Cascade Pole Site
Olympia, Washington

Project No. 4905039

SUPPLEMENTAL SITE INVESTIGATION REPORT

Volume II

Appendices

Prepared on behalf of:

Cascade Pole Company
Port of Olympia

Prepared by:

Environmental Science &
Engineering, Inc. (ESE)

Amherst, New Hampshire

July 10, 1992

A CILCORP Company

APPENDIX A

BORING LOGS AND WELL CONSTRUCTION DETAILS

ESE
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LEGEND TO LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

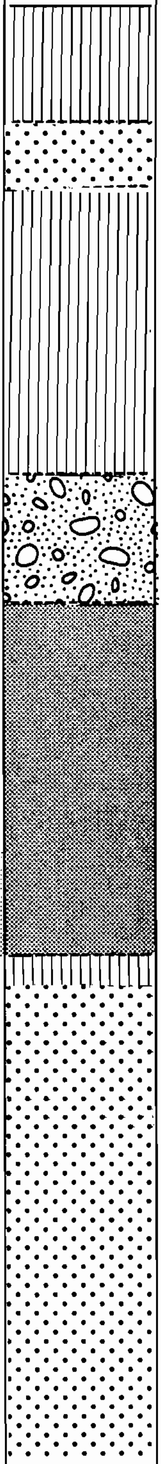
MAJOR DIVISIONS			GROUP SYMBOLS	DESCRIPTION	GRAPHIC LOG
COARSE GRAINED SOILS 50% or more retained on the No. 200 sieve.	GRAVELS More than half of coarse fraction retained on the No. 4 sieve	Clean sands	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	░
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.	░
		Gravels with fines	GM	Silty gravels, gravel-sand mixtures.	▥
			GC	Clayey gravels, gravel-sand-clay mixtures.	▨
	SANDS More than half of coarse fraction passing the No. 4 sieve.	Clean sands	SW	Well-graded sands, gravelly sands, little or no fines.	▒
			SP	Poorly-graded sands, gravelly sands, little or no fines.	░
		Sands with fines	SM	Silty sands, sand-silt mixtures.	▥
			SC	Clayey sands, sand clay mixtures.	▨
FINE GRAINED SANDS More than 50% passing the No. 200 sieve.	SILTS AND CLAYS	Liquid Limit below 50%	ML	Inorganic silts and very fine sands.	▥
			CL	Inorganic clays, gravelly clays, sandy clays, lean clays.	▨
			OL	Organic silts and organic clays	▦
			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	▥
		Liquid Limit 50% and above	CH	Inorganic fat clays.	▨
			OH	Organic clays or organic silts.	▨
Highly organic soils			Pt	Peat, organic content greater than 60%.	≈

LOG OF
EXPLORATORY BORING

Project No: 4-90-5039
Boring No: EB-1
Date: 1-14-91
Client: McFarland Cascade
Driller:West Hazmat
Location: Port of Olympia
Drilling Method: HSA
Hole Diameter: 6 3/4"
Logged By: G. Burgess/Generous
Page No: 1 of 1
Installation Data: Backfill with Bentonite chips

Field location of boring:

NOTE: TIP II malfunctions due to rainy conditions.

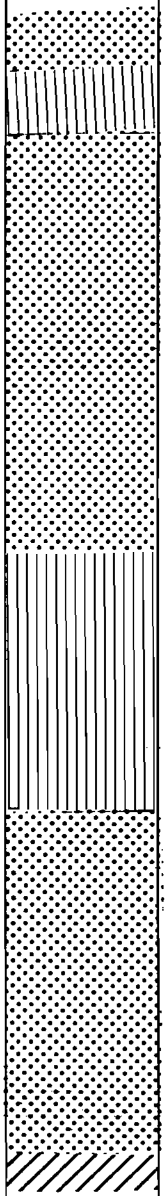
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A		0.0-1.5	ML				0.0'-1.0' Clayey silt, brown, wet, cohesive, soft, no sheen.
-									
1 -		B		1.5-3.0					@1.0' Same as above, 25% shell fragments.
-					SP				@1.5' Sand, fine to medium, brown, loose, wet, 25% shell fragments, no sheen.
2 -									
-					ML				@2.5' Silt, dark gray, soft, moist, some clay, fine sand, some shell fragments, no sheen.
3 -									
-		C		3.0-4.5	ML				@3.5' Sandy silt, fine to medium, gray, moist,soft, some shell fragments, no sheen.
4 -									
-		D		4.5-6.0					
5 -									
-									
6 -									
-		E		6.0-7.5					
7 -		F		7.5-9.0	GW				@7.0' Sandy gravel, fine to coarse gravel, fine to coarse sand black, saturated, loose, heavy oil stain.
-									
8 -									
-									
9 -		G		9.0-10.5	SW				@9.0' Sand, fine to coarse, dark gray, loose, moist, no sheen, 5% shell fragments.
-									
10 -									
-		H		10.5-12.0					
11 -									
-									
12 -		I		12.0-13.5					
-									
13 -									
-		J		13.5-15.0					
14 -									
-					ML				@14.5' Silt, brown, cohesive, moderate density, moist, sheen.
15 -		K		15.0-16.5					
-					SP				@15' Sand, fine to medium, dark gray, loose, moist, some coarse sand, 5% shell fragments.
16 -									
-		L		16.5-18.0					
17 -									
-									
18 -		M		18.0-19.5					
-									
19 -									
-		N		19.5-21.0					
20 -									
-									
21 -		O		21.0-22.5	CL				@22.0' Sandy clay, fine grained, gray-green, soft, cohesive very moist, sheen.
-									
22 -									TOTAL DEPTH = 22.5 ft.

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Burgess
Installation Data: Backfilled with Bentonite chips.

Boring No: EB-1A
Date: 1-22-91
Driller:West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A		0.0-1.5	SP				Sand, fine to medium, 10% shell fragments, grey, dry.
-									
1 -									@1.0' Silty clay, cohesive, dry, grey.
-		B		1.5-3.0	ML				
2 -					SP				@2.0' Gravelly sand, fine to medium sand, fine to medium gravel, 15% shell fragments, grey, no sheen, saturated.
-									
3 -		C		3.0-4.5					
-									
4 -									
-		D		4.5-6.0					
5 -									
-									
6 -		E		6.0-7.5					
-									
7 -									
-		F		7.5-9.0					
8 -									
-									@8.5' Silty clay, cohesive, moist, medium density, dark grey to black, no sheen.
9 -		G		9.0-10.5	ML				
-									
10 -									
-									
11 -		H		11.0-12.5					
-									
12 -									
-		I		12.5-14.0					@12.5' Sand, fine to medium, 15% shell fragments, dark grey to black, no sheen.
13 -					SP				
-									
14 -									
-		J		14.5-16.0					
15 -									
-									
16 -									
-									
17 -		K		17.0-18.5					
-									
18 -									@18.0' Silty sand, moist, cohesive, medium dense, wood fragments, grey-green, no sheen.
-					CL				
19 -									
-									
20 -									
-									
21 -									
-									
22 -									TOTAL DEPTH = 18.5 ft.

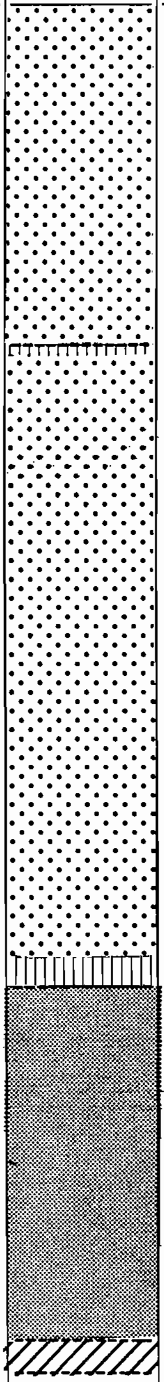
LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Burgess, J. Bryson
Installation Data: Boring backfilled with Bentonite chips.

Boring No: EB-2
Date: 1-9-91
Driller:West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1

Water Level	Time	Date	Comments:

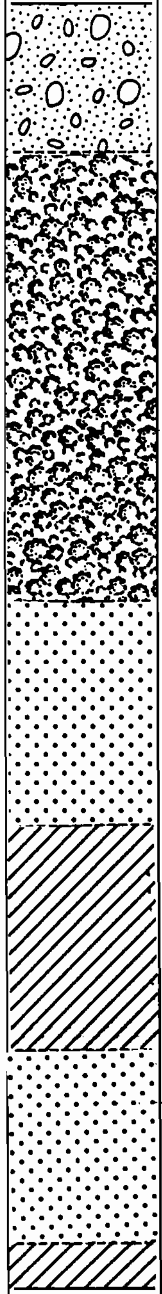
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	
0 -		A	ND	0.0-1.5	SP	Sand, fine to coarse, some fine to coarse gravel, loose moist, 10% shell fragments, grey.
-		B	ND	1.5-3.0		
1 -						
-						
2 -						
-						
3 -		C	ND	3.0-4.5		
-						
4 -						@4.0' Sand, same as above, dark grey, saturated.
-		D	ND	4.5-6.0		
5 -					ML	@5.0' Silt, moist, tan.
-					SP	@5.1' Sand, fine to coarse, some fine to coarse gravel, loose, 40% shell fragments, gray, saturated.
6 -		E	ND	6.0-7.5		
-						
7 -						
-		F	8	7.5-9.0		
8 -						
-						
9 -		G	2	9.0-10.5		
-						
10 -						
-		H	11	10.5-12.0		
11 -						
-						
12 -		I	8	12.0-13.5		
-						
13 -						
-		J	16	13.5-15.0		
14 -						
-					ML	@14.5' Clayey silt, soft, moist, trace very fine sand, grey-green.
15 -		K	5	15.0-16.5		
-					SW	@15.0' Sand,fine to coarse, loose, saturated, 40% shell fragments.
16 -						
-		L	3	16.5-18.0		
17 -						
-						
18 -		M	4	18.0-19.5		
-						
19 -						
-		N	2	19.5-21.0		
20 -						
-					CL	@20.5' Silty clay, soft, moist, cohesive, grey-green.
21 -						
-						
22 -						TOTAL DEPTH = 21 ft.

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Olympia, Washington
Logged By: G. Burgess
Installation Data: Backfill with Bentonite Chips

Boring No: EB-3
Date: 1-9-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 8"
Page No: 1 of 1

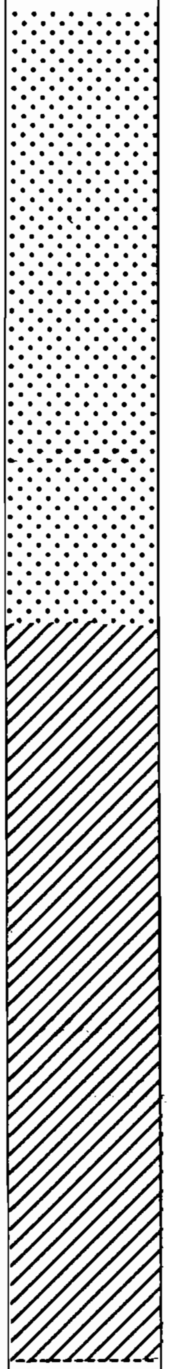
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0					GW	Gravel, fine to course, grey, dry, wood fragments			
1									
2						@2' Wood fragments, reddish brown, moist			
3		A	18	2.5-4.0					
4									
5						@5' Wood fragments, reddish brown, saturated			
6									
7		B	57	6.5-8.0		@7' Wood fragments, no soil evident, reddish brown, saturated no sheen			
8									
9						@9' Sand, fine-grained, intermixed with wood fragments (~20% sand, 80% wood), saturated, no sheen			
10		C	32	9.5-11.0					
					SP				
11									
12		D	NA	11.5-13.0					
						@12.5' Silty clay, gray-green, some fine-grained sand lenses moist, soft, no sheen			
13									
14		E	18	13.0-14.5					
					CL				
15						@15' Silty clay, gray-green, moist, soft, trace of fine sand no sheen			
		F	12	14.5-16.0					
16					SP	@16' Sand, gray, fine to medium grained, loose, saturated medium dense, ~40% shell fragments, no sheen			
		G	50	16.5-18.0					
17									
18									
19		H	15	18.0-19.5	CL	@19' Silty clay, gray-green, saturated, soft, cohesive, no sheen			
20									
21									
						Total Depth = 19.5'			
22						NOTE: Sample "I" submitted as a duplicate for sample "H".			

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Burgess/C. Generous
Installation Data: Boring backfilled with Bentonite chips.

Boring No: EB-4
Date: 1-14-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1

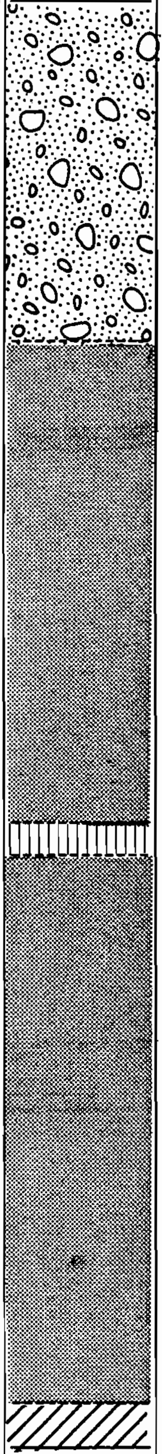
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A	ND	0.0-1.5	SP				@0-5' Sand, fine to medium, loose, some S H and small to large gravel, grey, moist, 10% shell fragments.
-									
1 -									
-		B	ND	1.5-3.0					
2 -									
-									
3 -		C	2	3.0-4.5					
-									
4 -									
-		D	3	4.5-6.0					
5 -									@5.0' Same as above, saturated, no sheen.
-									
6 -		E	75	6.0-7.5					@6.0' Same as above with sheen.
-									
7 -									
-		F	6	7.5-9.0					@7.5' Same as above, no sheen.
8 -									
-									
9 -		G	25	9.0-10.5					
-					CL				@9.5' Clay, cohesive, moist, soft, 5% shell fragments, occasional wood fragments, no sheen.
10 -									
-		H	35	10.5-12.0					
11 -									
-									
12 -		I	19	12.0-13.5					
-									
13 -									
-		J	7	13.5-15.0					
14 -									
-									
15 -		K	3	15.0-16.5					
-									
16 -									
-		L	76	16.5-18.0					
17 -									
-									
18 -		M	89	18.0-19.5					
-									
19 -									
-		N	60	19.5-21.0					
20 -					CL				@20.0' Clay, moist, cohesive, 1-5% shell fragments, gray-green, sheen.
-									
21 -									
-									
22 -									TOTAL DEPTH = 21 ft.

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Olympia, WA
Logged By: G. Burgess/J. Bryson
Installation Data: Backfilled w/Bentonite chips to surface.

Boring No: EB-5
Date: 1-8-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 8"
Page No: 1 of 1

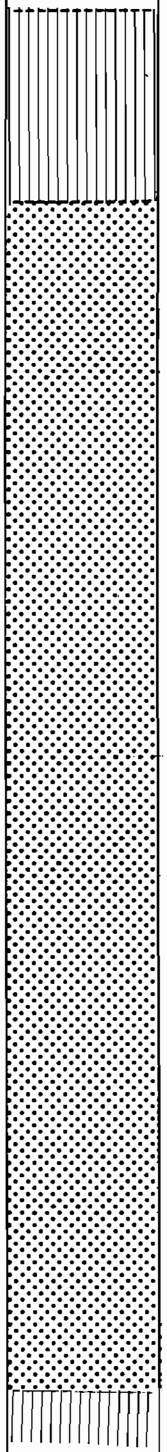
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -									
-									@0-5' Sand gravel, grey brown, fine to coarse gravel, some
1 -		A		0.0-2.0	GW				cobbles, fine to medium gravel, sand, moist, medium dense.
-									
2 -									
-									
3 -									
-									
4 -									
-									
5 -			8						
-					SW				@5' Sand, grey, fine to coarse grained, some gravel & cobbles,
6 -									trace of silt, saturated, medium dense.
-									
7 -		B	--	6.5-8.0	SW				As above, some shell fragments.
-									
8 -									
-									
9 -									
-									
10 -		C	1	9.5-11.0	SW				As above, no gravel or cobbles.
-									
11 -									
-									
12 -		D	11	11.5-13.0					
-					ML				@ 12.5' Silt, saturated, shell fragments, brown sheen.
13 -									As above, no sheen, no silt layer.
-					SW				@ 13' Sand, grey, fine to coarse, same gravel & cobbles,
14 -			--						trace silt, saturated, no sheen.
-									
15 -			1		SW				@ 15' Sand, as above, sheen.
-									
16 -									
-									
17 -			17		SW				As above, sheen.
-									
18 -									
-									
19 -			35		SW				As above, sheen.
-									
20 -									
21 -		E	3	20-21.5	SW				As above, sheen.
22 -			ND						
23 -					CL				@23.0 Silty clay, grey, some shell fragments, moist, soft,
24 -									cohesive. TOTAL DEPTH = 24 ft.

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Olympia, WA
Logged By: G. Burgess/J. Bryson
Installation Data: Completed,
Backfilled w/Bentonite chips
to surface.

Boring No: EB-6
Date: 1-8-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 8"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A							
-				0 to 9"					
1 -					ML	Gravelly silt: fine to coarse gravel, moist, dark brown to black,			
-						Peat (organic).			
2 -						Appearance--fill.			
3 -					SP	Sand: fine to medium sand, slightly moist, 10% shell fragments,			
-						grey, medium dense.			
4 -		B		3.0-4.5					
5 -		C	8	4.5-6.0		@5' As above, oily sheen, saturated.			
-				from Ring					
6 -									
7 -			10		SP	Sand: as above, no sheen.			
8 -									
9 -		D	18	Ring-Jar	SP	Sand: as above, sheen.			
10 -									
11 -			6		SP	Sand: as above, no sheen.			
12 -									
13 -			ND		SP	Sand: as above, approximately 30% shell fragments.			
14 -									
15 -			5		SP	Sand: as above.			
16 -									
17 -			3		SP	Sand: as above, approximately 5% shell fragments.			
18 -									
19 -		E	20	18.5-20.0					
20 -									
-		F	23	20.0-21.5					
21 -					ML	@ 21.5' Clay silt: moist, cohesive, soft, greenish-grey,			
-						brown oily sheen.			
22 -						TOTAL DEPTH = 22.5 ft.			

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039

Client: McFarland Cascade

Location: Port of Olympia, WA

Logged By: G. Burgess/J. Martin

Installation Data: Boring backfilled with Bentonite chips.

Boring No: EB-7

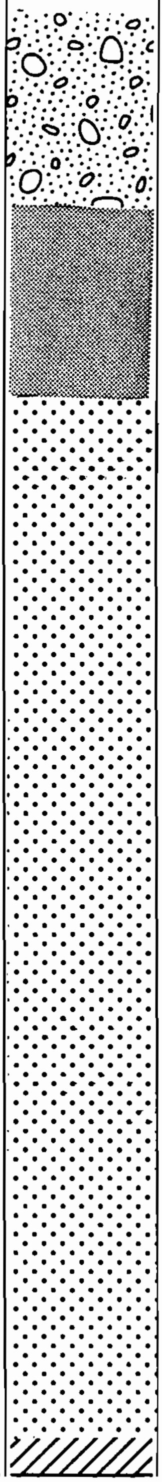
Date: 1-17-91

Driller:West Hazmat

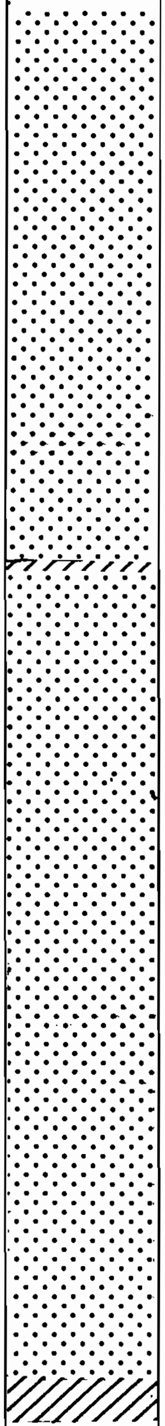
Drilling Method: HSA

Hole Diameter: 6 3/4"

Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A	ND	0.0-1.5	GW	Sandy gravel, fine to coarse gravel, fine to medium sand, brown, moist, no sheen.			
-									
1 -									
-		B	ND	1.5-3.0					
2 -									
-									
3 -		C	16	3.0-4.5	SW	@3.0' Gravelly sand, fine to coarse sand, fine to coarse gravel, wood chips, brown, dry, no sheen.			
-									
4 -									
-		D	17	4.5-6.0					
5 -									
-									
6 -		E	11	6.0-7.5	SP	@6.0' Gravelly sand, fine to medium sand, fine to medium gravel, wood fragments, moist, brown, saturated, no sheen.			
-									
7 -									
-		F	110	7.5-9.0					
8 -									
-									
9 -		G	220	9.0-10.5	SP	@9.0' Gravelly sand, fine sand, fine to medium gravel, black, sheen (9.0-9.5 Bentonite).			
-									
10 -									
-		H	240	10.5-12.0					
11 -									
-									
12 -		I	350	12.0-13.5		@12.0' Wood, some sand and gravel, black, sheen.			
-									
13 -									
-		J	300	13.5-15.0					
14 -									
-					SP	@14.5' Sand,fine to medium,5% shell fragments,gray,wet,no sheen.			
15 -		K	240	15.0-16.5					
-									
16 -		L	200	16.5-18.0					
-									
17 -									
-									
18 -		M	185	18.0-19.5					
-									
19 -									
-		N	NA	19.5-21.0					TOTAL DEPTH = 25 ft.
20 -									
-									
21 -		O	510	21.0-22.5					
-									
22 -		P	670	22.5-24.0	CL	@22.0' Silty clay, moist, cohesive, soft, gray-green.			

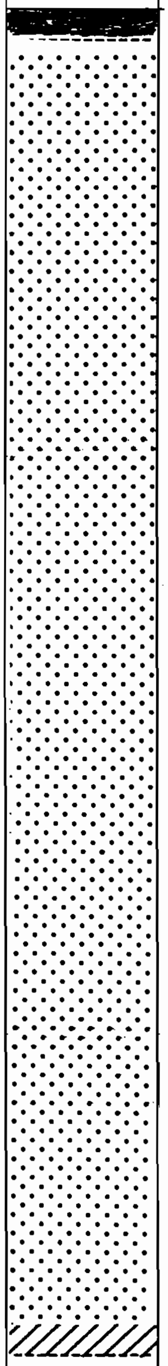
LOG OF EXPLORATORY BORING	Project No: 4-90-5039 Client: McFarland Cascade Location: Port of Olympia, WA Logged By: G. Burgess/J. Martin	Boring No: EB-8 Date: 1-19-91 Driller:West Hazmat Drilling Method: HSA Hole Diameter: 6 3/4" Page No: 1 of 1
Field location of boring:	Installation Data: Boring backfilled with Bentonite chips.	

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0		A	6	0.0-1.5	SP	Sand, gravel, wood, fill, moist, gray-brown, no sheen.			
1									
-		B		1.5-3.0		@1.5' Gravelly sand, fine to medium, fine to coarse gravel, dry, brown, no sheen.			
2									
3		C	115	3.0-4.5					
4									
-		D	220	4.5-6.0		@4.5' Gravelly sand, fine to medium, fine to medium gravel, 5% shell fragments, very moist, grey, no sheen, saturated at 6.0 feet.			
5									
6		E	1300	6.0-7.5					
7									
-		F	90	7.5-9.0					
8									
-					CL	@8.8' Silty clay, moist, cohesive, medium density, grey.			
9		G	950	9.0-10.5	SP	@9.0' Gravelly sand, fine to medium sand, fine to medium gravel, grey, sheen, 5% shell fragments.			
10									
-		H	1500	10.5-12.0					
11									
12									
-		I	1020	12.5-14.0					
13									
14		J	980	14.0-15.5					
15									
-		K	1003	15.5-17.0					
16									
17									
18		L	1400	18.0-19.5					
19									
20		M	960	20.0-21.5					
21									
-		N	350	21.5-23.0		@21.4' Sandy clay, cohesive, medium density, soft, grey-green.			
22					CL				

LOG OF
EXPLORATORY BORING

Field location of boring:

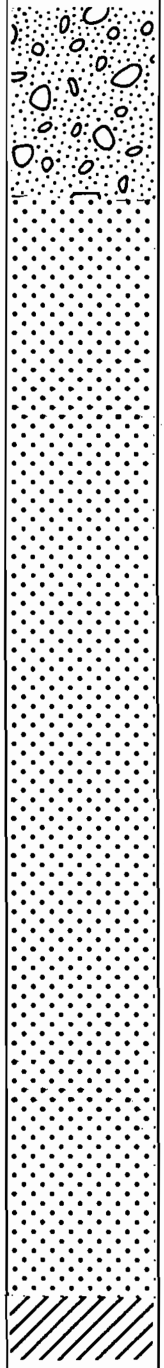
Project No: 4-90-5039
Boring No: EB-9
Date: 1-22-91
Client: McFarland Cascade
Driller:West Hazmat
Location: Port of Olympia, WA
Drilling Method: HSA
Hole Diameter: 6 3/4"
Logged By: G. Burgess
Page No: 1 of 1
Installation Data: Boring backfilled with Bentonite chips.

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A		0.0-1.5		ASPHALT.			
-					SP	@0.25' Gravelly sand, fine to medium sand, fine to coarse gravel, 5% shell fragments, brown, dry, no sheen, saturated @4.0'.			
1 -									
-		B		1.5-3.0					
2 -									
-									
3 -		C		3.0-4.5					
-									
4 -					SP	@4.0' Gravelly sand, same as above, saturated.			
-		D		4.5-6.0	SP	@4.5'to 20.5' Same as above, with sheen.			
5 -									
-									
6 -		E		6.0-7.5					
-									
7 -									
-		F		7.5-9.0					
8 -									
-									
9 -		G		9.0-10.5					
-									
10 -									
-									
11 -		H		11.0-12.5					
-									
12 -									
-									
13 -		I		13.0-14.5					
-									
14 -									
-		J		14.5-16.0					
15 -									
-									
16 -		K		16.0-17.5					
-									
17 -									
-		L		17.5-19.0					
18 -									
-									
19 -									
-		M		19.5-21.0					
20 -									
-					CL	@20.5' Silty clay,cohesive,soft,moist,medium density,grey-green.			
21 -									
-									
22 -						TOTAL DEPTH = 21 ft.			

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Boring No: EB-10
Date: 1-22-91
Client: McFarland Cascade
Driller:West Hazmat
Location: Port of Olympia, WA
Drilling Method: HSA
Hole Diameter: 6 3/4"
Logged By: G. Burgess
Page No: 1 of 1
Installation Data: Boring backfilled with Bentonite chips.

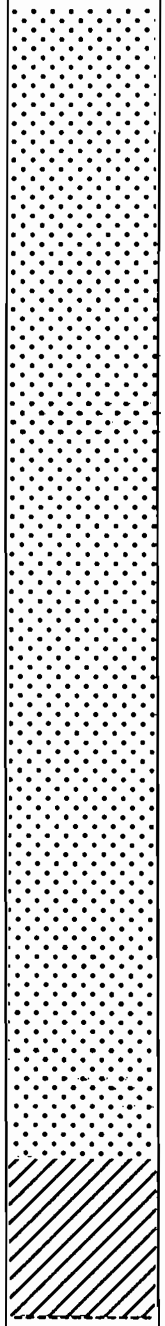
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A		0.0-1.5	GW				Sandy gravel, fine to medium gravel, fine to medium sand, brown, moist, no sheen.
-									
1 -									
-		B		1.5-3.0					
2 -									
-									
3 -		C		3.0-4.5	SP				@3.0' Gravelly sand, fine to medium sand, fine to medium gravel, 1% shell fragments, grey, wet, no sheen, saturated @3.5'.
-									
4 -									
-		D		4.5-6.0					
5 -									
-									
6 -		E		6.0-7.5					6.0' to 17.5' Same as above with sheen.
-									
7 -									
-		F		7.5-9.0					
8 -									
-									
9 -		G		9.0-10.5					
-									
10 -									
-		H		10.5-12.0					
11 -									
-									
12 -									
-		I		12.5-14.0					
13 -									
-									
14 -		J		14.0-15.5					
-									
15 -									
-		K		15.5-17.0					
16 -									
-									
17 -									
-		L		17.5-19.0	SP				@17.5' Sand, fine to medium, 1 - 5% shell fragments, grey, sheen.
18 -									
-									
19 -									
-		M		19.5-21.0					
20 -									@20.0' Sandy clay,cohesive,soft,moist,medium density,grey-green.
-					CL				
21 -									
-									
22 -									TOTAL DEPTH = 21.0 ft.

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Burgess/J. Martin
Installation Data: Backfilled with Bentonite chips.

Boring No: EB-11
Date: 1-18-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1



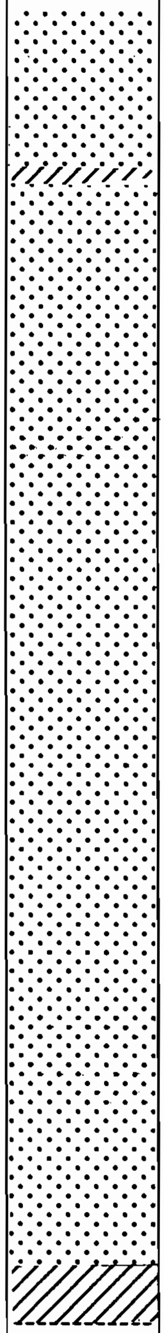
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A	0	0-1.5	SP				Gravelly sand: fine to medium sand, fine to medium gravel, dry, brown, no sheen.
1 -		B	1	1.5-3.0					@1' Gravelly sand: fine to medium sand, fine to medium gravel, 1% shell fragments, grey, dry, no sheen.
2 -									
3 -		C	3	3.0-4.5					
4 -		D	2	4.5-6.0					
5 -									
6 -		E	2	6.0-7.5	SP				@6' Gravelly sand: fine to medium sand, fine to medium gravel, 1% shell fragments, grey, saturated, no sheen.
7 -		F	10	7.5-9.0					
8 -									
9 -		G	4	9.0-10.5					
10 -		H	110	10.5-12.0					
11 -									
12 -		I		12.0-13.5					
13 -									
14 -		J	6.5	14.0-15.5	SP				@14' Gravelly sand: fine to medium sand, fine to medium gravel, 1% shell fragments, grey, dry, no sheen.
15 -		K	45	15.5-17.0					
16 -									
17 -		L	31	17.5-19.0					
18 -									
19 -		M		19.0-20.5	CL				@18.5' Sandy clay: very fine sand, moist, soft, cohesive, medium density, grey-green.
20 -									TOTAL DEPTH = 20.5 ft.
21 -									
22 -									

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Burgess/J. Martin
Installation Data: Backfilled with Bentonite chips.

Boring No: EB-12
Date: 1-19-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A	1	0-1.5	SP	Gravelly sand w/silt: topsoil, organics, fine to medium sand,			
-						fine to medium sand, fine to medium gravel, moist, brown.			
1 -		B	5.2	1.5-3.0					
-									
2 -									
-					CL	@2.6' Clay: cohesive, moist, soft, grey.			
3 -		C	9.1	3.0-4.5	SP	@2.7' Gravelly sand: fine to medium sand, fine to medium gravel,			
-						5% shell fragments, wet, grey, no sheen, saturated @ 3 feet.			
4 -		D	8	4.5-6.0					
-									
5 -									
-									
6 -		E	4	6.0-7.5					
-									
7 -		F	18	7.5-9.0	SP	@7.5' Gravelly silty sand: fine to medium sand, fine to medium			
-						gravel, slightly cohesive, grey, wet, no sheen.			
8 -									
-									
9 -		G	17	9.0-10.5					
-									
10 -									
-									
11 -		H	11	11.0-12.5					
-									
12 -		I	14	12.5-14.0					
-									
13 -									
-									
14 -		J	6.0	14.5-16.0	SP	@14' Gravelly sand: fine to medium sand, fine to medium gravel,			
-						wood fragments, wet, black, no sheen.			
15 -									
-									
16 -		K	9.5	16.0-17.5					
-									
17 -		L		17.5-19.0	SP	@17' Silty sand: fine sand, moist, grey, no sheen.			
-						@17.5' Gravelly sand: fine to medium sand, fine to medium gravel,			
18 -						gravel, trace silt, black, wood fragments, wet.			
-									
19 -		M		19.0-20.5					
-						@19.5' Silty clay: cohesive, moist, soft, medium density,			
20 -					CL	grey-green.			
-						TOTAL DEPTH = 20.5 ft.			
21 -									
-									
22 -									

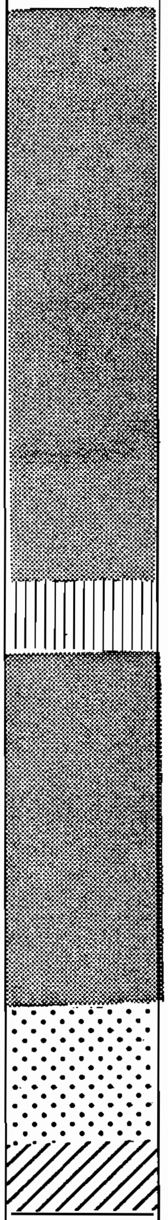
LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Stuesse
Installation Data: Screen: 18.5'-1';
Blank: 1'-0'; Sand: 18.5'-0.5';
Bentonite: 0.5'-0'; Cement: 0-0.5'

Boring No: EW-1
Date: 1-11-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 10 3/4"
Page No: 1 of 1

Water Level	Time	Date	Comments:



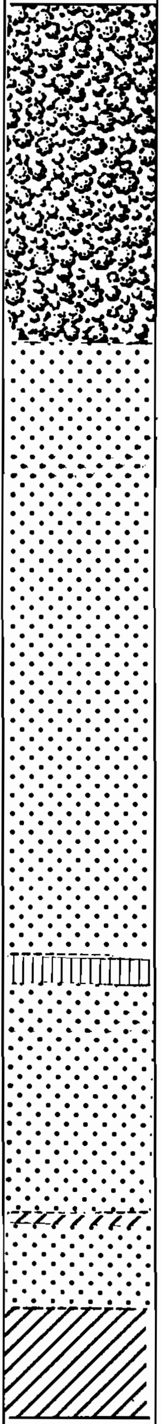
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	
0 -		A		0.0-1.5	SW	Sand: fine to coarse, very moist, loose,
-						shell fragments 1-10 cm, grey-black.
1 -		B		1.5-3.0		
-						
2 -						
-						
3 -		C		3.0-4.5		
-						
4 -		D		4.5-6.0		
-						
5 -						@5' Sand: fine to coarse, brown to gray, moist to saturated,
-					SW	sheen.
6 -		E		6.0-7.5		
-						
7 -		F		7.5-9.0		
-						
8 -						
-						
9 -		G		9.0-10.5	ML	@9' Silt: cohesive, dark grey, saturated.
-						@9.1' Sand: fine to coarse, brown to grey, loose,
10 -		H		10.5-12.0	SW	saturated, sheen.
-						
11 -						
-						
12 -		I		12.0-13.5		
-						
13 -		J		13.5-15.0		
-						
14 -						
-						
15 -		K		15.0-16.5		
-						
16 -		L		16.5-18.0	SP	@15.5' Sand: fine to medium, 10% shell fragments, saturated,
-						sheen.
17 -						@17.25' Silty clay: soft to firm, saturated, grey-green.
-						
18 -		M		18.0-19.5	CL	
-						TOTAL DEPTH = 18.5'
19 -						
-						
20 -						
-						
21 -						
-						
22 -						

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Burgess/J. Martin
Installation Data: Screen:
20.5 to 1.65; Blank: 1.65-0;
Sand: 20' to 1.0'; Bentonite: 1'-0; Concrete: 0-+0.5'

Boring No: EW-2
Date: 1-16-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 10 3/4"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -									Fill sand pad for Rrg.
-									@0-5' Concrete debris removed and backfilled with fill sand for rig access.
1 -									
-									
2 -									
-									
3 -									
-									
4 -									
-									
5 -		A	NA	5.0-6.5	SP				@ 5' Sand: fine to medium, trace fine gravel, 5% shell fragments, dark grey to black, saturated, sheen.
-									
6 -		B	NA	6.5-8.0					
-									
7 -									
-									
8 -		C	31	8.0-9.0	SP				@ 8' Gravelly sand: fine to medium sand, fine to coarse gravel, wood fragments, black, oily, loose.
-									
9 -		D	141	9.0-10.0					
-									
10 -		E	38	10.0-11.5	SP				@ 10' Gravelly sand: fine to medium sand, fine gravel, loose, 5% shell fragments, black, saturated, sheen.
-									
11 -		F	26	11.5-13.0					
-									
12 -									
-									
13 -		G	30	13.0-14.5					
-									
14 -		H	120	14.5-16.0					
-					ML				@ 14.5' Silty clay: moist, cohesive, soft, medium density, grey.
15 -					SP				@ 15' Gravelly sand: fine to medium sand, fine gravel, loose, 5% shell fragments, black, sheen, saturated.
-									
16 -		I	75	16.0-17.5					@ 16' Sand: fine to medium, 5% shell fragments,
-					SP				black, loose, sheen.
17 -		J	142	17.5-19.0					
-									
18 -									
-					CL				@ 18.5' Silty clay: Grey, moist, cohesive.
19 -		K	50	19.0-20.5					@ 18.6' Sand: fine to medium, 5% shell fragments,
-					SP				black, loose, sheen.
20 -									@ 20' Clay: moist, soft, cohesive, medium density, grey-green.
-					CL				
21 -									
-									TOTAL DEPTH 21.5 ft.
22 -									

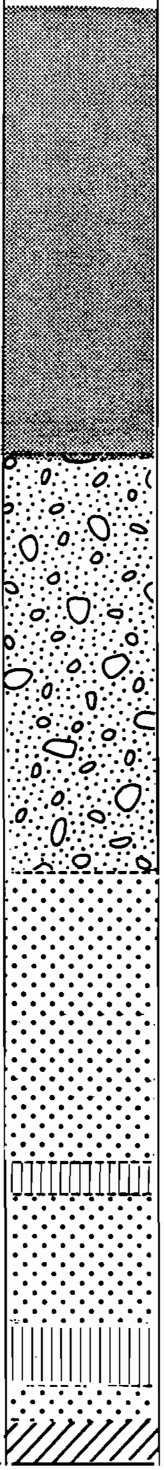
LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Olympia, WA
Logged By: G. Burgess/C. Generous
Installation Data:Screen: 22.5'-2.5'
Blank: 2.5'-0'; Sand: 22.5'-2';
Bentonite: 2'-1'; Concrete: 1'-0'

Boring No: EW-3
Date: 1-15-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 8'
Page No: 1 of 1

Water Level	Time	Date	Comments: On 1-24-91 a 4" well was installed to replaced the 2" well installed on 1-15-91.

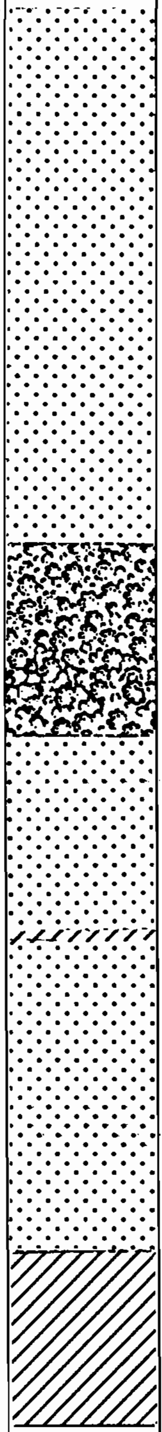
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	
0 -						Gravelly sand, fine to coarse grained, small to large gravel,
-					SW	brown, loose, moist, no sheen.
1 -		A	3 ppm	0.0-1.5		@ .5' Gravel, small to large gravel, fine to coarse sand.
-						
2 -						As above.
-						
3 -						
-						
4 -						As above.
-						
5 -						As above.
-						
6 -					SW	@ 6' Gravelly sand, fine to coarse grained sand, small to large
-						gravel, brown, loose, moist, shell fragments, no sheen.
7 -		B	10 ppm	6.0-7.5		@ 7' Gravel, fine to coarse with fine to coarse sand, loose, moist
-						
8 -					GW	
-						
9 -						Saturated @ 9', heavey sheen.
-						
10 -						
-						@ 10.5' Sandy gravel, fine grained sand, fine to coarse gravel,
11 -		C	60 ppm	10.5-12.0	GW	silt, saturated, loose, grey, heavy sheen.
-						
12 -						
-						
13 -		D	120 ppm	12.0-13.5		
-					SP	@ 13.5' Sand, fine grained, grey to dark grey, wet, loose,
14 -		E	100 ppm	13.5-15.0		medium to coarse sand, shell fragments, sheen.
-						
15 -					SP	@ 15' Sand, fine to medium grained, grey to dark grey,
-						some coarse sand, wet, loose, shell fragments, heavy sheen,
16 -		F	120 ppm	15.0-16.5		
-						
17 -		G	130 ppm	16.5-18.0	SP	@ 17' Silty sand, fine grained, brown, medium dense, wet,
-						heavy sheen. @ 17.5' Sand as at 15' with sheen.
18 -					ML	@ 18' Silt, brown, soft, cohesive, some clay, medium dense,
-						no sheen. @ 18.5' Sand with shell fragments, no sheen.
19 -		H	20 ppm	18.0-19.5	SP	@18.5' Sand with shell fragments, no sheen.
-						
20 -		I	70 ppm	19.5-21.0		@ 20.5' Silt, brown, soft, cohesive, some clay, medium dense,
-						no sheen.
21 -					ML	@ 21.5' Sand fine to medium grained, grey to dark grey, wet,
-					SP	loose, approximately 10% shell fragments, sheen.
22 -		J	140 ppm	21.0-22.5	CL	@ 22' Silty, clay, brown, soft, moist, cohesive, no sheen.

TD = 22.5'

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039	Boring No: EW-4
Client: McFarland Cascade	Date: 1-11-91
Location: Port of Olympia, WA	Driller: West Hazmat
Logged By: G. Burgess/J. Martin	Drilling Method: HSA
Installation Data: Screen: 20'-2.5'	Hole Diameter: 10 3/4"
Blank: 2.5-0; Sand: 19.0'-1.5';	Page No: 1 of 1
Bentonite: 1.5'-0'; Concrete: 0-+0.5'	

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A	2.5	0-1.5	SP				Gravelly sand: fine to medium sand, fine to medium gravel moist, brown.
1 -		B	0.7	1.5-3.0					
2 -									
3 -		C	421	3.0-4.5	SP				@ 3.0' Sand as above, with wood chips.
4 -		D	280	4.5-6.0	SP				@ 4.5' Gravelly sand: fine to medium sand, fine to medium gravel, wet, brown, no sheen, saturated at 5 ft.
5 -									
6 -		E	330	6.0-7.5	SP				@ 6' Same as above with sheen.
7 -									
8 -		F	238	8.0-9.5					@ 8' Fill: clay with sand & gravel, wood chips, yellow, wet.
9 -		G	330	9.5-11.0					@ 9.5' Fill: wood, some sand & gravel, wet, brown.
10 -									
11 -		H	570	11-12.5	SP				@ 11' Sand: fine to medium, wet, 5% shell fragments, grey-black sheen.
12 -									
13 -		I	351	13-14.5					
14 -		J	683	14.5-16.0	CL SP				@ 14' Silty clay: moist, cohesive, grey-green. @ 14.2' Sand: fine to medium, wet, 5% shell fragments, grey-black, sheen. @ 14.5' Gravelly sand: fine to medium sand, fine to medium gravel, wet, 5% shell fragments, grey.
15 -									
16 -		K	293	16.0-17.5					
17 -									
18 -		L	281	18-19.5					
19 -					---------- CL				@ 19.0' Sand clay: moist, cohesive, medium density, grey-green.
20 -									
21 -									TOTAL DEPTH = 21.5 FT.
22 -									

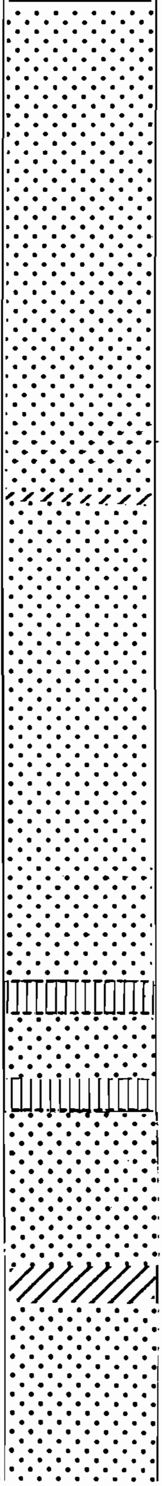
LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Burgess/C. Generous
Installation Data: 4"
Screen: 25.5'-3'; Blank: 3'-0';
Sand: 24.5'-2'; Bentonite: 2'-0'; Concrete: 0'-+0.5'

Boring No: EW-5
Date: 1-16-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 10 3/4"
Page No: 1 of 2

Water Level	Time	Date	Comments:

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	
0 -		A	3	0-1.5	SP	Gravelly sand: fine to medium sand, fine to coarse gravel, moist,
-						dark brown, no sheen.
1 -		B	3			
-				1.5-3		
2 -						
-						
3 -		C	3	3-4.5		
-						
4 -		D	20		SP	@4' Gravelly sand: medium to coarse sand, fine to coarse gravel,
-				4.5-6.0		grey, loose, very moist, wood fragments, no sheen, saturated @4.5'
5 -					SP	@5.5' Sand: fine to medium sand, some small gravel, 5-10% shell
-						fragments, dark grey.
6 -		E	20	6.0-7.5	SP	@6' Same as above, with wood fragments and sheen.
-						
7 -		F	54			@7.5' Sand: fine to medium sand, fine to coarse gravel,
-				7.5-8.0	CL	1" silty clay layers @7.6', dark grey, saturated, no sheen.
8 -		G	128	8.0-9.5		
-						
9 -		H			SP	@9.5' Sand: fine to medium, 5-15 cm shell fragments, grey,
-				9.5-11		saturated, no sheen.
10 -						
-						
11 -		I	4	11-12.5		
-					SP	@11.5' Sand: same as above, some fine to medium gravel.
12 -		J	12			
-				12.5-14	SP	@12.5' Sand: same as above, no gravel.
13 -						
-						
14 -		K	7	14-15.5		
-						@14.5' Sand: same as above, sheen.
15 -		L	12		ML	@15' Sandy silt: fine grained, grey/green, cohesive, very moist,
-				15.5-17	SP	soft, no sheen.
16 -						@15.5 Sand: fine to medium, 5-15cm shell fragments, no sheen.
-						@16.5' Clayey silt: grey/green,cohesive,soft,no sheen, very moist.
17 -		M		17-18.5	ML	@17' Sand: fine to medium, shell fragments, loose, wet, no sheen.
-					SP	@17.5 Sand: same as above, less shell fragments.
18 -		N	1			
-				18.5-20		
19 -						
-					CL	@19.5' Silty clay, stiff, cohesive, moist, grey/green, no sheen.
20 -		O		20-21.5	SP	@19.7' Sand: fine to medium, shell fragments, loose,wet, no sheen.
-						
21 -		P				@21' Sand: fine to medium, loose, very moist, grey/green, no sheen
-				21.5-23		trace of silt.
22 -						@22.5' Sand: same as above with sheen.

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Burgess/C. Generous
Installation Data: See pg. 1

Boring No: EW-5
Date: 1-16-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 10 3/4"
Page No: 2 of 2

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
23 -	░								@23' Sand: same as above, increase in shell fragments.
-	░				SP				
24 -	░	Q		23-24.5					
-	░								@24.5' Silty clay: soft, very moist, no sheen, grey/green.
25 -	▨	R		24.5-26					
-	▨				CL				
26 -	▨	S	2	26-27.5					
-	▨								
27 -	▨								
-	▨								TOTAL DEPTH = 27.5 ft.
28 -									
-									
29 -									
-									
30 -									
-									
31 -									
-									
32 -									
-									
33 -									
-									
34 -									
-									
35 -									
-									
36 -									
-									
37 -									
-									
38 -									
-									
39 -									
-									
40 -									
-									
41 -									
-									
42 -									
-									
43 -									
-									
44 -									
-									
45 -									

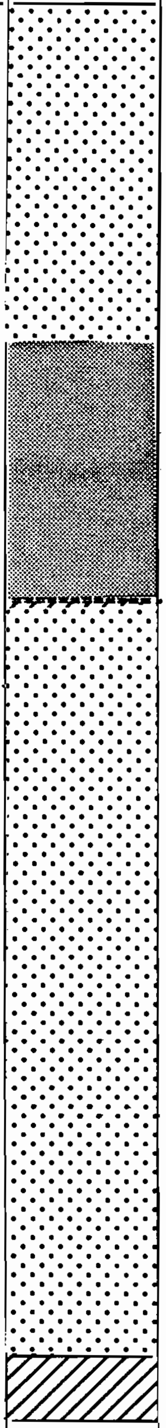
LOG OF
EXPLORATORY BORING

?ield location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia, WA
Logged By: G. Burgess
Installation Data: See comments.

Boring No: EW-6
Date: 1-21-91
Driller:West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1

Water Level	Time	Date	Comments: 2" screen: 21.5'-1.5'; blank : 1.5'-0'; sand: 20.5'-1.0'; bentonite: 1.0'-0'; concrete: 0'-+0.5'.

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	
0 -		A		0.0'-1.5'	SP	Gravelly sand: fine to medium sand, fine gravel, moist, organics, topsoil, black, no sheen.
-						
1 -						
-		B		1.5'-3.0'	SP	@1.5' Gravelly sand: fine to medium sand, fine to medium gravel, 5% shell fragments, wet, gray, no sheen.
2 -						
-						
3 -		C		3.0'-4.5'	SP	@3.0' Gravelly sand: same as above, saturated, no sheen.
-						
4 -						
-						
5 -		D		5.0'-6.5'	SW	@5.0' Sand: fine to coarse, 5% shell fragments, saturated, grey, no sheen.
-						
6 -						
-		E		6.5'-8.0'		
7 -						
-						
8 -						
-		F		8.5'-10.0'		
9 -					CL	@9.0' Clayey silt: moist, cohesive, grey, no sheen.
-					SP	@9.1' Gravelly sand: fine to medium sand, fine to medium gravel, wood fragments, brown-black, no sheen.
10 -		G		10.0'-11.5'		
-						
11 -						
-		H		11.5'-13.0'	SP	@11.5' Gravelly sand: fine to medium sand, fine gravel, 5% shell fragments, saturated, grey, no sheen.
12 -						
-						
13 -		I		13.0'-14.5'		
-						
14 -						
-		J		14.5'-16.0'	SP	@14.5' Gravelly sand: same as above with sheen.
15 -						
-						
16 -		K		16.0'-17.5'	SP	@16.0' Gravelly sand: same as above, no sheen.
-						
17 -						
-		L		17.5'-19.0'		
18 -						
-						
19 -						
-		M		19.5'-21.0'		
20 -						
-					CL	@20.5' Clay:trace silt,moist,cohesive,medium density,grey-green.
21 -						
-						
22 -						TOTAL DEPTH = 21.5'

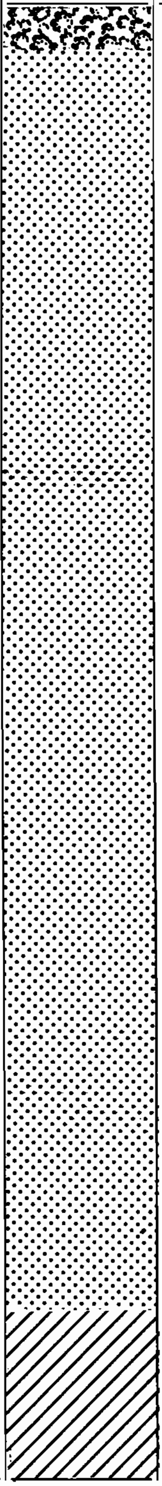
LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Olympia, WA
Logged By: G. Burgess
Installation Data: Screen: 20.5-3'
Blank: 3-0', Sand: 20.5-2'
Bentonite: 2-1.5', Concrete: 1.5-0'

Boring No: EW-7
Date: 1-21-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1

Water Level	Time	Date	Comments:

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	
0 -						
-						0-3" FILL: Fine to coarse gravel.
1 -		A	1	3"-1.5'	SP	@3", Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, dry, no sheen.
-						
2 -		B	8	1.5'-3.0'	SP	@1.5', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, dry, no sheen.
-						
3 -						
-		C	1	3.0'-4.5'	SP	@ 3.0', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, dry, 2% shell fragments, no sheen.
4 -						
-		D	1	4.5'-6.0'	SP	@4.5', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, saturated at 5'bgs, 2% shell fragments, no sheen.
5 -						
-						
6 -						
-		E	16	6.5'-8.0'	SP	@6.5', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, saturated, 2% shell fragments, light sheen.
7 -						
-						
8 -		F	88	8.0'-9.5'	SP	@'8.0', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, saturated, 2% shell fragments, sheen.
-						
9 -						
-		G	182	9.5'-11.0'	SP	@9.5', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, saturated, 5% shell fragments, sheen.
10 -						
-						
11 -		H	99	11.0'-12.5'	SP	@11', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, saturated, 5% shell fragments, no sheen.
-						
12 -						
-						
13 -		I	95	13.0'-14.5'	SP	@13.0', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, saturated, 5% shell fragments, light sheen.
-						
14 -						
-		J	120	14.5'-16.0'	SP	@14.5', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, saturated, 5% shell fragments, sheen.
15 -						
-						
16 -		K	120	16.0'-17.5'		
-						
17 -						
-		L	48	17.5'-19.0'	SP	@17.5', Gravelly sand: fine to medium sand, fine to coarse gravel, light grey, saturated, 5% shell fragments, no sheen.
18 -						
-						
19 -		M		19.0'-20.0'	SP	@19.0', Gravelly sand, fine to medium sand, fine to coarse gravel, light grey, saturated, 5% shell fragments, sheen.
-						
20 -						
-				20.0'-20.5'	CL	@20.0', silty clay: grey-green, moist, cohesive, med. density.
21 -						
-						
22 -						TOTAL DEPTH 22.5 ft.

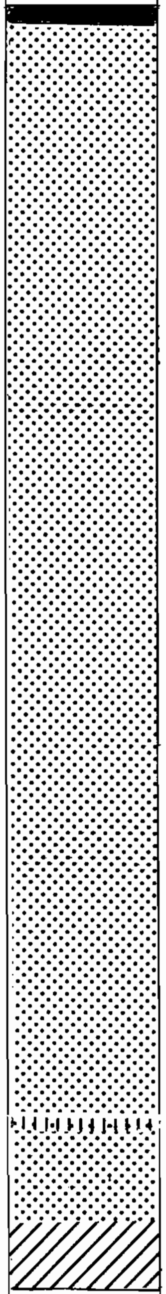
LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Olympia, WA
Logged By: G. Burgess/J. Martin
Installation Data: Screen: 20-2.5′
Blank: 2.5-0, Sand: 19.5-1.5
Bentonite: 1.5-0′, Concrete: 0-+0.5′

Boring No: EW-8
Date: 1-18-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1

Water Level	Time	Date	Comments:
			-

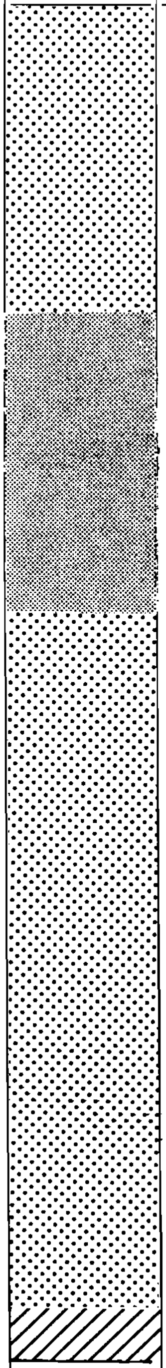
Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	
0 -						0-4" concrete.
-						
1 -		A	3	4"-1.5′	SP	@4" Gravelly sand: fine to medium sand, fine to coarse gravel, dry, grey, 1-5% shell fragments, no sheen.
-						
2 -						
-		B	92?			Refusal at 3.5′ bgl.
3 -						
-		C	84		SP	@3.5′ Gravelly sand: fine to medium sand, fine to coarse gravel, dry, 1-5% shell fragments, grey, no sheen.
4 -						
-		D	48	4.5-6.0′	SP	@4.5′ Gravelly sand: fine to medium sand, fine to coarse gravel, moist, grey, 1-5% shell fragments, no sheen.
5 -						
-						
6 -		E	220	6.0-7.5′	SP	@6.0′ Gravelly sand: fine to medium sand, fine to coarse gravel, saturated, grey, 1-5% shell fragments, possible sheen?
-						
7 -						
-		F	1300?	7.5-9.0′	SP	@7.5′ Gravelly sand: fine to medium sand, fine to coarse gravel, saturated, grey, 1-5% shell fragments, no apparent sheen?
8 -						
-						
9 -						
-		G	200	9.5-11.0′		
10 -						
-						
11 -		H	430	11.0-12.5′		
-						
12 -						
-		I	840	12.5-14.0′		
13 -						
-						
14 -		J	775	14.0-15.5′	SP	@14.0′ Sand: fine to medium, trace gravel, saturated, grey, 1-5% shell fragments, light sheen.
-						
15 -						
-						
16 -		K	440	16.0-17.4′	SP	@16.0′ Sand: fine to medium, trace gravel, grey, 1-5% shell fragments, saturated, no sheen.
-						
17 -						
-		L	1400	17.4-17.5′	SM	@17.4′ Silty sand: fine to medium sand, wet, dense, grey, no sheen
18 -						
-		M	200	17.5-19.0′	SP	@17.5′ Sand: fine to medium, saturated, grey, 1-5% shell fragments no sheen.
19 -						
-					CL	@19.0′ Silty clay: cohesive, moist, grey-green, medium density.
20 -						
-						TOTAL DEPTH 20.0 ft.
21 -						
-						
22 -						

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Olympia, WA
Logged By: G. Burgess
Installation Data: 20.8'-3.3'
Blank: 3.3'-0', Sand: 20'-2'
Bentonite: 2.0'-0.5', Concrete: 0.5'-+0.5'

Boring No: EW-9
Date: 1-21-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -		A	0	0.0'-1.5'	SP				@0.0'-1.5' Gravelly sand: fine to medium sand, fine to coarse grav brown, dry: fill.
-									
1 -									
-		B		1.5'-3.0'					
2 -									
-									
3 -		C	60	3.0'-4.5'	SP				@3.0' Sand: fine to medium, 10% shell fragments, brown, dry, no sheen.
-									
4 -									
-		D	70	4.5'-6.0'	SW				@4.5 Sand: fine to coarse, 5% shell fragments, wet, brown, no sheen.
5 -									
-									
6 -		E	90	6.0'-7.5'					
-									
7 -									
-		F		7.5'-9.0'					
8 -									
-									
9 -		G		9.0'-10.5'	SP				@9.0' Sand: fine to medium, 5% shell fragments, grey, wet, sheen.
-									
10 -									
-									
11 -		H	80	11.0'-12.5'					
-									
12 -									
-		I		12.5'-14.0'					
13 -									
-									
14 -		J		14.0'-15.5'					
-									
15 -		K		15.5'-16.0'					
-									
16 -		L		16.0'-17.5'					
-									
17 -									
-		M		17.5'-20.0'	SP				@17.5' Sand: fine to medium, 5% shell fragments, grey, wet, no sheen.
18 -									
-									
19 -									
-		N		20.0'-20.5'	CL				@20.0' Silty clay: grey-green, cohesive, moist, medium density.
20 -									
-									TOTAL DEPTH 20.8 ft.
21 -									
-									
22 -									

LOG OF
EXPLORATORY BORING

Field location of boring:

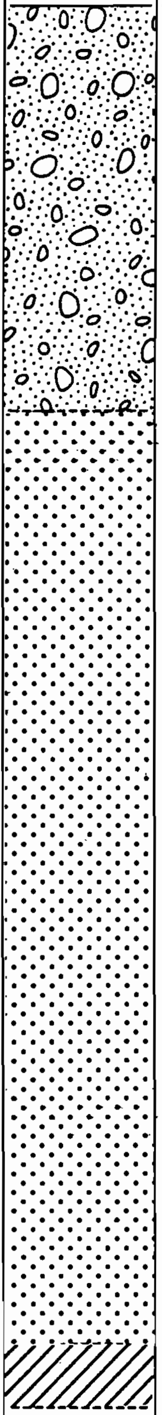
Project No: 4-90-5039

Client: McFarland Cascade
Location: Port of Olympia, WA

Logged By: G. Burgess
Installation Data: See comments.

