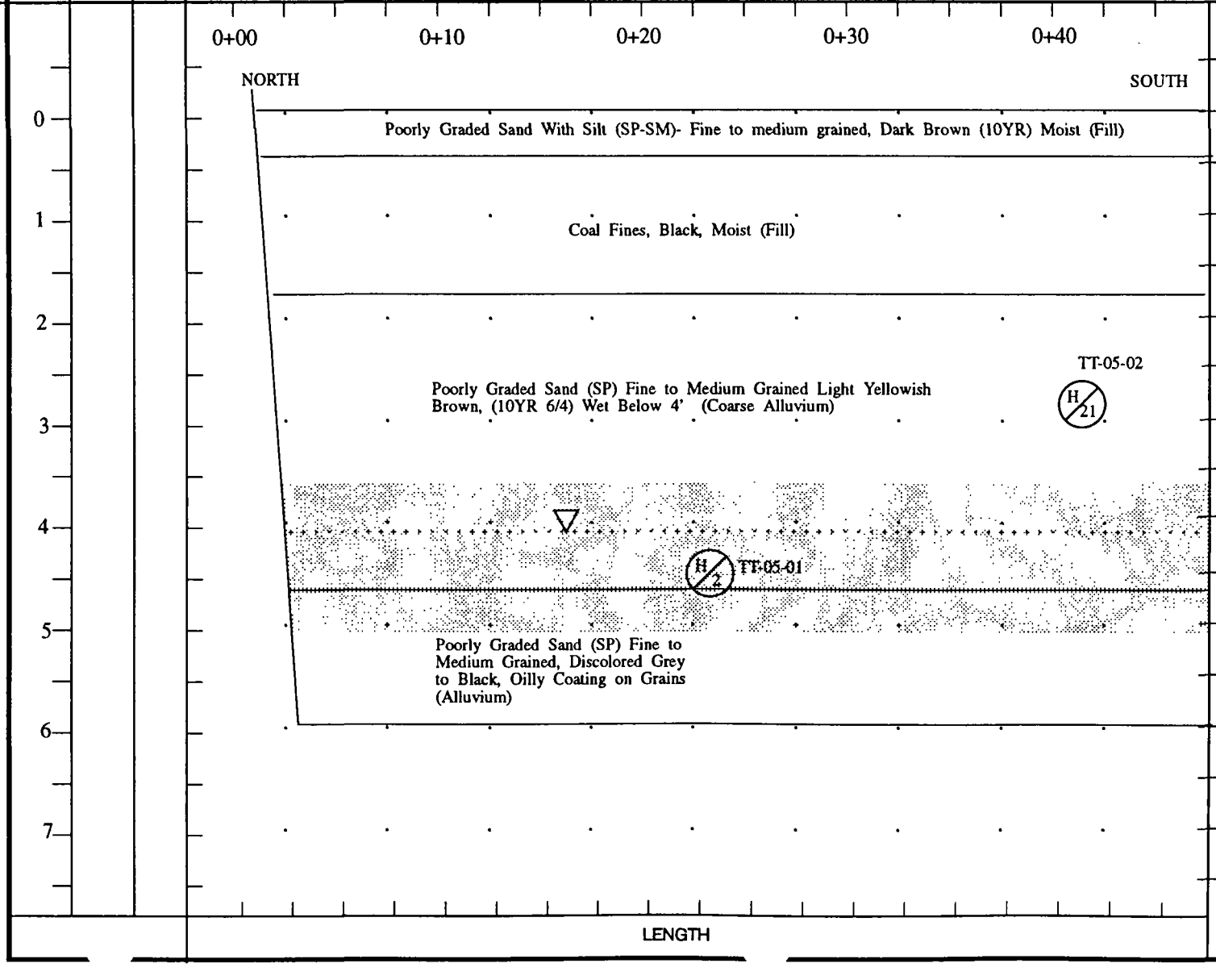
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF E WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/9/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 70' WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Groundwater @ 4' W/Heavy Rainbow Sheen

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-05 SHEET 2 OF 2

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF E WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/9/92-3/10/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 70' WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+40 0+50 0+60 0+70 0+80

NORTH SOUTH

0
1
2
3
4
5
6
7

Poorly Graded Sand (SP) and Poorly Graded Sand With Silt (SP-SM)- Fine Grained Dark Brown (10 YR 3/3) Moist (Fill)

Coal Fines, Black, Moist (Fill)

Poorly Graded Sand (SP) Fine to Medium Grained Light Yellowish Brown (10YR 6/4), Moist-Wet Below 4' (Fill)

Heavy Discoloration, Black and Greenish Brown

Oily Coated Grains and Saturated Pore-Spaces

Trench End @ 0+70 SW

Match 1 of 2

LENGTH

COMMENTS

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

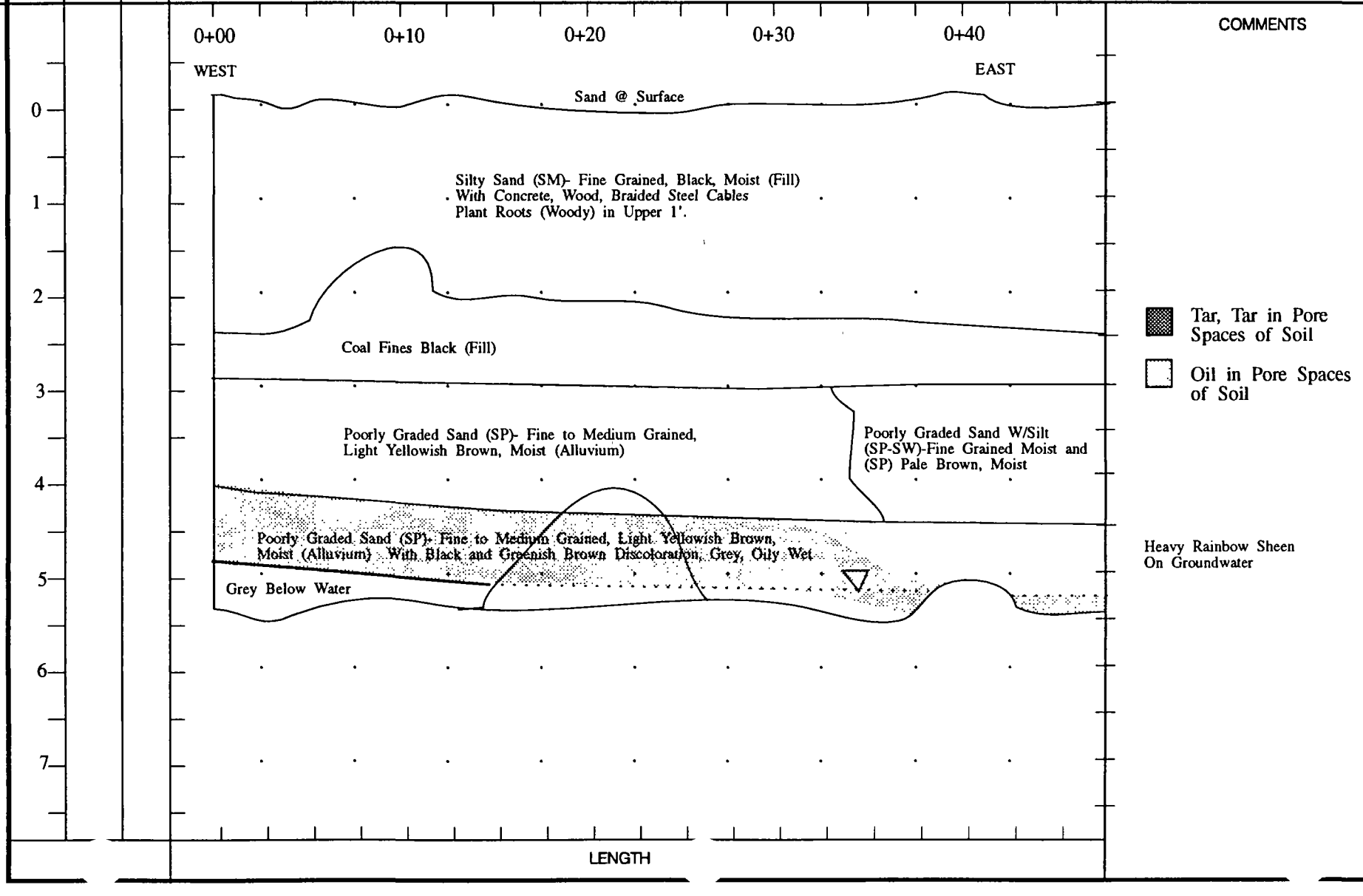
PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-05E SHEET 1 OF 3	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/10/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 120 WIDTH 3-4' DEPTH 2 1/2-6' REMARKS _____



PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-05E SHEET 2 OF 3	**TEST PIT WALL LOG**

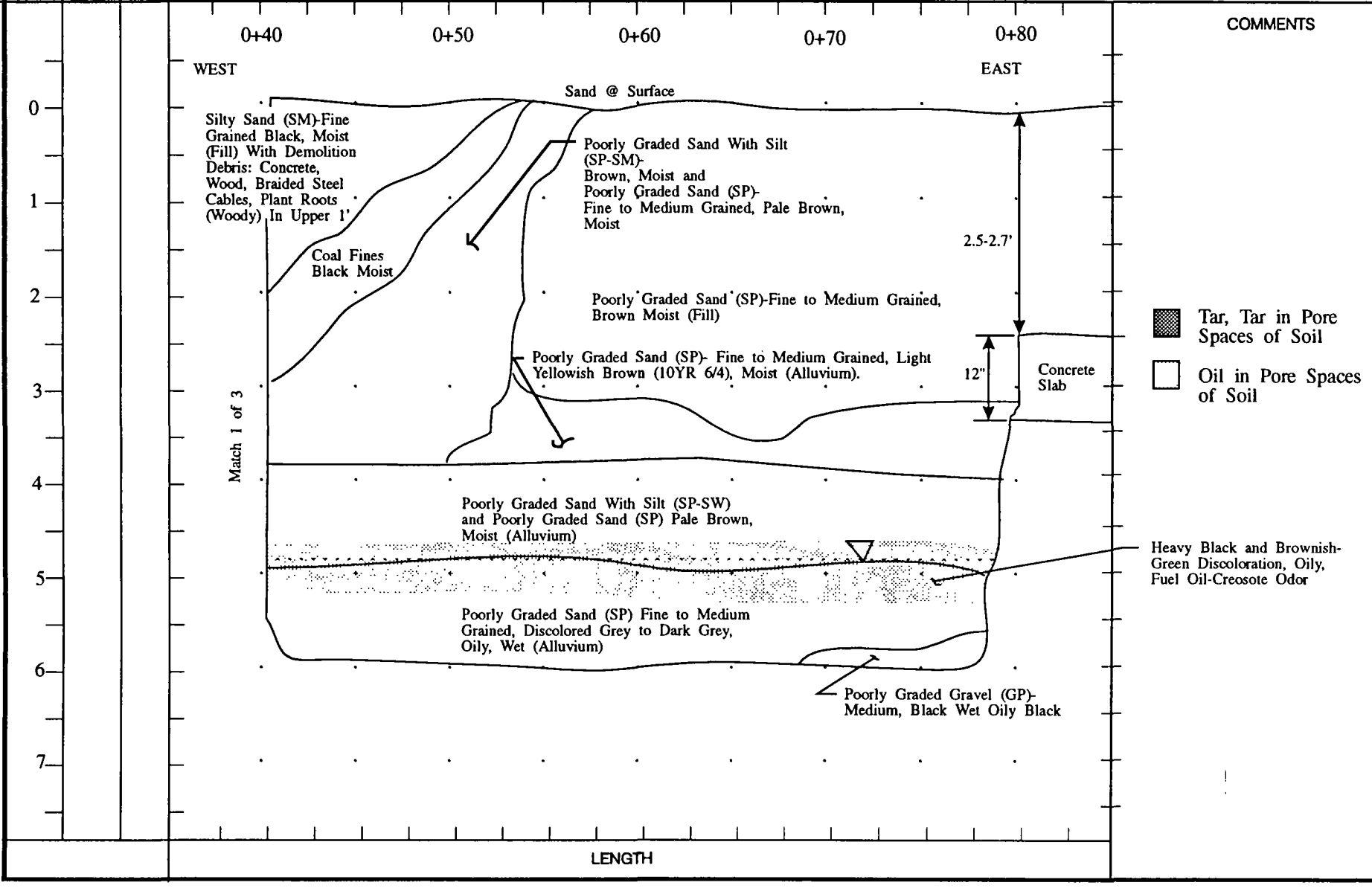
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/10/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 120 WIDTH 3-4' DEPTH 2 1/2-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-05E SHEET 3 OF 3

TEST PIT WALL LOG

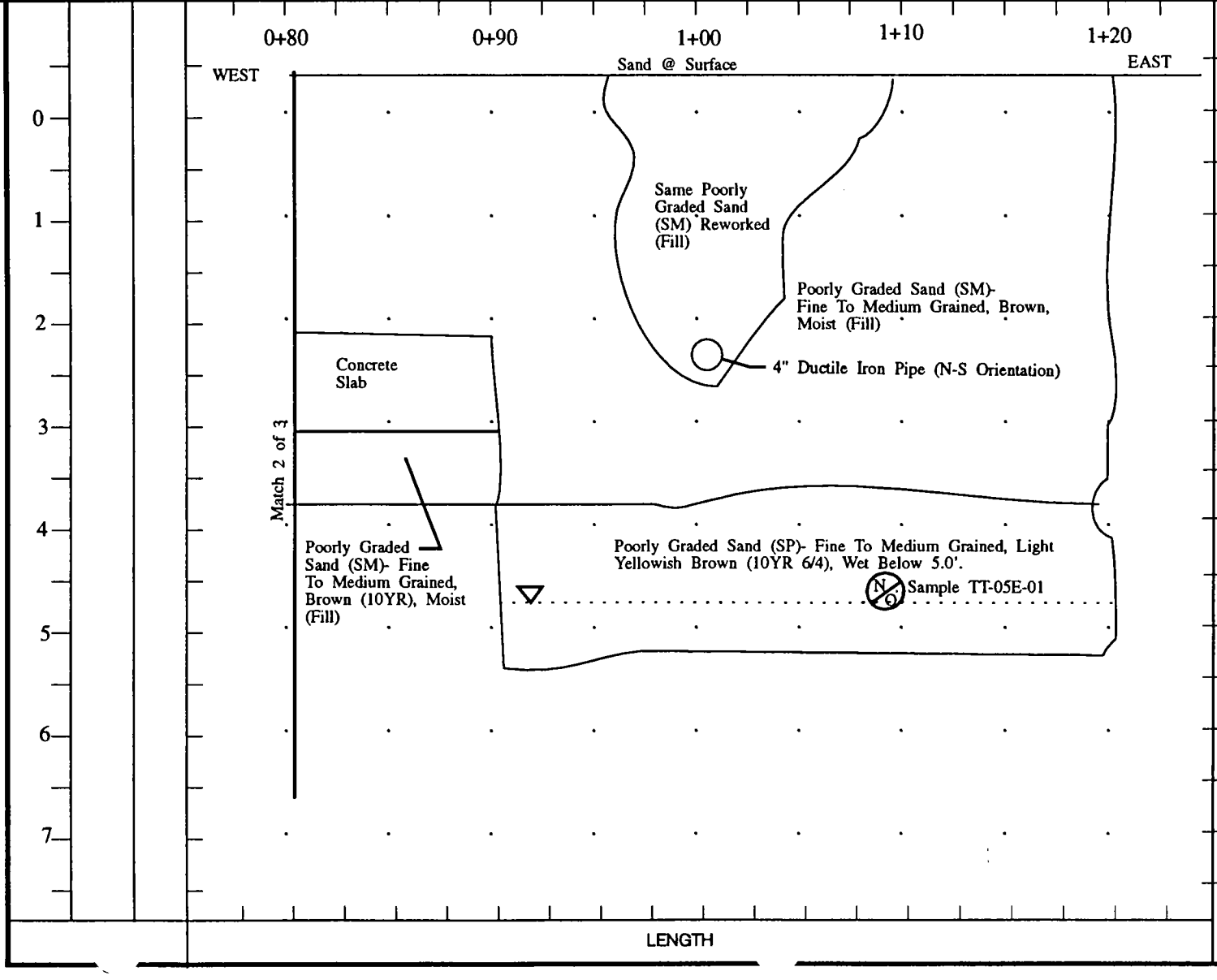
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/10/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 120 WIDTH 3-4' DEPTH 2 1/2-6' REMARKS _____

ELEVATION / DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

End of Trench @1+20'E

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-06 SHEET 1 OF 2	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/9/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 78' WIDTH 3-4' DEPTH 4.5-5.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+00 0+10 0+20

EAST WEST

Sand Drive @ Surface

0

Poorly Graded Sand (SP)- With a Trace of Silt, Fine Grained, Pale Brown (16YR 6/3), and Poorly Graded Sand (SP)- Fine to Medium Grained Very Pale Brown, (10YR 7/4) Moist (Fill)

1

2

Coal Fines Black (Fill)

3

Base Material Crushed Rock Medium To Coarse Gravel, Light Yellowish Brown (10YR 6/4)

Poorly Graded Sand (SP)- Fine to Medium Grained, Light Yellowish Brown, Moist (Coarse Alluvium)

Poorly Graded Sand With Silt (SP-SM)- Fine to Medium Grained, Grey (10YR 5/1), Moist (Fill)

4

TT-06-01 M/1'

Concrete Footing

5

Poorly Graded Sand (SP)- Fine to Medium Grained, Light Brownish Grey, Wet (Coarse Alluvium)

Heavy Rainbow Sheen on Groundwater @ 0+10 Oily

6

7

LENGTH

COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10 — Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-06 SHEET 2 OF 2

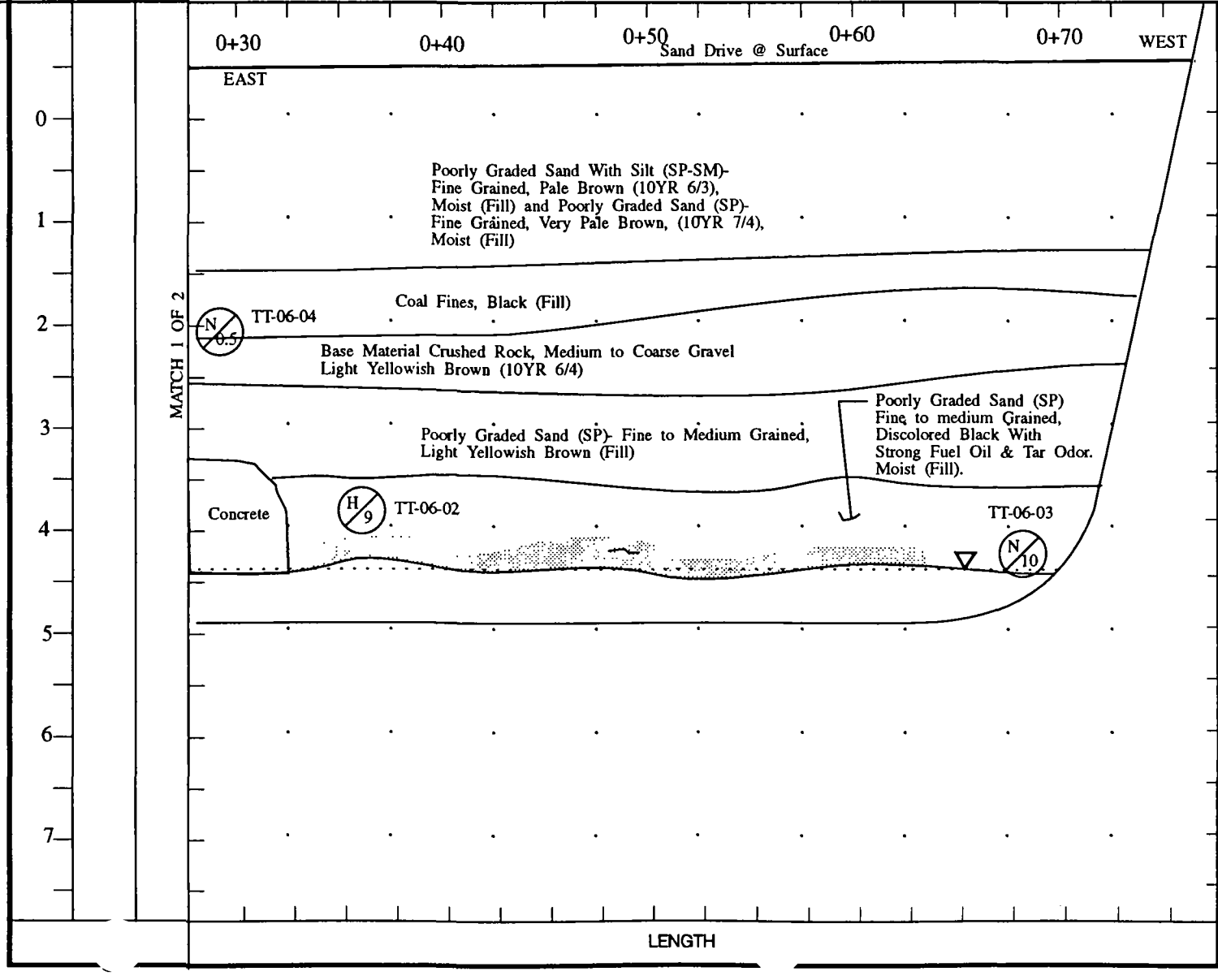
TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/9/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 78' WIDTH 3-4' DEPTH 5 1/2' REMARKS _____



COMMENTS

End of Trench @ 0+78

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10

Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Rainbow Sheen on Groundwater

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-07 SHEET 1 OF 2	**TEST PIT WALL LOG**

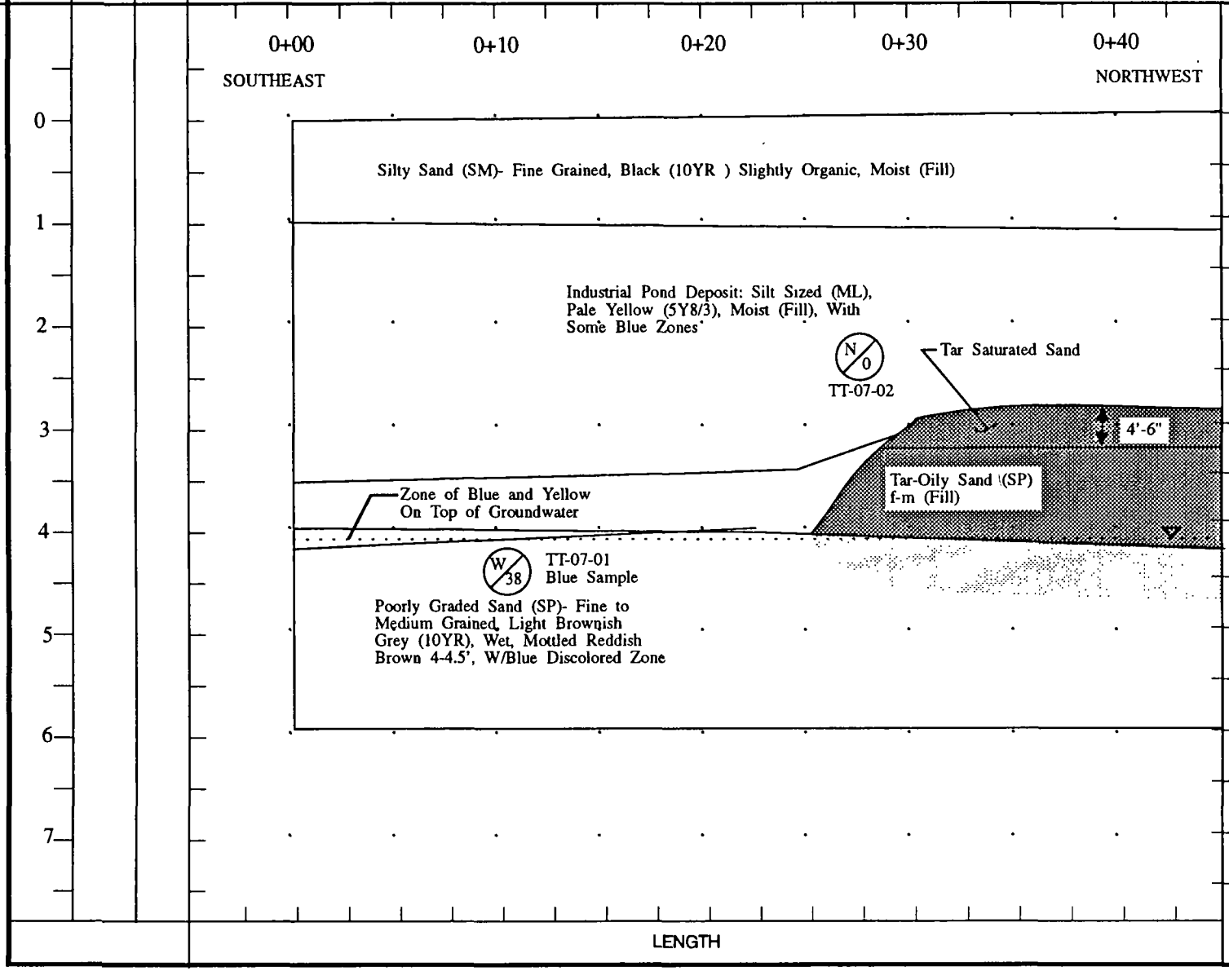
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NE WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/19/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 80' WIDTH 3-4' DEPTH 6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Moderate Sheen in Groundwater 0+00 to 0+30

Heavy Sheen W/Oily Blebs, Golden Brown 0+31

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-07 SHEET 2 OF 2	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NE WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/19/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 80' WIDTH 3-4' DEPTH 6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+40 0+50 0+60 0+70 0+80

SOUTHEAST NORTHWEST

0 1 2 3 4 5 6 7

Match 1 of 2

Silty Sand (SM)- Fine Grained, Black (10YR) Slightly Organic Moist (Fill)

Industrial Pond Deposit: Silt Sized (ML) Pale Yellow (5Y8/3), Moist (Fill), With Some Blue Zones

Tar- Saturated Sand

Tar - Oily Sand (SP) f-m (Fill)

Grading to Oily Sand

TT-07-03 Headspace H/150

Poorly Graded Sand (SP)- Fine to Medium Grained, Light Brownish Grey (10YR), Wet Mottled Reddish Brown 4-4.5'

LENGTH

COMMENTS

End of Trench @ 0+80' NW

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-08 SHEET 1 OF 1

TEST PIT WALL LOG

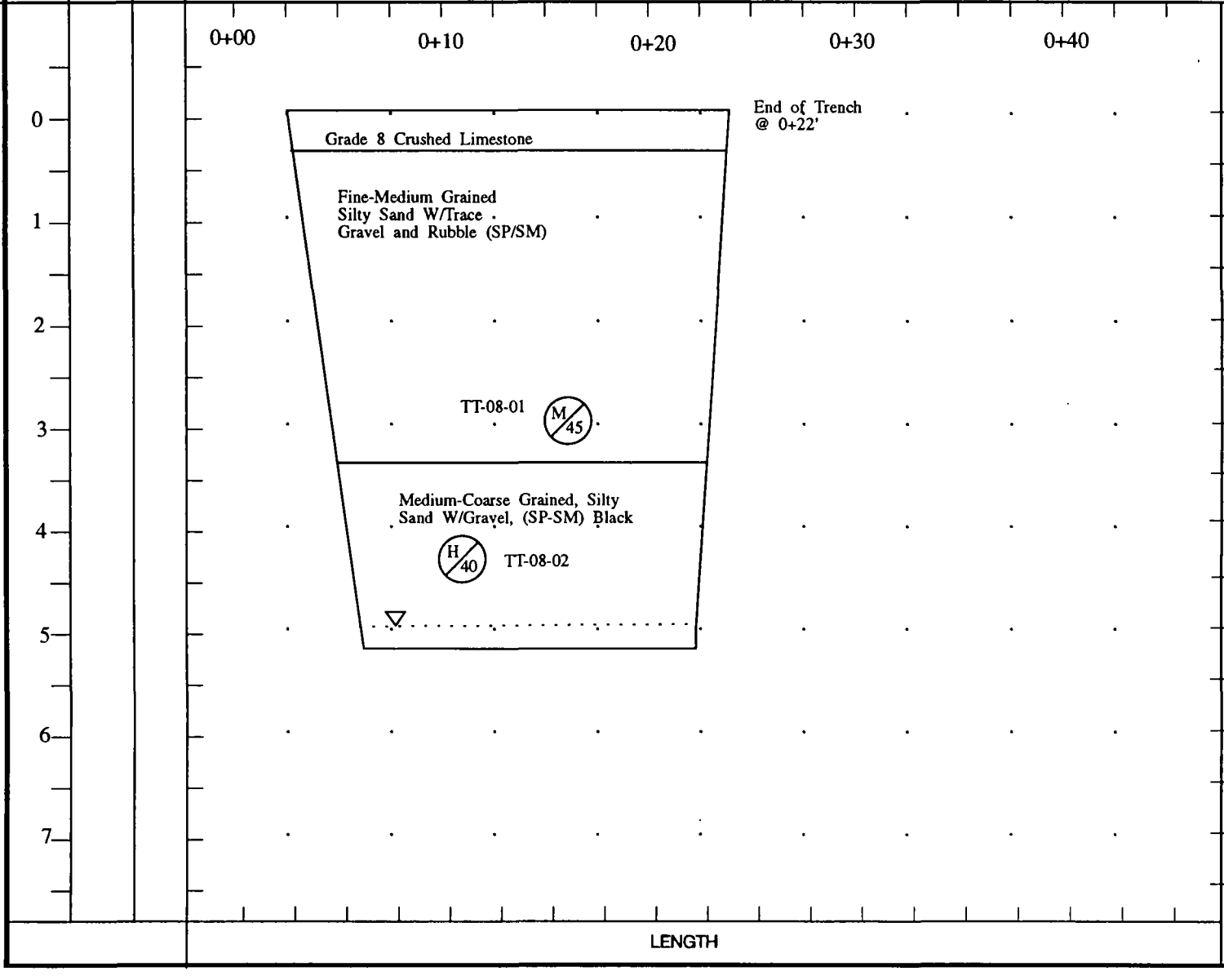
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/21/92

WATER LEVEL AND DATE 5' EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 22' WIDTH 3-4' DEPTH 5.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

Rubble Consists of Mostly Masonry Bricks, Large 3' x 4' of Sheet Metal, Wood

Heavy Sheen on Groundwater

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-08A | SHEET 1 OF 1

TEST PIT WALL LOG

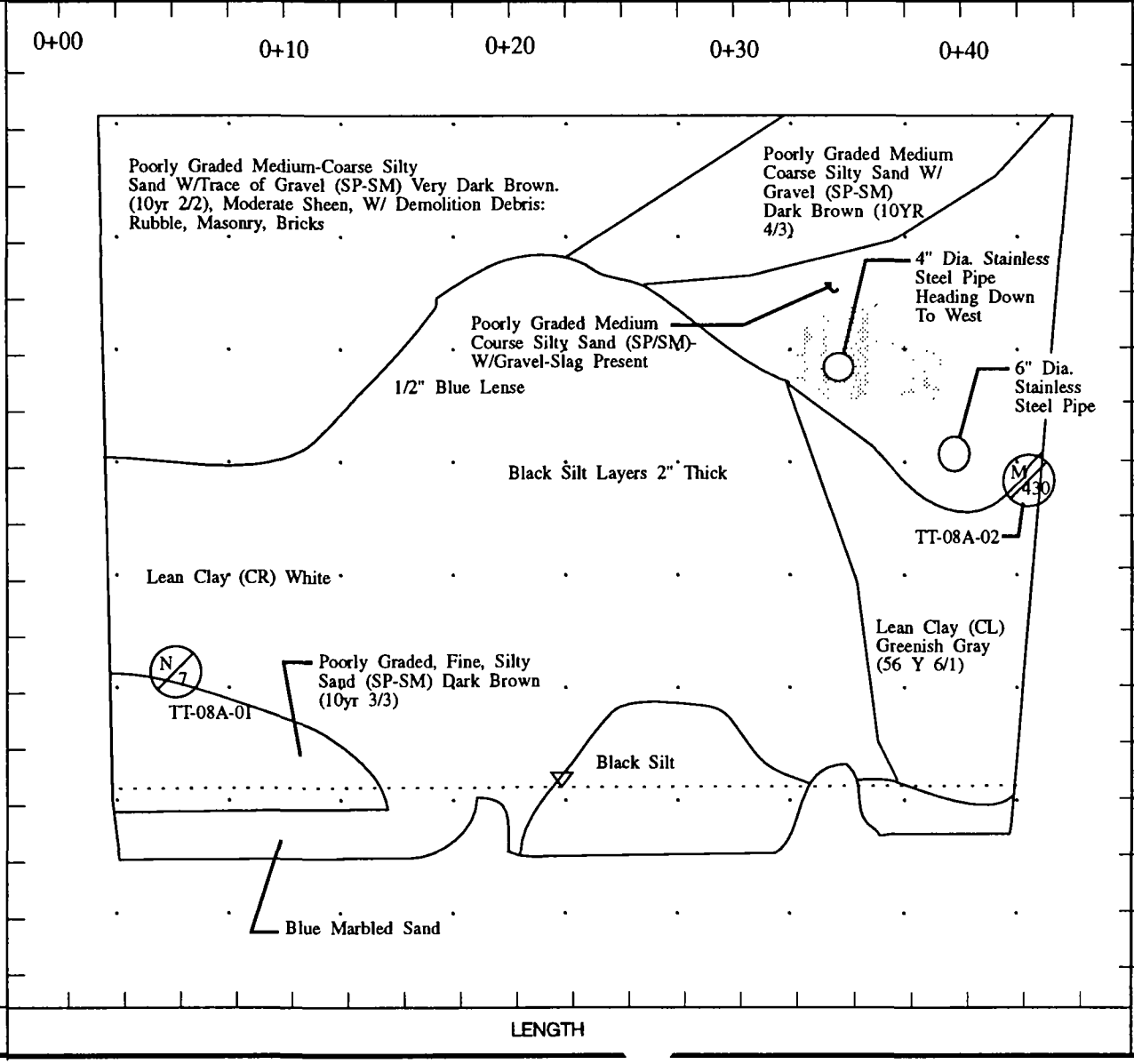
PROJECT Northshore Gas Waukegan Coke Plant | LOCATION Waukegan, IL. | MAP OF S WALL OF PIT

ELEVATION _____ | CONTRACTOR Kirshoffer | DATE EXCAVATED 3/21/92

WATER LEVEL AND DATE 6' | EXCAVATION METHOD B-Hoe | LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 45' WIDTH 3-4' DEPTH 6.5' | REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER, INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Between Sta. 0+00 and 0+30 Trench Emitted a "Musty" Odor.

A Heavy Gasoline Smell Near Sta. 0+20 & 0+40

Sulfur Odor Present In Sand, Depth 5-6', Sta. 0+00 to 0+05

End of Trench @ 0+45'

Heavy Oil Sheen on Groundwater

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-09 SHEET 1 OF 2

TEST PIT WALL LOG

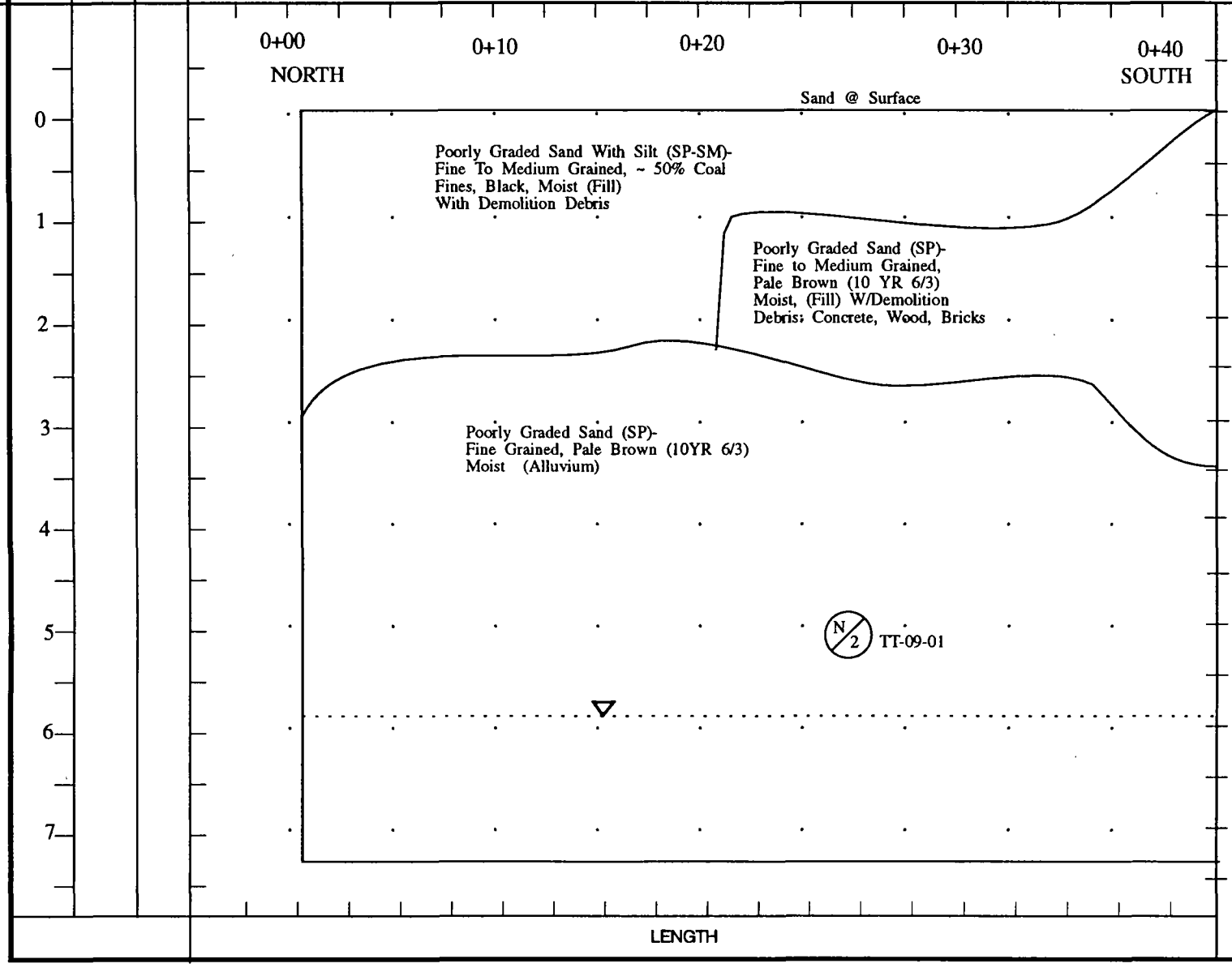
PROJECT Northshore Gas Waukegan Coke Plant | LOCATION Waukegan, IL. | MAP OF E WALL OF PIT

ELEVATION _____ | CONTRACTOR Kirshoffer | DATE EXCAVATED 3/11/92

WATER LEVEL AND DATE _____ | EXCAVATION METHOD B-Hoe | LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 70' WIDTH 3-4' DEPTH 5-7' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-09 SHEET 2 OF 2	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF E WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/11/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 70' WIDTH 3-4' DEPTH 6-7' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+40 NORTH 0+50 0+60 0+70 SOUTH

Sand @ Surface

End of Trench @ 0+70' S

Poorly Graded Sand (SP)-
Fine to Medium Grained,
Pale Brown (10YR 6/1)
Moist (Fill) W/Demolition Debris:
Concrete, Wood, Bricks

Poorly Graded Sand (SP)-
Fine Grained Pale Brown (10YR 6/3)
Moist (Alluvium)

N/9 TT-09-02

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10
- Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy
- Headspace Reading, ppm

Slight to Moderate Sheen on Groundwater 0+40 to End of Trench

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-10 SHEET 1 OF 1

TEST PIT WALL LOG

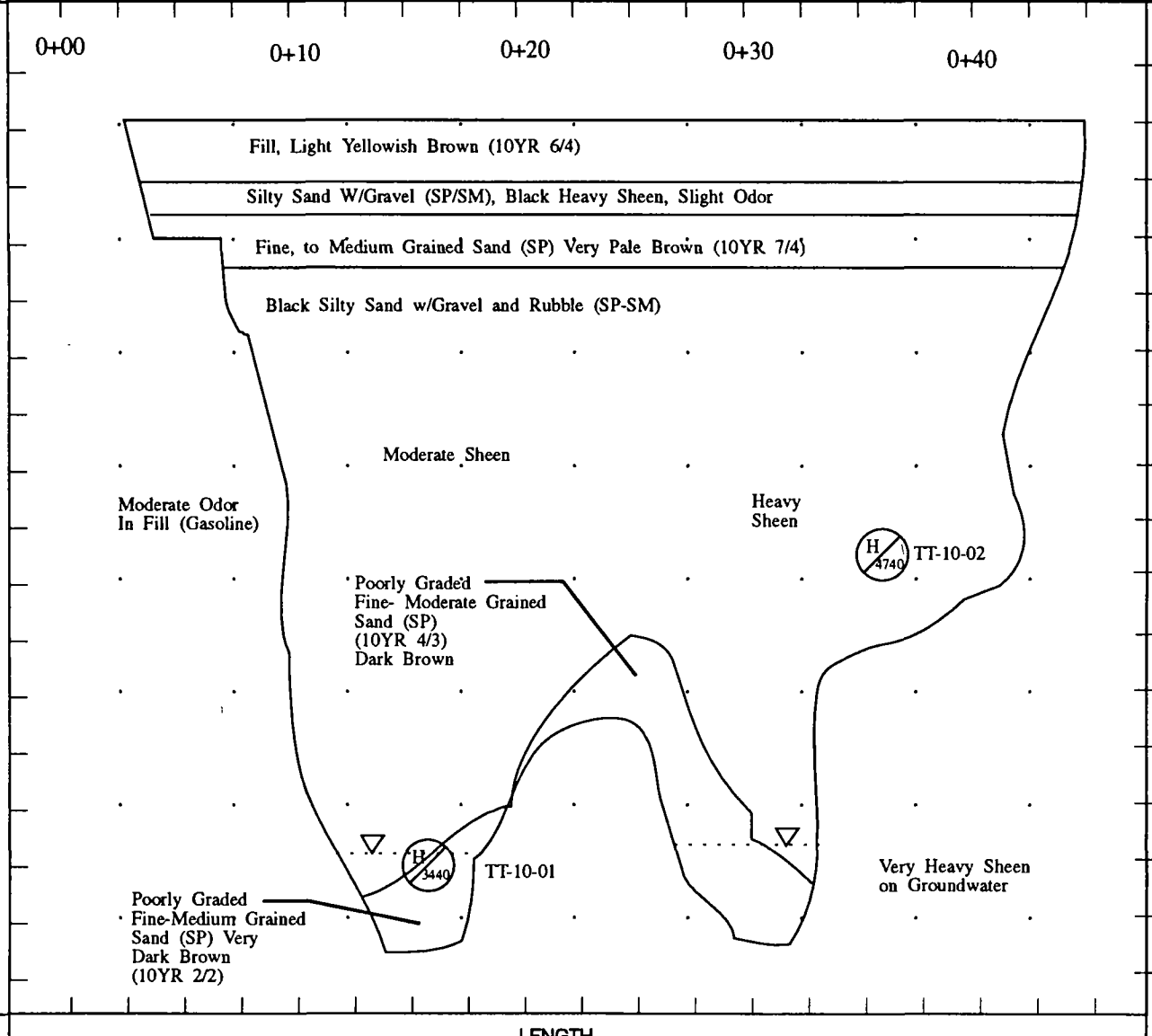
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/21/92

WATER LEVEL AND DATE 6-1/2' EXCAVATION METHOD B-Hoe LOGGER SEM

APPROXIMATE DIMENSIONS LENGTH 45' WIDTH 4-5' DEPTH 5-7' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Trench is Full of Demolition Debris of Masonry Bricks, Large Dia. (72") Concrete chunks, pipes (Not Connected to Anything, Varying Dia.) Wire, Wood, Concrete Chunks <2' Dia., Rubble Varies Up 40-50% of Fill.

End of Trench @ 0+ 45'

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-11 SHEET 1 OF 1	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/18/92

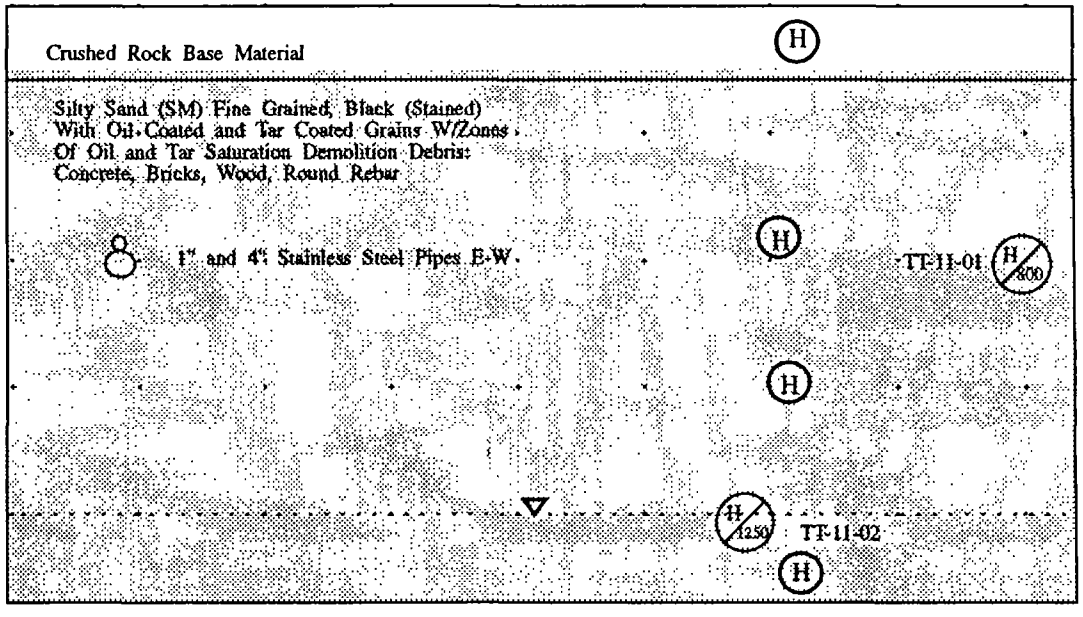
WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 41' WIDTH 3-4" DEPTH 4.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+00 0+10 0+20 0+30 0+40

NORTH SOUTH



0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Groundwater @ 4' With Heavy Oily Film, Heavy Sheen

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-12 SHEET 1 OF 1

TEST PIT WALL LOG

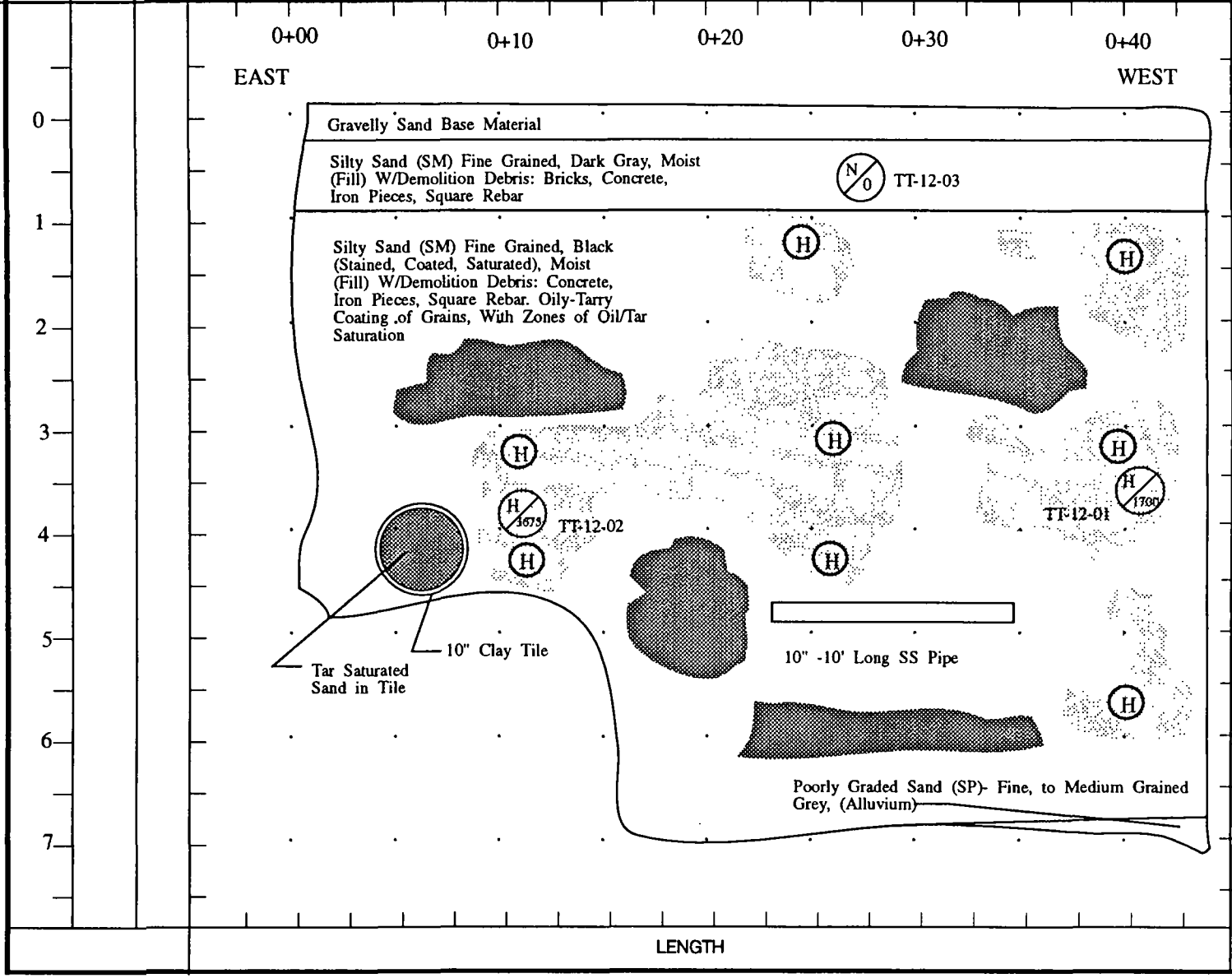
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/18/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 42' WIDTH 3-4" DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Very Heavy Sheen on Groundwater With Thick Black Oily Blebs

No Static Groundwater Level Recorded-Rising When Backfilled-Slow Recovery Due to Oil/Tar Saturated Soils.

- Tar, Tar in Pore Spaces of Soil
- Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-13 SHEET 1 OF 1

TEST PIT WALL LOG

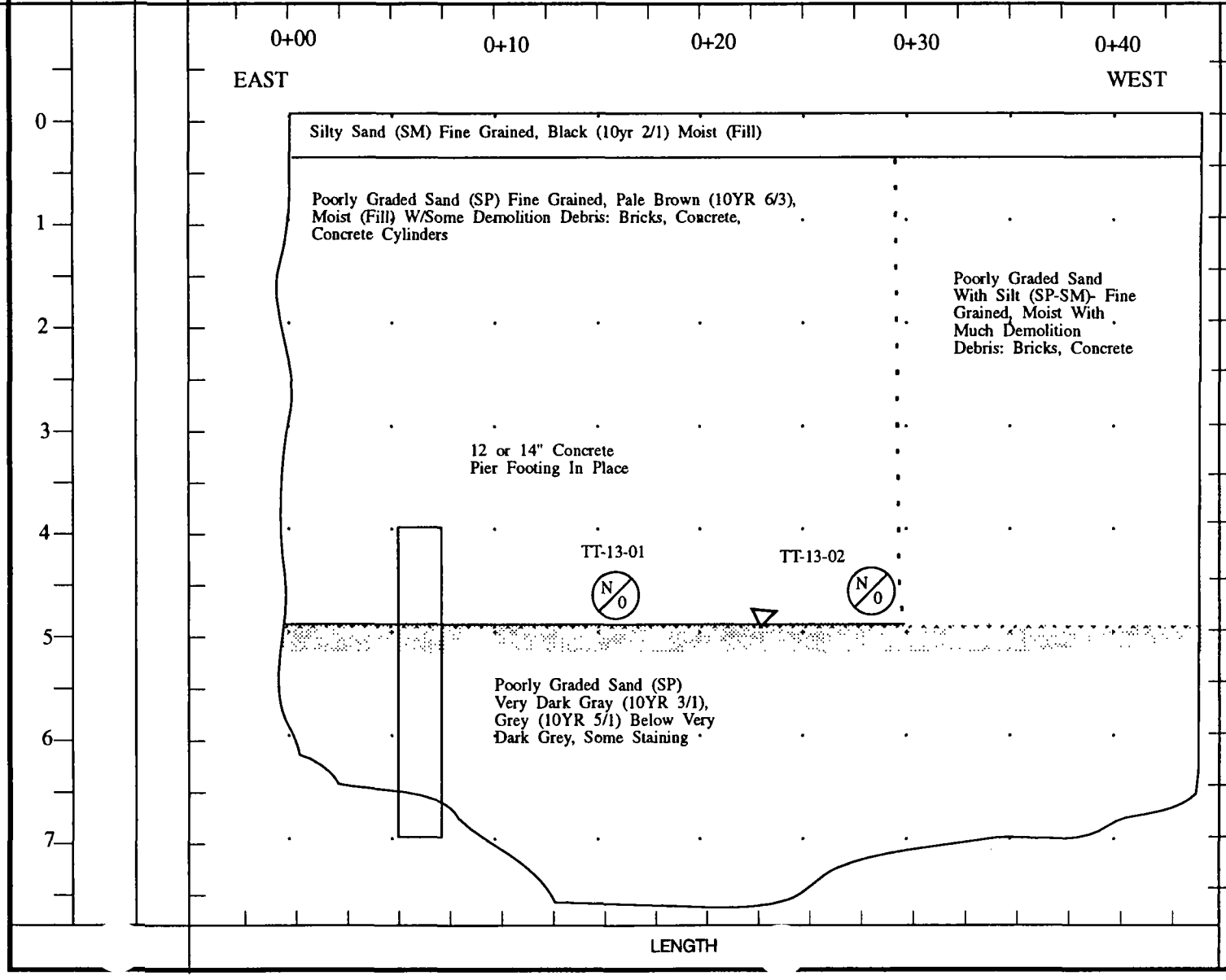
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/16/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 50' WIDTH 3-4" DEPTH 7.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE TYPE AND NUMBER | SAMPLE INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

End of Trench @ 0+50 W

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-14 SHEET 1 OF 2

TEST PIT WALL LOG

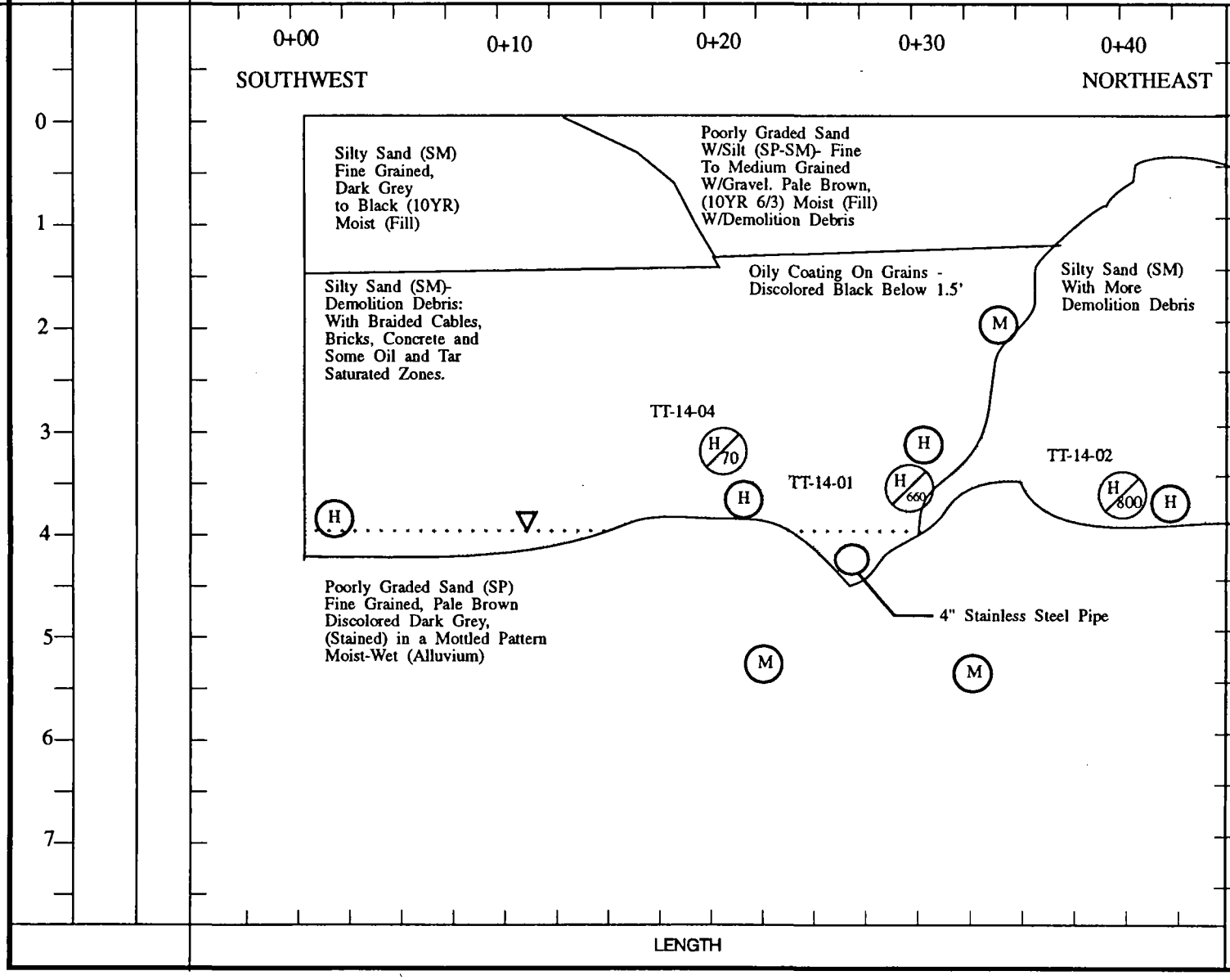
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NW WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/16/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 70' WIDTH 3-4" DEPTH 7.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Shaded Zone Contains Oil Coated Grains, With Some Saturated Areas. Heavy Sheen and Oily Blebs on Groundwater Surface.

PROJECT NO.	TEST PIT NO.		TEST PIT WALL LOG
13/49-003JSL	TT-14	SHEET 2 OF 2	

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NW WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/18/92

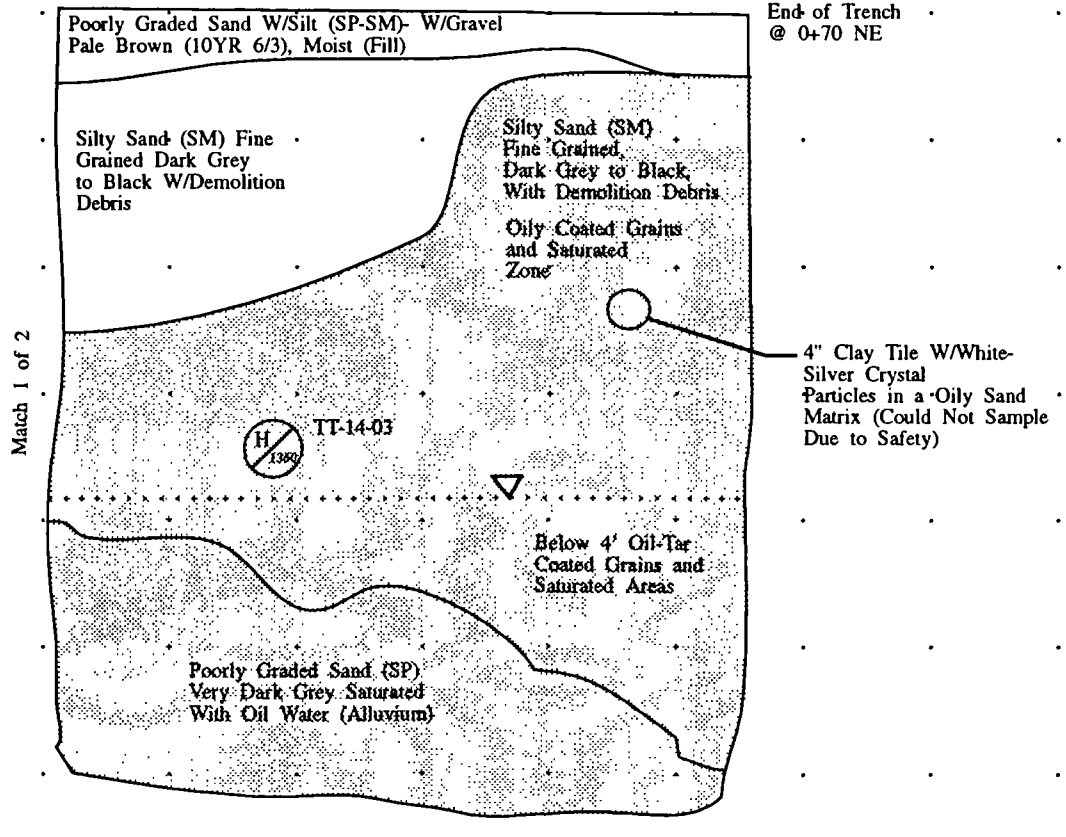
WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 70' WIDTH 3-4" DEPTH 6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+40 0+50 0+60 0+70 0+80

SOUTHWEST NORTHEAST



0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-15 EXT SHEET 1 OF 3

TEST PIT WALL LOG

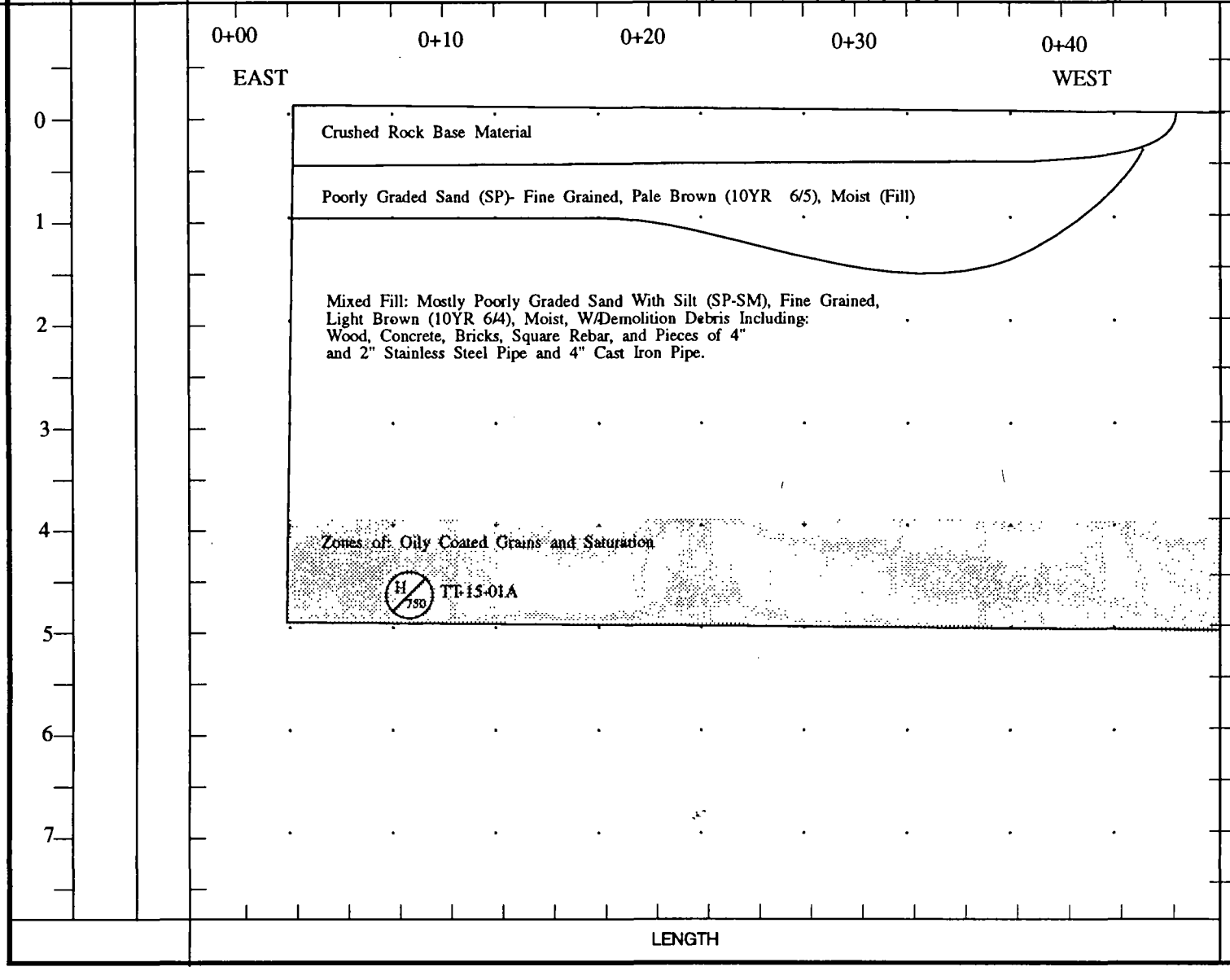
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF NWS WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/18/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 125' WIDTH 3-4" DEPTH 5 - 10' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-15 SHEET 2 OF 3	**TEST PIT WALL LOG**

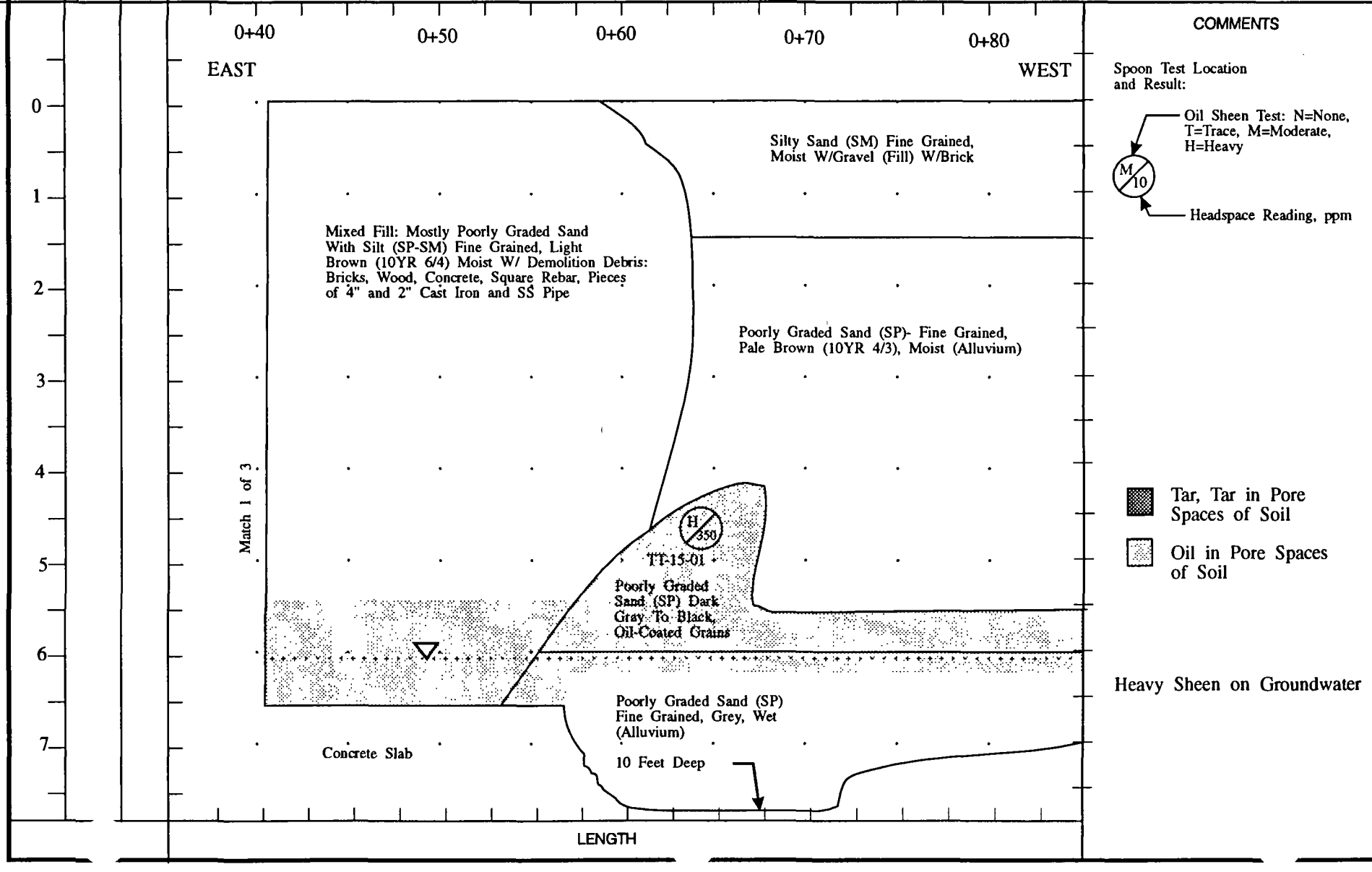
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/17/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 125' WIDTH 3-4' DEPTH 5 - 10' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Sheen on Groundwater

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-15 SHEET 3 OF 3

TEST PIT WALL LOG

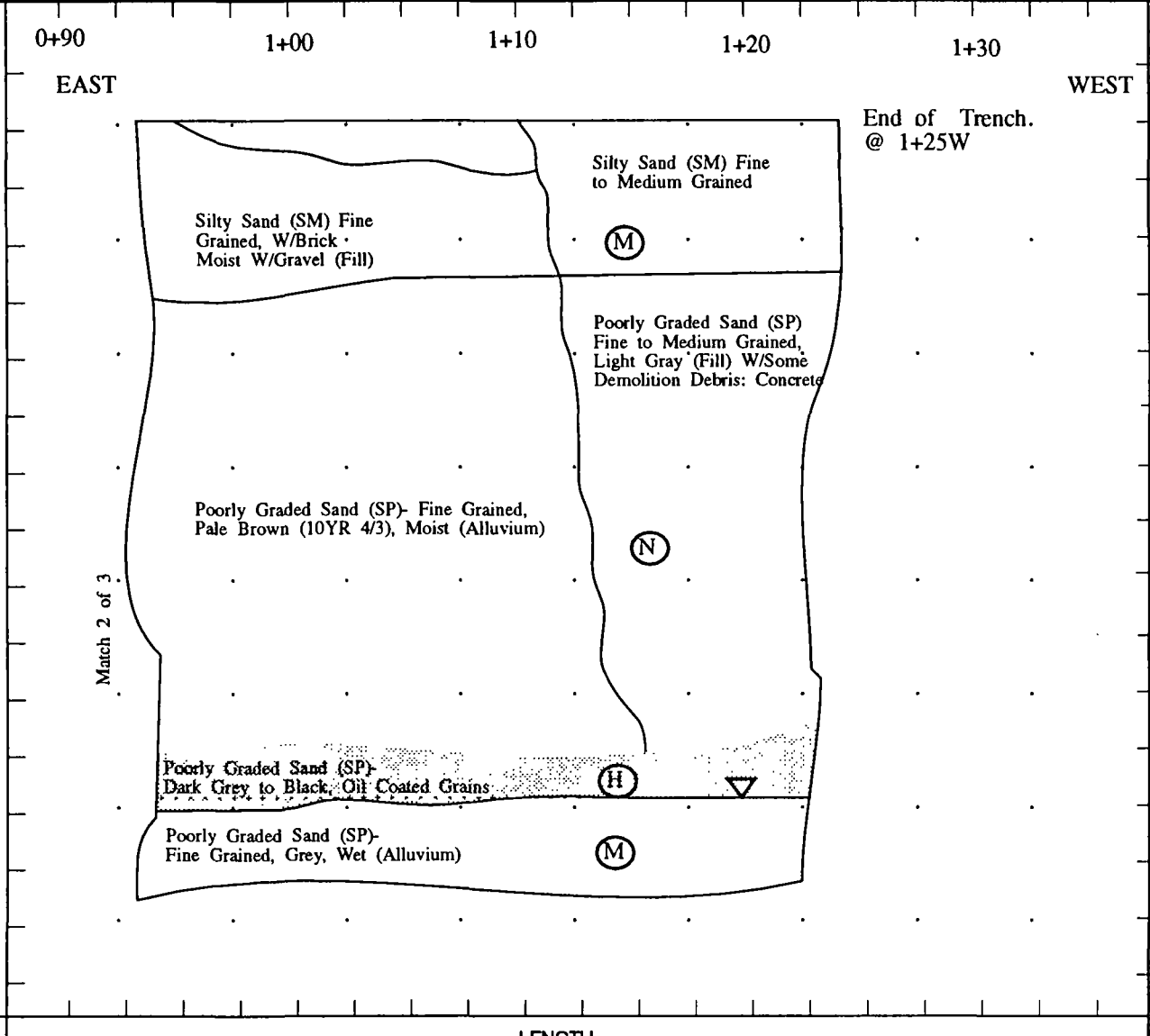
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/17/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 125' WIDTH 3-4' DEPTH 5-10' REMARKS _____

ELEVATION / DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Sheen on Groundwater

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-16 SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF E WALL OF PIT

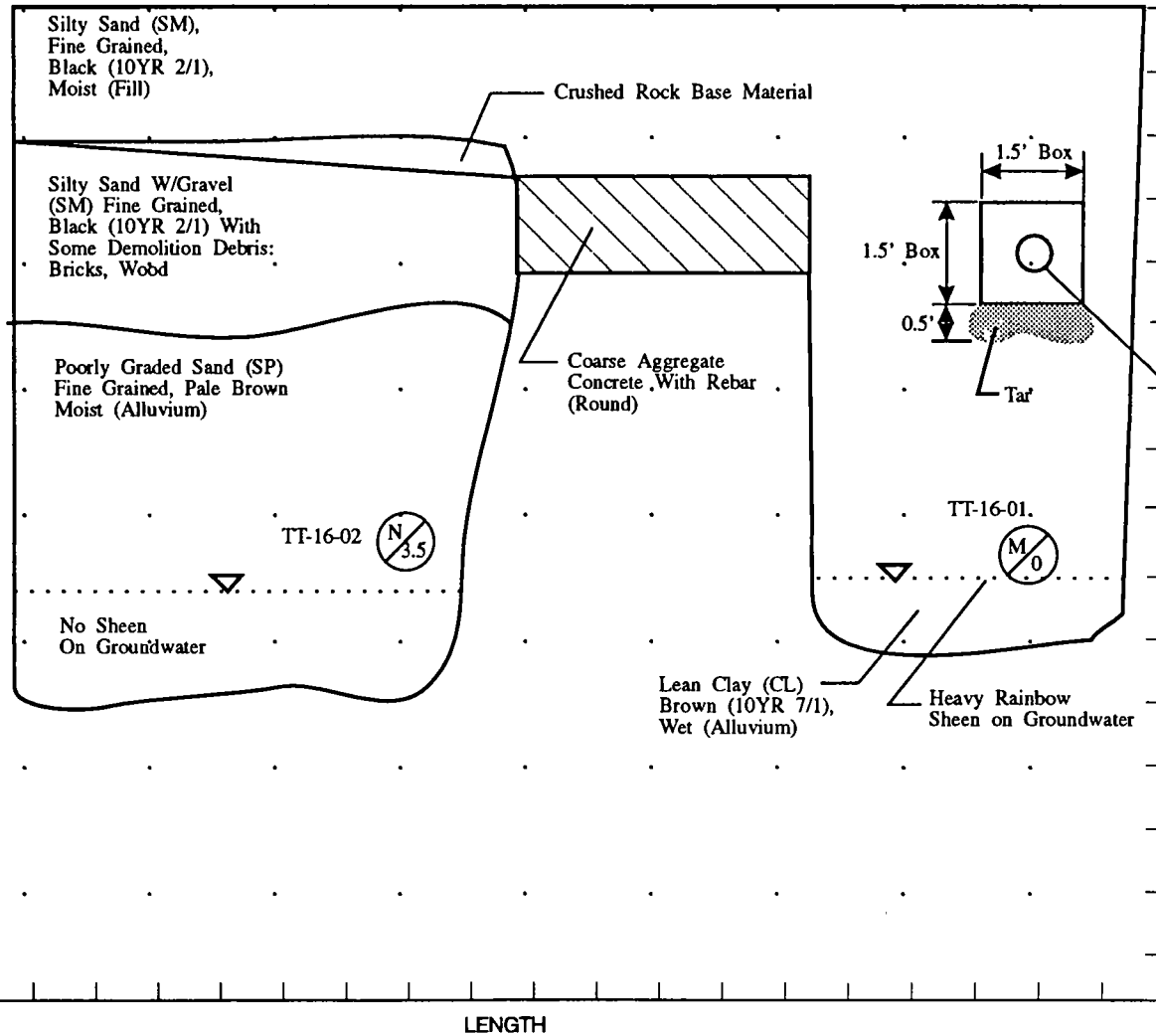
ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/12/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 48' WIDTH 3-4' DEPTH 5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+00 (NORTH) 0+10 0+20 0+30 0+40 (SOUTH)



LENGTH

COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10 — Headspace Reading, ppm

End of Trench @ 0 + 48S

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-17 SHEET 1 OF 2

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/12/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 80' WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+00 0+10 0+20 0+30 0+40

SOUTHWEST NORTHEAST

Poorly Graded Sand (SP)- Pale Brown

Grass & Weeds at Surface

Poorly Graded Sand With Silt (SP-SM) Fine to Medium Grained, Discolored Black, Moist (Fill)

Poured Wall With Wood Forms In Place NE-SW Line

Gravelly Sand (SP-GP), Fine to Coarse Grained, Dark Greyish Brown, (10YR 3/2) Moist (Fill) Composed 100% of Furnace Slag

Crushed Rock Base Material

Mixed Demolition Debris, Cement

Coal Fines

Poorly Graded Sand (SP) Not Excavated

Silty Sand & Gravelly (SP-GP) Fine to Coarse Grained, Dark Grey. Brown (10YR 3/2) Moist (Fill)

Lean Clay With Silt (CL/ML)

N/38 TT-17-01

Olive Yellow (2.5Y 6/6) Moist (Alluvium)

Poorly Graded Sand (SP) Fine to Medium Grained, Black, Oily (Alluvium)

LENGTH

COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

N/10 Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Poorly Graded Sand (SP), Fine to Medium Grained, Pale Brown (10YR) Moist, (Alluvium)

Heavy Rainbow Sheen On Groundwater

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-17 SHEET 2 OF 2	TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/12/92

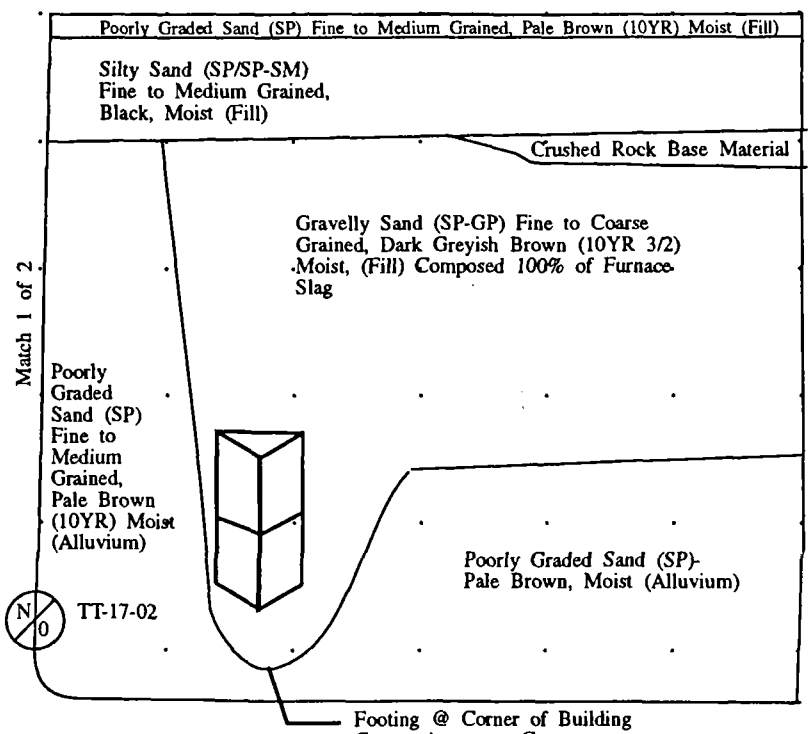
WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 80' WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION / DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+50 0+60 0+70 0+80 0+90

SOUTHWEST NORTHEAST



0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-18 SHEET 1 OF 1

TEST PIT WALL LOG

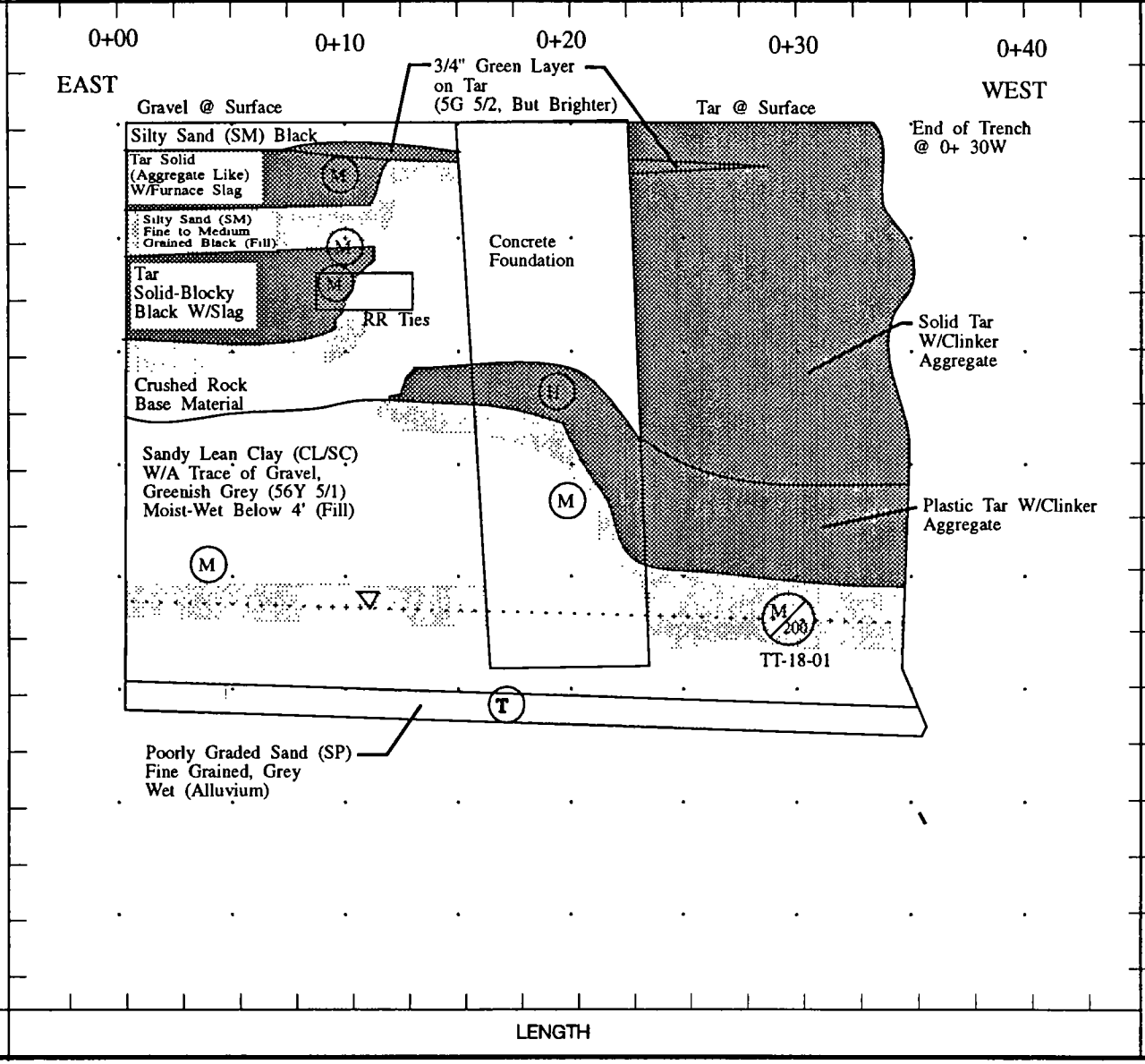
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/17/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 30' WIDTH 3-4' DEPTH 5.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10 — Headspace Reading, ppm

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

0 to 0+10 Heavy To Moderate Sheen On Groundwater

0+10 to End Heavy Sheen With Oily Blebs

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-19 SHEET 1 OF 2

TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/17/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 70' WIDTH 3-4' DEPTH 6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+00 SOUTH 0+10 0+20 0+30 0+40 NORTH

0 1 2 3 4 5 6 7

Silty Sand (SM) Fine Grained, Black (10YR)
Moist (Fill) With Demolition Debris: Bricks
Wood, Concrete, RR Ties, Timbers & Chunks of Tar

M

Tar Solid
With Slag

M

Gravelly Sand (SP-GP)
Medium Grained, Pale
Brown (10YR 6/3) Moist (Fill)

T

2" Stainless.
Steel Pipe
E-W

M

Sandy Lean Clay (CL-SC)
With Gravel, Greenish-Grey,
Moist.

Heavy Rainbow
Sheen on Groundwater

T

Poorly Graded Sand (SP)
Fine To Medium Grained,
Grey (10YR), Wet (Alluvium)

LENGTH

COMMENTS

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-19 SHEET 2 OF 2	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/17/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 70' WIDTH 3-4' DEPTH 6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+40 0+50 0+60 0+70 0+80

SOUTH NORTH

0 1 2 3 4 5 6 7

Silty Sand (SM)- Fine Grained
Black (10YR) Moist (Fill)
With Demolition Debris:
Bricks, Wood, Concrete, RR Ties,
Timbers and Chunks of Tar

M

Gravelly Sand (SP-GP)
Medium Grained, Pale
Brown (10yr 6/4) Moist (Fill)

M

End of Trench
@ 0+70N

Tar-Solid Sandy
Aggregate, With Some
Tar Chunks

N

Sandy Lean Clay
(CL-SC) With Gravel,
Greenish Grey Moist

M

H/2000

TT-19-01

Poorly Graded Sand (SP)
Fine to Medium Grained,
Grey (10YR), Wet (Alluvium)

T

LENGTH

COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10

Headspace Reading, ppm

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Heavy Oil Sheen on Groundwater With a Trace of Golden Brown Oily Blebs

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-19W SHEET 1 OF 4

TEST PIT WALL LOG

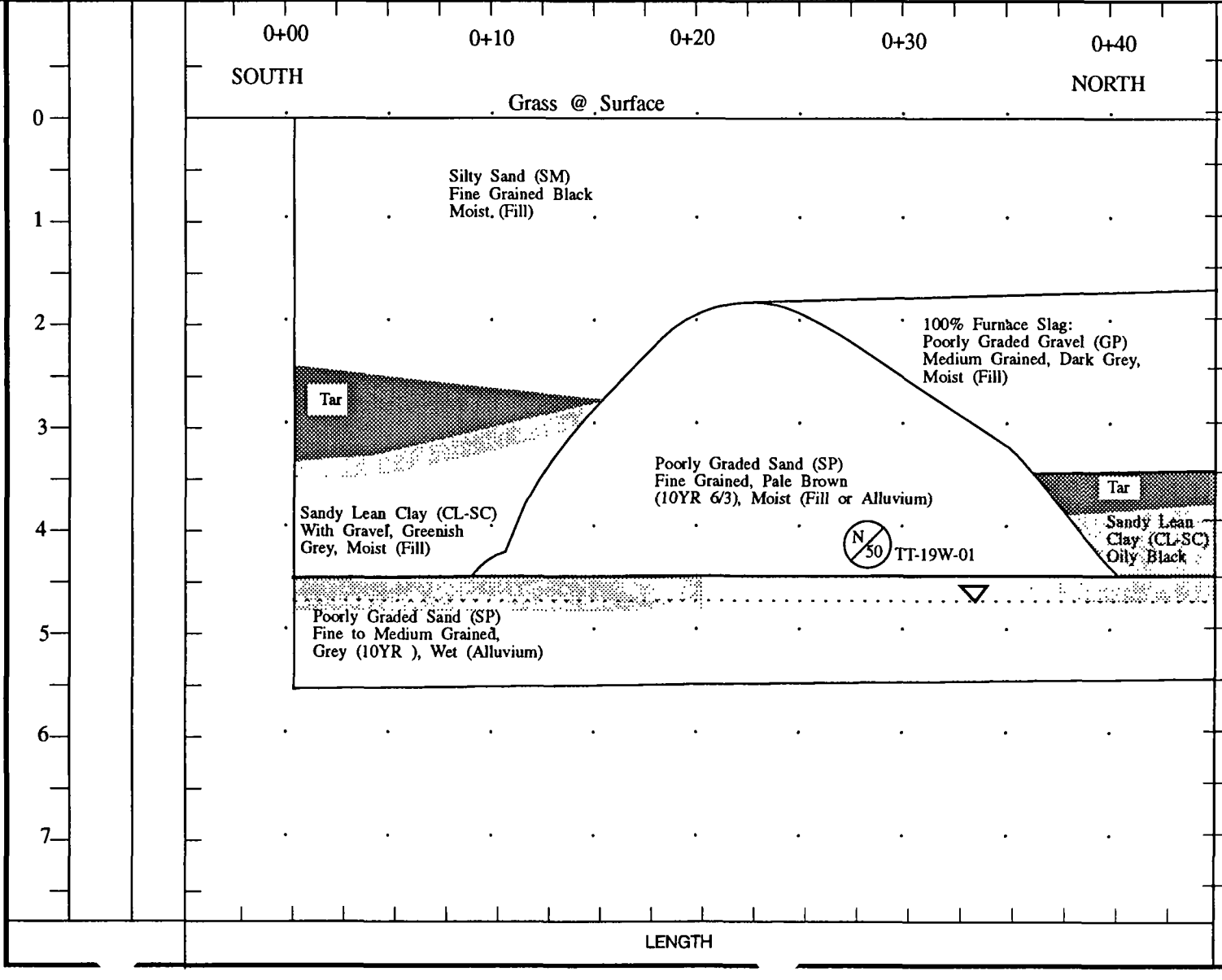
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/17/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 150' WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Oil Sheen on Groundwater 0 to 0+20

Moderate Oil Sheen on Groundwater 0+20 to 0+36'

Heavy Oil Sheen on Groundwater 0+36' to End

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-19W SHEET 2 OF 4	**TEST PIT WALL LOG**

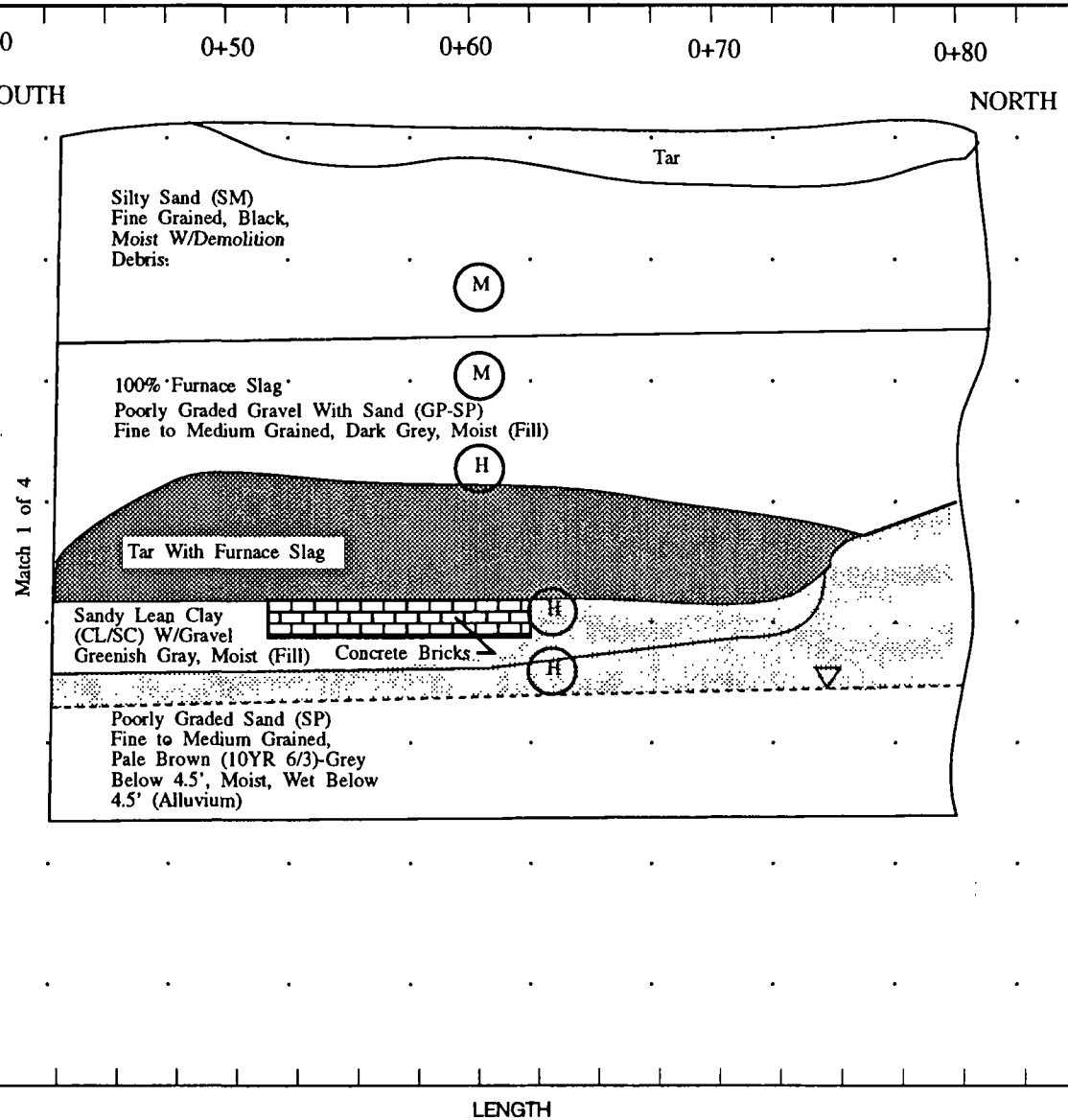
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/17/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 150' WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Rainbow Sheen On Ground Water

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-19W SHEET 3 OF 4

TEST PIT WALL LOG

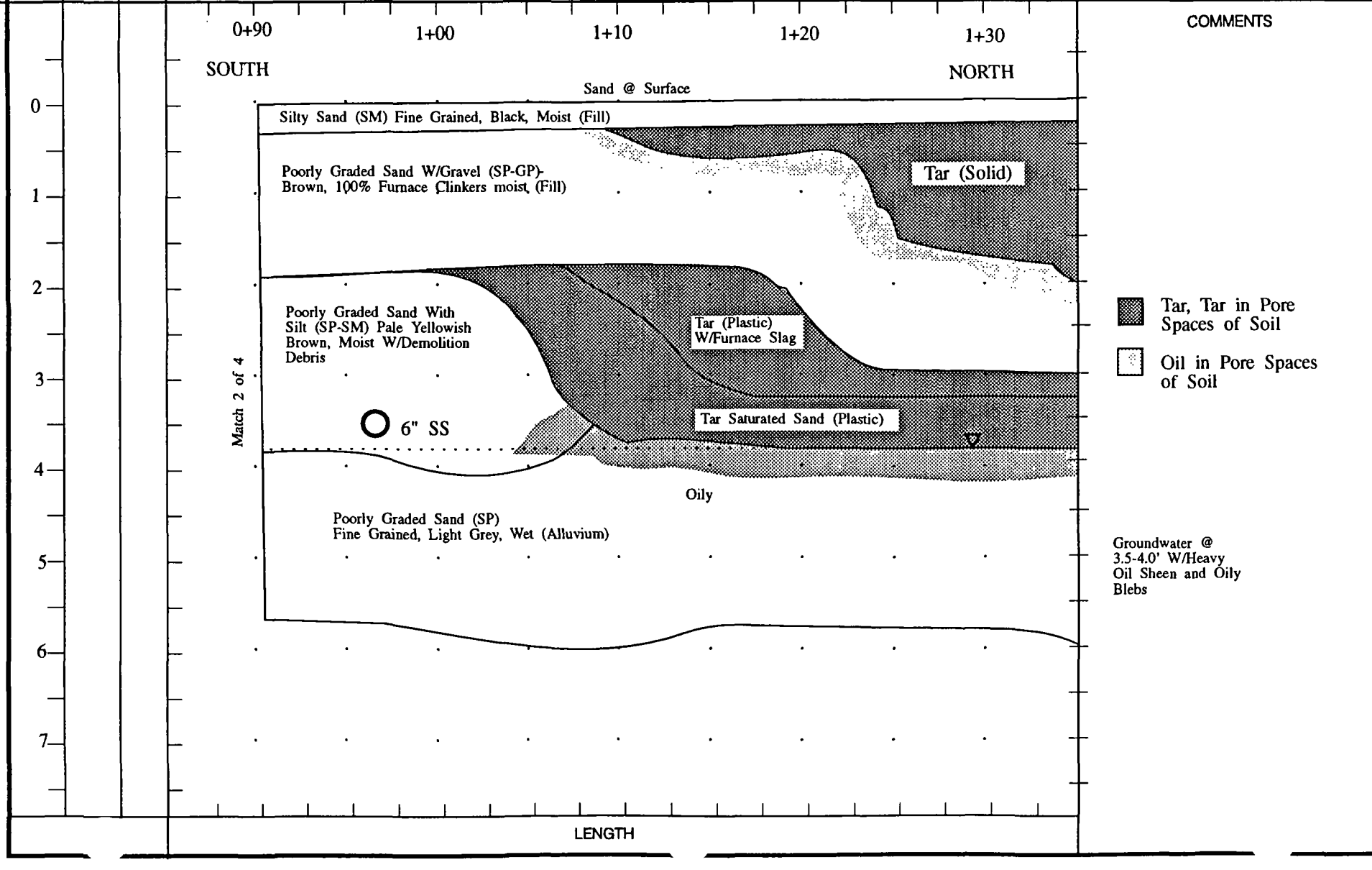
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/20/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 160' WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Groundwater @ 3.5-4.0' W/Heavy Oil Sheen and Oily Blebs

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-19W SHEET 4 OF 4	**TEST PIT WALL LOG**

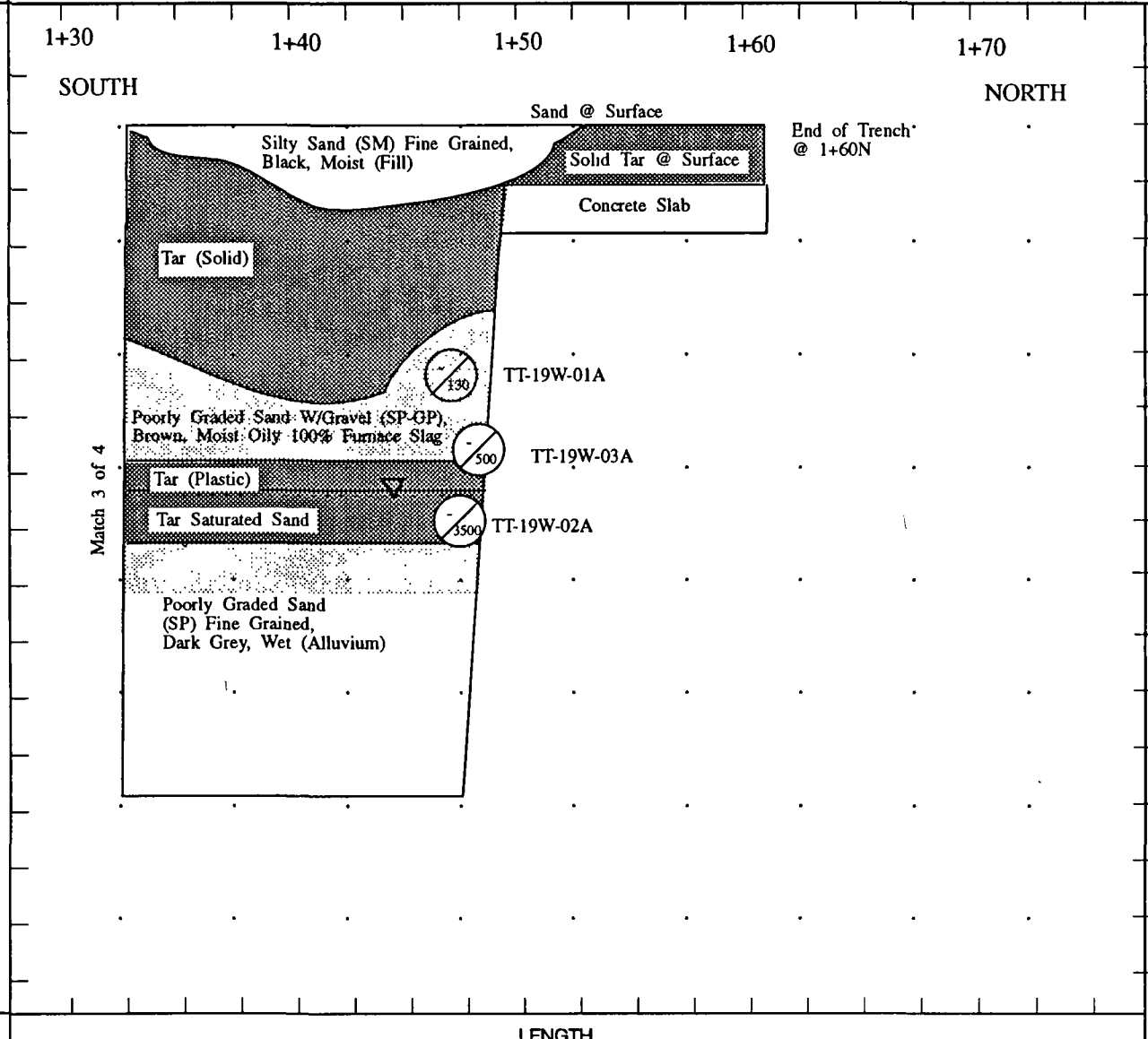
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF S WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/20/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 160' WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Sheen On Groundwater W/ Oily Blebs

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-20 SHEET 1 OF 2	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF E WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/16/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 60' WIDTH 3-4' DEPTH 5 - 5.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+00 0+10 0+20 0+30 0+40

SOUTH NORTH

Fence Grass @ Surface

Silty Sand (SM) Fine Grained, Pale Brown (10YR 6/3)

Poorly Graded Sand (SP) Fine to Medium Grained, Pale Brown (10YR 6/3) Moist (Fill)

Sand W/Coal Fines, Black (Fill), W/Chunks of Coal Tar

Lean Clay W/Sand (CL-SC) With a Trace of Gravel, Yellowish Brown (10YR 5/6), Moist (Fill)

Poorly Graded Sand (SP) Fine Grained Grey (10YR 5/1), Wet (Alluvium)

Poorly Graded Sand With Silt (SP-SM) Fine Grained, Dark Grey, Moist W/Demolition Debris: Bricks, Concrete Chunks of Coal Tar, Wood (Fill)

Tar

TT-20-01

N N N T

M/1

0 1 2 3 4 5 6 7

LENGTH

COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10

Headspace Reading, ppm

Spoon Test Location and Result:

(N) None
(T) Trace
(M) Moderate
(H) Heavy

Moderate Sheen on Groundwater Heavy Sheen @ 0+20

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-20 SHEET 2 OF 2

TEST PIT WALL LOG

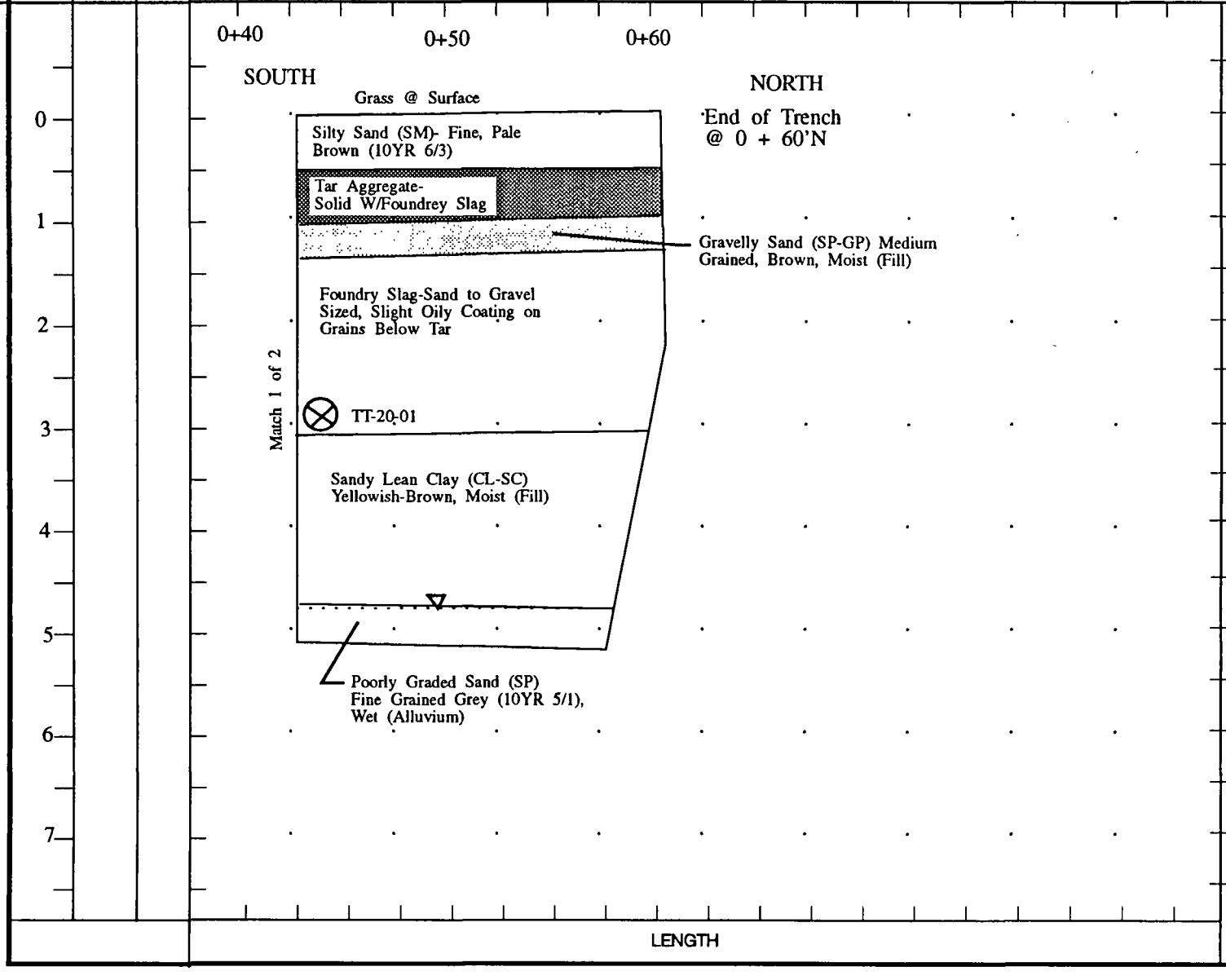
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF E WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/16/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 60' WIDTH 3-4' DEPTH 5 - 5.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-21 SHEET 1 OF 1

TEST PIT WALL LOG

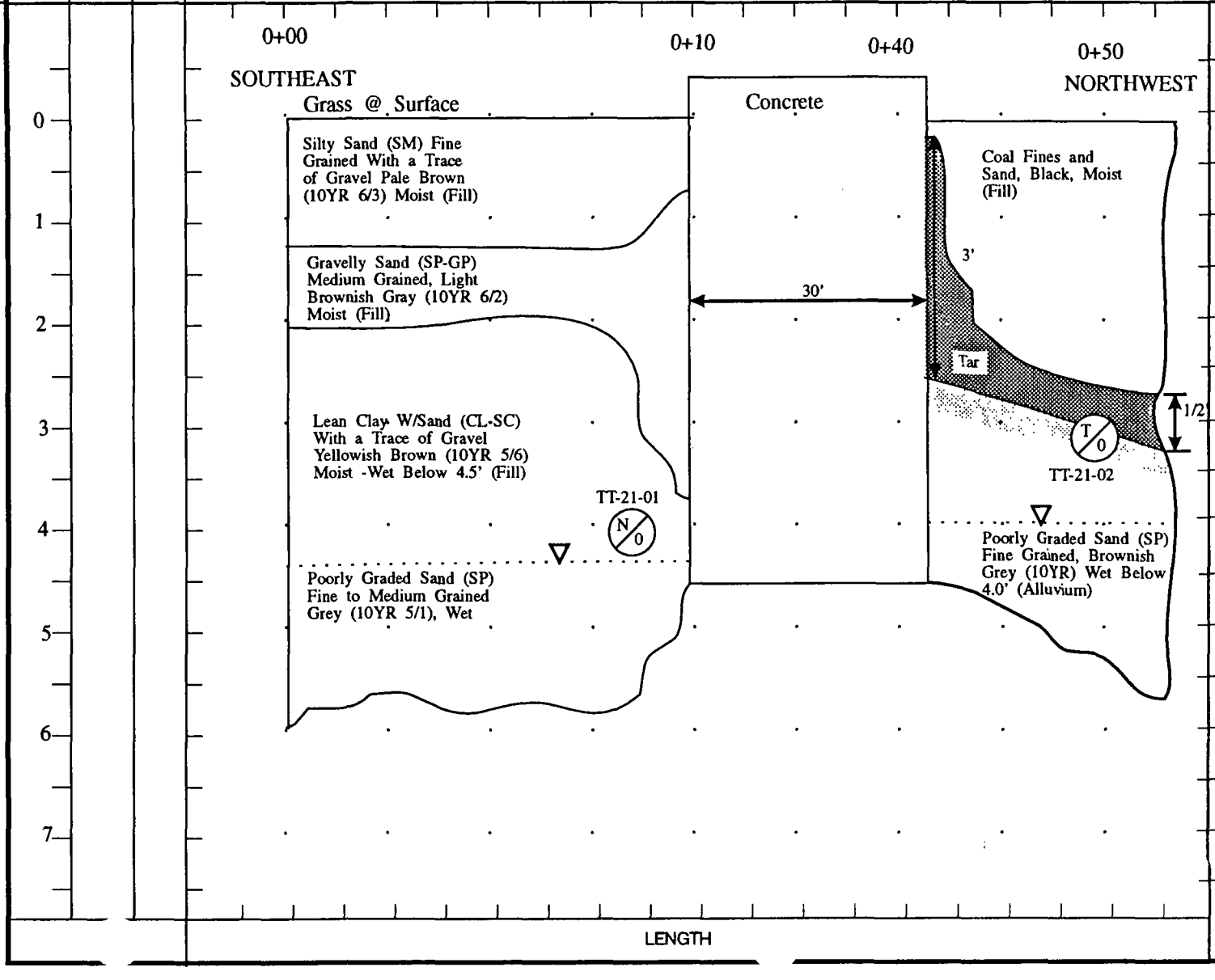
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF E WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/16/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 50' WIDTH 3-4' DEPTH 5-6' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

End of Trench @ 0 +50' NW

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Heavy Rainbow Sheen on Groundwater

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-22 SHEET 1 OF 2

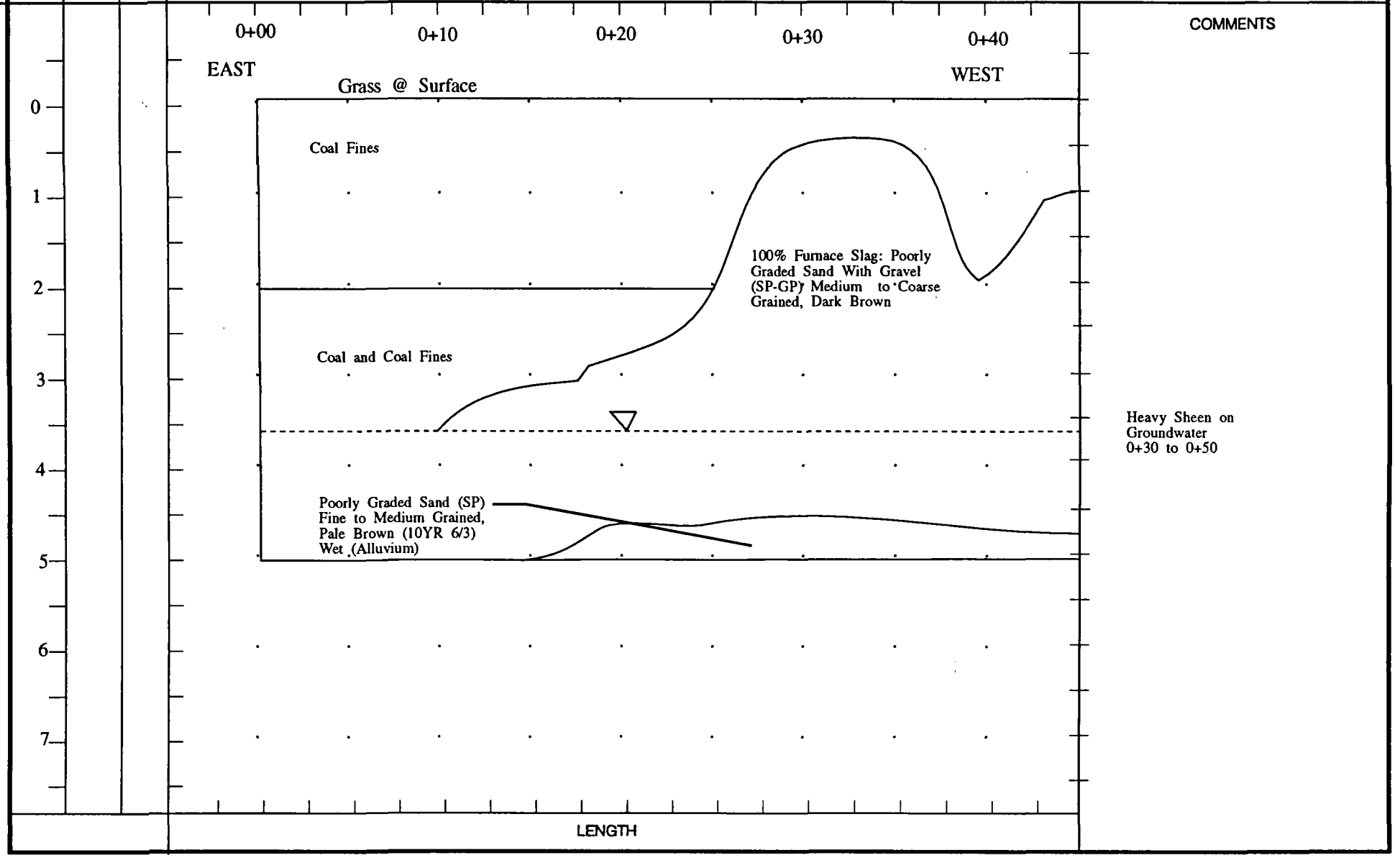
TEST PIT WALL LOG

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/12/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 65' WIDTH 3-4' DEPTH 5' REMARKS _____



PROJECT NO. 13/49-003JSL | TEST PIT NO. TT-22 SHEET 2 OF 2

TEST PIT WALL LOG

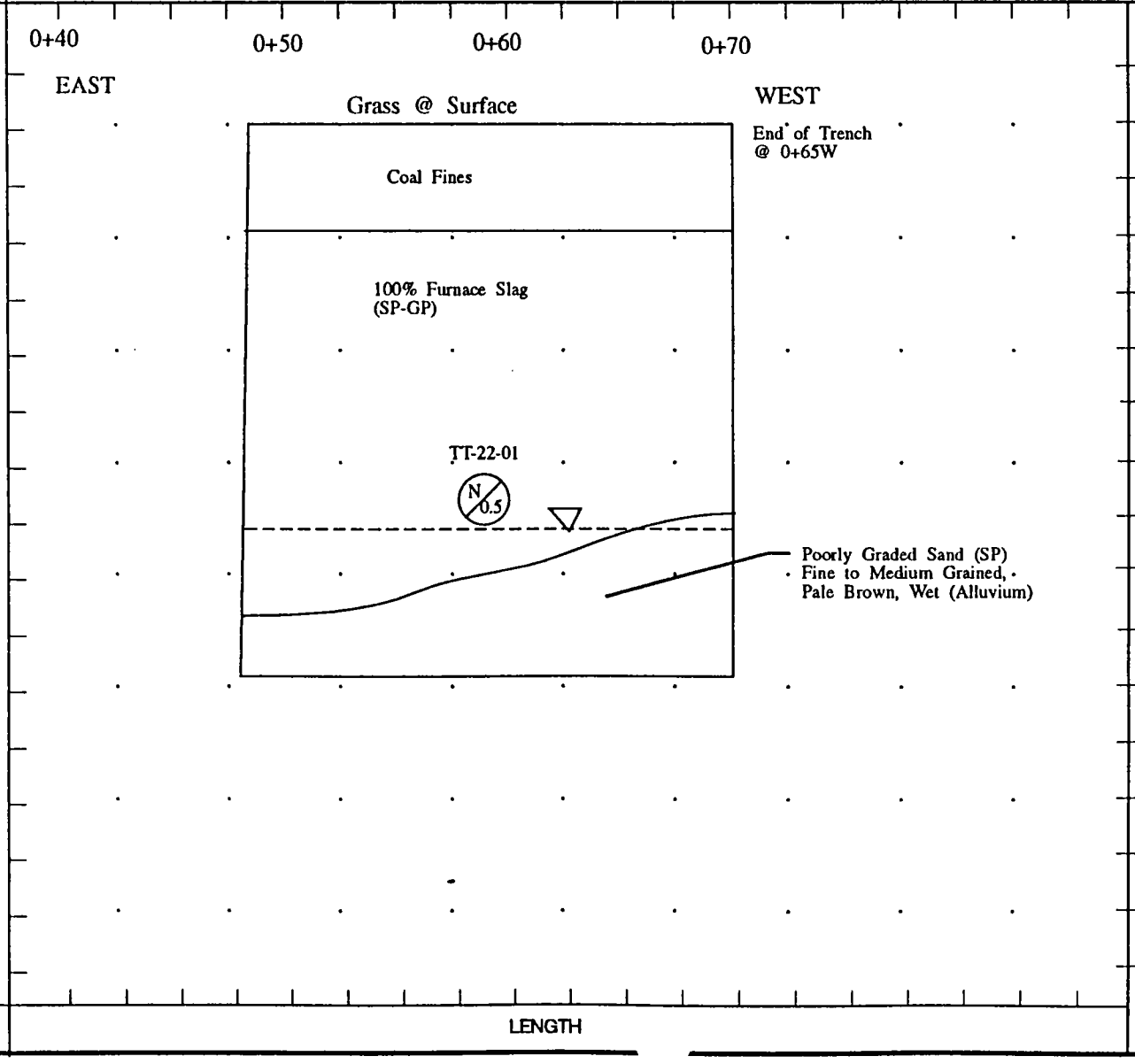
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/12/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 65' WIDTH 3-4' DEPTH 5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-22N SHEET 1 OF 2	**TEST PIT WALL LOG**

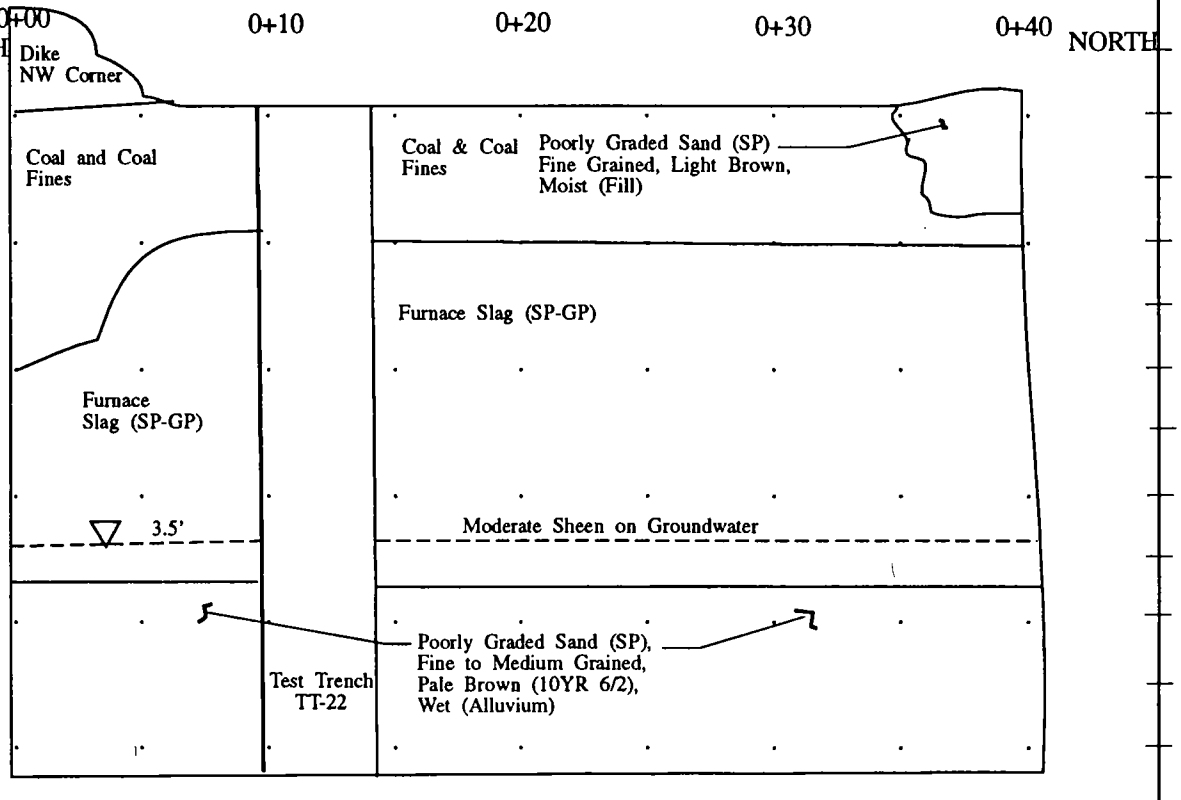
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/12/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 60' WIDTH 3-4' DEPTH 5' REMARKS _____

ELEVATION / DEPTH BELOW SURFACE (Ft.)	SAMPLE TYPE AND NUMBER	SAMPLE INTERVAL
0		
1		
2		
3		
4		
5		
6		
7		



LENGTH

COMMENTS

PROJECT NO.	TEST PIT NO.	
13/49-003JSL	TT-22N SHEET 2 OF 2	**TEST PIT WALL LOG**

PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/12/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 60' WIDTH 3-4' DEPTH 5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

0+40 SOUTH 0+50 0+60 NORTH

0

Poorly Graded Sand (SP)
Fine Grained, Light Brown
Moist (Fill)

End of Trench
@ 0 +60' N

1

Coal and Coal Fines

2

100% Furnace Slag
Poorly Graded Gravel
With Sand (SP-GP)

3

N/7 TT-22N-01

▽

4

Poorly Graded Sand (SP)
Fine to Medium Grained
Pale Brown (10YR 6/2)
Wet (Alluvium)

5

6

7

LENGTH

COMMENTS

Spoon Test Location and Result:

M/10 — Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy; Headspace Reading, ppm

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-23 SHEET 1 OF 1

TEST PIT WALL LOG

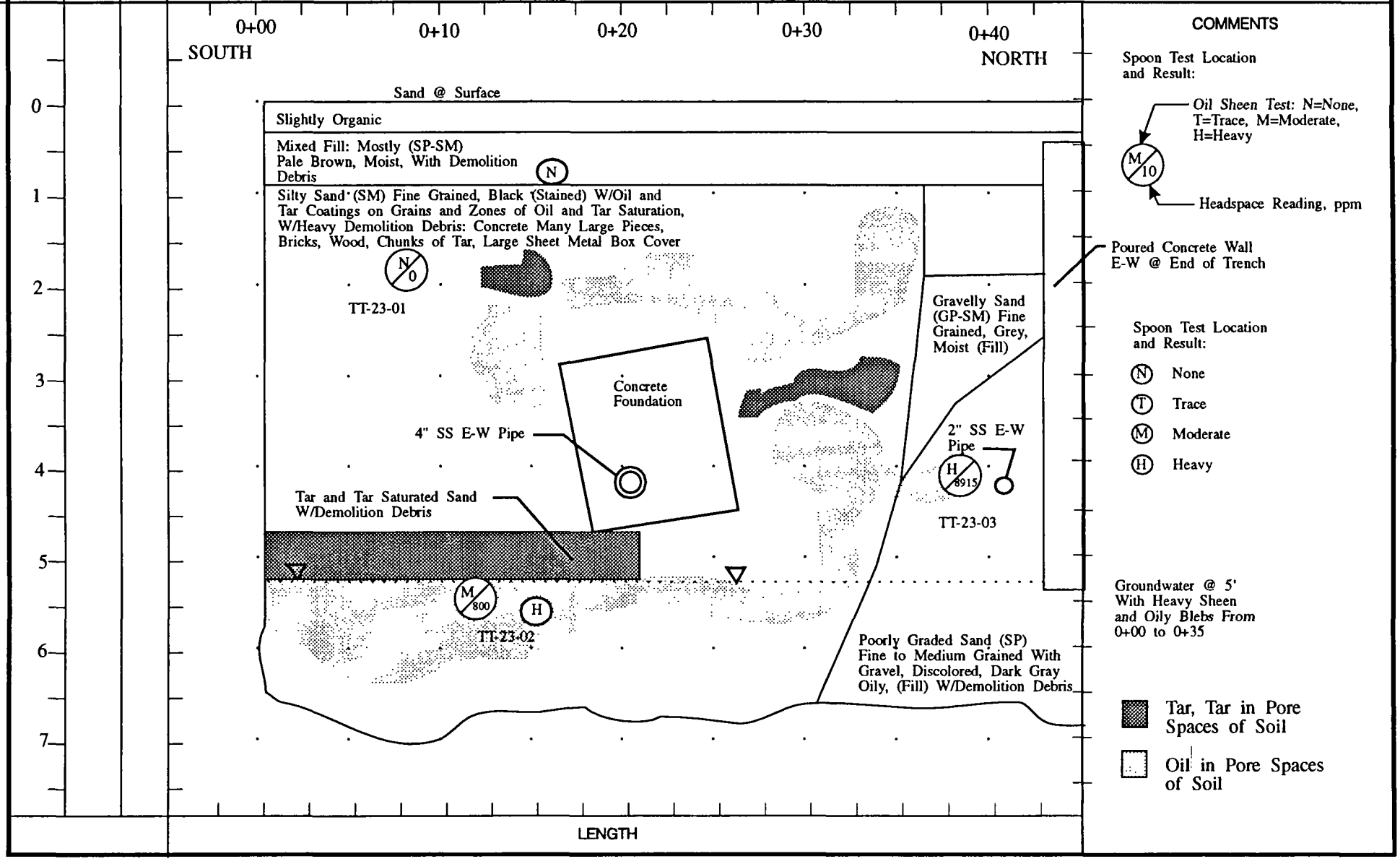
PROJECT Northshore Gas Waukegan Coke Plant LOCATION Waukegan, IL. MAP OF E WALL OF PIT

ELEVATION _____ CONTRACTOR Kirshoffer DATE EXCAVATED 3/19/92

WATER LEVEL AND DATE _____ EXCAVATION METHOD B-Hoe LOGGER JMF

APPROXIMATE DIMENSIONS LENGTH 50' WIDTH 10-70' DEPTH 7' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL



COMMENTS

Spoon Test Location and Result:

Oil Sheen Test: N=None, T=Trace, M=Moderate, H=Heavy

M/10 — Headspace Reading, ppm

Poured Concrete Wall E-W @ End of Trench

Spoon Test Location and Result:

- (N) None
- (T) Trace
- (M) Moderate
- (H) Heavy

Groundwater @ 5' With Heavy Sheen and Oily Blebs From 0+00 to 0+35

- Tar, Tar in Pore Spaces of Soil
- Oil in Pore Spaces of Soil

PROJECT NO 13/49-003JSL

TEST PIT NO. TT-24 SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSG - WCP LOCATION Waukegan, Illinois MAP OF West WALL OF PIT

ELEVATION 585.1 CONTRACTOR Kirshhoffer DATE EXCAVATED 10/7/93

WATER LEVEL AND DATE 4 Feet 10/7/93 EXCAVATION METHOD Backhoe LOGGER J. Fox

APPROXIMATE DIMENSIONS LENGTH 40' WIDTH 2' DEPTH 5.5' REMARKS

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

North South

TT-19W 1+40 W

Poorly Graded Sand With Silt (SP-SM),Fine Grained, Very Dark Grey, Moist (Fill)

Tar (Solid)

Tar Solid

H/60 TT2402

Tar Saturated Slag
Approximately 50% Tar Black (10YR 2/1)
(Fill)

Gradational Transition

Slag Medium Sand to
Coarse Gravel Sized
Dark Greyish Brown
Moist (Fill)

TT2403 H/50

4±

Tar Saturated Sand,
Sand Portion is Fine Grained,
Approximately 50% Tar, Black (Plastic).

H/100 TT2401

Poorly Graded Sand (SP) Fine Grained, Very Dark
Greyish Brown (10YR 3/2), Wet (Alluvium)

0 1 2 3 4 5 6 7

0+00 0+10 0+20 0+30 0+40

LENGTH

COMMENTS

Oil sheen test:
N= None,
T= Trace,
M=Moderate,
H=Heavy

M/10

Headspace Reading
in ppm.

Treatability (FS)
Sample Buckets
Collected @ TT2401 Location

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-25 SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSG - WCP LOCATION Waukegan, Illinois MAP OF North West WALL OF PIT

ELEVATION 585.3 CONTRACTOR Kirshhoffer DATE EXCAVATED 10/6/93

WATER LEVEL AND DATE 3.0' 10/6/93 EXCAVATION METHOD Backhoe LOGGER J. Fox

APPROXIMATE DIMENSIONS LENGTH 47' WIDTH 2' DEPTH 5.5' REMARKS

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

Southwest — Northeast

Poorly Graded Sand With Silt (SP-SM) With: Bricks, Slag, Wood, Fine to Medium Grained, Pale Brown (10YR 6/3) to Black (10YR 2/1), Moist (Fill)

T/0.0 TT2501

Furnace Slag
Medium Sand to Medium Gravel Sized
Very Dark Grey to Brown, Moist (Fill)

M/3.0 TT2502

▼3.0' @ 9:30 A.M. 10/6/93

N/37 TT2503 N/37 TT2506

Industrial Pond Deposit
Light Greenish Grey (5G 7/1)
Moist, Silty Grain Size (ML)

H/20 TT2504

Furnace Slag Same as Above

TT2505 S/H H/10

Poorly Graded Sand (SP) Fine Grained, Grey (5Y 5/1), (Alluvium)

0+00 0+10 0+20 0+30 0+40

LENGTH

COMMENTS

Oil sheen test:
N= None,
T= Trace,
M=Moderate,
H=Heavy

M/10 Headspace Reading in ppm.

Treatability (FS)
Sample Buckets
Collected @ TT2503 Location
and,@ 0+19' (2 5 - 4.5')

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Top of Sand Poor Spaces Filled (Saturated W/Golden Brown Oil)
Water Appears Confined Below Industrial Pond Deposit

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-26 SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSG - WCP LOCATION Waukegan, Illinois MAP OF South East WALL OF PIT

ELEVATION 584.6 CONTRACTOR Kirshhoffer DATE EXCAVATED 10/8/93

WATER LEVEL AND DATE _____ EXCAVATION METHOD Backhoe LOGGER J. Fox

APPROXIMATE DIMENSIONS LENGTH 68' WIDTH 2' DEPTH 4.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

Southwest — Northeast

Silty Sand (SM)-Fine to Medium Grained W/Gravel, Black (10YR 2/1), Moist, W/Concrete, Bricks, and other Debris, (Fill)

Concrete is Reinforced W/square and Round Rebar and Chunks are up to 5' Long

N/1500 TT2601

TT2603 M/15

Poorly Graded Sand (SP)- Fine grained, Dark Grayish Brown (10YR 4/2) Wet (Alluvium)

TT2602 M/300

0 1 2 3 4 5 6 7

0+00 0+15 0+30 0+45 0+60

LENGTH

COMMENTS

Oil sheen test:
N= None,
T= Trace,
M=Moderate,
H=Heavy

M/10 Headspace Reading in ppm.

Treatability (FS)
Sample Buckets
Collected @ TT2401 Location

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-27 SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSG - WCP LOCATION Waukegan, Illinois MAP OF South WALL OF PIT

ELEVATION 585.6 CONTRACTOR Kirshhoffer DATE EXCAVATED 10/6/93

WATER LEVEL AND DATE _____ EXCAVATION METHOD Backhoe LOGGER J. Fox

APPROXIMATE DIMENSIONS LENGTH 30' WIDTH 2' DEPTH 4.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

East West

0

1

2

3

4

5

6

7

Poorly Graded Sand (SP)- Fine to Medium Grained, Pale Brown (10YR6/3), Moist (Fill)

Furnace Slag, Medium Sand to Coarse Gravel Sized, Black (10YR/), Moist (Fill)

Brick Construction Debree or Foundation

Slight Sheen on Water in Trench.

▼ 4±

Poorly Graded Sand (SP)- Fine Grained, Pale Brown (10YR 6/3), Wet (Alluvium)

0+00 0+10 0+20 0+30 0+40

LENGTH

COMMENTS

Oil sheen test:
N= None,
T= Trace,
M=Moderate,
H=Heavy

M/10

Headspace Reading in ppm.

No Samples Collected

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-28 SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSG - WCP LOCATION Waukegan, Illinois MAP OF South WALL OF PIT

ELEVATION 585.6 CONTRACTOR Kirshhoffer DATE EXCAVATED 10/6/93

WATER LEVEL AND DATE _____ EXCAVATION METHOD Backhoe LOGGER J. Fox

APPROXIMATE DIMENSIONS LENGTH 30' WIDTH 2' DEPTH 5.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

East West

0 1 2 3 4 5 6 7

Poorly Graded Sand (SP)- Mostly Fine Grained
Pale Brown (10YR 6/3) to Grey Moist
W/Angle Iron, Cable, RR Tie, dimentional
Lumber 1" - 6"
and other Construction Debris (Fill)

TT2803 (N 0.0)

TT2802 (N 0)

4±

TT2801 (H 10)

Poorly Graded Sand (SP)- Fine Grained, Pale Brown (10YR 6/3), Wet (Alluvium)

0+00 0+10 0+20 0+30 0+40
LENGTH

COMMENTS

Oil sheen test:
N= None,
T= Trace,
M=Moderate,
H=Heavy

M 10 — Headspace Reading in ppm.

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

PROJECT NO. 13/49-003JSL

TEST PIT NO. TT-29 SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSG - WCP LOCATION Waukegan, Illinois MAP OF North WALL OF PIT

ELEVATION 585.5 CONTRACTOR Kirshhoffer DATE EXCAVATED 10/7/93

WATER LEVEL AND DATE _____ EXCAVATION METHOD Backhoe LOGGER J. Fox

APPROXIMATE DIMENSIONS LENGTH 25' WIDTH 2' DEPTH 7' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

West East

0

Silty Sand (SM)- Fine to Medium, Pale Brown (10YR 6/3), Moist (Till)

1

N/0.0 TT2901

(Pipe Backfill) Furnace Slag Fine Sand to Coarse Gravel Sized Dark Greyish Brown (10YR/) to Black (10YR 2/1), Moist (Fill)

2

3

TT2902

H/175

4

2 Two Inch Thin Walled Steel Pipes,Oriented NNE

5

Lean Clay With Sand and Gravel, Brown (10YR 5/3) Moist (Fill)

6

Poorly Graded Sand (SP) Fine Grained, Dark Grey (10YR/4/1) Wet (Alluvium)

M/0.0 TT2903

7

0+00 0+10 0+20 0+30 0+40

LENGTH

COMMENTS

M/10 — Oil sheen test N= None, T= Trace, M=Moderate, H=Heavy

Headspace Reading in ppm.

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Black (Liquid Tar Flowed from Pipes. Pipes Were Badly Rusted and Leaking- Section Removed and Photographed.

Strong Coal Tar Odor While Digging

PROJECT NO.	TEST PIT NO.	TEST PIT WALL LOG
13/49-003JSL	TT-30 SHEET 1 OF 1	

PROJECT NSG - WCP LOCATION Waukegan, Illinois MAP OF North WALL OF PIT

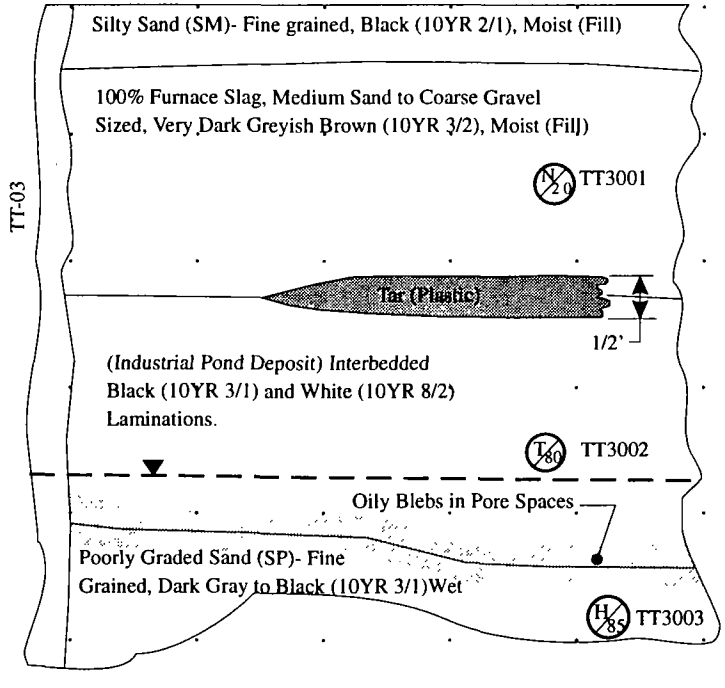
ELEVATION 585.8 CONTRACTOR Kirshhoffer DATE EXCAVATED 10/7/93

WATER LEVEL AND DATE _____ EXCAVATION METHOD Backhoe LOGGER J. Fox

APPROXIMATE DIMENSIONS LENGTH 23' WIDTH 2' DEPTH 5.5' REMARKS _____

ELEVATION | DEPTH BELOW SURFACE (Ft.) | SAMPLE: TYPE AND NUMBER | SAMPLE: INTERVAL

East West



0 1 2 3 4 5 6 7

0+00 0+10 0+20 0+30 0+40

LENGTH

COMMENTS

Oil sheen test:
N= None,
T= Trace,
M=Moderate,
H=Heavy

M/10 Headspace Reading in ppm.

Treatability (FS) Sample Buckets Collected @ TT3002 Location

Tar, Tar in Pore Spaces of Soil

Oil in Pore Spaces of Soil

Appendix 4-E

Well and Piezometer Construction Logs

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

Project WCP RI/FS Phase I — Well No. MW-3S

Date Started 3/13/92

Date Completed 3/14/92 — Riser Pipe Elevation 588.24[1]

Field Inspector K. French (BEC)

Crew Chief P. Dickinson (WTD) — Ground Surface Elevation 585.2

BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Borehole advanced from 0' to 13.0' (585.2-572.2) using 6 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water Well screen and riser pipe placed in the borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface. Water level was 2.5' below surface, on 3-13-92.	Fill 1.5' Coal Fines 2.5' Sand Fill 5.0' Medium Sand 8.0' Sand With Silt 11.0' Silty Sand 13.0' E.O.B.	▽ 2.5'	Stickup:3.04' 2 -inch diameter, stainless steel riser pipe 0' to 1.5' (585.2-583.7). 2-inch diameter, 10.5' long, #10 slot size stainless steel screen 1.5' - 12.0' (583.7-572.2). Sandpack 1.0 - 13.0' (584.2 - 572.2). Bentonite seal 0.5' - 1.0' (584.7 - 584.2). Cement grout 0 - 0.5'. 4-foot long steel protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

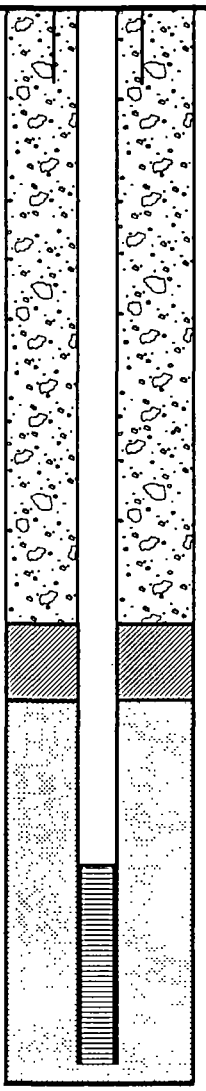
Project WCP RI/FS Phase I — Well No. MW-3D

Date Started 3/18/92

Date Completed 3/18/92 — Riser Pipe Elevation 588.23[1]

Field Inspector T. Wright-Wells (BEC)

Crew Chief P. Dickinson(WTD) — Ground Surface Elevation 585.5

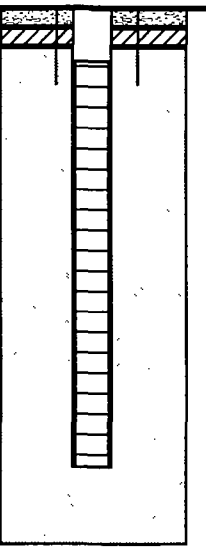
BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Borehole advanced from 0' to 28.0' (585.5 - 557.5) using 6 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water. Well screen and riser pipe placed in borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface.	Silty Sand Fill 1.5' Coal Fines 2.5' Medium Sand Fill 5.0' Clayey Sand 5.3' Medium Sand 8.0' Fine Sand With Silt 11.0' Silty Sand 20.0' Fine Sand With Silt 28.0' E.O.B.		Stickup up:2.73' 2-inch diameter, stainless steel riser pipe 0' to 22.8' (585.5-562.7). 2-inch diameter, 5' long , #10 slot size stainless steel screen 22.8'-27.8' (562.7-557.7') Sandpack 18'-27.8' (567.5-557.7). Bentonite seal 16.0-18.0' (569.5 - 567.5) Cement grout 0 - 16.0' (585.5 - 569.5) 5-foot long protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

Project WCP RI/FS Phase I
Well No. MW-4S
Date Started 3/19/92
Date Completed 3/19/92
Riser Pipe Elevation 589.17[1]
Field Inspector S. Marshik (BEC)
Crew Chief P. Dickinson(WTD)
Ground Surface Elevation 586.2

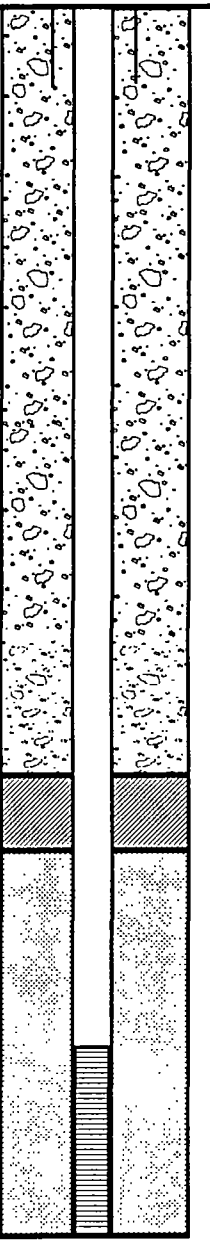
BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Borehole advanced from 0' to 14.0' (586.2 - 572.2) using 6 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water. Well screen and riser pipe placed in borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface.	Topsoil Silty Sand Fill and Coal Fines 1.0' Fine to Medium Sand Fill 5.0' Medium Sand 14.0' E.O.B.		Stickup up:2.97' 2-inch diameter, stainless steel riser pipe 0' to 1.7' (586.2- 584.5). 2-inch diameter 10.3' long , #10 slot size 1.7-12.0 (584.5-574.2) Sandpack 1.0- 14.0' (585.2 - 572.2) Bentonite seal 0.5-1.0' (585.7 - 585.2) Cement grout 0 - 0.5' (586.2 - 585.7') 5-foot long protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

Project WCP RI/FS Phase I
Well No. MW-4D
Date Started 3/20/92
Date Completed 3/20/92
Riser Pipe Elevation 589.06[1]
Field Inspector T. Wright-Wells (BEC)
Crew Chief P. Dickinson(WTD)
Ground Surface Elevation 586.1

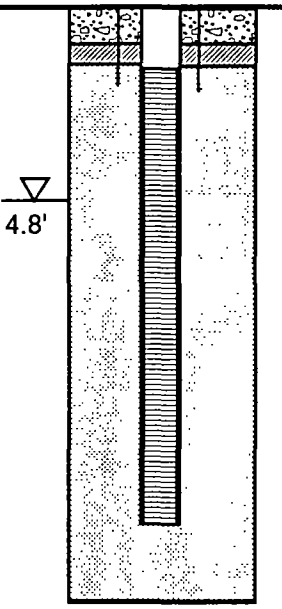
BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Borehole advanced from 0' to 32.0' (586.1-554.1) using 6 1/4-inch I.D. hollow stem auger. Inside of auger flushed potable water. Well screen and riser pipe placed in the borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface.	Silty SandFill 0.5' Coal Fines 1.0' Fine to Medium Sand Fill 5.0' Medium Sand 31.0' Gravel 31.5' Silt 32.0' E.O.B.		Stickup: 2.96' 2 -inch diameter, stainless steel riser pipe 0' to 27.0' (586.1-559.1). 2-inch diameter, 5' long, # 10 slot size stainless steel screen, 27.0-32.0' (559.1 - 554.1) Sandpack 22.0'-32.0' (564.1 - 554.1) Bentonite seal 20.0-22.0' (566.1- 564.1) Cement grout 0 - 20.0' (586.1 - 566.1) 5-foot long steel protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

Project WCP RI/FS Phase I
Well No. MW-5S
Date Started 3/20/92
Date Completed 3/20/92
Riser Pipe Elevation 587.89[1]
Field Inspector S. Marshik (BEC)
Crew Chief B. Loveland(WTD)
Ground Surface Elevation 585.4

BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Borehole advanced from 0' to 15.0' (585.4-570.4) using 6 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water. Well screen and riser pipe placed in the borehole. Sand pack and then bentonite pellets placed as auger retrated. Neat cement grout to surface. Water level was 4.8' below surface on 3-20-92.	Fine Sand Fill 5.0' Fine Sand 7.0' Fine to Medium Sand with Gravel 12.0' Fine Sand with Trace Silt 15.0' E.O.B.		Stickup:2.49' 2 -inch diameter, stainless steel riser pipe 0' to 2.8' (585.4-582.6). 2-inch diameter, 10.4' long #10 slot size stainless steel screen 2.8' - 13.2' (582.6-572.2). Sandpack 1.8' to 15.0' (583.6 - 570.4). Bentonite seal 1.0' - 1.8' (584.4 - 583.6). Cement grout 0 - 1.0'. 5-foot long steel protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

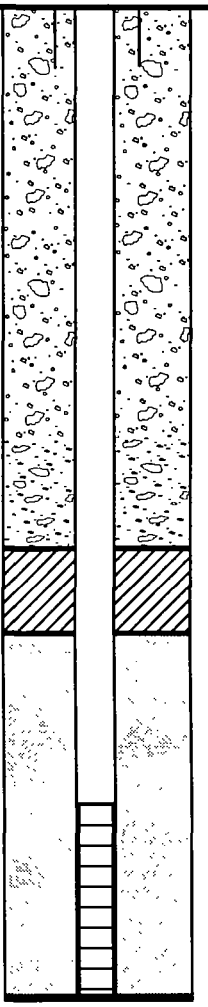
Project WCP RI/FS Phase I — Well No. MW-5D

Date Started 3/23/92

Date Completed 3/23/92 — Riser Pipe Elevation 588.47[1]

Field Inspector J. Fox (BEC)

Crew Chief B. Loveland(WTD) — Ground Surface Elevation 585.7

BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Borehole advanced from 0' to 26.0' (585.4-559.7) using 6 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water. Well screen and riser pipe placed in borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface.	Fine Sand Fill 5.0' Fine Sand 7.0' Fine to Medium Sand with Gravel 12.0' Fine Sand with a Trace of Silt 22.0' Fine to Medium Sand 25.5' Gravel 25.7' Silt 26.0' E.O.B.		Stickup:2.77' 2-inch diameter, stainless steel riser pipe 0' to 21.0' (585.7-571.7). 2-inch diameter, 5' long, #10 slot size stainless steel screen, flush threaded 21.0'-26.0' (564.7 - 559.7) Sandpack 16.0' - 26.0' (569.7' - 559.7). Bentonite seal 14.0' - 16.0' (571.7' -569.7') Cement grout 0 - 14.0' (585.7' - 571.7') 5-foot long steel protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

Sheet 1 of 1

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

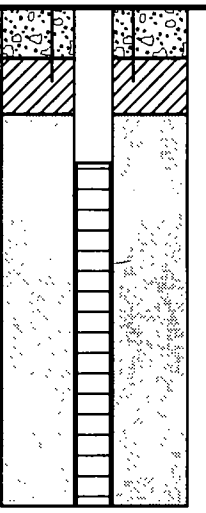
Project WCP RI/FS Phase I — Well No. MW-6S

Date Started 3/25/92

Date Completed 3/25/92 — Riser Pipe Elevation 588.45[1]

Field Inspector T. Wright-Wells (BEC)

Crew Chief P. Dickinson(WTD) — Ground Surface Elevation 585.7

BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Borehole advanced from 0' to 13.5' (585.7 - 572.2) using 6 1/4-inch I.D. hollow stem auger. Inside of auger flushed potable water. Well screen and riser pipe placed in borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface.	Fine to Medium Sand Fill 7.5' Fine to Medium Sand 13.5' E.O.B.		Stickup: 2.75 2 -inch diameter, stainless steel riser pipe 0' to 3.5' (585.7 - 582.2). 2-inch diameter, 10' long, #10 slot size stainless steel screen 3.5-13.5' (582.2-572.2) Sandpack 2.5 - 13.5' (583.2 - 572.2) Bentonite seal 1.0-2.5' (584.7 - 583.2) Cement grout 0 - 1.0' (585.7 - 584.7) 5- foot long protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

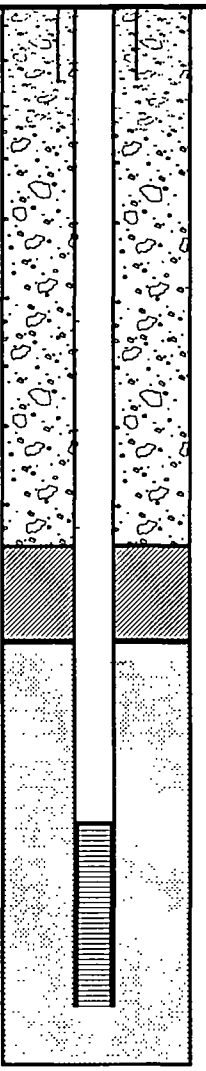
Project WCP RI/FS Phase I — Well No. MW-6D

Date Started 3/24/92

Date Completed 3/24/92 — Riser Pipe Elevation 588.51[1]

Field Inspector T. Wright-Wells (BEC)

Crew Chief B. Loveland (WTD) — Ground Surface Elevation 585.7

BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Borehole advanced from 0' to 27.5' (585.7 - 558.2) using 6 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water. Well screen and riser pipe placed in borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface.	Fine to Medium Sand Fill 7.5' Fine to Medium Sand 26.2' Gravel 26.5' Silt 27.5' E.O.B.		Stickup: 2.81 2-inch diameter, stainless steel riser pipe 0' to 21.5' (585.7 - 564.2). 2-inch diameter, 5' long, #10 slot size stainless steel screen, 21.5 - 26.5' (564.2-559.2) Sandpack 16.5 - 26.5' (569.2- 559.2) Bentonite seal 14.5 - 16.5' (571.2-569.2) Cement grout 0 - 14.5' (585.7 - 571.2) 5-foot long protective casing with locking cap. Three protective posts installed.

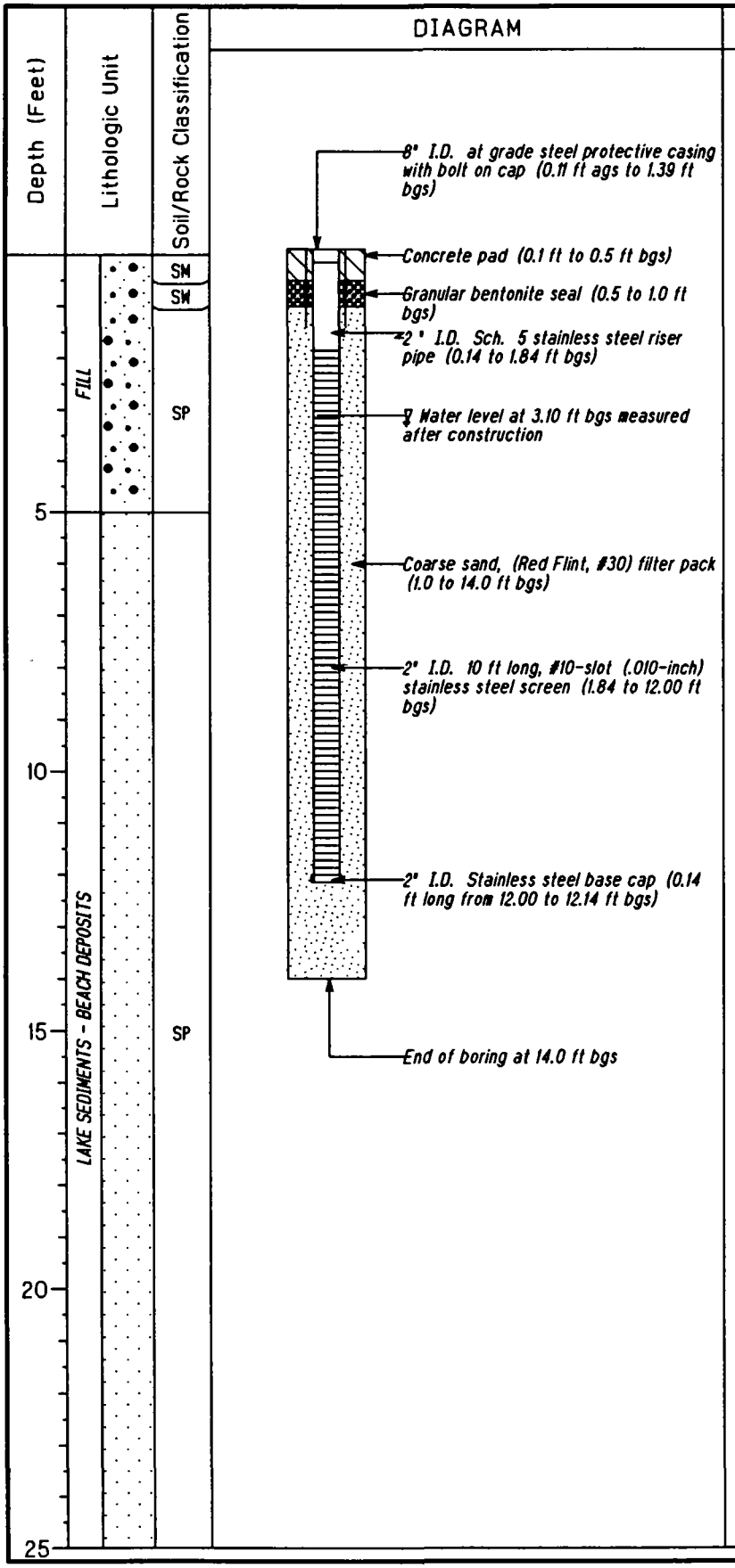
Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

Sheet 1 of 1

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 3/19/92
DATE COMPLETED: 3/19/92
FIELD INSPECTOR: S. Marshik (Barr)
CREW CHIEF: P. Dickenson (WTD)

WELL NUMBER: MW-04S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-04D
RISER PIPE ELEVATION: 586.16 ft MSL
GROUND SURFACE ELEVATION: 586.3 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger producing a 10¼" (I.D.) borehole. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7080). Please refer to the Boring Log SB-04D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

This monitoring well was converted from an above grade monitoring well to a flush mounted monitoring well. During the conversion, the protective casing and protective posts were removed, 2.9 ft of riser pipe was cut off, a flush mount protective casing was installed, and the well was re-developed. Please refer to the Well Log MW-4S in the Phase I Tech Memo for preconversion details.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.39 ft bgs with a 2x2x2 ft concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 1309 gallons had been removed at an average pumping rate of 5 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 241 gallons were removed from the well at an average pumping rate of 4.3 gpm.

The total volume pumped from the well during development was 1550 gallons.

NOTE:

ags = above ground surface

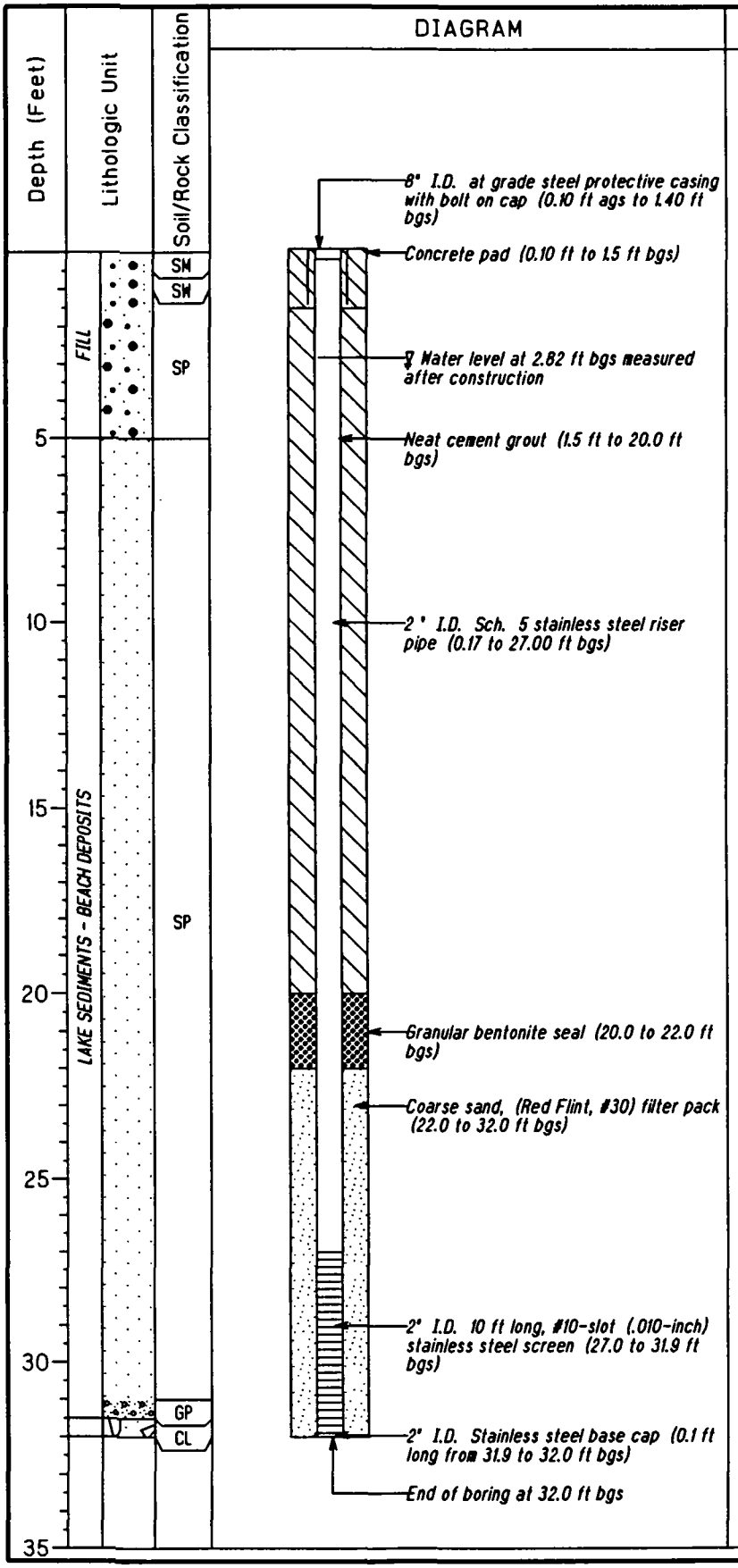
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 3/20/92
DATE COMPLETED: 3/20/92
FIELD INSPECTOR: T. Wright-Wells (Barr)
CREW CHIEF: P. Dickenson (WTD)

WELL NUMBER: MW-04D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-04D
RISER PIPE ELEVATION: 585.93 ft MSL
GROUND SURFACE ELEVATION: 586.1 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger producing a 10¼" (I.D.) borehole. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-04D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

This monitoring well was converted from an above grade monitoring well to a flush mounted monitoring well. During the conversion, the protective casing and protective posts were removed, 2.9 ft of riser pipe was cut off, a flush mount protective casing was installed, and the well was re-developed. Please refer to the Well Log MW-4D in the Phase I Tech Memo for preconversion details.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.40 ft bgs with a 2x2x2 ft concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging and pumping. The surge block was a bailer attached to the end of a suction hose. A centrifugal pump was used to remove the sediment produced by surging, and the well was surged over the entire screen length. This method allowed the well screen to be surged and pumped simultaneously.

After 1000 gallons had been removed at an average pumping rate of 5 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 1000 gallons were removed from the well at an average pumping rate of 7.5 gpm.

The total volume pumped from the well during development was 2000 gallons.

NOTE:

ags = above ground surface

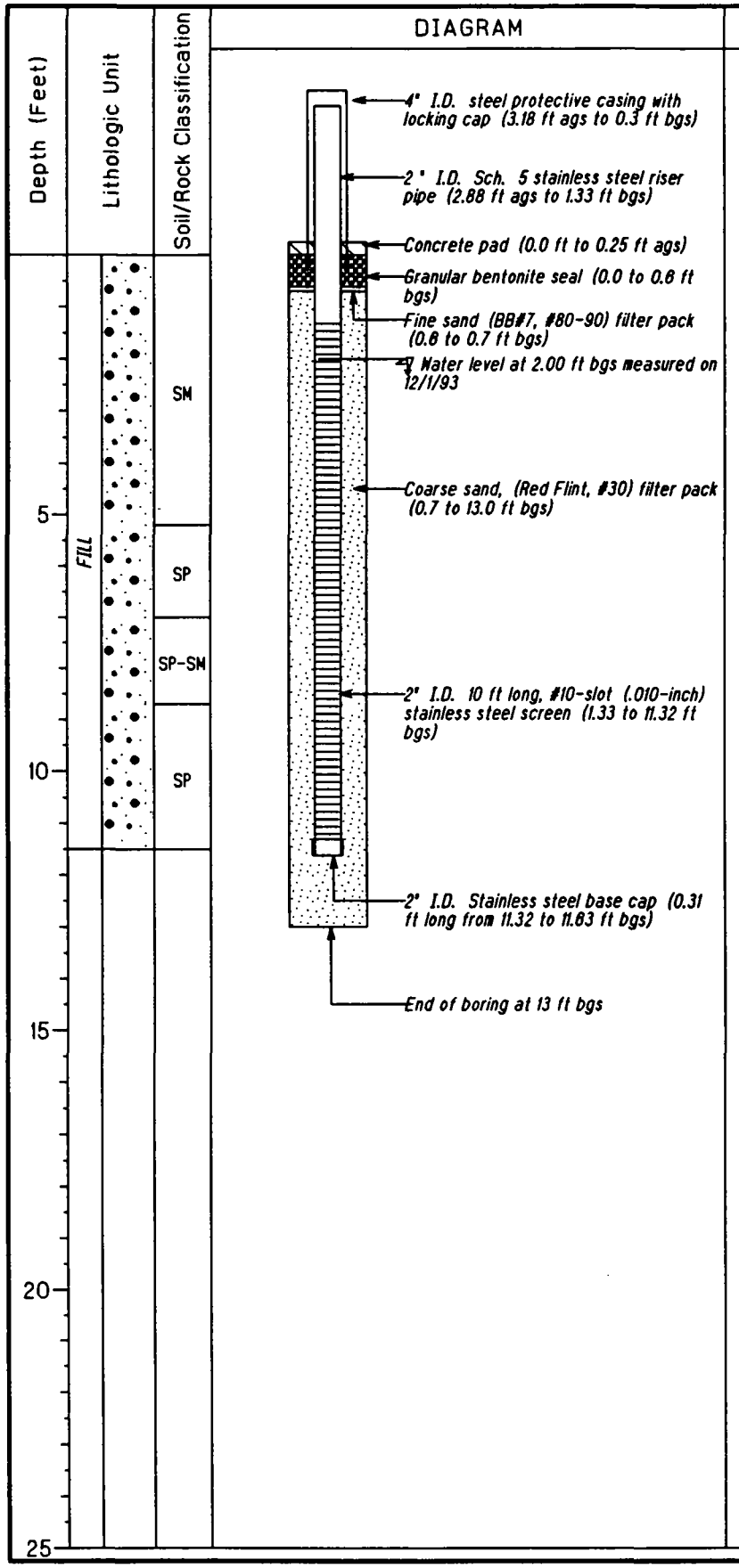
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/1/93
DATE COMPLETED: 9/1/93
FIELD INSPECTOR: K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

WELL NUMBER: MW-07S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-07S
RISER PIPE ELEVATION: 587.78 ft MSL
GROUND SURFACE ELEVATION: 584.9 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-07S for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 13 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 14.51 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 3.5 ft long, 4" diameter, schedule 40, steel protective casing with a locking cap was installed to 0.3 ft bgs with a 2x2x0.25 ft concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging and pumping. The surge block was a bailer attached to the end of a suction hose. A centrifugal pump was used to remove the sediment produced by surging, and the well was surged over the entire screen length. This method allowed the well screen to be surged and pumped simultaneously.

After 1000 gallons had been removed at an average pumping rate of 12 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 500 gallons were removed from the well at an average pumping rate of 7 gpm.

The total volume pumped from the well during development was 1500 gallons.

NOTE:

ags = above ground surface

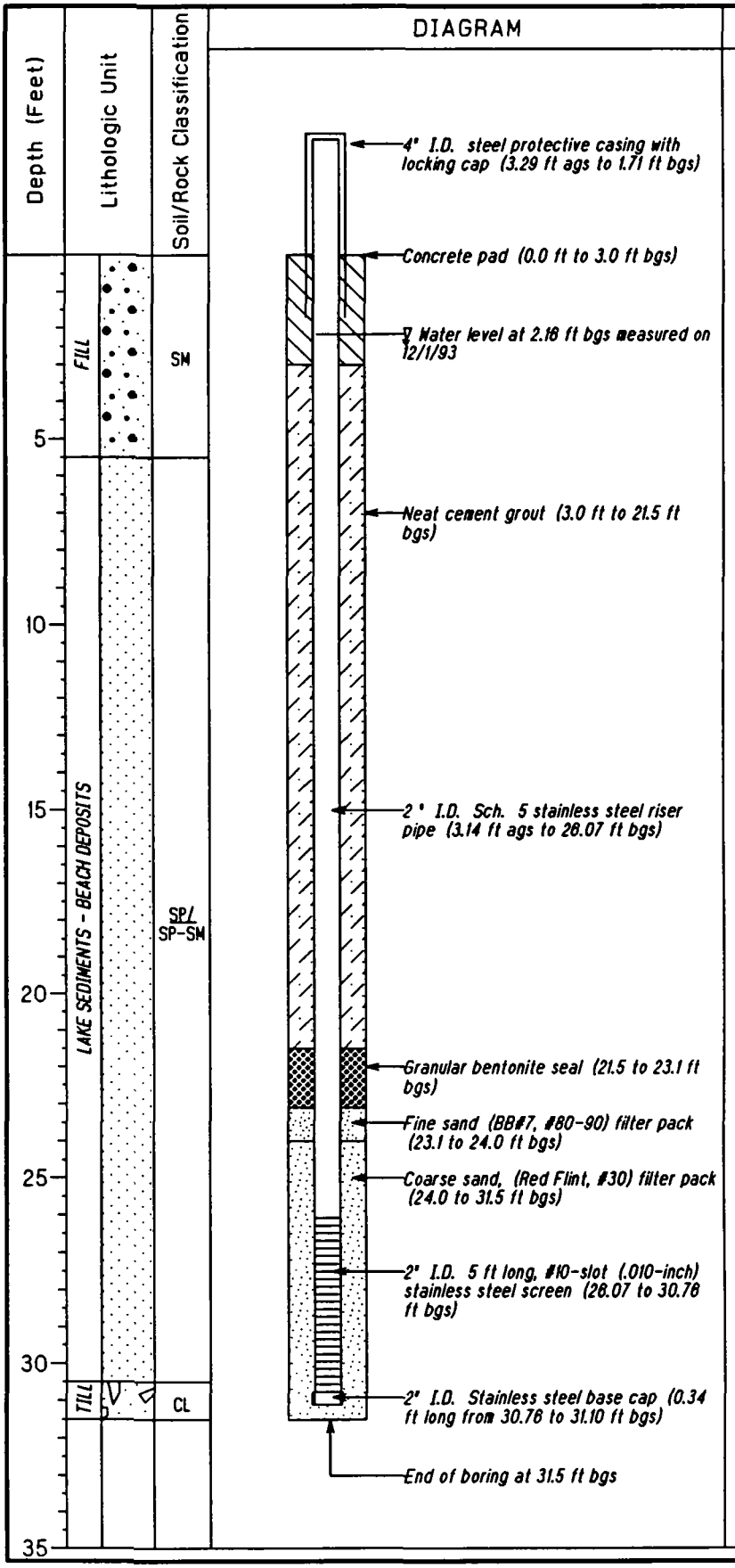
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/30/93
DATE COMPLETED: 8/30/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: MW-07D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-07D
RISER PIPE ELEVATION: 588.14 ft MSL
GROUND SURFACE ELEVATION: 585.0 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-07D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 31.5 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 34.24 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe untill the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 5.0 ft long, 4" diameter, schedule 40, steel protective casing with a locking cap was installed to 1.71 ft bgs with a concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging and pumping. The surge block was a bailer attached to the end of a suction hose. A centrifugal pump was used to remove the sediment produced by surging, and the well was surged over the entire screen length. This method allowed the well screen to be surged and pumped simultaneously.

After 1000 gallons had been removed at an average pumping rate of 12.5 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 1000 gallons were removed from the well at an average pumping rate of 5 gpm.

The total volume pumped from the well during development was 2000 gallons.

NOTE:

ags = above ground surface

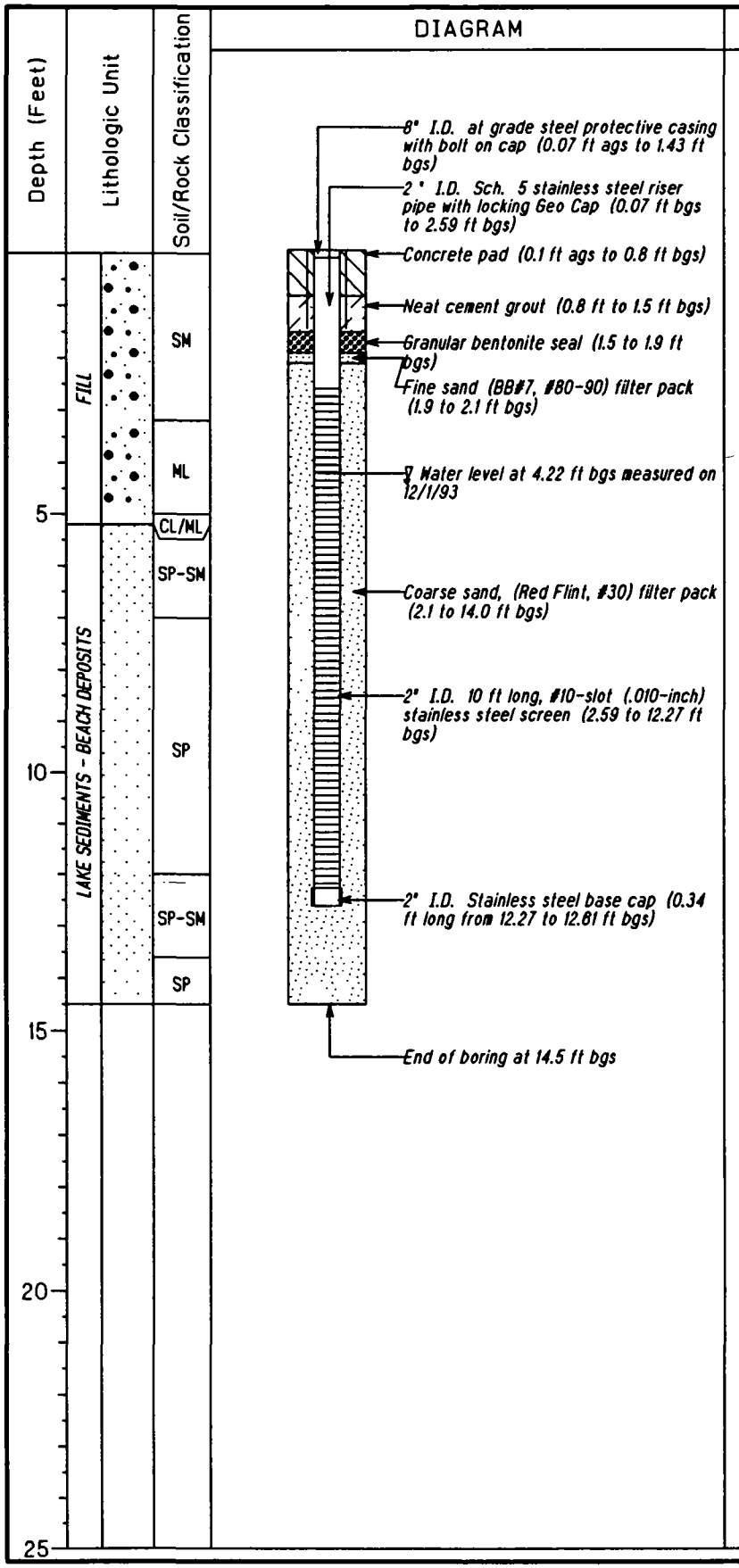
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/30/93
DATE COMPLETED: 8/30/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

WELL NUMBER: MW-08S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-08S
RISER PIPE ELEVATION: 586.43 ft MSL
GROUND SURFACE ELEVATION: 586.5 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-08S for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 14.5 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 12.54 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) granular bentonite (Baroid Drilling Fluids) and neat cement grout were placed around the well as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.4 ft bgs with a 2x2x0.8 ft concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 1600 gallons had been removed at an average pumping rate of 12 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 400 gallons were removed from the well at an average pumping rate of 5 gpm.

The total volume pumped from the well during development was 2000 gallons.

NOTE:

ags = above ground surface

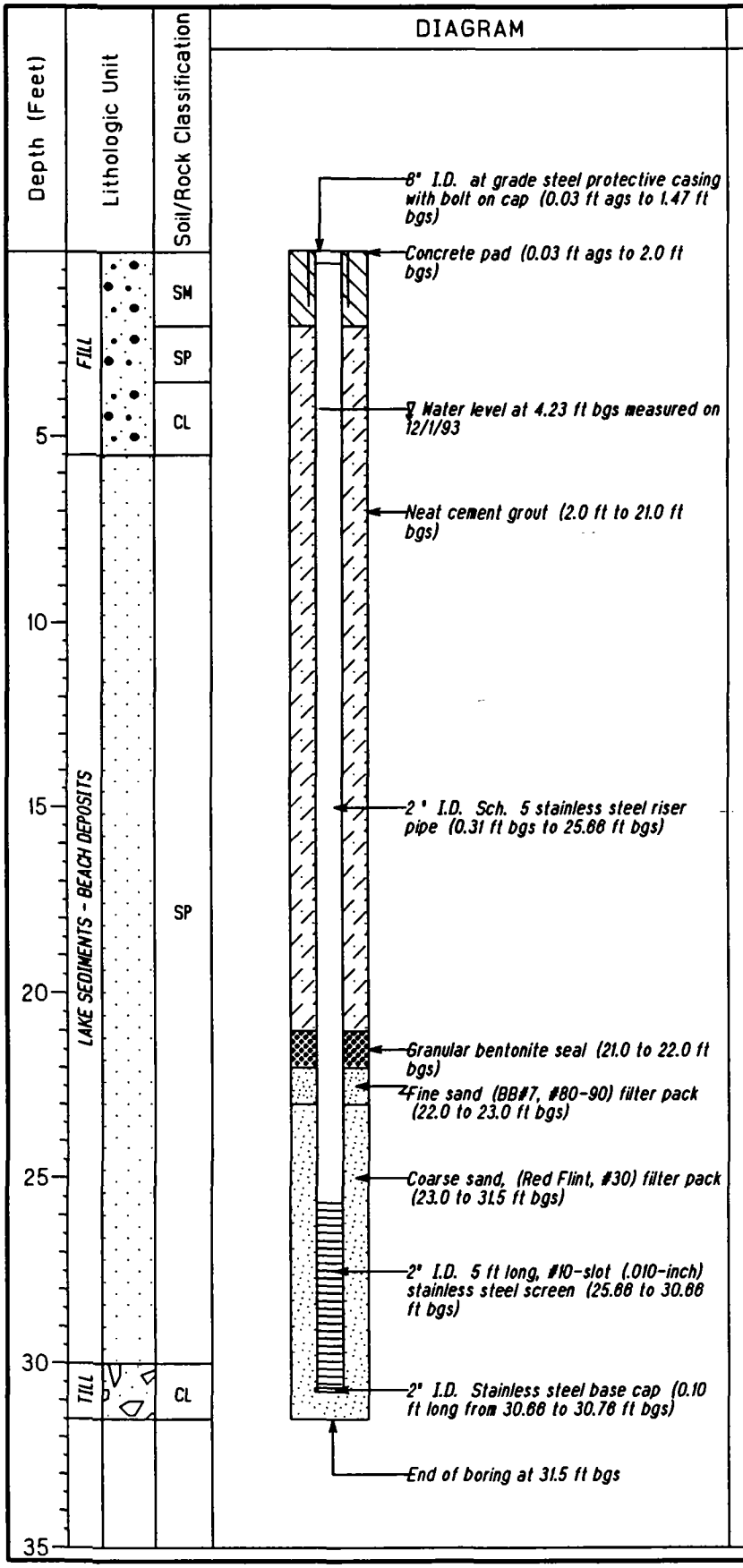
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 8/26/93
DATE COMPLETED: 8/27/93
FIELD INSPECTOR: J. de Beer (BARR)
CREW CHIEF: M. Meuller (WTD)

WELL NUMBER: MW-08D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-08D
RISER PIPE ELEVATION: 586.09 ft MSL
GROUND SURFACE ELEVATION: 586.4 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-08D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 31.5 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 30.45 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe untill the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.47 ft bgs with a 2x2x2 ft concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 2265 gallons had been removed at an average pumping rate of 5 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 630 gallons were removed from the well at an average pumping rate of 4 gpm.

The total volume pumped from the well during development was 2895 gallons.

NOTE:

ags = above ground surface

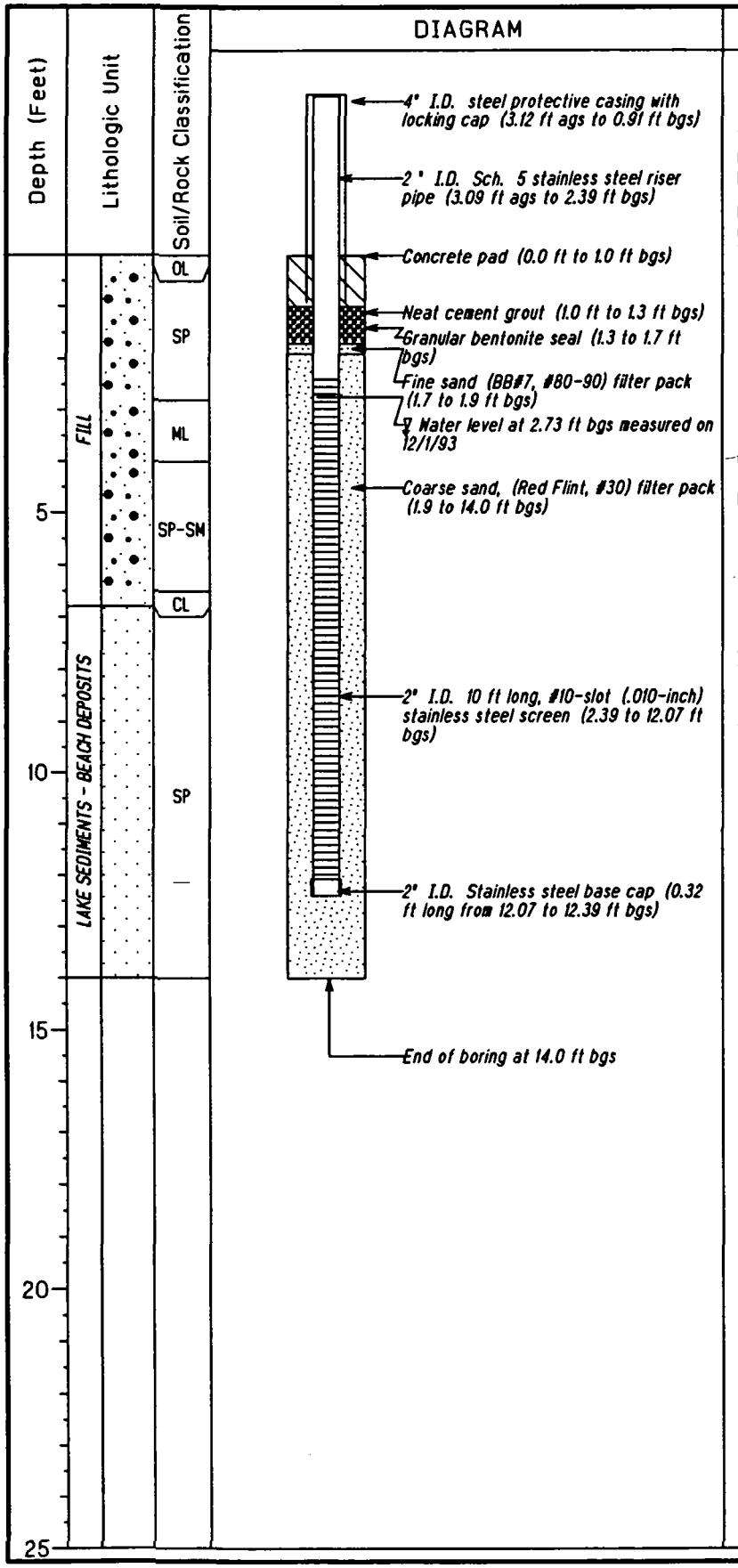
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/27/93
DATE COMPLETED: 8/27/93
FIELD INSPECTOR: K. French / R. Van Allen (Barr)
CREW CHIEF: B. Loveland (WTD)

WELL NUMBER: MW-09S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-09S
RISER PIPE ELEVATION: 588.49 ft MSL
GROUND SURFACE ELEVATION: 585.4 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-09S for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 14 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 15.48 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 4.0 ft long, 4" diameter, schedule 40, steel protective casing with a locking cap was installed to 0.91 ft bgs with a concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 850 gallons had been removed at an average pumping rate of 12 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 450 gallons were removed from the well at an average pumping rate of 4 gpm.

The total volume pumped from the well during development was 1300 gallons.

NOTE:

ags = above ground surface

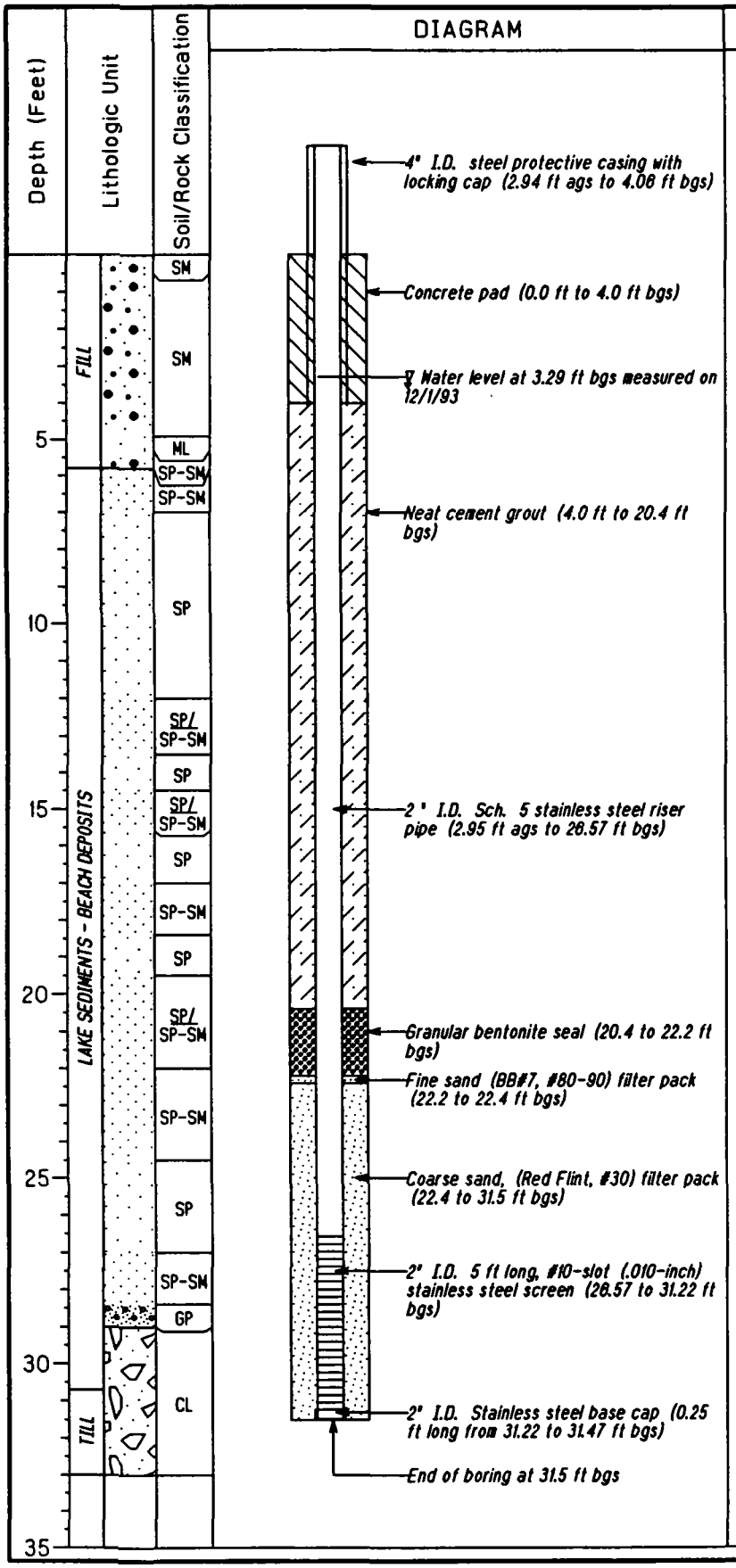
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/25/93
DATE COMPLETED: 8/26/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

WELL NUMBER: MW-09D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-09D
RISER PIPE ELEVATION: 588.65 ft MSL
GROUND SURFACE ELEVATION: 585.7 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to a Diedrich D50 truck mounted drill rig, producing a 10¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-09D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 31.5 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 34.42 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe until the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 7.0 ft long, 4" diameter, schedul 40, steel protective casing with a locking cap was installed to 4.06 ft bgs with a concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 2894 gallons had been removed at an average pumping rate of 7.5 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 800 gallons were removed from the well at an average pumping rate of 4 gpm.

The total volume pumped from the well during development was 3494 gallons.

NOTE:

ags = above ground surface

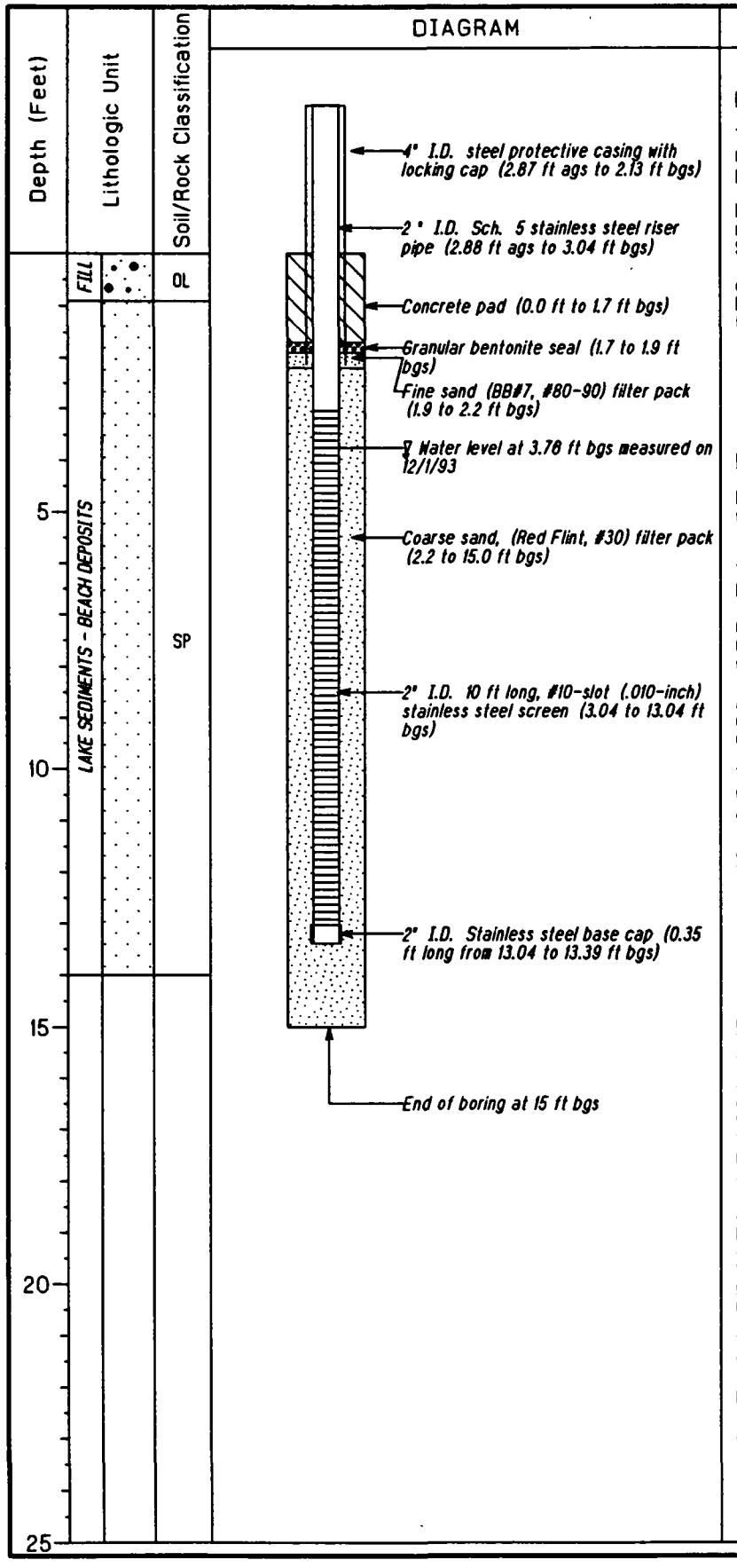
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/26/93
DATE COMPLETED: 8/27/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

WELL NUMBER: MW-10S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-10S
RISER PIPE ELEVATION: 588.58 ft MSL
GROUND SURFACE ELEVATION: 585.7 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 8¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-10S for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 15 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 16.27 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 5 ft long, 4" diameter, schedule 40, steel protective casing with a locking cap was installed to 2.13 ft bgs with a concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging and pumping. The surge block was a bailer attached to the end of a suction hose. A centrifugal pump was used to remove the sediment produced by surging, and the well was surged over the entire screen length. This method allowed the well screen to be surged and pumped simultaneously.

After 1000 gallons had been removed at an average pumping rate of 12 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 200 gallons were removed from the well at an average pumping rate of 7 gpm.

The total volume pumped from the well during development was 1200 gallons.

NOTE:

ags = above ground surface

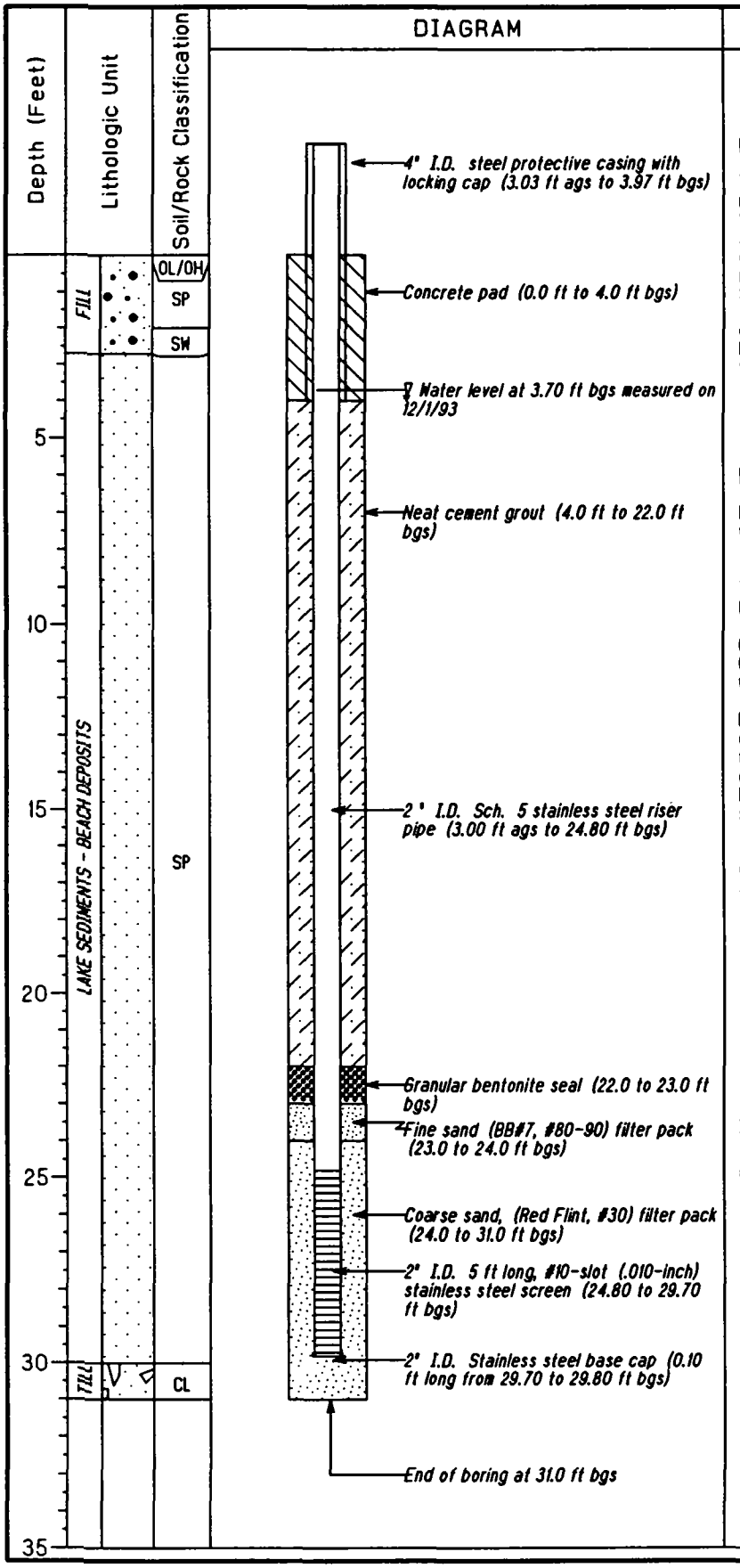
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 8/25/93
DATE COMPLETED: 8/25/93
FIELD INSPECTOR: J. de Beer (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: MW-10D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-10D
RISER PIPE ELEVATION: 588.60 ft MSL
GROUND SURFACE ELEVATION: 585.6 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2800) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-10D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 31.0 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 32.8 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe untill the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 7.0 ft long, 4" diameter, schedul 40, steel protective casing with a locking cap was installed to 3.97 ft bgs with a concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging and pumping. The surge block was a bailer attached to the end of a suction hose. A centrifugal pump was used to remove the sediment produced by surging, and the well was surged over the entire screen length. This method allowed the well screen to be surged and pumped simultaneously.

After 1500 gallons had been removed at an average pumping rate of 7.0 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 1000 gallons were removed from the well at an average pumping rate of 5 gpm.

The total volume pumped from the well during development was 2500 gallons.

NOTE:

ags = above ground surface

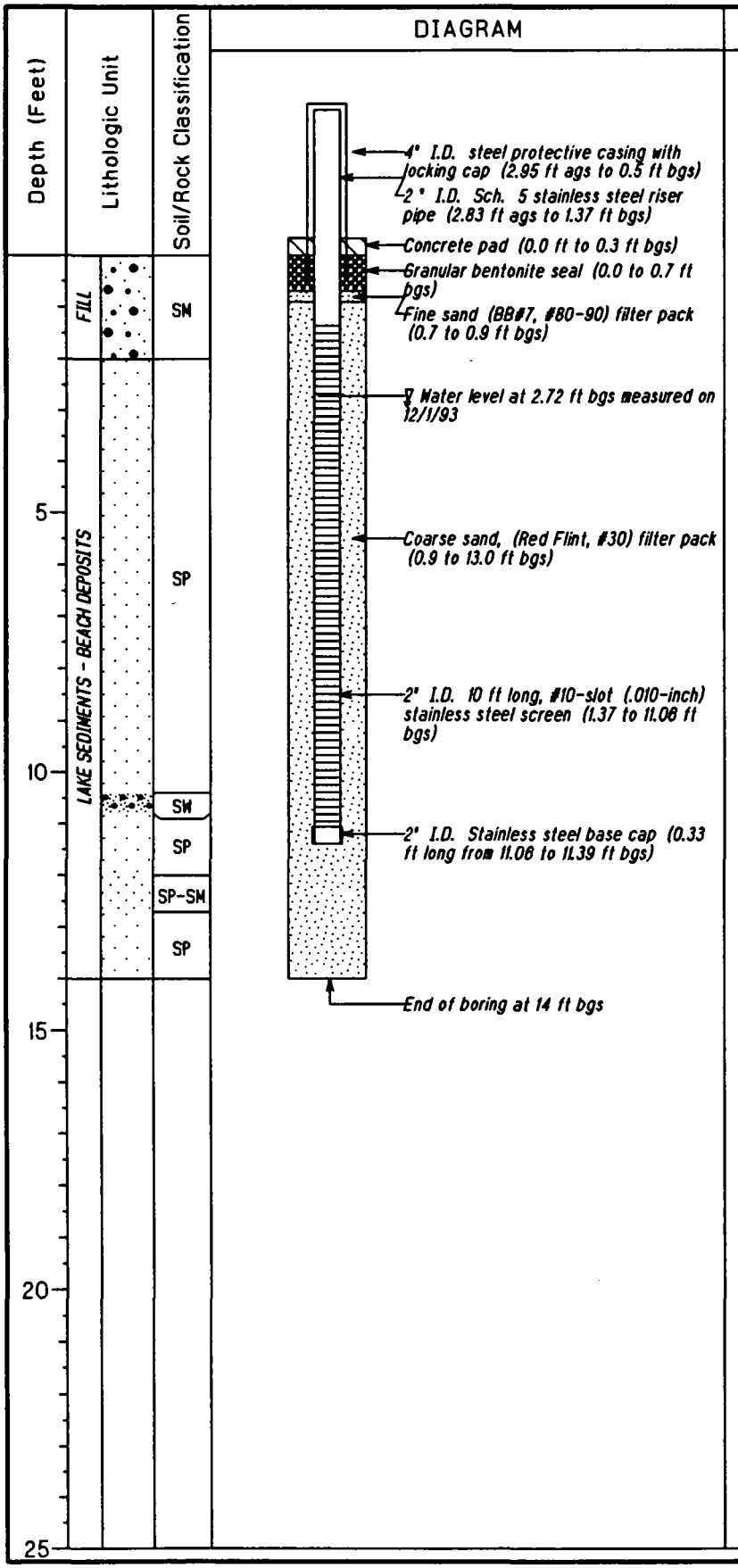
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/2/93
DATE COMPLETED: 9/2/93
FIELD INSPECTOR: K. French (Barr)
CREW CHIEF: B. Loveland (WTD)

WELL NUMBER: MW-11S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-11S
RISER PIPE ELEVATION: 587.83 ft MSL
GROUND SURFACE ELEVATION: 585.0 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-11S for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 14 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 14.22 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 3.4 ft long, 4" diameter, schedule 40, steel protective casing with a locking cap was installed to 0.5 ft bgs with a 2x2x.33 ft concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A Brainard-Kilman (BK) hand pump was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 220 gallons had been removed, a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 1007 gallons were removed from the well at an average pumping rate of 5.5 gpm.

The total volume pumped from the well during development was 1227 gallons.

NOTE:

ags = above ground surface

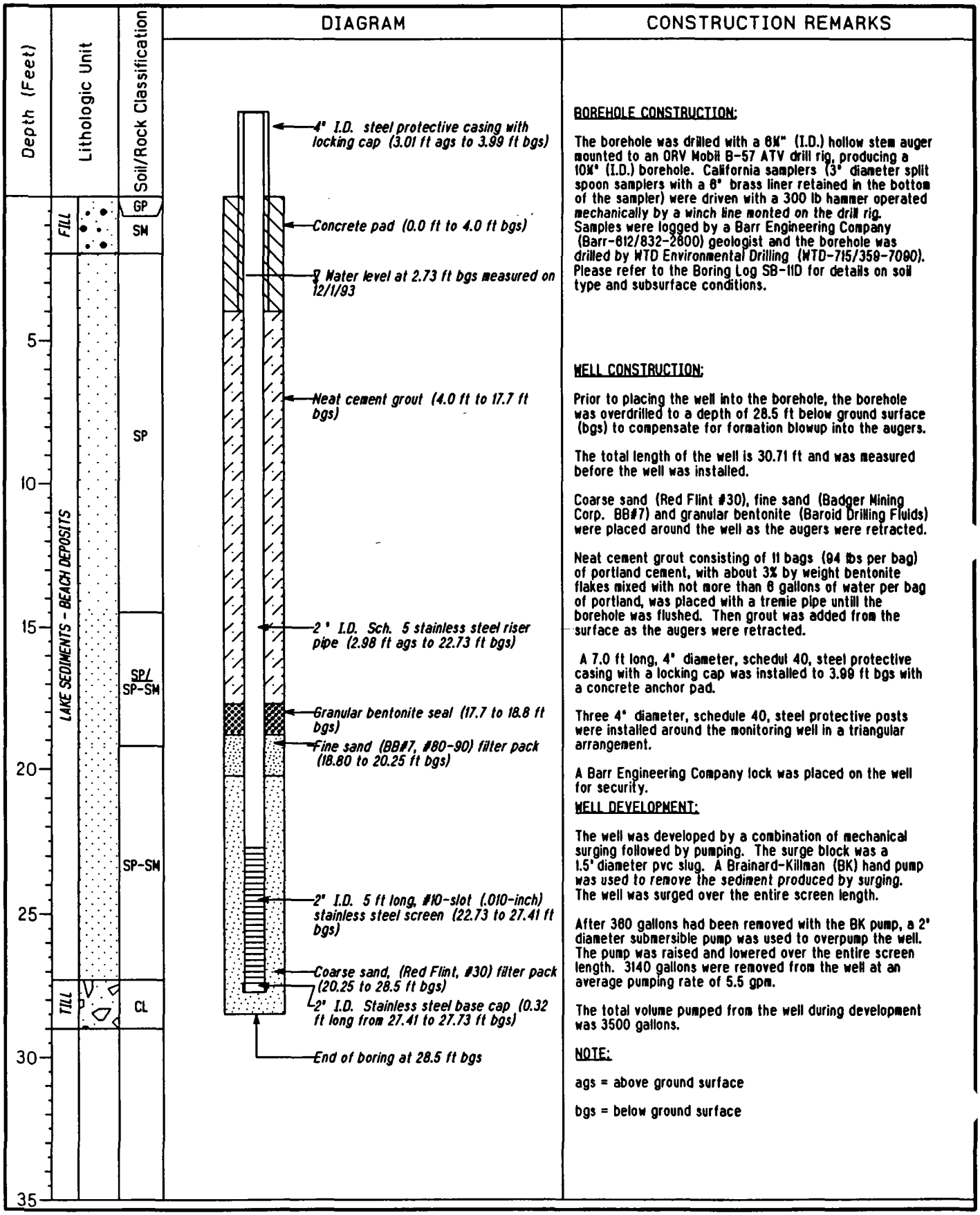
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/1/93
DATE COMPLETED: 9/1/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: MW-11D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-11D
RISER PIPE ELEVATION: 587.98 ft MSL
GROUND SURFACE ELEVATION: 585.0 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7080). Please refer to the Boring Log SB-11D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 28.5 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 30.71 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe untill the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 7.0 ft long, 4" diameter, schedul 40, steel protective casing with a locking cap was installed to 3.99 ft bgs with a concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5' diameter pvc slug. A Brainard-Killman (BK) hand pump was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 360 gallons had been removed with the BK pump, a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 3140 gallons were removed from the well at an average pumping rate of 5.5 gpm.

The total volume pumped from the well during development was 3500 gallons.

NOTE:

ags = above ground surface

bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/7/93
DATE COMPLETED: 9/7/93
FIELD INSPECTOR: J.deBeer/K.Laufenberg (Barr)
CREW CHIEF: M. Mueller (WTD)

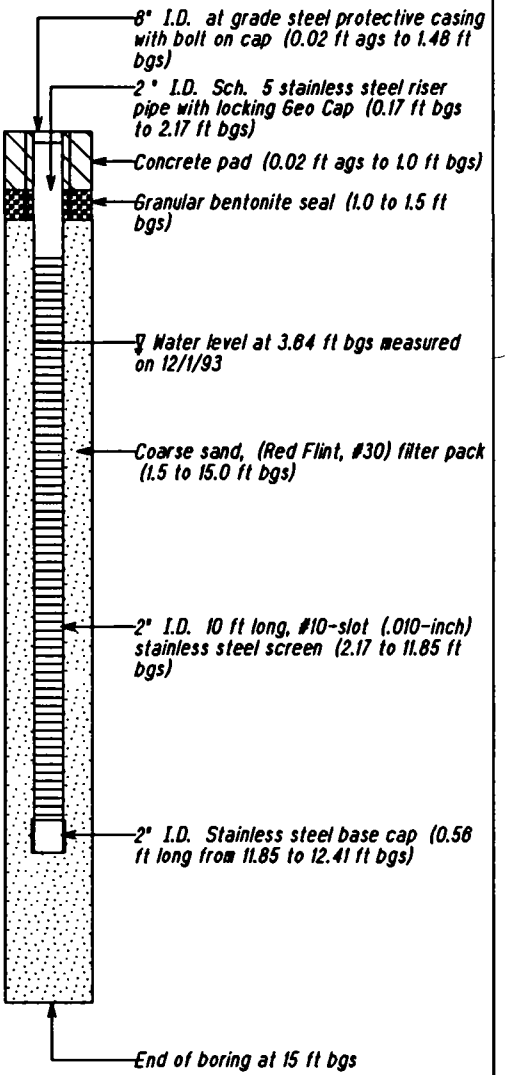
WELL NUMBER: MW-12S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-12S
RISER PIPE ELEVATION: 586.03 ft MSL
GROUND SURFACE ELEVATION: 586.2 ft MSL

Depth (Feet) | Lithologic Unit | Soil/Rock Classification

LAKE SEDIMENTS - BEACH DEPOSITS

SP

DIAGRAM



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-12S for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 15 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 12.24 ft and was measured before the well was installed.

Coarse sand (Red Flint #30) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.48 ft bgs with a 2 ft diameter concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump was used to remove the sediment produced by surging. The well was surged over the entire screen length.

1273 gallons was removed at a pumping rate of 8.6 gallons per minute (gpm) for 998 gallons, and 4.3 gpm for 275 gallons. A 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 300 gallons were removed from the well at an average pumping rate of 5 gpm.

The total volume pumped from the well during development was 1573 gallons.

NOTE:

ags = above ground surface

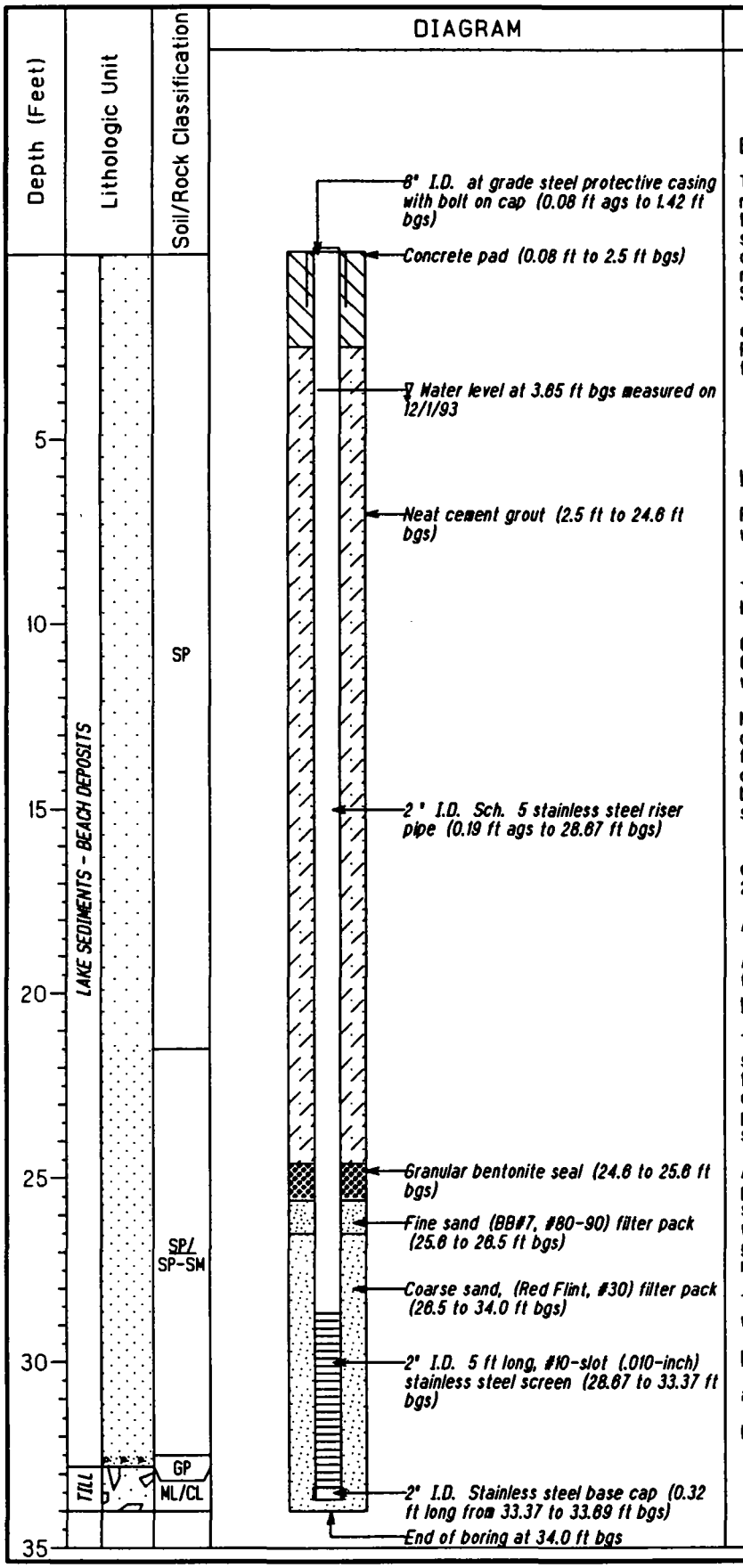
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/2/93
DATE COMPLETED: 9/2/93
FIELD INSPECTOR: J. Fox/K. Laufenberg (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: MW-12D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-12D
RISER PIPE ELEVATION: 586.01 ft MSL
GROUND SURFACE ELEVATION: 586.2 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-12D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 34.0 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 33.5 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe until the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.42 ft bgs with a 2 ft diameter concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 1998 gallons had been removed at an average pumping rate of 8.5 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 669 gallons were removed from the well at an average pumping rate of 6.5 gpm.

The total volume pumped from the well during development was 2667 gallons.

NOTE:

ags = above ground surface

bgs = below ground surface

WELLFM23 rev.11/16/93

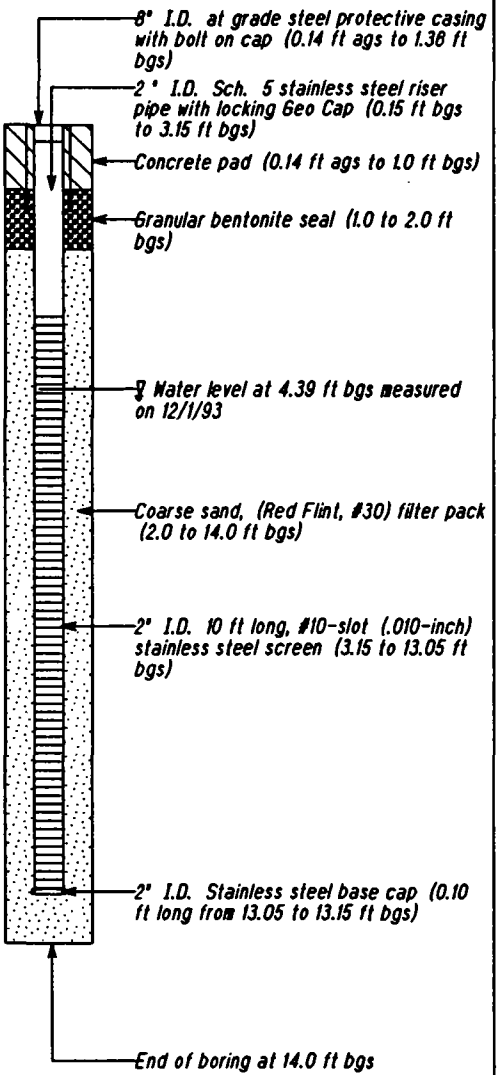
WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 9/13/93
DATE COMPLETED: 9/13/93
FIELD INSPECTOR: J. de Beer / S. Botts (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: MW-13S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-13S
RISER PIPE ELEVATION: 586.95 ft MSL
GROUND SURFACE ELEVATION: 587.1 ft MSL

Depth (Feet)	Lithologic Unit	Soil/Rock Classification
0–14	LAKE SEDIMENTS - BEACH DEPOSITS	SP

DIAGRAM



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-13S for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 14 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 13.0 ft and was measured before the well was installed.

Coarse sand (Red Flint #30) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.36 ft bgs with a 2 ft diameter concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging and pumping. The surge block was a bailer attached to the end of a suction hose. A centrifugal pump was used to remove the sediment produced by surging, and the well was surged over the entire screen length. This method allowed the well screen to be surged and pumped simultaneously.

1770 gallons was removed at a pumping rate of 15 gallons per minute (gpm). A 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 800 gallons were removed from the well at an average pumping rate of 5 gpm.

The total volume pumped from the well during development was 2570 gallons.

NOTE:

ags = above ground surface

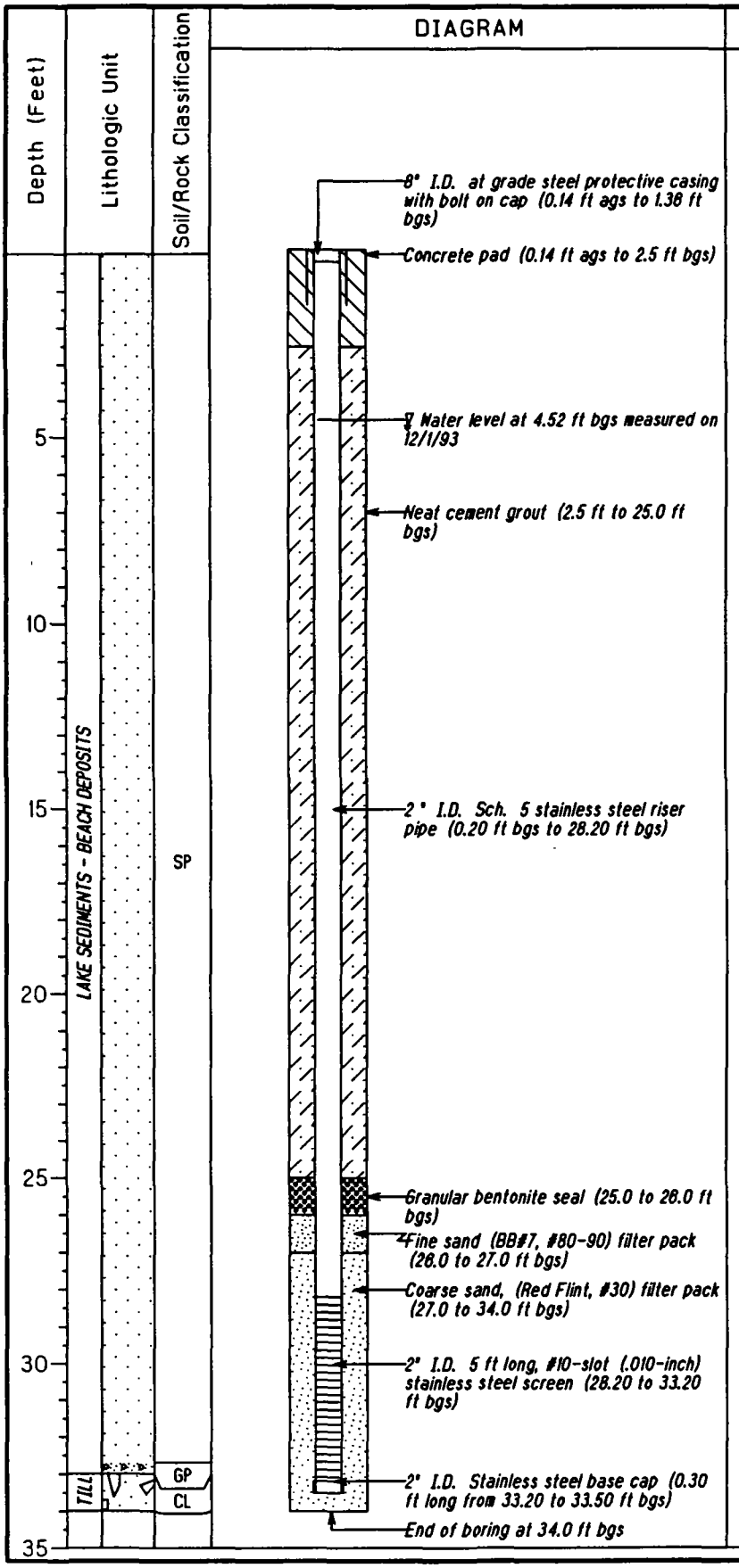
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/8/93
DATE COMPLETED: 9/8/93
FIELD INSPECTOR: J. de Beer (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: MW-13D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-13D
RISER PIPE ELEVATION: 586.90 ft MSL
GROUND SURFACE ELEVATION: 587.1 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-13D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 34.0 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 33.3 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7), and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe untill the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.36 ft bgs with a 2 ft diameter concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 2882 gallons had been removed at an average pumping rate of 8.5 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 279 gallons were removed from the well at an average pumping rate of 6.8 gpm.

The total volume pumped from the well during development was 3161 gallons.

NOTE:

ags = above ground surface

bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 9/13/93
DATE COMPLETED: 9/13/93
FIELD INSPECTOR: J. de Beer / S. Botts (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: MW-14S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-14S
RISER PIPE ELEVATION: 583.92 ft MSL
GROUND SURFACE ELEVATION: 584.1 ft MSL

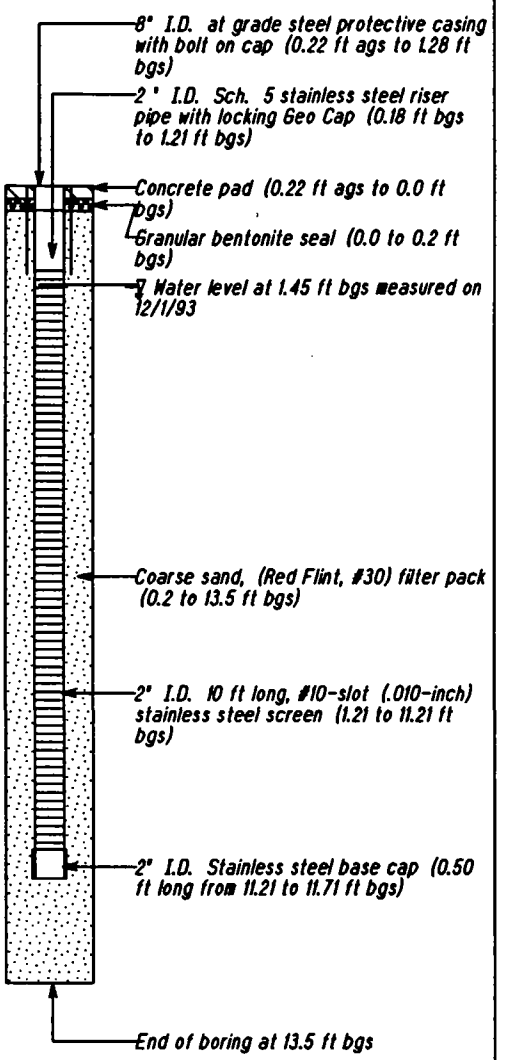
Depth (Feet) | Lithologic Unit | Soil/Rock Classification

LAKE SEDIMENTS - BEACH DEPOSITS

SP

5
10
15
20
25

DIAGRAM



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-14S for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 13.5 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 11.53 ft and was measured before the well was installed.

Coarse sand (Red Flint #30) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.28 ft bgs with a 2 ft diameter concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging and pumping. The surge block was a bailer attached to the end of a suction hose. A centrifugal pump was used to remove the sediment produced by surging, and the well was surged over the entire screen length. This method allowed the well screen to be surged and pumped simultaneously.

4080 gallons was removed at a pumping rate of 15 gallons per minute (gpm). A 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 212 gallons were removed from the well at an average pumping rate of 5 gpm.

The total volume pumped from the well during development was 4292 gallons.

NOTE:

ags = above ground surface

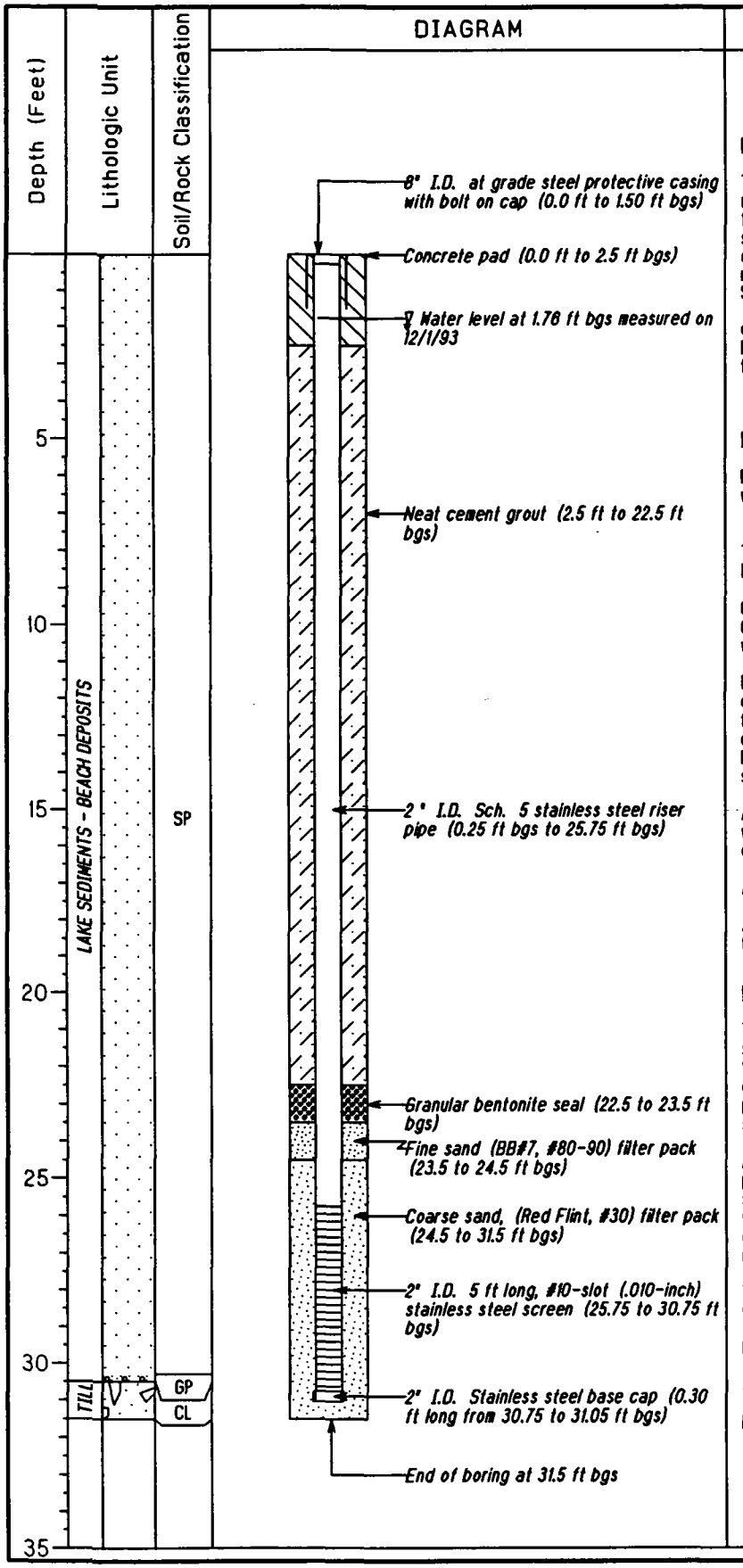
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/9/93
DATE COMPLETED: 9/9/93
FIELD INSPECTOR: J. de Beer / J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: MW-14D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-14D
RISER PIPE ELEVATION: 584.05 ft MSL
GROUND SURFACE ELEVATION: 584.3 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-14D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 31.5 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 30.8 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7), and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe untill the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.50 ft bgs with a 2 ft diameter concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 8010 gallons had been removed at an average pumping rate of 10 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 250 gallons were removed from the well at an average pumping rate of 2.0 gpm.

The total volume pumped from the well during development was 8260 gallons.

NOTE:

ags = above ground surface

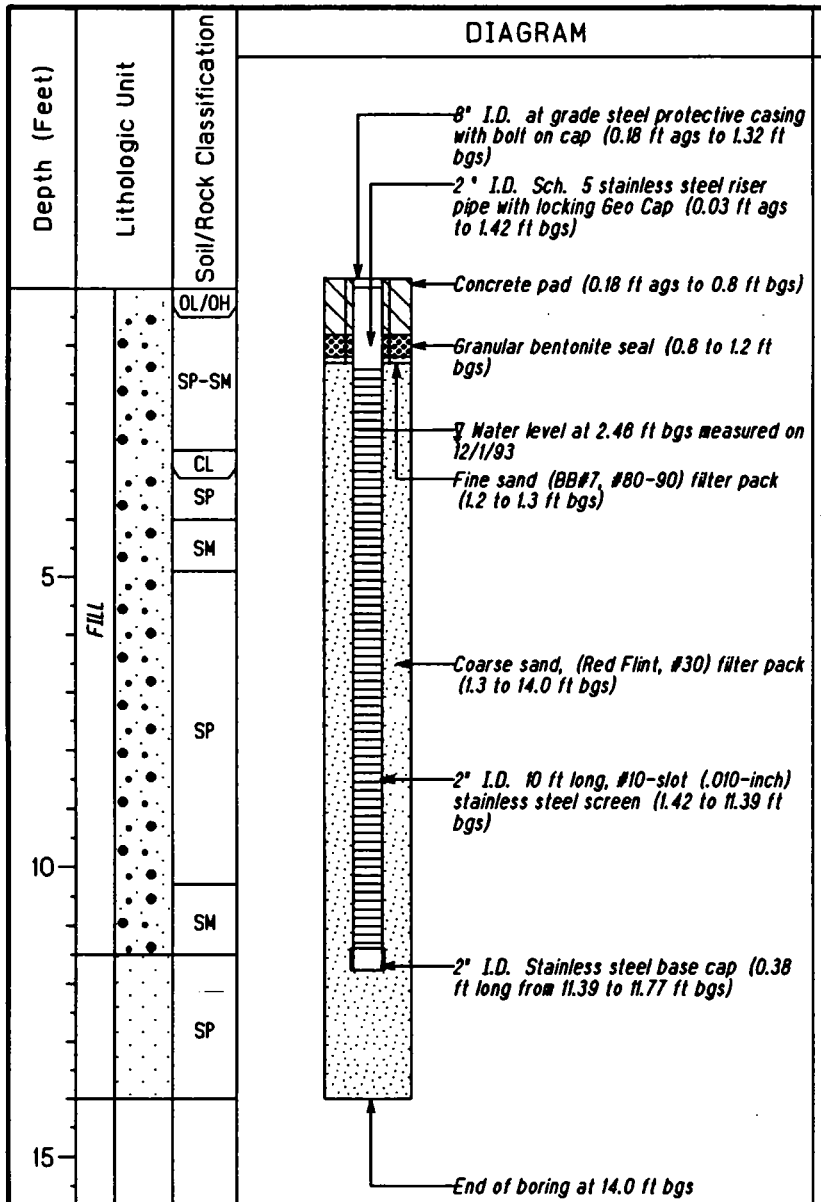
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/1/93
DATE COMPLETED: 9/1/93
FIELD INSPECTOR: K. French/K. Laufenberg (Barr)
CREW CHIEF: B. Loveland (WTD)

WELL NUMBER: MW-15S
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-15S
RISER PIPE ELEVATION: 585.33 ft MSL
GROUND SURFACE ELEVATION: 585.3 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to a D50 Diedrich truck mounted drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-15S for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 14.0 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 11.8 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.32 ft bgs with a 2 ft diameter concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

2210 gallons was removed at a pumping rate of 13 gallons per minute (gpm). A 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 285 gallons were removed from the well at an average pumping rate of 3 gpm.

The total volume pumped from the well during development was 2495 gallons.

NOTE:

ags = above ground surface

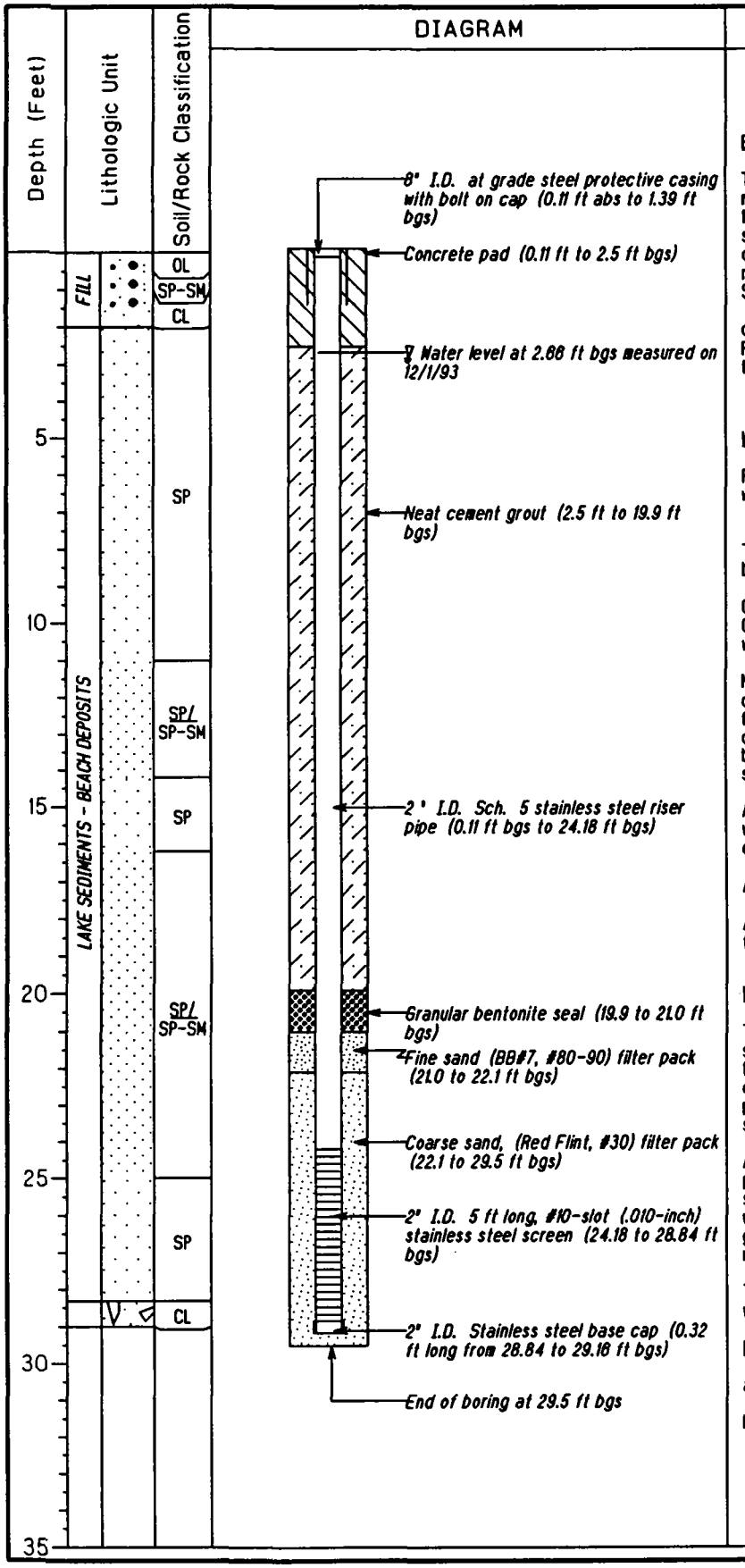
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 8/31/93
DATE COMPLETED: 8/31/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: MW-15D
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: SB-15D
RISER PIPE ELEVATION: 585.39 ft MSL
GROUND SURFACE ELEVATION: 585.5 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 8¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log SB-15D for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 29.5 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 28.05 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7), and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe untill the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.39 ft bgs with a 2 ft diameter concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 2350 gallons had been removed at an average pumping rate of 8.0 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 829 gallons were removed from the well at an average pumping rate of 3.8 gpm.

The total volume pumped from the well during development was 3179 gallons.

NOTE:

ags = above ground surface

bgs = below ground surface

WELLFM23 rev.11/16/93

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

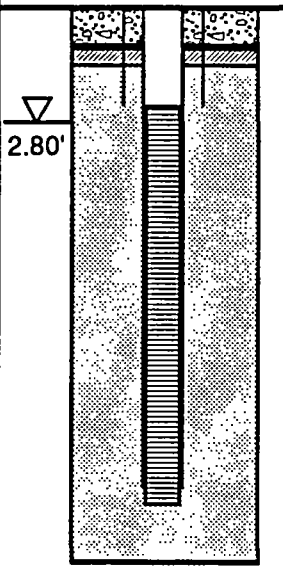
Project WCP RI/FS Phase I — Well No. P-101

Date Started 3/9/92

Date Completed 3/9/92 — Riser Pipe Elevation 588.14[1]

Field Inspector K. French (BEC)

Crew Chief P. Dickinson (WTD) — Ground Surface Elevation 585.0

BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Hollow stem auger method. Borehole advanced from 0' to 14.0' (585.0-571.0) using 3 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water. Well screen and riser pipe placed in the borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface. Water level was 5.94' below the top of the riser on 3/9/92 (582.2).	Silty Sand Fill 1.0' Fine to Medium Sand 14.0' E.O.B.		Stickup: 3.14' 1 1/4 -inch diameter, Schedule 40 PVC riser pipe 0' to 2.1' (585.0-582.9). 10.0 foot long, 1 1/4-inch diameter #10 slot size, Schedule 40 PVC screen 2.1- 12.1' (582.9-572.9) Sandpack 1.5' to 14.0' (583.5 - 571.0) Bentonite seal 1.0' to 1.5' (584.0- 583.5) Cement grout 0' to 1.0' (585.0-584.0) 5-foot long steel protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

Project WCP RI/FS Phase I — Well No. P-102

Date Started 3/12/92

Date Completed 3/12/92 — Riser Pipe Elevation 588.52[1]

Field Inspector K. French (BEC)

Crew Chief P. Dickinson (WTD) — Ground Surface Elevation 585.6

BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Hollow stem auger method. Borehole advanced from 0' to 14.0' (585.6-571.6)using 3 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water. Well screen and riser pipe placed in the borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface. Water level was 5.52' below the top of the riser on 3/13/92 (583.0).	Medium to Coarse Sand Fill 2.0' Fine to Medium Sand 14.0' E.O.B.	2.60'	Stickup: 2.92' 1 1/4 -inch diameter, Schedule 40 PVC riser pipe 0' to 2.2' (585.6-583.4). 9.96 foot long, 1 1/4-inch diameter Schedule 40 PVC #10 slot size screen 2.2-12.2' (583.4-573.4) Sandpack 1.5' to 14.0' (584.1- 571.6) Bentonite seal 1.0' to 1.5' (584.6- 584.1) Cement grout 0' to 1.0' (585.6-584.6) 5-foot long steel protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

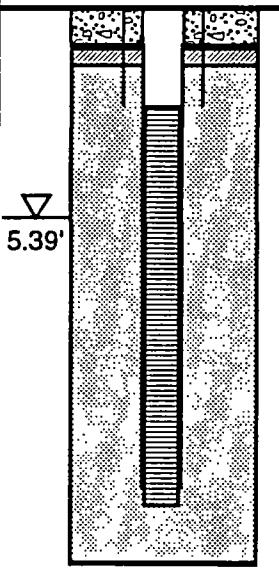
Project WCP RI/FS Phase I — Well No. P-103

Date Started 3/12/92

Date Completed 3/13/92 — Riser Pipe Elevation 589.44[1]

Field Inspector K. French (BEC)

Crew Chief P. Dickinson (WTD) — Ground Surface Elevation 586.4

BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Hollow stem auger method. Borehole advanced from 0' to 14.5' (586.4-571.9)using 3 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water. Well screen and riser pipe placed in the borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface. Water level was 5.39' below surface (581.01) on 3-13-92.	Fine to Medium Sand Fill 1.0' Fine to Medium Sand 14.0' E.O.B.		Stickup:3.04' 1 1/4 -inch diameter, Schedule 40PVC riser pipe 0' to 2.5' (586.4-583.9). 9.95 foot long, 1 1/4-inch diameter Schedule 40 PVC #10 slot size screen 2.5 - 12.5 (583.9-573.9) Sandpack 1.5' to 14.5' (584.9 - 571.9) Bentonite seal 1.0' to 1.5' (585.4 - 584.9) Cement grout 0' to 1.0' (586.4-585.4) 5-foot long steel protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL LOG

BARR ENGINEERING CO.
Minneapolis, Minnesota

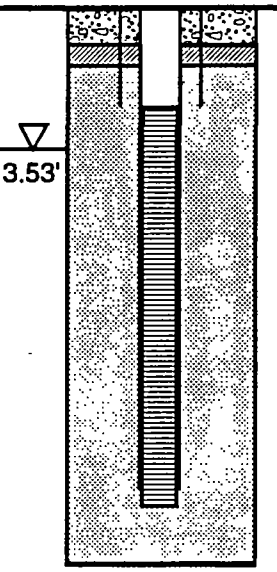
Project WCP RI/FS Phase I — Well No. P-104

Date Started 3/12/92

Date Completed 3/12/92 — Riser Pipe Elevation 589.07[1]

Field Inspector K. French (BEC)

Crew Chief P. Dickinson (WTD) — Ground Surface Elevation 586.0

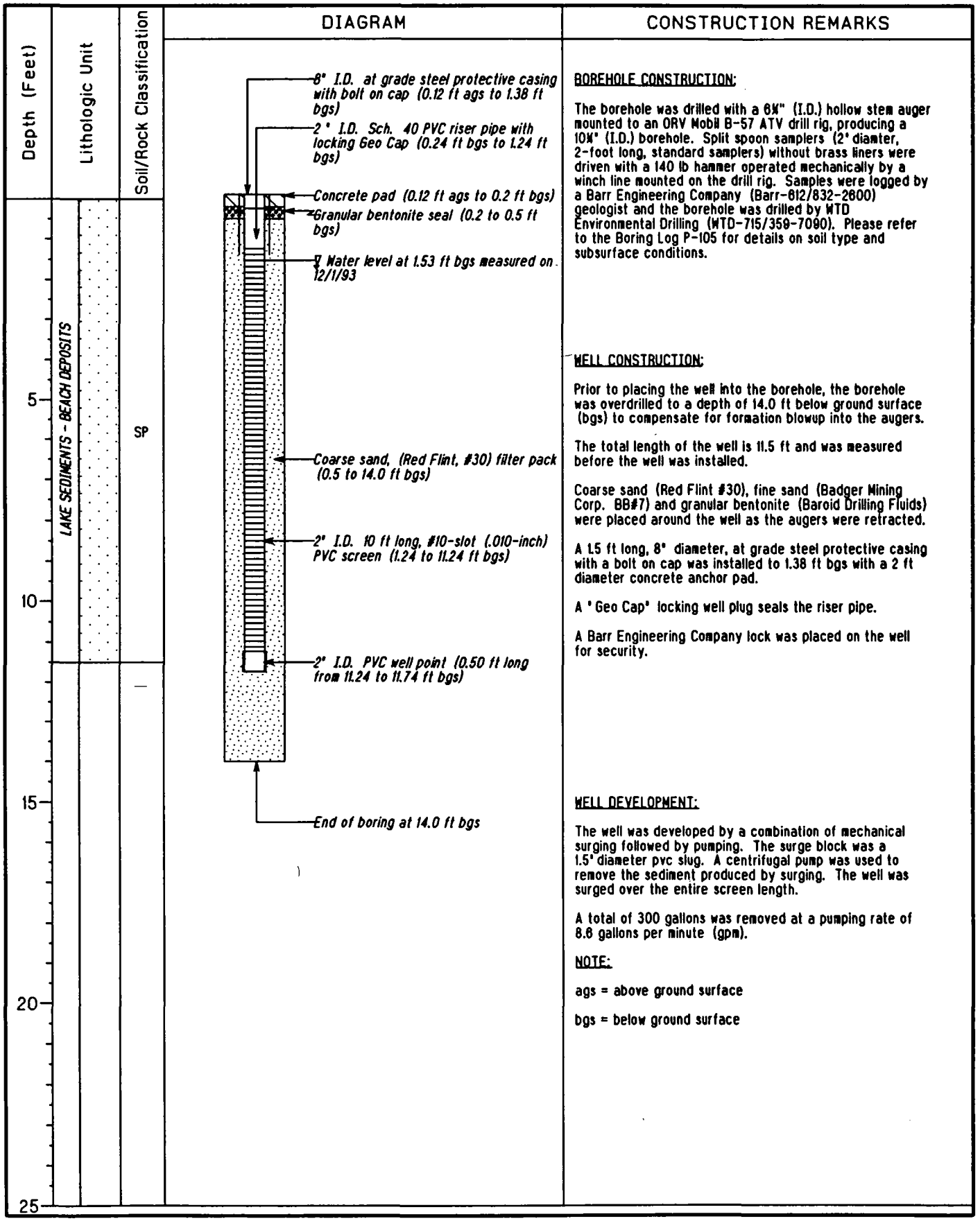
BOREHOLE CONSTRUCTION NOTES	LITHOLOGY	WELL CONSTRUCTION	WELL CONSTRUCTION NOTES
Hollow stem auger method. Borehole advanced from 0' to 14.0' (586.0-572.0)using 3 1/4-inch I.D. hollow stem auger. Inside of auger flushed with potable water. Well screen and riser pipe placed in the borehole. Sand pack and then bentonite pellets placed as auger retracted. Neat cement grout to surface. Water level was 3.5' below surface (582.5) on 3-13-92.	Poorly Graded Sand Fill 2.5' Fine to Medium Sand 14.0' E.O.B.	 	Stickup: 3.07' 1 1/4 -inch diameter, Schedule 40 PVC riser pipe 0' to 2.5' (586.0-583.5). 9.95 foot long, 1 1/4-inch diameter Schedule 40 PVC #10 slot size screen 2.1-12.0' (583.9-574.0) Sandpack 1.5' to 14.5' (584.5- 571.5) Bentonite seal 1.0' to 1.5' (585.0-584.5) Cement grout 0' to 1.0' (586.0-585.0) 5-foot long steel protective casing with locking cap. Three protective posts installed.

Comments: [1] Elevation in feet MSL
Vertical Scale : 1" = 5'

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 9/14/93
DATE COMPLETED: 9/14/93
FIELD INSPECTOR: J. de Beer / S. Botts (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: P-105
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: P-105
RISER PIPE ELEVATION: 583.96 ft MSL
GROUND SURFACE ELEVATION: 584.2 ft MSL



BOREHOLE CONSTRUCTION:

The borehole was drilled with a 6¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 10¼" (I.D.) borehole. Split spoon samplers (2" diamter, 2-foot long, standard samplers) without brass liners were driven with a 140 lb hammer operated mechanically by a winch line mounted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log P-105 for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 14.0 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 11.5 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.38 ft bgs with a 2 ft diameter concrete anchor pad.

A "Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump was used to remove the sediment produced by surging. The well was surged over the entire screen length.

A total of 300 gallons was removed at a pumping rate of 8.6 gallons per minute (gpm).

NOTE:

ags = above ground surface

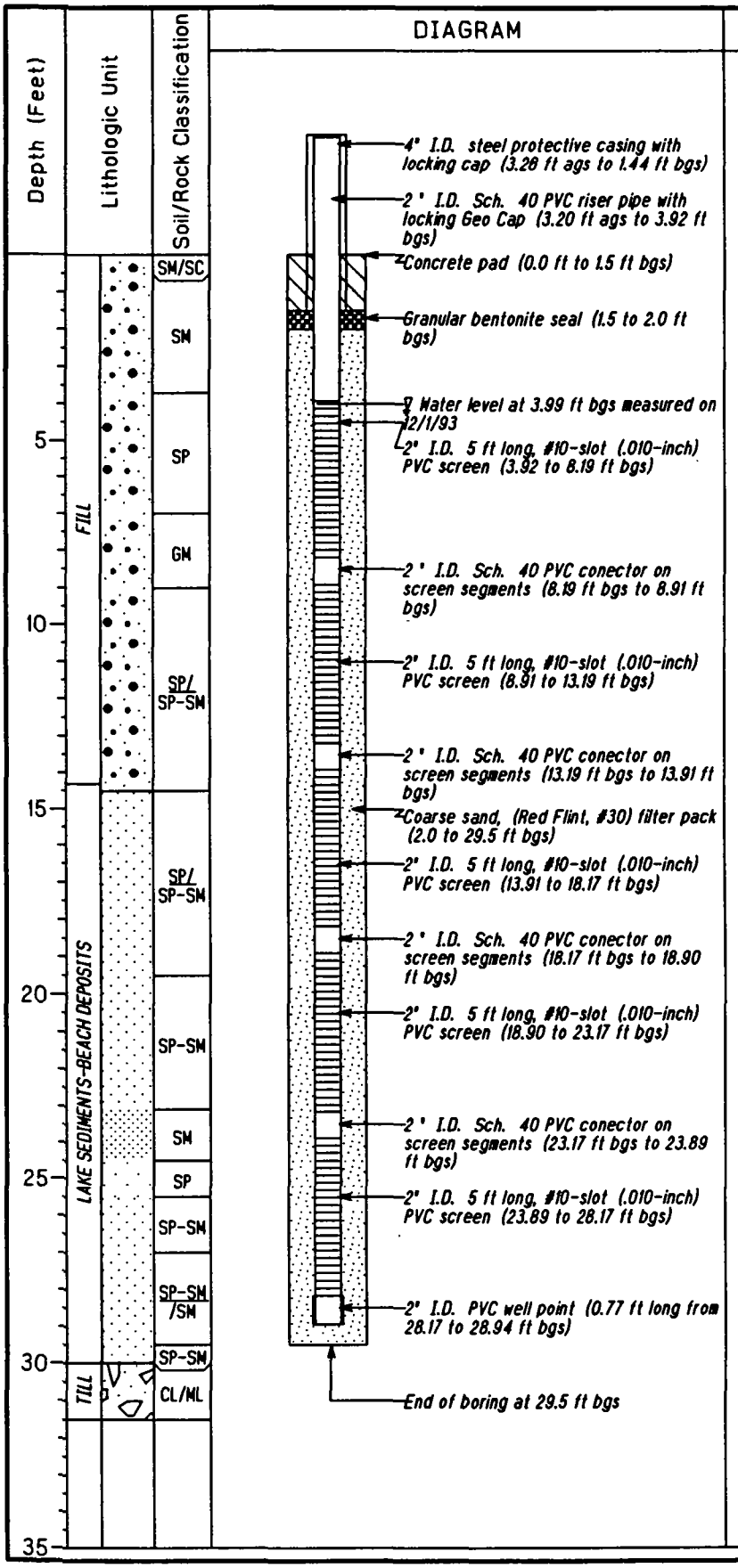
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS PHASE 2
DATE STARTED: 10/4/93
DATE COMPLETED: 10/4/93
FIELD INSPECTOR: K. French/K. Mann (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: P-106
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: P-106
RISER PIPE ELEVATION: 589.60 ft MSL
GROUND SURFACE ELEVATION: 586.4 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 8¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log P-106 for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 29.5 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 32.14 ft and was measured before the well was installed.

Coarse sand (Red Flint #30) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 4.7 ft long, 4" diameter, schedule 40, steel protective casing with a locking cap was installed to 1.44 ft bgs with a concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump was used to remove the sediment produced by surging. The well was surged over the entire screen length.

A total of 1535 gallons was removed during development.

NOTE:

ags = above ground surface

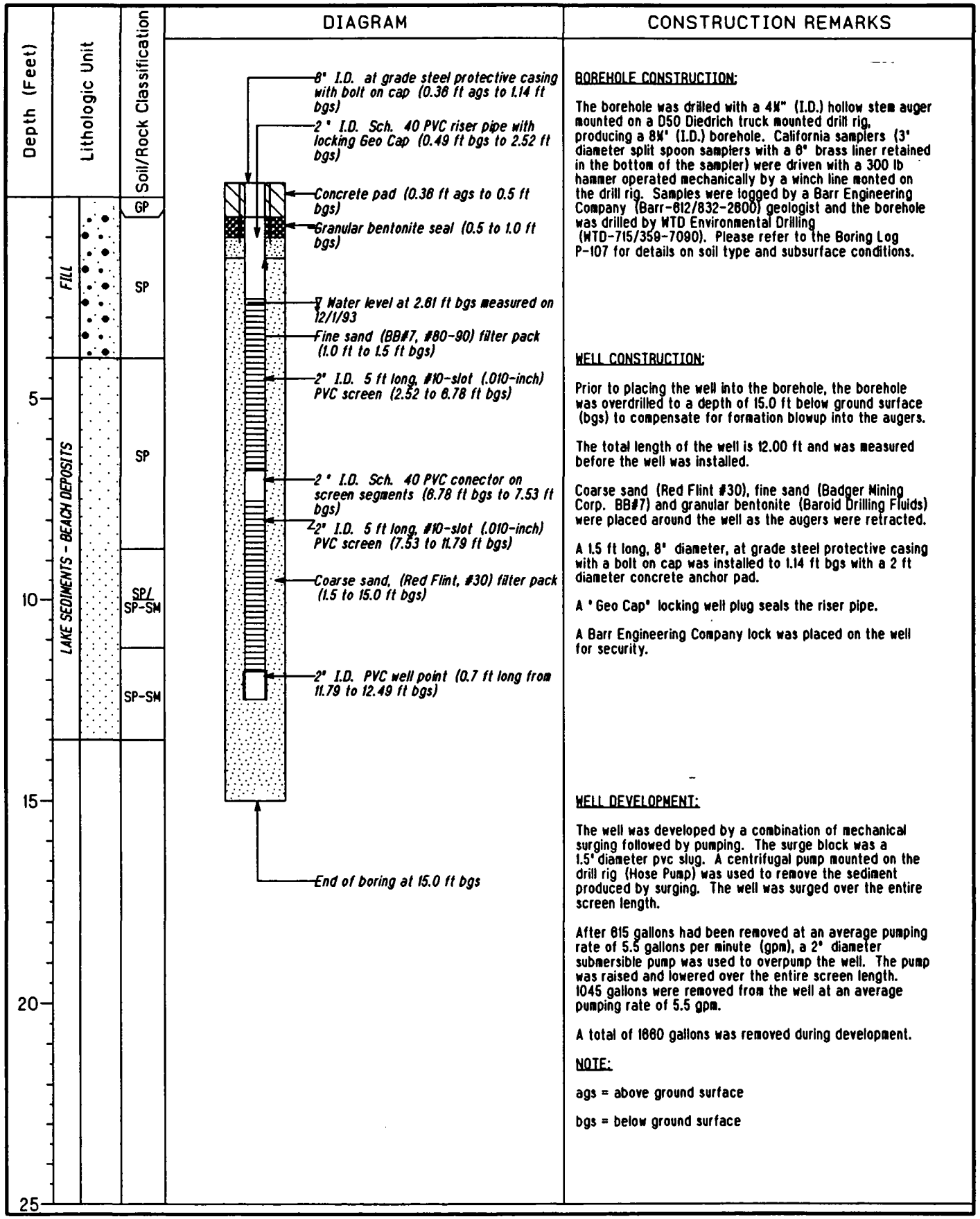
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 9/3/93
DATE COMPLETED: 9/3/93
FIELD INSPECTOR: J. Fox (Barr)
CREW CHIEF: B. Loveland (WTD)

WELL NUMBER: P-107
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: P-107
RISER PIPE ELEVATION: 584.41 ft MSL
GROUND SURFACE ELEVATION: 584.9 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted on a D50 Diedrich truck mounted drill rig, producing a 8¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log P-107 for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 15.0 ft below ground surface (bgs) to compensate for formation blowup into the augers.

The total length of the well is 12.00 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

A 1.5 ft long, 8" diameter, at grade steel protective casing with a bolt on cap was installed to 1.14 ft bgs with a 2 ft diameter concrete anchor pad.

A " Geo Cap" locking well plug seals the riser pipe.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging followed by pumping. The surge block was a 1.5" diameter pvc slug. A centrifugal pump mounted on the drill rig (Hose Pump) was used to remove the sediment produced by surging. The well was surged over the entire screen length.

After 615 gallons had been removed at an average pumping rate of 5.5 gallons per minute (gpm), a 2" diameter submersible pump was used to overpump the well. The pump was raised and lowered over the entire screen length. 1045 gallons were removed from the well at an average pumping rate of 5.5 gpm.

A total of 1660 gallons was removed during development.

NOTE:

ags = above ground surface

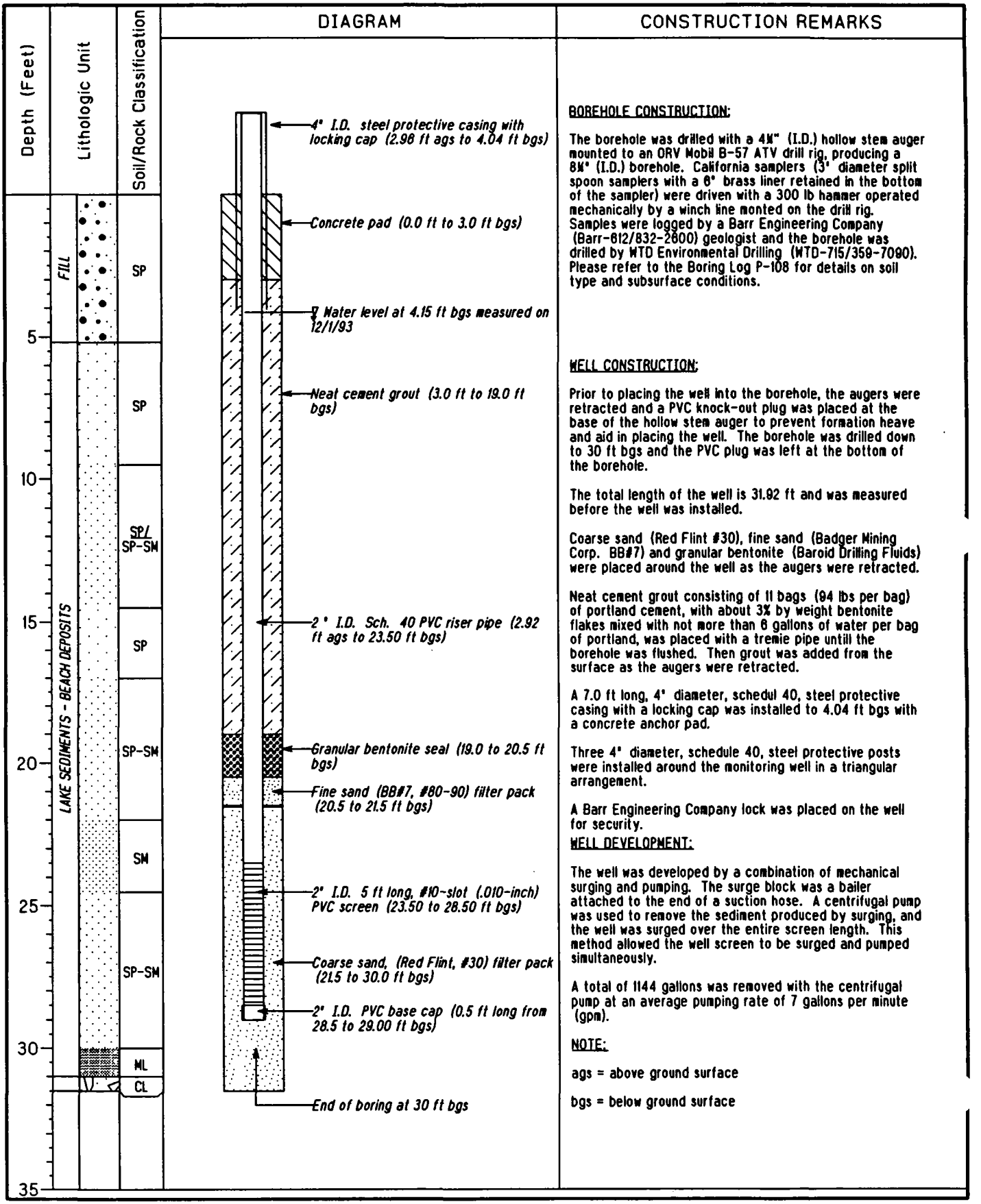
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS PHASE 2.
DATE STARTED: 10/6/93
DATE COMPLETED: 10/6/93
FIELD INSPECTOR: D. Moore (Barr)
CREW CHIEF: M. Mueller (WTD)

WELL NUMBER: P-108
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: P-108
RISER PIPE ELEVATION: 589.52 ft MSL
GROUND SURFACE ELEVATION: 586.6 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 4¼" (I.D.) hollow stem auger mounted to an ORV Mobil B-57 ATV drill rig, producing a 8¼" (I.D.) borehole. California samplers (3" diameter split spoon samplers with a 6" brass liner retained in the bottom of the sampler) were driven with a 300 lb hammer operated mechanically by a winch line monted on the drill rig. Samples were logged by a Barr Engineering Company (Barr-612/832-2600) geologist and the borehole was drilled by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log P-108 for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the augers were retracted and a PVC knock-out plug was placed at the base of the hollow stem auger to prevent formation heave and aid in placing the well. The borehole was drilled down to 30 ft bgs and the PVC plug was left at the bottom of the borehole.

The total length of the well is 31.92 ft and was measured before the well was installed.

Coarse sand (Red Flint #30), fine sand (Badger Mining Corp. BB#7) and granular bentonite (Baroid Drilling Fluids) were placed around the well as the augers were retracted.

Neat cement grout consisting of 11 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons of water per bag of portland, was placed with a tremie pipe untill the borehole was flushed. Then grout was added from the surface as the augers were retracted.

A 7.0 ft long, 4" diameter, schedul 40, steel protective casing with a locking cap was installed to 4.04 ft bgs with a concrete anchor pad.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging and pumping. The surge block was a bailer attached to the end of a suction hose. A centrifugal pump was used to remove the sediment produced by surging, and the well was surged over the entire screen length. This method allowed the well screen to be surged and pumped simultaneously.

A total of 1144 gallons was removed with the centrifugal pump at an average pumping rate of 7 gallons per minute (gpm).

NOTE:

ags = above ground surface

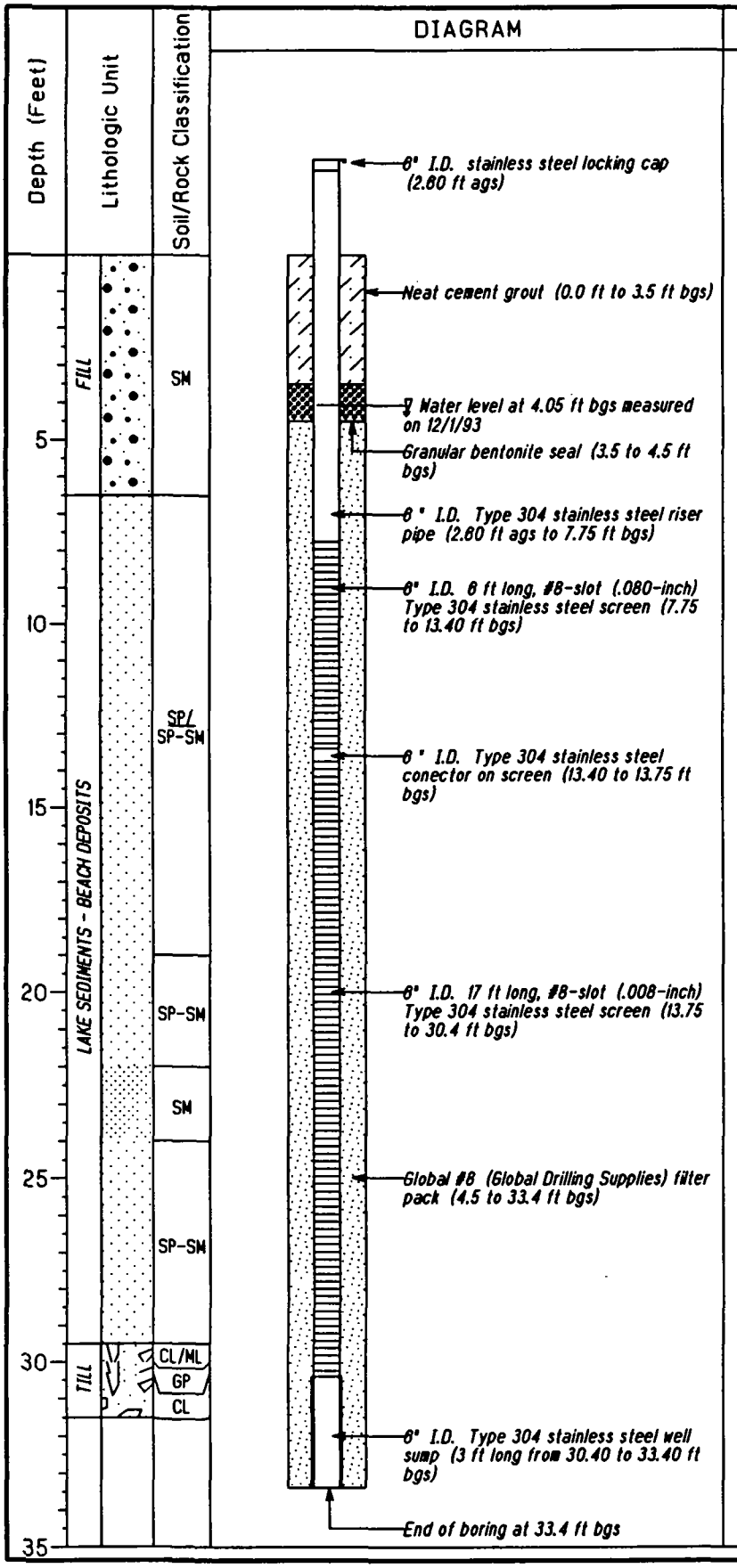
bgs = below ground surface

WELLFM23 rev.11/16/93

WELL CONSTRUCTION LOG

PROJECT: WCP RI/FS Phase 2
DATE STARTED: 10/28/93
DATE COMPLETED: 10/29/93
FIELD INSPECTOR: J. de Beer (Barr)
CREW CHIEF: P. Dickenson (WTD)

WELL NUMBER: PW-1
UNIQUE WELL NUMBER: N/A
REFERENCE BORING NUMBER: PW-1
RISER PIPE ELEVATION: 589.00 ft MSL
GROUND SURFACE ELEVATION: 586.4 ft MSL



CONSTRUCTION REMARKS

BOREHOLE CONSTRUCTION:

The borehole was drilled with a 12¼" (I.D.) hollow stem auger mounted to a BK-81 truck mounted drill rig, producing a 17¼" (I.D.) borehole. A Barr Engineering Company (Barr-612/832-2600) geologist observed well installation and the well was constructed by WTD Environmental Drilling (WTD-715/359-7090). Please refer to the Boring Log PW-1 for details on soil type and subsurface conditions.

WELL CONSTRUCTION:

Prior to placing the well into the borehole, the borehole was overdrilled to a depth of 33.4 ft below ground surface (bgs).

The total length of the well is 38.0 ft and was measured before the well was installed.

Filter pack sand (Global # 8), granular bentonite (Baroid Drilling Fluids) and neat cement grout were placed around the well as the augers were retracted.

Neat cement grout consisting of 4 bags (94 lbs per bag) of portland cement, with about 3% by weight bentonite flakes mixed with not more than 6 gallons per bag of portland. Then grout was added from the surface as the augers were retracted.

A 0.3 ft long, 6" diameter, Type 304 stainless steel locking cap was placed on the riser.

Three 4" diameter, schedule 40, steel protective posts were installed around the monitoring well in a triangular arrangement.

A Barr Engineering Company lock was placed on the well for security.

WELL DEVELOPMENT:

The well was developed by a combination of mechanical surging and pumping. The 6" diameter surge block was connected to the drill rods and the well was surged over the entire length of the screen. A 4" submersible pump was used to remove the sediment produced by surging.

The total volume pumped from the well during development was 5850 gallons at a pumping rate of 15 gallons per minute.

NOTE:

ags = above ground surface

bgs = below ground surface

WELLFM23 rev.11/16/93

Appendix 4-F

Field Log Data Sheets, Well Development

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW-35

Client NSG/WCP Project No. 1B1-1491-0103JTSLB1L

Location: Waukegan, IL Date: 3/25/92 Sample Time: ____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @25	pH	Eh
Barr Lock: Y N	Y	1. 2:35/750	9.3	490		7.30	
Casing Dia: (in.)	2	2. 2:40/825	9.0	490		7.09	
Total Depth (ft.)	12	3. 2:45/900	9.0	490		7.02	
Static Depth (ft.)	--	4. 2:50/975	8.9	490		7.07	
Water Depth:	5'(TOC)	5.					
Well Vol. (gal.)	1.5	6.					
Purge Method:	pump + surge	7.					
Samp. Method:	—	Appearance: slight oil sheen					
Start Time:	1:45	Odor: none					
Stop Time:	2:50	Comments:					
Duration: (min.)	65						
Rate, gpm:	15						
Volume Purged:	975						

Samplers: TWW, JMF Others Present:

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW-4S

Client NSG/WCP Project No. 13-49-003JSL31

Location: Waukegan, IL Date: 3/25/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N	Y	1. 6:15/675	8.5	550		7.40	
Casing Dia: (in.)	2	2. 6:20/750	8.4	550		7.21	
Total Depth (ft.)	12.0	3. 6:25/825	8.3	550		7.30	
Static Depth (ft.)	--	4. 6:40/900	8.3	550		7.36	
Water Depth:	6.8 (TOC)	5. 6:45/975	8.3	550		7.39	
Well Vol. (gal.)	1.2	6.					
Purge Method:	pump + surge	7.					
Samp. Method:	—	Appearance: clear, after a few minutes					
Start Time:	5:30	Odor: yes -					
Stop Time:	6:46	Comments: - pump stopped fr 6:26-6:35 + restarted.					
Duration: (min.)	76						
Rate, gpm:	±15						
Volume Purged:	975						

Samplers: JMF, TWW Others Present:

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW-5S

Client NSG/WCP Project No. 13-49-003JSL31

Location: Waukegan IL Date: 3/25/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N	Y	1. 4:20/75	8.3	320		7.57	
Casing Dia: (in.)	2	2. 4:25/100	8.2	320		7.59	
Total Depth (ft.)	13.2	3. 4:30/125	8.3	320		7.51	
Static Depth (ft.)	—	4. 4:35/175	8.1	312		7.60	
Water Depth:	5.8' (TOC)	5. 4:40/225	8.1	310		7.69	
Well Vol. (gal.)	1.6	6. 4:45/275	7.9	309		7.70	
Purge Method:	pump + surge	7.					
Samp. Method:	—	Appearance: clear, after 50 gals					
Start Time:	4:05	Odor: none					
Stop Time:	4:50	Comments:					
Duration: (min.)	45	- increased pumping rate fr. 5 to 10 gpm at 4:31					
Rate, gpm:	5-10	- pump shut off for 1 minute + restarted					
Volume Purged:	325						

Samplers: JMF, TWW Others Present:

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW-6S

Client NSG/WCP Project No. 11B1-1491-1093JS1431

Location: Waukegan, IL Date: 3/27/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N	Y	1. 12:25	9.6	1000		7.66	
Casing Dia: (in.)	2	2. 12:30	9.5	1000		7.76	
Total Depth (ft.)	13.5	3. 12:35	9.9	1000		7.75	
Static Depth (ft.)	—	4.					
Water Depth:	8.0(TOC)	5.					
Well Vol. (gal.)	1.3	6.					
Purge Method:	pump + surge	7.					
Samp. Method:	—	Appearance: clear					
Start Time:	10:30	Odor: yes					
Stop Time:	12:35	Comments:					
Duration: (min.)	125						
Rate, gpm:	6gpm						
Volume Purged:	750						

Samplers: TWW, JMF Others Present: WTD

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW-3D

Client NSG/WCP Project No. [illegible]

Location: Waukegan [illegible] Date: 3/[illegible]/[illegible] Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N	Y	1. 6:19/448	10.7	750		8.76	
Casing Dia: (in.)	2	2. 6:24/455	11.1	750		8.75	
Total Depth (ft.)	27.8	3. [illegible]/462	10.[illegible]	750		8.76	
Static Depth (ft.)	—	4.					
Water Depth:	5.9 (TOC)	5.					
Well Vol. (gal.)	3.3	6.					
Purge Method:	pump surge	7.					
Samp. Method:	—	Appearance: golden tint, no silt					
Start Time:	5:15	Odor: [illegible]					
Stop Time:	6:31	Comments: frothy					
Duration: (min.)	76						
Rate, gpm:	7						
Volume Purged:	550						

Samplers: TWW, JMF Others Present:

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

MONITORING WELL DEVELOPMENT

VELL NUMBER MW-4A D

WELL DIAMETER ~~3.0~~ 2" SS

TOTAL DEPTH 30.0

DEPTH TO WATER BEFORE DEVELOPMENT 6.8 TOC

DEPTH TO WATER AFTER DEVELOPMENT 6.8 TOC

PROJECT NO. 3568

DATE March 23, 92

DEVELOPED BY PD

DESCRIPTION OF DEVELOPMENT METHOD

1.7 BK hand pump 75 gal. March 23, 92

Trash Pump 5 gal/min 3-26-92
surge w/Bailer

Trash pump 450 gal 3-27-92

VOLUME OF WATER REMOVED FROM WELL ~~1500~~ 1,950

CLARITY OF WATER IN WELL BEFORE DEVELOPMENT Silty dark Brn / gray

CLARITY OF WATER IN WELL AFTER DEVELOPMENT Silty Lt. Brn

VOLUME OF WATER ADDED TO WELL none.

SOURCE OF WATER ADDED TO WELL none

TIME SPENT FOR DEVELOPMENT ~~7~~ 9 hours

COMMENTS:

ENVIRONMENTAL DRILLING
WTD
A DIVISION OF LONGYEAR COMPANY

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW-4D

Client NSG/WCP Project No. 13-49-003JSL31

Location: Waukegan IL Date: 3/26/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N	Y	1. 3:45/1400	11.4	7000		8.55	
Casing Dia: (in.)	2	2. 3:50/1425	11.1	7000		8.49	
Total Depth (ft.)	32'	3. 3:55/1450	11.7	7000		8.45	
Static Depth (ft.)	—	4. 400/1475	11.5	7000		8.44	
Water Depth:	6.8 TOC	5. 405/1500	11.5	7000		8.44	
Well Vol. (gal.)	3.8	6.					
Purge Method:	pump + surge	7.					
Samp. Method:	—	Appearance: Cloudy, slightly, [illegible]					
Start Time:	11:30	Odor: YES -					
Stop Time:	4:06	Comments:					
Duration: (min.)	276	11:30 - 12:30 1 gpm					
Rate, gpm:	see comments	12:30 - 1:30 3 gpm					
Volume Purged:	1500	1:30 - 5 gpm					

Samplers: TWW, JMF Others Present:

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW-4P

Client NSG Project No. 1B/49-003JSK31

Location: Waukegan, FL Date: 3/27/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N	Y	1. 2:22/335	12.3	6500		8.50	
Casing Dia: (in.)	2	2. 2:27/360	12.2	7000		8.50	
Total Depth (ft.)	32	3. 2:32/390	11.9	7000		8.48	
Static Depth (ft.)	–	4. 2:37/425	12.1	7000		8.48	
Water Depth:	6.8 (TOC)	5.					
Well Vol. (gal.)	3.8	6.					
Purge Method:	pump & surge	7.					
Samp. Method:	—	Appearance: GOLDEN BROWN - LITE FOAM					
Start Time:	12:30	Odor: YES					
Stop Time:	2:40	Comments: SEDIMENT cleaned up @ Between last pumping and ~200 gal this pumping.					
Duration: (min.)	130						
Rate, gpm:	±3						
Volume Purged:	425	VOLUMES were measured directly.					

Samplers: JMF / TWW Others Present: WTD

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

140
275
415

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW-5D

Client NSG - WCP Project No. 13-49-003JSL31

Location: Waukegan, IL. Date: 3/27/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	±.5 TEMP CENT.	±5 COND. umhos	COND. @25	±0.1 pH	Eh
Barr Lock: (Y) N	Y	1. 820/300	8.6	2600 ~~2580~~		8.40	
Casing Dia: (in.)	2	2. 825/325	9.3	2600 ~~2580~~		8.39	
Total Depth (ft.)	26.0	3. 830/350	8.9	2600 ~~2580~~		8.42	
Static Depth (ft.)	—	4. 835/375	8.8	2600 ~~2580~~		8.4.5	
Water Depth:	7.8(TOC)	5.					
Well Vol. (gal.)	3.2	6.					
Purge Method:	PUMP & SURGE	7.					
Samp. Method:	—	Appearance: golden					
Start Time:	7:10 AM	Odor: yes					
Stop Time:	8:40	Comments: 70 min/300 GAL = ~5 GPM					
Duration: (min.)	90						
Rate, gpm:	5±	clear - slightly golden after several well volumes.					
Volume Purged:	415 GAL						

Samplers: JMF / TWW Others Present: WTD

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW-6D

Client NSG/WCP Project No. 13-49-003JSL31

Location: Waukegan, IL Date: 3/27/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N	Y	1. 10:08/215	10.8	8500		8.33	
Casing Dia: (in.)	2	2. 10:13/	10.8	8500		8.30	
Total Depth (ft.)	26.5	3. 10:18/250	10.7	8500		8.28	
Static Depth (ft.)	—	4.					
Water Depth:	8.0 (TOC)	5.					
Well Vol. (gal.)	3.2	6.					
Purge Method:	Pump + surge	7.					
Samp. Method:	—	Appearance: golden brown, slightly cloudy					
Start Time:	9am	Odor: yes					
Stop Time:	10 20	Comments:					
Duration: (min.)	80						
Rate, gpm:	3						
Volume Purged:	250						

Samplers: TWW, JMF Others Present: WTD

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: P-101

Client NSG WXP Project No. 1B1-49-0003JSK311

Location: Waukegan IL Date: 3/24/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	±.5 TEMP CENT.	±5 COND. umhos	COND. @25	±0.0 pH	Eh
Barr Lock: Y N	Y	1. 5:32/20 GAL	7.2	1050		8.02	
Casing Dia: (in.)	1 1/4	2. 5:42/30 GAL	6.7	1050		7.79	
Total Depth (ft.)		3. 5:52/40 GAL	6.6	1050		7.76	
Static Depth (ft.)		4. 6:02/50 GAL	6.6	1050		7.76	
Water Depth:		5.					
Well Vol. (gal.)		6.					
Purge Method:		7.					
Samp. Method:		Appearance:					
Start Time:	5:12	Odor:					
Stop Time:	6:12	Comments: 5GAL/4MIN — 5GAL/5MIN cloudy — 5GAL then clear					
Duration: (min.)	60						
Rate, gpm:	~1 GPM						
Volume Purged:	60						

Samplers: JMF Others Present: WT

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: P-102

Client NSG-WCP Project No. 13-49-004JSC31

Location: Waukegan, IL. Date: 3/24/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	±.5 TEMP CENT.	±5 COND. umhos	COND. @25	±0.1 pH	Eh
Barr Lock: Y N	Y	1. 3:15/25 GAL	10.6	680		7.30	
Casing Dia: (in.)	1 1/4	2. 3:25/35 GAL	10.7	680		7.39	
Total Depth (ft.)		3. 3:35/45 GAL	10.4	680		7.46	
Static Depth (ft.)	15.0'	4. 3:45/55 GAL	10.5	680		7.50	
Water Depth:	6.3	5. 3:55/65 GAL	10.2	680 ~~710~~		[illegible]	7.48
Well Vol. (gal.)		6.					
Purge Method:		7.					
Samp. Method:		Appearance: cloudy - 10 GAL then clear					
Start Time:	2:50	Odor: NONE - ABOVE BACKGROUND					
Stop Time:	400	Comments:					
Duration: (min.)	70						
Rate, gpm:	w/ GPM						
Volume Purged:	70						

Samplers: JMF Others Present: WTD

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: P-103

Client NSG-WCP Project No. 13/49-003JSL31

Location: Waukegan, IL. Date: 3/24/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: (Y) N	Y	1. 11:11 / 30GAL	10.6	1020		7.66	
Casing Dia: (in.)	1¼	2. 11:25 / 40GAL	10.7	990		7.67	
Total Depth (ft.)		3. 11:40 / 55GAL	9.3	980		7.84	
Static Depth (ft.)	15.4'	4. 11:52 / 67GAL	8.8 ✓	~~905~~ 900 ✓		7.80 ✓	
Water Depth:	7.6	5. 12:02 / 77GAL	8.8 ✓	~~910~~ 900 ✓		7.89 ✓	
Well Vol. (gal.)		6. 12:12 / 87GAL	8.9 ✓	~~905~~ 900 ✓		7.80 ✓	
Purge Method:	AIR LIFT	7.					
Samp. Method:		Appearance: cloudy 0-10 GAL — Then clear.					
Start Time:	10:35	Odor: NONE					
Stop Time:	12:25	Comments: CI @ 15.4' @ START; H2O 7.6' " " } Below TOR					
Duration: (min.)	110						
Rate, gpm:	~1 GPM	START AIR LIFT 10:35 AM @ ~1 GPM (5GAL/6 min)					
Volume Purged:	110 ±						

(1) slightly cloudy
(2) clear
(3) clear
(4) clear

Samplers: JMF Others Present: WTD

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: P-104

Client NSG - WCP Project No. 1131-49-1003 JBK 31

Location: Waukegan, IL. Date: 3/24/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	±.5 TEMP CENT.	±5 COND. umhos	COND. @25	±0.1 pH	Eh
Barr Lock: Y N	Y	1. 1:47/42 GAL	11.1	720		7.51	
Casing Dia: (in.)	1 1/4	2. 1:57/52 GAL	9.3	700		7.26	
Total Depth (ft.)		3. 2:07/62 GAL	9.8 ✓	700 ✓		7.03 ✓	
Static Depth (ft.)	15.4	4. 2:17/72 GAL	9.4 ✓	700 ✓		7.06 ✓	
Water Depth:	6.6	5. 2:27/82 GAL	9.4 ✓	700 ✓		7.07 ✓	
Well Vol. (gal.)		6.					
Purge Method:	AIRLIFT	7.					
Samp. Method:		Appearance: cloudy 10 GAL - Then clear					
Start Time:	1:05	Odor: NONE - ABOVE BACK GROUND.					
Stop Time:	2:30	Comments: slight oily film and slight yellow color to H_2O - But clear of sediment.					
Duration: (min.)	85						
Rate, gpm:	1 GPM						
Volume Purged:	85						

Samplers: JMF Others Present: WTD

gen ____ VOC ____ COD ____ TOC ____ semi-volatile ____ f. metal ____ t. metal ____

nitro ____ cyanide ____ oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS

DEVELOPER NAME: B. Loveland WTD

WELL IDENTIFICATION: MW-45

DEVELOPMENT METHOD: surge w/ PVC then BK pump

JOB #: 13/49-003 JSL 52

DESCRIPTION OF EQUIPMENT: then surge & pump w/ centrifugal then 2" ss submersible for final development

WEATHER: steady rain, light wind, 70°F

DATE START: 9-14-93
DATE FINISH: 9-14-93

TIME START: 9:20
TIME FINISH: 15:00

1550 total gallons pumped

WATER LEVEL BEFORE PUMPING: 8:45 3.43' below top of riser

new at grade construction

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
9:20	18.33gal/5min	—	—	cloudy	some sand & silt
9:24	18.33gal/4min	—	—	clear to cloudy	some f. sand
9:46	18.33gal/4min	—	—	cloudy	some sand & silt
9:50	18.33gal/3min 40sec	16°C	600/7.0	clear to cloudy	some f. sand
9:53:50	18.33gal/3 min	—	—	clear to cloudy	some f. sand
10:18:30	18.33gal/3min 40sec	16°	600/7.4	clear to cloudy	some f. sand
10:29	10.7gpm for 4 min	16.5°	600/7.4	clear	no silt or sand
10:44	10.7gpm for 2min 20sec	16.5°	600/7.4	clear	no silt or sand
10:47	10.7gpm	16°	600/—	clear	no silt or sand
11:20	10.7gpm	16.5°	600/7.3	clear	few sand grains
11:28	10.7gpm	16°	600/7.4	clear	no silt or sand
11:38	4.3gpm	16°	600/7.3	clear	few sand grains
11:43	4.3gpm	16°	600/7.4	clear	few sand grains
11:55	4.3gpm	17°	600/7.4	clear	few sand grains
13:32	10.7gpm	16°	600/7.4	clear	few sand/silt grains
14:30	10.7gpm	15.5°	600/7.4	clear	few sand grains
14:35	10.7 gpm	16.0°	600/7.4	clear	5-10 sand grains
14:41	4.3 gpm	15.5°	600/7.4	clear	5-10 " "
14:55	4.3 gpm	15.5	600/7.4	clear	5-10 " "
14:57	4.3 gpm	15.5°	600/7.4	clear	5-10 " "
14:58	4.3 gpm	15.5°	600/7.4	clear	5 sand grains

NOTES:

9:06 begin surging w/ PVC plug
9:15 began pumping w/ BK hand pump
9:24 stopped pumping
9:28 began surging w/ PVC plug to 9:40 0.7' of silt in well
9:42 begin pumping w/ BK hand pump to 9:53:50
9:58 begin surging w/ PVC plug to 10:08
10:14:50 begin pumping w/ BK pump to 10:18:30
10:25 begin pumping w/ centrifugal pump at 10 gpm to 10:29
10:30 begin surging w/ PVC plug to 10:40
10:41:40 begin pumping w/ centrifugal to 10:49
10:57 begin surging w/ PVC plug to 11:07
11:16 begin pumping at 10gpm w/ centrifugal to 11:28
11:36 begin pumping w/ Grundfos to 11:55
12:41 to 13:15 pumping at 4.3 gpm w/ Grundfos - still has sand
13:15 begin surging w/ PVC block to 13:26

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: DEVELOPER NAME:

WELL IDENTIFICATION: MW-45 DEVELOPMENT METHOD:

JOB #: DESCRIPTION OF EQUIPMENT:

WEATHER:

DATE START: TIME START:
DATE FINISH: TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/pH	WATER APPEARANCE	COMMENTS

NOTES:

13:28 begin pumping w/ centrifugal to 13:45 10.7 gpm
14:09 " " " " " to 14:17 10.7 gpm
14:17 surge w/ PVC to 14:27
14:27 begin pumping w/ centrifugal to 14:36 at 10.7 gpm
14:38 begin pumping w/ Grundfos 2" ss submersible at 4.3 gpm
15:00 development done

BARR ENGINEERING CO.

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

CHECKED BY _____
DATE _____

9/27/93 1614

MW-40 2"SCH

Static 8.03
total 31.0
water depth 28'
4.5 GALLONS in a well volume
1625 4 GPM water looks cloudy
1641 5 GPM water is still cloudy
1709 pump lowered to 28'
1750 pump moved to bottom of well

1625	cond	12,000	1810	cond	7,000	
	Temp	13.0		temp	12.0	
	pH	8.16		pH	8.18	
1637	cond	9,000	1827	cond	4,806	pump moved up
	Temp	14.0		temp	12.0	
	pH	8.14		pH	8.04	
1700	cond	8000	1845	cond	7000	
	Temp	12.0		temp	12.0	
	pH	8.15		pH	8.17	
1715	cond	8000	1856	CONd	7,000	
	temp	12.0		temp	12.0	
	pH	8.15		pH	8.22	
1745	cond	7,000	stoped	1930	1000 GALLONS purged	
	temp	12.0				
	pH	8.14				
1800	cond	7000				
	temp	12.0				
	pH	8.17				

BARR ENGINEERING CO.

CHECKED BY _____
DATE _____

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

MW 7D 9-28-93

Start Time: pump rate:

cond 8,000
1925 temp 12.0
pH 8.68

1940 cond 8,000 Cloudy/brown
temp 12.0
pH 8.65

1955 cond 10,000
temp 12.0
pH 8.71

2000 cond 9,500
temp 12.0
pH 8.69

2020 cond 10,000
temp 12.0
pH 8.70

2045 cond 9,500
temp 12.0
pH 8.68

500 Gal out

2100

MW 7S 2"

1950 cond 750
temp 11.0
pH 6.34

2000 cond 600 clear
temp 16
pH 6.15

2020 cond 650
temp 16.0
pH 6.12

2045 cond 700
temp 16
pH 6.11

500 Gal out

2100 7S done

BARR ENGINEERING CO.

NAME _____
DATE _____
CHECKED BY _____ SHEET _____ IN SET
DATE _____ PAGE _____ IN FILE

MW 7D
4.69
32.0

~~pumping rate~~
removed approx
1000 gal. with
centrifugal pump

9-29-93
will use 2" sub.

9-28-93 MW 7S 4.42
14.0

Start cent 1752
15 gpm

1752 cond 700
temp 16.0
pH 6.20

1800 cond 625
temp 16 cleared up
pH 6.15

1810 cond 630
temp 16.0
pH 6.13

1830 cond 600
temp 16.0
pH 6.17

1845 cond 600
temp 16.0
pH 6.30

1900 cond cond 600
temp temp 16.0
pH pH 6.39

~~1915~~ cond
1915 temp
pH

removed ~ 1000 gallons
with cent

BARR ENGINEERING CO.

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

CHECKED BY _____
DATE _____

9/29/93

MW 7D

1035 cond 10,500
temp 12.0
pH 8.66

1045 cond 10,000
temp 12.0
pH 8.67

1050 cond 10,000
temp 12.0
pH 8.68

1110 10,000
12.0
8.65

1115 cond 10,000
temp 12.0
pH 8.66

1130 end cent 500 GAL

Start 1200 2"

cond 10,000
temp 12.0
pH 8.68

1220 cond 10,000
temp 12.0
pH 8.69

CENT

MW 7D

0735 cond 11,000
temp 12.0
pH 8.72

0755 cond 12,000
temp 12.0
pH 8.75

0815 cond 10,000
temp 12.0
pH 8.72

0830 cond 9500
temp 12.0
pH 8.72

0845 cond 10,500
temp 13.0
pH 8.71

0900 cond 9,500
temp 12.0
pH 8.69

0915 con 10,000
temp 12.0
pH 8.70

0945 cond 10,000
temp 12.0
pH 8.71

Stop 1000 1000 GAL out

76PM

cloudy

BARR ENGINEERING CO.

MW17D

CHECKED BY _____
DATE _____

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

1240	cond	10,000
	temp	12.0
	pH	8.68
1255	cond	10,000
	temp	12.0
	pH	8.69
1305	cond	10,000
	temp	12.0
	pH	~~8.66~~
END	1315	500 GAL

Developed

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: DEVELOPER NAME:

WELL IDENTIFICATION: DEVELOPMENT METHOD:

JOB #: mw85 DESCRIPTION OF EQUIPMENT: - Pump w/ Mobil B-57 Rig while we pump MW8D

WEATHER:

DATE START: 9/11/93 TIME START: 0800
DATE FINISH: TIME FINISH:

- pH meter calibrated before Testing.
- Redline Temp, conductivity meter
- Pumping at ~ 10.4 gpm.
- Grains are probably silt.

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
0850	~ 13 GALS.				START Pump
0900		17°C	900/7.4	clear, few grains.	
0906		stop pump		surge for ~10 mins.	
0917	START Rig.			Brown colored water.	
0934	458	17°C	1000/7.4	Clear, few grains	
0948	602	17°C	1000/7.4	clear, "	surge well, STOP pump
0949					START Pump - Brown water
1020	924	17°C	1100/7.4	clear, "	Stop pump - surge well.
1028				START Pump. Gray Brown colored sandy silty water.	
1050	1143	17°C	1050/7.4	clear, few sand grains,	surge well, stop pu
1056	START Pump.				
1125	1445		STOP pump - surge well.		
1131		START pump.			
1140		18°C	1100/7.4	clear, few grains.	
1600 1145	1591			STOP pump.	
1315 - 1400 - Decon Grundfos pump & set up TO Pump this well.					
1354	START Pump		- pumping at ~ 4.2 Gpm.		
1415	88	17°C	1100/7.4	clear, very few grains (SAND/silt).	
1456	260	17.5°C	1100/7.4	Clear NO grains.	
1506	302	17.5°C	1100/7.4	clear NO grains	
1515	340	17.5°C	1100/7.4	" "	
1525	382	17.5°C	1100/7.4		
400 1529	422	STOP	pump - well developed. - Tear Down		

NOTES:

T.D. 12.31', WL 4.10' (MW8D WAS Being pumped)
1354 WL 4.06 BTOR
WL 1549 4.01' BTOR

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: NSG-WCP

DEVELOPER NAME: JOHN FOX (BARR ENG) Bryan L. (WTD)

WELL IDENTIFICATION: MW-8S

DEVELOPMENT METHOD: PUMP & SURGE

JOB #: 13/49-003 JSL

DESCRIPTION OF EQUIPMENT: BK 1.7" HAND PUMP, AND 5'/1 3/4" Surge Block, w/ 2" Sub. Pump as final stage

WEATHER: P. cloudy 70°

DATE START: 9/9/93
DATE FINISH: 9/ /93

TIME START: 18:00
TIME FINISH:

WATER LEVEL BEFORE PUMPING: NOT Recorded

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
18:00	[illegible]	NOT	Recorded	BROWN-very cloudy	BK
18 10	55GAL.	"	"	GREY BROWN - cloudy	↓
18 12	—	—	—	—	SURGE W/ SURGE BLOCK
19:00	END FOR DAY				

NOTES:
9/10/93 - Begin Development of MW8S & 8D - setup 0800. - will pump with Pump on Mobil B-57 Rig.

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS

DEVELOPER NAME: JAB / M. Mueller

WELL IDENTIFICATION: MW08D

DEVELOPMENT METHOD: Pump & surge w/ Rig Pun & Slug (surge block).

JOB #: 13/49-003 JSL52

DESCRIPTION OF EQUIPMENT:
- Waukasha Hose Pump on ORV Mobil B-57 Drill Rig, Pumped into 450 gal TANK. Using a 3/4" PVC Tube Down Hole. Crestline HD100 3/4 inch (ASTM 2236).

WEATHER: Sunny, Breezy, cool.

DATE START: 9/10/93 **TIME START:** 0800
DATE FINISH: **TIME FINISH:**

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
0828	0			Dark gray Brown - Black	silty. - phenolic odor.
0846	100				Surge well.
0848 - 0858					Surged well.
0900				Dark gray, Murkey.	
0914	~180	13°C	5500/8.4	" , Sandy	Sand settling.
916	~200				Surge well.
0926		Surged	for 10	mins.	
0928			START Pump	- Dark gray water.	
0936 - 0946 -		Surge	- ~250 gals	start pump 0946 -	Dark gray water.
0953	300			Sand grains in suspension.	- Light Gray
1009	375	- Empty Tank.	- continue pumping, Discolored,	few	Sand grains - Surge again.
1011	400	Surge well			
1033	500	14°C	7000/8.7	Beer colored w/ foam head,	few Sand grains. - Surge well.
1045	START Pump.			Dark gray murkey water	
1054	575	13°C	7000/8.7	Beer colored. Very few	Sand grains - Cleans up Quicker
1100	Surge: Pulled in	~ 1' of	sediment into	well from surging.	Dark Gray Murkey Water
1110	650	Surge well again		- Grayish Amber colored	water, V. few grains
1116		Dark Gray murkey.	Water	After surging	
1135	750	Surge well.			
1140	START Pump.				
1150	Stop pump	- Clean up	for lunch,	- lunch	1200.
1320	- Back from	lunch			

NOTES:

0825 Water level: 3.58 TOTAL Depth: 28.8

50 gals: 0838 75 gals 0843 ~ 5 gals/min.

Each Time we surge we pull in about 1 foot of formation sand into the well

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE:

DEVELOPER NAME:

WELL IDENTIFICATION: MW8D

DEVELOPMENT METHOD:

JOB #:

DESCRIPTION OF EQUIPMENT:

WEATHER:

DATE START:
DATE FINISH:

TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
1325	Surge well	- Pumped ~850 gallons so Far			
1330	START Pump After Surging.			Dark Gray Sandy water,	Strong odor.
1341	850			Clear. grayish Amber color,	V. Little Fine SAND.
1346	965	Surge well.			
1352	START Pump.		Dark gray	murkey warter.	
1405	1095	-		Clear grayish Amber color	- Strong odor. few grains...
1415	START Pump				
1435	1300	Surge well.			
1442	Pump	~ 1"	of Seds	collected in well After Surging	
1454	1375	13°C	7500/8.7	Pumping @ ~7.5 Gals/min	
1505	START Pump		~ 6"	SAND in Bottom of well.	
1530	1500	Stop Pump - Surge well			
1540	START Pump.				
1550	1575	13.5°C	7500/8.7	Amber gray -	Very few grains, Surge well
1559	START	Pump.	About	9" fine sand	in Bottom of well.
1608	*~1675	13.8°C	7700/8.7	Amber gray -	Few grains.
1625	~1725	Surge well -		Amber gray (olive oil color)	
1634	START Pump	- SAND		in Bottom of well After Surging (~6")	
1645	1875	13.5°C	7500/8.7	Amber gray (olive)	few SAND grains.
1713	*2025	13.5°C	7500/8.7	Amber Gray (olive)	few SAND grains Surge well.
1755	2265	13.5°C	7500/8.8	olive)	few grains.
				- Shut DOWN	

NOTES:

1320. water level 3.6 BTOR TOTAL Depth 29.8' BTOR
- NO sediment Accumulated in well During Lunch.

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE:

DEVELOPER NAME: JAB / Mike Mueller

WELL IDENTIFICATION: MW8D cont.

DEVELOPMENT METHOD:

JOB #:

DESCRIPTION OF EQUIPMENT:

WEATHER:

- setup 0800,
START Grundfos 2" pump at 0830
- pH meter calibrated before pumping
- Redline Temp/cond meter.
- No sediment well when pump was [illegible] down
- Pumping at 4.16 GPM @ 210 Hz on pump controller.

DATE START: 9/11/93 Development continues w/

TIME START:

DATE FINISH:

TIME FINISH:

WATER LEVEL BEFORE PUMPING:

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
4 GPM	08:34	0				START Pump
	08:47	50	13°C	7100/8.8	Amber, clear, few grains.	
	0911					water getting Dark gray. -
109-325 -350	0920		13°C	7000/8.7	Light olive color	V. few grains
	0934	197	13.5°C	7000/8.8	Olive color	"
	0948	253	14°C	7000/8.7	Olive color	" Tapped Pump on Well Bottom
	1020	278	14°C	6500/8.7	Olive color	" "
	1050	404	14.5°C	7500/8.8	Olive color	few grains.
	1140		14.5°C	7500/8.7	"	Very "
	1144	629		Stop pump.		
	1215 Lunch					

NOTES:

WL: 3.63 TD 29.82 BTOR.

WL: 4.10 in MW8S TD 12.31'

4.5

0853 - 125 gals } 12.5 gpm Pumping vol w/ Both Pumps Running.

0855 - 150 " }

0857 - 175 " - Grundfos - ~4 gpm

0905 - 300 " - 14.5 Rig (Hose pump, 1.5" pipe) ~ 8.5 gpm.

0909 - 325 - Grundfos only, Rig shut off between 300 - 325 gals. } 4.16 gpm

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS
DEVELOPER NAME: B. Loveland WTD

WELL IDENTIFICATION: MW-9S
DEVELOPMENT METHOD: surge w/ PVC plug (10 min) then pump with BK

JOB #: 13149-003JSL52
DESCRIPTION OF EQUIPMENT:

WEATHER: rainy, cool (55°F), light wind

DATE START: 9-14-93
DATE FINISH: 9-15-93
TIME START: 16:00
TIME FINISH: 0912

WATER LEVEL BEFORE PUMPING: 3:55 pm 5.88' below top of riser 15.05' to bottom of well from top of riser

	TIME	RATE OR VOLUME	TEMP (C)	COND./PH	WATER APPEARANCE	COMMENTS
9-14-93	16:20	10 gpm	16.5	2010/6.4	cloudy, smoke color, odor	sand & silt
	16:26	10 gpm	14.5	2250/6.2	clear olive green, coal tar odor	little sand
	16:35	10 gpm	14.2	2300/6.4	clear olive gr, coal tar odor	little sand
	16:54	10 gpm	14.8	2250/6.4	clear, light olive green, coal tar odor	few sand grains
	17:12	10 gpm	14.5	2250/6.4	clear light olive gr, coal tar odor	few sand gr.
9-15-93	0836	12.5 gpm	14.5	2200/6.5	"	" w/ SAND
	0842	12.5 gpm	14.0	2200/6.3	clear lt. olive gr, coal tar odor	w a few SAND grains.
	0902	12.5 gpm	14.0	2200/6.3	cloudy lt. olive gray, coal tar odor	w/SAND
	0905	12.5 gpm	14.5	2850/6.3	clear lt. olive gray	" " w/ a trace of SAND grains
	0909	12.5 gpm	14.5	2150/6.3	clear lt. olive gray	" "
	0912	12.5 gpm	14.0	2250/6.3	" "	" "
	pumping stopped					

NOTES:

16:00 begin surging w/ PVC pump to 16:12
16:12 begin pumping w/ centrifugal to 16:36 35
16:36 begin surging to 16:45
16:41 pumping at 10 gpm w/ centrif to 16:54
16:54 begin surging w/ PVC plug to 17:04
17:06 pumping at 10 gpm w/ centrif to 17:12 - stop pumping for day
450 gallons pumped

9-15-93
7:27 surging with pvc to 7:38
7:56 begin pumping with centrif. to 8:12
8:13 begin surging w/ PVC 8:23
8:24 Pump @ 12.5 gpm w/ centrif pump to 08:42. (450+260 = 710 TOTAL PUMPED)
0845 surging (SAA) until 0900
0900 Pump @ 12.5 gpm w/ cent. to 0912 450+400 = 850 TOTAL pumped.

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP

DEVELOPER NAME: DDM

WELL IDENTIFICATION: 9S

DEVELOPMENT METHOD: 2" Sub.

JOB #: 13 44 00 3 351 52

DESCRIPTION OF EQUIPMENT:

WEATHER: light rain

DATE START: 9/29
DATE FINISH: 9/29

TIME START: 13:58
TIME FINISH: 15:43

1.7 hrs

WATER LEVEL BEFORE PUMPING: 5.88

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
14:09	4.0 g/m	15.5	1120/6.6	clear Trace fine sand	Yellowish-Green tint
14:30	3.8 g/m	15.0	1456 6.6	clear Trace fine sand	|
15:03	3.8 g/m	15.0	1592 6.6	clear w/ ½ trace fine Sand	

NOTES:
Milky tan at start
~ 450 gallons pumped
9S developed concurrently with 9D – Payment shall be for 2" deep monitoring wells

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS DEVELOPER NAME: JAB
M Mueller

WELL IDENTIFICATION: MW9D DEVELOPMENT METHOD: Mobil B-57 Hose pump

JOB #: 13/49-003 TSL 52 DESCRIPTION OF EQUIPMENT:

WEATHER: Cloudy, Breezy, wet - showers
9/14/93 - Rain, flood watches.

DATE START: 9/13/93 TIME START: 1600 - 1730
DATE FINISH: TIME FINISH:

WATER LEVEL BEFORE PUMPING: 6.05' BTOR, 32.76' BTOR TOTAL Depth

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
7 gals	1615	7.5 Gpm			Dark olive green - Black water.	~~Black~~
0 sec	1645		14°	9000/8.1	Black strong coal tar odor	some silt.
	1703		14°	9500/6.6	dark olive green to black water	coal tar odor little silt
	1714	450				Stop Pump - surge well
		Done for the Day - Rain.				
9/14/93	0800	7.5 gpm				
	0835	263	15°C	9700/9	Dark olive green - Black	strong odor silt [illegible]
6.02	0850	376			Stop pump	surge well
3.74	0903	7.5 Gpm		START pump - about 1" of sand/silt in well.		
	0932	↓	14.5°C	9700/8.2	Dark olive green - Black	coal tar odor, sandy/silt.
	0945	691	Stop pump		surge well.	
	0956	7.5 Gpm	START	Pump		
	1023	↓	14°C	9700/7.8	Dark olive green - Black	coal tar odor sandy/silty.
	1130	↓	14°C	9500/8.2	" " "	" few grains sand
	1132	1209			stop pump - surge	well.
	1142	START Pump				
stop. -	1300	1774			stop pump	No [illegible] taken.

NOTES:
9/13/93 [illegible] WL [illegible] 33.76' BTOR
[illegible]

1/100th gal

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WLP R1/FS

DEVELOPER NAME: DDM

WELL IDENTIFICATION: 9D

DEVELOPMENT METHOD: 9/29 2.5hp cent. pump-1.5in sub. 9/30 2" sub.