Boring No: EW-10
Date: 1-22-91
Driller:West Hazmat
Drilling Method: HSA
Hole Diameter: 6 3/4"
Page No: 1 of 1

Water Level	Time	Date	Comments: 2"screen: 21.5'-1.5'; blank: 1.5'-0.0'; sand: 20.5'-1.0'; bentonite: 1.0'-0.0'; concrete: 0.0'-+0.5'.

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	
0 -		A		0.0'-1.5'	GW	Sandy gravel: fine to medium sand, fine to coarse gravel, moist, brown, no sheen.
1 -				several attempts with no recovery		
2 -						
3 -		B		3.0'-4.5'		
4 -				several attempts with no recovery		
-					GW	@4.5' Sandy gravel: same as above, saturated.
5 -						
6 -		C		6.0'-7.5'	SP	@6.0' Gravelly sand: fine to medium sand, fine to medium coarse gravel, wet, gray, 1-3% shell fragments, no sheen.
7 -						
-		D		7.5'-9.0'	SP	@7.5' Gravelly sand: fine to medium sand, fine gravel, grey, wet, 3% shell fragments, no sheen.
8 -						
9 -		E		9.0'-10.5'		
10 -						
-		F		10.5'-12.0'		
11 -						
12 -						
-		G		12.5'-14.0'	SP	@12.5' Sand: fine sand, 5% shell fragments, wet, grey, no sheen.
13 -						
14 -						
-		H		14.5'-16.0'		
15 -						
16 -		I		16.0'-17.5'		
17 -						
-		J		17.5'-19.0'		
18 -						
19 -						
-		K		19.5'-21.0'		
20 -						
-					CL	@20.25' Sandy clay: moist, cohesive, medium density, grey.
21 -						
22 -						TOTAL DEPTH = 21.5'

LOG OF
EXPLORATORY BORING

Field location of boring:

Project No: 4-90-5039
Client: McFarland Cascade
Location: Olympia, WA
Logged By: G. Burgess
Installation Data: 20.5'-0.5'
Blank: 0.5'-+3.75',Sand: 19.5'-0.25'
Bentonite: 0.25'-+0.5', Concrete: +0.5'-+1.5'

Boring No: EW-11
Date: 1-23-91
Driller: West Hazmat
Drilling Method: HSA
Hole Diameter: 10 3/4"
Page No: 1 of 1

Water Level	Time	Date	Comments:

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	
0 -	▒	A	60	0.0'-1.5'	SW	@0.0'-2.5' Sand: fine to coarse, black, wet from surface water, no sheen.
-	▒					
1 -	▒					
-	▒					
2 -	▒					
-	⠿	B	50	2.5'-3.0'	SP	@2.5' Sand: fine to medium, 5% shell fragments, grey, wet, no sheen.
3 -	⠿					
-	⠿	C	60	3.0'-4.5'	SP	@3.0' Sand: fine to medium, 5% shell fragments, grey, saturated, sheen.
4 -	⠿					
-	⠿	D	80	4.5'-6.0'	SP	@4.5' Sand: fine to medium, trace gravel, 5% shell fragments, grey saturated, sheen.
5 -	⠿					
-	⠿					
6 -	⠿	E	80	6.0'-7.5'		
-	⠿					
7 -	⠿					
-	⠿	F	80	7.5'-9.0'		
8 -	⠿					
-	⠿					
9 -	⠿					
-	⠿	G	80	9.5'-11.0'		
10 -	⠿					
-	⠿					
11 -	⠿	H	80	11.0'-12.5'	SP	@11.0' Sand: fine to medium, trace gravel, 5% shell fragments, brown, saturated, heavy sheen.
-	⠿					
12 -	⠿					
-	⠿	I	80	12.5'-14.0'	SP	@12.5' Sand: fine to medium, 5% shell fragments, trace gravel, brown, sheen.
13 -	⠿					
-	⠿					
14 -	⠿					
-	⠿	J	80	14.5'-16.0'		
15 -	⠿					
-	⠿					
16 -	⠿	K	70	16.0'-17.5'		
-	⠿					
17 -	⠿					
-	⠿	L	70	17.5'-19.0'		
18 -	⠿					
-	⠿					
19 -	⠿					
-	▨	M	80	19.0'-19.5'	CL	@19.5 Silty clay: grey-green, moist, cohesive, medium density.
20 -	▨					
-						TOTAL DEPTH 20.5 ft.
21 -						
-						
22 -						

ESE
A CILCORP COMPANY

LOG OF EXPLORATORY BORING WITH WELL INSTALLATION DATA

PROJECT NO. 4-90-5039
CLIENT: McFarland Cascade
LOCATION: Port of Olympia, WA
LOGGED BY: GLS

WELL NO. EW-12
DATE: 10/23/91
DRILLER: Tacoma Pump/Drill
PAGE: 1 of 1

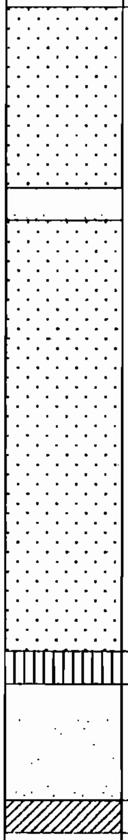
FIELD LOCATION: 5' So. of AG-16S
BENCHMARK ELEVATION: N/A
WELL CASING ELEVATION: 21.57 Above MLLW
WELL CASING TYPE: 304 Stainless Steel
SCREEN PERFORATION: 0.010

WELL COMPLETION DEPTH: 24.9
TOTAL DEPTH: 25'
BORING DIAMETER: 9.875
WELL DIAMETER: 2"
FILTER PACK TYPE: 12/20 Sand

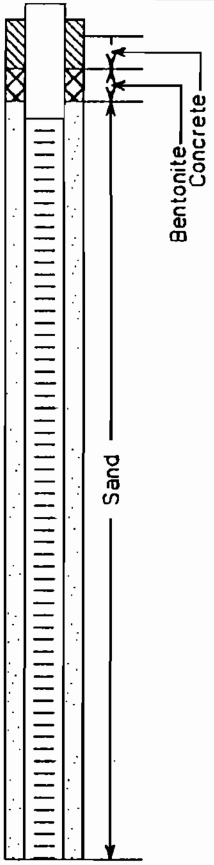
SEAL TYPE: Bentonite chips
WATER DEPTH FIRST: 6.5 BGS
WATER DEPTH COMPLETED: N/A
WATER DEPTH 24HRS: 8.80 BTOC

DEPTH	VAPOR CONC. (PPM)	BLOW/FT	SAMPLE TYPE	USCS SOIL TYPE	DESCRIPTION
0					
		47		sp	0-4.5' Gravelly SAND: Medium sand, brown, moist, slight-moderate odor, no sheen.
		26			
5		26			@4.5' SAND: Fine to medium, brown, slightly moist, no sheen.
		36			@5.5' Wood shavings, brown, no sheen.
		18		sp	@6.5' SAND, Fine to medium, dark gray, 10-20% shell fragments, wet, moderate odor, sheen.
15		15			
		18		sp	@15.5' SAND, fine grey, wet, loose, 10% shell fragments, no sheen.
		14			
		16			@18.5' SAND, fine to medium, gray, wet, loose, some gravel, slight sheen.
20		22		ml	@20' Clayey SILT, gray, wet, loose.
		39		sp	@20.2' Silty SAND, fine, olive gray, wet, dense, very slight sheen.
		36			
25				cl	@24' Silty CLAY, olive gray, wet, firm, no sheen.
					Total Depth: 25'
30					
40					

GRAPHICS LOG



WELL DIAGRAM



ESE
A CILCORP COMPANY

LOG OF EXPLORATORY BORING WITH WELL INSTALLATION DATA

PROJECT NO. 4-90-5039
CLIENT: McFarland Cascade
LOCATION: Port of Olympia, WA
LOGGED BY: GTB

WELL NO. RW-4
DATE: 10/3/91
DRILLER: Slead
PAGE: 1 of 1

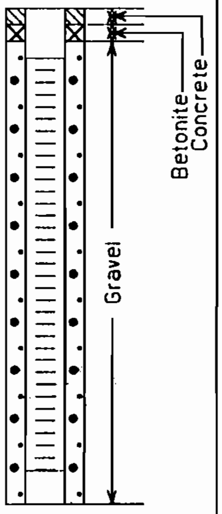
FIELD LOCATION: SE of AG-1s
BENCHMARK ELEVATION: N/A
WELL CASING ELEVATION: ~~18.75~~ 18.55 ft MLLW
WELL CASING TYPE: Corrugated Galvanized Steel
SCREEN PERFORATION: 0.20" torch cut

WELL COMPLETION DEPTH: 15'
TOTAL DEPTH: 15'
BORING DIAMETER: 42"
WELL DIAMETER: 30"
FILTER PACK TYPE: Pea Gravel

SEAL TYPE: Bentonite Chips
WATER DEPTH FIRST: 7'
WATER DEPTH COMPLETED: N/A
WATER DEPTH 24HRS: 6.3'

DEPTH	VAPOR CONC. (PPM)	BLOW/FT	SAMPLE TYPE	USCS SOIL TYPE	GRAPHICS LOG	DESCRIPTION
0						
				sp	░	0-3' Silty SAND, fine to medium, brown, dry, organics.
				sp	░	@3' Gravelly SAND, fine to medium sand, fine gravel, moist, trace silt, 10% shell fragments, no sheen.
5					░	
				sp	░	@7' Gravelly SAND, fine to medium sand, fine grave, wet, trace silt, 10% shell fragments, sheen.
10					░	
				cl	▨	@14' Sandy CLAY, gray, medium density, wet, trace silt, sheen.
15						Total Depth: 15'
20						
25						
30						
35						
40						

WELL DIAGRAM



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LOG OF EXPLORATORY BORING WITH WELL INSTALLATION DATA

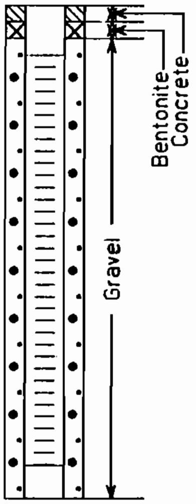
PROJECT NO. 4-90-5039
CLIENT: McFarland Cascade
LOCATION: Port of Olympia, WA
LOGGED BY: GTB

WELL NO. RW-5
DATE: 10/2/91
DRILLER: Slead
PAGE: 1 of 1

LD LOCATION: SW of EW-1
BENCHMARK ELEVATION: N/A
WELL CASING ELEVATION: ~~[illegible]~~ 18.87 ft MLLW
WELL CASING TYPE: Corrugated Galvinized Steel
SCREEN PERFORATION: 0.20" Torch Cut

WELL COMPLETION DEPTH: 15'
TOTAL DEPTH: 15'
BORING DIAMETER: 36"
WELL DIAMETER: 30
FILTER PACK TYPE: Gravel

SEAL TYPE: Bentonite Pellets
WATER DEPTH FIRST: 8'
WATER DEPTH COMPLETED: N/A
WATER DEPTH 24HRS: 6.5

DEPTH	VAPOR CONC. (PPM)	BLOW/FT	SAMPLE TYPE	USCS SOIL TYPE	GRAPHICS LOG	DESCRIPTION	WELL DIAGRAM
0							
5				sp	⁙	0-15'bgl - Gravelly SAND: Fine to medium sand, fine gravel, 10% shell fragments, trace silt, grey to dark grey, moist. Note: Wet at 8'bgl.	
10							
15						Total Depth: 15'bgl	
20							
25							
30							
35							
40							

Sediment Soil borings

On August 27, 1991 six borings were completed near the base of the riprap in the intertidal sediments. The purpose of these borings was to obtain additional data regarding the depth to the aquitard surface beneath the near-shore sediments in the East Bay of Budd Inlet. The six soil borings, S-1 through S-6, were located approximately at 100-foot intervals between Seep Locations ES-8 and ES-14 (Figure 2-6). The soil borings were drilled to a total depth of 5.5 to 11.3 feet below the ground surface using hand-auger equipment which consisted of a 4-inch diameter barrel, approximately 1.5 feet in length, which is connected to 5-foot long extension rods. A tee handle was then attached to manually turn the auger and collect the sediments within the barrel. Soil removed from the auger barrel was examined in the field for visual indication of contamination and for lithologic description. Soil samples, representative of each lithology change, were collected from each boring for future reference. Each soil boring location was surveyed on August 27, 1991 by Howard Godat & Associates to obtain x- and y-coordinates and an elevation relative to MLLW.

LOG OF
EXPLORATORY BORING

Field location of boring:

Between ES-8 and ES-9

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia
Logged By: G. Stuesse
Installation Data: Backfill with cuttings

Boring No: S-1
Date: 8-27-91
Driller: P. Hohner
Drilling Method: Hand Auger
Hole Diameter: 4"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -	▨				sm	0-1.5' - SAND, silty, medium to fine grained, grey to dark grey, fine to coarse gravels, occasional shell fragments, no sheen.			
-	▨								
1 -	▨								
-	▨				sm	1.5-4.0' - SAND, slightly silty, fine to medium grained, grey to dark grey, fine shell fragments, no sheen.			
2 -	▨								
-	▨								
3 -	▨								
-	▨								
4 -	▨				sm	4.0-6.5' - SAND, silty, fine to medium grained, grey, approximately 15% shell fragments, no sheen.			
-	▨								
5 -	▨								
-	▨								
6 -	▨								
-						**TOTAL DEPTH 6.5'** Boring discontinued at 6.5' due to caving.			
7 -									
-									
8 -									
-									
9 -									
-									
10 -									
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21 -									
-									
22 -									

LOG OF
EXPLORATORY BORING

Field location of boring:

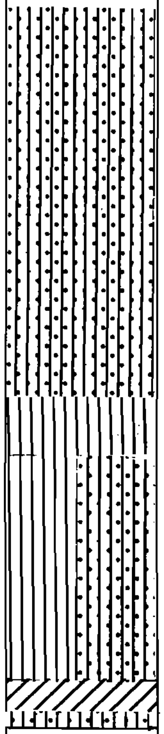
15' north of ES-10, near NPDES
outfall pipe.

Project No: 4-90-5039

Client: McFarland Cascade
Location: Port of Olympia

Logged By: G. Stuesse
Installation Data: Backfill with cuttings

Boring No: S-2
Date: 8-27-91
Driller: P. Hohner
Drilling Method: Hand Auger
Hole Diameter: 4"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -									0-0.5' - Wood fragments.
-					sm				0.5-2.0' - silty SAND, fine to medium grained, grey, saturated,
1 -									dense, 10-15% shell fragments, no sheen.
-									
2 -					sm				2.0-6.0' - silty SAND, fine to medium grained, grey, loose,
-									20-30% shell fragments, no sheen.
3 -									
-									
4 -									
-									
5 -									
-									
6 -					ml				6.0-7.0' - Sandy SILT, fine-grained sand, gray, 10% fine shell
-									fragments, firm, no sheen.
7 -					ml-sm				7.0-10.5' - Interbedded silty SAND and sandy SILT, fine-grained
-									sand, grey, firm to loose, no sheen.
8 -									
-									
9 -									
-									
10 -									
-					cl				10.5-11.0' - CLAY, olive-grey, soft sheen.
11 -					sm				11.0-11.3' - Silty SAND, fine grained, grey, saturated,
-									loose, sheen.
12 -									TOTAL DEPTH: 11.3'.
-									
13 -									
-									
14 -									
-									
15 -									
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16 -									
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-									
22 -									

LOG OF
EXPLORATORY BORING

Project No: 4-90-5039

Boring No: S-3
Date: 8-27-91

Client: McFarland Cascade
Location: Port of Olympia

Driller: P. Hohner
Drilling Method: Hand Auger
Hole Diameter: 4"

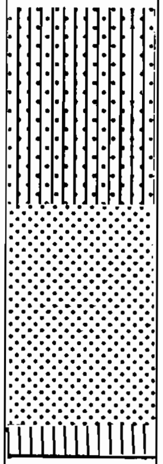
Logged By: G. Stuesse

Page No: 1 of 1

Installation Data: Backfill with cuttings

Field location of boring:

Approximately 30′ north of ES-11

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -					sm	0-3.0′ - Silty SAND, fine to medium grained, grey, approximately 50% wood fragments, no sheen			
-									
1 -									
-									
2 -									
-									
3 -					sp	3.0-4.0′ - SAND, medium-grained, dark grey, loose, no sheen.			
-									
4 -					sp	4-5.5′ - SAND, medium to fine grained, 20-40% fine shell fragments light grey.			
-									
5 -									
-					sp	5.5-6.5′ - SAND, as above except 5-10% fine shell fragments.			
6 -									
-					ml	6.5-7.0′ - slightly fine sandy SILT, soft, olive, no sheen.			
7 -						**TOTAL DEPTH:** 7.0′.			
-						Boring terminated due to caving.			
8 -									
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9 -									
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22 -									

LOG OF
EXPLORATORY BORING

Field location of boring:

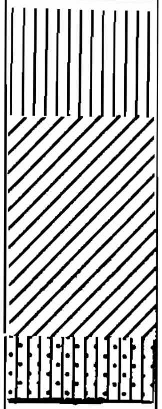
Approximately 30' southeast of
seep ES-12.

Project No: 4-90-5039

Client: McFarland Cascade
Location: Port of Olympia

Logged By: G. Stuesse
Installation Data: Backfill with cuttings

Boring No: S-4
Date: 8-27-91
Driller: P. Hohner
Drilling Method: Hand Auger
Hole Diameter: 4"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -					ml				0-1.5' - Clayey SILT, olive grey, soft, saturated, no sheen.
-									
1 -									
-					cl				1.5-3.0' - Silty CLAY, olive grey, soft, saturated, no sheen.
2 -									
-									
3 -					cl				3.0-4.0' - Very silty CLAY, as above, except 5-8% wood fragments, no sheen.
-									
4 -									4.0-5.0' - Very silty CLAY, as above, except firm, no sheen.
-									
5 -					sm				5.0-6.0' - silty SAND, fine to medium grained, light grey, loose, 5% small shell fragments, no sheen.
-									
6 -									TOTAL DEPTH: 6.0'.
-									
7 -									
-									
8 -									
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9 -									
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11 -									
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22 -									

LOG OF
EXPLORATORY BORING

Field location of boring:

Between seeps 13A and 12

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia
Logged By: G. Stuesse
Installation Data: Backfill with cuttings

Boring No: S-5
Date: 8-27-91
Driller: P. Hohner
Drilling Method: Hand Auger
Hole Diameter: 4"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concentration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -	▥				ml	0-1.5' - Clayey SILT, olive grey, soft, occasional large shell fragments, no sheen.			
-	▥								
1 -	▥								
-	▨				cl	1.5-2.5' - Silty CLAY, olive gray, firm 2-5% large shell fragments no sheen.			
2 -	▨								
-	▥				ml	2.5-4.0' - clayey SILT, light olive grey, soft, 10-20% shell fragments, no sheen.			
3 -	▥								
-	▥								
4 -	▥				ml	4.0-5.5' - Clayed SILT, as above, except 30-40% shell fragments.			
-	▥								
5 -	▥								
-						TOTAL DEPTH: 5.5'.			
6 -									
-									
7 -									
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8 -									
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9 -									
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10 -									
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22 -									

LOG OF
EXPLORATORY BORING

Field location of boring:

Near seep ES-14

Project No: 4-90-5039
Client: McFarland Cascade
Location: Port of Olympia
Logged By: G. Stuesse
Installation Data: Backfill with cuttings

Boring No: S-6
Date: 8-27-91
Driller: P. Hohner
Drilling Method: Hand Auger
Hole Diameter: 4"
Page No: 1 of 1

Depth (ft)	Graphic Log	Sample I.D.	Vapor Concen-tration (ppm)	Sample Interval (feet)	Soil Group Symbol (U.S.C.S.)	Water Level	Time	Date	Comments:
0 -	▥				ml	0-1.0 - clayey SILT, olive grey, soft, wood fragments, occasional shell fragments, no sheen.			
-	▥								
1 -	▨				cl	1.0-3.0' - CLAY, slightly silty, olive grey, firm, approximately 5% wood fragments, occasional shell fragments, no sheen.			
-	▨								
2 -	▨								
-	▨								
3 -	▨				cl	3.0-5.5' - CLAY, slightly silty, olive grey, soft, occasional wood and shell fragments, no sheen.			
-	▨								
4 -	▨								
-	▨								
5 -	▨								
-						TOTAL DEPTH: 5.5'			
6 -									
-									
7 -									
-									
8 -									
-									
9 -									
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10 -									
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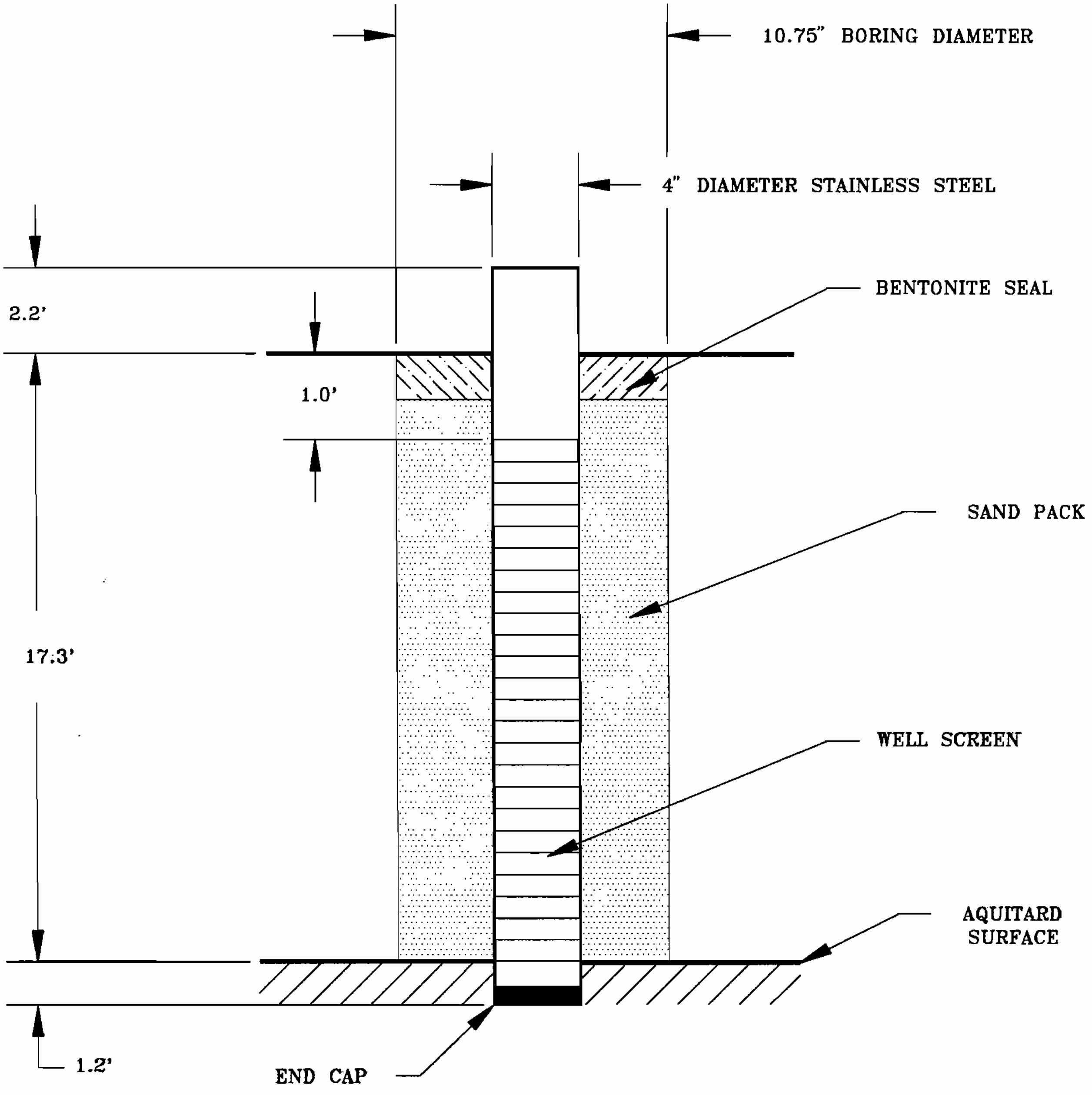

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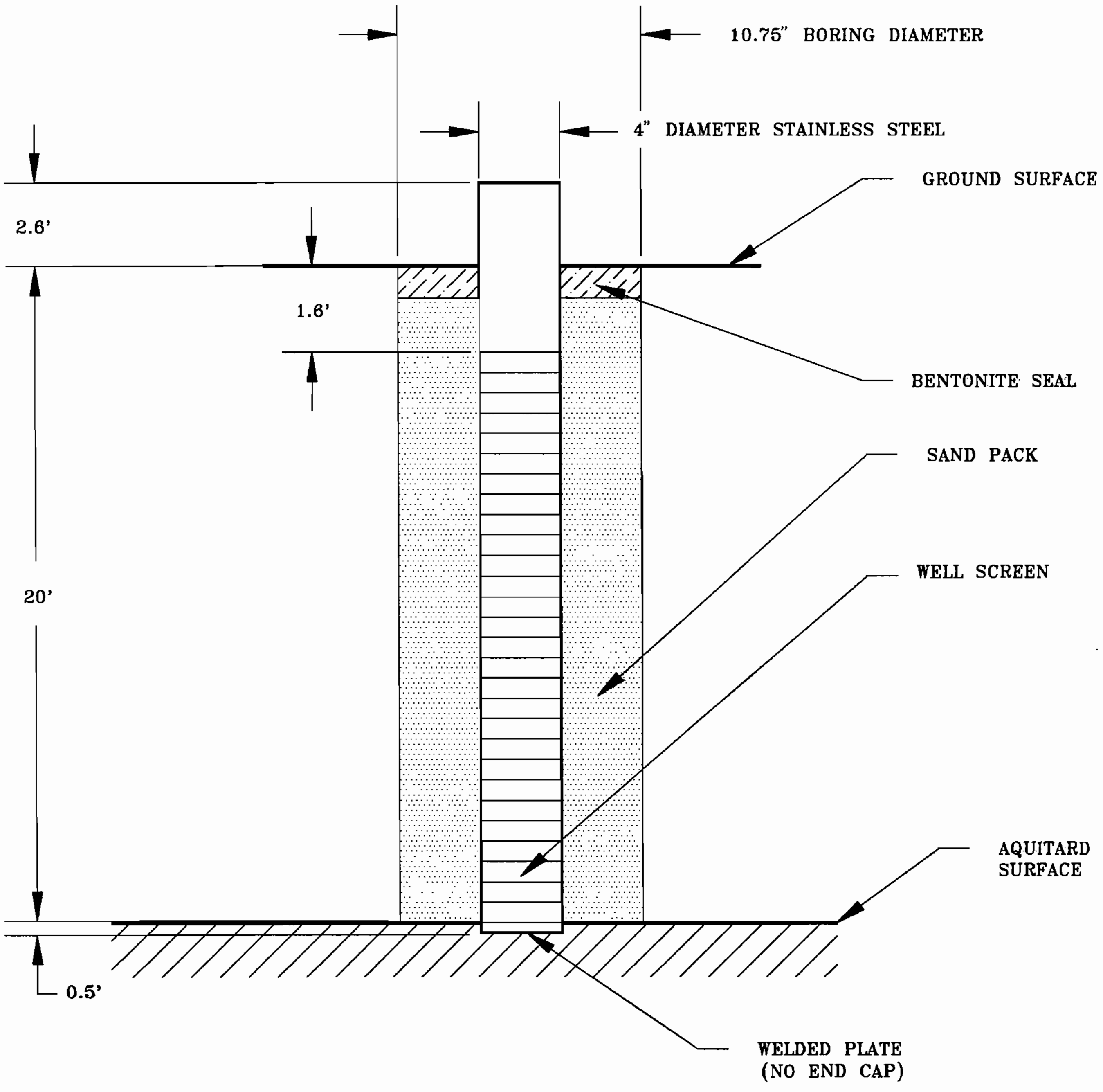
SUPPLEMENTAL SITE INVESTIGATION
CASCADE POLE SITE
OLYMPIA, WASHINGTON

WELL INSTALLATION DETAILS
WELL EW-1

SCALE: AS SHOWN | REVISION: | DRAWN BY: | DATE: 9/17/91

FILE: MCFEW1.DWG



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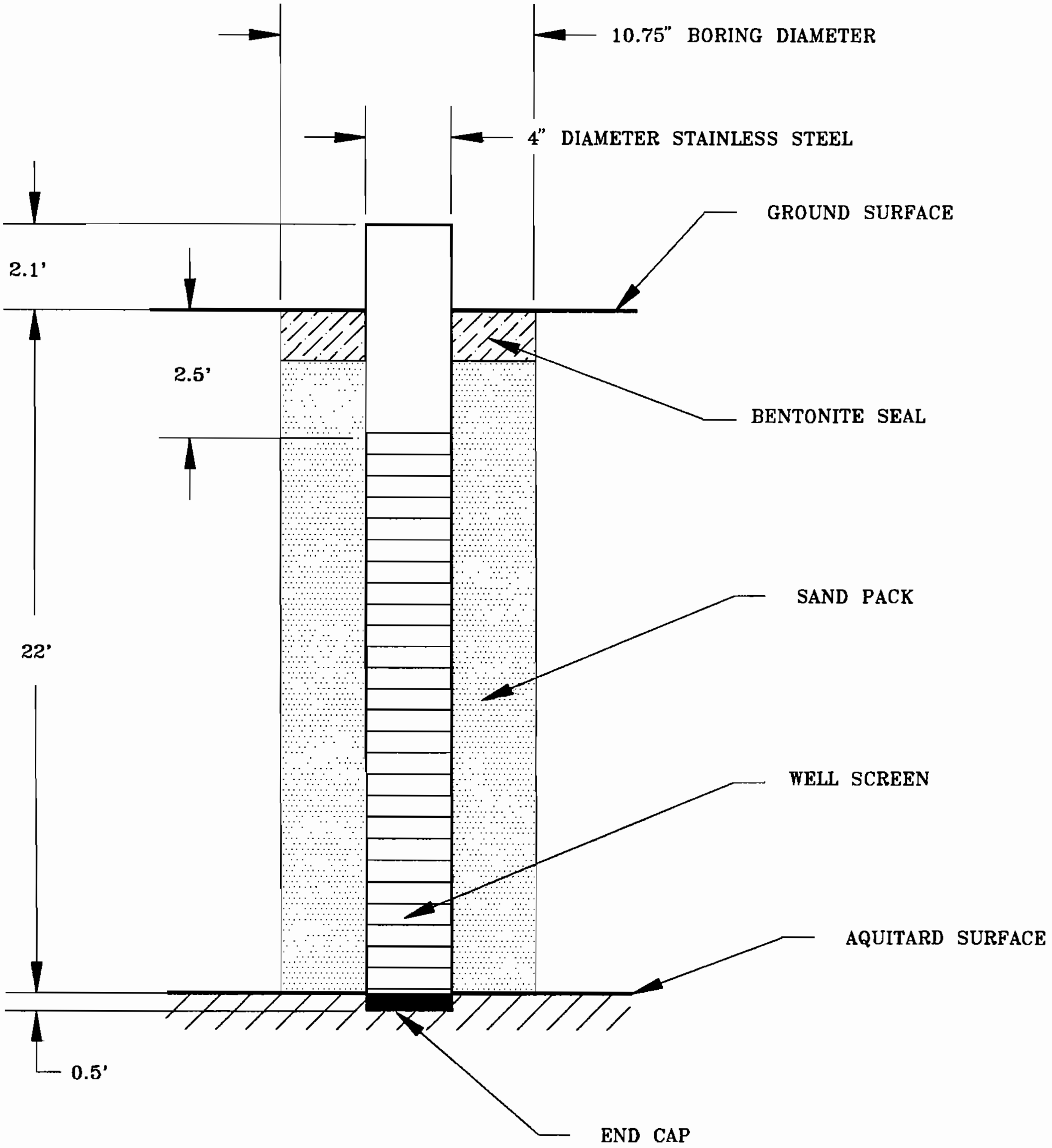
WELL INSTALLATION DETAILS
WELL EW-2

SCALE: *AS SHOWN*	REVISION:	DRAWN BY:	DATE: *9/17/91*

FILE: MCFEW2.DWG



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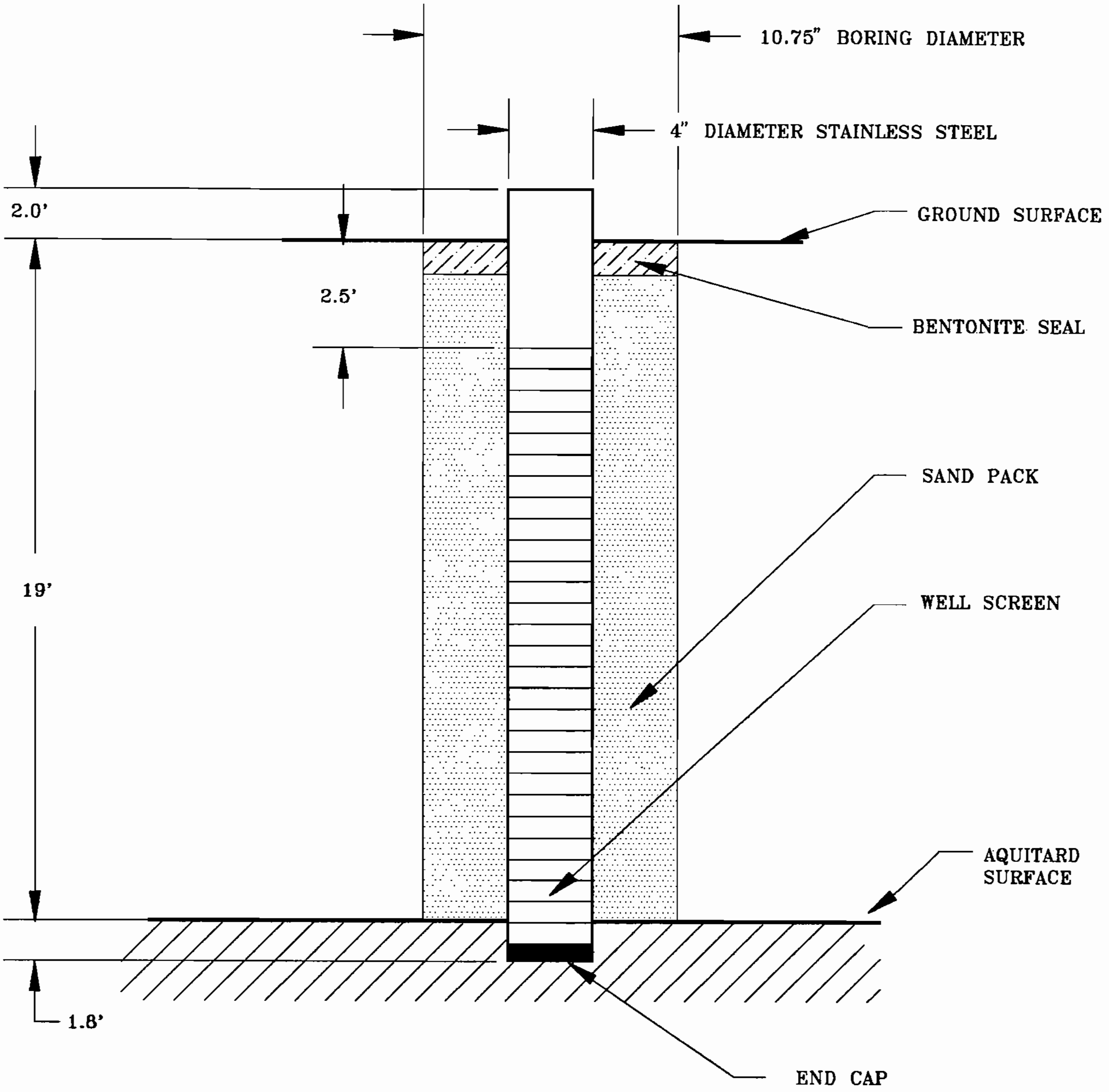
WELL INSTALLATION DETAILS
WELL EW-3

SCALE: *AS SHOWN* REVISION: DRAWN BY: DATE: *9/17/91*

FILE: MCFEW3.DWG



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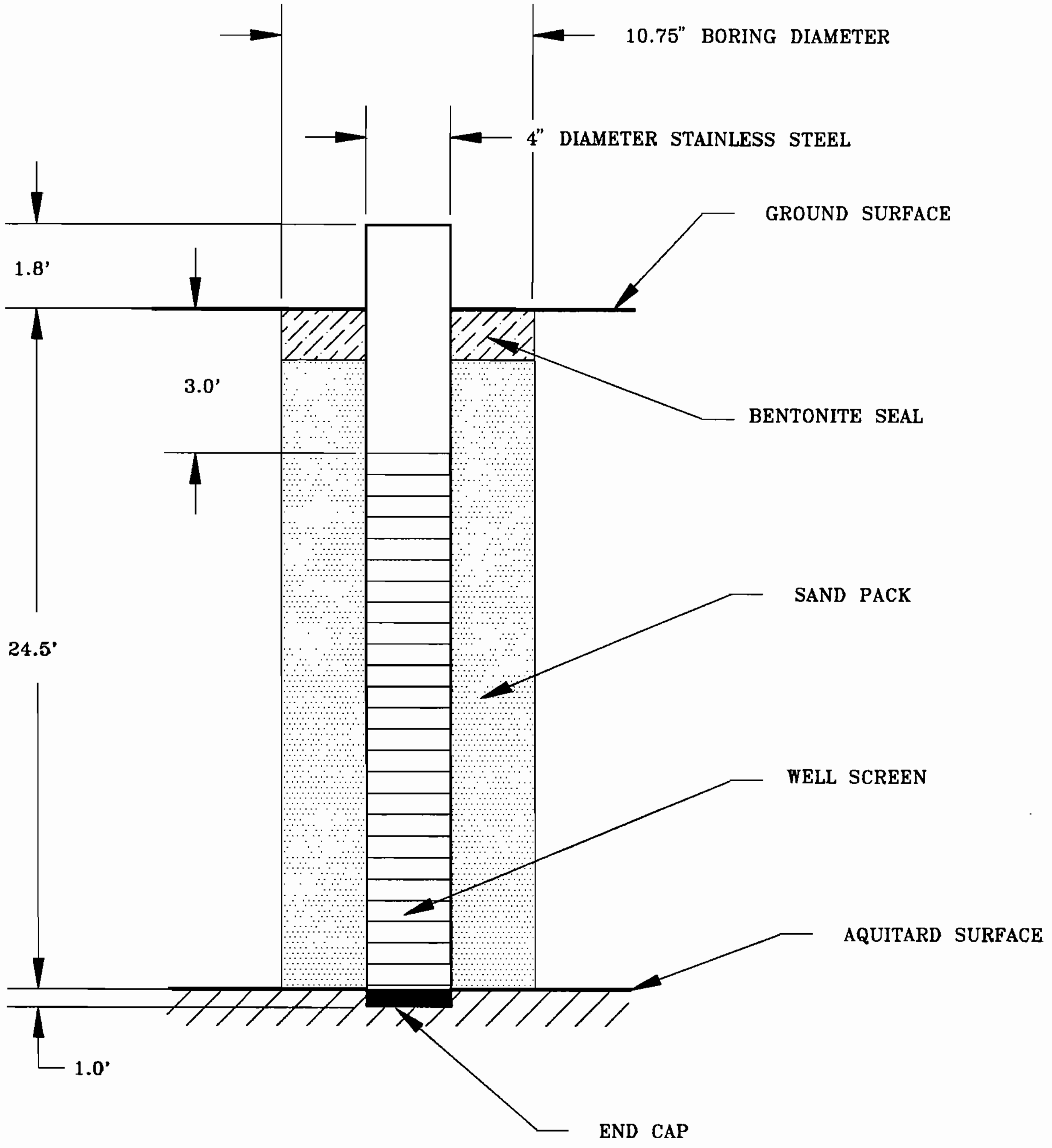
WELL INSTALLATION DETAILS
WELL EW-4

SCALE: *AS SHOWN*	REVISION:	DRAWN BY:	DATE: *9/17/91*

FILE: MCFEW4.DWG



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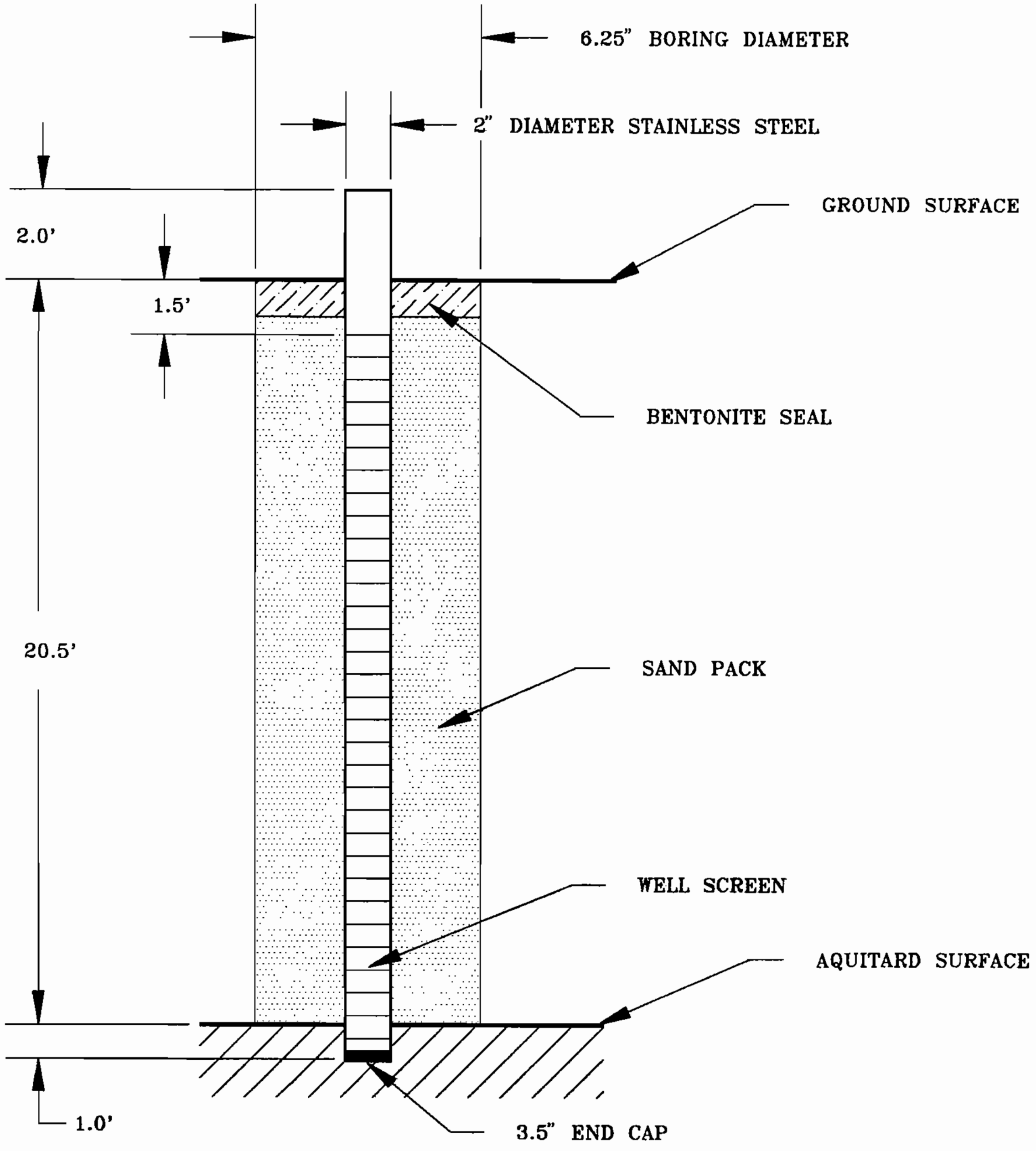
WELL INSTALLATION DETAILS
WELL EW-5

SCALE: *AS SHOWN* REVISION: DRAWN BY: DATE: *9/17/91*

FILE: MCFEW5.DWG



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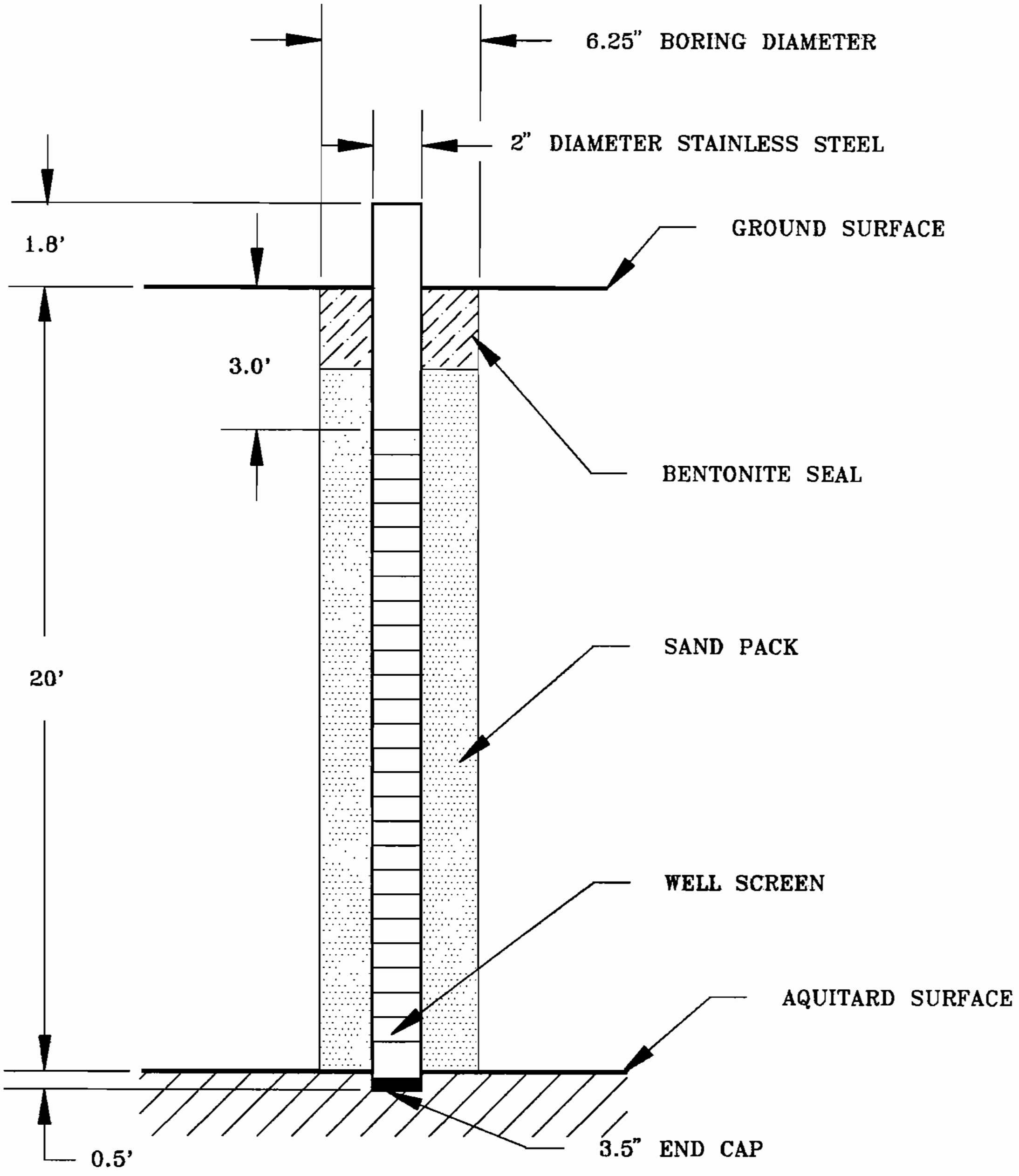
WELL INSTALLATION DETAILS
WELL EW 6

SCALE: *AS SHOWN* REVISION: DRAWN BY: DATE: *9/17/91*

FILE: MCFEW6.DWG



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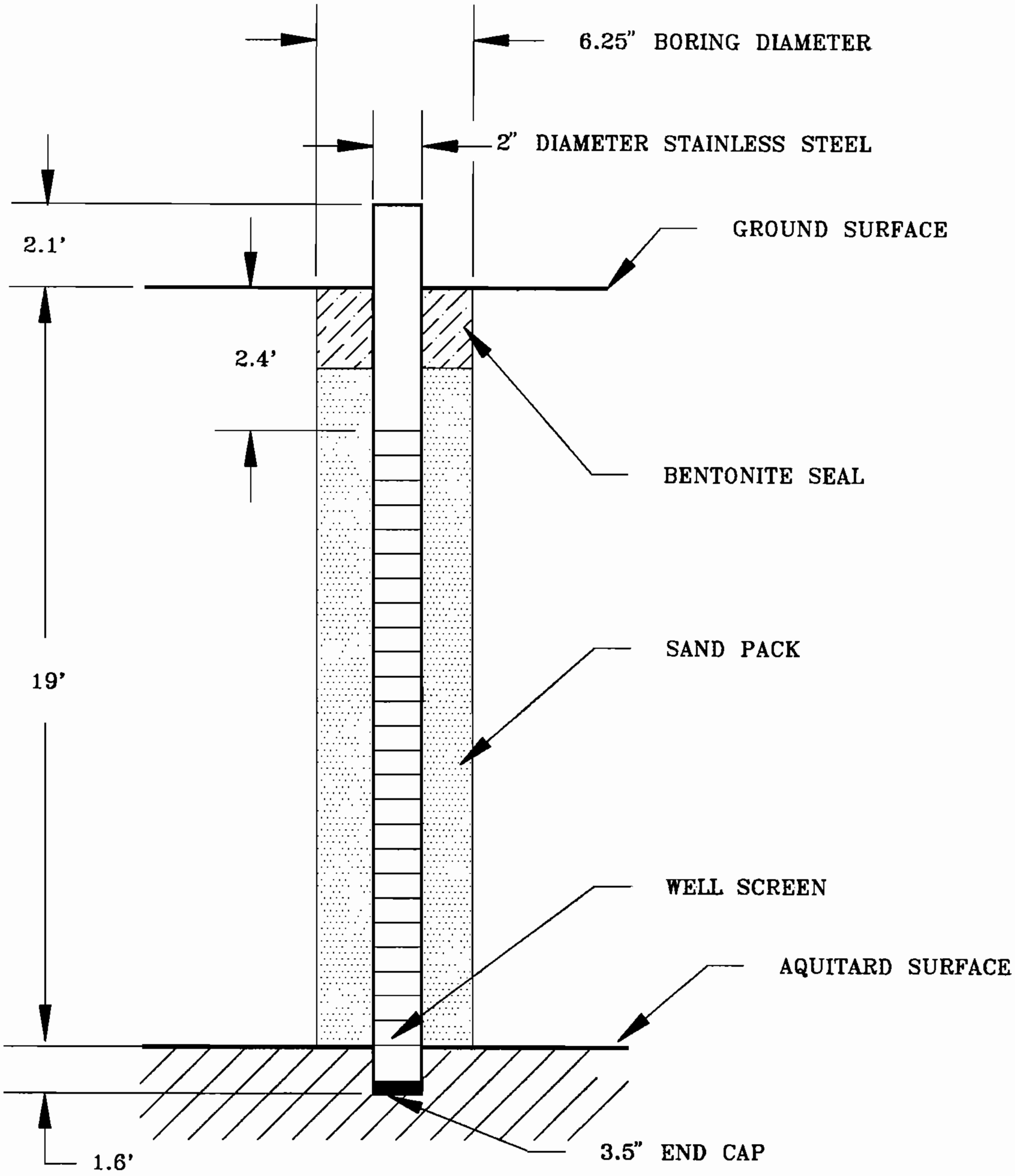
WELL INSTALLATION DETAILS
WELL EW-7

SCALE: *AS SHOWN*	REVISION:	DRAWN BY:	DATE: 9/17/91

FILE: MCFEW7.DWG



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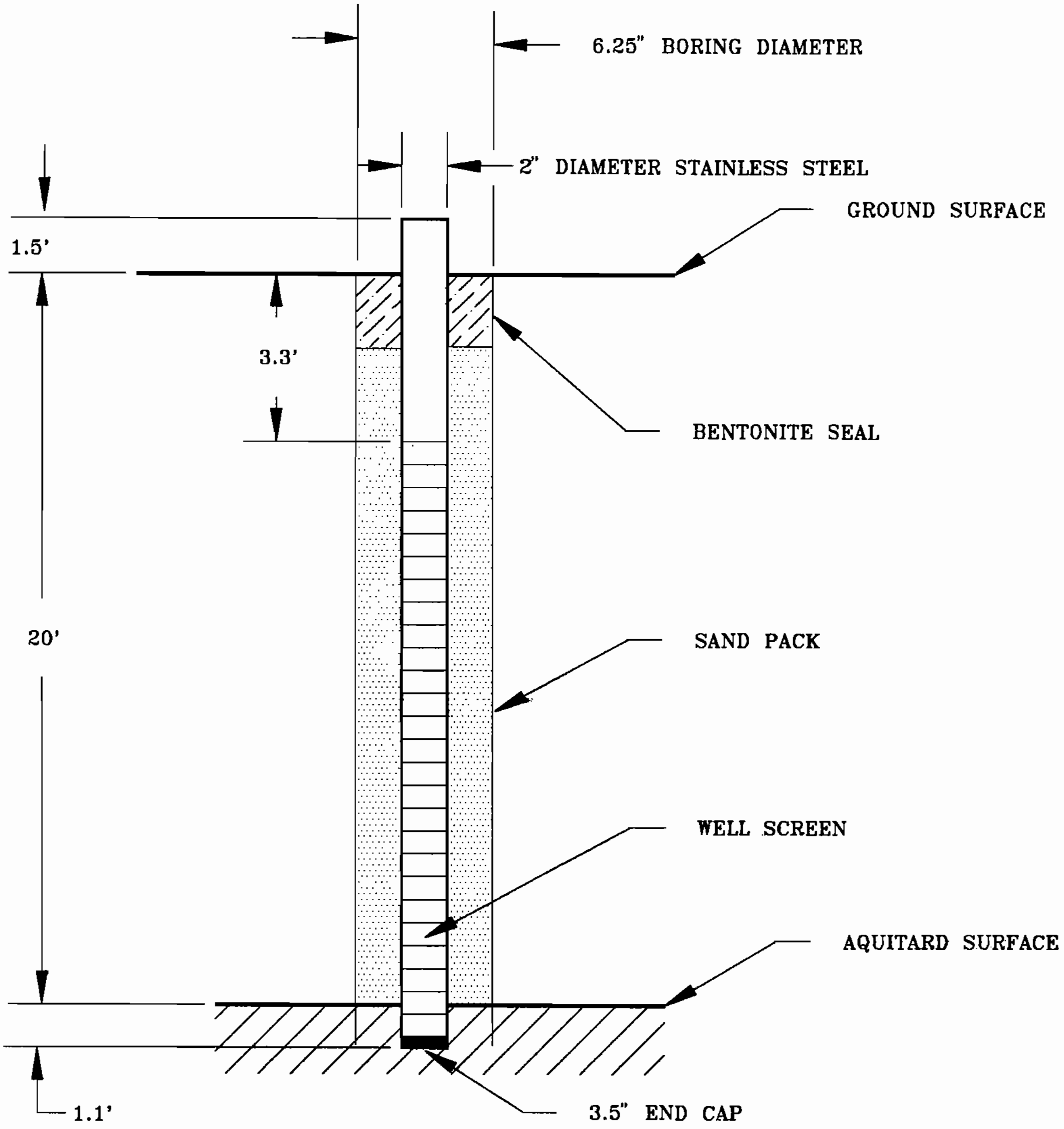
WELL INSTALLATION DETAILS
WELL EW-8

SCALE: *AS SHOWN*	REVISION:	DRAWN BY:	DATE: *9/17/91*

FILE: MCFEW8.DWG



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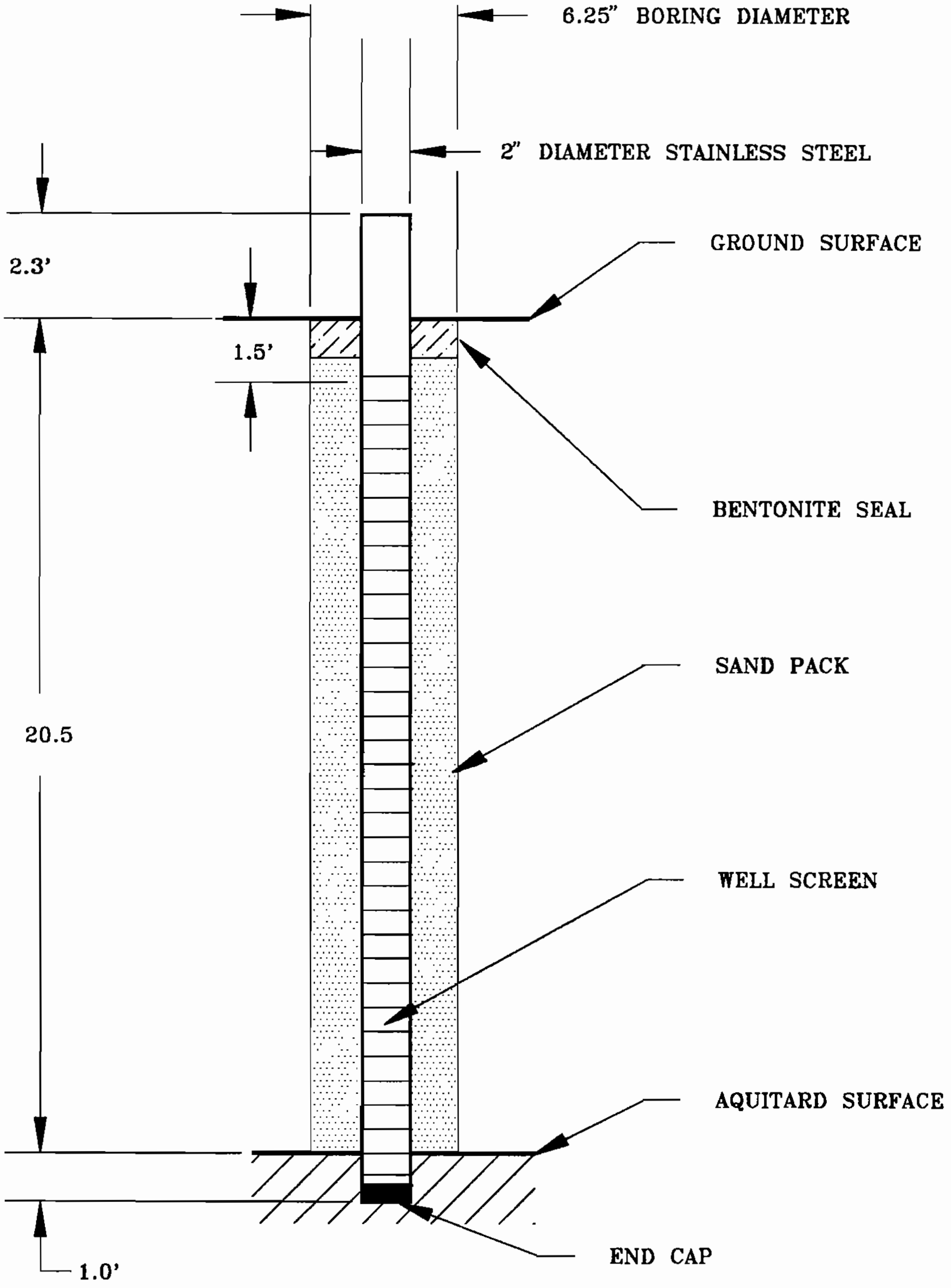
WELL INSTALLATION DETAILS
WELL EW-9

SCALE: *AS SHOWN*	REVISION:	DRAWN BY:	DATE: *9/17/91*

FILE: MCFEW9.DWG



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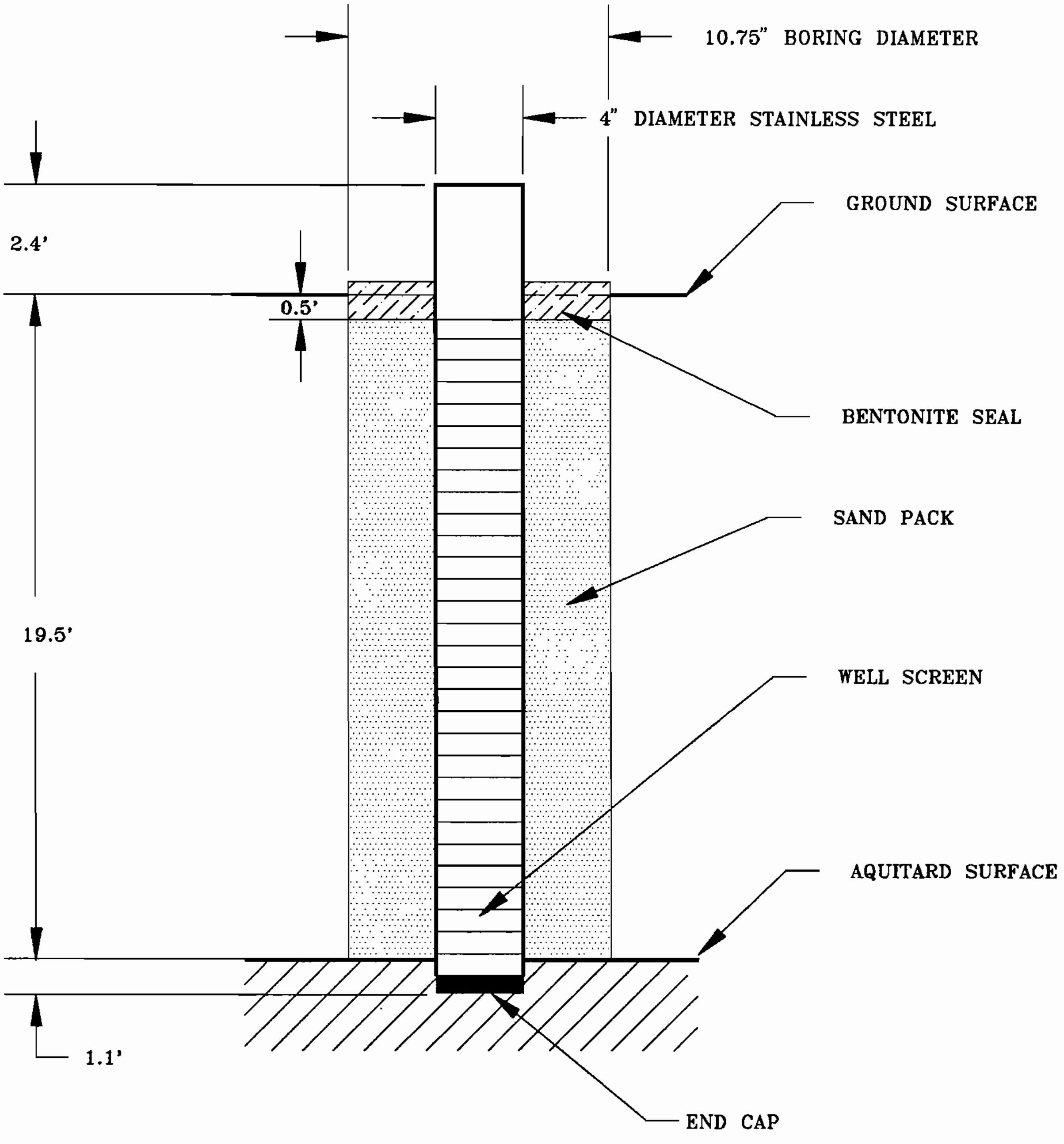
WELL INSTALLATION DETAILS
WELL EW-10

SCALE: AS SHOWN	REVISION:	DRAWN BY:	DATE: 9/17/91

FILE: MCFEW10.DWG



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SUPPLEMENTAL SITE INVESTIGATION
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OLYMPIA, WASHINGTON

WELL INSTALLATION DETAILS
WELL EW-11

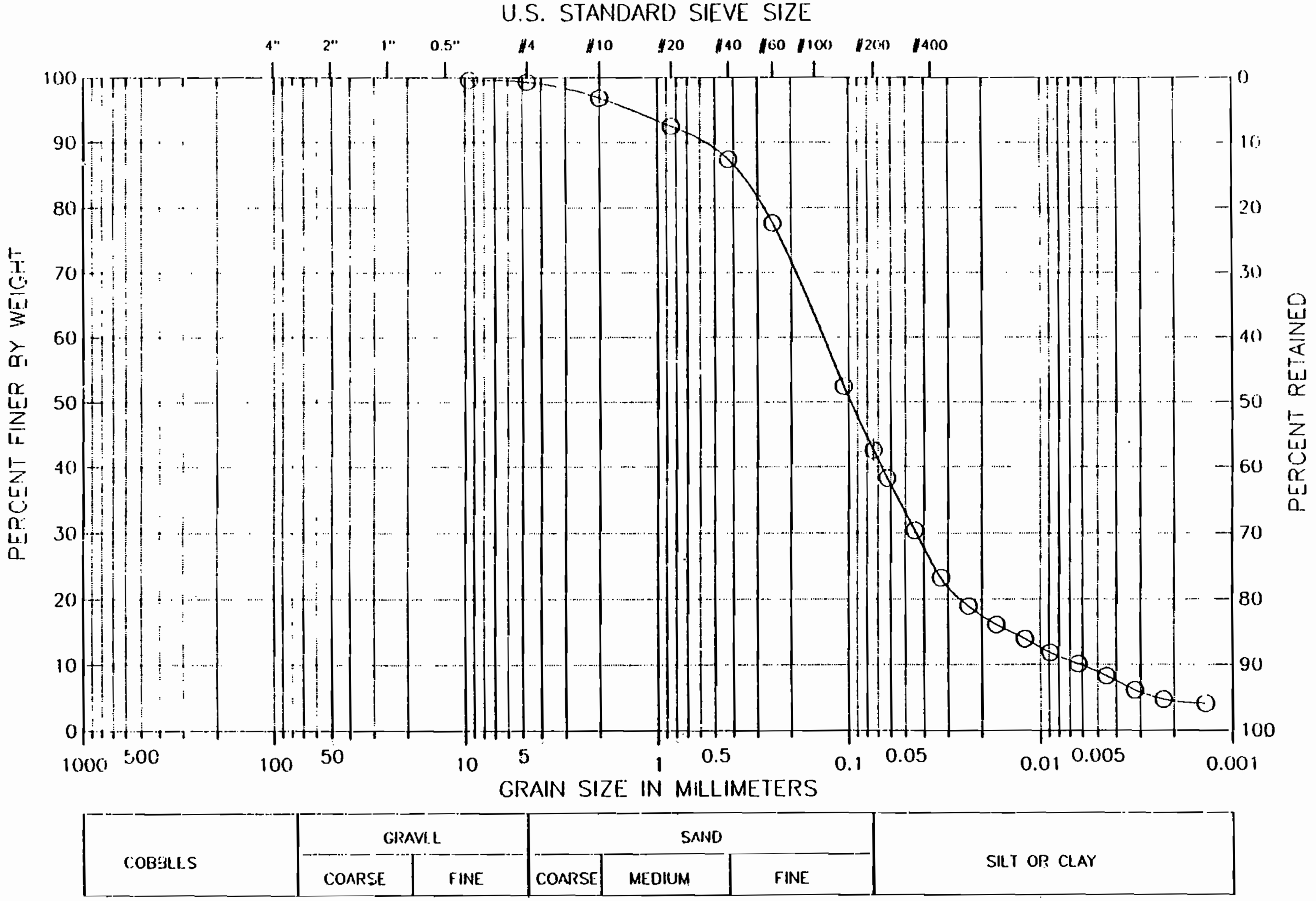
SCALE: *AS SHOWN*	REVISION:	DRAWN BY:	DATE: *9/17/91*

FILE: MCFEW11.DWG

Soil Technology, Inc.