JOB #: 13 49 003 JSL 52

DESCRIPTION OF EQUIPMENT:

WEATHER: 9/29 light rain / 9/30 sunny, cool, breezy
9/30 sunny, cool, breezy

DATE START: 9/29
DATE FINISH: 9/30

TIME START: 13:58 — 9/29 = 4 hrs
TIME FINISH: 18:00

9/30 08:25 / 11:07 = 2.75 hrs

WATER LEVEL BEFORE PUMPING: 6.05

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
9/29	14:04	6.6 g/min	12.5	7500/8.1	greenish black w/	black silt + V. fine sand
	14 37	6.6 g/m	12.0	7000/8.0	black	2" black F.Sat in 5 gallon settling
	15:15	7.1 g/m	12.0	7000/8.0	black	
1100 gal.	15:45	7.9	12.0	7100 8.2	black/olive black	Trace fine sand
	16:15	7.5	12.0	7000 7.2	Olive black	Trace fine sand
	16 32	Stop pump				
	16.37	Start grunfos				
	16:40	3.75	12.1	7000 8.1	Olive black	with light-mod fine sand (Quartz size)
	17:11	3.75	12.5	7200 8.1	Olive black	Trace fine sand
2 3	17:39 #	2.3	12.0	7200 8.1	Olive black	
	1245	3.65				
	18:00	stop pump				
9/30	08:25	4.3				
340g	08:51	4.2	11.2	6500 7.9	Olive black	Trace fine sand
	09:25	4.3			Olive black	Trace fine sand
75g	0945 Turn pump down 3.4				Olive black	trace fine sand
138g	10:07 Turn pump down 2.3				Olive black	Trace fine sand

Pinched hose; next reading is w/ straightened hose

NOTES:

9/29 Dark gray/black at start [illegible] fine sand, Cranny

9/29/93 1350 gal. pumped in about 4 hrs.

9/30/93 550 gal. pumped

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP

DEVELOPER NAME: DDM

WELL IDENTIFICATION: 9D

DEVELOPMENT METHOD: 2" Sub. pump

JOB #: 13 49 003 JSL 52

DESCRIPTION OF EQUIPMENT:

WEATHER: Sunny, cool, breezy

(9/29) 9/30

DATE START: 9/29 TIME START: 1358 8:25

DATE FINISH: 9/30 TIME FINISH: 18.00 11 07

WATER LEVEL BEFORE PUMPING: 6.05

TIME	RATE OR VOLUME	TEMP (C)	COND./PH	WATER APPEARANCE	COMMENTS
10:42		13.0	7000 7.9	Water is very dark, olive black	
10:44		13.0	7000 7.9	with a moderate phenolic odor and	
10:45		13.0	7000 7.9	a trace of fine sand.	
					DDM
11:07	Shut off pump				

NOTES:

BARR ENGINEERING CO.

CHECKED BY _____
DATE _____

DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

MW10S 9/28/93
Static 5.96
TWD 16.0
1 GALLON Well
Start cent pumping

1223	cond	365	12 GPM	
	temp	15.0		
	pH	6.82		
1327	500 GALLONS out			
			CAN PUMP 15 GPM	
1420	Restart	cond	500	
		temp	15.0	
		pH	6.84	cloudy some sediment
1430		cond	490	
		temp	15.0	
		pH	6.78	
1445		con	500	water clear
		temp	15.0	
		pH	6.95	
1451		cond	490	
		temp	15.0	
		pH	6.85	water clear
1500		con	490	500 GAL out
		temp	15.0	
		pH	6.84	
Start 2" 1550		cond	450	
		temp	15	
		pH	7.06	

BARR ENGINEERING CO.

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

CHECKED BY _____
DATE _____

MW10S #2

1600 cond 440
temp 13
pH 6.98

1609 well is developed 200 GALLONS out
water crystal clear

BARR ENGINEERING CO.

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

CHECKED BY _____
DATE _____

MW10D #2 1445 cond 5,000
temp 12.0
pH 8.44

9/28/93

1451 cond 5,000
temp 12.0
pH 8.41

1500 con 5,000 END 500 GALLONS out
tem 12.0
pH 8.42

start cent 1550 con 4,700
temp 14.0
pH 8.43

1600 cond 5,000
temp 14.0
pH 8.40

1615 cond 5000
temp 14.0
pH 8.42

1652 cond 5,000
temp 12.0
pH 8.47

1700 cond 5000 Well development completed
temp 12.0 500 GAL
ph 8.45

BARR ENGINEERING CO.

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

CHECKED BY _____
DATE _____

9/28/93

MW10D — Static 5.94 — TWD 31.5 — Well Volume 4 GALLONS — 10 GPM 0805

	cond 6,000	1015	5	cond 5,000		
	temp 11.0		1	temp 12.0		
	pH 8.25			pH 8.42		
0846	cond 5,500	1031		cond 5,000		
	temp 11.00			temp 13.0		
	pH 8.33			ph 8.42		
0854	cond 5,000	1032 (after surge)				
	temp 12.0			cond 5,000		
	pH 8.44			temp 12.0		
				pH 8.43		
0915	cond 5,000			stop 1038		
	temp 12.0			1,500 GALLONS purged		
	pH 8.47			cnd cont pumping		
				start 2" sub		
0926	cond 6,000 pump lowered			→ 1000 GALLONS out		
	temp 12.0					
	pH 8.49		Start	1224	cond 5,000	
					temp 13.0	
0934	cond 5,000 pump lowered				pH 8.42	
	temp 12.0					
	pH 8.47			1327	500 GAL out	
				1420	con 5,000	
0940	cond 6,000				ten 12.0	
	temp 12.0				PH 8.39	
	pH 8.47					
				1432	con 7,000	
1000	cond 5500				temp 13.0	
	temp 12.0				ph 8.47	
	pH 8.45					

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: NSG-WCP

DEVELOPER NAME: KAREN Laufenberg (BARR ENGINEERING) Bryan Loveland (WTD)

WELL IDENTIFICATION: MW-11S

DEVELOPMENT METHOD: Brainerd Killman AND 2" Sub. PUMP (PUMP AND SURGE)

JOB #: 13/49-002 JSL 52

DESCRIPTION OF EQUIPMENT:
- BK 1.7" HAND PUMP
- 2" Grundfos Sub. pump

WEATHER: SUNNY 70°

DATE START: 9-8-93
DATE FINISH: 9-8-93

TIME START: 8:20 – 10:10 BK pump
TIME FINISH: ~~[illegible]~~ 10:22 – 13:36 2" submersible pump

WATER LEVEL BEFORE PUMPING: 5.42 FEET BELOW TOP OF RISER @ 8:10.

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
BK	8:20					
	8:35	27.5 gal	~~20~~ 18.5	1650/7.1	Cloudy / Brown	w/ silt
	~~8:40~~					
	8:40	55 gal	~~20~~ 18.5	1750/7.0	cloudy-clear / Brown-gray	w/ silt
	9:00	110 gal	~~19.5~~ 18.0	1700/6.9	cloudy-clear	w/ silt
		~~165 gal~~				
	9:27					
	9:37	Surged with block surge				
	9:50	165 gal	~~19.0~~ 17.0	1750/6.9	cloudy / brown	w/ silt
	10:07	220 gal	~~19.0~~ 17.0	1800/6.9	cloudy-clear	w/ silt & some sand particles
Submersible	10:22	check pump rate				
Submersible	10:31	5.5 gal/min	~~19.0~~ 17.0	1900/6.9	clear - w/ silt	
	10:45					
	10:55	5.5 gal/min	~~19.0~~ 17.0	1900/7.0	clear - w/ some silt	
	11:05	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - few grains of silt	
	11:15	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - few grains on bottom	
	11:25	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - few grains on bottom	
	11:35	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - few grains on bottom	
	11:45	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - w/o grains	
	11:55	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - few grains on bottom	
	12:05	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - w/o grains	
	12:15	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - w/o grains	
	12:25	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - w/ grains on bottom	
	12:35	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - w/o grains	

NOTES:
- Use B-K pump at first: pumped water directly into 55 gallon drum then pumped into 1500 g. tank.
- Light sheen on water in drum
- Started surging with surge block (1 3/4" diameter, 5-feet long) at 9:27 to 9:37; Resume B-K pumping
- Water through hose is very dirty after surging
- Switch to submersible; Pump into 55 gal drum to test pumping rate will pump directly into 1500 gal. tank after obtaining pump rate

Rate = 55 gal / 10 min = 5.5 gal/min

12:45	5.5 gal/min	~~19.0~~ 17.0	1900/7.1	clear - w/o grains	
12:55	5.5 gal/min	~~19.0~~ 17.0	1850/7.1	clear - w/ a few grains	
13:05	5.5 gal/min	~~19.0~~ 17.0	1850/7.1	clear - w/ a few grains	
13:15	5.5 gal/min	~~19.0~~ 17.0	1850/7.1	clear - w/o grains	
13:25	5.5 gal/min	~~19.0~~ 17.0	1850/7.1	clear - w/o grains	
13:35	5.5 gal/min	~~19.0~~ 17.0	1850/7.1	clear - w/o grains	

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: Nav-LaCP

DEVELOPER NAME: WTD (Brian Loveland)

WELL IDENTIFICATION: MW-93-11D

DEVELOPMENT METHOD: Surge & pump

JOB #: 13149-003JSL 52

DESCRIPTION OF EQUIPMENT:

WEATHER: 75° P. cloudy

Brainerd Killmen 1.7" handpump
1/2" submersible

DATE START: 9-7-93
DATE FINISH: 9-7-93

TIME START: 13:00 - 14:30 2K PUMP & SURGE
TIME FINISH: 15:00 - 16:00 2" submersible

WATER LEVEL BEFORE PUMPING: NOT RECORDED

TIME	RATE OR VOLUME	TEMP (C)	COND./pH	WATER APPEARANCE	DH	COMMENTS
13:00				cloudy	GREY w/SILT	
13:30	556AL	16.5°	2150/7.2			
13:40				"	"	
13:53	1106AL	13.9°	2290/7.3	"	"	
14:00		12.9°	2400/7.3	"	"	
14:15	1656AL	13.2°	2600/7.2	cloudy-clear		
14:30	220GAL	12.9	2700/7.2	"	"	
15:00	5.5/min.					
15:05		13.5°	2620/7.2	clear w/o silt		
15:10		13.5°	2700/7.2	clear w/o silt		
15:20		13.0°	2700/7.2			
15:30		13.2°	2800/7.6			
15:40		13.5°	2720/7.2			
15:50		13.5°	2720/7.2			
16:00		13.5°	2720/7.2			

220+330=550 GAL TOTAL

NOTES:

- NO WATER LEVEL WAS RECORDED PRIOR TO STARTING DEVELOPMENT.
- HEAVY (RAINBOW) SHEEN AND VODKA ON WATER. (ACETONE-LIKE ODOR) SLIGHT
- WATER CLEAR WHEN PUMPED W/ SUBMERSIBLE PUMP.
- SAMPLES SETTLED for 10 min + TO CHECK for SILT.
- Submersible bounced off bottom of well TO clear any remaining sediments

55 GAL/10. min

60.0
5.5
300.0
3000

PAGE 2 of 3

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: NSG-WCP

DEVELOPER NAME: KARYN LAUFENBERG (WTD) Bryan Loveland (WTD)

WELL IDENTIFICATION: MW-11 D (cont'd)

DEVELOPMENT METHOD: SURGE & PUMP

JOB #: 13149-003 JSL 51

DESCRIPTION OF EQUIPMENT: 1½" SURGE BLOCK
1'7" BK HAND PUMP
2" SUB. PUMP

WEATHER: SUNNY 70°

DATE START: 9-7-93
DATE FINISH: 9-8-93

TIME START: 14:50 - 15:50 (BK pump)
TIME FINISH: 15:57 - 18:42 (Submersible pump)

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
14:56					SURGE W/ BLOCK
15:06					↓
15:18	27.5 gal	15°C	2850/7.2	cloudy/brown/w/silt	BK PUMP
15:33	55 gal	13.0	2750/7.3	cloudy/lt. brown/w/silt	
15:45	95 gal	13.2	2750/7.3	cloudy/w/silt	
15:50	140 gal	13.0	2800/7.3	cloudy/w/silt	↓
16:07	5.5 gal/min	13.5	2750/7.3	cloudy/w/silt	submersible
16:17	5.5 gal/min	13.2	2750/7.3	clear/w/fine sand & silt on bottom	
16:27	5.5 gal/min	13.5	2800/7.3	Clear/w fine sand & silt	
16:37	5.5 gal/min	14.0	2800/7.3	clear/w/fine sand & silt on bottom	
16:47	5.5 gal/min	13.5	2800/7.3	clear/w/fine sand & silt	
16:57	5.5 gal/min	13.5	2800/7.3	clear/w/fine sand & silt	
17:07	5.5 gal/min	13.5	2800/7.3	clear/w/fine sand & silt	
17:17	5.5 gal/min	13.5	2800/7.3	clear/w/fine sand & silt	
17:27	5.5 gal/min	13.5	2800/7.3	clear/w/fine sand & silt	
17:37	5.5 gal/min	13.5	2800/7.3	clear/w/fine sand & silt	
17:47	5.5 gal/min	13.5	2800/7.3	clear/w/fine sand & silt	
17:57	5.5 gal/min	13.5	2750/7.3	clear/w/fine sand & silt	
18:07	5.5 gal/min	13.5	2750/7.3	clear/w/fine sand & silt	
18:17	5.5 gal/min	13.5	2750/7.3	clear/w/fine sand & silt	
18:27	5.5 gal/min	13.5	2750/7.3	clear/w/fine sand & silt	
18:37	5.5 gal/min	13.5	2750/7.3	clear/w/fine sand & silt	
18:42	5.5 gal/min	13.5	2750/7.3	clear/w/fine sand & silt	↓

NOTES:

- After setting submersible water is brown through hose from material at well bottom.
- 9/8/93 → plan on finishing MW-11D development on 9/9/93

3
17
55
5
850
935
140
1075

11.5 hrs → drillers bid sheet for development 9/8/93

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: NSG - WCP

DEVELOPER NAME: B. Loveland (WTD)
K. Lanfenberg (Barr)

WELL IDENTIFICATION: MW-11D (cont'd)

DEVELOPMENT METHOD:

JOB #: 13/49-003 JSL 51

DESCRIPTION OF EQUIPMENT:

WEATHER: Sunny, 60°

DATE START: 9-7-93
DATE FINISH: 9- -93

TIME START: 8:33 } 2" submersible pump
TIME FINISH: 12:20

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
8:43	5.5 gal/min	13.5	2750/7.2	clear - with fine sand + silt	2" submersible
8:53	5.5 gal/min	13.5	2700/7.2	clear - with fine sand + silt	
9:03	5.5 gal/min	13.5	2700/7.2	clear - with fine sand + silt	
9:13	5.5 gal/min	13.5	2700/7.2	clear - with fine sand + silt	
9:23	5.5 gal/min	13.5	2700/7.2	" " "	
9:33	5.5 gal/min	13.5	2700/7.2	" " "	
9:43	5.5 gal/min	13.5	2700/7.2	" " "	
9:53	5.5 gal/min	13.5	2700/7.2	clear - w/ some sand	
10:03	5.5 gal/min	13.5	2700/7.2	clear - w/ fine sand	
10:13	5.5 gal/min	13.5	2700/7.2	clear - w/ fine sand	
10:23	5.5 gal/min	13.5	2700/7.2	clear - w/ fine sand	
10:33	5.5 gal/min	14.0	2700/7.2	clear - w/ fine sand	
10:43	5.5 gal/min	14.0	2700/7.2	clear - w/ fine sand	
10:53	5.5 gal/min	14.0	2700/7.2	clear - w/ fine sand	
11:03	5.5 gal/min	14.0	2650/7.2	clear - w/ few fine sand grains	
11:13	5.5 gal/min	14.0	2650/7.2	clear - w/ few f. sand gr.	
11:23	5.5 gal/min	14.0	2650/7.2	clear - w/ few f. sand gr.	
11:33	5.5 gal/min	14.0	2650/7.2	clear - w/ few fine sand gr.	
11:43	5.5 gal/min	14.0	2650/7.2	" " "	
11:53	5.5 gal/min	14.0	2650/7.2	" " "	
12:03	5.5 gal/min	14.0	2600/7.2	" " "	
12:13	5.5 gal/min	14.0	2600/7.2	" " "	
12:20	5.5 gal/min	14.0	2600/7.2	" " "	

NOTES:

* Bailed out water before pumping to check appearance; which was g. cloudy w/ sand.
* Light sheen on water in drum.
* Water clear when pumped with submersible

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE:

DEVELOPER NAME:

WELL IDENTIFICATION: MW-11D

DEVELOPMENT METHOD:

JOB #:

DESCRIPTION OF EQUIPMENT:

WEATHER:

DATE START: 9-7-93
DATE FINISH: 9-9-93

TIME START: 13:35 } 2" submersible
TIME FINISH: 16:00 }

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/pH	WATER APPEARANCE	COMMENTS
13:35	Start	2" Submersible		→	2" Submersible
13:45	5.5 gal/min	14.0	2600/7.2	clear-lt some fine sand	water has yellow tint+odor
13:55	5.5 gal/min	14.0	2550/7.2	clear - w/some fine sand	
14:05	5.5 gal/min	14.0	2550/7.2	clear - w/ some fine sand	
14:15	5.5 gal/min	14.0	2550/7.2	clear - w/ some fine sand	
14:25	5.5 gal/min	14.0	2550/7.2	clear - w/ some fine sand	
14:35	5.5 gal/min	14.0	2550/7.2	clear - w/ some fines	
14:45	5.5 gal/min	14.0	2550/7.2	clear - w/ some fines	
14:55	5.5 gal/min	14.0	2500/7.2	clear - w/ some fines	water has a yellow tint & odor
15:05	5.5 gal/min	14.0	2500/7.2	clear - w/some fines	
15:15	5.5 gal/min	14.0	2500/7.2	clear - w/ some fines	
15:20	5.5 gal/min	14.0	2500/7.2	" "	
15:25	5.5 gal/min	14.0	2500/7.2	cloudy w/ some fines	SURGED W/2" SUB.
1535	5.5 gal/min	14.0	2500/7.2		15:18 - 15:34
1545	5.5 gal/min	14.0	2500/7.2	clear W/O FINES	
1550	5.5 gal/min	14.0	2500/7.2	clear W/O FINES	
1555	5.5 gal/min	14.0	2500/7.2	clear W/O FINES	
1600	5.5 gal/min	14.0	2500/7.2	clear W/O FINES	

NOTES:
** Pumped at total of ~3715 gallons of water from MW-11D

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS
DEVELOPER NAME: KAF

WELL IDENTIFICATION: MW-12S
DEVELOPMENT METHOD: surge and pump alternately pump w/ centrifugal

JOB #: 13149-003 JSL52
DESCRIPTION OF EQUIPMENT: pump w/ submersible

WEATHER: sunny, clear, warm 65°F, still

DATE START: 9-24-93
DATE FINISH:

TIME START: 10:30
TIME FINISH:

WATER LEVEL BEFORE PUMPING: 3.53' below top of riser
bottom of well 11.74' below riser
well length as installed is 12.24' so approx 0.5' of sed in well

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	APPEARANCE WATER	COMMENTS
entr. pump	10:43	5gal/35=8.6 gpm	19	325/6.3	cloudy smoke color, thin coating of v.f. sand grains	on bottom
	10:46	8.6gpm	18.7	323/6.6	clear, no odor, thin film of v.f. sand grains	
	11:07	8.6 gpm	18.5	315/6.7	slightly cloudy, smoke color, thin film of v. fine sand	
	11:10	8.6 gpm	18.5	320/6.6	clear, no odor, thin film of v. fine sand & silt grains	
	11:13	8.6 "	18.3	319/6.6	clear, no odor, "	
	12:04	8.6 gpm	18.5	319/6.6	clear, no odor, 1/4" Ø circle of v. f. sand grains	
	12:21	8.6 gpm	18.3	318/6.6	clear, no odor, thin film of grains	
	12:24	8.6 gpm	18.5	319/6.6	clear, no odor, 1/4" Ø circle of v.f sand & silt grains	
	12:27	8.6 gpm	18.5	318/6.6	clear, no odor, "	"
	12:33	8.6 "	19	320/6.6	clear, no odor, "	
	12:45		18.5	315/6.6	clear, no odor "	
	13:10		18.3	310/6.8	clear, no odor, 1/2 Ø of v.f. sand grains	
	13:14		18	310/6.8	clear, no odor, "	
	13:23		18	310/6.8	slightly cloudy, no odor, 1/2" Ø of v.f. sand grains & silt grains	
	13:25		18	313/6.8	clear, no odor 1/2" Ø " " " "	
	13:27		18.5	315/6.8	clear, no odor 1/4" Ø " " " "	
	13:35	↓	18.5	315/6.8	clear, no odor 20-50 grains of v.f. sand or silt	
submersible	13:56	4.3gpm	19.1	320/6.9	clear, no odor, 20 sand & silt grains	
	14:48	4.3gpm	19	330/6.9	clear, no odor ~10 silt grains	
	14:51	↓	19	329/6.9	clear, " ~"	
	14:55	↓	19	329/6.9	clear, " <10 silt grains	
	14:57				development complete	

NOTES:

10:30	to	10:40	surge with PVC plug
10:40	to	10:50	pump with centrifugal pump at 8.6 gpm
10:50	to	11:00	surge with PVC plug
11:03	to	11:15	pump with centrifugal pump at 8.6 gpm
11:15	to	11:25	surge with PVC plug
11:53	to	12:05	pump with centrifugal
12:05	to	12:15	surge with PVC plug
12:15	to	13:15	pump with centrifugal pump at 8.6 gpm
13:15	to	13:22	continue pumping but surge with hose simultaneously
13:22	to	13:37	continue pumping
13:53	to	14:57	pump with submersible Grundfos pump

total pumped: 1273 gallons

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS Phase 2
DEVELOPER NAME: K. Carstenberg (Barr) M. Mueller (CWDD)
WELL IDENTIFICATION: MW-12D
DEVELOPMENT METHOD: Pump + Surge
JOB #: 13/49-003552.52
DESCRIPTION OF EQUIPMENT: Silver Pump and Grundfos Submersible
WEATHER: Mostly cloudy, windy, 50°F

DATE START: 9/27/93
DATE FINISH:
TIME START: 12:40
TIME FINISH:

WATER LEVEL BEFORE PUMPING: 2.7 feet

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
12:40	→	→	→	→	Start Pumping
12:50	8.5 gal/min	12.0	1050/7.0	slightly cloudy	w/ few sand & silt grains
12:59	↓	12.0	1010/7.1	slightly cloudy	w/ sand & silt grains
13:06	↓	11.5	1015/7.4	slightly cloudy	w/ less sand & silt
13:16	↓	11.5	1300/7.4	clear	w/ less sand & silt
13:21	↓	11.5	1300/7.4	slightly cloudy	w/ more sand & silt after surge
13:30	↓	11.5	1400/7.4	slightly cloudy	↓
13:38	↓	11.5	1400/7.4	slightly cloudy	w/ less sand & silt
13:46	↓	11.5	1400/7.4	slightly cloudy	w/ sand & silt
13:55	↓	11.5	1400/7.4	↓	↓
14:03	↓	11.5	1400/7.4	clear	w/ less sand & silt
14:13	↓	11.5	1400/7.4	clear	w/ less sand & silt
14:20	↓	11.5	1400/7.4	clear	w/ less sand & silt
14:27	↓	11.5	1400/7.4	clear	w/ same amount as above
14:35	↓	11.5	1400/7.4	clear	w/ less sand & silt
14:50	↓	11.5	1400/7.4	clear	w/ same as above
15:00	↓	11.5	1400/7.4	clear	w/ less sand & silt
15:00	↓	11.5	1400/7.4	clear	↓
15:15	↓	11.0	1400/7.4	clear	w/ more sand & silt after surge
15:20	↓	11.0	1400/7.4	clear	w/ less sand & silt
15:29	↓	11.0	1400/7.4	clear	w/ more sand & silt after surge
15:33	↓	11.0	1400/7.4	clear	w/ less sand & silt
15:43	↓	11.0	1400/7.4	clear	w/ less sand & silt

Date

NOTES:

9/27/93 12:40 start pumping MW-12D at 8.5 gal/min
16:35 stop pumping MW-12D. Pumped out 1997.5 gallons
measured bottom of well at 33.36' & hit bottom with water level (well is clear at this time)
9/28/93 9:22 start pumping MW-12D with submersible at 6.5 gal/min.

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS Phase 2
WELL IDENTIFICATION: MW-12D
JOB #: 13/49-003 JSL52
WEATHER:

DEVELOPER NAME: K. Laufenberg (Barr)
M. Mueller (MnDOT)
DEVELOPMENT METHOD: Pump + Surge
DESCRIPTION OF EQUIPMENT: Simer Pump Model 5282
Grundfos Submersible pump

DATE START: 9/27/93
DATE FINISH:
TIME START: 12:40 – 16:35 (9/27/93) / 8:22 (9/28/93) –
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
9/27/93	15:50	8.5 gal/min	11.0	1400/7.4	clear	w/ less sand & silt
	15:59	↓	11.0	1400/7.4	clear	w/ less silt / no sand
	16:08	↓	11.0	1400/7.4	clear	w/ silt / like above
	16:15	↓	11.0	1350/7.4	clear	w/ silt / like above
	16:27	↓	11.0	1350/7.4	clear	w/ less silt
	16:35	↓	11.0	1350/7.4	clear	w/ less silt
9/28/93	8:22	6.5 gal/min				→ start w/ Submersible
	8:34	↓	11.0	1300/7.2	clear	w/ some fine sand & silt
	8:44	↓	11.0	1350/7.2	clear	w/ fine sand & silt
	8:54	↓	11.15	1350/7.2	clear	w/ less silt / no sand
	9:04	↓	11.5	1400/7.3	clear	w/ less silt
	9:14	↓	11.0	1350/7.3	clear	w/ less silt
	9:24	↓	11.0	1350/7.3	clear	w/ same as above
	9:34	↓	11.0	1400/7.3	clear	w/ same as above
	9:40	↓	11.5	1350/7.3	clear	↓
	9:47	↓	11.5	1350/7.3	clear	w/ less silt
	9:56	↓	11.5	1350/7.3	clear	w/ less silt
	10:03	↓	11.5	1350/7.3	clear	w/ less silt (DONE)
	10:05				→ Finished Developing / Pull pump out	

NOTES:
10:05 Decide to shut off pump & pull out from well.
Pumped 669.5 gals today
Pumped 2667.0 gals total

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: NCP RI/FS Phase 2

DEVELOPER NAME: K. Lanfear Jasa (Barr) P. Jensen (WTD)

WELL IDENTIFICATION: MW-135

DEVELOPMENT METHOD: Surge + Pump

JOB #: 13/49-003 55L

DESCRIPTION OF EQUIPMENT: Simer Pump with foot. + Surge block Submersible pump (Grundfos)

WEATHER: Overcast, 60°F

DATE START: 9/22/93

TIME START: 8:52 (9/22/93)

DATE FINISH:

TIME FINISH:

WATER LEVEL BEFORE PUMPING: 4.34'

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
8:52	~~15gal/min~~				Start pumping
9:05	15gal/min	17	390/7.6	clear	very few sand grains
9:25	↓	17	340/7.8	clear	w/ more sand grains
9:35	↓	17	350/7.8	clear	w/ sand ~~grains~~
9:45	↓	17	350/7.8	clear	w/ less sand
10:05	↓	17	340/7.8	clear	w/ less sand
10:15	↓	17	340/7.8	clear	w/ sand
10:25	↓	17	340/7.8	clear	w/ less sand
10:35	↓	17	350/7.8	clear	less sand
10:55	↓	17	345/7.8	clear	w/ sand (during 4th and 5th surge)
11:05	↓	17	335/7.8	clear	w/ less sand
11:02	↓	17	325/7.8	clear	w/ less sand
12:00	5gal/min				Start pumping
12:15	↓	17.5	350/7.8	clear	very few sand grains
12:30	↓	18	350/7.8	clear	very few sand grains
12:40	↓	18	350/7.8	clear	w/ ~30 sand grains
12:50	↓	18	355/7.8	clear	w/ ~10 sand grains
13:00	↓	18	355/7.8	clear	w/ ~10 sand grains
13:10	↓	18	355/7.8	clear	w/ < 10 sand grains
13:20	↓	18	355/7.8	clear	w/ < 10 Sand grains
13:30	↓	18	310/7.8	clear	w/ < 10 Sand grains
13:43	↓	18	355/7.8	clear	w/ <10 Sand grains
14:00	↓	18	355/7.8	clear	w/ more sand

NOTES:

pumped 1770 gal

8:52 Start pumping MW-135
→ MW-135 Pump Rate: 5gal/20sec = 15 gal/min
9:05 Stop pump & surge MW-135 with surge block for 10 minutes
9:15 Stop surging & start pump
9:45 Stop pumping & surge for 10 minutes
9:55 Stop surging & start pump
10:36 Stop pumping & start surging MW-135
10:46 Start pumping MW-135
11:20 Turn off pump & set up to use Submersible pump
12:00 Start pumping with submersible pump (Grundfos). Pump Rate 5gal/53sec ≈ 5gpm

~~2155~~ 2570
~~3155~~ TOT

1770 gal w/ 2"
~~2355~~ w/ Cent.

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS Phase 2

DEVELOPER NAME: K. Lawrenberg (Barr) Pat Jensen (NTD)

WELL IDENTIFICATION: MW-135

DEVELOPMENT METHOD: Pump & Surge

JOB #: 13/49-003 JSL

DESCRIPTION OF EQUIPMENT: See page 1

WEATHER: See page 1

DATE START: 9/22/93

TIME START: 8:52 (9/22/93)

DATE FINISH:

TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME (12/10/93)	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
14:10	5 ~~(5)~~ gal/min	18	325/7.8	clear	<10 sand grains
14:20	~~(5)~~ ↓	18	355/7.8	clear	~5 sand grains
14:30	↓	18	355/7.8	clear	~5 sand grains
14:40	↓	18	~~380~~/7.8	clear	~5 sand grains
14:50	↓	18	310/7.8	clear	No Sand

200

NOTES:

14:40 Finished developing
Pumped a ~~total~~ of 2620 gallons from MW-135

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: NCP RI/FS Phase 2

DEVELOPER NAME: K. Lunkenberg (Barr) Pat (WTD)

WELL IDENTIFICATION: MW-13D

DEVELOPMENT METHOD: Pump & surge

JOB #: 13/49-003 JSL

DESCRIPTION OF EQUIPMENT: ATV B-57 rig pump & surge block.

WEATHER: Cloudy, overcast, 60°F to Partly Sunny, 68°F

DATE START: 9/22/93 TIME START: 8:50 (9/22/93)

DATE FINISH: 9/23/93 TIME FINISH: 15:50

WATER LEVEL BEFORE PUMPING: 4.34'

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
8:50					Start Pumping
9:00	8.5 gal/min	12.0	5950/8.1	Gray-brown cloudy	w/ fine sand & silt
9:10	↓	12.0	5200/8.8	Brown cloudy	w/ fine sand & silt
9:20	↓	12.0	5000/9.8	Brown cloudy/brown tint	w/ less fine sand & silt
9:30	↓	12.0	5000/8.8	Brown cloudy/brown tint	w/ less fine sand & silt
9:40	↓	12.0	5000/9.5	Brown tint	w/ fine sand & silt
9:50	↓	12.0	5000/9.6	Brown tint	w/ fine sand & silt
10:00	↓	12.0	5000/9.6	Brown tint	w/ min fine sand & silt
10:10	↓	12.0	5000/8.8	Brown tint	Less fine sand & silt
10:30	↓	12.0	6000/8.8	Brown tint	more sand & silt
10:43	↓	12.0	6000/8.6	Brown/cloudy tint	Sand & silt
10:50	↓	12.0	6000/8.8	Brown tint	less sand & silt
11:00	↓	12.5	6200/8.8	Brown tint	less sand & silt
11:15	↓	13.0	6000/8.8	Brown tint	w/ sand & silt
11:20	↓	13.0	6000/8.8	Brown tint	w/ sand & silt
11:33	↓	13.0	6000/8.6	Brown tint	w/ less sand & silt
11:43	↓	13.0	6500/8.8	Brown tint	w/ sand & silt
11.53	↓	13.0	6500/8.8	Brown tint	w/ sand & silt
12:05	↓	13.0	6000/8.8	Brown tint	w/ sand & silt
12:15	↓	13.0	7000/8.8	Brown tint	w/ less sand & silt
12:20	↓	13.0	6500/8.8	Brown tint	w/ less sand & silt
12:35	↓	13.0	6500/8.8	Brown tint	w/ sand & silt
12:45	↓	13.0	6500/8.8	Brown tint	w/ sand & silt

NOTES:

8:50 start pumping MW-13D Pump Rate: 5gal/35sec = 8.5 gal/min

10:10 Turn off pump & surge for 10 min

10:20 Start surging & pumping

10:31 Stop pumping & surging

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: VCP RI/FS Phase 2 **DEVELOPER NAME:** K. Lautenberg

WELL IDENTIFICATION: MW-13D **DEVELOPMENT METHOD:** Pump & surge

JOB #: 13/49-003 SL **DESCRIPTION OF EQUIPMENT:**

WEATHER:

DATE START: 9/22/93 **TIME START:** 8:50 (9/22/93)
DATE FINISH: **TIME FINISH:**

WATER LEVEL BEFORE PUMPING: 4.34'

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
12:55	8.5 gal/min	~~16~~ 13	6500/6.5	Brown tint	w/ sand & silt
13:05	↓	~~15~~ 13	6000/8.8	Brown tint	w/ less sand & silt
13:15	↓	13	6000/8.8	Brown tint	w/ less sand & silt
13:45	10 gal/min	13	7500/8.8	Cloudy brown/foamy/tint	w/ more sand & silt
14:05	↓	13	8000/8.8	Brown cloudy/foamy/tint	w/ sand & silt
14:15	↓	13	7500/8.8	Brown cloudy/foamy/tint	w/ less sand & silt
14:25	↓	13	7500/8.8	Brown cloudy/foamy/tint	w/ sand & silt
14:37	↓	13	7500/8.8	Brown/foamy/w/tint	w/ sand & silt
14:45	↓	13	7000/8.8	Brown/foamy/w/tint	w/ sand & silt
15:05	↓	13.5	7000/8.8	Brown tint/foamy	w/ sand & silt
15:15	↓	13.5	7000/8.8	Brown tint/foamy	w/ sand & silt
15:25	↓	13.5	7500/8.8	Brown tint/foamy	w/ sand & silt
15:35	↓	13.0	7500/8.8	Brown tint/foamy	w/ sand & silt
15:45	↓	12.5	7500/8.8	Brown tint/foamy	w/ less sand & silt
15:55	↓	12.5	7500/8.8	Brown tint/foamy	w/ less sand & silt
16:45	6.6 gal/min	~~13.5~~	~~7500/8.8~~	~~Brown tint/foamy~~	~~w/ more sand & silt~~ → start pump
16:50	↓	13.5	7500/8.8	Brown tint/foamy	w/ more sand & silt
17:00	↓	12.5	7500/8.8	Brown tint/foamy	w/ sand & silt
17:10	↓	12.5	7500/8.8	Brown tint/foamy	w/ less sand & silt
17:20	↓	13.0	7500/8.8	Brown tint/foamy	w/ sand & silt
17:29	↓	13.0	7500/8.8	Brown tint/foamy	w/ sand & silt

NOTES:

13:10 stop pump & surge for 10 minute.
13:30 stop pumping, set up Simer pump for pumping MW-13D.
13:35 start pumping with Simer pump Pump rate: 10 gal/min
16:00 stop pumping
16:45 start pumping at a new pump rate of: 6.6 gal/min
17:30 stop pump for day of 9/22/93
Pumped a total of 4557 gallons of water from MW-13D today 9/22/93

ter removed today 9/23/93

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS

DEVELOPER NAME: KAF

75 gal
gal
50 gal
50 gal
325 gal total

WELL IDENTIFICATION: MW-13D

DEVELOPMENT METHOD: simultaneous surge & pump

JOB #: 13149-003JSLS2

DESCRIPTION OF EQUIPMENT: • surging with PVC pipe with pump hose down the center
• then centrifugal pump
• then submersible

WEATHER: partly cloudy, 10 mph wind from NW, cool 60°F
8:30: water level before pumping 4.42' below riser

on 9-23

DATE START:
DATE FINISH:

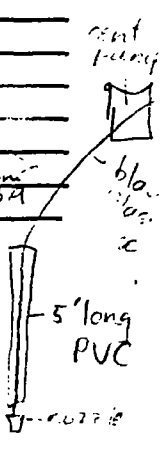
TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
-23-93	9:18:30	5gal/65sec	15°	11000/8.6	milky v. dk gray, mod odor,	1/2" v.f. sand settles out of full.
	9:29	"	12°	10000/8.6	cloudy greenish brown,	1/8" v. f. sand settles out of jar
	10:01	"	13.5°	9000/8.6	milky v dk. gray, mod odor	1/2" sed in jar
	10:55	5gal/38sec	13°	9000/8.6	milky v. dk gray, mod odor,	3/4" v.f. sand settles out of ja
er surge	11:00	"	12.5°	9000/8.6	cloudy olive, mod odor,	1/4" v.f. sand settles out
ter pump	11:36	"	13.5°	9000/8.6	clear olive, mod odor,	1/8" to 1/16" v.f. sand settles out
ter surge	13:17	7.9 gpm	13°	12000/8.6	cloudy v. dk gray, mod od	3/4" v.f. sand settles
fter pump	13:21	7.9 "	13	9500/8.6	clear olive, m odor,	1/4" v. f sand
fter surge	13:29	7.9 gpm	13	9800/8.5	cloudy, v.dk gray, mod odor,	3/4" v f. sand
fter pump	13:35	7.9 gpm	13	9500/8.4	clear, olive, m. odor,	1/8" v. f. sand settling out
fter surge	13:45	7.9 gpm	14	9800/8.4	cloudy v. dark gray, mod odor,	3/4" v f sand
pumping	13:47	7.9 gpm	13	9800/8.4	clear olive, mod odor,	thin film of v.f. sand at bott
inuous p	13:57	7.9 gpm	13	9500/8.4	clear olive, mod odor,	50-100 sand grains settle out
	14:02	7.9 gpm	13	9500/8.4	clear olive, mod odor,	v. fine coating of v. fine sand & silt as
	14:07	7.9 gpm	13	9700/8.4	clear olive, mod odor,	50-100 v.f sand grains & silt grains
					water froths when shaken	
	14:13	7.9 gpm	13.5	9500/8.4	clear olive, mod odor	50-100 v.f. sand & silt grains
	14:27	7.9 gpm	13.5	9500/8.4	clear olive, mod odor	few v. f. sand & silt grains
	14:49	~5 gpm	14.5	9500/8.4	clear beer brown"	"
	14:52	5.5 gpm	14	9500/8.4	clear beer brown, mod odor	50 v. f. sand & silt grains
	15:00	5.5	14	9500/8.4	clear beer brown,	circle 1/2" Ø at bottom of v.fine sand & silt
	15:09	6.8 gpm	15	9500/8.4	clear beer color	"
	15:15	6.8	13.5	9500/8.4	clear beer color, mod	odor, 1/4" Ø w/ v.f. sand & silt grains
	15:21	6.8	13.5	9500/8.4	clear beer color,	1/4" Ø w/ v. f. sand & silt grains
	15:28	6.8	13.0	9500/8.4	clear beer color	"

NOTES:

8:45 to 8:50 surge with rod made of BK pump brought 1' of sed in well.
8:55 to 9:05 pump with centrifugal at 5 gal/65 sec rate
9:08 to 9:13 surge with plunger rod brought 1.1' of sed in well
9:18 to 9:33 pump with centrifugal
9:33 to 10:01 simultaneously surge w/ hose while pumping
10:41 to 11:37 simultaneously surging & pumping with a 5'-long PVC tube
13:10 to 11:55 simultaneously surging & pumping
11:55 to 14:30 continuous pumping with centrifugal pump
14:34 to 15:50 pumping with submersible at 14:51 increased rate to 5.5 gpm
at 15:00 increase to 6.8 gpm from 5.4



MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS

DEVELOPER NAME: KAF

WELL IDENTIFICATION: MW-13D

DEVELOPMENT METHOD: surge + pump pump

JOB #: 13/49-003JSLS2

DESCRIPTION OF EQUIPMENT:

WEATHER:

DATE START:
DATE FINISH: 9-23-93

TIME START:
TIME FINISH: 15:50

WATER LEVEL BEFORE PUMPING:

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
9/23/93	15:34	6.8 gpm	14	9500/8.4	beer color, clear	same as above
	15:40	6.8 gpm	14	9500/8.4	beer color	1/8" Ø w/ silt + v.f. sand grains
	15:43	6.8	13	9500/8.4	"	"
	15:46	6.8	13	9500/8.4	"	"
	15:48	6.8	13	9500/8.4	"	< 1/8 Ø "
	15:50	development complete				

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS Phase 2

DEVELOPER NAME: K. Laufenberg, M. Mueller

WELL IDENTIFICATION: MW-145

DEVELOPMENT METHOD: Pump & Surge

JOB #: 13149-003 JSL

DESCRIPTION OF EQUIPMENT: Simer pump w/ foot valve. Model 2825

WEATHER:

DATE START: 9/21/93

TIME START:

DATE FINISH:

TIME FINISH:

WATER LEVEL BEFORE PUMPING: 1.46'

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
9/21/93 8:50	15 gal/min	17.5	380 / 7.2	clear	w/ a few fine sand grains
9:00	15 gal/min	17.0	380 / 7.4	clear	w/ a few fine sand grains
9:20	15 gal/min	17.0	380 / 7.4	clear	w/ a few fine sand grains
9:30	15 gal/min	17.0	380 / 7.4	clear	w/ a few fine sand grains
9:40	15 gal/min	17.0	395 / 7.4	clear	w/ a few fine sand grains
10:05	15 gal/min	17.0	380 / 7.4	clear	w/ a few fine sand grains
10:18	15 gal/min	17.0	390 / 7.4	clear	~10 sand grains
10:40	15 gal/min	17.0	370 / 7.4	clear	~20 sand grains
10:50	15 gal/min	17.0	390 / 7.4	clear	15-20 sand grains
11:00	15 gal/min	17.0	415 / 7.4	clear	Less sand grains
13:52	15 gal/min	17.5	420 / 7.6	clear	~20 sand grains
14:13	15 gal/min	17.5	410 / 7.6	clear	20-50 sand grains
14:36	15 gal/min	17.0	395 / 7.6	clear	50 grains sand

NOTES:

8:35 Start pumping MW-145; Pump rate: 20sec 15 gal = 15 gal/min

8:55 Stop pump & surge MW-145 for 10 minutes with surge block.

9:05 Start pump.

9:40 stop pump & surge MW-145

9:50 start pumping MW-145

10:20 Stop pump & surge MW-145

10:30 start pumping MW-145

[illegible] surge MW-145

[illegible]

13:38 start pump

13:53 stop pump, start surge for 10 min

14:01 start pump

14:14 stop pump, surge for 10 min

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: USG WC4

DEVELOPER NAME: Stephen Boyts (Barr) Mike Mueller (WTD)

WELL IDENTIFICATION: MW 14S

DEVELOPMENT METHOD: pump + surge

JOB #: 13 49 003 JSL

DESCRIPTION OF EQUIPMENT:

WEATHER: cloudy 60°

DATE START: 9/21/93

TIME START:

DATE FINISH:

TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/pH	WATER APPEARANCE	COMMENTS
14:47	15gal/min	17.5	395/7.6	clear	20-30 grains sand
14:57	15gal/min	17.5	395/7.6	clear	w/10-20 grains sand
15:10	15gal/mn	17.5	395/7.6	slightly cloudy	w/fine sand
15:13	15gal/min	17.5	397/7.6	clear	w/50+ grains silt
15:25	15gal/mn	17.5	397/7.6	clear	w/10-20 grains silt
15:35	15gal/mn	17.2	397/7.6	clear	w/10-15 grains silt
15:55	15gal/min	17.2	397/7.6	clear	w/ 50+ grain silt
16:05	15gal/min	17.5	397/7.6	clear	w/ 20-30 grains silt
16:15	15gal/min	17.5	397/7.6	clear	w/ 10-20 grains silt
16:55	4.5gal/mn	17.5	378/7.6	cloudy	w/very fine grained sand (silt)
17:05	4.5gal/min	17.5	378/7.6	clear	w/less than 5 grains
17:15	4.5gal/min	17.5	380/7.6	Clear	w/ 31-50 grains silt (less than prior)

NOTES:

14:20 start pump
14:57 stop pump, start surge for 10 min
15:04 start pump
15:37 stop pump, surge for 10 min
15:49 start pump
16:37 stop pump
16:43 start pump w/grundfos submersible (4.5 gal/min)
17:30 stop pump

772 mm x 15 = 4080

47 mm x 4.5 = 212

4080 w/ cent
212 w/ 2"

1.292

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS Phase 2

DEVELOPER NAME: K. Laufenberg (Barr)
M. Mueller (WTD)

WELL IDENTIFICATION: MW-14D

DEVELOPMENT METHOD: Pump & Surge

JOB #: 13/49-003JSL

DESCRIPTION OF EQUIPMENT: Pump with hose pump & ATV rig pump (centrifugal)

WEATHER: Cloudy, rainy, 60°

DATE START: 9/20/93
DATE FINISH:

TIME START: 12:00 - 17:15 (9/20/93) 8:
TIME FINISH:

WATER LEVEL BEFORE PUMPING: 1.5 feet

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
12:00	Start pump	~~13~~	~~395~~		
12:27	5 gal/min	13	395/8.1	Gray-brown, cloudy	
12:35	5 gal/min	12.3	400/8.1	Gray-brown, cloudy	w/ fine sand & black silt
12:45	5 gal/min	12.0	405/8.1	Gray-brown, cloudy	w/ fine sand & black silt
12:55	5 gal/min	12.0	405/8.1	Gray-brown cloudy/clear	w/ fine sand & black silt
13:00	5 gal/min	12.0	390/8.6	Gray-brown cloudy/clear	w/ fine sand & black silt
13:20	5 gal/min	12.0	380/8.5	Gray-brown, cloudy/clear	w/ fine sand & black silt
13:30	5 gal/min	12.0	380/8.5	Gray-brown cloudy/clear	w/ fine sand & black silt
13:40	5 gal/min	12.0	375/8.5	Gray-brown, clear/cloudy	w/ less fine sand & silt
13:50	5 gal/min	12.0	370/8.5	Mostly clear	w/ less fine sand & silt
14:00	5 gal/min	12.0	370/8.5	Mostly clear	w/ some fine sand & silt
14:10	5 gal/min	12.0	370/8.5	Mostly clear	w/ some fine sand & silt
14:20	5 gal/min	12.0	370/8.5	Mostly clear	w/ less fine sand & silt
14:30	5 gal/min	12.0	360/8.5	Mostly clear	w/ less fine sand & silt
14:40	5 gal/min	12.0	365/8.5	" "	" " "
14:55	Start	Pump			
15:05	5 gal/min	12.0	360/8.4	Gray-brown cloudy	w/ fine sand & silt
15:15	5 gal/min	12.0	355/8.4	less cloudy	w/ fine sand & silt
15:25	5 gal/min	12.0	355/8.4	Gray-brown cloudy	w/ fine sand & silt
15:40	5 gal/min	12.0	360/8.4	" "	w/ fine sand & silt
15:55	5 gal/min	12.0	360/8.4	Cloudy/clear	with fine sand & silt
16:05	5 gal/min	12.0	355/8.4	clear	with fine sand & silt
16:05	Stop	pump			

NOTES:

9-20-93 Pump rate: 25 gals/5 min = 5.0 gal/min
14:44 Turn off pump & surge well for 10 min [illegible]
14:55 Stop surging start pump, Pump Rate: 25 gals/5 min = 5 gal/min
16:05 Stop Pump & surge [illegible] 14D [illegible]

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

page 3 of ___

SITE: WCP RI/FS Phase 2

DEVELOPER NAME: K. Laufenberg (Barr) M. Mueller (WTD)

WELL IDENTIFICATION: MW-14D

DEVELOPMENT METHOD: Pump & surge

JOB #: 13/44-003JSL

DESCRIPTION OF EQUIPMENT: Centrifugal pump & hose from rig.

WEATHER: cloudy, rainy

DATE START:
DATE FINISH:

TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
9/20/93	16:15	Restart	Pump			
	16:25	5 gal/min	12	350/8.4	Gray-brown cloudy	w/ fine sand & silt
	16:40	5 gal/min	12	350/8.3	Light cloudiness	w/ fine sand & silt
	16:50	5 gal/min	12	350/8.3	clear/cloudy	w/ fine sand & silt
	17:00	5 gal/min	12	350/8.3	clear/cloudy	w/ fine sand & silt
	17:10	5 gal/min	12	350/8.3	clear/cloudy	w/ fine sand & silt
	17:15	5 gal/min	12	350/8.3	clear/cloudy	w/ fine sand & silt
	17:15	Stop pump for 9/20/93				
9/21/93	8:35	Start	Pump			
	8:45	5 gal/min	12.5	350/8.2	Brown-gray cloudy	w/ fine sand & black silt
	8:55	5 gal/min	13.0	350/8.3	slightly cloudy	w/ fine sand & silt
	9:05	5 gal/min	13.0	350/8.3	fairly clear	w/ fine sand & silt
	9:50	5 gal/min	13.0	345/8.3	slightly cloudy	w/ fine sand & silt
	10:05	5 gal/min	12.5	350/8.3	clear	w/ less fine sand & silt
	10:15	5 gal/min	12.5	345/8.3	clear	w/ few fine sand & silt
	10:25	5 gal/min	12.5	345/8.3	clear	w/ some fine sand & silt
	10:35	5 gal/min	12.5	345/8.3	clear	w/ less fine sand & silt
	11:05	[illegible]	[illegible]	[illegible]	[illegible]	w/ sand & silt
	11:15	5 gal/min	12.0	345/8.3	clear-cloudy	w/ fine sand & silt
	11:25	5 gal/min	12.0	340/8.3	clear	w/ fine sand & silt
	14:02	10 gal/min	13.0	355/8.3	cloudy gray	w/ some gray/black sand
	14:25	10 gal/min	13.0	355/8.3	clear	w/ some gray/black sand

NOTES:

9/20/93 16:15 Restart Pump Rate 5 gal/min
17:15 Stop pumping for 9/20/93 [illegible]
[illegible]

9/21/93 8:10 Surge MW-14D for 10 minutes
8:35 Start pump on MW-14D: Pump rate 5 gal/min
[illegible] pump off
~~9:00 [illegible]~~ 9:29 Surge MW-14D for [illegible]
9:30 Stop surging & pump MW-14D
10:38 Stop pump & surge for 5 minutes
10:55 Start pump for MW-14D
11:[illegible] Stop pump
12:40 Start surge for 5 min
12:48 Start pump 10 gal/min
[illegible] Stop pump, surge for 5 min

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: USG WCP

DEVELOPER NAME: SJB
mike mueller

WELL IDENTIFICATION: MW 141D

DEVELOPMENT METHOD: pump + surge

JOB #: 13/49 003 JSL

DESCRIPTION OF EQUIPMENT:

WEATHER: cloudy 60°

DATE START: 9/2/93
DATE FINISH:

TIME START: 14:42
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
14:52	10gal/min	13.0	355/8.2	slightly cloudy	w/grey & black sand (fine)
15:02	10gal/min	13.0	347/8.3	slightly cloudy	w/grey + black sand (fine)
15:17	10gal/min	13.0	350/8.3	very slightly cloudy	" "
15:30	10gal/min	13.0	350/8.3	" "	w/less grey + black sand (silt?)
15:40	10gal/min	13.0	345/8.3	" "	" "
15:50	10gal/min	12.5	342/8.3	" "	" "
16:00	10gal/min	13.0	340/8.3	clear	w/ fine grey sand
16:10	10gal/min	13.0	338/8.3	clear	w/ fine grey sand
16:20	10gal/min	13.0	338/8.3	clear	w/ fine grey sand (silt)
16:35	10gallmin	13.0	330/8.3	clear	w/very fine grey sand (silt)
16:45	10 gal/min	13.0	338/8.3	clear	w/less than previous
16:57	10gal/min	13.0	330/8.3	clear	w/less than previous
17:10	10gal/min	13.0	335/8.3	clear	" " " "
17:20	10gal/min	13.0	335/8.3	clear	" " " "
17:45	4.5gal/min	13.5	335/8.3	moderately cloudy	w/silt covering bottom of jar (fine/layer)

NOTES:
14:42 start pump
17:30 stop pump
17:37 start pump (grundfos submersible) 4.5 gal/min
17:46 stop pump (too much silt)

WELL NOT DONE
1. clay in well
2. call JSL about alternate
3.

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS Phase 2
WELL IDENTIFICATION: MW-14D
JOB #: 13149-003 JSL
WEATHER: Overcast, 50°F

DEVELOPER NAME: K. Laufenberg (Barr), M. Mueller (WTD) & P. Jensen (WTD)
DEVELOPMENT METHOD: Pump & surge
DESCRIPTION OF EQUIPMENT: Simer Pump

DATE START: 9/28/93
DATE FINISH:
TIME START: 13:30 (9/28/93)
TIME FINISH:

WATER LEVEL BEFORE PUMPING: 1.5 feet

9/28/93 TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
13:30	12 gal/min →				Start pumping
13:40	↓	12.0	330/8.1	slightly cloudy	~1" diameter of fine sand & silt
13:48	↓	12.0	330/8.0	slightly cloudy	↓
13:59	↓	12.0	330/8.0	Brown gray cloudy w/	sand & silt after surging
14:11	↓	12.0	330/8.0	slightly cloudy	~1" diam. of sand & silt
14:20	↓	13.0	335/8.0	Less cloudy – clear	↓
14:30	↓	13.0	330/8.0	clear	~3/4" diam. of sand & silt
14:42	↓	13.0	330/8.0	cloudy gray after surge w/	sand & silt
14:58	↓	13.0	335/8.0	slightly cloudy	~1" diam. of sand & silt
15:06	↓	13.0	340/8.0	cloudy gray w/ sand &	silt after surge
15:17	↓	13.0	335/8.0	slightly cloudy	~1" diam. of sand & silt
15:29	↓	13.0	335/8.0	clear	~3/4" diam. of sand & silt
15:37	↓	13.0	335/8.0	clear	↓
15:42	10 gal/min →				change pump rate
15:51	↓	13.0	330/8.0	clear	~3/4" diam. of sand & silt
16:00	↓	13.0	330/8.0	clear	~1/2" diam. of sand & silt
16:12	↓	12.5	330/8.0	clear	↓
16:22	↓	12.5	330/8.0	clear	↓
16:24	8.5 gal/min →				change pump rate
16:30	↓	12.5	330/8.0	clear	less sand & silt than previous
16:40	↓	12.5	325/8.0	clear	Mostly silt, like above
16:50	↓	12.5	330/8.1	clear	↓
17:01	↓	12.5	330/8.1	clear	less silt than above

NOTES:
13:30 Start pumping MW-14D. Pumping at 12 gal/min
15:42 Lower pump rate to 10 gal/min
16:24 Lower pump rate to 8.5 gal/min

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS Phase 2 — DEVELOPER NAME: ~~J. Lautenberg~~ (Barr) M. Mueller & D. Jensen (WTD)

WELL IDENTIFICATION: MW-14D — DEVELOPMENT METHOD: Pump + Surge

JOB #: 13/49-003 JSL — DESCRIPTION OF EQUIPMENT: Simer Pump Model C82

WEATHER: Overcast

DATE START: 9/28/13 — TIME START:

DATE FINISH: — TIME FINISH:

WATER LEVEL BEFORE PUMPING:

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
9/28/13	17:10	8.5 gal/min	12.0	330/8.1	clear	w/ silt like a bone
	17:20	↓	12.0	330/8.1	clear	↓
	17:30	↓	12.0	330/8.1	clear	↓
	17:30					Stop pump
7/29/13 JAB	0755	<5 gpm				
	0858	200 gal	11.0	350/7.8	Cleat w/ lots of suspended fines	- Stop Pump - switch to centrifugal pump
					TD = 29.5 Bgs, TD As built 30.5 ft Bgs.	
			Switch to	Centrifugal pump. & Pump & surge well		
10-260	0912	~10 gpm			START Pump	
13-275	0920				- surged 3 Times Already - cloudy water	
8.3 gpm	0933				Surging well every 3 minutes (or five counts) & letting	
	1022				- Reduce pumping rate	it clean up
	1033		11.5	350/7.8	Rate. Water has fines	Water Has a Hydrogen Sulfide odor.
				Clear water	fines, steam/surging	
	1053	800			- Switch to Grundfos	
	1036	4.7 gpm	- START	Grundfos	pump - ~ 3 gpm	
	1056	~1.7 gpm	Turn Down	Pump	- water has less fines stand.	
	1100	↓	12.0	325/7.8	clear - no odor	
	1108		12.3	330/7.8		
	1112		12.1	330/7.8		
	1114		12.1	330/7.8		
	1115	Time pump off.				

NOTES:

17:30 Stop pumping for day of 9/28/13. Plan on resuming pumping with groundwater recirculation system to develop MW-14D

Pumped 2505 gallons on 9/28/13

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: NSG-WCP

DEVELOPER NAME: JMF (BARR). MIKE (WTD)

WELL IDENTIFICATION: MW-15S

DEVELOPMENT METHOD: PUMP AND Surge

JOB #: 13149-003JSL

DESCRIPTION OF EQUIPMENT: SAME @ 15D

WEATHER: p. cloudy 60°

DATE START: 9-12-93 TIME START: 10:30

DATE FINISH: TIME FINISH:

WATER LEVEL BEFORE PUMPING: 2.91' TOR 11.73 TOTAL Depth

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
	1039					
	10:46	13 G.P.M.	17.0	411/7.1	Clear w/ trace of silt	PUMP W/ RIG PUMP
	10:51	↓	17.0	400/7.1	" "	
21	11:00	↓				Surge w/ slug
	11:10	—	[illegible]	[illegible]/7.1	Cloudy w/ SAND & SILT	↓
	11:15	13 GPM	17	420/7.1	"	PUMP W/ RIG
	11:40	↓	17	425/7.1	Clear w/ Trace of SAND	↓
30	11:45	↓	—	—		Surge w/ slug
	11:50	13 GPM			Cloudy w/ sand & silt, Grayish Brown	START Pump after surging
	12:20	↓	17	440/7.1	Clear NO SAND.	
41	12:31	↓		stop pump	— start again at 1300.	Surge.
100-	13:25	13 GPM	17	460/7.2	Trace of silt	
78	1418	↓	17	440/7.2		
		2210				
10	14:50	—	—	—	—	START SUB 2"
	15:21		18	460/7.4	Clear w/ Trace of silt	
	15:50	3 GPM	17	470/7.1	Clear w/ a few silt grains	
	15:55		18	450/7.2	" "	
	16:00		17	450/7.2	" "	
	16:15		17	450/7.2	" "	
	16:20		17	450/7.2	" "	
	END 16:25					
		285				

2495 TOTAL pumped

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: NSP-WCP

DEVELOPER NAME: J.H.N. FOX (BARR ENG) MIKE (WTO)

WELL IDENTIFICATION: MW-15D

DEVELOPMENT METHOD: PUMP & SURGE

JOB #: 13149-003 JSL 52

DESCRIPTION OF EQUIPMENT: 5'/1.7" surge block, RIG PUMP = "House pump" peristaltic type, 2" sub pump = Grundfos

WEATHER: P. cloudy 70°

DATE START: 9-11-93

TIME START: 15:15

DATE FINISH:

TIME FINISH:

WATER LEVEL BEFORE PUMPING: 2.75'

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
15:00					SURGE W/ BLDG
15:15				CLOUDY W/ SAND & SILT	↓
15:32	250 START PUMP		~SURGE	for 10 MINS.	PUMP W/ RIG PUMP —
15:50	START SURGE			clear w/ some SAND & SILT	SURGE W/ SLUG
16:00	~~700~~ START PUMP				PUMP W/ RIG PUMP
16:05				CLOUDY W/ SAND & SILT	
16:10	1050 GAL	13.5	2350/6.9	CLOUDY W/ SAND & SILT	
16:16	1100 GAL	12.5	2200/6.7	CLEAR W/ SAND & SILT	
16:35	1300 GAL	13.0	2200/6.8	clear w/a trace of F.MS SAND	
END	FOR DAY				
9/12/93 — 0725		~~13.5~~	~~2200/6.7~~	~~clear w/a trace of sand~~	SURGE W/ BAILER
0735	1400 GAL	13.5	2200/6.7	clear w/a trace of silt	PUMP W/ RIG PUMP
0751	1450 GAL	12.5	2200/6.6	" "	
0800	1500 GAL	12.5	2200/6.7	" "	
0810	1550 GAL	12.5	2150/6.6	clear w/ less SAND	
0815	1600 GAL				SURGE W/ BAILER
0825	1650 GAL	12.5	2200/6.6	clear w/ trace of SILT	PUMP W/ RIG PUMP
PUMPED 0835	1700 GAL	12.5	2200/6.6	clear w/ SAND & SILT	
0950	1800 GAL	12.5	2200/6.6	" "	
0855	1850 GAL				SURGE W/ BAILER
0915	1850	12.5	2200/6.8	clear w/ SAND AND SILT	PUMP W/ RIG PUMP
PUMPED 0936	2100	12.5	2100/6.9	" "	
10 00	2300	12.3	2100/6.8	clear w/ trace of SILT	
10:10	2350				2" SUB INSTALLED

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: NSG WELP

DEVELOPER NAME: JMF

WELL IDENTIFICATION: MW-15D

DEVELOPMENT METHOD:

JOB #:

DESCRIPTION OF EQUIPMENT:

WEATHER:

DATE START:
DATE FINISH:

TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
9/12 10:25	3.6 GPM	13.0	2100/6.7	clear w/ trace of silt	2" Sub. pump installed
15 10:40	"	13.0	2200/6.7	" "	
28 11:08	"	13.0	2200/6.6	" "	
30 11:38	"	13.5	2150/6.7	" "	
42 12:20	↓	14.0	2200/6.7	" "	
64 13:24	645 GAL	14.0	2200/6.8	" "	
14:15	3.6 GPM	14.0	2200/6.7	" "	

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS
DEVELOPER NAME: KAF

WELL IDENTIFICATION: P-105
DEVELOPMENT METHOD: surge and pump alternately pump w/ centrifugal pum

JOB #: 13/49-003JSL52
DESCRIPTION OF EQUIPMENT:

WEATHER: clear, sunny, warm (65°F), still

DATE START: 9-24-93
DATE FINISH: 9-24-93

TIME START: 8:23
TIME FINISH: 9:35

WATER LEVEL BEFORE PUMPING: 1.56' below top of riser

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
8:48	8.6 gpm	15.5	410/6.6	cloudy dk gr - smoke, 1/16"	sand at bottom of full quart jar, no od
8:52	8.6 gpm	16	390/6.3	clear, no odor, 1/4" v.f.	sand grains at bottom
8:55	8.6 gpm	16	375/6.5	clear, no odor,	50-100 v.f. sand grains
9:00	8.6 gpm	16	365/6.6	clear, no odor	20-50 v.f. sand grains
9:14	8.6 gpm	16	400/6.9	slightly cloudy, no odor	thin film of v.f. sand grains at bottom
9:19	8.6 gpm	16.5	360/6.9	clear, no odor	50-100 v.f. sand grains
9:23	8.6	17.5	370/6.9	clear	20-50 grains
9:26	8.6	17	370/6.9	clear	20 v.f. sand grains
9:29	8.6	17	368/6.9	clear	"
9:31	8.6	17	370/6.9	clear	~20 v.f. sand grains
9:35					development complete total of 300 gallons pumped

NOTES:

8:23 to 8:33 pump w/ centrifugal at 8.6 gpm
8:33 to 8:43 surge w/ PVC slug brought in approx 0.3' sediment
8:47 to 9:01 pump w/ centrifugal at 8.6 gpm
9:02 to 9:12 surge w/ PVC slug brought in approx 0.3' sediment
9:12 to 9:35 pump w/ centrifugal pump at 8.6 gpm

0.5 hrs standby

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WP

DEVELOPER NAME: Pat WFD DOM(Barr)

WELL IDENTIFICATION: P-106

DEVELOPMENT METHOD: Pump/surge

JOB #:

DESCRIPTION OF EQUIPMENT: Centrifical pump and garden hose. PVC slug to surge. Stab testing performed atop the baker tank.

WEATHER: Sunny breezy-hot

DATE START: 10/8/93 TIME START: 07:50

DATE FINISH: 10/8/93 TIME FINISH: 12:37

WATER LEVEL BEFORE PUMPING: 6.94' 29'11"

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
08:30	7.5gpm	14°	2680/8.2	light olive with trace sheen	t-m sand content
08:41	turn off pump / surge for 13 min. entire length of screen about 10" in bottom of screen				
08:54	turn on pump				
08:56	7.0			Olive w/sheen	t-m sand content
09:40	7.0	14.8	2900/8.2		Amber w/ Light sand content
09:40	Shut off pump	surge for 8 min. as before			
09:48	start pump at				
09:48	7.0				black
09:58	7.0	14.8	2800/8.2		Amber
10:23	7.0				
10:26	shut off pump	(1 min)			
10:34	start pump				
10:44					
10:54		15.0°	2950/8.2	Amber	light - Sand
10:56	Shut off pump	(9 min)			
11:05	on				
11:12	off	(9)			
11:21	on				
11:29	off	16.0°	3120/8.2	Amber	L. Sand
11:38	on	(58)			
11:43					
12:29	7.0	15°	3190/8.2	Amber L. sand	
12:30	7.0	15°	3190/8.2		
12:35	7.0	15°	3190/8.2		

~6 min of clear
2 min
5 min of clear

NOTES:

Total pumping time = 3:39 @ ~ 7gpm = ~ 1535 gallons pumped

Development Complete 10/8/93

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

TOT pumped (on 9-9-
315
315
630

SITE: WCP RI/FS

DEVELOPER NAME: JAB / CXL

WELL IDENTIFICATION: P107

DEVELOPMENT METHOD: Purge & Surge

JOB #: 13/49-003 JSL 52

DESCRIPTION OF EQUIPMENT: -
- Brainard Killman (BK) Hand Pump used to remove silt & sand from well.
- Well Surged w/ Slug (Surge Block).
- 1720 Hooked up Drill Rig Pump - pumping at a greater rate.

WEATHER: Partly Sunny, windy

DATE START: 9/9/93
DATE FINISH: 9/9/93

TIME START: 1620
TIME FINISH: 1900 (2.5) — Done

WATER LEVEL BEFORE PUMPING:

Date	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
9-9-93	1640					First water - Dark Brown - Phenolic odor.
	1700	20 GAL	~~22°C~~ 15.5	3000	Dark Brown / cloudy	Phenol odor strong.
	1735	120 GAL	~~22°C~~ 15.5	2800	Dark Brown / clear	Small amt. SAND
	1750	200 GAL	~~20°C~~ 18.5	2800	Dark Brown / clear	After surging for 10 mins.
	1845	615 GAL	~~20°C~~ 18.5	2850	Brownish / clear	Surged 4 Times total for 10 mins
						clear water after 615 gals.
9-10-93	8:40	5.5 gal/min	18.5	2400/8.3	clear w/ brown tint	fine sand on bottom.
	8:50	5.5 gal/min	18.0	2300/8.3	clear w/ brown tint	fine sand on bottom
105	9:00	5.5 gal/min	18.0	2250/8.3	clear w/ brown tint	fine sand on bottom
stop pump	9:10	5.5 gal/min	18.0	2250/8.3	" " "	" " "
start 9:40	9:50	5.5 gal/min	17.5	2250/8.3	clear w/ brown tint	fine sand on bottom
110 stop pump	10:00	5.5 gal/min	17.5	2250/8.3	" " "	" " "
start 10:20	10:30	5.5 gal/min	—	— /8.3	clear w/ brown tint	fine sand on bottom (less pre... us)
	10:40	5.5 gal/min	—	— /8.3	clear w/ brown tint	less fine sand
	10:50	5.5 gal/min	—	— /8.3	clear w/ brown tint	less fine sand
	11:00	5.5 gal/min	—	— /8.1	clear w/ brown tint	less fine sand
495	11:10	5.5 gal/min	18.0	2250/8.1	clear w/ brown tint	less fine sand
	11:20	5.5 gal/min	18.0	2300/8.1	clear w/ brown tint	more fine sand
	11:30	5.5 gal/min	18.0	2300/8.2	clear w/ brown tint	less fine sand
	11:40	5.5 gal/min	17.5	2300/8.2	clear w/ brown tint	less fine sand
stop pump	11:50	5.5 gal/min	17.5	2300/8.2	clear w/ brown tint	less fine sand
start 13.30	13:40	5.5 gal/min	18.0	2250/8.3	clear w/ brown tint	some fine sand
5	13:50	5.5 gal/min	18.0	2200/8.3	clear w/ brown tint	less fine sand

NOTES:

9-9-93 Water level: 2.26' Below top of Riser.
TD 9.5', Should be 11.5' BTOR
1850 hours: Water level 2.67' BTOR
TOTAL depth 11.59 BTOR
} Riser Below Ground surface by about 1 foot.

- TOTAL VOL Pumped ~ 630 gals.

9-10-93 8:22 Water level at 2.30" below top of riser.
8:30 Start pump → 5.5 gal/min pump rate
* Water Samples have strong - Moderate Odor.
* See notes on back Pg 1

9-10-93

7:00 EXC at P-107

8:05 JAB stops by site. JAB says to pump atleast 600 gal (~5 gal/min; ~2 hours) Water was sediment free yesterday but was brown colored due to contamination.

8:15 Drillers Bryan & Kurt on site. Open well & take water level. Water at 2.30' below riser.

8:30 Start pumping P-107 with 2" submersible pump.

9:20 Stop pump & surge with surge block.

9:35 Stop surging. Bail out well to observe appearance. Water appears Brown/Cloudy with sand on bottom

9:40 start 2" submersible pump. Water in hose is brown/cloudy

10:05 stop pump & surge P-107 with surge block.

10:15 Stop surging, set 2" submersible. First bail out water to check appearance. Water appears cloudy & brown with sand.

10:40 Air Monitoring: 0 ppm in work space & well opening area

11:20 Lift pump up & down for surging P-107. Water in sample was clear with brown tint and had more sand than previous samples. less sand in next sample.

11:55 Stop pump. Break for lunch.

13:25 Return to site. Surge P-107 with surge block.

13:30 Start 2" submersible pump.

14:45 Finish development. Clean up area around P-107.

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: WCP RI/FS

DEVELOPER NAME:

WELL IDENTIFICATION: P-107

DEVELOPMENT METHOD:

JOB #:

DESCRIPTION OF EQUIPMENT:

WEATHER:

DATE START:
DATE FINISH:

TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

Date	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
7-10-93	14:00	5.5 gal/min	18.0	2200/8.3	clear w/ brown tint	Few sand grains
	14:10	5.9 gal/min	18.0	2200/8.3	" " "	" " "
	14:20	5.5 gal/min	17.5	2200/8.3	" " "	Less sand grains
	14:30	5.8 gal/min	17.7	2200/8.3	" " "	Few sand grains
	14:40	5.5 gal/min	17.5	2200/8.3	clear w/ brown tint	few very fine sand, insignificant amount in water sample
	14:45					Finished development

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: UCP

DEVELOPER NAME: Pat (WTD) DDM (Barr) ICXL (Barr)

WELL IDENTIFICATION: P-108

DEVELOPMENT METHOD: Pump surge

JOB #:

DESCRIPTION OF EQUIPMENT:

1:17
2:17
= 31
1:46

WEATHER: ~~cool~~ Sunny breezy cool - warm

~~TO FINISH~~

~~KXL?~~

DATE START: 10/8 TIME START: 13:00

DATE FINISH: TIME FINISH: 15:17

WATER LEVEL BEFORE PUMPING: 6.88 82' 3 1/8"

	TIME	RATE OR VOLUME	TEMP (C)	COND/pH	WATER APPEARANCE	COMMENTS
10/8/93	12:00	start pump 7gpm			milky w/ tan & black	Fine sand. Army
	13:10	7.0	13.8	8700 / 8.6	beer color	
	13:14	Off to surge				
	13:20	on				
	13:50		13.7	9510 / 8.6	Beer color	
	13:50	off				
	13:56	on				
	14:07	7	13.3	10000 / 8.6		
	14:15	off				
	14:27	ON 7.0				
	14:35	OFF				
	14:39	ON				
	14:56	OFF				
	15:07	ON				
	15:09	7.0	13.1	9800 / 8.6	Beer	
10/11/93	11:38	6 gal/min				Start pumping
	12:02	↓	13.0	8200 / 8.9	orange brown tint	w/ fine sand
	12:10	↓	13.0	8800 / 8.9	↓	↓
	12:15	↓	13.3	9000 / 8.9	↓	↓
	12:21	↓	13.5	8900 / 8.9	↓	↓
	12:26	↓	13.5	8900 / 8.9	↓	↓
	12:31	↓	13.5	9000 / 8.9	↓	↓
	12:36	↓	13.5	9000 / 8.9	DONE	↓
	12:40	↓	13.5	9000 / 8.9	↓	↓
	12:45					Stop pumping

NOTES: Completed Development - 10/11/93

10/8/93 Well pumped at 7.0 gpm 106 min = 742 gallons total

10/11/93 11:30 5gal/59sec → Pump rate =

12:45 stop pump. finish development

Pumped 402 gallons on 10/11/93

Total = 1144 gallons

Development not complete as of 10/8/93

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: OMC NORTH Plant #2 DEVELOPER NAME: JAB M. Mueller

WELL IDENTIFICATION: EPA well west side of OMC plant By Rail Road TRACKS.

JOB #:

WEATHER: cool, partly sunny - overcast. breezy.

DEVELOPMENT METHOD: Centrifical pump 3/4" plastic Tube.

DESCRIPTION OF EQUIPMENT:

TD = 12' 10 1/4" - Rust on TAPE.
WL = 6.95 Below top of Riser
3.44 ft stick up above ground surface.

DATE START: 9/30/93 TIME START: 1133
DATE FINISH: TIME FINISH:

ID = 1 3/8" } Riser pipe - 4" steel protective
OD = 1 3/4" } steel. casing w/ cap.
stainless steel well Cut lock to gain Access.

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
1140		START	Pumping	first water - v. dark gray, silty & sandy.	
1145	25	18°C	850 / 6.6	clear v. few fine sand grains	
1148	40	19°C	850 / 6.5	"	"
1150	55	19°C	850 / 6.5	"	"
1152	70	19.5°	850 / 6.5	"	"
1154	90		stop pump - well developed.		

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: OMC North Plant #2

DEVELOPER NAME: JAB

WELL IDENTIFICATION: w m (e) Green, EPA well, East.

DEVELOPMENT METHOD: Centrifugal Pump, 3/4" plastic TU

JOB #:

DESCRIPTION OF EQUIPMENT: 2" Stainless steel Riser & cap, 3" steel protective casing. Lock was cut off to gain Access. ~2ft of stickup Above ground surface. WL: 3.96' BTOR - Riser & protective casing Loose. TD: 26'2" BTOR - Before Development.

WEATHER: Cool, Sunny, breezy

DATE START: 9/30/93 TIME START:

DATE FINISH: TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
1015	0 Gal	START pump		- Dark, sediment Rich water	
1020	25gals	13°C	700/7.1	Clear, few fine sand grains after swing 3 Times	
1024	65	13°C	700/7.0	"	
1027	85	13°C	700/7.1	" very few grains.	
1030	100gals	- STOP pump		- Developed.	

NOTES:
- Cleared up After swing 3 times - Last surge produced little sediment.

START @ 800

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: OMC North plant #2 (W) M E

Green EPA wells

WELL IDENTIFICATION: WEST

DEVELOPER NAME: JAB / M. Mueller

DEVELOPMENT METHOD: centrifical pump, 3/4" plastic Tubing

JOB #:

DESCRIPTION OF EQUIPMENT:
2" stainless steel Riser & CAP, steel protective casing (3" Diam). & locking cap. Lock was cut off to gain Access. ~2 ft of stickup Above ground surface
WL = 4.04' BTOR } Before development.
TD = 8.63' BTOR
- could NOT pump water out - not enough being produced from well.

WEATHER: Sunny, breezy, cool

DATE START: 9/30/93
DATE FINISH:

TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: W (m) E

DEVELOPER NAME: JAB / M. Mueller.

WELL IDENTIFICATION: EPA well - Green middle

DEVELOPMENT METHOD: Centrifical Pump, 3/4" Tube

JOB #:

DESCRIPTION OF EQUIPMENT: 2" stainless steel Riser & cap, 3" steel protective casing & locking cap. Lock was cut off to gain Access. ~2 ft of stickup Above ground surface.
WL 3.99' BTOR- Riser Bent } Before Development.
TD 16ft, 10" BTOR

WEATHER: Sunny, Breezy, Cool

DATE START: 9/30/93 TIME START:

DATE FINISH: TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND / PH	WATER APPEARANCE	COMMENTS
0955	40 Gals	14°C	1100 / 6.8	Clear, few grains.	
1000	65 Gals	14°C	1000 / 6.8	"	
1003	90 Gals	14°C	1000 / 6.8	"	
1005	100 Gals	14°C	900 / 6.8	"	
1009	125 gals	17°C	1000 / 6.8	"	
1011	150 "	14°C	950 / 6.8	"	shut pump off -

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: OMC North Plant #2

DEVELOPER NAME: JAB / M. Mueller

WELL IDENTIFICATION: EPA well Next to NSSD pond & West End of North Ditch.

DEVELOPMENT METHOD: centrifugal pump 3/4" plastic Tube.

JOB #:

DESCRIPTION OF EQUIPMENT: EPA well, Black steel protective casing w/ cap cut Lock to gain Access. ~1 3/4" Steel pipe for Riser, ~1.5 ft of stickup, protective casing About 1.5 ft Above top of Riser.

WEATHER:

WL = 6.47' Below top of Protective casing.

TD = 11'9" Below top of Protective casing Obstruction at 8' B Top of Protective casing.

- Stainless Steel well

DATE START: 9/30/93

TIME START: 1035

DATE FINISH:

TIME FINISH:

WATER LEVEL BEFORE PUMPING:

	TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
250	1055	START	Pump	- Water	was v. dark gray, silty &	SANDY - can't surge this
	1100			well - Too Narrow.		
	1100	20 Gals	18°C	1000 / 6.8	murkey water	
	1102	25 Gals	18.5°C	1000 / 6.7	"	
	1106	40 Gals	18.0°C	900 / 6.6	clear, few grains of fine	SAND.
	1110	50 "	17.5°C	1000 / 6.8	" "	
	1114	60 "	17.5°	850 / 6.6	" "	
	1120	70 "	18.0°C	1000 / 6.8	" V. few grains of	fine SAND
	1122	75 "	Turne	pump off.		

NOTES:

- Pumping at a slow rate, Draw down & Recharge limit the pumping capacity.

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: DMC North Plant #2

DEVELOPER NAME: JAB / M. Mueller

WELL IDENTIFICATION: EPA 2-2

DEVELOPMENT METHOD: Centrifical pump 3/4" plastic tubing

JOB #:

DESCRIPTION OF EQUIPMENT: 2" Stainless steel well, ~ 2 ft of riser stickup 4" Steel protective casing, Lock cut to gain ACCESS.
TD = 7.00 ft BTOR
WL = 2.66 BTOR

WEATHER: Windy, sunny cool.

DATE START: 9/30/93
DATE FINISH:

TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
1533	START pump.			-first water-	cloudy w/ fine sand.
1537	8gpm	16.5	700/6.8	clear, V. few fine	sand grains.
1541	↓	17.0	700/6.8	" "	
1544	↓	17.0	700/6.8	" very very few fine	sand grains
1546	↓	17.0	700/6.8	" "	
1548	↓	STOP pump.		well is developed	
	120 gallons				

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: OMC North Plant #2
DEVELOPER NAME: JAB / M. Mueller

WELL IDENTIFICATION: Z-1 EPA
DEVELOPMENT METHOD: centrifugal pump, 3/4" p' Le Tubing, check valve.

JOB #:
DESCRIPTION OF EQUIPMENT: 2" stainless steel well
4" steel protective casing w/ CAP.
Cut lock TO gain Access to well.
~2.4 ft of Riser pipe stickup.
WL 4.36 BTOR
TO. 12.5 ft BTOR

WEATHER: Cool, Sunny windy

DATE START: 7/30/93
DATE FINISH:
TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND / PH	WATER APPEARANCE	COMMENTS
1552	8Gpm	START Pump.		first water - DARK Grey & cloudy	
1557	↓	17.5°C	500 / 7.0	Clear, Very few fine SAND grains.	
1600		17.5°C	500 / 7.0	" / "	
1608		17.5°C	500 / 7.0	" Very very few fine SAND grains	
1605	STOP pump - well is Developed.				
	~100 gallons pumped			from well.	

- Done w/ Development @ 1630 hours
- Dump water & Recom. from 1605 - 1630

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: OMC North Plant #2

DEVELOPER NAME: JAB / M. Mueller

WELL IDENTIFICATION: Z-8 EpA Well

DEVELOPMENT METHOD: centrifical pump 3/4" Tubing

JOB #:

DESCRIPTION OF EQUIPMENT:
well condition.
TD 34ft 1½" } 1¾" steel well w/ 4" steel protective
WL 4.52 } casing. Casing & well Bent.
~ 20ft of stickup Above Ground Surface
4" steel protective casing - Cut
Lock to gain Access.
- Stainless steel well

WEATHER: warm, sunny windy

DATE START: 9/30/93
DATE FINISH:

TIME START: 1400
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
1506	- START	Pump -	Gray, cloudy	murkey water -	silty, NO SAND, clayey.
		- Pump	Drew	the water / collum down,	well does not
		produce enough water to Develop.			
1523 -	move to	Well Z-2			

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: OMC North Plant #2

DEVELOPER NAME: JAB / M. Mueller

WELL IDENTIFICATION: Z-9

DEVELOPMENT METHOD: Centrifical pump 3/4" Plastic Tubing

JOB #:

DESCRIPTION OF EQUIPMENT:
WL = 5.30' BTOR } steel pipe 1 3/4" OD
TD = 21'3" BTOR } well is bent, protective casing is
About 2 ft of stick up above ground surface
4" steel protective casing - cut lock to gain Access.
Stainless steel well

WEATHER: Warm Sunny windy.

DATE START: 9/30/93
DATE FINISH:

TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND	PH	WATER APPEARANCE	COMMENTS
1439 -	START	Pump			- first water was Gray silty & SANDY.	
1444	35 GALS	14.5	600	7.0	Clear, v. few fine SAND grains	
1448	50 "	14.5	600	6.8	" "	
1452	65 "	14.5	600	6.8	" "	
1456	90 "	14.5	600	7.0	" V.V. few fine SAND grains.	
1458	100 "				STOP pump - well developed	

NOTES:

MONITORING WELL DEVELOPMENT FORM
BARR ENGINEERING COMPANY

SITE: OMC North Plant #2

DEVELOPER NAME: JAB / M Mueller

WELL IDENTIFICATION: Z-10

DEVELOPMENT METHOD: Centrifical Pump.

JOB #:

DESCRIPTION OF EQUIPMENT:
TOC = 6'2" BTOR – steel pipe, 1 3/4" OD.
WL = 3.80' BTOR – About 2ft of Riser stick up Above ground Surface.
– got plastic tube About 10 ft down well from TOR.
– 4" STEEL protective casing – cut lock TO gain Access
Stainless steel well

WEATHER: Sunny, warm, windy

DATE START: 9/30/93
DATE FINISH:

TIME START:
TIME FINISH:

WATER LEVEL BEFORE PUMPING:

TIME	RATE OR VOLUME	TEMP (C)	COND/PH	WATER APPEARANCE	COMMENTS
1420	– begin	pumping		– gray silty – SANDY water	
1427	40	18°C	600 / 6.8	clear, slight Amber tint,	No Fines
1433	75	18°C	600 / 6.6	" "	
1436	90	18°C	600 / 6.6	" very few grains of	SAND.
1438	100	– STOP pump – well Developed.			

NOTES:

- Photos of well, sump, screen, Riser.
- Drilling method, Rig & specific site setup.

1020 Brown oil floating on water in mud tub. Drilling into Till - Gray Water/fluid being Pumped out of well.

1045 - Removed Tools from borehole

- Begin to place well.
- Borehole drilled to 33 ft BGS.
- Joints Tightened wrench tight w/ Chain wrenches.
- Well set at 32.5 ft BGS (Bottom of Sump.

1100 - Get sand to place SAND pack around well.

- SAND should be 2' Above the top of the Screen
- SAND placed as Augers Retracted.

1250 - Drillers take lunch

- Sand to about 8 ft Bgs

1315 - Drillers done w/ lunch.

1345 - SAND pack to 6.5', Auger left to 6.5 ft bgs.

- Clean out mud TANK.
- used 43 50 lb bags

PW-1 Development 10/28/93 noted by JAB 12/19/93

- 1400 - Assemble surge block & Rod
- Surge block is ~6" Diameter, stainless steel. photo 14 on ROLL is a picture of it.

1400 - Begin to Decon Augers (4¼) & Drill Rods. (3") used for Rotary Drilling.

1420 - SAND pack settled ~ 1 ft.

- After ~ 10 - 15 mins surging.
- Add SAND

1430 - Stop Surging - measure well for sediment, Bottom of well at 36 Ft BTOC - NO sed in Bottom of well After surging

- Put 4" Expandable Caps Down to Complete

Development

1445 - START 4" Grundfos
- Pumping into Baker tank at ~ 10 GPM Water is Gray, to Dark gray, silty, w/ Brown oil, mod. to High Sheen.
- High Sed Content.
- Added an extra Bag of SAND to SAND pack.

1625 - Clear water being pumped from well.

1630 - STOP Pump, Surge well.
- well has been surged twice Already.
- Add 3 more Bags of SAND TO THE well.

1645 - START Pump After Surging.
- 51 Bags TOTAL SAND pack
SAND @ 45 Ft BGS.

1735 - Generator Ran out of GAS & Pump shut Down.
- Silty Development water.

1740 - Surge well - Fourth time

1750 - START pump.
- NO seds on well Bottom
- SANDpack Not settled

1830 - STOP pump. - still silty water

Friday Oct 29 '93 windy, cold, clear.

on site 0700.

0730 - Begin to surge well with the Surge Block

0734 - STOP Surging, start Pump.
- Silty Water, gray, some sand

0815 - Clear water being pumped.

0818 - STOP pump - surge well.

0833 - STOP Surging - START Pump.
- Gray dirty water - Silty - some sand

0845 - Discharge water is clearer
Less silt, very little Sand.

0855 - clear water, stop pump
Surge for 15 mins.

0915 - START Pump - Gray, (Dark Gray) Silty water being pumped.

0940 - clear water - Lift pump out slowly to pump from Different levels. Shut pump off. Surge well for 15 mins.

0957 - STOP Surging
- START Pump. - Dark gray Silty Water.

1007 - Water is Markedly clearer.

1015 - Lift pump out of well slowly to pump from the whole length of the screen.

1017 - STOP pump - Surge well.

1030 - Stop Surging START Pump
- Did not see water.

1040 - Relatively Clear water

1050 - Stop pump - surge well for 15 min.

- Pump to 1130 - stop pump

1145 - Surge well

1200 - start pump.

1250 - STOP pump, Remove Pump from well. Get ready to grout The well in. - Done w/ Grouting.

measured SAND at ~ 1230. it was at 4.5 ft BGS - So: No SAND PACK settlement since Yesterday - Added 51 Bags Total for SAND PACK.

- Done w/ Grouting Well at 1300.

Appendix 4-G

Field Log Data Sheets
Water Level Measurements
and Hydrographs

VATER LEVEL DATA SHEET

PROJECT NAME WAKEGAN / WCP RI/FS

SAMPLERS E. Gabrielson
DATE 4/7/92
PAGE ____ OF ____

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
P101	588.14	5.84	15.72	582.30	
P102	588.52	5.50	15.09	583.02	
P103	589.44	6.99	15.42	582.45	
P104	589.07	6.27	15.06	582.80	
MW3D	588.23	5.59	30.84	582.64	
MW3S	588.24	5.54	15.04	582.70	
MW4D	589.06	6.54	34.34	582.52	
MW4S	589.17	6.62	15.45	582.55	
MW5D	588.47	7.93	28.62	580.54	
MW5S	587.89	7.32	16.28	580.57	
MW6D	588.51	7.81	29.53	580.70	
MW6S	588.45	7.70	16.75	580.75	
W1D	587.62	5.84	29.75	581.78	
MW1S	587.76	5.97	19.75	581.79	
Harbor	584.65				

VATER LEVEL DATA SHEET

PROJECT NAME WAKEGAN / WCP RI/FS

SAMPLERS JEG
DATE 4/9/92
PAGE ____ OF ____

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
P101	588.14	5.87	15.22	582.27	
P102	588.52	5.59	15.09	582.93	
P103	589.44	7.06	15.42	582.38	
P104	589.07	6.34	15.06	582.73	
MW3D	588.23	5.69	30.84	582.54	
MW3S	588.24	5.65	15.04	582.59	
MW4D	589.06	6.65	34.34	582.41	
MW4S	589.17	6.68	15.45	582.49	
MW5D	588.47	7.94	28.62	580.53	
MW5S	587.89	7.34	16.28	580.55	
MW6D	588.51	7.84	29.53	580.67	
MW6S	588.45	7.71	16.75	580.74	
MW1D	587.62	5.88	29.75	581.74	
MW1S	587.76	6.01	19.75	581.75	
Harbor	584.65				

WATER LEVEL DATA SHEET

PROJECT NAME Waukegan/WCP RI/FS

SAMPLERS KAF/TWW
DATE 4-15-92
PAGE 1 OF 1

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
P101	588.14	6.05	15.22	582.09	17:36
P102	588.52	5.82	15.09	582.70	18:03
P103	589.44	7.42	15.42	582.02	17:27
P104	589.07	6.65	15.06	582.42	17:32
Harbor	584.65	4.3	[illegible]	580.4	Elev. 584.65 measured below
MW3S	588.24	5.49	15.04	582.75	
MW3D	588.23	5.53	30.84	582.70	
MW4S	589.17	6.75	15.45	582.42	
MW4D	589.06	6.72	34.34	582.34	
MW5S	587.89	7.14	16.28	580.75	
MW5D	588.47	7.74	28.62	580.73	
MW6S	588.45	7.61	16.75	580.84	
MW6D	588.51	7.74	29.53	580.77	
MW1S	587.76	6.03	19.75	581.73	
MW1D	587.62	5.91	29.75	581.71	
~~Harbor~~	-		[illegible]		

WATER LEVEL DATA SHEET

PROJECT NAME WAKegan/WCP RI/FS

SAMPLERS MES/LCK
DATE 4-21-92
PAGE 1 OF 1

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
P101	588.14	6.10	15.22	582.04	
P102	588.52	5.91	15.09	582.61	
P103	589.44	7.42	15.42	582.02	
P104	589.07	6.64	15.06	582.43	
Harbor	584.65	~~4.26~~ 4.3 LAF	~~[illegible]~~	580.4	Is marked w/ the Elev. 584.65. Is located on the north seawall. Take measurement from between seawall + walkway the benchmark X.
MW3S	588.24	5.56	15.04	582.68	
MW3D	588.23	5.60	30.84	582.63	
MW4S	589.17	6.76	15.45	582.41	
MW4D	589.06	6.72	34.34	582.34	
MW5S	587.89	7.10	16.28	580.79	
MW5D	588.47	7.69	28.62	580.78	
MW6S	588.45	7.56	16.75	580.89	
MW6D	588.51	7.68	29.53	580.83	
MW1S	587.76	5.97	19.75	581.79	
MW1D	587.62	5.84	29.75	581.76	
~~Harbor~~			~~[illegible]~~		

WATER LEVEL DATA SHEET

PROJECT NAME WAKEGAN / WCP RI/FS

SAMPLERS LCK
DATE 5-7.92
PAGE 1 OF 1

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
P101	588.14	6.34	15.22	581.80	
P102	588.52	6.16	15.09	582.36	
P103	589.44	7.63	15.42	581.81	
P104	589.07	6.92	15.06	582.15	
MW3D	588.23	6.00	30.84	582.23	
MW3S	588.24	5.97	15.04	582.27	
MW4D	589.06	6.99	34.34	582.07	
MW4S	589.17	7.02	15.45	582.15	
* MW5D	588.47	7.75	28.62	580.72	Riser cover was very diff. to remove. Pry bar is valuable tool to have along.
MW5S	587.89	7.16	16.28	580.73	
MW6D	588.51	7.70	29.53	580.81	
MW6S	588.45	7.59	16.75	580.86	
MW1D	587.62	6.02	29.75	581.60	
MW1S	587.76	6.13	19.75	581.63	
** Harbor	584.65	4.20 **		580.5	value reported is middle range of wave action (±1/2")

* Pry lid

** wave action ± 1/2 inch.

WATER LEVEL DATA SHEET

PROJECT NAME WAKEGAN / WCP / RI/FS

SAMPLERS LCK
DATE 5-27-92
PAGE 1 OF 1

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH (SOLINST)	WATER LEVEL DEPTH (POWERS WELL SOUNDER WS-1)	TOTAL WELL DEPTH	WATER LEVEL ELEVATION USING SOLINST	COMMENTS
P101	588.14	6.48	6.48 6.51	15.22	581.66	
P102	588.52	6.37	6.38 6.42	15.09	582.15	
P103	589.44	7.94	7.94 7.98	15.42	581.50	
P104	589.07	7.28	7.28 7.32	15.06	581.79	
MW3D	588.23	6.29	6.10 6.31	30.84	581.94	
MW3S	588.24	6.25	6.26 6.29	15.04	581.99	Solinst used before and after Powers. Readings on Solinst = Exact match.
MW4D	589.06	7.34	7.27 7.36	34.34	581.72	
MW4S	589.17	7.36	7.38 7.40	15.45	581.81	Audible | Vi 1st hit (2-3 mAmps) Full 15 mAmps
MW5D	588.47	7.73	7.72 7.76	28.62	580.74	
MW5S	587.89	7.13	7.12 7.16	16.28	580.76	
MW6D	588.51	7.74	7.68 7.74	29.53	580.77	
MW6S	588.45	7.63	7.63 7.67	16.75	580.82	
MW1D	587.62	6.23	6.09 6.30	29.75	581.39	
MW1S	587.76	6.35	6.36 6.39	19.75	581.41	
Harbor	584.65	4.05 4.16	4.04 4.15		580.5	1 beep/15 sec Constant on (15 sec.) | SAME SAME

FIELD WATER LEVEL ELEVATION DATA

DATE 4/15/93			
WELL NUMBER	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL DEPTH (FT)	WATER LEVEL ELEVATION (FT)
P101	588.14	4.41	583.73
P102	588.52	3.39	585.13
P103	589.44	4.87	584.57
P104	589.07	3.54	585.53
MW1S	587.76	3.19	584.57
MW1D	587.62	3.03	584.59
MW3S	588.24	3.18	585.06
MW3D	588.23	3.13	585.1
MW4S	589.17	4.58	584.59
MW4D	589.06	4.48	584.58
MW5S	587.89	5.69	582.2
MW5D	588.47	6.29	582.18
MW6S	588.45	6.38	582.07
MW6D	588.51	6.51	582
HARBOR	584.65	3.21	581.4

WAUKEGAN COKE PLANT

WATER LEVEL DATA SHEET

date 4-15-93 by KSJ, TDM, MAGGIE (NSG)

Well Number	*Time*	*measuring point elevation*	*previous water depth*	*water level depth*	*water level elevation*	*comments*
P-101		588.14		4.41		access through Larsen Marine
P-102		588.52		3.39		
P-103		589.44		4.87		
P-104		589.07		3.54		
MW-1S		587.76		3.19		
MW-1D		587.62		3.03		
MW-3S		588.24		3.18		
MW-3D		588.23		3.13		
MW-4S		589.17		4.58		
MW-4D		589.06		~~4.68~~ 4.48		
MW-5S		587.89		5.69		
MW-5D		588.47		6.29		[redacted]
MW-6S		588.45		6.38		
MW-6D		588.51		6.51		
HARBOR		584.65		3.21	581.44	access through Larsen Marine

FIELD WATER LEVEL ELEVATION DATA

DATE 5/21/93			
WELL NUMBER	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL DEPTH (FT)	WATER LEVEL ELEVATION (FT-MSL)
P101	588.14	5.91	582.23
P102	588.52	5.61	582.91
P103	589.44	6.64	582.8
P104	589.07	6.12	582.95
MW1S	587.76	5.19	582.57
MW1D	587.62	5.05	582.57
MW3S	588.24	5.4	582.84
MW3D	588.23	5.45	582.78
MW4S	589.17	6.32	582.85
MW4D	589.06	6.2	582.86
MW5S	587.89	6.38	581.51
MW5D	588.47	6.97	581.5
MW6S	588.45	6.82	581.63
MW6D	588.51	6.95	581.56
HARBOR	584.65	3.46	581.2

WAUKEGAN COKE PLANT

WATER LEVEL DATA SHEET

date 5-21-93 by MSKINNER

Well Number	*Time*	*measuring point elevation*	*previous water depth*	*water level depth*	*water level elevation*	*comments*
P-101		588.14	4.41	5.91		*access through Larsen Marine*
P-102		588.52	3.39	5.61		
P-103		589.44	4.87	6.64		
P-104		589.07	3.54	6.12		
MW-1S		587.76	3.19	5.19		
MW-1D		587.62	3.03	5.05		
MW-3S		588.24	3.18	5.40		
MW-3D		588.23	3.13	5.45		
MW-4S		589.17	4.58	6.32		
MW-4D		589.06	4.48	6.2		
MW-5S		587.89	5.69	6.38		
MW-5D		588.47	6.29	6.97		
MW-6S		588.45	6.38	6.82		
MW-6D		588.51	6.51	6.95		
HARBOR		584.65	3.21	3.46		*access through Larsen Marine*

FIELD WATER LEVEL ELEVATION DATA

DATE 6/16/93			
WELL NUMBER	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL DEPTH (FT)	WATER LEVEL ELEVATION (FT)
P101	588.14	5.68	582.46
P102	588.52	5.47	583.05
P103	589.44	6.42	583.02
P104	589.07	5.83	583.24
MW1S	587.76	4.99	582.77
MW1D	587.62	4.87	582.75
MW3S	588.24	5.1	583.14
MW3D	588.23	5.14	583.09
MW4S	589.17	6.12	583.05
MW4D	589.06	5.99	583.07
MW5S	587.89	6.12	581.77
MW5D	588.47	--	--
MW6S	588.45	6.56	581.89
MW6D	588.51	6.67	581.84
HARBOR	584.65	3.14	581.51

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WAUKEGAN COKE PLANT

WATER LEVEL DATA SHEET

date 6-16-93 by M. SKINNER

Well Number	Time	measuring point elevation	previous water depth	water level depth	water level elevation	comments
P-101		588.14	5.91	5.68		access through Larsen Marine
P-102		588.52	5.61	5.47		
P-103		589.44	6.64	6.42		
P-104		589.07	6.12	5.83		
MW-1S		587.76	5.19	4.99		
MW-1D		587.62	5.05	4.87		
MW-3S		588.24	5.40	5.10		
MW-3D		588.23	5.45	5.14		
MW-4S		589.17	6.32	6.12		
MW-4D		589.06	6.2	5.99		
MW-5S		587.89	6.38	6.12		
MW-5D		588.47	6.97			could not remove inner well cap.
MW-6S		588.45	6.82	6.56		
MW-6D		588.51	6.95	6.67		
HARBOR		584.65	3.46	3.135		access through Larsen Marine

FIELD WATER LEVEL ELEVATION DATA

DATE 7/19/93			
WELL NUMBER	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL DEPTH (FT)	WATER LEVEL ELEVATION (FT)
P101	588.14	5.12	583.02
P102	588.52	4.45	584.07
P103	589.44	5.33	584.11
P104	589.07	4.63	584.44
MW1S	587.76	3.78	583.98
MW1D	587.62	3.65	583.97
MW3S	588.24	4.01	584.23
MW3D	588.23	4.03	584.2
MW4S	589.17	5.25	583.92
MW4D	589.06	5.11	583.95
MW5S	587.89	5.32	582.57
MW5D	588.47	5.91	582.56
MW6S	588.45	5.77	582.68
MW6D	588.51	5.9	582.61
HARBOR	584.65	2.84	581.8

88 18. N

WAUKEGAN COKE PLANT

WATER LEVEL DATA SHEET

date 7-19-93 by MS

Well Number	Time	measuring point elevation	previous water depth	water level depth	water level elevation	comments
P-101		588.14		5.12		access through Larsen Marine
P-102		588.52		4.45		
P-103		589.44		5.33		
P-104		589.07		4.63		
MW-1S		587.76		3.78		
MW-1D		587.62		3.65		
MW-3S		588.24		4.01		
MW-3D		588.23		4.03		
MW-4S		589.17		5.25		
MW-4D		589.06		5.11		
MW-5S		587.89		5.32		
MW-5D		588.47		5.91		PART OF BROKEN CAP FELL INTO THE WELL - I THINK ALL WENT INTO OUTER WELL CASING
MW-6S		588.45		5.77		
MW-6D		588.51		5.90		
HARBOR		584.65		2.845		access through Larsen Marine

TAR PIT WELL #	MW-1	MW-2	MW-3	MW-4	MW4-D
WATER LEVEL DEPTH	5.06	5.56	4.08	4.67	4.68

NSSD POND ADJACENT TO MW-3 WAS ~½ full. POND ADJACENT TO MW-4+MW4D WAS LOW (WATER LEVEL)

FIELD WATER LEVEL ELEVATION DATA

DATE 8/21/93			
WELL NUMBER	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL DEPTH (FT)	WATER LEVEL ELEVATION (FT)
P101	588.14	--	--
P102	588.52	6.09	582.43
P103	589.44	7.04	582.4
P104	589.07	6.59	582.48
MW1S	587.76	5.44	582.32
MW1D	587.62	5.29	582.33
MW3S	588.24	5.8	582.44
MW3D	588.23	5.84	582.39
MW4S	589.17	6.73	582.44
MW4D	589.06	6.63	582.43
MW5S	587.89	5.96	581.93
MW5D	588.47	6.56	581.91
MW6S	588.45	6.46	581.99
MW6D	588.51	6.59	581.92
W-13 (Z-1)	587.63	5.2	582.43

WATER LEVEL DATA SHEET

SAMPLERS JAB

PROJECT NAME WCP RI/FS

PAGE 1 of _

WELL NUMBER	DATE 8/21/93	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
P-102	1450		6.09' NO odor	15.00' Low Cobble odor	NO free product	OVA - Background
MW-3S	1430		5.80' Trace odor	14.95' Slight odor	Saturated NO free product	Formation rinse & Hydrated. Odor from the Tipping floor & background.
MW-3D	1430		5.84' NO odor Noticeable	30.73' Strong odor at bottom	NO oil	15 ppm > Background Breathing zone OK.
P-101		Piezometer not to be measured.				
P-103	1505		7.04' Low odor	15.33' Black Coal odor	Coal tar Low	OVA = Background Organic AC Interface
MW-5D	1220	Medium odor	6.56' Slight odor	28.51' Mod. odor	No free product	NO Piezometer
MW-5S	1213		5.96' NO odor	16.21' Slight odor	NO free product	
MW-6D	1340	Strong odor - product	6.59' Strong odor	29.32'	At bottom	OVA Background 10+ ppm Odor - Upper zone
MW-6S	1330	Coal tar odor	6.46' Coal tar odor	16.68' Coal tar odor	NO free product	OVA - 7 ppm Above background
MW-1D	1555		5.29' Low Wood/coal odor	29.63'		OVA AT Background. TOP OF RISER
MW-1S	1545		5.44' NO odor	19.60' Moderate Coal TAR odor		OVA - TOP OF RISER
MW-4D	1606		6.63' Moderate odor	36.11' Moderate NO odor	Oily Water	OVA 200 ppm > Background AT TOP OF RISER = Background
MW-4S	1600		6.73' NO odor	15.39' NO odor	NO free product	OVA AT TOP OF Background
P-104	1525		6.59' NO odor	14.99' NO odor		OVA - Not above background
OMC E-1	8/20/93 1335 hours		5.20'	12.48'	NO free product	Well not locked.
OMC E-2						Locked No key
OMC L-2B						Locked No keys

OVA Background 7 ppm

FIELD WATER LEVEL ELEVATION DATA

DATE 9/29/93			
WELL NUMBER	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL DEPTH (FT)	WATER LEVEL ELEVATION (FT)
P101	588.14	–	–
P102	588.52	5.38	583.14
P103	589.44	6.47	582.97
P104	589.07	5.81	583.26
P105	583.96	0.79	583.17
P106	589.6	–	–
P107	584.41	1.76	582.65
P108	589.52	–	–
MW1S	587.76	4.81	582.95
MW1D	587.62	4.68	582.94
MW3S	588.24	5.09	583.15
MW3D	588.23	5.11	583.12
MW4S	586.16	2.96	583.2
MW4D	585.93	2.72	583.21
MW5S	587.89	6.16	581.73
MW5D	588.47	6.77	581.7
MW6S	588.45	6.51	581.94
MW6D	588.51	6.62	581.89
MW7S	587.78	4.42	583.36
MW7D	588.14	4.85	583.29
MW8S	586.43	3.55	582.88
MW8D	586.09	3.24	582.85
MW9S	588.49	5.27	583.22
MW9D	588.65	5.52	583.13
MW10S	588.58	6.05	582.53
MW10D	588.6	6.11	582.49
MW11S	587.83	5.31	582.52
MW11D	587.98	5.43	582.55
MW12S	586.03	2.78	583.25
MW12D	586.01	2.75	583.26
MW13S	586.95	3.73	583.22
MW13D	586.9	3.76	583.14
MW14S	583.92	1.08	582.84
MW14D	584.05	1.24	582.81
MW15S	585.33	2.1	583.23
MW15D	585.39	2.16	583.23
PW1	589	–	–
SG-1	582.36*	1.24**	582.6
SG-2	582.27*	1.34**	582.61
SG-3	582.19*	1.4**	582.59
W-13 (Z-1)	587.63	4.46	583.17
W-12 (Z-2)	585.81	2.73	583.08
W-2C (Z-8)	586.8	4.31	582.49
W-2B (Z-9)	586.34	4.2	582.14
W-2A (Z-10)	586.22	3.61	582.61
W-6 (EPA-OMC)	589.8	6.92	582.88
W-5 (EPA NSSD BY N. DITCH)	~~587.86~~ 589.66	6.47	~~581.39~~ 583.19 KAF 3-25-94
W-4B (EPA MIDDLE GREEN)	586.89	3.79	583.1
W-4A (EPA WEST GREEN)	586.45	3.82	582.63
W-4C (EPA EAST GREEN)	586.41	3.76	582.65
SW-1	584.56	3.59	580.97
SW-2	585.52	4.45	581.07

* REPRESENTS 1-FOOT MARK ON STAFF GAUGE.

**ACTUAL STAFF GAUGE READING.

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WATER LEVEL DATA SHEET

PROJECT NAME Waukegan

SAMPLERS DJM, JEG
DATE 9/29/93
PAGE 1 OF 2

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
~~SG-3~~ SG-1	10/11/93	2.40			
SG-2		1.34			ACTUAL STAFF GAUGE READINGS
~~SG-1~~ SG-3		1.24			KAF 11/4/94
Z-1		4.46	12.42		
Z-2		2.73	7.00		
Harbor					
MW 12S		2.78	12.0		
MW 12D		2.75	33.0		
P-105		.79	10.80		
MW 13S		3.73	13.0		
MW 13D		3.76	33.0		
MW 14S		1.08	11.5		
MW 14D		1.24	30.5		
MW 15S		2.10	12.0		
MW 15D		2.16	29.0		
MW 11S		5.31	14.0		
MW 11D		5.43	30.6		
P-107		1.76	11.58		
MW 3S		5.09	14.95		
MW 3D		5.11	30.71		
P-102		5.38	14.96		
MW 7S		4.42	14.5		
MW 7D		4.85	34.3		
P-104		5.81	14.55		
MW 1S		4.81	19.58		
MW 1D		4.68	29.62		
PW 1	not	installed			
P-106		11			

WATER LEVEL DATA SHEET

PROJECT NAME Waukegan

SAMPLERS DJM, JEG
DATE 9-29-93
PAGE 2 OF 2

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
MW 6S		6.51	16.5		
MW 6D		6.62	29.0		
MW 5S		6.16	16.17		
MW 5D		6.77	28.47		
MW 10S		6.05	16.2		
MW 10D		6.11	~~35.31~~	32.6	
P-103		6.47	15.31		
MW 8S		3.55	12.5		
MW 8D		3.24	30.0		
MW 4S		2.96	12.14		
MW 4D		2.72	32.12		
MW 9S		5-27	15.0		
MW 9D		5.52	34.0		
Z 8		4.31	33.63		
Z 9		4.20	21.87		
Z 10		3.61	10.09		
EPA-Organic		6.92	12.79		East side of OMC, North Plant #2 by RR tracks
EPA Auger Middle		3.79	16.98	12/15/93	TOC NSSP by North Pland
EPA West Green		3.82	8.70		Near of 3 wells, Green well - Mid Point of North ditch
EPA East Green		3.76			west of Green
Stirling well 2		4.45			east of Green
~~Stirling well~~		3.59			
EPA NSSP by No Ditch		6.47	11.66		

FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER PW-1**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93*	589	6.52	582.48
10/31/93*	589	6.56	582.44
11/01/93*	589	6.61	582.39
11/02/93*	589	6.61	582.39
11/03/93	589	7.04	581.96
11/04/93	589	7.1	581.9
11/05/93	589	7.88	581.12
11/06/93	589	7.19	581.81

WELL NUMBER SW-2**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	585.52	4.65	580.87
10/30/93	585.52	4.24	581.28
10/31/93	585.52	3.95	581.57
11/01/93*	585.52	4.35	581.17
11/02/93	585.52	4.39	581.13
11/03/93	585.52	4.57	580.95
11/04/93	585.52	4.55	580.97
11/05/93	585.52	3.82	581.7
11/06/93	585.52	4.08	581.44

WELL NUMBER SW-1**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	584.56	3.63	580.93
10/30/93	584.56	3.11	581.45
10/31/93	584.56	3.05	581.51
11/01/93	584.56	3.51	581.05
11/02/93	584.56	3.7	580.86
11/03/93	584.56	3.73	580.83
11/04/93	584.56	3.48	581.08
11/05/93	584.56	2.95	581.61
11/06/93	584.56	3.36	581.2

WELL NUMBER MW-1S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	587.76	5.23	582.53
10/30/93	587.76	5.29	582.47
10/31/93	587.76	5.31	582.45
11/01/93	587.76	5.37	582.39
11/02/93	587.76	5.38	582.38
11/03/93	587.76	5.38	582.38
11/04/93	587.76	5.4	582.36
11/05/93	587.76	5.42	582.34
11/06/93	587.76	5.44	582.32

* WATER LEVELS MEASURED MANUALLY.

** FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER MW-1D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	587.62	5.08	582.54
10/30/93	587.62	5.15	582.47
10/31/93	587.62	5.18	582.44
11/01/93	587.62	5.23	582.39
11/02/93	587.62	5.24	582.38
11/03/93	587.62	5.23	582.39
11/04/93	587.62	5.23	582.39
11/05/93	587.62	5.24	582.38
11/06/93	587.62	5.26	582.36

WELL NUMBER MW-9S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	588.49	5.49	583
10/30/93	588.49	5.68	582.81
10/31/93	588.49	5.71	582.78
11/01/93	588.49	5.77	582.72
11/02/93	588.49	5.77	582.72
11/03/93	588.49	5.79	582.7
11/04/93	588.49	5.8	582.69
11/05/93	588.49	5.84	582.65
11/06/93	588.49	5.86	582.63

WELL NUMBER MW-9D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	588.65	5.85	582.8
10/30/93	588.65	5.9	582.75
10/31/93	588.65	5.92	582.73
11/01/93	588.65	5.97	582.68
11/02/93	588.65	5.99	582.66
11/03/93	588.65	6	582.65
11/04/93	588.65	6.01	582.64
11/05/93	588.65	6.06	582.59
11/06/93	588.65	6.08	582.57

WELL NUMBER MW-10S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	588.58	6.51	582.07
10/30/93	588.58	6.57	582.01
10/31/93	588.58	6.59	581.99
11/01/93	588.58	6.62	581.96
11/02/93	588.58	6.63	581.95
11/03/93	588.58	6.63	581.95
11/04/93	588.58	6.63	581.95
11/05/93	588.58	6.65	581.93
11/06/93	588.58	6.67	581.91

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER MW-10D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	588.6	6.59	582.01
10/30/93	588.6	6.62	581.98
10/31/93	588.6	6.64	581.96
11/01/93	588.6	6.66	581.94
11/02/93	588.6	6.67	581.93
11/03/93	588.6	6.66	581.94
11/04/93	588.6	6.67	581.93
11/05/93	588.6	6.68	581.92
11/06/93	588.6	6.71	581.89

WELL NUMBER P-103**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	589.44	7.15	582.29
10/30/93	589.44	6.97	582.47
10/31/93	589.44	7	582.44
11/01/93	589.44	7.04	582.4
11/02/93	589.44	7.03	582.41
11/03/93	589.44	7.05	582.39
11/04/93	589.44	7.11	582.33
11/05/93	589.44	8.38	581.06
11/06/93	589.44	7.23	582.21

WELL NUMBER P-106**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	589.6	7.23	582.37
10/30/93	589.6	–	–
10/31/93	589.6	7.13	582.47
11/01/93	589.6	7.18	582.42
11/02/93	589.6	7.18	582.42
11/03/93	589.6	7.19	582.41
11/04/93	589.6	7.27	582.33
11/05/93	589.6	9.76	579.84
11/06/93	589.6	7.37	582.23

WELL NUMBER P-107**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	584.41	2.05	582.36
10/30/93	584.41	2.08	582.33
10/31/93	584.41	2.09	582.32
11/01/93*	584.41	2.14	582.27
11/02/93	584.41	2.16	582.25
11/03/93	584.41	2.17	582.24
11/04/93	584.41	2.15	582.26
11/05/93	584.41	2.16	582.25
11/06/93	584.41	2.21	582.2

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER P-108**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	DATA LOGGER WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/29/93	589.52	7.09	582.43
10/30/93	589.52	7	582.52
10/31/93	589.52	7.02	582.5
11/01/93*	589.52	7.08	582.44
11/02/93	589.52	7.09	582.43
11/03/93	589.52	7.11	582.41
11/04/93	589.52	7.15	582.37
11/05/93	589.52	8.19	581.33
11/06/93	589.52	7.29	582.23

WELL NUMBER P-102**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	588.52	5.83	582.69
10/31/93	588.52	5.85	582.67
11/01/93	588.52	5.88	582.64
11/02/93	588.52	5.89	582.63
11/03/93	588.52	5.85	582.67
11/04/93	588.52	5.86	582.66
11/05/93	588.52	5.92	582.6

WELL NUMBER P-104**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	589.07	6.29	582.78
10/31/93	589.07	6.34	582.73
11/01/93	589.07	6.39	582.68
11/02/93	589.07	6.42	582.65
11/03/93	589.07	6.41	582.66
11/04/93	589.07	6.42	582.65
11/05/93	589.07	6.46	582.61

WELL NUMBER P-105**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	583.96	1.36	582.6
10/31/93	583.96	1.38	582.58
11/01/93	583.96	1.42	582.54
11/02/93	583.96	1.43	582.53
11/03/93	583.96	1.44	582.52
11/04/93	583.96	1.48	582.48
11/05/93	583.96	1.51	582.45

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

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FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER MW-3S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	588.24	5.61	582.63
10/31/93	588.24	5.63	582.61
11/01/93	588.24	5.69	582.55
11/02/93	588.24	5.65	582.59
11/03/93	588.24	5.59	582.65
11/04/93	588.24	5.59	582.65
11/05/93	588.24	5.69	582.55

WELL NUMBER MW-3D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	588.23	5.64	582.59
10/31/93	588.23	5.65	582.58
11/01/93	588.23	5.72	582.51
11/02/93	588.23	5.69	582.54
11/03/93	588.23	5.62	582.61
11/04/93	588.23	5.63	582.6
11/05/93	588.23	5.73	582.5

WELL NUMBER MW-4S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.16	3.41	582.75
10/31/93	586.16	3.44	582.72
11/01/93	586.16	3.48	582.68
11/02/93	586.16	3.5	582.66
11/03/93	586.16	3.47	582.69
11/04/93	586.16	3.51	582.65
11/05/93	586.16	3.53	582.63

WELL NUMBER MW-4D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	585.93	3.27	582.66
10/31/93	585.93	3.36	582.57
11/01/93	585.93	3.32	582.61
11/02/93	585.93	3.37	582.56
11/03/93	585.93	3.34	582.59
11/04/93	585.93	3.39	582.54
11/05/93	585.93	3.38	582.55

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

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FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER MW-5S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	587.89	6.58	581.31
10/31/93	587.89	6.34	581.55
11/01/93	587.89	6.48	581.41
11/02/93	587.89	6.65	581.24
11/03/93	587.89	6.68	581.21
11/04/93	587.89	6.58	581.31
11/05/93	587.89	6.33	581.56

WELL NUMBER MW-5D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	588.47	7.16	581.31
10/31/93	588.47	6.92	581.55
11/01/93	588.47	7.07	581.4
11/02/93	588.47	7.22	581.25
11/03/93	588.47	7.24	581.23
11/04/93	588.47	7.17	581.3
11/05/93	588.47	6.94	581.53

WELL NUMBER MW-6S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	588.45	6.79	581.66
10/31/93	588.45	6.67	581.78
11/01/93	588.45	6.77	581.68
11/02/93	588.45	6.85	581.6
11/03/93	588.45	6.84	581.61
11/04/93	588.45	6.81	581.64
11/05/93	588.45	6.7	581.75

WELL NUMBER MW-6D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	588.51	6.9	581.61
10/31/93	588.51	6.78	581.73
11/01/93	588.51	6.88	581.63
11/02/93	588.51	6.96	581.55
11/03/93	588.51	6.95	581.56
11/04/93	588.51	6.92	581.59
11/05/93	588.51	6.82	581.69

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

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FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER MW-7S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	587.78	4.91	582.87
10/31/93	587.78	4.93	582.85
11/01/93	587.78	4.98	582.8
11/02/93	587.78	4.99	582.79
11/03/93	587.78	4.96	582.82
11/04/93	587.78	4.99	582.79
11/05/93	587.78	5.03	582.75

WELL NUMBER MW-7D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	588.14	5.34	582.8
10/31/93	588.14	5.36	582.78
11/01/93	588.14	5.41	582.73
11/02/93	588.14	5.42	582.72
11/03/93	588.14	5.39	582.75
11/04/93	588.14	5.43	582.71
11/05/93	588.14	5.47	582.67

WELL NUMBER MW-8S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.43	4.09	582.34
10/31/93	586.43	4.12	582.31
11/01/93	586.43	4.15	582.28
11/02/93	586.43	4.17	582.26
11/03/93	586.43	4.15	582.28
11/04/93	586.43	4.18	582.25
11/05/93	586.43	4.2	582.23

WELL NUMBER MW-8D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.09	3.79	582.3
10/31/93	586.09	3.82	582.27
11/01/93	586.09	3.85	582.24
11/02/93	586.09	3.87	582.22
11/03/93	586.09	3.85	582.24
11/04/93	586.09	3.88	582.21
11/05/93	586.09	3.9	582.19

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

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FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER MW-11S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	587.83	5.66	582.17
10/31/93	587.83	5.65	582.18
11/01/93	587.83	5.67	582.16
11/02/93	587.83	5.68	582.15
11/03/93	587.83	5.64	582.19
11/04/93	587.83	5.64	582.19
11/05/93	587.83	5.65	582.18

WELL NUMBER MW-11D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	587.98	5.81	582.17
10/31/93	587.98	5.79	582.19
11/01/93	587.98	5.81	582.17
11/02/93	587.98	5.82	582.16
11/03/93	587.98	5.78	582.2
11/04/93	587.98	5.79	582.19
11/05/93	587.98	5.79	582.19

WELL NUMBER MW-12S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.03	3.54	582.49
10/31/93	586.03	3.57	582.46
11/01/93	586.03	3.58	582.45
11/02/93	586.03	3.59	582.44
11/03/93	586.03	3.6	582.43
11/04/93	586.03	3.64	582.39
11/05/93	586.03	3.66	582.37

WELL NUMBER MW-12D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.01	3.53	582.48
10/31/93	586.01	3.54	582.47
11/01/93	586.01	3.56	582.45
11/02/93	586.01	3.57	582.44
11/03/93	586.01	3.58	582.43
11/04/93	586.01	3.61	582.4
11/05/93	586.01	3.64	582.37

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

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FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER MW-13S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.95	4.4	582.55
10/31/93	586.95	4.41	582.54
11/01/93	586.95	4.41	582.54
11/02/93	586.95	4.42	582.53
11/03/93	586.95	4.41	582.54
11/04/93	586.95	4.47	582.48
11/05/93	586.95	4.49	582.46

WELL NUMBER MW-13D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.9	4.57	582.33
10/31/93	586.9	4.42	582.48
11/01/93	586.9	4.4	582.5
11/02/93	586.9	4.41	582.49
11/03/93	586.9	4.43	582.47
11/04/93	586.9	4.46	582.44
11/05/93	586.9	4.49	582.41

WELL NUMBER MW-14S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	583.92	1.35	582.57
10/31/93	583.92	1.33	582.59
11/01/93	583.92	1.35	582.57
11/02/93	583.92	1.36	582.56
11/03/93	583.92	1.37	582.55
11/04/93	583.92	1.4	582.52
11/05/93	583.92	1.42	582.5

WELL NUMBER MW-14D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	584.05	1.48	582.57
10/31/93	584.05	1.46	582.59
11/01/93	584.05	1.46	582.59
11/02/93	584.05	1.47	582.58
11/03/93	584.05	1.48	582.57
11/04/93	584.05	1.52	582.53
11/05/93	584.05	1.53	582.52

*WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

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FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER MW-15S**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	585.33	--	--
10/31/93	585.33	2.66	582.67
11/01/93	585.33	2.72	582.61
11/02/93	585.33	2.67	582.66
11/03/93	585.33	2.63	582.7
11/04/93	585.33	2.6	582.73
11/05/93	585.33	2.67	582.66

WELL NUMBER MW-15D**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	585.39	--	--
10/31/93	585.39	2.73	582.66
11/01/93	585.39	2.79	582.6
11/02/93	585.39	2.74	582.65
11/03/93	585.39	2.7	582.69
11/04/93	585.39	2.68	582.71
11/05/93	585.39	2.74	582.65

WELL NUMBER W-13 (Z-1)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	587.63	4.98	582.65
10/31/93	587.63	5.01	582.62
11/01/93	587.63	5.03	582.6
11/02/93	587.63	5.02	582.61
11/03/93	587.63	4.99	582.64
11/04/93	587.63	5.01	582.62
11/05/93	587.63	5.03	582.6

WELL NUMBER W-12 (Z-2)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	585.81	3.17	582.64
10/31/93	585.81	3.22	582.59
11/01/93	585.81	3.22	582.59
11/02/93	585.81	3.18	582.63
11/03/93	585.81	3.16	582.65
11/04/93	585.81	3.19	582.62
11/05/93	585.81	3.2	582.61

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER W-2C (Z-8)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.8	4.23	582.57
10/31/93	586.8	4.07	582.73
11/01/93	586.8	4.09	582.71
11/02/93	586.8	4.1	582.7
11/03/93	586.8	4.08	582.72
11/04/93	586.8	4.1	582.7
11/05/93	586.8	4.1	582.7

WELL NUMBER W-2B (Z-9)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.74	4.14	582.6
10/31/93	586.74	3.97	582.77
11/01/93	586.74	3.98	582.76
11/02/93	586.74	3.99	582.75
11/03/93	586.74	3.97	582.77
11/04/93	586.74	3.99	582.75
11/05/93	586.74	3.99	582.75

WELL NUMBER W-2A (Z-10)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.22	3.6	582.62
10/31/93	586.22	3.41	582.81
11/01/93	586.22	3.43	582.79
11/02/93	586.22	3.45	582.77
11/03/93	586.22	3.43	582.79
11/04/93	586.22	3.44	582.78
11/05/93	586.22	3.43	582.79

WELL NUMBER W-4C (EPA E. GREEN)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.41	3.84	582.57
10/31/93	586.41	3.67	582.74
11/01/93	586.41	3.7	582.71
11/02/93	586.41	3.7	582.71
11/03/93	586.41	3.65	582.76
11/04/93	586.41	3.66	582.75
11/05/93	586.41	3.68	582.73

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

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FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER W-4B (EPA MID. GREEN)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.39	3.83	582.56
10/31/93	586.39	3.65	582.74
11/01/93	586.39	3.68	582.71
11/02/93	586.39	3.68	582.71
11/03/93	586.39	3.64	582.75
11/04/93	586.39	3.66	582.73
11/05/93	586.39	3.66	582.73

WELL NUMBER W-4A (EPA W. GREEN)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.45	3.85	582.6
10/31/93	586.45	3.65	582.8
11/01/93	586.45	3.7	582.75
11/02/93	586.45	3.7	582.75
11/03/93	586.45	3.67	582.78
11/04/93	586.45	3.67	582.78
11/05/93	586.45	3.69	582.76

WELL NUMBER W-5 (EPA NSSD)**				
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)	
10/30/93	~~587.86~~ 589.66	6.85	~~581.01~~	582.81
10/31/93	~~587.86~~	6.78	~~581.08~~	582.89
11/01/93	~~587.86~~	6.83	~~581.03~~	582.83
11/02/93	~~587.86~~	6.84	~~581.02~~	582.82
11/03/93	~~587.86~~	6.72	~~581.14~~	582.94
11/04/93	~~587.86~~	6.72	~~581.14~~	582.94
11/05/93	~~587.86~~	6.8	~~581.06~~	582.86

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WELL NUMBER W-6 (EPA-OMC)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	589.8	7.01	582.79
10/31/93	589.8	6.99	582.81
11/01/93	589.8	7.03	582.77
11/02/93	589.8	7.01	582.79
11/03/93	589.8	6.95	582.85
11/04/93	589.8	6.94	582.86
11/05/93	589.8	6.97	582.83

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

FIELD WATER LEVEL ELEVATION DATA

STAFF GAUGE SG-1**			
DATE	MEASURING POINT ELEVATION*** (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	582.36	1.25	582.61
10/31/93	582.36	1.47	582.83
11/01/93	582.36	1.45	582.81
11/02/93	582.36	1.42	582.78
11/03/93	582.36	1.44	582.8
11/04/93	582.36	1.43	582.79
11/05/93	582.36	1.43	582.79

STAFF GAUGE SG-2**			
DATE	MEASURING POINT ELEVATION*** (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	582.27	1.33	582.6
10/31/93	582.27	1.55	582.82
11/01/93	582.27	1.22	582.49
11/02/93	582.27	–	–
11/03/93	582.27	1.53	582.8
11/04/93	582.27	1.52	582.79
11/05/93	582.27	1.53	582.8

STAFF GAUGE SG-3**			
DATE	MEASURING POINT ELEVATION*** (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	582.19	1.48	582.67
10/31/93	582.19	1.36	582.55
11/01/93	582.19	1.37	582.56
11/02/93	582.19	1.3	582.49
11/03/93	582.19	1.3	582.49
11/04/93	582.19	1.3	582.49
11/05/93	582.19	1.3	582.49

NSSD-1 (NORTH POND)			
DATE	MEASURING POINT ELEVATION (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
11/04/93	596.93	DRY	–
11/05/93	596.93	DRY	–

NSSD-2 (MIDDLE POND)			
DATE	MEASURING POINT ELEVATION (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
11/04/93	596.36	DRY	–
11/05/93	596.36	DRY	–

NSSD-3 (SOUTH POND)			
DATE	MEASURING POINT ELEVATION (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
11/04/93	596.32	DRY	–
11/05/93	596.32	DRY	–

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

*** REPRESENTS 1-FOOT MARK ON STAFF GAUGE.

FIELD WATER LEVEL ELEVATION DATA

WELL NUMBER W-4B (EPA MID. GREEN)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.39	3.83	582.56
10/31/93	586.39	3.65	582.74
11/01/93	586.39	3.68	582.71
11/02/93	586.39	3.68	582.71
11/03/93	586.39	3.64	582.75
11/04/93	586.39	3.66	582.73
11/05/93	586.39	3.66	582.73

WELL NUMBER W-4A (EPA W. GREEN)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	586.45	3.85	582.6
10/31/93	586.45	3.65	582.8
11/01/93	586.45	3.7	582.75
11/02/93	586.45	3.7	582.75
11/03/93	586.45	3.67	582.78
11/04/93	586.45	3.67	582.78
11/05/93	586.45	3.69	582.76

WELL NUMBER W-5 (EPA NSSD)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	587.86	6.85	581.01
10/31/93	587.86	6.78	581.08
11/01/93	587.86	6.83	581.03
11/02/93	587.86	6.84	581.02
11/03/93	587.86	6.72	581.14
11/04/93	587.86	6.72	581.14
11/05/93	587.86	6.8	581.06

WELL NUMBER W-6 (EPA-OMC)**			
DATE	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL MEASUREMENT (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	589.8	7.01	582.79
10/31/93	589.8	6.99	582.81
11/01/93	589.8	7.03	582.77
11/02/93	589.8	7.01	582.79
11/03/93	589.8	6.95	582.85
11/04/93	589.8	6.94	582.86
11/05/93	589.8	6.97	582.83

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

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FIELD WATER LEVEL ELEVATION DATA

STAFF GAUGE SG-1**			
DATE	MEASURING POINT ELEVATION*** (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	582.36	1.25	582.61
10/31/93	582.36	1.47	582.83
11/01/93	582.36	1.45	582.81
11/02/93	582.36	1.42	582.78
11/03/93	582.36	1.44	582.8
11/04/93	582.36	1.43	582.79
11/05/93	582.36	1.43	582.79

STAFF GAUGE SG-2**			
DATE	MEASURING POINT ELEVATION*** (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	582.27	1.33	582.6
10/31/93	582.27	1.55	582.82
11/01/93	582.27	1.22	582.49
11/02/93	582.27	–	–
11/03/93	582.27	1.53	582.8
11/04/93	582.27	1.52	582.79
11/05/93	582.27	1.53	582.8

STAFF GAUGE SG-3**			
DATE	MEASURING POINT ELEVATION*** (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
10/30/93	582.19	1.48	582.67
10/31/93	582.19	1.36	582.55
11/01/93	582.19	1.37	582.56
11/02/93	582.19	1.3	582.49
11/03/93	582.19	1.3	582.49
11/04/93	582.19	1.3	582.49
11/05/93	582.19	1.3	582.49

NSSD-1 (NORTH POND)			
DATE	MEASURING POINT ELEVATION (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
11/04/93	596.93	DRY	–
11/05/93	596.93	DRY	–

NSSD-2 (MIDDLE POND)			
DATE	MEASURING POINT ELEVATION (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
11/04/93	596.36	DRY	–
11/05/93	596.36	DRY	–

NSSD-3 (SOUTH POND)			
DATE	MEASURING POINT ELEVATION (FT-MSL)	STAFF GAUGE READING (FT)	WATER LEVEL ELEVATION (FT-MSL)
11/04/93	596.32	DRY	–
11/05/93	596.32	DRY	–

* WATER LEVELS MEASURED MANUALLY.

**FIELD WATER LEVEL DATA INCLUDED IN APPENDIX 4J-1.

*** REPRESENTS 1-FOOT MARK ON STAFF GAUGE.

WATER LEVEL DATA SHEET

PROJECT NAME Waukegan

SAMPLERS DJM, JEG
DATE 9/29/93
PAGE 1 OF 2

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
~~SG-3~~ SG-1	KAF 12/15/93	1.40			
SG-2		1.34			ACTUAL STAFF GAUGE READINGS
~~SG-1~~ SG-3		1.24			KAF 11/4/94
Z-1		4.46	12.42		
Z-2		2.73	7.00		
Harbor					
MW 12S		2.78	12.0		
MW 12D		2.75	33.0		
P-105		.79	10.80		
MW 13S		3.73	13.0		
MW 13D		3.76	33.0		
MW 14S		1.08	11.5		
MW 14D		1.24	30.5		
MW 15S		2.10	12.0		
MW 15D		2.16	29.0		
MW 11S		5.31	14.0		
MW 11D		5.43	30.6		
P-107		1.76	11.58		
MW 3S		5.05	14.95		
MW 3D		5.11	30.71		
P-102		5.38	14.56		
MW 7S		4.42	14.5		
MW 7D		4.85	34.3		
P-104		5.81	14.55		
MW 1S		4.81	19.58		
MW 1D		4.68	29.62		
PW 1	not	installed			
P-106		11			

FIELD WATER LEVEL ELEVATION DATA

DATE 12/01/93			
WELL NUMBER	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL DEPTH (FT)	WATER LEVEL ELEVATION (FT)
P101	588.14	–	–
P102	588.52	5.74	582.78
P103	589.44	7.08	582.36
P104	589.07	6.36	582.71
P105	583.96	1.29	582.67
P106	589.6	7.19	582.41
P107	584.41	2.12	582.29
P108	589.52	7.11	582.41
MW1S	587.76	5.4	582.36
MW1D	587.62	5.27	582.35
MW3S	588.24	5.51	582.73
MW3D	588.23	5.54	582.69
MW4S	586.16	3.43	582.73
MW4D	585.93	3.52	582.41
MW5S	587.89	6.58	581.31
MW5D	588.47	7.18	581.29
MW6S	588.45	6.81	581.64
MW6D	588.51	6.94	581.57
MW7S	587.78	4.88	582.9
MW7D	588.14	5.31	582.83
MW8S	586.43	4.15	582.28
MW8D	586.09	3.92	582.17
MW9S	588.49	5.82	582.67
MW9D	588.65	6.24	582.41
MW10S	588.58	6.63	581.95
MW10D	588.6	6.73	581.87
MW11S	587.83	5.55	582.28
MW11D	587.98	5.71	582.27
MW12S	586.03	3.47	582.56
MW12D	586.01	3.46	582.55
MW13S	586.95	4.24	582.71
MW13D	586.9	4.32	582.58
MW14S	583.92	1.27	582.65
MW14D	584.05	1.51	582.54
MW15S	585.33	2.43	582.9
MW15D	585.39	2.55	582.84
PW1	589	6.65	582.35
SG-1	582.36*	1.75**	583.11
SG-2	582.27*	1.84**	583.11
SG-3	582.19*	1.15**	582.34
W-13 (Z-1)	587.63	4.67	582.96
W-12 (Z-2)	585.81	2.77	583.04
W-2C (Z-8)	586.8	–	–
W-2B (Z-9)	586.34	3.67	582.67
W-2A (Z-10)	586.22	3.11	583.11
W-6 (EPA-OMC)	589.8	6.76	583.04
W-5 (EPA NSSD BY N. DITCH)	~~587.86~~ 589.66	6.57	~~581.29~~ 583.09 KAF 3-25-94
W-4B (EPA MIDDLE GREEN)	586.89	3.36	583.53
W-4A (EPA WEST GREEN)	586.45	3.39	583.06
W-4C (EPA EAST GREEN)	586.41	3.41	583
SW-1	584.56	3.52	581.04
SW-2	585.52	4.48	581.04
NSSD-1 (NORTH POND)	596.93	DRY	–
NSSD-2 (MIDDLE POND)	596.36	DRY	–
NSSD-3 (SOUTH POND)	596.32	DRY	–

*REPRESENTS 1-FOOT MARK ON STAFF GAUGE.

**ACTUAL STAFF GAUGE READING.

A:\KXL\13\49\003\WCPWL.Q1

FIELD WATER LEVEL ELEVATION DATA

DATE 9/29/93			
WELL NUMBER	MEASURING POINT ELEVATION (FT-MSL)	WATER LEVEL DEPTH (FT)	WATER LEVEL ELEVATION (FT)
P101	588.14	–	–
P102	588.52	5.38	583.14
P103	589.44	6.47	582.97
P104	589.07	5.81	583.26
P105	583.96	0.79	583.17
P106	589.6	–	–
P107	584.41	1.76	582.65
P108	589.52	–	–
MW1S	587.76	4.81	582.95
MW1D	587.62	4.68	582.94
MW3S	588.24	5.09	583.15
MW3D	588.23	5.11	583.12
MW4S	586.16	2.96	583.2
MW4D	585.93	2.72	583.21
MW5S	587.89	6.16	581.73
MW5D	588.47	6.77	581.7
MW6S	588.45	6.51	581.94
MW6D	588.51	6.62	581.89
MW7S	587.78	4.42	583.36
MW7D	588.14	4.85	583.29
MW8S	586.43	3.55	582.88
MW8D	586.09	3.24	582.85
MW9S	588.49	5.27	583.22
MW9D	588.65	5.52	583.13
MW10S	588.58	6.05	582.53
MW10D	588.6	6.11	582.49
MW11S	587.83	5.31	582.52
MW11D	587.98	5.43	582.55
MW12S	586.03	2.78	583.25
MW12D	586.01	2.75	583.26
MW13S	586.95	3.73	583.22
MW13D	586.9	3.76	583.14
MW14S	583.92	1.08	582.84
MW14D	584.05	1.24	582.81
MW15S	585.33	2.1	583.23
MW15D	585.39	2.16	583.23
PW1	589	–	–
SG-1	582.36*	1.24**	582.6
SG-2	582.27*	1.34**	582.61
SG-3	582.19*	1.4**	582.59
W-13 (Z-1)	587.63	4.46	583.17
W-12 (Z-2)	585.81	2.73	583.08
W-2C (Z-8)	586.8	4.31	582.49
W-2B (Z-9)	586.34	4.2	582.14
W-2A (Z-10)	586.22	3.61	582.61
W-6 (EPA-OMC)	589.8	6.92	582.88
W-5 (EPA NSSD BY N. DITCH)	~~587.86~~ 583.66	6.47	~~581.89~~ 583.19 KAF 3-25-94
W-4B (EPA MIDDLE GREEN)	586.89	3.79	583.1
W-4A (EPA WEST GREEN)	586.45	3.82	582.63
W-4C (EPA EAST GREEN)	586.41	3.76	582.65
SW-1	584.56	3.59	580.97
SW-2	585.52	4.45	581.07

* REPRESENTS 1-FOOT MARK ON STAFF GAUGE.

**ACTUAL STAFF GAUGE READING.

A:\KXL\13\49\003\WCPWL.Q1

WATER LEVEL DATA SHEET

By: DDM Date: 12-1-93 PM

Total Depth - 0.06'

Page 1 of 2

	WELL NUMBER	TIME Hr. Min. Sec.	Measuring Point Elevation	Previous Water Level Depth	Water Level Depth	Water Level Elevation	Comments
W-13	Z-1				4.67	12.45	no sand
W-12	Z-2				2.77	7.01	no sand
W2C	Z-8				—	—	cannot unscrew cover
W2B	Z-9				3.67	21 90	sand
W2A	Z-10				3.11	10.12	sand
W4A	3 green			W	3.39	8.73	sand
W4B	wells				3.36	16.93	more sand
W4C	nested			E	3.41	21.59	sand
W5	EPA well/NSSD pond		TOR - TOC = 1.83'		6.57	11.68	Sand (TOPR.C)
W6	EPA well w of OMC #2				6.76	12.80	~~[illegible]~~ NO SAND
SW-1	Harbor				3.52	7.82	stilling well next to Larsen storage
SW-2	Slip				4.48	12 18	stilling well n to P-107 tr
	SG-1				1.75	Frozen	north ditch
KXL 12/14/93	SG-2			ACTUAL STAFF	1.84	Frozen	north ditch
	SG-3			GAUGE READINGS	1.15		discharge
	P-102			KAT 1/4/94	5.74	14.99	trace
	P-103				7.08	15.33	
	P-104				6.36	14.97	
	P-105				1.29	10.93	no sand
	P-106				7.19	31.15	tr
	P-107				2 12	11 59	tr Sand
	P-108				7.11	32.33	tr.
(12)	PW-1	X			6.65	35.99	trace sand
(11)	MW1S	X			5.40	19.60	sand
	MW1D	X			5.27	29.65	sand
(10)	MW3S	X			5.51	14.95	no sand
	MW3D	X			5.54	30.75	trace sand
(13)	MW4S	X			3.43	12.15	no sand
	MW4D	X			3.52	32.15	trace Sand

WATER LEVEL DATA SHEET

By: DDM Date: 12-1-93 PM

Total depth ~0.06'

Page 2 of 2

WELL NUMBER	TIME Hr. Min. Sec.	Measuring Point Elevation	Previous Water Level Depth	Water Level Depth	Water Level Elevation	Comments
MW5S				6.58	16.00	
MW5D				7.18	28.50	
MW6S				6.81	16.68	No sand
MW6D				6.94	29.26	Trace
MW7S				4.88	14.44	no sand
MW7D				5.31	34.35	no sand
MW8S				4.15	12.45	sand
MW8D				3.92	29.91	no sand
MW9S				5.82	15.03	trace sand
MW9D				6.34	34.24	much sand
MW10S				6.63	16.21	trace sand
MW10D				6.73	32.64	Sand
MW11S				5.55	14.17	No Sand
MW11D				5.71	30.65	No Sand
MW12S				3.47	12.03	no sand
MW12D				3.46	33.40	sand
MW13S				4.24	12.91	sand
MW13D				4.32	33.12	sand
MW14S				1.27	11.45	tr. sand
MW14D				1.51	30.57	tr sand
MW15S				2.43	11.78	tr sand
MW15D				2.55	29.00	tr sand
MW1				6.70	14.91	tr sand
MW2				7.25	15.20	No Sand
MW3				6.67	15.48	no sand
MW4				5.84	16.03	No sand
MW4D				5.55	28.12	lots of sand
N NSSD Pond (NSSD 1)				Dry KAF	POND DRY	meas. pt is 5 cm [illegible]
S NSSD Pond (NSSD 3)				12.11 1/4/94	POND DRY	of ponds [illegible] of concrete
MW11 (NSSD 2)					POND DRY	

TO: JAB

From: DDM

12/7/93 ~10:15 AM

L2B - 4.73

Z8 - 3.64 W2C

Z2 - 2.68 W12

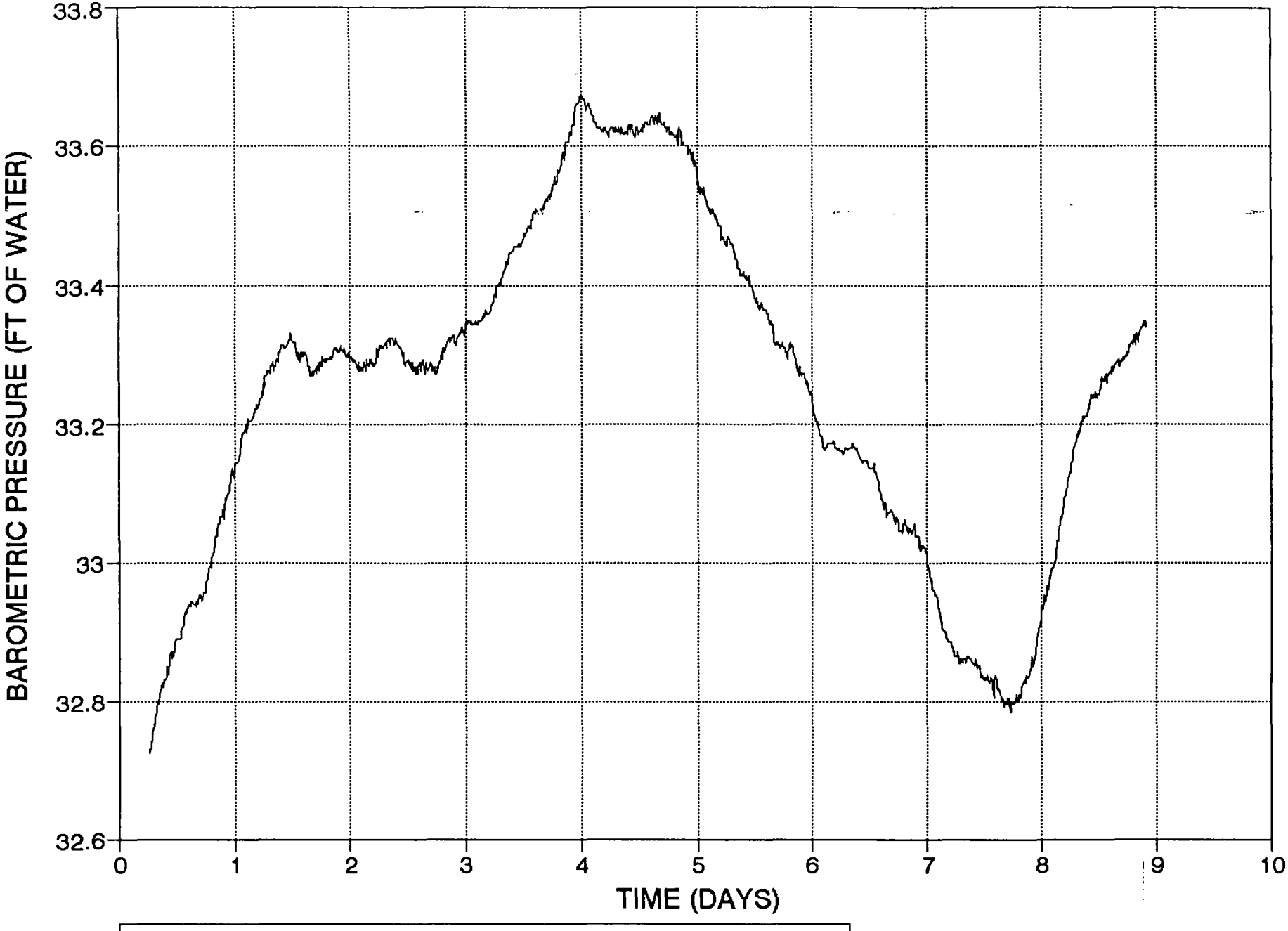
Green E - 3.26 W4C

↑

NOTES By JAB
12/7/93

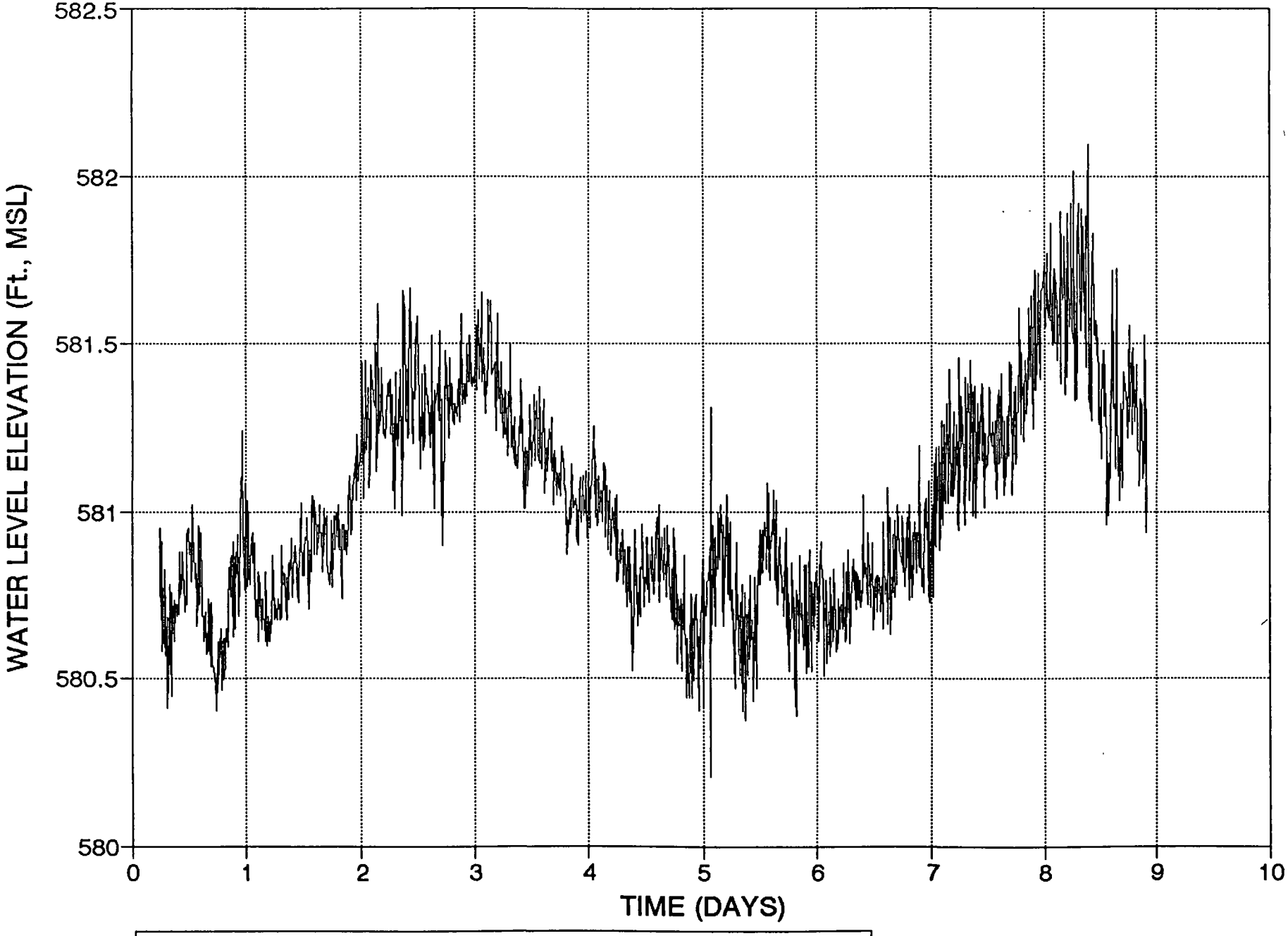
P.S The phone will be disconnected tomorrow, (12/8), afternoon. Use VoiceMail for messages.

BAROMETRIC PRESSURE



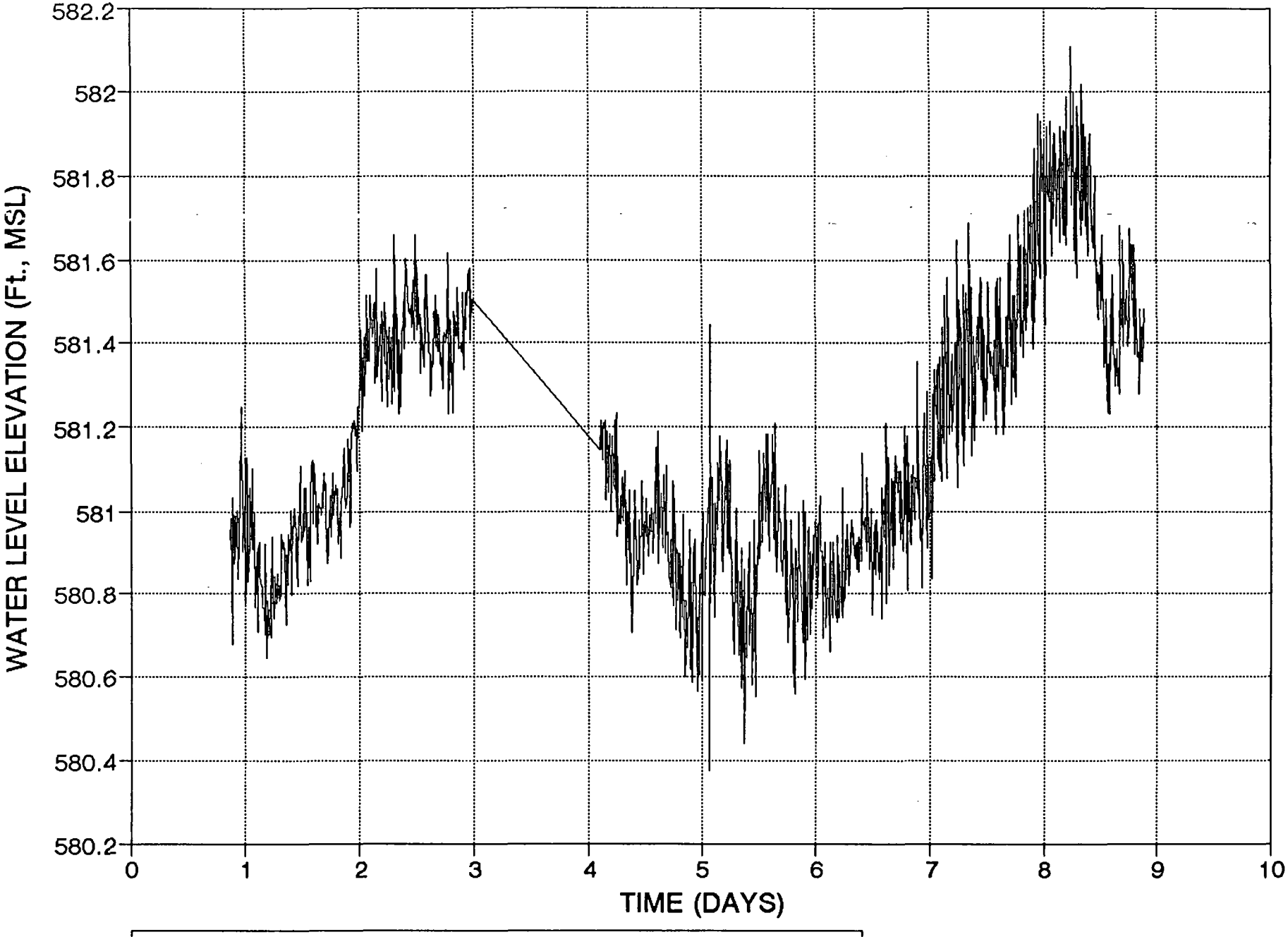
NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS TIME EQUAL ZERO DAYS.