Boring No.: EB-3-D
Sample No.: 9102001-01
Tested by : RGS
Filename : 128EB3D

Project . ESE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-:EB-3-D
Date : Wed Feb 20 1991



Classification :
(SM) Silty sand
Visual Description :

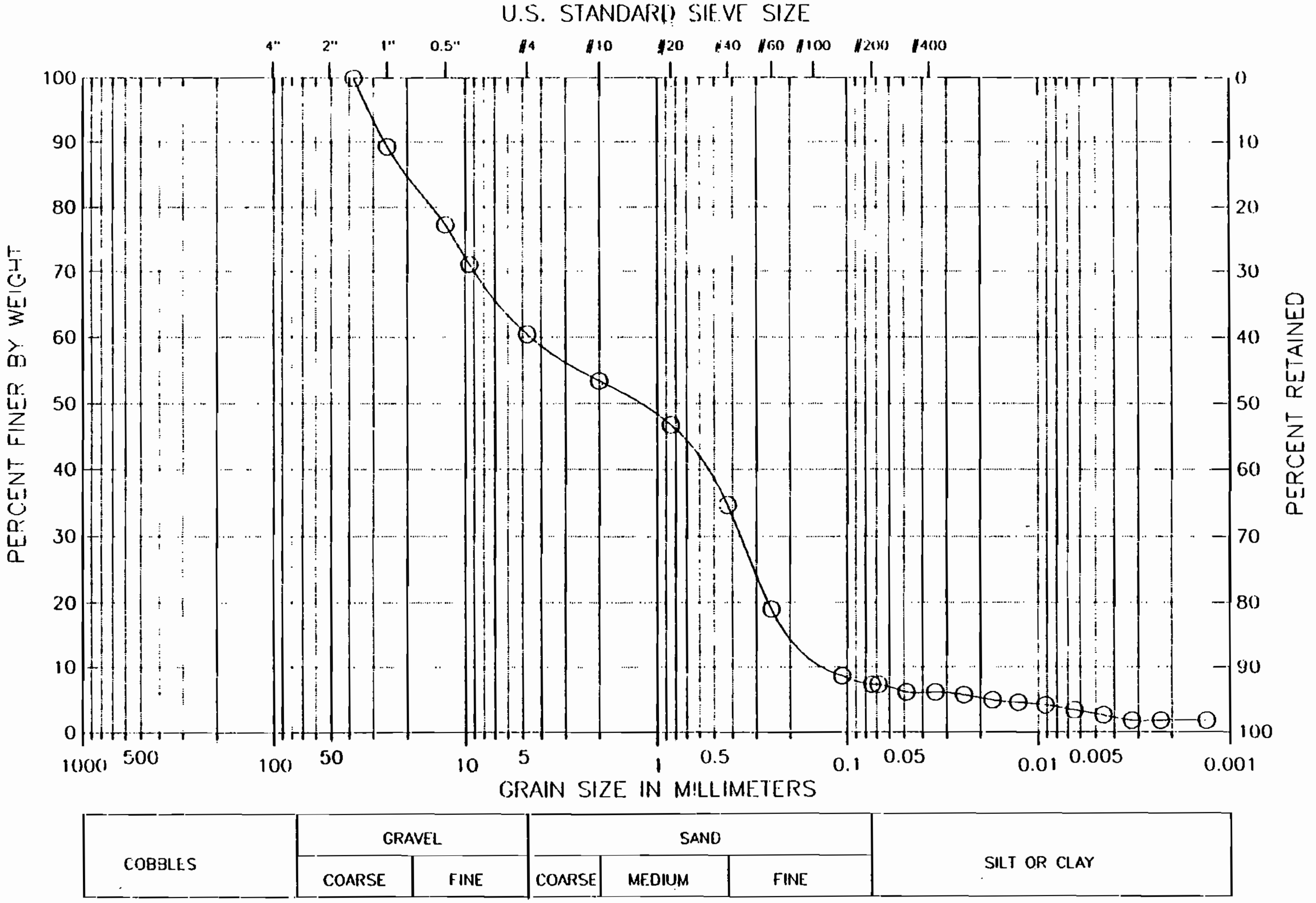
Remarks :
WET DENSITY = 113 PCF; DRY DENSITY =78 PCF WC=44%

Figure 1

Soil Technology, Inc.

Boring No. : EW-5-D
Sample No.: 9102001-02
Tested by : RGS
Filename : 128EW5D

Project : ESE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EW-5-D
Date : Wed Feb 20 1991



Classification :
(SP-SM) Poorly graded sand with silt and gravel
Visual Description :

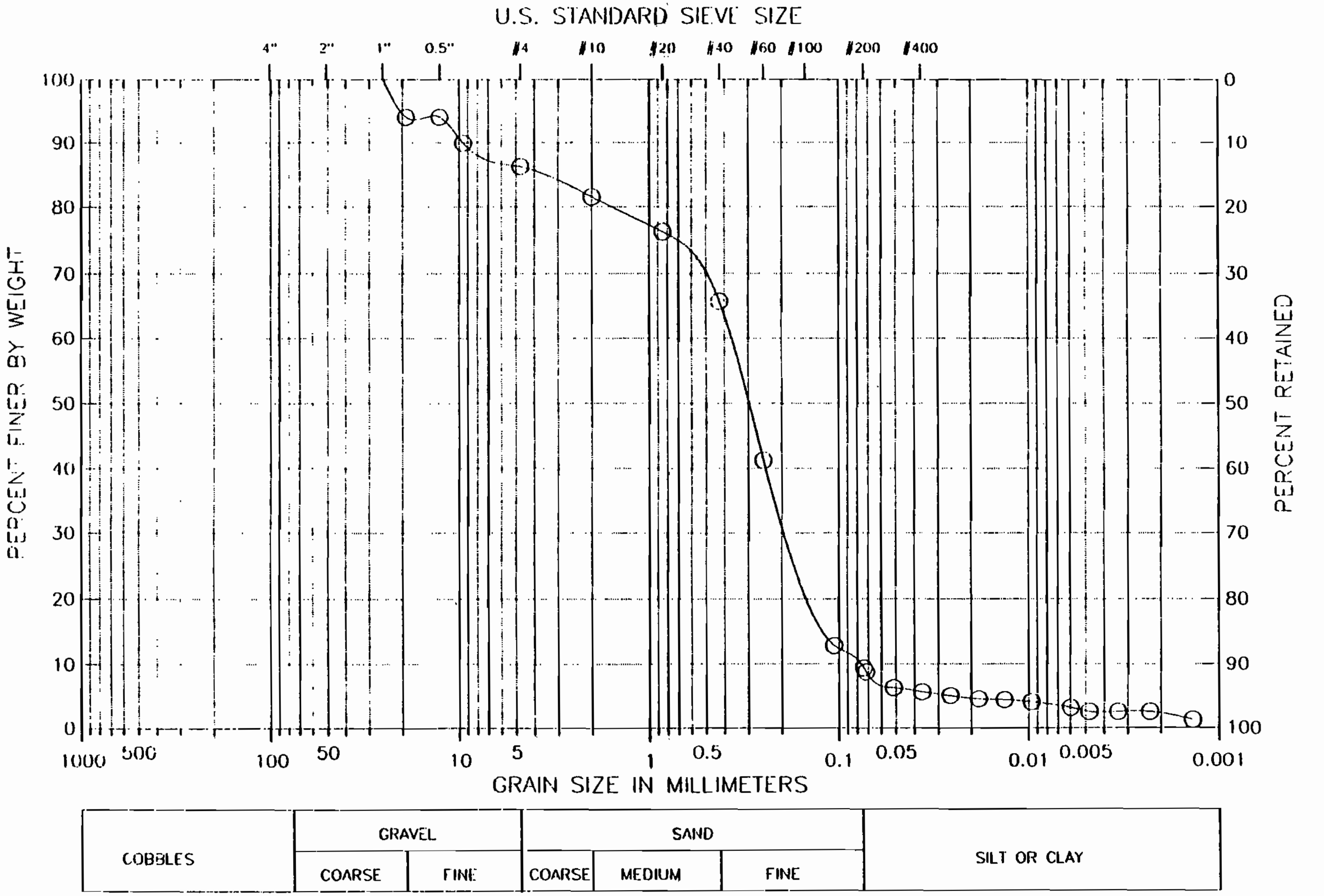
Remarks :
WET DENSITY = 136 PCF; DRY DENSITY =123 PCF WC=10%

Figure 2

Soil Technology, Inc.

Boring No. : EB-6-C
Sample No.: 9102001-03
Tested by : RGS
Filename : 128EB6C

Project : ESE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EB-6-C
Date : Wed Feb 20 1991



Classification :
(SP-SM) Poorly graded sand with silt
Visual Description :

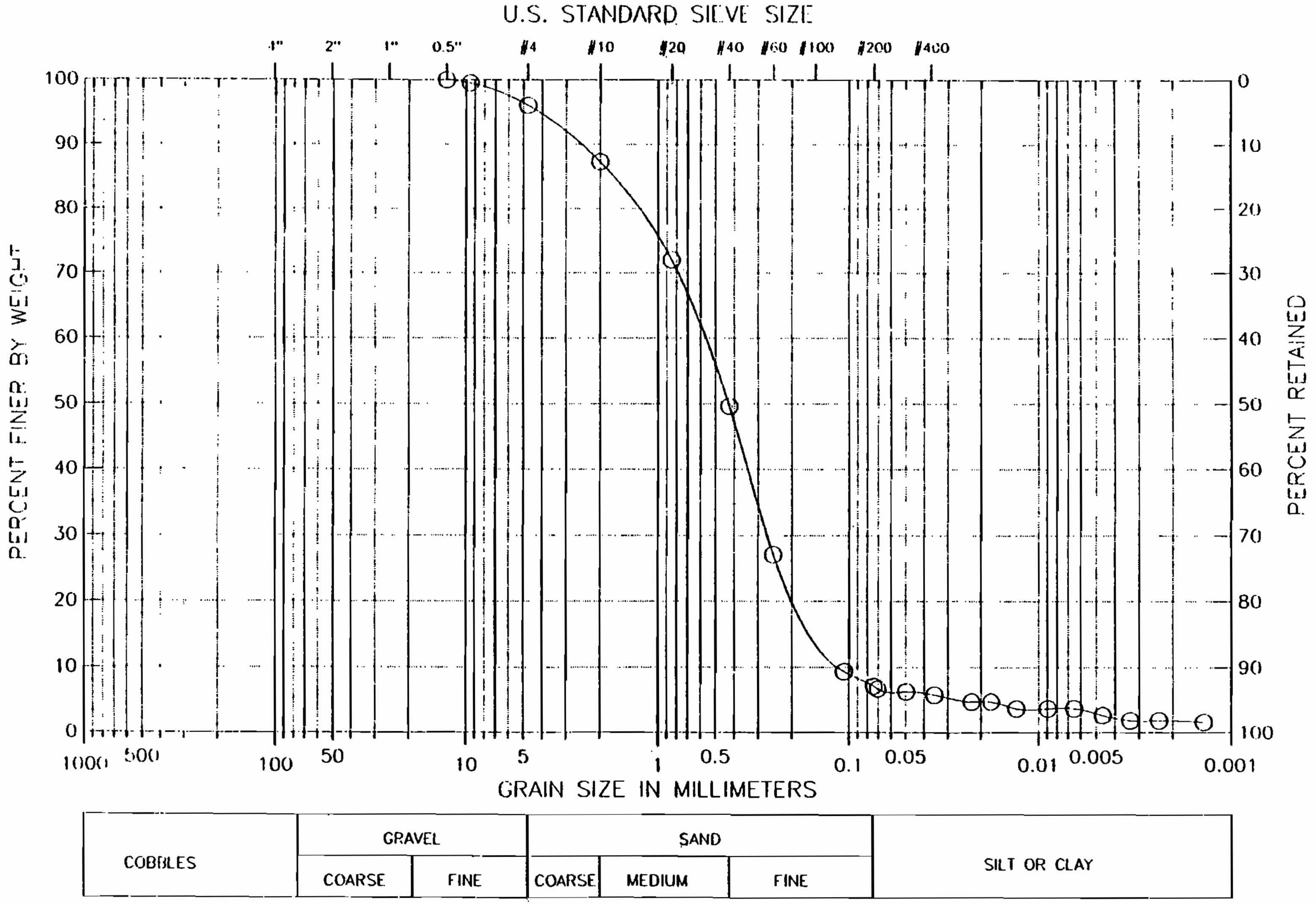
Remarks :
WEY DENSITY = 124 PCF; DRY DENSITY =103 PCF WC=20%

Figure 3

Soil Technology, Inc.

Boring No. : EW-1-A
Sample No.: 9102001-04
Tested by : RGS
Filename : 128EW1

Project . ESE, PORT OI OLYMBIA
Project No.: J-128
Location: CP-S-EW-1-A
Date : Thu Feb 21 1991



Classification :
(SP-SM) Poorly graded sand with silt
Visual Description :

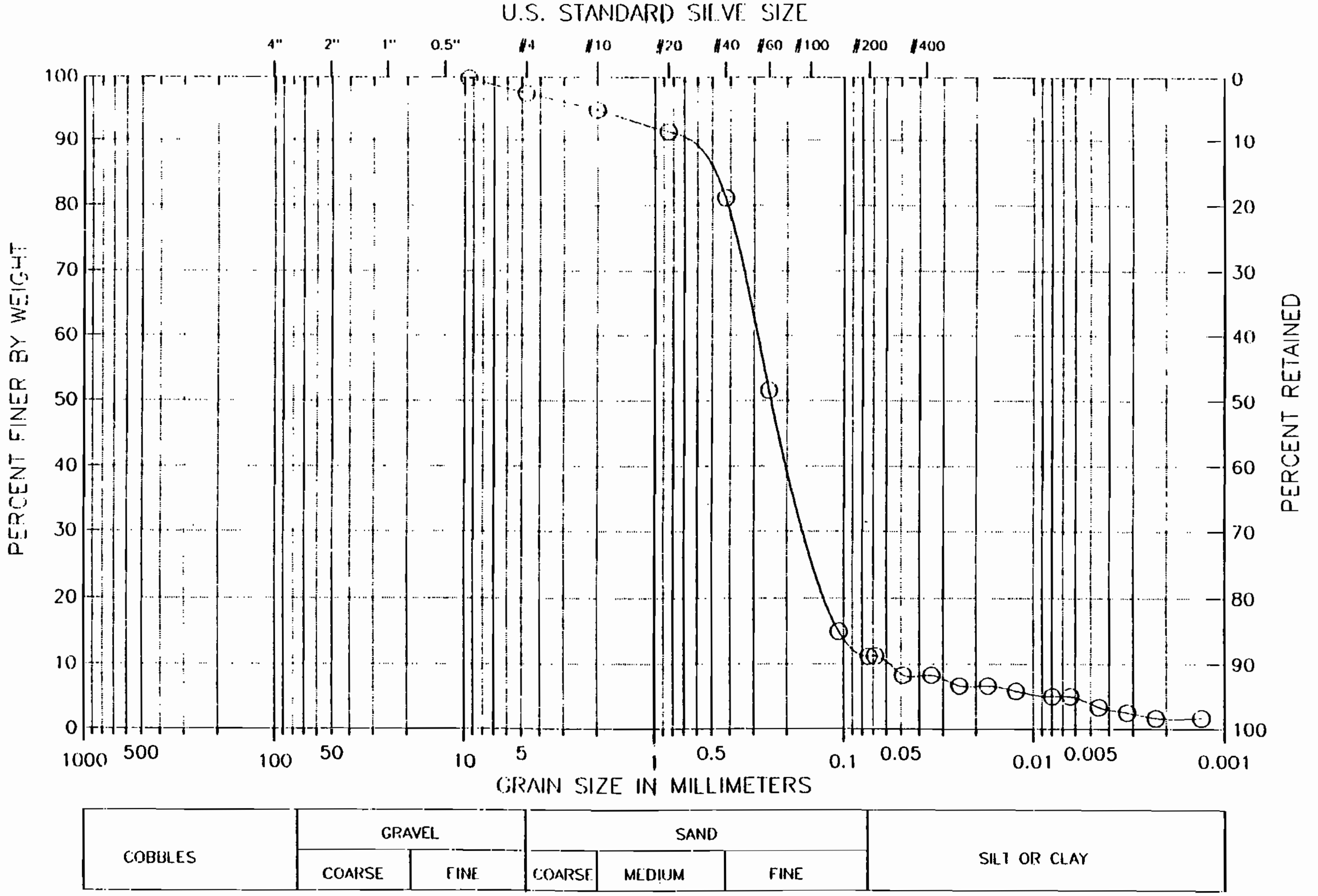
Remarks :
WET DENSITY = 123 PCF; DRY DENSITY =106 PCF WC=16%

Figure 4

Soil Technology, Inc.

Boring No. : EW-1-G
Sample No.: 9102001-05
Tested by : RGS
Filename : 128EW1G

Project . ESE, PORT OF OLYMPIA
Project No.: J-128
Location: CP-S-EW-1-G
Date . Thu Feb 21 1991



Classification :
(SP-SM) Poorly graded sand with silt
Visual Description :

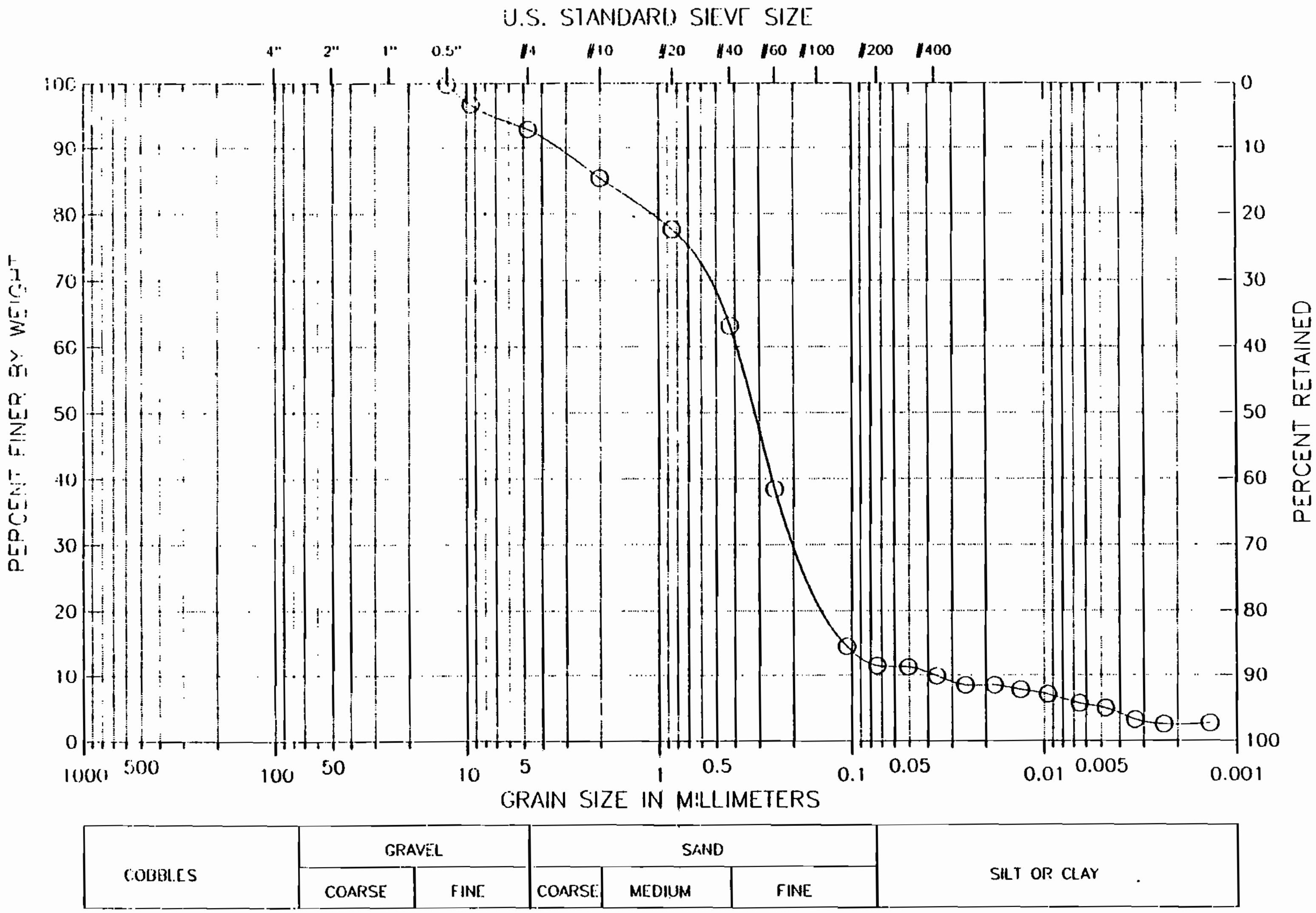
Remarks :
WET DENSITY = 132 PCF; DRY DENSITY =109 PCF WC=21%

Figure 5

Soil Technology, Inc.

Boring No. : EB-5-D
Sample No.: 9102001-06
Tested by : RGS
Filename : 128EB5

Project : ESE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EB-5-D
Date : Thu Feb 21 1991



Classification :
(SW-SM) Well-graded sand with silt
Visual Description :

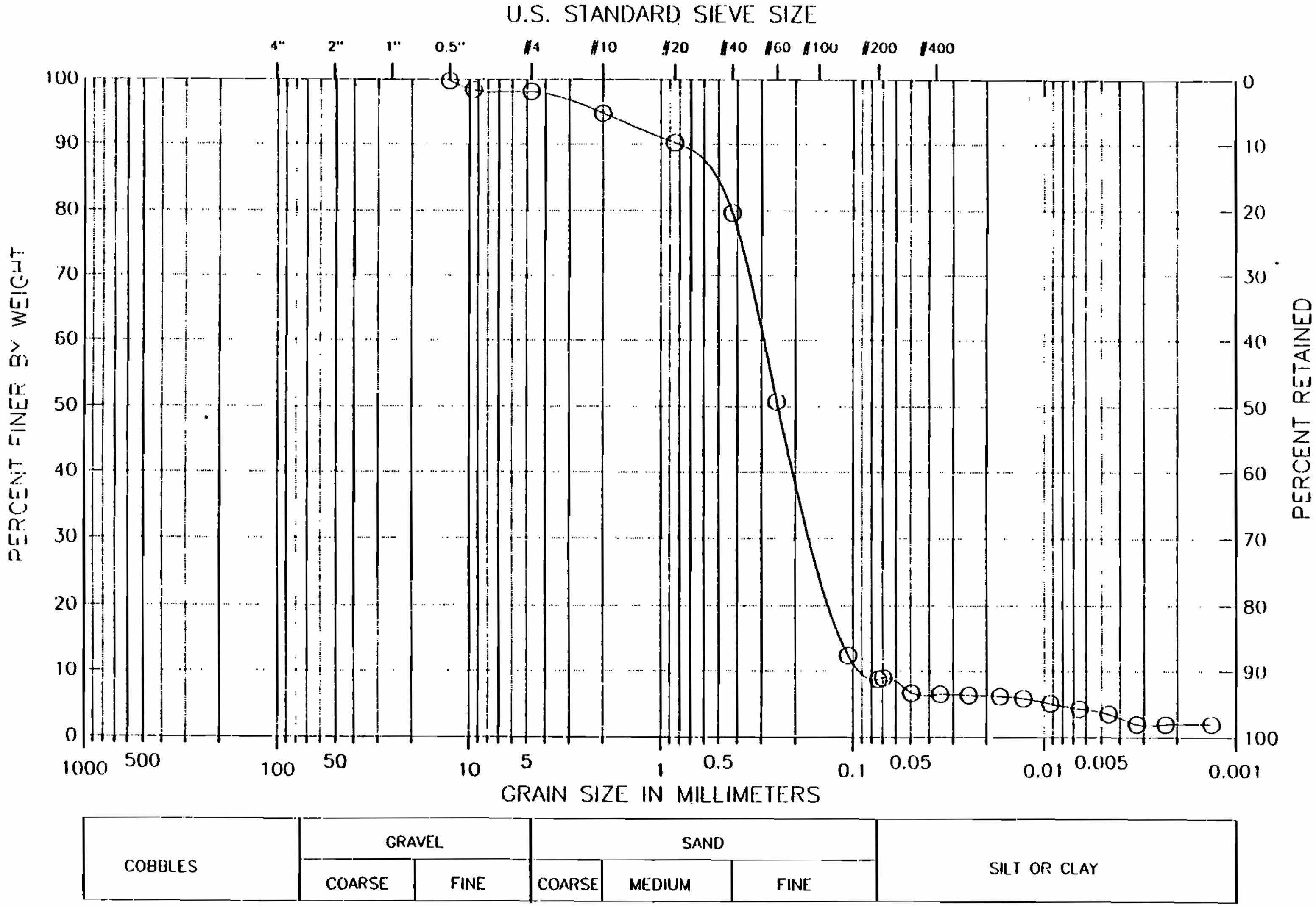
Remarks :
WET DENSITY = 130 PCF; DRY DENSITY =108 PCF WC=20%

Figure 6

Soil Technology, Inc.

Boring No. : EB-1-0
Sample No.: 9102001-07
Tested by : RGS
Filename : 128EB10

Project . ESL, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EP-1-0
Date : Wed Feb 20 1991



Classification :
(SP-SM) Poorly graded sand with silt
Visual Description :

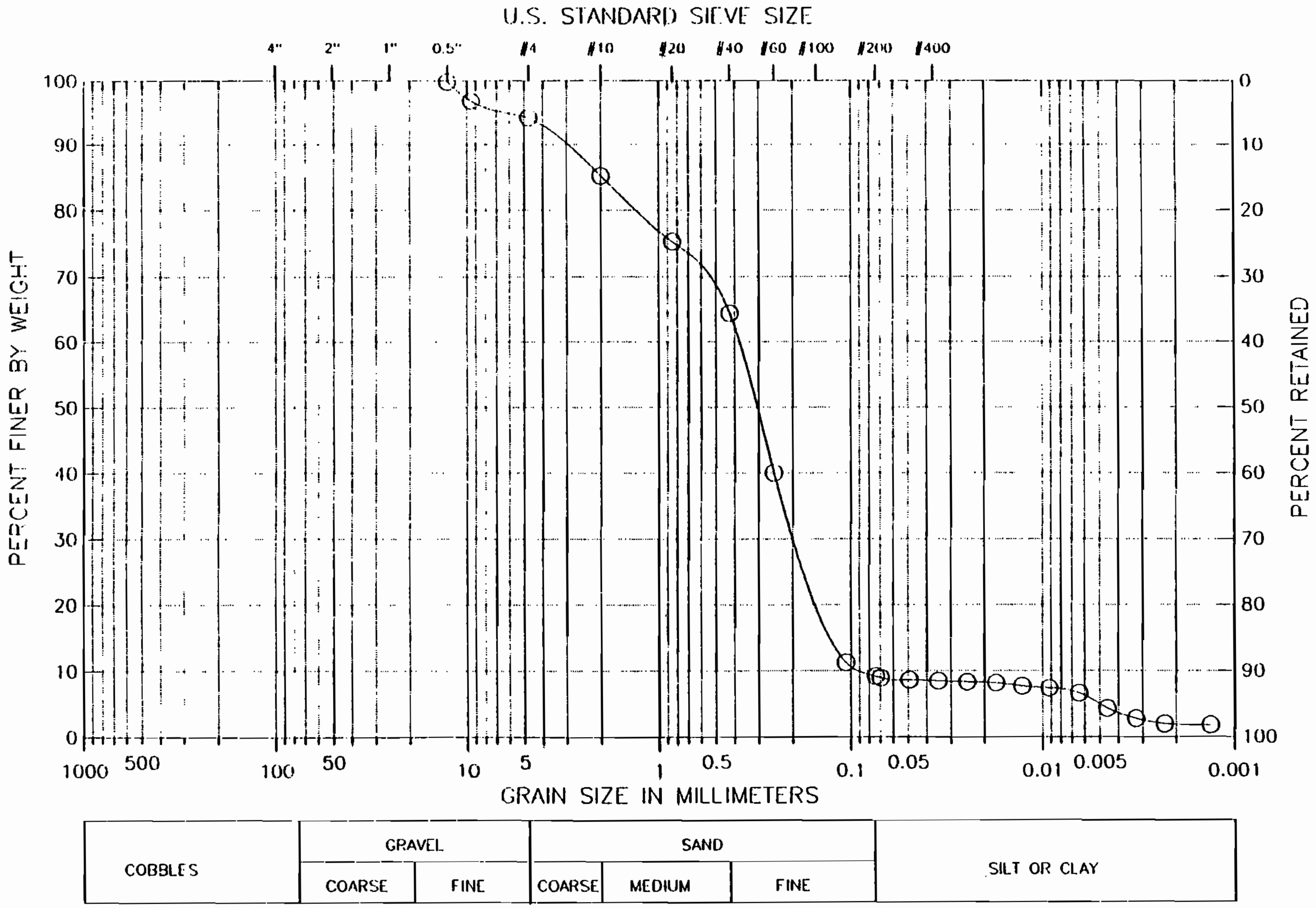
Remarks :
WET DENSITY = 132 PCF; DRY DENSITY =106 PCF WC=24%

Figure 7

Soil Technology, Inc.

Boring No. : EB-2-N
Sample No.: 9102001-08
Tested by : RGS
Filename : 128EB2N

Project : ESE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EB-2-N
Date : Thu Feb 21 1991



Classification :
(SP-SM) Poorly graded sand with silt
Visual Description :

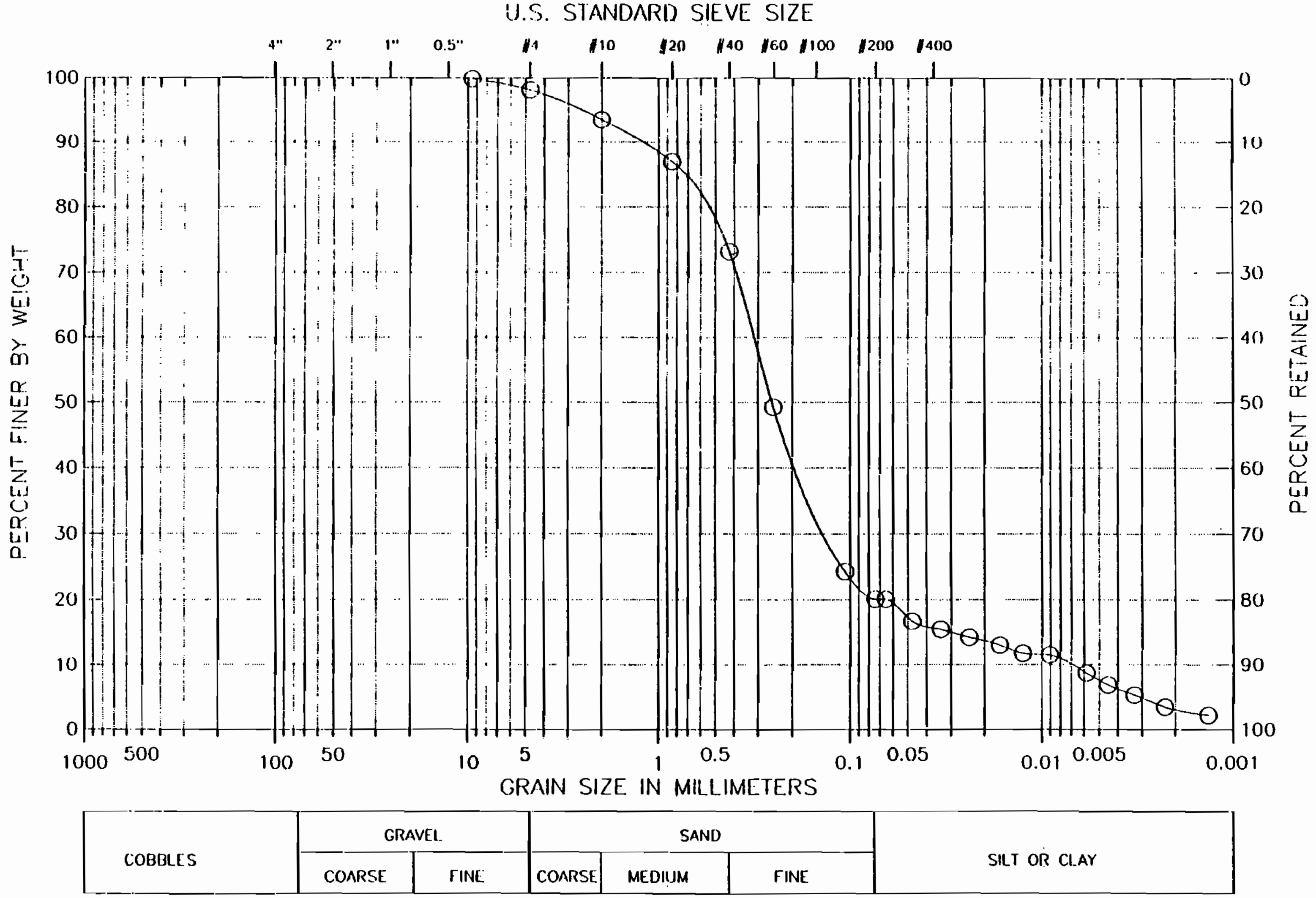
Remarks :
WET DENSITY = 131 PCF; DRY DENSITY =107 PCF WC=23%

Figure 8

Soil Technology, Inc.

Boring No. : EB-11-G
Sample No.: 9101001-09
Tested by : RGS
Filename : 128EB11G

Project : ESE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EB-11-G
Date : Thu Feb 21 1991



Classification :
(SM) Silty sand
Visual Description :

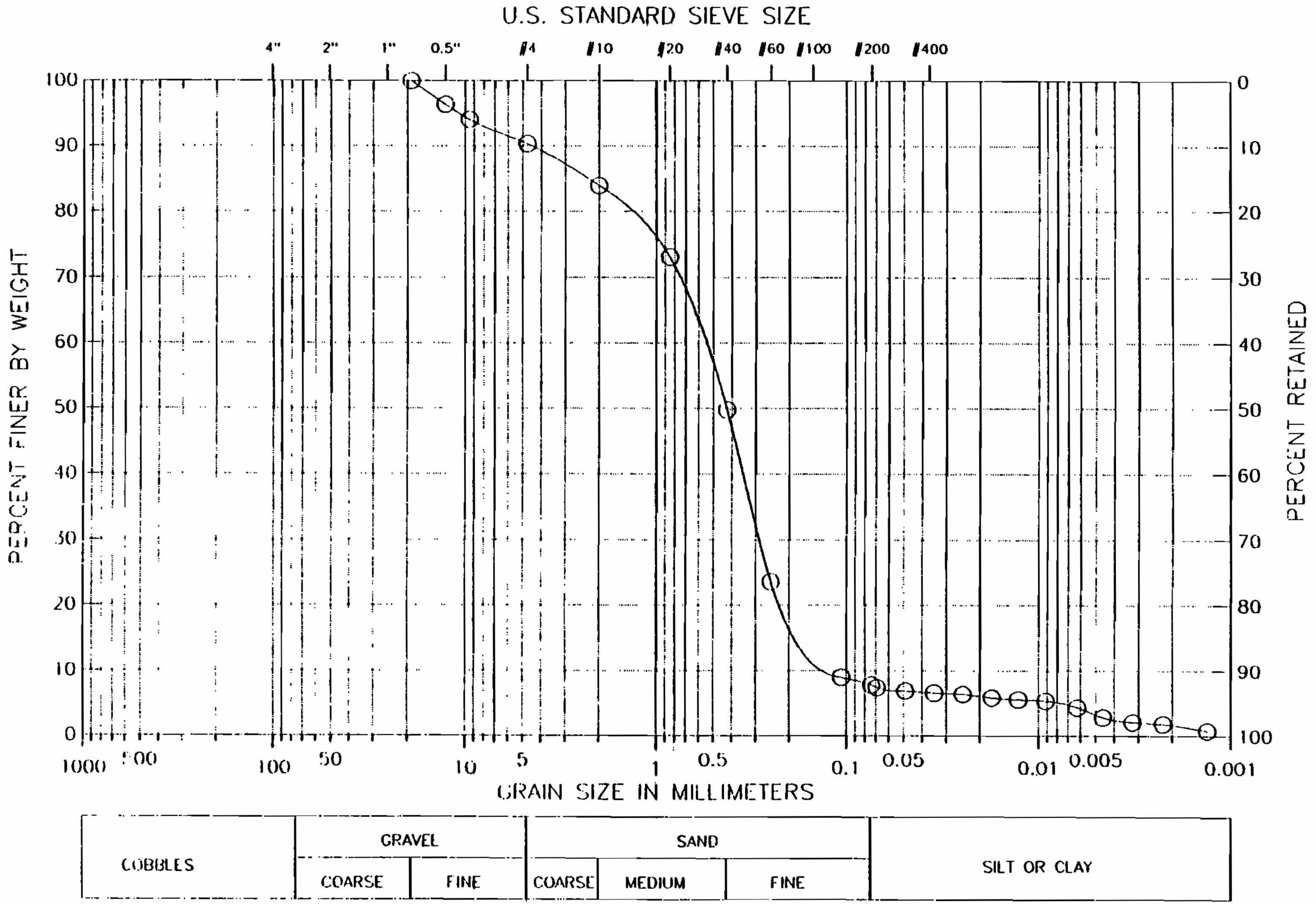
Remarks :
WET DENSITY = 126 PCF; DRY DENSITY =104 PCF;WC=21%

Figure 9

Soil Technology, Inc.

Boring No. : EW-8-E
Sample No.: 9102001-10
Tested by : RGS
Filename : 128EW8E

Project : ESE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EW-8-E
Date : Thu Feb 21 1991



Classification :
(SP-SM) Poorly graded sand with silt
Visual Description :

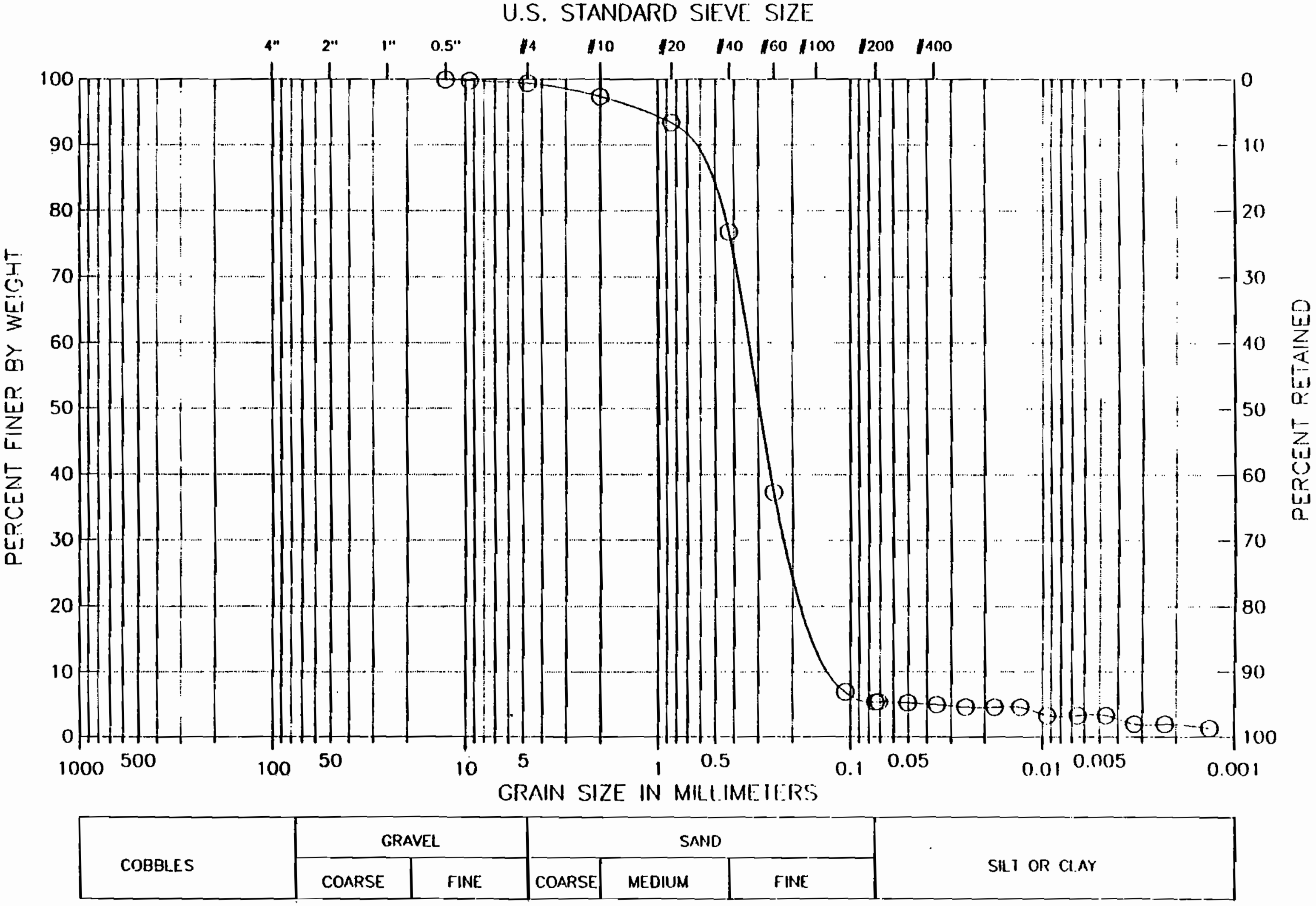
Remarks :
WET DENSITY = 122 PCF; DRY DENSITY =103 PCF WC=18%

Figure 10

Soil Technology, Inc.

Boring No. : EW-6-N
Sample No.: 9101245-12
Tested by : RGS
Filename : 128EW6N

Project : FSE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EW-6-N
Date : Thu Feb 21 1991



Classification :
(SP-SM) Poorly graded sand with silt
Visual Description :

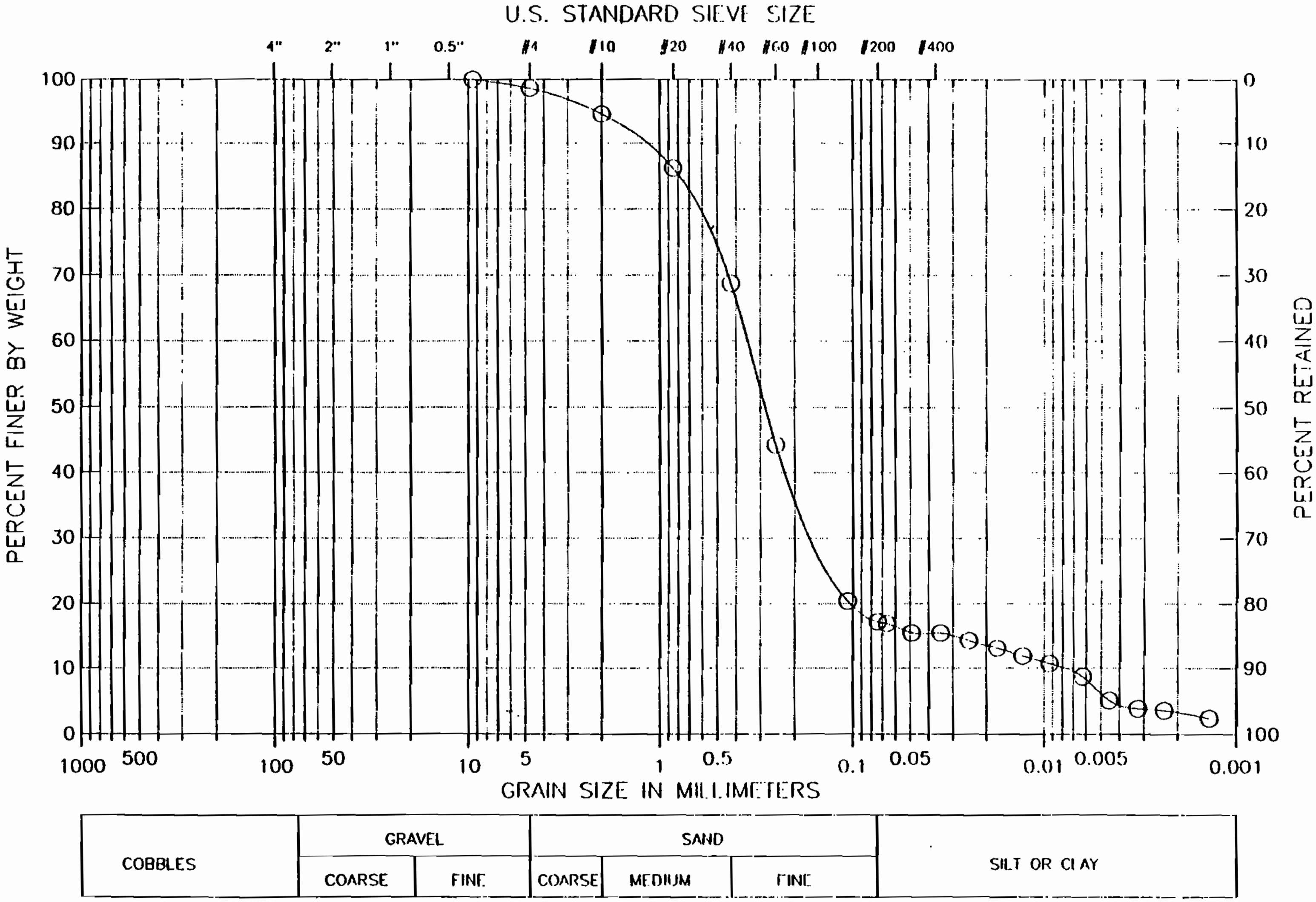
Remarks :
WET DENSITY = 121 PCF; DRY DENSITY =98 PCF; WC=24%

Figure 1

Soil Technology, Inc.

Boring No. : EW-9-G
Sample No.: 9101245-13
Tested by : RGS
Filename : 128EW9G

Project . ESE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EW-9-G
Date : Thu Feb 21 1991



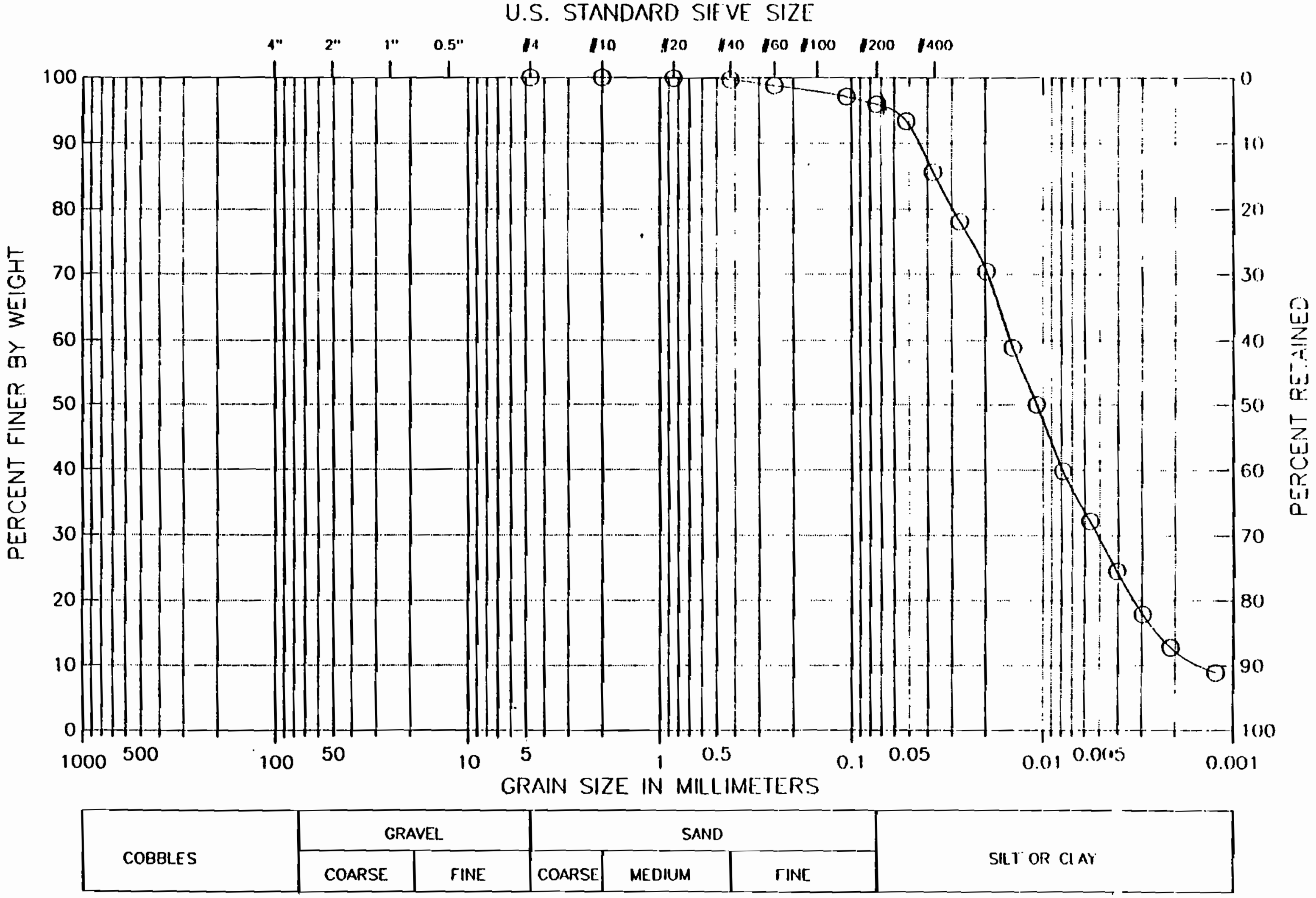
Classification :
(SM) Silty sand
Visual Description :

Remarks :
WET DENSITY = 128 PCF; DRY DENSITY =107 PCF;WC=19%

Figure 2

Soil Technology, Inc.

Boring No. : EW-9-N	Project . ESE, PORT OF OLYMBIA
Sample No.: 9101245-14	Project No.: J-128
Tested by : RGS	Location: CP-S-EW-9-N
Filename : 128EW9N	Date : Fri Feb 22 1991



Classification :
(ML) silt
Visual Description :

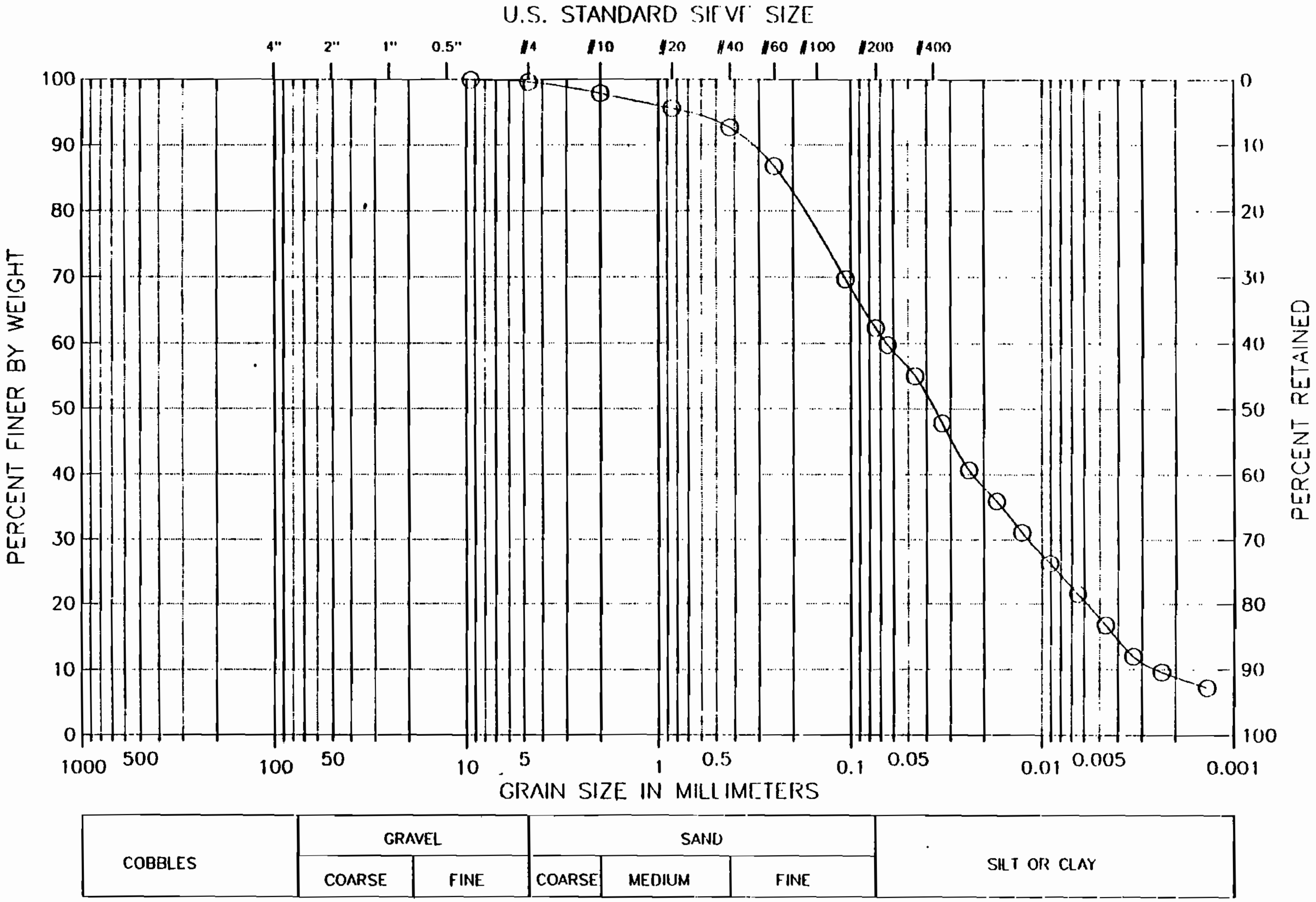
Remarks :
WET DENSITY = 97 PCF; DRY DENSITY = 55 PCF;WC=77%

Figure 3

Soil Technology, Inc.

Boring No. : EW-10-L
Sample No.: 9101245-15
Tested by : RGS
Filename : 128EW10L

Project : ESE, PORT OF OLYMPIA
Project No.: J-128
Location: CP-S-EW-10-L
Date : Fri Feb 22 1991



Classification :
(ML) Sandy silt
Visual Description :

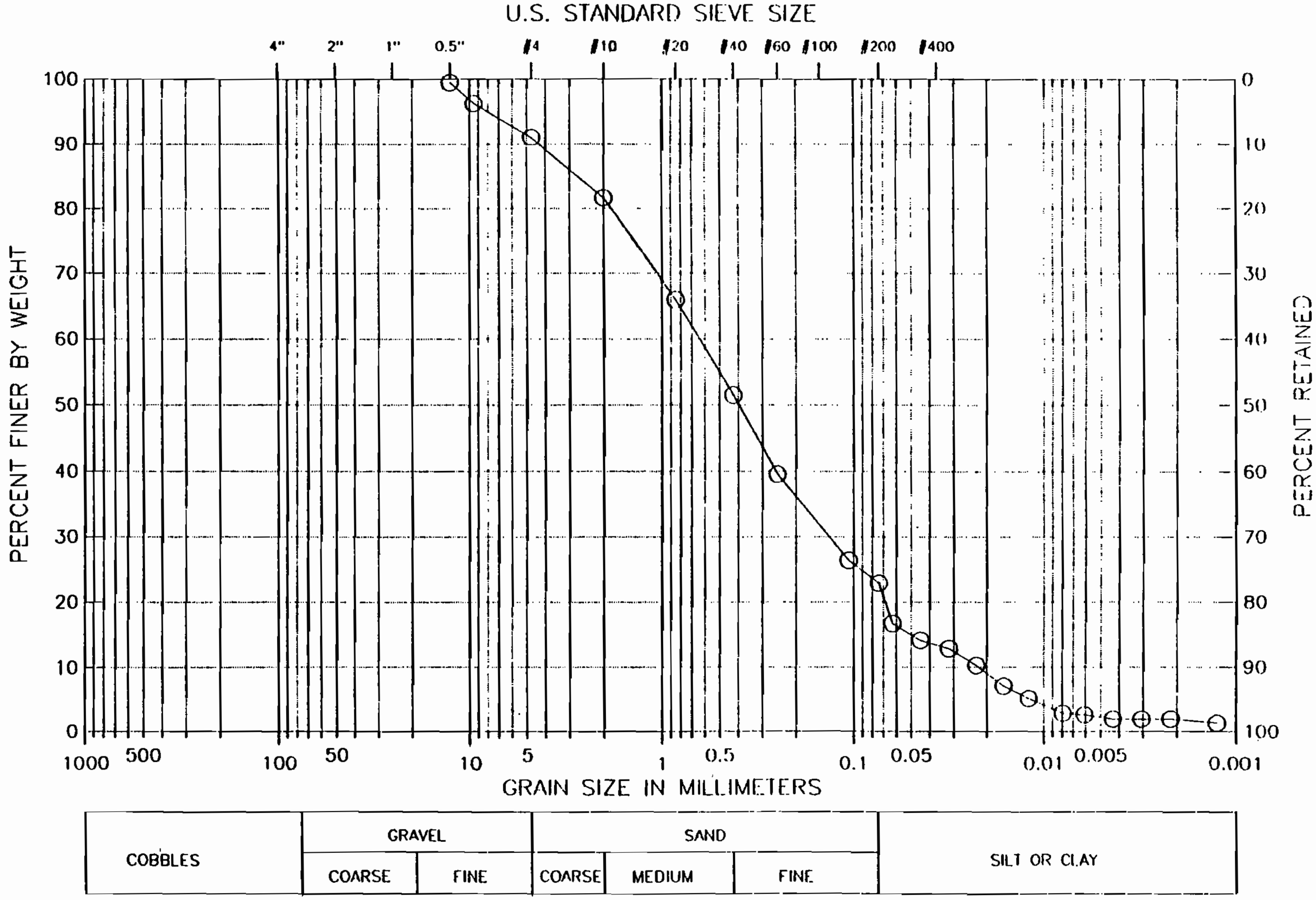
Remarks :
WET DENSITY = 102 PCF; DRY DENSITY = 66 PCF;WC=56%

Figure 4

Soil Technology, Inc.

Boring No. : EW-11-A
Sample No.: 9101245-16
Tested by : RGS
Filename : 128EW11A

Project : ESE, PORT OF OLYMPIA
Project No.: J-128
Location: CP-S-EW-11-A
Date : Thu Feb 21 1991



Classification :
(SM) Silty sand
Visual Description :

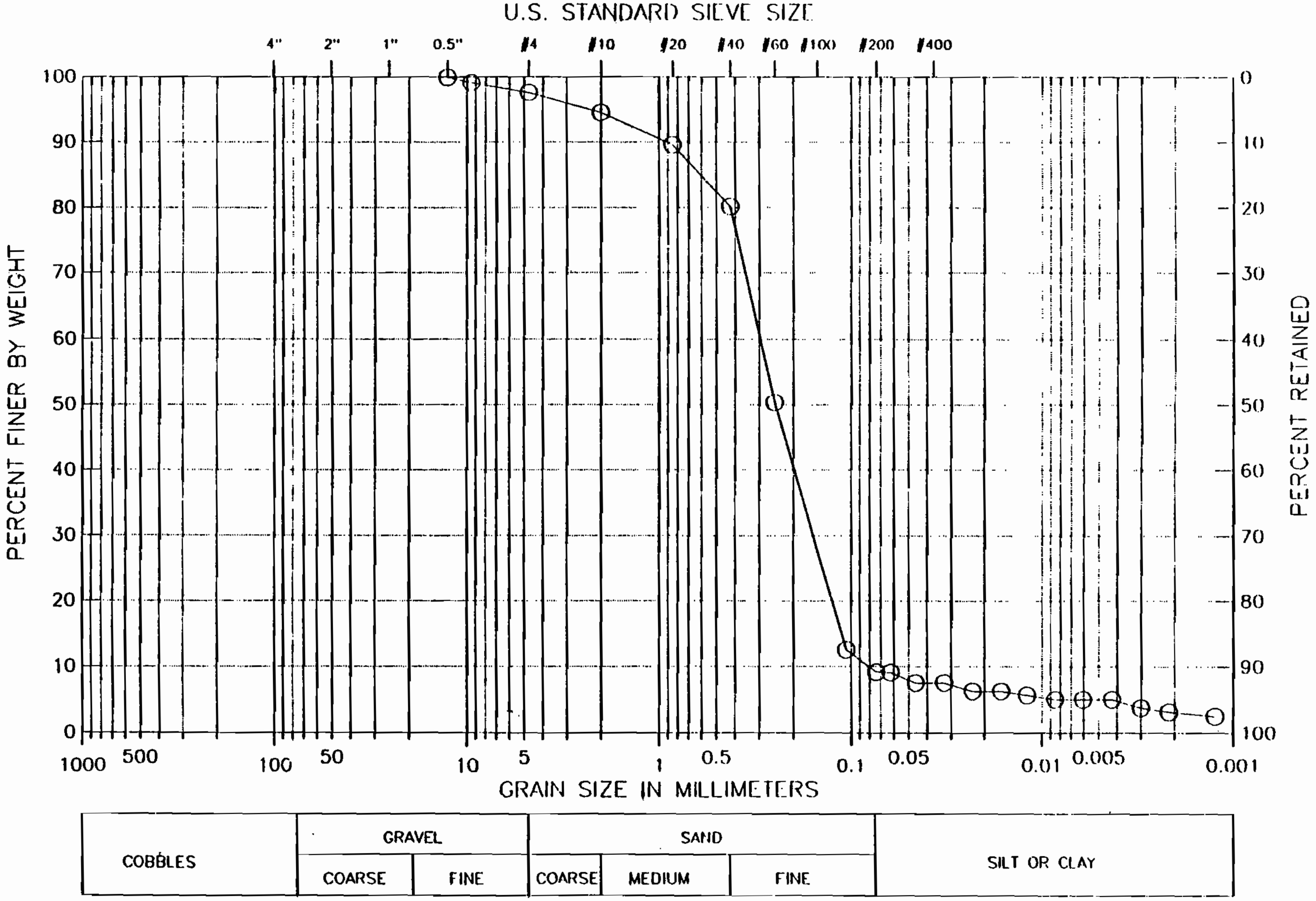
Remarks :
WET DENSITY = 98 PCF; DRY DENSITY =69 PCF; WC=42 %

Figure 5

Soil Technology, Inc.

Boring No. : EW-11-I
Sample No.: 9101245-17
Tested by : RGS
Filename : 128EW111

Project : ESE, PORT OF OLYMPIA
Project No.: J-128
Location: CP-S-EW-11-I
Date : Thu Feb 21 1991



Classification :
(SP-SM) Poorly graded sand with silt
Visual Description :

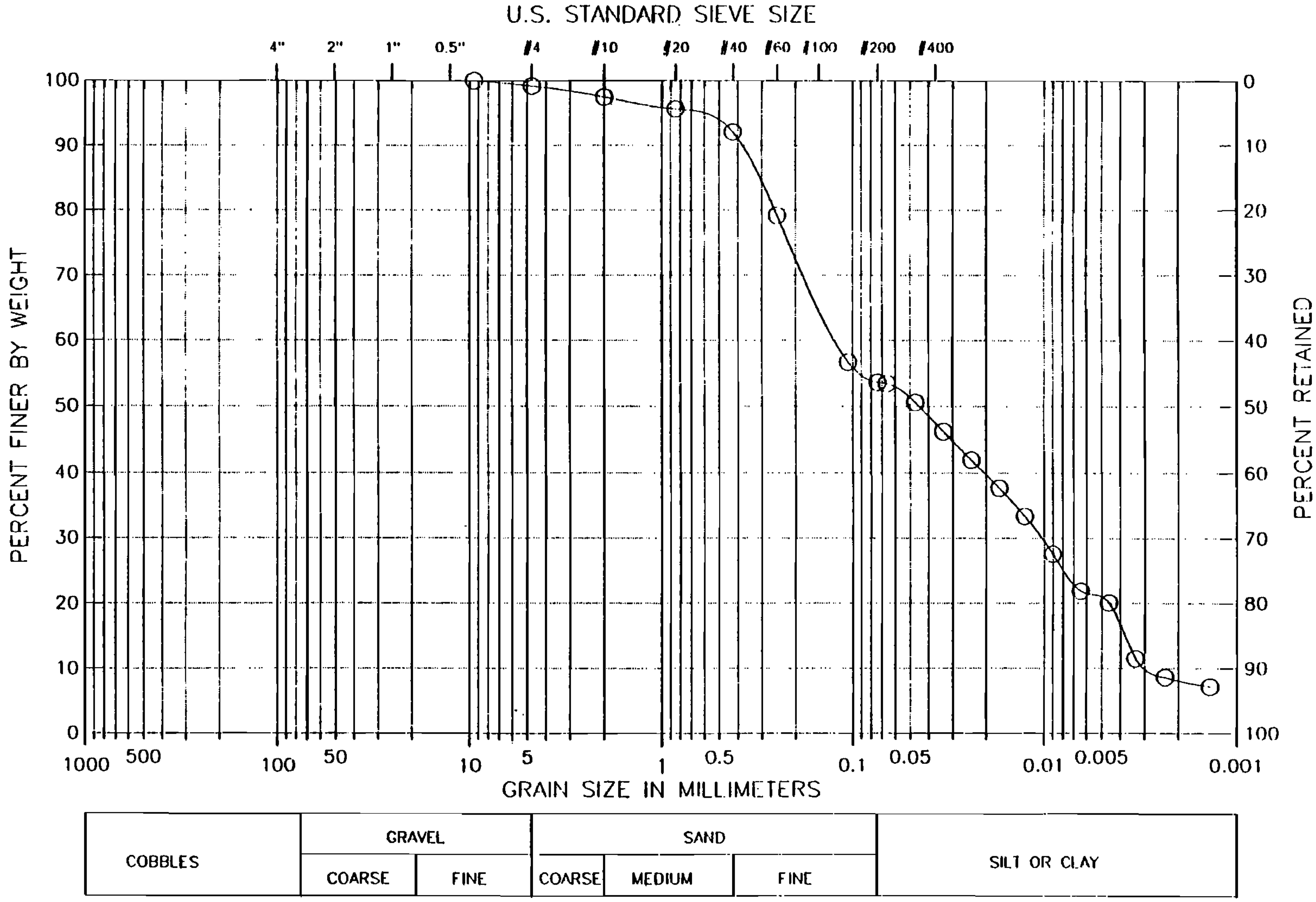
Remarks :
WET DENSITY = 131 PCF; DRY DENSITY =101 PCF;WC=29%

Figure 6

Soil Technology, Inc.

Boring No. : EW-11-M
Sample No.: 9101245-18
Tested by : RGS
Filename : 128EW11M

Project . ESE, PORT OF OLYMBIA
Project No.: J-128
Location: CP-S-EW-11-M
Date : Fri Feb 22 1991



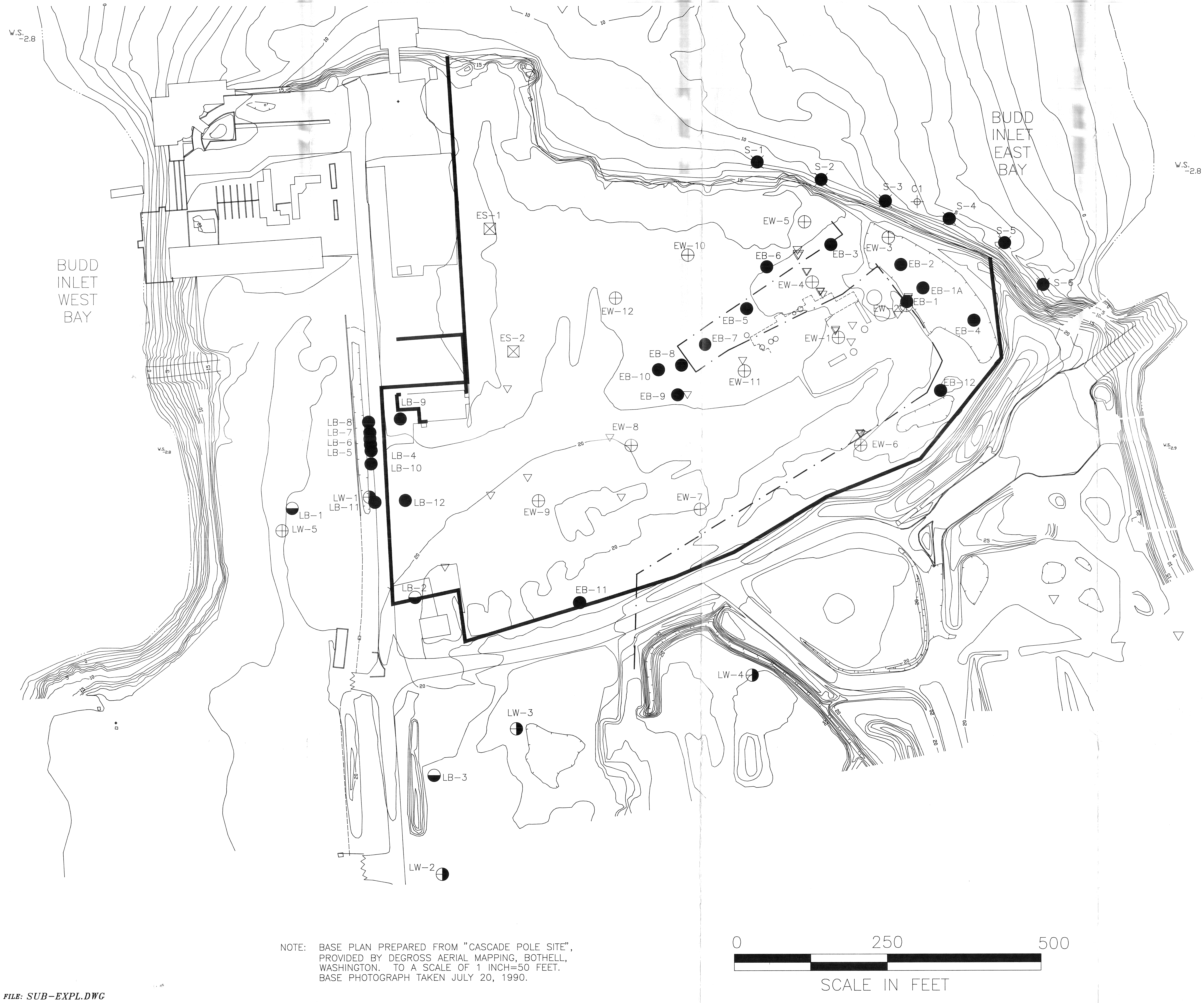
Classification :
(ML) Sandy silt
Visual Description :

Remarks :
WET DENSITY = 108 PCF; DRY DENSITY = 72 PCF;WC=49%

Figure 7

APPENDIX B

SITE MAPS



NOTE: BASE PLAN PREPARED FROM "CASCADE POLE SITE", PROVIDED BY DEGROSS AERIAL MAPPING, BOTHELL, WASHINGTON. TO A SCALE OF 1 INCH=50 FEET. BASE PHOTOGRAPH TAKEN JULY 20, 1990.

FILE: SUB-EXPL.DWG

LEGEND

— · —	1930–1980 SHORELINE
▬	APPROXIMATE FORMER LEASED PROPERTY BOUNDARY
EB-7 ●	BORING COMPLETED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE), IN JANUARY 1991.
LB-1 ◒	BORING COMPLETED BY LANDAU ASSOCIATES, INC. IN JANUARY, AND OCTOBER, 1991.
ES-1 ☒	LOCATION OF SURFICIAL SOIL SAMPLE OBTAINED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE), IN MARCH 1991.
LW-1 ◑	LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC. IN JANUARY 1991.
EW-9 ⊕	LOCATION OF MONITORING WELL INSTALLED BY ENVIRONMENTAL SCIENCE & ENGINEERING, (ESE), IN JANUARY 1991. EW-12 INSTALLED IN OCTOBER, 1991.
S-1 ●	LOCATION OF HAND AUGER BORING COMPLETED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE), IN AUGUST 1991.
C1 ⌖	LOCATION OF BORING COMPLETED BY LANDAU ASSOCIATES, INC. IN JULY 1991.
—··· —	BUDD INLET TIDAL ELEVATION (-2.8 FEET MLLW) AT TIME OF AERIAL PHOTOGRAPH.
~ 20 ~	GROUND SURFACE ELEVATION (FEET MLLW).

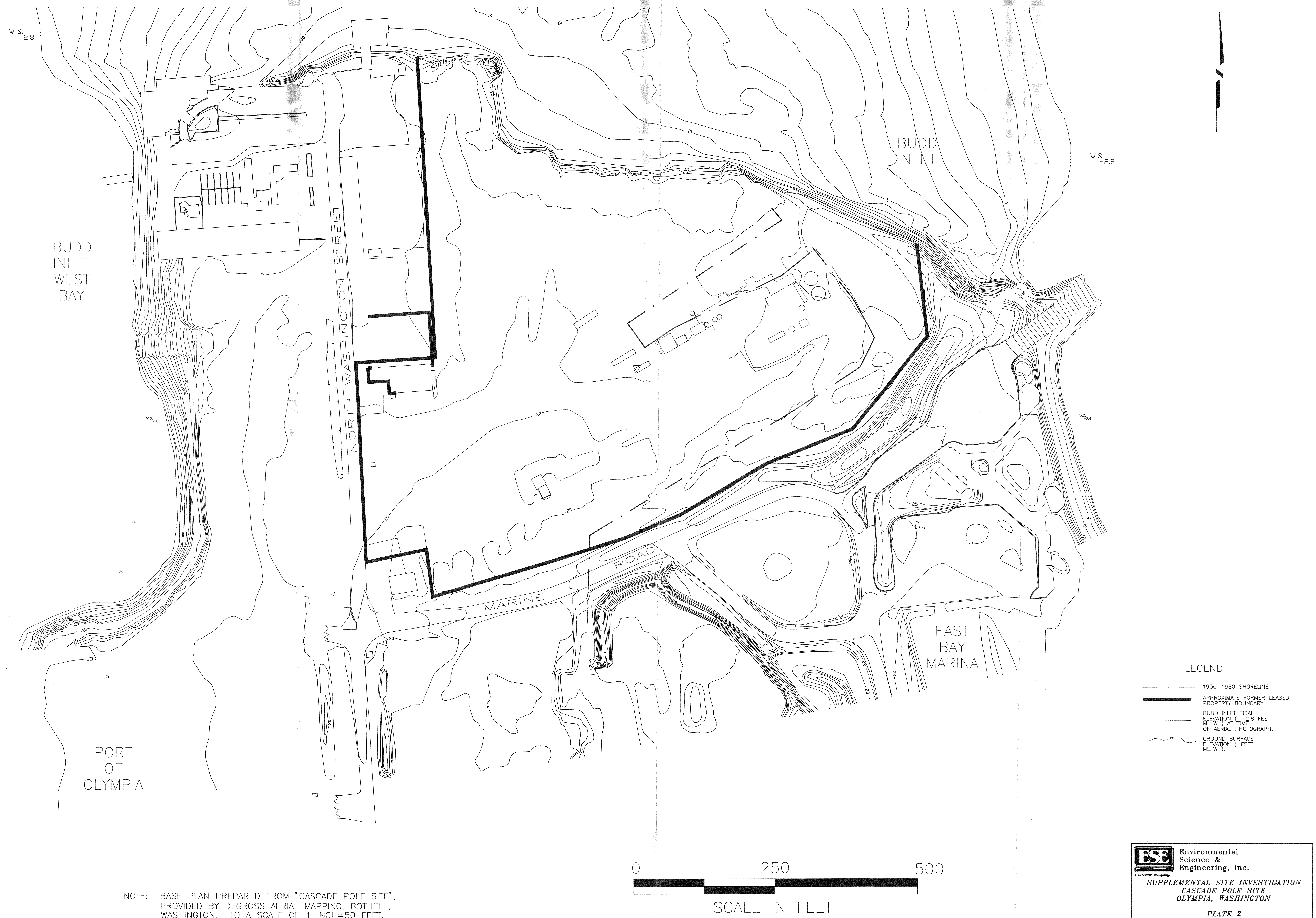
ESE Environmental Science & Engineering, Inc.
A CILCORP Company.

SUPPLEMENTAL SITE INVESTIGATION
CASCADE POLE SITE
OLYMPIA, WASHINGTON

PLATE 1

SUBSURFACE EXPLORATION MAP

SCALE: AS SHOWN	REVISION: 0	DRAWN BY: Marcos Peroza	DATE: 7/10/92



NOTE: BASE PLAN PREPARED FROM "CASCADE POLE SITE", PROVIDED BY DEGROSS AERIAL MAPPING, BOTHELL, WASHINGTON. TO A SCALE OF 1 INCH=50 FEET. BASE PHOTOGRAPH TAKEN JULY 20, 1990.

FILE: POLE-2.DWG

ESE
A CILCORP Company.

Environmental
Science &
Engineering, Inc.

SUPPLEMENTAL SITE INVESTIGATION
CASCADE POLE SITE
OLYMPIA, WASHINGTON

PLATE 2

SITE TOPOGRAPHIC MAP

SCALE: AS SHOWN	REVISION:	DRAWN BY:	DATE: 7/10/92

APPENDIX C

SLUG TEST RESULTS

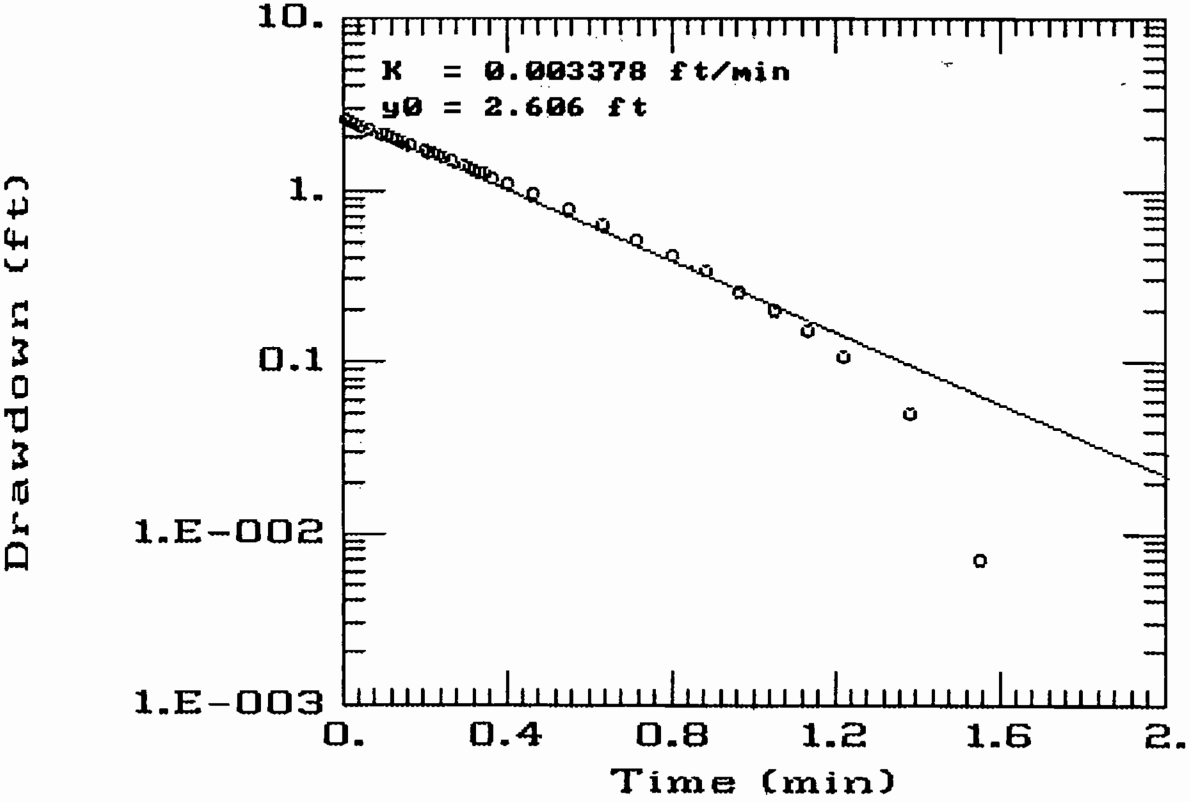
C.1 Introduction

As discussed in Section 3.2.5, two data analysis methods, Bouwer and Rice (1976) and Hvorslev (1951), were used to evaluate the drawdown data collected during slug tests in Shallow and Lower Aquifer monitoring wells. Tables 3-8 and 3-9 present the calculated hydraulic conductivities for all of the slug tests. This appendix presents graphs of the drawdown data and calculated hydraulic conductivities based on "best fit" matching of the data to the data evaluation type curves. The appendix is divided into two sections: (1) evaluation of data from existing wells based on Bouwer and Rice (1976), and (2) evaluation of data from EW-series and existing wells based on Hvorslev (1951). The remaining analysis results are shown in Tables 3-8 and 3-9.

Existing Monitoring Wells

Data Analyzed based on Bouwer and Rice (1976)

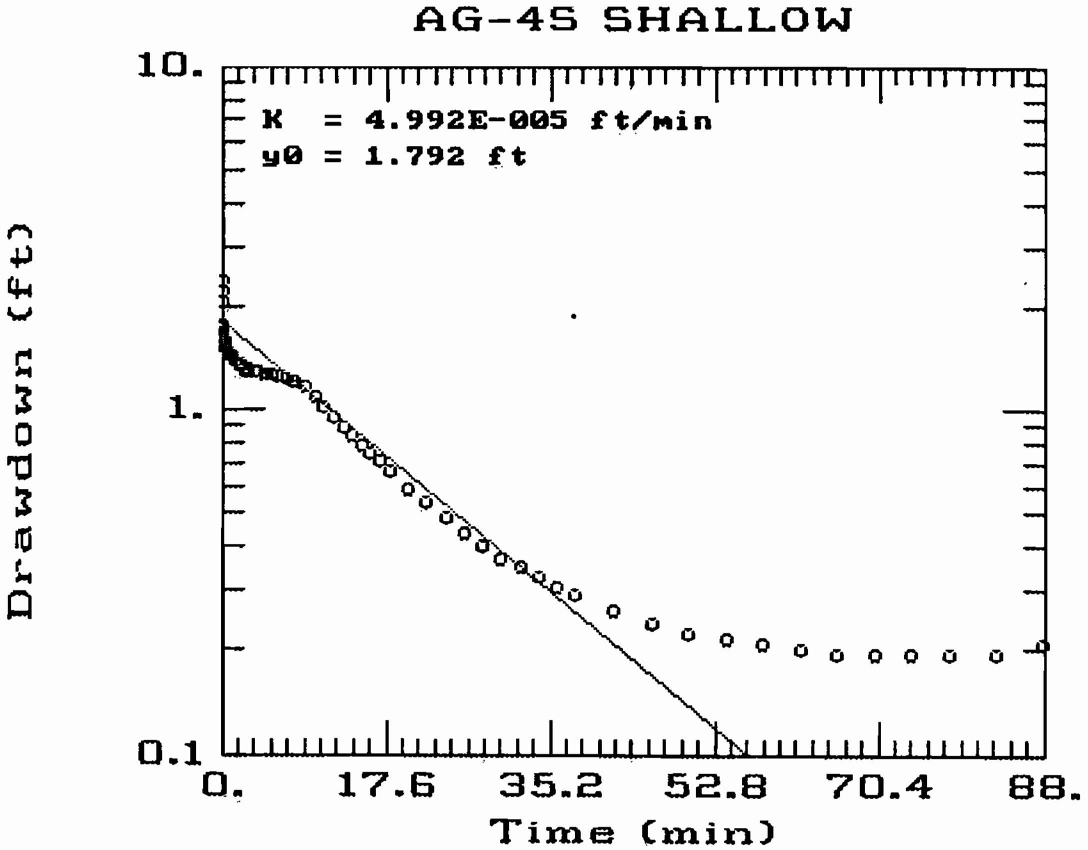
AG-2S SHALLOW



AQTESOLV

GERAGHTY
& MILLER, INC.

Modeling Group



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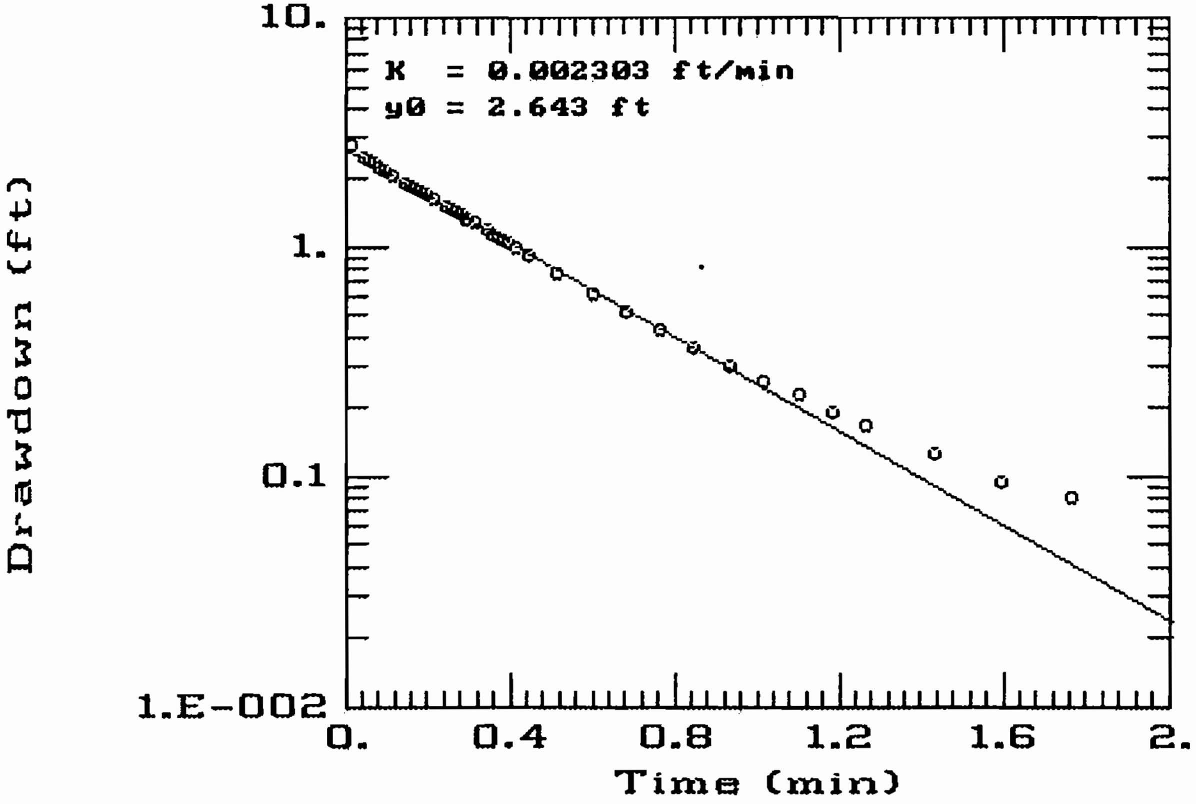
S-4 SHALLOW



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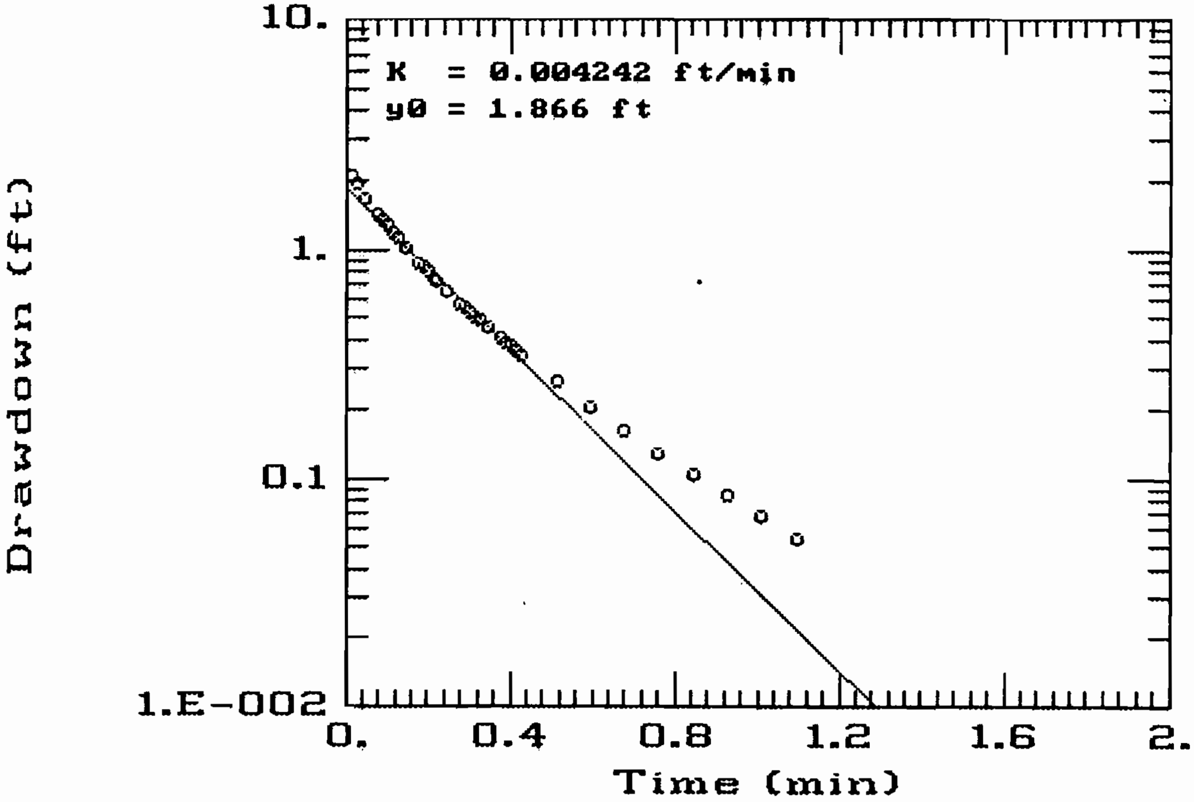
SP-1 SHALLOW



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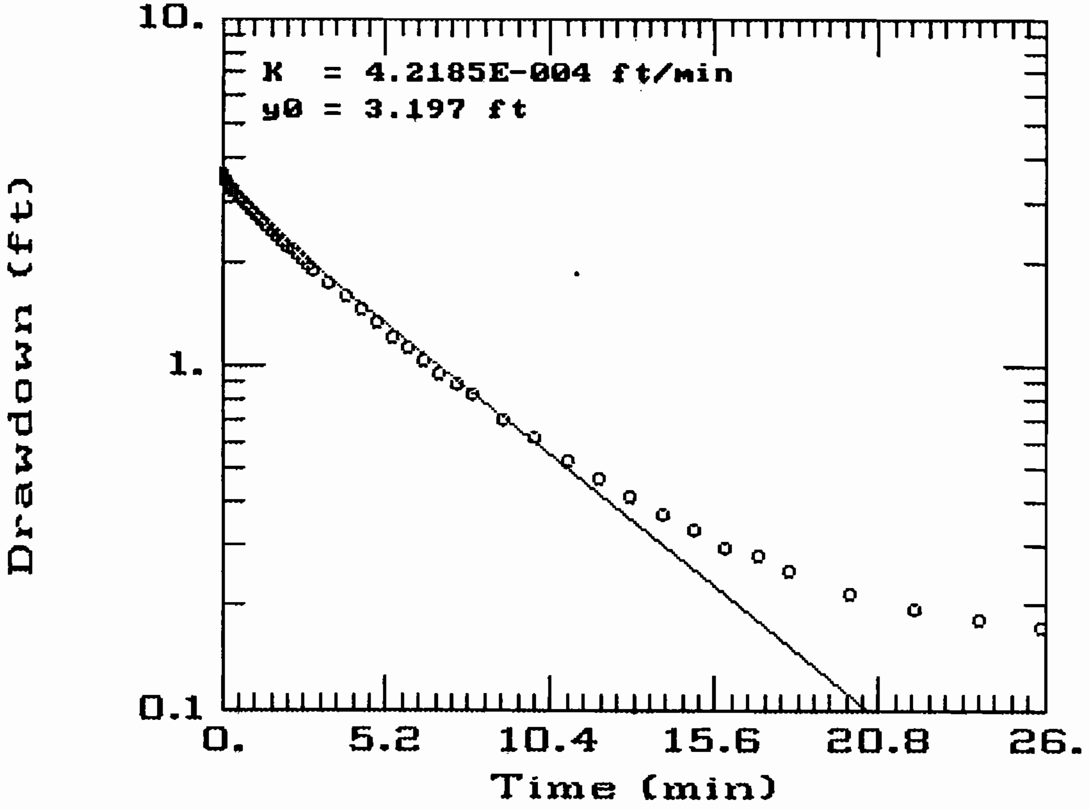
AG-15D DEEP



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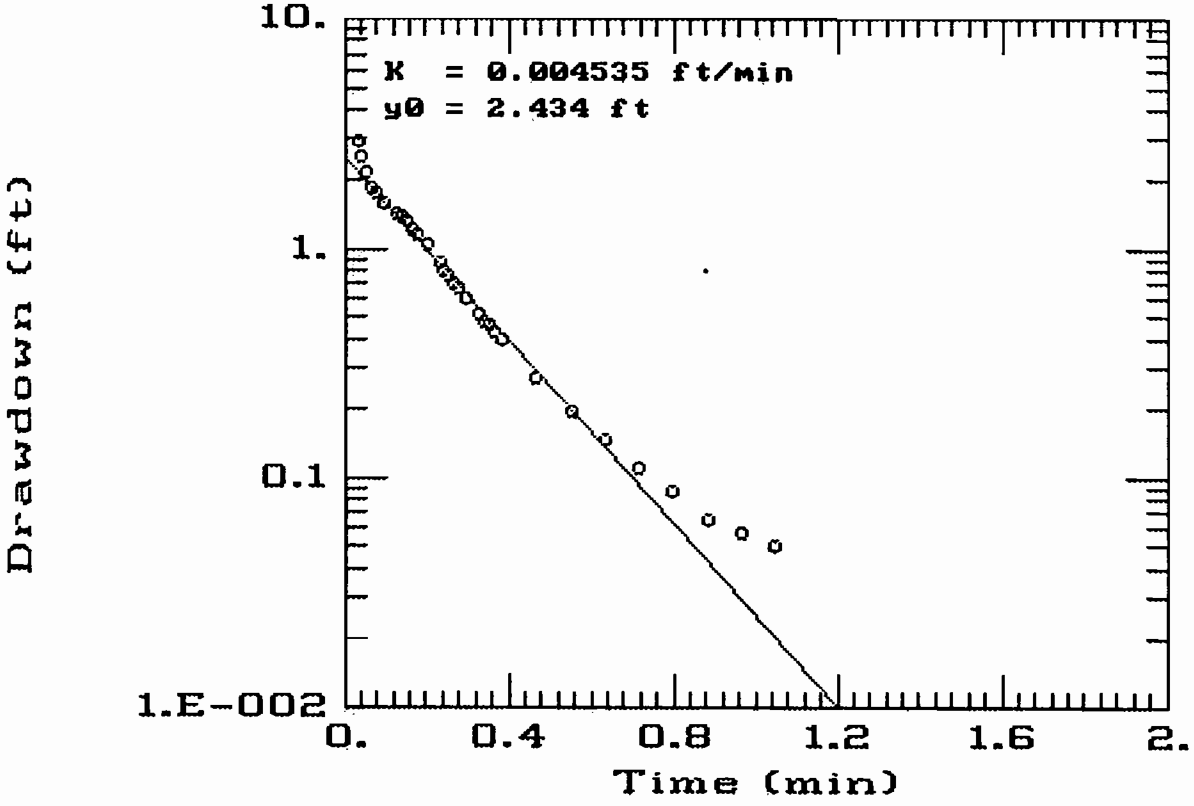
AG-15S SHALLOW



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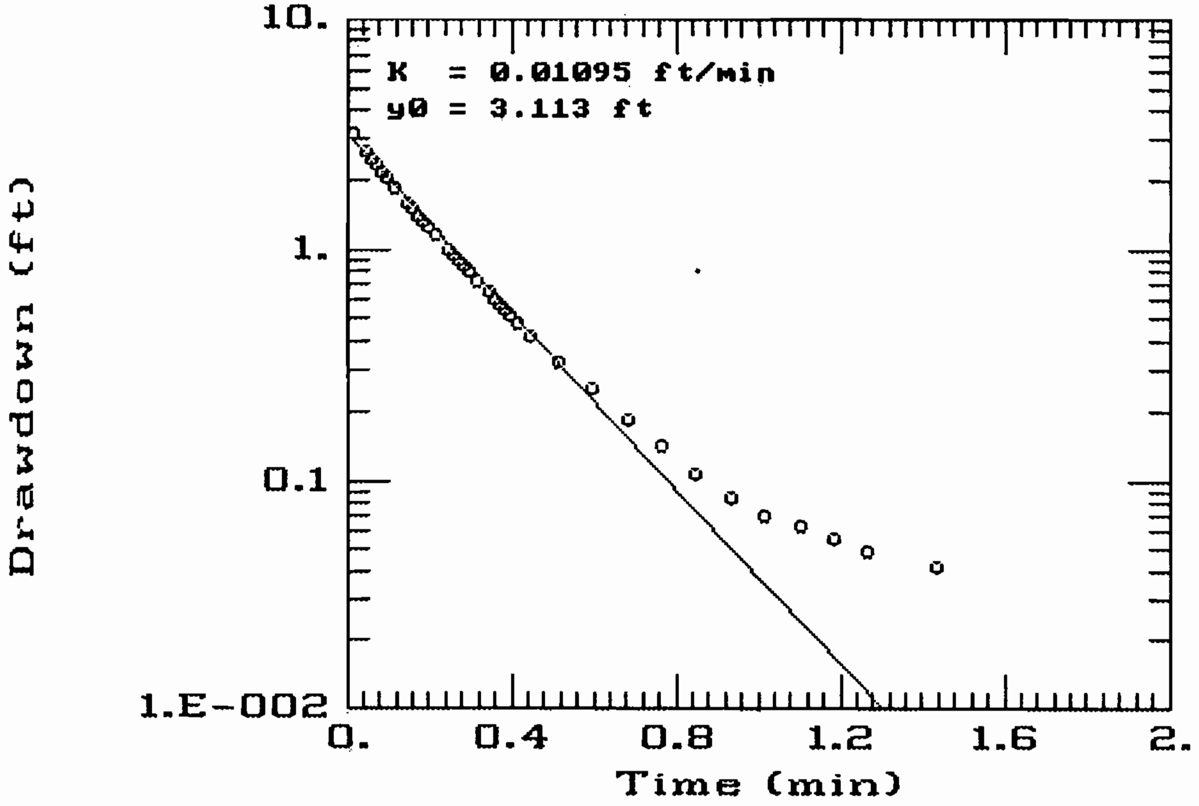
Modeling Group

AG-13D DEEP



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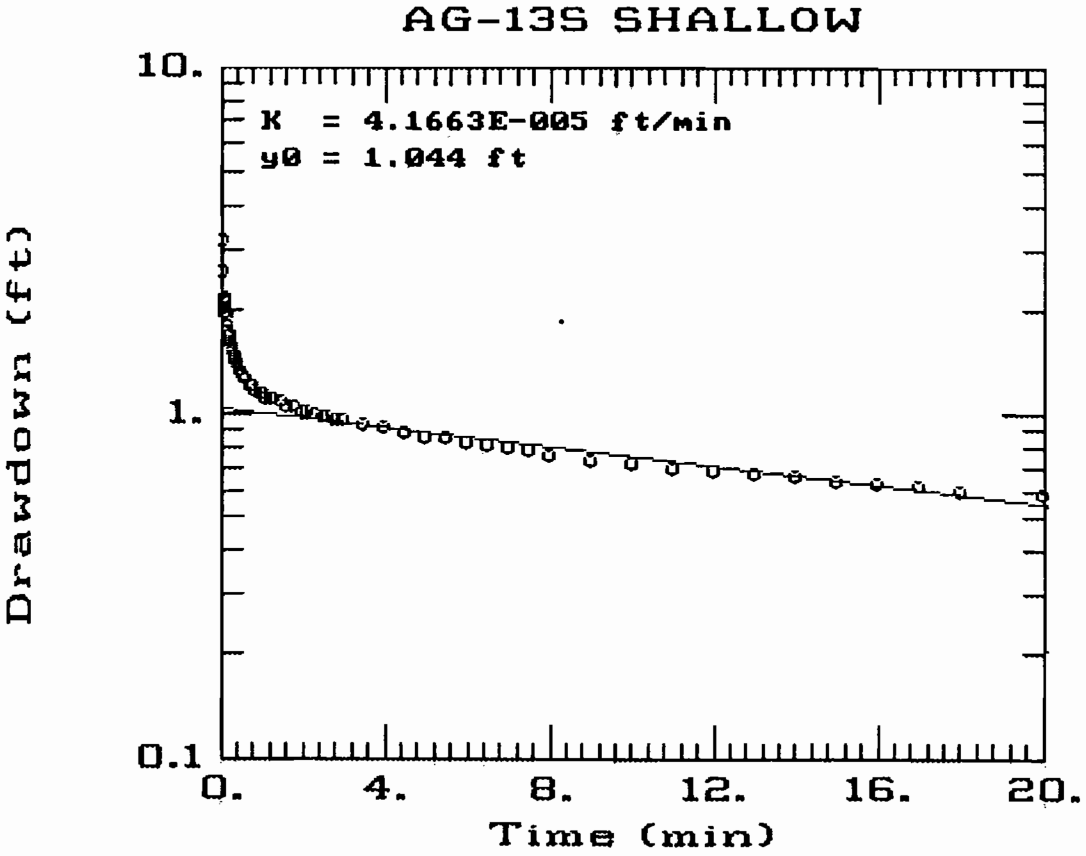
& MILLER, INC.
Modeling Group



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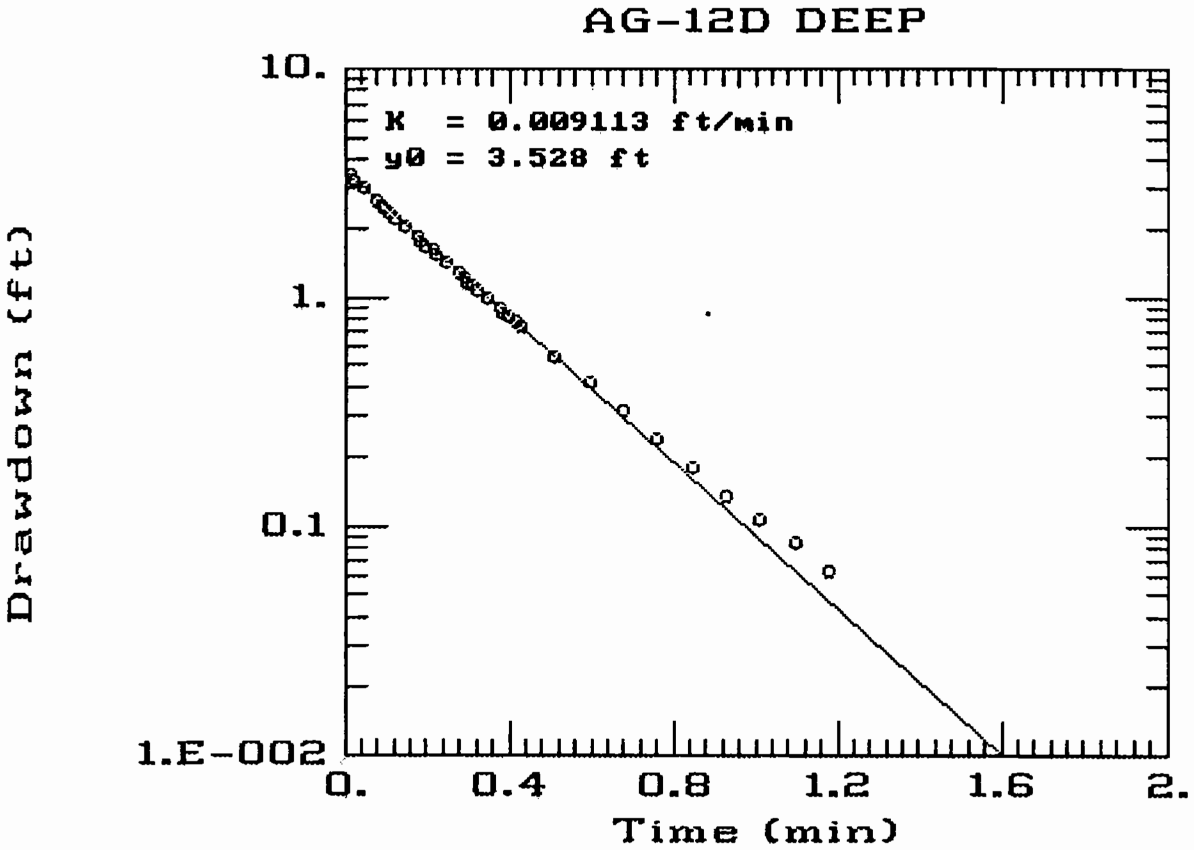
GERAGHTY
& MILLER, INC.
Modeling Group



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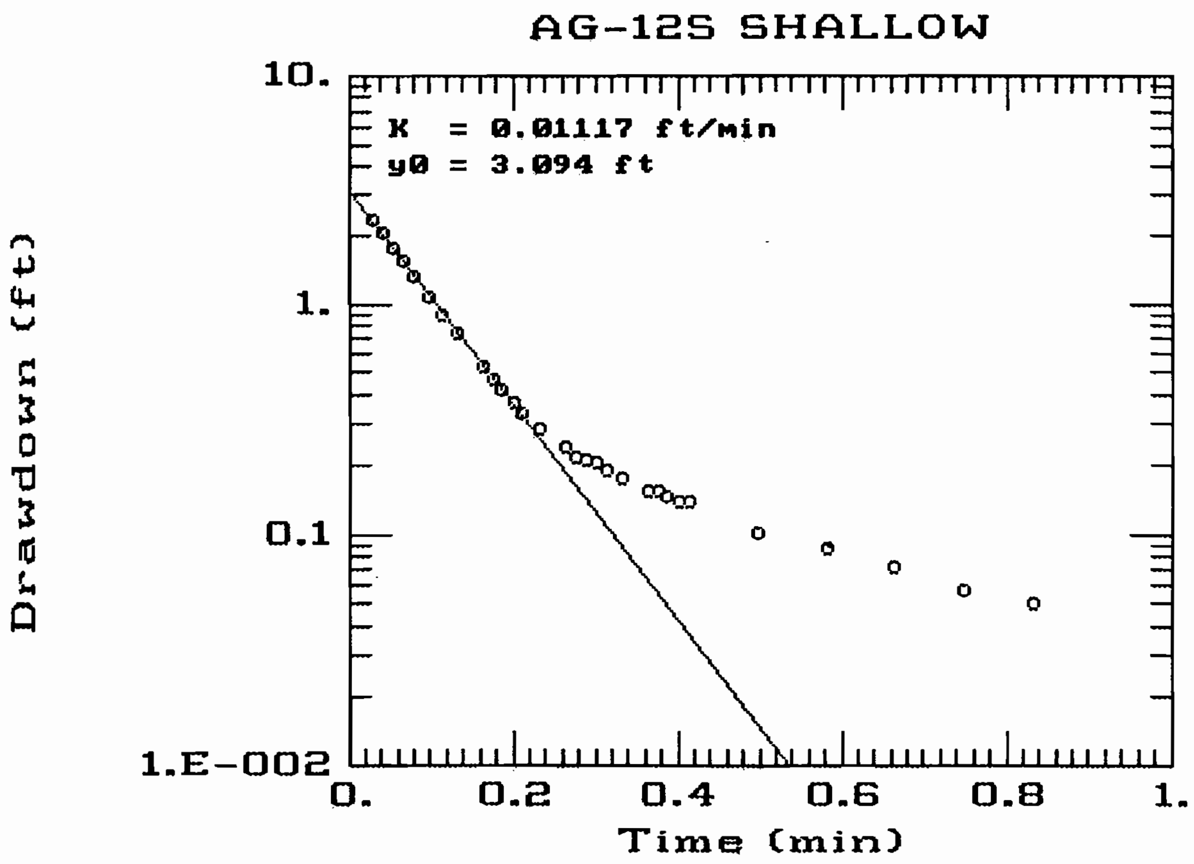
& MILLER, INC.
Modeling Group



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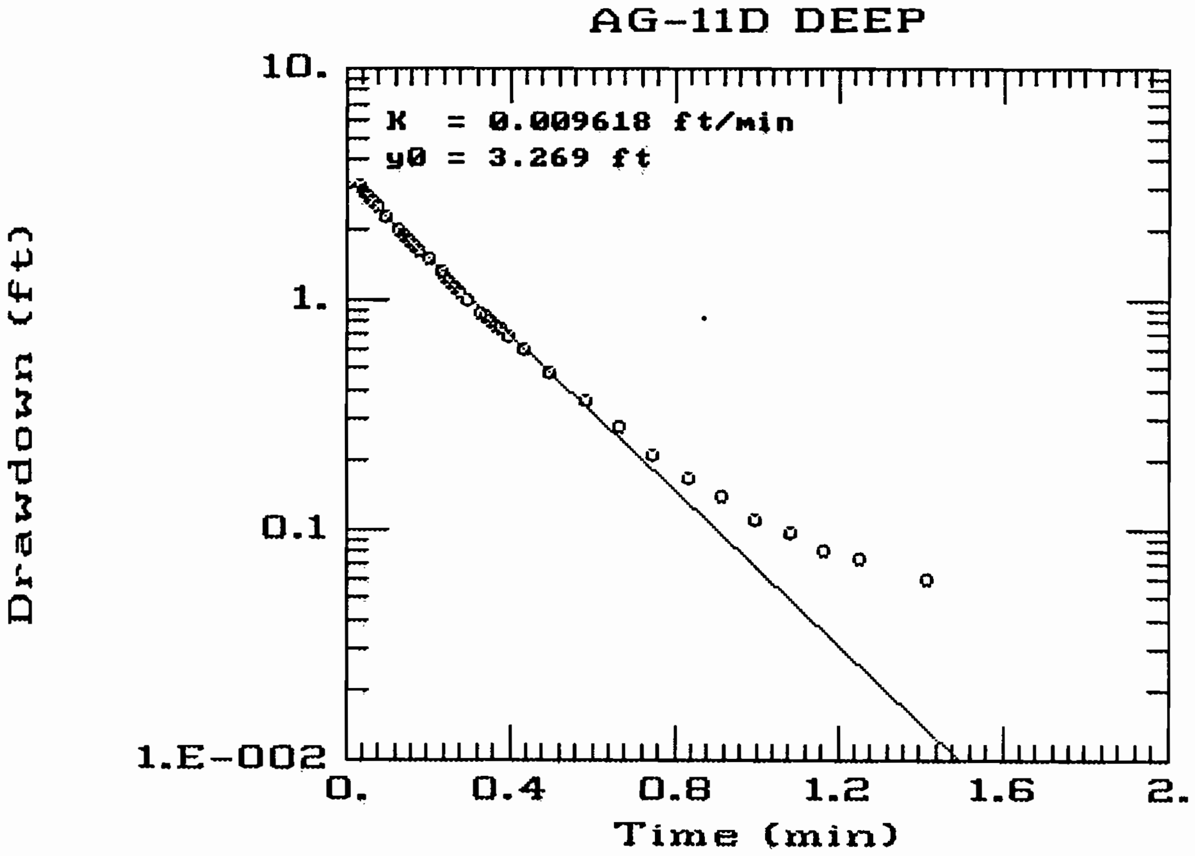
& MILLER, INC.
Modeling Group



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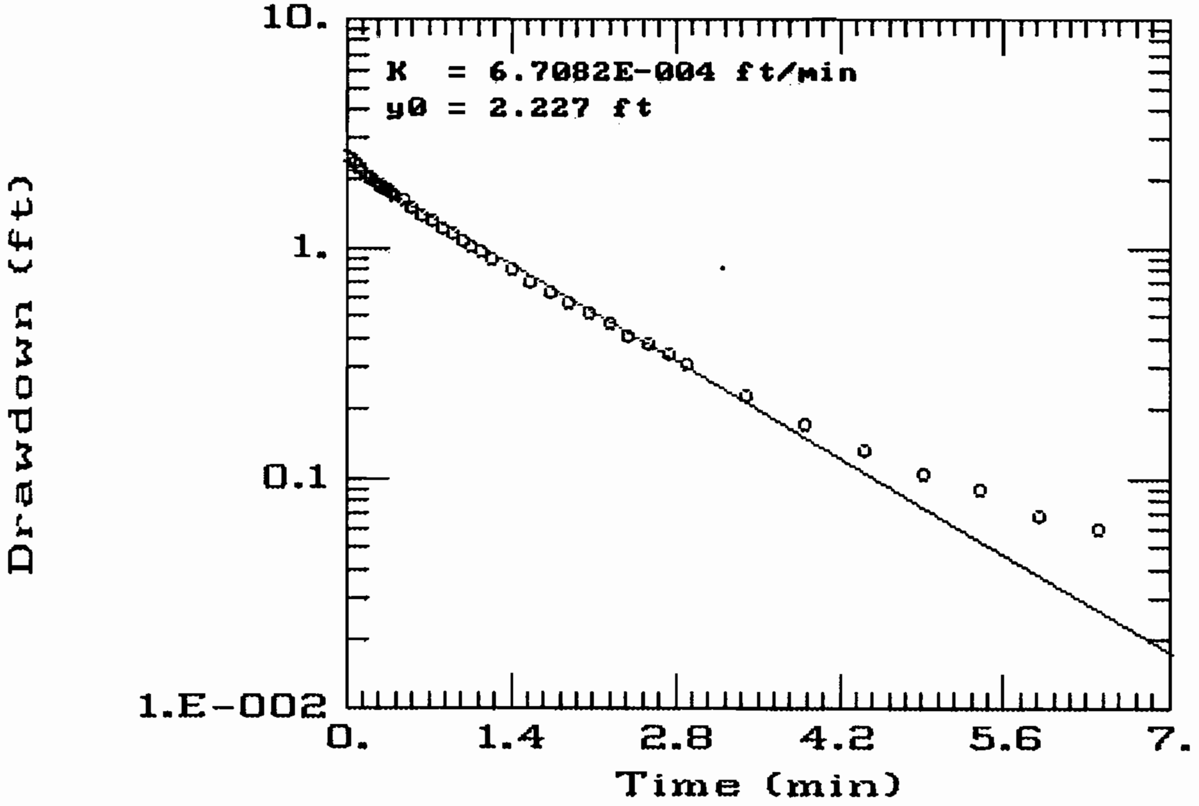
Modeling Group

AG-11S SHALLOW



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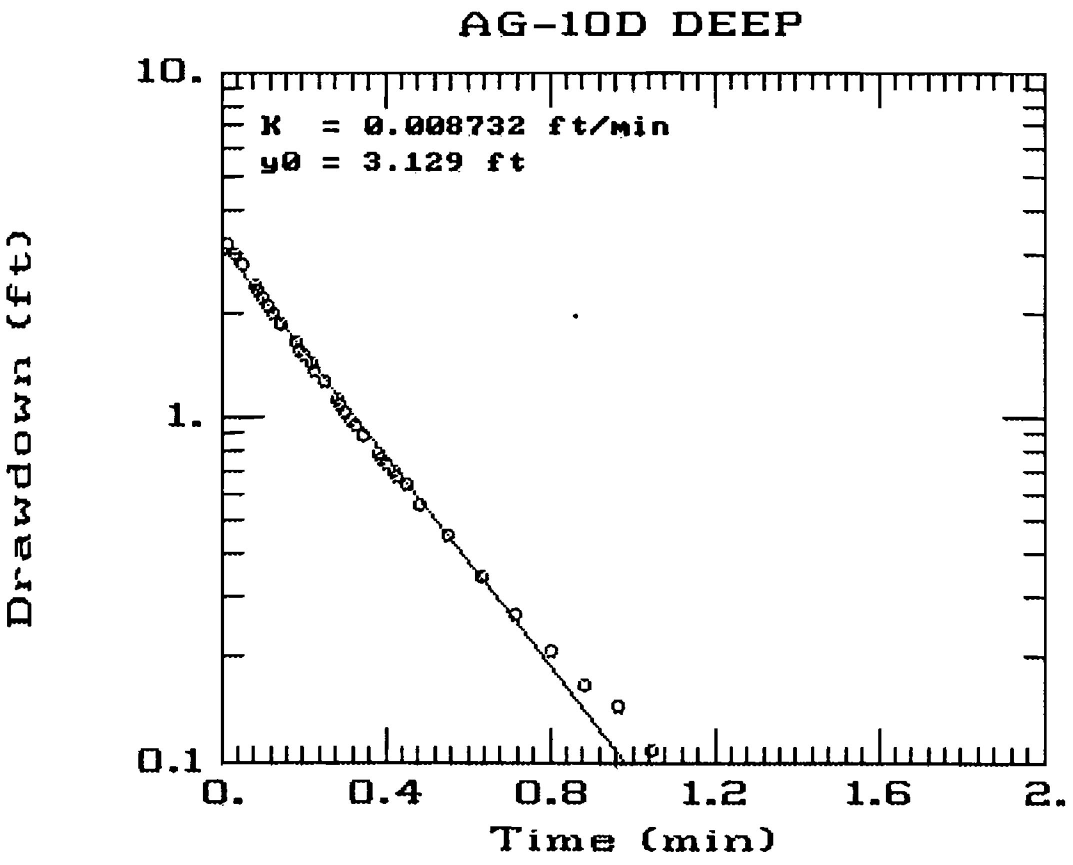
GERAGHTY
& MILLER, INC.
Modeling Group



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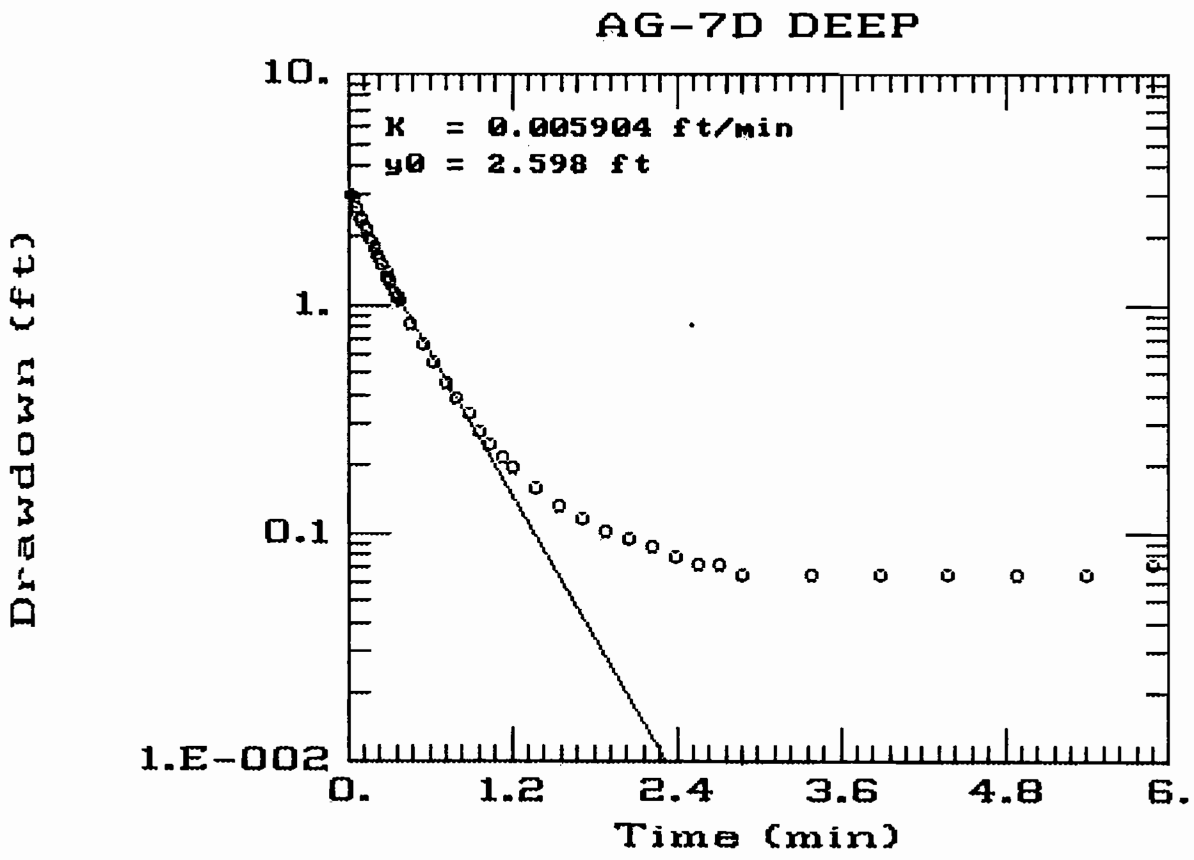
& MILLER, INC.