HARBOR (SW-1) HYDROGRAPH



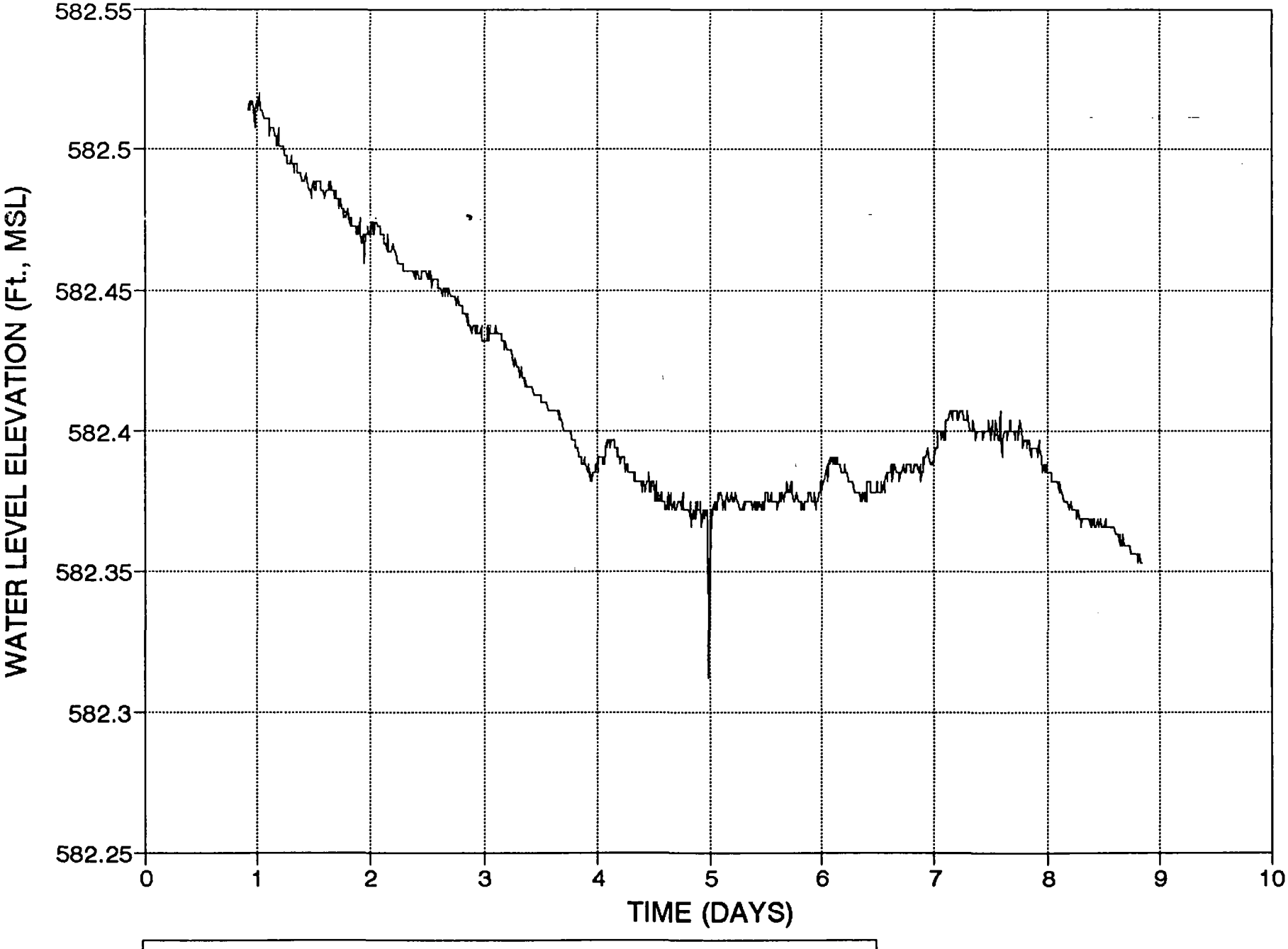
NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS T EQUAL ZERO DAYS.

SLIP (SW-2) HYDROGRAPH



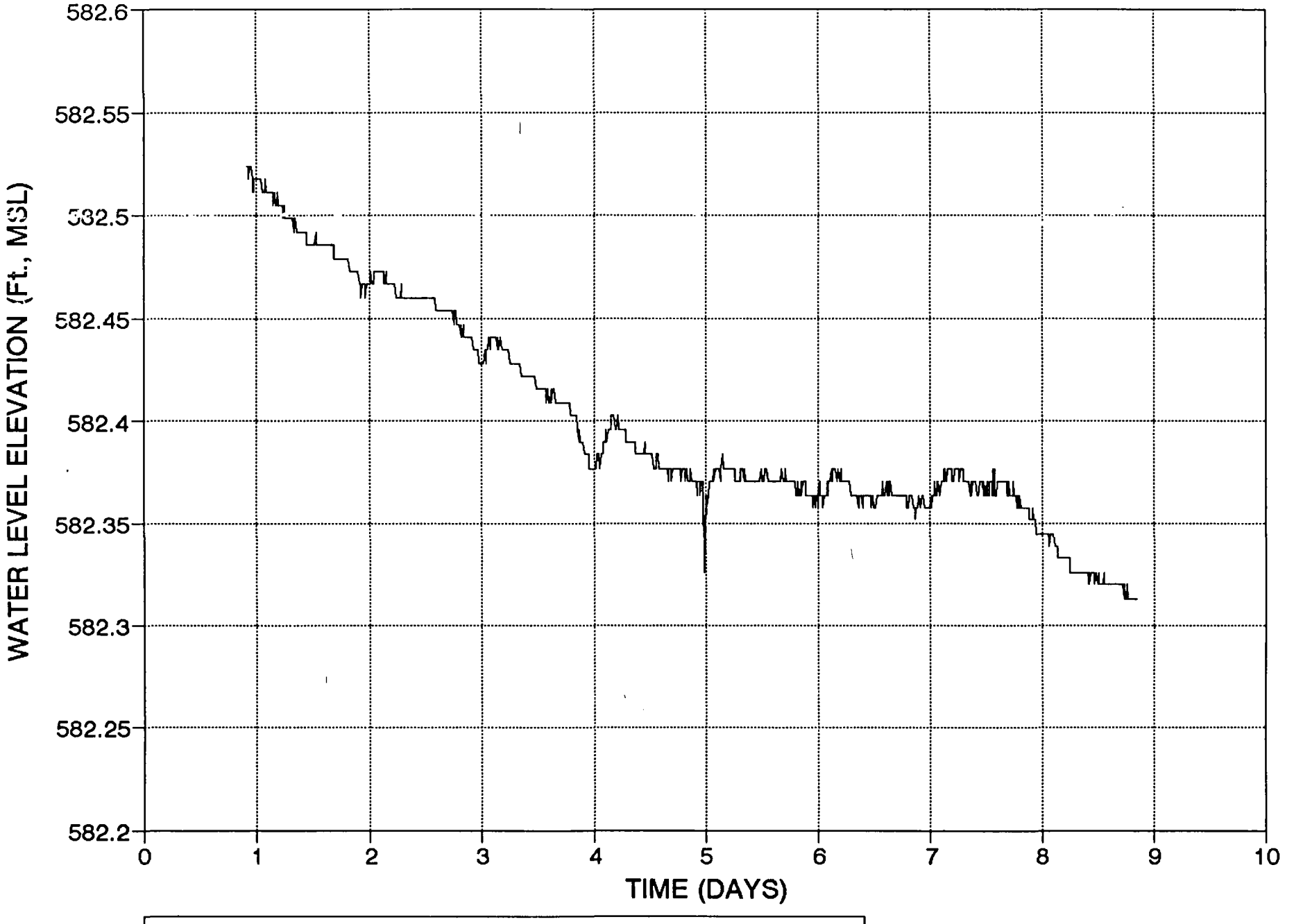
NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS TIME EQUAL ZERO DAYS.

MW-01D HYDROGRAPH



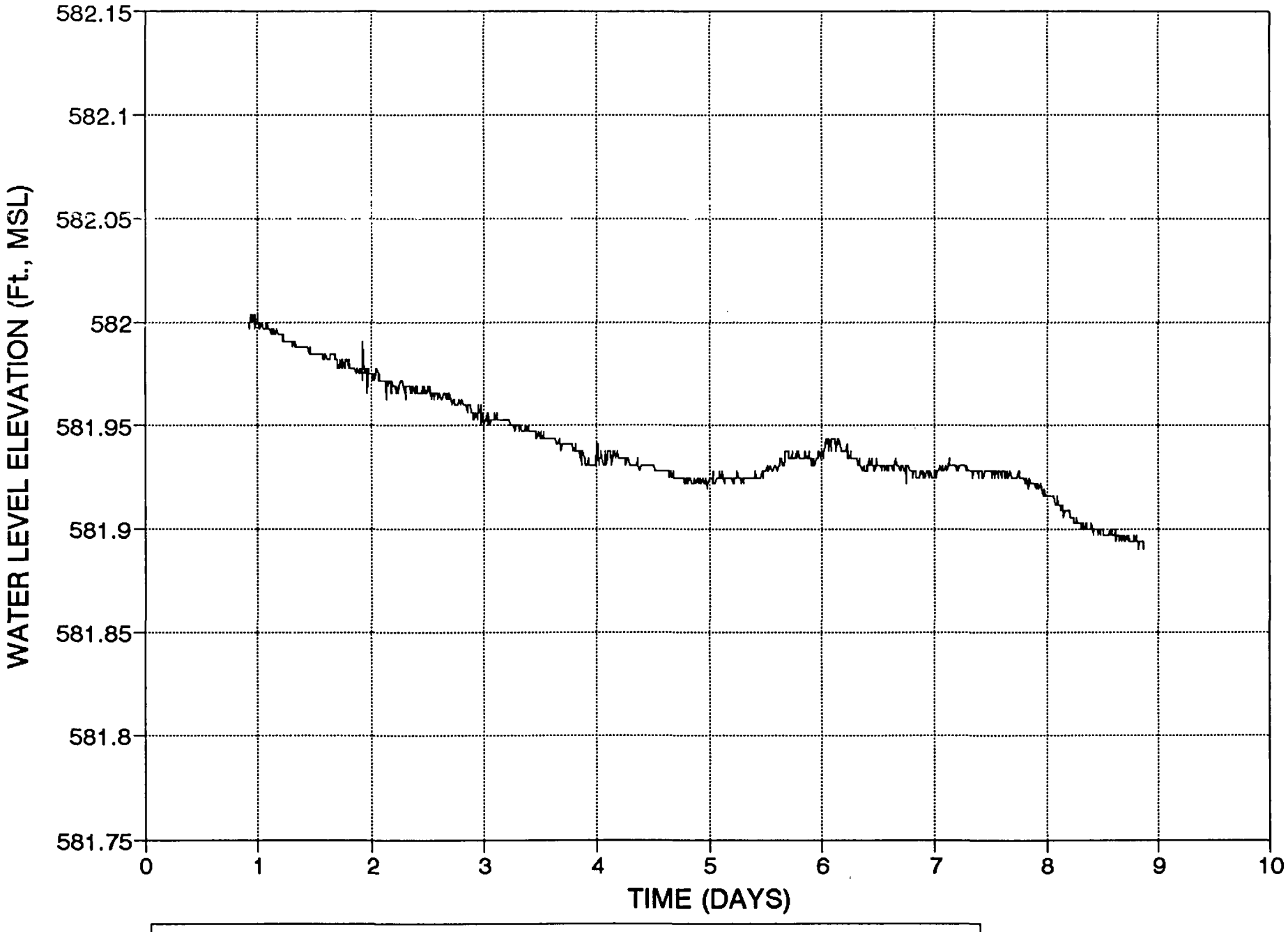
NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS T' EQUAL ZERO DAYS.

MW-01S HYDROGRAPH



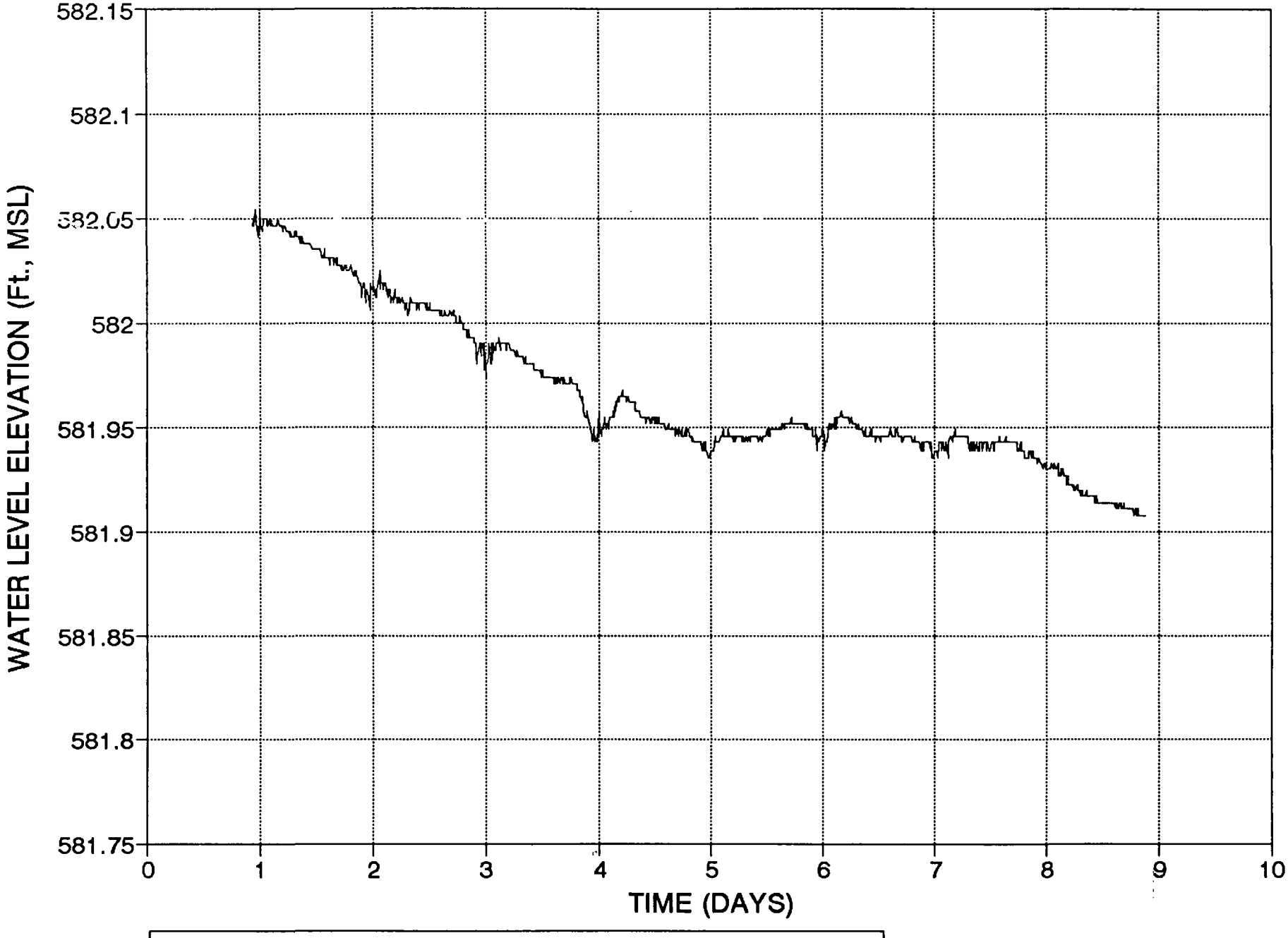
NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS TIME EQUAL ZERO DAYS.

MW-10D HYDROGRAPH



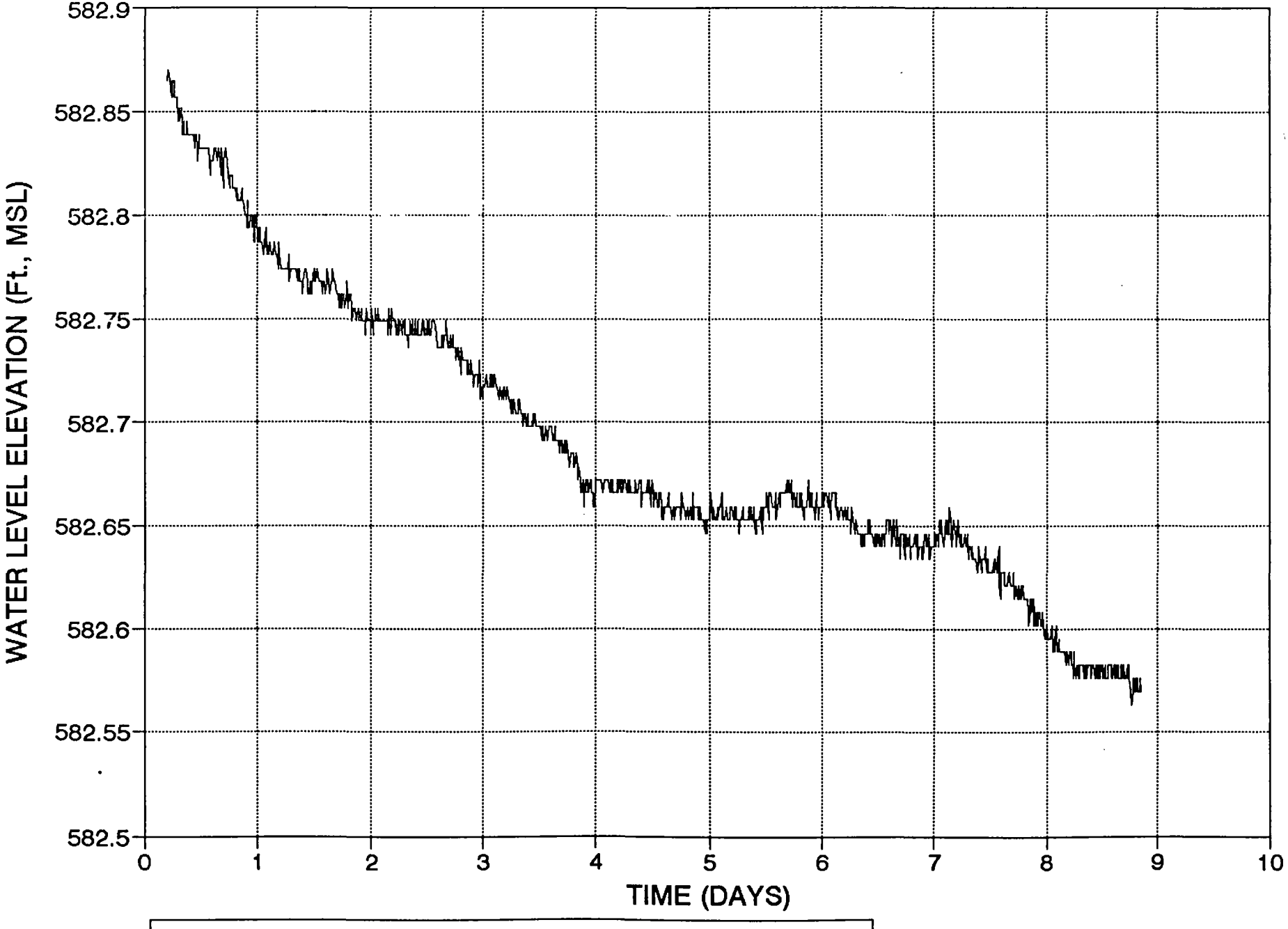
NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED TIME EQUAL ZERO DAYS.

MW-10S HYDROGRAPH



NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS TIME EQUAL ZERO DAYS.

MW-09D HYDROGRAPH



NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS TI[illegible] EQUAL ZERO DAYS.

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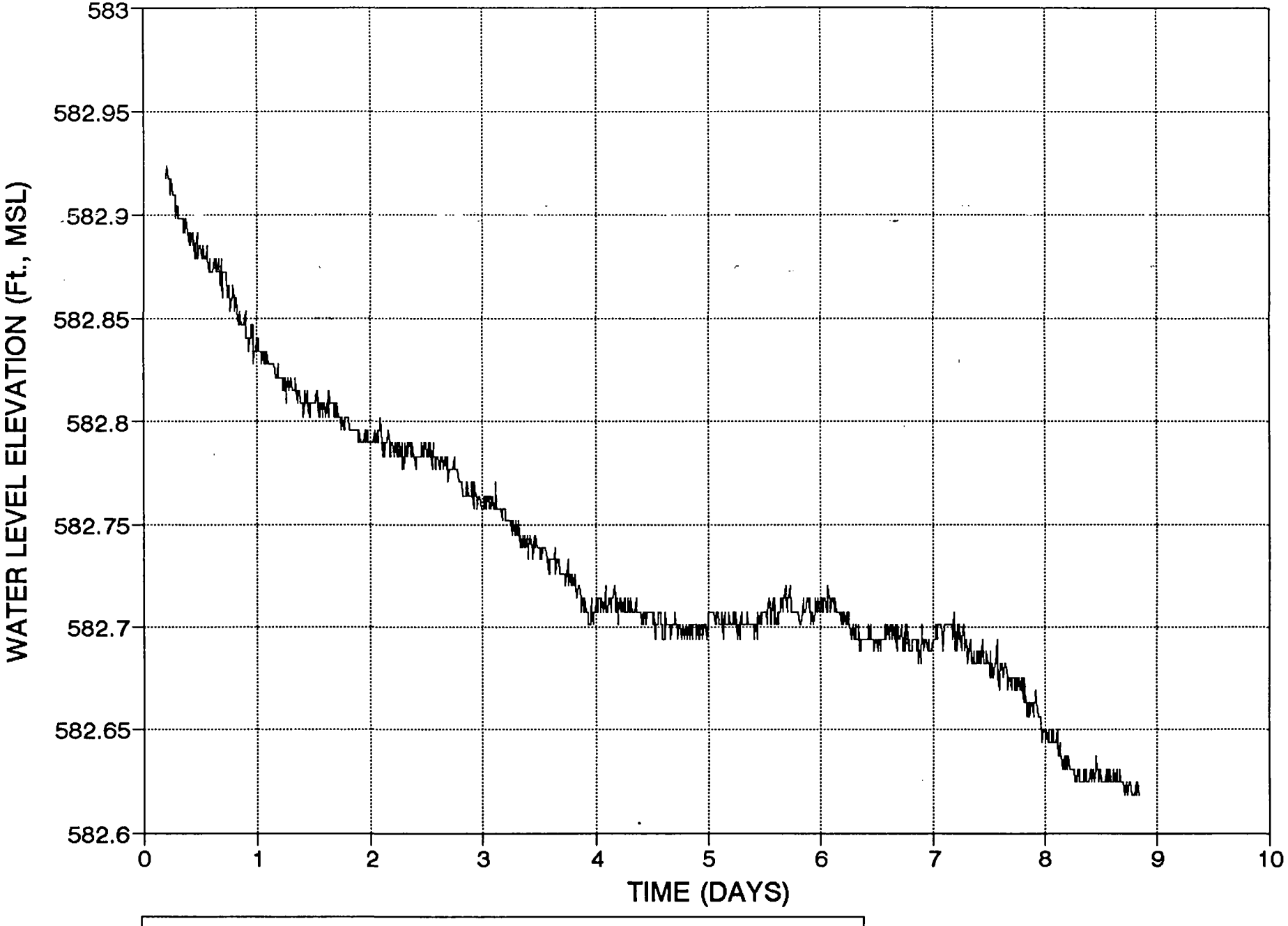
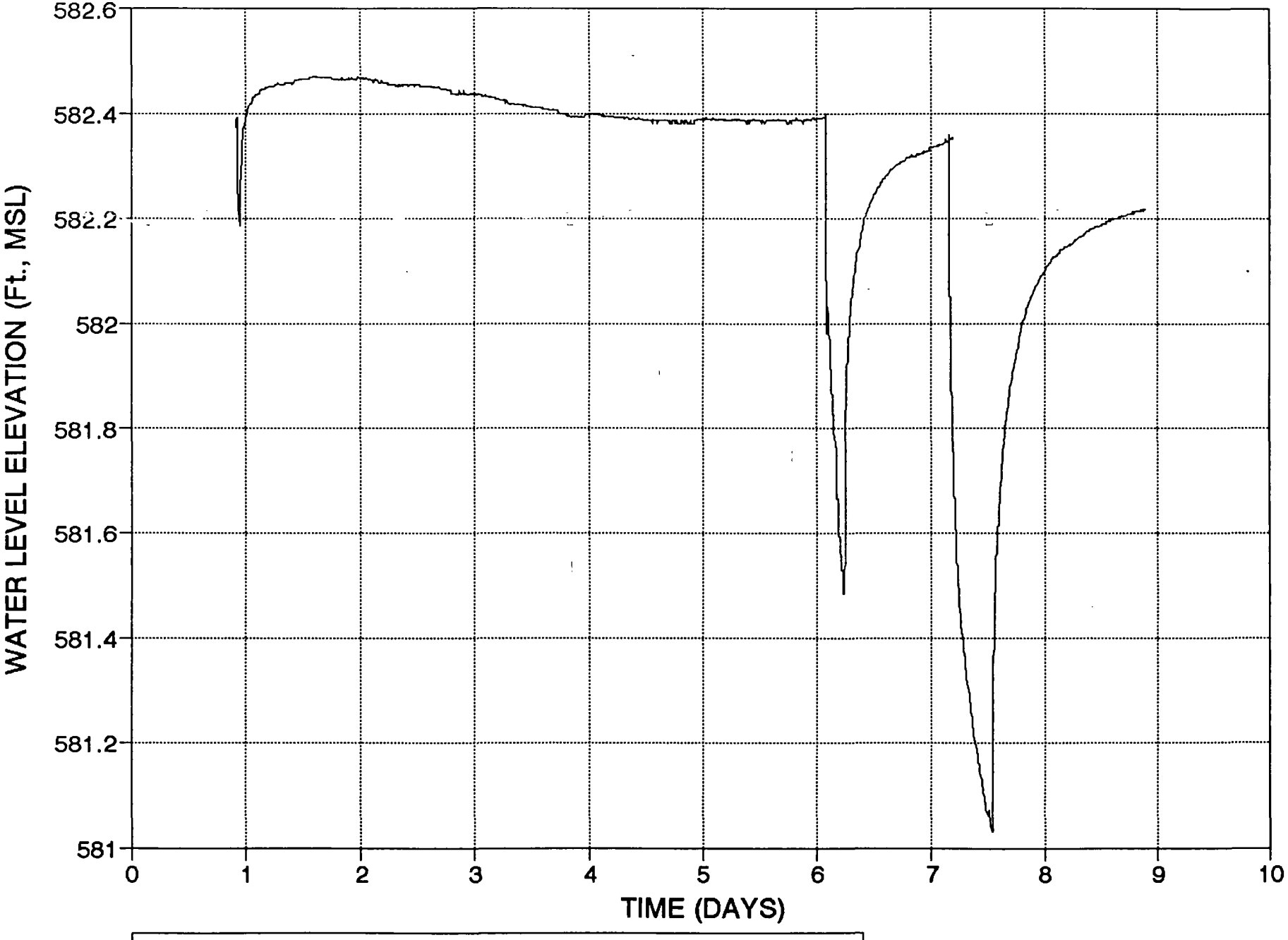


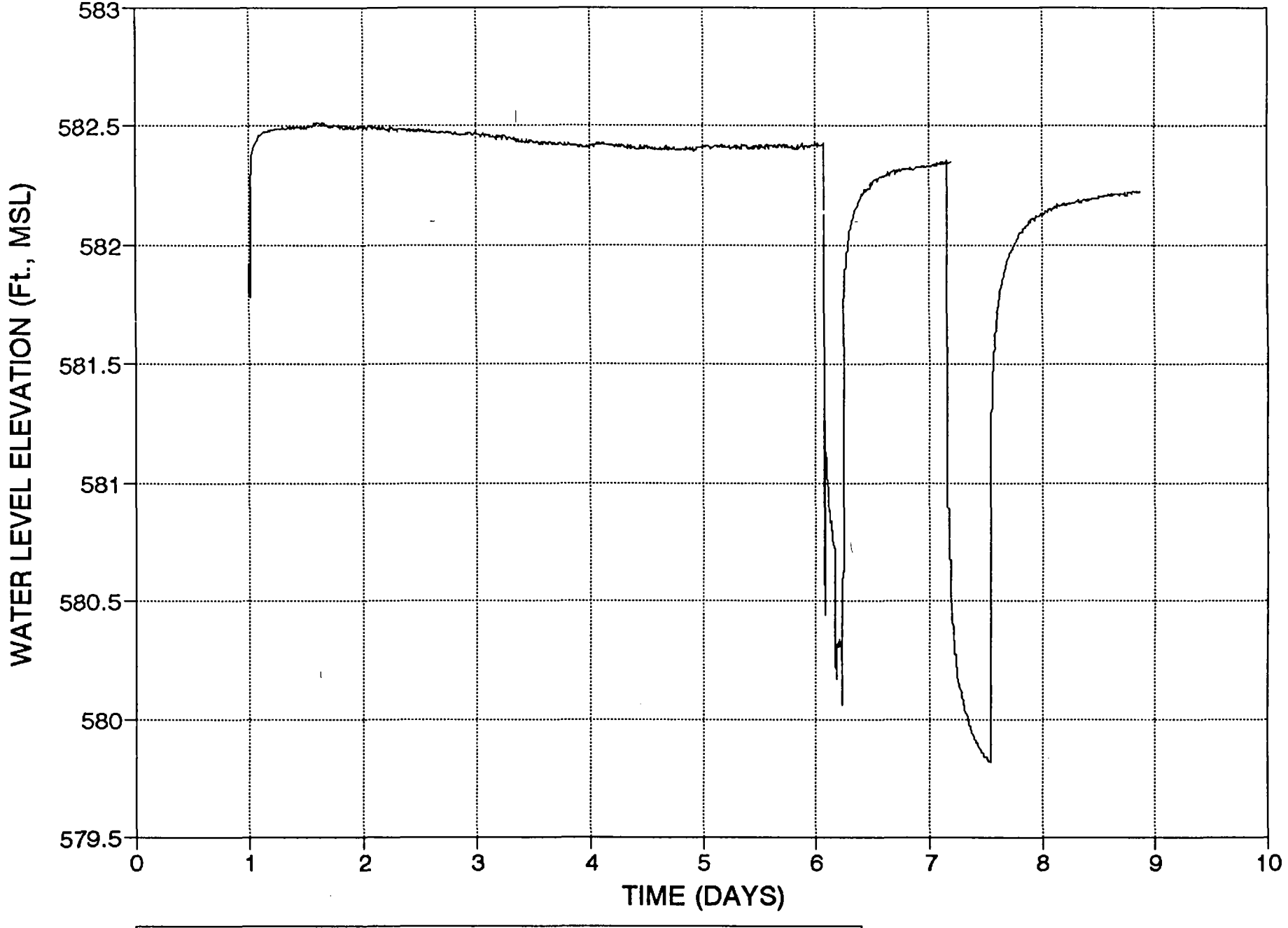
NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS TIME EQUAL ZERO DAYS.

P-103 HYDROGRAPH



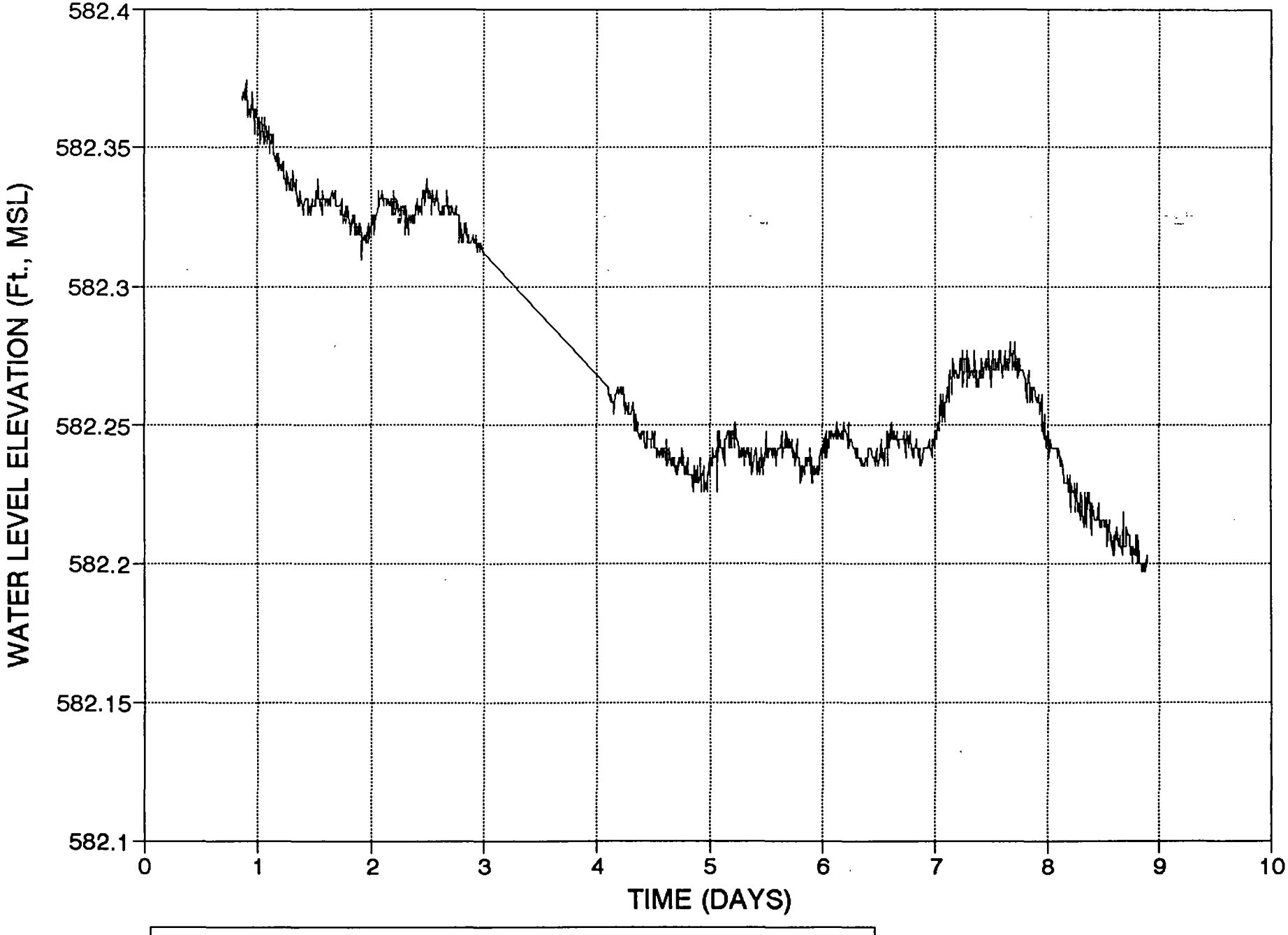
NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS TI[illegible] EQUAL ZERO DAYS.

P-106 HYDROGRAPH



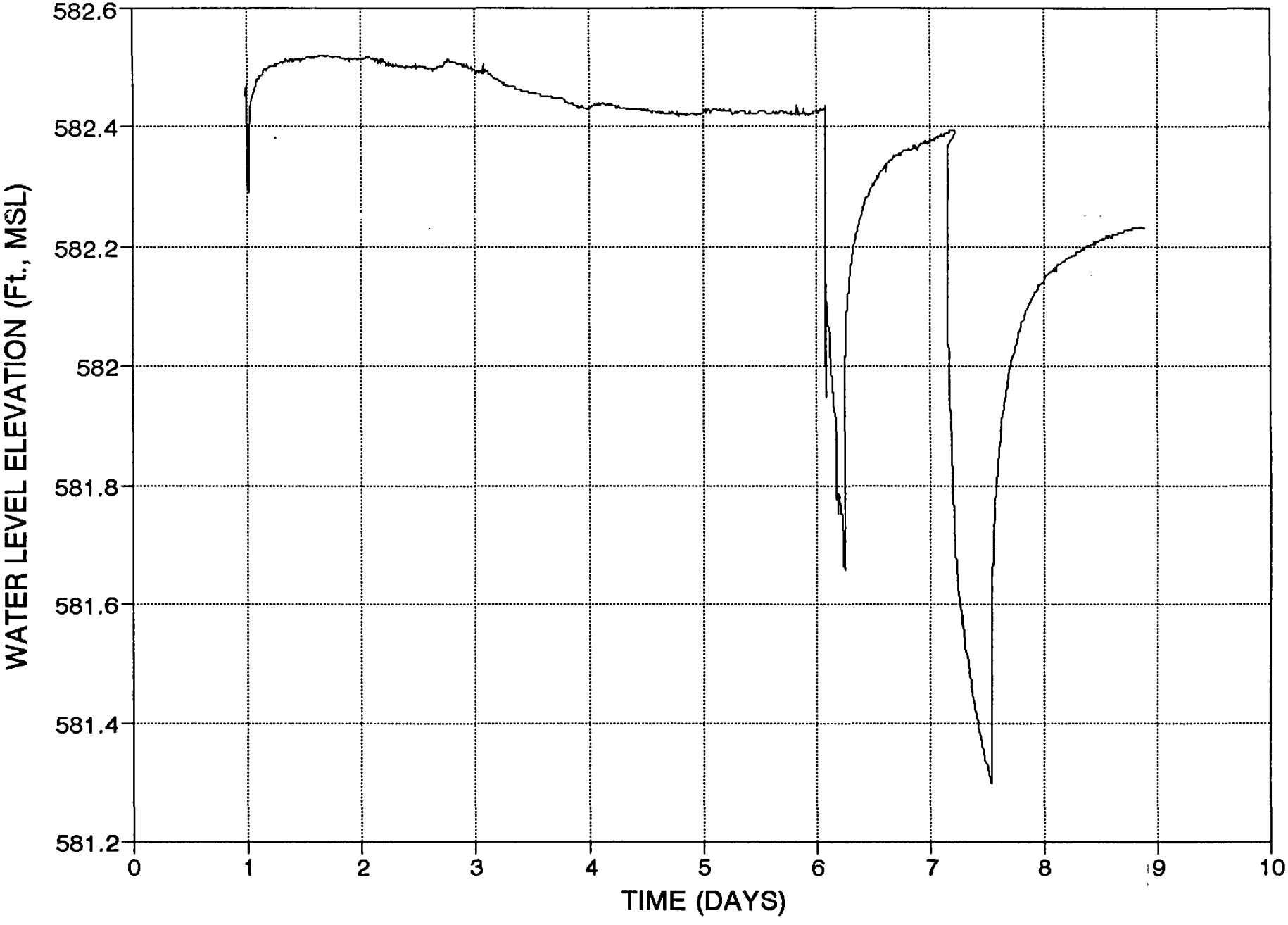
NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS TIME EQUAL ZERO DAYS.

P-107 HYDROGRAPH



NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS T' EQUAL ZERO DAYS.

P-108 HYDROGRAPH



NOTE: OCTOBER 28, 1993, 12:00 PM, DESIGNATED AS TIME EQUAL ZERO DAYS.

Appendix 4-H

Field Log Data Sheets
Precipitation Measurements

BARR ENGINEERING CO.

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

13/49-003JSL52
WCP RI/FS

CHECKED BY _____
DATE _____

Precipitation Measurements

Date	Measurement (in inches)	Measured a.m. on
8-23-93	0.3	8-24-93
8-24-93	0	8-25-93
8-25-93	0	8-26-93
8-26-93	0	8-27-93 am
8-27-93	0	8-27-93 pm
8-28-93	} no measurements made	
8-29-93	} no measurements made	
8-30-93	severe thunderstorm at 18:30	
	0.21	8-31-93
8-31-93	0	9-1-93
9-1-93	0	9-2-93
9-2-93	0	9-3-93
9-3-93	NA	9-4-93
9-4-93	NA	9-5-93
9-5-93	NA	9-6-93
9-6-93	0	9-7-93
9-7-93	0.1	9-8-93
9-8-93	0	9-9-93
9-9-93	0	9-10-93
9-10-93	0	9-11-93
9-11-93	0.1	9-12-93
9-12-93	0.0	9-13-93
9-13-93	0.4	9-14-93
9-14-93	0.25	9-15-93
9-15-93	0	9-16-93
9-16-93	0	9-17-93
9-17-93	–	9-18-93
9-18-93	–	9-19-93
9-19-93	.15	9-20-93
9-20-93	0.20	9-21-93
9-21-93	0	9-22-93
9-22		9-23
9-23	0	9-24

BARR ENGINEERING CO.

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

13/49-003JSL52
WCP RI/FS

CHECKED BY _____
DATE _____

Precipitation Measurements (cont'd)

Date	Measurements (in inches)	Measured a.m. on
~~23~~ ~~23~~		24
9-~~24~~-93	0	9-~~25~~-93
9-24-93	0 (gauge was tipped on its side there is standing water on-site)	9-27-93
9-27-93	0	9-28-93
9-28-93	—	9-29-93
9-29-93	—	9-30-93
9-30-93	—	10-1-93
10-1-93	0	10-4-93
10-4-93	0	10-5-93
10-5-93	0	10-6-93
10-6-93	0	10-7-93
10-7-93	0	10-8-93
10-8-93	0	10-11-93
10-11-93	0	10-12-93
10-12-93	0	10-13-93
10-13-93	0	
10-14-93	0	
10-15-93	0.0	
10-16-93	0.2	
10-17-93	1.40	
10-18-93	—	
10-19-93	0.0	
10-20/93	0.0	
10-21/93	—	
22	—	
23	—	
24	—	
25	0.1	
26	0.0	
27	0.0	
28	0.0	
29	0.0	
10/30	0.1	
10/31	< 0.1	

NOTES ADDED 11/8/93 JAB

Gauge # 2

- Not installed

NOTES ADDED 11/6/93 JAB

0.0
0.0
0.0
0.0
0.06
0.02

BARR ENGINEERING CO.

NAME _____
DATE _____
CHECKED BY _____ SHEET _____ IN SET
DATE _____ PAGE _____ IN FILE

	Gauge 1	Gauge 2
11/1	0.0	0.02
11/2	— —	— —
11/3	0.1	0.09
11/4	0.0	0.00
11/5	0.0	0.00
11/6	< 0.1	0.05
11/7	— —	— —
11/8	— —	— —
11/9	— —	— —
11/10	— —	— —
11/11	— —	— —
11/12	— —	0.44
11/13	— —	— —
11/14	— —	0.23

Notes Taken from Field Book for pumping Test
JAB 11/6/93

BARR ENGINEERING CO.

NAME _____
DATE _____
SHEET _____ IN SET
PAGE _____ IN FILE

Week of Oct 25

CHECKED BY _____
DATE _____

DEC 0 2

TO BARR ENGINEERING

Date	Rain gauge by Trailer	Rain gauge by well
10/25/93	0.1 Inch	Not installed.
10/26/93	0.0	0.0
10/27/93	0.0	0.0
10/28/93	0.0	0.0
10/29/93	0.0	0.0
10/30/93	8am 0.0	0.0
	5pm 0.1	0.06 · 57.11 Rainy/5000.
11-12		0.44
11-14		0.23

TO: JAB

FROM: DDM

Rain Gauge #1 — By: Office Trailer

Date	Time	Level
10/30	0800	0.0
10/30	1700	0.1
10/31	1348	< 0.1"
11/01	1050	0.0
11/02	1110	reading
11/03	1400	0.1"
11/04	8:10	0.00
11/05	840	0.0
11/6	09:31	dry

Rain Gauge 2 By Pumping Well 2

Date	Time	Level
10/30	0800	0.0
10/30	1700	0.06
10/31	1242	.02
11/01	0704	.03
11/3	07:30	0.01
11/4	07:30	0.00
11/05	08 50	0.0
11/6	07:31	0.00

Appendix 4-I

Slug Test Data and Evaluation

APPENDIX 4-I

SLUG TEST PROCEDURE, DATA, AND EVALUATION

Equipment used to conduct the slug tests consisted of a pressure transducer rated at 10 or 20 psi, an automatic data recorder (In Situ Hermit ST1000B), and a solid PVC plug lowered on a stainless-steel cable. The tests were conducted in the following manner:

1. Measure the water level.

2. Place a pressure transducer greater than 6, but less than 12 feet below the water surface and secure.

3. Set the static water level registered on the data logger as the reference point.

4. Simultaneously activate the data logger's recording mode and lower the slug as rapidly as possible until the slug descends completely below the static water level.

5. Monitor the automatic data logger until the water level returns to the static level.

6. Simultaneously step the data logger to the second step of the test and remove the slug as rapidly as possible.

7. Continue the test until the static water level equilibrates.

8. Stop recording data.

9. Repeat steps 3 through 8 for the second slug test.

10. Decontaminate the pressure transducer, slug, and drop line by washing them in a solution of tap water and detergent and rinsing them in tap water before moving to the next well.

The transducers were connected to the data loggers to record the water level fluctuations during the tests. The recovery of the water in the well after a slug-in or slug-out phase was recorded by the pressure change at the transducer at logarithmic time intervals. Recovery in all tested wells was achieved after a few minutes.

Slug test data were analyzed using the Bouwer and Rice method (Bouwer and Rice, 1976; Bouwer, 1989). To perform this analysis, the digitally recorded data were downloaded to a computer and the time versus drawdown data were plotted with the use of AQTESOLV software (Duffield and Rumbaugh, 1989). The AQTESOLV plots are provided with this appendix. The portion of the curve thought to represent the response from the aquifer was determined visually based on: (1) omitting initial variations in data caused by the slug disturbing the water level; (2) considering the second straight line segment for water table well plots to remove filter pack effects from the analyses (Bouwer, 1989); and (3) using data from periods occurring prior to periods for which consecutive head measurements did not change. The wells were assumed to be partially penetrating. The parameters used in the analyses are summarized in Table 4-I-1.

According to the Bouwer and Rice method, an equivalent value of r_c must be substituted for r_c when the water is rising or falling within the gravel pack, as well as the well casing. The formula for the equivalent r_c is:

$$\text{equiv } r_c = \sqrt{(1-n)\,r_c^2 + n r_w^2}$$

where: n = porosity of gravel pack
r_w = radius of gravel pack
r_c = radius of casing

This formula assumes that the entire porosity of a gravel pack drains into the well casing during the slug test. An equivalent radius was calculated for Wells MW-3S, MW-4S, MW-5S, and MW-6S, which are screened across the water table. The hydraulic conductivities estimated using this radius were several times higher than the hydraulic conductivities estimated for the deeper wells (sand pack fully saturated), although there was no geologic explanation for the difference. When the actual r_c value instead of the equivalent r_c value was

used, the hydraulic conductivity estimates for the water table wells were similar to those for the deeper wells. The conclusion was that the equivalent r_c was too large and that the entire porosity of the gravel pack cannot have drained into the well casing. The following calculation shows that only 3 percent of the total volume of the exposed filter pack drained into the well casing:

Volume of water drained from filter pack into screen:

$$\Pi r_c^2 (0.8 \text{ ft}) 1$$

where: 1 = porosity of the well casing, and

where: y_0 = 1 foot (initial drawdown)

y_t = 0.2 foot (beginning of aquifer response on graph)

$y_0 - y_t$ = 0.8 foot (recovery due to draining of filter pack)

Volume of filter pack that can drain into well:

$$\Pi(r_w^2 - r_c^2) y_0$$

Drained porosity of filter pack (x):

$$x = \frac{\Pi r_c^2 (0.8)}{\Pi (r_w^2 - r_c^2) y_0} = 0.03$$

where: r_c = 0.083 foot, r_w = 0.427 foot, and y_0 = 1.0 foot

Because only 3 percent of the total filter pack volume drained into the well during the slug test, the filter pack can be assumed to have been essentially saturated throughout the test and the actual casing radius (r_c) can be used instead of the equivalent radius.

REFERENCES

Bouwer, H. and R.C. Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells. Water Resources Research, Vol. 12, pp. 423-428.

Bouwer, H. 1989. The Bouwer and Rice Slug Test - An Update. Groundwater, 27(3), pp. 304-309.

Duffield, G.M. and J.O. Rumbaugh III. 1989. Geraghty and Miller Modelling Group, AQTESOLV™. Aquifer Test Solver, Version 1.00 Documentation, October 17, 1989.

TABLE 4-I-1

SLUG TEST PARAMETERS
BOUWER AND RICE METHOD

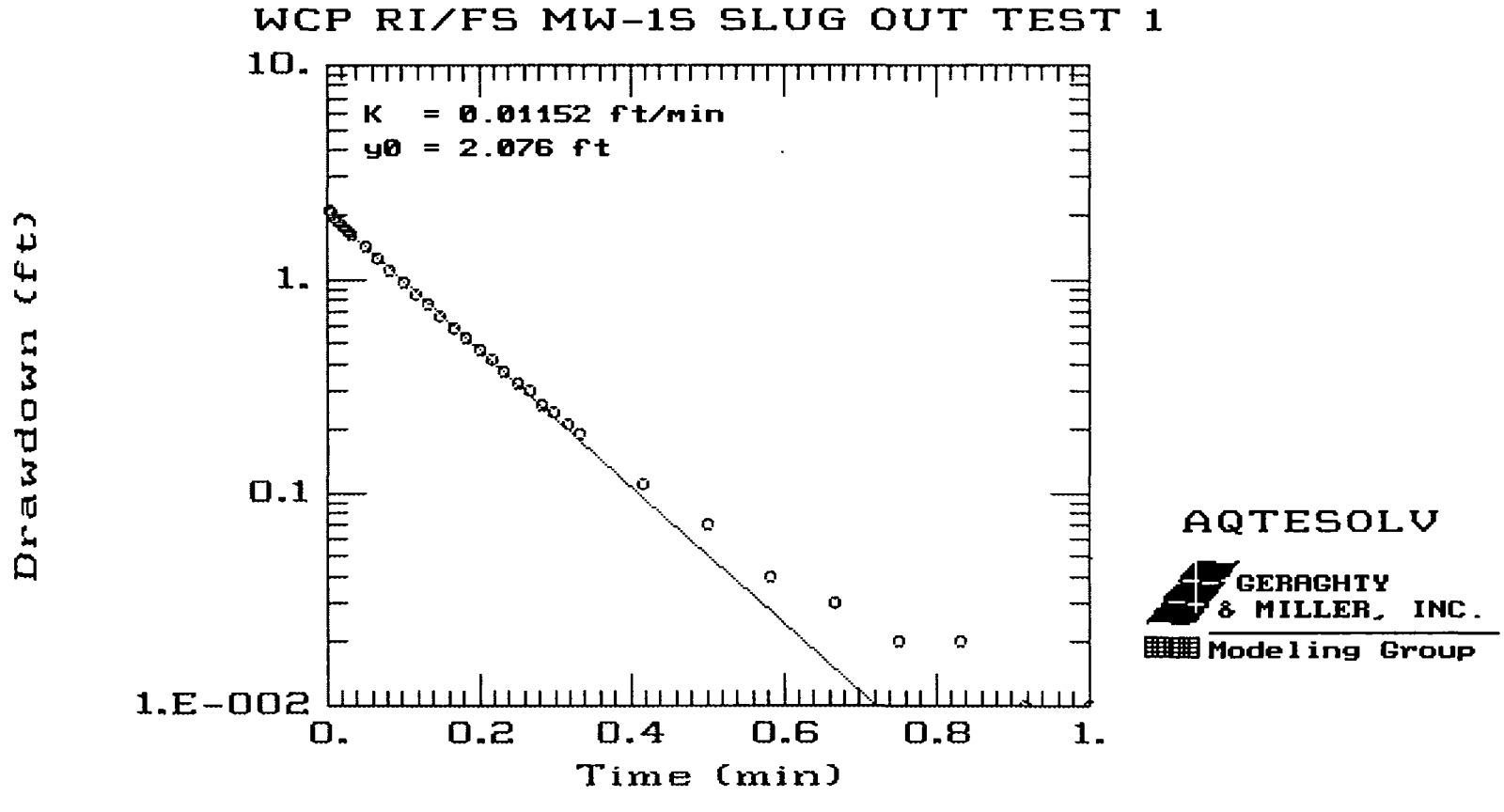
	DEPTH TO STATIC WATER LEVEL (BELOW TOP OF CASING)	AVERAGE INITIAL DISPLACEMENT (Y_0) (FT)	STATIC HEIGHT OF WATER IN WELL (L_w) (FT)	SATURATED SCREEN LENGTH (L_e) (FT)	RADIUS OF CASING (R_w) (FT)	RADIUS OF FILTER PACK (R_w) (FT)	SATURATED THICKNESS OF AQUIFER (H) (FT)
MW-1S	6.03[1]	2.1	13.72	5.0	0.083	0.25	24.0
MW-1D	5.91[1]	1.8	23.84	5.0	0.083	0.25	24.0
MW-3S	5.49[1]	0.18	9.55	9.55	0.083	0.427	26.1
MW-3D	5.53[1]	1.6	25.31	5.0	0.083	0.427	25.7
MW-4S	6.75[1]	0.19	8.70	8.70	0.083	0.427	27.7
MW-4D	6.72[1]	1.5	27.62	4.5	0.083	0.427	27.7
MW-5S	7.14[1]	0.17	9.14	9.14	0.083	0.427	21.1
MW-5D	7.74[1]	1.6	20.88	4.7	0.083	0.427	20.9
MW-6S	7.61[1]	0.19	9.14	9.14	0.083	0.427	21.6
MW-6D	7.74[1]	2.0	21.79	5.0	0.083	0.427	21.8
MW-7S	4.72[3]	0.06	9.70	9.70	0.083	0.427	28.7
MW-7D	5.17[3]	2.01	28.47	5.0	0.083	0.427	28.5
MW-8S	4.15[5]	2.08	8.36	8.36	0.083	0.427	25.8
MW-8D	3.92[5]	2.04	25.77	5.0	0.083	0.427	25.8
MW-9S	5.51[3]	0.15	9.89	9.89	0.083	0.427	28.3
MW-9D	5.75[3]	1.91	27.9	5.0	0.083	0.427	27.9
MW-10S	6.41[2]	0.20	9.80	9.80	0.083	0.427	26.5
MW-10D	6.50[2]	2.06	26.50	5.0	0.083	0.427	26.5
MW-11S	5.52[3]	0.08	8.64	8.64	0.083	0.427	24.6
MW-11D	5.66[3]	1.60	24.62	5.0	0.083	0.427	24.6
MW-12S	3.38[3]	0.04	8.52	8.52	0.083	0.427	29.3

TABLE 4-I-1 (Cont.)

SLUG TEST PARAMETERS
BOUWER AND RICE METHOD

	DEPTH TO STATIC WATER LEVEL (BELOW TOP OF CASING)	AVERAGE INITIAL DISPLACEMENT (Y_0) (FT)	STATIC HEIGHT OF WATER IN WELL (L_w) (FT)	SATURATED SCREEN LENGTH (L_s) (FT)	RADIUS OF CASING (R_w) (FT)	RADIUS OF FILTER PACK (R_w) (FT)	SATURATED THICKNESS OF AQUIFER (H) (FT)
MW-12D	3.36[3]	1.67	29.25	5.0	0.083	0.427	29.3
MW-13S	4.40[4]	0.06	8.24	8.24	0.083	0.427	28.5
MW-13D	4.57[4]	1.99	28.23	5.0	0.083	0.427	28.2
MW-14S	1.35[4]	0.07	9.81	9.81	0.083	0.427	29.0
MW-14D	1.48[4]	1.75	28.77	5.0	0.083	0.427	28.8
MW-15S	2.43[3]	0.12	9.32	9.32	0.083	0.427	25.9
MW-15D	2.54[3]	1.75	25.65	5.0	0.083	0.427	25.7
P-105	1.21[3]	0.06	9.69	9.69	0.083	0.427	30.6
P-106	6.90[2]	0.13	26.30	25.00	0.083	0.427	26.3
P-107	1.90[3]	0.09	9.74	9.74	0.083	0.427	25.6
P-108	9.82[2]	2.20	25.1	5.0	0.083	0.427	25.1
PW-1	6.65[5]	0.73	25.45	23.0	0.25	0.072	25.5

[1]Measured on 4/15/92.
[2]Measured on 10/26/93.
[3]Measured on 10/27/93.
[4]Measured on 10/30/93.
[5]Measured on 12/2/93.


WCP RI/FS MW-1S SLUG OUT TEST 1
K = 0.01152 ft/min
y0 = 2.076 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.2
0.4
0.6
0.8
1.
Time (min)
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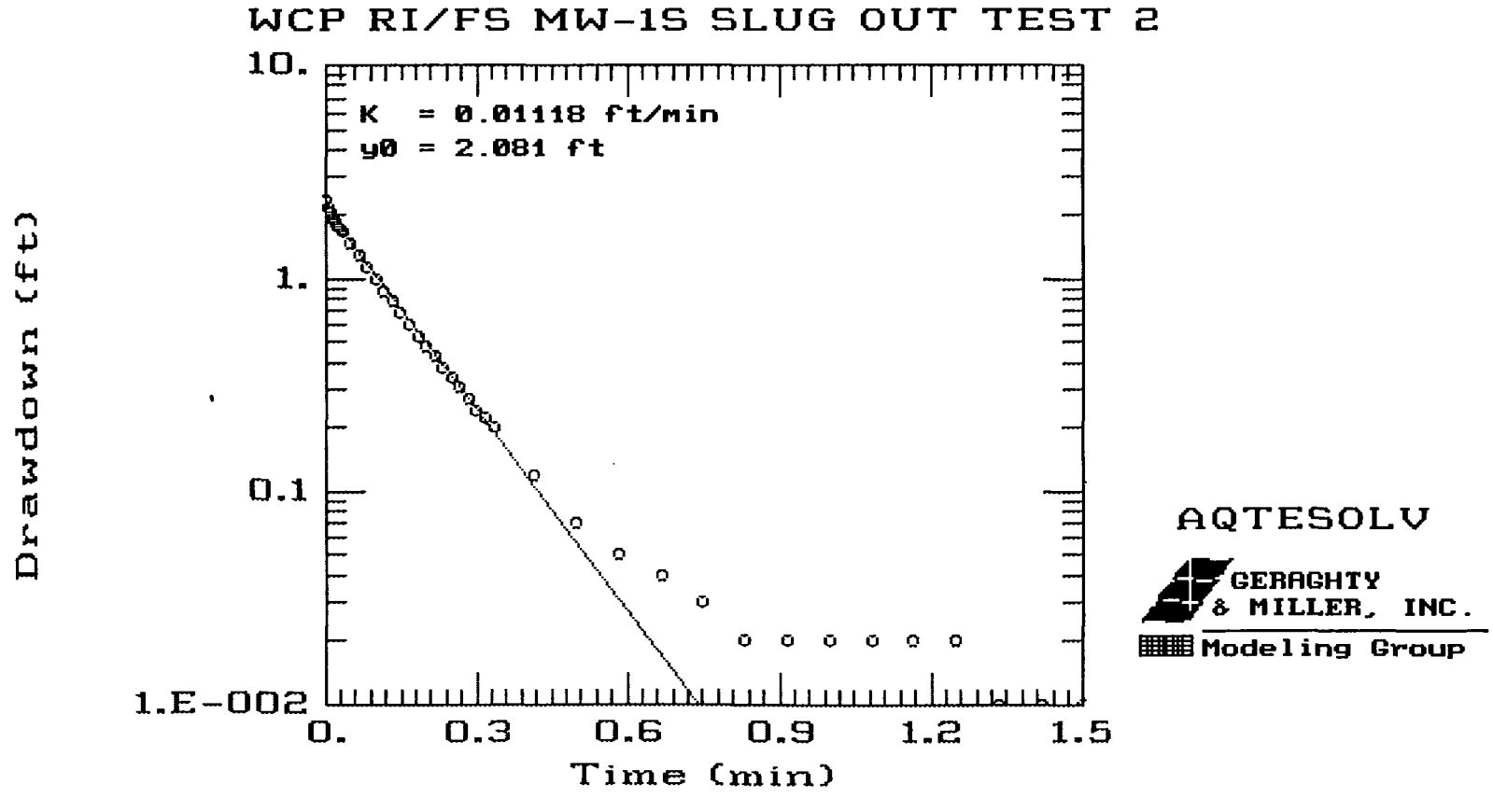
WCP RI/FS MW-1S SLUG OUT TEST 2
K = 0.01118 ft/min
y0 = 2.081 ft
10.
1.
0.1
1.E-002
Drawdown (ft)
0.
0.3
0.6
0.9
1.2
1.5
Time (min)
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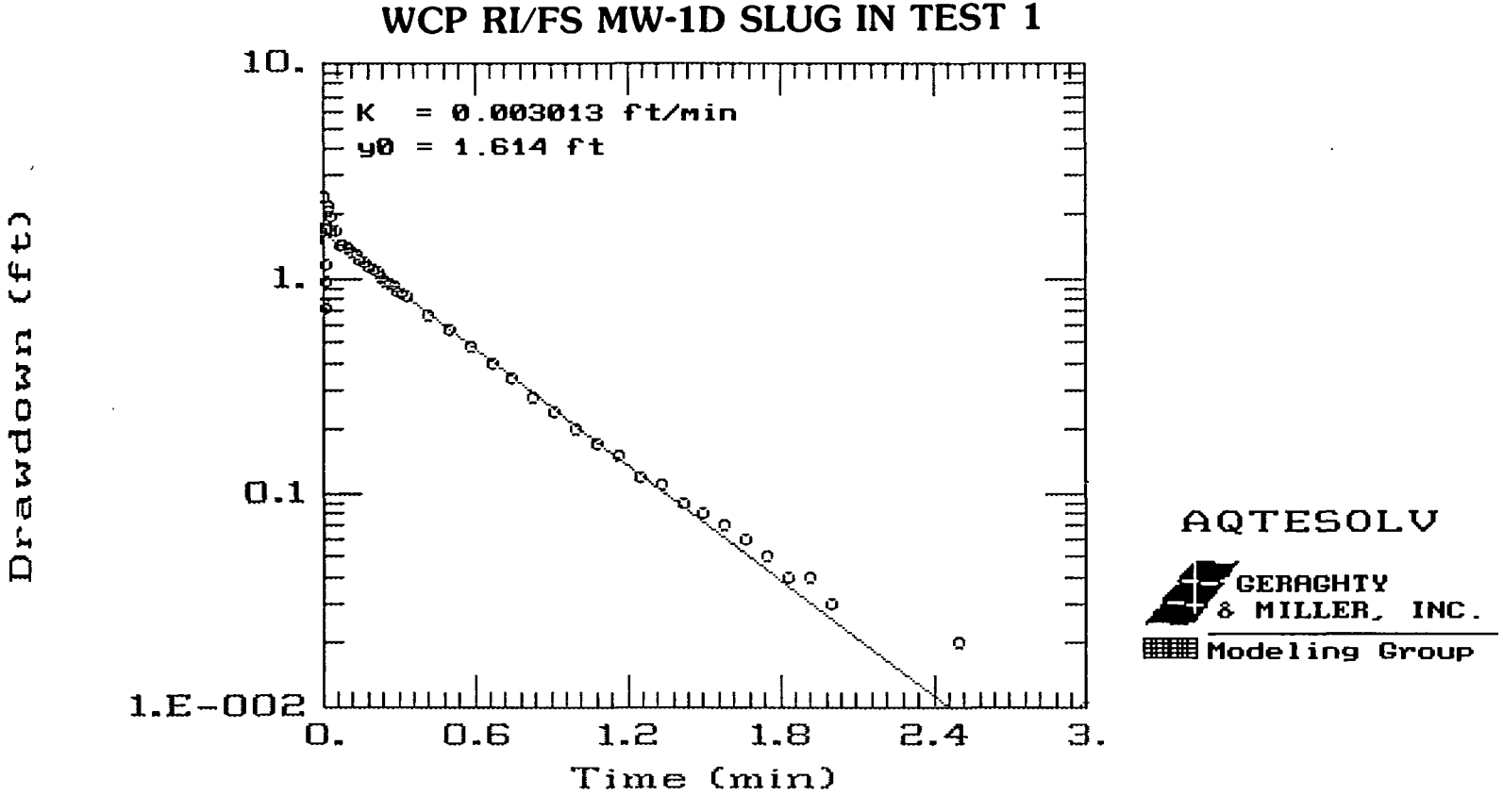
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K = 0.003013 ft/min
y0 = 1.614 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.6
1.2
1.8
2.4
3.
Time (min)
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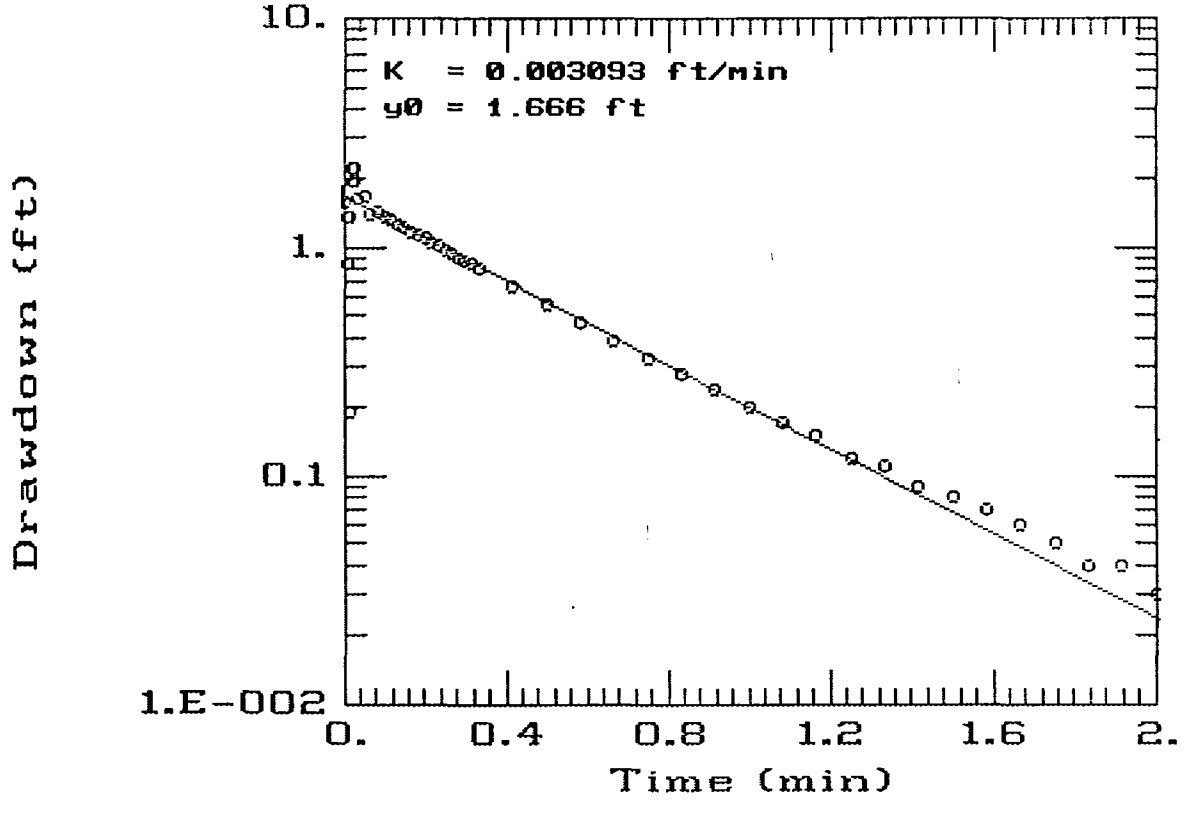

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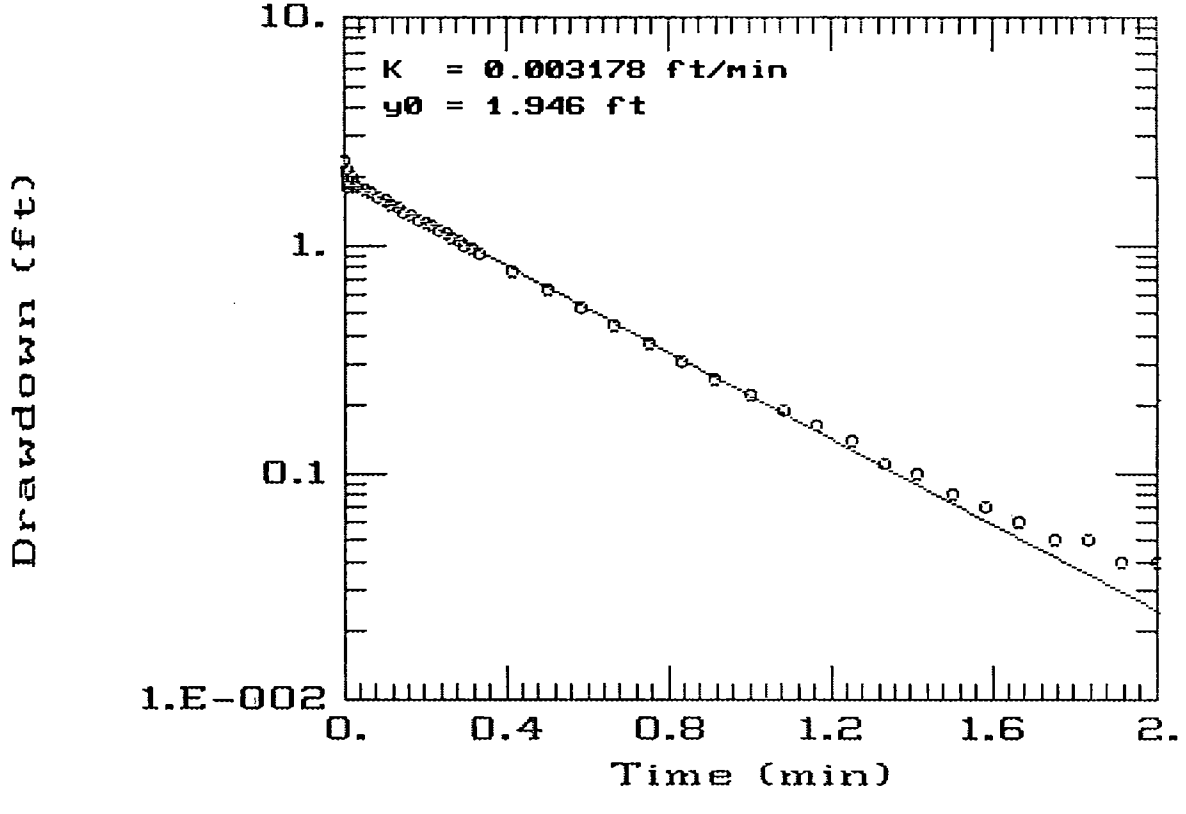

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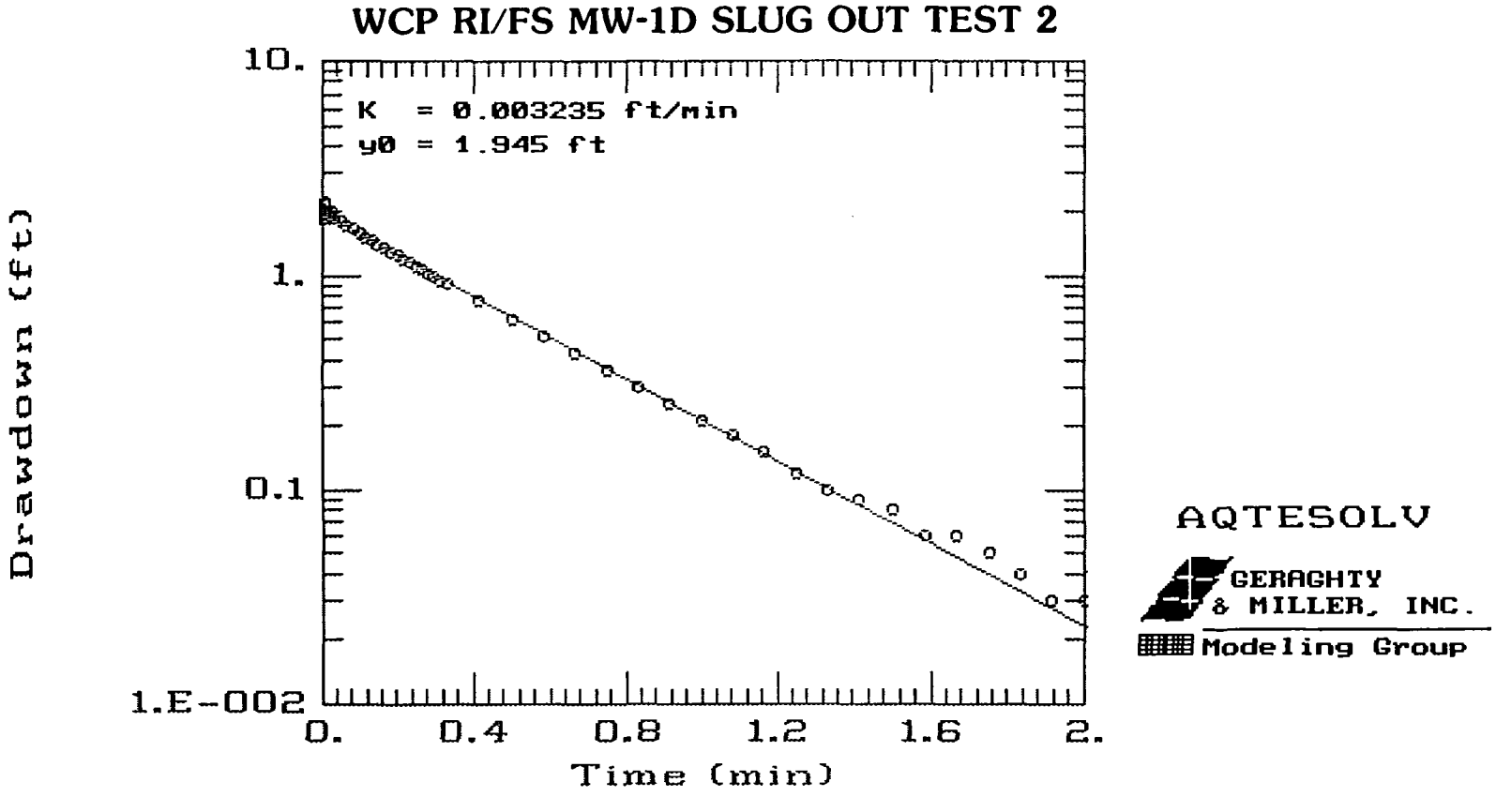
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K = 0.003235 ft/min
y0 = 1.945 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.4
0.8
1.2
1.6
2.
Time (min)
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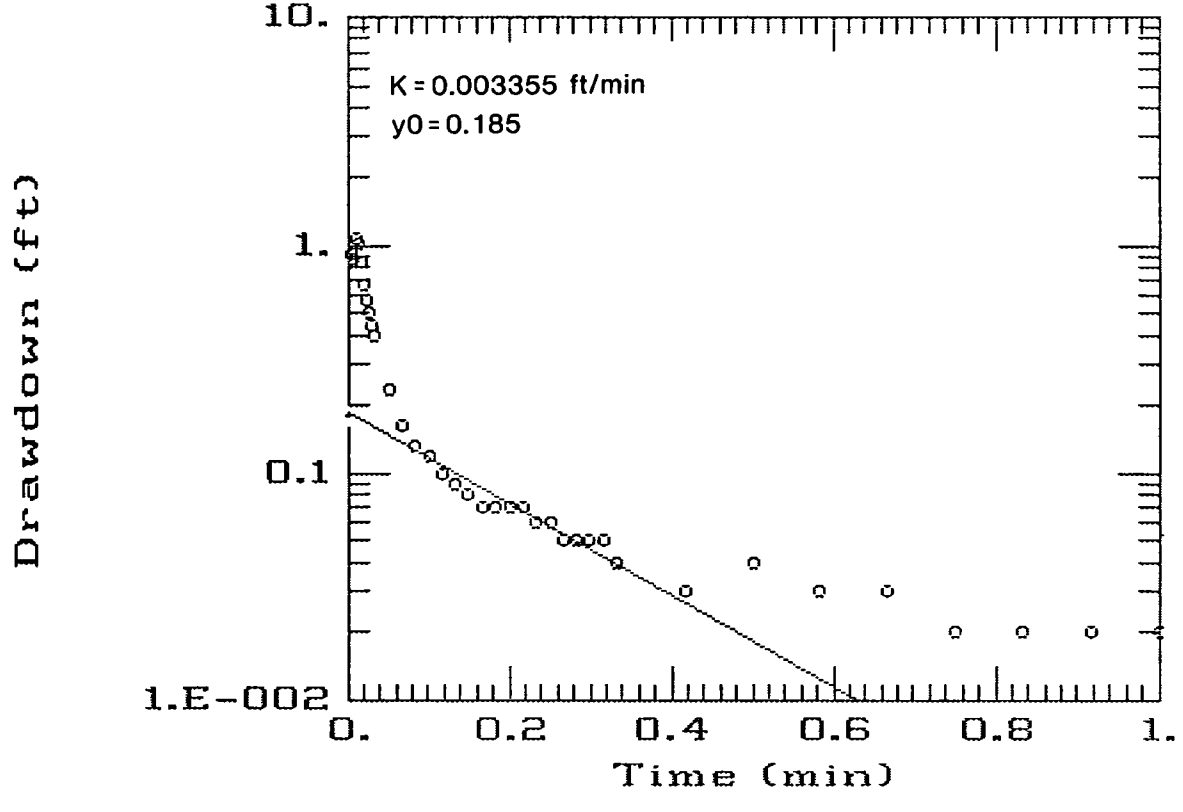
WCP RI/FS MW-3S SLUG OUT TEST 1



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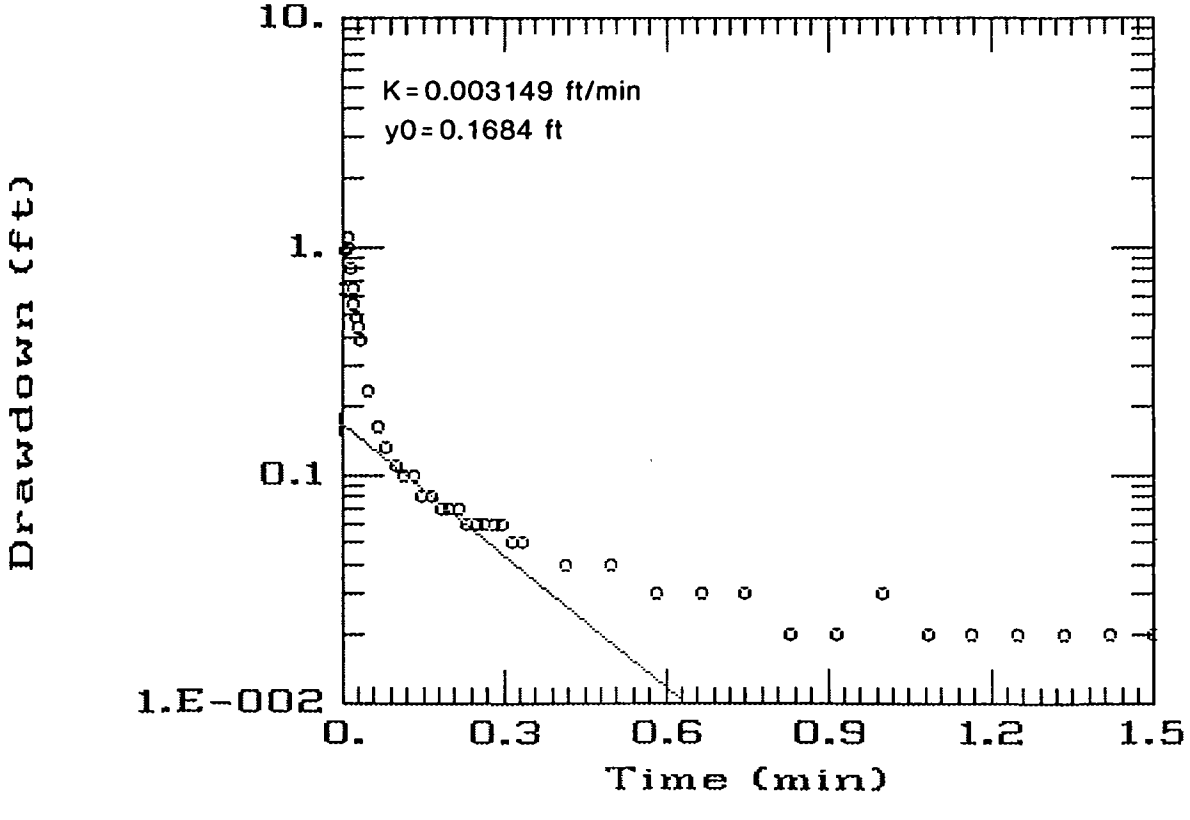

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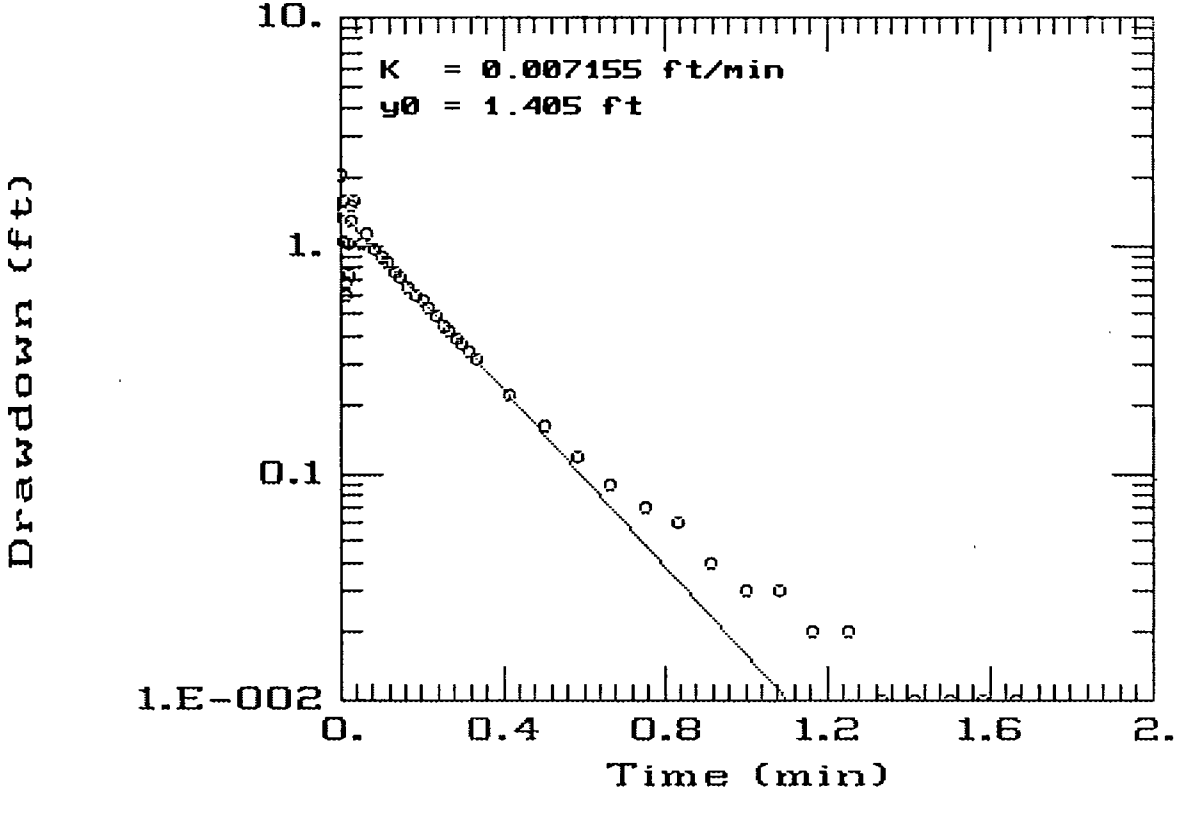

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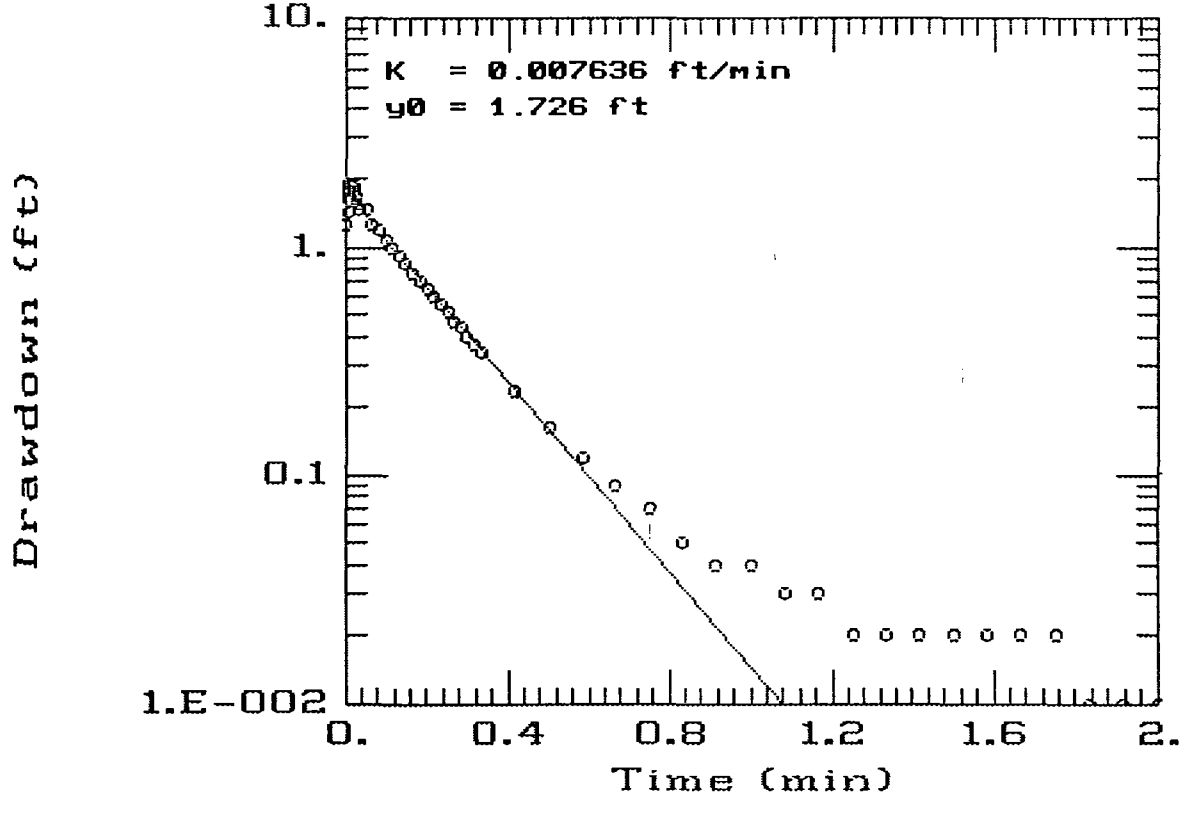

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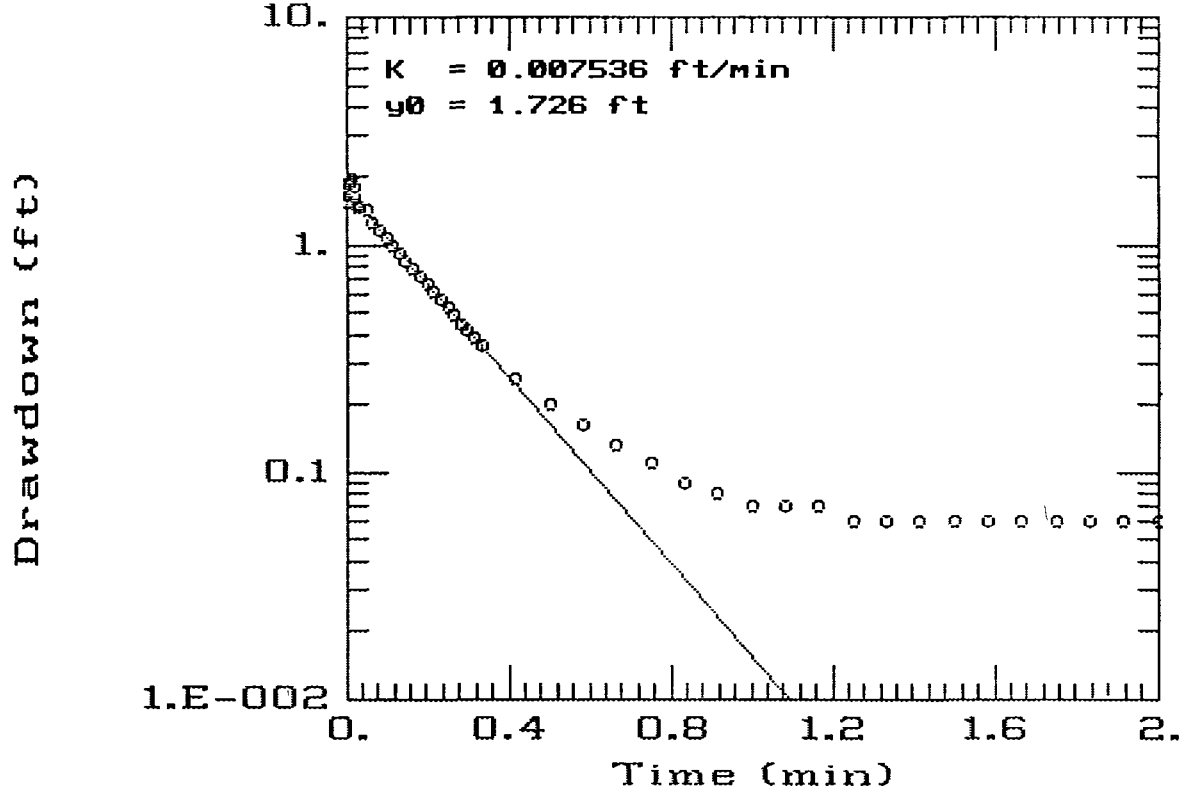

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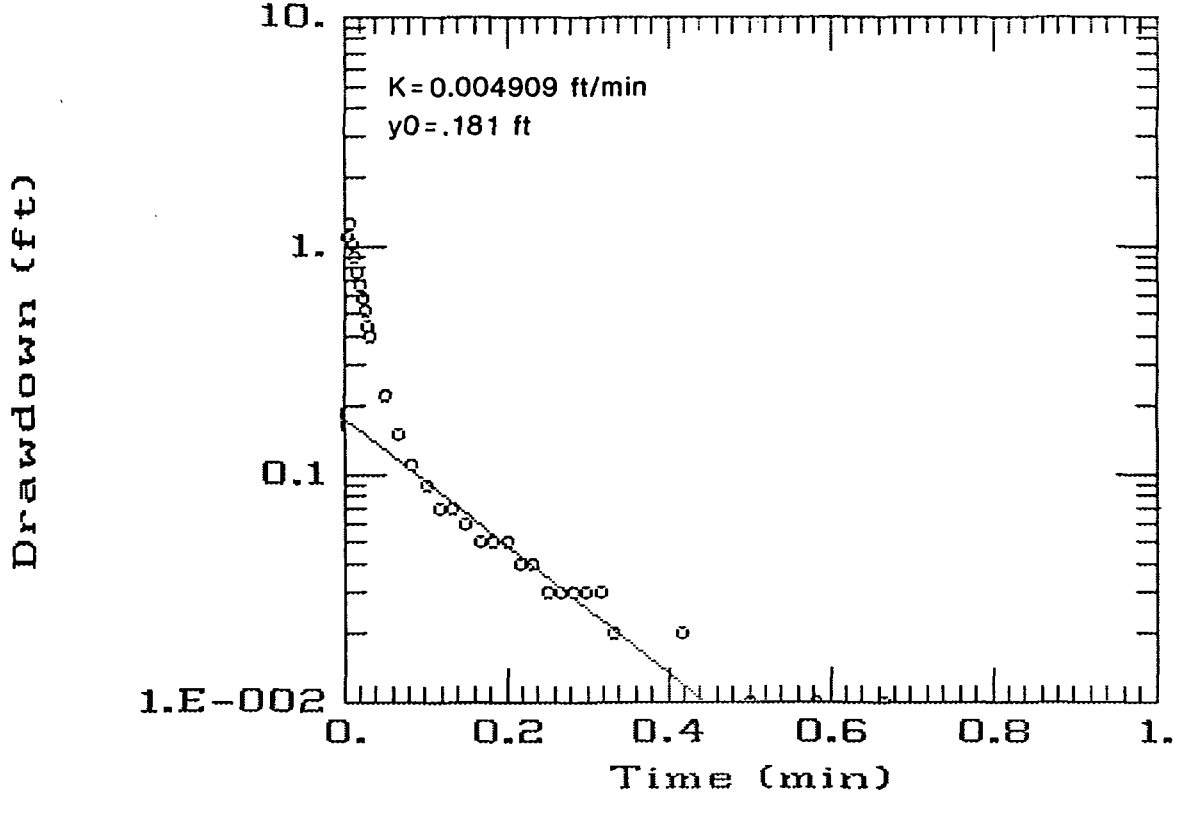
WCP RI/FS MW-4S SLUG OUT TEST 1



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GERAGHTY & MILLER, INC.

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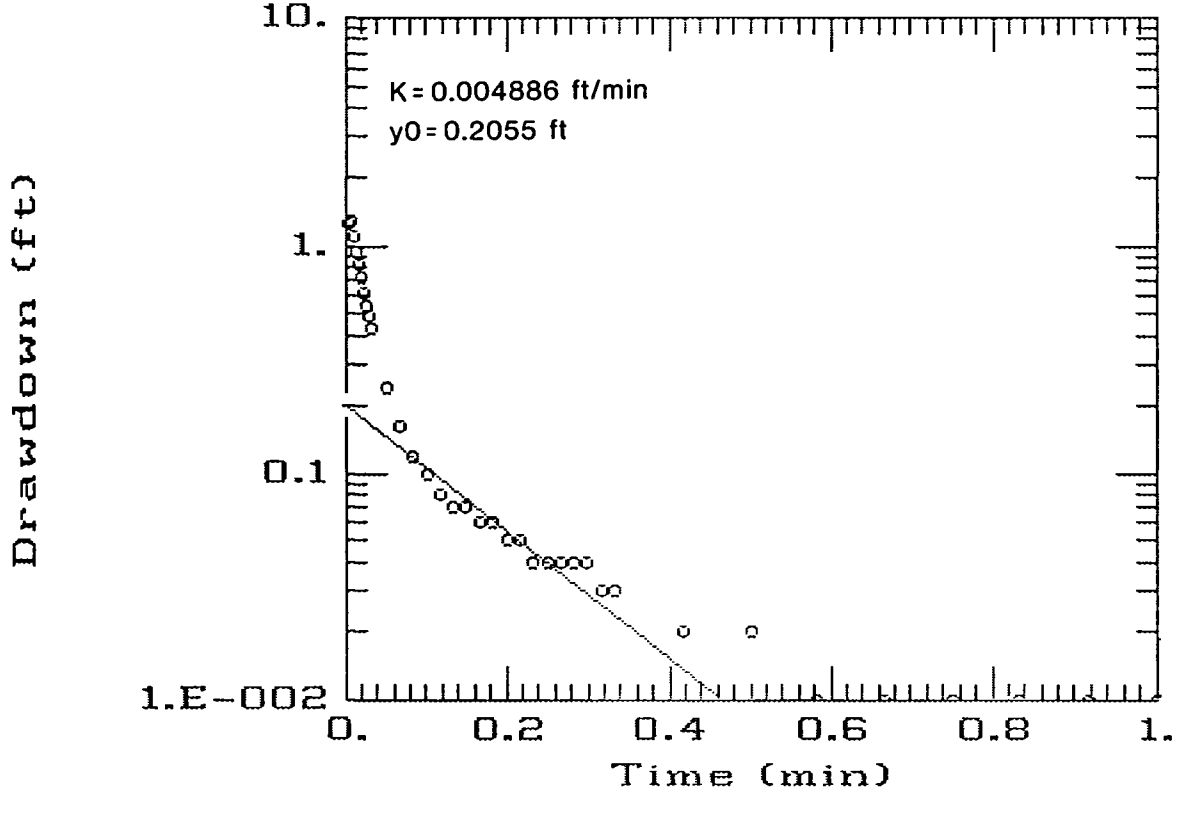

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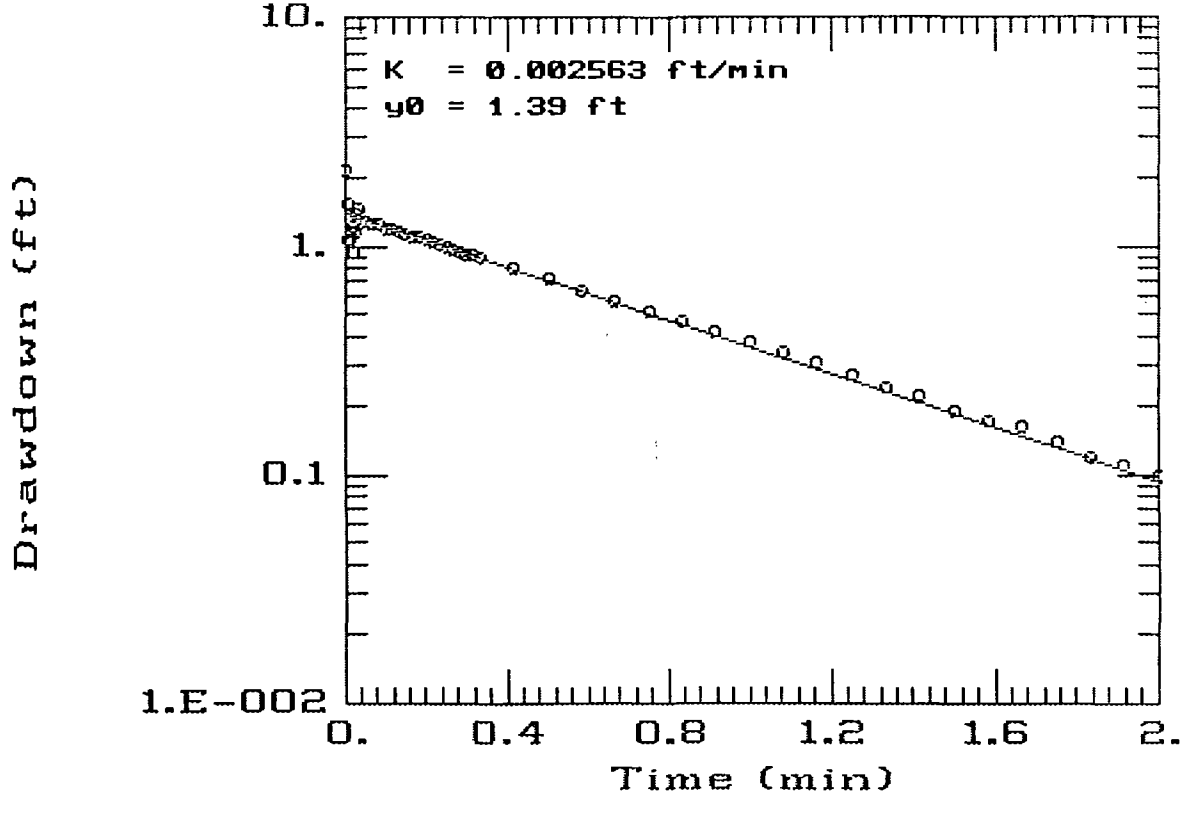

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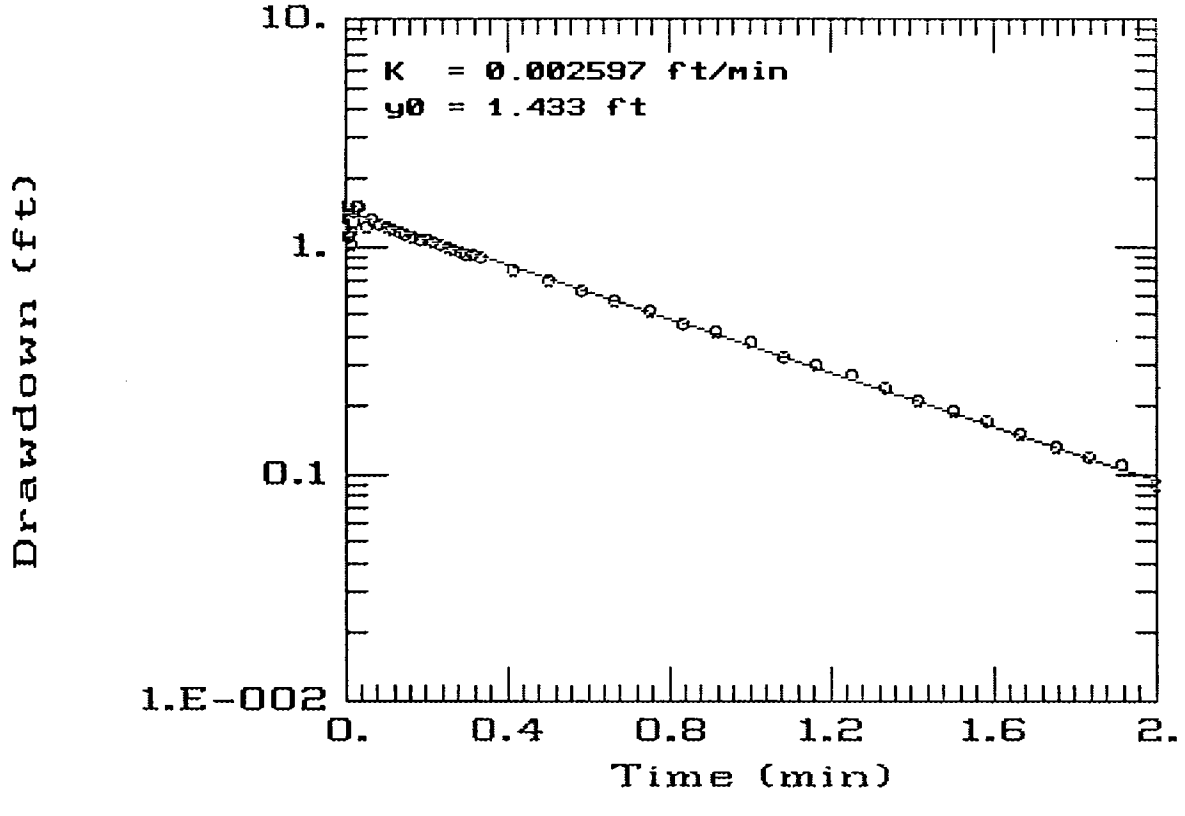

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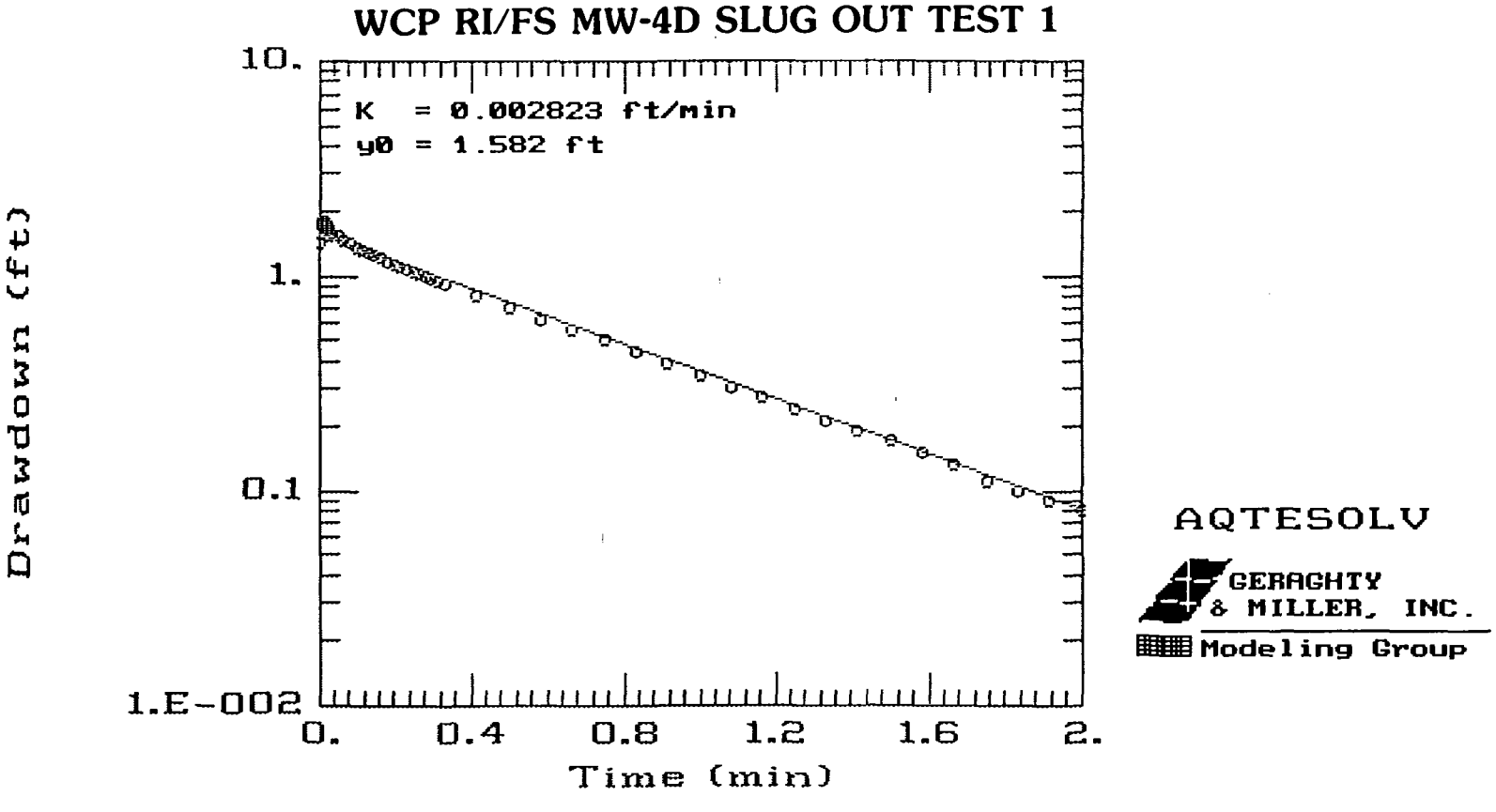
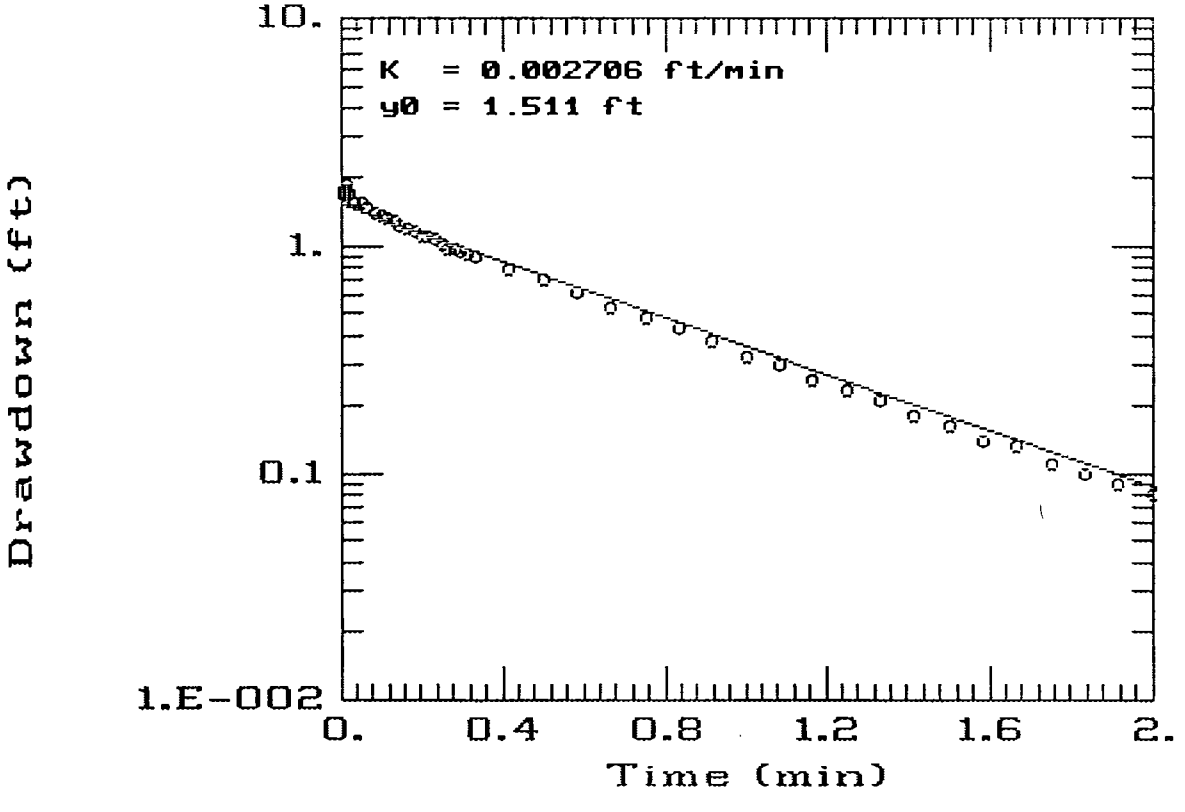

WCP RI/FS MW-4D SLUG OUT TEST 1
K = 0.002823 ft/min
y0 = 1.582 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.4
0.8
1.2
1.6
2.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

WCP RI/FS MW-4D SLUG OUT TEST 2



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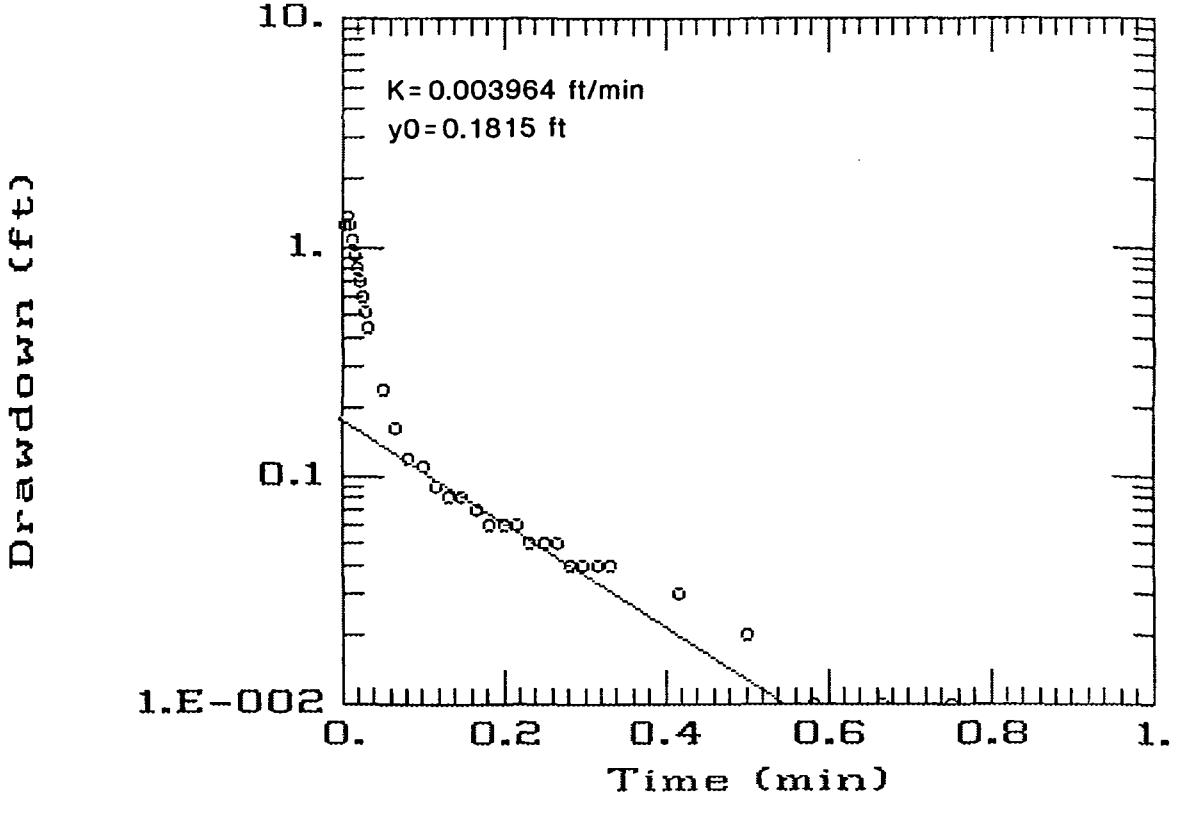

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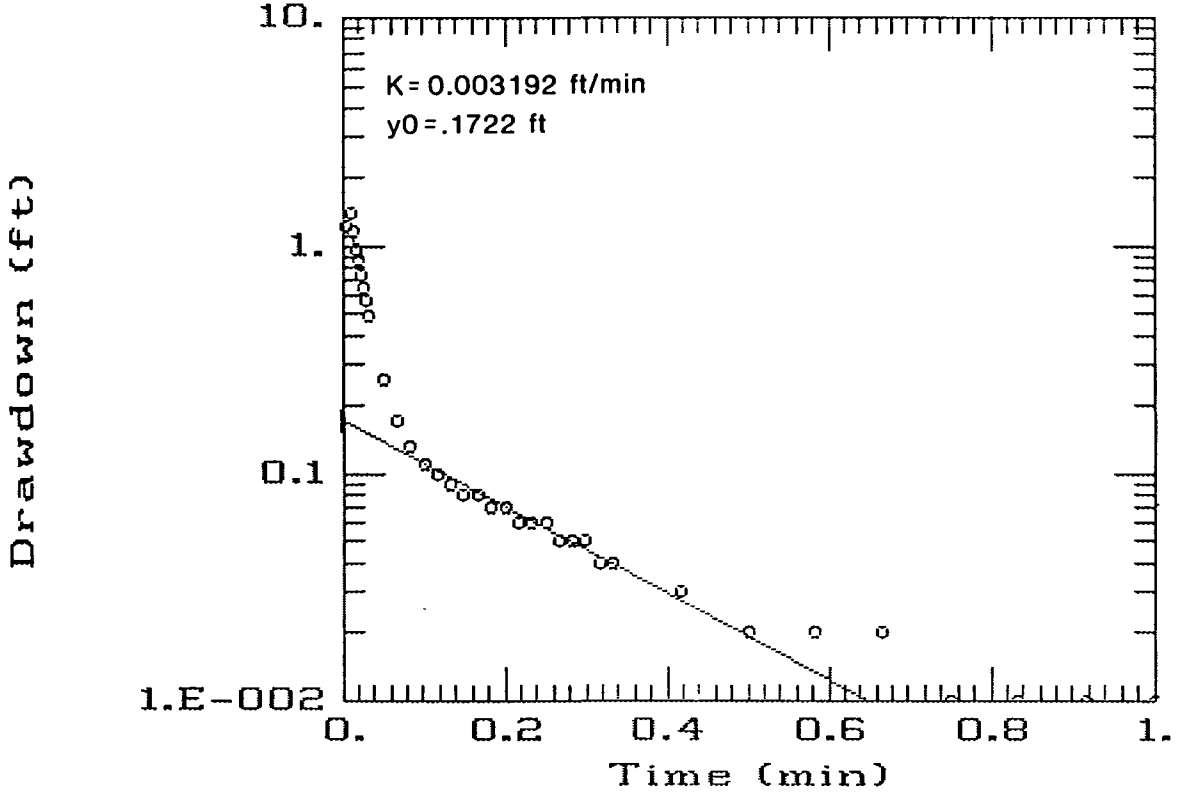

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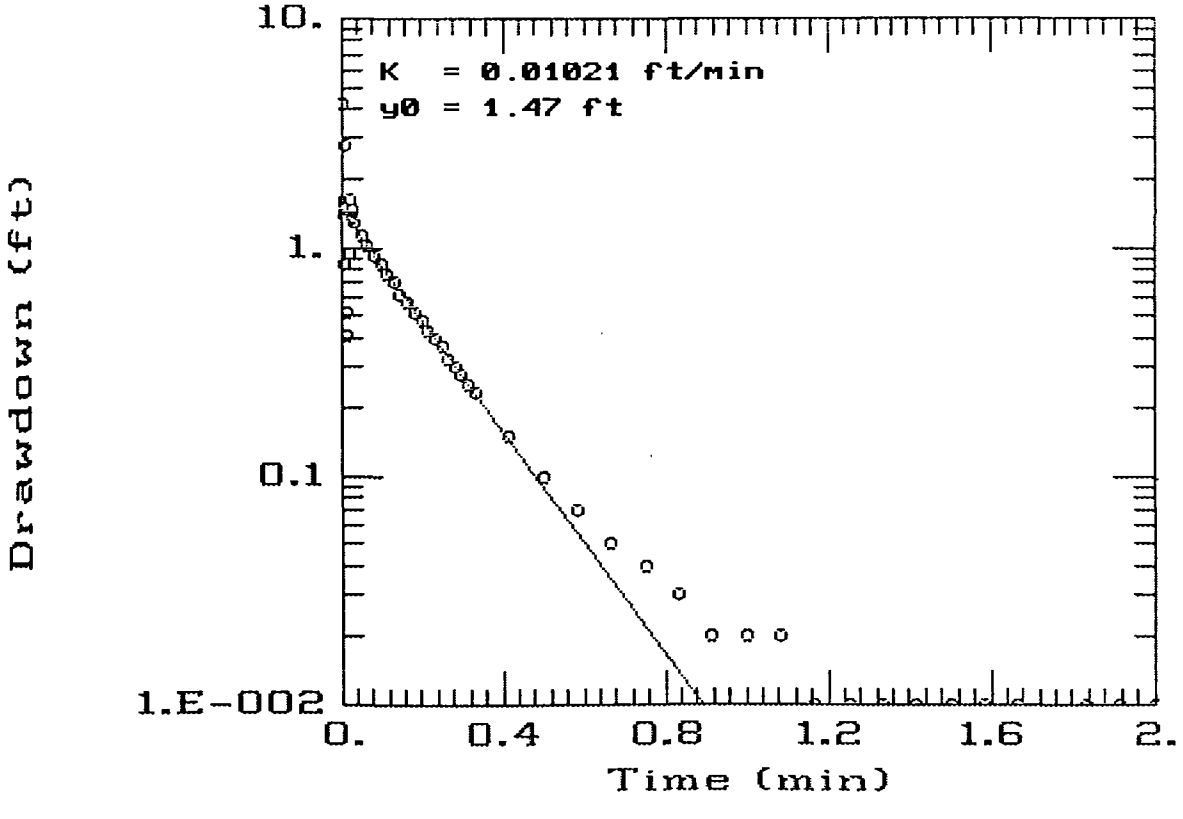

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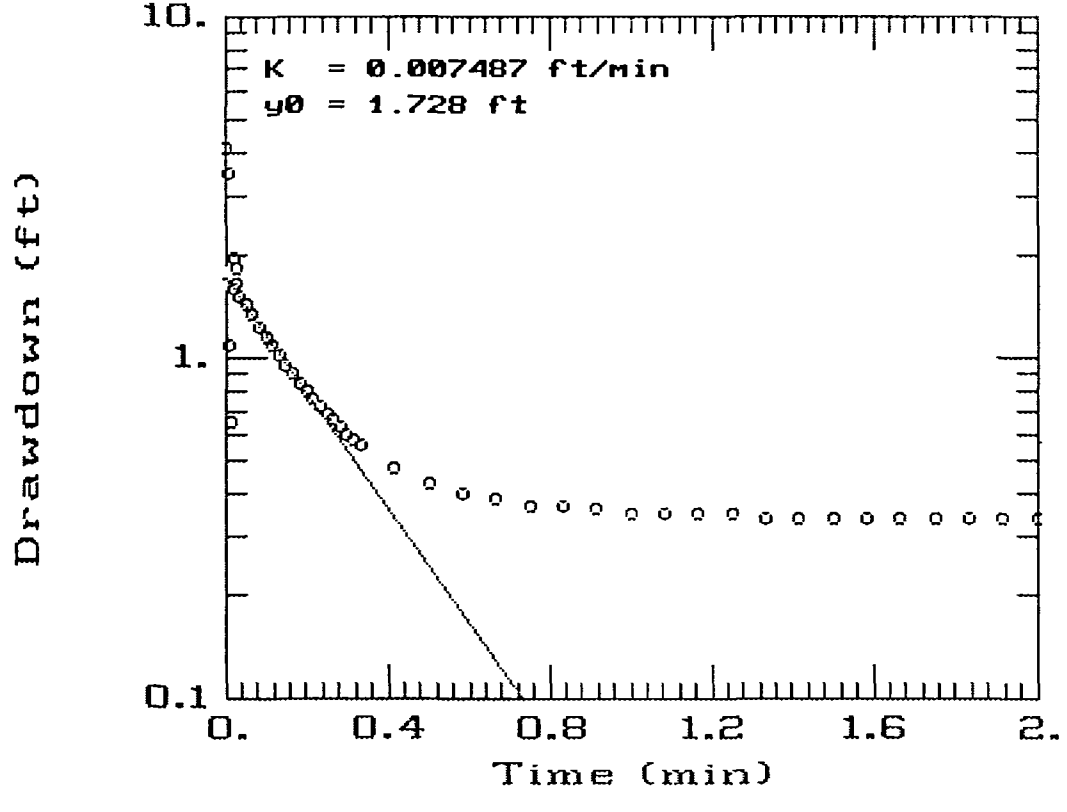

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GERAGHTY & MILLER, INC.
Modeling Group

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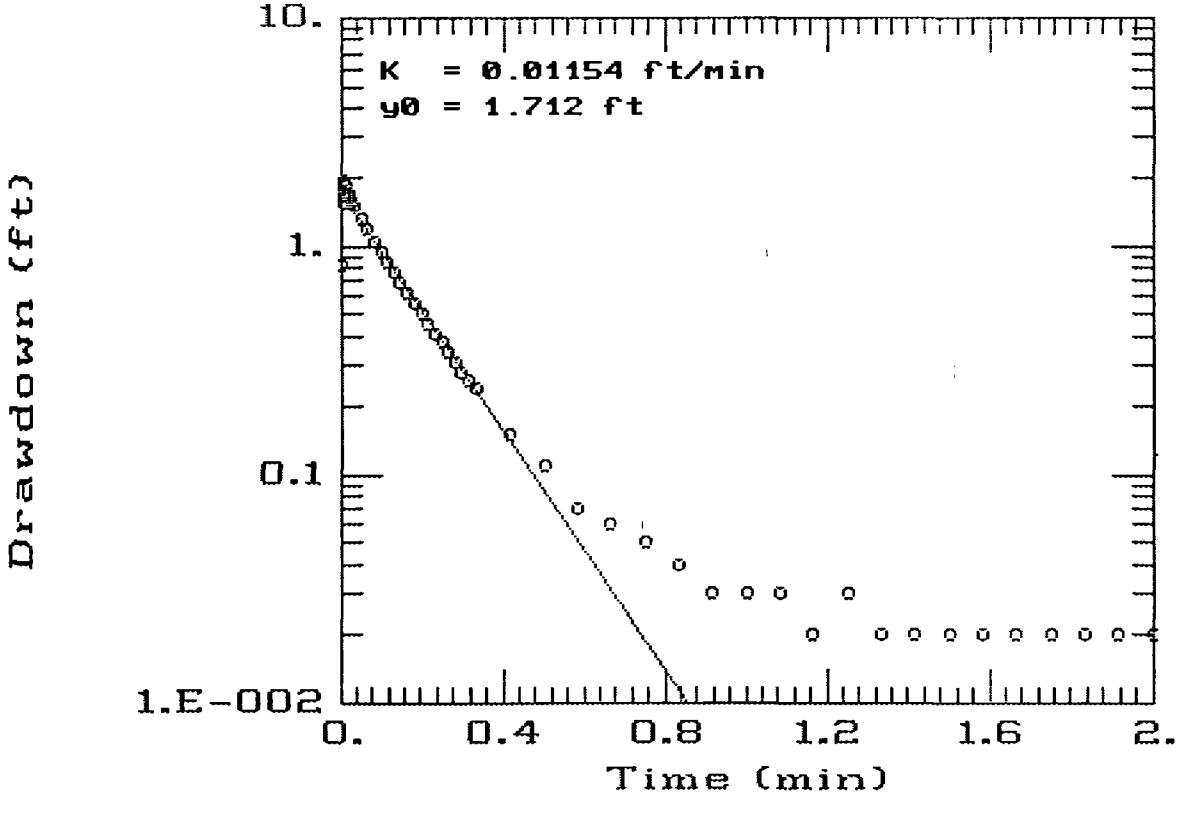

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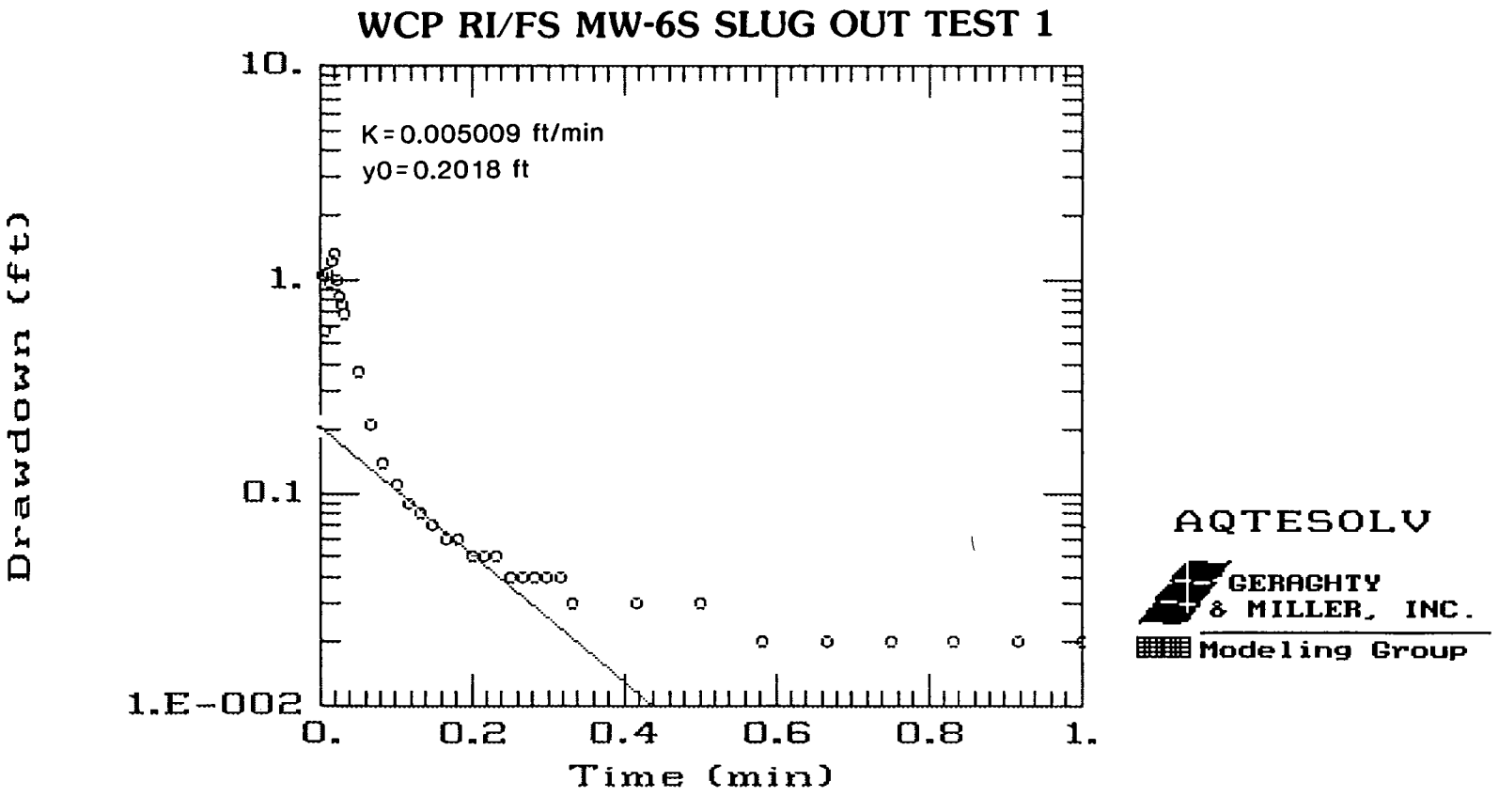
Modeling Group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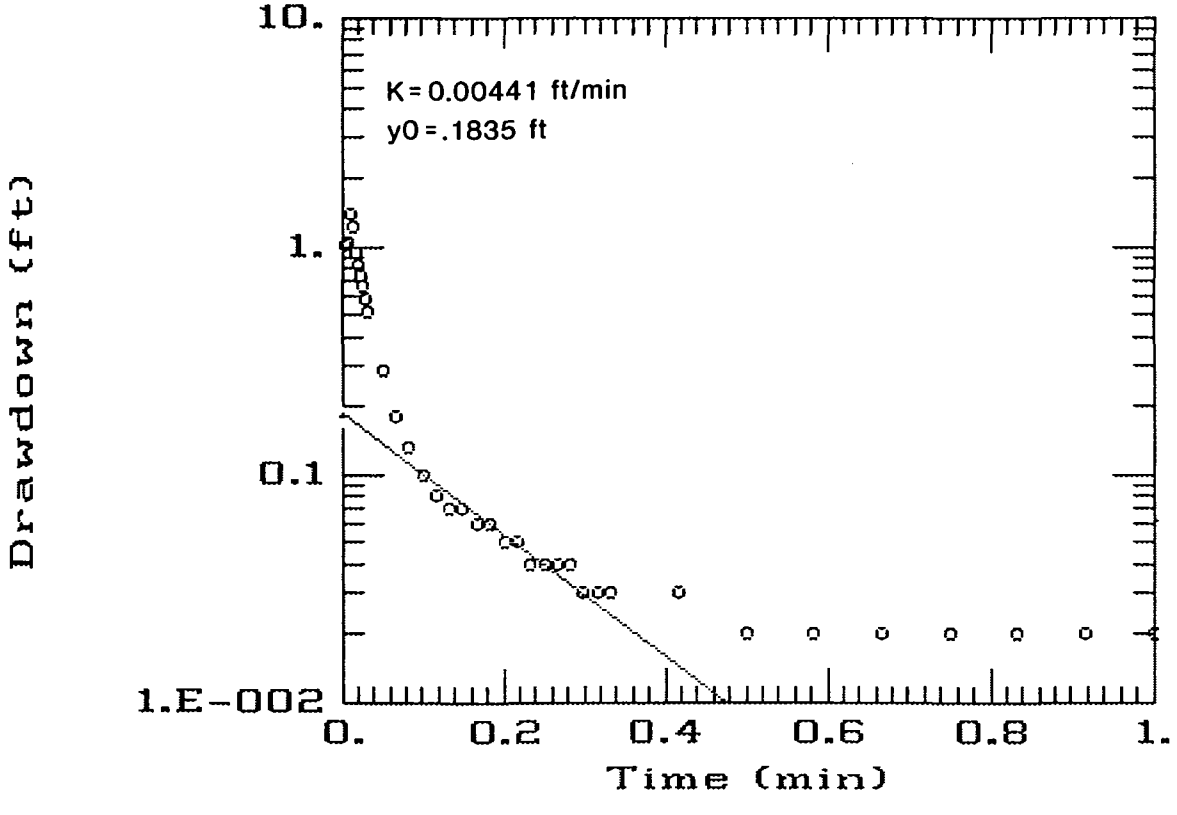
y0 = 0.2018 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.2
0.4
0.6
0.8
1.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

WCP RI/FS MW-6S SLUG OUT TEST 2



AQTESOLV

GERAGHTY & MILLER, INC.
Modeling Group

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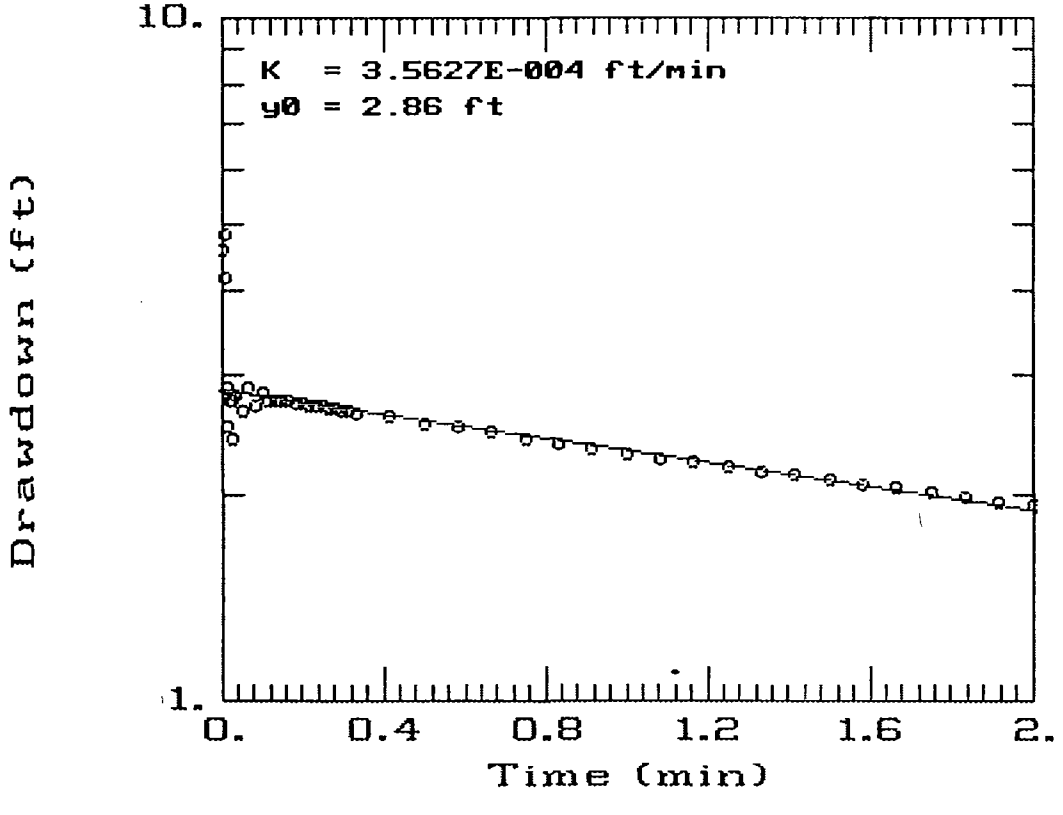

AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

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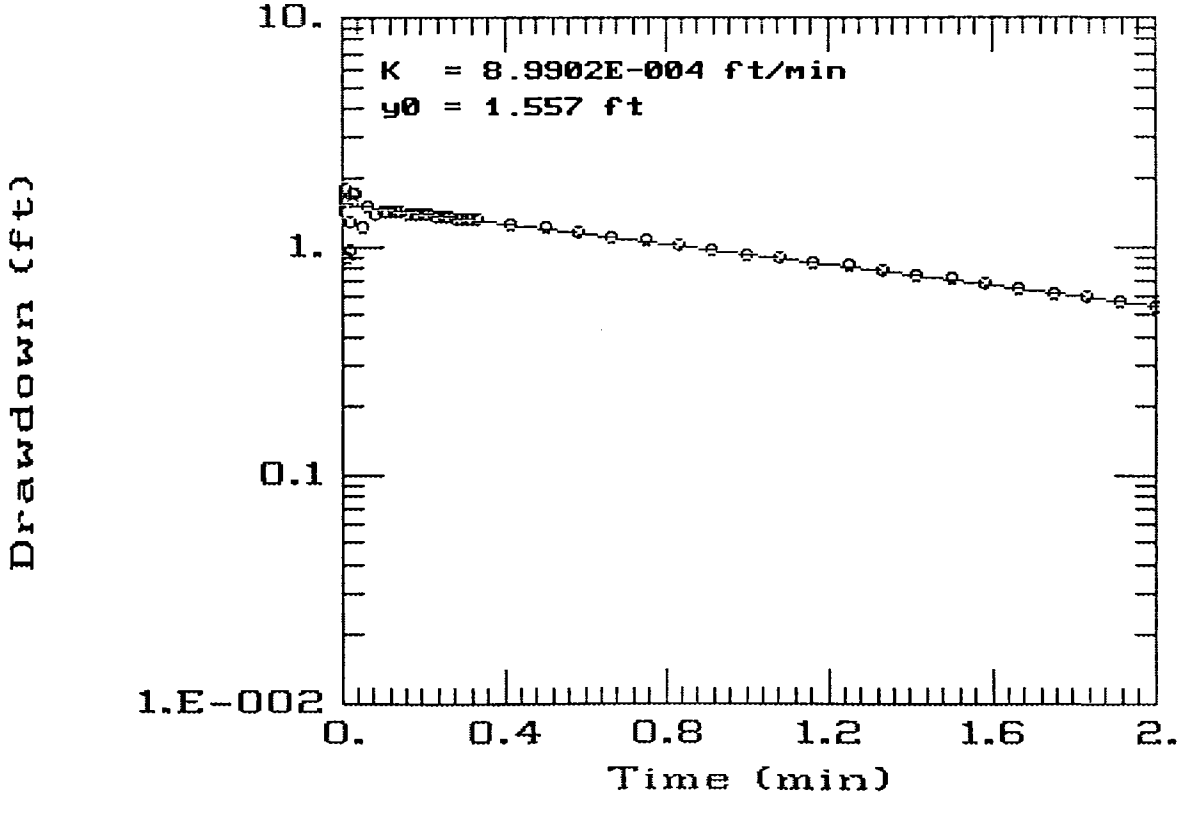

AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

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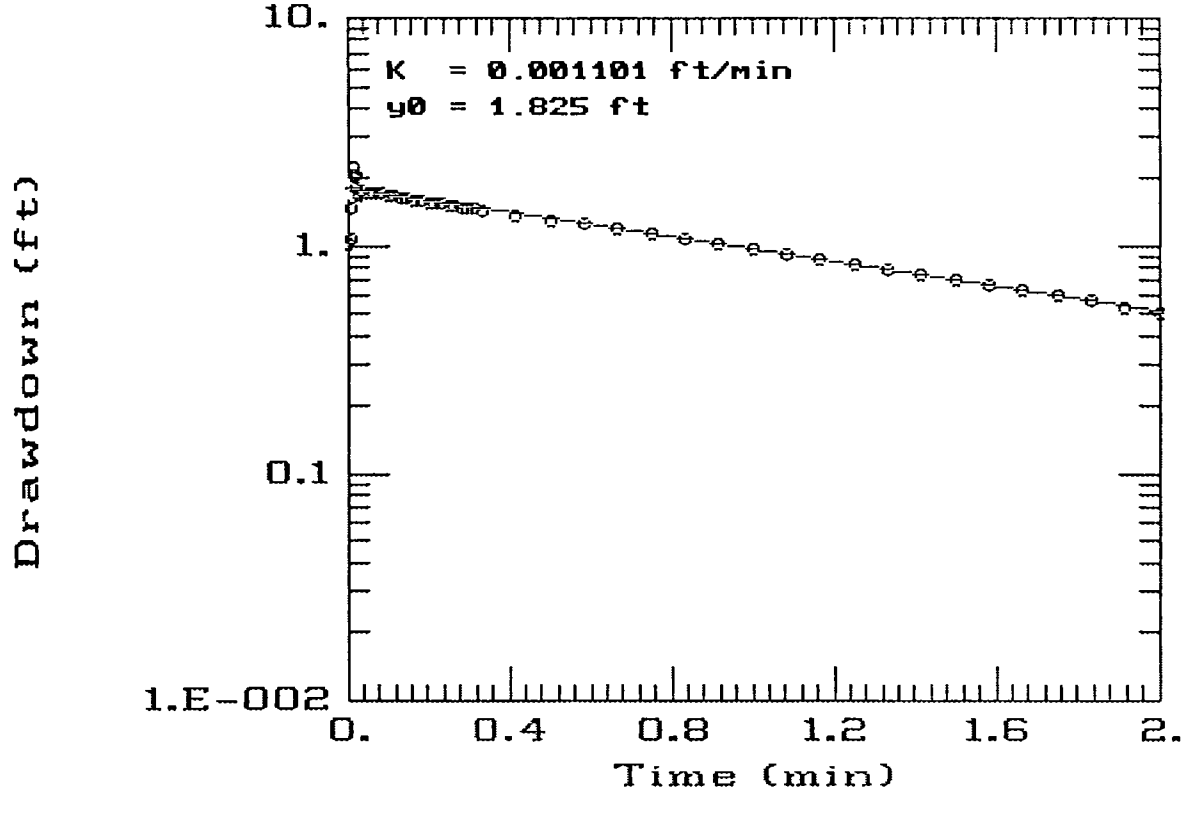
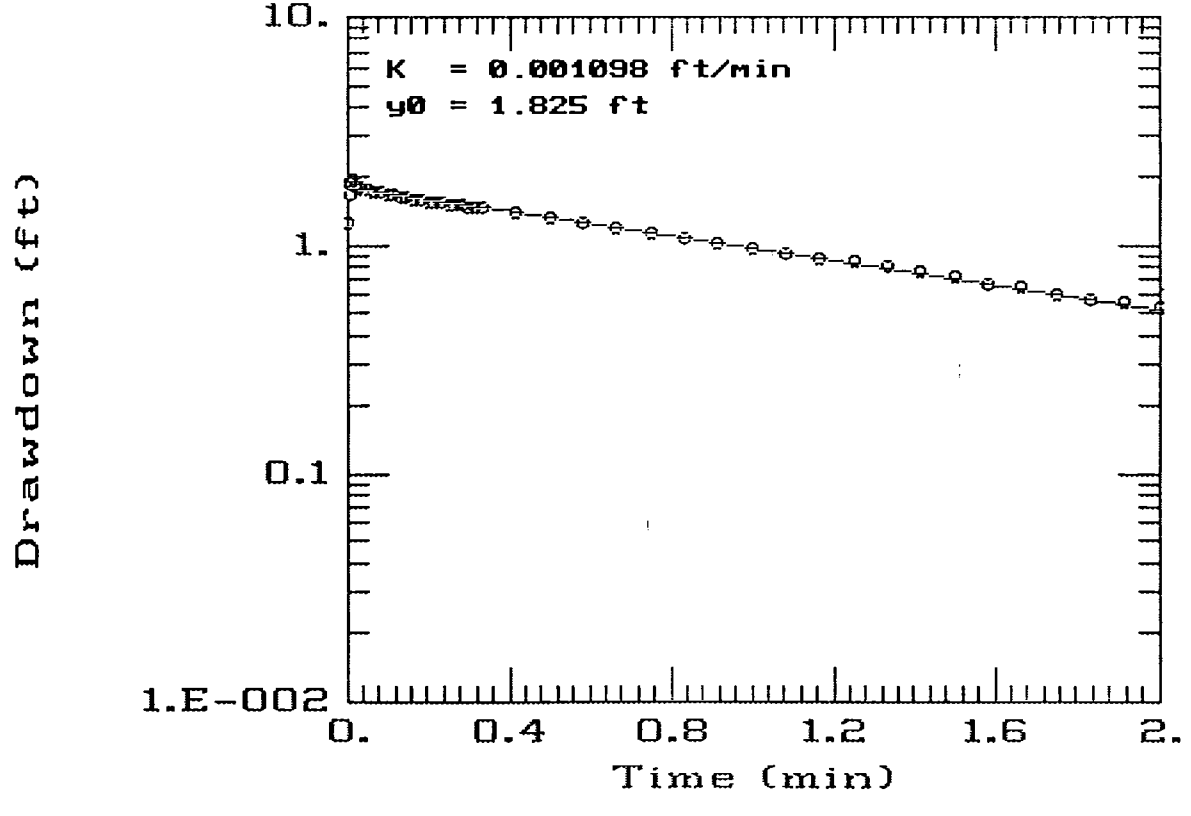


AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

WCP RI/FS MW-6D SLUG OUT TEST 2



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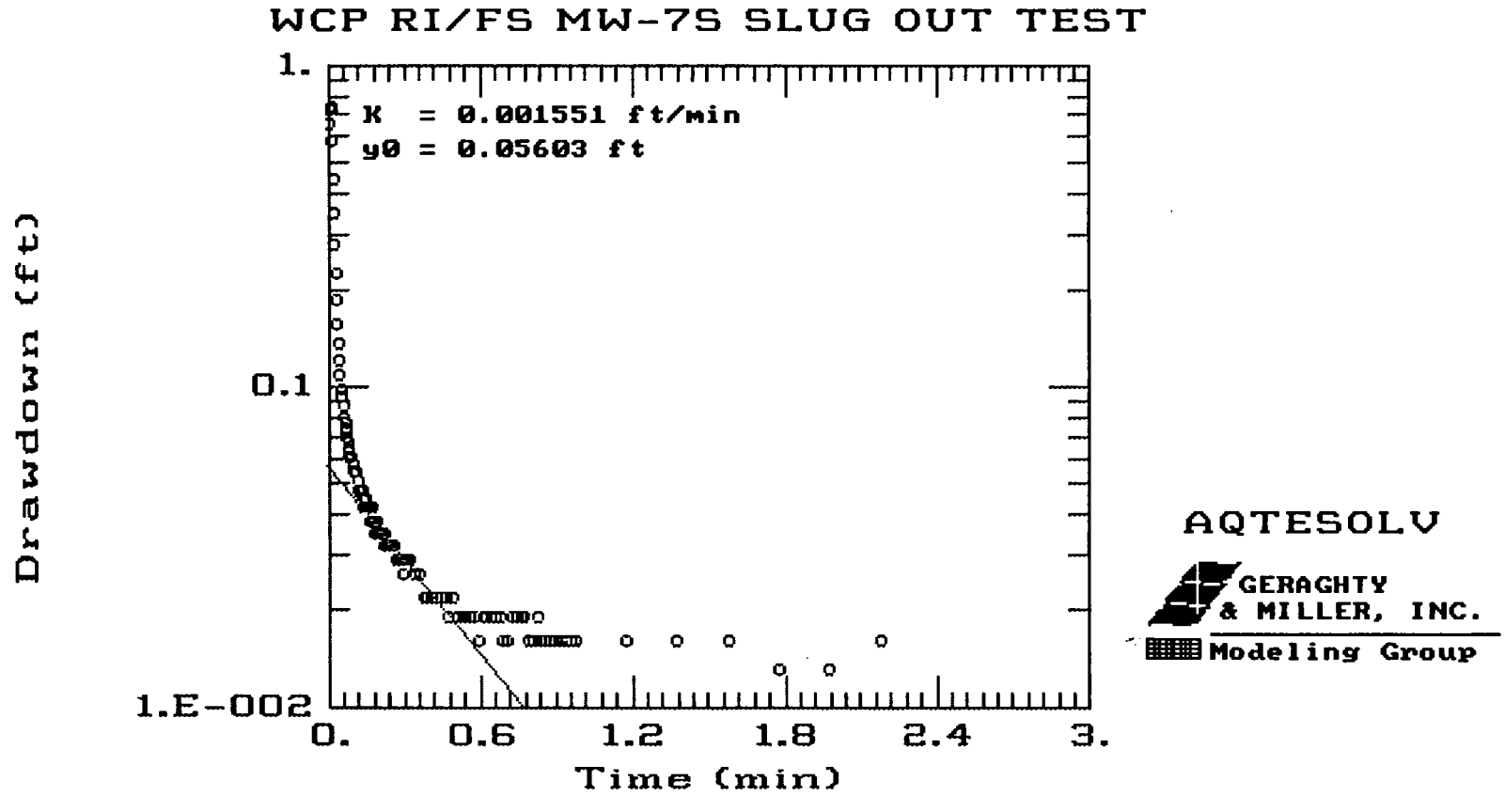
WCP RI/FS MW-7S SLUG OUT TEST
K = 0.001551 ft/min
y0 = 0.05603 ft
Drawdown (ft)
1.
0.1
1.E-002
0.
0.6
1.2
1.8
2.4
3.
Time (min)
AQTESOLV
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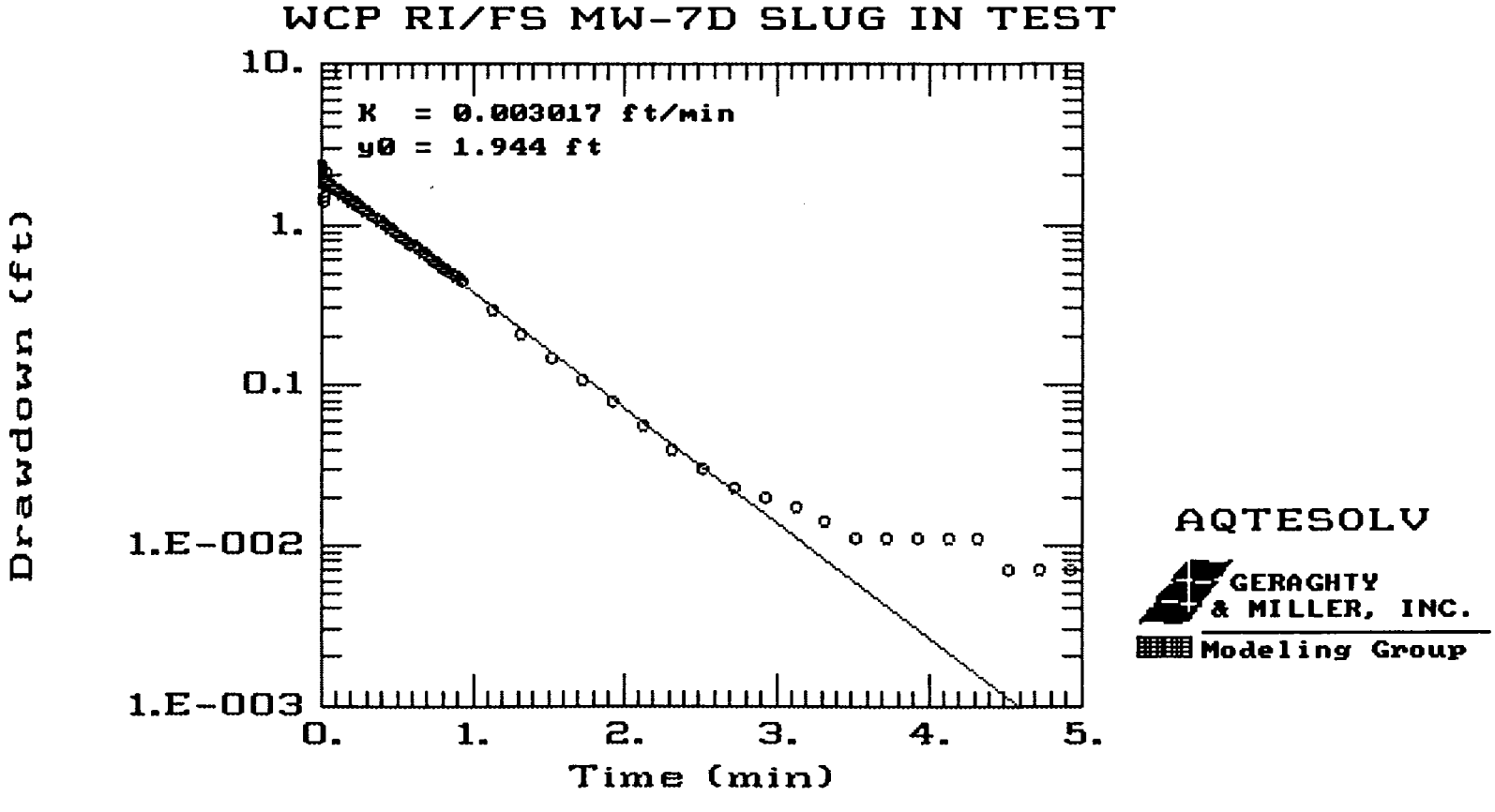
Modeling Group