Modeling Group



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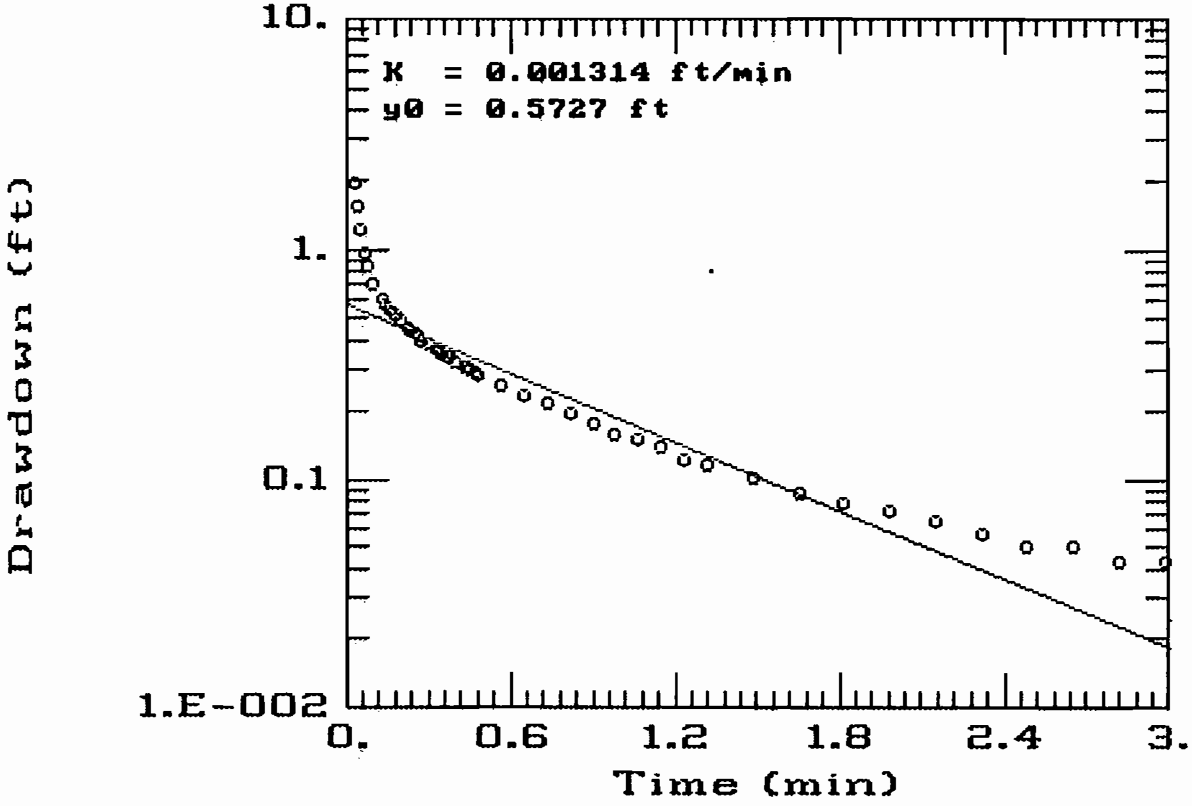
Modeling Group

AG-7S SHALLOW



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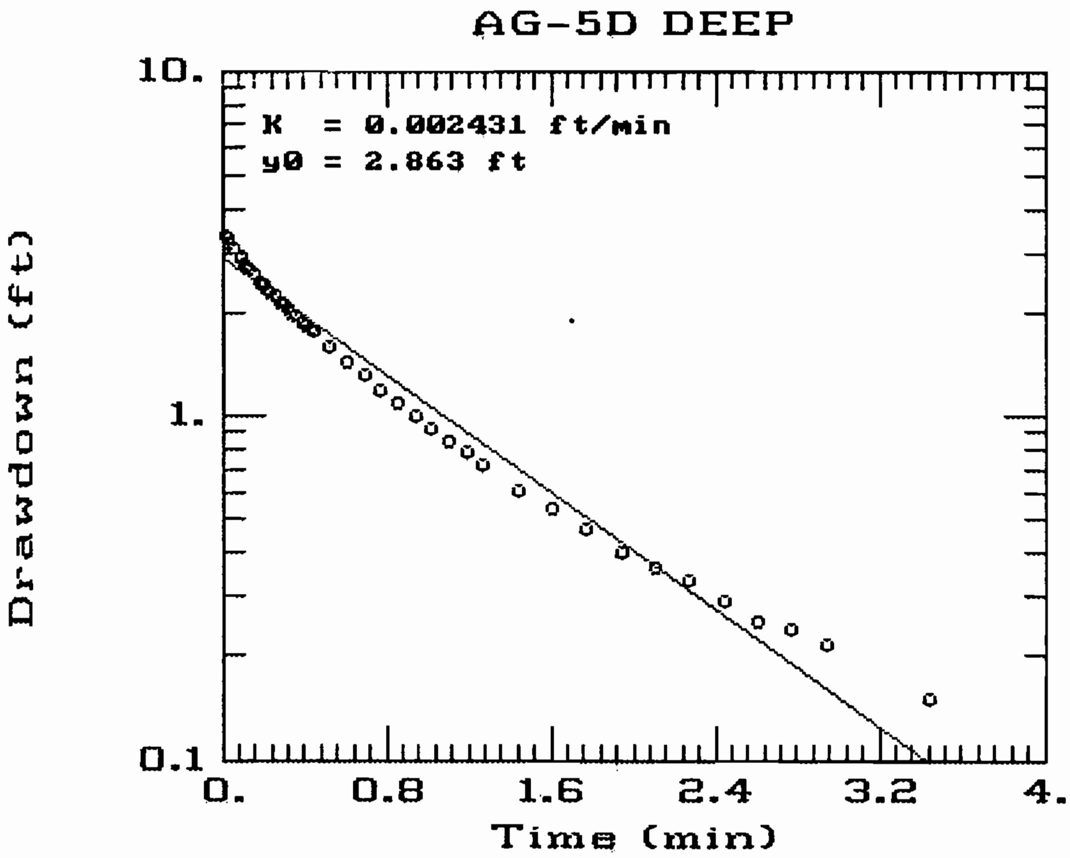
Modeling Group



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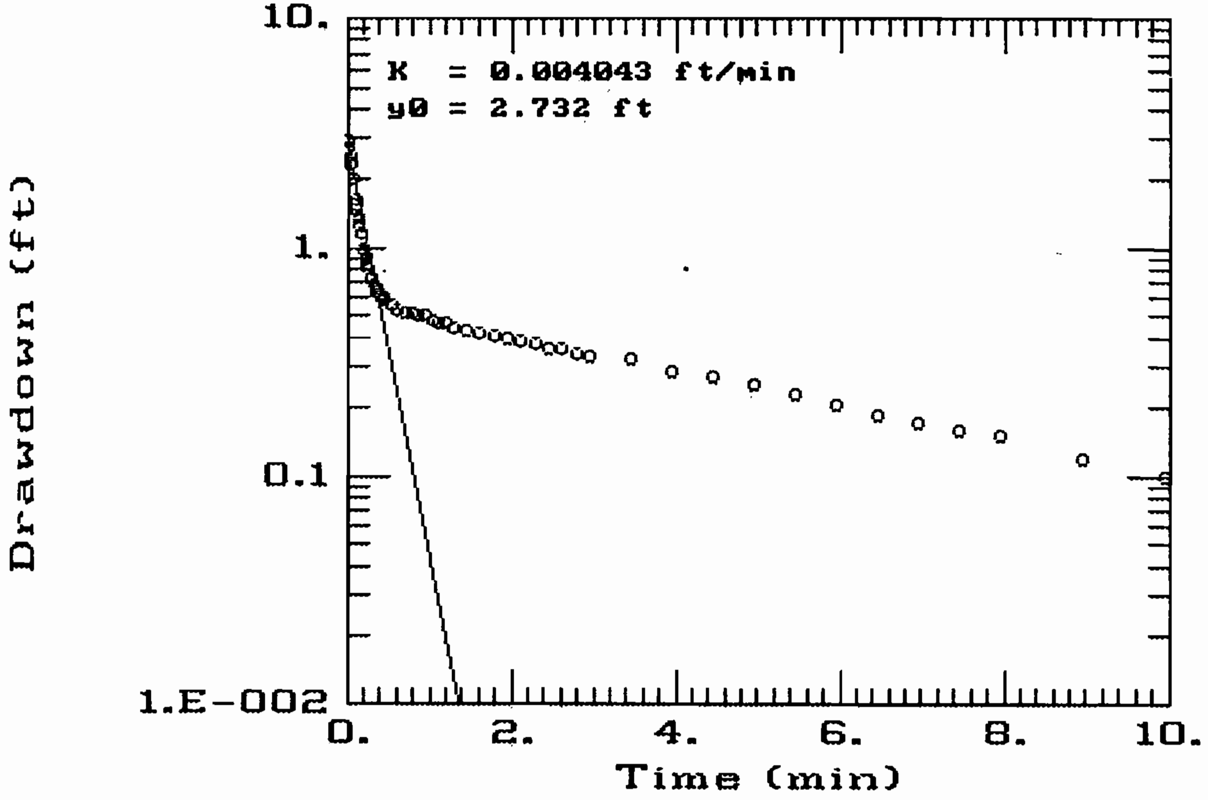
Modeling Group

AG-5S SHALLOW



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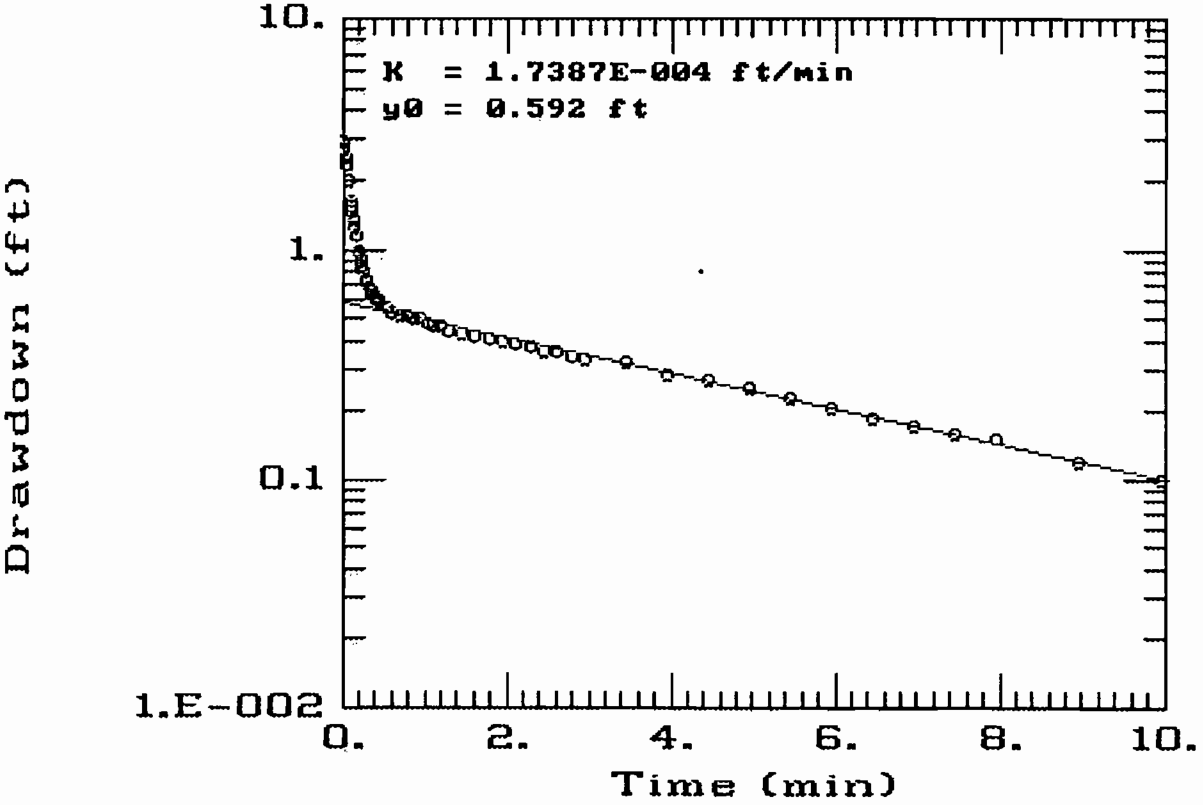
Modeling Group

AG-5S SHALLOW



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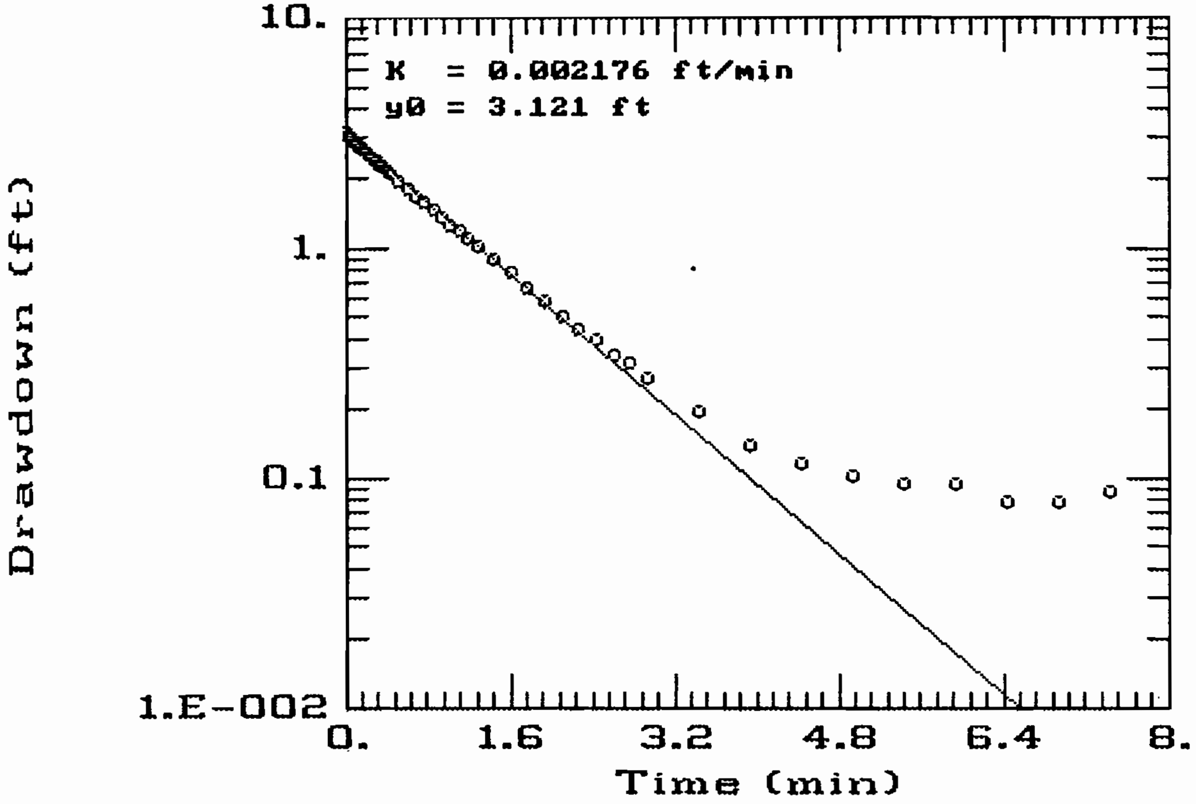
Modeling Group

AG-4D DEEP



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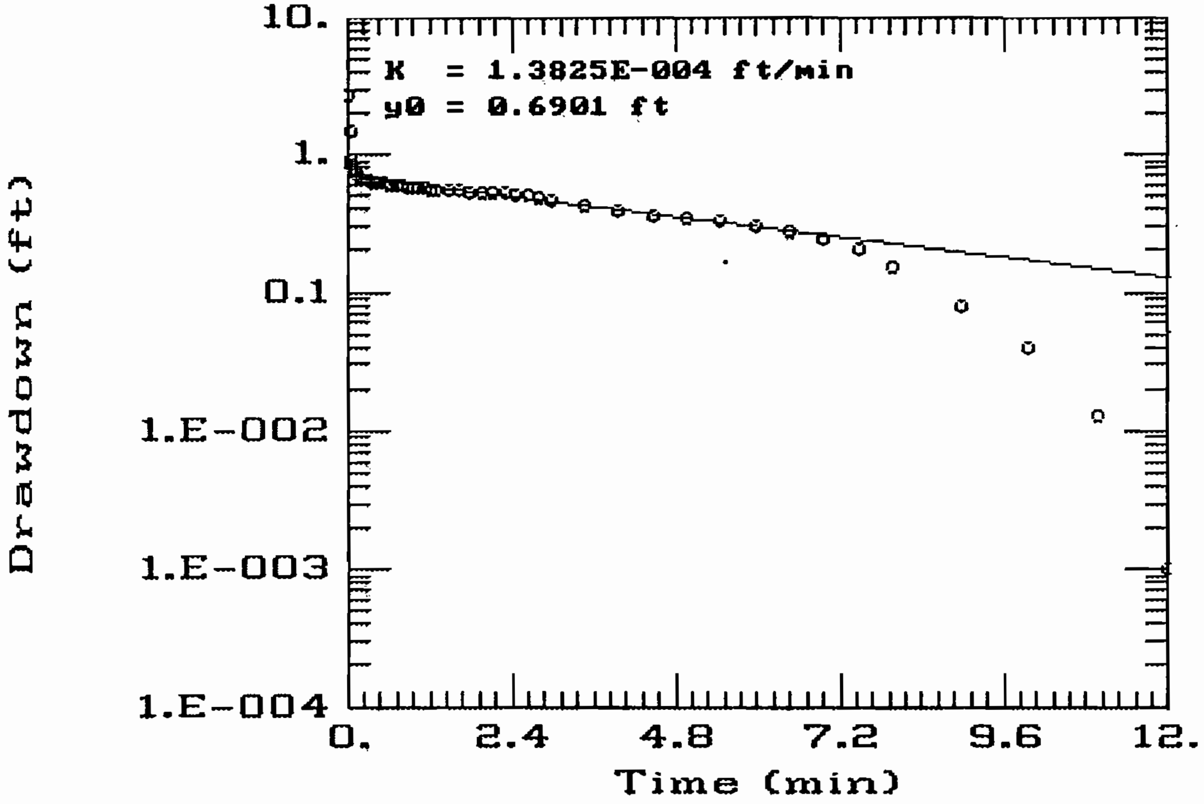
AG-4S SHALLOW (after redevelopment)



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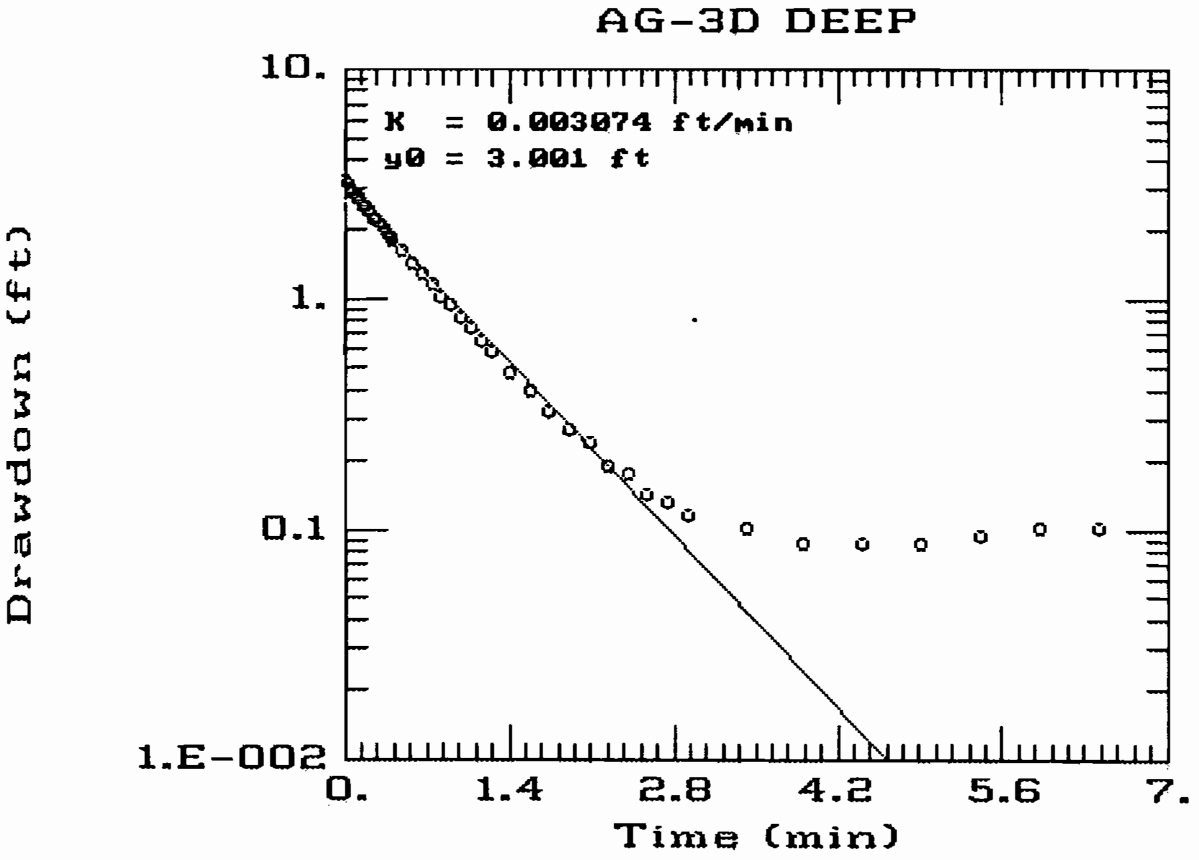
Modeling Group



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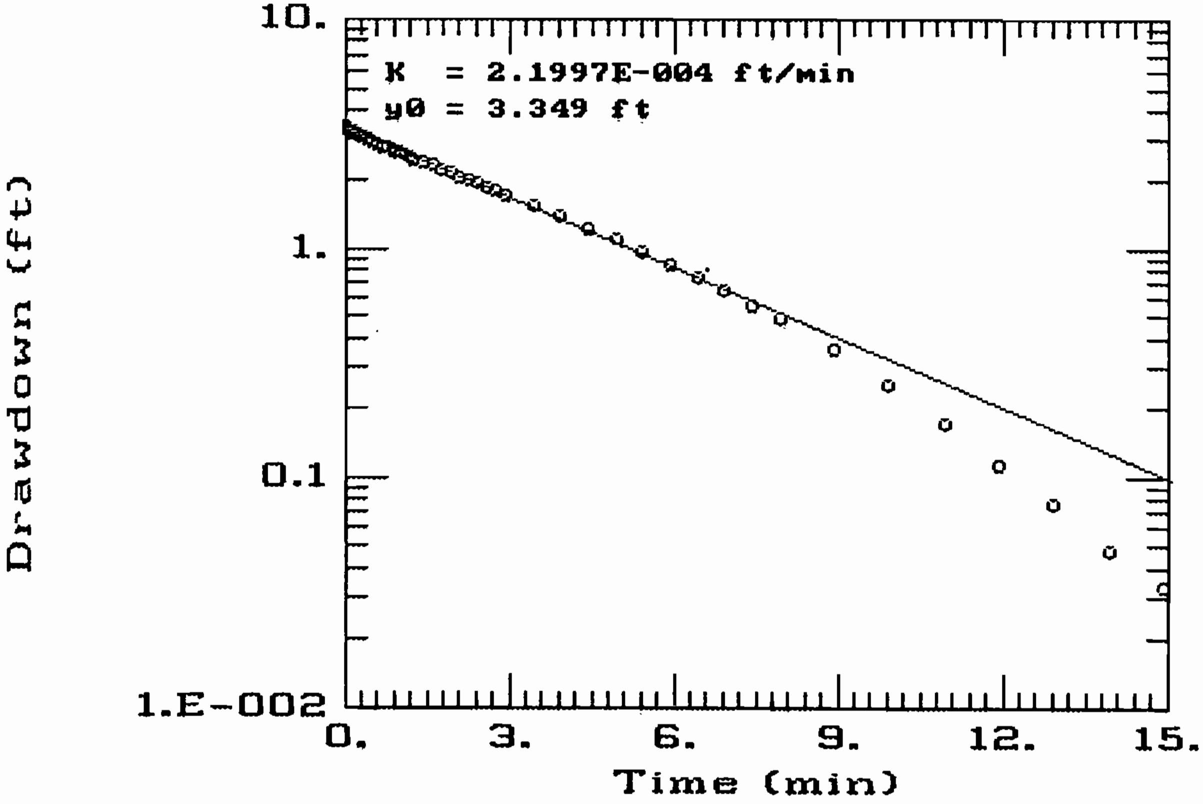
Modeling Group

N-1 SHALLOW



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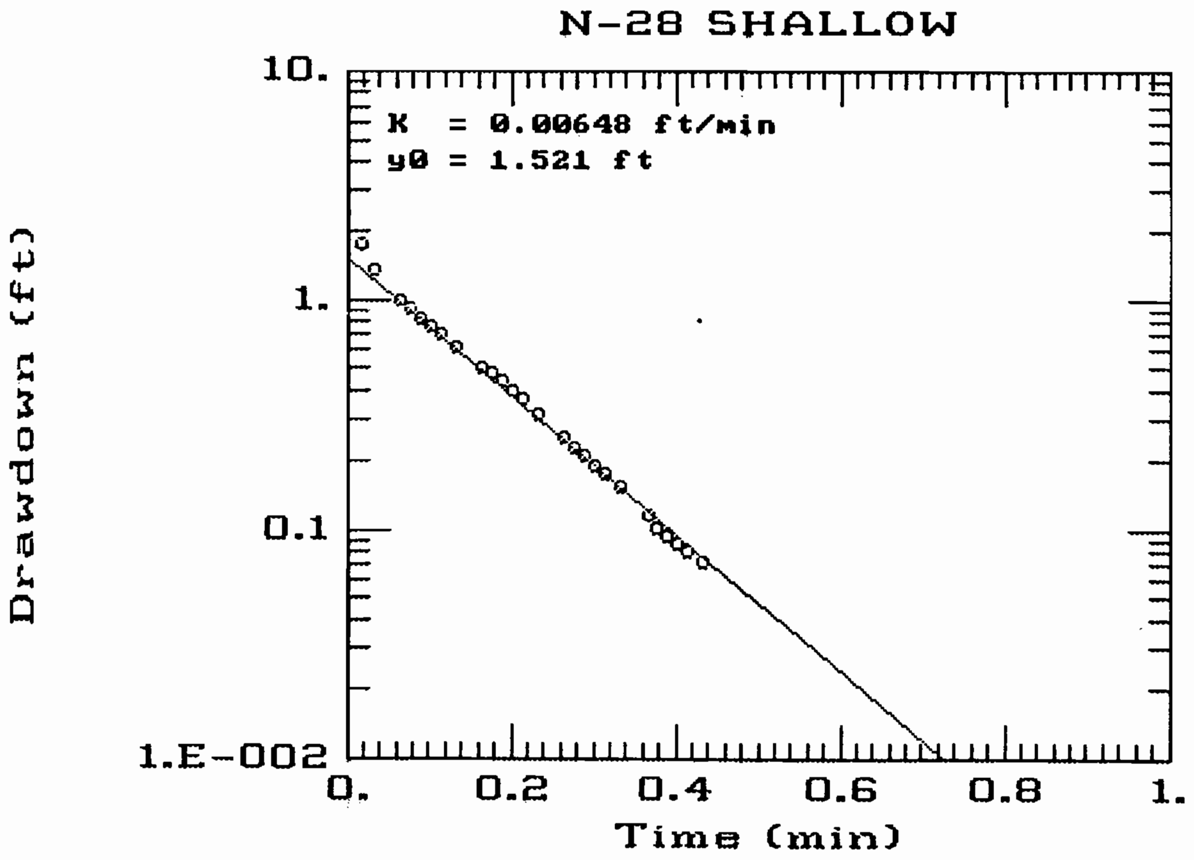
& MILLER, INC.

Modeling Group



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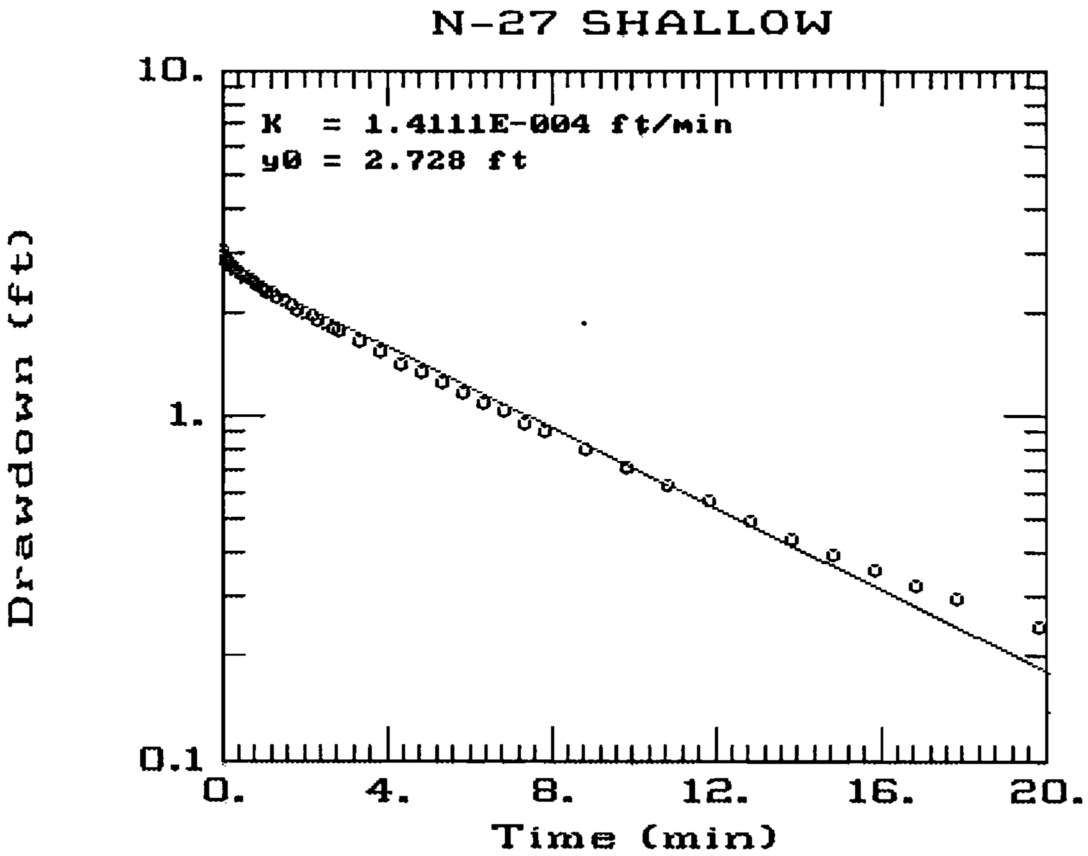
GERAGHTY
& MILLER, INC.
Modeling Group



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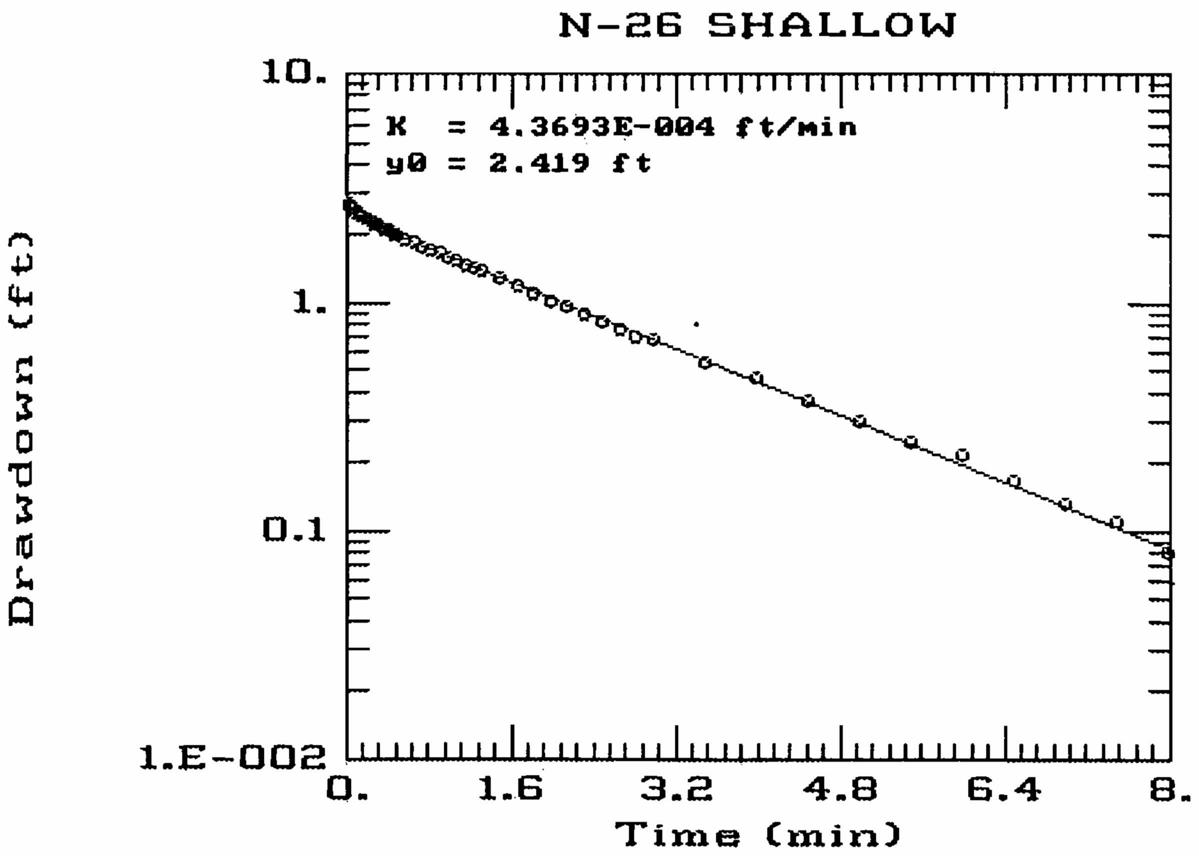
Modeling Group



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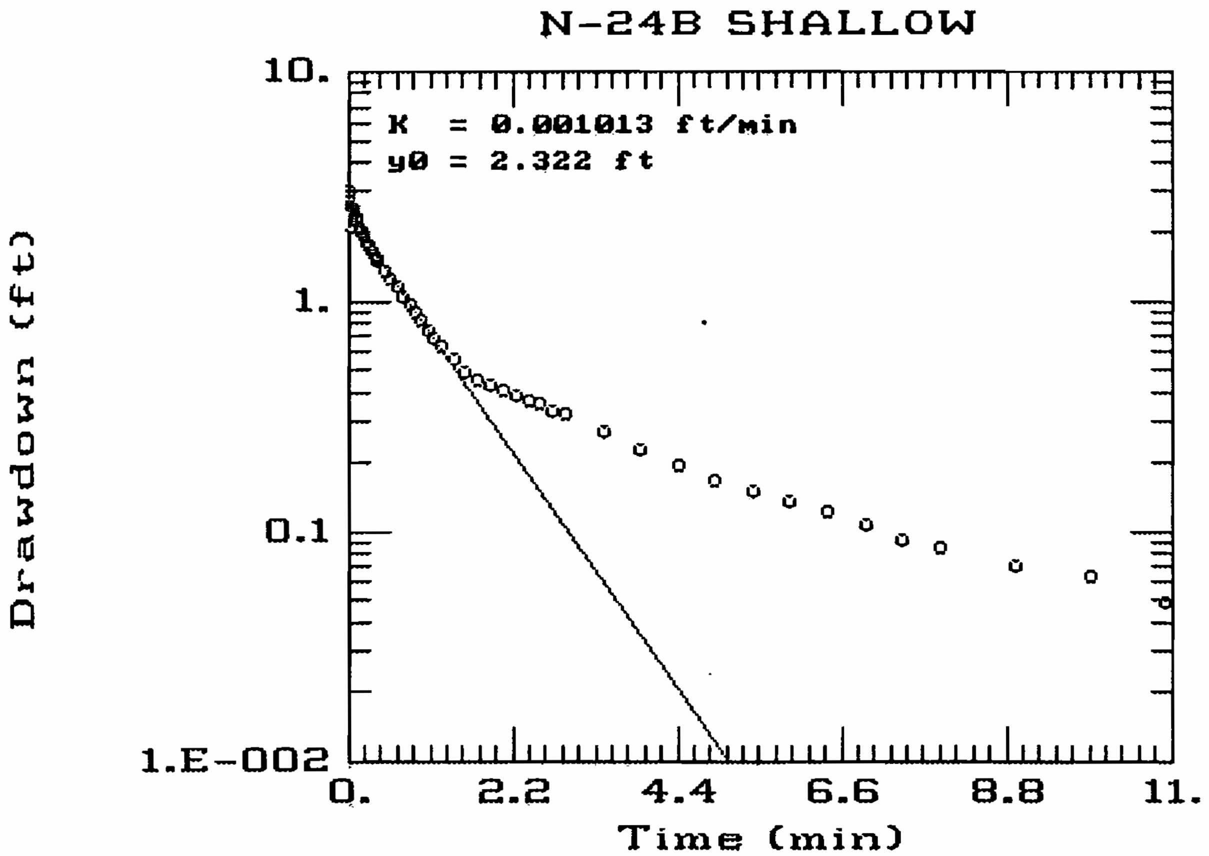
Modeling Group



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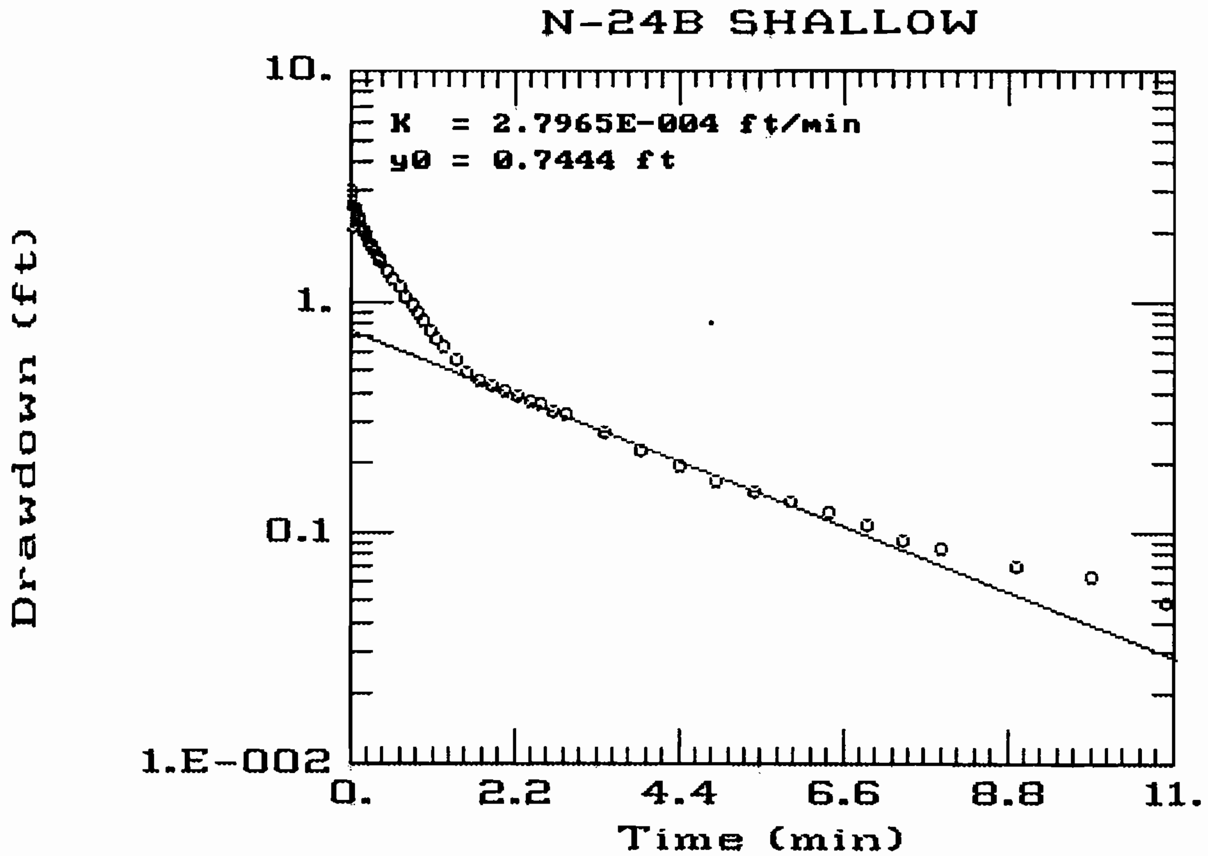
& MILLER, INC.

Modeling Group



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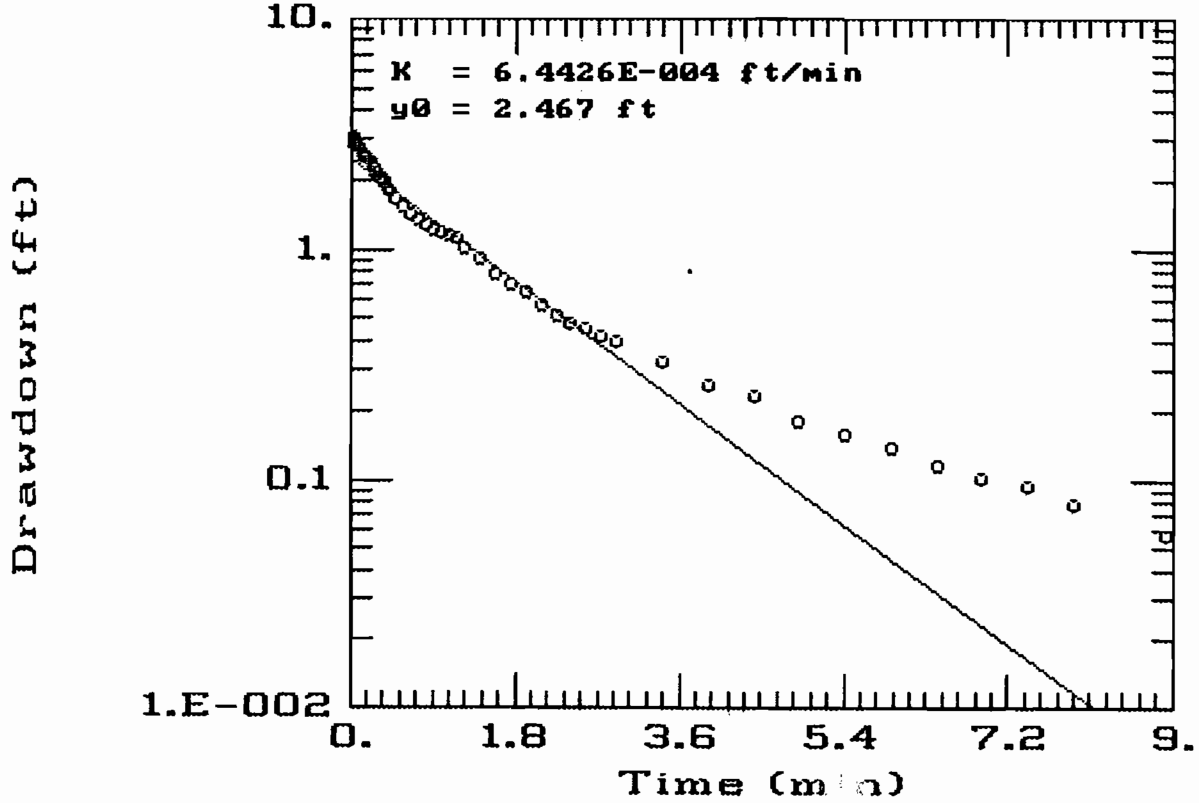
N-7 SHALLOW



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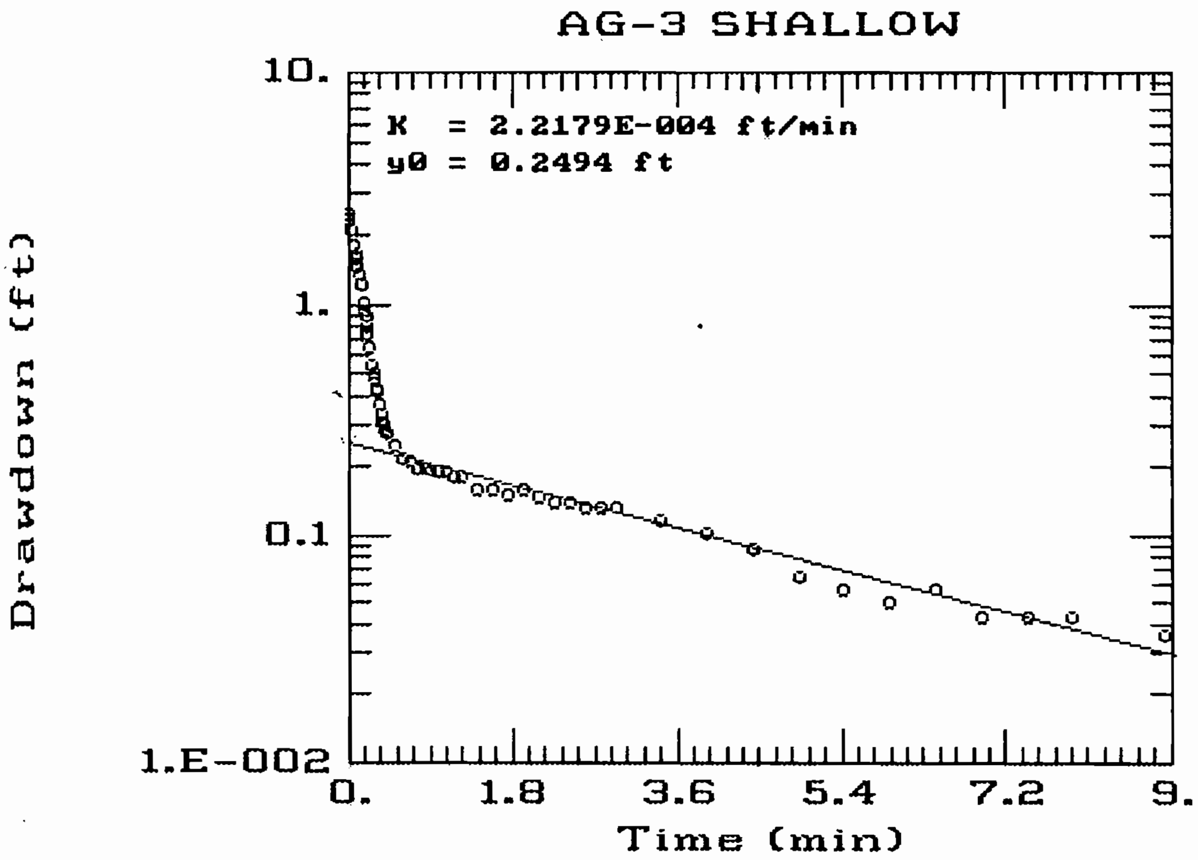

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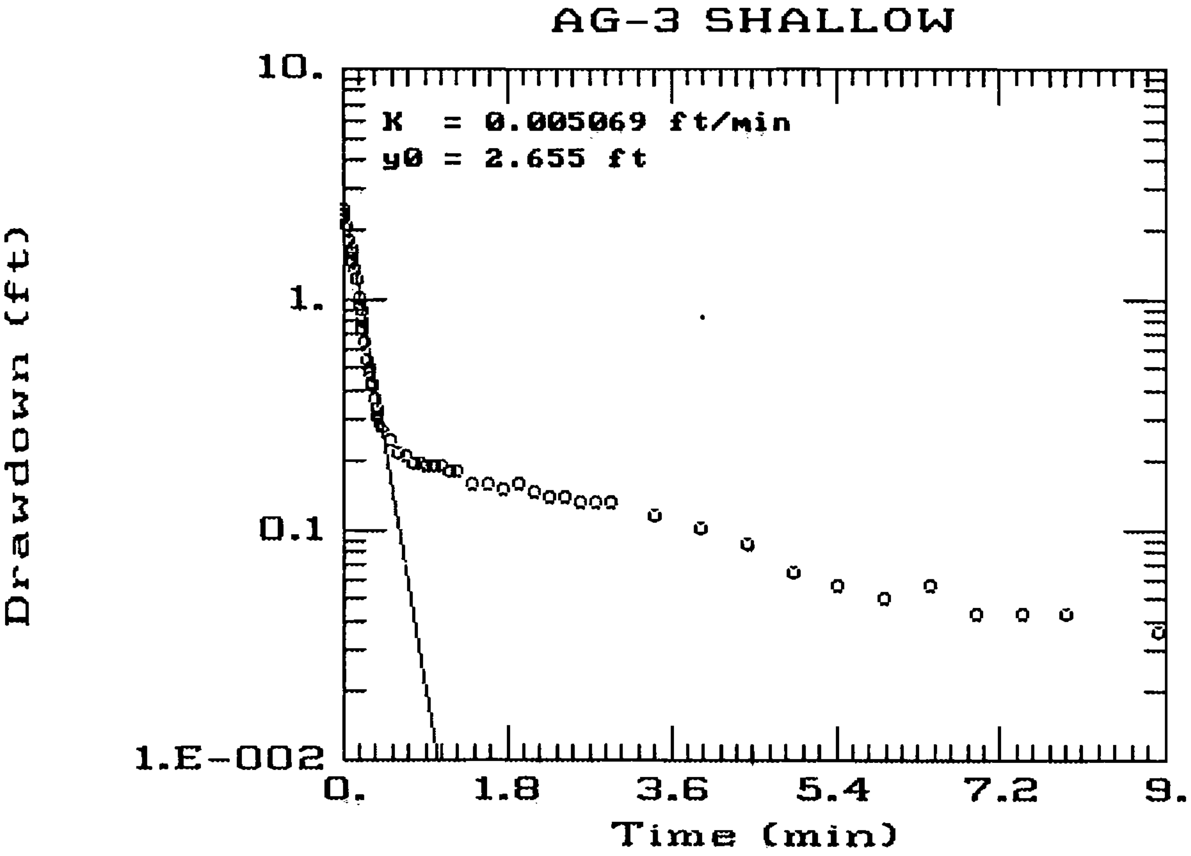

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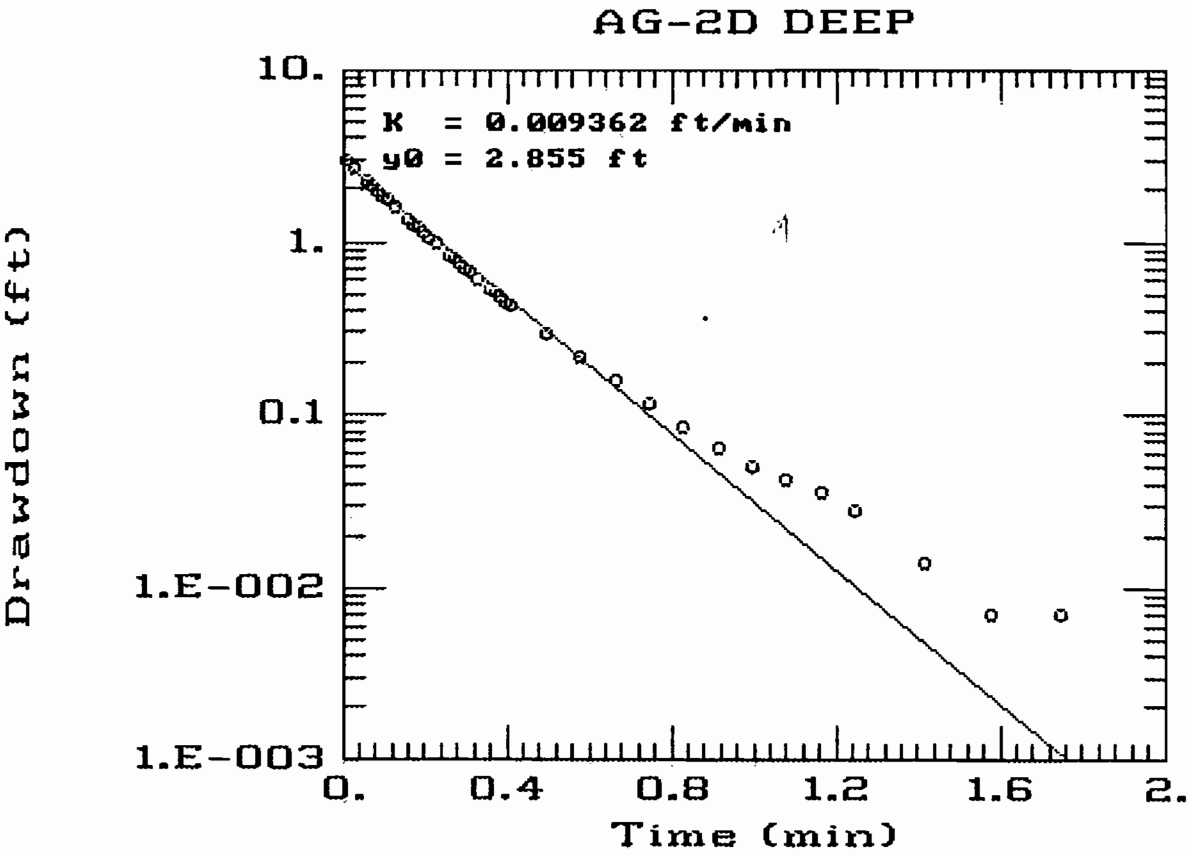

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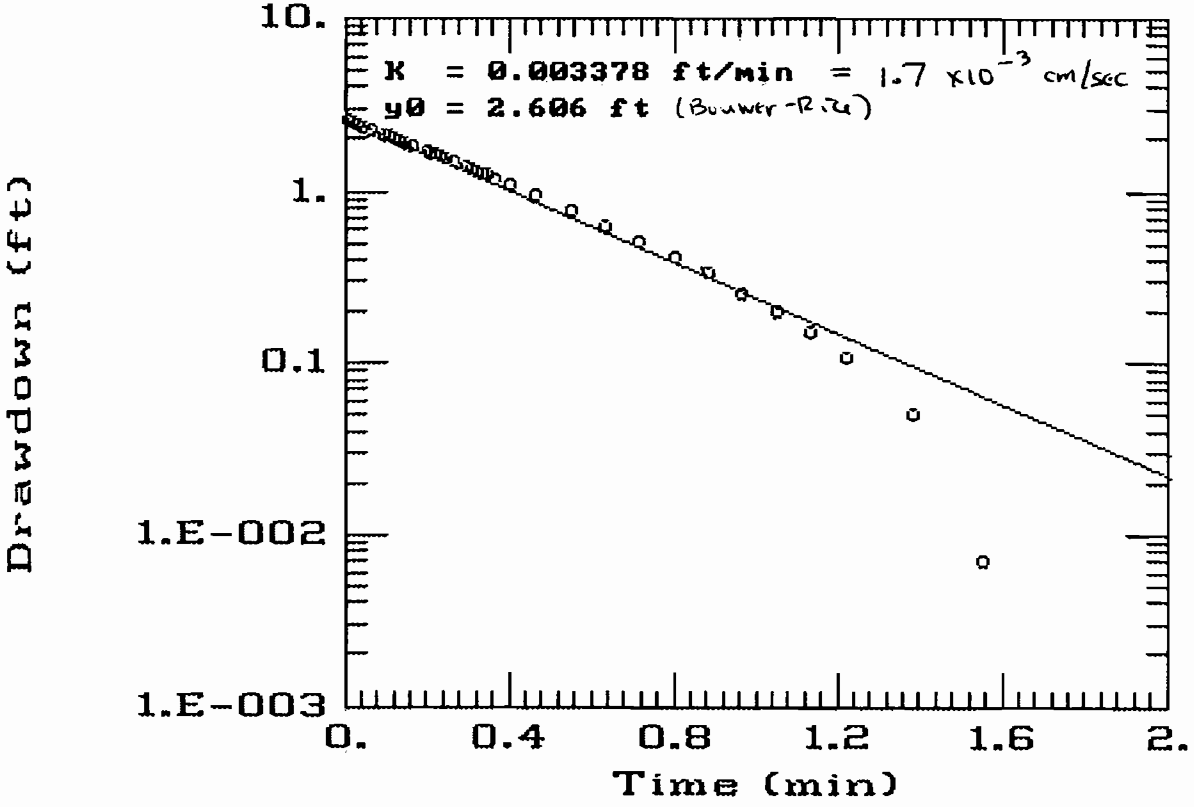
AG-2S SHALLOW



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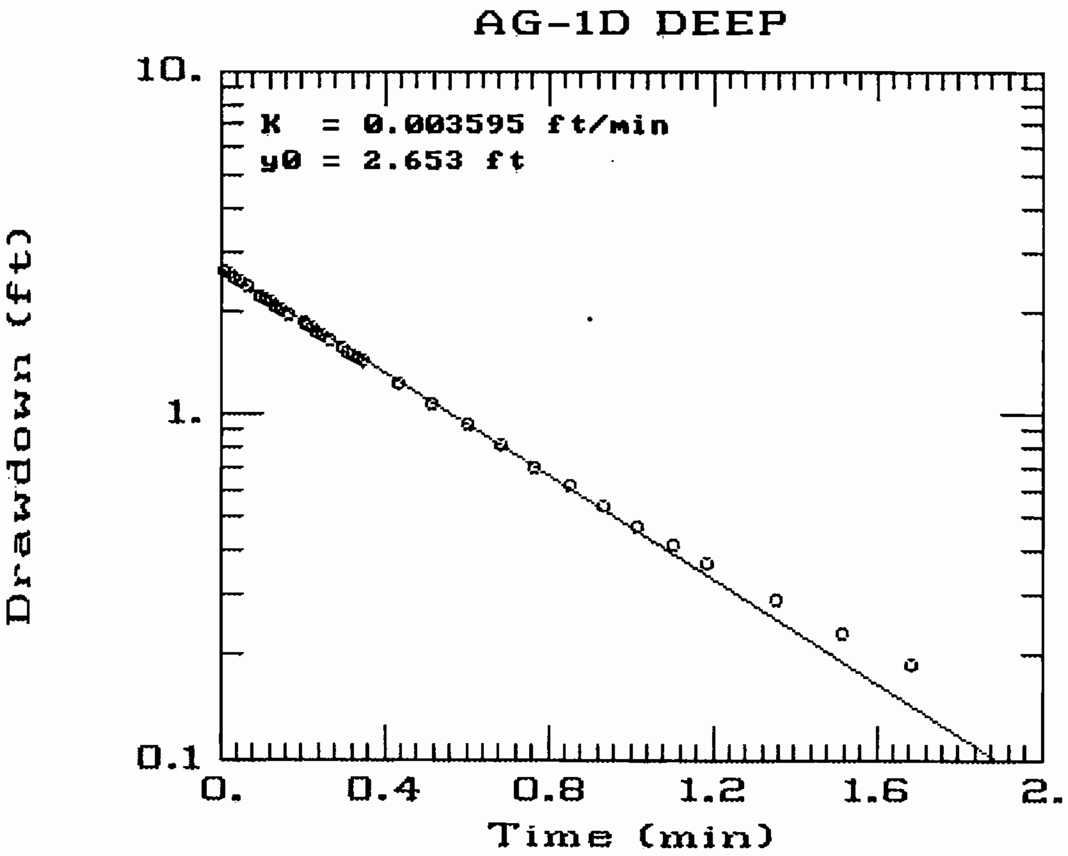

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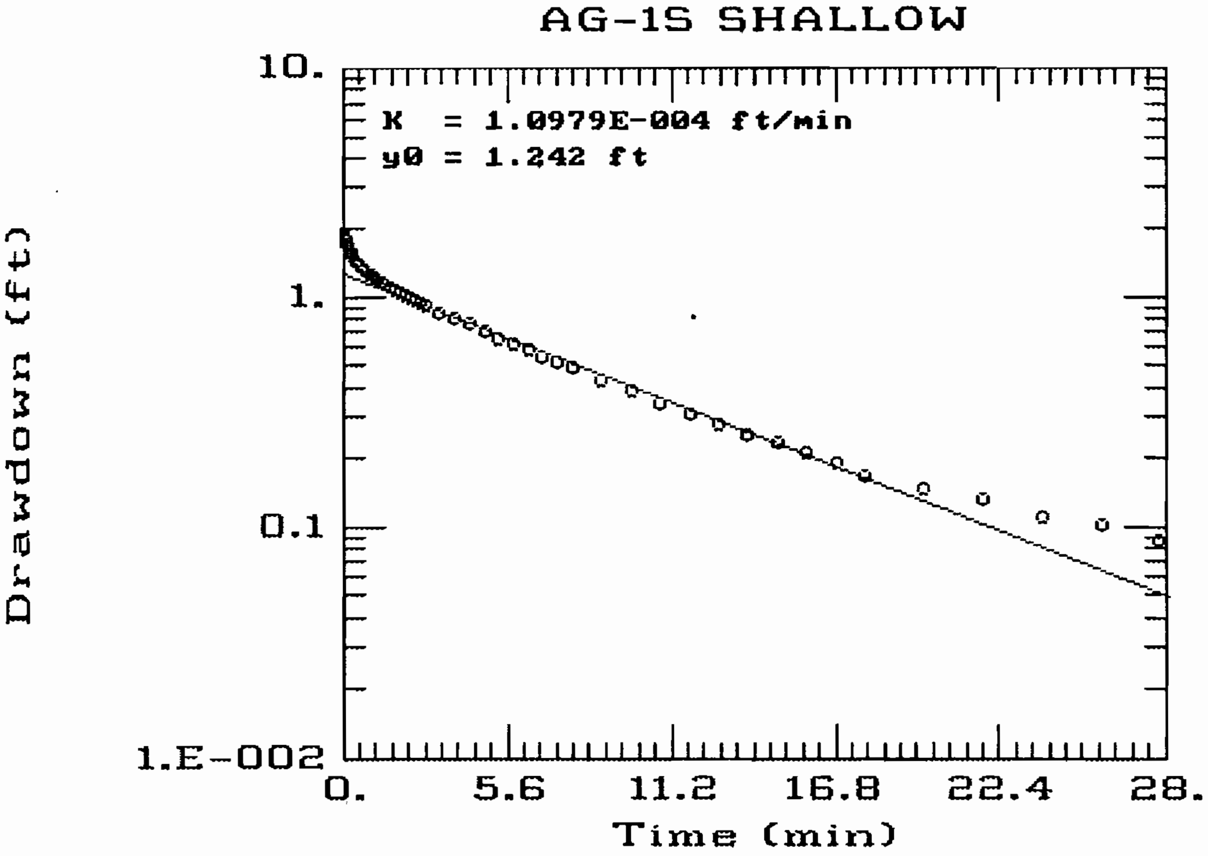

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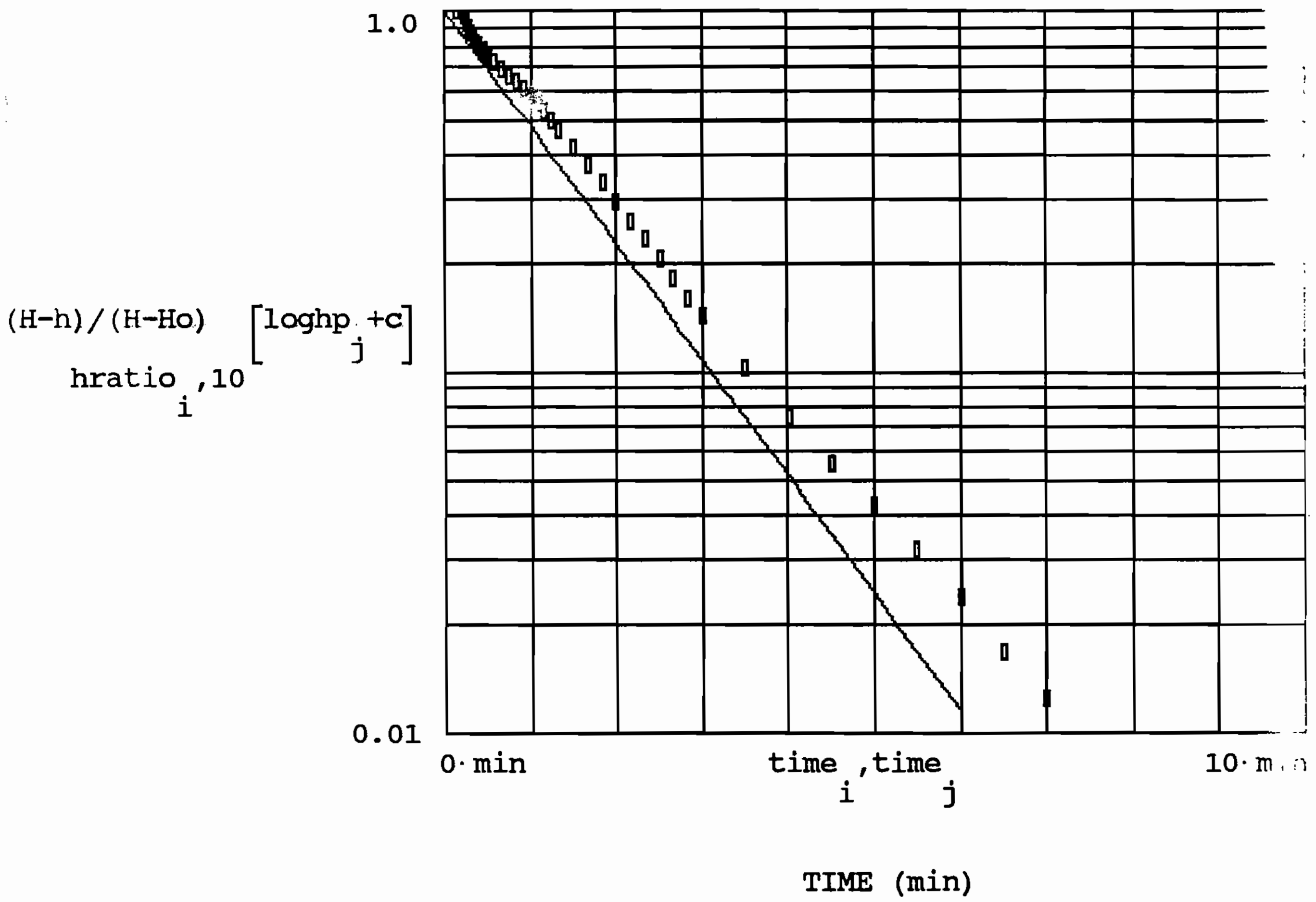
Modeling Group

EW-Series and Existing Monitoring Wells

Data Analyzed
Based on Hvorslev (1951)

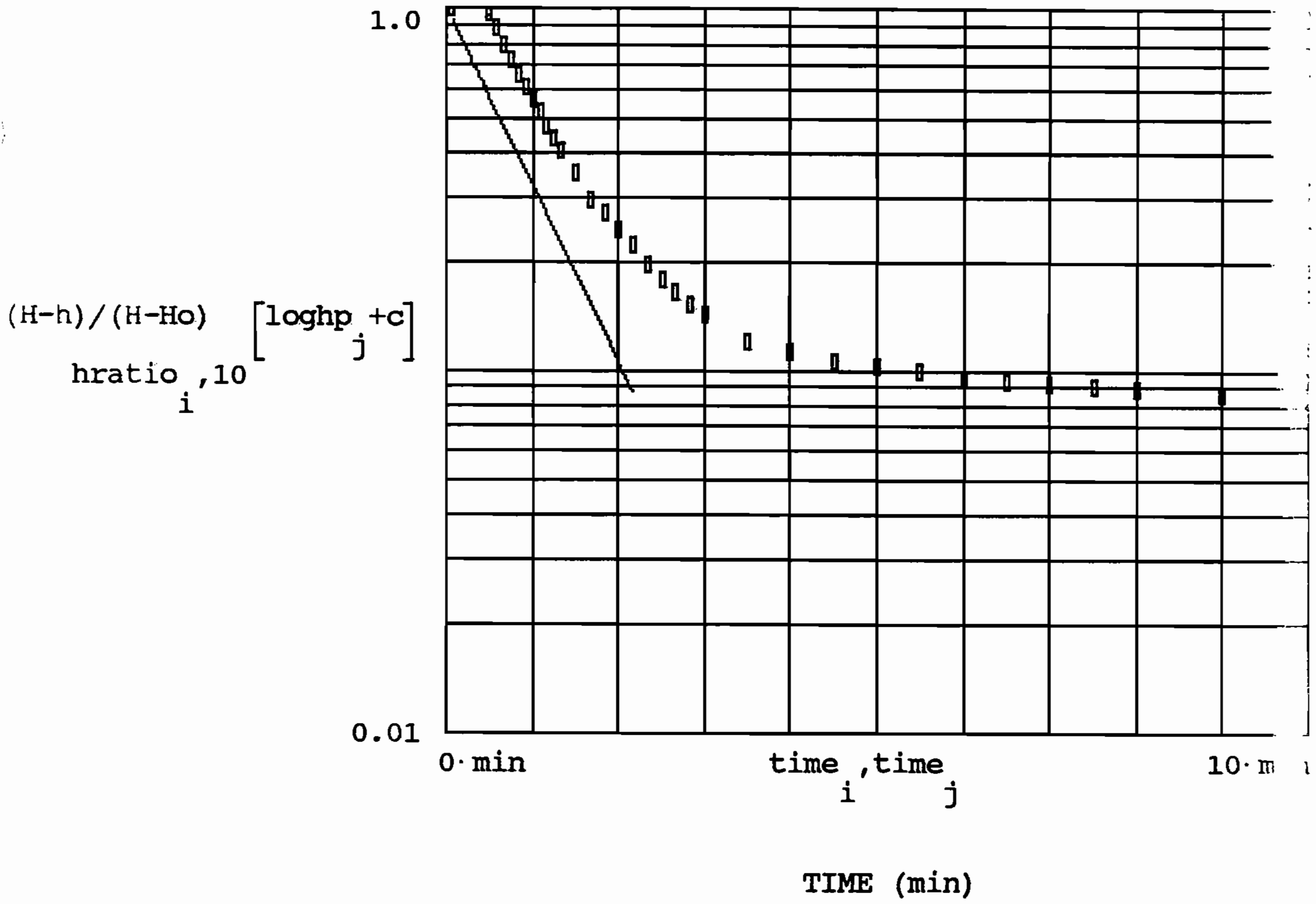
$$K_h = 1.23 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

EW-1 SHALLOW



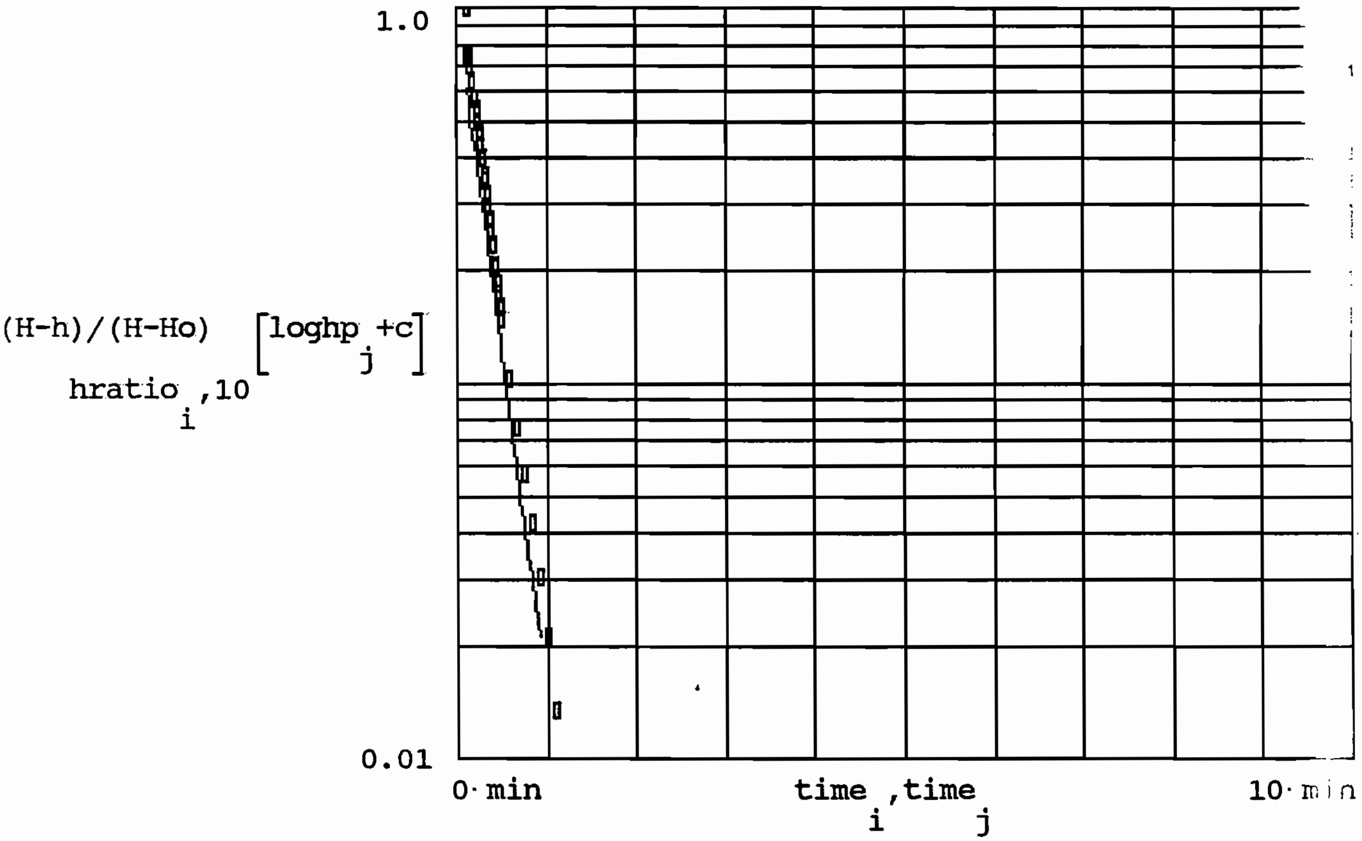
$$K_h = 1.86 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

EW-2 SHALLOW



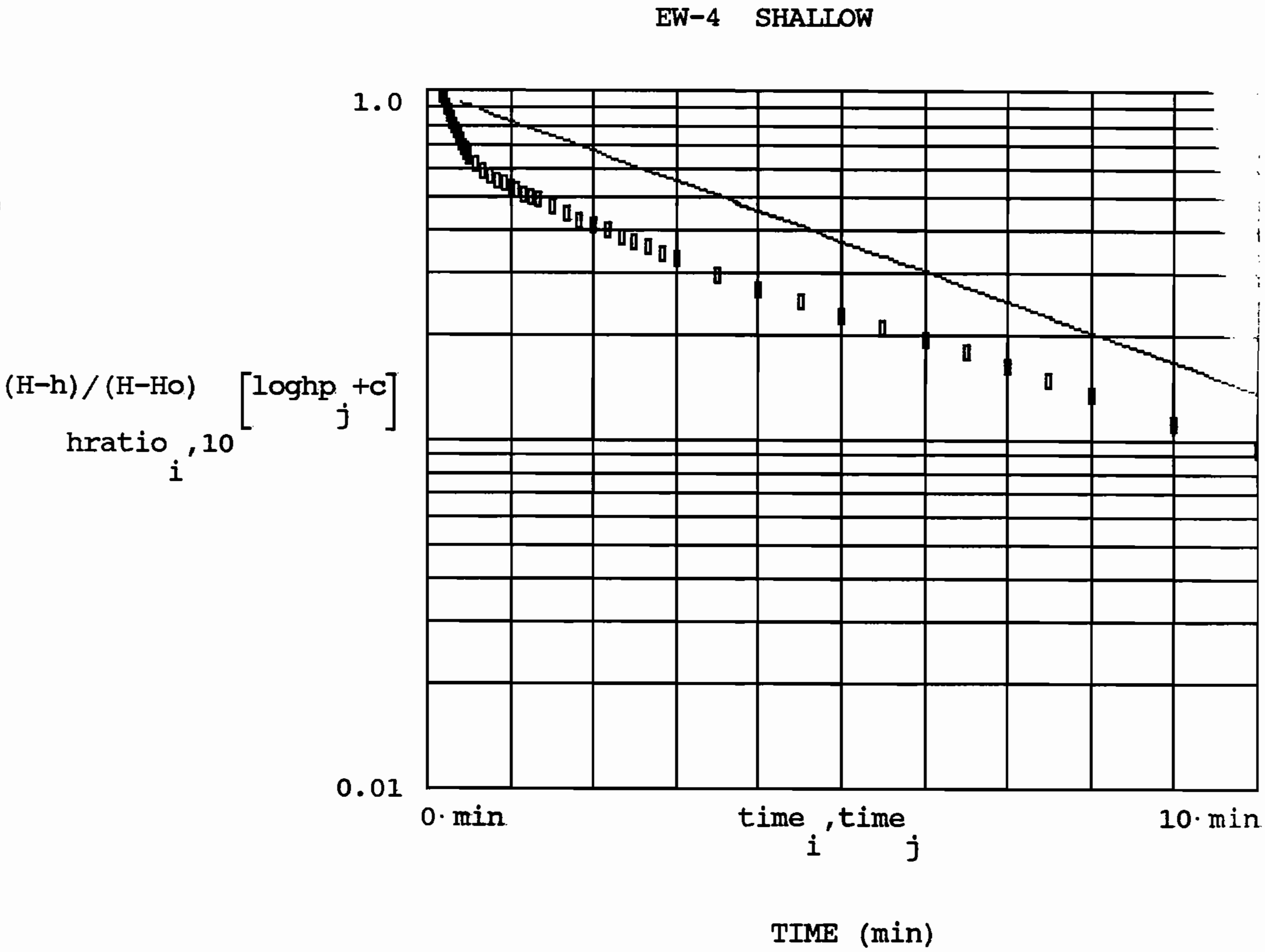
$$K_h = 6.92 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

EW-3 SHALLOW

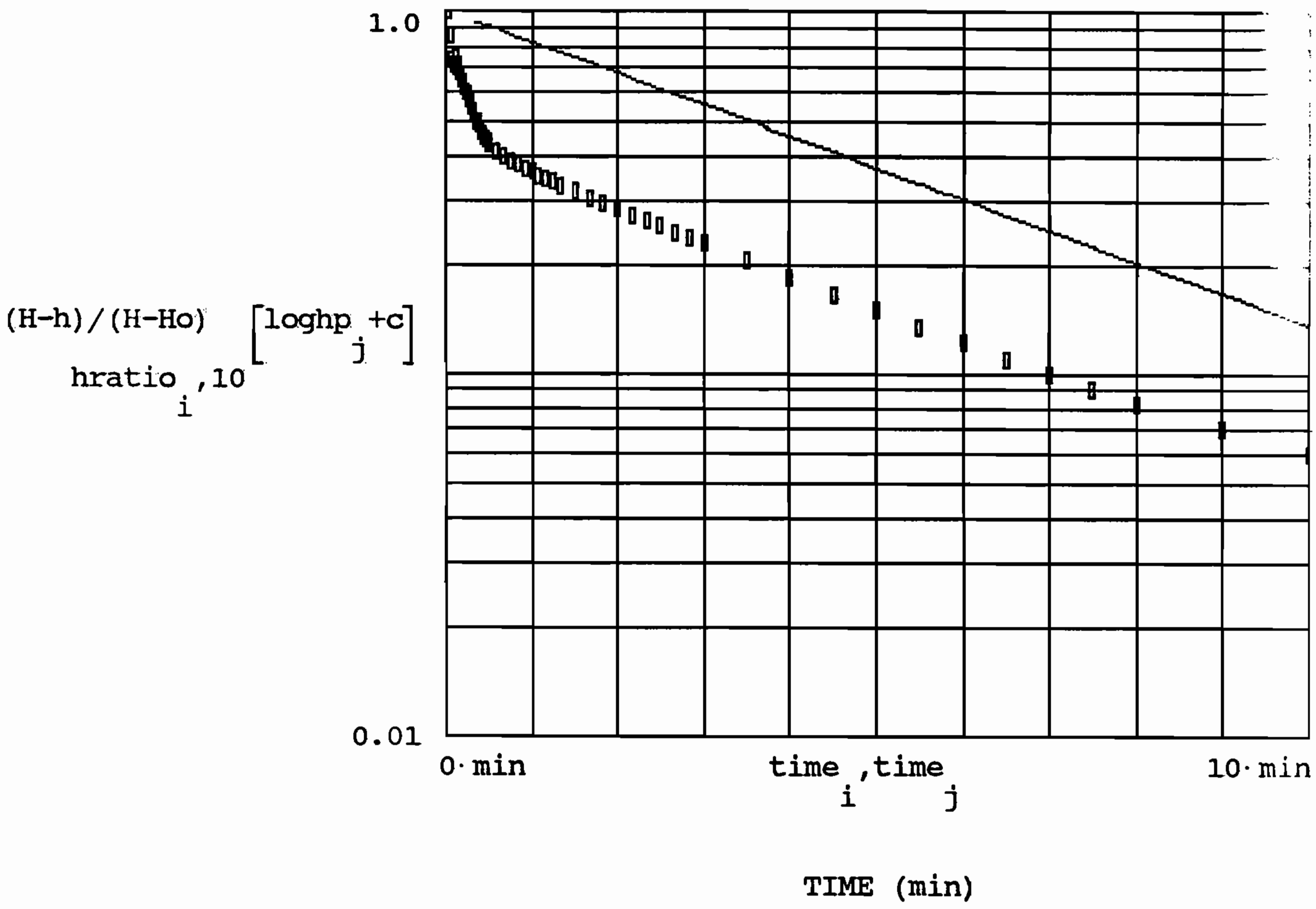


TIME (min)

$$K_h = 3.31\cdot 10^{-4}\cdot\frac{cm}{sec}$$



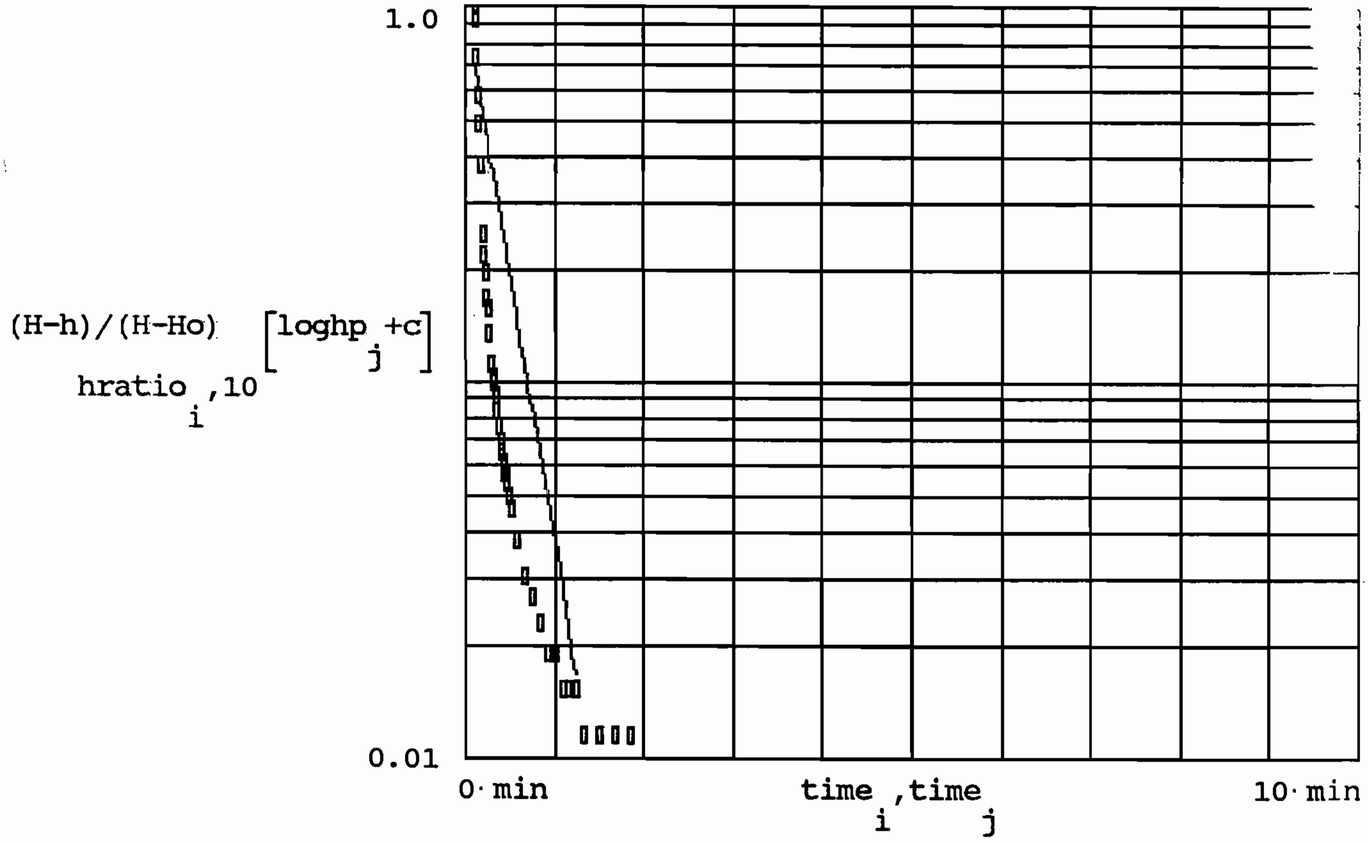
$$K_h = 3.32 \cdot 10^{-4} \cdot \frac{cm}{sec}$$



EW-5 SHALLOW

$K_h = 5.4 \cdot 10^{-3} \cdot \frac{cm}{sec}$

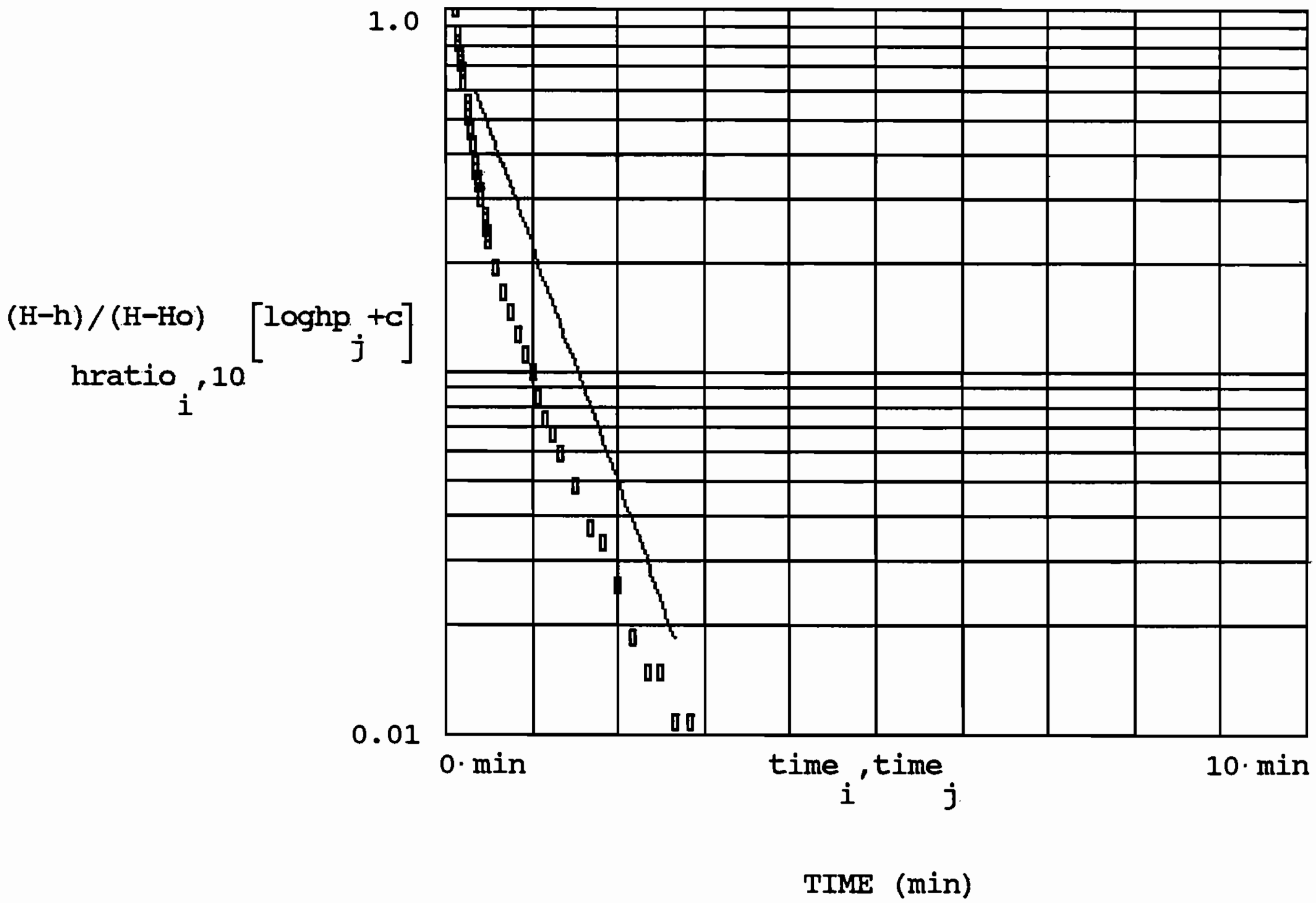
EW-6 SHALLOW



TIME (min)

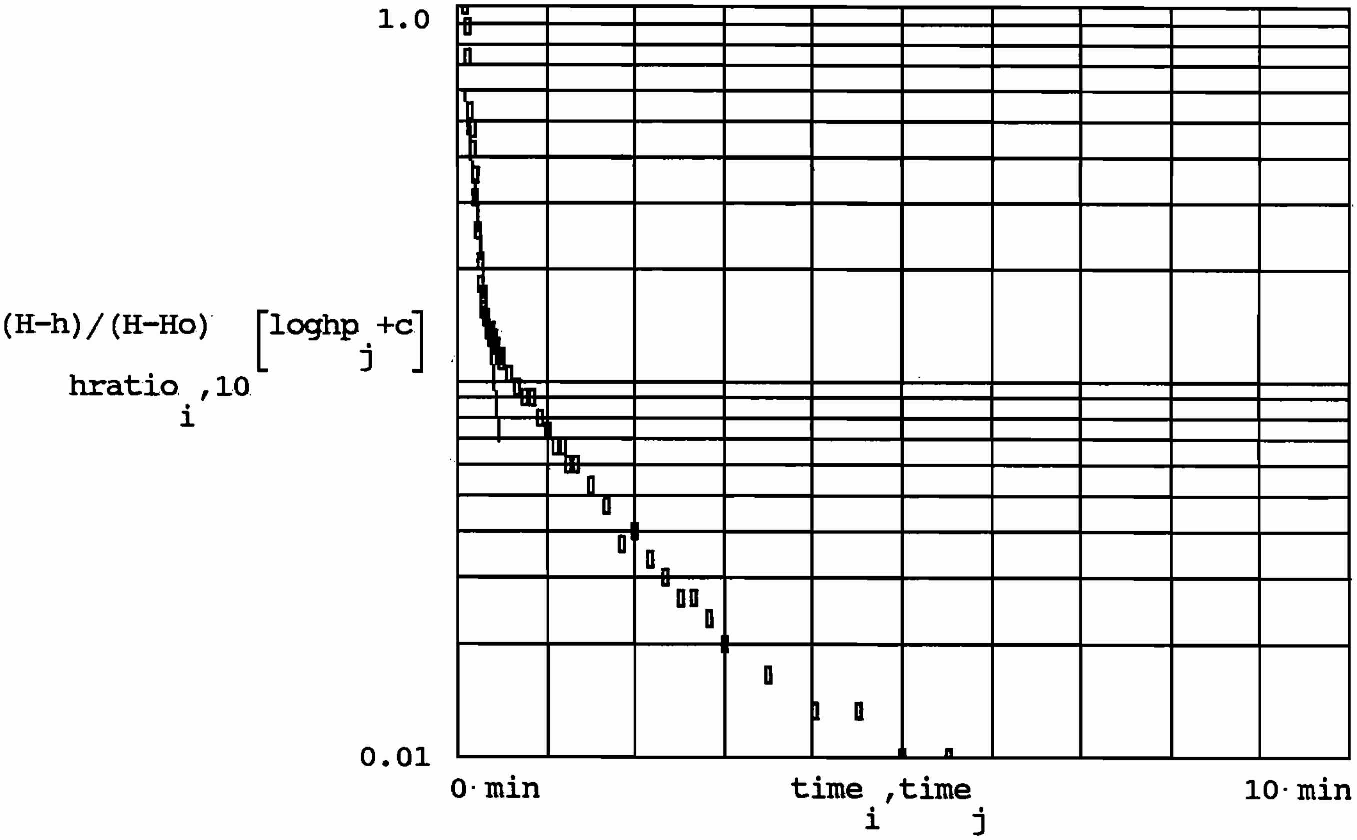
$$K_h = 2.48 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

EW-8 SHALLOW



$$K_h = 9.5 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

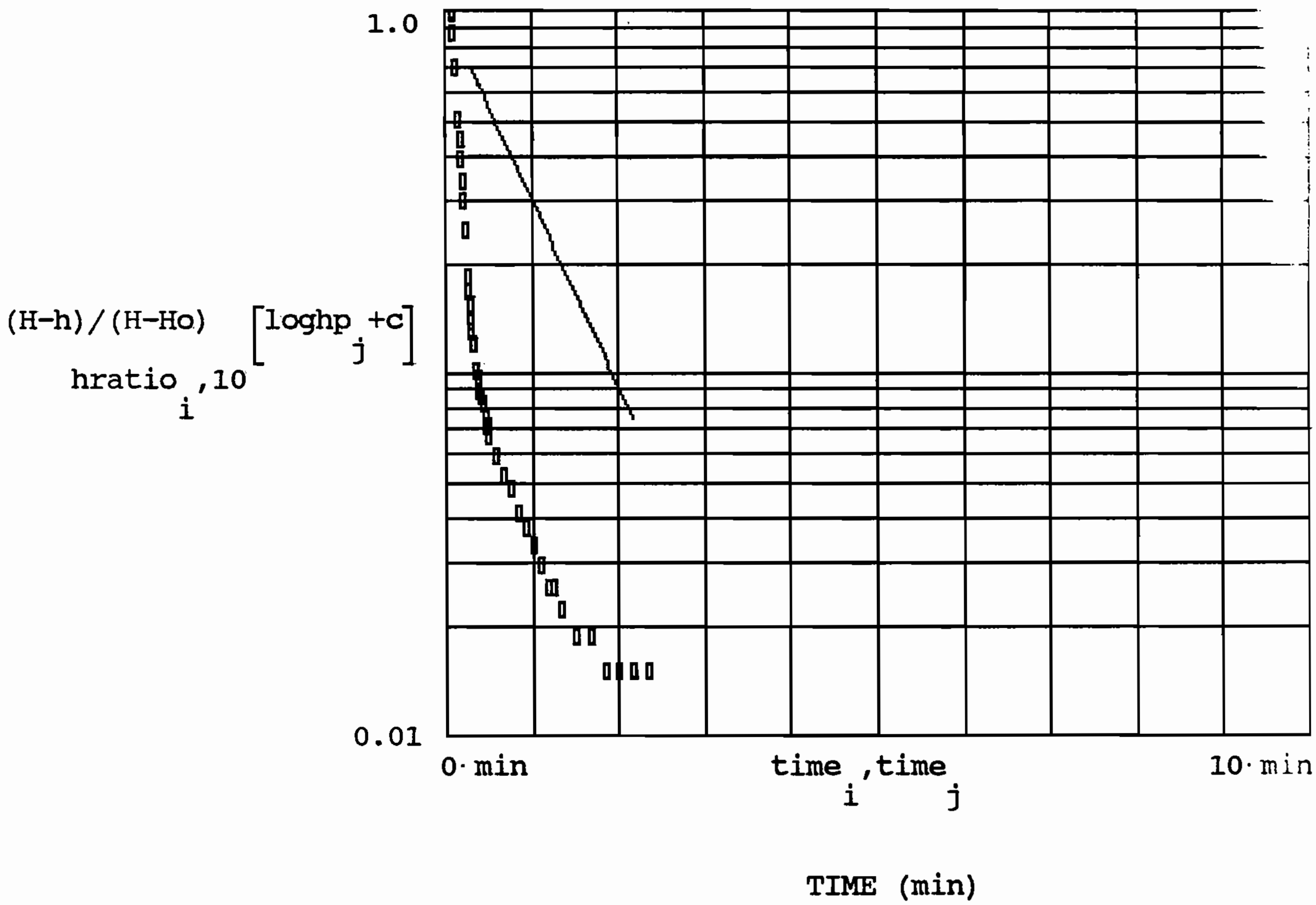
EW-7 SHALLOW



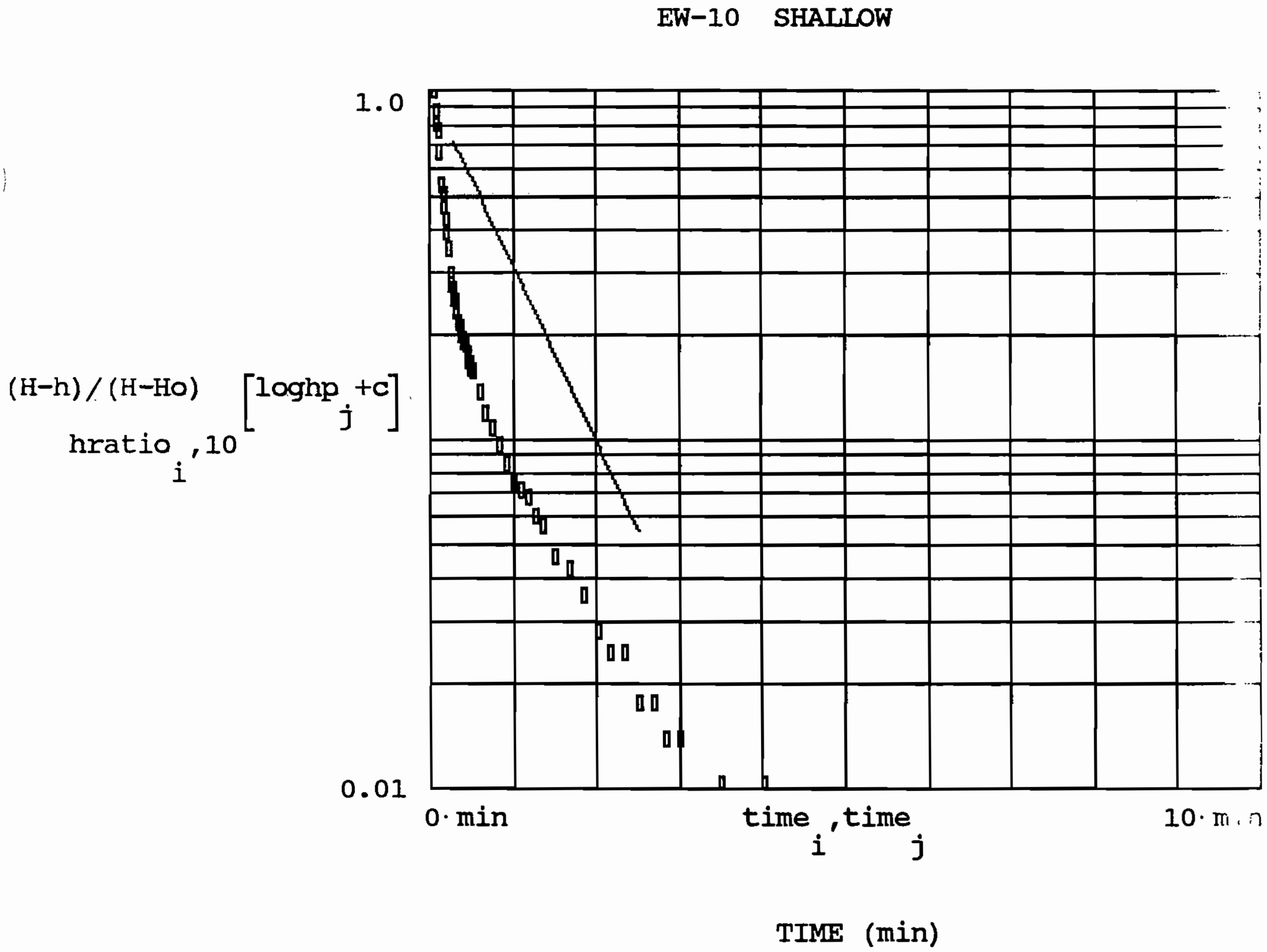
TIME (min)

$$K_h = 1.98 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

EW-9 SHALLOW

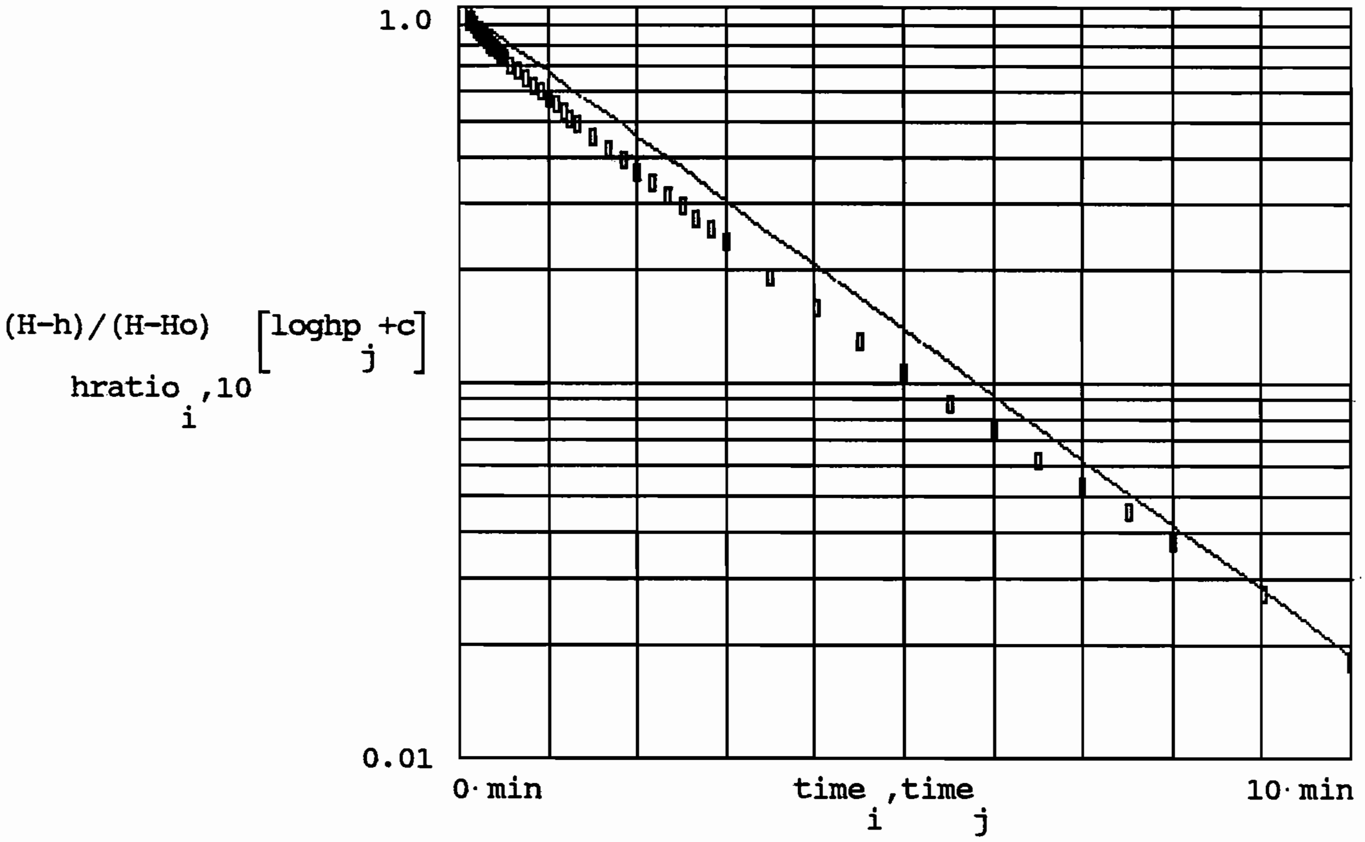


$$K_h = 1.92 \cdot 10^{-3} \cdot \frac{cm}{sec}$$



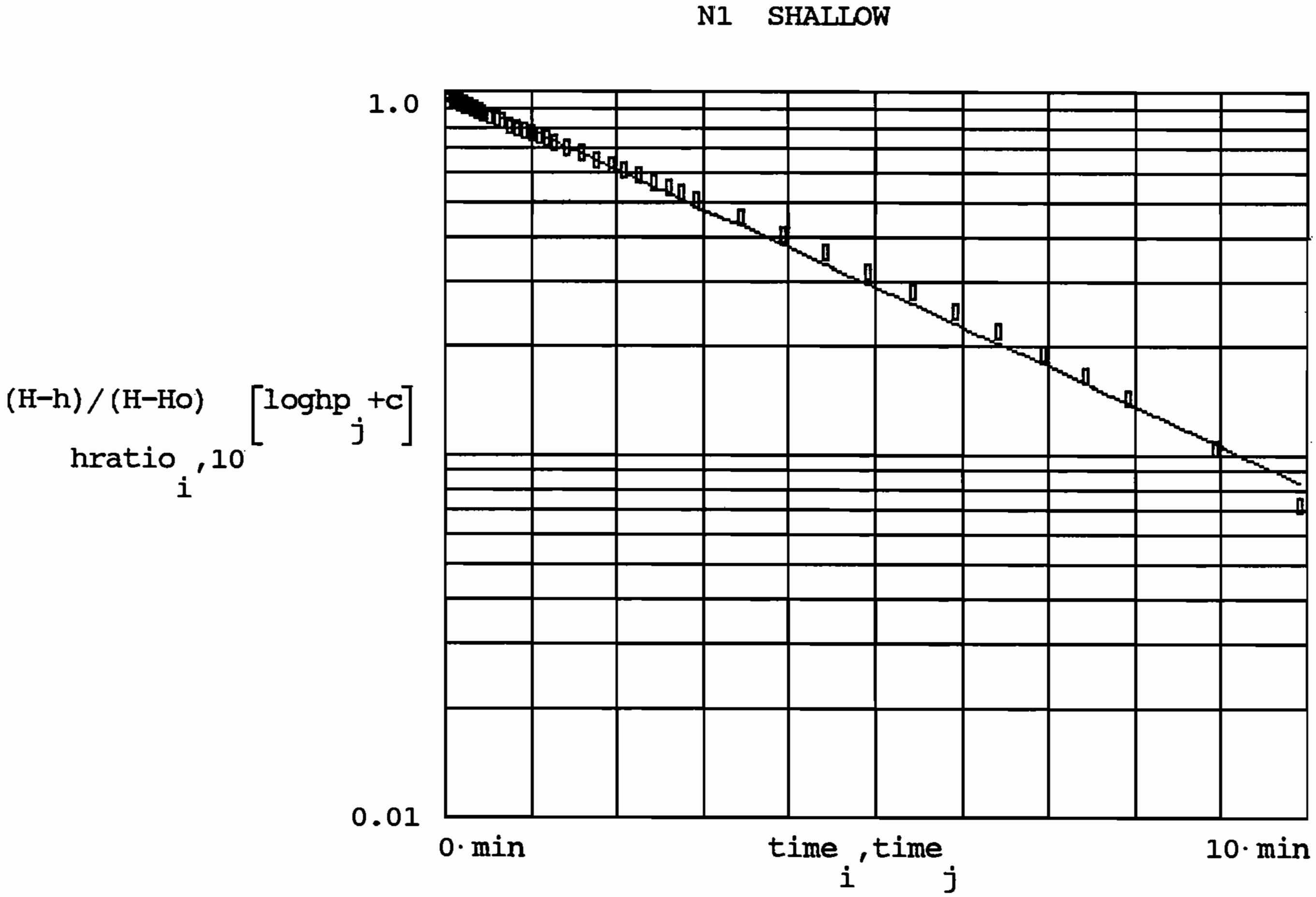
$$K_h = 6.58 \cdot 10^{-4} \cdot \frac{cm}{sec}$$

EW-11 SHALLOW



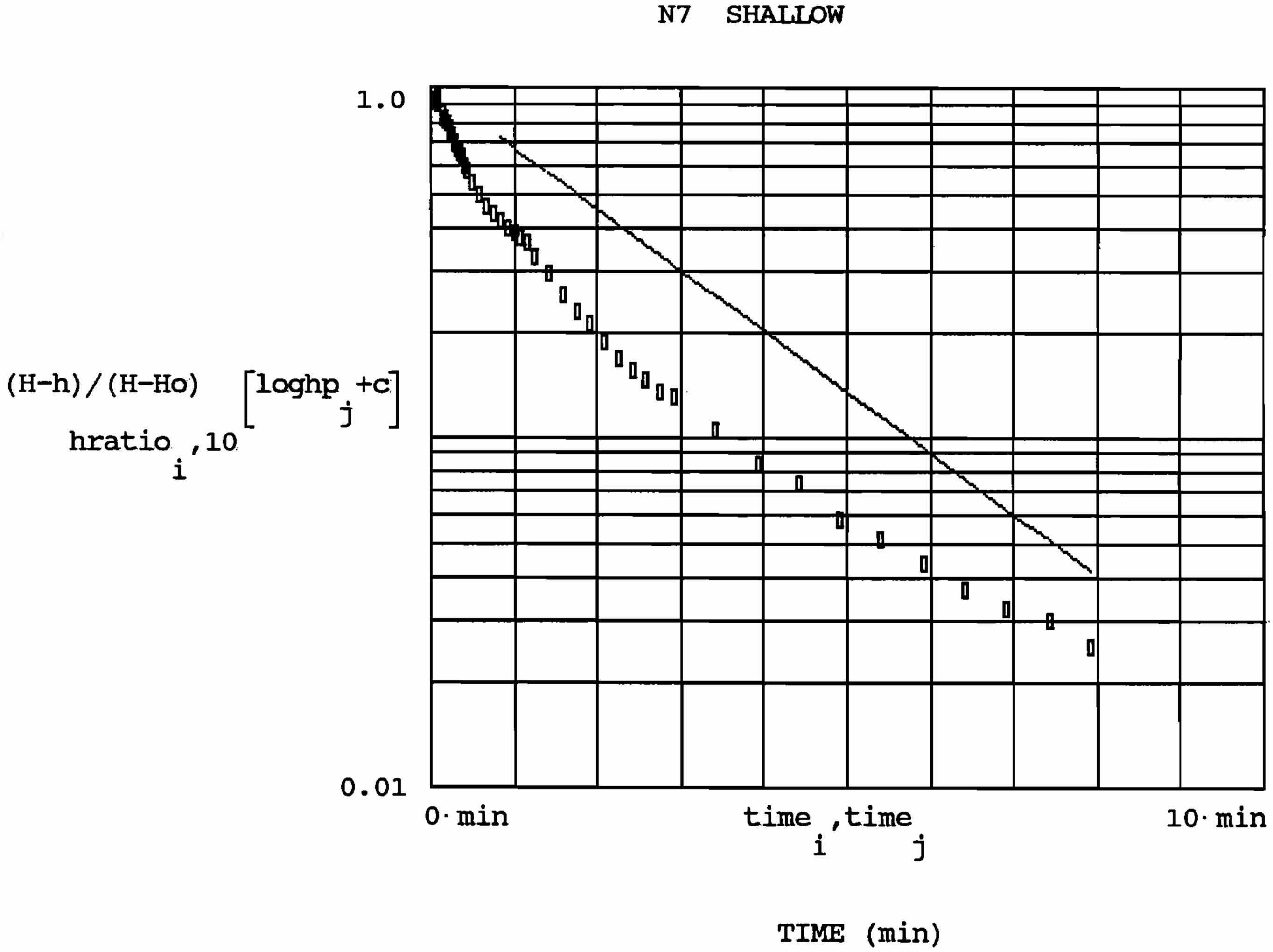
TIME (min)

$$K_h = 1.55 \cdot 10^{-4} \cdot \frac{cm}{sec}$$

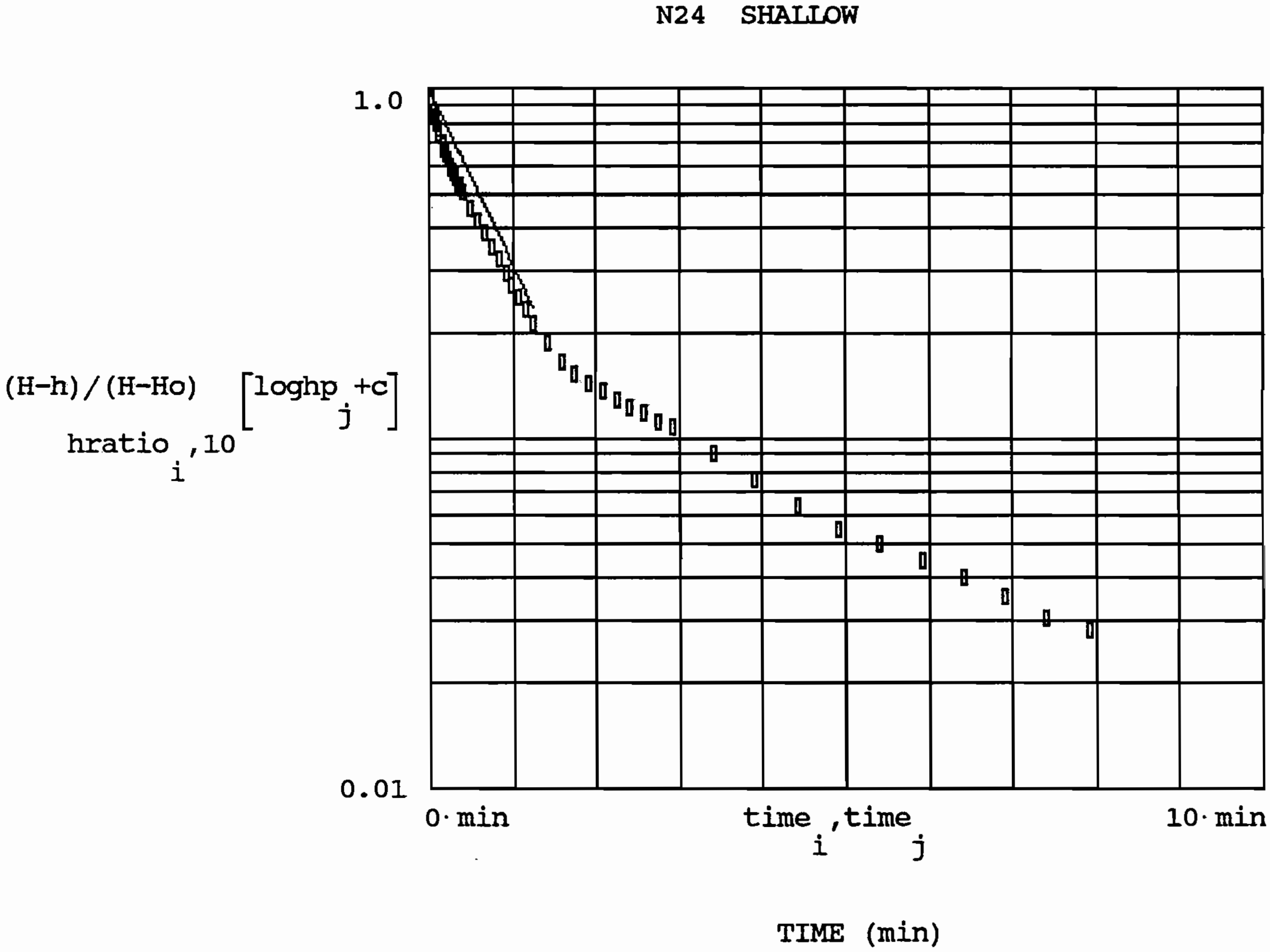


TIME (min)