WCP RI/FS MW-7D SLUG IN TEST
K = 0.003017 ft/min
y0 = 1.944 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
1.
2.
3.
4.
5.
Time (min)
AQTESOLV
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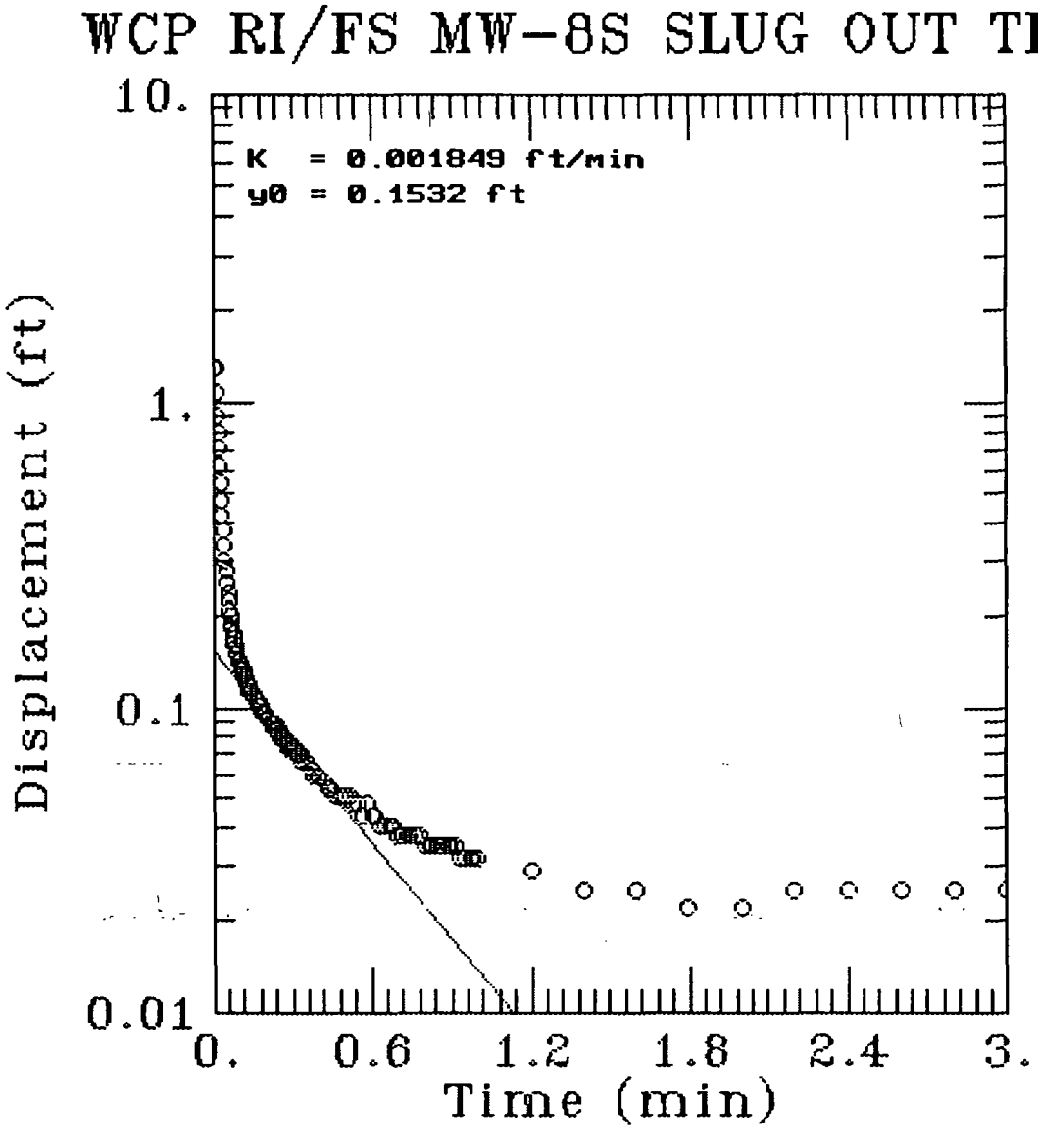
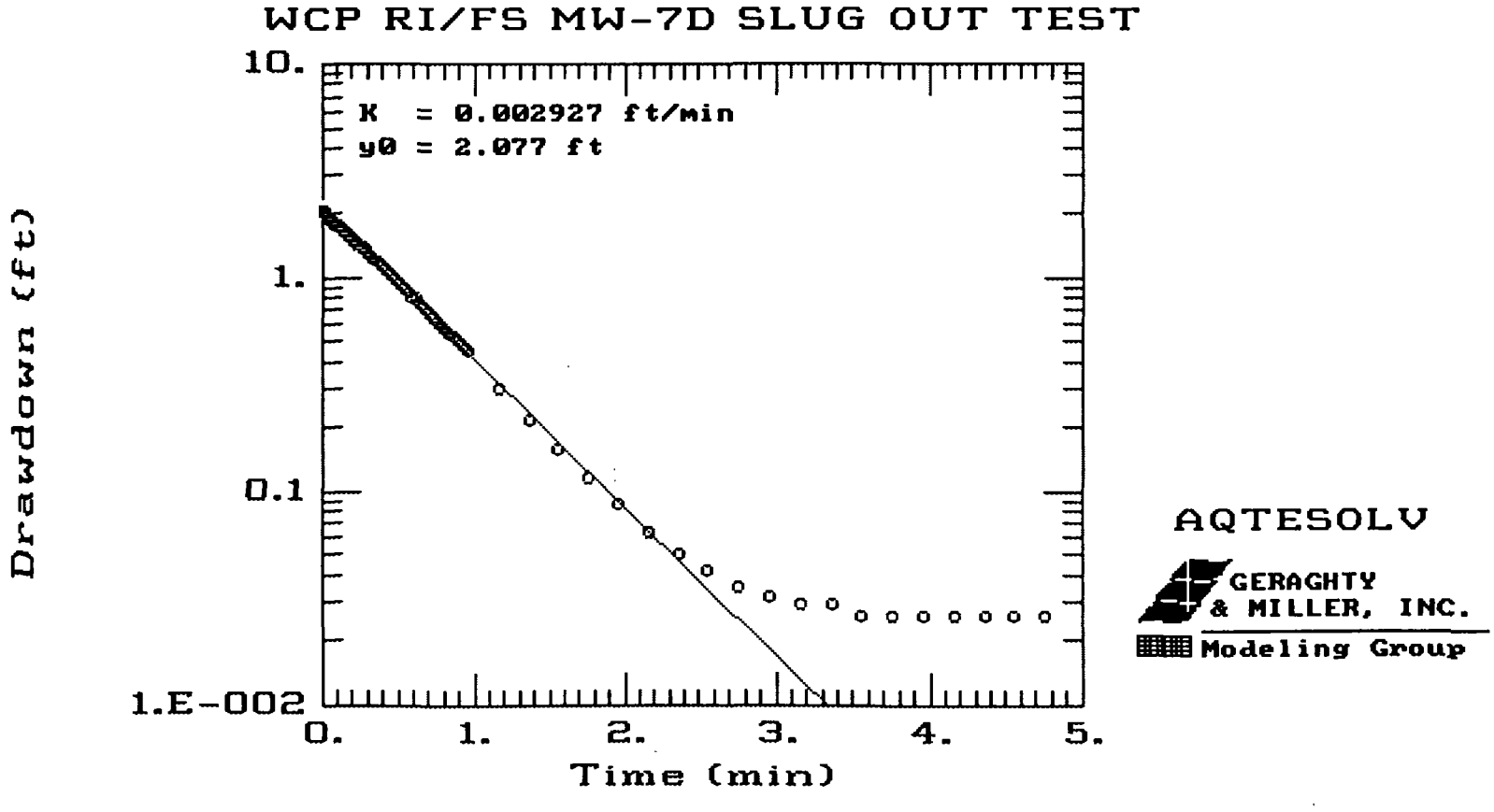
Modeling Group


WCP RI/FS MW-8S SLUG OUT TEST
K = 0.001849 ft/min
y0 = 0.1532 ft
Displacement (ft)
10.
1.
0.1
0.01
0.
0.6
1.2
1.8
2.4
3.
Time (min)


WCP RI/FS MW-7D SLUG OUT TEST
K = 0.002927 ft/min
y0 = 2.077 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
1.
2.
3.
4.
5.
Time (min)
AQTESOLV
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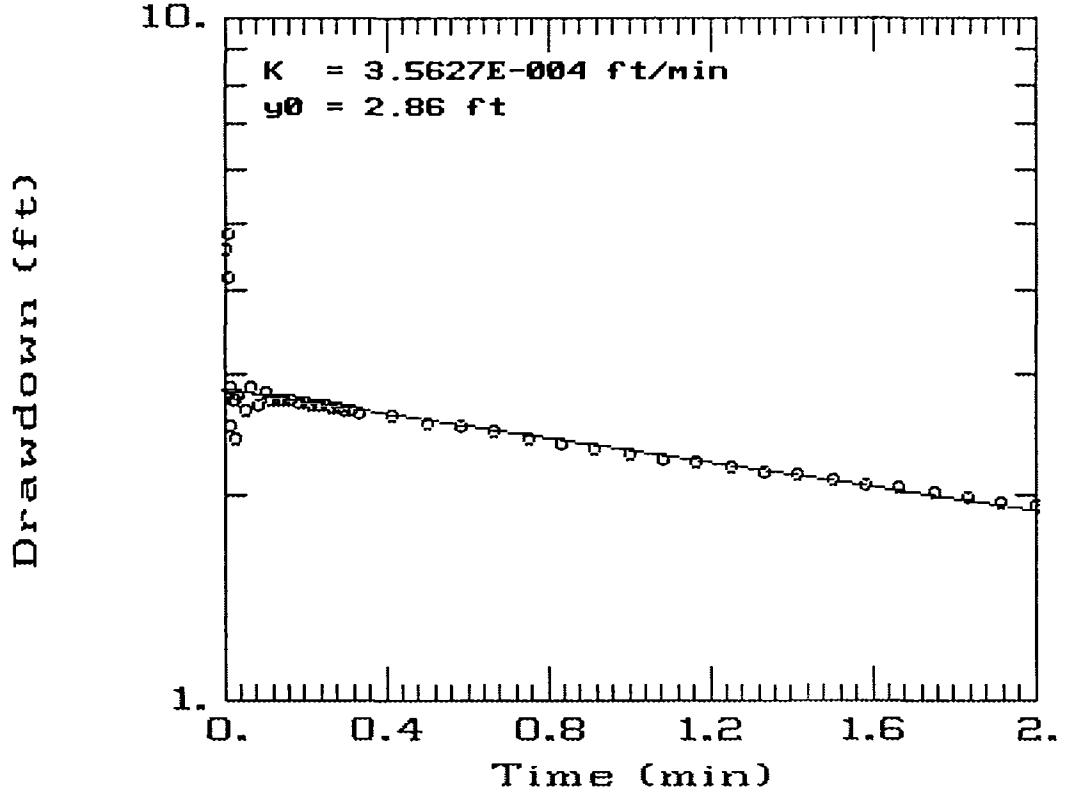
& MILLER, INC.
Modeling Group

WCP RI/FS MW-6D SLUG IN TEST 1



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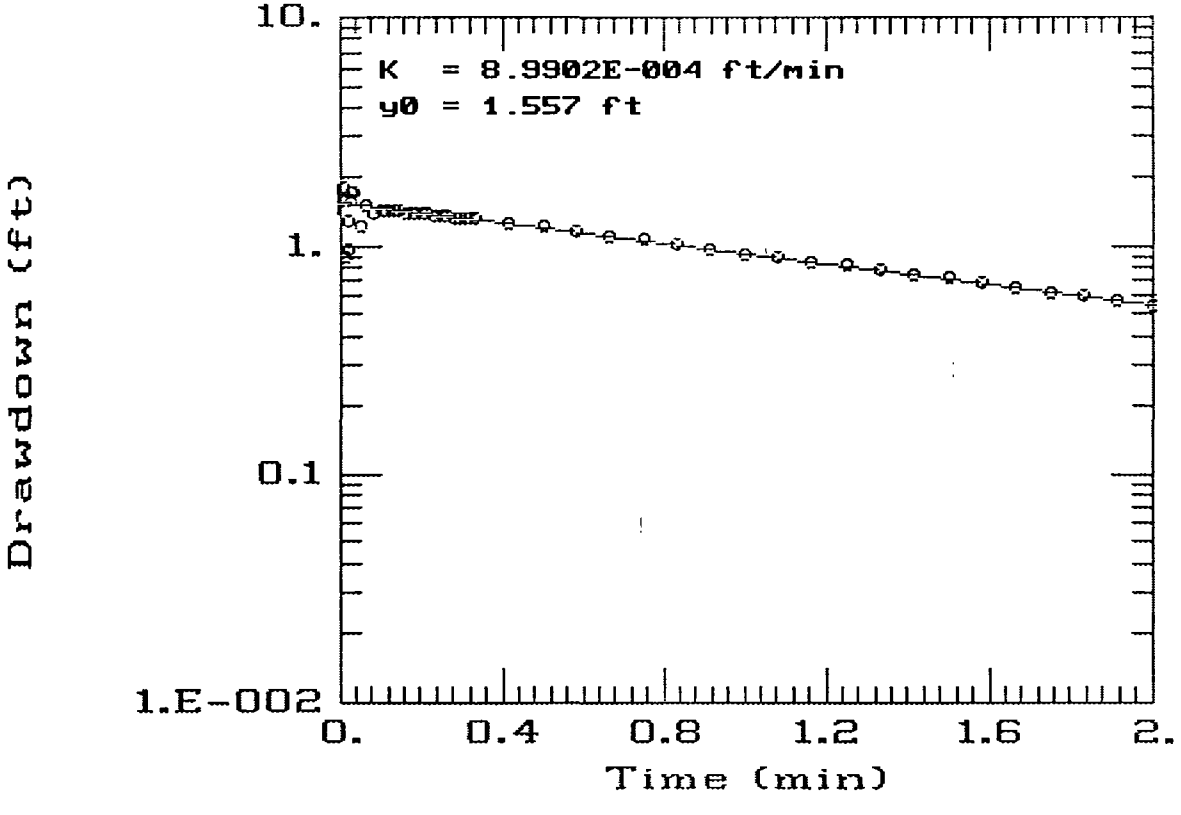
WCP RI/FS MW-6D SLUG IN TEST 2



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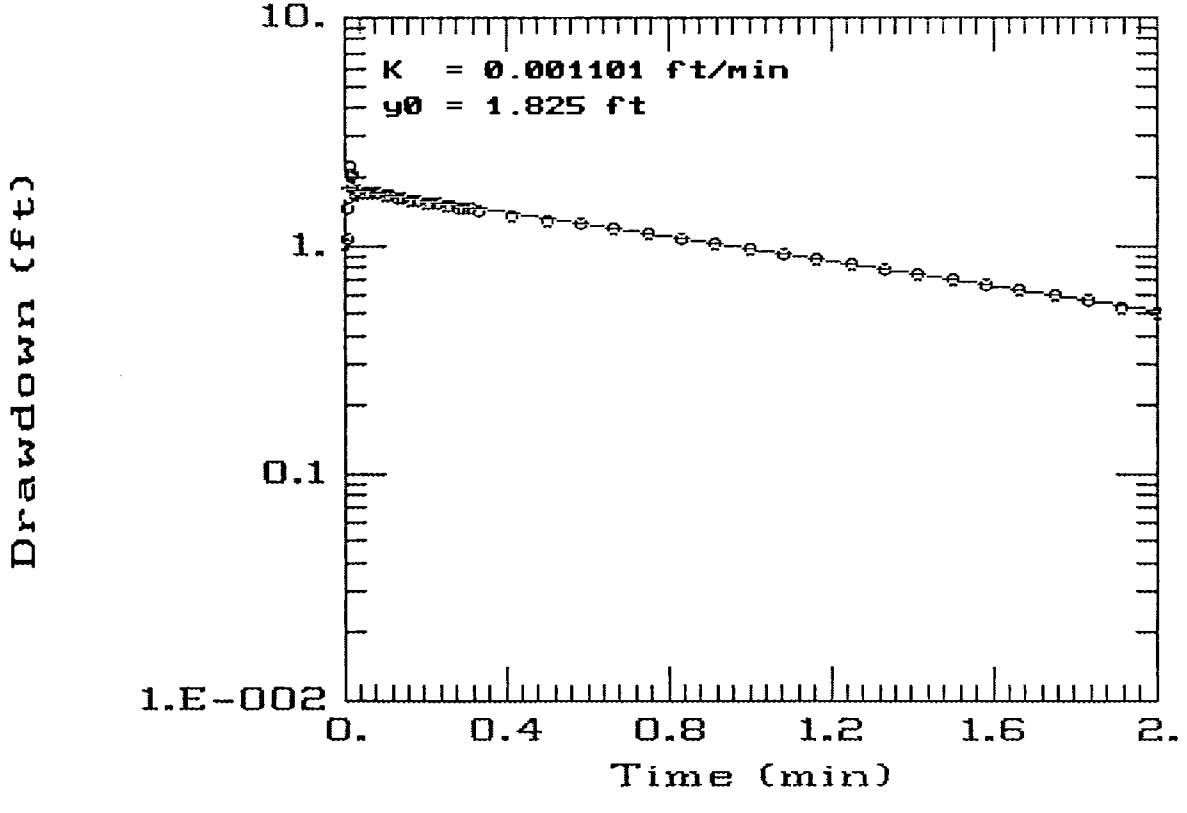
WCP RI/FS MW-6D SLUG OUT TEST 1



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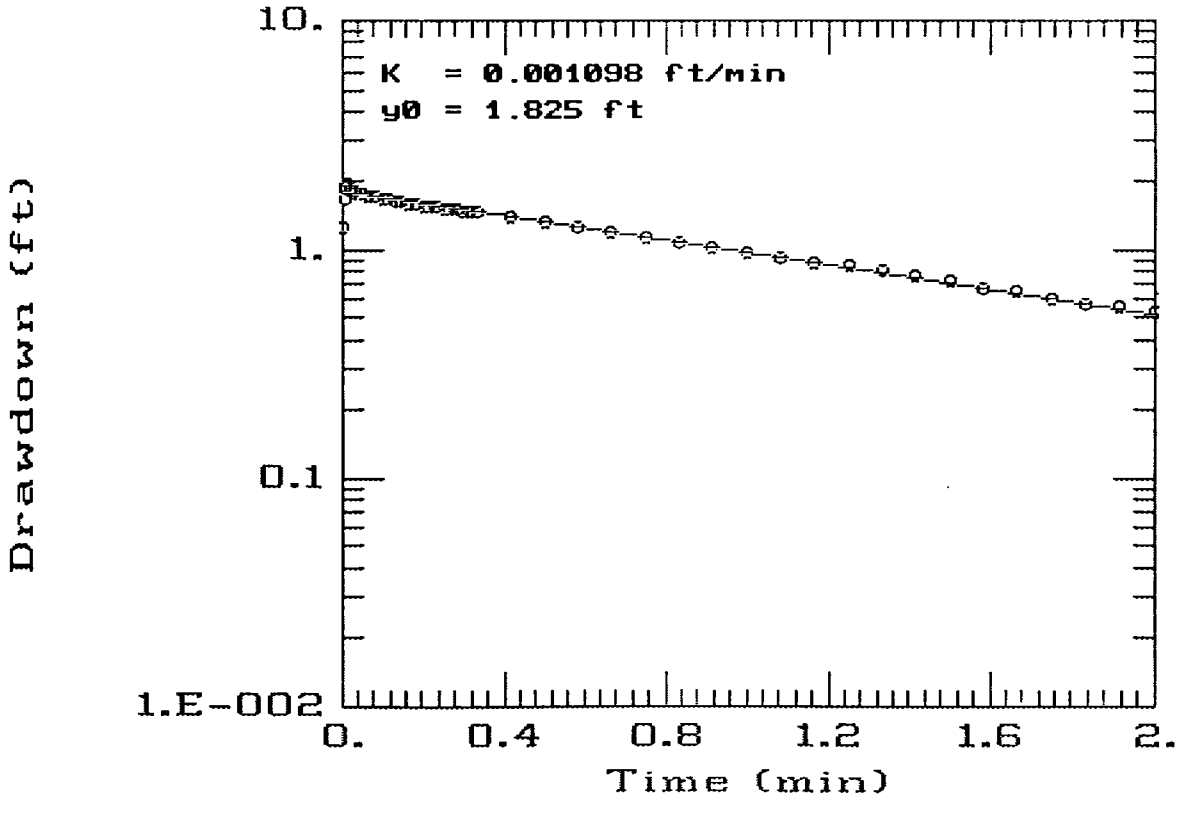
WCP RI/FS MW-6D SLUG OUT TEST 2



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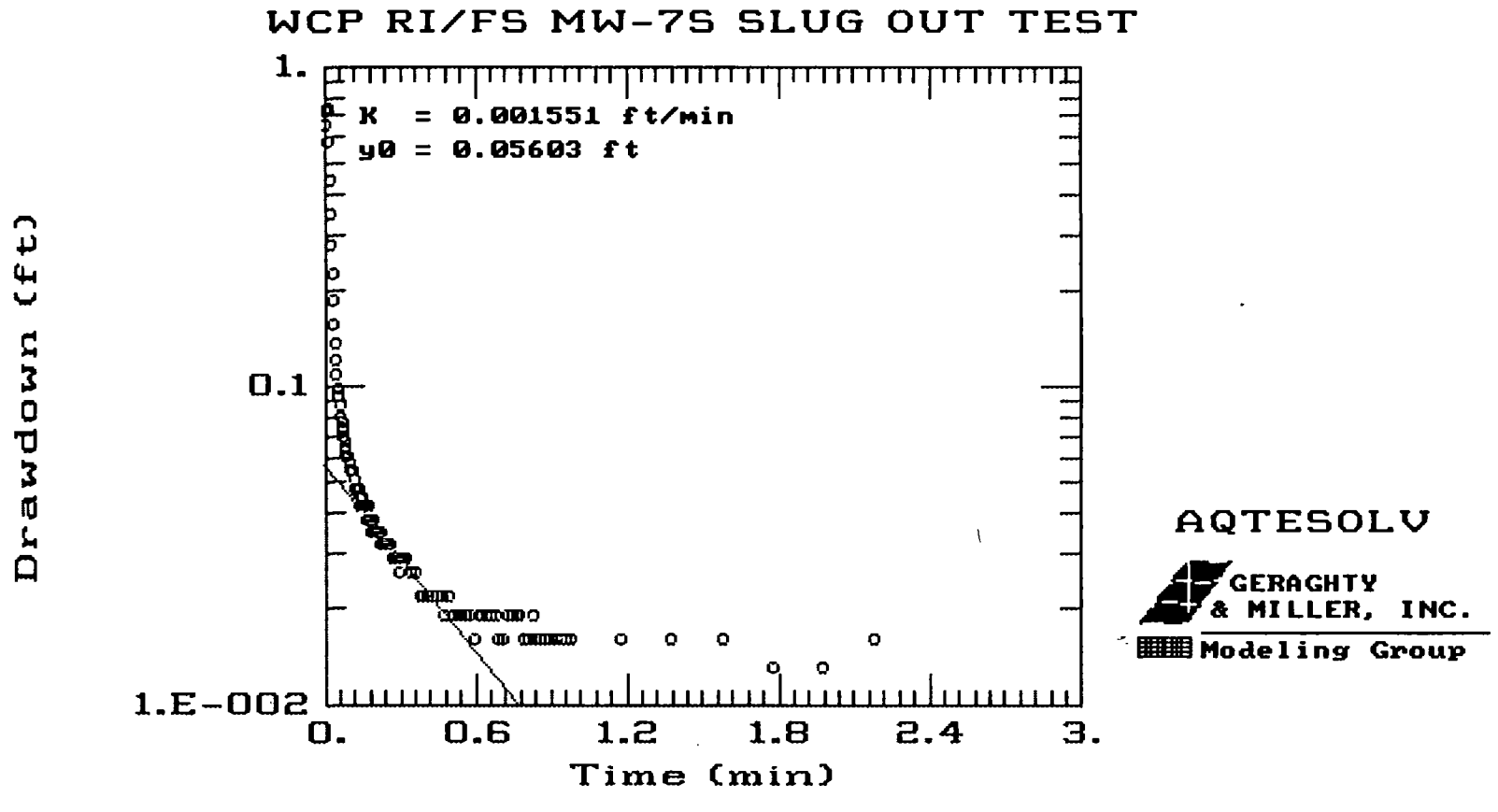
Modeling Group


WCP RI/FS MW-7S SLUG OUT TEST
K = 0.001551 ft/min
y0 = 0.05603 ft
Drawdown (ft)
1.
0.1
1.E-002
0.
0.6
1.2
1.8
2.4
3.
Time (min)
AQTESOLV
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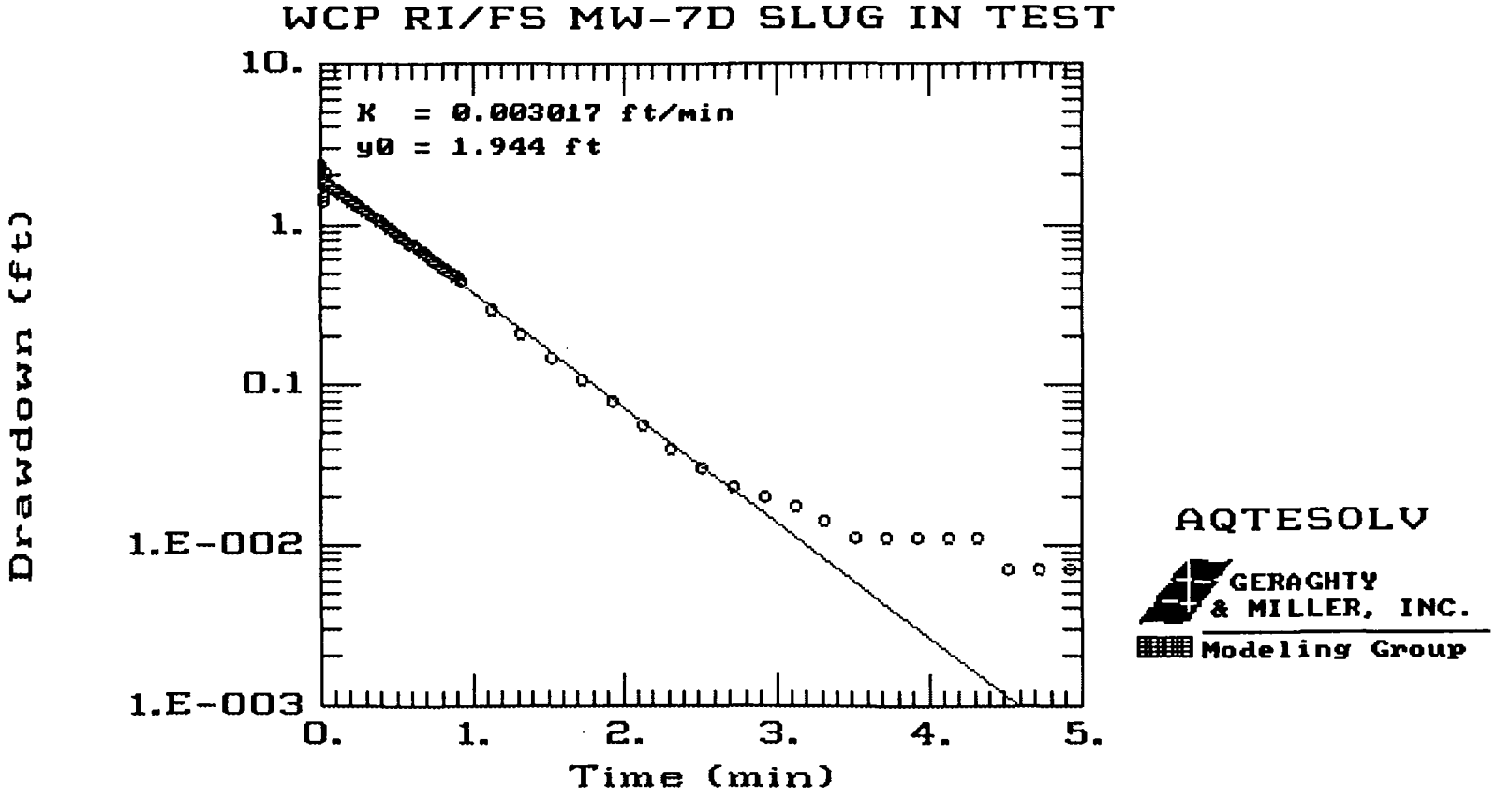
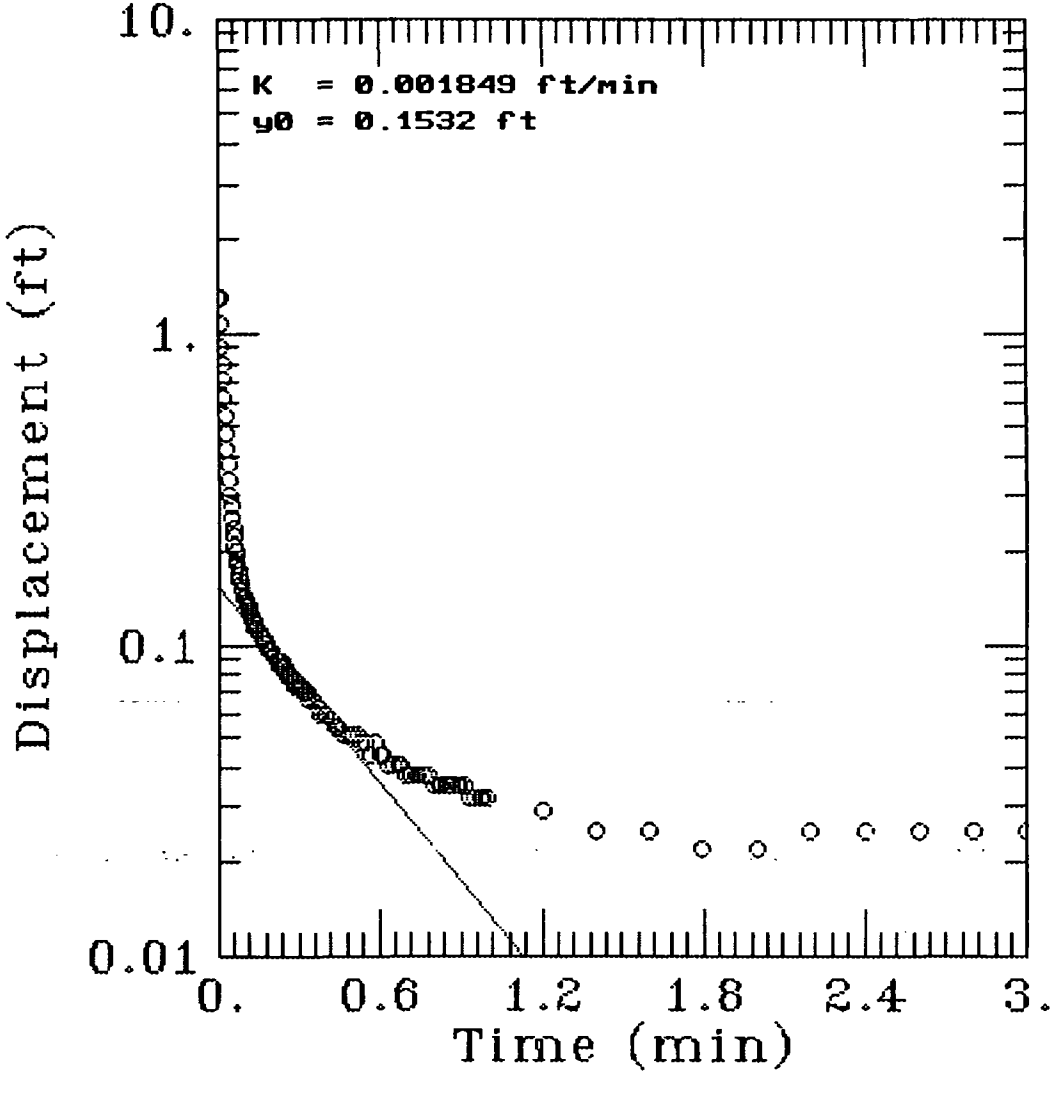
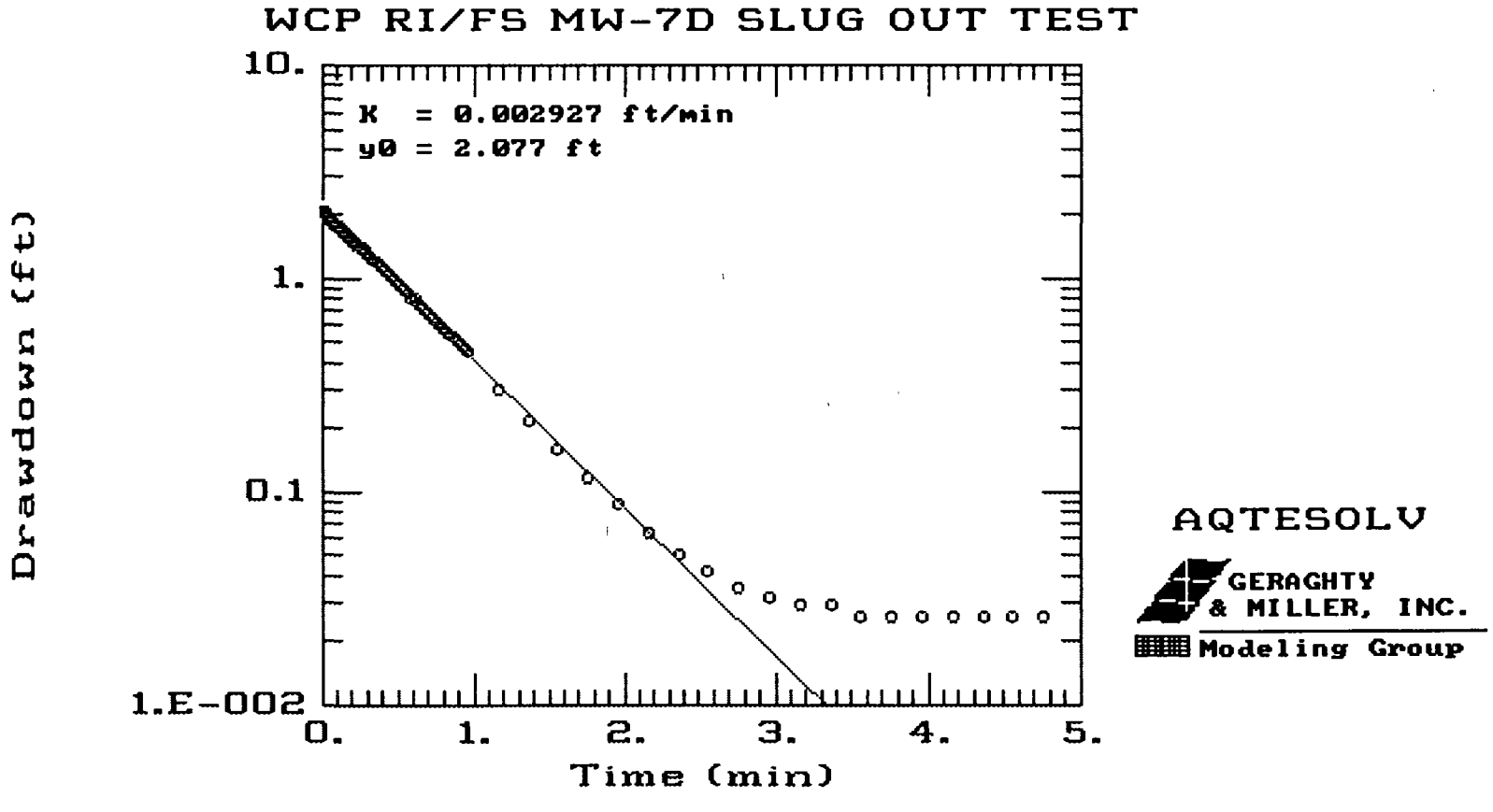
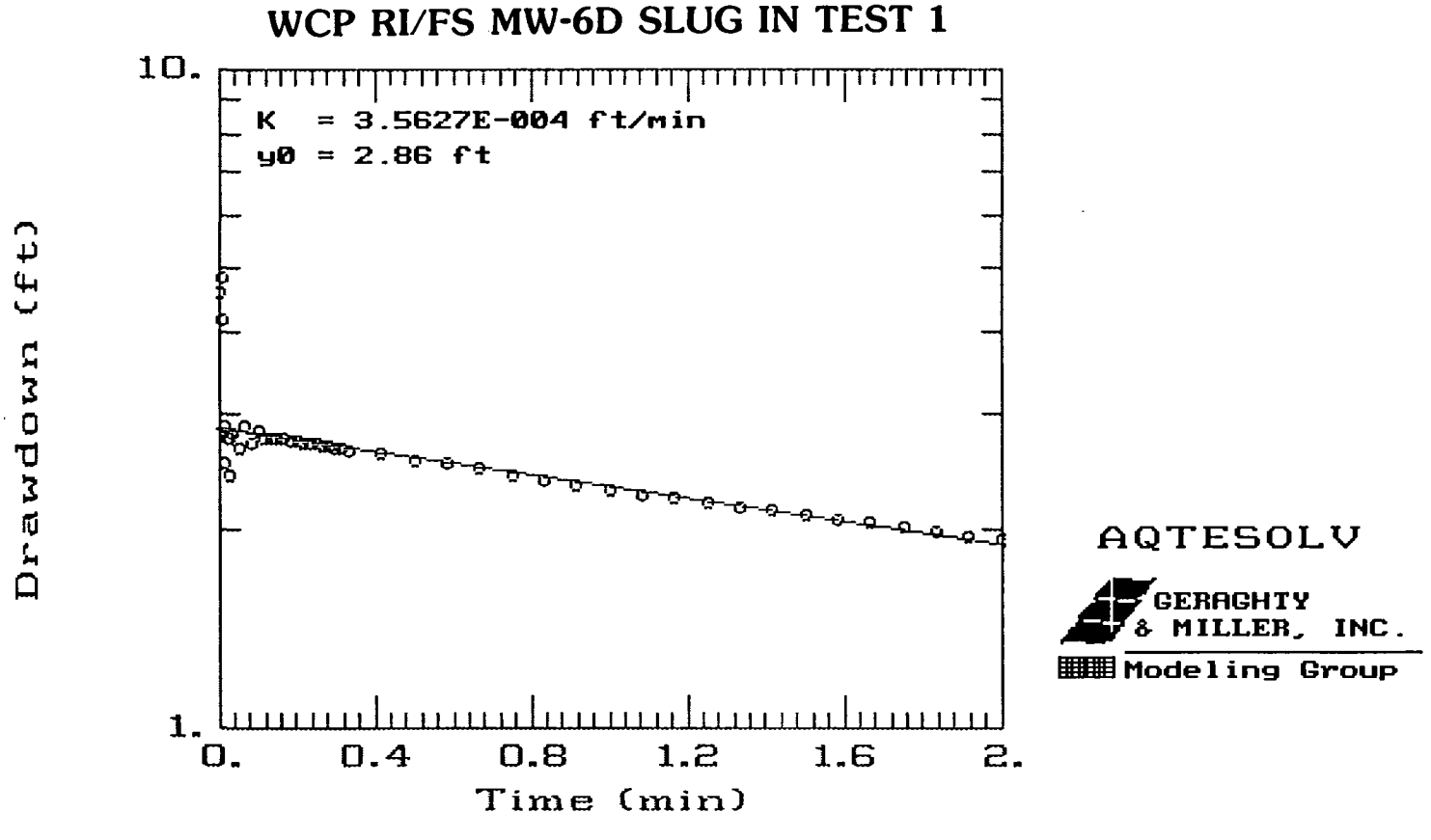
Modeling Group


WCP RI/FS MW-7D SLUG IN TEST
K = 0.003017 ft/min
y0 = 1.944 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
1.
2.
3.
4.
5.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

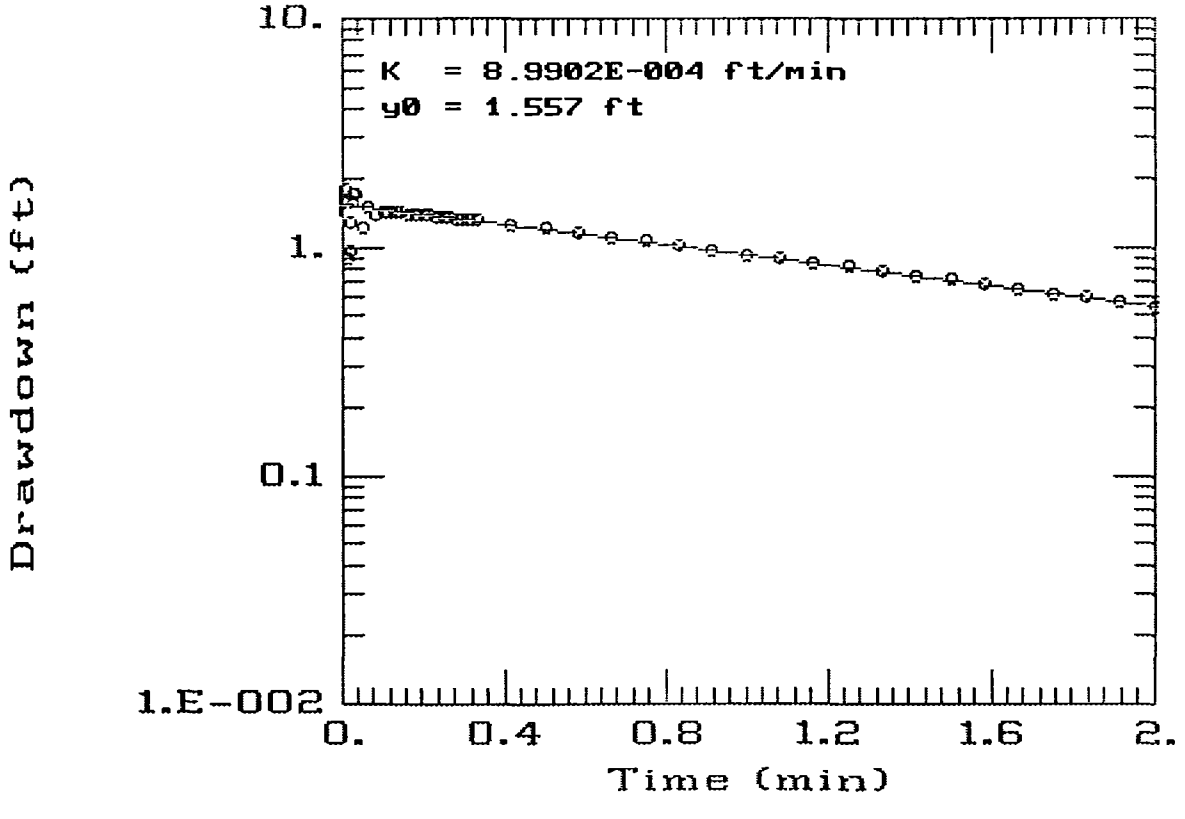
WCP RI/FS MW-8S SLUG OUT TEST




WCP RI/FS MW-7D SLUG OUT TEST
K = 0.002927 ft/min
y0 = 2.077 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
1.
2.
3.
4.
5.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS MW-6D SLUG IN TEST 1
K = 3.5627E-004 ft/min
y0 = 2.86 ft
10.
1.
0.
0.4
0.8
1.2
1.6
2.
Drawdown (ft)
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

WCP RI/FS MW-6D SLUG IN TEST 2



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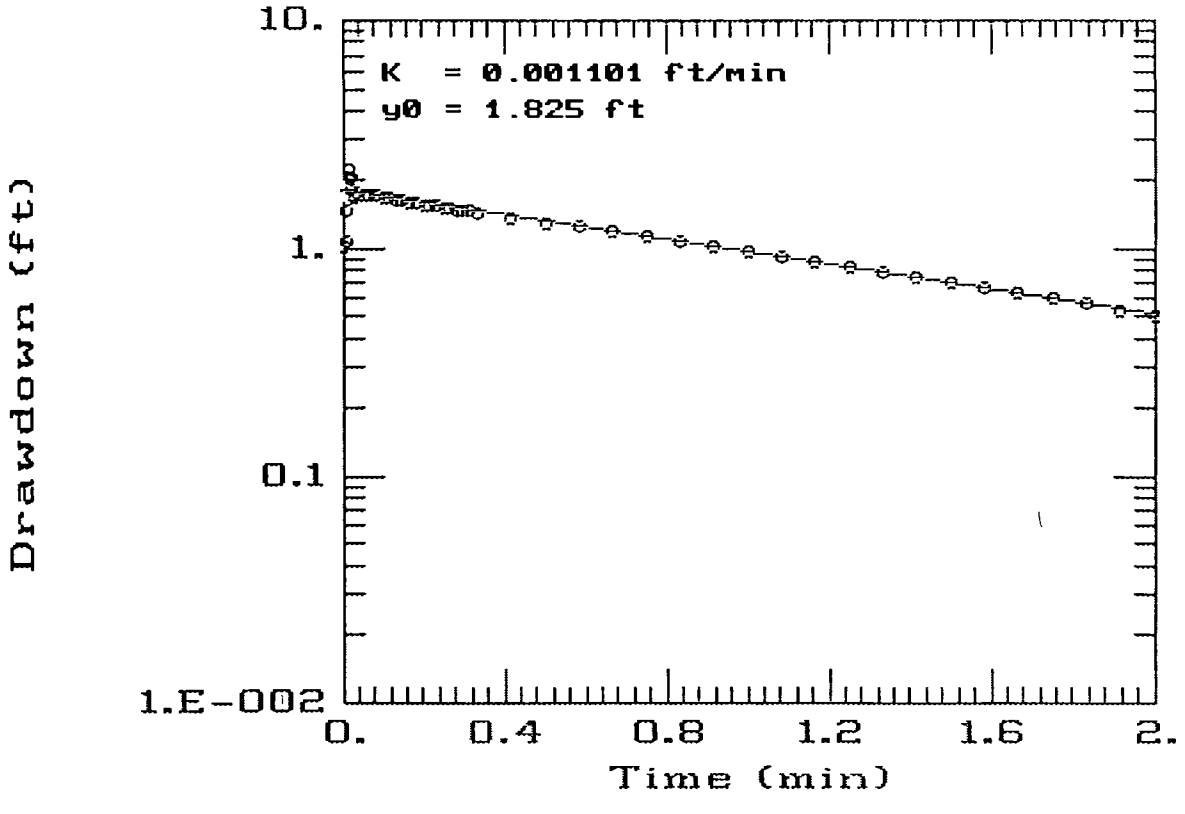
Modeling Group

WCP RI/FS MW-6D SLUG OUT TEST 1



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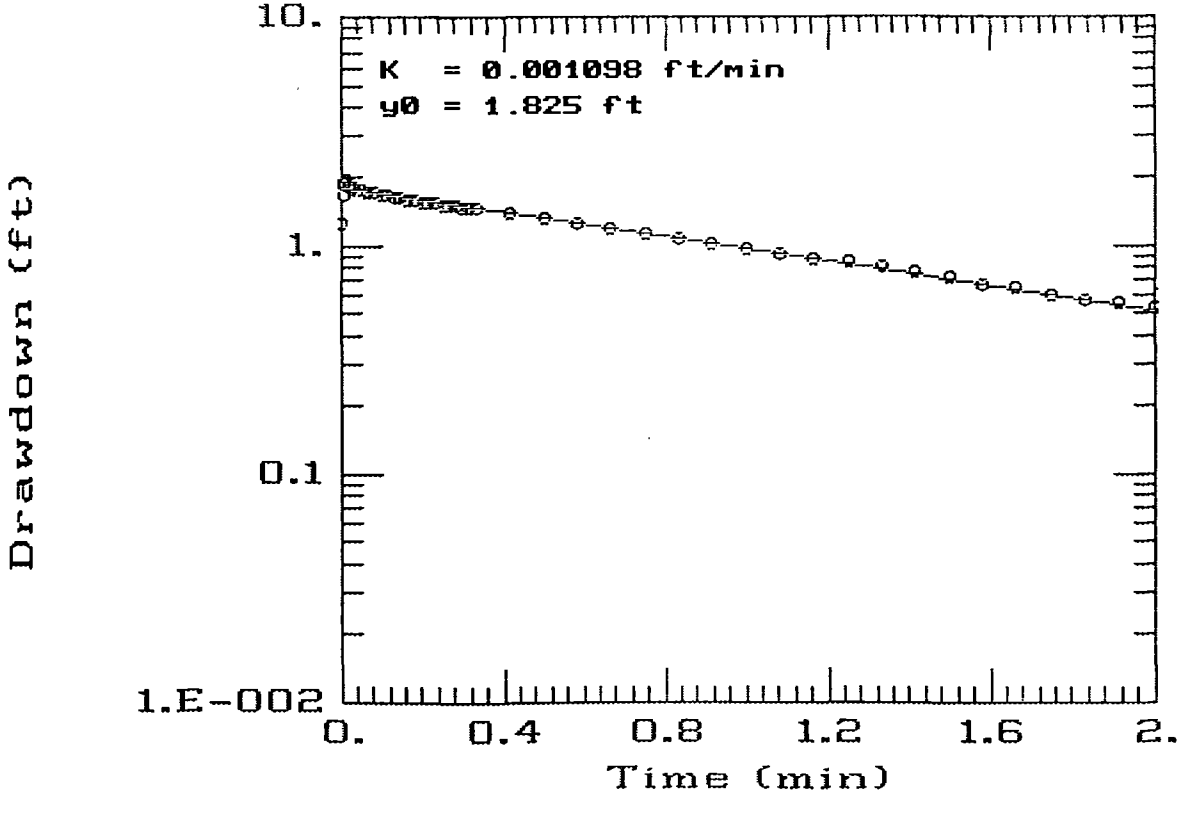
Modeling Group

WCP RI/FS MW-6D SLUG OUT TEST 2



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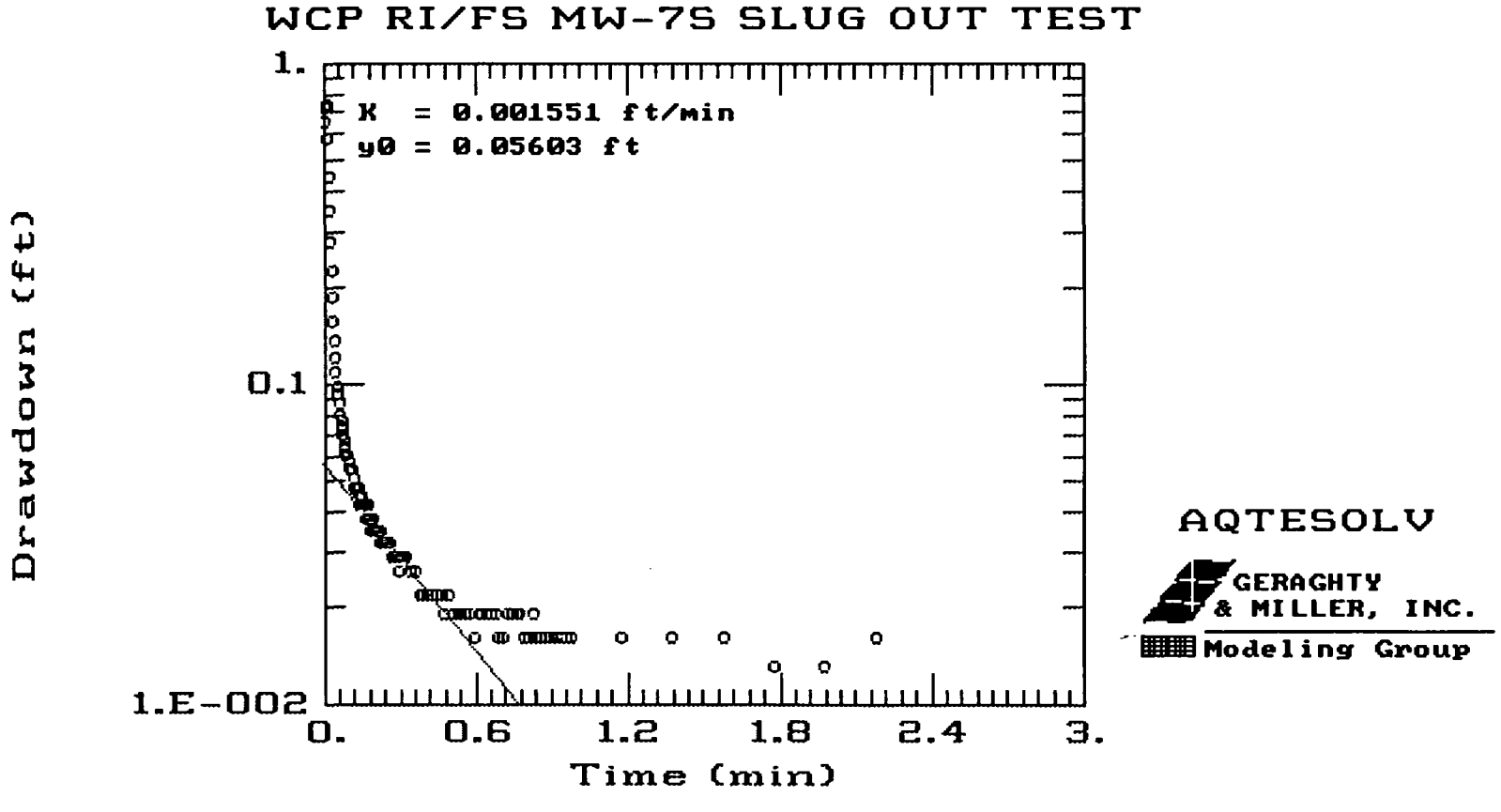
Modeling Group


WCP RI/FS MW-7S SLUG OUT TEST
K = 0.001551 ft/min
y0 = 0.05603 ft
Drawdown (ft)
1.
0.1
1.E-002
0.
0.6
1.2
1.8
2.4
3.
Time (min)
AQTESOLV
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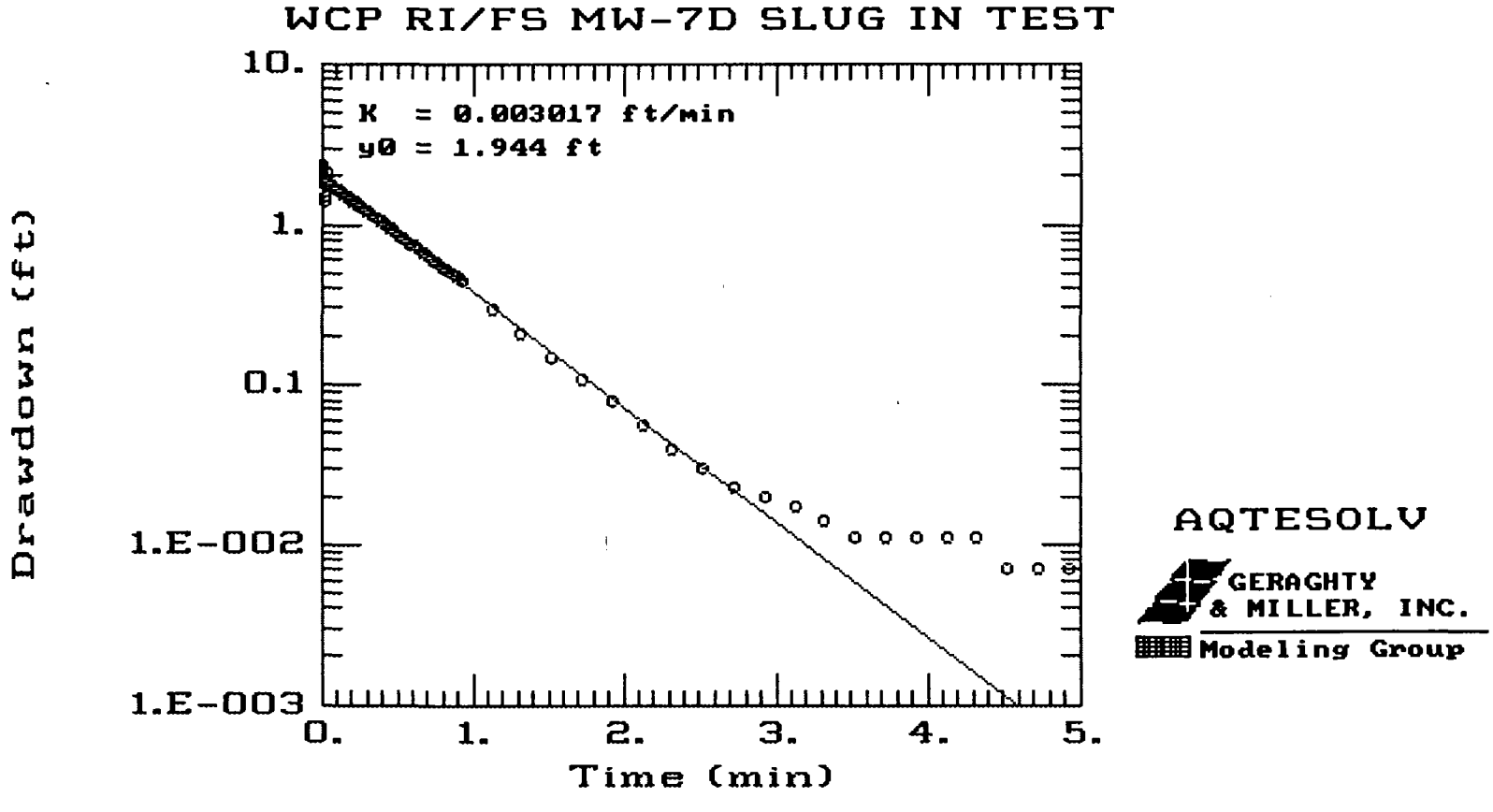
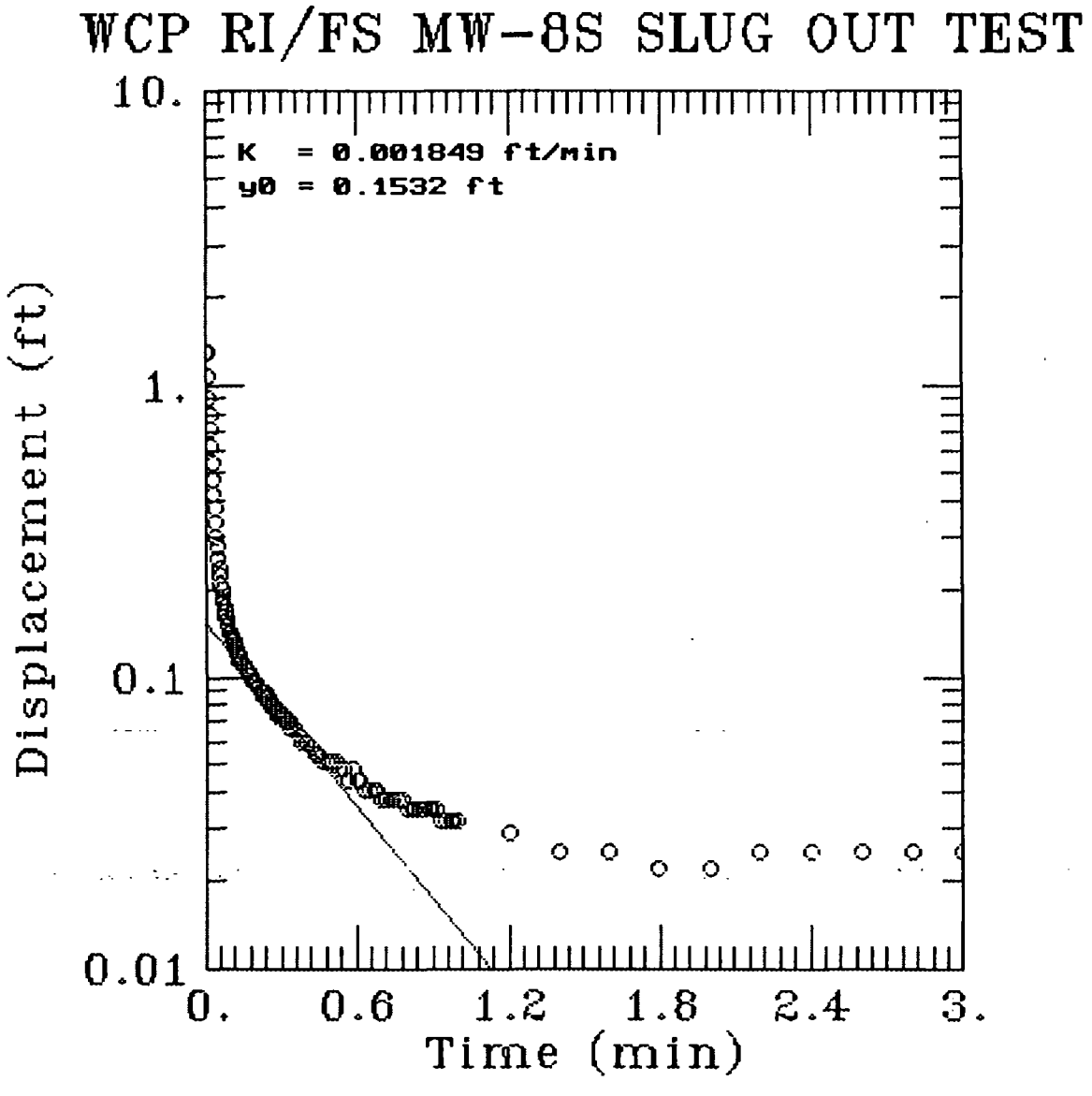
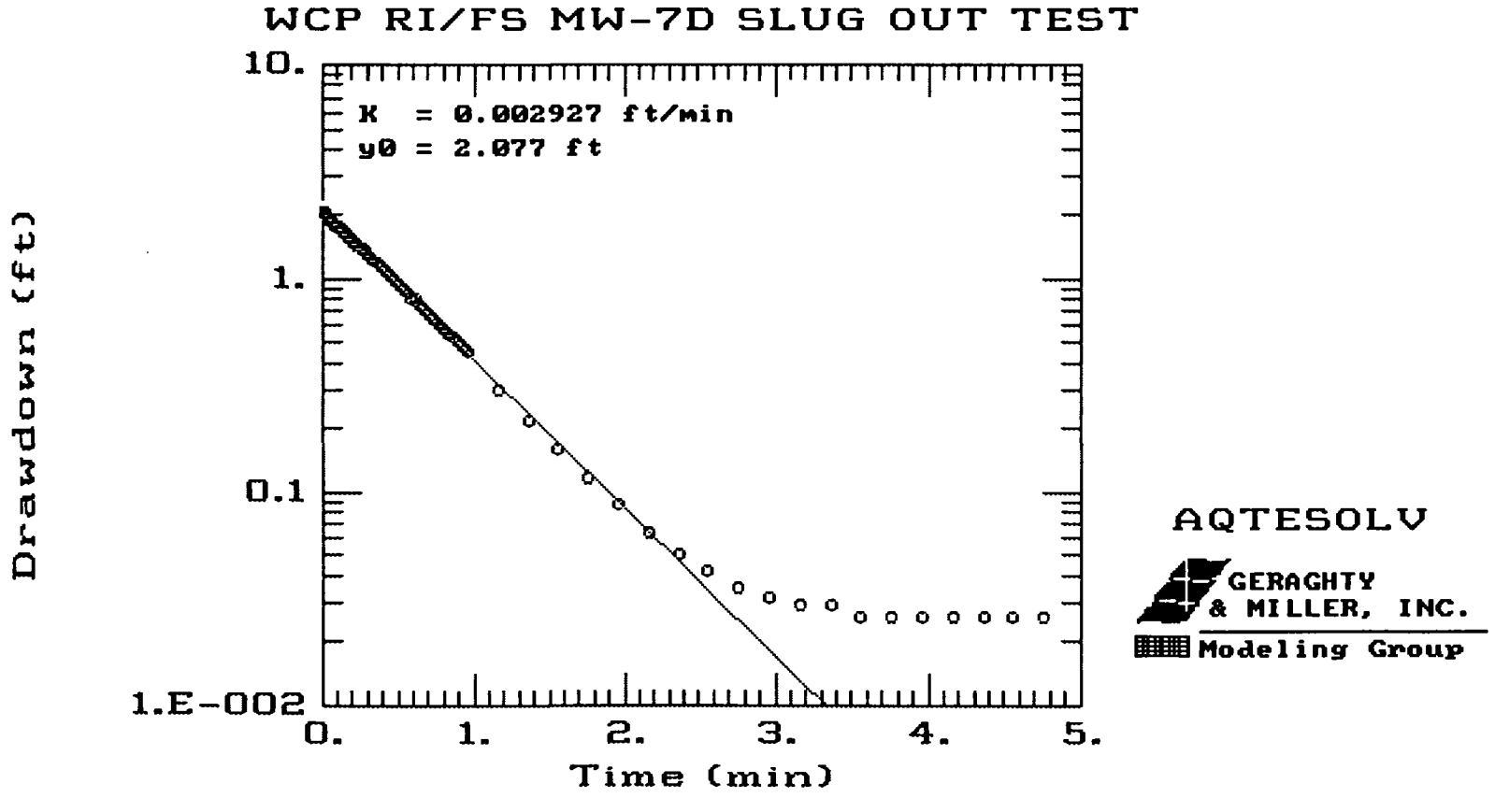
Modeling Group


WCP RI/FS MW-7D SLUG IN TEST
K = 0.003017 ft/min
y0 = 1.944 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
1.
2.
3.
4.
5.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS MW-8S SLUG OUT TEST
K = 0.001849 ft/min
y0 = 0.1532 ft
Displacement (ft)
10.
1.
0.1
0.01
0.
0.6
1.2
1.8
2.4
3.
Time (min)


WCP RI/FS MW-7D SLUG OUT TEST
K = 0.002927 ft/min
y0 = 2.077 ft
10.
1.
0.1
1.E-002
Drawdown (ft)
0.
1.
2.
3.
4.
5.
Time (min)
AQTESOLV
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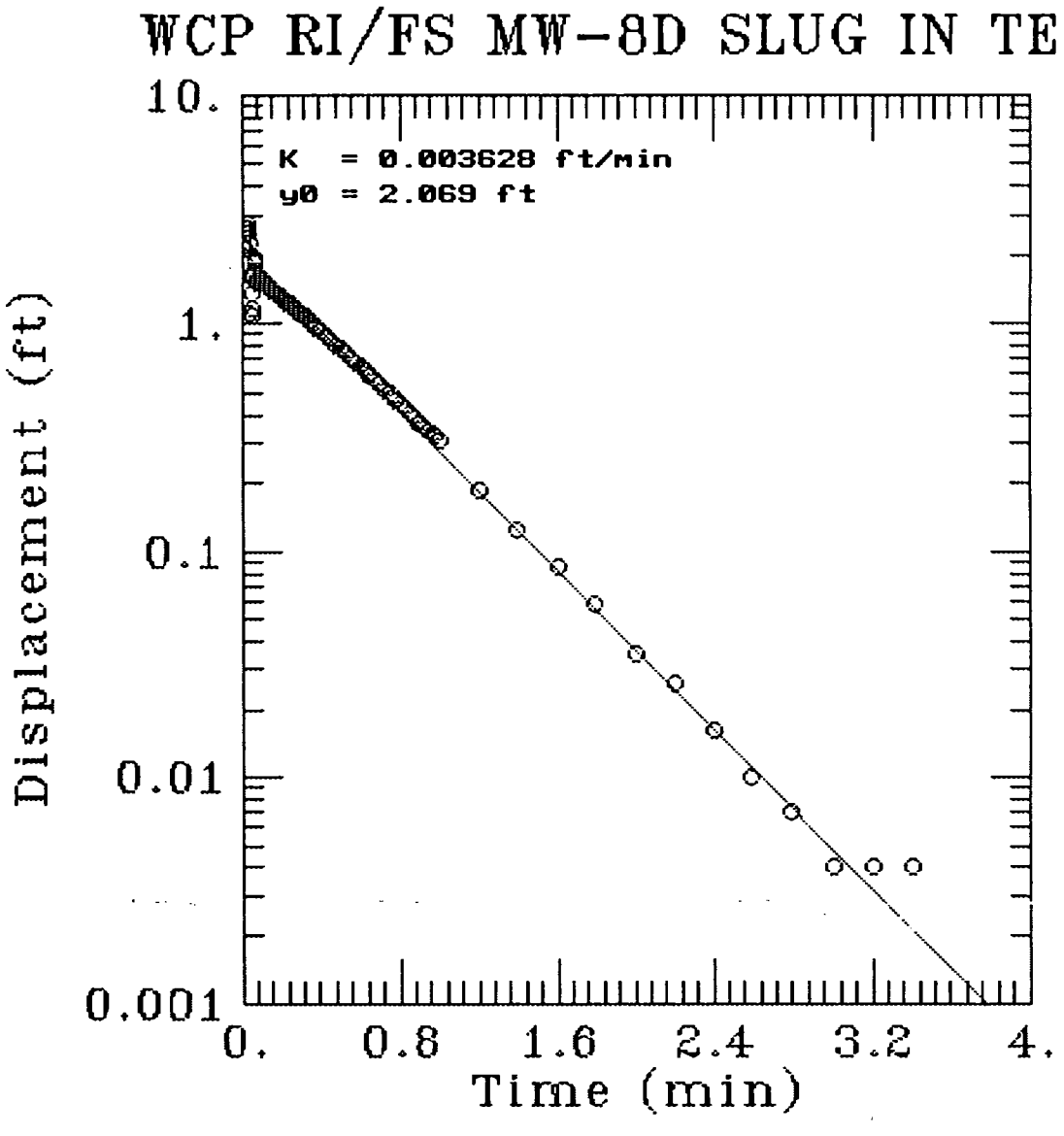
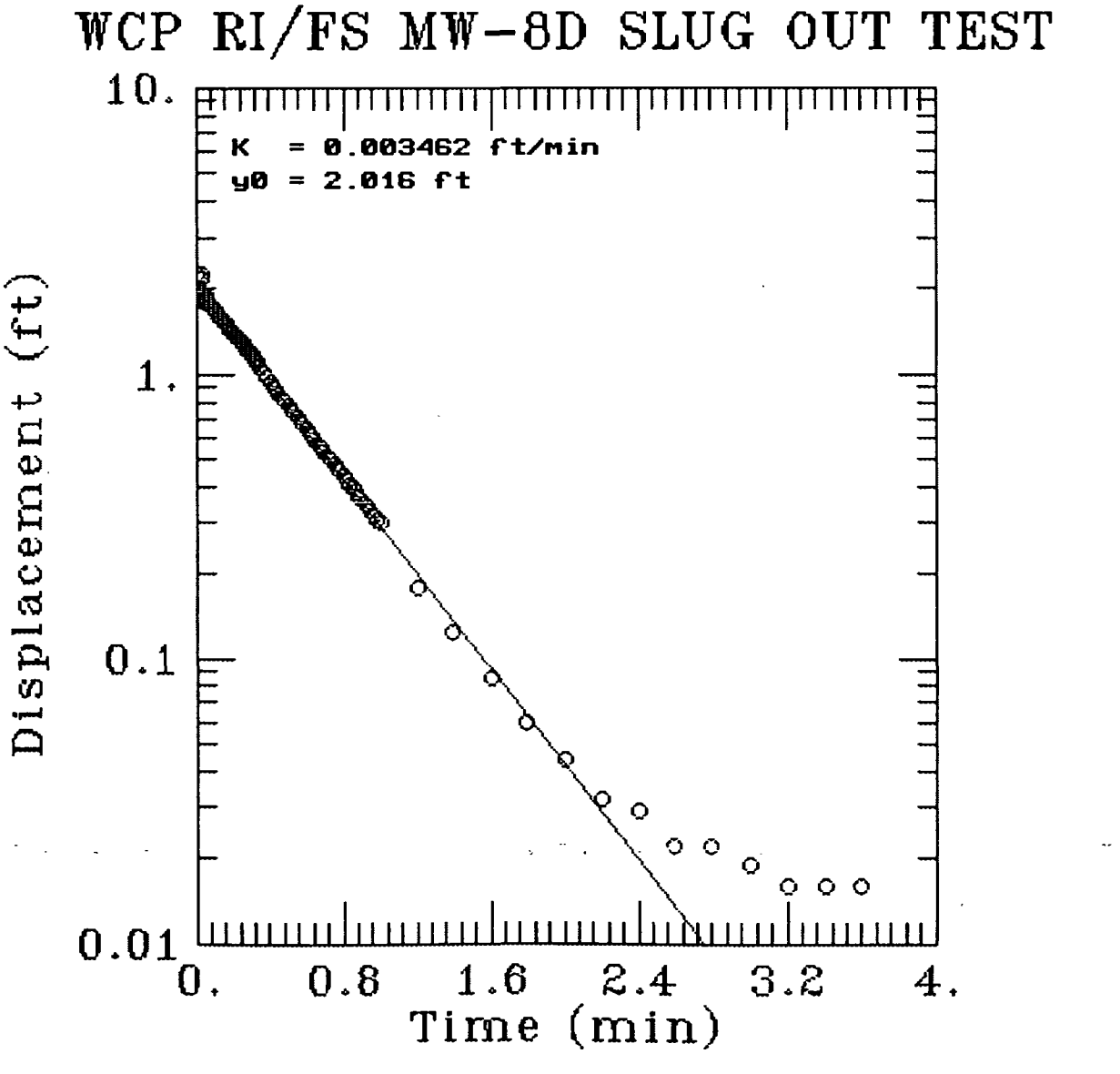
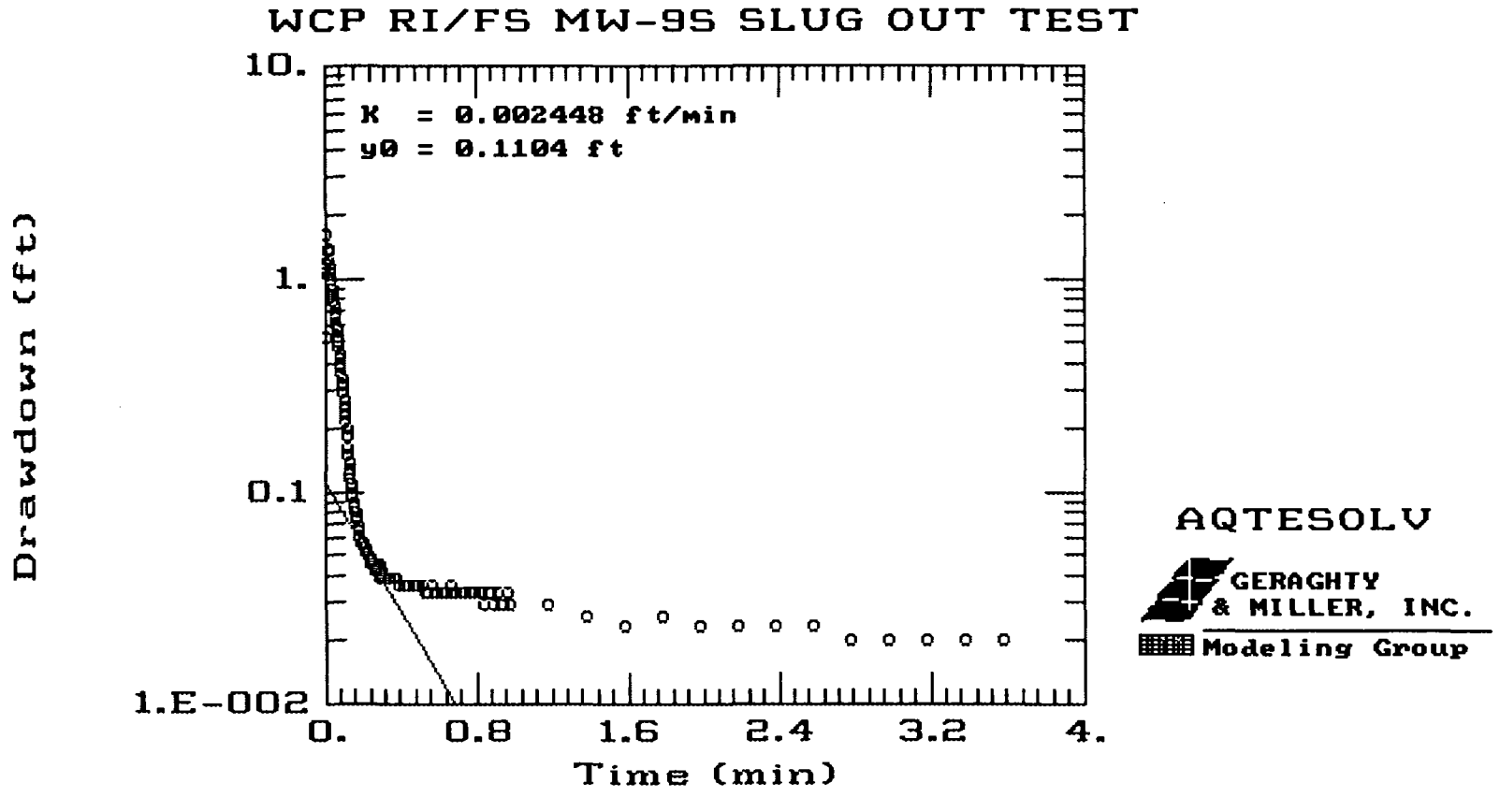
& MILLER, INC.
Modeling Group


WCP RI/FS MW-8D SLUG IN TEST
K = 0.003628 ft/min
y0 = 2.069 ft
Displacement (ft)
10.
1.
0.1
0.01
0.001
0.
0.8
1.6
2.4
3.2
4.
Time (min)


WCP RI/FS MW-8D SLUG OUT TEST
K = 0.003462 ft/min
y0 = 2.016 ft
Displacement (ft)
10.
1.
0.1
0.01
0.
0.8
1.6
2.4
3.2
4.
Time (min)


WCP RI/FS MW-9S SLUG OUT TEST
K = 0.002448 ft/min
y0 = 0.1104 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.8
1.6
2.4
3.2
4.
Time (min)
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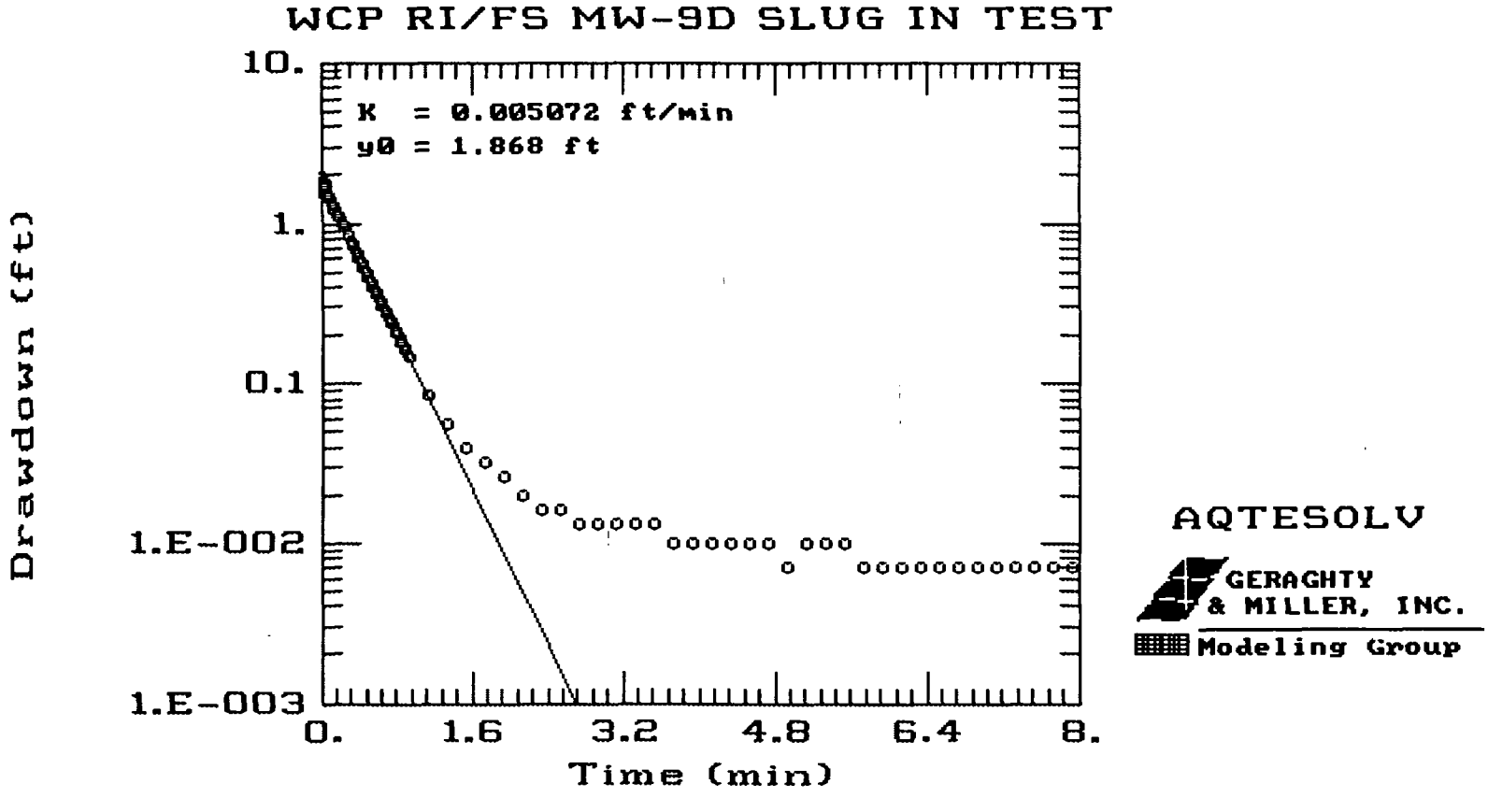
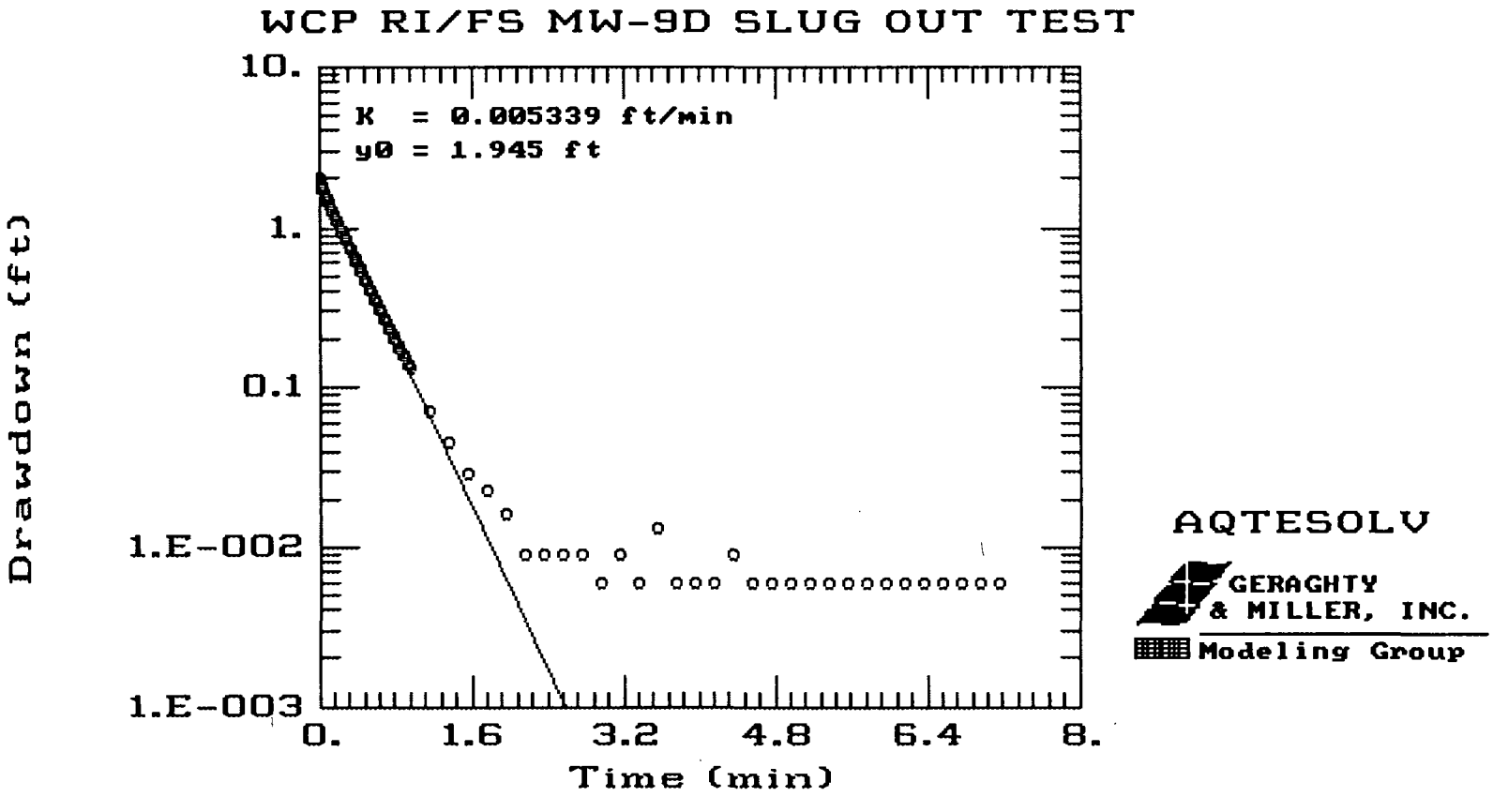
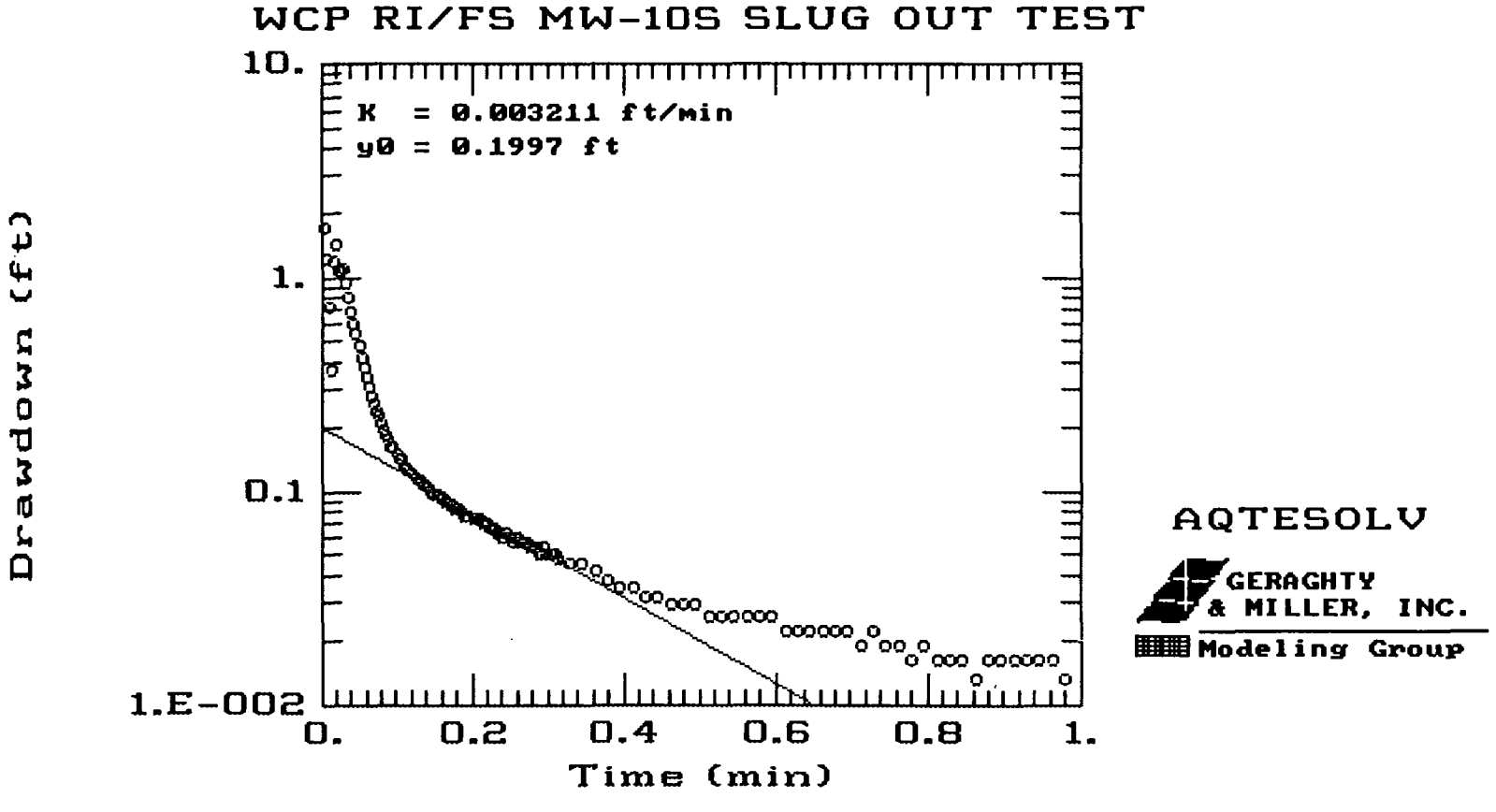
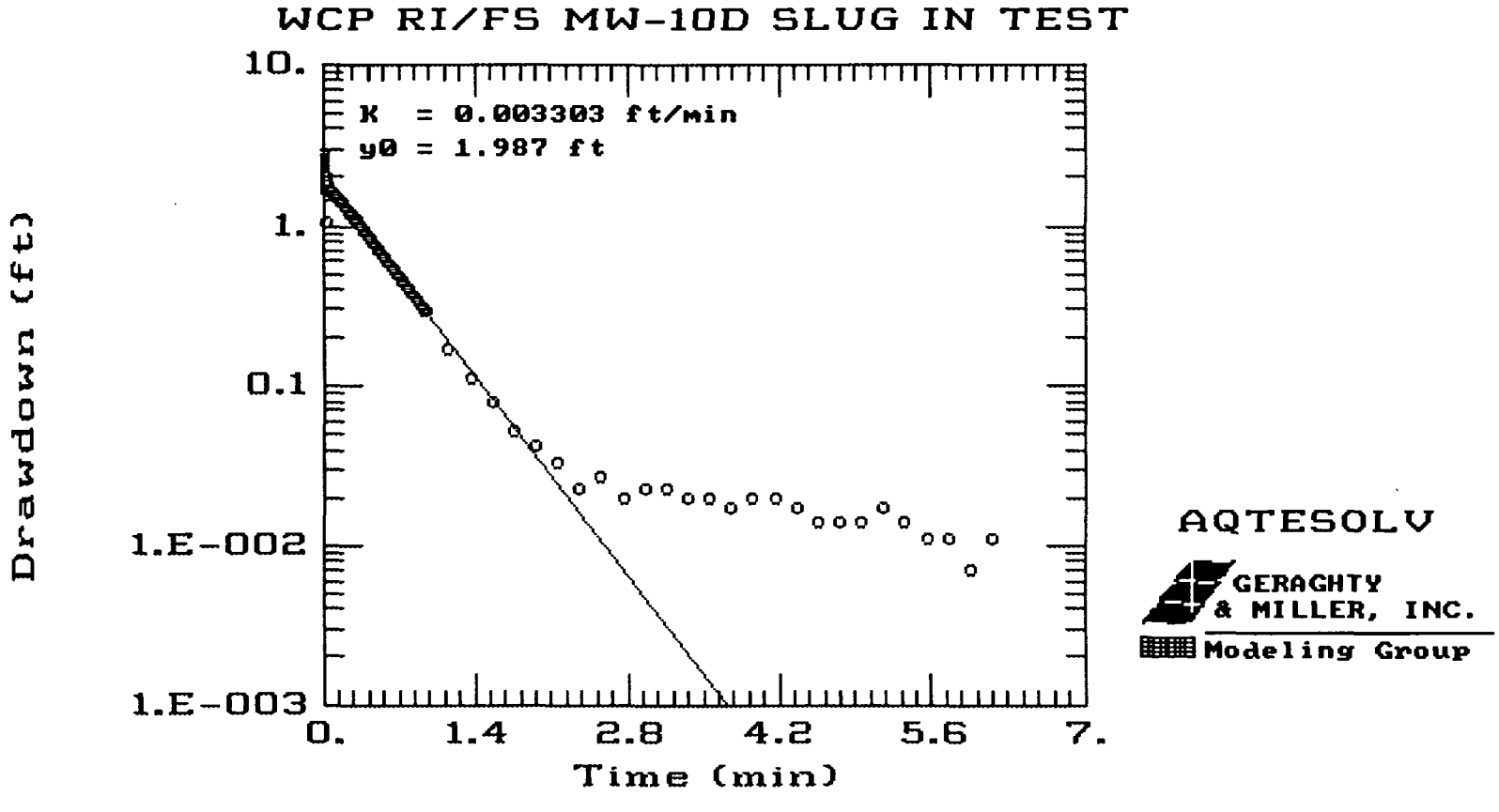
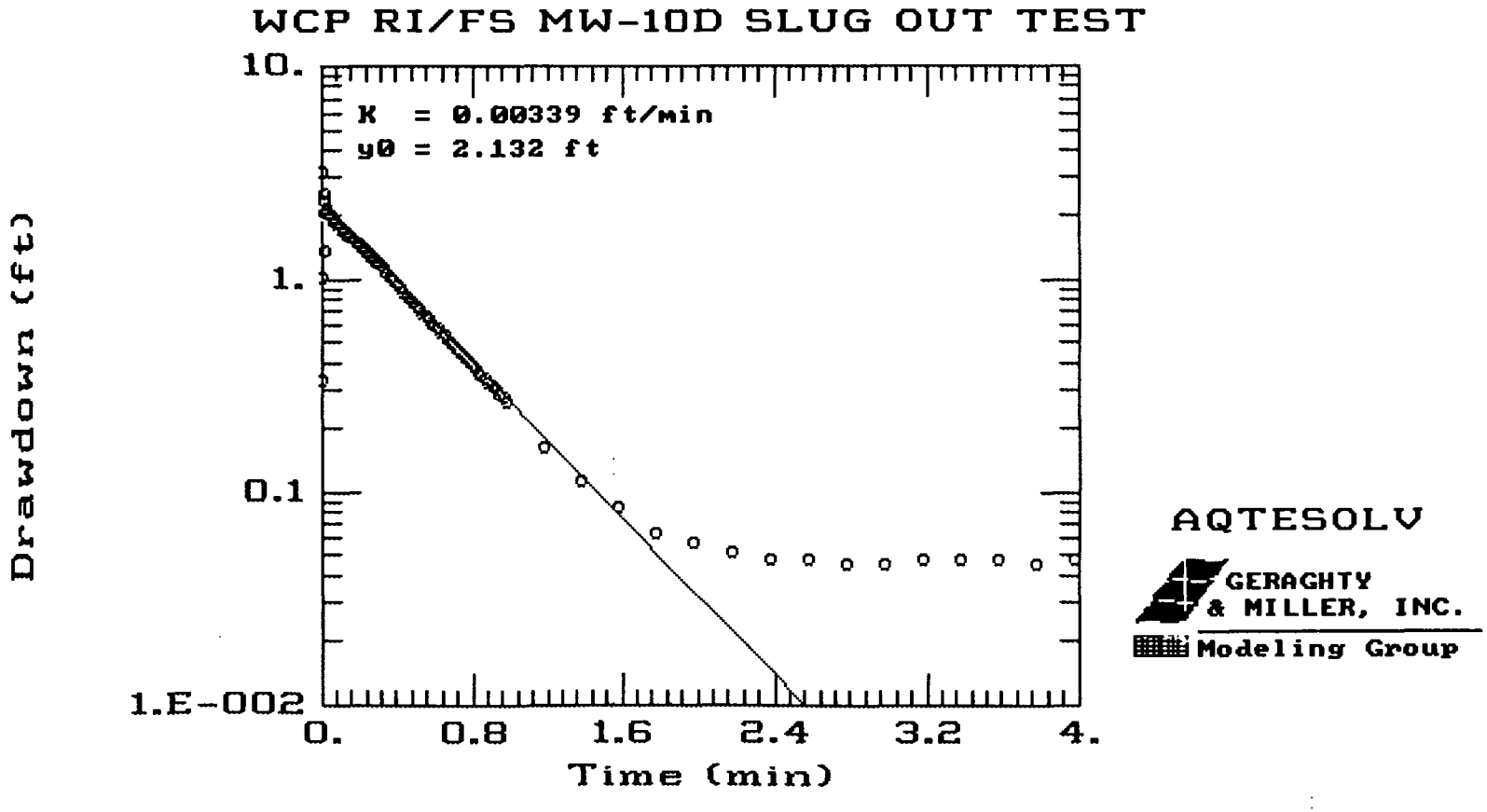
Modeling Group

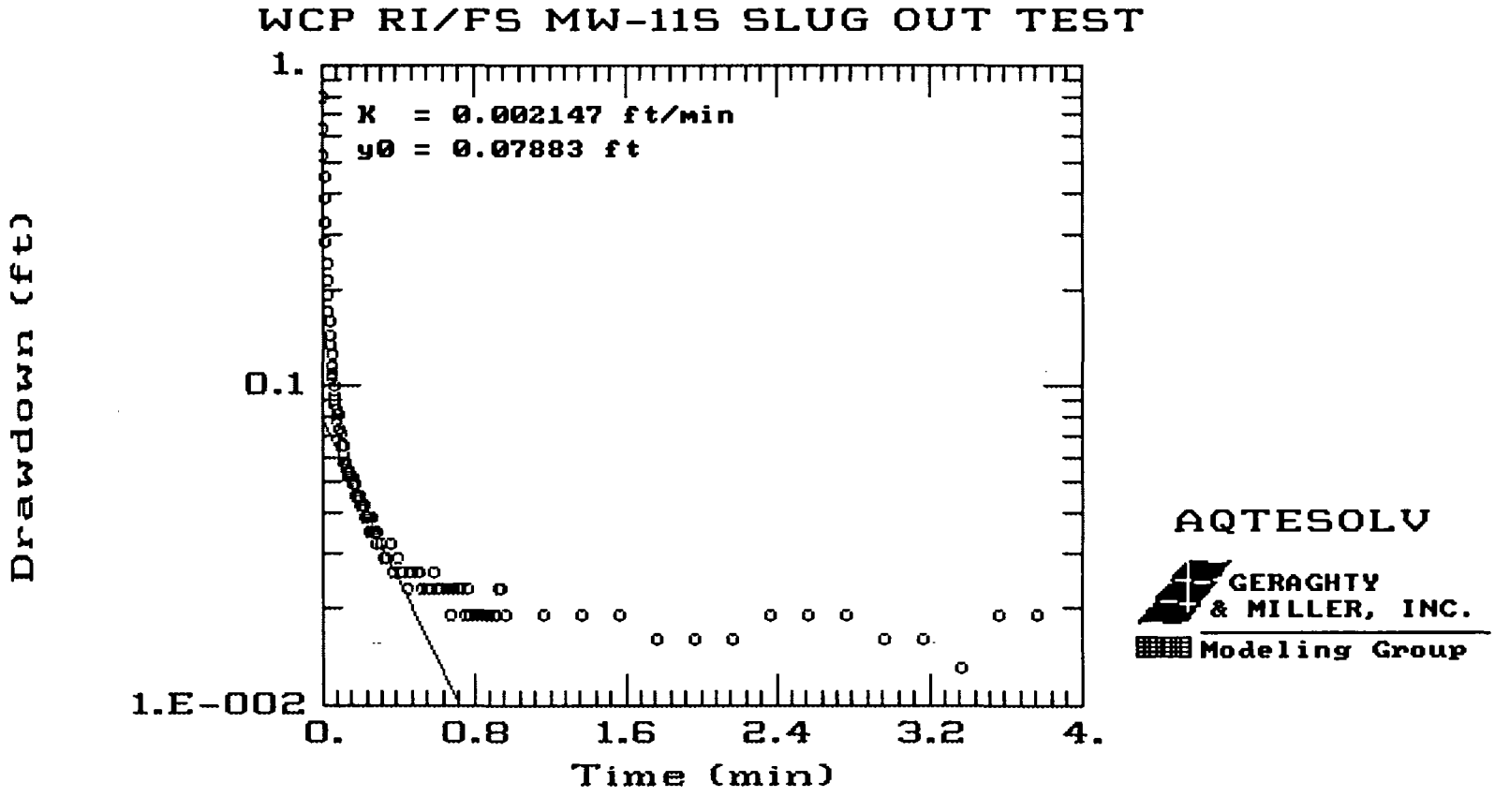

WCP RI/FS MW-9D SLUG IN TEST
K = 0.005072 ft/min
y0 = 1.868 ft
10.
1.
0.1
1.E-002
1.E-003
Drawdown (ft)
0.
1.6
3.2
4.8
6.4
8.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

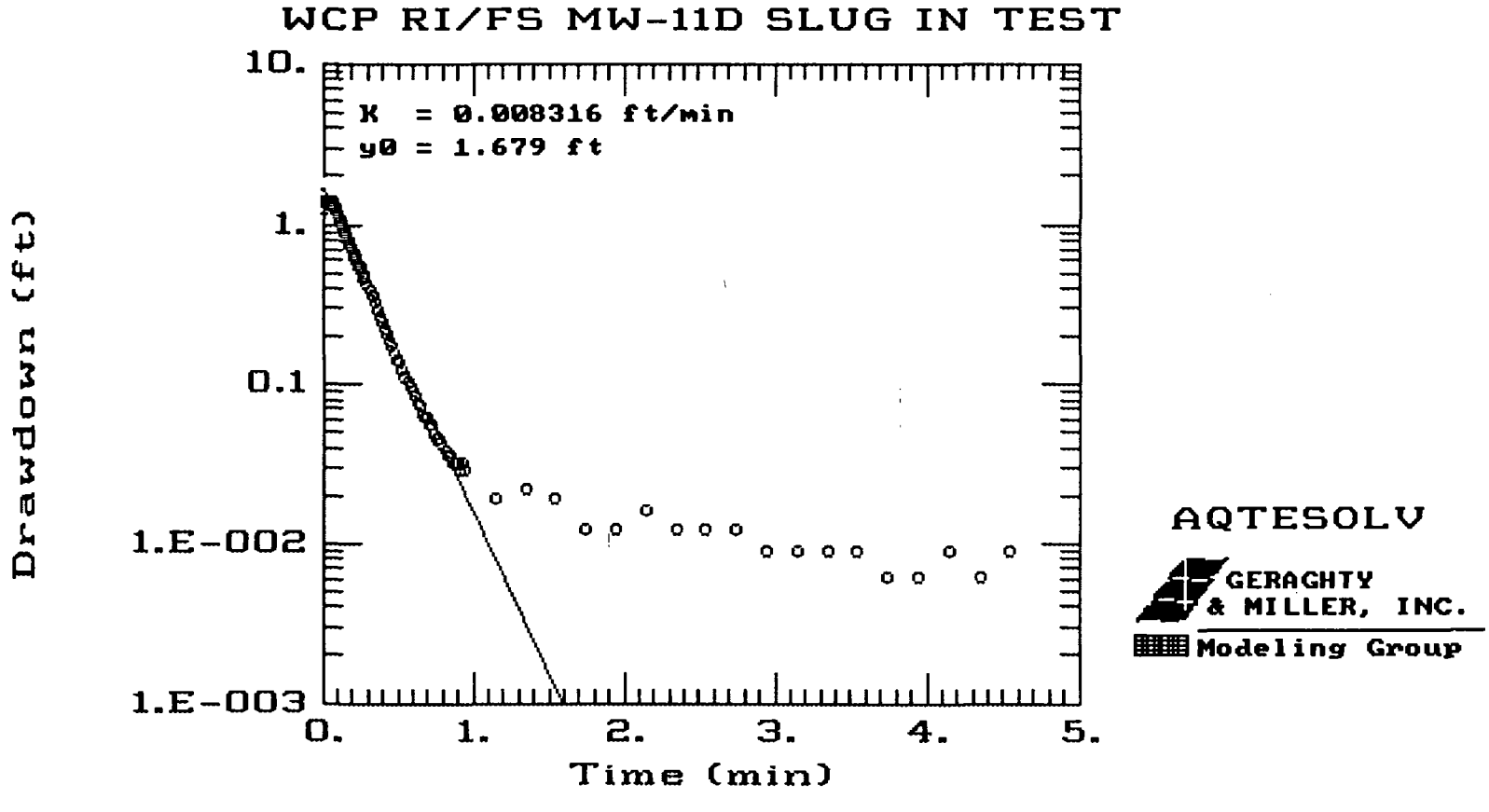

WCP RI/FS MW-9D SLUG OUT TEST
K = 0.005339 ft/min
y0 = 1.945 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
1.6
3.2
4.8
6.4
8.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

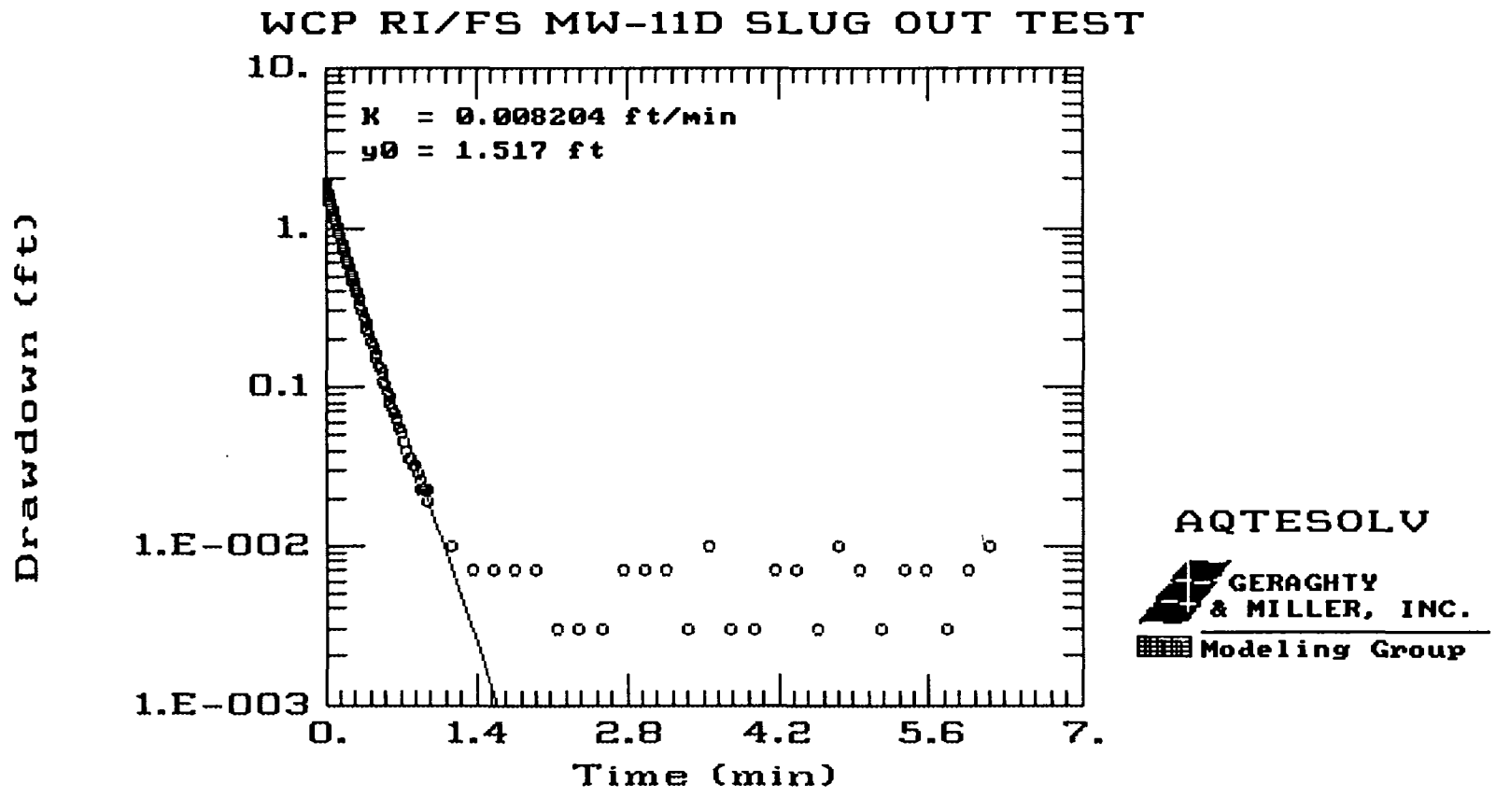

WCP RI/FS MW-10S SLUG OUT TEST
K = 0.003211 ft/min
y0 = 0.1997 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.2
0.4
0.6
0.8
1.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

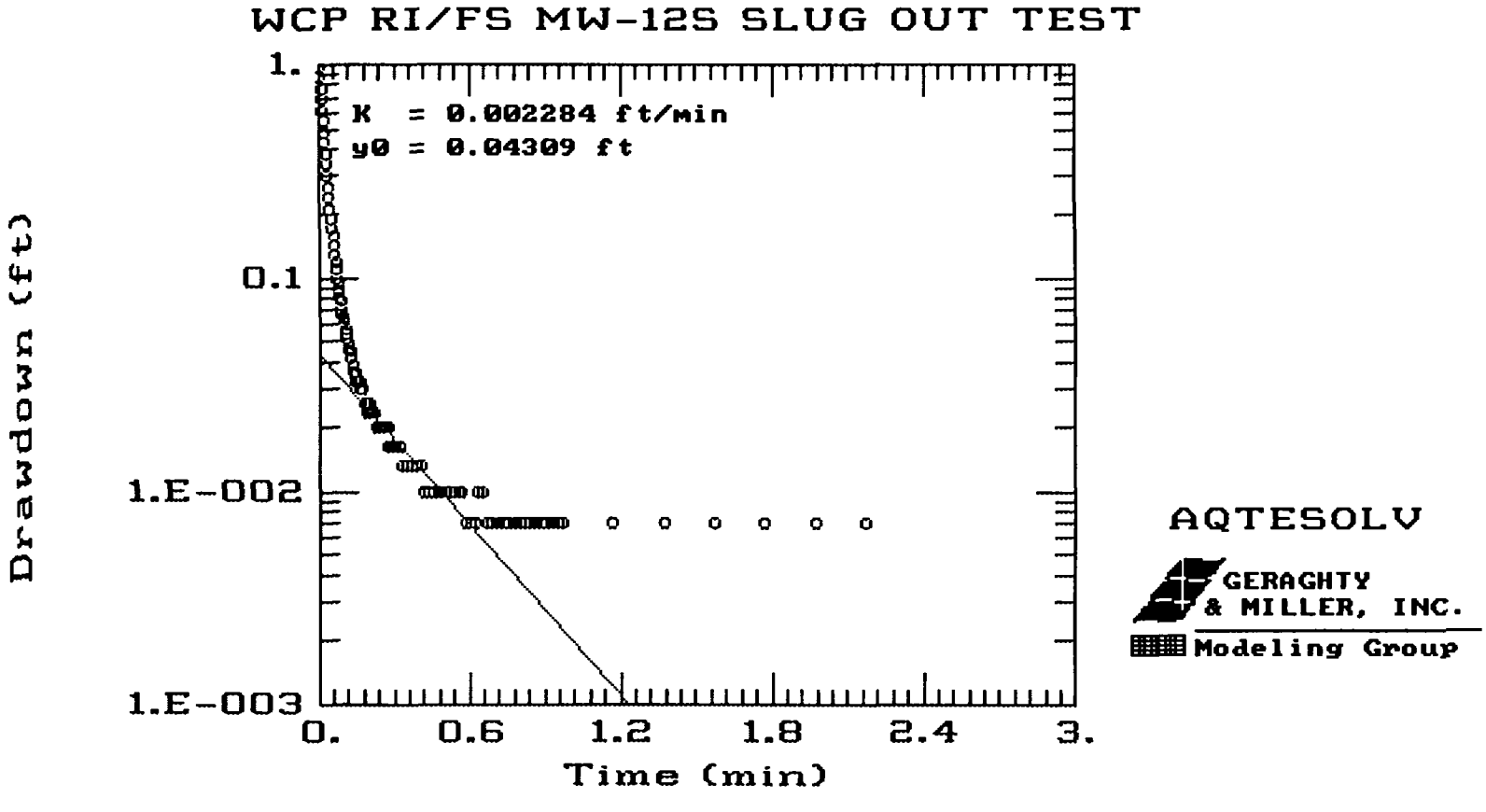

WCP RI/FS MW-10D SLUG IN TEST
K = 0.003303 ft/min
y0 = 1.987 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
1.4
2.8
4.2
5.6
7.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

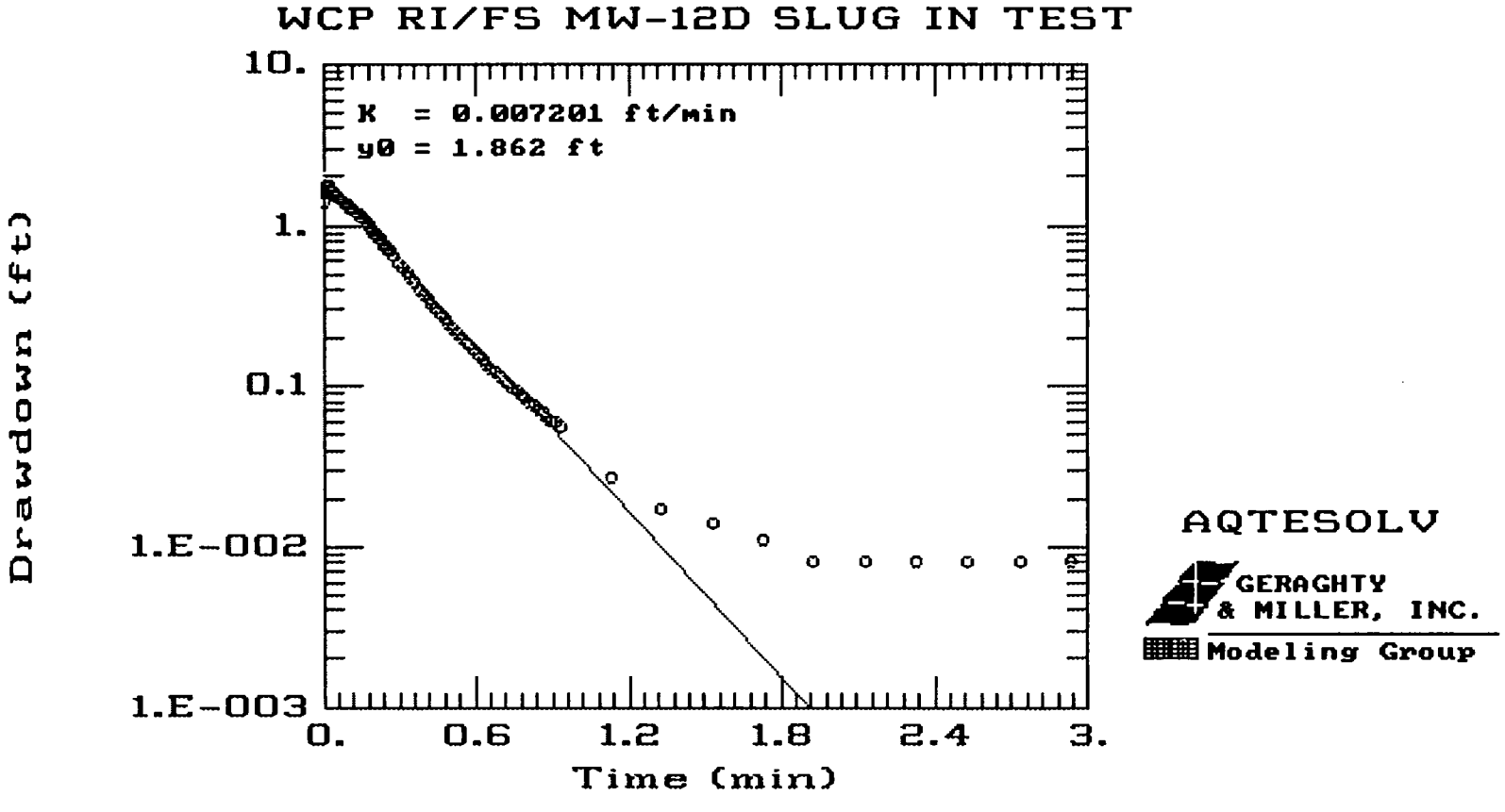

WCP RI/FS MW-10D SLUG OUT TEST
K = 0.00339 ft/min
y0 = 2.132 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
0.8
1.6
2.4
3.2
4.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

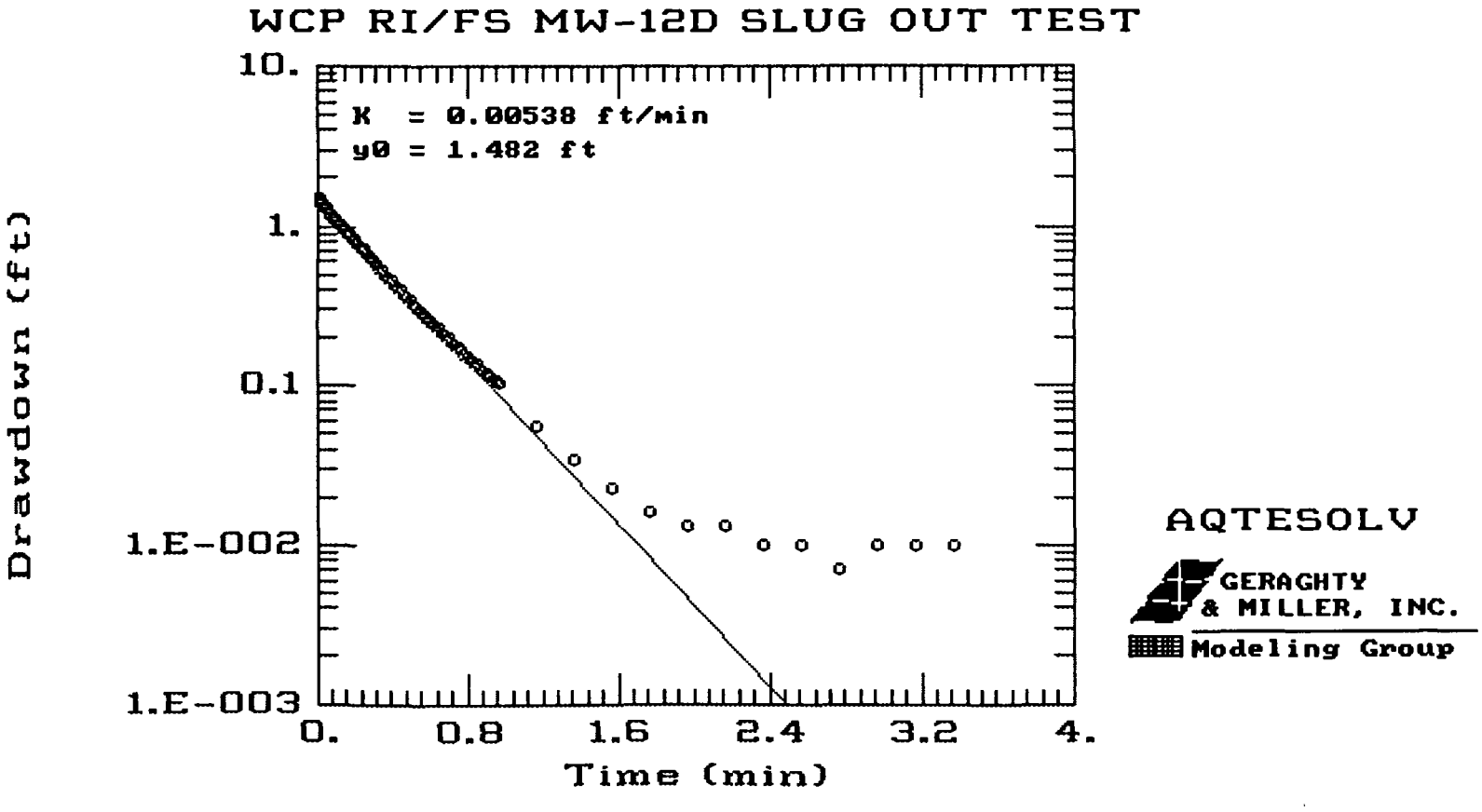

WCP RI/FS MW-11S SLUG OUT TEST
K = 0.002147 ft/min
y0 = 0.07883 ft
Drawdown (ft)
1.
0.1
1.E-002
0.
0.8
1.6
2.4
3.2
4.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

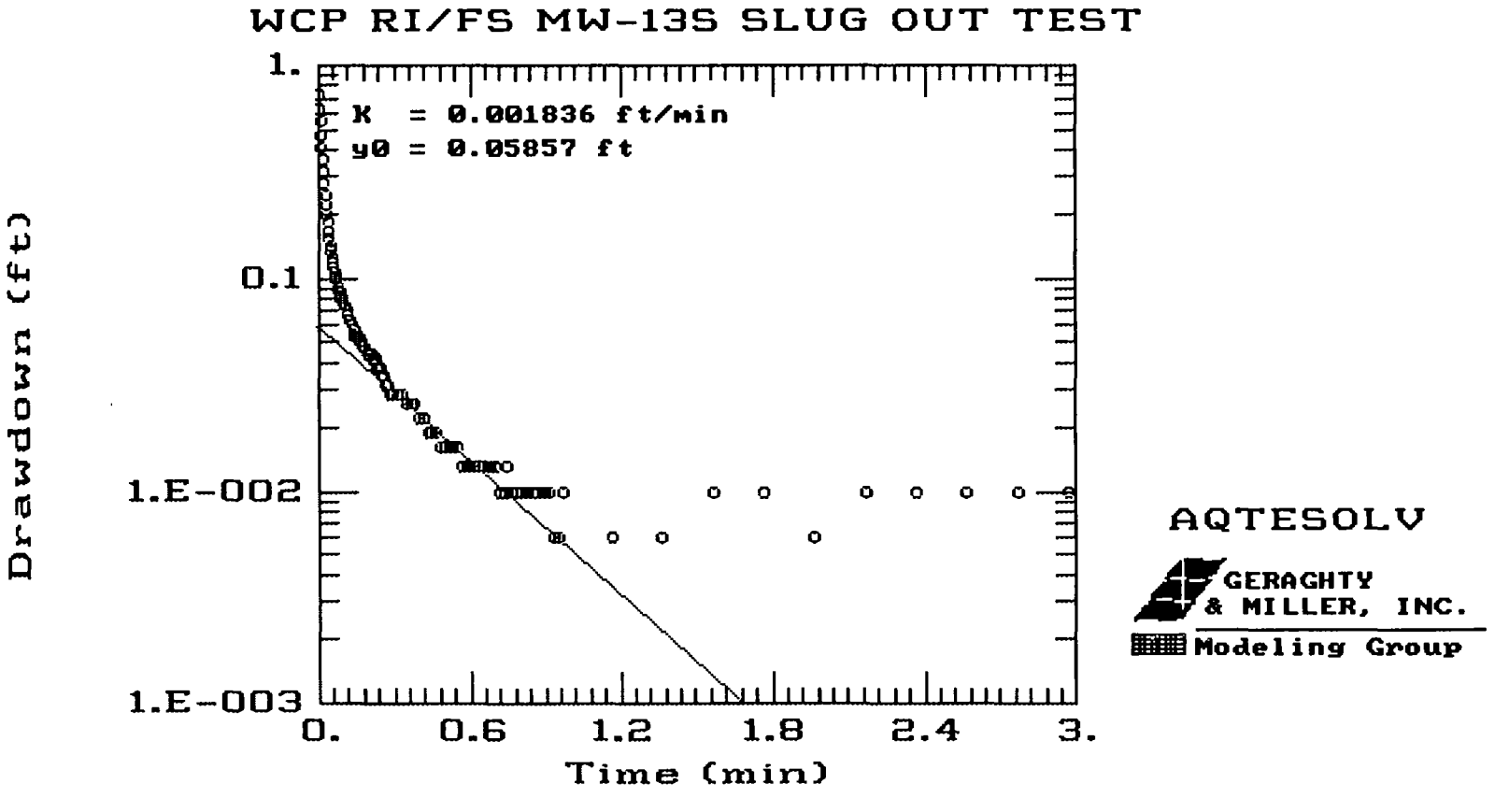

WCP RI/FS MW-11D SLUG IN TEST
K = 0.008316 ft/min
y0 = 1.679 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
1.
2.
3.
4.
5.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

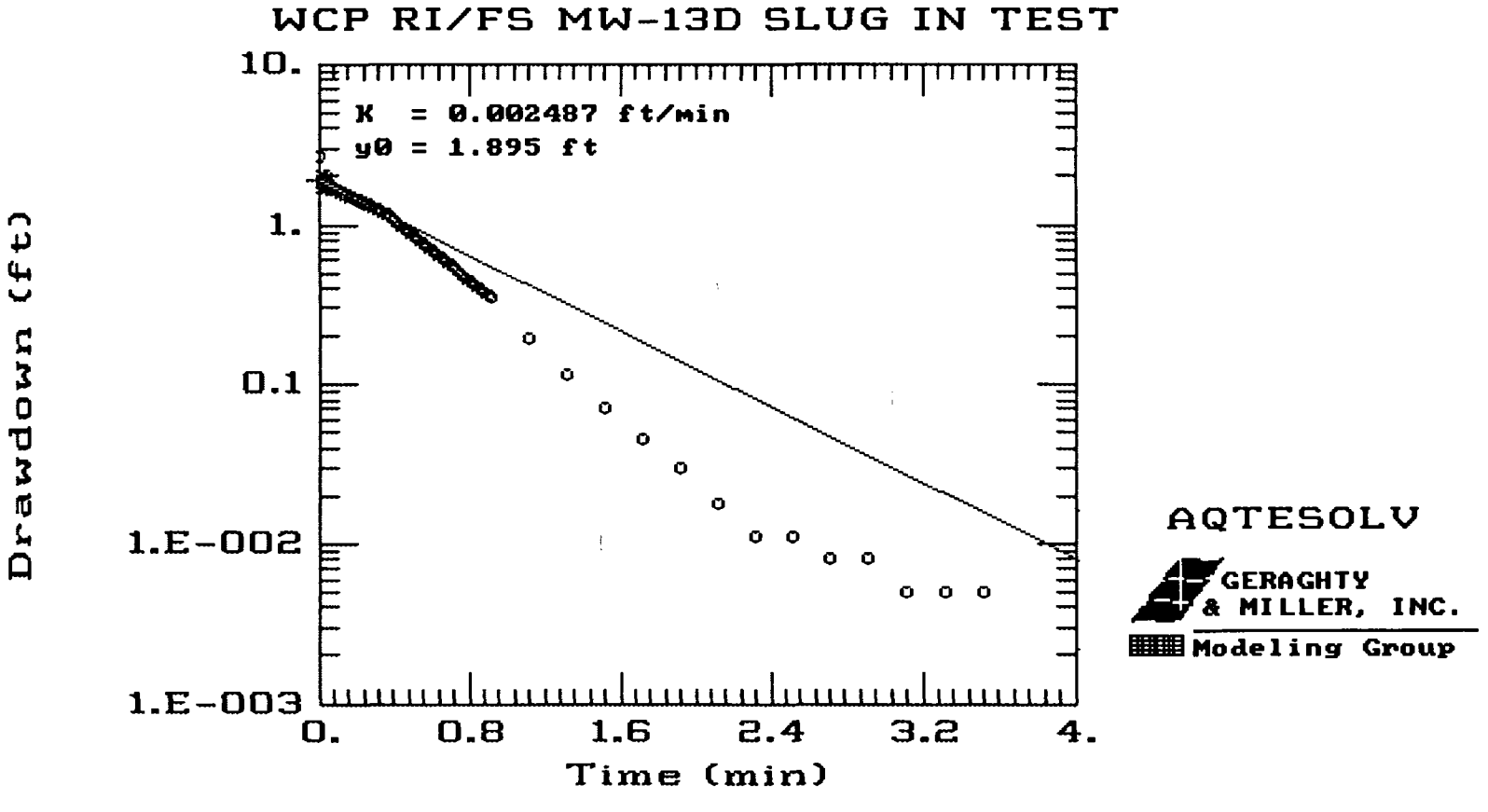

WCP RI/FS MW-11D SLUG OUT TEST
K = 0.008204 ft/min
y0 = 1.517 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
1.4
2.8
4.2
5.6
7.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

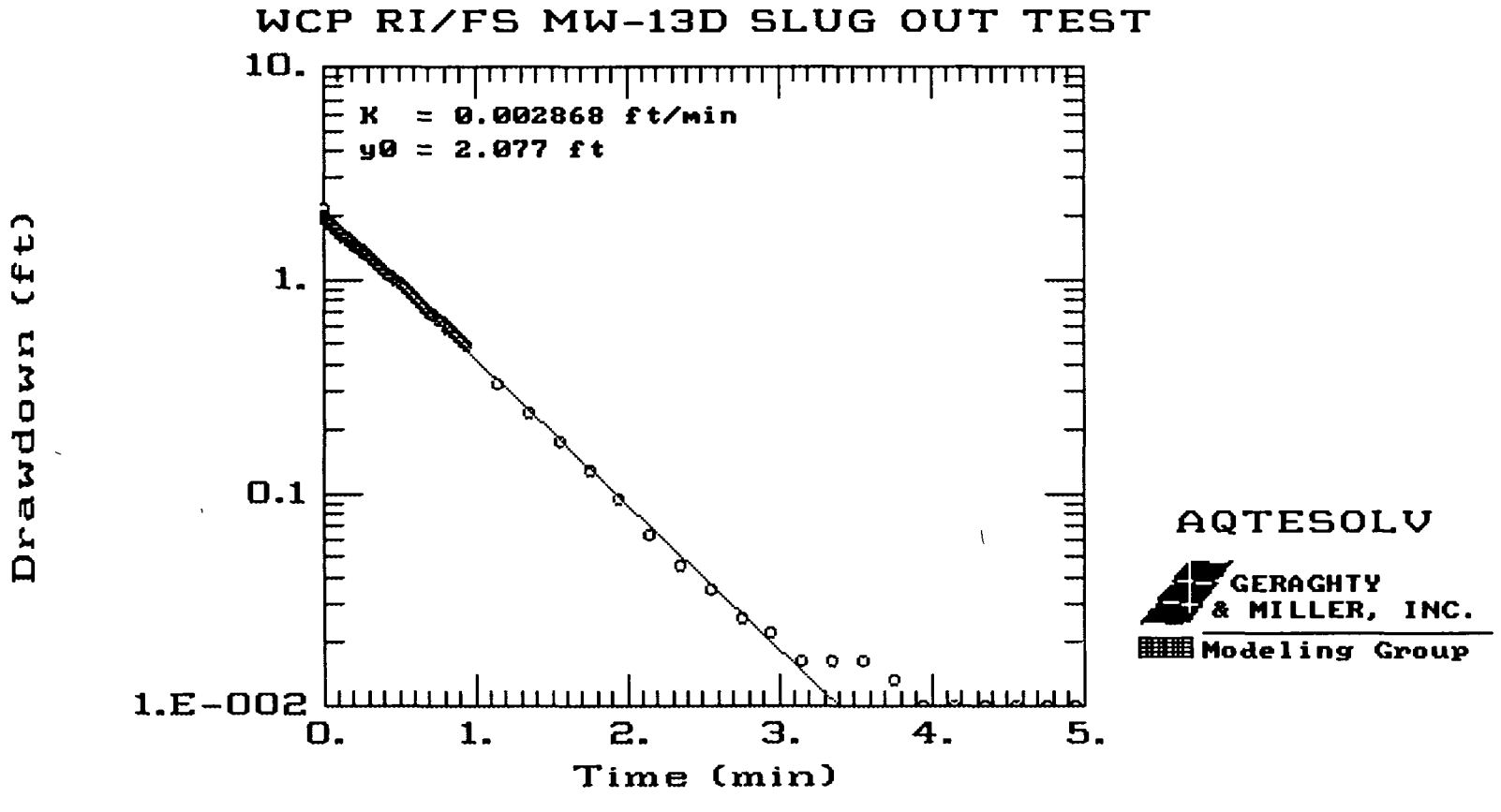

WCP RI/FS MW-12S SLUG OUT TEST
K = 0.002284 ft/min
y0 = 0.04309 ft
Drawdown (ft)
1.
0.1
1.E-002
1.E-003
0.
0.6
1.2
1.8
2.4
3.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS MW-12D SLUG IN TEST
K = 0.007201 ft/min
y0 = 1.862 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
0.6
1.2
1.8
2.4
3.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS MW-12D SLUG OUT TEST
K = 0.00538 ft/min
y0 = 1.482 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
0.8
1.6
2.4
3.2
4.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS MW-13S SLUG OUT TEST
K = 0.001836 ft/min
y0 = 0.05857 ft
Drawdown (ft)
1.
0.1
1.E-002
1.E-003
0.
0.6
1.2
1.8
2.4
3.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS MW-13D SLUG IN TEST
K = 0.002487 ft/min
y0 = 1.895 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
0.8
1.6
2.4
3.2
4.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group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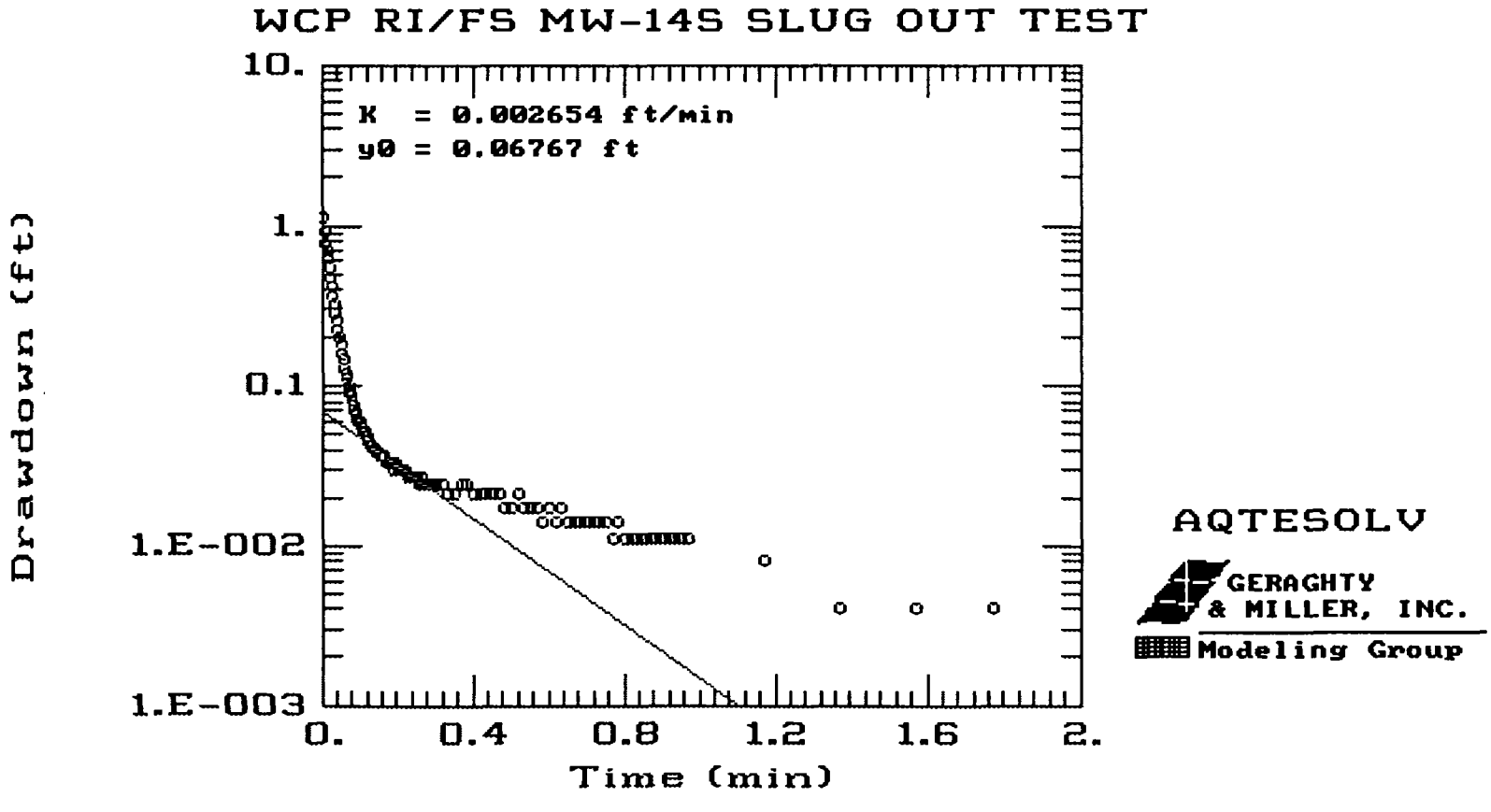
y0 = 2.077 ft
10.
1.
0.1
1.E-002
0.
1.
2.
3.
4.
5.
Drawdown (ft)
Time (min)
AQTESOLV
GERAGHTY
& MILLER, INC.
Modeling Group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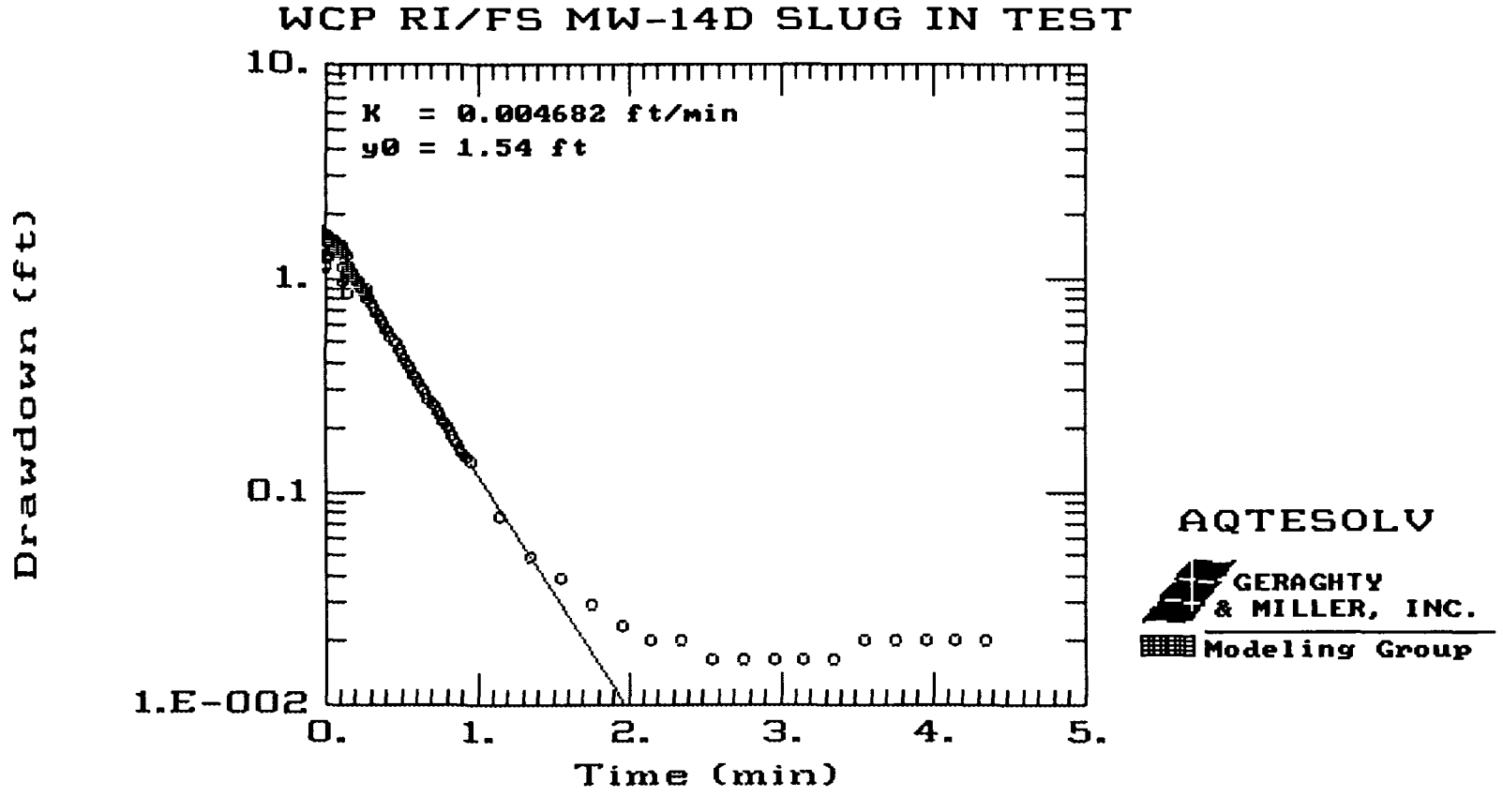
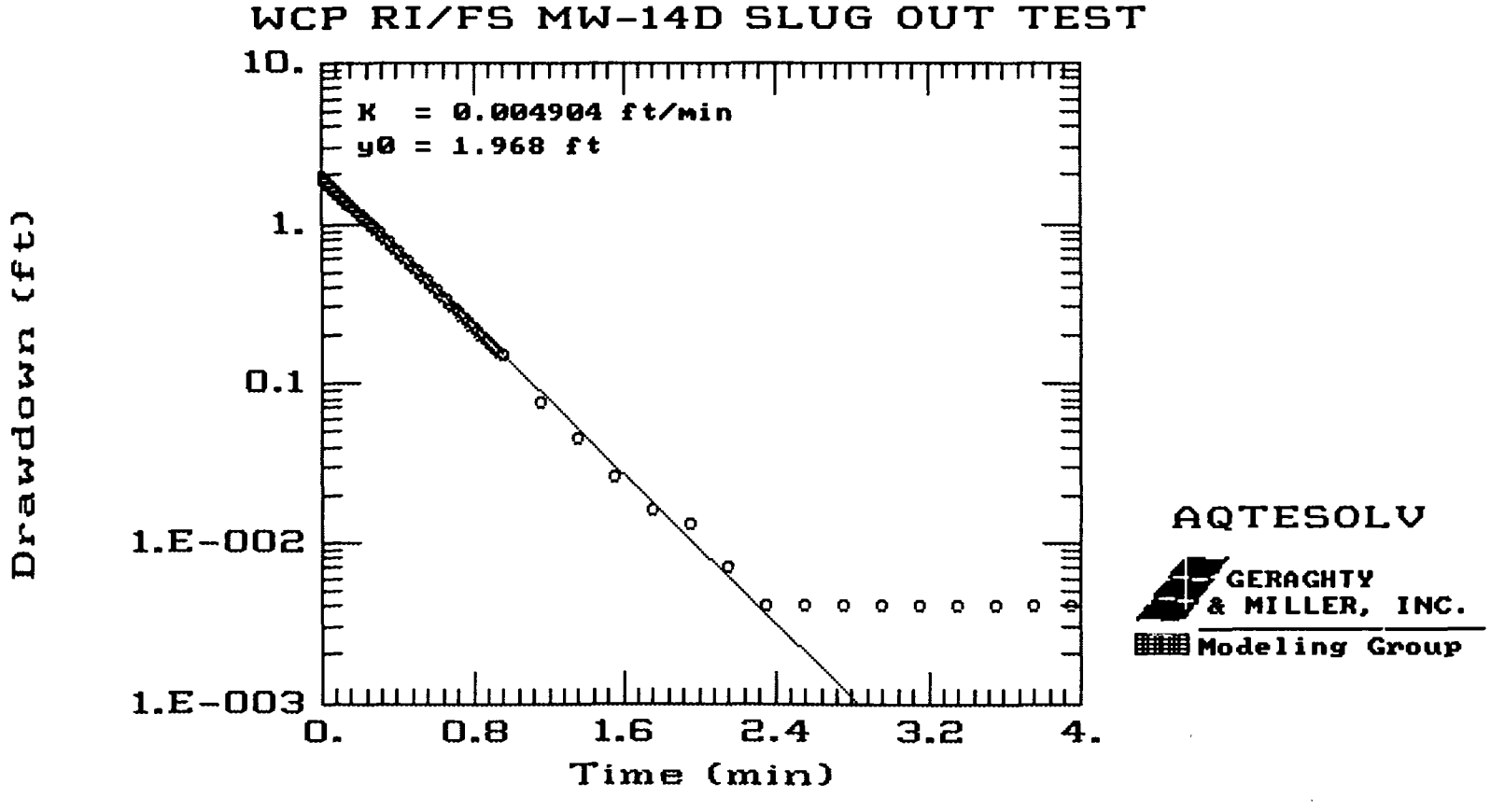
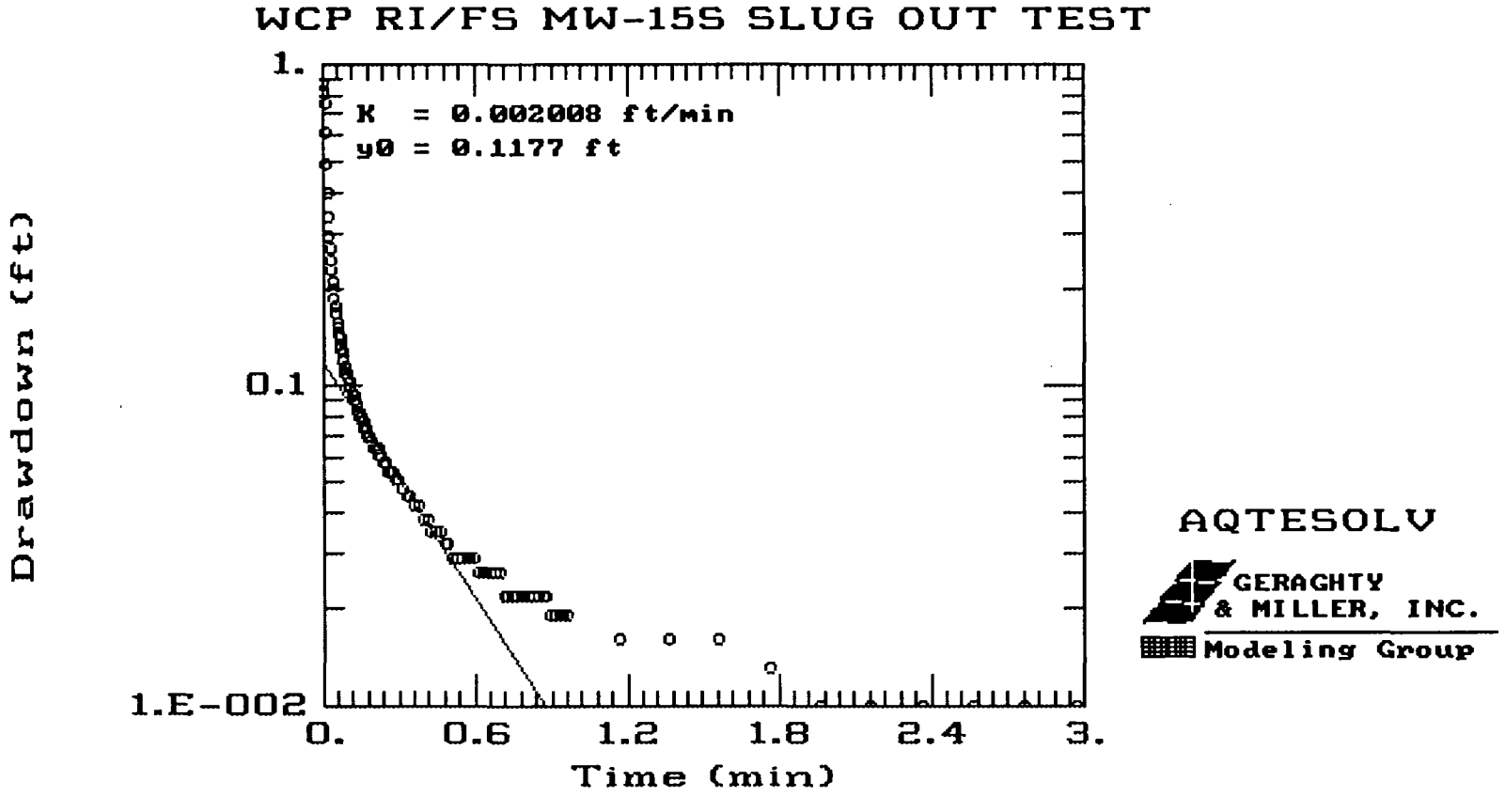
K = 0.002654 ft/min
y0 = 0.06767 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
0.4
0.8
1.2
1.6
2.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS MW-14D SLUG IN TEST
K = 0.004682 ft/min
y0 = 1.54 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
0.
1.
2.
3.
4.
5.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS MW-14D SLUG OUT TEST
K = 0.004904 ft/min
y0 = 1.968 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
0.8
1.6
2.4
3.2
4.
Time (min)
AQTESOLV
GERAGHTY
& MILLER, INC.
Modeling Group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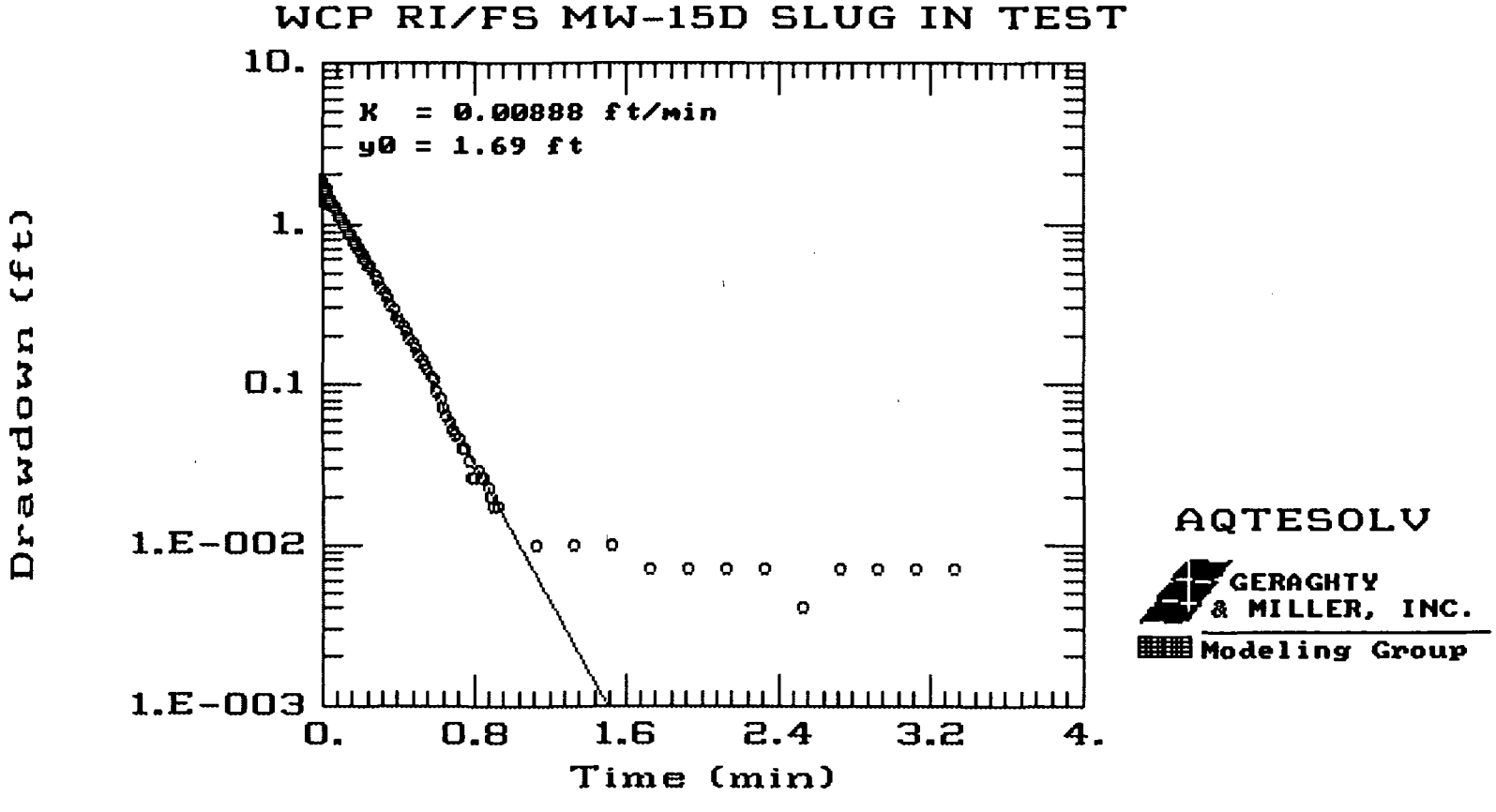
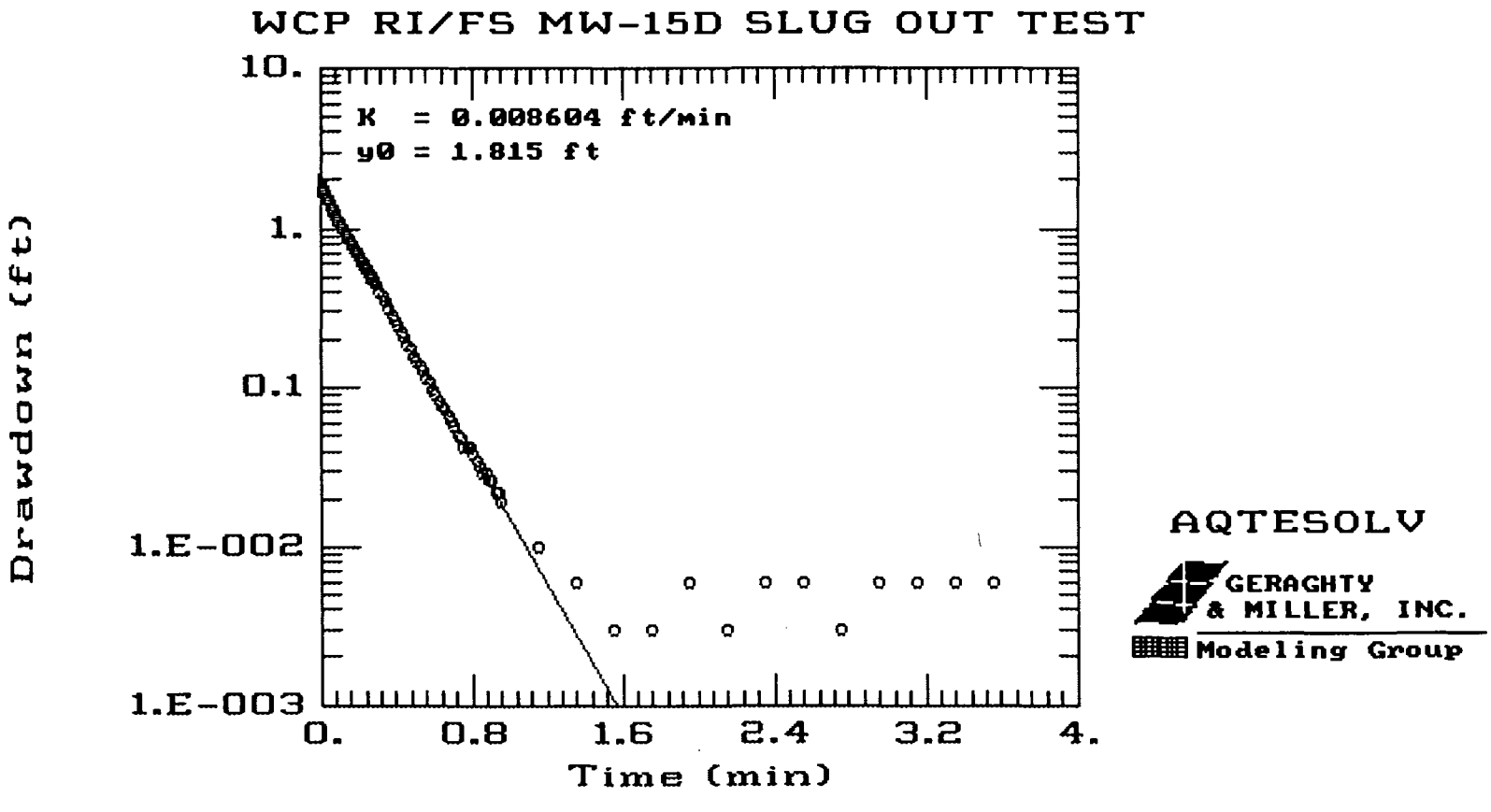
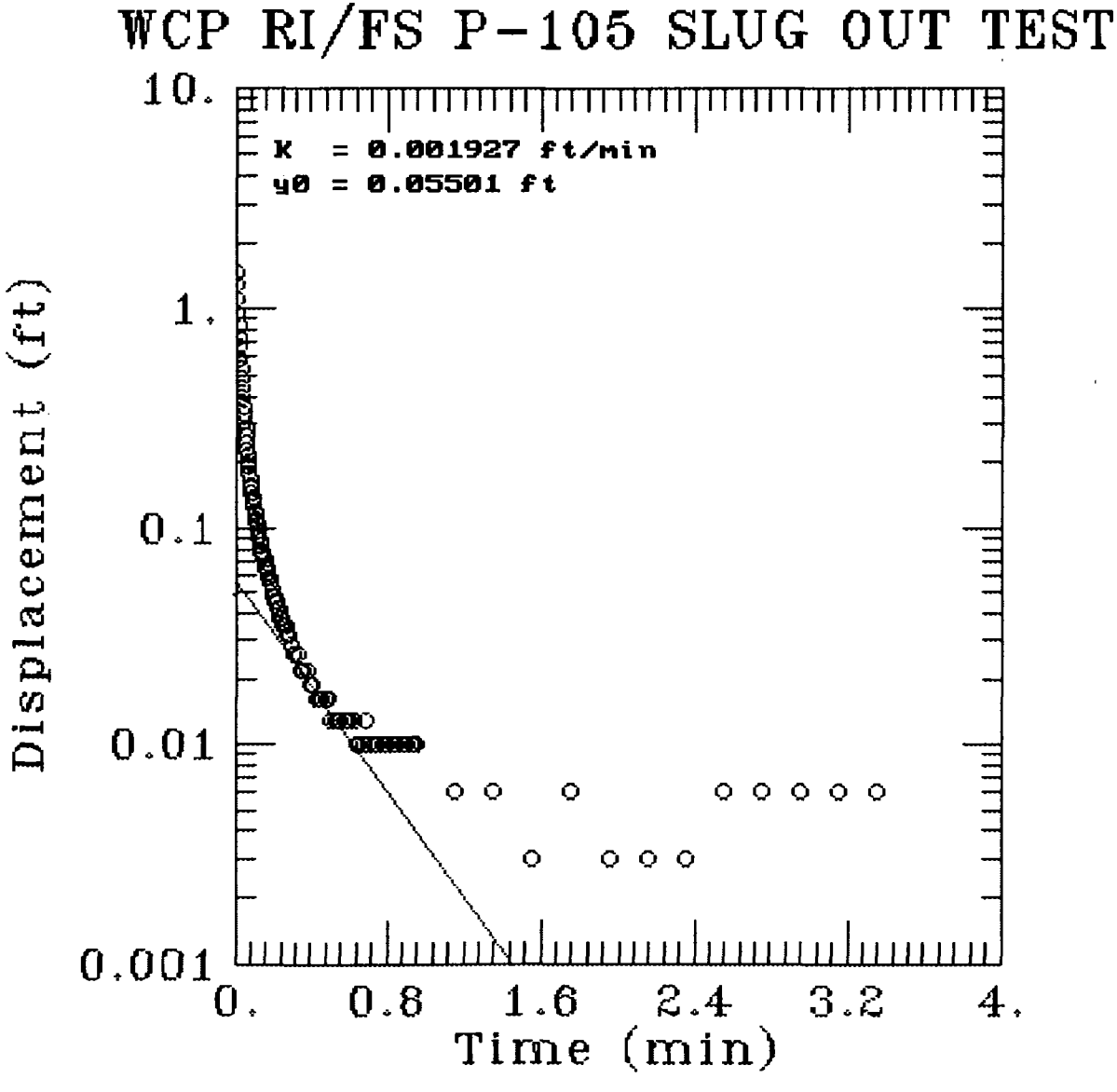
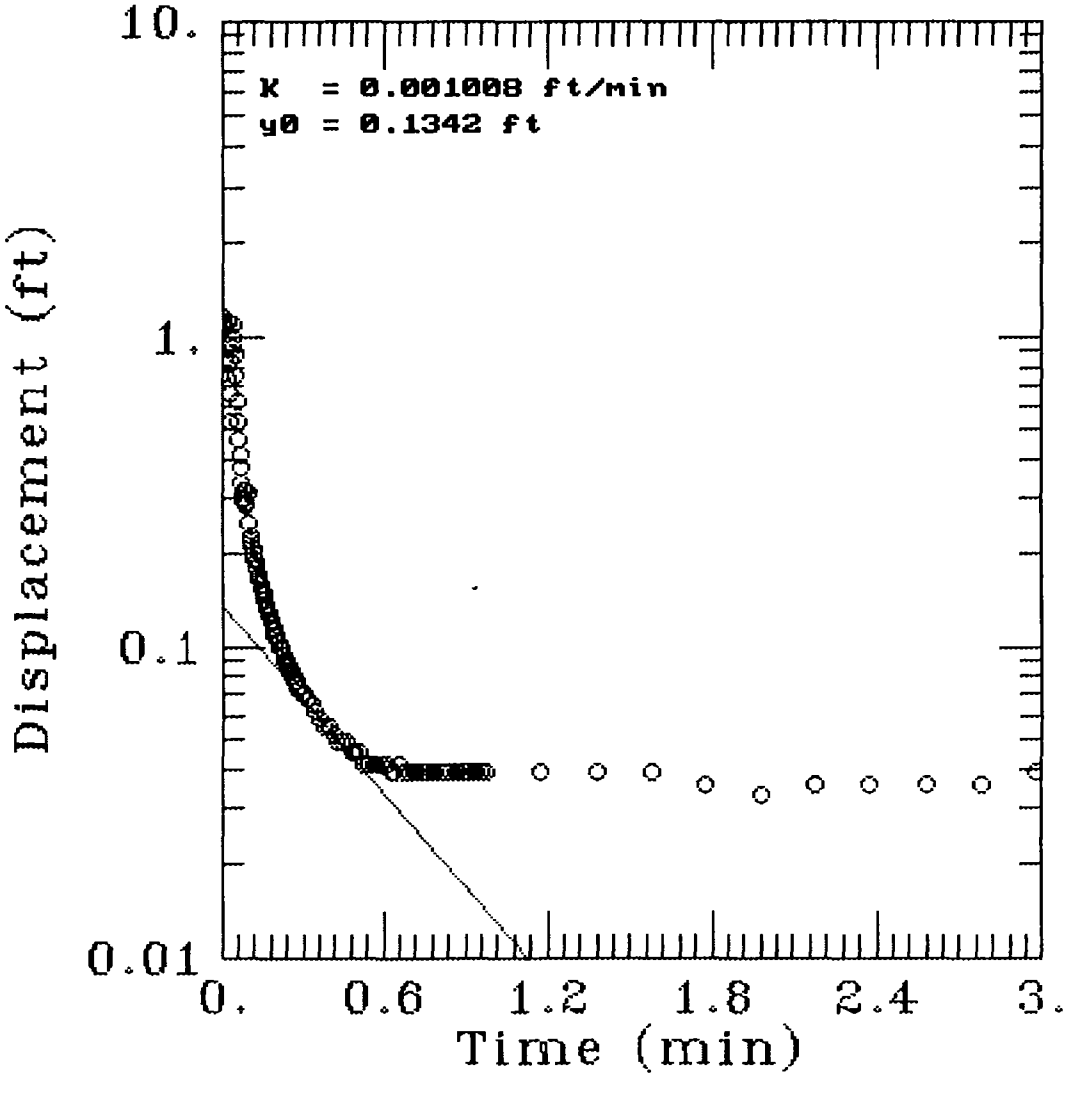
K = 0.002008 ft/min
y0 = 0.1177 ft
Drawdown (ft)
1.
0.1
1.E-002
0.
0.6
1.2
1.8
2.4
3.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS MW-15D SLUG IN TEST
K = 0.00888 ft/min
y0 = 1.69 ft
Drawdown (ft)
10.
1.
0.1
1.E-002
1.E-003
0.
0.8
1.6
2.4
3.2
4.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