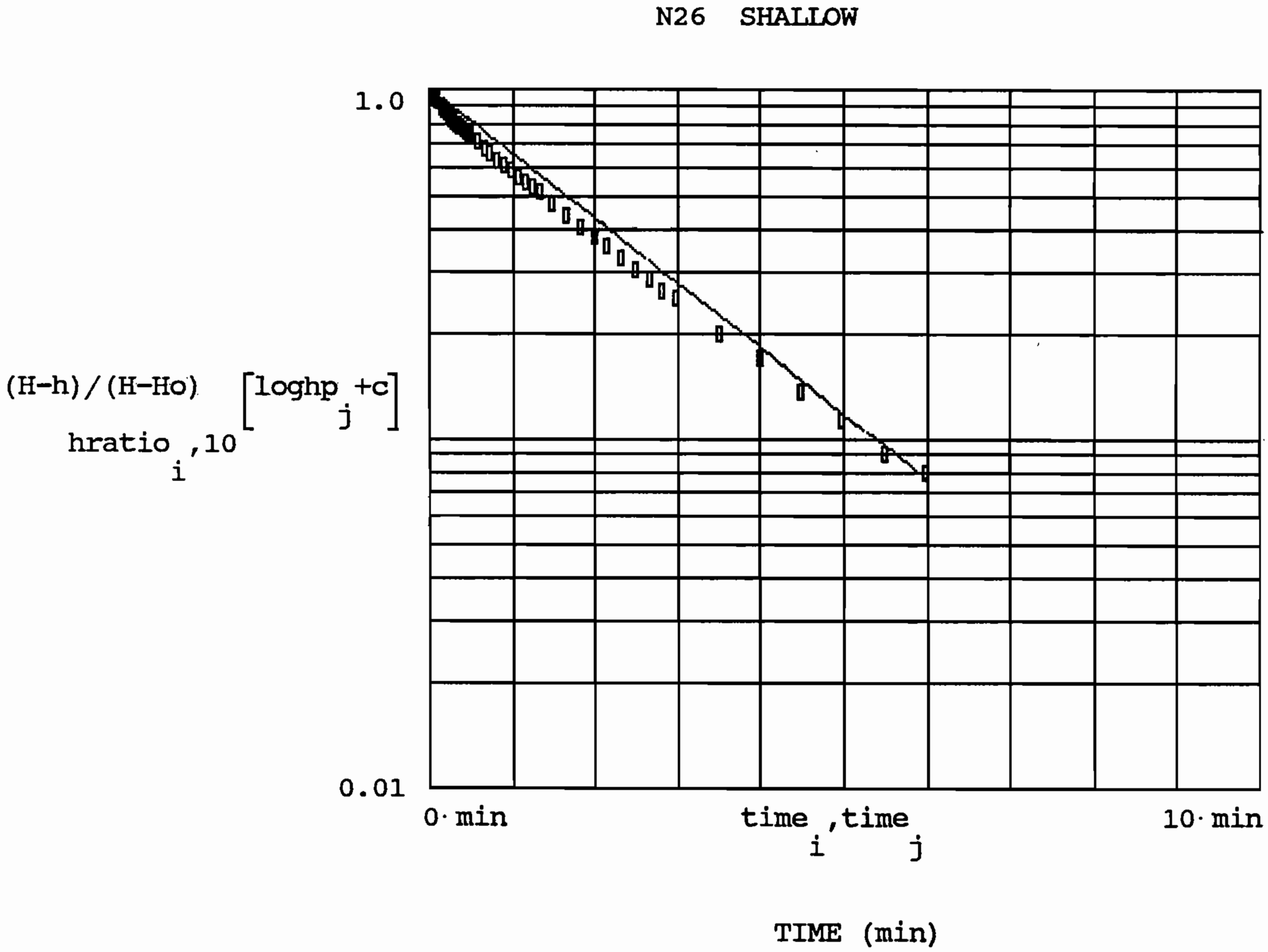
$$K_h = 2.49 \cdot 10^{-4} \cdot \frac{cm}{sec}$$



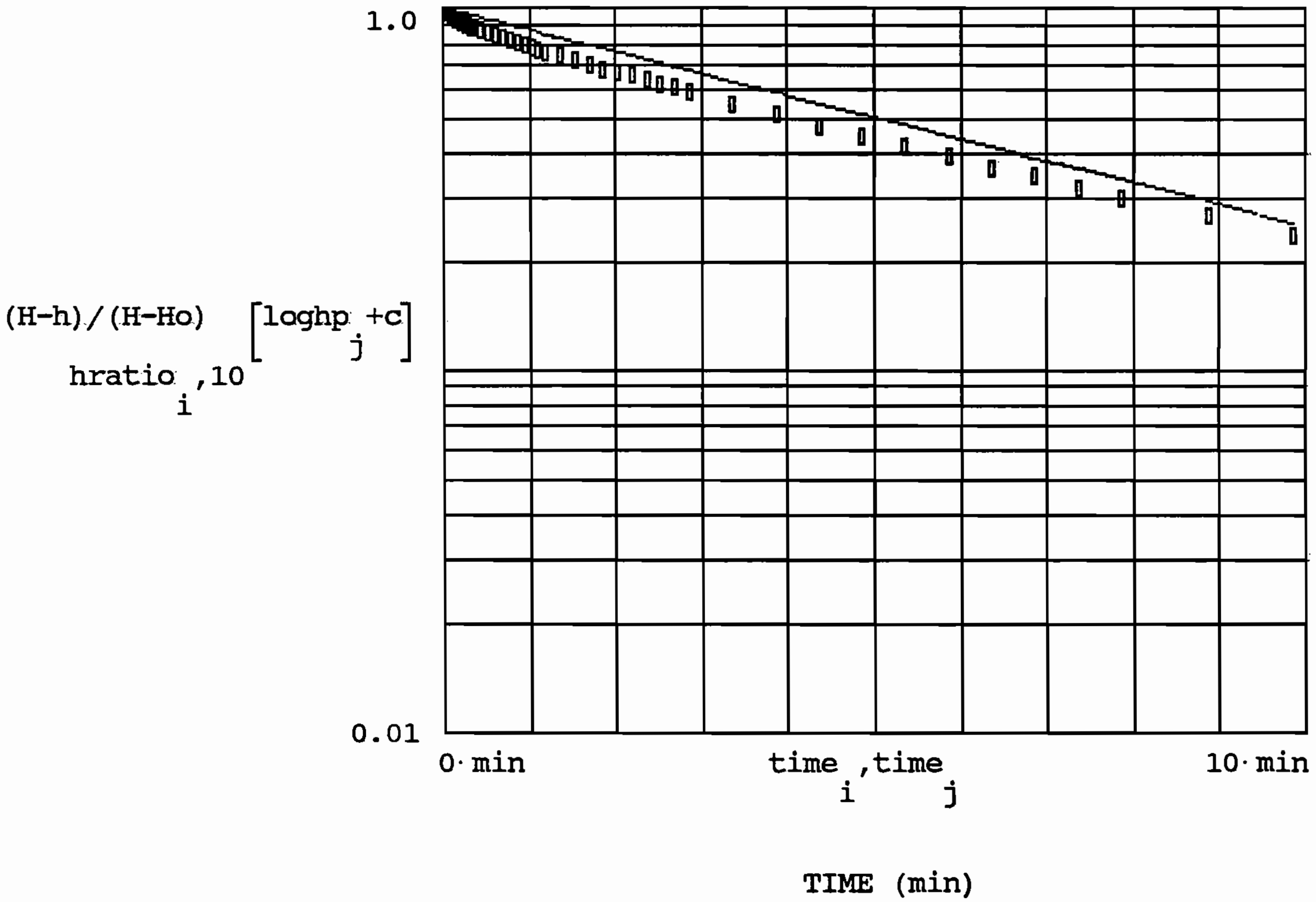
$$K_h = 7.17\cdot10^{-4}\cdot\frac{cm}{sec}$$



$$K_h = 2.65 \cdot 10^{-4} \cdot \frac{cm}{sec}$$



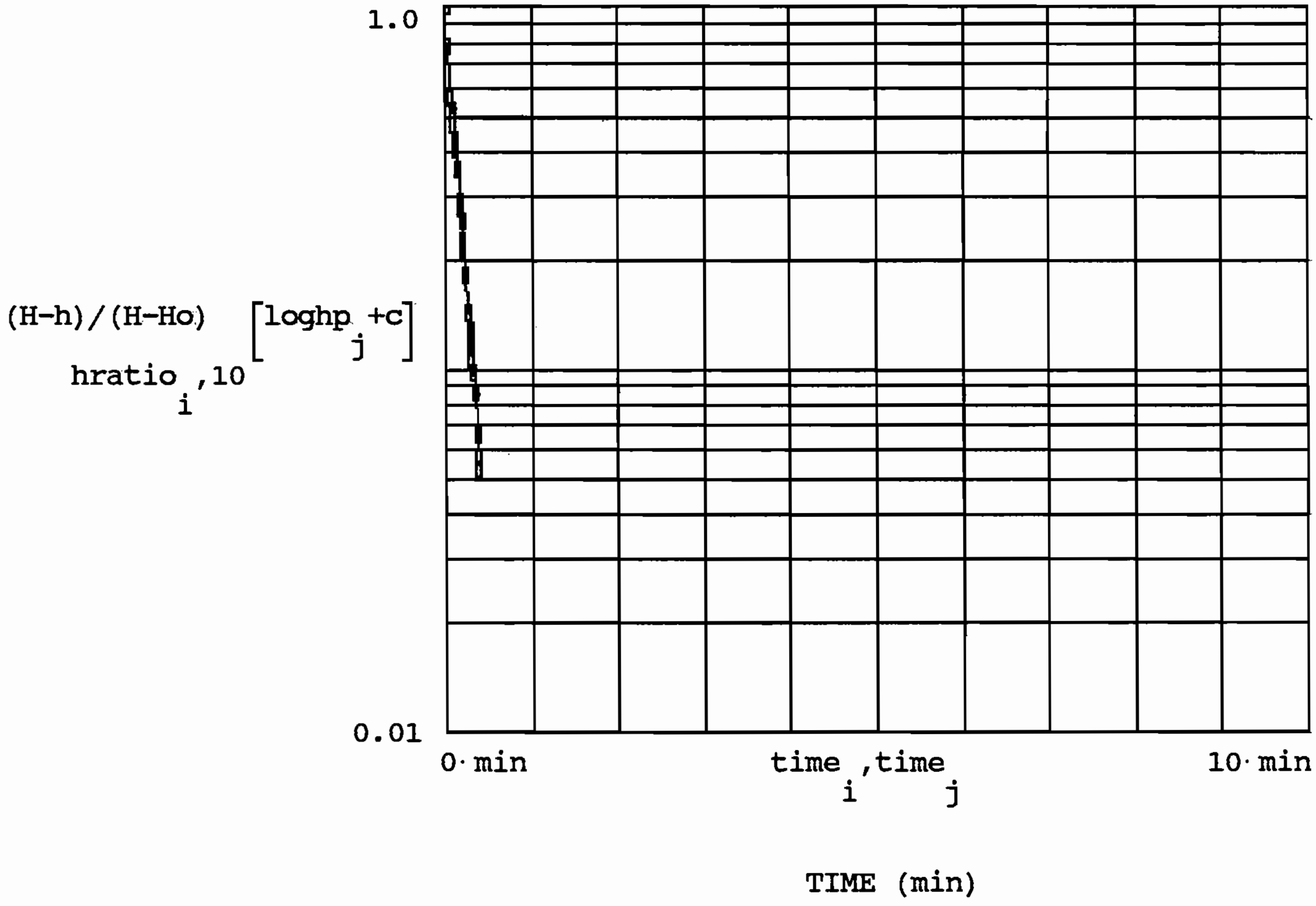
$$K_h = 8.61\cdot 10^{-5}\cdot\frac{cm}{sec}$$



N27 SHALLOW

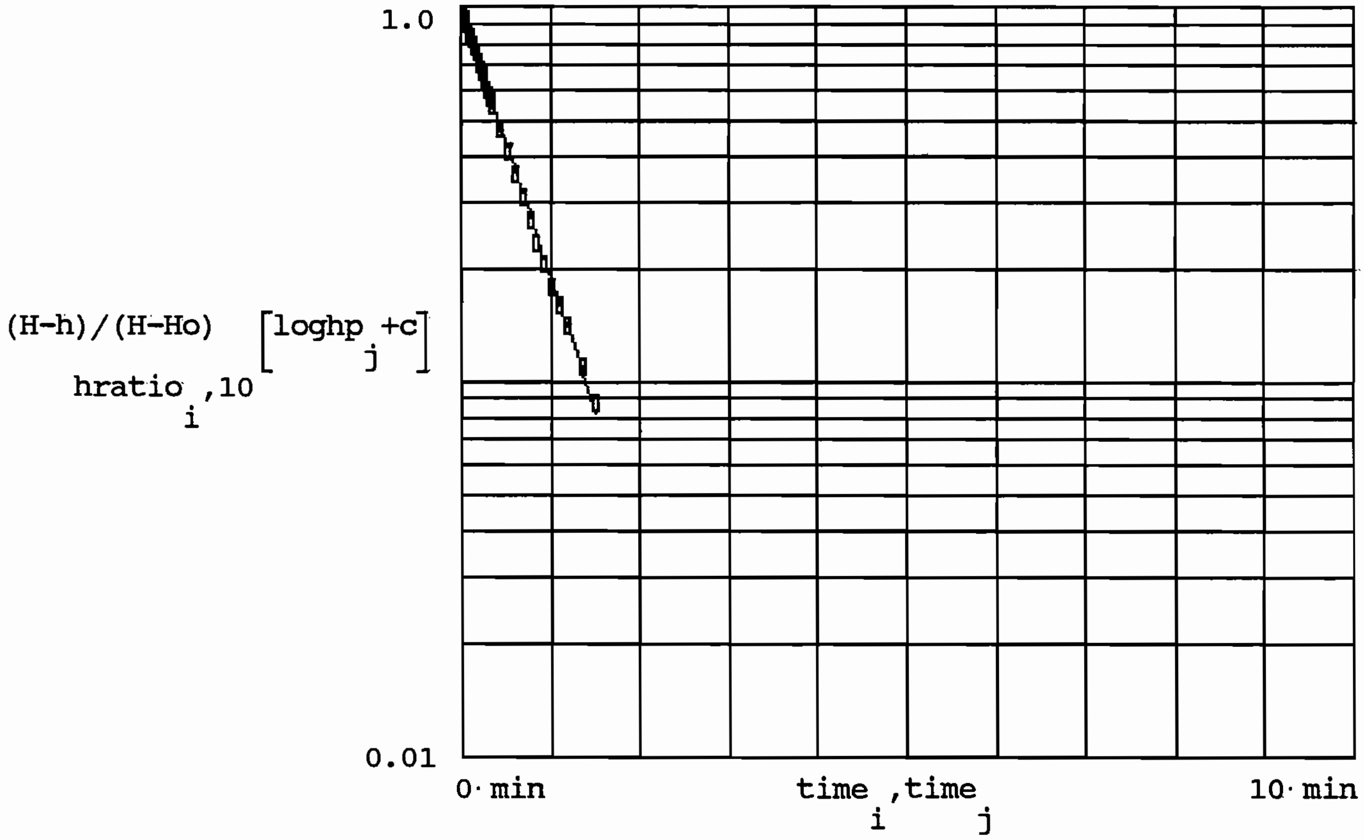
$$K_h = 4.48 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

N28 SHALLOW



$$K_h = 1.68 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

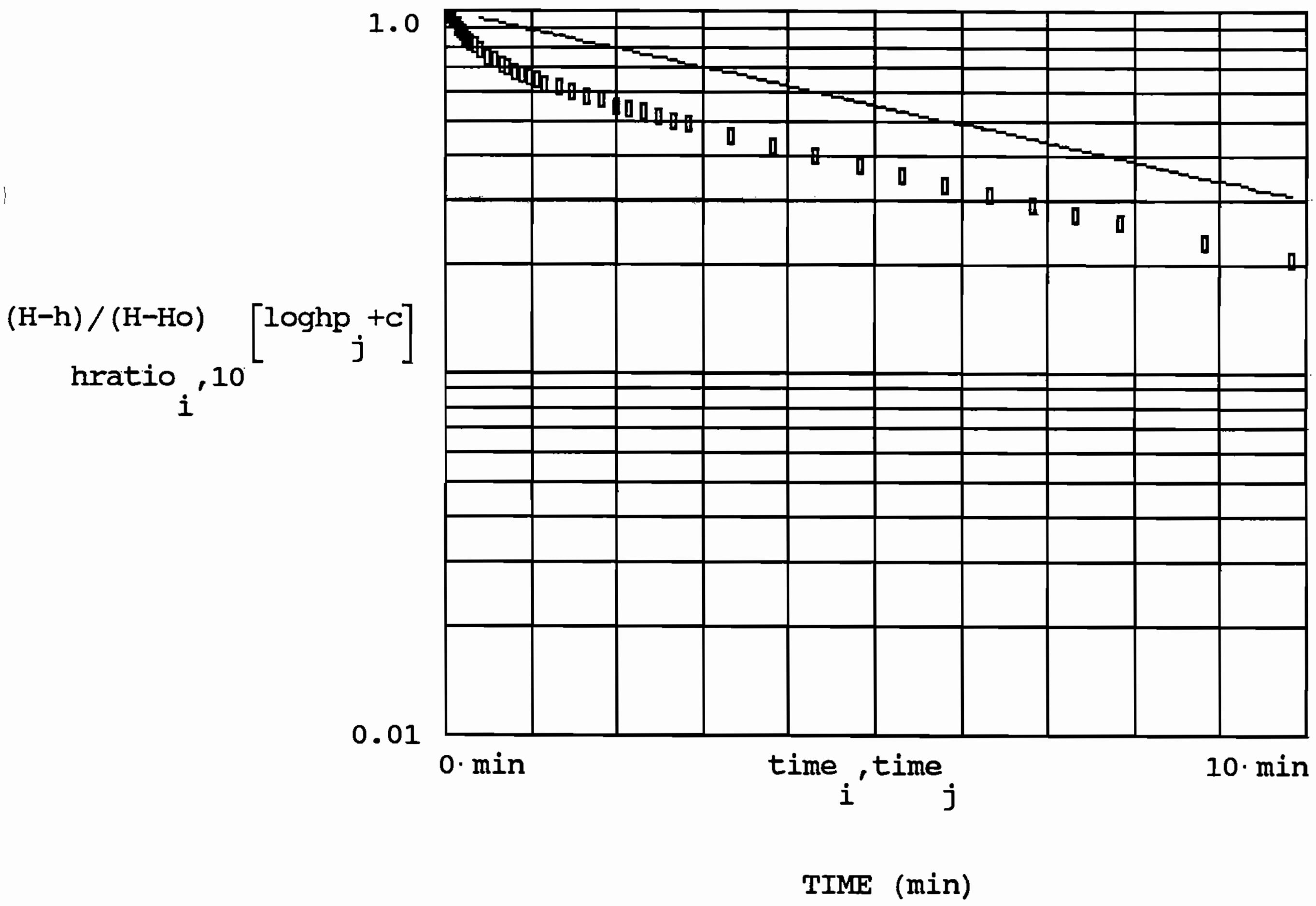
AG-1D DEEP



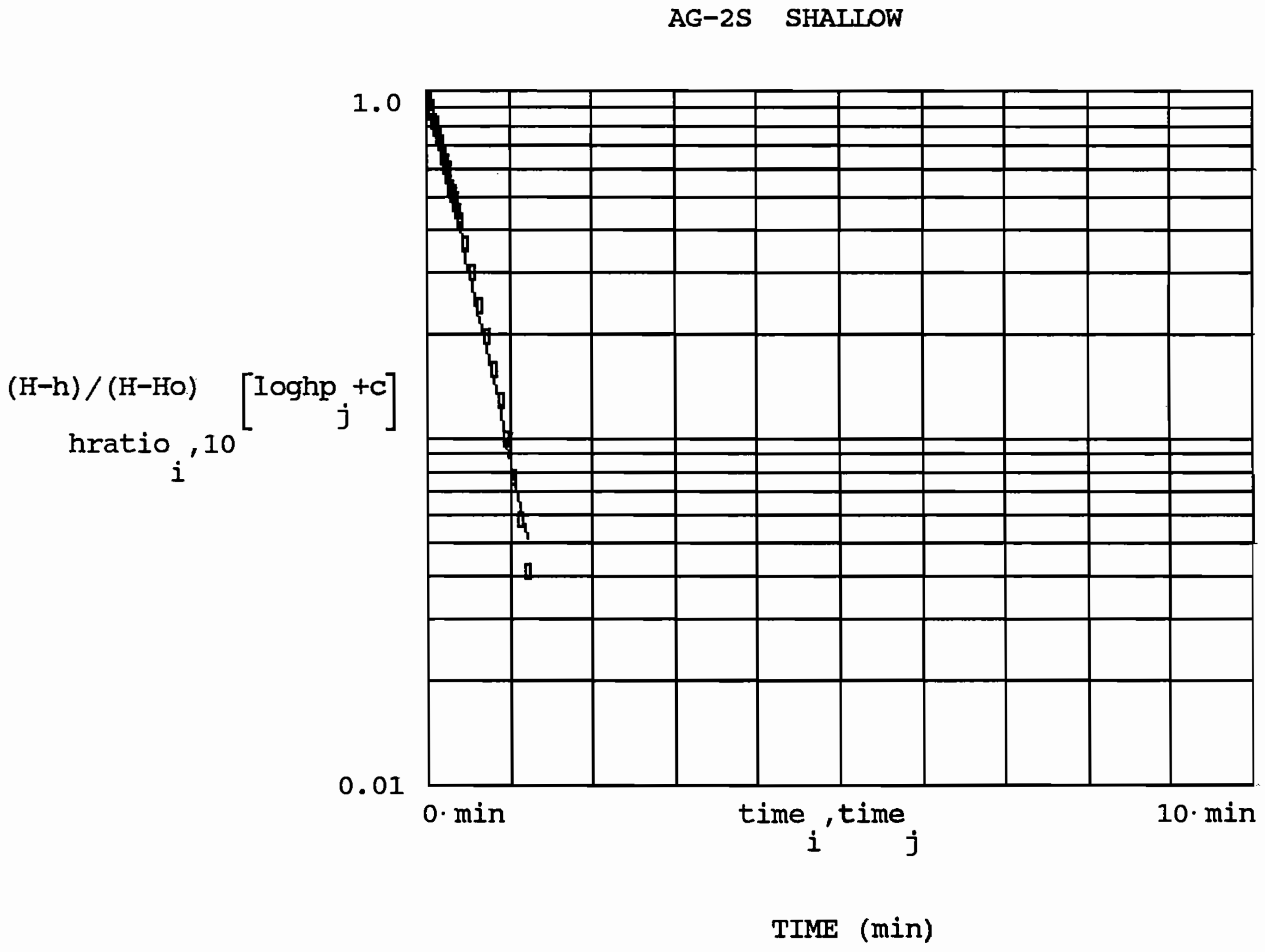
TIME (min)

$$K_h = 7.47 \cdot 10^{-5} \cdot \frac{cm}{sec}$$

AG-1S SHALLOW



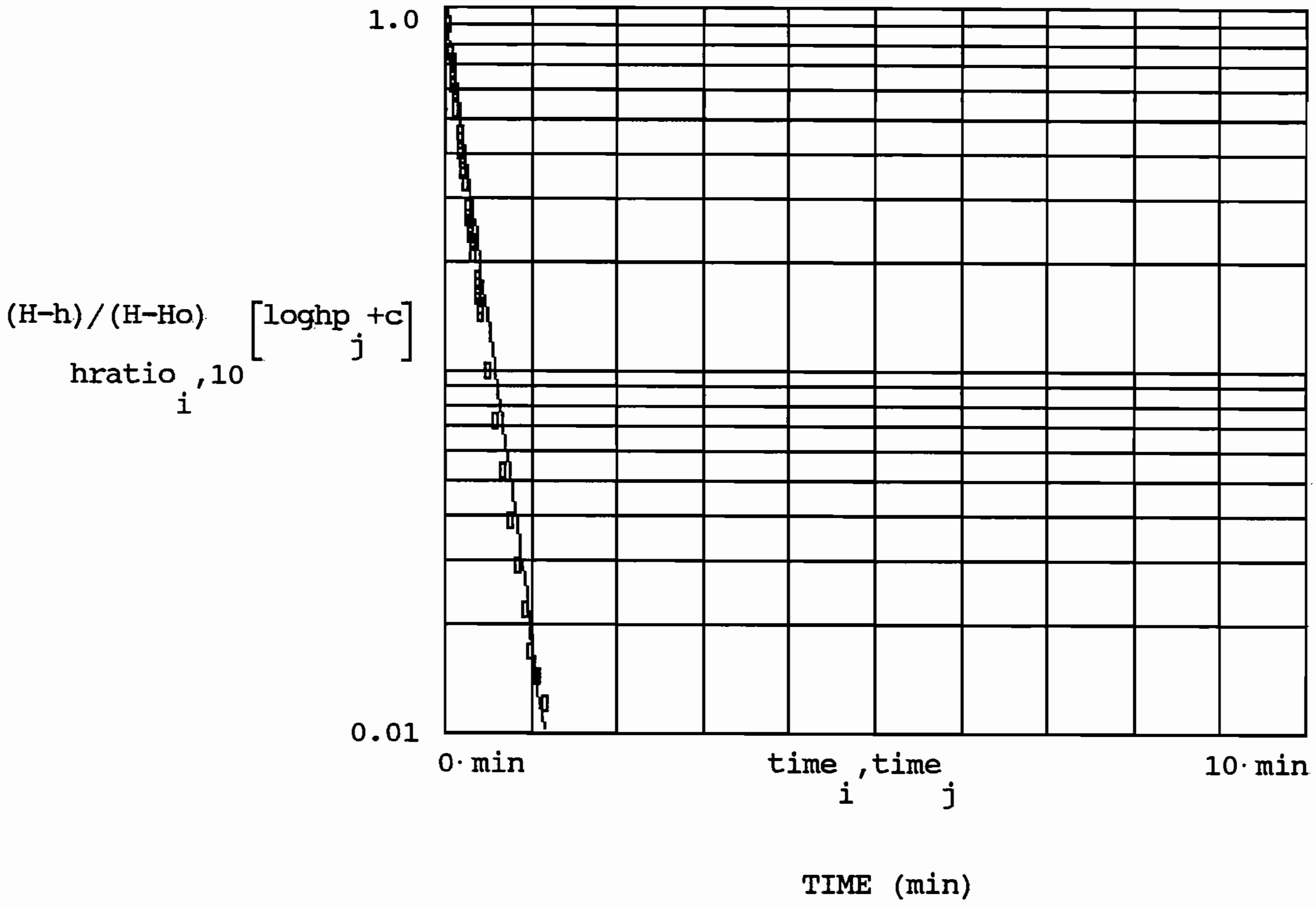
$$K_h = 1.85 \cdot 10^{-3} \cdot \frac{cm}{sec}$$



AG-2S SHALLOW

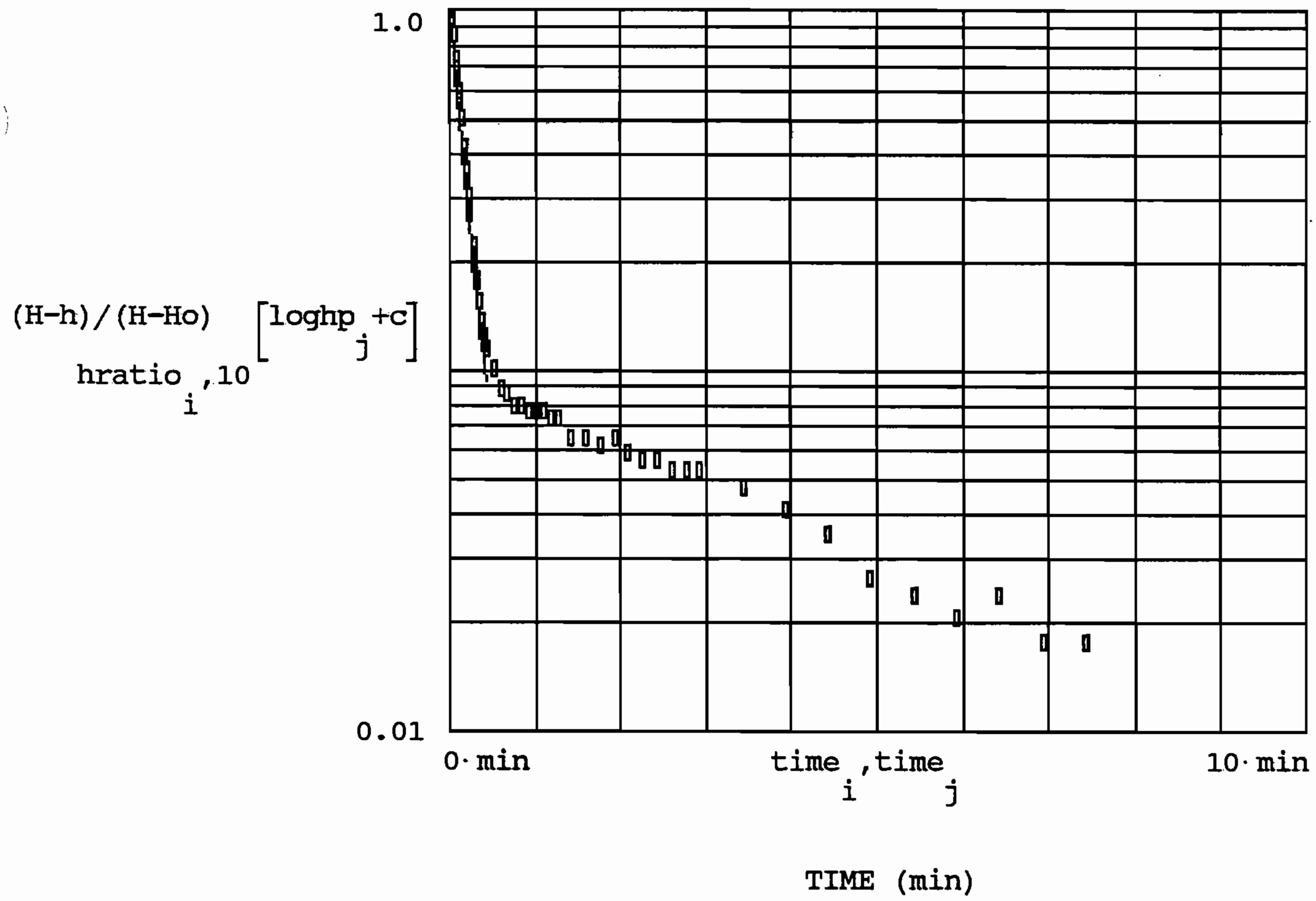
$$K_h = 4\cdot 10^{-3}\cdot\frac{cm}{sec}$$

AG-2D DEEP

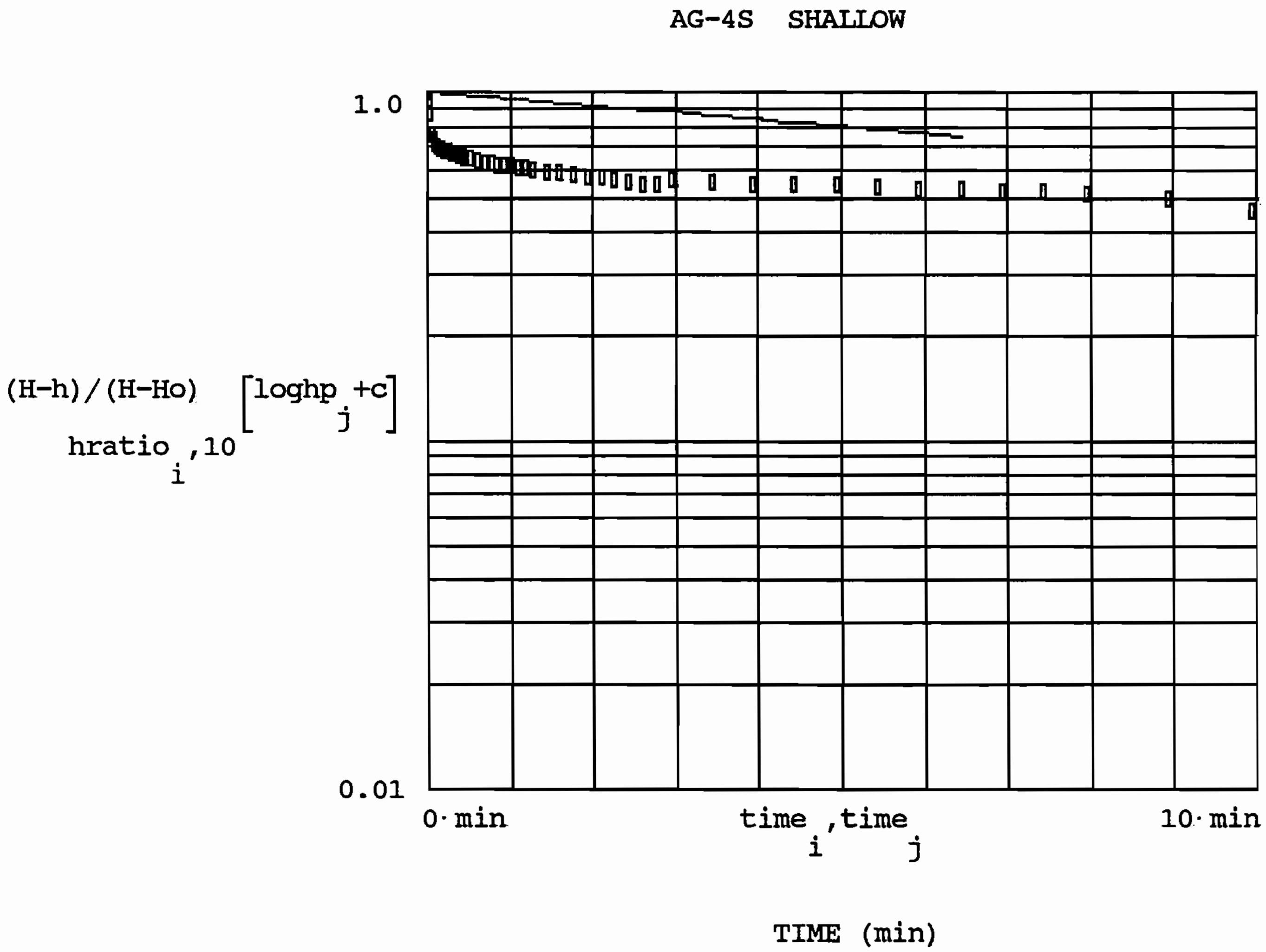


$$K_h = 3.45 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

AG-3S SHALLOW

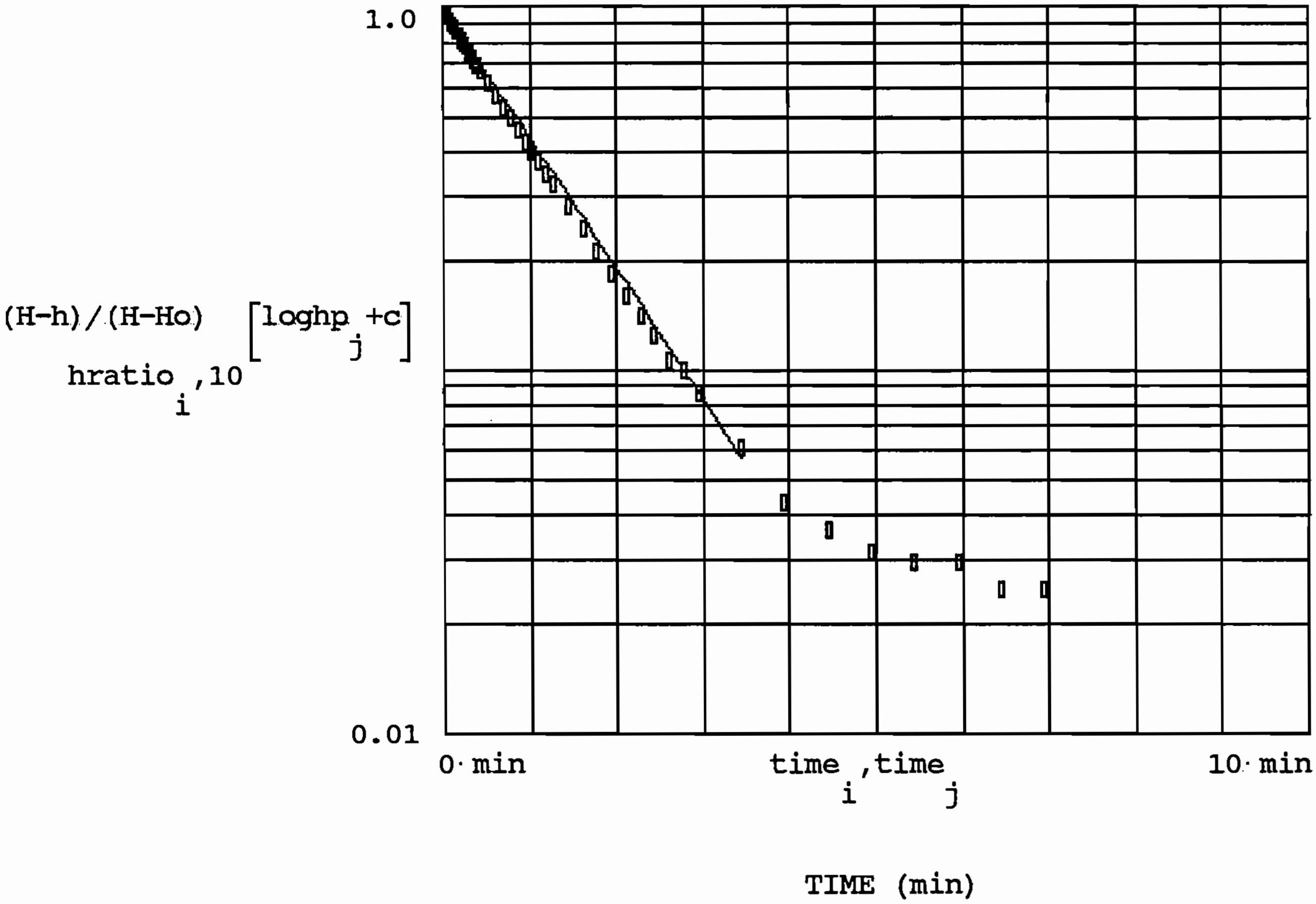


$$K_h = 2.81 \cdot 10^{-5} \cdot \frac{cm}{sec}$$



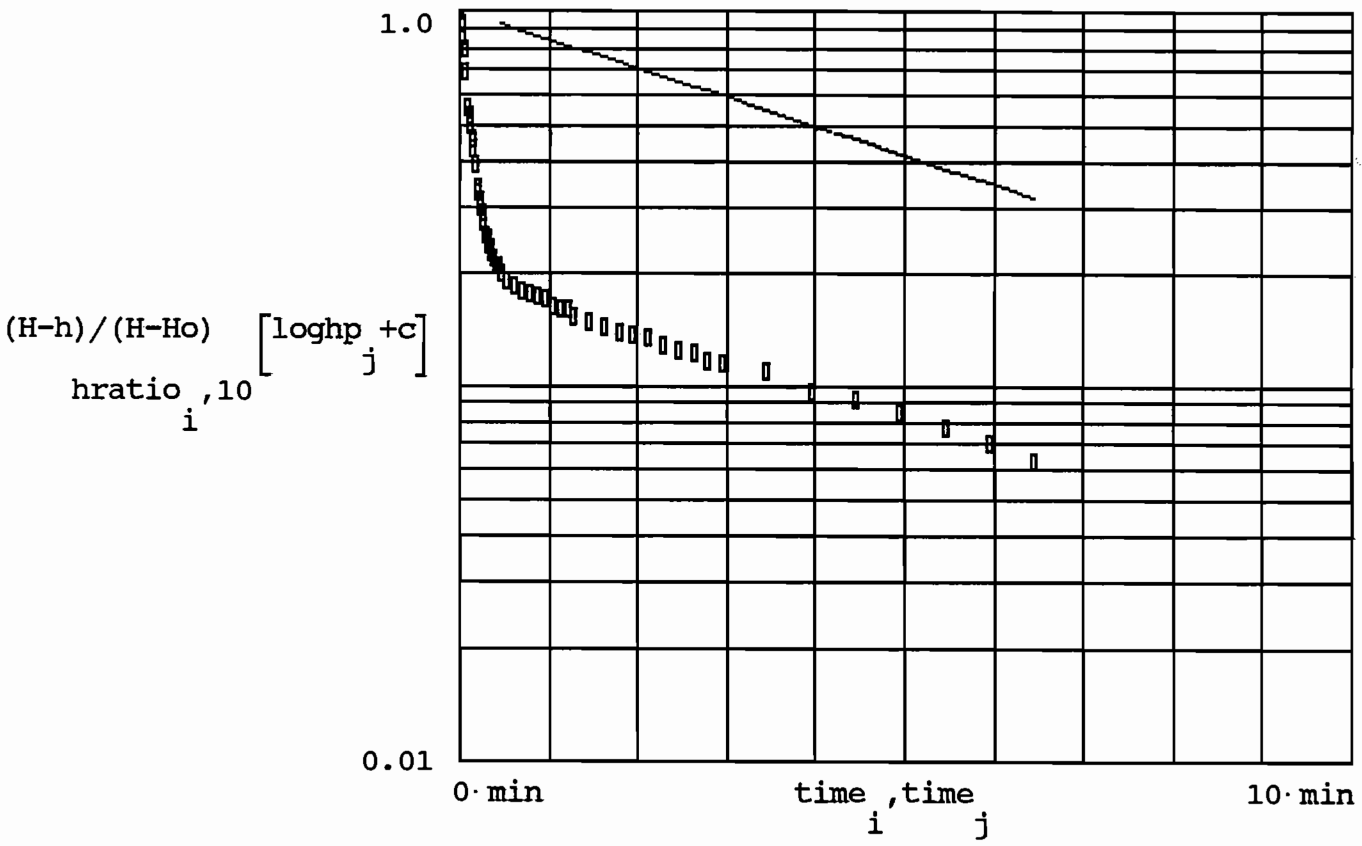
$$K_h = 8.45 \cdot 10^{-4} \cdot \frac{cm}{sec}$$

AG-4D DEEP



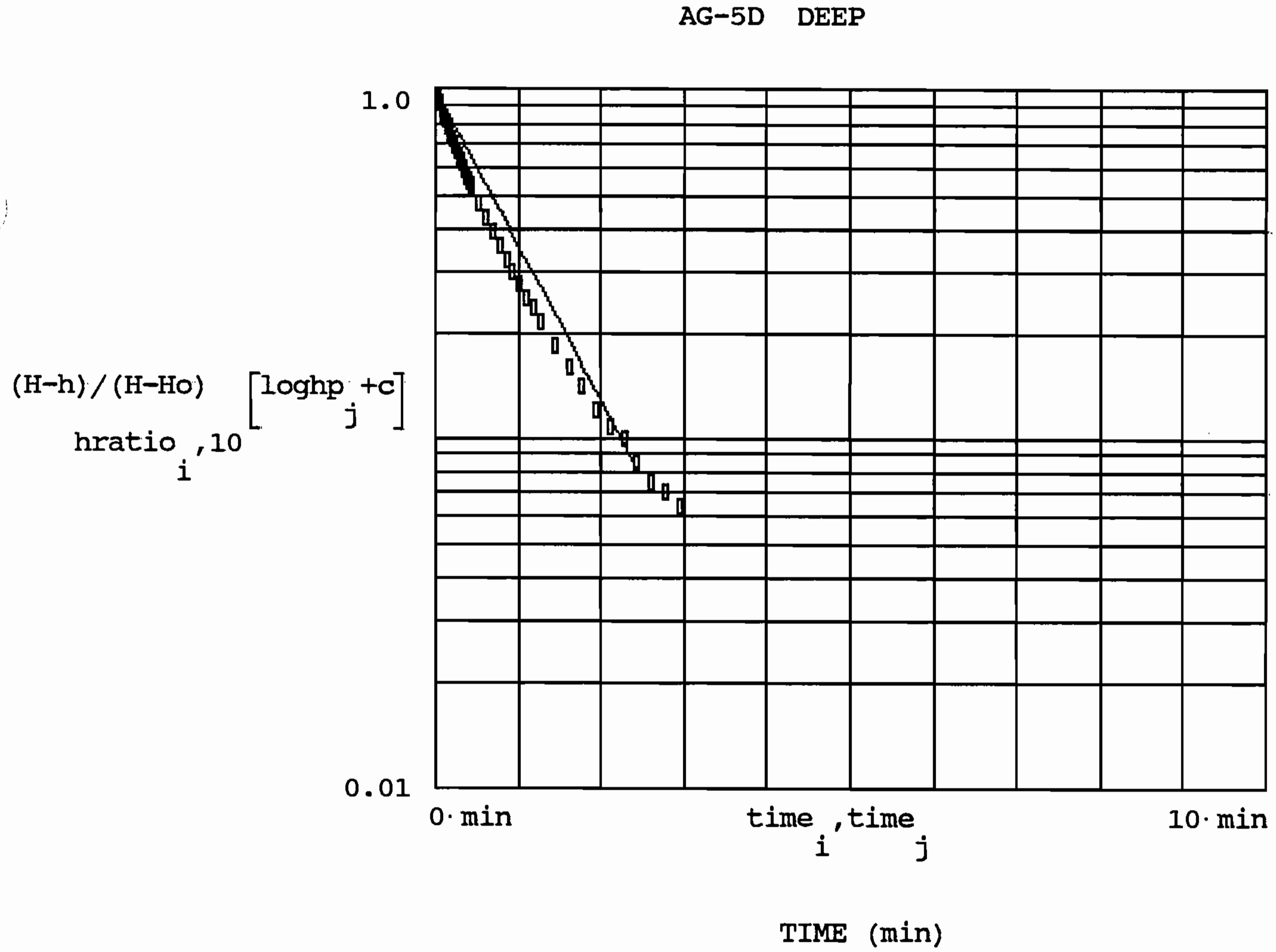
$$K_h = 1.1 \cdot 10^{-4} \cdot \frac{cm}{sec}$$

AG-5S SHALLOW

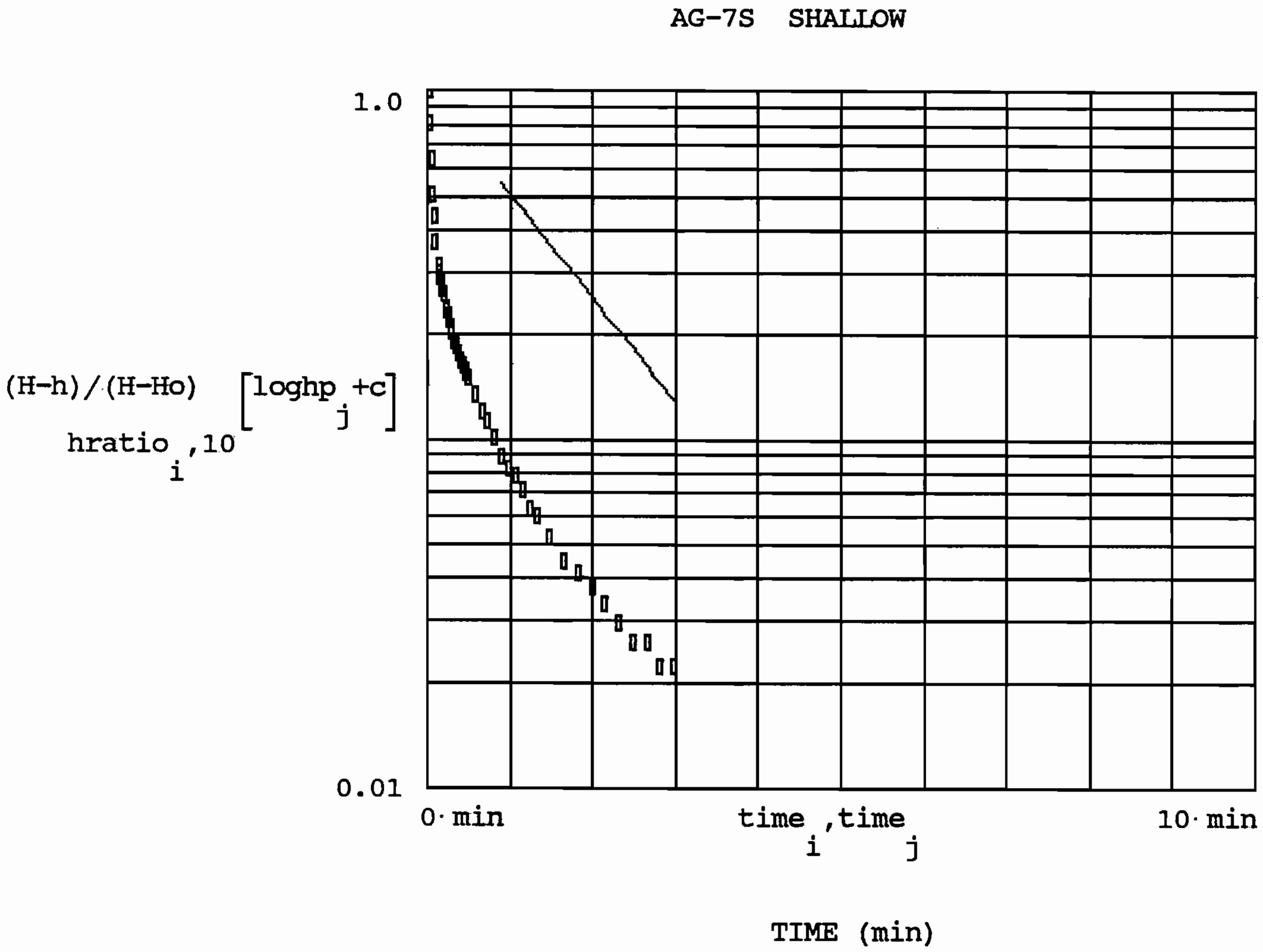


TIME (min)

$$K_h = 1.05 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

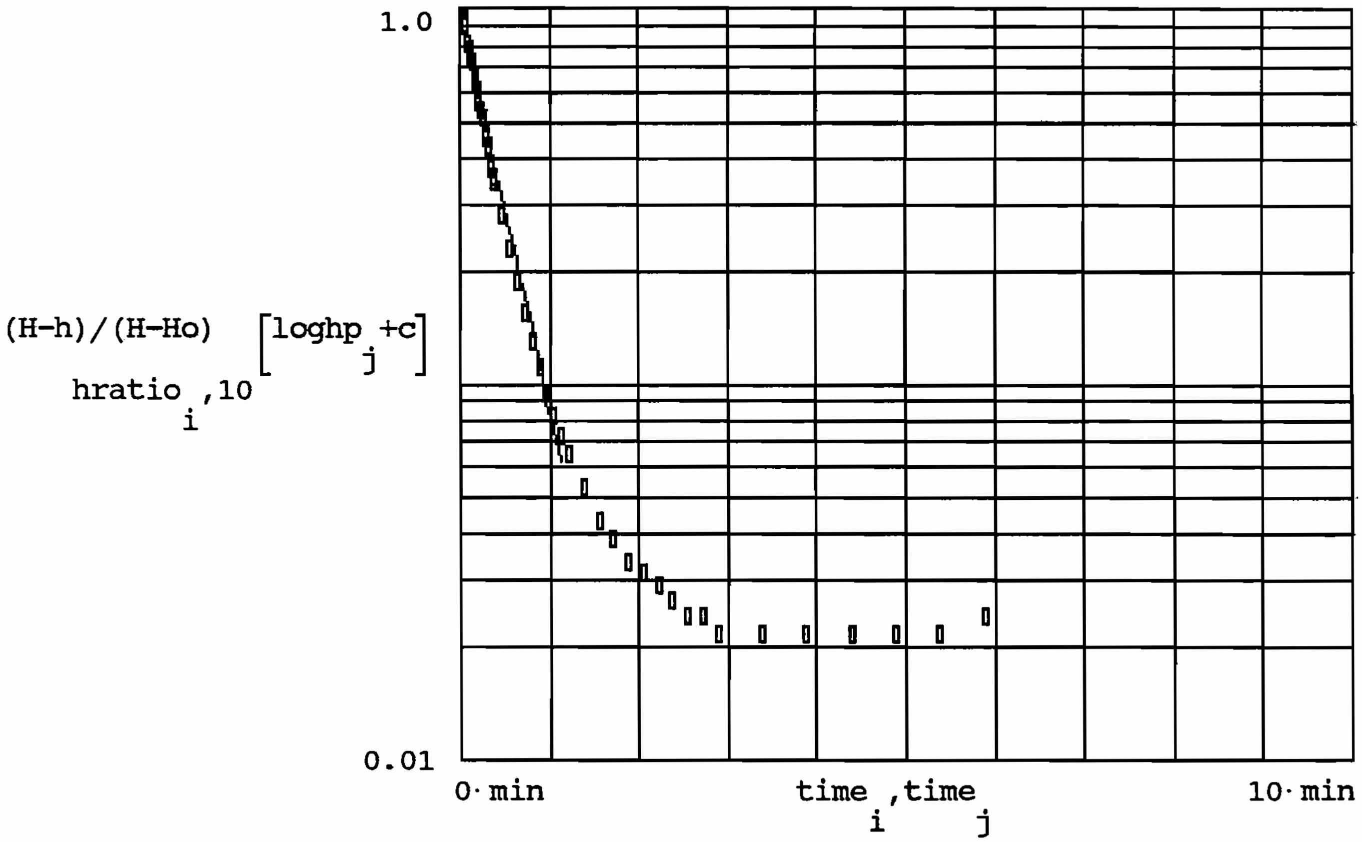


$$K_h = 5.52 \cdot 10^{-4} \cdot \frac{cm}{sec}$$



$$K_h = 1.98 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

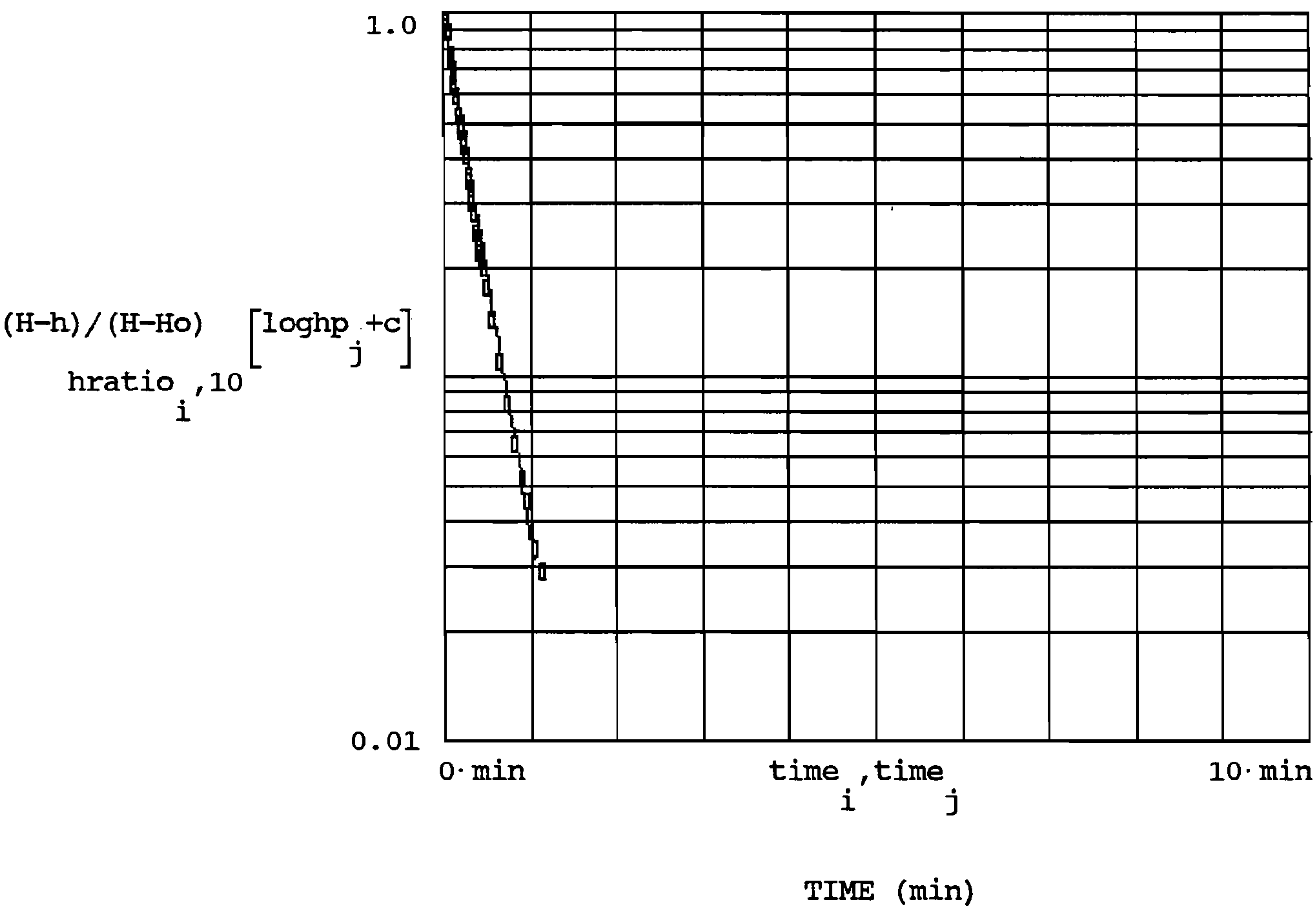
AG-7D DEEP



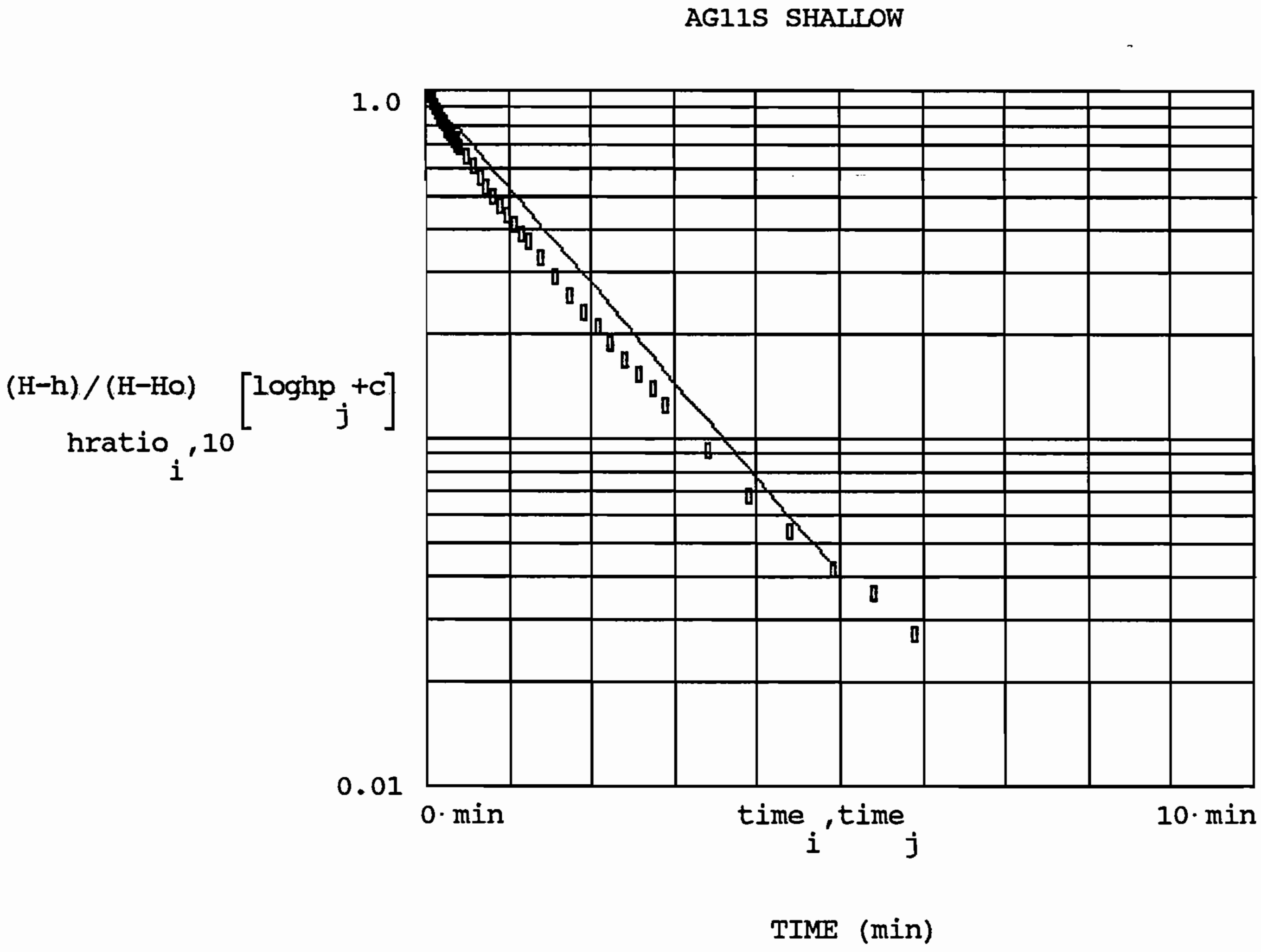
TIME (min)