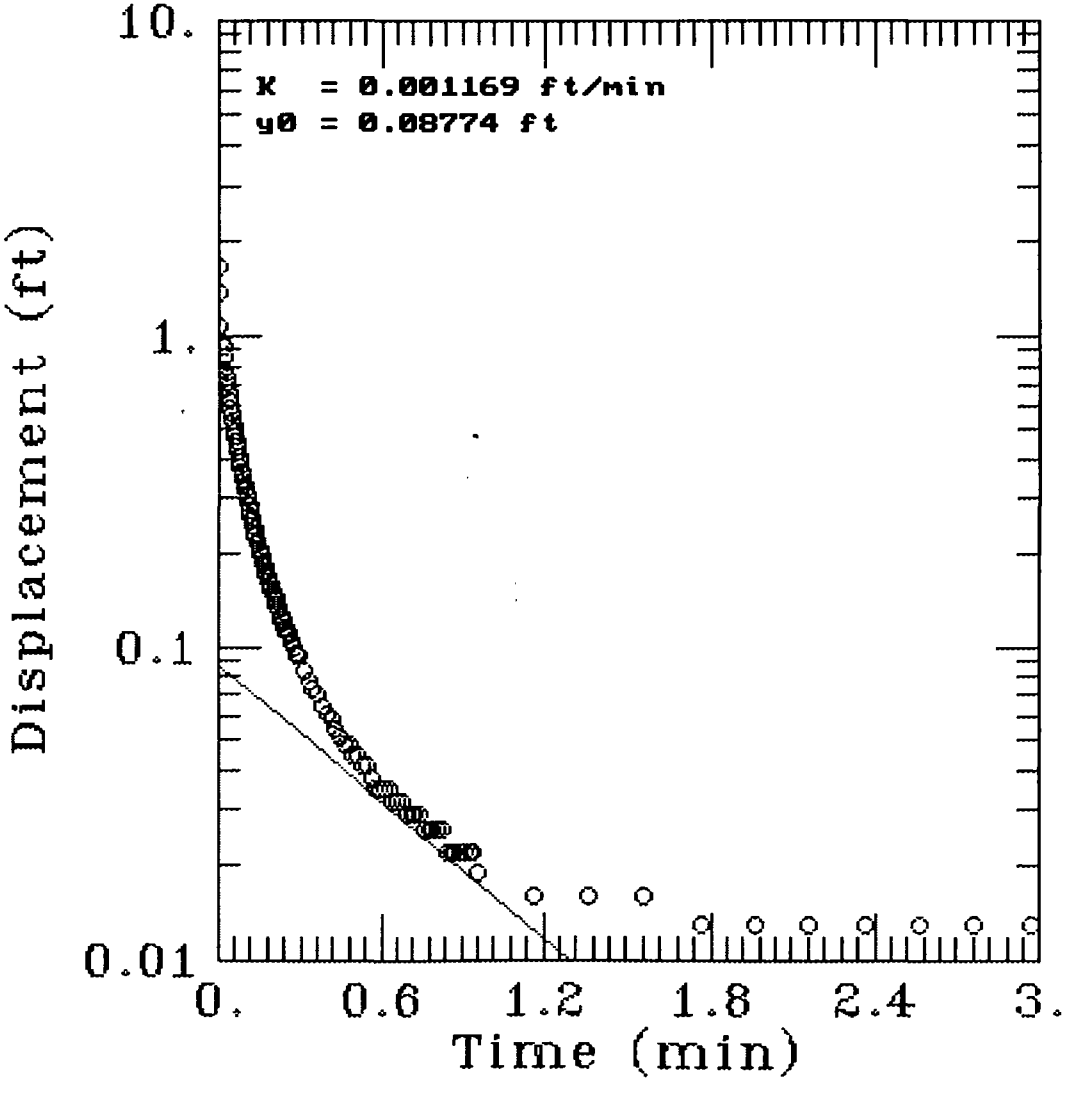

WCP RI/FS MW-15D SLUG OUT TEST
K = 0.008604 ft/min
y0 = 1.815 ft
10.
1.
0.1
1.E-002
1.E-003
Drawdown (ft)
0.
0.8
1.6
2.4
3.2
4.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


WCP RI/FS P-105 SLUG OUT TEST
K = 0.001927 ft/min
y0 = 0.05501 ft
Displacement (ft)
10.
1.
0.1
0.01
0.001
0.
0.8
1.6
2.4
3.2
4.
Time (min)

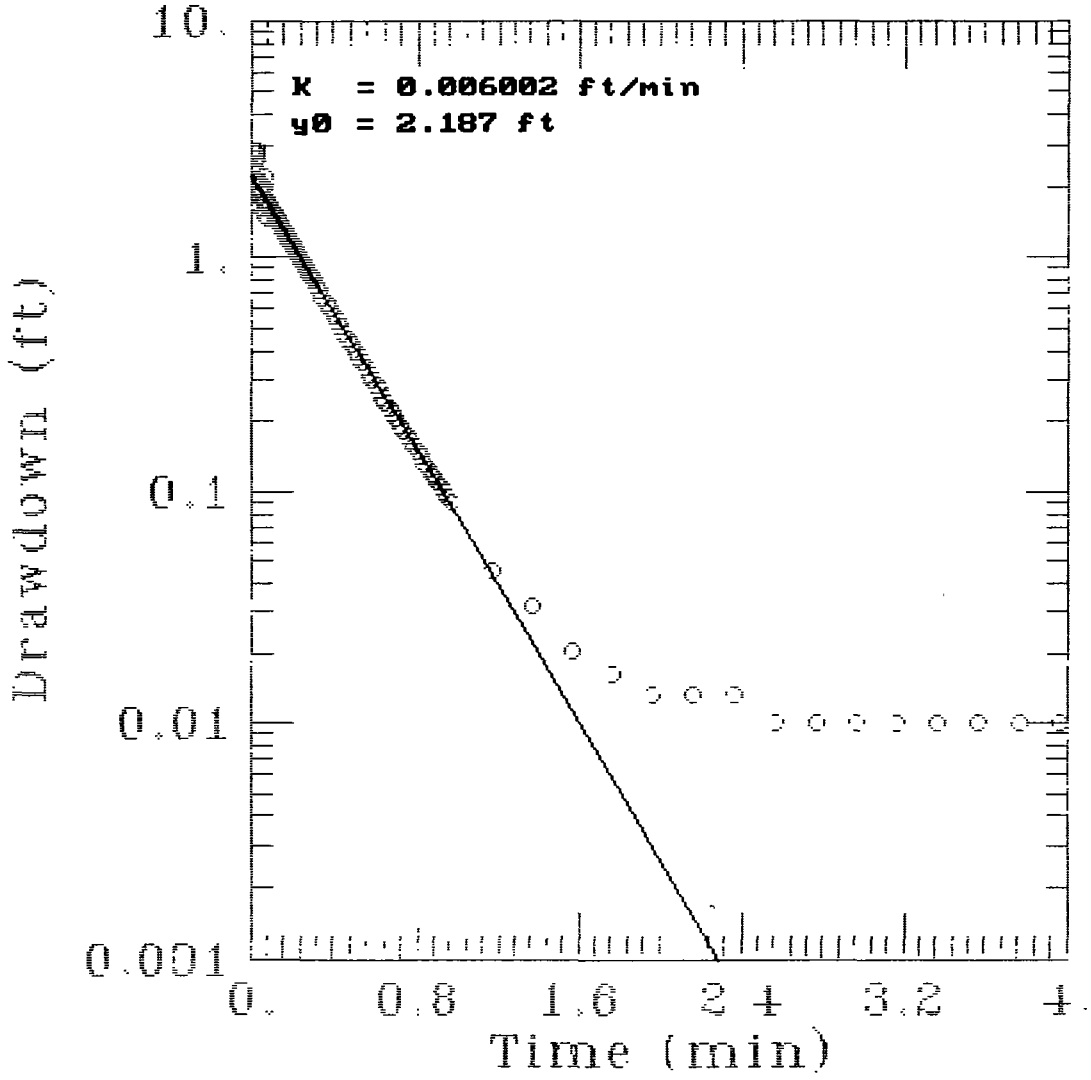
WCP RI/FS P-106 SLUG OUT TEST



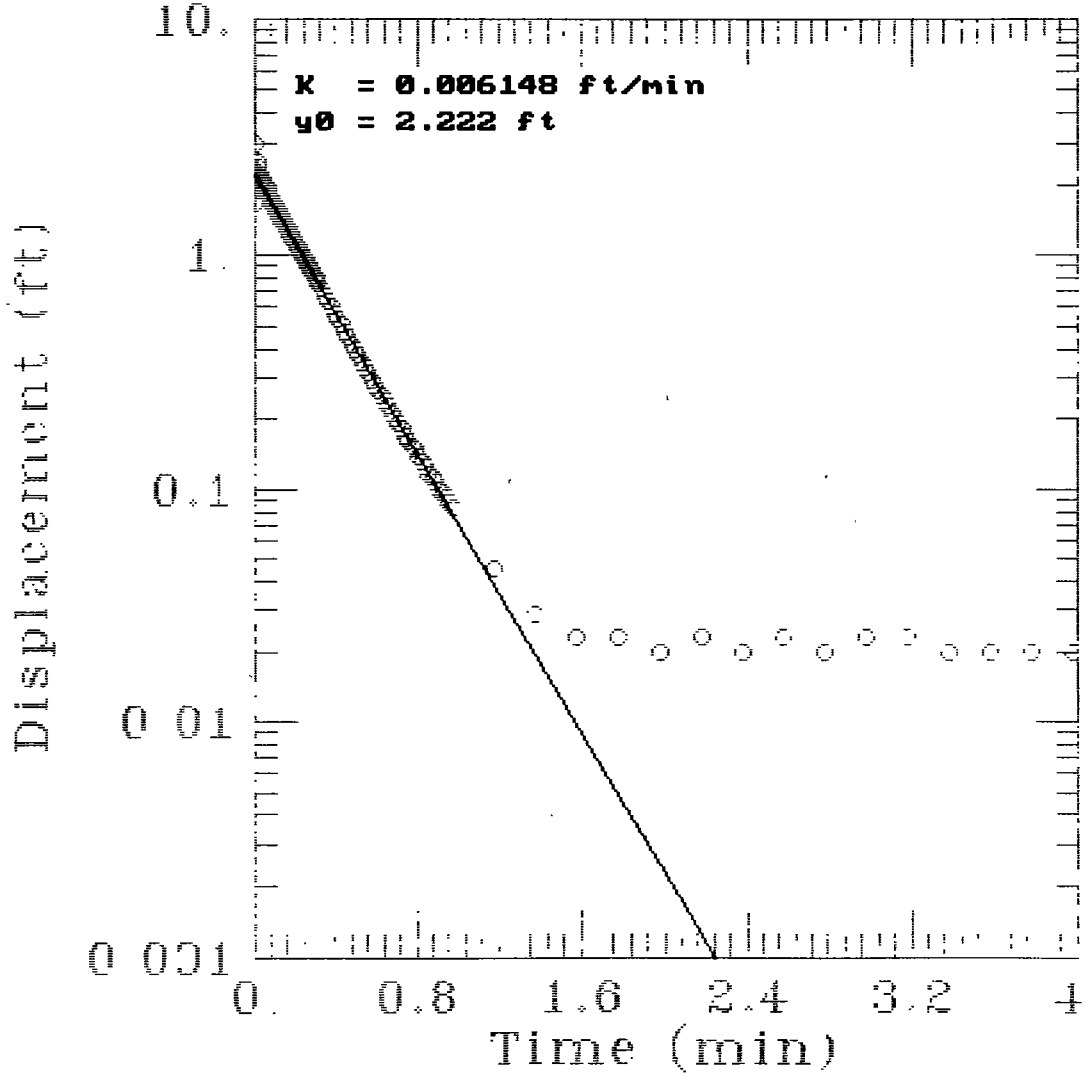
WCP RI/FS P-107 SLUG OUT TEST

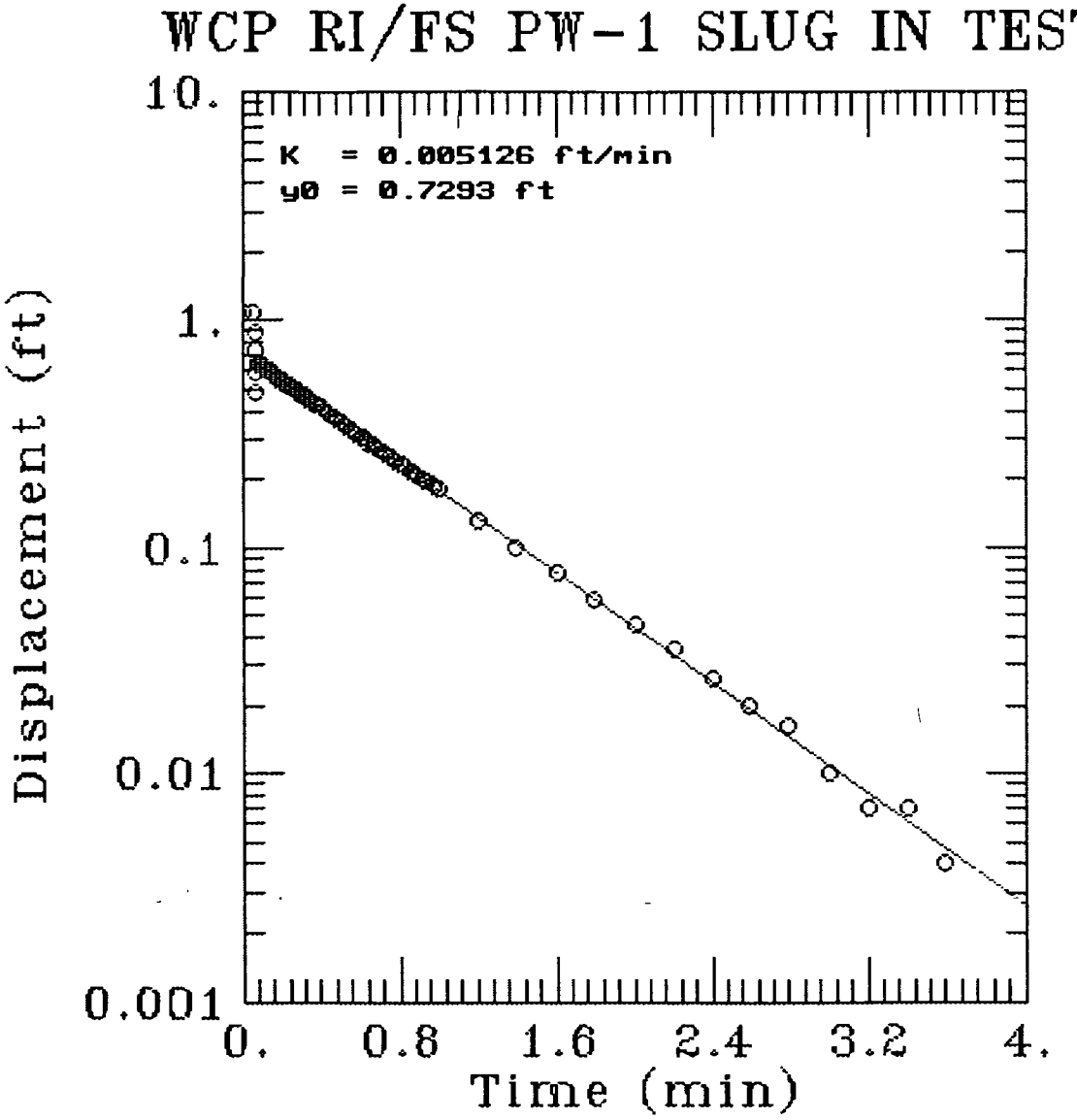


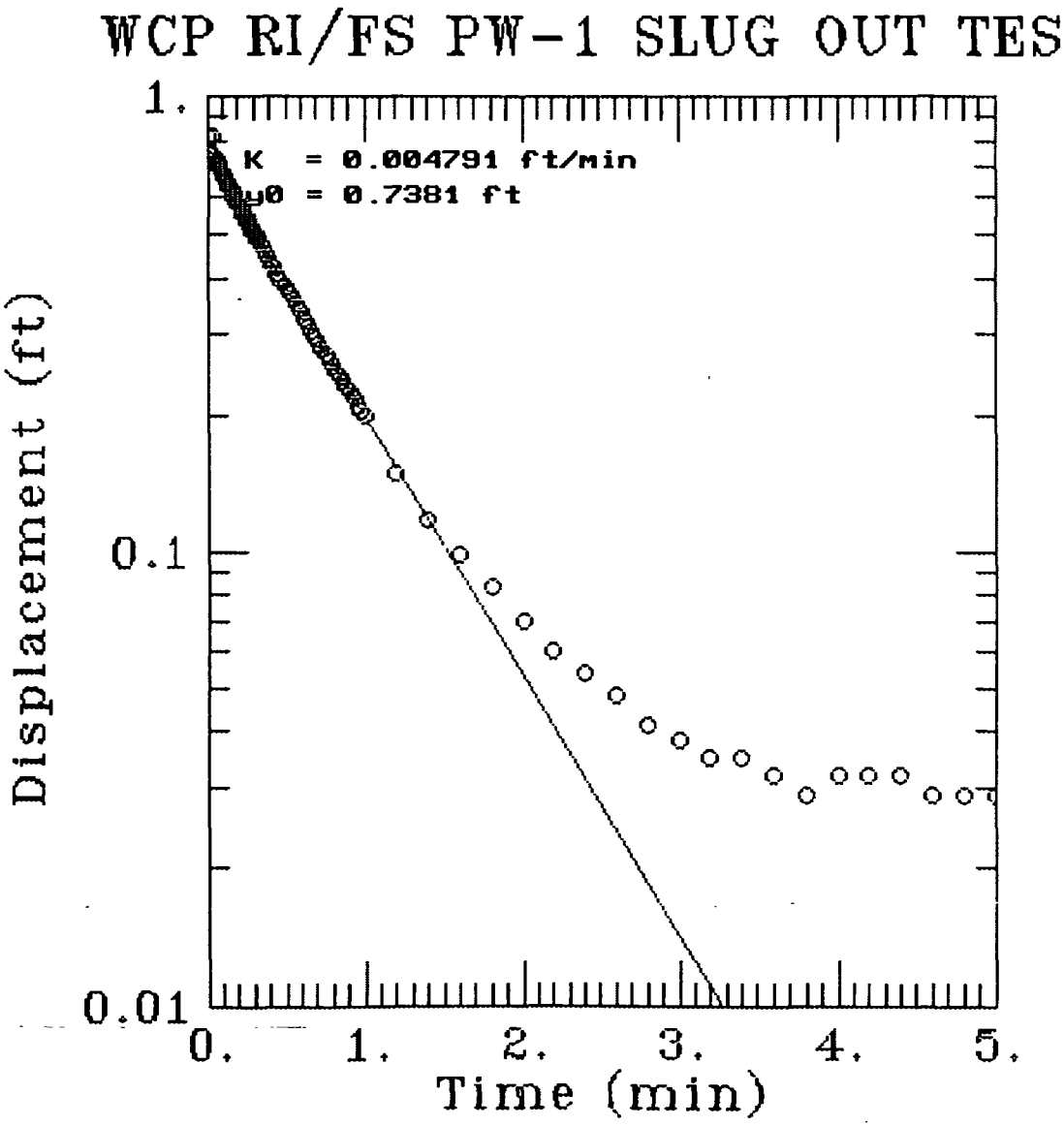
WCP RI/FS P-108 SLUG IN TEST



WCP RI/FS P-108 SLUG OUT TEST




WCP RI/FS PW-1 SLUG IN TEST
K = 0.005126 ft/min
y0 = 0.7293 ft
Displacement (ft)
10.
1.
0.1
0.01
0.001
0.
0.8
1.6
2.4
3.2
4.
Time (min)


WCP RI/FS PW-1 SLUG OUT TEST
K = 0.004791 ft/min
y0 = 0.7381 ft
Displacement (ft)
1.
0.1
0.01
0.
1.
2.
3.
4.
5.
Time (min)

Appendix 4-J

Step Drawdown Test and Pumping Test Data and Evaluation

Appendix 4J-1
Field Notes

Appendix 4J-2
Input Data Files

Step Drawdown Test and Pumping Test Data and Evaluation

APPENDIX 4-J

STEP-DRAWDOWN TEST AND PUMPING TEST
DATA AND EVALUATION

INTRODUCTION

This appendix describes aquifer testing performed at the Waukegan Coke Plant Site in November 1993. The aquifer testing consisted of a step-drawdown test and a constant-rate pumping test of Well PW-1, using Piezometers P-106, P-103, and P-108 as primary observation wells. The field methods and data analysis are described below.

Field Methods

A submersible pump was installed in Well PW-1 with the pump intake located approximately 28.9 feet below the top of the casing (BTOC). The pump was placed as deep as possible without placing the motor in the well sump. A drop-pipe was installed to allow water level measurement in the pumping well. The base of the drop pipe was placed just above the top of the pump, approximately 27.2 feet BTOC.

Pumping rates were measured with a totalizing flow meter and controlled with a gate-valve placed downstream of the flow meter. Hoses were run from the wellhead to four different Baker tanks to contain the water produced from the well during the aquifer testing.

Water levels in the pumped well and three observation wells were measured both automatically and manually. Automatic measurements were made using PXD-260 pressure transducers connected to Hermit SE-1000C data loggers manufactured by In-Situ Inc. Manual measurements were made using water level indicators manufactured by Solinst, Inc. Pretest monitoring was performed from October 30 to the time of the aquifer testing. Water levels were measured automatically in Waukegan Harbor, Slip No. 4, MW-1S, MW-1D, MW-9S, MW-9D, MW-10S, MW-10D, P-103, P-106, P-107, and P-108. Barometric pressure was also measured automatically. Manual water level measurements were taken daily in all of the

site wells during the period from October 28 to November 5. The purpose of the pretest monitoring was to determine the relationship between water levels in the wells and harbor/lake water levels and barometric pressure in the event that the pumping test was performed during a period of changing harbor/lake level or barometric pressure. If this had been the case, the effect of the external influences would have been filtered out of the pumping test data using the methods outlined by Walton (1987, p. 32-33). The harbor/lake level and barometric pressure were relatively steady during the aquifer testing period so data adjustments were not necessary. The results of the pretest monitoring are summarized in Section 4.2.2.

Step-Drawdown Test

The step-drawdown test was started at 13:01 on November 3, 1993. Figure 4-J-1 is a hydrograph from Well PW-1 for the duration of the step-drawdown test. The initial target pumping rate was 20 gpm. The pretest static water level was 7.04 feet below the top of the casing (BTOC). After pumping at approximately 40 gpm for the first 13 minutes of the test, the flow rate was adjusted downward to 20 gpm. After approximately two hours of pumping at 20 gpm, the pumping water level in Well PW-1 was 17.18 feet BTOC. At this time, the rate of water level decline had decreased to less than 0.1 foot/ 15 minutes.

The next target pumping rate was 30 gpm; however, when the pumping rate was increased, the pumping water level rapidly drew down to the pump intake (28.9 feet BTOC). The pumping rate was decreased to 25 gpm and the water level recovered to approximately 20.70 feet BTOC, then continued to draw down approximately 0.2 foot over the next 30 minutes. The pumping rate was increased to 30 gpm to verify that the water level drew down to the pump intake; then the step test was terminated.

Based on the results of the step-drawdown test (i.e., the relatively flat drawdown plot for the 25-gpm step, as shown on Figure 4-J-1), a target pumping rate of 25 gpm was chosen to maximize the stress on the aquifer during the constant-rate pumping test (in accordance with the July 1993 TM objective of maximizing the pumping rate).

Constant Rate-Pumping Test

The constant-rate pumping test was not begun until the water levels in the aquifer in the vicinity of Well PW-1 had recovered to within 0.03 foot of the levels measured prior to the step-drawdown test. The U.S. EPA's contractor (PRC) confirmed that it was appropriate to start the test on the afternoon of Thursday, November 4.

Pumping began at 16:01. The pumping rate was maintained within 5 percent of the target rate of 25 gpm throughout the pumping phase (Table 4-J-1). Water levels were measured manually and automatically as described above. The field notes are presented in Appendix 4-J-1. Test analysis input files are presented in Appendix 4-J-2.

Based on the step-drawdown test results and the general characteristics of unconfined aquifers, it was anticipated that the rate of decline of the pumping water level in Well PW-1 would decrease after a short period due to the delayed gravity response. However, Figure 4-J-2 (a hydrograph from Well PW-1 during the pumping test) shows that the pumping water level drew down steadily during the pumping phase to reach the pump intake nine hours into the test. At that point, the pumping test was terminated since it was determined that the test objective (i.e., estimating the hydraulic conductivity of the sand unit) had been met.

The planned pumping test (July 1993 TM) involved an anticipated flow rate of between 15 and 45 gpm to be maintained over a period of 8 to 24 hours; the test, as implemented, involved a flow rate of 25 gpm maintained over a period of 9 hours. The constant rate pumping test, therefore, achieved the data collection objective and was performed in a manner consistent with procedures outlined in the July 1993 TM.

Water level recovery after the constant-rate pumping test was monitored for approximately 32 hours. At the end of the recovery monitoring period, water levels in the aquifer were approximately 0.14 foot below pretest static water levels.

Data Analysis

Time-drawdown data from the aquifer tests were downloaded from the data loggers to personal computer for analysis. Test analysis input files are presented in Appendix 4-J-2, and input data are summarized in Table 4-J-2. The AQTESOLV computer program (Duffield and Rumbaugh, 1989) and graphical techniques discussed by Cooper and Jacob (1946) and Neuman (1975) were used for analysis of the aquifer testing data. The time-drawdown data from the constant-rate pumping test from Piezometer P-106 was analyzed using the Theis method (Theis, 1935) and the data from Piezometers P-103 and P-108 were analyzed using the Neuman method (Neuman, 1975). The water level recovery data after the step-drawdown test and constant-rate pumping test were analyzed using the Theis recovery method (Theis, 1935). Distance drawdown data from the later portion of the pumping phase were evaluated for analysis using the Cooper-Jacob method (Cooper and Jacob, 1946). Figures 4-J-3 through 4-J-13 show the results of the analyses. The analytical methods are discussed below, and the results are summarized in Table 4-J-3.

Theis Method

The assumptions and conditions underlying the Theis method for analyzing pumping test data are:

- The aquifer is confined;
- The aquifer has a seemingly infinite areal extent;
- The aquifer is homogeneous, isotropic, and of uniform thickness over the area influenced by the test;
- The pumping well penetrates the entire thickness of the aquifer;
- Prior to pumping, the piezometric surface is horizontal or nearly horizontal over the area to be influenced by the test;

- The aquifer is pumped at a constant discharge rate (within +/- 10 percent; Stallman, 1971, p. 11); and

- Flow to the well is in unsteady state.

The Theis method is applicable to both the early and late-time data from pumping tests of unconfined aquifers (Kruseman and deRidder, 1990, p. 101). Based on the response of water levels in Piezometer P-103, P-106, and P-108 to pumping, no hydrologic boundaries were encountered in the area affected by the pumping test. The cone of depression did not reach well nests MW-1S/-1D, MW-9S/-9D, or MW-10S/-10D. For these reasons, the assumption of infinite areal extent is not limiting in this case. Based on the consistency of the analytical results, the aquifer is homogeneous in the area affected by the pumping test. The aquifer is anisotropic; however, the pumping well is fully penetrating, so flow to the well was primarily horizontal. The aquifer is essentially uniform in thickness over the area affected by the test. The piezometric surface was nearly horizontal prior to the beginning of the aquifer test. The maximum variation in pumping rate during the test was 5 percent (Table 4-J-1). Flow to the pumping well was in unsteady state throughout the pumping test.

Jacob's correction for changes in saturated thickness of an unconfined aquifer is applicable to late time-drawdown data from the pumping phase (Neuman, 1975, p. 334). The correction is significant if drawdown in the aquifer exceeds 10 percent of the original saturated thickness. The late-time data from Piezometer P-106 were corrected and the Theis analysis applied (Figure 4-J-6). Piezometer P-106 is believed to be located so close to the extraction well that the net volume of aquifer material dewatered in the vicinity of Piezometer P-106 and the pumping well was not large enough to cause a measurable deviation from the Theis curve. Consequently, the storage value obtained from the analysis is representative of the storage coefficient rather than the specific yield.

Neuman Method

The assumptions underlying the Neuman method are the same as those for the Theis method except that the aquifer is assumed to be unconfined rather than

confined. Compliance of the pumping test with these assumptions is discussed in the section regarding the Theis method.

The response of water levels in an unconfined aquifer to pumping differ from those in a confined aquifer. When drawdown is plotted versus time on logarithmic scales, the data typically form an "S"-shaped curve. Neuman (1975) described the physical phenomenon that causes this behavior as delayed gravity response. The early, steep part of the data represents removal of water from storage by expansion of the water and compression of the aquifer material in response to pumping (elastic response). The intermediate, flat segment represents removal of water from storage by gravity draining of the aquifer. The effect of the gravity draining is to temporarily reduce the rate of water level decline in the aquifer in the vicinity of the pumping well. After the delayed gravity response has dissipated, the late time data form a steeper segment of continued drawdown (Neuman, 1975, p. 329).

The early data on the time-drawdown plots for Piezometers P-106 and P-103 fall below the type curves (Figures 4-J-6 and 4-J-9). This is believed to be a reflection of the casing storage effect. During this time, the stress to the aquifer was actually less than the pumping rate of 25 gpm, because a portion of the water being pumped was derived from within the well casing (Driscoll, 1986, p. 232). Based on an empirical formula (Walton, 1987, p. 3), the casing storage effect lasted approximately 14 minutes. As discussed above, the delayed gravity response is not believed to have been significant at Piezometer P-106 due to its proximity to the extraction well. Based on the inflection in the time-drawdown curve and the calculated storage value based on the late time data, the delayed gravity response is believed to have been significant at Piezometer P-103.

The casing storage effect did not cause measurable deviation from the type curve in the time-drawdown analysis for Piezometer P-108 (Figure 4-J-12). The analysis of these data yielded estimates all of the pertinent aquifer parameters. The results from the analysis of the data from P-108 were used to generate the type curve plotted on Figure 4-J-6, the Neuman method analysis of the data from P-103.

The calculated specific yield for the aquifer is 3.6 percent. This value is within the range of typical values for unconfined aquifers of 1 to 30 percent (Kruseman and deRidder, 1990, p. 23; Freeze and Cherry, 1979, p. 61). However, the calculated special yield is at the low end of the typical range. The low specific yield is believed to reflect the fine-grained nature of the aquifer material. Although the porosity of the material is much higher than the computed specific yield, it is believed that capillary action prevented complete draining of the aquifer material (Bureau of Reclamation, 1977, p. 33; McWhorter and Sunada, 1977, p. 20-22; Bear and Verruijt, 1990, p. 87). After the drainage had stopped, the volume of water retained in the aquifer per unit area and unit drop of water table elevation is referred to as the specific retention. The porosity is the sum of specific yield and specific retention. Estimates of the average linear groundwater velocity should use the porosity rather than the specific yield (Bear and Verruijt, 1990, p. 87). It is not anticipated that specific yield values will be used in groundwater flow evaluations for the WCP site, and obtaining specific yield estimates was not an objective of the pumping test. Literature values may be used to supplement site-specific values if specific yield is to be used in site hydrogeologic evaluations.

The β parameter from the Neuman method is defined as:

$$\beta = \frac{K_z}{K_r} \frac{r^2}{b^2}$$

where: K_z is the vertical hydraulic conductivity

K_r is the horizontal hydraulic conductivity

r is the distance from the pumping well to the observation well

b is the aquifer saturated thickness

Rearranging the terms of the previous equation gives an expression for the ratio of vertical to horizontal hydraulic conductivity.

$$\frac{K_z}{K_r} = \frac{\beta\, b^2}{r^2}$$

Using the values from the analyses of data from Piezometers P-103 and P-108, the estimated ratio of vertical to horizontal hydraulic conductivity is 0.32 and 0.17, respectively.

Theis Recovery Method

The Theis recovery method is based on the principle of superposition. To simulate the pump being shut off, the analysis adds hypothetical recharge to the well at a magnitude equal to the pumping rate beginning at the time the pump was shut off. The residual drawdown in the observation wells is the difference between the drawdown due to pumping and the recovery due to injection.

In addition to the assumptions listed above for the Theis analysis, the Theis recovery method requires that u and u', the dimensionless parameters of the well function for pumping and injection, be less than 0.01 (Kruseman and deRidder, 1990, p. 195). Given a specific yield of 0.036 and a transmissivity of 0.90 ft^2/min, the minimum duration of the pumping phase and recovery phase to achieve u and u' values less than 0.01 are 100 minutes for Piezometer P-106, 510 minutes for Piezometer P-103, and 960 minutes for Piezometer P-108. The pumping phase and recovery phase of the step-drawdown test lasted 232 minutes and 1,280 minutes, respectively. The pumping phase and recovery phase of the constant-rate pumping test lasted 543 minutes and 1,729 minutes, respectively. Although the analyses shown on Figures 4-J-8 and 4-J-11 (from the step-drawdown test) and Figure 4-J-13 (from the constant rate test) do not strictly meet the conditions of the Theis recovery method, the results are consistent with the results of other analyses. Because of the criteria for the analytical method, however, the values calculated from these plots were not used in calculating the mean aquifer parameters.

The delayed gravity response described under the Neuman method is applicable to unconfined aquifers whether the water table is declining or rising (Neuman, 1975, p. 333). Similar to pumping phase data, when residual drawdown during recovery is plotted versus time, the data typically form an "S"-shaped

curve. On the recovery plots, however, the time is plotted as time since the pump was shut off (t) divided by time since the pump was initially turned on (t'). Early recovery data plot on the right and late data approach a value of unity at the left edge of the plot. The early, flat part of the curve represents placement of water into storage by expansion of the aquifer material and compression of the water (Neuman, 1975, p. 334). The intermediate part of the curve represents a period when the water level is rising through the previously dewatered part of the aquifer. The rate of water level rise decreases as water is placed back in storage. The late data form a linear segment after the effect of elastic storage has dissipated at the well. The late data must be fitted when doing a Theis recovery analysis on an unconfined aquifer (Neuman, 1975, p. 334; Kruseman and deRidder, 1990, p. 196).

Cooper-Jacob Method

In addition to the assumptions listed above for the Theis analysis, the Cooper-Jacob method requires that the value of u (the dimensionless parameter of the well function) be less than 0.01 (Kruseman and deRidder, 1990, p. 67). Neuman (1975, p. 335) warns that the delayed gravity response must have dissipated at all of the wells before the Cooper-Jacob method can be applied for unconfined aquifers. At the position of Piezometer P-108, the u value exceeds 0.01. For this reason, the results of the Cooper-Jacob analysis are not included in the pumping test data analysis.

Summary and Conclusions

The mean transmissivity value from the pumping test results is 0.84 ft^2/min (1,200 ft^2/day), which (for an aquifer thickness of 25.5 feet) produces a computed hydraulic conductivity value of 47 ft/day. The mean storage coefficient value is 1 x 10^{-3}. Based on the pumping test data, the specific yield is estimated to be 3.6 percent, indicating a high specific retention for the fine-grained aquifer material. The mean ratio of vertical to horizontal hydraulic conductivity is estimated to be 0.24.

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TABLE 4-J-1

FLOW RATE AT PW-1 DURING THE CONSTANT RATE PUMPING TEST

DATE	TIME	TOTAL GALLONS	CUMUL. RATE (gpm)	INST. RATE (gpm)
11/04/93	16:01:05	5,470		
11/04/93	16:03:00	5,520	26.09	26.09
11/04/93	16:07:07	5,620	24.86	24.29
11/04/93	16:09:12	5,670	24.64	24.00
11/04/93	16:11:16	5,720	24.55	24.19
11/04/93	16:17:31	5,870	24.34	24.00
11/04/93	16:21:42	5,970	24.25	23.90
11/04/93	16:23:46	6,020	24.25	24.19
11/04/93	16:25:52	6,070	24.21	23.81
11/04/93	16:31:06	6,195	24.15	23.89
11/04/93	16:35:19	6,295	24.10	23.72
11/04/93	16:43:38	6,500	24.21	24.65
11/04/93	16:49:33	6,650	24.35	25.35
11/04/93	16:57:29	6,850	24.47	25.21
11/04/93	17:15:21	7,300	24.64	25.19
11/04/93	17:33:14	7,750	24.74	25.16
11/04/93	17:49:08	8,150	24.80	25.16
11/04/93	18:09:03	8,650	24.85	25.10
11/04/93	18:38:51	9,400	24.91	25.17
11/04/93	18:52:47	9,750	24.93	25.12
11/04/93	19:32:43	10,750	24.95	25.04
11/04/93	20:00:45	11,450	24.95	24.97
11/04/93	20:24:48	12,050	24.95	24.95
11/04/93	21:03:02	13,000	24.94	24.85
11/04/93	21:33:20	13,750	24.92	24.75
11/04/93	21:45:29	14,050	24.91	24.69
11/04/93	22:03:48	14,500	24.90	24.57
11/04/93	22:32:22	15,200	24.87	24.50
11/04/93	23:01:06	15,900	24.83	24.36
11/05/93	00:01:16	17,350	24.74	24.10
11/05/93	00:15:53	17,700	24.72	23.95
11/05/93	00:24:16	17,900	24.70	23.86

TABLE 4-J-2

INPUT DATA PARAMETERS FOR PUMPING TEST ANALYSES

PARAMETER	PARAMETER VALUE
Average Pumping Rate, Step-Drawdown Test	23.5 gpm
Total Pumping Time, Step-Drawdown Test	232 minutes
Average Pumping Rate, Constant Rate Test	24.6 gpm
Total pumping Time, Constant Rate Test	543 minutes
Distance to Pumping Well, P-103	22.7 feet
Distance to Pumping Well, P-106	10.1 feet
Distance to Pumping Well, P-108	31 feet
Initial Saturated Thickness	25.5 feet

TABLE 4-J-2

SUMMARY OF PUMPING TEST DATA ANALYSES

	TRANSMISSIVITY (ft^2/min)	AVERAGE TRANSMISSIVITY (FT^2/MIN)	STORAGE COEFFICIENT	SPECIFIC YIELD	$\frac{K_z}{K_r} = \beta \frac{b^2}{r^2}$	METHOD
PW-1	0.98	0.92				1
	0.85					1
P-106	0.91	0.96				1
	1.10		7×10^{-4}			2
	0.86					1
P-103	0.76	0.75		0.036	0.32	3
	0.73			—		1
P-108	0.76	0.76	2×10^{-3}	0.036	0.17	3
Mean Value		0.84[a]	1×10^{-3}[b]	0.036[b]	0.24[a]	

Methods:

1 - Theis Recovery Method (Theis, 1935)

2 - Theis Method (Theis, 1935)

3 - Neuman, 1975

[a]Geometric mean.

[b]Arithmetic mean.

—

TABLE 4-J-3

SUMMARY OF PUMPING TEST DATA ANALYSES

	TRANS-MISSIVITY (ft^2/min)	AVERAGE TRANSMISSIVITY (FT^2/MIN)	$K_V:K_H$ RATIO[a]	METHOD
PW-1	0.98[b]	0.92		1
	0.85[c]			1
P-106	0.91[b]	0.96		1
	1.10			2
	0.86[c]			1
P-103	0.76	0.75	0.32	3
	0.73[c]			1
P-108	0.76	0.76	0.17	3
Mean Value		0.84[d]	0.24[d]	

Methods:

1 - Theis Recovery Method (Theis, 1935)

2 - Theis Method (Theis, 1935)

3 - Neuman, 1975

[a]Ratio of vertical hydraulic conductivity to horizontal hydraulic conductivity.

[b]Based on step-drawdown test data.

[c]Based on constant rate test data.

[d]Geometric mean.

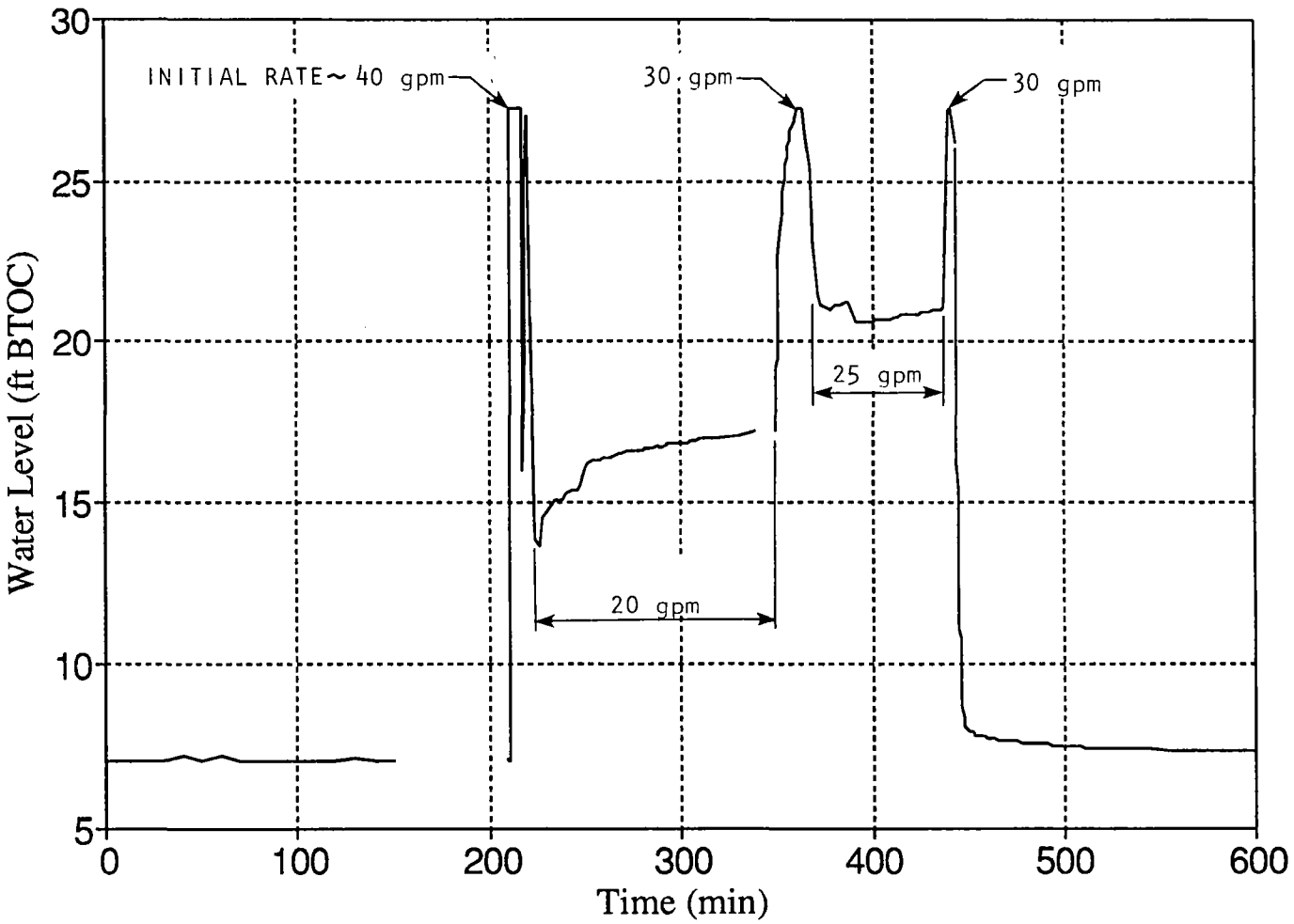


Figure 4J-1

HYDROGRAPH FOR WELL PW-1
DURING THE STEP-DRAWDOWN TEST

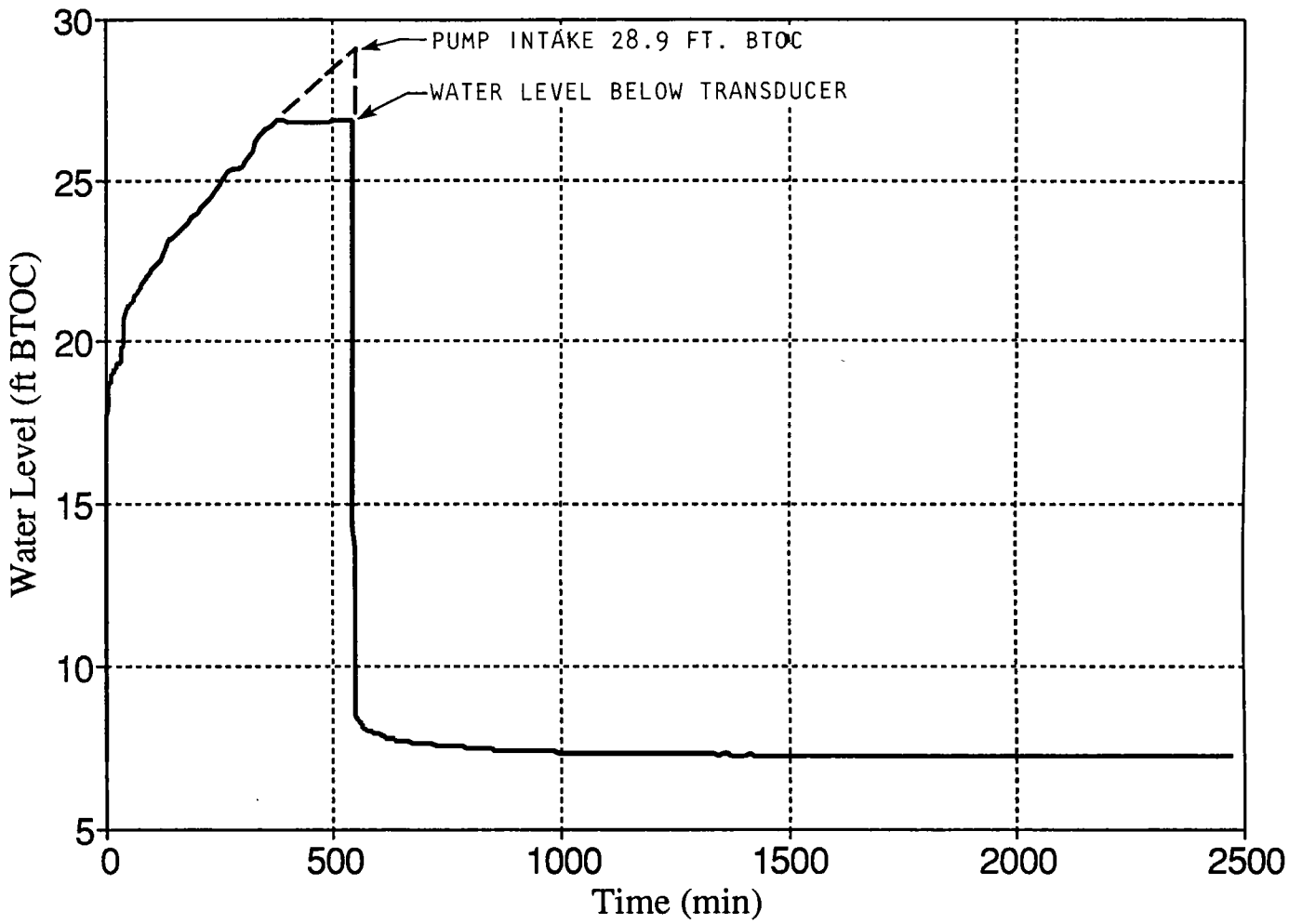


Figure 4J-2

HYDROGRAPH FOR WELL PW-1
DURING THE CONSTANT RATE PUMPING TEST

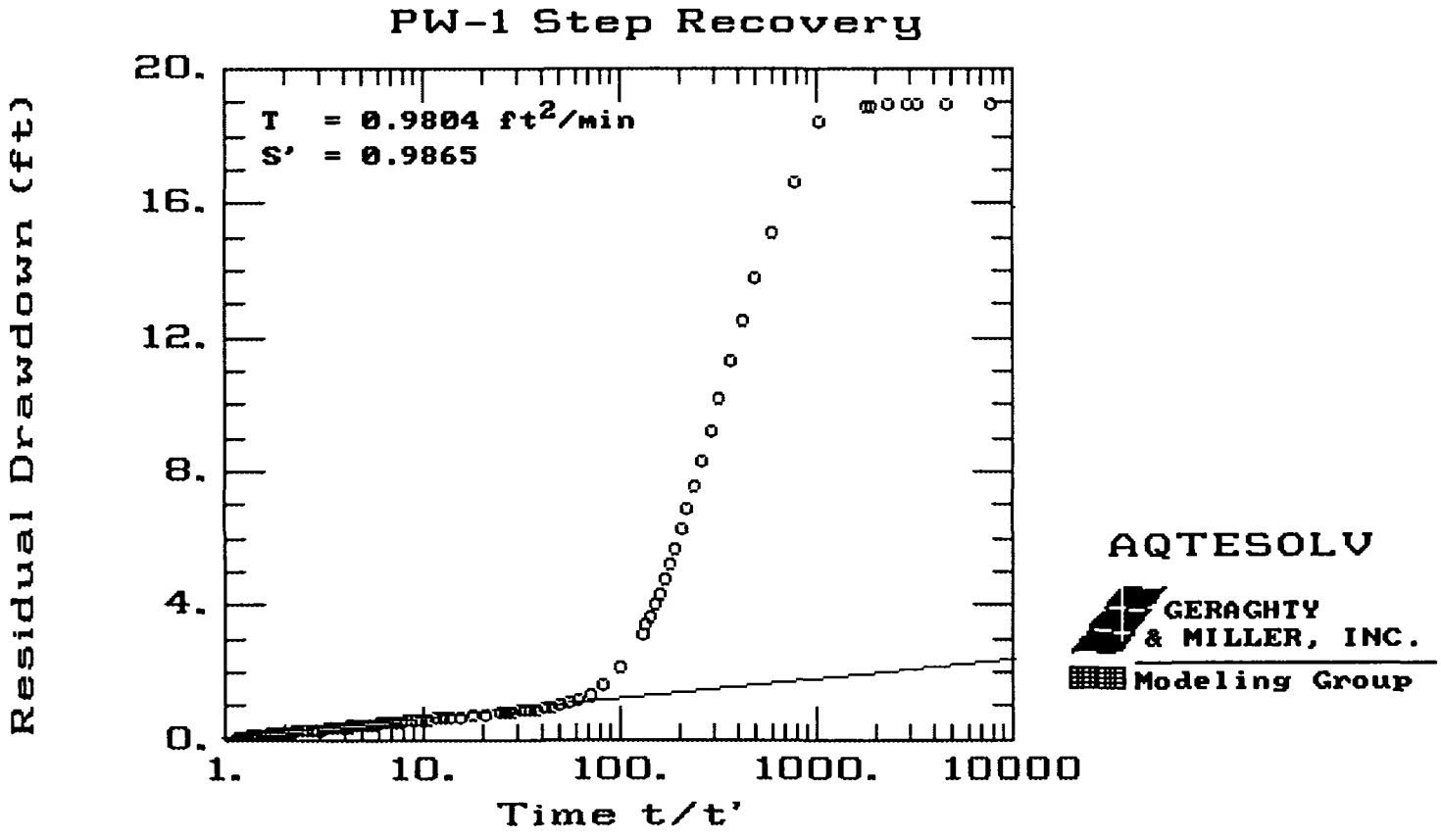


Figure 4J-3

THEIS RECOVERY ANALYSIS FOR WELL PW-1
AFTER THE STEP-DRAWDOWN TEST

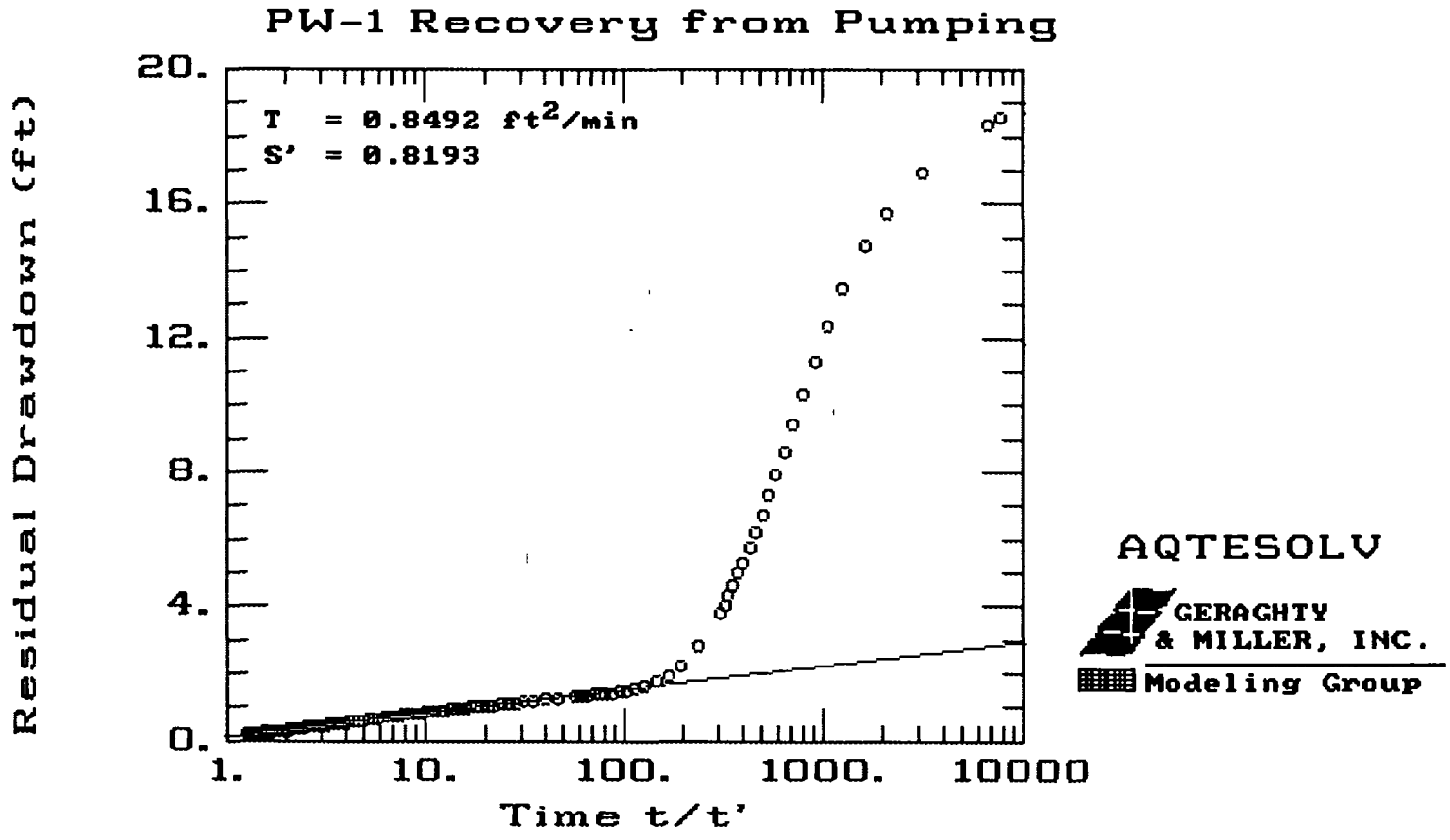


Figure 4J-4

THEIS RECOVERY ANALYSIS FOR WELL PW-1
AFTER THE CONSTANT RATE PUMPING TEST

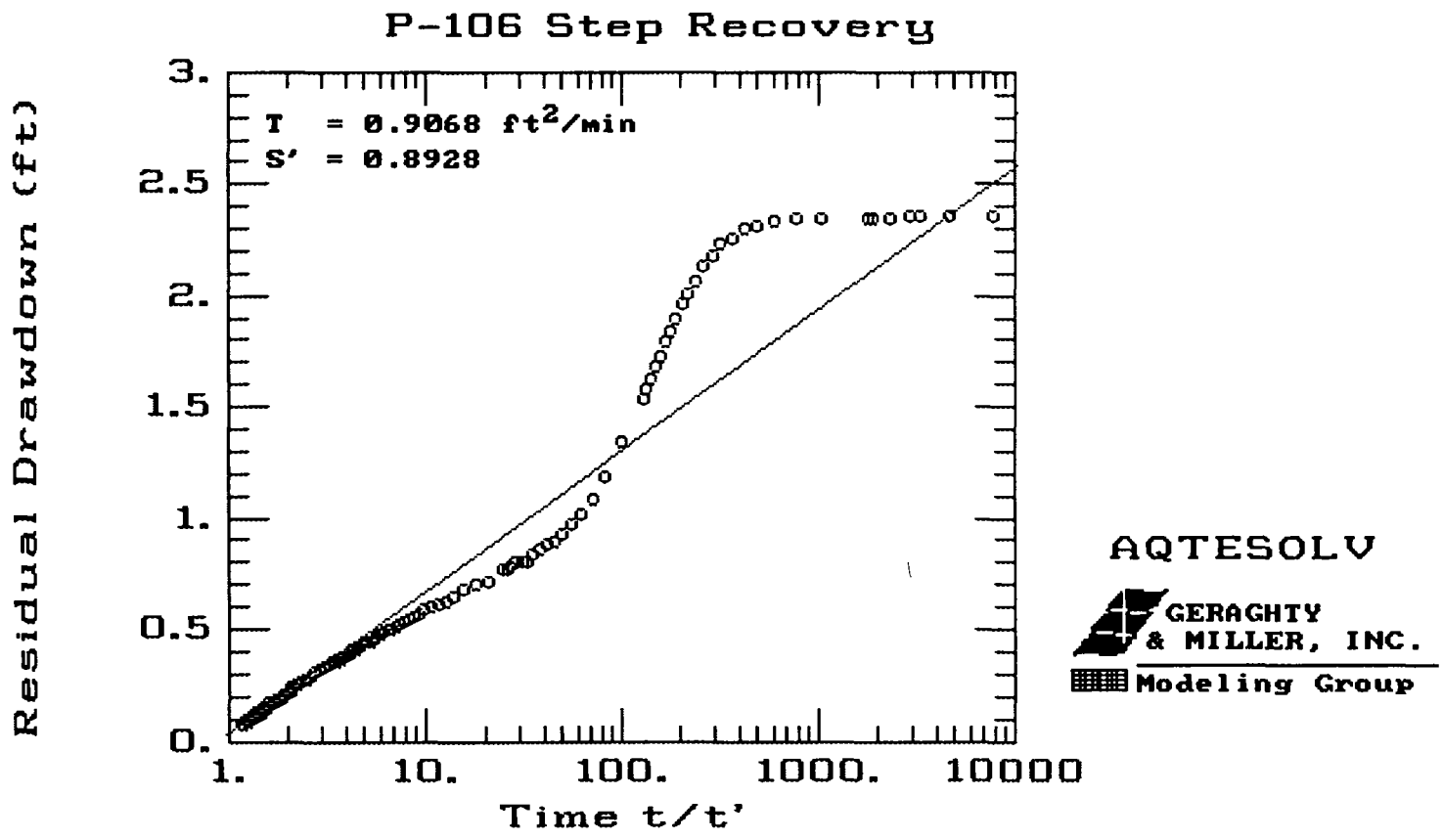


Figure 4J-5

THEIS RECOVERY ANALYSIS FOR PIEZOMETER P-106
AFTER THE STEP-DRAWDOWN TEST

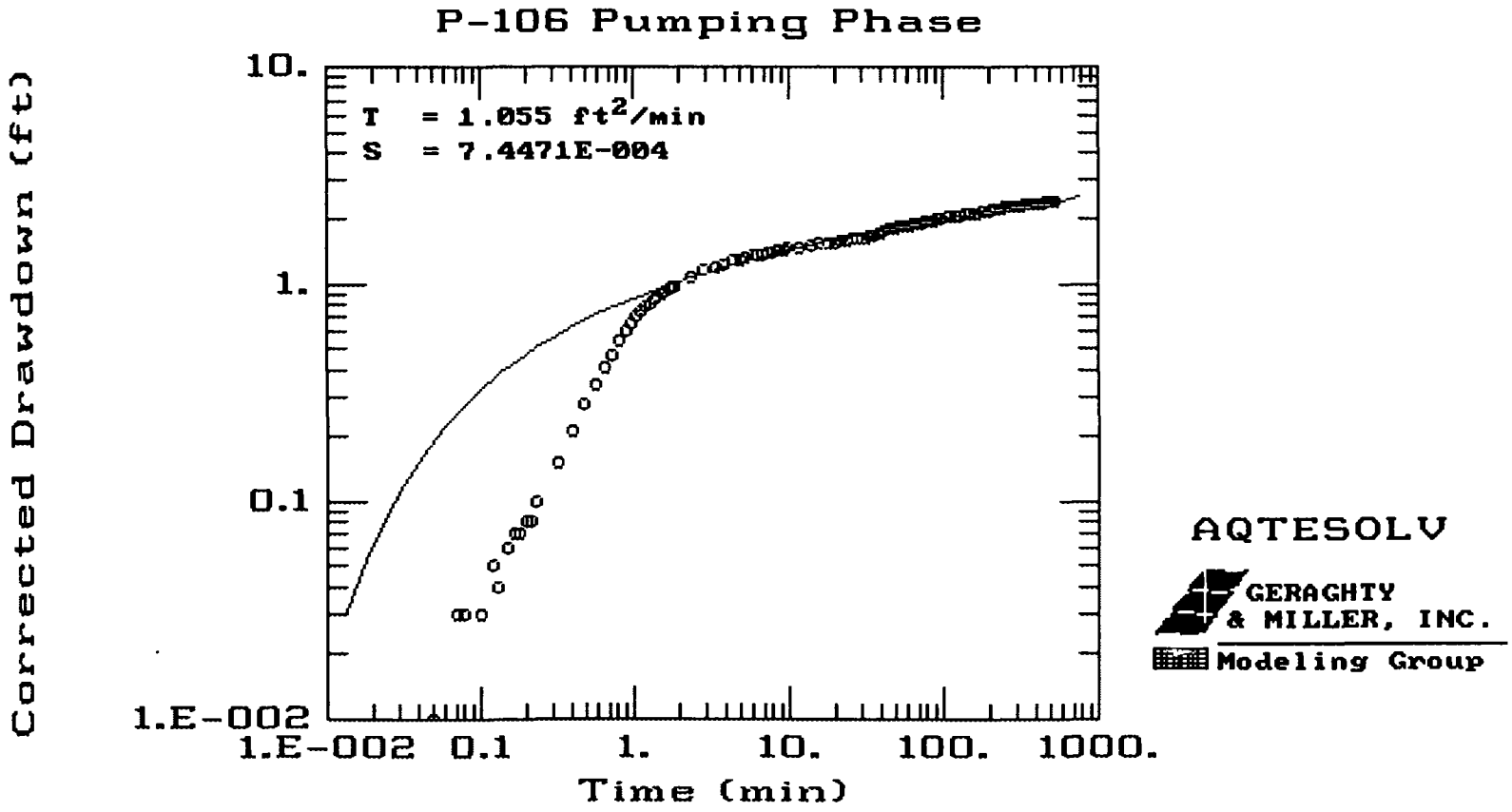


Figure 4J-6

THEIS ANALYSIS FOR PIEZOMETER P-106

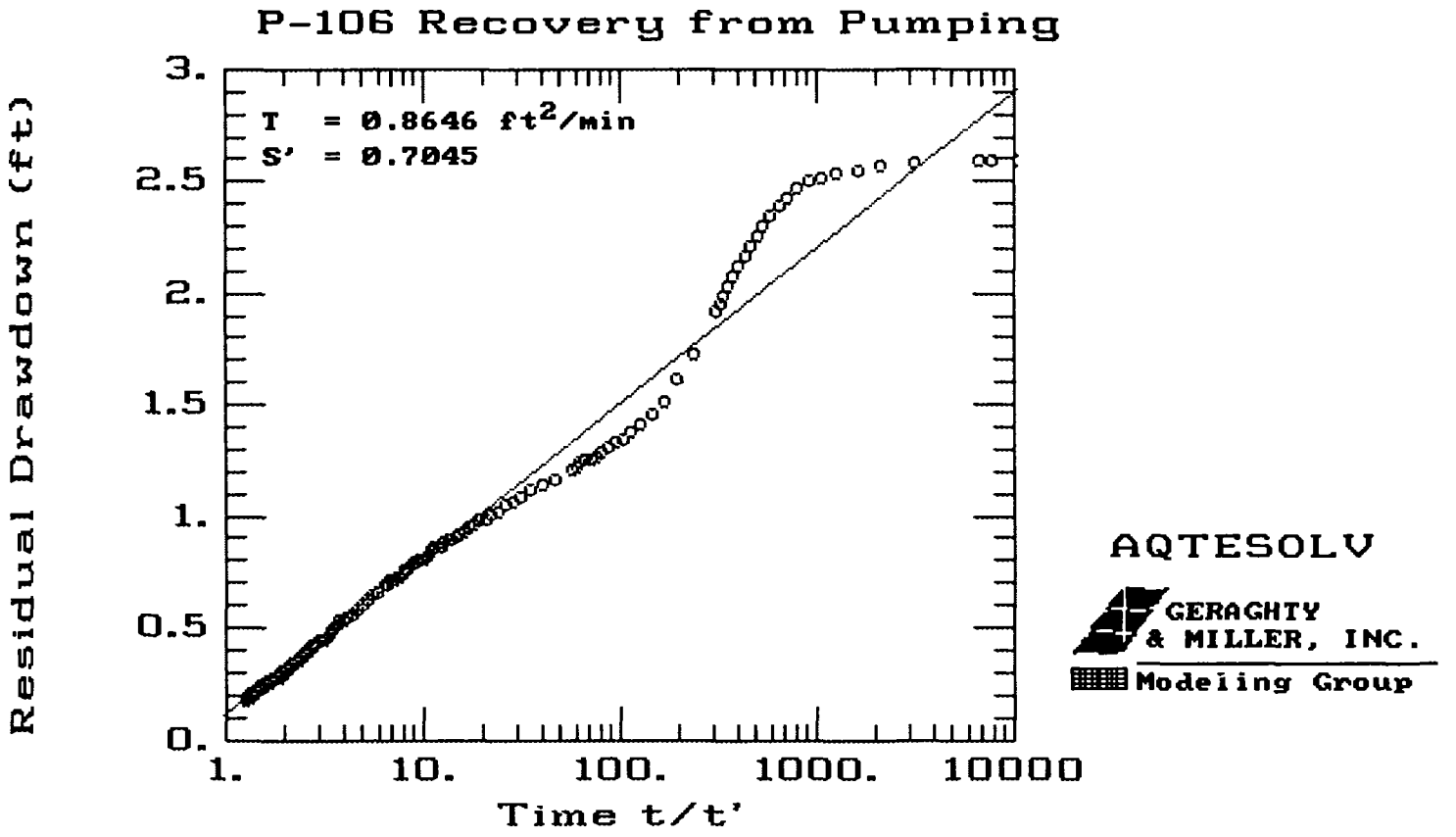


Figure 4J-7

THEIS RECOVERY ANALYSIS FOR PIEZOMETER P-106
AFTER THE CONSTANT RATE PUMPING TEST

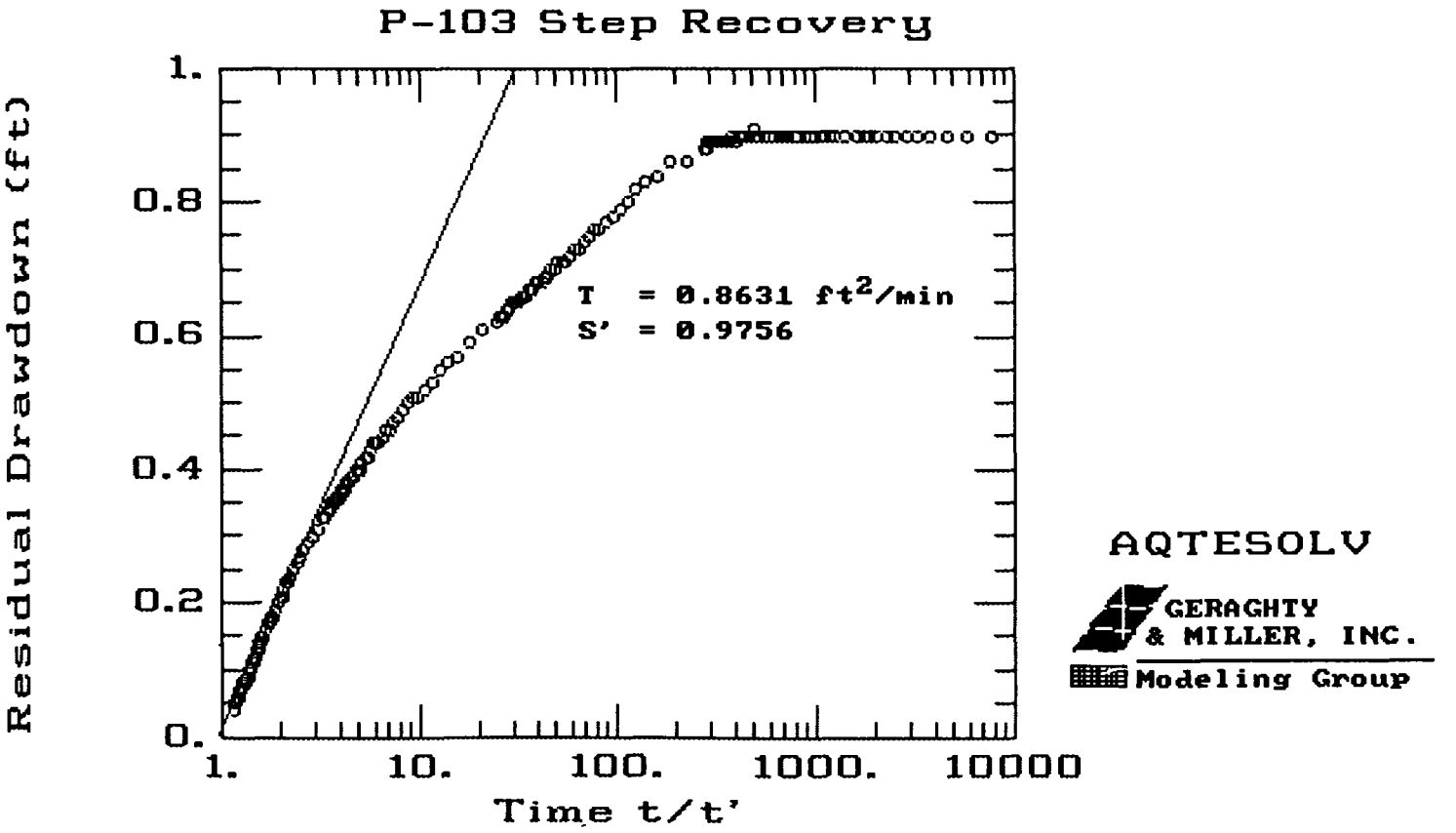


Figure 4J-8

THEIS RECOVERY ANALYSIS FOR PIEZOMETER P-103
AFTER THE STEP-DRAWDOWN TEST

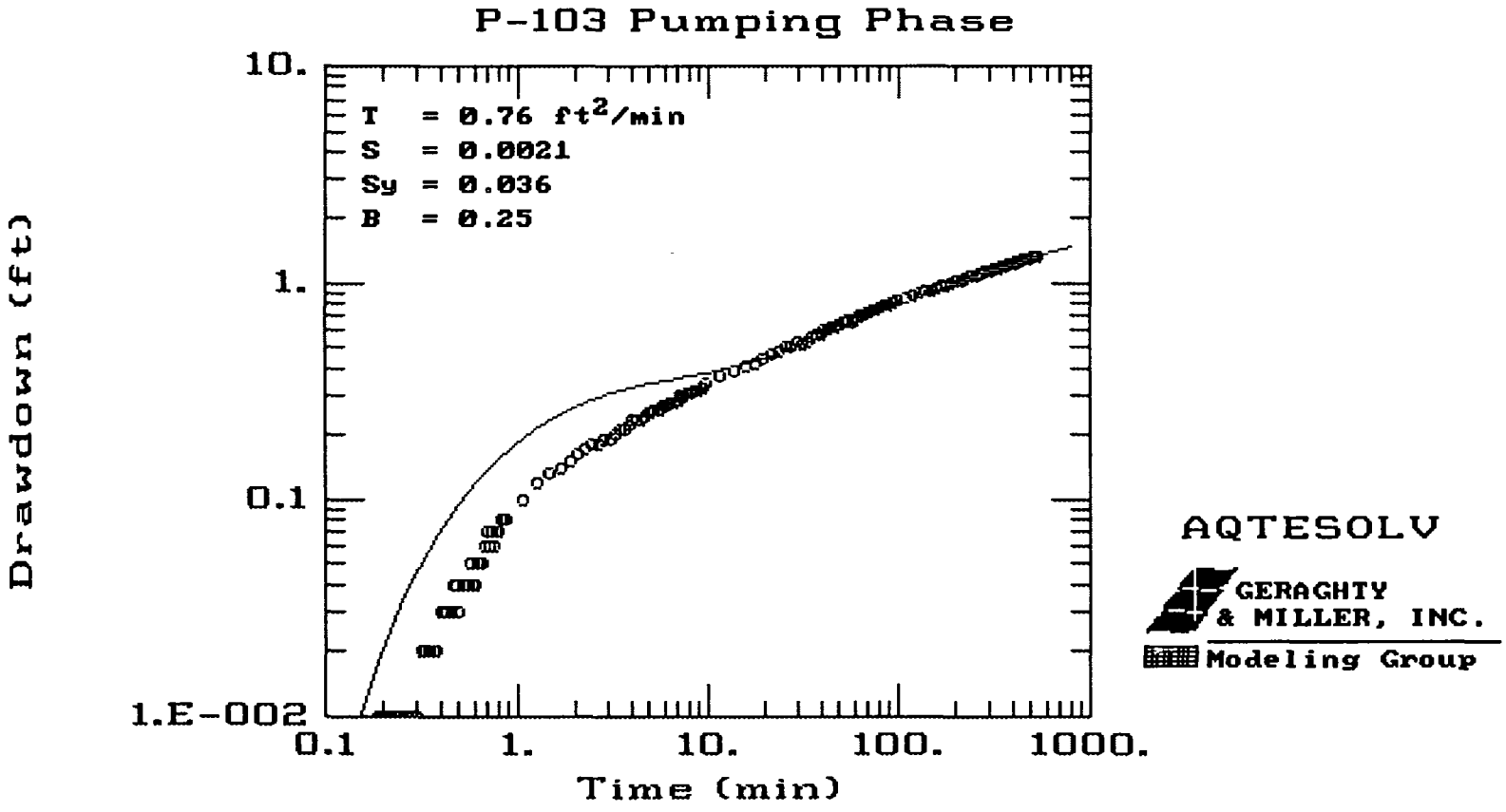


Figure 4J-9

NEUMAN ANALYSIS FOR PIEZOMETER P-103

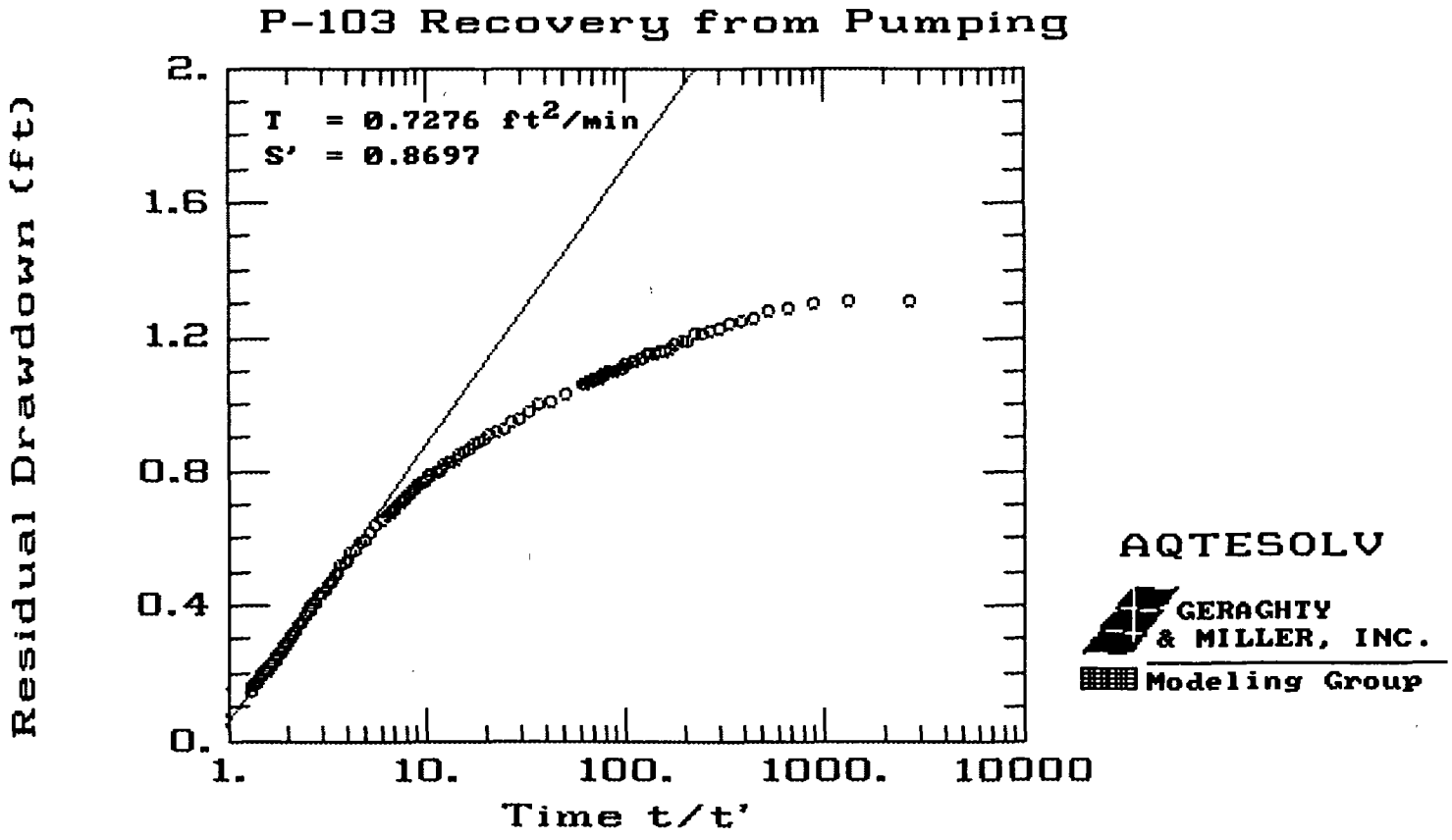


Figure 4J-10

THEIS RECOVERY ANALYSIS FOR PIEZOMETER P-103
AFTER THE CONSTANT RATE PUMPING TEST

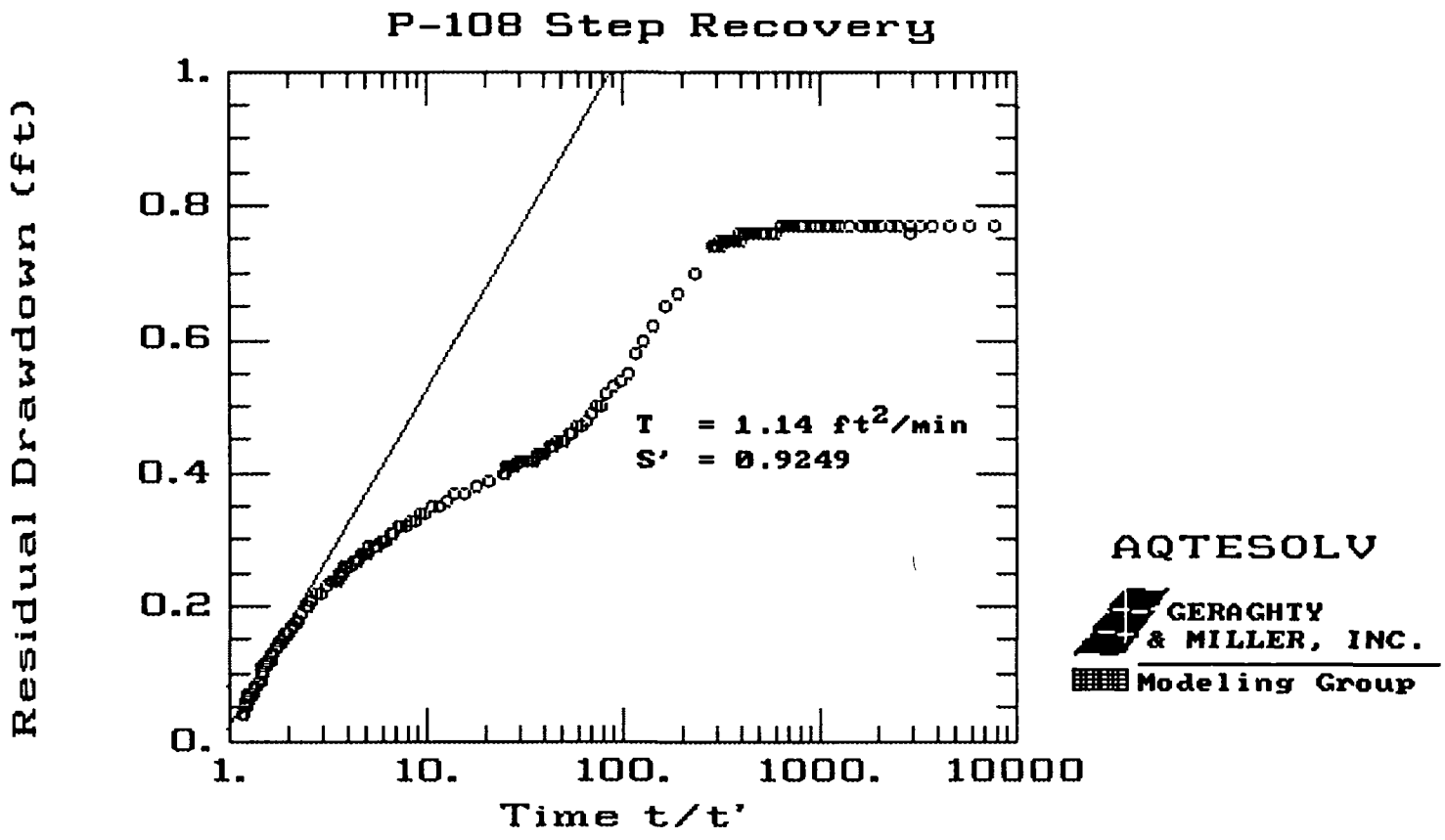


Figure 4J-11

THEIS RECOVERY ANALYSIS FOR PIEZOMETER P-108
AFTER THE STEP-DRAWDOWN TEST

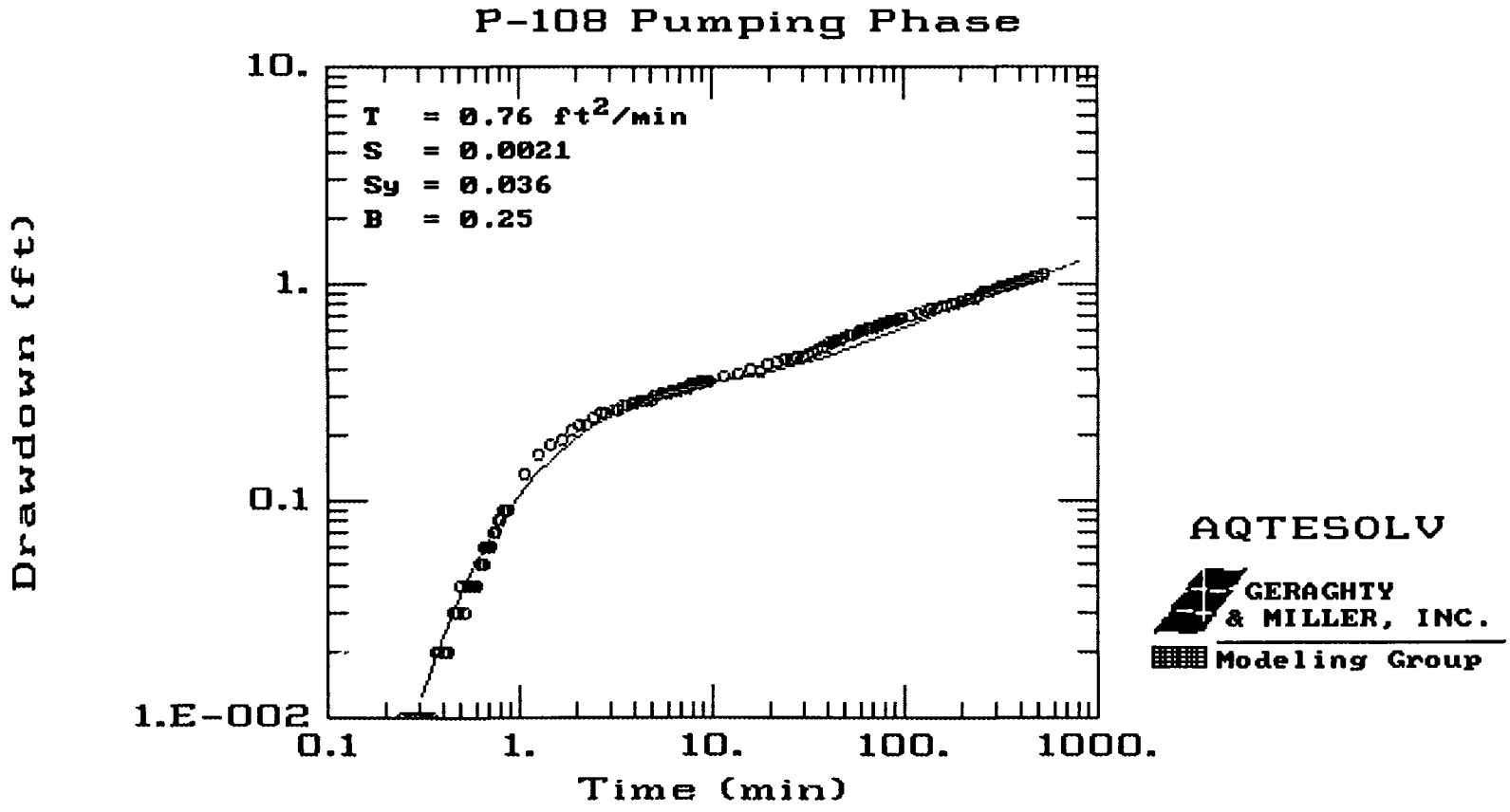


Figure 4J-12

NEUMAN ANALYSIS FOR PIEZOMETER P-108

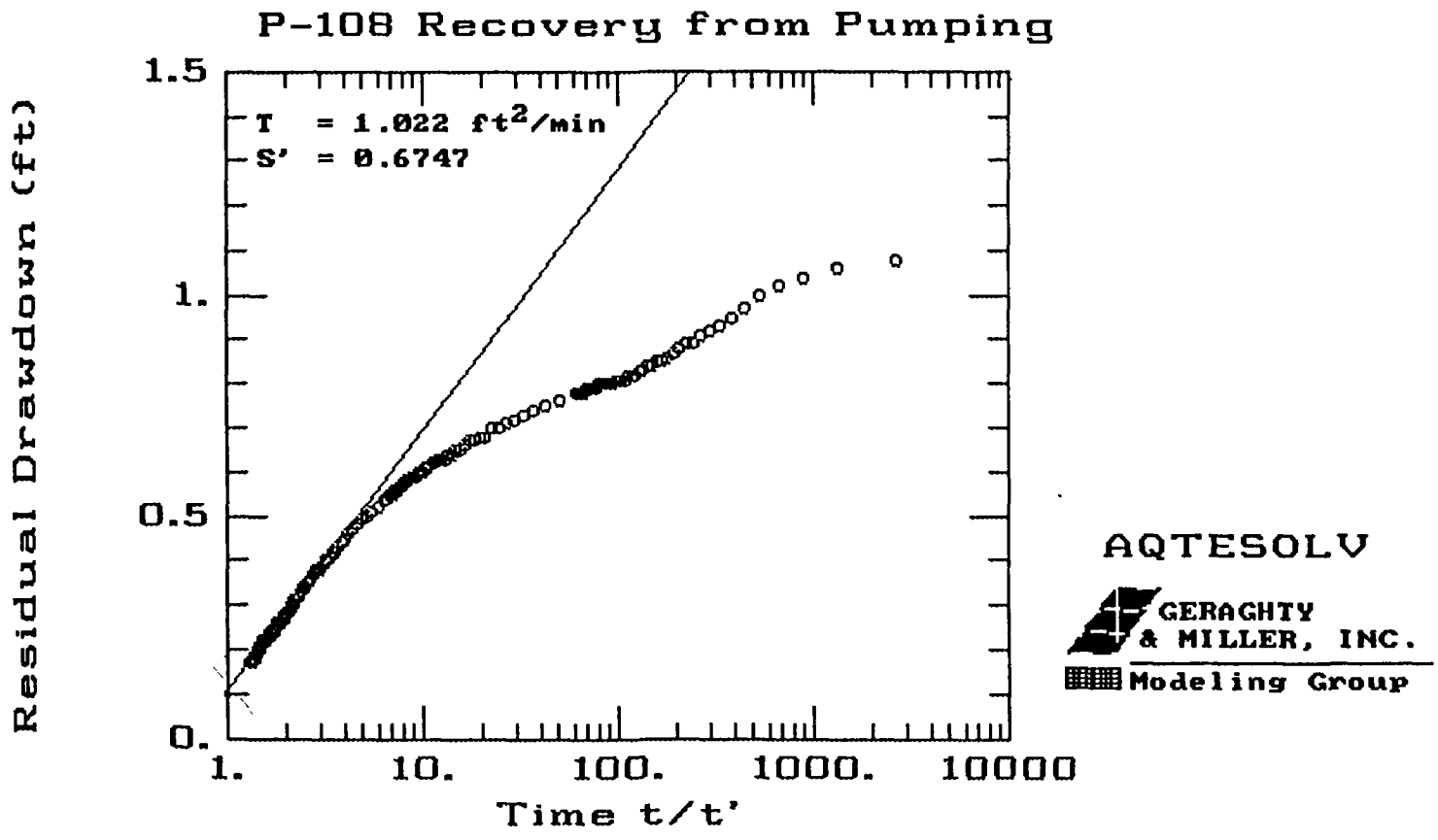


Figure 4J-13

THEIS RECOVERY ANALYSIS FOR PIEZOMETER P-108
AFTER THE CONSTANT RATE PUMPING TEST

SOKKIA™

MADE IN U.S.A.

SOKKIA™

13/49-003

LEVEL BOOK

WAUKEGAN
Coke plant
pumping
test

No. 8152-55

Tanks for [illegible]
505
517

empty 35x8x8 + 15x3x8 = 19,0[illegible] nominal 21

35x8x4.5 ft = 9424 gal

Property of Barr Engineering Co.

Address 8300 Norman Center Dr
Minneapolis MN 55437-1026

Telephone (612) 832-2600

DJD home phone 933-0637
KAF 893-0462
FOX 487-4123

Thurs [illegible]
Fri 8:00
Sat 8:00
Sun

60
4hr
240
40
000
960
~~[illegible]~~
~~57,600~~
9600

This Book is manufactured of a High Grade 50% Rag Ledger Paper having a Water Resistant Surface, and is sewed with Nylon Waterproof Thread.

PRC (312) 856-8700 Rick Herseman

Driller's in 110 of Comfort Inn
623-1400

30
31
1
2
3
4

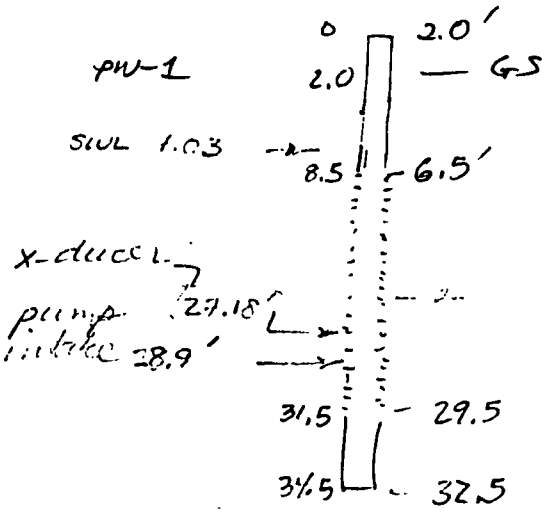
INDEX

1440
6
8640

MW-105 102
10/29 10:30 [illegible]
11/4 9:30 [illegible]

8520 (11/4 7:40 CST)	6.63
8490	6.63
8430	6.63
[illegible]	6.63
8310	6.63
8190	6.63
8010	6.63
7950	6.63
7830	6.63
7710	6.63
7590	6.63
7470	6.62
7340	6.63
7220	6.63
7100	6.63
[illegible]	6.62

	PW-1	P-106
1100	7.07	7.26
1000	7.11	7.27
990	7.10	7.27
940	7.12	7.27
900	7.11	7.28
860	7.10	7.26
800	7.11	7.27



pump intake 28.9' BTOC

pump not shrouded driller did not want to put intake in sump because motor would burn up

- we did not specify shroud, so this is as deep as the pump can be set

20.15	~~19.72~~
7.03	7.03
27.18	~~26.75~~

10/28/93

16:26 set up MW-9S / MW-9D 97

Hermit 999

synch clock

Test 0 Lin 10 80% daily

ch 1: scale ~~20.17~~ 20.07

off 0.06

Lin 0.12

Ch 2 scale 20.14

off 0.04

Lin 0.12

9S	5.57'	BTOC	4.92'	BSWL
9D	5.78'	BTOC	23.19'	BSWL
not	test 0	only	17:00	BSWL
				14:00

17:04 set up stilling well 1/BP
Hermit 11111
synch clock
Test 0 Lin 10 8008 data pts
Input 1 (SW-1)
scale 20.09
off 0.07
lin 0.12
Input 2 BP
scale 15.59
off 0.25
lin 0.20
SW-1 3.86' BTOC 3.68' BSWL
set for delayed start 18:00
Test 0 Step 1 set dly 11/3 11:30 CST
(10:30 CST)

10/29/93
set up stilling well 2 / P-107
Hermit 10722
synch clock
Test 0 lin 10 8008 data pts
Input 1 (P-107)
scale 10.09
off 0.02
Lin 0.02
Input 2 20.03 scale
off 0.07
lin 0.12
P-107 2.04' BTOC 9.32' BSWL
SW-2 4.64' BTOC 7.33' BSWL
set for delayed start 04:00

09:27 setting up MW-1S/1D

Hermit 00111

synch clock

Test 0 lin 10 8008 datapts

Input 1 (MW-1S)

Scale 20.16

off 0.04

lin 0.12

Input 2 (MW-1D

Scale 9.98

Off 0.02

Lin 0.02

MW-1S 5.23' BTOC 14.21' BSWL

MW-1D 5.10 BTOC 11.29' BSWL

set for delayed Start 10:00

10:00 setting up MW [illegible]

Hermit 01010

synch clock

Test 0 lin 10 [illegible]

Input 1: MW-10S

Scale 10.04

off -0.04

Lin 0.00

Input 2: MW-10D

Scale 9.98

Offset -0.004 (0.00)

Lin 0.00

MW-10S 6.52 BTOC 9.63 BSWL

MW-10D 6.60 BTOC 11.59 BSWL

Set for Delayed Start @ 10:30

Setting up P-103/P-108

Hermit 10308

Test 0 lin 10 8008 data pts

Input 1 (P-103)

Scale 10.05

Off 0.04

Lin 0.05

Input 2 (P-108)

Scale 10.04

Off 0.01

Lin ~~0.00~~ 0.00

P-103 7.11 7.97

P-108 7.08 11.23

set for delay start @ 11:30

may have to reset references

PW-1 being developed when

set

11/3 12:11 CST Test 1 Log 10

11:27 Setting up P-106

(PW-1 still being developed;

cannot place X-ducer in

PW-1 until pump set -)

Unit 10601 Test 0 lin 10 data pts

synch clock 1 input 16035

Input 1 (P-106)

Scale 10.03

Off 0.06

Lin 0.04

P-106 7.12 BTOC 11.39 BSWL

set for delayed start @ 12:00

may have to reset reference -

PW-1 being developed when

set

11/3/93 rechecked ref OK - stop

0 to add X-d for step drawdown

test 1 LIN 10 7680 data pts

scale 20.09 off 0.09 lin 0.11

PW-1 7.03 BTOC ~~19.78~~ 20.15 BSWL

TOC temp: 0.19 ft above [illegible]

Start test 1 10:30 CTV

10/29 11:33 surging again

11.43 finished surging [illegible]

11/01/93 - Change Hermit data Logger at P107/

1240 Stilling well #2

- using Barr Eng. Co. #555

Hermit #

Synch clock

Test 0 Lin 10 8008 Data pts.

Input 1 P-107 ~~2.04~~ STATIC at 2.11 BTOC

scale 10.09 ~~Transducer at 9.02~~

off 0.02

Lin 0.02

Input 2 (stilling well #2 - [illegible]) WL 4.41 BTOC

Scale 20.03

off 0.07 7.55 BSWL

Lin 0.12

Set for Delayed start @ ~~13~~ 1430

11/3/93

S-1 5.795

S-2 5.795

comparison of readings from 2 solinst - DDM using S-1 for ▽ meas, DTD using S-2

07:55 Jerry from IEPA showed up to observe step drawdown test

08:10 drillers (Paul & Larry) setting pump - intake will be 28.9' BTOC - shroud not specified in contract, this is as low as pump can go w/o putting motor in sump

09:15 set up X-ducer in PW-1. NOTE Tests started [illegible] daylight savings ended - hermit clocks 1 hr ahead of CST

09:40 Kevin from PRC on site
09:46 John from Northern Ice
pump on site to supply
pipe to WTD
12:11 getting set to start pumping
12:21 still checking controller
13:01 start pumping
16:44 call Rick Herseman @
PRC tomorrow re start of
Q test Kevin Schnoes
(Snows)

11/4/93 met w/ JSL &
client re: duration of
test — run up to 40,000 gal.
cut off when good data has
been collected — get PRC
approval and ~~get~~ stop test
11:46 spoke with Rick Herseman
of PRC — he is willing to let
us start this afternoon —

they don't need to see start —
just want to see some part
of the test — call Rick
later this Aft. to update —

Distances to IWCCs —
P-106 10.13
P-103 22.67
P-108 31.0

15:29 - calling Rick Herseman
left message for Rick and
Kevin

memory necessary 231 sets [illegible]
min + 134.0 [illegible]
[illegible]

15:53 wells within 0.03 [illegible]
pre step test SWL — prepare
for constant rate test
reset clocks on 10308
Test 2 6369 data points [illegible]
reset clocks on
Test 3 7058 data points left

11/5 00:46

pump rate decreasing

water level in PW-1 below

pump

pressure dropping and

becoming more erratic,

indicating breakup

suction (52 psi)

if pump rate cannot

be sustained ≥ 23.75 gpm

(0.95 × 25 gpm) will

terminate test

01:02 pressure fluctuating

between 44 & 50 psi -

rate dropping below 23.75

terminate test — began

recovery

Gallons pumped: 18,848

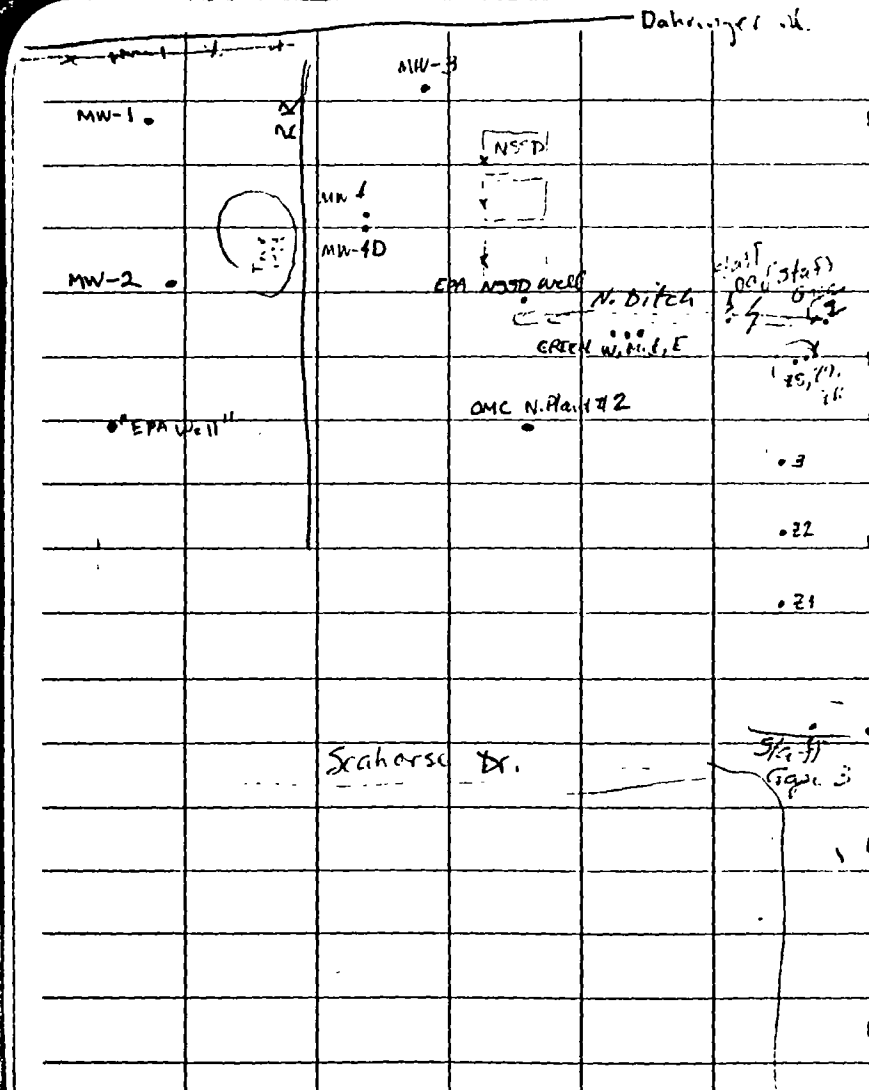
5,470

13,378

1500 gal/hr

9 hr

13,500



PW-1 Flow Meter

DATE	TIME			SWL: [illegible]
11/3	12:11	[illegible]		
	13:01	start	~40 gpm	
	13:14:22	[illegible]-115	~20 gpm	14.55
	13:20:09	515		
	13:25			15.06
	13:27:16	[illegible] 650		
	13:30:21	710		[illegible]
	[illegible]:37	[illegible]		
	13:49:07	1090		[illegible]
	13:54:50	1210		[illegible]
	14:12:32	1580		16.66
	14:18:15	1700		
	14:32:38	2000		
	14:45:04	2260		
	14:50:48	2380		17.04
	15:05:11	[illegible]		[illegible]
	15:16:12	[illegible]		17.18

Step up to 30 gpm

	PW-1 Flow Meter			
set	hermits for	delay	16.20	C.T
			15:20	C.T
11/3	15:19:33	2980	(Clear [illegible]	
	15:23:11	3080	25.12 [illegible]	
	15:26:13	3170		
	15:34 drawn below x-ducer			
	15:35:24	3440		
[illegible]	[illegible] 25 gpm			
	15:41:21	3600	15:43	21.25
	15:45:15	3700		
	15:[illegible]	4025		21.03
	16:09:57	4325		20.80
	16:[illegible]	5050		20.78
	16:46 increase to 30 gpm			21.30
	16:53 cut off test			

		PW-1	Flow	Meter	
11/4	15:[illegible]	5470		[illegible]	[illegible]
	16:05:00	[illegible]20			
	16:07:07	5[illegible]20			[illegible]
	16:10:12	5640			[illegible]
	16:11:16	5[illegible]20		[illegible]	[illegible]
	16:17:31	[illegible]		[illegible]	[illegible]
	16:21:42	5970		20:00:45	11450
	16:23:46	6020		20:24:48	12050
	16:25:52	6070		21:02:02	13000
	16:31:06	~~6[illegible]~~ 6175		21:[illegible]:20	13750
	16:35:19	6295		21:45:29	14050
	16:[illegible]	~~6[illegible]~~ 6300		22:03:48	14500
	16:49:33	6[illegible]		22:32:[illegible]	15[illegible]
	16:57:29	6[illegible]50		23:01:[illegible]	[illegible]
	17:15:21	7300		[illegible]:01:16	17,[illegible]
	17:[illegible]:14	7[illegible]		[illegible]:15:53	17,100
	18:[illegible]:08	8[illegible]		[illegible]	14,[illegible]
	18:[illegible]	8[illegible]			
	18:38:51	[illegible]			

	PW-1 Flow Meter			50 gal 2 min 6 sec
11/5	00:49:29	18,500		
	01:04	final reading		18,848

		PW-1 Water Levels	
Date	Time	Manual	Data Logger
10/30	1015	6.52	--
10/31	1255	6.56	--
11/01	0712	6.61	--
11/02	17 3[illegible]	6.[illegible]1	
11/3	09:35	7.04 *	7.04
11/4	07:35	7.12	7.10
11/4	09:45	7.11	7.11
11/4	15:50	7.08	7.07
@ test start		16:01	
11/4	16:21	19.20	19.19
	16:34	19.44	19.[illegible]
	16:48	—	21.09
	17:02	—	21.28
	17:20	21.84	21.80
	17:37	~~17.[illegible]~~	2[illegible].15
	18:01	22.55	22.[illegible]
	18:45	—	2[illegible].44
	19:29	24.16	24.1[illegible]

* top of drop pipe 0.4[illegible]
permanent top of [illegible]

PW-1 water levels

Date	Time	Manual	Data Logger
11/4	20:06	24.84	24.81
11/4	20:25	—	25.12
11/4	21:04		25.42
	21:32		26.24
	~~22:02~~ 20:		26.60
	22:32		26.81
	23:02		26.80
11/05	02:05	7.89	7.88
	0723	7.42	7.39
	0827	7.36	7.37
	14:07	7.28	7.26
	16:33	7.26	7.26
	19:34	7.25	7.24
11/6	05:45	7.20	7.19

Boat Slip water levels (SW-2)

Date	Time	manual	Data logger
10/29	12:50	4.64	4.65
10/30	1523	4.22	4.24 ~~2.88~~
10/31	0954	3.90	3.75
11/01	0846	4.35	
11/02	16/40	4.35	4.39
11/03	09:31	4.55	4.57
11/04	11:35	4.53	4.55
11/05	10:25	3.76	3.82
11/6	08:30	4.08	4.08

Harbor water levels (SW-1)

Date	Time	Manual	Data logger
10/29	13:00	3.72	3.63 reset ref
10/30	1517	3.12	3.11
10/31	1006	3.13	3.05
11/01	0838	3.52	3.51
11/02	1653	3.75	3.70
11/03	09:33	3.74	3.73
11/04	11:45	3.36	3.18
11/05	10:33	3.11	2.95
11/6	09:03	3.40	3.36

MW-1S water levels

Date	Time	Manual	Data logger
10/29	12:15	5.24	5.23
10/30	1046	5.29	5.29
10/31	1319	5.32	5.31
11/01	1007	5.36	5.37
11/02	17:49		
11/03	11:35	5.36	5.38
11/4	07:55	5.40	5.40
11/4	17:06	5.38	5.41
11/5	13:44	543	542
11/6	07:11	5.45	5.41

MW-1D water levels

Date	Time	Manual	Data Logger
10/29	12:17	5.10	5.08 (reset 17:1
10/30	1046	5.15	5.15
10/31	1319	5.18	5.18
11/01	1007	5.22	5.23
11/02	17.49	5.23	5.21
11/03	11:35	5.23	5.23
11/4	07:56	5.26	5.23
11/4	17:07	5.25	5.1
11/5	1344	5.29	5.24
11/6	07.13	5.31	5.26

MW-9S Water Levels

Date	Time	Manual	Data Logger
10/29	12:08	5.64	5.49 reset ref
	(logger was set [illegible] SUR)		
10/30	1110	5.70	5.68
10/31	1343	5.73	5.71
11/01	1024	5.78	5.77
11/02	1[illegible]10	[illegible]	
11/3	07:44	5.78	5.79
11/4	08:04	5.81	~~5.79~~ 5.80
11/4	10:51	—	5.80
11/4	17:11	5.~~7~~81	[illegible]
11/5	13:57	5.86	5.84
11/6	05:51	—	5.86
11/6	07:35	5.87	5.86

MW-9D Water Level Data

Date	Time	Manual	Data logger
10/29	12:10	5.85	5.85
10/30	11:11	5.90	5.90
10/31	1343	5.93	5.92
11/01	1025	5.98	5.97
11/02	1812	6.00	5.99
11/3	07:47	5.99	6.00
11/4	08:05	6.01	6.01
11/4	10:51	-	6.01
11/4	17:11	6.01	6.01
11/5	13 57	6.06	6.06
11/6	05:52	-	6.01
11/6	07:34	6.09	6.08

MW-10S Water Level

Date	Time	Manual	Data Logger
10/29	12:23	6.54	6.51
10/30	10:27	6.57	6.57
10/31	1300	6.59	6.59
11/01	0753	6.61	6.62
11/2	1736	6.62	6.64
11/03	11 26	6 61	6.62
11/4	07:41	6.62	6.63
9/4	16:52	6.61	6.63
11/5	13:35	6.65	6.65
11/6	08:00	6.66	6.67

MW-10D water levels

Date	Time	Manual	Data logger
10/29	15:25	6.60	6.59
10/30	10:29	6.64	6.62
10/31	1300	6.66	6.64
11/01	0753	6.68	6.66
11/02	1735	6.68	6.67
11/03	11:26	6.67	6.66
11/4	07:41	6.69	6.67
11/4	16:53	6.69	6.66
11/5	1335	6.71	6.68
11/6	08:02	6.73	6.71

P-103 Water Level

Date	Time	Manual	Data logger
10/29	12:33	7.14	7.15
10/30	10:18	6.97	6.97
10/31	1242	7.05	7.00
11/1	0706	7.06	7.04
11/2	17:21	7.05	7.03
11/3	09:32	7.06	7.05
11/4	07:30	7.13	7.11
11/4	15:47	7.10	7.08
	16:17	7.53	7.[illegible]
	16:32	7.62	7.60
	16:46	7.71	7.68
	16:58	7.77	7.74
	17:18	7.[illegible]	[illegible]
	19:[illegible]	7.92	[illegible]
	19:25	7.98	[illegible]
	19:41	[illegible]	8.03
	19:24	[illegible]	8.[illegible]
	20:09	8.17	8.15

P-103 Water Levels –

DATE	TIME	MANUAL	DATA LOGGER
11/4	21:38	8.26	8.25
	22:08	—	8.27
11/5	00:21	8.40	8.38
	02:06	7.83	7.83
	07:18	7.45	7.45
	08:17	7.42	7.43
	14:00	7.33	7.31
	16:30	7.30	7.29
	19:32	7.28	7.27
11/6	05:42	7.23	7.23

P-106 Water levels

Date	Time	Manual	Data logger
10/29	12.37	7.26	7.23 next [illegible]
10/30	No	Reading / Not Recorded	
10/31	1251	7.14	7.13
[illegible]	0707	7.18	7.18
11/02	1730	7.18	7.[illegible]
11/3	09:05	7.19	7.19
[illegible]	07:36	7.25 ~~7.27~~	7.27
11/4	09:48	7.23	7.26 ~~7.27~~
11/4	15:48	7.23	7.24
	Q test began 16:01		
	16:20	8.86	[illegible]
	16:33	8.96	[illegible]
	16:47	9.13	9.12
	17:01	9.18	[illegible]
	17:19	9.[illegible]	9.27
	17:37	9.32	9.[illegible]
	18:02	9.[illegible]	[illegible]
	18:45	9.[illegible]	[illegible]

P-106

DATE	TIME	MANUAL	DATA LOGGER
11/4	19:28	9.55	9.54
11/4	20:07	9.59	9.59
	21:42	9.68	9.68
	22:10	—	9.70
	23 09	9.75	9.74
11/5	00:19	9.77	9.76
	02:05	8.00	8:00
		~~7.72~~	~~7.72~~
	0724	7.54	7.55
	0828	7.51	7.52
	1407	7 43	7 45
	16:33	7.41	7.42
	19:34	7.39	7.40
11/6	05:44	7.36	7.37

P-107 Water Levels

Date	Time	Manual	Data logger
10/29	12:51	2.04	2.05
10/30	1523	2.10	2.08
10/31	0954	2.09	2.09
11/01	[illegible]	2.14	[illegible]
11/02	16:40	2.15	2.16
11/03	09:19	2.16	2.17
11/04	11:35	2.15	2.15
11/05	10:25	2.17	2.16
11/6	05:28	2.19	2.21

P-10X Water Levels

Date	Time	Manual	Data logger
10/29	12:30	7.11	7.09 reset ref
10/30	10:21	7.02	7.00
10/31	1243	7.06	7.02
11/01	0706	[illegible]	[illegible]
11/02	1720	7.10	7.[illegible]
11/3	09:33	7.10	~~7.0~~ 7.11
11/4	07:30	7.17	7.15
11/4	15:46	7.14	7.12
	pump up test start [illegible]		
	16:18:54	7.55	7.[illegible]
	16:33	7.64	7.[illegible] ~~7.64~~
	16:46	7.69	[illegible]
	16:59	7.74	7.71
	17:18	7.79	7.74
	17:44	7.85	7.82
	18:[illegible]6	7.8[illegible]	7.[illegible]
	18:43	7.[illegible]	7.90
	19:24	7.[illegible]	[illegible]

		P-108 Manual	Data Logger	
11/4	20:10	~~7~~ 8.02	7.99	
	21:39	8.10	8.06	reset ref
	22:08	—	8.11	
11/5	00:??	?.20	?.??	
	02:06	7.72	7.72	
	07:14	7.45	7.45	
	12:17	7.42	7 43	
	1400	7 34	7 35	
	16:30	~~7.34~~ 7.33	7.34	
	19:31	7.31	7.33	
11/6	05:40	7.27	7.29	
	12:30	7.26		

P-102 water Levels

Date	Time	Level
10/30	1106	5.83
10/31	1335	5.85
11/01	1018	5.88
11/02	18:00	5.89
11/03	11:42	5.85
11/4	12:03	5.86
11/05	1352	5.92

P-104 Water Level

Date	Time	Level
10/30	1051	6.29
10/31	1323	6.34
11/01	1011	6.37
11/02	1552	6.42
11/03	11:38	6.41
11/04	12:01	6.42
11/05	13:45	6.46

P-105 Water levels

Date	Time	Level
10/30	1157	1.36
10/31	1048	1.38
11/01	0754	1.42
11/02	15:30	1.43
11/03	10:53	1.44
11/04	10:25	1.48
11/05	9:20	1.51

MW-35 Water Level:

Date	Time	Level
10/30	1055	5.61
10/31	1329	5.63
11/01	1014	5.69
11/02	1758	5.65
11/03	1141	5.59
11/04	1205	5.59
11/05	1350	5.69

MW-3D Water level

Date	Time	Level
10/30	1057	5.64
10/31	1331	5.65
11/01	1015	5.72
11/02	12:49	5.71
11/03	11:41	5.62
11/04	12:05	5.63
11/05	13:50	5.73

MW-45 water levels

Date	Time	Level
10/30	1126	3.41
10/31	1119	3.44
11/01	0746	3.48
11/02	15:07	3.50
11/03	11:20	3.47
11/04	10:15	3 5'
11/05	9:12	3.53

MW-4D Water Level

Date	Time	Level	
10/30	1134	3.27	well not located from [illegible]
10/31	1120	3.36	"
11/01	0[illegible]	3.3[illegible]	
11/02	15:11	3.37	
11/03	11:20	3.34	
11/04	10:15	3 34	
11/05	912	3 38	

MW-5S WATER Levels

Date	Time	Level
10/30	10:33	6.58
10/31	1303	6.34
11/01	0958	6.42
11/02	11:18	6.65
11/03	11:29	6.63
11/04	11:55	6.58
11/05	13:40	6.33

MW-5D Water Levels

Date	Time	Level
10/30	10:34	7.16
10/31	1311	6.92
11/01	1000	7.07
11/02	1738	7.22
11/03	11:29	7.24
11/04	11:55	7.17
11/05	1340	6.94

MW-6S Water Level

Date	Time	Level
10/30	1039	6.79
10/31	1314	6.67
11/01	1002	6.77
11/02	1747	6.85
11/03	11:33	6.84
11/04	11:50	6.81
11/05	1340	6.70

MW-6D Water Levels

Date	Time	Level
10/30	1041	6.90
10/31	1316	6.78
11/01	1004	6.88
11/02	17.43	6.96
11/03	11:33	6.95
11/04	11:58	6.92
11/05	1390	6.87

MW-7S water level

Date	Time	Level
10/30	1102	4.91
10/31	1339	4.93
11/01	1021	4.95
11/02	18:06	4.94
11/03	11:47	4.96
11/4	12:00	4.99
11/05	1354	5.03

MW-7D water levels

Date	Time	Level
10/30	1104	5.34
10/31	1340	~~4.93~~ 5.36
11/01	1032	5.41
11/02	1806	5.42
11/03	11:47	5.39
11/4	11:59	5.43
11/05	1351	5.47

MW-8S Water Level

Date	Time	Level
10/30	1142	4.09
10/31	1109	4.12
11/01	644	4.15
11/02	15:21	4.17
11/03	11:08	4.15
11/04	10:20	4.18
11/05	9.17	4.20

MW-8D Water Level Data

Date	Time	Level
10/30	1143	3.79
10/31	1111	3.82
11/01	0647	3.85
11/02	1412	3.87
11/03	11:08	3.85
11/04	10:70	3.88
11/05	9:19	3.90

MW-11S Water Levels

Date	Time	Level
10/30	1511	5.66
10/31	1000	5.65
11/01	0833	5.67
11/02	1525	[illegible]
11/03	09:36	5.64
11/04	11:49	5.64
11/05	1037	5.65

MW 11D Water Level

Date	Time	Level
10/30	1513	5.81
10/31	1003	5.79
11/01	[illegible]	[illegible]
11/02	1823	[illegible]
11/03	9:36	5.78
11/04	11:49	5.79
11/05	10:37	5.79

MW-12S (upper zone)

Date	Time	Level
10/30	1202	3.54
10/31	1059	3.57
11/01	0758	[illegible]
11/02	1532	3.59
11/03	11:00	3.60
11/04	10:30	3.64
11/05	925	3.66

MW-12D

Date	Time	Level
10/30	1204	3.53
10/31	1100	3.54
11/01	0759	3.[illegible]
11/02	15:34	3.57
11/03	11:m	3.58
11/04	10:30	3.61
11/04	925	3.64

MW-13S water level (ft)

Date	Time	Level
10/30	1300	4.40
10/31	1040	4.41
11/01	0806	4.41
11/02	15:39	4.42
11/03	10:45	4.41
11/04	10:37	4.47
11/05	9:34	4.49

	MW-13D Water Level	
Date	Time	Level
10/30	1303	4.57
10/31	1041	4.42
11/01	0806	4.40
11/02	1542	4.41
11/03	10:45	4.43
11/04	10:37	4.46
11/05	934	4.49

	MW-145	Water Level
Date	Time	Level
10/30	1410	1.35
10/31	1030	1.33
11/01	0815	1.35
11/02	1553	1.36
11/03	1038	1.37
11/04	10:45	1.40
11/05	940	1.42

	MW-14D Water Level	
Date	Time	Level
10/30	1433	1.48
10/31	1028	1.46
11/01	0817	1.46
11/02	15 55	1.47
11/03	10 38	1.48
11/04	1045	1.52
11/05	9 40	153

MW-15S Water Level Data

Date	Time	Level
10/30	no reading	
10/31	1014	2.66
11/01	0827	2.72
11/02	1634	2.67
11/03	0944	2.63
11/04	1126	2.60
11/05	1020	2.67

	MW-15D		Water Levels
Date	Time	Level	
10/30	No Reading.		
10/31	1016	2.73	
11/01	0922	2.79	
11/02	1635	2.74	
11/03	0944	2.70	
11/04	1126	2.69	
11/05	1020	2.74	

EPA WELL B-1 W-13

Date	Time	Level
10/30	1544	4.98
10/31	1129	5.01
11/01	[illegible]	[illegible]
11/02	16:06	5.02
11/03	09 50	4.99
11/04	10·55	5.1
11/05	950	5.03

	EPA	Well	Z-2	W-17
Date	Time	level		
10/30	1548	3.17		
10/31	1132	3.22		
11/01	0855	3.[illegible]		
11/02	1609	3.18		
11/03	0950	3.16		
11/04	10:55	3.19		
11/05	956	3.20		

EPA well Z-8 W2C

Date	Time	Level
10/30	1552	4.23
10/31	1135	4.07
11/01	0700	4.07
11/02	16:15	4.10
11/03	07:50	4.08
11/04	11:02	4.10
11/05	956	4.10

EPA Well Z-7 W2B

Date	Time	Level
10/30	1552	4.14
10/31	1136	3.97
11/01	[illegible]	[illegible]
11/02	16:15	3.99
11/03	09:50	3.97
11/04	11:02	3.99
11/05	9:56	3.91

EPA well E-10 W2A

Date	Time	level
10/30	1554	3.60
10/31	1137	3.41
[illegible]	[illegible]	
11/02	16:15	3.45
11/03	[illegible]	3.13
11/04	[illegible]	3.44
11/05	956	3.43

	EPA	Green	EAST	W4C
Date	Time	Level		
10/30	1607	3.84		
10/31	1151	3.67		
11/01	0930	3.70		
11/02	10.25	3.7[illegible]		
11/03	10 12	3.65		
11/04	11:12	3.66		
11/05	1005	3.68		

	EPA	well	Oregon Middle
			W4B
Date	Time	level	
10/30	1608	3.83	
10/31	1154	3.65	
11/01	07:31	3.57	
11/02	1625	3.68	
11/03	10:12	3.64	
11/04	11:12	3.66	
11/05	10:05	3.66	

ERA Well Green West

W4N

Date	Time	Level
10/30	1609	3.85
10/31	1155	3.65
11/01	0932	3.70
11/02	16:25	3.70
11/03	10:12	3.64
11/04	11:12	3.62
11/05	10:05	3.69

EPA Well NSSD Well

Top [illegible]

W-5

Date	Time	Level
10/30	1614	6.85
10/31	1200	6.78
11/01	0936	6.83
11/02	16:26	6.84
11/03	10 12	6.72
11/04	11:18	6 72
11/05	10:10	6.80

EPA Well OMC North Plant #2
West By Fence

W-6

Date	Time	Level
10/30	1618	~~7.10~~ 7.01
10/31	1204	6.99
11/01	0940	7.03
11/02	16:30	7.01
11/03	10:20	6.95
11/04	11:22	6.94
11/05	1053	6.97

STAFF Gauge 1

Central North Ditch.

Date	Time	Level
10/30	1603	1.25
10/31	1146	1.47
11/01	0905	1.45
11/02	16:24	1.42
11/03	10 07	1.44
11/04	11:16	1.43
11/05	1020	1.43

STAFF Guage 2 Eastern Leg of The North Dil

Date	Time	Level
10/30	1557	1.33
10/31	1141	1.55
11/01	0904	1.52
11/02	No	reading
11/03	10:18	153
11/04	11:00	152
11/05	.1014	153

STAFF Gauge 3 By MW145 & MW140

Date	Time	Level
10/30	1621	1.48
10/31	1126	1.36
11/01	0822	1.37
11/02	16:04	1.30
11/03	9:45	1.30
11/04	10.50	130
11/05	945	130

Rain Gauge I By Office Trailer

Date	Time	Level
10/30	0800	0.0
10/30	1700	0.1
10/31	1348	<0.1"
11/01	1030	0.0
11/02	110	reading
11/03	1400	0.1"
11/04	8:10	0.00
11/05	840	0.0
11/6	09:31	trace

Rain Gauge 2

By Pumping Well

Date	Time	Level
10/30	0800	0.0
10/30	1700	0.06
10/31	1242	.02
11/01	0704	.02
11/3	07:30	0.00
11/4	07:30	0.00
11/05	08 50	0.0
11/6	07:31	0.00"

Tar Pit well MW-1
(TPW)

Date	Time	Level
11/03	8:40	6.67
11/04	4:40	6.69
11/05	10 54	6.72

Tar Pit Well (TPW)
MW-2

Date	Time	level
11/03	8:45	7.18
11/04	9 41	7 19
11/05	7.22	7.22

Tar Pit Well (TPW)
MW-3

Date	Time	level
11/03	8:35	6.81
11/04	8 56	7 E1
11/05	10:45	6 88

Tar Pit Well (TPW)

MW-41

Date	Time	Level
11/03	8:38	5.92
11/04	9:30	5.91
11/05	1050	5.97

MW-41D

Date	Time	Level
11/03	08:39	5.91
11/04	9:35	5.90
11/05	1050	5.86

NSSD PONDS SW Corners

North Pond

Date	Time	Level	
11/4	08:56	1095	pond dry
11/05	11:20	10.97	"

Middle Pond

Date	Time	Level	
11/04	08:59	1097	pond dry
11/05	11:22	10.99	

South Pond

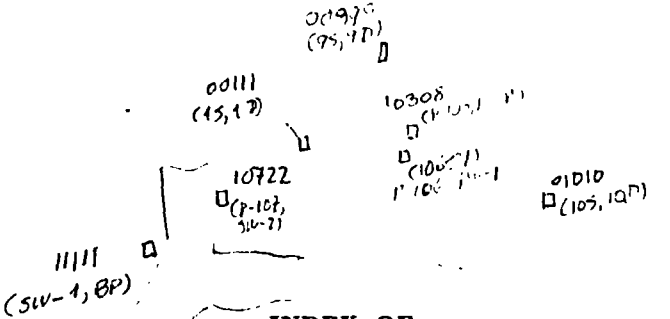
Date	Time	Level	
11/04	09:03	1092	pond dry
11/05	1125	10.95	

Tar Pit Well (TPW)

"EPA Well" Well with threaded cap that looks similar to TPW Well's size etc. "EPA Well" is located in SW part of Tar Pit site

Date	Time	BTOC Level	BTOPC Level
11/03	850	6.64	7.75
11/04	9:37	6.50	728
11/05	11:00		7 31

DATE	TIME	HERMIT	TEST/STEP	INPUT	FILE
11/3/93	10:31 CST	11111	0/0	1	batteryclo ~~[illegible]~~
11/4/93	7:24 CST	10601	2/2	2	P1STPREC
			2/2	1	~~103STREC~~.



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APPENDIX 4J-2

TEST ANALYSIS INPUT FILES

Extraction Well PW-1 Aquifer Test Analysis Input Files

PW-1 Step Recover

pwrate
3.14
radius
0.25
trecov
232
tsdata

0.01	18.95	1
0.02	18.94	1
0.03	18.93	1
0.05	18.93	1
0.07	18.91	1
0.08	18.92	1
0.1	18.91	1
0.12	18.9	1
0.13	18.9	1
0.22	18.43	1
0.3	16.64	1
0.38	15.13	1
0.47	13.75	1
0.55	12.46	1
0.63	11.27	1
0.72	10.18	1
0.8	9.2	1
0.88	8.32	1
0.97	7.55	1
1.05	6.83	1
1.13	6.24	1
1.22	5.69	1
1.3	5.18	1
1.38	4.74	1
1.47	4.34	1
1.55	3.99	1
1.63	3.67	1
1.72	3.38	1
1.8	3.13	1
2.3	2.14	1
2.8	1.62	1
3.3	1.34	1
3.8	1.15	1
4.3	1.06	1
4.8	0.98	1
5.3	0.96	1
5.8	0.92	1
6.3	0.88	1
6.8	0.87	1
7.3	0.84	1
7.8	0.84	1
8.3	0.8	1
8.8	0.81	1
9.3	0.78	1
9.8	0.78	1
11.8	0.75	1
13.8	0.71	1
15.8	0.66	1
17.8	0.66	1
19.8	0.64	1
21.8	0.61	1
23.8	0.59	1
25.8	0.57	1
27.8	0.56	1
29.8	0.55	1
31.8	0.54	1
33.8	0.52	1
35.8	0.52	1
37.8	0.5	1
39.8	0.49	1
41.8	0.49	1
43.8	0.47	1
45.8	0.46	1
47.8	0.45	1
49.8	0.44	1
51.8	0.44	1

PW-1 Recovery from Pumping

pwrate
3.29
radius
0.25
trecov
543.00
tsdata

0	19.76	1
0.02	19.68	1
0.03	19.65	1
0.05	18.88	1
0.07	18.6	1
0.08	18.32	1
0.17	16.94	1
0.25	15.7	1
0.33	14.74	1
0.42	13.5	1
0.5	12.33	1
0.58	11.26	1
0.67	10.29	1
0.75	9.41	1
0.83	8.61	1
0.92	7.91	1
1	7.29	1
1.08	6.7	1
1.17	6.2	1
1.25	5.72	1
1.33	5.31	1
1.42	4.96	1
1.5	4.6	1
1.58	4.29	1
1.67	4.03	1
1.75	3.79	1
2.25	2.78	1
2.75	2.22	1
3.25	1.91	1
3.75	1.74	1
4.25	1.63	1
4.75	1.56	1
5.25	1.49	1
5.75	1.46	1
6.25	1.42	1
6.75	1.41	1
7.25	1.39	1
7.75	1.36	1
8.25	1.35	1
8.75	1.34	1
9.25	1.32	1
9.75	1.28	1
11.75	1.26	1
13.75	1.21	1
15.75	1.18	1
17.75	1.15	1
19.75	1.11	1
21.75	1.09	1
23.75	1.07	1
25.75	1.05	1
27.75	1.03	1
29.75	1	1
31.75	0.99	1
33.75	0.98	1
35.75	0.95	1
37.75	0.95	1
39.75	0.93	1
41.75	0.92	1
43.75	0.91	1
45.75	0.89	1
47.75	0.88	1
49.75	0.87	1
51.75	0.86	1
53.75	0.85	1
55.75	0.84	1
57.75	0.84	1

53.8	0.43	1	59.75	0.83	1
55.8	0.43	1	61.75	0.81	1
57.8	0.42	1	63.75	0.81	1
59.8	0.42	1	65.75	0.81	1
61.8	0.42	1	67.75	0.8	1
63.8	0.4	1	69.75	0.79	1
65.8	0.4	1	71.75	0.78	1
67.8	0.39	1	73.75	0.77	1
69.8	0.4	1	75.75	0.77	1
71.8	0.37	1	77.75	0.76	1
73.8	0.37	1	79.75	0.76	1
75.8	0.37	1	81.75	0.74	1
77.8	0.36	1	83.75	0.74	1
79.8	0.35	1	85.75	0.73	1
81.8	0.36	1	87.75	0.72	1
83.8	0.35	1	89.75	0.73	1
85.8	0.35	1	91.75	0.71	1
87.8	0.35	1	93.75	0.71	1
89.8	0.33	1	95.75	0.71	1
91.8	0.32	1	97.75	0.7	1
93.8	0.32	1	99.75	0.69	1
95.8	0.32	1	109.75	0.67	1
97.8	0.32	1	119.75	0.64	1
99.8	0.32	1	129.75	0.62	1
109.8	0.3	1	139.75	0.6	1
119.8	0.29	1	149.75	0.58	1
129.8	0.28	1	159.75	0.56	1
139.8	0.26	1	169.75	0.55	1
149.8	0.26	1	179.75	0.52	1
159.8	0.23	1	189.75	0.51	1
169.8	0.23	1	199.75	0.5	1
179.8	0.23	1	209.75	0.49	1
189.8	0.22	1	219.75	0.49	1
199.8	0.21	1	229.75	0.48	1
209.8	0.21	1	239.75	0.46	1
219.8	0.21	1	249.75	0.45	1
229.8	0.19	1	259.75	0.43	1
239.8	0.19	1	269.75	0.43	1
249.8	0.18	1	279.75	0.42	1
259.8	0.16	1	289.75	0.41	1
269.8	0.17	1	299.75	0.41	1
279.8	0.15	1	309.75	0.39	1
289.8	0.16	1	319.75	0.39	1
299.8	0.15	1	329.75	0.38	1
309.8	0.16	1	339.75	0.38	1
319.8	0.16	1	349.75	0.38	1
329.8	0.14	1	359.75	0.37	1
339.8	0.15	1	369.75	0.36	1
349.8	0.14	1	379.75	0.36	1
359.8	0.14	1	389.75	0.35	1
369.8	0.12	1	399.75	0.35	1
379.8	0.12	1	409.75	0.35	1
389.8	0.12	1	419.75	0.33	1
399.8	0.11	1	429.75	0.33	1
409.8	0.13	1	439.75	0.34	1
419.8	0.12	1	449.75	0.32	1
429.8	0.1	1	459.75	0.32	1
439.8	0.1	1	469.75	0.32	1
449.8	0.12	1	479.75	0.31	1
459.8	0.1	1	489.75	0.31	1
469.8	0.12	1	499.75	0.3	1
479.8	0.12	1	509.75	0.3	1
489.8	0.11	1	519.75	0.3	1
499.8	0.11	1	529.75	0.3	1
509.8	0.11	1	539.75	0.3	1
519.8	0.08	1	549.75	0.29	1
529.8	0.08	1	559.75	0.29	1
539.8	0.1	1	569.75	0.29	1
549.8	0.08	1	579.75	0.29	1
559.8	0.08	1	589.75	0.29	1
569.8	0.08	1	599.75	0.28	1
579.8	0.1	1	609.75	0.27	1
589.8	0.08	1	619.75	0.28	1
599.8	0.1	1	629.75	0.27	1
609.8	0.09	1	639.75	0.27	1
619.8	0.1	1	649.75	0.29	1
629.8	0.08	1	659.75	0.26	1
639.8	0.07	1	669.75	0.26	1
649.8	0.08	1	679.75	0.26	1
659.8	0.07	1	689.75	0.26	1

669.8	0.07	1	699.75	0.26	1
679.8	0.07	1	709.75	0.25	1
689.8	0.07	1	719.75	0.25	1
699.8	0.07	1	729.75	0.25	1
709.8	0.07	1	739.75	0.25	1
719.8	0.06	1	749.75	0.24	1
729.8	0.06	1	759.75	0.25	1
739.8	0.07	1	769.75	0.25	1
749.8	0.06	1	779.75	0.24	1
759.8	0.06	1	789.75	0.24	1
769.8	0.06	1	799.75	0.24	1
779.8	0.07	1	809.75	0.24	1
789.8	0.05	1	819.75	0.25	1
799.8	0.07	1	829.75	0.24	1
809.8	0.07	1	839.75	0.24	1
819.8	0.06	1	849.75	0.22	1
829.8	0.05	1	859.75	0.22	1
839.8	0.06	1	869.75	0.24	1
849.8	0.05	1	879.75	0.23	1
859.8	0.06	1	889.75	0.23	1
899.8	0.06	1	899.75	0.23	1
939.8	0.07	1	909.75	0.23	1
969.8	0.05	1	919.75	0.22	1
999.8	0.06	1	929.75	0.22	1
1099.8	0.05	1	939.75	0.21	1
1179.8	0.03	1	949.75	0.22	1
1229.8	0.03	1	959.75	0.22	1
1279.8	0.05	1	969.75	0.22	1
			979.75	0.23	1
			989.75	0.22	1
			999.75	0.22	1
			1009.8	0.22	1
			1019.8	0.22	1
			1029.8	0.22	1
			1039.8	0.22	1
			1049.8	0.21	1
			1059.8	0.21	1
			1069.8	0.2	1
			1079.8	0.21	1
			1089.8	0.21	1
			1099.8	0.2	1
			1109.8	0.22	1
			1119.8	0.19	1
			1129.8	0.2	1
			1139.8	0.2	1
			1149.8	0.21	1
			1159.8	0.2	1
			1169.8	0.21	1
			1179.8	0.2	1
			1189.8	0.2	1
			1199.8	0.2	1
			1209.8	0.2	1
			1219.8	0.2	1
			1229.8	0.2	1
			1239.8	0.2	1
			1249.8	0.19	1
			1259.8	0.18	1
			1269.8	0.19	1
			1279.8	0.2	1
			1289.8	0.18	1
			1299.8	0.19	1
			1309.8	0.19	1
			1319.8	0.18	1
			1329.8	0.19	1
			1339.8	0.19	1
			1349.8	0.2	1
			1359.8	0.18	1
			1369.8	0.18	1
			1379.8	0.2	1
			1389.8	0.18	1
			1399.8	0.19	1
			1409.8	0.18	1
			1419.8	0.18	1
			1429.8	0.18	1
			1439.8	0.18	1
			1449.8	0.18	1
			1459.8	0.18	1
			1469.8	0.18	1
			1479.8	0.18	1
			1489.8	0.18	1

1499.8	0.18	1
1509.8	0.17	1
1519.8	0.17	1
1529.8	0.18	1
1539.8	0.17	1
1549.8	0.17	1
1559.8	0.18	1
1569.8	0.17	1
1579.8	0.17	1
1589.8	0.17	1
1599.8	0.17	1
1609.8	0.17	1
1619.8	0.17	1
1629.8	0.17	1
1639.8	0.17	1
1649.8	0.18	1
1659.8	0.17	1
1669.8	0.17	1
1679.8	0.17	1
1689.8	0.18	1
1699.8	0.17	1
1709.8	0.18	1
1719.8	0.17	1
1729.8	0.16	1
1739.8	0.16	1
1749.8	0.17	1
1759.8	0.15	1
1769.8	0.17	1
1779.8	0.15	1
1789.8	0.17	1
1799.8	0.16	1
1809.8	0.17	1
1819.8	0.17	1
1829.8	0.17	1
1839.8	0.18	1
1849.8	0.17	1

Piezometer P-103 Aquifer Test Analysis Input Files

P-103 Step Recove
pwrate
3.14
radius
22.7
trecov
232
tsdata

0.01	0.9	1
0.01	0.9	1
0.02	0.9	1
0.02	0.9	1
0.02	0.9	1
0.03	0.9	1
0.03	0.9	1
0.03	0.9	1
0.04	0.9	1
0.04	0.9	1
0.04	0.9	1
0.05	0.9	1
0.05	0.9	1
0.05	0.9	1
0.06	0.9	1
0.06	0.9	1
0.06	0.9	1
0.07	0.9	1
0.07	0.9	1
0.07	0.9	1
0.08	0.9	1
0.08	0.9	1
0.08	0.9	1
0.09	0.9	1
0.09	0.9	1
0.09	0.9	1
0.1	0.9	1
0.1	0.9	1
0.1	0.9	1
0.11	0.9	1
0.11	0.9	1
0.11	0.9	1
0.12	0.9	1
0.12	0.9	1
0.12	0.9	1
0.13	0.9	1
0.13	0.9	1
0.13	0.9	1
0.14	0.9	1
0.14	0.9	1
0.14	0.9	1
0.16	0.9	1
0.18	0.9	1
0.19	0.9	1
0.21	0.9	1
0.23	0.9	1
0.24	0.9	1
0.26	0.9	1
0.28	0.9	1
0.29	0.9	1
0.31	0.9	1
0.33	0.9	1
0.34	0.9	1
0.36	0.9	1

P-103 Pumping Pha
pwrate
3.29
radius
22.700
sthick
25.5
tsdata

0.19	0.01	1
0.19	0.01	1
0.20	0.01	1
0.20	0.01	1
0.20	0.01	1
0.21	0.01	1
0.21	0.01	1
0.21	0.01	1
0.22	0.01	1
0.23	0.01	1
0.25	0.01	1
0.27	0.01	1
0.28	0.01	1
0.30	0.01	1
0.32	0.02	1
0.33	0.02	1
0.35	0.02	1
0.37	0.02	1
0.38	0.02	1
0.40	0.03	1
0.42	0.03	1
0.43	0.03	1
0.45	0.03	1
0.47	0.04	1
0.48	0.04	1
0.50	0.03	1
0.52	0.04	1
0.53	0.04	1
0.55	0.04	1
0.57	0.05	1
0.58	0.04	1
0.60	0.04	1
0.62	0.05	1
0.63	0.05	1
0.65	0.05	1
0.67	0.05	1
0.68	0.06	1
0.70	0.07	1
0.72	0.06	1
0.73	0.07	1
0.75	0.06	1
0.77	0.06	1
0.78	0.07	1
0.80	0.07	1
0.82	0.07	1
0.83	0.08	1
0.85	0.08	1
0.87	0.08	1
0.88	0.08	1
1.08	0.1	1
1.28	0.12	1
1.48	0.13	1
1.68	0.14	1
1.88	0.15	1

P-103 Recovery from Pumpin
pwrate
3.29
radius
22.7
trecov
543
tsdata

0	1.32	1
0.2	1.31	1
0.4	1.31	1
0.6	1.3	1
0.8	1.29	1
1	1.28	1
1.2	1.26	1
1.4	1.25	1
1.6	1.24	1
1.8	1.23	1
2	1.22	1
2.2	1.21	1
2.4	1.21	1
2.6	1.19	1
2.8	1.19	1
3	1.18	1
3.2	1.17	1
3.4	1.16	1
3.6	1.16	1
3.8	1.15	1
4	1.15	1
4.2	1.15	1
4.4	1.14	1
4.6	1.14	1
4.8	1.13	1
5	1.13	1
5.2	1.12	1
5.4	1.12	1
5.6	1.11	1
5.8	1.11	1
6	1.1	1
6.2	1.1	1
6.4	1.1	1
6.6	1.1	1
6.8	1.09	1
7	1.09	1
7.2	1.08	1
7.4	1.08	1
7.6	1.08	1
7.8	1.08	1
8	1.07	1
8.2	1.07	1
8.4	1.07	1
8.6	1.06	1
8.8	1.06	1
9	1.06	1
11	1.03	1
13	1.01	1
15	1	1
17	0.98	1
19	0.96	1
21	0.95	1
23	0.93	1
25	0.92	1

0.38	0.9	1	2.08	0.16	1	27	0.91	1
0.39	0.9	1	2.28	0.17	1	29	0.9	1
0.41	0.9	1	2.48	0.18	1	31	0.89	1
0.43	0.9	1	2.68	0.18	1	33	0.88	1
0.44	0.9	1	2.88	0.19	1	35	0.87	1
0.46	0.91	1	3.08	0.19	1	37	0.86	1
0.48	0.9	1	3.28	0.2	1	39	0.85	1
0.49	0.9	1	3.48	0.21	1	41	0.84	1
0.51	0.9	1	3.68	0.21	1	43	0.83	1
0.53	0.9	1	3.88	0.22	1	45	0.83	1
0.54	0.9	1	4.08	0.23	1	47	0.82	1
0.56	0.89	1	4.28	0.23	1	49	0.81	1
0.58	0.89	1	4.48	0.23	1	51	0.8	1
0.59	0.9	1	4.68	0.24	1	53	0.8	1
0.61	0.89	1	4.88	0.25	1	55	0.79	1
0.63	0.89	1	5.08	0.25	1	57	0.79	1
0.64	0.89	1	5.28	0.26	1	59	0.78	1
0.66	0.89	1	5.48	0.26	1	61	0.77	1
0.68	0.89	1	5.68	0.26	1	63	0.77	1
0.69	0.89	1	5.88	0.27	1	65	0.76	1
0.71	0.89	1	6.08	0.27	1	67	0.76	1
0.73	0.89	1	6.28	0.27	1	69	0.75	1
0.74	0.89	1	6.48	0.28	1	71	0.75	1
0.76	0.89	1	6.68	0.28	1	73	0.74	1
0.78	0.89	1	6.88	0.29	1	75	0.73	1
0.79	0.88	1	7.08	0.29	1	77	0.73	1
0.81	0.88	1	7.28	0.3	1	79	0.72	1
1.01	0.86	1	7.48	0.3	1	81	0.72	1
1.21	0.86	1	7.68	0.3	1	83	0.71	1
1.41	0.84	1	7.88	0.31	1	85	0.71	1
1.61	0.83	1	8.08	0.31	1	87	0.7	1
1.81	0.82	1	8.28	0.31	1	89	0.7	1
2.01	0.8	1	8.48	0.32	1	91	0.69	1
2.21	0.79	1	8.68	0.32	1	93	0.69	1
2.41	0.78	1	8.88	0.32	1	95	0.68	1
2.61	0.77	1	9.08	0.32	1	97	0.68	1
2.81	0.76	1	9.28	0.33	1	99	0.67	1
3.01	0.76	1	9.48	0.33	1	109	0.66	1
3.21	0.75	1	9.68	0.33	1	119	0.64	1
3.41	0.74	1	9.88	0.34	1	129	0.62	1
3.61	0.73	1	11.88	0.37	1	139	0.6	1
3.81	0.73	1	13.88	0.39	1	149	0.59	1
4.01	0.72	1	15.88	0.41	1	159	0.57	1
4.21	0.71	1	17.88	0.42	1	169	0.56	1
4.41	0.71	1	19.88	0.45	1	179	0.54	1
4.61	0.71	1	21.88	0.47	1	189	0.53	1
4.81	0.7	1	23.88	0.48	1	199	0.52	1
5.01	0.7	1	25.88	0.5	1	209	0.5	1
5.21	0.69	1	27.88	0.51	1	219	0.49	1
5.41	0.69	1	29.88	0.53	1	229	0.48	1
5.61	0.68	1	31.88	0.52	1	239	0.47	1
5.81	0.68	1	33.88	0.54	1	249	0.46	1
6.01	0.68	1	35.88	0.56	1	259	0.45	1
6.21	0.67	1	37.88	0.57	1	269	0.44	1
6.41	0.67	1	39.88	0.58	1	279	0.44	1
6.61	0.67	1	41.88	0.6	1	289	0.43	1
6.81	0.66	1	43.88	0.61	1	299	0.42	1
7.01	0.66	1	45.88	0.62	1	309	0.41	1
7.21	0.66	1	47.88	0.63	1	319	0.41	1
7.41	0.65	1	49.88	0.64	1	329	0.4	1
7.61	0.65	1	51.88	0.65	1	339	0.39	1
7.81	0.65	1	53.88	0.66	1	349	0.39	1
8.01	0.65	1	55.88	0.67	1	359	0.38	1
8.21	0.65	1	57.88	0.66	1	369	0.37	1

8.41	0.64	1	59.88	0.68	1	379	0.36	1
8.61	0.64	1	61.88	0.69	1	389	0.36	1
8.81	0.63	1	63.88	0.7	1	399	0.35	1
9.01	0.63	1	65.88	0.71	1	409	0.35	1
9.21	0.63	1	67.88	0.71	1	419	0.34	1
9.41	0.63	1	69.88	0.72	1	429	0.34	1
9.61	0.63	1	71.88	0.73	1	439	0.33	1
9.81	0.62	1	73.88	0.74	1	449	0.33	1
11.81	0.61	1	75.88	0.74	1	459	0.33	1
13.81	0.59	1	77.88	0.74	1	469	0.32	1
15.81	0.57	1	79.88	0.76	1	479	0.31	1
17.81	0.56	1	81.88	0.76	1	489	0.31	1
19.81	0.55	1	83.88	0.77	1	499	0.31	1
21.81	0.53	1	85.88	0.78	1	509	0.31	1
23.81	0.52	1	87.88	0.79	1	519	0.3	1
25.81	0.51	1	89.88	0.79	1	529	0.3	1
27.81	0.51	1	91.88	0.8	1	539	0.29	1
29.81	0.5	1	93.88	0.81	1	549	0.29	1
31.81	0.49	1	95.88	0.81	1	559	0.29	1
33.81	0.48	1	97.88	0.82	1	569	0.28	1
35.81	0.47	1	99.88	0.82	1	579	0.28	1
37.81	0.46	1	109.88	0.85	1	589	0.28	1
39.81	0.46	1	119.88	0.88	1	599	0.28	1
41.81	0.45	1	129.88	0.89	1	609	0.27	1
43.81	0.44	1	139.88	0.91	1	619	0.27	1
45.81	0.44	1	149.88	0.93	1	629	0.27	1
47.81	0.44	1	159.88	0.95	1	639	0.26	1
49.81	0.43	1	169.88	0.96	1	649	0.26	1
51.81	0.42	1	179.88	0.98	1	659	0.26	1
53.81	0.42	1	189.88	1	1	669	0.26	1
55.81	0.41	1	199.88	1.01	1	679	0.25	1
57.81	0.4	1	209.88	1.02	1	689	0.25	1
59.81	0.4	1	219.88	1.03	1	699	0.25	1
61.81	0.4	1	229.88	1.05	1	709	0.25	1
63.81	0.39	1	239.88	1.06	1	719	0.25	1
65.81	0.39	1	249.88	1.08	1	729	0.24	1
67.81	0.38	1	259.88	1.08	1	739	0.24	1
69.81	0.38	1	269.88	1.1	1	749	0.24	1
71.81	0.37	1	279.88	1.11	1	759	0.24	1
73.81	0.37	1	289.88	1.12	1	769	0.24	1
75.81	0.37	1	299.88	1.13	1	779	0.23	1
77.81	0.36	1	309.88	1.14	1	789	0.23	1
79.81	0.36	1	319.88	1.15	1	799	0.23	1
81.81	0.36	1	329.88	1.16	1	809	0.23	1
83.81	0.35	1	339.88	1.16	1	819	0.23	1
85.81	0.35	1	349.88	1.18	1	829	0.23	1
87.81	0.35	1	359.88	1.19	1	839	0.23	1
89.81	0.34	1	369.88	1.2	1	849	0.22	1
91.81	0.34	1	379.88	1.21	1	859	0.22	1
93.81	0.34	1	389.88	1.22	1	869	0.22	1
95.81	0.33	1	399.88	1.22	1	879	0.22	1
97.81	0.33	1	409.88	1.23	1	889	0.22	1
99.81	0.33	1	419.88	1.24	1	899	0.22	1
109.81	0.31	1	429.88	1.25	1	909	0.22	1
119.81	0.3	1	439.88	1.26	1	919	0.21	1
129.81	0.29	1	449.88	1.27	1	929	0.21	1
139.81	0.28	1	459.88	1.27	1	939	0.21	1
149.81	0.27	1	469.88	1.28	1	949	0.21	1
159.81	0.26	1	479.88	1.29	1	959	0.21	1
169.81	0.25	1	489.88	1.29	1	969	0.21	1
179.81	0.24	1	499.88	1.29	1	979	0.21	1
189.81	0.23	1	509.88	1.31	1	989	0.21	1
199.81	0.23	1	519.88	1.31	1	999	0.21	1
209.81	0.22	1	529.88	1.32	1	1009	0.21	1

219.81	0.21	1	539.88	1.33	1	1019	0.21	1
229.81	0.21	1				1029	0.21	1
239.81	0.2	1				1039	0.2	1
249.81	0.19	1				1049	0.2	1
259.81	0.19	1				1059	0.2	1
269.81	0.18	1				1069	0.2	1
279.81	0.18	1				1079	0.2	1
289.81	0.17	1				1089	0.2	1
299.81	0.17	1				1099	0.2	1
309.81	0.17	1				1109	0.2	1
319.81	0.16	1				1119	0.2	1
329.81	0.16	1				1129	0.2	1
339.81	0.16	1				1139	0.19	1
349.81	0.15	1				1149	0.19	1
359.81	0.15	1				1159	0.19	1
369.81	0.15	1				1169	0.19	1
379.81	0.14	1				1179	0.19	1
389.81	0.14	1				1189	0.19	1
399.81	0.14	1				1199	0.18	1
409.81	0.14	1				1209	0.18	1
419.81	0.13	1				1219	0.18	1
429.81	0.13	1				1229	0.18	1
439.81	0.13	1				1239	0.18	1
449.81	0.12	1				1249	0.18	1
459.81	0.12	1				1259	0.18	1
469.81	0.12	1				1269	0.18	1
479.81	0.12	1				1279	0.18	1
489.81	0.11	1				1289	0.18	1
499.81	0.11	1				1299	0.18	1
509.81	0.11	1				1309	0.18	1
519.81	0.11	1				1319	0.18	1
529.81	0.11	1				1329	0.18	1
539.81	0.11	1				1339	0.18	1
549.81	0.1	1				1349	0.17	1
559.81	0.1	1				1359	0.18	1
569.81	0.1	1				1369	0.17	1
579.81	0.1	1				1379	0.17	1
589.81	0.1	1				1389	0.17	1
599.81	0.1	1				1399	0.17	1
609.81	0.09	1				1409	0.17	1
619.81	0.09	1				1419	0.17	1
629.81	0.09	1				1429	0.17	1
639.81	0.09	1				1439	0.17	1
649.81	0.09	1				1449	0.17	1
659.81	0.09	1				1459	0.17	1
669.81	0.09	1				1469	0.17	1
679.81	0.08	1				1479	0.17	1
689.81	0.08	1				1489	0.16	1
699.81	0.08	1				1499	0.17	1
709.81	0.08	1				1509	0.16	1
719.81	0.08	1				1519	0.16	1
729.81	0.08	1				1529	0.16	1
739.81	0.08	1				1539	0.16	1
749.81	0.08	1				1549	0.16	1
759.81	0.08	1				1559	0.16	1
769.81	0.08	1				1569	0.16	1
779.81	0.08	1				1579	0.16	1
789.81	0.08	1				1589	0.16	1
799.81	0.08	1				1599	0.16	1
809.81	0.08	1				1609	0.16	1
819.81	0.08	1				1619	0.16	1
829.81	0.07	1				1629	0.16	1
839.81	0.07	1				1639	0.16	1
849.81	0.07	1				1649	0.15	1

859.81	0.07	1
869.81	0.07	1
879.81	0.07	1
889.81	0.07	1
899.81	0.07	1
909.81	0.07	1
919.81	0.07	1
929.81	0.07	1
939.81	0.07	1
949.81	0.07	1
959.81	0.07	1
969.81	0.07	1
979.81	0.06	1
989.81	0.07	1
999.81	0.06	1
1009.8	0.06	1
1019.8	0.06	1
1029.8	0.06	1
1039.8	0.06	1
1049.8	0.06	1
1059.8	0.06	1
1069.8	0.06	1
1079.8	0.06	1
1089.8	0.06	1
1099.8	0.06	1
1109.8	0.06	1
1119.8	0.06	1
1129.8	0.05	1
1139.8	0.05	1
1149.8	0.05	1
1159.8	0.05	1
1169.8	0.05	1
1179.8	0.05	1
1189.8	0.05	1
1199.8	0.05	1
1209.8	0.05	1
1219.8	0.05	1
1229.8	0.05	1
1239.8	0.05	1
1249.8	0.05	1
1259.8	0.05	1
1269.8	0.04	1

1659	0.15	1
1669	0.15	1
1679	0.15	1
1689	0.15	1
1699	0.15	1
1709	0.15	1
1719	0.15	1
1729	0.15	1

Piezometer P-106 Aquifer Test Analysis Input Files

P-106 Step Recove

```
pwrate
      3.14
radius
      10.1
trecov
       232
tsdata
  0.01    2.36       1
  0.02    2.36       1
  0.03    2.36       1
  0.05    2.36       1
  0.07    2.36       1
  0.08    2.36       1
   0.1    2.35       1
  0.12    2.35       1
  0.13    2.35       1
  0.22    2.35       1
   0.3    2.35       1
  0.38    2.34       1
  0.47    2.31       1
  0.55     2.3       1
  0.63    2.26       1
  0.72    2.23       1
   0.8    2.18       1
  0.88    2.13       1
  0.97    2.07       1
  1.05    2.01       1
  1.13    1.96       1
  1.22     1.9       1
   1.3    1.84       1
  1.38    1.79       1
  1.47    1.73       1
  1.55    1.68       1
  1.63    1.63       1
  1.72    1.58       1
   1.8    1.54       1
   2.3    1.34       1
   2.8    1.19       1
   3.3    1.09       1
   3.8    1.02       1
   4.3    0.97       1
   4.8    0.93       1
   5.3    0.89       1
   5.8    0.88       1
   6.3    0.86       1
   6.8    0.84       1
   7.3    0.81       1
   7.8    0.81       1
   8.3     0.8       1
   8.8    0.78       1
   9.3    0.77       1
   9.8    0.77       1
  11.8    0.72       1
  13.8     0.7       1
  15.8    0.68       1
  17.8    0.65       1
  19.8    0.63       1
  21.8    0.61       1
  23.8     0.6       1
  25.8    0.59       1
  27.8    0.57       1
  29.8    0.56       1
  31.8    0.55       1
  33.8    0.53       1
  35.8    0.52       1
  37.8    0.51       1
  39.8     0.5       1
  41.8     0.5       1
  43.8    0.49       1
  45.8    0.48       1
  47.8    0.48       1
  49.8    0.47       1
  51.8    0.46       1
  53.8    0.45       1
  55.8    0.44       1
  57.8    0.44       1
  59.8    0.44       1
```

P-106 Pumping Phase

```
pwrate
      3.29
radius
      10.1
tsdata
    0.05    0.01     0.1
    0.07    0.03     0.1
    0.08    0.03     0.1
     0.1    0.03     0.1
    0.12    0.05     0.1
    0.13    0.04     0.1
    0.15    0.06     0.1
    0.17    0.07     0.1
    0.18    0.07     0.1
     0.2    0.08     0.1
    0.22    0.08     0.1
    0.23     0.1     0.1
    0.32    0.15     0.1
     0.4    0.21     0.1
    0.48    0.28     0.1
    0.57    0.35     0.1
    0.65    0.41     0.1
    0.73    0.47     0.1
    0.82    0.55     0.1
     0.9    0.61     0.1
    0.98    0.66     0.1
    1.07    0.72       1
    1.15    0.75       1
    1.23     0.8       1
    1.32    0.82       1
     1.4    0.87       1
    1.48    0.88       1
    1.57    0.91       1
    1.65    0.94       1
    1.73    0.96       1
    1.82    0.98       1
     1.9       1       1
     2.4     1.1       1
     2.9    1.18       1
     3.4    1.22       1
     3.9    1.27       1
     4.4    1.31       1
     4.9    1.34       1
     5.4    1.36       1
     5.9    1.38       1
     6.4    1.41       1
     6.9    1.41       1
     7.4    1.43       1
     7.9    1.45       1
     8.4    1.46       1
     8.9    1.46       1
     9.4    1.47       1
     9.9     1.5       1
    11.9    1.53       1
    13.9    1.56       1
    15.9    1.59       1
    17.9     1.6       1
    19.9    1.62       1
    21.9    1.65       1
    23.9    1.66       1
    25.9    1.68       1
    27.9    1.69       1
    29.9     1.7       1
    31.9    1.71       1
    33.9    1.72       1
    35.9    1.75       1
    37.9    1.77       1
    39.9    1.79       1
    41.9    1.84       1
    43.9    1.86       1
    45.9    1.88       1
    47.9    1.89       1
    49.9     1.9       1
    51.9    1.91       1
    53.9    1.92       1
    55.9    1.93       1
    57.9    1.94       1
```

P-106 Recovery from Pumpin

```
pwrate
      3.29
radius
      10.1
trecov
     543.00
tsdata
       0    2.59       1
    0.02     2.6       1
    0.03    2.59       1
    0.05    2.59       1
    0.07    2.59       1
    0.08    2.59       1
    0.17    2.58       1
    0.25    2.57       1
    0.33    2.55       1
    0.42    2.54       1
     0.5    2.52       1
    0.58     2.5       1
    0.67    2.47       1
    0.75    2.43       1
    0.83    2.39       1
    0.92    2.35       1
       1     2.3       1
    1.08    2.26       1
    1.17    2.21       1
    1.25    2.17       1
    1.33    2.12       1
    1.42    2.08       1
     1.5    2.03       1
    1.58    1.99       1
    1.67    1.95       1
    1.75    1.92       1
    2.25    1.73       1
    2.75    1.61       1
    3.25    1.51       1
    3.75    1.46       1
    4.25    1.41       1
    4.75    1.38       1
    5.25    1.34       1
    5.75    1.33       1
    6.25    1.31       1
    6.75    1.29       1
    7.25    1.27       1
    7.75    1.26       1
    8.25    1.25       1
    8.75    1.24       1
    9.25    1.22       1
    9.75    1.21       1
   11.75    1.17       1
   13.75    1.14       1
   15.75    1.12       1
   17.75    1.09       1
   19.75    1.06       1
   21.75    1.05       1
   23.75    1.02       1
   25.75    1.01       1
   27.75    0.99       1
   29.75    0.98       1
   31.75    0.96       1
   33.75    0.95       1
   35.75    0.93       1
   37.75    0.92       1
   39.75    0.91       1
   41.75     0.9       1
   43.75    0.89       1
   45.75    0.88       1
   47.75    0.86       1
   49.75    0.86       1
   51.75    0.86       1
   53.75    0.85       1
   55.75    0.83       1
   57.75    0.82       1
   59.75     0.8       1
   61.75    0.81       1
   63.75     0.8       1
   65.75    0.79       1
```

61.8	0.43	1	59.9	1.94	1	67.75	0.79	1
63.8	0.42	1	61.9	1.95	1	69.75	0.78	1
65.8	0.41	1	63.9	1.97	1	71.75	0.77	1
67.8	0.41	1	65.9	1.97	1	73.75	0.76	1
69.8	0.41	1	67.9	1.98	1	75.75	0.75	1
71.8	0.4	1	69.9	1.99	1	77.75	0.76	1
73.8	0.39	1	71.9	2	1	79.75	0.74	1
75.8	0.39	1	73.9	2.01	1	81.75	0.73	1
77.8	0.39	1	75.9	2.02	1	83.75	0.73	1
79.8	0.38	1	77.9	2.03	1	85.75	0.73	1
81.8	0.38	1	79.9	2.03	1	87.75	0.72	1
83.8	0.37	1	81.9	2.04	1	89.75	0.72	1
85.8	0.37	1	83.9	2.05	1	91.75	0.71	1
87.8	0.37	1	85.9	2.06	1	93.75	0.71	1
89.8	0.36	1	87.9	2.06	1	95.75	0.69	1
91.8	0.36	1	89.9	2.07	1	97.75	0.69	1
93.8	0.35	1	91.9	2.07	1	99.75	0.69	1
95.8	0.35	1	93.9	2.08	1	109.75	0.66	1
97.8	0.35	1	95.9	2.09	1	119.75	0.65	1
99.8	0.34	1	97.9	2.09	1	129.75	0.62	1
109.8	0.33	1	99.9	2.1	1	139.75	0.6	1
119.8	0.32	1	109.9	2.13	1	149.75	0.58	1
129.8	0.31	1	119.9	2.15	1	159.75	0.56	1
139.8	0.29	1	129.9	2.18	1	169.75	0.55	1
149.8	0.28	1	139.9	2.21	1	179.75	0.54	1
159.8	0.28	1	149.9	2.22	1	189.75	0.53	1
169.8	0.26	1	159.9	2.24	1	199.75	0.51	1
179.8	0.25	1	169.9	2.24	1	209.75	0.5	1
189.8	0.25	1	179.9	2.27	1	219.75	0.49	1
199.8	0.24	1	189.9	2.28	1	229.75	0.47	1
209.8	0.24	1	199.9	2.3	1	239.75	0.46	1
219.8	0.22	1	209.9	2.31	1	249.75	0.45	1
229.8	0.22	1	219.9	2.32	1	259.75	0.45	1
239.8	0.21	1	229.9	2.34	1	269.75	0.44	1
249.8	0.21	1	239.9	2.35	1	279.75	0.43	1
259.8	0.21	1	249.9	2.37	1	289.75	0.42	1
269.8	0.19	1	259.9	2.37	1	299.75	0.42	1
279.8	0.19	1	269.9	2.38	1	309.75	0.41	1
289.8	0.19	1	279.9	2.39	1	319.75	0.4	1
299.8	0.19	1	289.9	2.39	1	329.75	0.4	1
309.8	0.18	1	299.9	2.41	1	339.75	0.39	1
319.8	0.18	1	309.9	2.42	1	349.75	0.38	1
329.8	0.18	1	319.9	2.43	1	359.75	0.38	1
339.8	0.18	1	329.9	2.44	1	369.75	0.37	1
349.8	0.16	1	339.9	2.44	1	379.75	0.36	1
359.8	0.16	1	349.9	2.45	1	389.75	0.36	1
369.8	0.17	1	359.9	2.46	1	399.75	0.36	1
379.8	0.17	1	369.9	2.46	1	409.75	0.35	1
389.8	0.15	1	379.9	2.47	1	419.75	0.34	1
399.8	0.15	1	389.9	2.48	1	429.75	0.34	1
409.8	0.14	1	399.9	2.48	1	439.75	0.34	1
419.8	0.15	1	409.9	2.49	1	449.75	0.34	1
429.8	0.14	1	419.9	2.49	1	459.75	0.33	1
439.8	0.15	1	429.9	2.5	1	469.75	0.33	1
449.8	0.15	1	439.9	2.5	1	479.75	0.32	1
459.8	0.14	1	449.9	2.5	1	489.75	0.32	1
469.8	0.13	1	459.9	2.51	1	499.75	0.31	1
479.8	0.13	1	469.9	2.52	1	509.75	0.31	1
489.8	0.13	1	479.9	2.52	1	519.75	0.31	1
499.8	0.13	1	489.9	2.52	1	529.75	0.3	1
509.8	0.12	1	499.9	2.53	1	539.75	0.3	1
519.8	0.13	1	509.9	2.53	1	549.75	0.3	1
529.8	0.12	1	519.9	2.54	1	559.75	0.29	1
539.8	0.13	1	529.9	2.54	1	569.75	0.31	1
549.8	0.13	1				579.75	0.3	1
559.8	0.12	1				589.75	0.28	1
569.8	0.13	1				599.75	0.29	1
579.8	0.11	1				609.75	0.29	1
589.8	0.12	1				619.75	0.29	1
599.8	0.12	1				629.75	0.29	1
609.8	0.11	1				639.75	0.28	1
619.8	0.11	1				649.75	0.28	1
629.8	0.11	1				659.75	0.28	1
639.8	0.11	1				669.75	0.28	1
649.8	0.11	1				679.75	0.28	1
659.8	0.11	1				689.75	0.28	1
669.8	0.12	1				699.75	0.28	1
679.8	0.11	1				709.75	0.27	1
689.8	0.11	1				719.75	0.26	1
699.8	0.1	1				729.75	0.27	1

709.8	0.11	1
719.8	0.1	1
729.8	0.1	1
739.8	0.11	1
749.8	0.1	1
759.8	0.1	1
769.8	0.1	1
779.8	0.1	1
789.8	0.1	1
799.8	0.1	1
809.8	0.1	1
819.8	0.1	1
829.8	0.1	1
839.8	0.1	1
849.8	0.1	1
859.8	0.09	1
899.8	0.1	1
939.8	0.09	1
969.8	0.09	1
999.8	0.09	1
1099.8	0.07	1
1179.8	0.07	1
1229.8	0.07	1
1279.8	0.07	1

739.75	0.27	1
749.75	0.27	1
759.75	0.26	1
769.75	0.26	1
779.75	0.25	1
789.75	0.27	1
799.75	0.25	1
809.75	0.26	1
819.75	0.25	1
829.75	0.25	1
839.75	0.25	1
849.75	0.25	1
859.75	0.25	1
869.75	0.24	1
879.75	0.24	1
889.75	0.24	1
899.75	0.25	1
909.75	0.24	1
919.75	0.24	1
929.75	0.24	1
939.75	0.24	1
949.75	0.23	1
959.75	0.24	1
969.75	0.23	1
979.75	0.24	1
989.75	0.23	1
999.75	0.24	1
1009.8	0.23	1
1019.8	0.24	1
1029.8	0.23	1
1039.8	0.24	1
1049.8	0.23	1
1059.8	0.23	1
1069.8	0.23	1
1079.8	0.23	1
1089.8	0.23	1
1099.8	0.23	1
1109.8	0.22	1
1119.8	0.22	1
1129.8	0.22	1
1139.8	0.23	1
1149.8	0.23	1
1159.8	0.22	1
1169.8	0.23	1
1179.8	0.23	1
1189.8	0.22	1
1199.8	0.22	1
1209.8	0.22	1
1219.8	0.22	1
1229.8	0.22	1
1239.8	0.22	1
1249.8	0.21	1
1259.8	0.22	1
1269.8	0.21	1
1279.8	0.22	1
1289.8	0.22	1
1299.8	0.21	1
1309.8	0.21	1
1319.8	0.21	1
1329.8	0.21	1
1339.8	0.21	1
1349.8	0.21	1
1359.8	0.21	1
1369.8	0.21	1
1379.8	0.21	1
1389.8	0.21	1
1399.8	0.2	1
1409.8	0.21	1
1419.8	0.21	1
1429.8	0.21	1
1439.8	0.21	1
1449.8	0.2	1
1459.8	0.21	1
1469.8	0.2	1
1479.8	0.2	1
1489.8	0.2	1
1499.8	0.2	1
1509.8	0.2	1
1519.8	0.2	1
1529.8	0.2	1

1539.8	0.2	1
1549.8	0.2	1
1559.8	0.2	1
1569.8	0.2	1
1579.8	0.2	1
1589.8	0.2	1
1599.8	0.2	1
1609.8	0.2	1
1619.8	0.19	1
1629.8	0.2	1
1639.8	0.19	1
1649.8	0.2	1
1659.8	0.2	1
1669.8	0.19	1
1679.8	0.19	1
1689.8	0.19	1
1699.8	0.19	1
1709.8	0.19	1
1719.8	0.2	1
1729.8	0.19	1
1739.8	0.2	1
1749.8	0.2	1
1759.8	0.2	1
1769.8	0.19	1
1779.8	0.19	1
1789.8	0.19	1
1799.8	0.19	1
1809.8	0.19	1
1819.8	0.19	1
1829.8	0.19	1
1839.8	0.18	1
1849.8	0.19	1

Piezometer P-108 Aquifer Test Analysis Input Files

P-108 Step Recove			P-108 Pumping Pha			P-108 Recovery from Pumpin		
pwrate			pwrate			pwrate		
3.14			3.29			3.29		
radius			radius			radius		
31			31.000			31		
trecov			sthick			trecov		
232			25.5			543		
tsdata			tsdata			tsdata		
0.01	0.77	1	0.19	0	1	0	1.09	1
0.01	0.77	1	0.19	0	1	0.2	1.08	1
0.02	0.77	1	0.20	0	1	0.4	1.06	1
0.02	0.77	1	0.20	0	1	0.6	1.04	1
0.02	0.77	1	0.20	0	1	0.8	1.02	1
0.03	0.77	1	0.21	0	1	1	1	1
0.03	0.77	1	0.21	0	1	1.2	0.97	1
0.03	0.77	1	0.21	0	1	1.4	0.95	1
0.04	0.77	1	0.22	0	1	1.6	0.93	1
0.04	0.77	1	0.23	0	1	1.8	0.92	1
0.04	0.77	1	0.25	0.01	1	2	0.91	1
0.05	0.77	1	0.27	0.01	1	2.2	0.89	1
0.05	0.77	1	0.28	0.01	1	2.4	0.89	1
0.05	0.77	1	0.30	0.01	1	2.6	0.88	1
0.06	0.77	1	0.32	0.01	1	2.8	0.87	1
0.06	0.77	1	0.33	0.01	1	3	0.86	1
0.06	0.77	1	0.35	0.01	1	3.2	0.85	1
0.07	0.77	1	0.37	0.02	1	3.4	0.85	1
0.07	0.77	1	0.38	0.02	1	3.6	0.84	1
0.07	0.77	1	0.40	0.02	1	3.8	0.84	1
0.08	0.76	1	0.42	0.02	1	4	0.83	1
0.08	0.77	1	0.43	0.02	1	4.2	0.83	1
0.08	0.77	1	0.45	0.03	1	4.4	0.82	1
0.09	0.77	1	0.47	0.03	1	4.6	0.82	1
0.09	0.77	1	0.48	0.03	1	4.8	0.82	1
0.09	0.77	1	0.50	0.04	1	5	0.81	1
0.1	0.77	1	0.52	0.03	1	5.2	0.81	1
0.1	0.77	1	0.53	0.04	1	5.4	0.81	1
0.1	0.77	1	0.55	0.04	1	5.6	0.81	1
0.11	0.77	1	0.57	0.04	1	5.8	0.8	1
0.11	0.77	1	0.58	0.04	1	6	0.8	1
0.11	0.77	1	0.60	0.04	1	6.2	0.8	1
0.12	0.77	1	0.62	0.05	1	6.4	0.8	1
0.12	0.77	1	0.63	0.05	1	6.6	0.8	1
0.12	0.77	1	0.65	0.05	1	6.8	0.8	1
0.13	0.77	1	0.67	0.06	1	7	0.79	1
0.13	0.77	1	0.68	0.06	1	7.2	0.79	1
0.13	0.77	1	0.70	0.06	1	7.4	0.79	1
0.14	0.77	1	0.72	0.06	1	7.6	0.79	1
0.14	0.77	1	0.73	0.07	1	7.8	0.79	1
0.14	0.77	1	0.75	0.07	1	8	0.79	1
0.16	0.77	1	0.77	0.07	1	8.2	0.78	1
0.18	0.77	1	0.78	0.08	1	8.4	0.78	1
0.19	0.77	1	0.80	0.08	1	8.6	0.78	1
0.21	0.77	1	0.82	0.08	1	8.8	0.78	1
0.23	0.77	1	0.83	0.09	1	9	0.78	1
0.24	0.77	1	0.85	0.09	1	11	0.76	1
0.26	0.77	1	0.87	0.09	1	13	0.75	1
0.28	0.77	1	0.88	0.09	1	15	0.74	1
0.29	0.77	1	1.08	0.13	1	17	0.73	1
0.31	0.77	1	1.28	0.16	1	19	0.72	1
0.33	0.77	1	1.48	0.18	1	21	0.71	1
0.34	0.77	1	1.68	0.19	1	23	0.7	1
0.36	0.77	1	1.88	0.21	1	25	0.7	1

0.38	0.76	1	2.08	0.22	1	27	0.68	1
0.39	0.76	1	2.28	0.22	1	29	0.68	1
0.41	0.76	1	2.48	0.24	1	31	0.67	1
0.43	0.76	1	2.68	0.25	1	33	0.67	1
0.44	0.76	1	2.88	0.25	1	35	0.66	1
0.46	0.76	1	3.08	0.26	1	37	0.65	1
0.48	0.76	1	3.28	0.26	1	39	0.65	1
0.49	0.76	1	3.48	0.27	1	41	0.64	1
0.51	0.76	1	3.68	0.27	1	43	0.64	1
0.53	0.76	1	3.88	0.28	1	45	0.63	1
0.54	0.76	1	4.08	0.28	1	47	0.63	1
0.56	0.76	1	4.28	0.29	1	49	0.63	1
0.58	0.75	1	4.48	0.29	1	51	0.62	1
0.59	0.76	1	4.68	0.29	1	53	0.62	1
0.61	0.75	1	4.88	0.29	1	55	0.61	1
0.63	0.75	1	5.08	0.3	1	57	0.61	1
0.64	0.75	1	5.28	0.3	1	59	0.6	1
0.66	0.75	1	5.48	0.31	1	61	0.6	1
0.68	0.75	1	5.68	0.31	1	63	0.6	1
0.69	0.75	1	5.88	0.31	1	65	0.59	1
0.71	0.75	1	6.08	0.31	1	67	0.59	1
0.73	0.74	1	6.28	0.32	1	69	0.59	1
0.74	0.75	1	6.48	0.32	1	71	0.58	1
0.76	0.74	1	6.68	0.32	1	73	0.58	1
0.78	0.74	1	6.88	0.33	1	75	0.58	1
0.79	0.74	1	7.08	0.33	1	77	0.57	1
0.81	0.74	1	7.28	0.33	1	79	0.57	1
1.01	0.7	1	7.48	0.33	1	81	0.56	1
1.21	0.67	1	7.68	0.33	1	83	0.56	1
1.41	0.65	1	7.88	0.34	1	85	0.56	1
1.61	0.62	1	8.08	0.34	1	87	0.56	1
1.81	0.6	1	8.28	0.34	1	89	0.55	1
2.01	0.58	1	8.48	0.34	1	91	0.55	1
2.21	0.55	1	8.68	0.34	1	93	0.55	1
2.41	0.54	1	8.88	0.35	1	95	0.55	1
2.61	0.53	1	9.08	0.35	1	97	0.54	1
2.81	0.52	1	9.28	0.35	1	99	0.54	1
3.01	0.5	1	9.48	0.35	1	109	0.52	1
3.21	0.5	1	9.68	0.35	1	119	0.51	1
3.41	0.49	1	9.88	0.35	1	129	0.5	1
3.61	0.48	1	11.88	0.37	1	139	0.49	1
3.81	0.47	1	13.88	0.38	1	149	0.48	1
4.01	0.47	1	15.88	0.4	1	159	0.47	1
4.21	0.46	1	17.88	0.39	1	169	0.46	1
4.41	0.46	1	19.88	0.42	1	179	0.45	1
4.61	0.45	1	21.88	0.43	1	189	0.44	1
4.81	0.45	1	23.88	0.44	1	199	0.43	1
5.01	0.45	1	25.88	0.45	1	209	0.42	1
5.21	0.44	1	27.88	0.46	1	219	0.42	1
5.41	0.44	1	29.88	0.46	1	229	0.41	1
5.61	0.44	1	31.88	0.47	1	239	0.4	1
5.81	0.43	1	33.88	0.48	1	249	0.4	1
6.01	0.43	1	35.88	0.49	1	259	0.39	1
6.21	0.43	1	37.88	0.5	1	269	0.38	1
6.41	0.43	1	39.88	0.51	1	279	0.38	1
6.61	0.42	1	41.88	0.53	1	289	0.38	1
6.81	0.42	1	43.88	0.54	1	299	0.37	1
7.01	0.42	1	45.88	0.55	1	309	0.37	1
7.21	0.42	1	47.88	0.55	1	319	0.36	1
7.41	0.42	1	49.88	0.56	1	329	0.35	1
7.61	0.42	1	51.88	0.57	1	339	0.35	1
7.81	0.42	1	53.88	0.58	1	349	0.34	1
8.01	0.42	1	55.88	0.58	1	359	0.34	1
8.21	0.42	1	57.88	0.59	1	369	0.34	1

8.41	0.41	1	59.88	0.6	1	379	0.33	1
8.61	0.41	1	61.88	0.6	1	389	0.33	1
8.81	0.41	1	63.88	0.61	1	399	0.32	1
9.01	0.41	1	65.88	0.62	1	409	0.32	1
9.21	0.41	1	67.88	0.62	1	419	0.31	1
9.41	0.41	1	69.88	0.63	1	429	0.31	1
9.61	0.4	1	71.88	0.63	1	439	0.31	1
9.81	0.4	1	73.88	0.64	1	449	0.3	1
11.81	0.39	1	75.88	0.64	1	459	0.3	1
13.81	0.38	1	77.88	0.65	1	469	0.3	1
15.81	0.37	1	79.88	0.66	1	479	0.29	1
17.81	0.37	1	81.88	0.66	1	489	0.29	1
19.81	0.36	1	83.88	0.66	1	499	0.29	1
21.81	0.35	1	85.88	0.67	1	509	0.29	1
23.81	0.35	1	87.88	0.67	1	519	0.28	1
25.81	0.34	1	89.88	0.67	1	529	0.28	1
27.81	0.34	1	91.88	0.68	1	539	0.28	1
29.81	0.33	1	93.88	0.68	1	549	0.28	1
31.81	0.33	1	95.88	0.69	1	559	0.28	1
33.81	0.32	1	97.88	0.69	1	569	0.27	1
35.81	0.32	1	99.88	0.69	1	579	0.27	1
37.81	0.32	1	109.88	0.71	1	589	0.27	1
39.81	0.31	1	119.88	0.73	1	599	0.26	1
41.81	0.31	1	129.88	0.74	1	609	0.26	1
43.81	0.3	1	139.88	0.76	1	619	0.26	1
45.81	0.3	1	149.88	0.77	1	629	0.26	1
47.81	0.3	1	159.88	0.78	1	639	0.26	1
49.81	0.29	1	169.88	0.79	1	649	0.26	1
51.81	0.29	1	179.88	0.8	1	659	0.26	1
53.81	0.29	1	189.88	0.81	1	669	0.25	1
55.81	0.29	1	199.88	0.82	1	679	0.25	1
57.81	0.28	1	209.88	0.83	1	689	0.25	1
59.81	0.28	1	219.88	0.84	1	699	0.25	1
61.81	0.28	1	229.88	0.85	1	709	0.25	1
63.81	0.28	1	239.88	0.86	1	719	0.25	1
65.81	0.27	1	249.88	0.87	1	729	0.24	1
67.81	0.27	1	259.88	0.91	1	739	0.24	1
69.81	0.27	1	269.88	0.92	1	749	0.24	1
71.81	0.27	1	279.88	0.92	1	759	0.24	1
73.81	0.26	1	289.88	0.93	1	769	0.24	1
75.81	0.26	1	299.88	0.94	1	779	0.24	1
77.81	0.26	1	309.88	0.95	1	789	0.24	1
79.81	0.26	1	319.88	0.96	1	799	0.24	1
81.81	0.26	1	329.88	0.96	1	809	0.23	1
83.81	0.25	1	339.88	0.97	1	819	0.24	1
85.81	0.25	1	349.88	0.98	1	829	0.23	1
87.81	0.25	1	359.88	0.99	1	839	0.23	1
89.81	0.24	1	369.88	0.99	1	849	0.23	1
91.81	0.24	1	379.88	1	1	859	0.23	1
93.81	0.24	1	389.88	1.01	1	869	0.23	1
95.81	0.24	1	399.88	1.02	1	879	0.23	1
97.81	0.24	1	409.88	1.02	1	889	0.23	1
99.81	0.24	1	419.88	1.03	1	899	0.23	1
109.81	0.23	1	429.88	1.04	1	909	0.22	1
119.81	0.22	1	439.88	1.04	1	919	0.22	1
129.81	0.22	1	449.88	1.05	1	929	0.22	1
139.81	0.21	1	459.88	1.05	1	939	0.22	1
149.81	0.2	1	469.88	1.06	1	949	0.22	1
159.81	0.2	1	479.88	1.06	1	959	0.22	1
169.81	0.19	1	489.88	1.07	1	969	0.22	1
179.81	0.18	1	499.88	1.07	1	979	0.22	1
189.81	0.18	1	509.88	1.08	1	989	0.22	1
199.81	0.17	1	519.88	1.09	1	999	0.22	1
209.81	0.17	1	529.88	1.09	1	1009	0.22	1

219.81	0.17	1	539.88	1.1	1	1019	0.22	1
229.81	0.16	1				1029	0.21	1
239.81	0.16	1				1039	0.21	1
249.81	0.16	1				1049	0.21	1
259.81	0.15	1				1059	0.21	1
269.81	0.15	1				1069	0.21	1
279.81	0.15	1				1079	0.21	1
289.81	0.14	1				1089	0.21	1
299.81	0.14	1				1099	0.21	1
309.81	0.14	1				1109	0.21	1
319.81	0.13	1				1119	0.21	1
329.81	0.13	1				1129	0.21	1
339.81	0.13	1				1139	0.2	1
349.81	0.12	1				1149	0.2	1
359.81	0.13	1				1159	0.2	1
369.81	0.12	1				1169	0.2	1
379.81	0.12	1				1179	0.2	1
389.81	0.12	1				1189	0.2	1
399.81	0.11	1				1199	0.2	1
409.81	0.12	1				1209	0.2	1
419.81	0.11	1				1219	0.2	1
429.81	0.11	1				1229	0.2	1
439.81	0.11	1				1239	0.2	1
449.81	0.1	1				1249	0.2	1
459.81	0.1	1				1259	0.2	1
469.81	0.1	1				1269	0.19	1
479.81	0.1	1				1279	0.19	1
489.81	0.1	1				1289	0.19	1
499.81	0.09	1				1299	0.19	1
509.81	0.11	1				1309	0.19	1
519.81	0.09	1				1319	0.19	1
529.81	0.09	1				1329	0.19	1
539.81	0.09	1				1339	0.19	1
549.81	0.09	1				1349	0.19	1
559.81	0.09	1				1359	0.19	1
569.81	0.08	1				1369	0.19	1
579.81	0.08	1				1379	0.19	1
589.81	0.08	1				1389	0.19	1
599.81	0.08	1				1399	0.19	1
609.81	0.08	1				1409	0.19	1
619.81	0.08	1				1419	0.18	1
629.81	0.08	1				1429	0.19	1
639.81	0.08	1				1439	0.18	1
649.81	0.08	1				1449	0.18	1
659.81	0.08	1				1459	0.18	1
669.81	0.08	1				1469	0.18	1
679.81	0.07	1				1479	0.18	1
689.81	0.08	1				1489	0.18	1
699.81	0.07	1				1499	0.18	1
709.81	0.07	1				1509	0.18	1
719.81	0.07	1				1519	0.18	1
729.81	0.07	1				1529	0.18	1
739.81	0.07	1				1539	0.18	1
749.81	0.07	1				1549	0.18	1
759.81	0.07	1				1559	0.18	1
769.81	0.07	1				1569	0.18	1
779.81	0.07	1				1579	0.18	1
789.81	0.06	1				1589	0.18	1
799.81	0.07	1				1599	0.18	1
809.81	0.07	1				1609	0.17	1
819.81	0.07	1				1619	0.17	1
829.81	0.07	1				1629	0.17	1
839.81	0.06	1				1639	0.17	1
849.81	0.06	1				1649	0.17	1

859.81	0.06	1
869.81	0.06	1
879.81	0.06	1
889.81	0.06	1
899.81	0.07	1
909.81	0.06	1
919.81	0.06	1
929.81	0.06	1
939.81	0.06	1
949.81	0.06	1
959.81	0.06	1
969.81	0.06	1
979.81	0.05	1
989.81	0.06	1
999.81	0.05	1
1009.8	0.05	1
1019.8	0.06	1
1029.8	0.05	1
1039.8	0.06	1
1049.8	0.05	1
1059.8	0.05	1
1069.8	0.05	1
1079.8	0.05	1
1089.8	0.05	1
1099.8	0.05	1
1109.8	0.05	1
1119.8	0.05	1
1129.8	0.05	1
1139.8	0.04	1
1149.8	0.05	1
1159.8	0.04	1
1169.8	0.04	1
1179.8	0.04	1
1189.8	0.04	1
1199.8	0.04	1
1209.8	0.04	1
1219.8	0.04	1
1229.8	0.04	1
1239.8	0.04	1
1249.8	0.04	1
1259.8	0.04	1
1269.8	0.04	1

1659	0.17	1
1669	0.17	1
1679	0.17	1
1689	0.17	1
1699	0.17	1
1709	0.17	1
1719	0.17	1
1729	0.17	1

Appendix 4-K

Geotechnical Laboratory Reports

Laboratory Test Summary

Project: USG COKE PLANT - WAUKEGAN, IL - #13149-003 JSL53 Date: 10-15-93

Reported To: BARR ENGINEERING COMPANY Job No.: 1998-B

Boring No.		SB2106	SB2112	SB2114	SB2115	
Sample No.						
Depth (Ft)						
Type of Sample		2½" LINER	2½" LINER	3T	2½" LINER	
Soil Classification (ASTM: D2487/2488)		SAND, FINE GRAINED (SP)	SILTY SAND (SM)	LEAN CLAY (CL)	LEAN CLAY (CL)	
Mechanical Analysis Dry Weight (Grams)		715	736	427	136	
Percent Passing						
Gravel	3"					
	2"					
	1"					
	3/4"		100			
Sand	#4	100	99.8	100		
	#10	99.8	99.6	99.7	100	
	#40	98.1	98.9	99.0	99.9	
	#100	24.9	85.7	98.1	99.8	
	#200	4.4	15.9	97.2	99.5	
Atterberg Limits						
Liquid Limit				26.1	30.9	
Plastic Limit				15.7	16.8	
Plasticity Index				10.4	14.1	
Moisture - Density						
Water Content (%)		23.8	22.0	12.9	15.8	
Dry Density (PCF)		101.7	105.2	125.6	117.4	
Unconfined Compression Maximum Load (psf)						
Hand Penetrometer (tsf)						
Organic Content (%)						
Porosity (%)		38.7	36.6	25.5	29.6	
Specific Gravity		2.66*	2.66*	2.70*	2.67*	
Resistivity (ohm-cm)						* ASSUMED

9301 Bryant Avenue South Suite 107 SOIL ENGINEERING TESTING, INC. Bloomington, Minnesota 55420-3436

Permeability Test Data

(Undisturbed / In-situ Samples)

Project: NSG, COKE PLANT - WAUKEGAN, IL. - #13/49-003 JSL 53 Date: 10-15-93

Reported To: BARR ENGINEERING COMPANY Job No.: 1998-B

Lift				
Sample No.	SB 2/14			
Elevation				
Location				
Type of Sample	3T			
Soil Type	LEAN CLAY (CL)			
Atterberg Limits				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Permeability Test				
Specimen No.				
Height (Inches)	2.53			
Diameter (Inches)	2.83			
Dry Density (pcf)	125.6			
Water Content (%)	12.9			
Type of Test (Head)	Falling			
Max. Head Differential (ft)	9.7			
Confining Pressure (Effective-psi)	2.0			
Backpressure (psi)	70.0			
Water Temp. (°C)	24			
Coefficient of Permeability				
K @ 20°C (cm/sec)	2.9×10^{-8}			
K @ 20°C (ft/min)	5.7×10^{-8}			

Laboratory Test Summary

Project: NSG, Coke Plant-Waukegan, IL - #13/49-003JSL53 Date: 10-15-93

Reported To: Barr Engineering Company Job No.: 1998-B

Boring No.						
Sample No.		SB 3012	SB 3017	SB 3206	SB 3211	SB 3306
Depth (Ft)						
Type of Sample		2½" Liner	2½" Liner	2½" Liner	2½" Liner	2½" Liner
Soil Classification (ASTM: D2487/2488)		Sand w/Silt, Fine Grained (SP-SM)	Sand w/Silt, Fine Grained (SP-SM)	Sand, Fine Grained (SP)	Sand w/Silt, Fine Grained (SP-SM)	Sand, Fine Grained (SP)
Mechanical Analysis Dry Weight (Grams)		729	731	836	698	667
Percent Passing						
Gravel	3"					
	2"					
	1"					
	3/4"		100	100	100	100
Sand	#4	100	99.4	99.3	99.7	99.6
	#10	99.5	98.9	98.4	98.7	99.5
	#40	98.9	84.0	95.1	96.2	97.9
	#100	27.4	69.4	6.9	76.7	14.9
	#200	6.5	8.3	2.2	7.7	2.7
Atterberg Limits Liquid Limit						
Plastic Limit						
Plasticity Index						
Moisture - Density Water Content (%)						
Dry Density (PCF)						
Unconfined Compression Maximum Load (psf)						
Hand Penetrometer (tsf)						
Organic Content (%)						
pH (Meter Method)						
Specific Gravity						
Resistivity (ohm-cm)						

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Laboratory Test Summary

Project: NSG, COKE PLANT-WAUKEGAN, IL - #13/49-003JSL53 Date: 10-15-93

Reported To: BARR ENGINEERING COMPANY Job No.: 1998-B

Boring No.						
Sample No.		SB3310	SB4103	SB4106	SB4110	SB4609
Depth (Ft)						
Type of Sample		2½" LINER	2½" LINER	2½" LINER	2½" LINER	2½" LINER
Soil Classification (ASTM: D2487/2488)		SAND w/SILT, FINE GRAINED (SP-SM)	SAND, FINE GRAINED (SP)	SAND w/A TRACE OF GRAVEL, FINE GRAINED (SP)	SILTY SAND (SM/SP-SM)	SILTY SAND (SM)
Mechanical Analysis Dry Weight (Grams)		703	750	779	739	744
Percent Passing						
Gravel	3"					
	2"					
	1"					
	3/4"	100		100	100	100
Sand	#4	99.0	100	97.4	98.8	99.7
	#10	98.7	99.6	97.2	97.7	99.5
	#40	98.1	86.1	94.2	96.0	98.9
	#100	74.3	4.6	11.6	88.4	82.1
	#200	10.4	2.5	3.9	14.4	28.0
Atterberg Limits Liquid Limit						
Plastic Limit						
Plasticity Index						
Moisture - Density Water Content (%)						
Dry Density (PCF)						
Unconfined Compression Maximum Load (psf)						
Hand Penetrometer (tsf)						
Organic Content (%)						
pH (Meter Method)						
Specific Gravity						
Resistivity (ohm-cm)						

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Laboratory Test Summary

Project: USG WAUKEGAN COKE PLANT - #13/49-003JSL53 Date: 10-1-93

Reported To: BADGER ENGINEERING COMPANY Job No.: 1998-A

Boring No.						
Sample No.		SB4406	SB4411	SB4806	SB4812	
Depth (Ft)						
Type of Sample		2½" LINER	2½" LINER	2½" LINER	2½" LINER	
Soil Classification (ASTM: D2487/2488)		SAND, FINE GRAINED (SP)	SILTY SAND, FINE GRAINED (SM/SP-SM)	SAND, FINE GRAINED (SP)	SILTY SAND, FINE GRAINED (SM/SP-SM)	
Mechanical Analysis						
Dry Weight (Grams)		718	697	746	742	
Percent Passing						
Gravel	3"					
	2"					
	1"					
	3/4"	100		100		
Sand	#4	99.9		99.9		
	#10	99.6	100	99.7	100	
	#40	97.3	99.7	97.4	99.8	
	#100	10.4	94.1	11.1	97.8	
	#200	3.1	13.8	4.1	15.1	
Atterberg Limits						
Liquid Limit						
Plastic Limit						
Plasticity Index						
Moisture - Density						
Water Content (%)		20.5	22.0	20.3	21.1	
Dry Density (PCF)		112.4	102.3	102.3	104.7	
Unconfined Compression						
Maximum Load (psf)						
Porosity (%)		33.0	41.2	39.1	38.8	
Organic Content (%)						
pH (Meter Method)						
Specific Gravity		2.69 *	2.74	2.69 *	2.74	
Resistivity (ohm-cm)		* ASSUMED				

9301 Bryant Avenue South Suite 107 SOIL ENGINEERING TESTING, INC. Bloomington, Minnesota 55420-3436

Permeability Test Data

(Undisturbed / In-situ Samples)

Project: NSG WAUKEGAN COKE PLANT - #13/49-003JSL53 Date: 10-1-93

Reported To: BARR ENGINEERING COMPANY Job No.: 1998-A

Boring No.				
Sample No.	SB4406	SB4411	SB4806	SB4812
Depth (Ft)				
Location				
Type of Sample	2½" LINER	2½" LINER	2½" LINER	2½" LINER
Soil Type	SAND, FINE GRAINED (SP)	SILTY SAND, FINE GRAINED (SM/SP-SM)	SAND, FINE GRAINED (SP)	SILTY SAND, FINE GRAINED (SM/SP-SM)
Atterberg Limits				
Liquid Limit				
Plastic Limit				
Plasticity Index				
Permeability Test				
Specimen No.				
Height (Inches)	5.26	5.60	5.99	5.82
Diameter (Inches)	2.43	2.43	2.43	2.43
Dry Density (pcf)	112.4	102.3	102.3	104.7
Water Content (%)	20.5	22.0	20.3	21.1
Type of Test (Head)	Constant	Constant	Constant	Constant
Max. Head Differential (ft)	0.80	0.74	0.58	1.09
Confining Pressure (Effective-psi)	0	0	0	0
Trial No.	7-9	7-9	6-9	6-9
Water Temp. (°C)	24	23	24	24
Coefficient of Permeability				
K @ 20°C (cm/sec)	1.6×10^{-3}	1.8×10^{-3}	5.9×10^{-3}	1.1×10^{-3}
K @ 20°C (ft/min)	3.2×10^{-3}	3.5×10^{-3}	1.2×10^{-2}	2.1×10^{-3}

Laboratory Test Summary

Project: NSG WAUKEGAN COKE PLANT - #13/49-003JSL53 Date: 10-4-93

Reported To: BARR ENGINEERING COMPANY Job No.: 1998-A

Boring No.						
Sample No.		SB4415	SB4815			
Depth (Ft)		36-37½	34.5-35.4			
Type of Sample		3T	3T			
Soil Classification (ASTM: D2487/2488)		LEAN CLAY (CL)	LEAN CLAY w/ SAND & A LITTLE GRAVEL (CL)			
Mechanical Analysis Dry Weight (Grams)		736	968			
Percent Passing						
Gravel	3"					
	2"					
	1"					
	3/4"	100	100			
Sand	#4	99.0	92.9			
	#10	98.6	90.9			
	#40	97.6	86.9			
	#100	96.4	83.2			
	#200	95.1	79.4			
Atterberg Limits						
Liquid Limit		32.0	30.1			
Plastic Limit		15.5	15.0			
Plasticity Index		16.5	15.1			
Moisture - Density						
Water Content (%)						
Dry Density (PCF)						
Unconfined Compression Maximum Load (psf)				Calculated by BARR on 12/23/93 Karyn Lanfersiek		
Porosity (%)		30%	30%			
Organic Content (%)						
pH (Meter Method)						
Specific Gravity		2.78	2.77			
Resistivity (ohm-cm)						

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Permeability Test Data

(Undisturbed / In-situ Samples)

Project: NSG WAUKEGAN COKE PLANT - # 13/49-003 JSL 53 Date: 10-6-93

Reported To: BARR ENGINEERING COMPANY Job No.: 1998-A

Boring No.				
Sample No.	SB44 15	SB48 15		
Depth (Ft)	36-37½	34.5-35.4		
Location				
Type of Sample	3T	3T		
Soil Type	LEAN CLAY (CL)	LEAN CLAY W/SAND & A LITTLE GRAVEL (CL)		
Atterberg Limits				
Liquid Limit	32.0	30.1		
Plastic Limit	15.5	15.0		
Plasticity Index	16 5	15.1		
Permeability Test				
Specimen No.				
Height (Inches)	2.43	2.63		
Diameter (Inches)	2.87	2.85		
Dry Density (pcf)	121.5	121.1		
Water Content (%)	14.4	14.0		
Type of Test (Head)	Falling	Falling		
Max. Head Differential (ft)	8.56	2.86		
Confining Pressure (Effective-psi)	2.0	2.0		
Trial No.	4-7	4-7		
Water Temp. (°C)	24	24		
Coefficient of Permeability				
K @ 20°C (cm/sec)	1.3×10^{-8}	2.7×10^{-8}		
K @ 20°C (ft/min)	2.5×10^{-8}	5.4×10^{-8}		

Laboratory Test Summary

Project: NSG, COKE PLANT - WAUKEGAN, IL. - #13149-003JSL53 Date: 10-15-93

Reported To: BARR ENGINEERING COMPANY Job No.: 1998-B

Boring No.						
Sample No.		SB4612				
Depth (Ft)						
Type of Sample		2½" LINER				
Soil Classification (ASTM: D2487/2488)		SILTY SAND (SM)				
Mechanical Analysis						
Dry Weight (Grams)		702				
Percent Passing						
Gravel	3"					
	2"					
	1"					
	3/4"	100				
Sand	#4	99.5				
	#10	99.3				
	#40	99.2				
	#100	96.5				
	#200	18.2				
Atterberg Limits						
Liquid Limit						
Plastic Limit						
Plasticity Index						
Moisture - Density						
Water Content (%)						
Dry Density (PCF)						
Unconfined Compression						
Maximum Load (psf)						
Hand Penetrometer (tsf)						
Organic Content (%)						
pH (Meter Method)						
Specific Gravity						
Resistivity (ohm-cm)						

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Laboratory Test Summary
(Grain Size Distribution)

Project: NSG WAUKEGAN COKE PLANT - #13/29-003 JSL51 Date: 9-7-93

Reported To: BARR ENGINEERING COMPANY Job No.: 1998

Boring No.		PW-1	PW-1	PW-1	PW-1	PW-1
Sample No.						
Depth (Ft)		7-9	9.5-14.0	14.5-19.0	19.5-24	24.5-29
Location						
Type of Sample		JAR	JAR	JAR	JAR	JAR
Soil Classification (ASTM: D2487/2488)		SAND W/SILT & GRAVEL, FINE TO MEDIUM GRAINED (SP-SM/SP)	SAND, FINE GRAINED (SP)	SAND, FINE GRAINED (SP)	SAND W/SILT, FINE GRAINED (SP-SM)	SAND W/SILT, FINE GRAINED (SP-SM)
Mechanical Analysis						
Dry Weight (Grams)		143	1014	1332	1065	1135
Percent Passing	1"	100				
Gravel	3/4"	89.4	100			
	3/8"	78.7	99.4	100	100	100
Sand	#4	69.2	99.2	99.8	99.9	99.9
	#8	65.0	99.0	99.6	99.7	99.5
	#10	64.1	98.9	99.5	99.7	99.4
	#16	61.2	98.2	99.2	99.6	98.8
	#20	59.7	97.6	98.8	99.5	98.4
	#30	58.1	96.7	98.3	99.4	97.9
	#40	56.3	95.1	97.3	99.2	97.4
	#50	51.7	89.2	92.4	98.6	96.8
	#60	44.8	77.7	81.2	97.7	96.2
	#100	10.2	8.7	10.0	70.4	80.0
Fines	#200	5.5	1.2	2.3	7.3	9.1

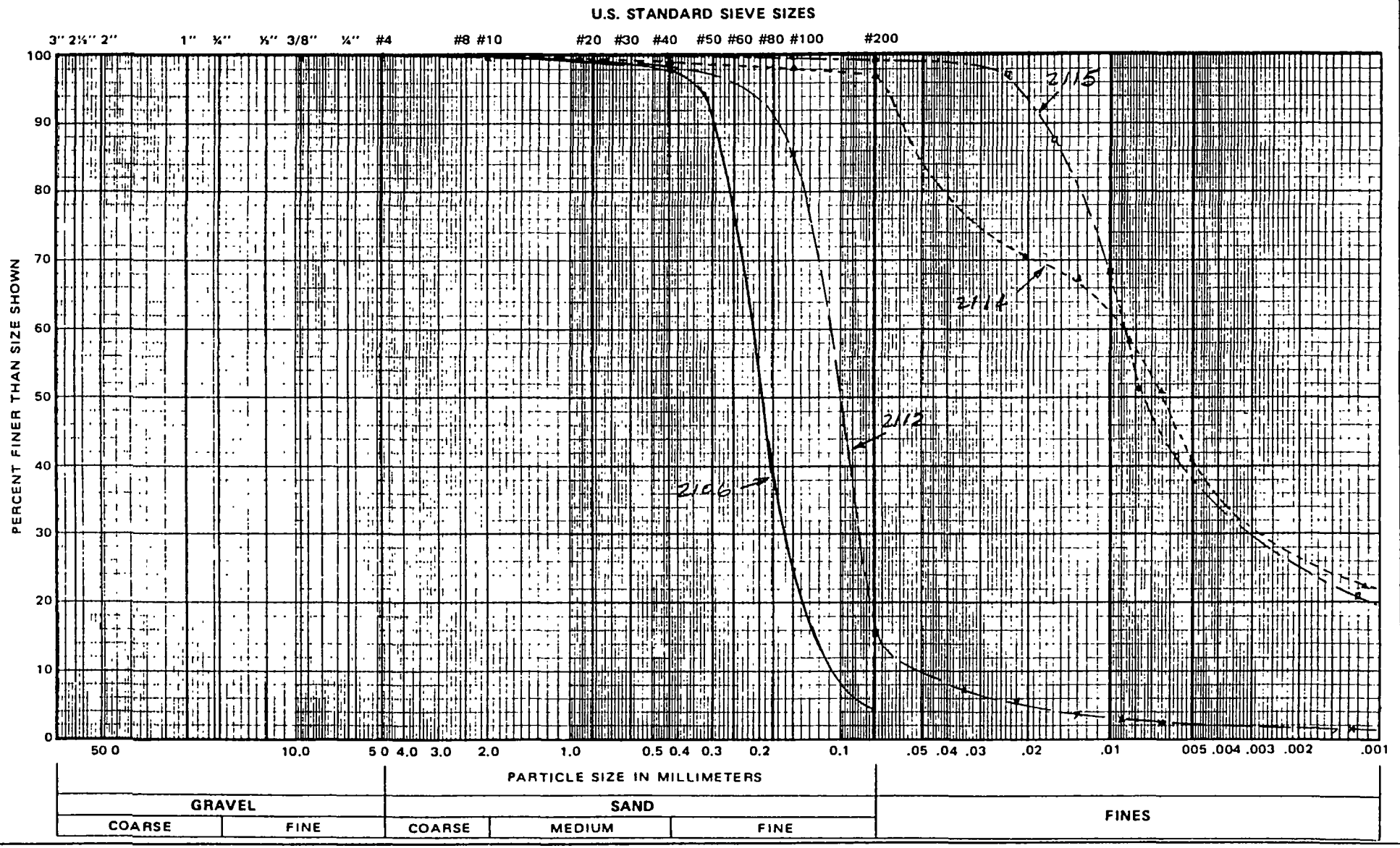
Grain Size Distribution

Boring No.	Sample No.	Depth (ft)	Soil Classification
SB 2106			SAND, FINE GRAINED (SP)
SB 2112			SILTY SAND (SM)
SB 2114			LEAN CLAY (CL)
SB 2115			LEAN CLAY (CL)

Job No: 1998-B Date: 10-15-93

Project: NSG COKE PLANT - WAUKEGAN, IL
#13/49-003 JSL53

Reported To: BARR ENGINEERING COMPANY



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SET B2

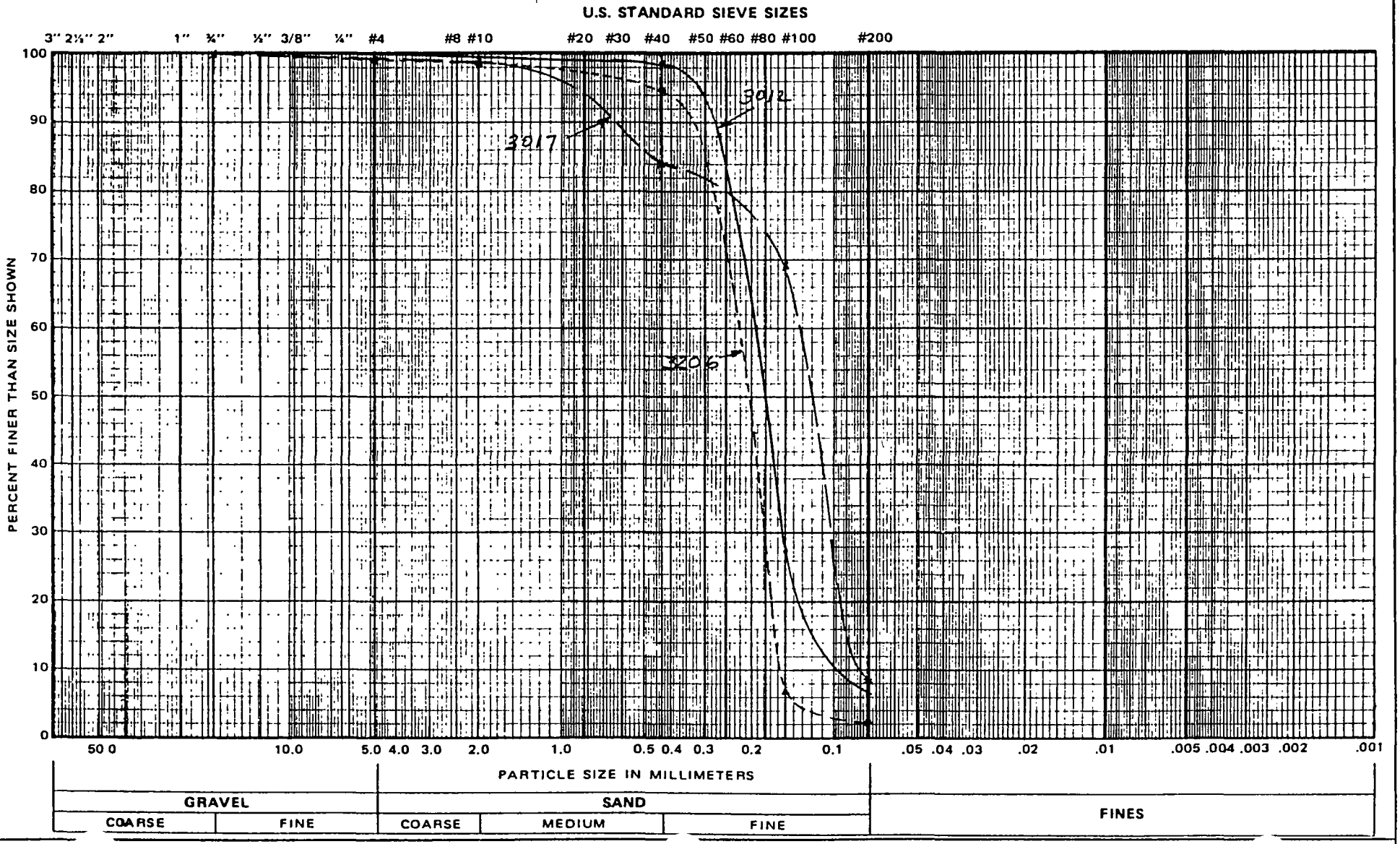
Grain Size Distribution

Boring No.	Sample No.	Depth (ft)	Soil Classification
	SB3012		SAND w/SILT, FINE GRAINED (SP-SM)
	SB3017		SAND w/SILT, FINE GRAINED (SP-SM)
	SB3206		SAND, FINE GRAINED (SP)

Job No: 1998-B Date: 10-15-93

Project: NSG, COKE PLANT - WAUKEGAN, IL
#13149-003 JSL 53

Reported To: BARR ENGINEERING COMPANY



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SET B3

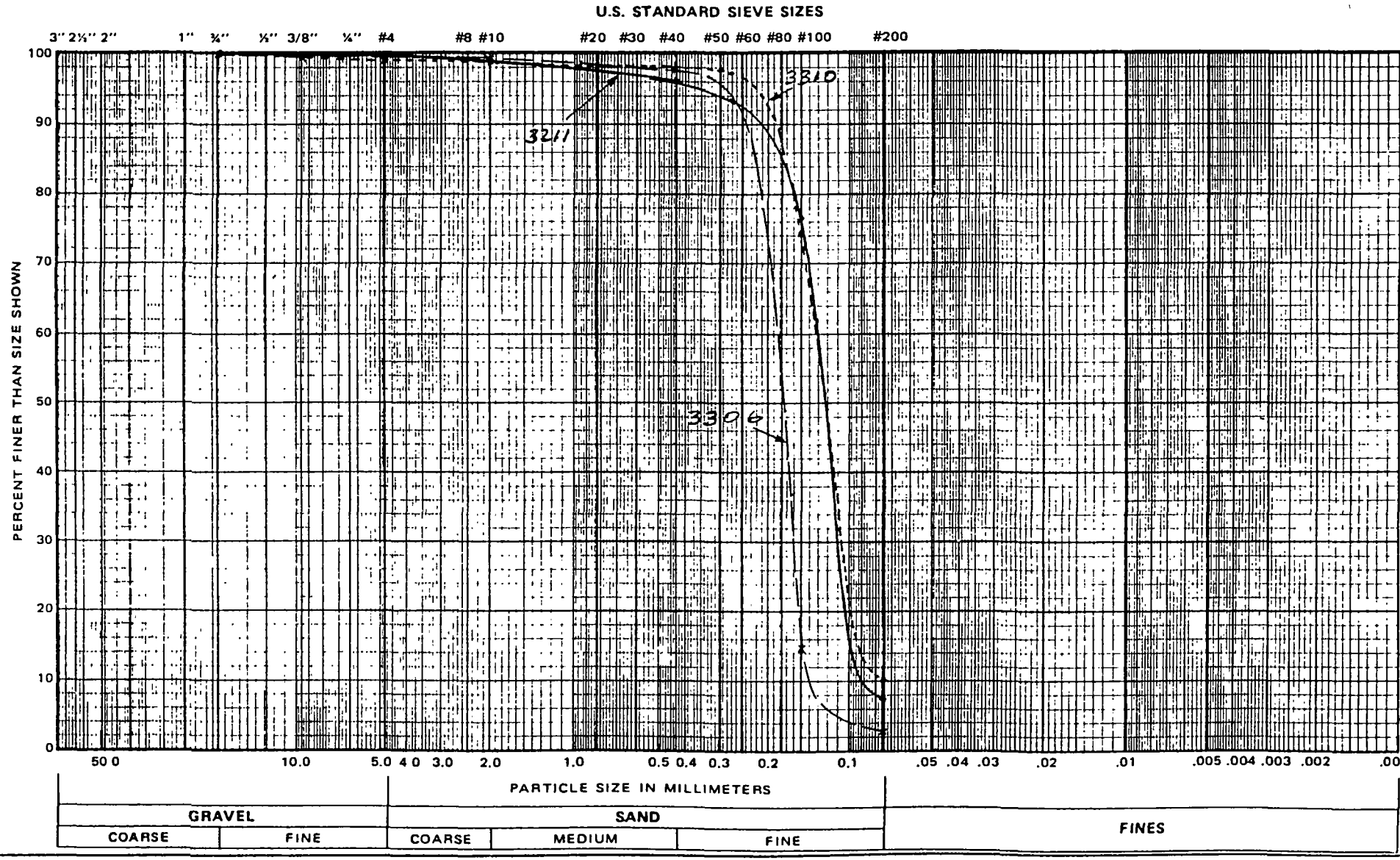
Grain Size Distribution

Boring No.	Sample No.	Depth (ft)	Soil Classification
	SB3211		SAND W/SILT, FINE GRAINED (SP-SM)
	SB3306		SAND, FINE GRAINED (SP)
	SB3310		SAND W/SILT, FINE GRAINED (SP-SM)

Job No: 1998-B Date: 10-15-93

Project: NSG, COKE PLANT - WAUKEGAN, IL. #13/49-003 JSL 53

Reported To: BARR ENGINEERING COMPANY



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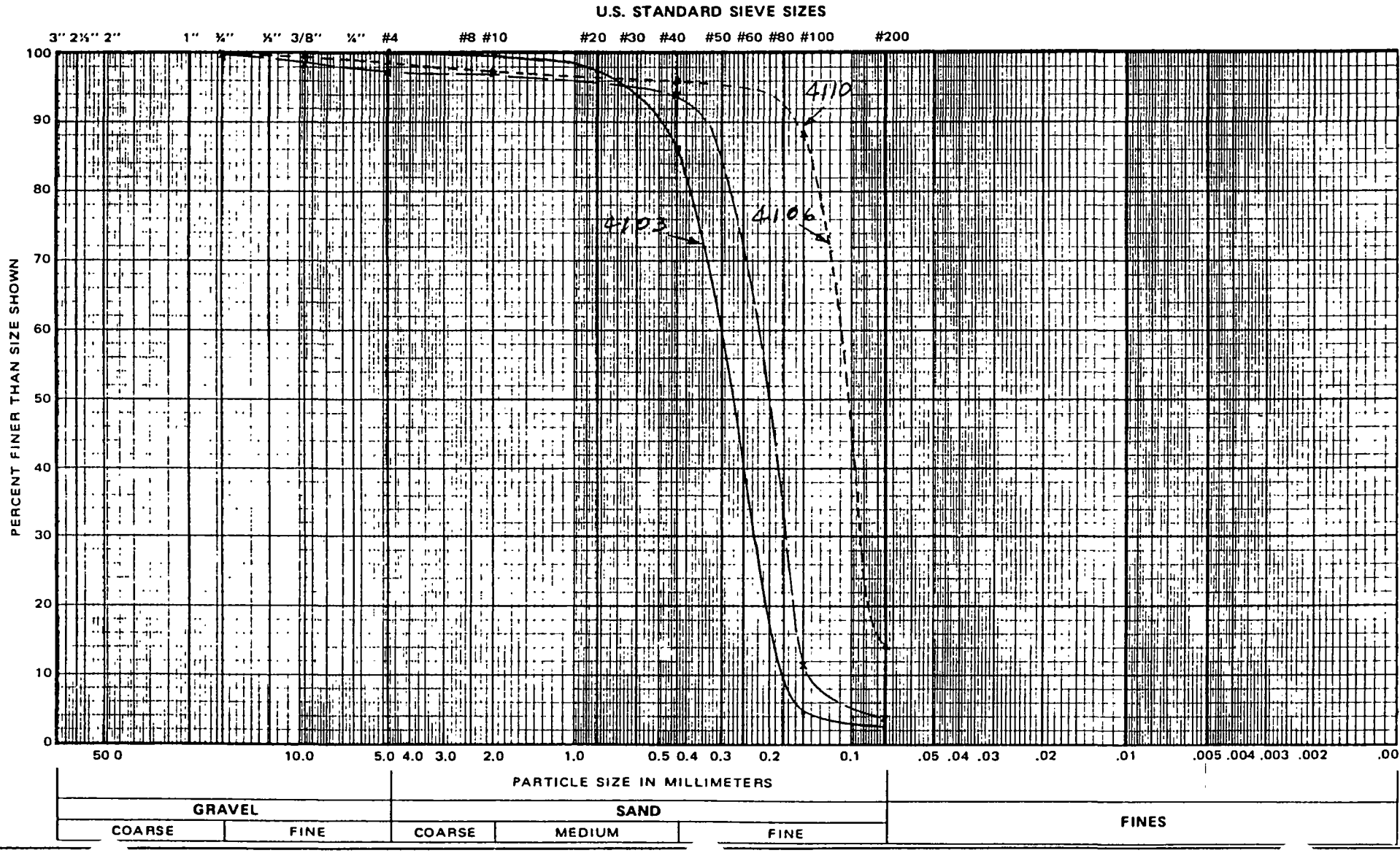
Grain Size Distribution

Boring No.	Sample No.	Depth (ft)	Soil Classification
	SB4103		SAND, FINE GRAINED (SP)
	SB4106		SAND W/A TRACE OF GRAVEL, FINE GRAINED (SP)
	SB4110		SILTY SAND (SM/SP-SM)

Job No: 1998-B Date: 10-15-93

Project: USG, COLCE PLANT - WAUKEGAN, IL. #13/49-003JSL53

Reported To: BARR ENGINEERING COMPANY



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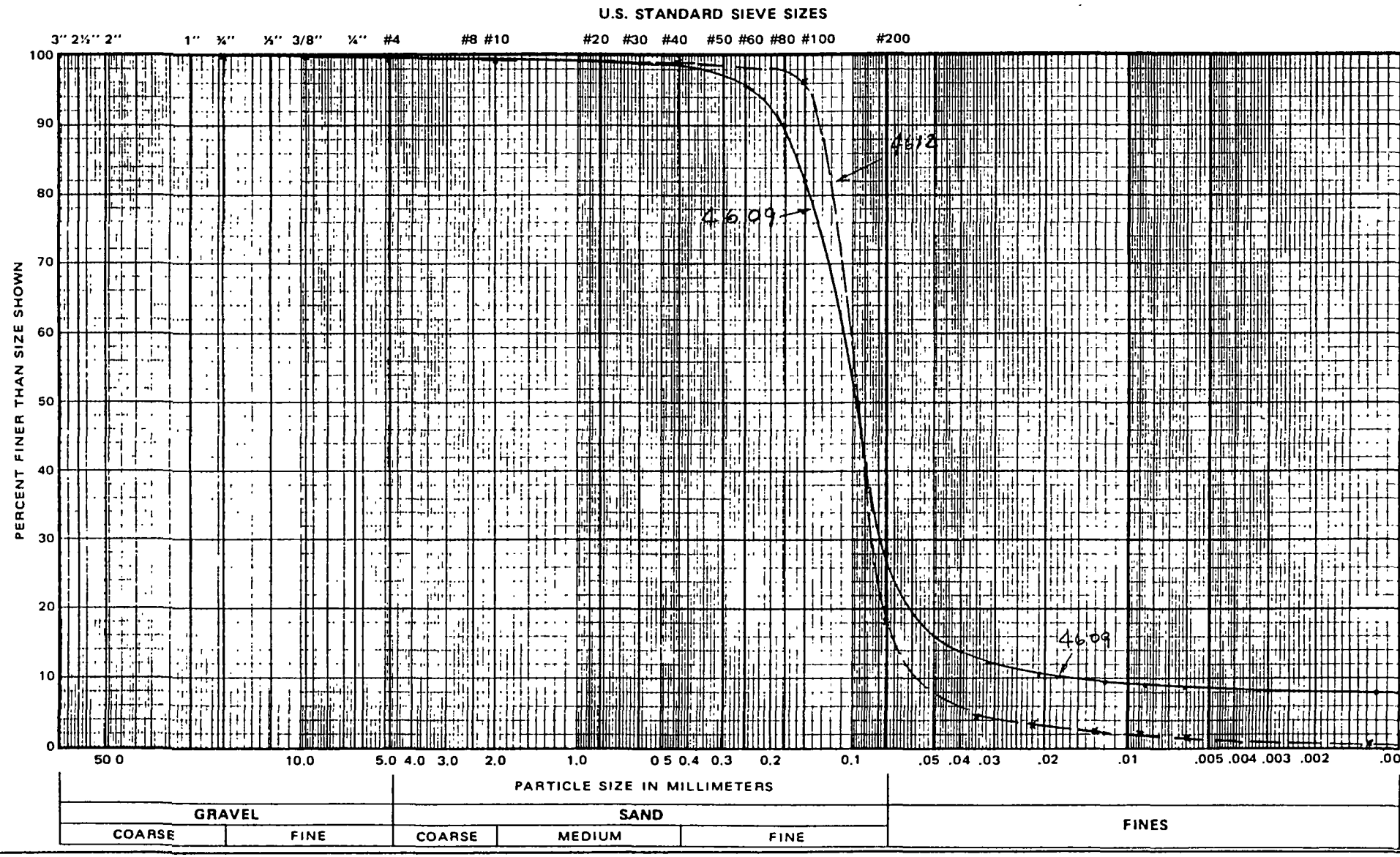
Grain Size Distribution

Boring No	Sample No	Depth (ft)	Soil Classification
	SB4609		Silty Sand (SM)
	SB4612		Silty Sand (SM)

Job No: 1998-B Date: 10-15-93

Project: NSG, Coke Plant - Waukegan, IL.
13149-003 JSL53

Reported To: Ball Engineering Company



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SET-B3

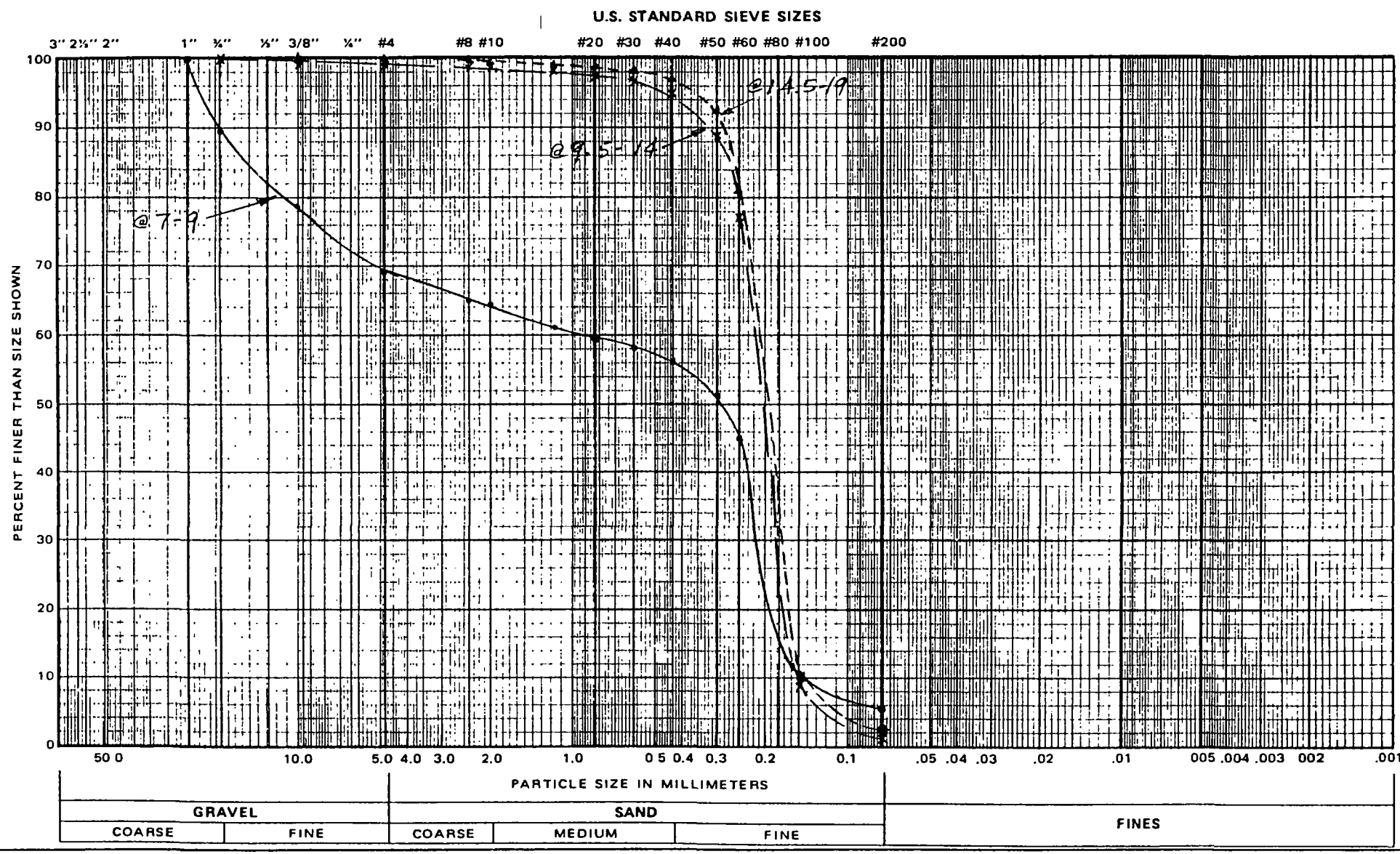
Grain Size Distribution

Boring No.	Sample No.	Depth (ft)	Soil Classification
PW-1		7-9	SAND W/SILT & GRAVEL (SP-SM/SP)
PW-1		9.5-14	SAND (SP)
PW-1		14.5-19	SAND (SP)

Job No: 1998 Date: 9-7-93

Project: USG WAUKEGAN COKE PLANT
#13129-003 JSL 51

Reported To: BARR ENGINEERING COMPANY



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SET-R3

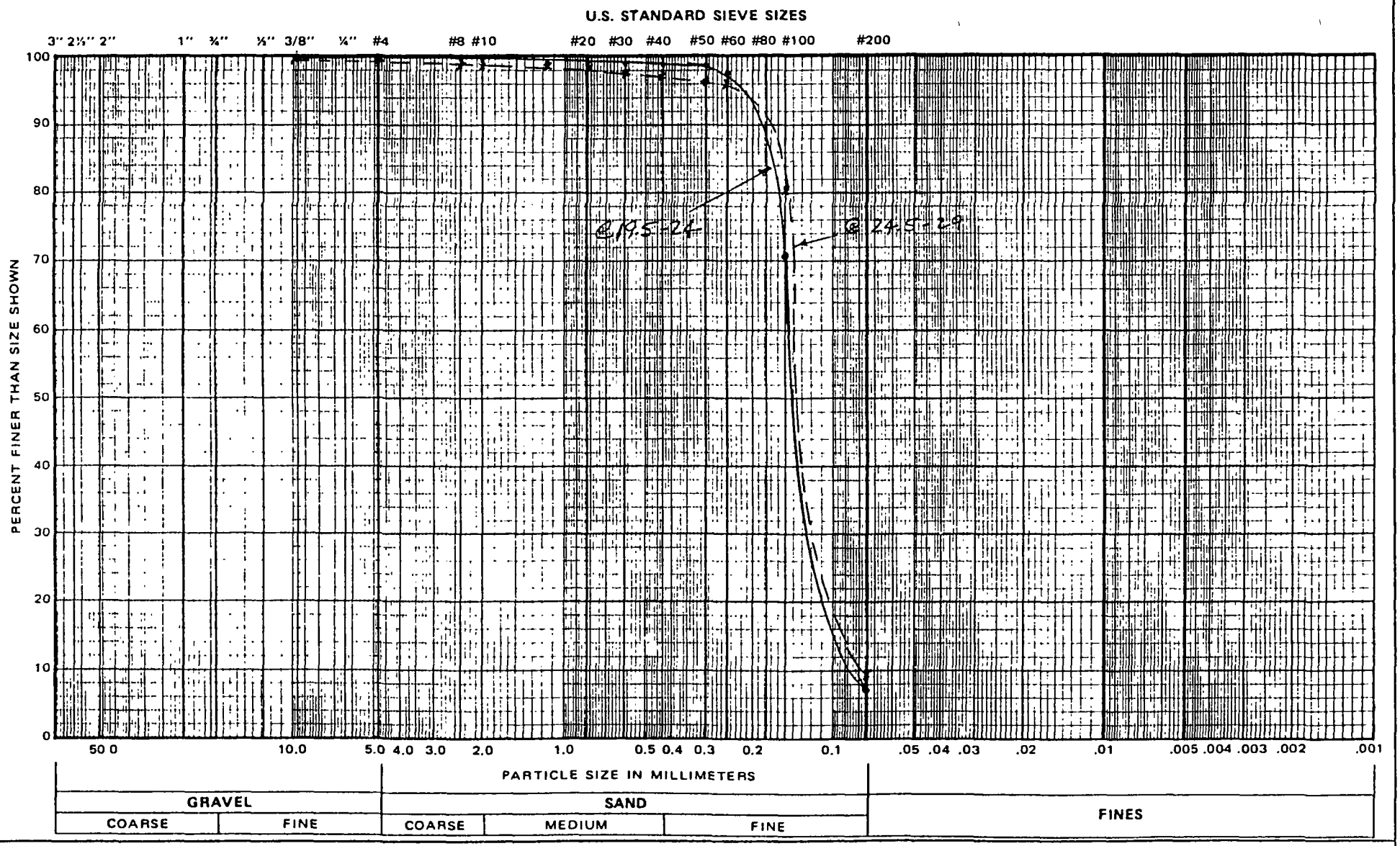
Grain Size Distribution

Boring No.	Sample No.	Depth (ft)	Soil Classification
PW-1		19.5-24	SAND w/SILT (SP-SM)
PW-1		24.5-29	SAND w/SILT (SP-SM)

Job No: 1898 Date: 9-7-93

Project: NSG WAUKEGAN COKE PLANT #13/29-003 JSL 51

Reported To: BARR ENGINEERING COMPANY



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SET B3

BARR ENGINEERING CO.

NAME K. Laufenberg
DATE 12/23/93
SHEET _____ IN SET
PAGE _____ IN FILE

13/49-003JSL104

CHECKED BY _____
DATE _____

WCP RI/FS Phase II

Porosity calculations:

1) SB4415 (36-37.2 ft)

$$\gamma_d = \gamma_w G_s (1-n)$$

Unit weight $H_2O = \gamma_w = 62.4$ pcf
Specific Gravity $= G_s = 2.78$ } From Soil Engineering Testing, Inc.
Dry Unit Weight $= \gamma_d = 121.5$ pcf }

$$121.5 \text{ pcf} = (62.4 \text{ pcf})(2.78)(1-n)$$

Porosity $= n = 0.2995987$

Porosity = 30%

2) SB4815 (34.5-35.4 ft)

$$\gamma_d = \gamma_w G_s (1-n)$$

Unit Weight $H_2O = \gamma_w = 62.4$ pcf
Specific Gravity $= G_s = 2.77$ } From Soil Engineering Testing, Inc.
Dry Unit Weight $= \gamma_d = 121.1$ pcf }

$$121.1 \text{ pcf} = (62.4 \text{ pcf})(2.77)(1-n)$$

Porosity $= n = 0.2993844$

Porosity = 30%

Appendix 4

Field Log Data Sh
Groundwater Sampl

April

September/October

November/December

Field Log Data Sheets
Groundwater Sampling

April 1992

FIELD LOG COVER SHEET

WATER SAMPLING

Client: WAKEGAN / WCP RI/FS Project Number 13149-003JSL31

Samplers: JEG KSJ Sampling Period: 4/17/92
4/18/92
4/19/92
/ /

Weather:

Date	Temperature	Wind Speed	Wind Direction	Cloud Cover
4/17/92	45 oF	5-10 mph	W	40 %
4/18/92	50 oF	10-15 mph	SE	10 %
4/19/92	___ oF	___ mph		
/ /	___ oF	___ mph		

Containers received from: Pace Braun Enseco (CH2M Hill) EDI

Samples shipped for analysis to: Pace Braun Enseco (CH2M Hill) EDI

Samples dropped off at: Pace Braun

Water blank received from: Pace (Braun) Enseco CH2M Hill EDI

Type of blank: (Trip) / (Field) Field blank is: air / (water)

Mask # 1 collected at station # MW4D-1 Mask # 2 collected at station # MW6S-1
MS/MSD - MW5S-1

Name and affiliation of others present: pete Lynch PRC

Comments:

Water Levels were taken 4/7/92 and 4/9/92.

WATER LEVEL DATA SHEET

PROJECT NAME WAKEGAN / WCP RI/FS

SAMPLERS E. Gabrielson
DATE 4/7/92
PAGE ____ OF ____

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
P101	588.14	5.84	15.22	582.30	
P102	588.52	5.50	15.09	583.02	
P103	589.44	6.99	15.42	582.45	
P104	589.07	6.27	15.06	582.80	
MW3D	588.23	5.59	30.84	582.64	
MW3S	588.24	5.54	15.04	582.70	
MW4D	589.06	6.54	34.34	582.52	
MW4S	589.17	6.62	15.45	582.55	
MW5D	588.47	7.93	28.62	580.54	
MW5S	587.89	7.32	16.28	580.57	
MW6D	588.51	7.81	29.53	580.70	
MW6S	588.45	7.70	16.75	580.75	
MW1D	587.62	5.84	29.75	581.78	
MW1S	587.76	5.97	19.75	581.79	
Harbor	584.65				

WATER LEVEL DATA SHEET

PROJECT NAME WAKEGAN / WCP RI/FS

SAMPLERS JEG
DATE 4/9/92
PAGE ____ OF ____

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
P101	588.14	5.87	15.72	582.27	
P102	588.52	5.59	15.09	582.93	
P103	589.44	7.06	15.42	582.38	
P104	589.07	6.34	15.06	582.73	
MW3D	588.23	5.69	30.84	582.54	
MW3S	588.24	5.65	15.04	582.59	
MW4D	589.06	6.65	34.34	582.41	
MW4S	589.17	6.68	15.45	582.49	
MW5D	588.47	7.94	28.62	580.53	
MW5S	587.89	7.34	16.28	580.55	
MW6D	588.51	7.84	29.53	580.67	
MW6S	588.45	7.71	16.75	580.74	
J1D	587.62	5.88	29.75	581.74	
MW1S	587.76	6.01	19.75	581 75	
Harbor	584.65				

FIELD DATA REPORT

PROJECT NAME WAUKEGAN WCP RI/FS

PROJECT NUMBER 1 1 3 / 4 9 - 0 0 3 [redacted]

SAMPLER E. Gabrielson KSJ

SAMPLING LOCATION	SAMPLING DATE MONTH DAY YEAR	TEMP °C	CONDUCTIVITY @ 25°C	pH	STATIC	ELEVATION
MW 3S	4/7/92	11.0	585	7.4	15.54	
MW 3D	"	13.0	10200	9.4	5.59	
MW 4S	"	10.0	800	8.0	6.62	
MW 4D	"	13.0	12100	9.2	6.54	
MW 5S	4/8/92	9.0	475	7.4	7.32	
MW 5D	"	11.0	4400	8.2	7.93	
MW 6S	"	11.0	1100	7.5	7.70	
MW 6D	"	11.0	13500	7.5	7.81	
MW 1S	4/9/92	11.0	1200	7.2	5.97	
MW 1D	"	12.0	6500	8.6	5.84	
Carbon - INF	"	11.0	6000	8.3	—	
Carbon - eff	"	9.0	9000	8.2	—	

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW35-1

Client: WCP RI/FS Project No. 13-49-003JSL31

Location: _____ Date: 4/7/92 Sample Time: 1520

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: (Y) N		1. 1502	12.0	450		7.3	
Casing Dia: (in.)	2"	2. 1503 30	11.0	445		7.4	
Total Depth (ft.)	15	3. 1504 30	11.0	440		7.4	
Static Depth (ft.)	5.54	4. 1505	11.0	440	585	7.4	
Water Depth:	10	5.					
Well Vol. (gal.)	1.5	6.					
Purge Method:	Cont	7.					
Samp. Method:	Bailer	Appearance: Brown					
Start Time:	1458	Odor: yes					
Stop Time:	1505	Comments: FB-1 poured					
Duration: (min.)	7						
Rate, gpm:	1.5						
Volume Purged:	10.5						

Samplers: JEG KSJ Others Present:

gen 3 VOC ____ COD ____ TOC ____ semi-volatile 2 f. metal 1 t. metal ____

nitro ____ cyanide 1 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW30-1

Client: WCP RI/FS Project No. 13-49-003JSL31

Location: _____ Date: 4/7/92 Sample Time: 1536

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N		1. 1510	13.0	8000		9.4	
Casing Dia: (in.)	2	2. 1512	13.0	8000		9.4	
Total Depth (ft.)	31	3. 1513	13.0	8000	10200	9.4	
Static Depth (ft.)	5.59	4.					
Water Depth:	25.5	5.					
Well Vol. (gal.)	4	6.					
Purge Method:	Cent	7.					
Samp. Method:	Bailer	Appearance: light brown, milky white residue					
Start Time:	1507	Odor: yes					
Stop Time:	1514	Comments:					
Duration: (min.)	7						
Rate, gpm:	3						
Volume Purged:	21						

Samplers: Others Present:

gen ____ VOC 3 COD ____ TOC ____ semi-volatile 2 f. metal ____ t. metal ____

nitro ____ cyanide 1 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW45-1

Client WCP RI/FS Project No. 1131-419-010BJS1C1311

Location: _____ Date: 4/7/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: (Y) N		1. 4.5/GAL	10	600		8.0	
Casing Dia: (in.)	2"	2. 6.0/GAL	10	600		8.0	
Total Depth (ft.)	15.5	3. 7.5/GAL	10	600	800	8.0	
Static Depth (ft.)	6.62	4.					
Water Depth:	9	5.					
Well Vol. (gal.)	1.5	6.					
Purge Method:	cent	7.					
Samp. Method:	Bailer	Appearance: clear					
Start Time:	1639	Odor: NO					
Stop Time:	1643	Comments:					
Duration: (min.)	4						
Rate, gpm:	2						
Volume Purged:	8						

Samplers: JEG KSJ Others Present:

gen ____ VOC 3 COD ____ TOC ____ semi-volatile 2 f. metal 1 t. metal ____

nitro ____ cyanide 1 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW40-1

Client WCP RI/FS Project No. 1131-1491-0013JS1431

Location: _____ Date: 4/7/92 Sample Time: 1720

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: (Y) N		1. 1651	12.0	8500		9.16	
Casing Dia: (in.)	2"	2. 1653	13.	9500		9.19	
Total Depth (ft.)	34.5	3. 1655	13	9500	12100	9.19	
Static Depth (ft.)	6.54	4.					
Water Depth:	28	5.					
Well Vol. (gal.)	4.5	6.					
Purge Method:	Cent	7.					
Samp. Method:	Bailer	Appearance: orange/white					
Start Time:	1645	Odor: YES					
Stop Time:	1655	Comments: M-1					
Duration: (min.)	10						
Rate, gpm:	2						
Volume Purged:	22.5						

Samplers: JEG KSJ Others Present:

gen ____ VOC 6 COD ____ TOC ____ semi-volatile 4 f. metal 2 t. metal ____

nitro ____ cyanide 2 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW5S-1

Client: WCP RI/FS Project No. 13-49-003JSL311

Location: _____ Date: 4/8/92 Sample Time: 1220 → 1259

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: (Y) N	~~0~~	1. 4.5	9.0	350		7.5	
Casing Dia: (in.)	2"	2. 6.0	9.0	340		7.4	
Total Depth (ft.)	16	3. 7.5	9.0	340		7.4	
Static Depth (ft.)	7.32	4. 9.0	9.0	340	475	7.4	
Water Depth:	8.5	5.					
Well Vol. (gal.)	1.5	6.					
Purge Method:	Centr.	7.					
Samp. Method:	Bailer	Appearance:					
Start Time:	1207	Odor:					
Stop Time:	1214	Comments: MS/MSD					
Duration: (min.)	7						
Rate, gpm:	1	10% clouds, 50°F, SE @ 10-15 mph					
Volume Purged:	~~4~~ 7.5	meters. YSI conductivity - redline ok ORION pH - 7.00 : 10.00					

Samplers: KSJ JEG Others Present: Pete Lynch

gen ____ VOC 9 COD ____ TOC ____ semi-volatile 6 f. metal 3 t. metal ____

nitro ____ cyanide 3 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW5D-1

Client WCP RI/FS Project No. 1131-1417-0103JS431

Location: _____ Date: 4/8/92 Sample Time: 1320

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N		1. 10.5	11.0	2900		8.2	
Casing Dia: (in.)	2"	2. 14.0	11.0	3300		8.2	
Total Depth (ft.)	28.5	3. 17.5	11.0	3300		8.2	
Static Depth (ft.)	7.93	4. 21.	11.0	3300	4400	8.2	
Water Depth:	20.5	5.					
Well Vol. (gal.)	3.5	6.					
Purge Method:	Cent	7.					
Samp. Method:	Bailer	Appearance: Orange					
Start Time:	1303	Odor: yes					
Stop Time:	1312	Comments:					
Duration: (min.)	9						
Rate, gpm:	2						
Volume Purged:	17.5						

Samplers: KSJ JEG Others Present: Pete Lynch

gen ____ VOC 3 COD ____ TOC ____ semi-volatile 2 f. metal 1 t. metal ____

nitro ____ cyanide 1 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MWGS-1

Client WCP RI/FS Project No. 1173-49-0003JSC311

Location: Date: 4/8/92 Sample Time: 1520

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: (Y) N		1. 4.5	11.0	950		7.6	
Casing Dia: (in.)	2"	2. 6.0	11.0	800		7.5	
Total Depth (ft.)	17	3. 7.5	11.0	800		7.5	
Static Depth (ft.)	7.70	4. 9.0	11.0	800	1100	7.5	
Water Depth:	9.5	5.					
Well Vol. (gal.)	1.5	6.					
Purge Method:	cent	7.					
Samp. Method:	Bailer	Appearance:					
Start Time:	1504	Odor:					
Stop Time:	1509	Comments: M-2					
Duration: (min.)	5						
Rate, gpm:	2						
Volume Purged:	10						

Samplers: JEG KSJ Others Present:

gen ____ VOC 6 COD ____ TOC ____ semi-volatile 4 f. metal 2 t. metal ____

nitro ____ cyanide 2 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW60-1

Client WCP RI/FS. Project No. 1131-1419-101013515140111

Location: _____ Date: 4/8/92 Sample Time: 1610

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @25	pH	Eh
Barr Lock: (Y) N		1. 10.5	11.0	10,100		7.5	
Casing Dia: (in.)	2"	2. 14.0	11.0	10,100		7.5	
Total Depth (ft.)	29.5	3. 17.5	11.0	10,100	13,500	7.5	
Static Depth (ft.)	7.81	4.					
Water Depth:	21.5	5.					
Well Vol. (gal.)	3.5	6.					
Purge Method:	Cent	7.					
Samp. Method:	Bailer	Appearance: orange / milky					
Start Time:	1547	Odor: yes					
Stop Time:	1556	Comments:					
Duration: (min.)	9						
Rate, gpm:	2						
Volume Purged:	17.5						

Samplers: JEG KSJ Others Present:

gen ___ VOC 3 COD ___ TOC ___ semi-volatile 2 f. metal 1 t. metal ___

nitro ___ cyanide 1 oil & grease ___ 200 ml filter ___ 500 ml filter ___

others ___

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW1S-1

Client WCP RI/FS Project No. 13-49-003JSL311

Location: _____ Date: 4/9/92 Sample Time: _____

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: (Y) N		1. 6/GAL	11.0	1000		7.2	
Casing Dia: (in.)	2"	2. 8/GAL	11.0	900		7.2	
Total Depth (ft.)	20.75	3. 10/GAL	11.0	900		7.2	
Static Depth (ft.)	5.97	4. 12/GAL	11.0	900	1200	7.2	
Water Depth:	14	5.					
Well Vol. (gal.)	2	6.					
Purge Method:	Cent	7.					
Samp. Method:	Bailer	Appearance:					
Start Time:	0952	Odor:					
Stop Time:	1004	Comments: FB-2					
Duration: (min.)	12						
Rate, gpm:	1						
Volume Purged:	12 GAL						

Samplers: JEG KSJ Others Present:

gen ____ VOC 3 COD ____ TOC ____ semi-volatile 2 f. metal 1 t. metal ____

nitro ____ cyanide 1 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: MW1P

Client: WCP RI/FS Project No. 13-49-003JSL31

Location: _____ Date: 4/9/92 Sample Time: 1035

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: (Y) N		1. 12/GAL	12.0	5000		8.6	
Casing Dia: (in.)	2"	2. 16/GAL	12.0	5000		8.6	
Total Depth (ft.)	30	3. 20/GAL	12.0	5000	6500	8.6	
Static Depth (ft.)	5.84	4.					
Water Depth:	24	5.					
Well Vol. (gal.)	4	6.					
Purge Method:	cent	7.					
Samp. Method:	Bailer	Appearance: Foamy					
Start Time:	1014	Odor: Very					
Stop Time:	1021	Comments:					
Duration: (min.)	7						
Rate, gpm:	3						
Volume Purged:	20						

Samplers: Others Present:

gen ____ VOC 3 COD ____ TOC ____ semi-volatile 2 f. metal 1 t. metal ____

nitro ____ cyanide 1 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: influent

Client WAKEGAN WCP RI/FS Project No. 13-49-003JSL31

Location: _____ Date: 4/9/92 Sample Time: 1134

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N	—	1.	11.0	4500	6000	8.3	
Casing Dia: (in.)	—	2.					
Total Depth (ft.)	—	3.					
Static Depth (ft.)	—	4.					
Water Depth:	—	5.					
Well Vol. (gal.)	—	6.					
Purge Method:	—	7.					
Samp. Method:	—	Appearance:					
Start Time:	—	Odor:					
Stop Time:	—	Comments: 150 GAL IN TANK					
Duration: (min.)	—	2.2 PPM organic vapors in tank					
Rate, gpm:	—	OVM					
Volume Purged:	—	"Inside of TANK"					

Samplers: Others Present:

gen ____ VOC 3 COD ____ TOC ____ semi-volatile 2 f. metal 1 t. metal ____

nitro ____ cyanide 1 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

Barr
Engineering Company

FIELD LOG DATA SHEET

Station: effluent

Client: WAKEGAN WCP RI/FS Project No. 17-49-003JSK31

Location: _____ Date: 4/9/92 Sample Time: 1155

General		Stabilization Test					
		TIME/ VOLUME	TEMP CENT.	COND. umhos	COND. @ 25	pH	Eh
Barr Lock: Y N		1. 1155	10	6000		8.2	
Casing Dia: (in.)		2.		-			
Total Depth (ft.)		3. 1740	9.0	6500	9000	8.2	
Static Depth (ft.)		4.					
Water Depth:		5.					
Well Vol. (gal.)		6.					
Purge Method:		7.					
Samp. Method:		Appearance: slight Grey					
Start Time:		Odor: yes					
Stop Time:		Comments: 0.0 OVM Readings					
Duration: (min.)		Clear, slight grey, Head space JAR					
Rate, gpm:							
Volume Purged:							

Samplers: Others Present:

gen ____ VOC 3 COD ____ TOC ____ semi-volatile 2 f. metal 1 t. metal ____

nitro ____ cyanide 1 oil & grease ____ 200 ml filter ____ 500 ml filter ____

others ____

CHAIN OF CUSTODY

BARR ENGINEERING CO.
7803 GLENROY ROAD
MINNEAPOLIS, MN 55439

PROJECT NUMBER: 13/49-003 JS 431

NO:

PROJECT MANAG: JSL

PROJECT CONTACT: SDI

LABORATORY: CH2MHill

REMARKS/ ANALYSIS REQUIRED: Level 3 QACQ

CONTAINER TYPE AND NUMBER

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMP.	BLANK	VOLATILE ORGANIC	SEMIVOLATILE ORGANIC	FILTERED METALS	UNFILTERED METALS	GENERAL	CYANIDE	NUTRIENTS	OIL AND GREASE	TOC	SULFIDE	DIOXIN	TOTAL NO. OF CONTAINERS	REMARKS
MW1S-1	4/9/92		X				2	1			1						4	See List
CF-inf 1			X				2				1						3	
MW1D-1			X					1			1						2	
CF-eff-1			X					1			1						1	
FB-3					X			1			1						2	

SAMPLED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
Eric GABrielson KSJ	[signature]	4/7/92				
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME

REMARKS:

SAMPLES SHIPPED VIA
☐ AIR FREIGHT ☐ FED. EXP. ☐ SAMPLER
☐ OTHER

AIR BILL NUMBER:

DISTRIBUTION: WHITE-ORIGINAL ACCOMPANIES SHIPMENT TO LAB, RETURNS TO BARR WITH RESULTS; YELLOW-LAB COPY; PINK-LAB COORDINATOR; GOLD-FIELD COPY

CHAIN OF CUSTODY

BARR ENGINEERING CO.
7803 GLENROY ROAD
MINNEAPOLIS, MN 55439

PROJECT NUMBER No. 01547
13/49-003 JSL31

NO:

PROJECT MANAGER: JSL

PROJECT CONTACT: SDI

LABORATORY: CH2M Hill

REMARKS/ ANALYSIS REQUIRED: Level 3 QA/QC

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMP.	BLANK	VOLATILE ORGANIC	SEMIVOLATILE ORGANIC	FILTERED METALS	UNFILTERED METALS	GENERAL	CYANIDE	NUTRIENTS	OIL AND GREASE	TOC	SULFIDE	DIOXIN	TOTAL NO. OF CONTAINERS	REMARKS/ ANALYSIS REQUIRED
MW1S-1	4/9/92		X			3											3	
MW1D-1			X			3	2										5	See
PCF eFF				X		3	2	1									6	
CF iNG				X		3		1									4	List
FB-3					X	3	2										5	

SAMPLED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
Eric Gabrielson KSJ	[signature]	4/9/92				
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME

REMARKS:

SAMPLES SHIPPED VIA
☐ AIR FREIGHT ☐ FED. EXP. ☐ SAMPLER
☐ OTHER

AIR BILL NUMBER:

DISTRIBUTION: WHITE-ORIGINAL ACCOMPANIES SHIPMENT TO LAB, RETURNS TO BARR WITH RESULTS; YELLOW-LAB COPY; PINK-LAB COORDINATOR, GOLD-FIELD COPY

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: MW 55
Location: COKE PLANT	Date: 11-30-93
Project #: 13149.003 JSL53	Sample time: 915

GENERAL DATA		STABILIZATION TEST					
Barr lock: (Y) N		Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	16	1 4.5	11.0		980	7.32	
Static water level:*	6.58	2 6	11.5		750	7.43	
Water depth:*	9.5	3 7.5	11.3		750	7.46	
Well volume: (gal)	1.5	4 9.0	11.5		746	7.40	-50
Purge method:	Peristic.	5					
Sample method:	BAILER	6					
Start time:	—	Dissolved Oxygen: 3.2 mg/L			Odor: no detection		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	—	Comments:					
Volume purged:	9.0						
Duplicate collected?	NO						
Sample collection by: SDI DJM							

Others present: | Well condition: GOOD

(MW): groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 1

others SEE ATTACHED LIST

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1
Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
PAH Phenols	Group 2	2 2L AMBER	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
VOC CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: 5D
Location:	Date: 11/30/93
Project # : 13 / 49 - 003 JSL53	Sample time: 945

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/ Volume	Temp. oC	Conduct. umhos	Conduct. @25	pH	Eh
Casing diameter:	2						
Total well depth:*	28.5	1 10.5	11.1		5560	8.23	
Static water level:*	7.18	2 14.0	11.1		5500	8.25	
Water depth:*	21.3	3 17.5	11.1		5450	8.26	+25
Well volume: (gal)	3.5	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 1.1 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: light AMBER					
Duration: (minutes)	—	Sample Appearance: light AMBER					
Rate, gpm:	—	Comments:					
Volume purged:	17.5						
Duplicate collected?	NO						
Sample collection by: DJM, SDI							

Others present:	Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC____ semi-volatile____ general____ COD____ TOC____ nutrient____ cyanide____

oil,grease____ whirl pak____ Total metal____ Filtered metal____ 500 ml filter 2

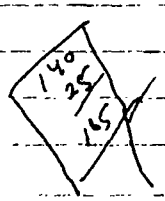
others see attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

5D

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered — Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
— Total Metals	Group 2	1 L Plastic HNO_3	3 ✓
— PAH Phenols	Group 2	2 - 2L AMBER	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Grab VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓

n° 1



Barr Engineering Company
Field Log Data Sheet

Client:	North Shore GAS	Station:	65
Location:	Coke Plant	Date:	12/1/93
Project # :	1314 9 - 003 JSL 53	Sample time:	1030

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	16.5	1 5.0	11.3		1270	7.57	
Static water level:*	6.84	2 6.5	11.4		1230	7.56	
Water depth:*	9.66	3 8.0	11.7		1220	7.51	-50
Well volume: (gal)	1.5	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.0 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: ~~Amber~~ clear					
Duration: (minutes)	—	Sample Appearance: ~~Brown clear~~ small 5.solid					
Rate, gpm:	—	Comments:					
Volume purged:							
Duplicate collected?	NO						
Sample collection by:	BJR, SDJ						

Others present: | Well condition: GOOD

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 1

others see Attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Field	Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
Field	As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
	Total metals	Group 2	1 L Plastic + HNO_3	3 ✓
	PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Collected	VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓✓
	1	1L	Plastic	
	1	500 ml	H_2SO_4	
Field	1	500 ml	HNO_3	

Barr Engineering Company
Field Log Data Sheet

Client: North Shore GAS	Station: 6D
Location: Coke Plant	Date: 12/1/93
Project # : 13 / 49 - 003 JSL 53	Sample time: 1100

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/ Volume	Temp. oC	Conduct. umhos	Conduct. @25	pH	Eh
Casing diameter:	2						
Total well depth:*	29	1 11.0	10.5		21,000 ~~2070~~	7.71	
Static water level:*	6.96	2 14.5	11.0		21,000	7.76	
Water depth:*	22.04	3 18.0	10.9		21,000	7.81	~~5~~ -107
Well volume: (gal)	3.5	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 0.5 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: light Amber					
Duration: (minutes)	—	Sample Appearance: light Amber					
Rate, gpm:	—	Comments: [redacted]					
Volume purged:	18.0						
Duplicate collected?	NO						
Sample collection by:	SDI, DJM						

Others present:	Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC____ semi-volatile____ general____ COD____ TOC____ nutrient____ cyanide____

oil,grease____ whirl pak____ Total metal____ Filtered metal____ 500 ml filter ~~[illegible]~~ 9

others see attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1
Filtered — Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2
Filtered — As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3
Total Metal	Group 2		3
PAH Phenols	Group 2	2 2L AMBER	3
CYANIDE (Total)	Group 2	1/2 gal NAOH	3
CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2
Aggressive — VOL CLP-TCL	Group 2	3 vials + HCl	3
	1	1L Plastic	
	1	500 mL H_2SO_4	
Filtered	1	500 ml HNO_3	

Barr Engineering Company
Field Log Data Sheet

Client: North Shore Gas	Station: 35
Location: Coke Plant	Date: 12/1/93
Project # : 1319 49 - 003 JSL 53	Sample time: 1200

GENERAL DATA

Barr lock: Y N	Y
Casing diameter:	2
Total well depth:*	15
Static water level:*	5.51
Water depth:*	9.49
Well volume: (gal)	1.5
Purge method:	peristaltic
Sample method:	bailer
Start time:	—
Stop time:	—
Duration: (minutes)	—
Rate, gpm:	—
Volume purged:	~9.0
Duplicate collected?	no
Sample collection by:	DJH, SPL

STABILIZATION TEST

	Time/ Volume	Temp. oC	Conduct. umhos	Conduct. @25	pH	Eh
1	4.6	11.0		1150	6.86	
2	6.0	11.5		940	6.93	
3	7.5	11.6		940	6.85	
4	9.0	11.5		930	6.88	-105
5						
6						

Dissolved Oxygen: 2.5 mg/l

Odor: no detection

Purge Appearance: clear

Sample Appearance:

Comments:

Others present:

Well condition: riser loose

MW groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 4

others see attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered: Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered: Ag, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
Total metals	Group 2		3 ✓
PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Preservable VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓✓

Barr Engineering Company
Field Log Data Sheet

Client: North Shore Mines	Station: 3D
Location: Coke Plant	Date: 12/1/93
Project #: 13149-003 TSL 53	Sample time: 1230

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	30.7	1 12	11.7		14390	8.48	
Static water level:*	5.54	2 16	11.9		14240	8.48	
Water depth:*	25.16	3 20	11.9		14030	8.48	-55
Well volume: (gal)	4.0	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 1.0 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: Amber (Dark)					
Duration: (minutes)	—	Sample Appearance: Amber (Dark)					
Rate, gpm:	—	Comments:					
Volume purged:	20						
Duplicate collected?	NO						
Sample collection by:	DSM, SDS						

Others present:	Well condition: Good

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 2

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered: Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered: As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
Total metals	Group 2		3 ✓
PAH Phenols	Group 2	2 2L AMBER	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Refrigerate — VOL CLP-TCL	Group 2	3 vials + HCl	3 ✓ ✓

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: 15
Location: COKE PLANT	Date: 12-1-93
Project #: 13149-003 3SL53	Sample time: 1300

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	19.5	1 6	12.3		1700	7.18	
Static water level:*	5.40	2 8	12.7		1650	7.21	
Water depth:*	14	3 10	12.7		1610	7.15	
Well volume: (gal)	2	4 12	12.6		1600	7.20	-96
Purge method:	Peristic.	5					
Sample method:	BAILER	6					
Start time:	-	Dissolved Oxygen: 7.1 mg/L			Odor: YES		
Stop time:	-	Purge Appearance: clear					
Duration: (minutes)	-	Sample Appearance: clear					
Rate, gpm:	-	Comments:					
Volume purged:	12						
Duplicate collected?	SD1 DJM						
Sample collection by:							
Others present:		Well condition: GOOD					

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 1

others SEE ATTACHED LIST.

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered: Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered: As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
Total metals	Group 2		3 ✓
PAH Phenols	Group 2	2 - 2L AMBER	3 ✓✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak Dis. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Rainwater VOC CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: North Shore Gas	Station: 1D
Location: Coke Plant	Date: 12/1/93
Project #: 13149-003 JSL 53	Sample time: 1330

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	29.65	1 12	11.2		970	8.72	
Static water level:*	5.27	2 16	11.2		980	8.71	
Water depth:*	24.38	3 20	11.3		980	8.71	-43
Well volume: (gal)	4.0	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 0.5 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: AMBER					
Duration: (minutes)	—	Sample Appearance: AMBER					
Rate, gpm:	—	Comments:					
Volume purged:	20	MW-3					
Duplicate collected?	YES MW-3						
Sample collection by:	DJM, SMS						

Others present:	Well condition: GOOD

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 6

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered — Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered — As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
Total metals	Group 2		3 ✓
PAH Phenols	Group 2	2 - 2L AMBER	3 ✓✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Ammenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Confirm — VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓✓

M-3 (1-D)

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1
Filtered — Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2
Filtered — As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3
Total metals	Group 2		3
PAH Phenols	Group 2	2 2L AMBER	3
CYANIDE (Total)	Group 2	1/2 gal NAOH	3
CYANIDE (Amenable) Weak DBS. CN Thio cyanate	Group 2	1/2 gal NAOH	2
Grab Wells — VOL CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: 45
Location: COKE PLANT	Date: 12-1-93
Project #: 13149-003 JSL53	Sample time: 1500

GENERAL DATA

Barr lock: (Y) N	
Casing diameter:	2
Total well depth:*	12
Static water level:*	3.43
Water depth:*	8.57
Well volume: (gal)	1.4
Purge method:	Peristic.
Sample method:	BAILER
Start time:	—
Stop time:	—
Duration: (minutes)	—
Rate, gpm:	—
Volume purged:	10.5
Duplicate collected?	NO
Sample collection by:	SDI, DJM

STABILIZATION TEST

	Time/ Volume	Temp. oC	Conduct. umhos	Conduct. @25	pH	Eh
1	4.0	11.1		1013	7.34	
2	6.5	11.5		900	7.44	
3	9.0	11.3		860	7.37	
4	10.5	11.5		855	7.37	-97
5						
6						

Dissolved Oxygen: 1.5 mg/L Odor: NO

Purge Appearance: clear

Sample Appearance: clear

Comments:

Others present: SDI DJM Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 2

others SEE ATTACHED LIST.

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
Total Metals	Group 2		3 ✓
PAH Phenols	Group 2	2 - 2L AMBER	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓✓

Barr Engineering Company
Field Log Data Sheet

Client: North Shore GAS	Station: 4D
Location: COKE Plant	Date: 12/1/93
Project # : 13 / 49 - 003 JSL 53	Sample time: 1530

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	32.1	1 14	11.2		16 400	8.30	
Static water level:*	3.52	2 18.5	11.1		16 400	8.30	
Water depth:*	28.48	3 23	11.2		16 300	8.31	-24
Well volume: (gal)	4.6	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 0.5 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: AMBER					
Duration: (minutes)	—	Sample Appearance: AMBER					
Rate, gpm:	—	Comments:					
Volume purged:							
Duplicate collected?	No						
Sample collection by:	DJM, SDE						

Others present:	Well condition: Good

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC____ semi-volatile____ general____ COD____ TOC____ nutrient____ cyanide____

oil,grease____ whirl pak____ Total metal____ Filtered metal____ 500 ml filter 3

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filled	Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
Filled	As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
	Total Metals	Group 2		3 ✓
	PAH Phenols	Group 2	2 - 2L AMBER	3 ✓ ✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Gravity	VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓ ✓

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: 7S
Location: COKE PLANT	Date: 12-1-93
Project # : 13 / 49 . 003 JEL 53	Sample time: 1600

GENERAL DATA		STABILIZATION TEST					
Barr lock: (Y) N		Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	14.5	1 4.5	9.8		1160	6.95	
Static water level:*	4.88	2 6	9.8		870	6.94	
Water depth:*	10	3 7.5	9.9		770	6.66	
Well volume: (gal)	1.5	4 9.0	9.8		750	6.60	
Purge method:	Perstic.	5 10.5	9.8		750	6.67	+15
Sample method:	Bailer	6					

Start time:	—	Dissolved Oxygen: 3.5 mg/L	Odor: no detection
Stop time:	—	Purge Appearance: ~~clear~~ reddish	
Duration: (minutes)	—	Sample Appearance: clear reddish	
Rate, gpm:	—	Comments:	
Volume purged:	10.5		
Duplicate collected?	NO		
Sample collection by: SDI DJM			

Others present:	Well condition:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC____ semi-volatile____ general____ COD____ TOC____ nutrient____ cyanide____

oil,grease____ whirl pak____ Total metal____ Filtered metal____ 500 ml filter 1

others See ATTACHED CST

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered — Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered — As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
Total Metals	Group 2		3 ✓
TRACE — PAH Phenols	Group 2	2 2L AMBER	3 ✓ ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
BTEX — VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓ ✓
	1	1L Plastic ✓	
	1	500 ml H_2SO_4 ✓	
Filtered	1	500 ml HNO_3 ✓	

Barr Engineering Company
Field Log Data Sheet

Client: North Shore Gas	Station: 7D
Location: Coke Plant	Date: 12/1/93
Project #: 17149-003 JSL 53	Sample time: 1650

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	34.35	1 135	11.2	19500	→	8.75	
Static water level:*	5.31	2 18.0	11.1	19500	→	8.75	
Water depth:*	29	3 22.5	11.1	19500	→	8.76	-86
Well volume: (gal)	4.5	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 0.5 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: Amber					
Duration: (minutes)	—	Sample Appearance: Amber					
Rate, gpm:	—	Comments:					
Volume purged:	22.5						
Duplicate collected?	No						
Sample collection by:	DSM, SDI						

Others present:	Well condition: Good

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 2

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

7D

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered: Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered: As, CD, PB, SE Mercury	Group 2	1 L plastic + HNO_3	3 ✓
Total Metals	Group 2		3 ✓
PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Gainville VOC CLP-TCL	Group 2	3 vials + HCl	3
	1	1 L Plastic	
	1	500 ml H_2SO_4	
Filtered	1	500 ml HNO_3	

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: 9S
Location: COKE PLANT	Date: 12-2-93
Project # : 13 / 49 -003 JSL53	Sample time: 830

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25	5.36	
Total well depth:*	15	1 4.5	7.9		2000	~~7.8~~	
Static water level:*	5.82	2 6	7.8		2000	5.34	
Water depth:*	9.5	3 7.5	7.9		2000	5.37	+75
Well volume: (gal)	1.5	4					
Purge method:	Peristic.	5					
Sample method:	Bailer	6					
Start time:	—	Dissolved Oxygen: 4.0 mg/L			Odor: Slight odor		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	—	Comments: FB-3					
Volume purged:	7.5						
Duplicate collected?	NO						
Sample collection by: SDI DJM							

Others present: | Well condition:

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 3

others SEE ATTACHED SHT.

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered — Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered — As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
Total Metals	Group 2		3 ✓
PAH Phenols	Group 2	2 - 2L AMBER	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Bomb VOL CLP-TCL	Group 2	3 vials + HCl	3 ✓

	1	1 L	Plastic
	1	500ml	H_2SO_4
Filtered	1	500ml	HNO_3

PARAMETER	GROUP	CONTAINER	LEVEL
AMMONIA	GROUP 2	500 PLASTIC + H2S04	1
ARSENIC (III,V)	GROUP 2	1 L PLASTIC + HNO3	2
AS,CD,PB,SE,	GROUP 2	1 L PLASTIC + HNO3	3
~~MERCURY~~	~~GROUP 2~~	"	~~3~~
THIOCYANATE	GROUP 2	"	2
PAH (Table 2.4-8)	GROUP 2	2 2L AMBER GLASS	3
PHENOLS (Table 2.4-8)	GROUP 2	"	3
CYANIDE (TOTAL)	GROUP 2	1/2 GAL PLASTIC+NAOH	3
CYANIDE (AMENABLE)	GROUP 2	"	2
WEAK ACID DISSOCIABLE CN	GROUP 2	"	2
VOCS CLP-TCL	GROUP 2	3 VOC VIALS + HCL	3

Barr Engineering Company
Field Log Data Sheet

Client: North Shore GAS	Station: 90
Location: COKE Plant	Date: 12/2/93
Project # : 13 / 49 - 003 352 53	Sample time: 0900

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/ Volume	Temp. oC	Conduct. umhos	Conduct. @25	pH	Eh
Casing diameter:	2						
Total well depth:*	34.24	1 13.5	10.0		10,900	8.00	
Static water level:*	6.04	2 18.1	10.0		11,000	8.00	
Water depth:*	28	3 22.5	9.9		11,000	7.98	+88
Well volume: (gal)	4.5	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 0.5 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: Amber					
Duration: (minutes)	—	Sample Appearance: Amber					
Rate, gpm:	—	Comments:					
Volume purged:	22.5						
Duplicate collected?	No						
Sample collection by:	DJM, SDT						

Others present:	Well condition: Good

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC____ semi-volatile____ general____ COD____ TOC____ nutrient____ cyanide____

oil,grease____ whirl pak____ Total metal____ Filtered metal____ 500 ml filter 3

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	2 ✓
Filtd — Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtd — As, CD, PB, SE MERCURY	Group 2	1 L Plastic HNO_3	3 ✓
Total Metals	Group 2		3 ✓
PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2
Effluent — VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓
	1	1 L	Plastic
	1	500 ml	H_2SO_4
Filtd —	1	500 ml	HNO_3

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: PW-1
Location: COKE PLANT	Date: 12-1-93
Project # : 13149-003 JSL53	Sample time: 1130

GENERAL DATA		STABILIZATION TEST					
Barr lock: (Y) N		Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	6	Volume	oC	umhos	@25		
Total well depth:*	35.99	1 129	12.5		4800	8.44	
Static water level:*	6.65	2 172	12.5		4700	8.49	
Water depth:*	29.34	3 215	12.3		4700	8.51	-74
Well volume: (gal)	43	4					
Purge method:	cent.	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 0.5 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: cloudy					
Duration: (minutes)	—	Sample Appearance: cloudy					
Rate, gpm:	—	Comments:					
Volume purged:	215						
Duplicate collected?	NO						
Sample collection by: DJM, SDI							

Others present: | Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 2

others SEE ATTACHED SHEET

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

PW - 1

CLP PESTICIDES/PCBS	FULL SCAN	2L AMBER GLASS	LEVEL 3
CLP SEMIVOLS (PAHS+PHENOLS)	FULL SCAN	2L AMBER GLASS	LEVEL 3
CLP CYANIDE	FULL SCAN	1/2 GAL PLASTIC+NAOH	LEVEL 3
CLP VOS'S	FULL SCAN	3 VOA VILES HCL	LEVEL 3
CLP METALS	FULL SCAN	1 1L PLASTIC HNO3	LEVEL 3

LEVEL 1

Barr Engineering Company — Chain of Custody

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 1349-003-254

No: 14701

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH2M Hill MONT

Remarks/ Analysis Required:

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Nutrients (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required
1.	14S	11/3/93	745	X			X			1	1	Group 2, LEVEL 1
2.	FB-1		745						X	1	1	
3.	14D		0800				X			1	1	
4.	13S		915				X			1	1	
5.	13D		945							1	1	
6.	MW-1		—							1	1	
7.	12S		1100							1	1	
8.	12D		1130							1	1	
9.	11S		1245							1	1	
10.	MW-2		—							1	1	
11.	11D		1315							1	1	
12.	15S		1430							1	1	
13.	15S MS		↓							1	1	
14.	15S MSD		↓							1	1	
15.	15D		1500							1	1	
16.	9S		1600							1	1	

Number of Containers/Preservative: Volatile Organic (Unpres.); Volatile Organic (Pres.); Semivolatile Organic; Total Metals (HNO_3); Dissolved Metals (HNO_3); General (Unpreserved); Cyanide (N_xOH,Asc. Acid); Nutrients (H_2SO_4) 5 20ml; Oil and Grease (H_2SO_4); TOC (H_2SO_4); Sulfide ($Z_nAcetate$); Dioxin; Whirlpak/Bacteria; Total Phenol (H_2SO_4)

Sampled By: Dan Mahan, SDI

Remarks:

		Date	Time			
Relinquished By:	Dan Mahan	11/3/93	1930	Received by Lab:	Date	Time
Relinquished By.		Date	Time	Received by Lab:	Date	Time
Samples Shipped VIA ☐Air Freight ☒Fed Exp ☐Sampler ☐Other				Air Bill Number: 416 853 3401		

Distribution White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 1

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003JSL53

No: 14677

Project Manager: Karlene French

Project Contact: Mary Maday

Laboratory: CH2 M Hill, MONT

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc Acid)	Nutrients (H_2SO_4) 500 ml	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1. 8D	1130		X			X										1							1	Group 2, Level 1
2. 8D MS	↓		↓			↓										1							1	↓
3. 8D MSD	↓		↓			↓										1							1	↓
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								
11.																								
12.																								
13.																								
14.																								
15.																								
16.																								

Sampled By: Dave Mahan, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Mahan	11-20-93	1430			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 416 853 3401

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordina... Gold - Field Copy

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003JSL53

No: 14696

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH2 Mill, MONT

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	12D	11/30/93	1130	X			X							1	1		1							3	Turbidity
2.	15S		1430	X			X							1	1		1							3	Nitrate
3.																									Nitrate
4.																									Alkalinity Bicarbonate
5.																									Total Phosphorus
6.																									Dissolved Fe
7.																									Cation - ION Balance
8.																									
9.																									
10.																									
11.																									
12.																									
13.																									
14.																									
15.																									
16.																									

Sampled By: Dan Milne, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dan Milne, SDI	11/30/93	1931			
Relinquished By:	Date	Time	Received by Lab:	Date	Time
Samples Shipped VIA ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other			Air Bill Number: 416 553 3401		

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 2

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 JSL 53

No: 14680

Project Manager: Karlene French

Project Contact: Mary Malay

Laboratory: CH2M Hill, MONT

Remarks/ Analysis Required:

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required
1. 14S	11/3/93	745	X			X							1		1								2	Group 2, Level 2
2. FB-1		745						X					1		1								2	
3. 14D		800				X							1		1								2	
4. 13S		915											1		1								2	
5. 13D		445											1		1								2	
6. M-1		—											1		1								2	
7. 12S		1100											1		1								2	
8. 12D		1130											1		1								2	
9. 11S		1245											1		1								2	
10. M-2		—											1		1								2	
11. 11D		1315											1		1								2	
12. 15S		1430											1		1								2	
13. 15S MS													1		1								2	
14. 15S MSD													1		1								2	
15. 15D		1500											1		1								2	
16. 8S		1100											1		1								2	

Sampled By: Dave Malay, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Malay	11/3/93	1930			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 416 853 3701

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; [illegible] - Field Copy

LEVEL

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 TSL 53

No: 14681

Project Manager: Karlene French

Project Contact: Mary Maley

Laboratory: CH2 Mill, MOVIT

Remarks/ Analysis Required:

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required
1. 8D	11/3/93	1630	X			X							1		1								2	Group 2, Level 2
2. 8D MS	↓	↓	X			X							1		1								2	↓
3. 8D MSD	↓	↓	X			X							1		1								2	↓
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								
11.																								
12.																								
13.																								
14.																								
15.																								
16.																								

Sampled By: Dan Malone, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dan Malone	11/3/93	1930			
Relinquished By:	Date	Time	Received by Lab.	Date	Time
Samples Shipped VIA ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other			Air Bill Number: 416 853 3401		

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 3

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 JSL 53

No: 14678

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: Ell, Millill, Mont

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1. 14S	11/30/93	745	X			X						1	1		1								3	Group 2, Level 3
2. FB-1		745						X				1	1		1								3	
3. 14D		800				X						1	1		1								3	Hold Total Metals
4. 13S		915										1	1		1								3	analysis - contact
5. 13D		945										1	1		1								3	Mary Mackey
6. M-1		—										1	1		1								3	
7. 12S		1100										1	1		1								3	
8. 12D		1130										1	1		1								3	
9. 11S		1245										1	1		1								3	
10. M-2		—										1	1		1								3	
11. 11D		1315										1	1		1								3	
12. 15S		1430										1	1		1								3	
13. 15S MS												1	1		1								3	
14. 15S MSD												1	1		1								3	
15. 15D		1500										1	1		1								3	
16. 8S		1600										1	1		1								3	

Sampled By: Dave McLean SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave McLean	11/31/93	1930			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 411 853 3401

Distribution: te-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; - Field Copy

LEVEL 3

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-00355253

No: 14679

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH2 Mill, MONT

Number of Containers/Preservative

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1. SD	11/30/93	1630	Y			Y						1	1		1								3	Group 2, Level 3
2. SD ms	↓	↓	↓			↓						1	1		1								3	↓
3. SD msD	↓	↓	↓			↓						1	1		1								3	↓
4.																								Hold Total METALS
5.																								Analysis - contact
6.																								Mary Mackey
7.																								
8.																								
9.																								
10.																								
11.																								
12.																								
13.																								
14.																								
15.																								
16.																								

Sampled By: Dave Mahan, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Mahan	11/30/93	1930			
Relinquished By:	Date	Time	Received by Lab.	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 416 853 3401

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

Z L AMBER

LEVEL 3

Barr Engineering Company — *Chain of Custody*

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003JSL53

No. 14697

Project Manager: Kurtoe French

Project Contact: Mary Mackey

Laboratory: Chem Hill, MONT

Number of Containers/Preservative

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	14S	745	11/3/13	X			X					2	TRACE				PAH							2	Group 2, LEVEL 3
2.	FB-1	745							X			2												2	Extract and analyze
3.	14D	0810					X					2	TRACE				PAH							2	PAH's and phenols
4.	13S	0915										2	TRACE				PAH							2	Separately, note
5.	13D	0945										2												2	TRACE PAH analysis
6.	M-1	—										2												2	on some wells
7.	12S	1100										2	TRACE				PAH							2	
8.	12D	1130										2	TRACE				PAH							2	
9.	11S	1245										2	TRACE				PAH							2	
10.	M-2	—										2	TRACE				PAH							2	
11.	11D	1315										2	TRACE				PAH							2	
12.	15S	1430										2	TRACE				PAH							2	
13.	15S MS											2												2	
14.	15S MSD											2												2	
15.	15D	1500										2	TRACE				PAH							2	
16.	8S	1600										2	TRACE				PAH							2	

Sampled By: Dan Milan, SOI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dan Milan	11/3/13	1930			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 416 853 3401

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

2 L AMBERS

LEVEL 3

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 1349-003-353-553

No: 14695

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide ($NaOH$,Asc Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (ZnAcetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1. SD	11/2/93	1630	X			X					2												2	Group 2, LEVEL 3
2. SD MS	↓	↓	X			X					2												2	Extract and analyze
3. SD MSD	↓	↓	X			X					2												2	PAH's and phenols
4.																								separately
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								
11.																								
12.																								
13.																								
14.																								
15.																								
16.																								

Number of Containers/Preservative

Project Manager: Karen French

Project Contact: Mary Mahaley

Laboratory: Cliff Mill, MONT

Sampled By: Dan Mahn, SDI

Remarks:

Relinquished By: Dan Mahn — Date: 11/3/93 — Time: 1930

Relinquished By: — Date: — Time:

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Received by Lab: — Date: — Time:

Received by Lab: — Date: — Time:

Air Bill Number: 4116.853 3401

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 3

Barr Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Chain of Custody

Project Number: 13/49-003-353

No: 14700

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_xOH.Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_nAcetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required
1. 8D	11/30/93	1630	X			X				3													3	Group 2, 20.13
2. 8D MS	↓	↓	X			X				3													3	↓
3. 8D MSD	↓	↓	X			X				3													3	
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								
11.																								
12.																								
13.																								
14.																								
15.																								
16.																								

Project Manager: Karlene French

Project Contact: Mary Madacy

Laboratory: CH2M Hill, Alaska

Remarks/ Analysis Required:

Sampled By: Dave Mahan / SDT

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Mahan	12/1/93	1930			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 447 653 7703

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 3

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 JSL53

No: 14699

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH_2 MHill, Alavahua

Number of Containers/Preservative

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	14S	11/30/93	745	X			X				3													3	Group 2, Level 3
2.	FB-1		745						X		3													3	
3.	14D		0800				X				3													3	
4.	13S		0915				X				3													3	
5.	13D		0945				X				3													3	
6.	m-1		—				X				3													3	
7.	12S		1100				X				3													3	
8.	12D		1130				X				3													3	
9.	11S		1245				X				3													3	
10.	m-2		—				X				3													3	
11.	11D		1315				X				3													3	
12.	15S		1430				X				3													3	
13.	15S MS						X				3													3	
14.	15S MSD						X				3													3	
15.	15D		1500				X				3													3	
16.	8S		1600				X				3													3	

Sampled By: Dan Melanson SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dan Melanson	11/30/93	1930			
Relinquished By:	Date	Time	Received by Lab:	Date	Time
Samples Shipped VIA ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other			Air Bill Number. 447 653 7763		

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 1

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003JSL53

No: 14682

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH2M Hill MONT

Remarks/ Analysis Required:

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required
1.	10S	12-1-93	730	X			X										1							1	Group 2 Level 1
2.	10D		0800														1							1	
3.	5S		915														1							1	
4.	5D		945														1							1	
5.	6S		1030														1							1	
6.	6D		1100														1							1	
7.	3S		1200														1							1	
8.	3D		1230														1							1	
9.	1S		1300														1							1	
10.	1D		1330														1							1	
11.	M-3		—														1							1	
12.	FB-2		730						X								1							1	
13.	4S		1500				X										1							1	
14.	4D		1530														1							1	
15.	7S		1600														1							1	
16.	7D		1630														1							1	

Sampled By: Dave Mckey, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Mckey, SDI	12-1-93	1930			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 675 520 8316

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Yellow - Field Copy

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-00335653

No: NO 14691

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH2M Hill, Mont

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required.
1. 10S	12-1-93	730	X			X							1	1		1							3	Turbidity
2. 10D		0800											1	1		1							3	nitrite
3. 6S		1030											1	1		1							3	nitrate
4. 6D		1100											1	1		1							3	Alkalinity Bicarbonate
5. 7S		1600											1	1		1							3	Total Phosphorus
6. 7D		1630											1	1		1							3	Dissolved Fe
7.																								Cation - Ion Balance
8.																								
9.																								
10.																								
11.																								
12.																								
13.																								
14.																								
15.																								
16.																								

Sampled By: Dave Mckee, SDT

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Mckee	12/30				
Relinquished By:	Date	Time	Received by Lab:	Date	Time
Samples Shipped VIA ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other			Air Bill Number: 675 5208316		

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 2

Barr — Chain of Custody

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 1349-003-SL53

No: 14692

Project Manager: Kurt Friedl

Project Contact: Mary Motley

Laboratory: CH2M Hill, Mount

Remarks/ Analysis Required: Comp 2, Level 2

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Soil	Other	Type: Grab	Comp.	QC	Number of Containers/Preservative: Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_aOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide ($Z_nAcetate$)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers
1.	10S	12-1-93	0730	X			X							1		1								2
2.	10D		0800											1		1								2
3.	5S		0915											1		1								2
4.	5D		0930											1		1								2
5.	6S		1030											1		1								2
6.	6D		1100											1		1								2
7.	3S		1200											1		1								2
8.	3D		1210											1		1								2
9.	1S		1300											1		1								2
10.	1D		1330											1		1								2
11.	M-3		—											1		1								2
12.	FB-2		0750						X					1		1								2
13.	4S		1500				X							1		1								2
14.	4D		1530											1		1								2
15.	7S		1600											1		1								2
16.	7D		1630											1		1								2

Sampled By: Dan Mahn, SDI

Remarks:

Relinquished By: Dan Mahn — Date: 12-1-93 — Time: 1930

Relinquished By: — Date: — Time:

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Received by Lab: — Date: — Time:

Received by Lab. — Date: — Time:

Air Bill Number: 875 520 5316

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Canary - Field Copy

2L

LEVEL 3

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003JSL53

No: NC 14683

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: Gilt, M Hill, MONT

Number of Containers/Preservative

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	10S	12-1-93		X			X					2	TRACE PAH											2	Group 2, Level 3
2.	10D											2												2	Extract and analyze
3.	5S											2												2	PAH's and phenols
4.	5D											2												2	separately, note
5.	6S											2												2	TRACE PAH analysis
6.	6D											2												2	on some wells
7.	3S											2												2	
8.	3D											2												2	
9.	1S											2												2	
10.	1D											2												2	
11.	M-3											2												2	
12.	FB-2								X			2												2	
13.	4S						X					2												2	
14.	4D											2												2	
15.	7S											2	TRACE PAH											2	
16.	7D											2												2	

Sampled By: Dan Mahan, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dan Mahan, SDI	12-1-93	1930			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 675 520 5316

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 3

Barr Engineering Company — *Chain of Custody*

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 35L53

No: 14693

Project Manager: Karlene French

Project Contact: Mary Mackay

Laboratory: CH2M Hill, MONT

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	10S	12-1-93	0730	X			X						1	1		1								3	Group 2, Level 3
2.	10D		0800										1	1		1								3	
3.	5S		0915										1	1		1								3	Hold Told METALS
4.	5D		0945										1	1		1								3	analysis, contact
5.	6S		1030										1	1		1								3	Mary Mackay
6.	6D		1100										1	1		1								3	
7.	3S		1200 ~~1130~~										1	1		1								3	
8.	3D		1230 ~~1200~~										1	1		1								3	
9.	1S		1300 ~~1230~~										1	1		1								3	
10.	1D		1330										1	1		1								3	
11.	m-3		—										1	1		1								3	
12.	FB-2		0730						X				1	1		1								3	
13.	4S		1500				X						1	1		1								3	
14.	4D		1530										1	1		1								3	
15.	7S		1100										1	1		1								3	
16.	7D		1130										1	1		1								3	

Sampled By: Dave Melman, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Melman, SDI	12-1-93	1930			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 675 520 8316

Distribution: ...te-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; - Field Copy

LEVEL

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 JS 253

No: 14686

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH2 m Hill, Alaska

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	9S	12-2-93	0830	X			X				3													3	Temp 2, Level 3
2.	9D		0900				X				3													3	
3.	FB-3		0830						X		3													3	
4.	~~PW-1~~																								
5.																									
6.	PW-1		1130				X				3													3	Full Scan, LEVEL 3
7.																									
8.																									
9.																									
10.																									
11.																									
12.																									
13.																									
14.																									
15.																									
16.																									

Sampled By: Dan Melman, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dan Melman SDI	12/2/93	1300			
Relinquished By:	Date	Time	Received by Lab:	Date	Time
Samples Shipped VIA ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other			Air Bill Number. 674 392 850 5		

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 3

Barr Engineering Company — *Chain of Custody*

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49_00335253

No: 14688

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH2M Hill MONT

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	9S	12-2-93	0830	X			X						1	1		1								3	Group 2, Level 3
2.	9D	↓	0900	X			X						1	1		1								3	
3.	FB-3	↓	0830	X					X				1	1		1								3	Hold Total Metals
4.																									analysis, contact Mary
5.																									Mackey
6.																									
7.																									
8.																									
9.																									
10.	PW-1	12-2-93	1150	X			X							1		1								2	CLP CYANIDE
11.																									CLP METALS
12.																									Full SCAN, Level 3
13.																									
14.																									
15.																									
16.																									

Sampled By: Dan Malone, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dan Malone, SDI	12/2/93	1500			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 416 849 7782

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

CL

LEVEL 3

Barr Engineering Company

Chain of Custody

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 JSL 53

No: 14687

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH2M Hill, MONT

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	9S	12.2.93	0830	X			X					2												2	Group 2, LEVEL 3
2.	9D	↓	0900	X			X					2												2	↓
3.	FB-3	↓	0930	X								2												2	↓
4.	7S	↓	1200	X			X					2	TRACE PAH											2	↓
5.																									
6.																									
7.	PW-1	12.2.93	1130	X			X					2												2	CLP Pesticides/PCBS
8.																									CLP SEMIVOLS (PAH + Phenols)
9.																									Full SCAN, LEVEL 3
10.																									
11.																									Extract and analyze
12.																									PAH's and Phenols
13.																									separately, note TRACE PA
14.																									on ONE well (7S)
15.																									
16.																									

Sampled By: Dan Mclaw, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dan Mclaw SDI	12/2/93	1340			
Relinquished By:	Date	Time	Received by Lab:	Date	Time
Samples Shipped VIA ☐ Air Freight ☐ Fed Exp ☐ Sampler ☐ Other X			Air Bill Number. 416 849 7782		

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 2

Barr Engineering Company — *Chain of Custody*

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003JSL53

No: 14685

Project Manager: Karlene French

Project Contact: Mary Mickey

Laboratory: CH2 M Hill, MONT

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	9S	12-2-93	0830	X			X							1		1								3	Group 2, Level 2
2.	9D	↓	0900	↓			X							1		1								3	↓
3.	FB-3	↓	0830	↓					X					1		1								3	↓
4.																									
5.																									
6.																									
7.																									
8.																									
9.																									
10.																									
11.																									
12.																									
13.																									
14.																									
15.																									
16.																									

Sampled By: Dan Mulan, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dan Mulan SDI	12/2/93	1300			
Relinquished By:	Date	Time	Received by Lab:	Date	Time
Samples Shipped VIA ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other			Air Bill Number: 416 849 7782		

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; G... - Field Copy

LEVEL 1

Barr Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Chain of Custody

Project Number: 13/49-003 JS 253

No: 14684

Project Manager: Karlene French

Project Contact: Mary Mackey

Laboratory: CH2 M Hill, MONT

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_xOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_v Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	9S	12/2/93	0830	X			X										1							1	Group 2, Level 1
2.	9D	↓	0900	↓			↓										1							1	↓
3.	~~[illegible]~~	↓		↓																					
4.	FB-3	↓	0830	↓					X								1							1	↓
5.																									
6.																									
7.																									
8.	9S	12/2/93	0830	X			X							1	1		1							3	Turbidity, nitrite, nitrate,
9.	9D	↓	0900	X			X							1	1		1							3	Alkalinity, bicarbonate, Total Phosphorus
10.																									Dissolved Fe, Cation - Ion Balance
11.																									
12.																									
13.																									
14.																									
15.																									
16.																									

Sampled By: Dan Mahan, SDI

Remarks:

Relinquished By	Date	Time	Received by Lab	Date	Time
Dan Mahan SDI	12/2/93	1300			
Relinquished By:	Date	Time	Received by Lab:	Date	Time
Samples Shipped VIA ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other			Air Bill Number: 416 899 7782		

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

LEVEL 3

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 JSL 53

No: 14608

Project Manager: Harlene French

Project Contact: Mary Mackey

Laboratory: CH2 M Hill, Mont

Number of Containers/Preservative

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1. Filter CARE 12/93	12/3/93	0930			X	X			2					3									5	TCLP: VOC, semi-VOC,
2.																								Inorganics
3.																								group 8, Level 3
4.																								
5.																								
6.																								
7.																								
8.																								
9.																								
10.																								
11.																								
12.																								
13.																								
14.																								
15.																								
16.																								

Sampled By: Dave Melmer, SDI

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Melmer, SDI	12/3/93	1110			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Air Bill Number: 675 517 4393

Distribution: White-Original Accompanies Shipment to Lab, Pink - Lab Coordinator; Yellow - Field Copy

Heritage Quote #

Barr Engineering Company

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Chain of Custody

Quote # Z118869

Project Number: 13/49-003JSL53

No: 14589

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide ($Z_nAcetate$)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	plastic cubes for CN, thiosulfate					Total No. Of Containers	Remarks/ Analysis Required:
1. CE426D BF unfiltered	12/2/93	1100	X			X									2							2						4	Contact ANN Ochs for analysis: 612 832-2600
2.																													
3. CE426D BF 50u Filter	12/2/93	1615	X			X									2							2						4	
4.																													*3 DAY Turnaround*
5. CE426D BF 25u Filter	12/2/93	1630	X			X									2							2						4	Formaldehyde Method
6.																													
7. CE426D BF 5u Filter	12/2/93	1645	X			X									2							2						4	
8.																													
9.																													
10.																													
11. CE398D BF 25u Filter	12/2/93	1655	X			X					2																	2	phenol, P-cresol
12.																													
13. GS505EA BF 25u Filter	12/2/93	1730	X			X					2																	2	phenol, P-cresol, O-cresol
14.																													*3 DAY Turnaround*
15.																													
16.																													

Number of Containers/Preservative

Project Manager: Karleen French

Project Contact: ANN Ochs

Laboratory: Heritage LABS

Remarks/ Analysis Required:

Sampled By: Dan Mahn, SDI

Remarks:

Relinquished By	Date	Time	Received by Lab:	Date	Time
Dan Mahn, SDI	12/2/93	1930			
Relinquished By:	Date	Time	Received by Lab:	Date	Time
			Air Bill Number: FED EX 074257 6461		

Samples Shipped VIA: ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ Other

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

CHAIN OF CUSTODY
BARR ENGINEERING CO.
7803 GLENROY ROAD
MINNEAPOLIS, MN 55439

PROJECT NUMBER: 01549
13/49-003 JSL31
NO:

PROJECT MANAGER: JSL
PROJECT CONTACT: SDI
LABORATORY: CH2M Hill
REMARKS/ ANALYSIS REQUIRED: Level 3 QA/QC

CONTAINER TYPE AND NUMBER

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMP.	BLANK	VOLATILE ORGANIC	SEMIVOLATILE ORGANIC	FILTERED METALS	UNFILTERED METALS	GENERAL	CYANIDE	NUTRIENTS	OIL AND GREASE	TOC	SULFIDE	DIOXIN	TOTAL NO. OF CONTAINERS	
MW3S-1	4/7/92		X			3	2										5	See List
MW3D-1			X			3	2										5	
FB-1					X	3	2										5	
MW4S-1			X			3											3	
MW4D-1			X			3											3	
M-1			X			3											3	
TB-1					X	3											3	

SAMPLED BY: Eric Gapritson KSJ	RELINQUISHED BY: [signature]	DATE 4/7/92	TIME	RECEIVED BY LAB:	DATE	TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
REMARKS:	SAMPLES SHIPPED VIA ☐ AIR FREIGHT ☐ FED. EXP. ☒ SAMPLER ☐ OTHER			AIR BILL NUMBER:		

DISTRIBUTION: WHITE-ORIGINAL ACCOMPANIES SHIPMENT TO LAB, RETURNS TO BARR WITH RESULTS; YELLOW-LAB COPY; PINK-LAB COORDINATOR; GOLD-FIELD COPY

CHAIN OF CUSTODY
BARR ENGINEERING CO.
7803 GLENROY ROAD
MINNEAPOLIS, MN 55439

PROJECT NUMBER № 01342
13/49-6037

NO:

PROJECT MANAGER: JSL

PROJECT CONTACT: SDI

LABORATORY: CH2MHill

REMARKS/ ANALYSIS REQUIRED: Level 3 QA/QC

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMP.	BLANK	VOLATILE ORGANIC	SEMIVOLATILE ORGANIC	FILTERED METALS	UNFILTERED METALS	GENERAL	CYANIDE	NUTRIENTS	OIL AND GREASE	TOC	SULFIDE	DIOXIN	TOTAL NO. OF CONTAINERS	
M-1	4/7/92		X				2										2	See List
MW4D-1			X				2										2	
MW4S-1			X				2										2	

SAMPLED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME

REMARKS:

SAMPLES SHIPPED VIA
☐ AIR FREIGHT ☐ FED. EXP. ☐ SAMPLER
☐ OTHER

AIR BILL NUMBER:

DISTRIBUTION: WHITE-ORIGINAL ACCOMPANIES SHIPMENT TO LAB, RETURNS TO BARR WITH RESULTS; YELLOW-LAB COPY; PINK-LAB COORDINATOR; GOLD-FIELD COPY

CHAIN OF CUSTODY
BARR ENGINEERING CO.
7803 GLENROY ROAD
MINNEAPOLIS, MN 55439

PROJECT NUMBER: 13/49-003 JSL31 № 01541

NO:

PROJECT MANAGER: JSL

PROJECT CONTACT: SDI

LABORATORY: CH2M Hill

REMARKS/ANALYSIS REQUIRED: Level 3 QA/QC

CONTAINER TYPE AND NUMBER

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMP.	BLANK	VOLATILE ORGANIC	SEMIVOLATILE ORGANIC	FILTERED METALS	UNFILTERED METALS	GENERAL	CYANIDE	NUTRIENTS	OIL AND GREASE	TOC	SULFIDE	DIOXIN	TOTAL NO. OF CONTAINERS
MW3D-1	4/7/92		X					1			1						2
MW3S-1			X					1			1						2
MW4D-1			X					1			1						2
MW4S-1			X					1			1						2
FB-1					X			1			1						2
M-1			X					1			1						2

SAMPLED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
Eric Cabrickson KST	[signature]	4/7/92				
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME

REMARKS:

SAMPLES SHIPPED VIA
☐ AIR FREIGHT ☐ FED. EXP. ☑ SAMPLER
☐ OTHER

AIR BILL NUMBER:

DISTRIBUTION: WHITE-ORIGINAL ACCOMPANIES SHIPMENT TO LAB, RETURNS TO BARR WITH RESULTS; YELLOW-LAB COPY; PINK-LAB COORDINATOR; GOLD-FIELD COPY

CHAIN OF CUSTODY
BARR ENGINEERING CO.
7803 GLENROY ROAD
MINNEAPOLIS, MN 55439

PROJECT NUMBER № 01543
13/49-003JSL31

NO:

PROJECT MANAGER: JSL

PROJECT CONTACT: SDI

LABORATORY: CH2M Hill

REMARKS/ ANALYSIS REQUIRED: Level 3 QA/QC

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMP.	BLANK	VOLATILE ORGANIC	SEMIVOLATILE ORGANIC	FILTERED METALS	UNFILTERED METALS	GENERAL	CYANIDE	NUTRIENTS	OIL AND GREASE	TOC	SULFIDE	DIOXIN	TOTAL NO. OF CONTAINERS	
MW6S-1	4/8/92		X				2	1			1						4	
MW5D-1			X								1						1	See
MW6D-1			X								1						1	List
MW5S-1/MSD			X					1			1						2	
MW5S-1			X					1			1						2	
MW5S-1/MS			X					1			1						2	
M-2			X					1			1						2	

SAMPLED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
Eric Gabrielson KSJ	[illegible]	4/9/92				
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME

REMARKS:

SAMPLES SHIPPED VIA
☐ AIR FREIGHT ☐ FED. EXP. ☐ SAMPLER
☐ OTHER

AIR BILL NUMBER:

[illegible] SUBMIT TO LAB. RETURNS TO BARR WITH RESULTS: YELLOW-LAB COPY; PINK-LAB COORDINATOR; GOLD-FIELD COPY

CHAIN OF TODY

BARR ENGINEERING CO.
7803 GLENROY ROAD
MINNEAPOLIS, MN 55439

PROJECT NUMBER № 01544
13/49-003 JSL31

NO:

PROJECT MANAGE: JSL

PROJECT CONTACT: SDI

LABORATORY: CH2MHill

REMARKS/ANALYSIS REQUIRED: Level 3 QA/QC

CONTAINER TYPE AND NUMBER

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMP.	BLANK	VOLATILE ORGANIC	SEMIVOLATILE ORGANIC	FILTERED METALS	UNFILTERED METALS	GENERAL	CYANIDE	NUTRIENTS	OIL AND GREASE	TOC	SULFIDE	DIOXIN	TOTAL NO. OF CONTAINERS	REMARKS
M-2	4/8/92		X				2										2	See List
MW5D-1	|		X				2	1									3	|
MW6D-1	|		X				2	1									3	|

SAMPLED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
Eric Gabrielson KSJ	[signature]	4/9/92				
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE	TIME

REMARKS:

SAMPLES SHIPPED VIA
☐ AIR FREIGHT ☐ FED. EXP. ☐ SAMPLER
☐ OTHER

AIR BILL NUMBER:

DISTRIBUTION: WHITE ORIGINAL ACCOMPANIES SHIPMENT TO LAB. RETURNS TO BARR WITH RESULTS; YELLOW-LAB COPY; PINK-LAB COORDINATOR; GOLD-FIELD COPY

CHAIN OF CUSTODY

BARR ENGINEERING CO.
7803 GLENROY ROAD
MINNEAPOLIS, MN 55439

PROJECT NUMBER № 01545
13/419-003 JSL 31

NO:

PROJECT MANAGER: JSL

PROJECT CONTACT: SDI

LABORATORY: CH2MHill

REMARKS/ ANALYSIS REQUIRED: Level 3 QA QC

SAMPLE IDENTIFICATION	COLLECTION DATE	COLLECTION TIME	GRAB	COMP.	BLANK	CONTAINER TYPE AND NUMBER: VOLATILE ORGANIC	SEMIVOLATILE ORGANIC	FILTERED METALS	UNFILTERED METALS	GENERAL	CYANIDE	NUTRIENTS	OIL AND GREASE	TOC	SULFIDE	DIOXIN	TOTAL NO. OF CONTAINERS
MW55-1	4/8/92		X			3	2										5
MW55-1/MS	"		X			3	2										5
MW55-1/MSD	"		X			3	2										5
MW65-1	"		X			3											3
MW6D-1	"		X			3											3
MW5D-1	"		X			3											3
M-2	"		X			3											3
FB-2	"				X	3											3

See List

SAMPLED BY: Eric Garretson KSJ	RELINQUISHED BY:	DATE 4/15/92	TIME	RECEIVED BY LAB:	DATE / TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE / TIME
RECEIVED BY:	RELINQUISHED BY:	DATE	TIME	RECEIVED BY LAB:	DATE / TIME
REMARKS:	SAMPLES SHIPPED VIA ☐ AIR FREIGHT ☐ FED. EXP. ☐ SAMPLER ☐ OTHER			AIR BILL NUMBER:	

DISTRIBUTION: WHITE-ORIGINAL ACCOMPANIES SHIPMENT TO LAB, RETURNS TO BARR WITH RESULTS; YELLOW-LAB COPY; PINK-LAB COORDINATOR; GOLD-FIELD COPY

September/October 1993

FIELD LOG COVER SHEET

WATER SAMPLING

Client: North Shore Gas Project Number: 13/49003JSL53

Technicians: Eric Gabrielson, Dave Melmer

Sampling Period: 9/30/93
10/1/93

Weather:

Date	Temperature	Wind Speed	Wind Direction	Cloud cover
9/30/93	40 F	5-10 mph	SW	0
10/1/93	65 F	10-15 mph	W	100

All of the sampling containers were shipped directly from Ch2m Hill Laboratory in Montgomery, Al. to the site in Waukegan. All sample containers were shipped directly from Waukegan to Montgomery, for analysis.

Two field/equipment blanks were taken in the field. PRC split on Fb-2 using water we received from Ch2m Hill.

Three field duplicates were taken called; M-1, M-2, M-3. M-1, was taken at well MW7D. M-2, was taken at well MW6D. M-3, was taken at MW10S. At well MW12S an MS/MSD was taken for QA/QC purpose.

PRC accompanied us throughout most of the sampling period, and split on wells MW12S, MW12D, MW14D, and MW15D.

FIELD DATA REPORT

North shore gas
Project number: 1349003JSL53
Technicians: Eric Gabrielson, and Dave Melmer

Sampling location	Date	Temperatu C	Conductivi 25 C	pH	Static	Elevation	Eh	DO mg/L
MW12S	9/30/93	16.0	500	6.88	2.78	-----	+8.0	2.2
MW12D	"	12.0	2000	7.07	2.75	-----	-6.0	1.5
MW9D	"	13.0	9500	7.85	5.52	-----	-58.0	*
MW13S	"	16.0	400	6.90	3.73	-----	-6.3	2.8
MW13D	"	12.0	11500	8.47	3.76	-----	-92.0	4
MW14S	"	16.0	500	7.05	1.08	-----	-12.0	2.9
MW14D	"	13.0	500	7.67	1.24	-----	-60.0	2.9
MW15S	"	16.0	600	6.78	2.10	-----	+15.0	2.8
MW15D	"	12.0	3000	6.70	2.16	-----	+9.0	5.5
MW11S	10/1/93	17.0	2000	7.05	5.31	-----	-12.0	3.1
MW11D	"	13.0	3000	7.09	5.43	-----	+6.0	2.6
MW7S	"	16.0	850	6.38	4.42	-----	+32.0	2.2
MW7D	"	12.0	13000	8.70	4.85	-----	-104.0	2.1
MW6S	"	15.0	1200	7.41	6.51	-----	-30.0	3
MW6D	"	12.0	17000	7.84	6.62	-----	-49.0	1.8
MW10S	"	15.0	500	7.47	6.05	-----	-30.0	2.5
MW10D	"	12.0	15500	8.47	6.11	-----	-90.0	2.2
MW8S	"	17.0	1000	7.10	3.55	-----	-13.0	2.1
MW8D	"	13.0	10000	8.73	3.24	-----	-106.0	2.3
MW9S	"	16.0	2000	6.18	5.27	-----	+41.0	2.1

* = Possible damage to probe if used in this well.

North shore gas, Waukegan, Illionis 9/29/93

SJB,DDM,JEG,DJM.

Well name	Measuring point elevation	Water level depth	Total well depth	Water level elevation	comments
SG-1		1.24			actual staff gauge reading
SG-2		1.34			actual staff gauge reading
SG-3		1.40			actual staff gauge reading
Z-1		4.46	12.4		
Z-2		2.73	7.0		
Harbor					
MW12S		2.78	12.0		
MW12D		2.75	33.0		
P-105		0.79	10.8		
MW13S		3.73	13.0		
MW13D		3.76	33.0		
MW14S		1.08	11.5		
MW14D		1.24	30.5		
MW15S		2.10	12.0		
MW15D		2.16	29.0		
MW11S		5.31	14.0		
MW11D		5.43	30.5		
P-107		1.76	11.6		
MW3S	588.24	5.09	15.0	583.15	
MW3D	588.23	5.11	30.7	583.12	
P-102	588.52	5.38	15.0	583.14	
MW7S		4.42	15.5		
MW7D		4.85	34.3		
P-104	589.07	5.81	15.0	583.26	
MW1S	587.76	4.81	19.6	582.95	
MW1D	587.62	4.68	29.6	582.94	
PW-1					
P-106					
MW6S	588.45	6.51	16.5	581.94	
MW6D	588.51	6.62	29.0	581.89	
MW5S	587.89	6.16	16.2	581.73	
MW5D	588.47	6.77	28.5	581.70	
MW10S		6.05	16.2		
MW10D		6.11	32.6		
P-103	589.44	6.47	15.2	582.97	

Well name	Measuring point elevation	Water level depth	Total well depth	Water level elevation	comments
MW8D		3.24	30.0		
MW4S	589.17	2.96	12.1	586.21	
MW4D	589.06	2.72	32.1	586.34	
MW9S		5.27	15.0		
MW9D		5.52	34.0		
Z-8		4.31	33.6		
Z-9		4.20	21.9		
Z-10		3.61	10.1		
EPA ?		6.92	12.8		
EPA ?		3.79	17.0		
EPA ?		3.82	8.7		
EPA		3.76			
Still W1		3.59			harbor
Still W2		4.45			

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW12S
Location:	Date: 9/30/93
Project #: 13149-003 JSL53	Sample time: 0930

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2"	Volume	oC	umhos	@25		
Total well depth:*	12.0	1 0850	16.0	400		6.85	
Static water level:*	2.78	2 0851	16.0	400		6.85	
Water depth:*	9.22	3 08852	16.0	400	500	6.88	+8.0 ← E
Well volume: (gal)	1.5	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					

Start time:	0844	Dissolved Oxygen: 2.2 mg/L	Odor: NO
Stop time:	0452	Purge Appearance: clear	
Duration: (minutes)	4	Sample Appearance: clear	
Rate, gpm:	1.0	Comments: 40°F	Sound Radius OK
Volume purged:	8	SW 5-10	pH OK
Duplicate collected?	yes MS MSD	sunny	MS
Reviewed by:		12S MS 12S MSD	MSD

Sample collected by: DJM, JEG	Others present: FRC: RAY Mastrolonardo Keith Foszcz

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 SEE general Attached sheets 1 COD 1 TOC 1 12S nutrient 12S MS 12S MSD cyanide 1

oil,grease 1 whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 9

others

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW120
Location:	Date: 9/30/93
Project #: 13 / 49 - 003 TSL53	Sample time: 1030

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2"	Volume	oC	umhos	@25		
Total well depth:*	33.0	1 15 GAL	12.0	1500		7.02	
Static water level:*	2.75	2 20 GAL	12.0	1500		7.09	
Water depth:*	30.25	3 25 GAL	12.0	1500	2000	7.07	-8.0 ← Eh
Well volume: (gal)	4.9	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	0858	Dissolved Oxygen: DJM ~~10.1~~ 1.5			Odor:	NO	
Stop time:	0919	Purge Appearance: slight cloud then clear					
Duration: (minutes)	21	Sample Appearance: clear					
Rate, gpm:	1	Comments: PRC split					
Volume purged:	25						
Duplicate collected?	NO						
Reviewed by:	KSJ						

Sample collected by: DJM, JEG

Others present: PRC, see MW125 for names

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 see general 1 Asbestos COD 1 spare TOC 1 nutrient ____ cyanide 1

oil,grease 1 whirl pak ____ Total metal ____ Filtered metal ____ 500 ml filter 2

others

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: 1349003JSL53 Waukegan	Station: MW9D
Location:	Date: 9-30-93
Project # : 13/49-003JSL53	Sample time: 1115

GENERAL DATA		STABILIZATION TEST						
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh	DO
Casing diameter:	2"	Volume	oC	umhos	@25			
Total well depth:*	34	1 550 gal	130	7500	9500	7.85	-58	
Static water level:*	5.52	2						
Water depth:*	28.48	3						
Well volume: (gal)	4.6	4						
Purge method:	2" sub (development)	5						
Sample method:	bailer	6						

Start time:		Dissolved Oxygen: NO	Odor: YE
Stop time:		Purge Appearance: well dev. & stabilized by driller	
Duration: (minutes)		Sample Appearance:	
Rate, gpm:		Comments: well developed & stabilized by drillers prior to stampling (FB-1	
Volume purged:			
Duplicate collected?	NO		
Reviewed by:		Do not taken be of suspect damage to probe	

Sample collected by: DJM, JEG	Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general 2 see Attached sheet COD 1 TOC 1 nutrient ~~2~~ cyanide 3

oil,grease 1 whirl pak____ Total metal____ Filtered metal 1 500 ml filter____

others

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW 135
Location:	Date: 9/30/93
Project #: 13 149 -003 JSL 53	Sample time: 1330

GENERAL DATA		STABILIZATION TEST						
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh	
Casing diameter:	2	Volume	oC	umhos	@25			
Total well depth:*	13.0	1 4.5	16.0	360		6.64		
Static water level:*	3.73	2 6.0	16.0	320		6.83		
Water depth:*	9.27	3 7.5	16.0	320		6.90		Eh
Well volume: (gal)	1.5	4 9.0	16.0	325	400	6.90	-6.3	
Purge method:	peristaltic	5						
Sample method:	bailer	6						
Start time:	1320	Dissolved Oxygen: 2.8			Odor: NO			
Stop time:	—	Purge Appearance: clear						
Duration: (minutes)		Sample Appearance: clear						
Rate, gpm:	1.0	Comments:						
Volume purged:	10							
Duplicate collected?	No							
Reviewed by:								

Sample collected by: DSM, JEG	Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general See attached sheet COD ____ TOC ____ nutrient ____ cyanide 1

oil,grease ____ whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 1

others

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW13D
Location:	Date: 9/30/93
Project #: 13149-003 JSL 53	Sample time: 1345

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	33.0	1 10	12.0	9060		8.44	
Static water level:*	3.76	2 15	12.0	9000		8.46	
Water depth:*	29.24	3 20	12.0	9000	11500	8.47	-92
Well volume: (gal)	4.7	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 11.0 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: light Amber but clear					
Duration: (minutes)	—	Sample Appearance: light Amber					
Rate, gpm:	1.0	Comments:					
Volume purged:	20						
Duplicate collected?	NO						
Reviewed by:							

Sample collected by: DSM, JEF	Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general ____ COD ____ TOC ____ nutrient ____ cyanide 1

oil,grease 1 whirl pak ____ Total metal ____ Filtered metal ____ 500 ml filter 1

others SEE Attached Sheet for Bottles

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW14S
Location:	Date: 9-30-93
Project #: 13 / 49 - 603 JSL 53	Sample time: 1500

GENERAL DATA		STABILIZATION TEST						
Barr lock: Y N	Y		Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2		Volume	oC	umhos	@25		
Total well depth:*	11.5	1	5.5	16.0	700		6.88	
Static water level:*	1.08	2	7.0	16.0	400		7.20	
Water depth:*	10.42	3	8.5	16.0	400		6.99	
Well volume: (gal)	1.6	4	10.0	16.0	400		7.00	
Purge method:	peristaltic	5	11.5	16.0	400	500	7.05	-12.0
Sample method:	bailer	6						
Start time:	—	Dissolved Oxygen: 2.9 mg/L				Odor: no detect		
Stop time:	—	Purge Appearance: Faint Amber						
Duration: (minutes)	—	Sample Appearance: Faint Amber						
Rate, gpm:	1.0	Comments:						
Volume purged:	11.5							
Duplicate collected?	NO							
Reviewed by:								

Sample collected by: DJM, JEG

Others present: ~~split with PRC sec 125~~

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general____ COD____ TOC____ nutrient____ cyanide 1

oil,grease____ whirl pak____ Total metal____ Filtered metal 1 500 ml filter 1

others see attached sheet for bottles filled

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan				Station: MW14D			
Location:				Date: 9/30/93			
Project #: 13149-003 JEE53				Sample time: 1530			
GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	30.5	1 14	13.0	380		7.66	
Static water level:*	1.24	2 19	13.0	375		7.65	
Water depth:*	29.26	3 24	13.0	380	500	7.67	~60
Well volume: (gal)	4.7	4					
Purge method:	peristlic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.9 mg/L			Odor: no detect		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	1.0	Comments: PRC split Their MS/MSD					
Volume purged:	24						
Duplicate collected?	NO						
Reviewed by:							
Sample collected by: DSM, JEE		Others present: split with PRC see MS for NAME					
MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:							
VOC 3 semi-volatile 3 general ____ COD ____ TOC ____ nutrient ____ cyanide 1							
oil,grease ____ whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 1							
others							

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan		Station: MW155	
Location:		Date: 9/30/93	
Project #: 13149 - 003 JEL-53		Sample time: 1715	

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	12.0	1 4.5	16.0	500		~~7.16~~ 6.80	
Static water level:*	2.10	2 6.0	16.0	500		6.80	
Water depth:*	9.9	3 7.5	16.0	500	600	6.78	+15
Well volume: (gal)	1.6	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					

Start time:	—	Dissolved Oxygen: 2.8 mg/L	Odor: YES
Stop time:	—	Purge Appearance: cloudy → then clear slightly	
Duration: (minutes)	—	Sample Appearance: clearer than purge water but still cloudy	
Rate, gpm:	1.0	Comments:	
Volume purged:	7.5	FB-1 → used our FB water split ISDW PRC	
Duplicate collected?	NO		
Reviewed by:			

Sample collected by: DJM, JEL	Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general ____ COD ____ TOC ____ nutrient ____ cyanide 1

oil,grease ____ whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 2

others SEE Attached Sheet for Bottles filled

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Wa-kager	Station: MW15D
Location:	Date: 9/30/93
Project # : 13149-003552.53	Sample time: 1745

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	29.0	1 13	12.0	2300		6.63	
Static water level:*	2.16	2 17	12.0	2300		6.69	
Water depth:*	26.84	3 22	12.0	2300	3,000	6.70	+9.0
Well volume: (gal)	4.3	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 5.5 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: cloudy → clearer					
Duration: (minutes)	—	Sample Appearance: clearer than purge water					
Rate, gpm:	1.0	Comments:					
Volume purged:	22						
Duplicate collected?	NO						
Reviewed by:							

Sample collected by: DJM, JEG | Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general ____ COD ____ TOC ____ nutrient ____ cyanide 1

oil,grease ____ whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 1

others See attached sheet for BOTTLES filled

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan					Station: [illegible] MW 11S		
Location:					Date: 10-1-93		
Project # : 13149 - 003 SL 53					Sample time: 0830		
GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	14.0	1 4.0	17.0	1300		6.95	
Static water level:*	5.31	2 6.0	17.0	1300		7.00	
Water depth:*	8.69	3 7.0	17.0	1300	2000	7.05	-12
Well volume: (gal)	1.4	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 3.1 mg/L			Odor: No detect		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	1.0	Comments:					
Volume purged:	8.0	FB-2 0750					
Duplicate collected?	no FB-1						
Reviewed by:							
Sample collected by: DJM, JEL		Others present:					
MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:							
VOC 3 semi-volatile 3 general ____ COD ____ TOC ____ nutrient ____ cyanide 1							
oil,grease ____ whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 1							
others see attached sheet							

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukesha	Station: MW11D
Location:	Date: 10-1-93
Project # : 13 / 49 - 003 J3L53	Sample time: 0900

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	30.5	1 12	13.0	2200		7.00	
Static water level:*	5.43	2 16	13.0	2200		6.95	
Water depth:*	25.07	3 20	13.0	2200	3000	7.09	+6
Well volume: (gal)	4.0	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.6 mg/L			Odor: no defect		
Stop time:	—	Purge Appearance: slightly cloudy → cleared up as purged					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	1.0	Comments:					
Volume purged:	20						
Duplicate collected?	NO						
Reviewed by:							

Sample collected by: DJM, JEG	Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general____ COD____ TOC____ nutrient____ cyanide 1

oil,grease____ whirl pak____ Total metal____ Filtered metal 1 500 ml filter 1

others

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukesha					Station: MW7S		
Location:					Date: 10/1/93		
Project #: 13149-003 JSL53					Sample time: 0915		
GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	~~34.0~~ 14.41	1 5.0	16.0	700		6.33	432
Static water level:*	~~4.35~~ 4.42	2 6.5	16.0	700		6.39	
Water depth:*	9.98	3 8.0	16.0	700	850	6.38	432
Well volume: (gal)	1.6	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.2 mg/L			Odor: no detect		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	1.0	Comments: drill to E					
Volume purged:	8.0	Lin 10-15 @ 180°					
Duplicate collected?	NO	65°F					
Reviewed by:							

Sample collected by: DSM, JKF | Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general 2 COD 1 TOC 1 nutrient ____ cyanide 1

oil,grease 1 whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 1

others

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Wayzata	Station: MW7D (M-1)
Location:	Date: 10/1/93
Project #: 13 / 49 - 003 JSL 53	Sample time: 0945

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	34.3	1 14	12.0	10,000		8.69	
Static water level:*	4.85	2 19	12.0	10,000		8.71	
Water depth:*	29.45	3 24	12.0	10,000	13,000	8.70	-104
Well volume: (gal)	4.8	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.1 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: dark amber same cloudiness — clearer as purge					
Duration: (minutes)	—	Sample Appearance: same					
Rate, gpm:	1.0	Comments: Drillers to East equip running					
Volume purged:	24	wind 10-20 mph SW					
Duplicate collected?	M-1	M-1					
Reviewed by:							

Sample collected by: DJM, JTG — Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general 2 COD 1 TOC 1 nutrient ____ cyanide 1

oil,grease 1 whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 8 10

others See attached sheet

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW 65
Location:	Date: 10-1-93
Project #: 1231219 - 003 JSL53	Sample time: ~~1100~~ 1045

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	~~16.5~~ 16.5	1 5.0	15.0	1200		7.41	
Static water level:*	6.51	2 6.5	15.0	1000		7.39	
Water depth:*	9.99	3 8.0	15.0	1000		7.40	-30
Well volume: (gal)	1.6	4 9.5	15.0	1000	1200	7.41	-30
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 3.0 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: Grey but clear					
Duration: (minutes)	—	Sample Appearance: clear than purge water					
Rate, gpm:	1.0	Comments:					
Volume purged:	10.0						
Duplicate collected?	NO						
Reviewed by:							

Sample collected by: DJM, JEE	Others present:

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC____ semi-volatile____ general 2 COD 1 TOC 1 nutrient____ cyanide____

oil,grease 1 whirl pak____ Total metal____ Filtered metal____ 500 ml filter____

others See Attached Sheet

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MWHD (M-2)
Location:	Date: 10-1-93
Project #: 1314 9-003 SSLS3	Sample time: 1100

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	29	1 11	12.0	13000		7.79	
Static water level:*	6.62	2 15	12.0	13000		7.80	
Water depth:*	22.38	3 18	12.0	13000	17,000	7.84	-49
Well volume: (gal)	3.6	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 1.8 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: dark amber					
Duration: (minutes)	—	Sample Appearance: same					
Rate, gpm:	1.0	Comments:					
Volume purged:	18						
Duplicate collected?	YES M-2						
Reviewed by:							

M-2

Sample collected by: DJM, JEE	Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC____ semi-volatile____ general 2 COD 1 TOC 1 nutrient____ cyanide____

oil,grease 1 whirl pak____ Total metal____ Filtered metal____ 500 ml filter____

others See Attached sheet

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW 105 (M-3)
Location:	Date: 10-1-93
Project # : 13149 - 003 JSL 53	Sample time: 1145

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2"	Volume	oC	umhos	@25		
Total well depth:*	16.2	1 5.0	16.0	410		6.83	
Static water level:*	6.05	2 1.5	15.0	400		7.40	
Water depth:*	10.15	3 8.0	15.0	400		7.47	-30.0
Well volume: (gal)	1.6	4 9.5	15.0	400	500	7.47	-30.0
Purge method:	peristaltic	5					
Sample method:	bailer	6					

Start time:	—	Dissolved Oxygen: 2.5 mg/L	Odor: No detection
Stop time:	—	Purge Appearance: clear	
Duration: (minutes)	—	Sample Appearance: same	
Rate, gpm:	1.0	Comments: M-3	
Volume purged:	9.5-10.0		
Duplicate collected?	YES M-3		
Reviewed by:			

Sample collected by: DJM JEG | Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general 2 COD 1 TOC 1 nutrient ____ cyanide 1

oil,grease 1 whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 2

others see attached sheets

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW10D
Location:	Date: 10-1-93
Project #: 13 1 4-9 - 003 35L53	Sample time: 1215

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	32.6	1 14	12.0	5000		8.40	
Static water level:*	6.11	2 18	12.0	5000		8.46	
Water depth:*	26.49	3 22	12.0	5000	15,500	8.47	-90
Well volume: (gal)	4.3	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.2 mg/L			Odor: Y/N		
Stop time:	—	Purge Appearance: dark ~~grey~~ Amber, (clear) clear as purged					
Duration: (minutes)	—	Sample Appearance: light ~~grey~~ Amber (clear)					
Rate, gpm:	1.0	Comments:					
Volume purged:	22						
Duplicate collected?	NO						
Reviewed by:							

Sample collected by: DJM, JEG | Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general 2 COD 1 TOC 1 nutrient ____ cyanide 1

oil,grease 1 whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 2

others See attached sheets

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW 85
Location:	Date: 10-1-93
Project # : B3149-003JSL53	Sample time: 1300

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	12.5	1 4.5	17.0	1100		6.84	
Static water level:*	3.55	2 6.0	17.0	1000		7.05	
Water depth:*	8.95	3 7.5	17.0	1000		7.06	
Well volume: (gal)	1.5	4 9.0	17.0	1000	1000	7.10	-13
Purge method:	peristaltic	5					
Sample method:	Bailer	6					

Start time:	—	Dissolved Oxygen: 2.1 mg/L	Odor: no detect
Stop time:	—	Purge Appearance: clear	
Duration: (minutes)	—	Sample Appearance: Clear	
Rate, gpm:	1.0	Comments:	
Volume purged:	9.0		
Duplicate collected?	NO		
Reviewed by:			

Sample collected by: DJM, JFG	Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general____ COD____ TOC____ nutrient____ cyanide 1

oil,grease____ whirl pak____ Total metal____ Filtered metal 1 500 ml filter 1

others See attached sheet

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: MW8D
Location:	Date: 10-1-93
Project #: 13149-003 JS253	Sample time: 1320

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	30.0	1 14	13.0	8000		8.72	
Static water level:*	3.34	2 18	13.0	8000		8.73	
Water depth:*	26.76	3 22	13.0	8000	10,000	8.73	-106
Well volume: (gal)	11.3	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.3 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: light grey - light amber					
Duration: (minutes)	—	Sample Appearance: same					
Rate, gpm:	1.0	Comments:					
Volume purged:	22						
Duplicate collected?	NO						
Reviewed by:							

Sample collected by: DSM, JEG — Others present:

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC 3 semi-volatile 3 general ____ COD ____ TOC ____ nutrient ____ cyanide 1

oil,grease ____ whirl pak ____ Total metal ____ Filtered metal 1 500 ml filter 1

others see attached sheet

* Measurements are referenced from top of riser pipe.

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan					Station: MW95		
Location:					Date: 10-1-93		
Project #: 13149 - 003 JL53					Sample time: 1415		
GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	15.0	1 5.0	16.0	1800		6.15	
Static water level:*	5.27	2 6.5	16.0	1800		6.17	
Water depth:*	9.73	3 8.0	16.0	1800	2000	6.18	+41
Well volume: (gal)	1.6	4					
Purge method:	peristalic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.1 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: cloudy (white)					
Duration: (minutes)	—	Sample Appearance: cloudy					
Rate, gpm:	1.0	Comments:					
Volume purged:	8.0						
Duplicate collected?	NO						
Reviewed by:							
Sample collected by: DSM, JEC		Others present:					
MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:							
VOC 3 semi-volatile 3 general 2 COD 1 TOC 1 nutrient ___ cyanide 1							
oil,grease 1 whirl pak ___ Total metal ___ Filtered metal 1 500 ml filter ___							
others	see attached sheet						

* Measurements are referenced from top of riser pipe.

Well development procedures of North Shore Gas, Waukegan Coke Plant (NSG-WEP), Monitoring wells.

A list of wells developed by JEG and DJM

MW4D	MW10D
MW10S	MW7D
MW7S	

The method of well development used was mechanical surging. This method involves the forcing of water to flow into and out of a screen by operating a bailer at the end of a suction hose as a plunger. This motion is similar to a piston in a cylinder of an automobile. With use of a centrifugal pump we are removing water at the same time the surging takes place.

After a significant amount of water was removed from each well, usually 1000 gallons, and a reduction in the amount of visible sediment, a two inch submersible pump was used to remove water at designated intervals throughout the well screen. The two inch submersible was used to insure that all areas of the well were developed consistently.

Prior to well development static water levels were taken using the riser of the well as a reference point. During development readings of pH, conductivity, and temperature were recorded every fifteen minuets.

All of the water purged during development was contained in a large polyurethane storage tank, that was then transferred into a semitrailer holding tank.

Date 9/27/93

Well name: MW4D

		Well volume =E
Total well depth	31.0' A	(A-B)=C CxD=E
Orginal static	3.03' B	
Water depth	28.0' C	
2" conversion	.163 D	

Started pumping well at 1614 with a two inch submersible, the well had already been mechanically purged.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1625	12000	15000	13.0	8.16	
1637	9000	11000	14.0	8.14	
1700	8000	10500	12.0	8.15	
1715	8000	10500	12.0	8.15	
1745	7000	9000	12.0	8.14	
1800	7000	9000	12.0	8.17	
1810	7000	9000	12.0	8.18	
1827	4800	6000	12.0	8.04	*
1845	7000	9000	12.0	8.17	
1856	7000	9000	12.0	8.22	
Average	7680	9800	12.3	8.15	

Stopped pumping at 1930 after 135 minutes. 1000 gallons purged at a average rate of 7.5 gpm.

* = Pump moved and readings do not represent actual parameters

Date 9/28/93 page 1
Well name: MW10D

			Well volume =E
Total well depth	31.5'	A	(A-B)=C CxD=E
Orginal static	5.94'	B	
Water depth	25.5'	C	
2" conversion	.163	D	

Started pumping and surging well at 0805 with a centrifugal pump.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
0805	6000	8000	11.0	8.25	
0806	5500	7500	11.0	8.33	
0854	5000	6500	12.0	8.44	
0915	5000	6500	12.0	8.47	
0926	6000	8000	12.0	8.49	
0934	5000	6500	12.0	8.47	
0940	6000	8000	12.0	8.47	
1000	5500	7000	12.0	8.45	
1015	5000	6500	12.0	8.42	
1031	5000	6500	13.0	8.42	
1032	5000	6500	12.0	8.43	
Average	5364	7045	11.9	8.42	

Stopped pumping at 1032 after 147 minutes. 1000 gallons purged at a average rate of 6.8 gpm.

Started pumping well at 1224 with a two inch submersible.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1224	5000	6500	13.0	8.42	
1420	5000	6500	12.0	8.39	
1432	7000	9000	13.0	8.47	
1445	5000	6500	12.0	8.44	
1451	5000	6500	12.0	8.41	
1500	5000	6500	12.0	8.41	
Average	5333	6917	12.3	8.42	

Stopped pumping at two separate times because we were developing two wells at a time. 1000 gallons out.

Restarted pumping MW10D with the centrifugal pump at 1550.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1550	4700	6000	14.0	8.43	
1600	5000	6000	14.0	8.40	
1615	5000	6000	14.0	8.42	
1652	5000	6500	12.0	8.47	
1700	5000	6500	12.0	8.45	
Average	4940	6200	13.2	8.43	

Stopped pumping at 1700 after 70 minutes. 500 gallons purged at a average rate of 7.2 gpm.

Average of all readings.

Conductivity	Conductivity at 25	Temperature	pH
5212	6721	12.5	8.43

Date 9/28/93

Well name: MW10S

			Well volume =E
Total well depth	16.0'	A	(A-B)=C CxD=E
Orginal static	5.96'	B	
Water depth	10.0'	C	
2" conversion	.163	D	

Started pumping and surging well at 1223 with a centrifugal pump.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1223	365	450	15.0	6.82	
1327	500	600	15.0	6.84	
1420	490	600	15.0	6.78	
1430	500	600	15.0	6.95	
1445	500	600	15.0	6.85	
1451	490	600	15.0	6.84	
1500	490	600	15.0	6.84	
Average	424	579	15.0	6.85	

Stopped pumping at two separate times because we were developing two wells at a time. 1000 gallons pumped out.

Started pumping well at 1550 with a two inch submersible pump.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1550	450	550	15.0	7.06	
1600	440	550	15.0	6.98	
Average	445	550	15.0	7.02	

Well was completely developed after taking out 200 gallons with a crystal clear appearence. Well purged for 10 minutes at an average rate of 20 gpm.

Total water removed from MW10S was 1200 gallons.
Average of all readings.

Conductivity	Conductivity at 25	Temperature	pH
435	564	15.0	6.93

Date 9/28/93

Well name: MW7D

Well volume =E
(A-B)=C CxD=E

Total well depth	22.0'	A
Orginal static	4.69'	B
Water depth	17.5'	C
2" conversion	.163	D

Started pumping and surging well at 1925 with a centrifugal pump.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1925	8000	10500	12.0	8.68	
1940	8000	10500	12.0	8.65	
1955	10000	13000	12.0	8.71	
2000	9500	12500	12.0	8.69	
2020	10000	13000	12.0	8.70	
2045	9500	12500	12.0	8.68	
Average	9167	12000	12.0	8.69	

Stopped pumping at 2045 after 80 minutes. 1000 gallons purged at a average rate of 12.5 gpm.

Date 9/29/93

Restarted pumping and surging well at 0735 with a centrifugal pump.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
0735	11000	14500	12.0	8.72	
0755	12000	15500	12.0	8.75	
0815	10000	13000	12.0	8.72	
0830	9500	12500	12.0	8.72	
0845	10500	13500	13.0	8.71	
0900	9500	12500	12.0	8.69	
0915	10000	13000	12.0	8.70	
0945	10000	13000	12.0	8.71	
1000	10000	13000	12.0	8.72	
Average	10417	13583	12.2	8.72	

Stopped pumping at 1000 after 205 minutes. 1000 gallons pumped out at an average rate of 5 gpm.

Well name: MW7D

Restarted pumping and surging well at 0735 with a centrifugal pump.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1035	10500	13000	12.0	8.68	
1045	10000	13000	12.0	8.67	
1050	10000	13000	12.0	8.68	
1110	10000	13000	12.0	8.65	
1115	10000	13000	12.0	8.66	
1130	10000	13000	12.0	8.67	
Average	10083	13000	12.0	8.67	

Stopped pumping at 1130 after 55 minutes. 500 gallons pumped out at an average rate of 9 gpm.

Starting pumping well at 1200 with a two inch submersible.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1200	10000	14500	12.0	8.68	
1240	10000	15500	12.0	8.69	
1255	10000	13000	12.0	8.68	
1305	10000	12500	12.0	8.69	
1315	10000	13500	12.0	8.68	
Average	10000	13800	12.0	8.68	

Stopped pumping well at 1315 after 75 minutes. 500 gallons pumped out at an average rate of 6.5 gpm.

Total water removed 3000 gallons
Average of all readings.

Conductivity	Conductivity at 25	Temperature	pH
9917	13096	12.0	8.69

Date 9/28/93
Well name: MW7S

		Well volume =E
Total well depth	14.0' A	(A-B)=C CxD=E
Orginal static	4.42' B	
Water depth	9.5' C	
2" conversion	.163 D	

Started pumping and surging well at 1752 with a centrifugal pump.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1752	700	850	16.0	6.20	
1800	625	750	16.0	6.15	
1810	630	750	16.0	6.13	
1830	600	700	16.0	6.17	
1845	600	700	16.0	6.30	
1900	600	700	16.0	6.39	
1915	600	700	16.0	6.35	
Average	622	736	16.0	6.24	

Stopped pumping at 1915 after 83 minutes. 1000 gallons purged at a average rate of 12 gpm.

Started pumping well at 1950 with a two inch submersible.

Time	Conductivity	Conductivity at 25	Temperature	pH	Comments
1950	750	1000	11.0	6.34	
2000	600	700	16.0	6.15	
2020	650	775	16.0	6.12	
2045	700	800	16.0	6.11	
2100	700	800	16.0	6.10	
Average	680	815	15.0	6.16	

Stopped pumping at 2100 after 70 minutes. 500 gallons removed at a average rate of 7 gpm.
Total water removed 1500 gallons.

Conductivity	Conductivity at 25	Temperature	pH
651	775	15.5	6.20

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9/29/93

MW 7D

1035	cond	10,500
	temp	12.0
	pH	8.68
1045	cond	10,000
	temp	12.0
	pH	8.67
1050	cond	10,000
	temp	12.0
	pH	8.68
1110		10,000
		12.0
		8.65
1115	cond	10,000
	temp	12.0
	pH	8.66
1130	end cent	500 GAL
start	1200 2"	
	cond	10,000
	temp	12.0
	pH	8.68
1220	cond	10,000
	temp	12.0
	pH	8.69

CENT

MW 7D

0735	cond	11,000
	temp	12.0
	pH	8.72
0755	cond	12,000
	temp	12.0
	pH	8.75
0815	cond	10,000 76PM
	temp	12.0
	pH	8.72
0830	cond	9500
	temp	12.0
	pH	8.72
0845	cond	10,500 cloudy
	temp	13.0
	pH	8.71
0900	cond	9,500
	temp	12.0
	pH	8.69
0915	con	10,000
	temp	12.0
	pH	8.70
0945	cond	10,000
	temp	12.0
	pH	8.71
stop 1000		1000 GAL out

BARR ENGINEERING CO.

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MW70

1240	cond	10,000
	temp	12.0
	pH	8.68
1255	cond	10,000
	temp	12.0
	pH	8.69
1305	cond	10,000
	temp	12.0
	pH	~~8.56~~
END	1315	500 GAL

Developed

BARR ENGINEERING CO.

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MW 10 D #2

9/28/93

1445 cond 5,000
temp 12.0
pH 8.44

1451 cond 5,000
temp 12.0
pH 8.41

1500 con 5,000 End 500 GALLONS out
tem 12.0
pH 8.42

start cent 1550
con 4,700
temp 14.0
pH 8.43

1600 cond 5,000
temp 14.0
pH 8.40

1615 cond 5000
temp 14.0
pH 8.42

1652 cond 5,000
temp 12.0
pH 8.47

1700 cond 5000 Well development completed
temp 12.0 500 GAL
ph 8.45

BARR ENGINEERING CO.

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T 9/28/93 →

MW 10 D

Static 5.94
TWD 31.5
Well Volume 4 GALLONS

10 GPM 0805

	cond 6,000	1015	cond 5,000		
	temp 11.0		temp 12.0		
	pH 8.25		pH 8.42		
0846	cond 5,500	1031	cond 5,000		
	temp 11.00		temp 13.0		
	pH 8.33		pH 8.42		
0854	cond 5,000	1032 (After surge)			
	temp 12.0		cond 5,000		
	pH 8.44		temp 12.0		
			pH 8.43		
0915	cond 5,000		STOP 1038		
	temp 12.0		1,500 GALLONS purged		
	pH 8.47		cnd cent pumping		
			start 2" Sub		
0926	cond 6,000	pump lowered	→ 1000 GALLONS out		
	temp 12.0				
	pH 8.49	Start 1224	cond 5,000		
			temp 13.0		
0934	cond 5,000	pump lowered	pH 8.42		
	temp 12.0				
	pH 8.47	1327	500 GAL out		
		1420	con 5,000		
0940	cond 6,000		ten 12.0		
	temp 12.0		pH 8.39		
	pH 8.47				
		1432	con 7,000		
1000	cond 5500		temp 13.0		
	temp 12.0		ph 8.47		
	nit 0.45				

BARR ENGINEERING CO.

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9/27/93 1614

MW-40 2" sub

static 3.03
total 31.0
water depth 28'
4.5 GALLONS in a well volume
1625 4 GPM water looks cloudy
1641 5 GPM water is still cloudy
1709 pump lowered to 28'
1750 pump moved to bottom of well

1625	cond	12,000	1810	cond	7,000	
	Temp	13.0		temp	12.0	
	pH	8.16		pH	8.18	
1637	cond	9,000	1827	cond	4,806	pump moved up
	Temp	14.0		temp	12.0	
	pH	8.14		pH	8.04	
1700	cond	8000	1845	cond	7000	
	Temp	12.0		temp	12.0	
	pH	8.15		pH	8.17	
1715	cond	8000	1856	cond	7,000	
	temp	12.0		temp	12.0	
	pH	8.15		pH	8.22	
1745	cond	7,000	stopped	1930	1000 GALLONS purged	
	temp	12.0				
	pH	8.14				
1800	cond	7000				
	temp	12.0				
	pH	8.17				

BARR ENGINEERING CO.

CHECKED BY _____ DATE _____

DATE _____ SHEET _____ IN SET PAGE _____ IN FILE

MW10S 9/28/93

Static 5.96

TWO 16.0

1 GALLON Well

Start cent pumping

1223		cond	365	12 GPM
		temp	15.0	
		pH	6.82	
1327		500 GALLONS out		
				CAN PUMP 15 GPM
1420	Restart	cond	500	
		temp	15.0	
		pH	6.84	cloudy some sediment
1430		cond	490	
		temp	15.0	
		pH	6.78	
1445		con	500	water clear
		temp	15.0	
		pH	6.95	
1451		cond	490	
		temp	15.0	
		pH	6.85	water clear
1500		con	490	500 GAL out
		temp	15.0	
		pH	6.84	
Start 2"	1550	cond	450	
		temp	15	
		pH	7.06	

BARR ENGINEERING CO.

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MW10S #2

1600 cond 440
temp 13
pH 6.98

1609 well is developed 200 GALLONS out
water crystal clear

BARR ENGINEERING CO.

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MW 7D 9-28-93

Start Time:

	cond	8,000
1925	temp	12.0
	pH	8.68
1940	cond	8,000
	temp	12.0
	pH	8.65
1955	cond	10,000
	temp	12.0
	pH	8.71
2000	cond	9,500
	temp	12.0
	pH	8.69
2020	cond	10,000
	temp	12.0
	pH	8.70
2045	cond	9,500
	temp	12.0
	pH	8.68

pump rate:

Cloudy/orange

500 GAL out

2100

MW 7S 2"

1950	cond	750
	temp	11.0
	pH	6.34
2000	cond	600 clear
	temp	16
	pH	6.15
2020	cond	650
	temp	16.0
	pH	6.12
2045	cond	700
	temp	16
	pH	6.11

500 GAL out

2100 75 done

BARR ENGINEERING CO.

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MW 7D
4.69
?2.0

~~pumping~~ rate
removed approx
1000 gal. with
centrifugal pump

9-29-93
will use 2" sub.

9-28-93 MW 7S 4.42
14.0

Start cent 1752
15 gpm

1752 cond 700
temp 16.0
pH 6.20

1600 cond 625
temp 16 clean up
pH 515

1810 cond 630
temp 16.0
pH 6.13

1830 cond 600
temp 16.0
pH 6.17

1845 cond 600
temp 16.0
pH 6.30

1900 ~~cond~~ cond 600
~~temp~~ temp 16.0
~~pH~~ pH 6.39

~~1915~~ cond
1915 temp
pH

removed ~ 1000 gallons
Limit cond

Barr — Chain of Custody

Level 3

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 5552 53

No: No 14630

Project Manager: KAF

Project Contact: MTM

Laboratory: CH2M Hill

Remarks/ Analysis Required: FS Level 3

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Number of Containers/Preservative: Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_xOH,Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_nAcetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)					Total No. Of Containers
1.	MW12S	9-30-93	0930	X			X					2																2
2.	MW12SMS			X			X					1																1
3.	MW12SMSD			X			X					3																3
4.	MW12D		1030	X			X					3																3
5.	MW11S	10-1-93	0830	X			X																					
6.	FB-2			X					X	3	3			1		1												8
7.	MW11D		0900	X			X			3	3			1		1												8
8.	MW7S		0915	X			X			3	3			1		1												8
9.	MW7DM-1		0945	X			X			3	3			1		1												8
10.	M-1									3	3			1		1												8
11.	MW10S		1145	X			X			3	3			1		1												8
12.	M-3			X			X			3	3			1		1												8
13.	MW10D		1215	X			X			3	3			1		1												8
14.	MW6S		1310	X			X			3	3			1		1												8
15.	MW8D		1320	X			X			3	3			1		1												8
16.	MW9S		1415	X			X			3	3			1		1												8

Sampled By: Dave Melnick

Remarks:

Relinquished By: Dave Melnick — Date: 10-1-93 — Time: 1800

Relinquished By: — Date: — Time:

Samples Shipped VIA: ☐ Air Freight ☑ Fed Exp. ☐ Sampler ☐ Other

Received by Lab: — Date: — Time:

Received by Lab: — Date: — Time:

Air Bill Number: ~~9704 79 6633~~ 397 421 1430

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

Level 1

Barr Engineering Company — *Chain of Custody*

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 JSL 53

No: № 14631

Project Manager: KAF

Project Contact: MTM

Laboratory: CH2 M Hill

Number of Containers/Preservative

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1.	MW 7S	10-1-93	0915	X			X								2		2	1		1				6	Group 1 Level 1
2.	MW 7D		0945	X			X								2		2	1		1				6	
3.	~~M-1~~																								
4.	MW 6S		1045	X			X								2		2	1		1				~~6~~	
5.	MW 6D M-2		1100	X			X								2		2	1		1				6	421
6.	M-2			X			X								2		2	1		1				6	
7.	MW 10S M-3		1145	X			X								2		2	1		1				6	
8.	MW 10D		1215	X			X								2		2	1		1				6	
9.	MW 9S		1415	X			X								2		2	1		1				6	
10.																									
11.																									
12.																									
13.																									
14.																									
15.																									
16.																									

Sampled By: Dave [illegible], JEL

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave [illegible]	10-1-93	1600			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed. Exp. ☐ Sampler ☐ Other

Air Bill Number: ~~9709 [illegible]~~ 397 421 1430

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

Level 1

Barr *Chain of Custody*

Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 [illegible] 53

No: No 14628

Project Manager: KAF

Project Contact: MTM

Laboratory: CH_2M Hill

Number of Containers/Preservative

Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)	Total No. Of Containers	Remarks/ Analysis Required:
1. MW12S	9-30-93	0930	X			X								2		2	1		1				6	Group 1, Level 1
2. ~~MW12S MD~~			X			X								2		2	1		1				6	
3. ~~MW12S MS~~			X			X								2		2	1		1				6	
4. ~~FB-1~~		1700	X					X						2		2	1		1				6	
5. MW12D		1030	X			X								2		2	1		1				6	
6. ~~MW13S~~		1330	X			X								2		2	1		1				6	
7. ~~MW13D~~		1345	X			X								2		2	1		1				6	
8. ~~MW14S~~		1500	X			X								2		2	1		1				6	
9. ~~MW14D~~		1530	X			X								2		2	1		1				6	
10. ~~MW15S~~		1715	X			X								2		2	1		1				6	
11. ~~MW15D~~		1745	X			X								2		2	1		1				6	
12. MW9D		1115	X			X								2		2	1		1				6	
13.																								
14.																								
15.																								
16.																								

Sampled By: Dave Melvin, JEG

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Melvin	9-30-93	1900			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA: ☐ Air Freight ☒ Fed. Exp. ☐ Sampler ☐ Other

Air Bill Number: 416 849 7911

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator, Gold - Field Copy

LEVEL 3

Barr Engineering Company — *Chain of Custody*

8300 Norman Center Drive
Minneapolis, MN 55437-1026
(612) 832-2600

Project Number: 13/49-003 SSL 53

No: NP 14627

Project Manager: KAF

Project Contact: MTM

Laboratory: CH2 Mill

Remarks/Analysis Required:

	Sample Identification	Collection Date	Collection Time	Matrix: Water	Matrix: Soil	Matrix: Other	Type: Grab	Type: Comp.	Type: QC	Volatile Organic (Unpres.)	Volatile Organic (Pres.)	Semivolatile Organic	Total Metals (HNO_3)	Dissolved Metals (HNO_3)	General (Unpreserved)	Cyanide (N_AOH, Asc. Acid)	Nutrients (H_2SO_4)	Oil and Grease (H_2SO_4)	TOC (H_2SO_4)	Sulfide (Z_N Acetate)	Dioxin	Whirlpak/Bacteria	Total Phenol (H_2SO_4)						Total No. Of Containers	Remarks/Analysis Required
1.	MW12S	9-30-93	0930	X			X				3	3		1		1													8	FS Level 3
2.	MW12SMS			X			X				3	3		1		1													8	
3.	MW12S MSD			X			X				3	3		1		1													8	
4.	FB-1		1700	X					X		3	3		1		1													8	
5.	MW12D		1030	X			X				3	3		1		1													8	
6.	MW13S		1330	X			X				3	3		1		1													8	
7.	MW13D		1345	X			X				3	3		1		1													8	
8.	MW14S		1500	X			X				3	3		1		1													8	
9.	MW14D		1530	X			X				3	3		1		1													8	
10.	MW15S		1715	X			X				3	3		1		1													8	
11.	MW15D		1745	X			X				3	3		1		1													8	
12.	MW9D		1115	X			X				3	3		1		1													8	
13.																														
14.																														
15.																														
16.																														

Sampled By: Dave Milner JEG

Remarks:

Relinquished By:	Date	Time	Received by Lab:	Date	Time
Dave Milner	9-30-93	1960			
Relinquished By:	Date	Time	Received by Lab:	Date	Time

Samples Shipped VIA ☐ Air Freight ☒ Fed Exp ☐ Sampler ☐ O

Air Bill Number: 416-849-7911

Distribution: White-Original Accompanies Shipment to Lab; Pink - Lab Coordinator; Gold - Field Copy

FIELD DATA REPORT

North Shore Gas
Project number: 1349003JSL52
Technicians: Eric Gabrielson, and Dave Melmer

Sampling location	Date	Temperature C	Conductivity 25 C	pH	Static	Elevation	Eh	DO mg/L
MW14S	11/30/93	9.0	525	7.80	1.34	582.58	101	2.5
MW14D	11/30/93	11.0	560	7.48	1.45	582.78	60	2.2
MW13S	11/30/93	11.5	426	7.53	4.18	582.71	5	4.0
MW13D	11/30/93	10.4	15800	8.63	4.32	582.58	-80	0.5
MW12S	11/30/93	10.8	590	7.68	3.44	582.56	-50	2.5
MW12D	11/30/93	10.0	2200	7.30	3.47	582.55	-10	1.8
MW11S	11/30/93	10.2	970	7.47	5.55	582.28	-26	5.8
MW11D	11/30/93	12.1	3050	7.24	5.70	582.27	8	3.8
MW15S	11/30/93	10.7	590	7.70	2.55	582.9	-35	2.5
MW15D	11/30/93	11.6	3100	6.90	2.65	582.84	19	1.2
MW8S	11/30/93	12.5	1200	7.37	4.13	582.28	8	2.1
MW8D	11/30/93	12.6	13000	8.97	3.85	582.17	34	2.0
MW10S	12/1/93	10.9	520	7.75	6.62	581.95	-6	5.0
MW10D	12/1/93	11.2	11150	8.44	6.70	581.87	55	2.5
MW5S	12/1/93	11.5	746	7.40	6.58	581.31	-50	3.2
MW5D	12/1/93	11.1	5450	8.26	7.18	581.29	25	1.1
MW6S	12/1/93	11.7	1220	7.51	6.84	581.64	-50	2.0
MW6D	12/1/93	10.9	21000	7.81	6.96	581.57	-107	0.5
MW3S	12/1/93	11.5	930	6.88	5.51	582.73	-105	2.5
MW3D	12/1/93	11.9	14030	8.48	5.54	582.69	-55	1.0
MW1S	12/1/93	12.6	1600	7.2	5.4	582.36	-96	2.1
MW1D	12/1/93	11.3	980	8.71	5.27	582.35	-43	0.5
MW4S	12/1/93	11.5	855	7.37	3.43	582.73	-97	1.5
MW4D	12/1/93	11.2	16300	8.31	3.52	582.41	-24	0.5
MW7S	12/1/93	9.8	750	6.67	4.88	582.9	15	3.5
MW7D	12/1/93	11.1	19500	8.76	5.31	582.83	-86	0.5
MW9S	12/2/93	7.8	2000	5.37	5.82	582.67	75	4.0
MW9D	12/2/93	9.9	11000	7.98	6.04	582.61	88	0.5
PW1	12/2/93	12.3	4700	8.51	6.65	582.35	-74	0.5

FIELD DATA REPORT

PROJECT NAME Waukegan Coke Plant (WCP)

PROJECT NUMBER 113/14/91-0103 JSL52

SAMPLER DJM, SDI

SAMPLING LOCATION	SAMPLING DATE MONTH DAY YEAR	TEMP °C	CONDUCTIVITY @ 25°C	Eh	pH	STATIC	ELEVATION	D.O. mg/L
MW14S	11/30/93	9.0	525	+101	7.8	1.34		2.9
MW14D		11.0	560	+60	7.48	1.45		2.2
MW13S		11.5	426	+5	7.53	4.18		4.0
MW13D		10.4	15,800	-80	8.63	4.32		0.5
MW12S		10.8	590	-50	7.68	3.44		2.5
MW12D		10.0	2200	-10	7.30	3.47		1.8
MW11S		10.2	970	-26	7.47	5.55		5.1
MW11D		12.1	3050	+8	7.24	5.70		3.
MW15S		10.7	590	-35	7.70	2.55		2..
MW15D		11.6	3100	+19	6.90	2.65		1.
MW8S		12.5	1200	+8	7.37	4.13		2.
MW8D		12.6	13,000	+34	8.97	3.85		2.
MW10S	12/1/93	10.9	520	-6	7.75	3.62		5.
MW10D		11.2	11,150	+55	8.44	6.7		2.
MW5S		11.5	746	-50	7.40	6.58		3.
MW5D		11.1	5450	+25	8.26	7.18		1.
MW6S		11.7	1220	-50	7.51	6.84		2
MW6D		10.9	21,000	-107	7.81	6.96		0.
MW3S		11.5	930	-105	6.88	5.51		2

FIELD DATA REPORT

PROJECT NAME Waukegan Coke Plant (WCP)

JJECT NUMBER 1 1 3 / 1 4 9 — 0 0 3 [redacted] 5 2
J S L

SAMPLER DJM, SDI

SAMPLING LOCATION	SAMPLING DATE MONTH DAY YEAR	TEMP °C	CONDUCTIVITY @ 25 °C	Eh	pH	STATIC	ELEVATION	D.O mg/L
MW3D	12/1/93	11.9	14,030	-55	8.48	5.54		1.0
MW1S		12.6	1600	-96	7.20	5.40		2.1
MW1D		11.3	980	-43	8.71	5.27		0.5
MW4S		11.5	855	-97	7.37	3.43		1.5
MW4D		11.2	16,300	-24	8.31	3.52		0.5
MW7S		9.8	750	+15	6.67	4.88		3.5
MW7D		11.1	19500	-86	8.76	5.31		0.[illegible]
MW9S	12/2/93	7.8	2000	+75	5.37	5.82		4.0
MW9D		9.9	11,000	+88	7.98	6.04		0.5
PW1		12.3	4700	-74	8.51	6.65		0.5

FIELD LOG COVER SHEET

WATER SAMPLING

Client: WCP Project Number 13149-003 JS652

Samplers: DJM, SDI Sampling Period: / / / / / / / /

Weather:

Date	Temperature	Wind Speed	Wind Direction	Cloud Cover
11/30/93	25 oF	SE mph	15+	●
12/1/93	30 oF	SW mph	15+	●
12/2/93	30 oF	5 mph	light	●
/ /	___ oF	___ mph		

Containers received from: Pace Braun Enseco (CH2M Hill) EDI

Samples shipped for analysis to: Pace Braun Enseco (CH2M Hill) EDI

Samples dropped off at: Pace Braun

Water blank received from: Pace Braun Enseco (CH2M Hill) EDI

Type of blank: ~~Trip~~ / (Field) Field blank is: air / (water)

Mask #1 collected at station #13D Mask #2 collected at station #11S

Mask #3 1D

Name and affiliation of others present: _____

Comments:

MW Samples and water levels were collected on 11/30, 12/1, 12/2. Filter bag samples were collected on 12/2 and filter cake samples were collected on 12/3.

WATER LEVEL DATA SHEET

WAUKEGAN COKE PLANT
1349003JSL52
DDM
12/1/93 PM

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
Z-1 (W13)		4.67	12.45		
Z-2 (W12)		2.77	7.01		
Z-8 (W2C)					CAN NOT OPEN
Z-9 (W2B)		3.67	21.9		
Z-10 (W2A)		3.11	10.12		
3 GREEN		3.39			W W4A
WELLS		3.36	16.93		W4B MIDDLE
NESTED		3.41	26.59		E W4C
EPA/NSSD		6.57	11.68		
EPA/OMC2		6.76	12.80		W6
HARBOR		3.52	7.82		SW1
SLIP		4.48	12.18		SW2
SG-1		1.75	FROZEN		ACTUAL STAFF GAUGE READING
SG-2		1.84	FROZEN		ACTUAL STAFF GAUGE READING
SG-3		1.15			ACTUAL STAFF GAUGE READING
P-102	588.52	5.74	14.99	582.78	
P-103	589.44	7.08	15.33	582.36	
P-104	589.07	6.36	14.97	582.71	
P-105	583.96	1.29	10.93	582.67	
P-106	589.6	7.19	31.15	582.41	
P-107	584.41	2.12	11.59	582.29	
P-108	589.52	7.11	32.33	582.41	
MW1		6.7	14.91		TARPIT
MW2		7.25	15.2		TARPIT
MW3		6.67	15.48		TARPIT
MW4		5.84	16.03		TARPIT
MW4D		5.85	28.12		TARPIT
N NSSD		DRY			POND DRY
S NSSD		12.11			POND DRY
MIDDLE		12.09			POND DRY

WATER LEVEL DATA SHEET

WAUKEGAN COKE PLANT
1349003JSL52
DDM
12/1/93 PM

WELL NUMBER	MEASURING POINT ELEVATION	WATER LEVEL DEPTH	TOTAL WELL DEPTH	WATER LEVEL ELEVATION	COMMENTS
MW14S	583.92	1.27	11.45	582.65	
MW14D	584.05	1.51	30.57	582.54	
MW13S	586.95	4.24	12.91	582.71	
MW13D	586.9	4.32	33.12	582.58	
MW12S	586.03	3.47	12.03	582.56	
MW12D	586.01	3.46	33.4	582.55	
MW11S	587.83	5.55	14.17	582.28	
MW11D	587.98	5.71	30.65	582.27	
MW15S	585.33	2.43	11.78	582.9	
MW15D	585.39	2.55	29.00	582.84	
MW8S	586.43	4.15	12.45	582.28	
MW8D	586.09	3.92	29.91	582.17	
MW10S	588.58	6.63	16.21	581.95	
MW10D	588.6	6.73	32.64	581.87	
MW5S	587.89	6.58	16.00	581.31	
MW5D	588.47	7.18	28.5	581.29	
MW6S	588.45	6.81	16.68	581.64	
MW6D	588.51	6.94	29.26	581.57	
MW3S	588.24	5.51	14.95	582.73	
MW3D	588.23	5.54	30.75	582.69	
MW1S	587.76	5.4	19.60	582.36	
MW1D	587.62	5.27	29.65	582.35	
MW4S	586.16	3.43	12.15	582.73	
MW4D	585.93	3.52	32.15	582.41	
MW7S	587.78	4.88	14.44	582.9	
MW7D	588.14	5.31	34.35	582.83	
MW9S	588.49	5.82	15.03	582.67	
MW9D	588.65	6.24	34.24	582.41	
PW1	589	6.65	35.99	582.35	

WATER LEVEL DATA SHEET

By: DDM Date: 12-1-93 PM

Total Depth - 0.06'

WELL NUMBER	TIME Hr. Min. Sec.	Measuring Point Elevation	Previous Water Level Depth	Water Level Depth	Water Level Elevation	Comments
Z-1				4.67	12.45	No sand
Z-2				2.77	7.01	NO sand
Z-8				—	—	Cannot unscrew cover
Z-9				3.67	21 90	sand
Z-10				3.11	10.12	sand
3 green			W	3.39	8.73	sand
wells				3.36	16.93	more sand
nested			E	3.41	21.59	sand
EPA well/NSD pond		TOR - TOC = 1.83'		6 57	11.68	Sand (TOR.C
EPA well w of DMC #2				6.76	12 80	NO SAND
Harbor				3.52	7.82	stilling well next to Lafarge storage
Slip				4 48	12 18	stilling well next to P-107 tr sand
SG-1				1.75	Frozen	north ditch
SG-2			ACTUAL STAFF	1.84	Frozen	north ditch
SG-3			GAUGE READINGS	1.15		discharge
P-102			LAF 11/4/94	5.74	14.99	trace
P-103				7.08	15.33	
P-104				6 36	14.97	
P-105				1.29	10.93	no sand
P-106				7.19	31.15	tr
P-107				2 12	11 59	tr. Sand
P-108				7.11	32 33	tr.
PW-1				6 65	35.99	trace sand
MW1S				5.40	19 60	sand
MW1D				5 27	29.65	sand
MW3S				5.51	141.95	no sand
MW3D				5.54	30.75	trace sand
MW4S				3.43	12.15	no sand
MW4D				3.52	32.15	trace Sand

WATER LEVEL DATA SHEET

By: DDM Date: 12-1-93 PM

Total depth ~0.06'

Page 2 of 2

WELL NUMBER	TIME Hr. Min. Sec.	Measuring Point Elevation	Previous Water Level Depth	Water Level Depth	Water Level Elevation	Comments
mw5S				6.58	16.00	
mw5D				7.18	28.50	
mw6S				6.81	16.68	No sand
mw6D				6.94	29.26	Trace
mw7S				4.88	14.44	no sand
mw7D				5.31	34.35	no sand
mw8S				4.15	12.45	Sand
mw8D				3.92	29.91	No sand
mw9S				5.82	15.13	trace sand
mw9D				6.14	34.24	much sand
mw10S				6.63	16.21	trace sand
mw10D				6.73	32.64	Sand
mw11				5.55	14.17	No Sand
mw11D				5.71	30.65	No Sand
mw12S				3.47	12.03	no sand
mw12D				3.46	33.40	Sand
mw13S				4.24	12.91	Sand
mw13D				4.32	33.12	Sand
mw14S				1.27	11.45	tr. Sand
mw14D				1.51	30.57	tr sand
mw15S				2.43	11.78	tr sand
mw15D				2.55	29.60	tr Sand
mw1				6.70	14.91	tr Sand
mw2				7.25	15.20	No Sand
mw3				6.67	15.48	no sand
mw4				5.84	16.03	No sand
mw4D				5.55	28.12	lots of Sand
Northern Pond				Dry	POND DRY	
Southern Pond				12.11	POND DRY	

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: 14 B S
Location: COKE PLANT	Date: 11-30-93
Project # : 13149 - 003 JSL 53	Sample time: 745

GENERAL DATA		STABILIZATION TEST					
Barr lock: (Y) N	FLUSH MT.	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	11.5	1 4.5	8.9		520	8.22	
Static water level:*	1.34	2 6	9.1		520	7.8	
Water depth:*	10	3 7.5	8.7		520	7.8	
Well volume: (gal)	1.5	4 9.0	9.0		525	7.8	+101
Purge method:	Peristic	5					
Sample method:	BAILER	6					
Start time:	—	Dissolved Oxygen: 3.5 mg/L			Odor: NO		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	—	Comments:					
Volume purged:	9.0 gal	FB-1					
Duplicate collected?	NO						
Sample collection by: SDI DJM							

Others present:	Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 3

others SEE ATTACHED SHEET

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1
Filtered	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2
	As, CD, PB, SE MERCURY	Group 2	1 L plastic + HNO_3	3
	Total Metals	Group 2	"	3
TRACE	PAH Phenols	Group 2	2 2L AMBER	3
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3
	CYANIDE (Ammenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2
GAInsville	VOC CLP-TCL	Group 2	3 vials + HCl	3

Hardness + Ammonia

H_2SO_4

FB-1

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	2 ✓
Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
Total Metals	Group 2		3 ✓
PAH Phenols	Group 2	2 2L AMBER	3 ✓ ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) WEAK DIS. CN THIO cyanate	Group 2	1/2 gal NAOH	2 ✓
VOL CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: 13 49 003 JSL 53 / Waukegan	Station: 140
Location:	Date: 11/30/93
Project # : 1 -	Sample time: 0800

GENERAL DATA

Barr lock: Y N	Y
Casing diameter:	2
Total well depth:*	30.5
Static water level:*	1.45
Water depth:*	29.0
Well volume: (gal)	4.5
Purge method:	peristaltic
Sample method:	bailer
Start time:	—
Stop time:	—
Duration: (minutes)	—
Rate, gpm:	—
Volume purged:	22.5
Duplicate collected?	NO
Sample collection by:	DJH, SDI

STABILIZATION TEST

~~Time~~ Volume	Temp. oC	Conduct. umhos	Conduct. @25	pH	Eh
1 13.5	10.9		550	7.38	
2 18	11.0		555	7.45	
3 22.5	11.0		560	7.48	+60
4					
5					
6					

Dissolved Oxygen: 2.2 mg/L Odor: NO

Purge Appearance: clear

Sample Appearance: clear

Comments:

Others present: Well condition: Good

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 3

others See attached sheet for bottles filled

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1
Filtered	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2
Filtered	As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3
	Total Metals	Group 2		3
TRACE	PAH Phenols	Group 2	2 2L AMBER	3
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3
	CYANIDE (Amenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2
Aluminum	VOC CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: 13 S
Location: COKE PLANT	Date: 11-30-93
Project # : 13149-003 JSL 53	Sample time: 0915

GENERAL DATA		STABILIZATION TEST					
Barr lock: (Y) N	FLUSH MT.	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	13	1 4.5	11.2		419	7.58	
Static water level:*	4.18	2 6	11.2		422	7.56	
Water depth:*	9	3 7.5	11.5		426	7.53	~~+46~~ +5
Well volume: (gal)	1.5	4					
Purge method:	Peristic.	5					
Sample method:	BAILER	6					
Start time:	—	Dissolved Oxygen: 4.6 mg/L			Odor: NO		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	—	Comments:					
Volume purged:	7.5 gal						
Duplicate collected?	NO						
Sample collection by: SDI DJM							

Others present:	Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 1

others SEE ATTACHED SHEET

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1
	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2
	As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3
	Total	Group 2		3
TRACE	PAH Phenols	Group 2	2 2L AMBER	3
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3
	CYANIDE (Ammenable) weak DIS. CN Thio cyanide	Group 2	1/2 gal NAOH	2
NA Tusville →	VOC CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: 13D
Location:	Date: 11/30/93
Project # : 13149-003 JSL53	Sample time: 0945

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	33.0	1 13.5	10.3		14700	8.58	
Static water level:*	4.32	2 18	10.1		15600	8.63	
Water depth:*	28.5	3 22.5	10.2		15700	8.62	
Well volume: (gal)	4.5	4 27.0	10.4		15800	8.63	-80
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 0.5 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: cloudy / AMBER					
Duration: (minutes)	—	Sample Appearance: cloudy / AMBER					
Rate, gpm:	—	Comments: strong odor					
Volume purged:							
Duplicate collected?	~~NO~~ MW-1						
Sample collection by: DJM, SDL							

Others present:	Well condition: GOOD

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 4

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1
Filtered: Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2
Filtered: As, CD, PB, SE MERCURY	Group 2	1 L plastic + HNO_3	3
Total Metals	Group 2		3
PAH Phenols	Group 2	2 — 2L AMBER	3
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 —
Gasoline → VOL CLP-TCL	Group 2	3 vials + HCl	3

~~Grant~~ (130)

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered: Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2
Filtered: As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
Total Metals	Group 2		3
PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3
CYANIDE (Amenable) Weak Dis. CN This cyanide	Group 2	1/2 gal NAOH	2 ✓
Volatile VOL CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS		Station: MW 12S	
Location: COKE PLANT		Date: 11-30-93	
Project # : 13149-003JSL53		Sample time: 1100	

GENERAL DATA

Barr lock: (Y) N	FLUSH
Casing diameter:	2
Total well depth:*	12
Static water level:*	3.49
Water depth:*	9.5
Well volume: (gal)	1.5
Purge method:	Peristic
Sample method:	BAILER
Start time:	—
Stop time:	—
Duration: (minutes)	—
Rate, gpm:	—
Volume purged:	7.5 gal
Duplicate collected?	NO
Sample collection by:	SDI DJM

STABILIZATION TEST

	Time/ Volume	Temp. oC	Conduct. umhos	Conduct. @25	pH	Eh
1	4.5	10.5		600	7.73	
2	6	10.7		590	7.69	
3	7.5	10.8		590	7.68	-50
4						
5						
6						

Dissolved Oxygen: 2.5 mg/L

Odor: NO

Purge Appearance: clear

Sample Appearance: clear

Comments:

Others present:

Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 2

others SEE ATTACHED SHEET

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered	Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered	As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
	Total Metals	Group 2		3
TRACE —	PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Ammenable) weak DIS. CN This cyanide	Group 2	1/2 gal NAOH	2 ✓
extra vials →	VOC CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: 12D
Location:	Date: 11/30/93
Project #: 13149-083 JS253	Sample time: 1130

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	33.0	1 13.5	9.5		2180	7.28	
Static water level:*	3.47	2 18.0	10.0		2200	7.28	-10
Water depth:*	29.5	3 22.5	10.0		2200	7.30	~~-33~~ -18
Well volume: (gal)	4.5	4					
Purge method:	peristic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 1.8 mg/L			Odor: no detection		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	—	Comments:					
Volume purged:	22.5						
Duplicate collected?	NO						
Sample collection by: DSM, SDI							

Others present: | Well condition: GOOD

(MW) groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 1

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

120

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered	As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
	Total metals	Group 2		3
TRPH	PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Amenable) Weak DBS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Genville →	VOL CLP-TCL	Group 2	3 vials + HCl	3

1 L Plastic

500 ml H_2SO_4

Filtered — 500 ml HNO_3

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS					Station: 115		
Location: COLE PLANT					Date: 11-30-93		
Project # : / -					Sample time: 1245		
GENERAL DATA		STABILIZATION TEST					
Barr lock: (Y) N		Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	14	1 4.5	10.2		980	7.52	
Static water level:*	5.55	2 6	10.3		990	7.51	
Water depth:*	8.5	3 7.5	10.2		970	7.47	-26
Well volume: (gal)	1.5	4					
Purge method:	Peristic.	5					
Sample method:	BAILER	6					
Start time:	-	Dissolved Oxygen: 5.8 mg/L			Odor: NO		
Stop time:	-	Purge Appearance: clear					
Duration: (minutes)	-	Sample Appearance: clear					
Rate, gpm:	-	Comments:					
Volume purged:	7.5 gal	M-2					
Duplicate collected?	M-2						
Sample collection by: SDI DJM							
Others present:		Well condition:					
MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:							
VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____							
oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 3							
others SEE ATTACHED SHEET							

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered	As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
	Total Metals	Group 2		3
TRACE	PAH Phenols	Group 2	2 2L AMBER	3 ✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Amenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
GASEOUS	VOL CLP-TCL	Group 2	3 vials + HCl	3 ✓

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
	As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
	Total [illegible]	2		3
TRACE	PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Ammonable) Weak DIS. CN Thio cyanide	Group 2	1/2 gal NAOH	2 ✓
SAcrolle	VOC CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: 11D
Location:	Date: 11/30/93
Project #: 13149-003JSL53	Sample time: 1315

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	30.5	1 12	11.7		3050	7.30	
Static water level:*	5.70	2 16	12.0		3100	7.25	
Water depth:*	25	3 20	12.1		3050	7.24	+8
Well volume: (gal)	4	4					
Purge method:	peristalt	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 3.8 mg/L			Odor: NO		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	—	Comments:					
Volume purged:	20						
Duplicate collected?	NO						
Sample collection by: SDI, DSM							

Others present:	Well condition: good

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 2

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered — Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered — As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
Total Metal	Group 2		3
TRACE → PAH Phenols	Group 2	2 2L AMBER	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak Diss. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
GAS SHIP → VOC CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: MW 155
Location: COKE PLANT	Date: 11-30-93
Project # : 13A9 - 003 JSL53	Sample time: 1430

GENERAL DATA		STABILIZATION TEST					
Barr lock: (Y) N		Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	12	1 4.5	10.4		600	8.80	
Static water level:*	2.55	2 6	10.6		590	7.72	
Water depth:*	9.5	3 7.5	10.7		590	7.70	~~+69~~ -35
Well volume: (gal)	1.5	4					
Purge method:	Persfic.	5					
Sample method:	BAILER	6					
Start time:	—	Dissolved Oxygen: 2.5 mg/L			Odor: NO		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	—	Comments:					
Volume purged:	7.5 gal	MS					
Duplicate collected?	YES	MSD					
Sample collection by: SDI DJM							

Others present:	Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 3

others SEE ATTACHED SHEET

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	2 ✓
Filtered	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
	As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
	TOTAL METALS	2		2
TRIPLICATE	PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Amenable) WEAK DIS. CN THIO CYANATE	Group 2	1/2 gal NAOH	2 ✓
GASOLINE	VOL CLP-TCL	Group 2	3 vials + HCl	3
	—	1 L	Plastic	CLEAN
	—	1	500	H_2SO_4
Filtered	~~—~~	1	500	HNO_3

15 J ms

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered	As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
	Total metals	2		3
TRAFFIC	PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Ammonable) Weak DIS. CN Thio cyanide	Group 2	1/2 gal NAOH	2 ✓
Gasoline →	VOC CLP-TCL	Group 2	3 vials + HCl	3

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered — Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered — As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
TOTAL Metals	2		3
TRACE — PAH Phenols	Group 2	2 2L AMBER	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
SEMIVOLS — VOL CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: 15D
Location:	Date: 11/30/93
Project #: 13149 - 003 JSL53	Sample time: 1500

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	29.0	1 12	11.1		3020	6.84	
Static water level:*	2.65	2 16	11.3		3100	6.82	
Water depth:*	26.5	3 20	11.6		3100	6.90	+19
Well volume: (gal)	4.0	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 1.2 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: slight amber tint / odor					
Duration: (minutes)	—	Sample Appearance: SAME					
Rate, gpm:	—	Comments:					
Volume purged:	20						
Duplicate collected?	NO						
Sample collection by: DJM, SDI							

Others present:	Well condition:

(MW): groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 1

others See attached Sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filled	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
	As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
	TOTAL METALS	2		3
TAKE	PAH Phenols	Group 2	2 2L AMBER	3 ✓✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Amenable) WEAK DIS. CN THIO cyanate	Group 2	1/2 gal NAOH	2 ✓
Failed	VOL CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: MW 8S
Location: COKE PLNT	Date: 11-30-93
Project #: 13149 - 003 SSL53	Sample time: 1600

GENERAL DATA		STABILIZATION TEST					
Barr lock: (Y) N		Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	12.5	1 4.5	12.5		1230	7.38	
Static water level:*	4.13	2 6	12.5		1200	7.38	
Water depth:*	8.5	3 7.5	12.5		1200	7.37	+8
Well volume: (gal)	1.5	4					
Purge method:	Peristc.	5					
Sample method:	BAILER	6					
Start time:	—	Dissolved Oxygen: 2.1 mg/L			Odor: NO		
Stop time:	—	Purge Appearance: clear					
Duration: (minutes)	—	Sample Appearance: clear					
Rate, gpm:	✓	Comments:					
Volume purged:	7.5						
Duplicate collected?	NO						
Sample collection by: SDI DJM							

Others present:	Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 1

others SEE ATTACHED SHEET

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered	As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
	Total Metals	2		3
THRIVE	PAH Phenols	Group 2	2 - 2L AMBER	3 ✓✓
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
	CYANIDE (Amenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
GARVILLE	VOC CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: Waukegan	Station: 8D
Location:	Date: 11/30/93
Project # : 13149 - 003 JSL 53	Sample time: 1630

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	30	1 12	12.5		13000	8.99	
Static water level:*	3.85	2 16	12.6		13000	8.99	
Water depth:*	26.1	3 20	12.6		13000	8.97	+54
Well volume: (gal)	4.2	4					
Purge method:	peristalic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.0 mg/L			Odor:	YES	
Stop time:	—	Purge Appearance:	AMBER				
Duration: (minutes)	—	Sample Appearance:	AMBER				
Rate, gpm:	—	Comments:					
Volume purged:	20	MS					
Duplicate collected?	YES MS MSD	MSD					
Sample collection by: DSH, SDI							

Others present:	Well condition: GOOD

MW: groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 3 BC

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

8D

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
As, CD, PB, SE Mercury	Group 2	1 L Plastic + HNO_3	3 ✓
TOH Mold	2		3
PAH Phenols	Group 2	2 - 2L - AMBER	3 ✓✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
VOL CLP-TCL	Group 2	3 vials + HCl	3

8 D MS

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered: Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered: As, CD, PB, SE Mercury	Group 2	1 L plastic + HNO_3	3 ✓
Total Metal	2		3
PAH Phenols	Group 2	2 2L Amber	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
Chemistry → VOC CLP-TCL	Group 2	3 vials + HCl	3

DV MW

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Filtered — Arsenic (III, IV)	Group 2	1 L Plastic + HNO_3	2 ✓
Filtered — As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
Total Metals	2		2
— PAH Phenols	Group 2	2 2L AMBER	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Amenable) Weak Dis. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
[illegible] VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓

Barr Engineering Company
Field Log Data Sheet

Client: NORTH SHORE GAS	Station: MW 10S
Location: COKE PLANT	Date: 11-30-93
Project # : 13149-003 JSL53	Sample time: 0730

GENERAL DATA		STABILIZATION TEST					
Barr lock: (Y) N		Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	16	1 4.5	10.8		530	7.85	
Static water level:*	6.62	2 6	11.0		520	7.75	
Water depth:*	9.5	3 7.5	10.9		520	7.75	~~+109~~ -6
Well volume: (gal)	1.5	4					
Purge method:	Peristic.	5					
Sample method:	Bailer	6					

Start time:	—	Dissolved Oxygen: 5.0 mg/L	Odor: NO
Stop time:	—	Purge Appearance: clear	
Duration: (minutes)	—	Sample Appearance: clear	
Rate, gpm:	—	Comments:	
Volume purged:	7.5	FB-2	
Duplicate collected?	NO		
Sample collection by: SDI, DJM			

Others present:	Well condition: GOOD

(MW): groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC____ semi-volatile____ general____ COD____ TOC____ nutrient____ cyanide____

oil,grease____ whirl pak____ Total metal____ Filtered metal____ 500 ml filter 7

others SEE ATTACHED SHEET

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1
Filtered: Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2
Filtered: As, CD, PB, SE MERCURY	Group 2	1 L Plastic HNO_3	3
TOTAL Metals	2		5
TRACE – PAH Phenols	Group 2	2 – 2L AMBER	3
CYANIDE (Total)	Group 2	1/2 gal NAOH	3
CYANIDE (Amenable) weak DIS. CN This cyanide	Group 2	1/2 gal NAOH	2
~~CHLORINATED~~ → VOL CLP-TCL	Group 2	3 vials + HCl	3

~~1 L Plastic~~

~~500 ml H_2SO_4~~

~~500 ml HNO_3~~

Filtered

1 Liter Plastic

1 500 ml H_2SO_4

1 500 ml HNO_3

FB-2

	Parameter	Group	Container	Level
	Ammonia	Group 2	500 plastic H_2SO_4	1
Filted	Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2
Filted	As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3
	Total Metals	Group 2		3 L
	PAH Phenols	Group 2	2 2L AMBER	3
	CYANIDE (Total)	Group 2	1/2 gal NAOH	3
	CYANIDE (Amenable) Weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2
Gainesville	VOC CLP-TCL	Group 2	3 vials + HCl	3

Barr Engineering Company
Field Log Data Sheet

Client: Inwalkegan	Station: 10D
Location:	Date: 11/30/93
Project #: 13149-003-SL53	Sample time: 0800

GENERAL DATA		STABILIZATION TEST					
Barr lock: Y N	Y	Time/	Temp.	Conduct.	Conduct.	pH	Eh
Casing diameter:	2	Volume	oC	umhos	@25		
Total well depth:*	32.6	1 12.0	10.9		11100	8.41	
Static water level:*	6.7	2 16.0	11.0		11150	8.44	
Water depth:*	25.9	3 20.0	11.2		11150	8.44	+55
Well volume: (gal)	4.2	4					
Purge method:	peristaltic	5					
Sample method:	bailer	6					
Start time:	—	Dissolved Oxygen: 2.5 mg/L			Odor: YES		
Stop time:	—	Purge Appearance: AMBER					
Duration: (minutes)	—	Sample Appearance: AMBER					
Rate, gpm:	—	Comments:					
Volume purged:	20						
Duplicate collected?	NO						
Sample collection by: DJM, SOI							

Others present:

Well condition: Good

(MW): groundwater monitoring well WS: water supply well SW: surface water SE: sediment other:

VOC_____ semi-volatile_____ general_____ COD_____ TOC_____ nutrient_____ cyanide_____

oil,grease_____ whirl pak_____ Total metal_____ Filtered metal_____ 500 ml filter 4

others See attached sheet

* Measurements are referenced from top of riser pipe, unless otherwise indicated.

Parameter	Group	Container	Level
Ammonia	Group 2	500 plastic H_2SO_4	1 ✓
Arsenic (III, V)	Group 2	1 L Plastic + HNO_3	2 ✓
As, CD, PB, SE MERCURY	Group 2	1 L Plastic + HNO_3	3 ✓
PAH Phenols	Group 2	2 - 2L AMBER	3 ✓
CYANIDE (Total)	Group 2	1/2 gal NAOH	3 ✓
CYANIDE (Ammenable) weak DIS. CN Thio cyanate	Group 2	1/2 gal NAOH	2 ✓
VOC CLP-TCL	Group 2	3 vials + HCl	3 ✓

1 1L Plastic

1 500 ml H_2SO_4

1 500 ml HNO_3

STANDARD OPERATING PROCEDURES
FOR
MEASUREMENT OF DISSOLVED OXYGEN

PURPOSE: To describe the procedure of measuring dissolved oxygen.

APPLICABILITY: This procedure applies to the measurement of dissolved oxygen in groundwater monitoring wells.

DEFINITIONS: Dissolved oxygen is the amount of oxygen dissolved in water in milligrams per liter.

REFERENCES: Instruction Manual YSI Model 57 Dissolved Oxygen Meter by Yellow Springs Instrument Company.

RESPONSIBILITIES: The environmental technician(s) are responsible for the measurement of dissolved oxygen in groundwater samples in the field.

PROCEDURE: Prepare the instrument by placing it in its intended operating position vertical, tilted, or on its back before it is prepared for use and calibrated. Readjustment may be necessary when the instrument operating position is changed.

1. With switch in the OFF position, adjust the meter pointer to Zero with the screw in the center of the meter panel. Readjustment may be necessary if the instrument position is changed.

2. Switch to RED LINE and adjust the RED LINE knob until the meter needle aligns with the red mark at the 31°C position.

3. Switch to Zero and adjust to zero with zero control knob.

4. Attach the prepared probe to the PROBE connector of the instrument and adjust the retaining ring finger tight.

5. Before calibrating allow 15 minutes for optimum probe stabilization. Repolarize whenever the instrument has been OFF or the probe has been disconnected.

CALIBRATION: The technician has a choice of three calibration methods - Winkler Titration, Saturated Water and Air. Of these three methods listed, the most widely used by the field technician(s) is the Air calibration.

1. Place the probe in moist air by loosely wrapping a damp cloth around the probe taking care the cloth does not touch the membrane. Wait approximately 10 minutes for temperature stabilization.

2. Switch to TEMPERATURE and read. Refer to Table 4-M-1 - Solubility of Oxygen if Fresh Water, and determine calibration value.

3. Determine altitude or atmospheric correction factor from Table 4-M-2.

4. Multiply the calibration value from Table 4-M-1 by the correction factor from Table 4-M-2.

5. Switch to the appropriate PPM range, set the SALINITY knob to zero and adjust the CALIBRATE knob until the meter reads the correct calibration value from Step 4. Wait two minutes to verify calibration stability. Readjust if necessary.

MEASUREMENT: With the instrument prepared for use and the probe calibrated, place the probe in the sample to be measured.

1. If no stirring mechanism is provided, then manually stir by raising and lowering the probe about 1 foot per second.

2. Adjust the SALINITY knob to the salinity of the sample.

3. Allow sufficient time for probe to stabilize to sample temperature and dissolved oxygen.

CALIBRATION TABLES:

TABLE 4-M-1

SOLUBILITY OF OXYGEN IN FRESH WATER

Temperature C	PPM Dissolved Oxygen	Temperature C	PPM Dissolved Oxygen
0	14.6	23	8.7
1	14.2	24	8.5
2	13.9	25	8.4
3	13.5	26	8.2
4	13.2	27	8.1
5	12.8	28	7.9
6	12.5	29	7.8
7	12.2	30	7.7
8	11.9	31	7.5
9	11.6	32	7.4
10	11.3	33	7.3
11	11.1	34	7.2
12	10.8	35	7.1
13	10.6	36	7.0
14	10.4	37	6.8
15	10.2	38	6.7
16	9.9	39	6.6
17	9.7	40	6.5
18	9.5	41	6.4
19	9.3	42	6.3
20	9.2	43	6.2
21	9.0	44	6.1
22	8.8	45	6.0

TABLE 4-M-2

ALTITUDE CORRECTION FACTOR

Atmospheric Pressure (mmHg)	or	Equivalent Altitude (ft)	=	Correction Factor
775		540		1.02
760		0		1.00
745		542		.98
730		1,094		.96
714		1,688		.94
699		2,274		.92
684		2,864		.90
669		3,466		.88
654		4,082		.86
638		4,756		.84
623		5,403		.82
608		6,065		.80
593		6,744		.78
578		7,440		.76
562		8,204		.74
547		8,939		.72
532		9,694		.70
517		10,472		.68
502		11,273		.66

NOTE: A high sensitivity membrane can be used when measurements are to be made consistently at low temperatures (<15°C).

DOCUMENTATION: The technician(s) shall document the readings on the field log data sheets for each reading taken. Any adjustments needed when checking the electrode operation should be noted in the log book.

STANDARD OPERATING PROCEDURES
FOR
MEASURING THE OXIDATION POTENTIAL

PURPOSE: To describe the measuring of oxidation potential (Eh).

APPLICABILITY: This procedure applies to the measurement of oxidation potential (Eh) in groundwater wells.

DEFINITIONS: Eh is another term for oxidating potential. A + Eh the groundwater geochemistry has oxidizing potential, a - Eh the groundwater geochemistry has reducing potential. It is the potential of a platinum electrode.

REFERENCES: Ground Water Sampling Guidelines by MPCA; Groundwater and Surface Water Sampling Procedures by Barr Engineering Co.; Field Methods for Measurement of Ground Water Redox Chemical Parameters by Day, Macalady, Brooks and Tate.

DISCUSSION: Oxidation potential (Eh) measurements are conducted mostly on landfill sites. It is measured by using the pH meter and a Redox probe.

RESPONSIBILITIES: The environmental technician(s) are responsible for the measurement of the oxidation potential of groundwater samples in the field, otherwise the laboratory is responsible.

PROCEDURE: <u>Oxidation Potential (Eh)</u>.

a. Measurement

1. Connect the Redox probe to the pH meter.

2. Set function to the millivolt mode.

3. Place electrode in the sample collected.

4. When reading stabilizes, record reading on field log data sheet.

NOTE: The reading will have either a + or - value for it.

b. Checking electrode operation

1. Prepare solution A (0.1 M potassium ferrocyanide and 0.05 M potassium ferricyanide): weight out 4.22 g reagent-grade $K_4Fe(cn)_6 \bullet 3H_20$ and 1.652 g reagent-grade $K_3Fe(cn)_6$. Place in a 100-ml volumetric flask. Add 50 ml distilled water and swirl to dissolve solids. Dilute to volume with distilled water.

2. Prepare solution B. (0.01 potassium ferrocyanide, 0.05 M potassium ferricyanide, and a 0.365 M potassium fluoride): weigh out 0.42 g reagent-grade $K_4Fe(cn)_6 \bullet 3H_20$, 1.65 g reagent-grade $K_3Fe(cn)_6$, and 3.39 g reagent-grade $KF \bullet 2H_20$. Place in a 100-ml volumetric flask. Add 50 ml distilled water and swirl to dissolve solids. Dilute to volume with distilled water.

3. Transfer solution A to a 150-l beaker. Place electrode in the solution and wait until the reading stabilizes.

   NOTE: The reading should be approximately +66 mV greater in the B solution than the A.

4. Rinse electrode and repeat the measurement with solution B.

   NOTE: The reading should be approximately +66 mV greater in the B solution than the A.

c. Cleaning

1. To clean the outside of electrode, rinse with distilled water.

2. If the inside of the probe is dirty, flush out with clean filling solution.

3. Refill with fresh solution.

QA/QC: To ensure accurate reading, make sure pH meter is working properly, the probe is clean, and has fresh filling solution.

DOCUMENTATION: The technician(s) shall document the readings on the field log data sheets for each time readings were taken. Any adjustments needed when checking the electrode operation should be noted in the log book for each meter.

Appendix 4-N

Field Log Data Sheets
Surface Water Sampling

A subset of TABLE 4.4

WAUKEGAN SAMPLE MANAGEMENT TABLE

8-31 windy NW 15 G
8-30 wind S SW 15 G
Am rain

C-WAUK1.WB1				WAUKEGAN PHASE II ANALTICAL WATER SAMPLES															
04-Aug-93				ANALYTICAL GROUPS								FIELD OBSERVATIONS							
03:37 PM																			
13/49-003/JSL52	Field	COLLECTION		FULL					Oil			Spec		Dissolved		VISUAL	C of C	Date sent	
SAMPLE	Duplicate	DATE/TIME	MATRIX	SCAN	1	2	3	4	Sheen	Odor	Ph	Cond	Temp	Oxygen	Eh	EXAM	#	to lab	Comments
SURFACE WATER SAMPLES																	see	8-30	~~DO & Eh~~
SW04S		1300 8-30	WATER			x		x	NO	NO	7.0	230	23.0	8.5	-15	slightly turbid	C.O.C	8-30	wpt 21
SW05S		1400 8-30				x		x	NO	NO	7.0	225	21.0	8.7	-16		File with	8-30	22
SW06S	M-1	1445 8-30				x		x	NO	NO	7.0	230	22.0	8.5	-20		Sparkle	8-30	23
SW07S		1600 8-30				x		x	NO	NO	7.1	210	21.0	8.2	-22		C.O.C vs	8-30	24
SW08S		0700 8-31				x		x	NO	NO	7.0	215	23.0	8.6	-1.5		site	8-31	25
SW09S		0800 8-31				x		x	NO	NO	7.0	215	17.0	8.3	-3.0		list	8-31	26
SW10S	FB-2	0845 8-31				x		x	NO	NO	7.0	200	15.0	8.8	2.7			8-31	27
SW11S		0915 8-31				x		x	NO	NO	7.1	215	16.0	9.0	+22			8-31	wading to NE 28
SW12S		1015 8-31				x		x	NO	NO	7.1	200	23.0	8.9	-21			8-31	wpt 29
SW01D	FB-1	1100 8-30				x		x	NO	NO	7.1	249	23.0	4.1	-25			8-30	6.5' 18
SW02D		1200 8-30				x		x	NO	NO	7.0	245	22.0	8.5	-22			8-30	6.5' 19
SW03D		1230 8-30				x		x	NO	NO	7.0	231	23.0	9.0	-20			8-30	10.5' 20
SW04D		1330 8-30				x		x	NO	NO	7.0	230	19.0	7.8	-20			8-30	13' 21
SW05D		1430 8-30				x		x	NO	NO	7.1	210	22.0	8.0	-14			8-30	11' 22
SW06D		1515 8-30				x		x	NO	NO	7.1	210	21.0	8.0	-10			8-30	14' 23
SW07D		1615 8-30				x		x	NO	NO	7.3	210	21.0	8.0	-42			8-30	24' 24
SW08D		0730 8-31				x		x	NO	NO	7.0	200	14.0	9.2	+7			8-31	24' RAIN 25
SW09D		0830 8-31				x		x	NO	NO	6.9	200	15.0	9.0	+7			8-31	20' 26 NAT-1 tug + Cargo Mo fit.
SW10D		0900 8-31				x		x	NO	NO	6.9	210	15.0	8.2	+12.7			8.31	22' 27
SW11D	M-2	0930 8-31				x		x	NO	YES	6.7	200	15.0	9.1	+118			8-31	14' 28
SW12D		1020 8-31				x		x	NO	slight	7.2	190	17.0	9.5	-37			8-31	14' 29

Appendix ~~TABLE~~ 4.4 –

WAUKEGAN SAMPLE MANAGEMENT TABLE

C.WAUK1.WB1				WAUKEGAN PHASE II ANALTICAL WATER SAMPLES															
04-Aug-93				ANALYTICAL GROUPS								FIELD OBSERVATIONS							
03:37 PM																			
13/49-003/JSL52	Field	COLLECTION		FULL					Oil			Spec		Dissolved		VISUAL	C of C	Date sent	
SAMPLE	Duplicate	DATE/TIME	MATRIX	SCAN	1	2	3	4	Sheen	Odor	Ph	Cond	Temp	Oxygen	Eh	EXAM	#	to lab	Comments
——— SURFACE WATER SAMPLES																	Sec	8/30	~~[illegible]~~
M -1	SW065	1445 8/30	WATER			X		X	NO								C.O.C.	8/31	
M -2	SW110	0930 8/31				X		X	NO								File		
~~M—~~						X		X									with		
FB -1	SW010	1100 8-30				X			NO								Separate	8-30	
FB -2	SW105	0945 8-31				X			NO								C.O.C	8-31	
~~FB—~~						X											vs.		
MS/MSD	SW090	0830 9-31				X			NO								site	8-31	
~~MS/MSD~~						X											list		

Lake profile of Lake Michigan, Waukegan Illinois

8/31/93

Eric Gabrielson and Dave Melmer

Location	Time	Depth	pH	DO mg/l	DO %	Cond	Sal	Ise mv	Tur	Presure	Temp F
SWO1	1221:02	S	7.57	7.33	81.1	284	0.1	184	17	99.5	65.5
SWO1	1221:24	3	7.56	7.32	81.0	284	0.1	187	17	99.4	65.5
SWO1	1221:45	6	7.55	7.34	81.0	284	0.1	190	17	99.5	65.3
SW02	1236:08	S	7.75	7.30	81.1	282	0.1	204	18	99.4	65.8
SW02	1236:26	3	7.77	7.34	81.2	284	0.1	204	21	99.4	65.5
SW02	1236:41	6	7.76	7.40	81.5	282	0.1	206	26	99.4	65.1
SWO3	1242:58	S	7.79	7.32	80.0	286	0.1	215	17	99.4	64.4
SWO3	1243:23	3	7.75	7.31	79.9	282	0.1	217	17	99.4	64.4
SWO3	1243:43	6	7.73	7.35	80.0	286	0.1	218	17	99.4	64.0
SWO3	1244.08	9	7.80	8.56	89.3	282	0.1	212	21	99.4	60.4
SWO4	1225:51	S	7.65	7.40	81.9	284	0.1	196	16	99.4	65.5
SWO4	1225:50	3	7.67	7.39	81.7	282	0.1	196	16	99.4	65.5
SWO4	1226:03	6	7.68	7.37	81.5	284	0.1	197	16	99.5	65.5
SWO4	1226:20	9	7.68	7.36	81.4	282	0.1	198	16	99.5	65.5
SWO4	1226:30	12	7.69	7.36	79.5	280	0.1	201	31	99.5	63.3
SW05	1232:29	S	7.75	7.36	81.6	284	0.1	199	16	99.5	65.7
SW05	1232:57	3	7.74	7.40	82.0	284	0.1	200	16	99.4	65.7
SW05	1233:12	6	7.74	7.36	81.6	284	0.1	201	17	99.4	65.7
SW05	1233:26	9	7.74	7.40	81.9	284	0.1	202	18	99.4	65.5
SW06	1246:16	S	7.73	7.16	78.7	286	0.1	219	17	99.4	64.9
SW06	1246:40	3	7.72	7.09	77.8	284	0.1	219	17	99.4	64.8
SW06	1247:00	6	7.72	6.99	75.4	286	0.1	220	17	99.4	63.1
SW06	1249:19	9	7.74	7.59	78.2	286	0.1	222	17	99.4	59.4
SW06	1247:32	12	7.72	7.73	77.8	286	0.1	224	17	99.4	57.4
SW07	1249:38	S	7.68	7.21	79.7	282	0.1	217	17	99.4	65.3
SW07	1249:58	3	7.70	7.25	79.8	286	0.1	217	17	99.4	64.9
SW07	1250:15	6	7.71	7.26	79.5	284	0.1	218	17	99.4	64.6
SW07	1250:33	9	7.74	7.43	79.6	284	0.1	218	17	99.4	62.6
SW07	1250:49	12	7.73	7.46	78.7	282	0.1	222	17	99.4	61.3
SW07	1251:02	15	7.72	7.49	78.1	286	0.1	224	17	99.4	60.3
SW07	1251:17	18	7.71	7.78	79.3	284	0.1	227	18	99.3	58.3
SW08	1255:56	S	7.67	6.78	74.5	288	0.1	226	17	99.4	64.9
SW08	1256:14	3	7.65	6.76	74.0	290	0.1	227	17	99.4	64.6
SW08	1256:57	6	7.64	6.79	73.9	292	0.1	227	18	99.4	64.0
SW08	1256:45	9	7.62	6.95	74.6	294	0.1	228	18	99.4	62.8
SW08	1257:03	12	7.61	7.33	77.5	294	0.1	226	18	99.4	61.5
SW08	1257:14	15	7.60	7.37	77.9	288	0.1	225	19	99.4	61.5
SW09	1301:24	S	7.54	6.73	74.6	294	0.1	229	17	99.4	65.7
SW09	1301:45	3	7.54	6.75	74.1	296	0.1	228	17	99.4	64.8
SW09	1302:02	6	7.53	6.71	72.0	300	0.1	227	19	99.4	62.8
SW09	1302:23	9	7.49	6.74	72.2	296	0.1	222	19	99.4	62.6

S = Surface water, Conductivity corected to 25C

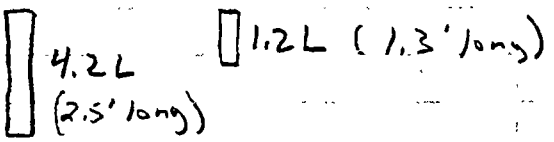
Location	Time	Depth	pH	DO mg/l	DO %	Cond	Sal	Ise mv	Tur	Presure	Temp F
SW10	1309:27	S	7.50	5.87	62.9	296	0.1	193	20	99.3	62.6
SW10	1309:51	3	7.43	5.79	62.1	298	0.1	171	20	99.4	62.6
SW10	1310:37	6	7.30	5.75	61.6	298	0.1	138	20	99.4	62.6
SW10	1311:02	9	7.26	5.81	62.3	298	0.1	126	20	99.4	62.6
SW10	1311:21	12	7.23	5.82	62.4	302	0.1	120	20	99.4	62.6
SW10	1311:39	15	7.21	5.80	62.2	298	0.1	114	20	99.4	62.6
SW11	1315:51	S	7.31	6.70	72.2	296	0.1	171	18	99.4	63.1
SW11	1316:16	3	7.29	6.59	70.4	298	0.1	165	19	99.4	62.4
SW11	1317:07	6	7.25	6.52	69.3	296	0.1	150	19	99.4	62.1
SW11	1317:27	9	7.23	6.59	69.9	296	0.1	146	19	99.4	61.9
SW11	1317:49	12	7.20	6.73	71.3	296	0.1	144	19	99.4	61.7
SW11	1318:06	15	7.21	6.78	71.1	294	0.1	145	23	99.3	60.8
SW12	1320:41	S	7.31	6.78	74.4	290	0.1	165	17	99.4	64.8
SW12	1320:58	3	7.37	7.55	80.7	290	0.1	163	17	99.3	62.4
SW12	1321:19	6	7.39	7.93	83.9	288	0.1	164	17	99.4	61.5
SW12	1321:32	9	7.39	7.70	81.3	290	0.1	168	23	99.3	61.3

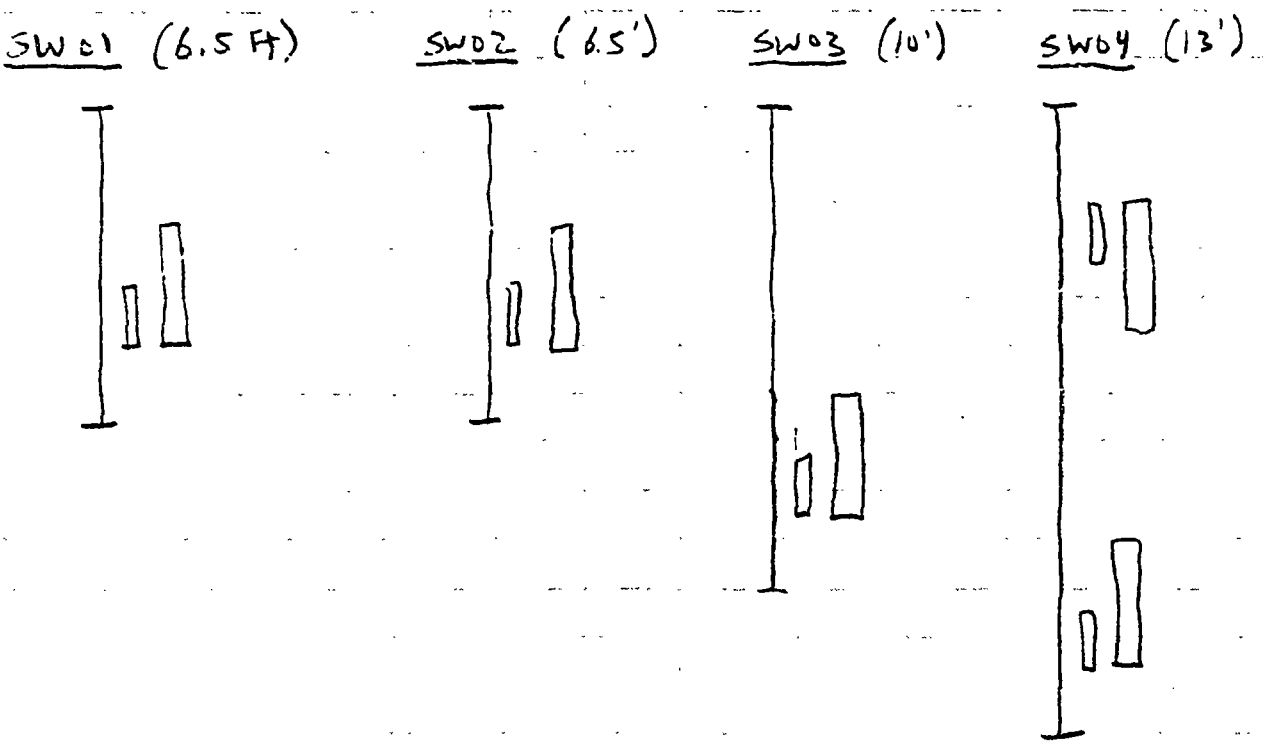
S = Surface water, Conductivity corected to 25C

All PAH and VOC samples were collected directly from a stainless steel teflon end seal Kemmerer bottle (1.2L), Approx 1.3' long

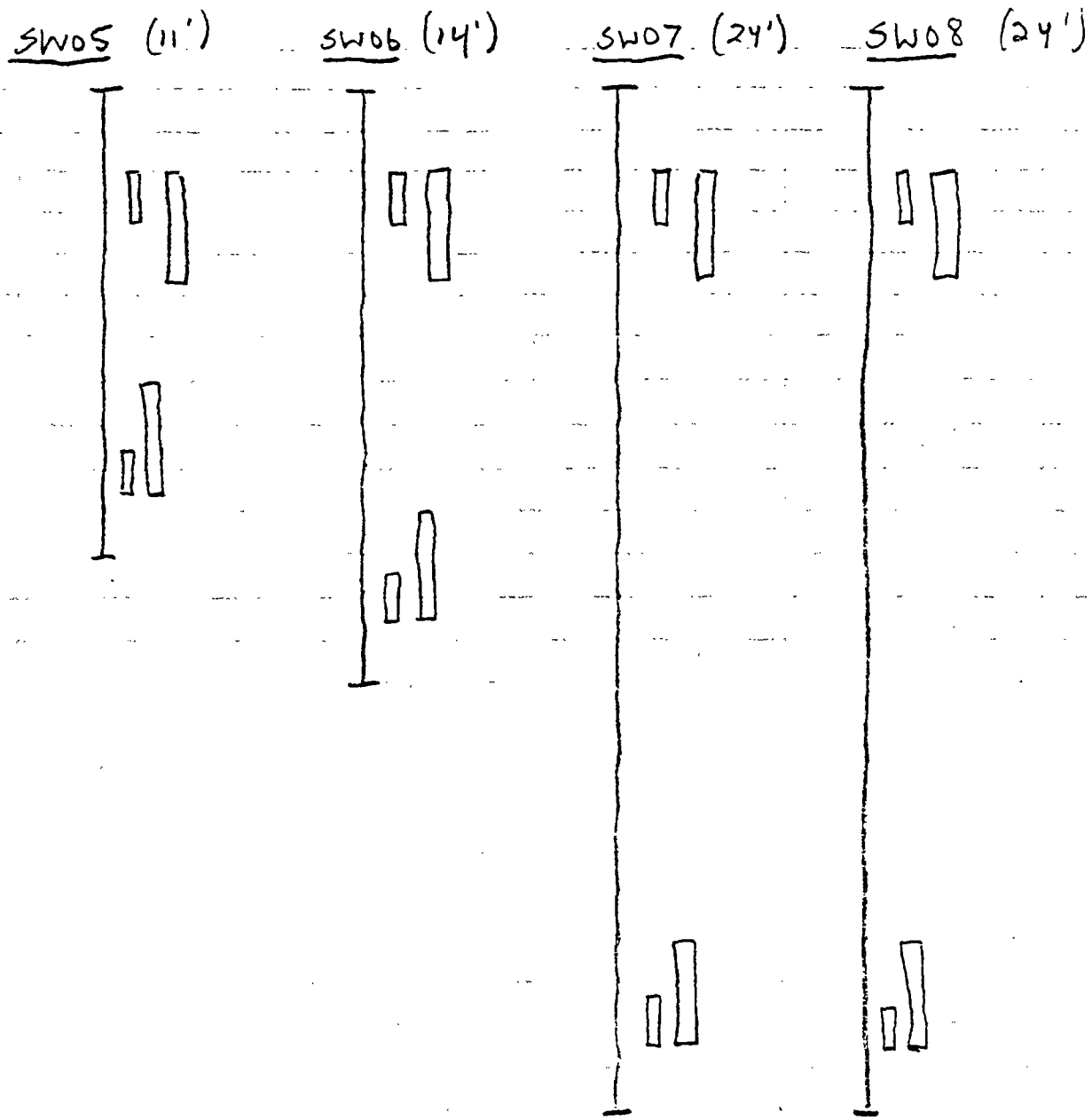
Remaining parameters were collected from a composite jug (20L clear polycarbonate bottle, D.I rinsed 3X between sample collection). Composite jug filled from a 4.2 L stainless steel, urethane end sealed Kemmerer bottle (see photo 1A)

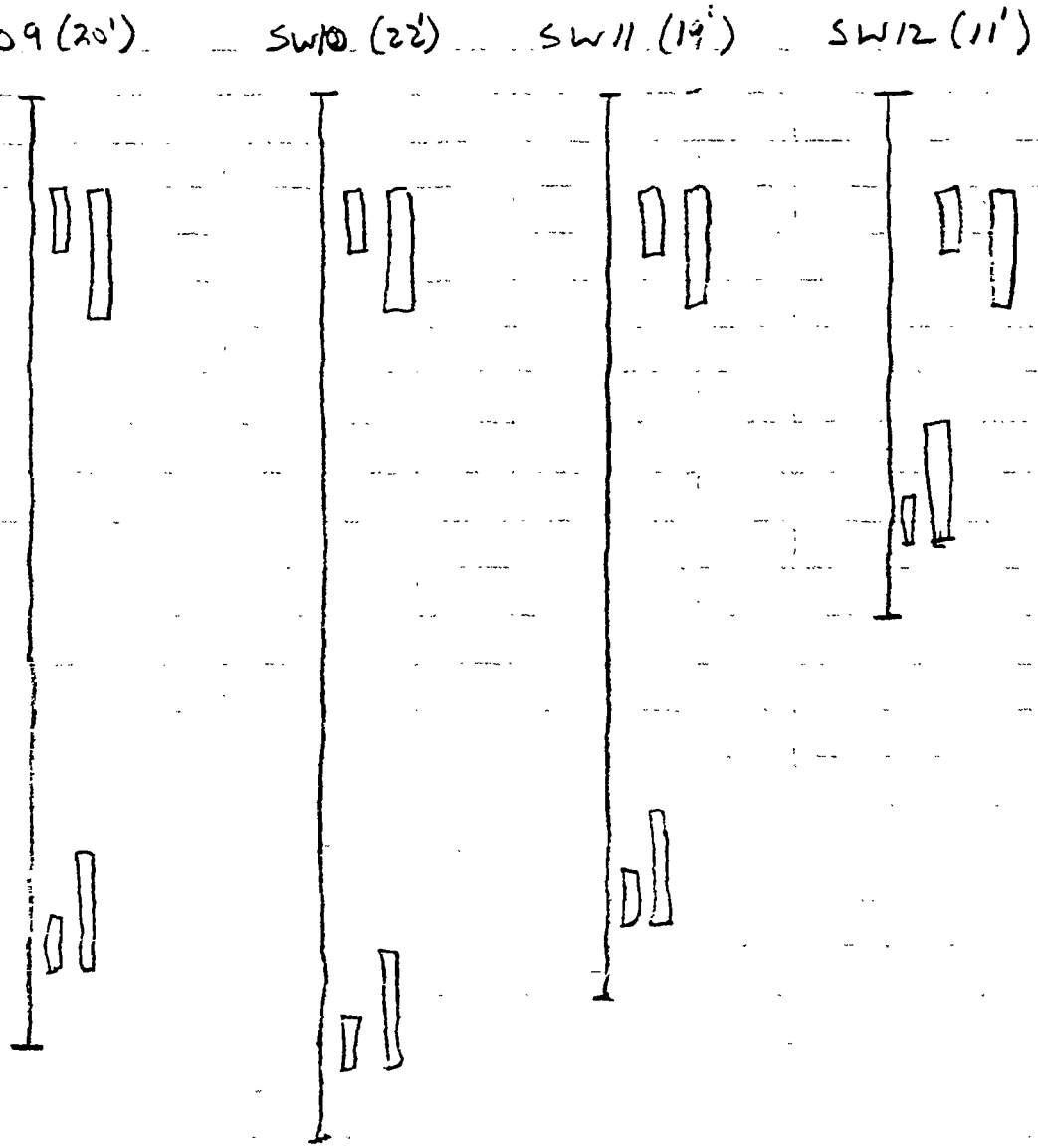
*Profile of sample collection





* ... to ... action sample collection depths are approx.


SW05 (11')
SW06 (14')
SW07 (24')
SW08 (24')



- 1 ship arrived in port on 8-30-93 and departed on 8-31-93 early A.M before harbor sites were sampled
- site SW10S, SW10D located near OMC plant had appox. 10 motors running. OMC shut down prior to sampling (see photo 4A, 5A)
- at site SW11D, SW12D an odor was detected in the sample odor was stronger at SW11D
- at SW09 a tug was operating near sampling site (see photo 6
- profile meter was damaged on 8-30-93, samples SW 1-7 were collected on 8-30-93 sample SW 8-12 collected on 8-31-93.

Appendix

WAUKEGAN HARBOR - LAKE MICHIGAN

SURFACE WATER LOCATIONS	C.O.C. NUMBER
SW01D	15192, 15193, 15195, 15218
FB-1	15192, 15193, 15195, 15218
SW02D	15192, 15193, 15195, 15218
SW03D	15198, 15199, 15219, 15200
SW04S	15192, 15193, 15219, 15195
SW04D	15192, 15193, 15219, 15195
SW05S	15198, 15199, 0925, 15200
SW05D	15198, 15199, 0925, 15200
SW06S	15198, 15199, 0925, 15200
M-1	15198, 15199, 0926
SW06D	15198, 15199, 0926, 15200
SW07S	15192, 15199, 15219
SW07D	15192, 15199, 15219
SW08S	15205, 15202, 15216, 15208
SW08D	15205, 15202, 15217, 15208
SW09S	15205, 15202, 15216, 15208
SW09D	15205, 15202, 15217, 15208
SW09D MS	15205, 15202, 15207, 15208
SW09D MSD	15205, 15202, 15207, 15208
SW10S	15209, 15211, 15212, 15215
FB-2	15209, 15211, 15212, 15215
SW10D	15209, 15211, 15212, 15215
SW11S	15209, 15211, 15213, 15215
SW11D	15209, 15211, 15213, 15215
M-2	15210, 15211, 15213, 15215
SW12S	15210, 15211, 15214, 15215
SW12D	15210, 15211, 15214, 15215

APPENDIX 4-O

SULFATE REDUCING BACTERIA ASSAY PROCEDURES

The term "sulfur bacteria" or "sulfate-reducing bacteria" has been used interchangeably to describe various genera of anaerobic bacteria (bacteria that cannot live in the presence of oxygen) which reduce sulfates to sulfides (sulfate-reducing bacteria) or those that reduce sulfates to elemental sulfur or sulfuric acid (sulfur bacteria). For example, sulfate-reducing bacteria of the genera *Desulfobacterium* and *Desulfomonile* in pure culture are capable of the transformation of nonsulfur-containing chlorinated solvents (chloroform, trichloroethene) and aromatic hydrocarbons (toluene), using sulfate as an electron acceptor.

The BART (Biological Activity Reaction Test) System (Droycon Bioconcepts, Inc.) uses a variety of differential media for the culture and semiquantitation of bacterial groups, such as sulfate reducing bacteria, iron, and manganese-oxidizing bacteria, etc. in water and soils. The test kit consists of an outer, screw-capped vial and an inner, screw-capped sterile plastic vial containing a dehydrated, selective media, and a floating intercedent device (FID). When the inner vial is filled with an aqueous suspension, an aerobic zone is created in the upper portion of the vial and an anaerobic zone is created in the lowest portion of the vial. The FID (a plastic sphere) controls diffusion of oxygen into the culture media and provides a surface on which sessile bacteria (bacteria requiring points of attachment to a solid surface) can grow. The growth and color changes in the differential media due to microbial growth are observed during the course of incubation of the system.

The BART-SRB differential media contains sulfate salts in addition to other essential culture media constituents. BART-SRB vials inoculated with soil suspensions were incubated at room temperature (approximately 72°F, 22°C) until black deposits of reduced sulfur (iron sulfide) were observed as either a suspension in the lower zone of the culture media in the vial or as a precipitate at the bottom of the vial (sulfate-reducing bacteria are anaerobic, and the reduction of sulfate in the culture media will take place at the bottom of the vial).

To inoculate the BART-SRB system, a 1 gram sample of each soil was suspended in 15 milliliters of sterile phosphate buffer[1], then pipetted into the BART-SRB vials. Vials were observed daily, and darkening of the culture media with a black precipitate forming in the bottom of the vials was interpreted as a positive sulfate reduction reaction. A sterile control for the study was prepared by pipetting 15 milliliters of sterile phosphate buffer into a designated BART-SRB vial.

Precise determination of the numbers of sulfate-reducing bacteria in soil samples is not a feature of the BART-SRB system. However, a semiquantitative determination of the number of CFUs (Colony Forming Units) of bacteria is possible by comparing the time (in days) for a positive sample result in a BART-SRB vial to a graph[2] (Figure 4-O-1) of the generalized number of bacterial CFUs per milliliter necessary to elicit a positive reaction in a BART-SRB system (since the matrix for these samples was 1 gram of soil, the number of colony forming units quantified using the BART-SRB was reported in CFUs per gram). This graph was generated by studies comparing the number of days necessary to observe visible positive reactions in the BART-SRB to colony forming units of bacteria determined by laboratory standard extinction dilution spread plate techniques. (Generally, samples with greater numbers of bacteria capable of reducing sulfates in the culture media will result in more rapid positive reactions in the BART-SRB, if the size or volume of sample added is equivalent).

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[1]3050C 1a. Phosphate Buffer. Standard Methods for the Examination of Water and Wastewater. American Public Health Association, American WaterWorks Association, Water Environment Association. 18th Edition, 1992.

[2]Dr. Roy Cullimore, in Practical Manual of Groundwater Microbiology. Lewis Publishers, 1992.

Figure 1. Sulfate Reducing Bacteria

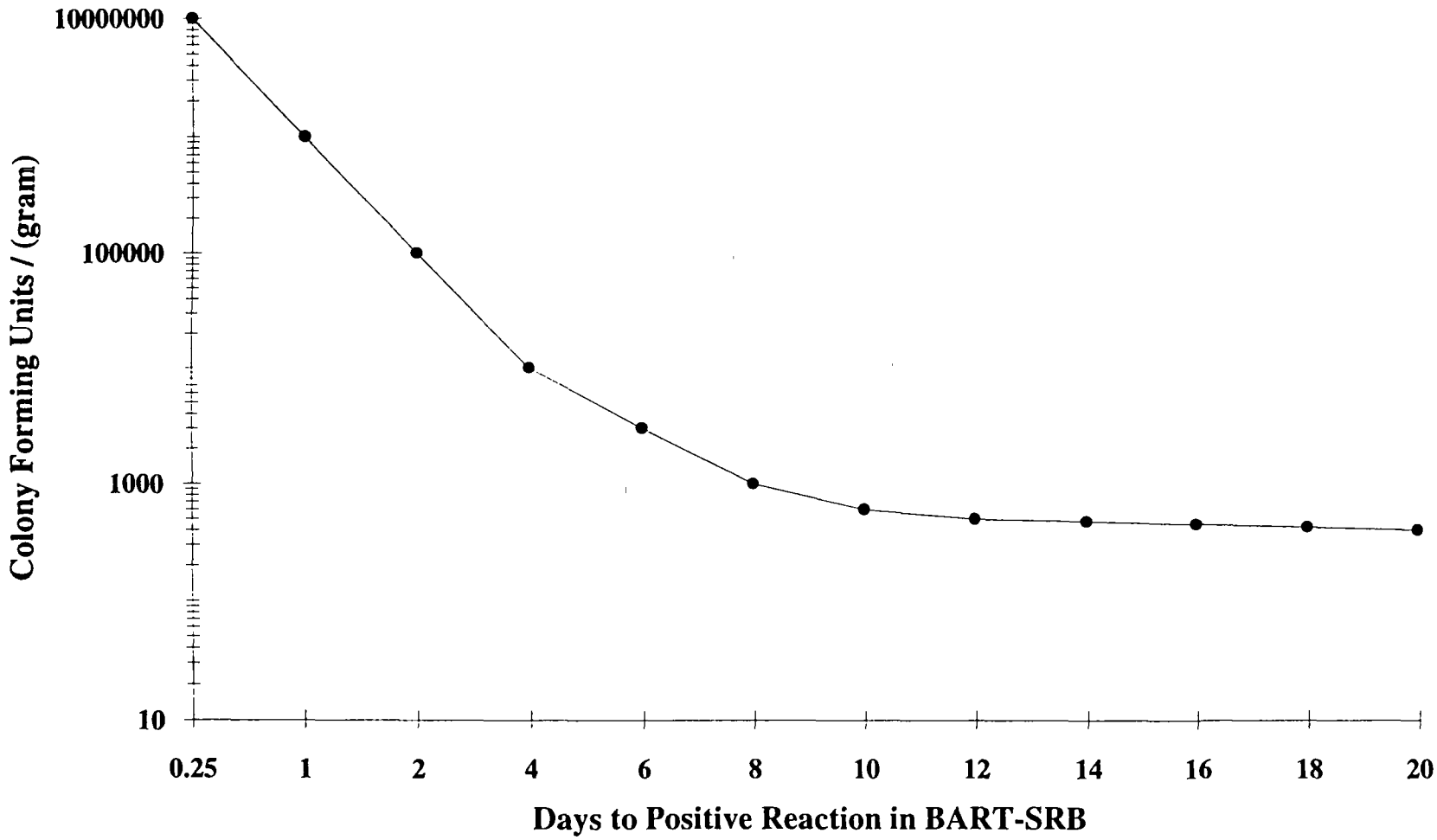


Figure 4-O-1

A

Analytical Lab
Mol

ARC™
Aspen Research Corporation
436 West County Rd D, St Paul, MN 55112-3522
Tel 612/ 631-9234 Fax 612/ 631-9270

November 5, 1993

Dr. Charles Peng
Barr Engineering Company
8300 Norman Center Drive
Minneapolis, MN 55437-1026

Reference: Identification of Waste Pond Material

Dear Dr. Peng:

We have completed the requested analysis on the above referenced project; enclosed please find a summary of the results obtained.

Thank you for selecting Aspen Research Corporation. We look forward to providing you with continued analytical support and service. As always, we welcome your comments regarding the quality of the work you have received. If you have any questions, please call me.

Sincerely,

ASPEN RESEARCH CORPORATION

Will Wood

Will Wood
Encl.

TITLE

Identification of Waste Pond Material

OBJECTIVE

The purpose of the testing was to qualitative identify an fine-grain paste material (color is off-white with dark gray streaks) using selected instrumental methods of analysis.

MATERIAL TESTED

Sample Identification	ARC Sample Number
Pond Waste TT2506	44599
Pond Waste TT2506	44600

CONCLUSION

The waste material is a complex mixture of hydrated metal and non-metal oxides, and sulfur (S_8). The principal metal and non-metal oxides are magnesium oxide and silicon dioxide (silica). Trace amounts of other metals including aluminum, calcium, copper, gold, iron and manganese were identified. The waste had a mild naphthalene odor but no organics were identified by Fourier transform infrared (FTIR) analysis following solvent extraction ($CHCL_3$) and analysis of the solvent soluble residue.

INSTRUMENTAL ANALYSIS OF SOLID WASTE

Fourier Transform Infrared Analysis of Pond Waste

The range in the electromagnetic spectrum extending from 5000 cm^{-1} to 500 cm^{-1} is referred to as the infrared region for purposes of this analyst. Infrared spectra originate primarily from the vibrational stretching and bending modes within molecules. Most organic and inorganic materials show absorption and, in all but a few cases, this absorption includes several characteristic wavelengths. FTIR has valuable, although limited, utility in gaining information about inorganic materials. For qualitative analysis, one of the best features of an infrared spectrum is that the absorption or the lack of absorption in specific frequency regions can be correlated with specific vibrational groups and bending motions and , in some cases, with the relationship of these

groups to the remainder of the molecule. It provides a "fingerprint" for identification and a powerful tool for the study of molecular structure. Empirical correlations of vibrating groups with specific, observed absorption bands offer the possibility of chemical identification.

FTIR spectra were produced from the pond waste sample "as received" by direct transmission. Two separate spectra were produced. The first (top spectra) was obtained from one of the two sample jars (ARC #44600) while the second (bottom spectra) was obtained from the second sample jar (ARC #44599)..

Thus, by interpretation of the spectrum it is possible to state that certain functional groups (identified in sample spectra) are present in the material and that certain others are absent. Figure 1 was identified as a metal oxide spectra. No specific metallic elements could be identified from the resulting spectra. With this one datum, the possibilities for the unknown can be narrowed to confirm the identification by other instrumental means (e.g., emission spectroscopy).

Pond waste sample TT2506 was also prepared for FTIR analysis by extracting a portion of the sample with chloroform ($CHCL_3$). The purpose of the extraction was to remove any soluble organic portion in the waste sample from the inorganic portion. Pale yellow crystal remained after the $CHCL_3$ was evaporated off. The crystals did not produce any absorptions in the infrared region. These crystals were later analyzed by X-ray diffraction.

In many cases the interpretation of the infrared spectrum on the basis of characteristic frequencies will not be sufficient to permit positive identification of an inorganic unknown. By employing other analytical methods such as X-ray powder diffraction analysis, additional valuable qualitative information about unknown crystalline inorganic compounds can be obtained.

X-Ray Powder Diffraction

Each atom in a crystal has the power of scattering an X-ray beam incident on it. The sum of all the scattered waves in the crystal results in the X-ray beam being, in effect, diffracted from each allowed crystal plane. Every crystalline substance scatters the X-rays in its own unique diffraction pattern, producing a "fingerprint" of its atomic and molecular structure. The intensity of each reflection forms the basic information required in crystal structure analysis. One unique feature of X-ray diffraction is that components are identified as specific compounds. The identification of unknown compounds from their X-ray diffraction diagrams constitutes what is probably the most widespread use of diffraction methods.

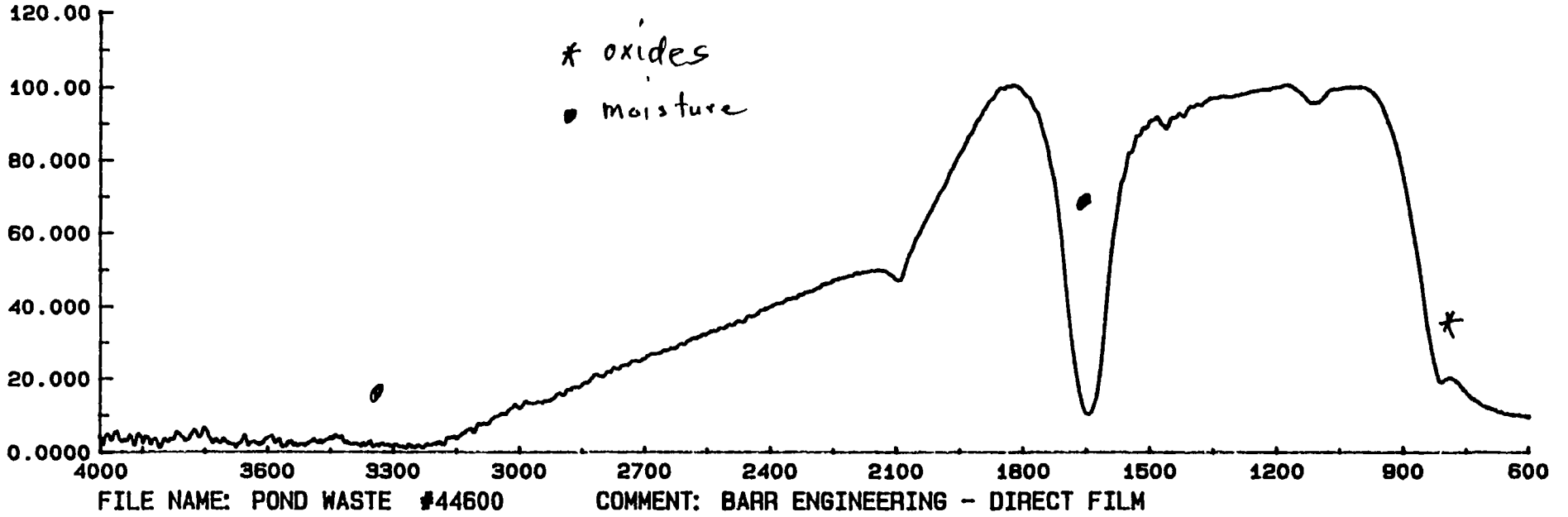
An oven dried (105°C) pond waste sample was analyzed by X-ray powder diffraction (Figure 2). If the identification of the sample is desired, its diffraction pattern is compared to an index file of known substances until a match is obtained. An X-ray pattern for sulfur (S_8) is provided. Only orthorhombic sulfur was identified in the dried waste sample no other crystalline materials were identified in the sample matrix.

The non-volatile portion (pale yellow crystals) of the $CHCL_3$ extraction prepared for FTIR analysis was also analyzed by X-ray diffraction. The resulting X-ray pattern is provided in Figure 3. The non-volatile portion of the $CHCL_3$ extract was identified as orthorhombic sulfur.

Emission Spectroscopy

An oven dried portion of the sample was analyzed for metallic and non-metallic (i.e., P, Si, As and B) elements by emission spectroscopy. The dried sample was excited by a high energy a-c spark across two electrodes. The spectral bands produced from the sample were then used to qualitatively identify the elements, and then the quantification of elements to a detection of 10 ppm. The pond waste material matrix was principally magnesium and silicon with small traces of aluminum, calcium, copper, iron and magnesium. Gold was present around 10 ppm.

Figure 1. FTIR Spectra of Pond Waste "As Received"



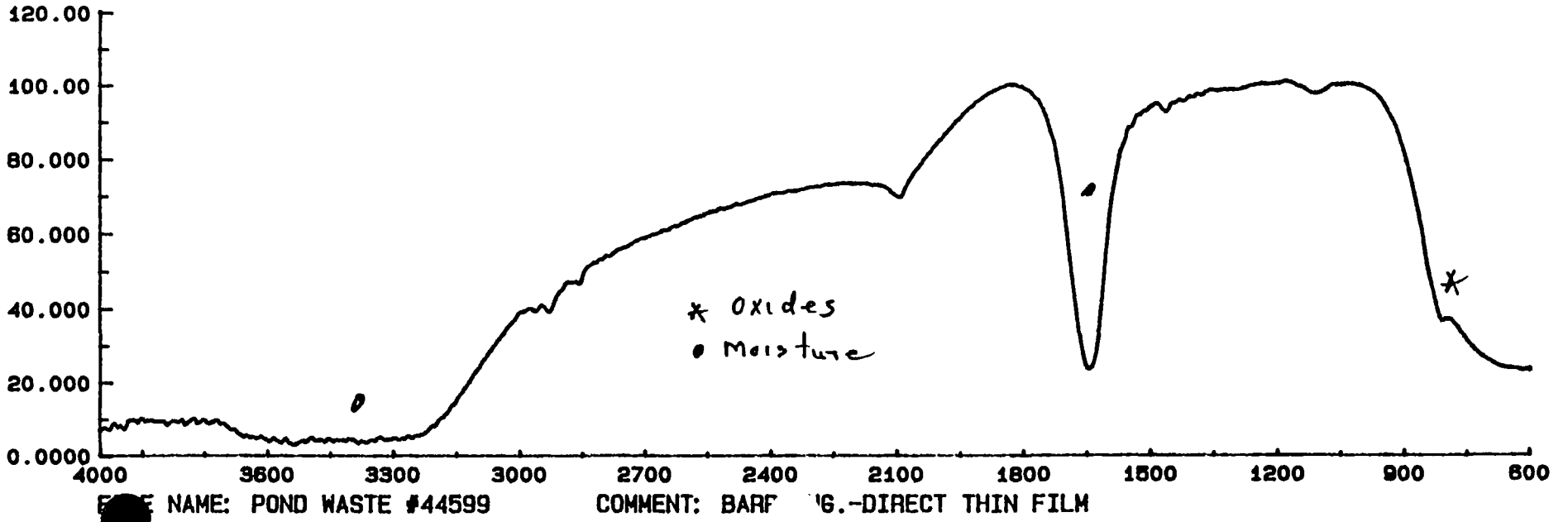


Figure 2. X-Ray Diffraction Data for Oven Dried Pond Waste Sample

D SPACING FROM X-RAY POWDER DIFF. CAMERA [illegible] mm DIA.
REPORT #: ARC/11154 DATE: [illegible] CU TUBE [illegible]
SAMPLE:

LINE #	LEFT	RIGHT	INTENSITY	D OF XTAL	AVERAGE
1	33.01	0.00	W	5.715 +	
2	32.43	0.00	W---	4.170	
3	32.36	0.00	W--	4.039	
4	32.24	36.88	S+	3.833 +	34.560
5	32.05	0.00	W--	3.547	
6	31.96	0.00	W+	3.426 +	
7	31.88	0.00	W	3.326 +	
8	31.73	37.34	W+	3.208 +	34.[illegible]
9	31.67	0.00	W	3.089 +	
10	31.41	0.00	W	[illegible].839 +	
11	31.1[illegible]	0.00	W	[illegible].606 +	
12	31.04	0.00	W---	[illegible].549 +	
13	30.96	0.00	W-	[illegible].494 +	
14	30.84	0.00	W-	[illegible].416 +	
15	30.75	0.00	W-	[illegible].361	
16	30.62	0.00	W--	[illegible].286 +	
17	30.33	0.00	W---	[illegible].136	
18	30.2[illegible]	0.00	W	2.108	
19	29.75	0.00	W-	1.891	
20	29.[illegible]	0.00	W---	1.[illegible]	
21	29.42	0.00	W--	1.777	
22	29.[illegible]4	0.00	W--	1.752	
23	29.[illegible]6	0.00	W---	1.7[illegible]7	
24	29.1[illegible]	0.00	W---	1.692	

ENTER = 34.[illegible]

Sulfur

8-247

d	3.85	3.21	3.44	7.69	S
I/I₁	100	60	40	6	SULFUR

Rad. CuK λ 1.5405 Filter Dia. 114.6mm
Cut off 50A I/I₁ PHOTOMETER GUINIER CAMERA
Ref. DEWOLFF, TECHN. PHYS. DIENST, DELFT, HOLLAND

Sys. ORTHORHOMBIC S.G. D_{2H}^{24} - FDDD (B.P.)
a. 10.45 b. 12.84 c. 24.46 A C
α β γ Z Dx
Ref. IBID.

ε α n=β ε γ Sign
ΣV D mp Color
Ref.

SEE FOLLOWING CARD

d Å	I/I₁	hkl	d Å	I/I₁	hkl
7.69	6	111	2.614	4	400
5.76	14	113	2.569	8	333
5.88	5	022	2.501	7	244
4.80	2	202	2.424	13	317
4.19	2	151	2.404	2	404
4.06	11	220	2.375	4	422
3.91	12	131	2.366	4	335
3.85	100	222	2.288	6	0.2.10
3.57	8	133	2.215	2	048,2.0.[illegible]
3.44	40	026	2.146	4	1.1.11
3.38	3	224	2.112	10m	319,062
3.33	25	311	2.098	2	2.2.10
3.21	60	206	2.057	1	511
3.11	25	313	2.041	1	0.0.12,248
3.08	17	135	2.003	2	353
3.06	1	008	1.988	4	408
2.842	18	044	1.957	2	262
2.688	2	331	1.926	1	444
2.673	1	242	1.900	7m	355,066,515
2.621	13	137	1.856	1	3.1.11

Figure 3. X-Ray Diffraction Data for Chloroform Extractable (Non-Volatile) Portion of Pond Sample

		ARC 11154?			
		Pond Waste Diffraction Data			
dist	int			d	I/I0
33	78	23.20		3.8343	100
44.5	40	27.80		3.2095	51
40	32	26.00		3.4274	41
47.5	22	29.00		3.0793	28
42	20	26.80		3.3269	26
54	16	31.60		2.8316	21
14	15	15.60		5.6810	19
82.5	13	43.00		2.1037	17
30	12	22.00		4.0407	15
61	12	34.40		2.6073	15
68	12	37.20		2.4172	15
103.5	11	51.40		1.7779	14
108	11	53.20		1.7219	14
4	10	11.60		7.6294	13
95	10	48.00		1.8956	13

8-247

d	3.85	3.21	3.44	7.69	S
I/I1	100	60	40	6	SULFUR

Rad. CuK λ 1.5405 Filter Dia. 114.6mm
Cut off 50A I/I1 PHOTOMETER GUINIER CAMERA
Ref. DEWOLFF, TECHN. PHYS. DIENST, DELFT, HOLLAND

Sys. ORTHORHOMBIC S.G. D_{2h}^{24} - FDDD (B.P.)
a_o 10.45 b_o 12.84 c_o 24.46 A C
α β γ Z Dx
Ref. IBID.

εα nωβ εγ Sign
2V D mp Color
Ref.

See following card

d Å	I/I1	hkl	d Å	I/I1	hkl
7.69	6	111	2.614	4	400
5.76	14	113	2.569	8	333
5.68	5	022	2.501	7	244
4.80	2	202	2.424	13	317
4.19	2	151	2.404	2	404
4.06	11	220	2.375	4	422
3.91	12	131	2.366	4	335
3.85	100	222	2.288	6	8.2.10
3.57	8	133	2.215	2	048,2.0.10
3.44	40	026	2.146	4	1.1.11
3.38	3	224	2.112	10m	319,062
3.33	25	311	2.098	2	2.2.10
3.21	60	206	2.057	1	511
3.11	25	313	2.041	1	0.0.12,248
3.08	17	135	2.003	2	353
3.86	1	008	1.988	4	408
2.862	18	044	1.957	2	262
2.688	2	331	1.926	1	444
2.673	1	242	1.900	7B	355,066,515
2.621	13	137	1.856	1	3.1.11

Analytic

BARR ENGINEERING CO.

MEMORANDUM

TO: Waukegan Coke Plant Site, 13/49-003JSL54

FROM: Grant Paul

SUBJECT: Semivolatile Method Detection Limit Study

DATE: January 24, 1994

The results of method detection limit (MDL) studies for semivolatile organic compound parameters was provided by CH_2M Hill Laboratories. The MDL studies were the most current version available prior to the start of the analysis of the Phase II samples for the project. The were performed in accordance with the guidance set forth in the 40 CFR Part 136, Appendix B document which pertains to the procedure for the determination of method detection limits.

An MDL study was provided for both soil and water samples. The sample volume basis for the water samples was one liter. The concentration units for the water MDLs are in ug/l. The sample weight basis for the soil samples was 30.0 grams. The concentration units for the soil MDLs are in ug/kg (with 100 percent solids).

The MDL study results summary follows.

Filename: RIFS\MDL.MEM

SEMIVOLATILE MDL STUDY- WATER
INCOS 50 XLe
SYSTEM : Y
01/22/93
CONTINUOUS EXT - 1 PH ADJUSTMENT(PH2)

		MDL ug/L
CI30	D4-1,4-DICHLOROBENZENE	0.000
CI40	D8-NAPTHALENE	0.000
CI50	D10-ACENAPHTHENE	0.000
CI60	D10-PHENANTHRENE	0.000
CI70	D12-CHRYSENE	0.000
CI75	D12-PERYLENE	0.000
CS50	2-FLUOROPHENOL*	1.247
CS45	D5-PHENOL*	1.137
CS70	D4-2-CHLOROPHENOL*	1.138
CS75	D4-1,2-DICHLOROBENZENE*	1.677
CS20	D5-NITROBENZENE*	1.269
CS25	2-FLUOROBIPHENYL*	1.523
CS55	2,4,6-TRIBROMOPHENOL**	0.916
CS30	D14-TERPHENYL*	1.767
C310	N-NITROSODIMETHYLAMINE	1.451
C315	PHENOL*	1.296
C325	BIS(2-CHLOROETHYL)ETHER*	1.368
C330	2-CHLOROPHENOL*	1.401
C335	1,3-DICHLOROBENZENE*	1.794
C340	1,4-DICHLOROBENZENE*	1.748
C350	1,2-DICHLOROBENZENE*	1.751
C355	2-METHYLPHENOL*	1.705
C357	BIS(2-CHLOROISOPROPYL)ETHER**	1.575
C365	4-METHYLPHENOL*	1.643
C375	HEXACHLOROETHANE*	1.799
C370	N-NITROSO-DI-N-PROPYLAMINE*	1.209
C410	NITROBENZENE*	1.241
C415	ISOPHORONE*	1.322
C420	2-NITROPHENOL*	1.084
C425	2,4-DIMETHYLPHENOL*	3.165
C435	BIS(2-CHLOROETHOXY)METHANE*	1.431
C440	2,4-DICHLOROPHENOL*	1.298
C445	1,2,4-TRICHLOROBENZENE*	1.376
C455	4-CHLOROANALINE**	1.759
C450	NAPHTHALENE*	1.356
C460	HEXACHLOROBUTADIENE**	1.767
C465	4-CHLORO-3-METHYLPHENOL*	1.188
C470	2-METHYLNAPHTHALENE*	1.385
C510	HEXACHLOROCYCLOPENTADIENE**	1.341
C515	2,4,6-TRICHLOROPHENOL*	1.171
C520	2,4,5-TRICHLOROPHENOL*	1.248
C525	2-CHLORONAPHTHALENE*	1.366

C530	2-NITROANALINE**	1.275
C535	DIMETHYL PHTHALATE**	1.330
C540	ACENAPHTHYLENE*	1.476
C543	2,6-DINITROTOLUENE*	1.095
C545	3-NITROANALINE**	1.806
C550	ACENAPHTHENE*	1.487
C555	2,4-DINITROPHENOL**	4.061
C565	DIBENZOFURAN*	1.404
C560	4-NITROPHENOL**	1.878
C570	2,4-DINITROTOLUENE*	1.140
C590	FLUORENE*	1.442
C580	DIETHYL PHTHALATE**	1.529
C585	4-CHLOROPHENYL PHENYL ETHER*	1.313
C595	4-NITROANALINE**	1.655
C610	4,6-DINITRO-2-METHYLPHENOL**	2.284
C615	N-NITROSODIPHENYLAMINE**	1.588
C625	4-BROMOPHENYL PHENYL ETHER*	1.057
C630	HEXACHLOROBENZENE*	1.374
C635	PENTACHLOROPHENOL*	1.690
C640	PHENANTHRENE*	1.554
C645	ANTHRACENE*	1.595
C647	CARBAZOLE**	1.648
C650	DI-N-BUTYLPHTHALATE**	1.304
C655	FLUORANTHENE*	1.477
C715	PYRENE*	1.814
C720	BUTYL BENZYL PHTHALATE**	1.256
C730	BENZO(A)ANTHRACENE*	1.785
C725	3,3'-DICHLOROBENZIDINE**	4.770
C740	CHRYSENE*	1.925
C745	BIS(2-ETHYLHEXYL)PHTHALATE**	6.179
C760	DI-N-OCTYL PHTHALATE**	2.101
C765	BENZO(B)FLUORANTHENE*	2.409
C770	BENZO(K)FLUORANTHENE*	1.918
C775	BENZO(A)PYRENE*	2.213
C780	INDENO(1,2,3-CD)PYRENE*	2.205
C785	DIBENZO(A,H)ANTHRACENE*	1.943
C790	BENZO(G,H,I)PERYLENE*	1.992
C345	BENZYL ALCOHOL	1.188
C430	BENZOIC ACID	14.580
C620	1,2-DIPHENYLHYDRAZINE	0.627

1,2-DIPHENYLHYDRAZINE, HEXACHLOROCYCLOPENTADIENE, 3,3'-DICHLOROBENZIDINE, BENZOIC ACID VALUES WERE DETERMINED FROM ANALYTICAL RUNS 93D09Y05, 93D09Y06, 93D09Y07, 93D09Y08, 93D09Y09, 93D09Y10, 93D09Y11

SEMIVOLATILE MDL STUDY _SOIL
INCOS 50 XLe
SYSTEM : Y
04/21/93
SOIL - SONICATION

		MDL
		ug/kg
CI30	D4-1,4-DICHLOROBENZENE	0.000
CI40	D8-NAPHTHALENE	0.000
CI50	D10-ACENAPHTHENE	0.000
CI60	D10-PHENANTHRENE	0.000
CI70	D12-CHRYSENE	0.000
CI75	D12-PERYLENE	0.000
CS50	2-FLUOROPHENOL*	76.520
CS45	D5-PHENOL*	63.058
CS70	D4-2-CHLOROPHENOL*	43.818
CS75	D4-1,2-DICHLOROBENZENE*	51.227
CS20	D5-NITROBENZENE*	53.910
CS25	2-FLUOROBIPHENYL*	42.383
CS55	2,4,6-TRIBROMOPHENOL**	45.157
CS30	D14-TERPHENYL*	42.924
C310	N-NITROSODIMETHYLAMINE	47.569
C315	PHENOL*	43.012
C325	BIS(2-CHLOROETHYL)ETHER*	53.492
C330	2-CHLOROPHENOL*	46.745
C335	1,3-DICHLOROBENZENE*	51.406
C340	1,4-DICHLOROBENZENE*	50.363
C350	1,2-DICHLOROBENZENE*	50.127
C355	2-METHYLPHENOL*	33.150
C357	BIS(2-CHLOROISOPROPYL)ETHER**	45.646
C365	4-METHYLPHENOL*	35.734
C375	HEXACHLOROETHANE*	46.884
C370	N-NITROSO-DI-N-PROPYLAMINE*	41.415
C410	NITROBENZENE*	46.924
C415	ISOPHORONE*	48.264
C420	2-NITROPHENOL*	50.503
C425	2,4-DIMETHYLPHENOL* (1)	221.514
C435	BIS(2-CHLOROETHOXY)METHANE*	46.156
C440	2,4-DICHLOROPHENOL*	32.124
C445	1,2,4-TRICHLOROBENZENE*	50.195
C455	4-CHLOROANALINE** (1)	57.815
C450	NAPHTHALENE*	44.596
C460	HEXACHLOROBUTADIENE**	47.081
C465	4-CHLORO-3-METHYLPHENOL*	41.909
C470	2-METHYLNAPHTHALENE*	47.530

SEMIVOLATILE MDL STUDY
INCOS 50 XLe
SYSTEM : Y
04/21/93
SOIL - SONICATION

		MDL
C510	HEXACHLOROCYCLOPENTADIENE**	40.968
C515	2,4,6-TRICHLOROPHENOL*	38.302
C520	2,4,5-TRICHLOROPHENOL*	53.569
C525	2-CHLORONAPHTHALENE*	40.605
C530	2-NITROANALINE**	37.283
C535	DIMETHYL PHTHALATE**	43.480
C540	ACENAPHTHYLENE*	40.737
C543	2,6-DINITROTOLUENE*	45.549
C545	3-NITROANALINE** (1)	97.378
C550	ACENAPHTHENE*	36.721
C555	2,4-DINITROPHENOL** (1)	82.764
C565	DIBENZOFURAN*	39.568
C560	4-NITROPHENOL** (1)	242.495
C570	2,4-DINITROTOLUENE*	50.957
C590	FLUORENE*	41.844
C580	DIETHYL PHTHALATE**	46.076
C585	4-CHLOROPHENYL PHENYL ETHER*	37.831
C595	4-NITROANALINE** (1)	126.274
C610	4,6-DINITRO-2-METHYLPHENOL**(1)	143.343
C615	N-NITROSODIPHENYLAMINE**	36.769
C625	4-BROMOPHENYL PHENYL ETHER*	30.292
C630	HEXACHLOROBENZENE*	32.100
C635	PENTACHLOROPHENOL*	53.296
C640	PHENANTHRENE*	38.283
C645	ANTHRACENE*	34.011
C647	CARBAZOLE**	42.232
C650	DI-N-BUTYLPHTHALATE**	85.723
C655	FLUORANTHENE*	45.730
C715	PYRENE*	40.859
C720	BUTYL BENZYL PHTHALATE**	42.200
C730	BENZO(A)ANTHRACENE*	41.372
C725	3,3'-DICHLOROBENZIDINE** (1)	159.201
C740	CHRYSENE*	34.232
C745	BIS(2-ETHYLHEXYL)PHTHALATE**	108.983
C760	DI-N-OCTYL PHTHALATE**	55.695
C765	BENZO(B)FLUORANTHENE*	29.395
C770	BENZO(K)FLUORANTHENE*	56.637
C775	BENZO(A)PYRENE*	42.591

SEMIVOLATILE MDL STUDY
INCOS 50 XLe
SYSTEM : Y
04/21/93
SOIL - SONICATION

		MDL
C780	INDENO(1,2,3-CD)PYRENE*	41.720
C785	DIBENZO(A,H)ANTHRACENE*	45.332
C790	BENZO(G,H,I)PERYLENE*	40.329
C345	BENZYL ALCOHOL	42.568
C430	BENZOIC ACID(1)	142.571
C620	1,2-DIPHENYLHYDRAZINE (1)	44.374