$$K_h = 3.36 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

AG-10D DEEP

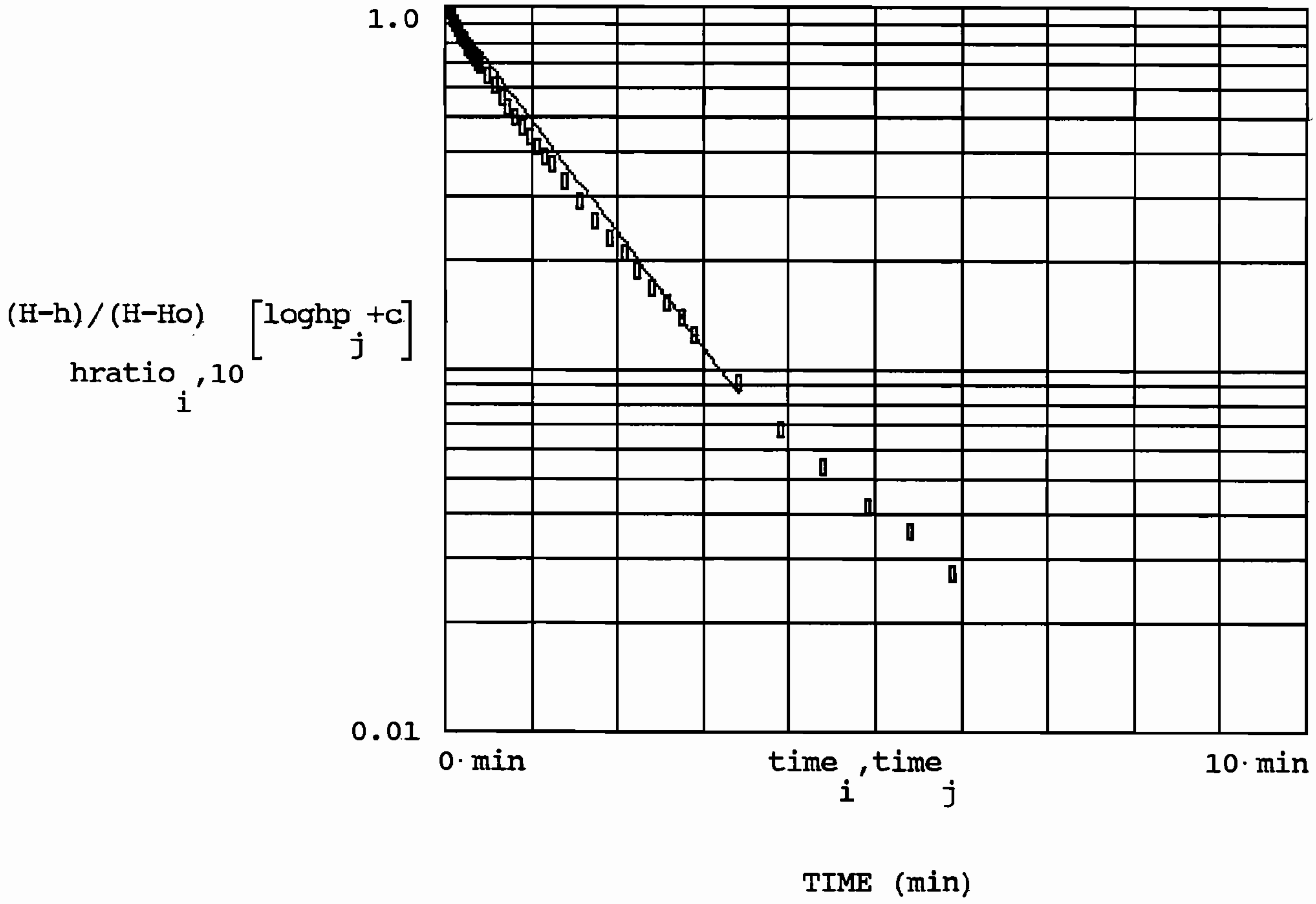


$$K_h = 1.1 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

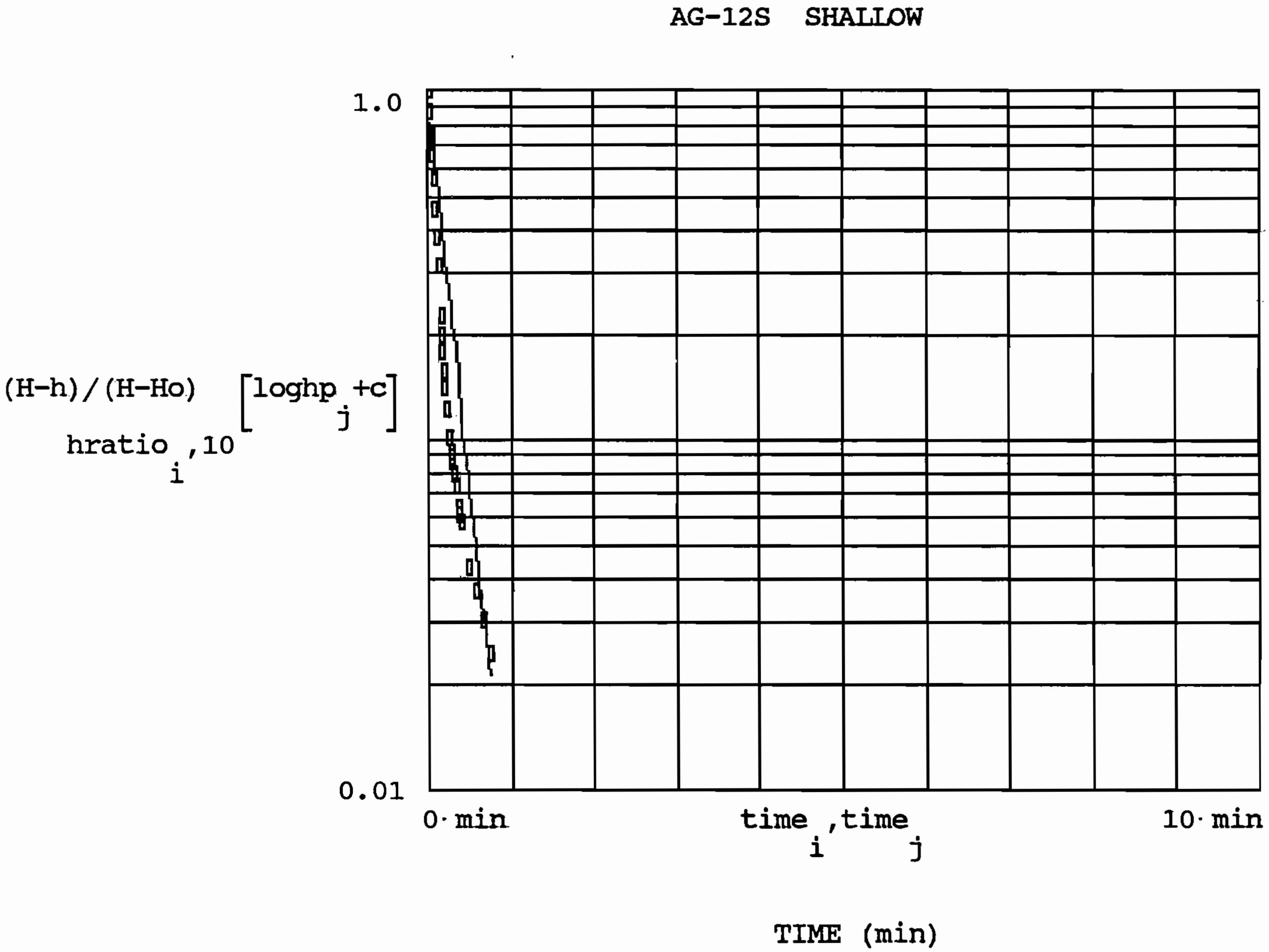


$$K_h = 7.33\cdot10^{-4}\cdot\frac{cm}{sec}$$

AG-11D DEEP

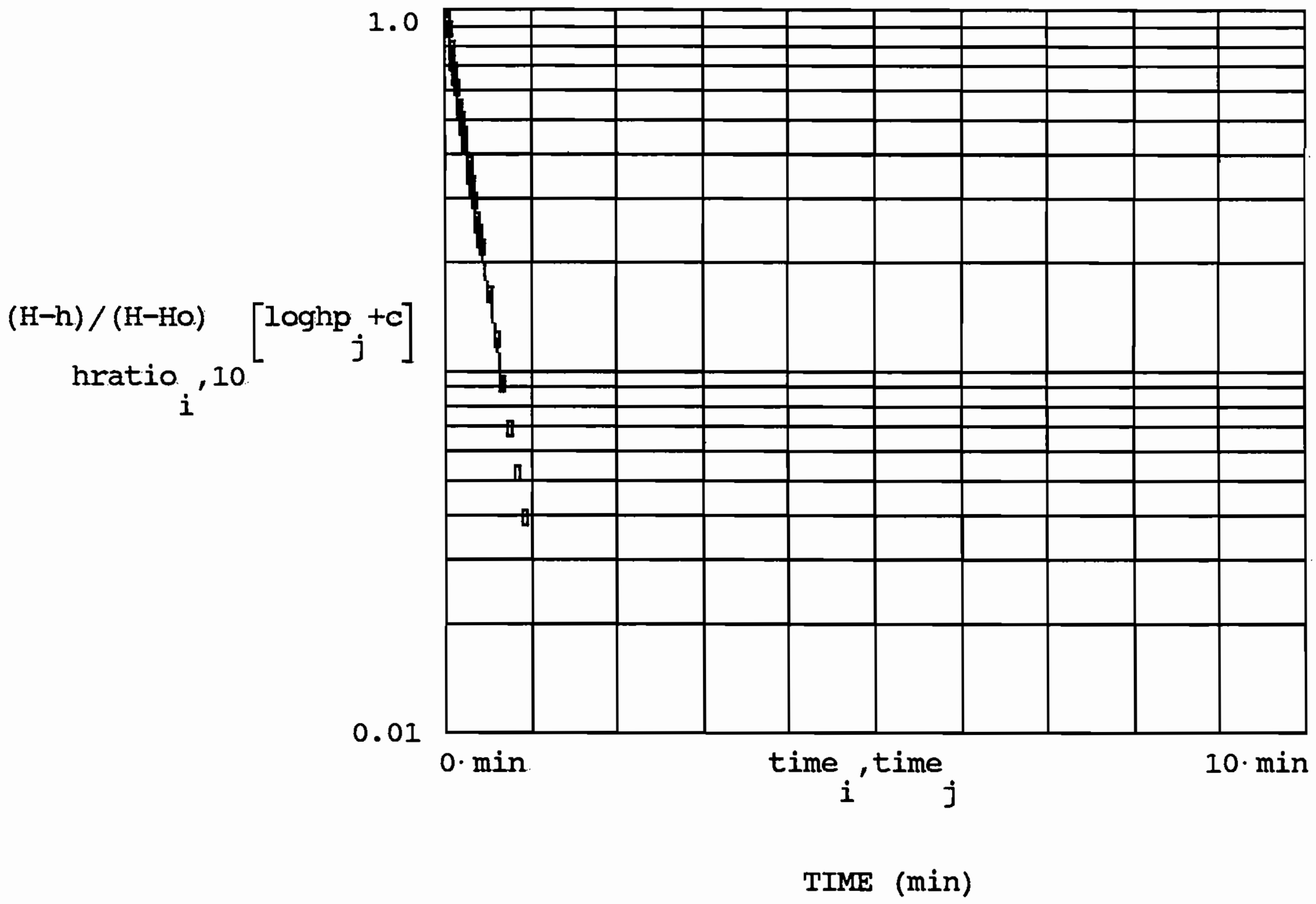


$$K_h = 3.45 \cdot 10^{-3} \cdot \frac{cm}{sec}$$



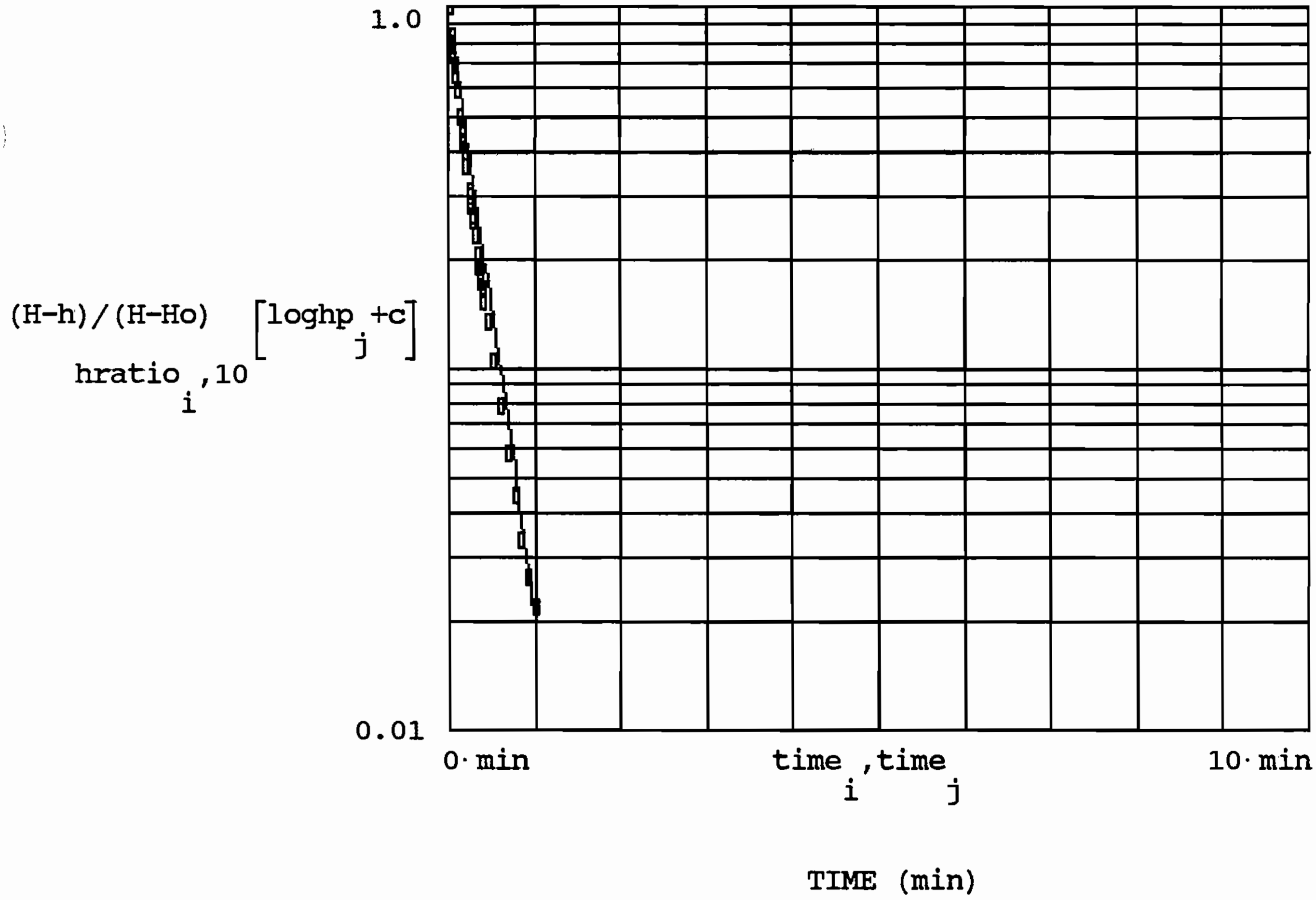
$$K_h = 3.61 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

AG-12D DEEP

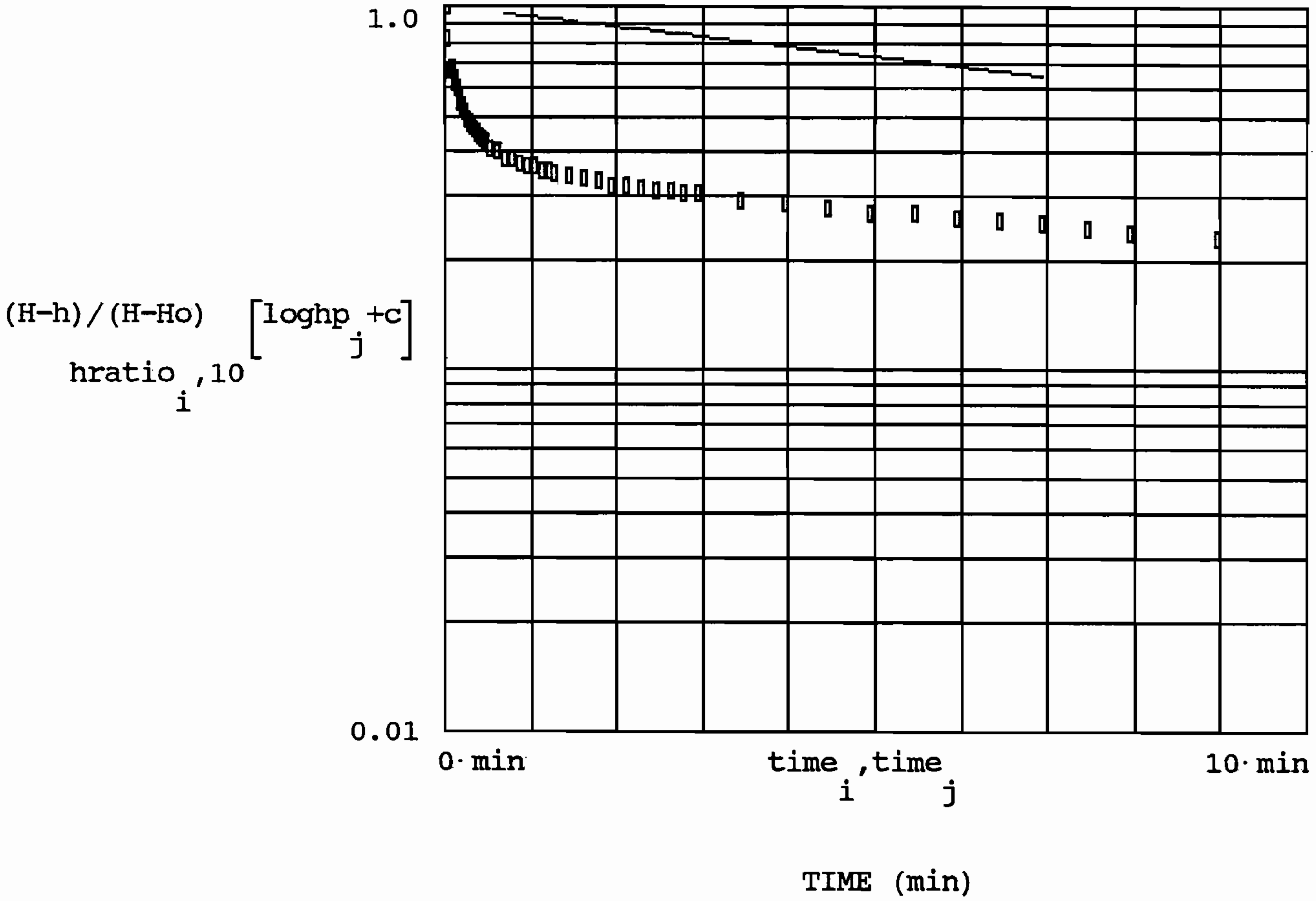


$$K_h = 3.91 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

AG-13D DEEP



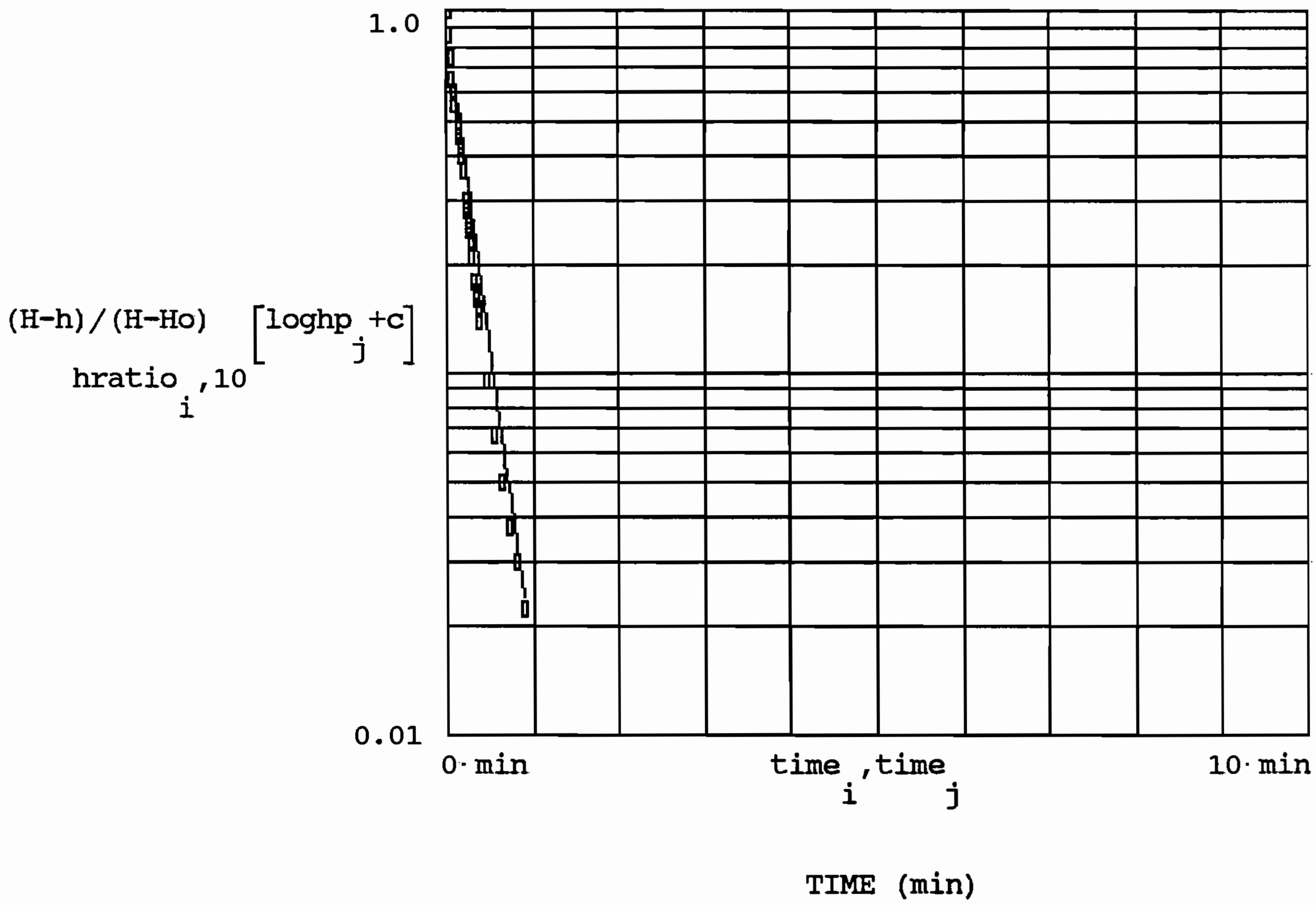
$$K_h = 4.7 \cdot 10^{-5} \cdot \frac{cm}{sec}$$



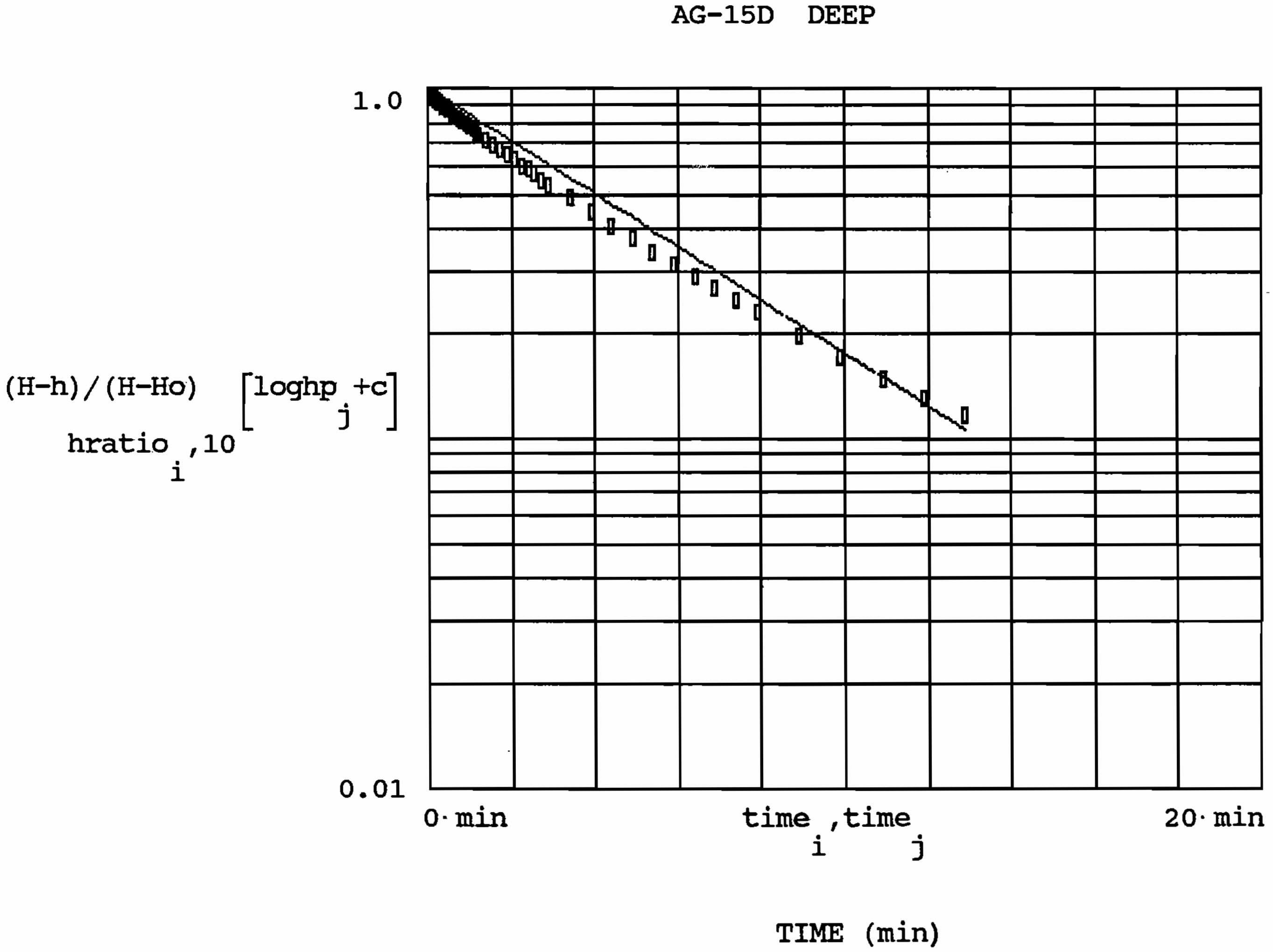
AG-13S SHALLOW

$$K_h = 2.62 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

AG-15S SHALLOW

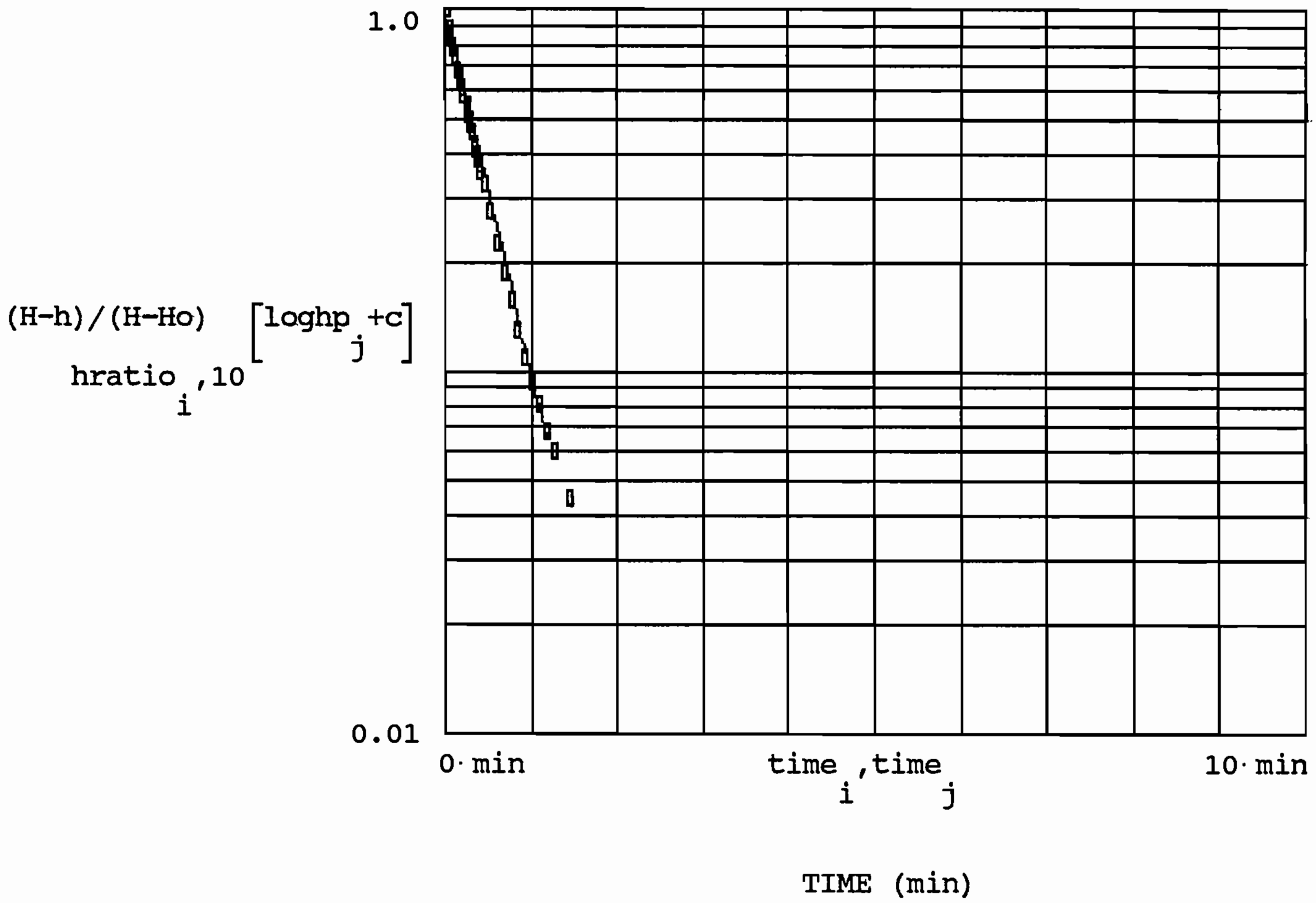


$$K_h = 1.77 \cdot 10^{-4} \cdot \frac{cm}{sec}$$



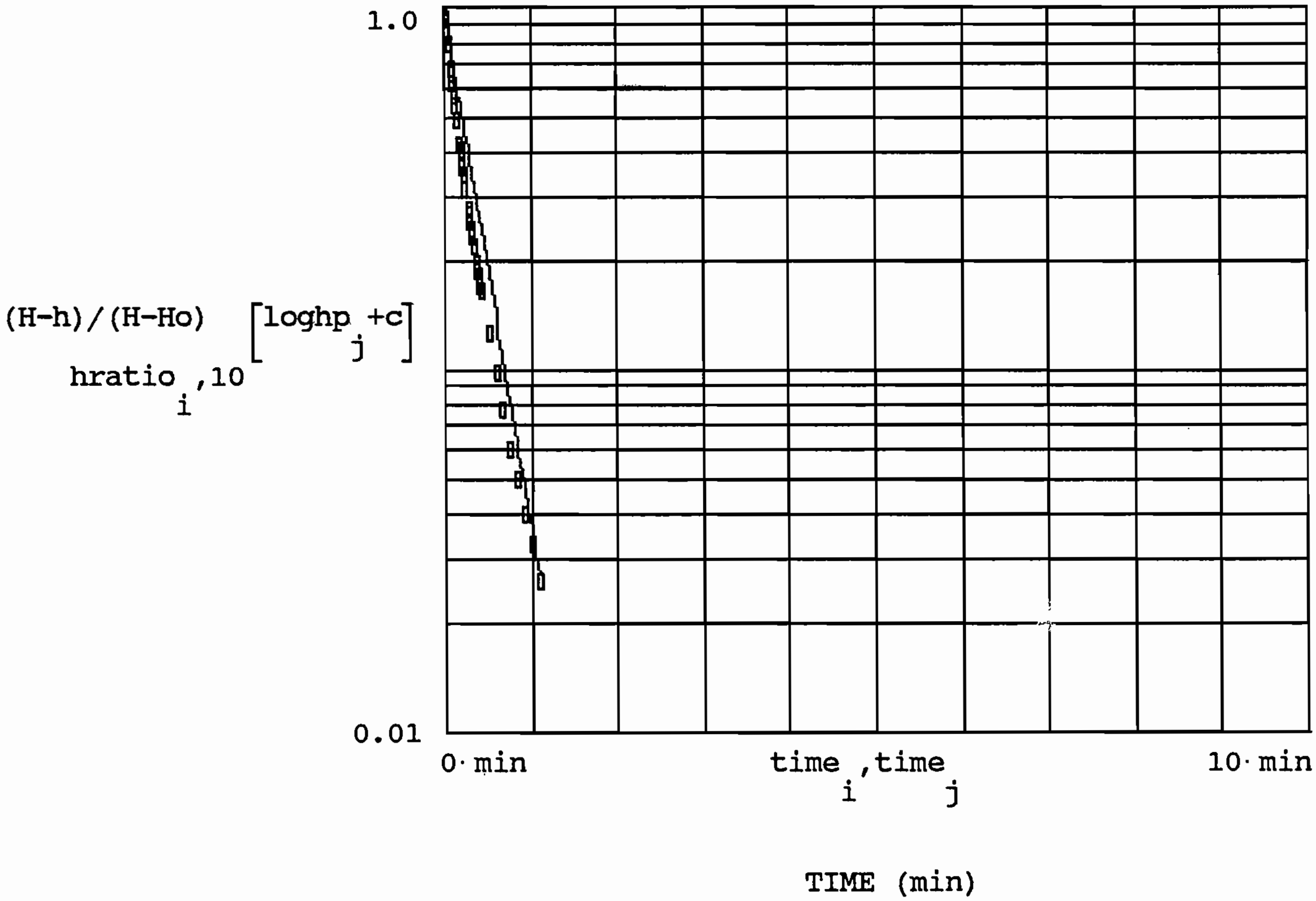
$$K_h = 3.94 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

S-4 SHALLOW



$$K_h = 5.59 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

SP1 SHALLOW



APPENDIX D

REVISED PIEZOMETRIC HEAD CALCULATIONS

Cascade Pole Site
Methodology for Converting LNAPL, DNAPL, and Salinity Measurements to Equivalent Piezometric Head

Given the relatively thin Shallow Aquifer thickness, it is reasonable to look at areal groundwater flow across the Cascade Pole Site as two-dimensional, horizontal flow. Exceptions to this, of course, would include three-dimensional flow to a partially penetrating pumping well; analysis of recharge effects on water table concentrations, etc.

Accordingly, it is appropriate to define a depth-averaged piezometric head, $\bar{\phi}$:

$$\bar{\phi}(x,y,t) = \frac{1}{L}\int_0^L \phi(x,y,z,t)\,dz$$

where,

$$\phi(x,y,z,t) = \frac{P(x,y,z,t)}{\gamma(x,y,z,t)} + z$$

x,y = horizontal coords.

z = vertical coord. (positive upward)

L = thickness over which average head is calculated

$P(x,y,z,t)$ = fluid pressure in aquifer (e.g., lb/ft^2)

$\gamma(x,y,z,t)$ = unit weight of aquifer fluid (e.g., lbs/ft^3)

In order to make this equivalent head calculation applicable to horizontal groundwater flow calculation, it is useful to look at Darcy's law for determining groundwater pore velocities:

$$\vec{V} = \frac{-\kappa}{n_e\mu}\left(\nabla P + \rho g \nabla z\right)$$

Which can be arranged to

$$\vec{V} = \underbrace{\frac{-\kappa\rho_o g}{n_e\mu}\,\nabla\left(\frac{P}{\rho_o g} + z\right)}_{\text{Velocity for constant density fluid}} + \underbrace{\frac{k\rho_o g}{n_e\mu}\left(\frac{\rho_o - \rho}{\rho_o}\right)\nabla z}_{\substack{\text{Correction term for variable density fluid}\\ \text{(note that correction only effects vertical}\\ \text{velocity)}}}$$

where,

$\vec{V}$ = pore velocity (vector)
κ = intrinsic permeability of aquifer (length^2)
n_e = effective porosity
μ = dynamic viscosity of fluid
g = gravitational acceleration
ρ_o = reference density (e.g., density of pure water)

By defining a hydraulic conductivity based on the reference fluid (assume it is pure water), the above equation can be rewritten as:

$$\vec{V} = \frac{-K}{n_e} \nabla\phi_o - \frac{K}{n_e}\frac{\rho-\rho_o}{\rho_o} \nabla z$$

where, K = hydraulic conductivity with pure water as the fluid (length/time)

$$K = \frac{\kappa \rho_o g}{\mu}$$

$$\gamma_o = \rho_o g$$

$$\phi_o = \frac{P}{\gamma_o} + z$$

By assuming the z-dir. is positive upwards and aligned with gravity, the three pore velocities (v_x, v_y, v_z) can be written as:

$$v_x(x,y,z,t) = \frac{-K}{n_e} \frac{\partial\phi_o}{\partial x} (x,y,z,t)$$

$$v_y(x,y,z,t) = \frac{-K}{n_e} \frac{\partial\phi_o}{\partial y} (x,y,z,t)$$

$$v_z\ (x,y,z,t) = \frac{-K}{n_e}\left(\frac{\partial\phi_o(x,y,z,t)}{\partial z} + \frac{\rho(x,y,z,t)-\rho_o}{\rho_o}\right)$$

From the above equations for groundwater pore velocity with a variable density fluid, it is apparent that what should be calculated is an equivalent head to use in horizontal flow calculations; that is:

$$\overline{V_x}(x,y,t) = \frac{1}{L}\int_o^L V_x(x,y,z,t)\,dz = \frac{-K}{Ln_e}\frac{\partial}{\partial x}\left[\int_o^L \phi_o(x,y,z,t)\,dz\right]$$

$$\overline{V_y}(x,y,t) = \frac{1}{L}\int_o^L V_y(x,y,z,t)\,dz = \frac{-K}{Ln_e}\frac{\partial}{\partial y}\left[\int_o^L \phi_o(x,y,z,t)\,dz\right]$$

In other words, the field data should be used to calculate:

$$\overline{\phi_o}(x,y,t) = \frac{1}{L}\int_o^L \phi_o(x,y,z,t)\,dz$$

or,

$$\overline{\phi_o}(x,y,t) = \frac{1}{L}\int_o^L\left[\frac{P(x,y,z,t)}{\gamma_o} + z\right]dz$$

The density profile can be used to calculate $\bar{\phi}_o$ from a set of LNAPL, DNAPL, water level, and salinity measurements.

As shown in Figure D-1, the pressure at any point in the fluid column in the well casing is equal to the total weight of fluid above that point (assuming a unit horizontal cross-sectional area).

Probably the most straight forward way to calculate the first term in the expression for $\bar{\phi}_o$,

$$\frac{1}{\gamma_o L}\int_o^L P(x,y,z,t)\,dz \quad ,$$

is to derive the pressure curve in Figure D-1 and use this curve to calculate the average pressure, $\bar{P}$, over the distance L, referred to as the interval "A" in Figure D-1.

$$\overline{P} = \frac{1}{L}\int_o^L P(x,y,z,t)dz$$

and recognize that,

$$\frac{\overline{P}}{\gamma_o} = \frac{1}{\gamma_o L}\int_o^L P(x,y,z,t)dz$$

$\bar{\mathrm{P}}$ can either be calculated graphically or numerically.

If S = salinity (parts per thousand) then the unit weight of saline water, γ_s, is given by (Wetzel, 1983).

$$\gamma_s = \left(1 + \frac{S}{1{,}250}\right)\gamma_w$$

where, γ_w = unit weight of pure water.

Summary of Methodology for Calculating $\bar{\phi}_o$

(1) Calculate and Plot Pressure Distribution in Well (Figure D-1)

(a) within LNAPL zone ($0 \leq b \leq \Delta b_1$)

$$P = \gamma_L b$$

b = distance from top of LNAPL layer in well to point of interest

(b) within saline (potentially) groundwater zone ($\Delta b_1 \leq b \leq \Delta b_1 + \Delta b_2$),

$$P = \gamma_L \Delta b_1 + \overset{=}{\gamma_s}\ (b - \Delta b_1)$$

where, $\overset{=}{\gamma}_s$ = average unit weight (calculate numerically or graphically) over the interval ⇒ $\Delta b_1 \leq b \leq \Delta b_1 + \Delta\ b$

$$\Delta b = b - \Delta b_1$$

(c) $(\Delta b_1 + \Delta b_2 \leq b \leq L)$:

$$P = \gamma_L \Delta b_1 + \overline{\gamma_s} \Delta b_2 + \gamma_D (b - \Delta b_1 - \Delta b_2)$$

where, $\bar{\gamma}_s$ = average unit weight over the interval ⇒ $\Delta b_1 \leq b \leq \Delta b_1 + \Delta b_2$

(2) Calculate Average Pressure, $\bar{P}$

(a) Numerical Method (trapezoidal rule)

N = number of discrete points defining pressure curve

$$\bar{P} = \frac{1}{L} \sum_{i=1}^{N-1} \left(\frac{P_i + P_{i+1}}{2} \right) (b_{i+1} - b_i)$$

(b) Graphical Method

- Digitize area under pressure curve (area in in.^{2} based on any plot)
- Divide this area by length of distance "L" (inches)
- Convert this value ($\bar{P}$, in inches) to pressure units based on pressure axis

(3) Calculate $\frac{1}{L} \int_o^L z\, dz$

z = elevation above a datum (use MLLW)

$$\frac{1}{L} \int_o^L z\, dz = \frac{L}{2} + z_{aquitard}$$

$z_{aquitard}$ = elevation of aquitard surface (MLLW)

(4) Calculate $\bar{\phi}_o$

$$\overline{P} = \frac{1}{L}\int_o^L P dz \Rightarrow \frac{1}{L}\int_o^L \left[\frac{P(x,y,z,t)}{\gamma_o}\right] dz = \frac{\overline{P}}{\gamma_o}$$

Let, $\gamma_o = \gamma_w$ = unit weight of fresh water

Then,

$$\overline{\Phi_o} = \frac{\overline{P}}{\gamma_w} + \frac{L}{2} + z_{aquitard}$$

Use this "corrected" piezometric head to develop Shallow Aquifer piezometric surface maps.

References

Wetzel, Robert G., 1983., Limnology. 2nd Edition, Saunders College Publishing, pp 11-12.

C:\WPDOCS\Doug

Example Calculations
for Hypothetical Monitoring Well

Cascade Pole Site, Olympia, Washington, Conversion of LNAPL, DNAPL and Salinity Measurements to Equivalent Piezometric Head for Well # TEST

Written by ESE May 20th, 1991 Using Mathcad Software
by Mathsoft, Inc., Cambridge, Massachusetts.

Basic Units $cm \equiv 1L$ $g \equiv 1M$ $sec \equiv 1T$

Derived Units

$m \equiv 100 \cdot cm$ $in \equiv 2.54 \cdot cm$ $ml \equiv 1 \cdot cm^{3}$

$min \equiv 60 \cdot sec$ $hr \equiv 60 \cdot min$ $day \equiv 24 \cdot hr$

$kg \equiv 1000 \cdot g$ $mg \equiv 0.001 \cdot g$ $ft \equiv 12 \cdot in$

$lb \equiv 448 \cdot g$

$$N \equiv kg \cdot \frac{m}{sec^{2}}$$

Calculation to Correct Piezometric head

Read in Variables

$b := 1.5 \cdot ft$	Depth of LNAPL
$b2a := 22 \cdot ft$	Liquid Depth to Bottom of DNAPL
$b2 := 0.5 \cdot ft$	Depth of DNAPL
§L := 0.8	Specific Gravity of LNAPL
§D := 1.02	Specific Gravity of DNAPL
§W := $9800 \cdot \frac{N}{m^{3}}$	Unit Weight of Pure Water
$b1L := 20 \cdot ft$	Length of Saline Water Column
$Z := 17 \cdot ft$	Elevation of Aquitard Surface (from MLLW)
$A := 22 \cdot ft$	Depth of Liquid Column in Well
$b2L := 21.5 \cdot ft$	Depth of Liquid above DNAPL

(STEP 1) Calculate Pressure Created by LNAPL

$$Psur := 0.0 \cdot \frac{N}{m^2} \qquad P1 := \S L \cdot b \cdot \S W$$

$$bsur := 0.0 \cdot ft \qquad P1 = 3.584 \cdot 10^3 \cdot \frac{N}{m^2}$$

(STEP 2) (a) Calculation of Unit Weight of Salinity at Range of Depths

$q := b$

1. Supply number of data points $n := 6$

2. Salinity File

$i := 1 \,..n$

$M := READPRN\left[Salinity_{prn}\right]$

$j := 1 \,..n - 1$

$$M = \begin{bmatrix} 3 & 2 \\ 6 & 4 \\ 9 & 6 \\ 12 & 8 \\ 15 & 9 \\ 18 & 13 \end{bmatrix}$$

$b1 := M^{<0>}$ $\qquad S := M^{<1>}$

$b1 := b1 \cdot ft$ $\qquad Sal := S$

3. Calculate Unit Weight of Saline Water, S

$$S := \left[1 + \frac{Sal}{1250}\right] \cdot \S W$$

$$S = \begin{bmatrix} 9.816 \cdot 10^3 \\ 9.831 \cdot 10^3 \\ 9.847 \cdot 10^3 \\ 9.863 \cdot 10^3 \\ 9.871 \cdot 10^3 \\ 9.902 \cdot 10^3 \end{bmatrix} \cdot \frac{N}{m^3}$$

4. Calculate Pressure Created by Saline Water at Depth of First Salinity Measurement. The Unit Weight of First Measurement is Used to Calculate Pressure at the First Saline Measurement Depth.

$$Pa := P1 + \left[b1_0 - b\right] \cdot S_0$$

$$b1 = \begin{bmatrix} 0.914 \\ 1.829 \\ 2.743 \\ 3.658 \\ 4.572 \\ 5.486 \end{bmatrix} \cdot m$$

$$Pa = 8.072 \cdot 10^3 \cdot \frac{N}{m^2}$$

.....Pressure at depth of 1st saline measurement

5. Calculate Average Unit Weight of Each Column Segment Using the Trapezoidal Rule.

$$i := 0 \,..n - 2$$

$$b1a := b1_0$$

$$s_i := \frac{1}{\left[b1_i - b1_{i+1}\right] \cdot -1} \cdot \frac{S_i + S_{i+1}}{2} \cdot \left[\left[b1_i - b1_{i+1}\right] \cdot -1\right]$$

....above trapezoidal rule is used to calculate the average unit weight of saline water

$$s = \begin{bmatrix} 9.824 \cdot 10^3 \\ 9.839 \cdot 10^3 \\ 9.855 \cdot 10^3 \\ 9.867 \cdot 10^3 \\ 9.886 \cdot 10^3 \end{bmatrix} \cdot \frac{N}{m^3}$$

6 Calculate Pressure at Each Saline Measurement Depth Excluding the First Descrete Segment and Last Descrete Segment.

$$Pb_i := s_i \cdot \left[\left[b1_i - b1_{i+1}\right] \cdot -1\right]$$

$$Pb = \begin{bmatrix} 8.983 \cdot 10^3 \\ 8.997 \cdot 10^3 \\ 9.011 \cdot 10^3 \\ 9.022 \cdot 10^3 \\ 9.04 \cdot 10^3 \end{bmatrix} \cdot \frac{N}{m^2}$$

....Pressure calculated at each saline measured depth excluding first and last segment

$ORIGIN := -1$

$i := 0 ..3$

$$Pb_i := Pb_i + Pb_{i-1}$$

$$Pb = \begin{bmatrix} 8.983 \cdot 10^3 \\ 1.798 \cdot 10^4 \\ 2.699 \cdot 10^4 \\ 3.601 \cdot 10^4 \\ 4.505 \cdot 10^4 \end{bmatrix} \cdot \frac{N}{m^2}$$

....Total pressure at each measured saline depth excluding pressure created by LNAPL and first discrete segment of saline water

$i := 0 ..4$

$ORIGIN := 0$

$$Pb_i := Pa + Pb_i$$

$$Pb = \begin{bmatrix} 1.705 \cdot 10^4 \\ 2.605 \cdot 10^4 \\ 3.506 \cdot 10^4 \\ 4.409 \cdot 10^4 \\ 5.313 \cdot 10^4 \end{bmatrix} \cdot \frac{N}{m^2}$$

....Total pressure at each measured interval including LNAPL and first segment.

7. Calculate Pressure for Last Saline Segment

$$Pc := \left[S_{n-1}\right] \cdot \left[b2L - b1_{n-1}\right] + Pb_{n-2}$$

$$Pc = 6.369 \cdot 10^{4} \cdot \frac{N}{m^{2}}$$

....Pressure at bottom of saline layer

(Step 3) 1. Calculate Total Pressure at Bottom of DNAPL Layer

$$P3 := Pc + ((\S D \cdot b2) \cdot \S W)$$

$$P3 = 6.521 \cdot 10^{4} \cdot \frac{N}{m^{2}}$$

....Pressure at bottom of DNAPL Layer

2. This Procedure Combines all the Individual Calculated Pressure Measurements into 2 colums, Pressure and Depth

$$\mathrm{WRITEPRN}\left[\mathrm{PRES}_{\mathrm{prn}}\right] := \mathrm{Psur}$$

$$\mathrm{APPENDPRN}\left[\mathrm{PRES}_{\mathrm{prn}}\right] := \mathrm{P1}$$

$$\mathrm{APPENDPRN}\left[\mathrm{PRES}_{\mathrm{prn}}\right] := \mathrm{Pa}$$

$$\mathrm{APPENDPRN}\left[\mathrm{PRES}_{\mathrm{prn}}\right] := \mathrm{Pb}$$

$$\mathrm{APPENDPRN}\left[\mathrm{PRES}_{\mathrm{prn}}\right] := \mathrm{Pc}$$

$$\mathrm{APPENDPRN}\left[\mathrm{PRES}_{\mathrm{prn}}\right] := \mathrm{P3}$$

$$\mathrm{P} := \mathrm{READPRN}\left[\mathrm{PRES}_{\mathrm{prn}}\right]$$

$$\mathrm{WRITEPRN}\left[\mathrm{DEPT}_{\mathrm{prn}}\right] := \mathrm{bsur}$$

$$\mathrm{APPENDPRN}\left[\mathrm{DEPT}_{\mathrm{prn}}\right] := \mathrm{b}$$

$$\mathrm{APPENDPRN}\left[\mathrm{DEPT}_{\mathrm{prn}}\right] := \mathrm{b1a}$$

$$\mathrm{APPENDPRN}\left[\mathrm{DEPT}_{\mathrm{prn}}\right] := \mathrm{b1}_{j}$$

$$\mathrm{APPENDPRN}\left[\mathrm{DEPT}_{\mathrm{prn}}\right] := \mathrm{b2L}$$

$$\mathrm{APPENDPRN}\left[\mathrm{DEPT}_{\mathrm{prn}}\right] := \mathrm{b2a}$$

$$\mathrm{b} := \mathrm{READPRN}\left[\mathrm{DEPT}_{\mathrm{prn}}\right]$$

$$\mathrm{WRITEPRN}\left[\mathrm{L}_{\mathrm{prn}}\right] := \mathrm{q}$$

$$\mathrm{APPENDPRN}\left[\mathrm{L}_{\mathrm{prn}}\right] := \mathrm{q}$$

$$\mathrm{L} := \mathrm{READPRN}\left[\mathrm{L}_{\mathrm{prn}}\right]$$

$$\mathrm{WRITEPRN}\left[\mathrm{D}_{\mathrm{PRN}}\right] := \mathrm{b2L}$$

$$\mathrm{APPENDPRN}\left[\mathrm{D}_{\mathrm{prn}}\right] := \mathrm{b2L}$$

$$\mathrm{D} := \mathrm{READPRN}\left[\mathrm{D}_{\mathrm{prn}}\right]$$

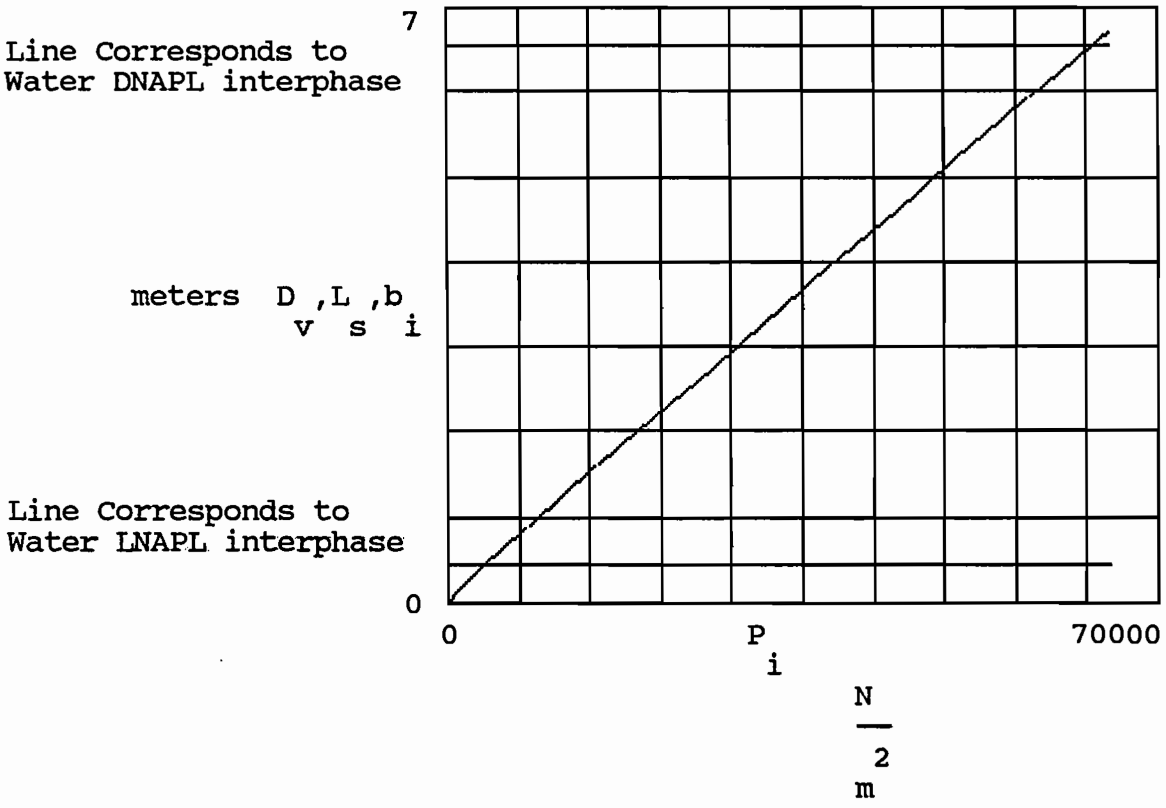
$R := n + 2$ $\qquad$ $i := 0 \,..R + 1$

$P := P^{<0>}$ $\qquad$ $r := 0 \,..0$ $\qquad$ $b := b^{<0>}$

$s := 0 \,..1$ $\qquad$ $v := 0 \,..1$

3. Graph of Change in Pressure With Depth

$D_v := \frac{D_v}{100}$ $\qquad$ $b_i := \frac{b_i}{100}$ $\qquad$ $P_i := \frac{P_i}{10}$ $\qquad$ $L_s := \frac{L_s}{100}$



$b_i := b_i \cdot 100$ $\qquad$ $P_i := P_i \cdot 10$

$b := b \cdot cm$ $\qquad$ $P := P \cdot \frac{g}{cm \cdot sec^2}$

4. New Combined Files Pressure and Depth

$$b = \begin{bmatrix} 0 \\ 1.5 \\ 3 \\ 6.001 \\ 8.999 \\ 12.001 \\ 15 \\ 17.999 \\ 21.499 \\ 22.001 \end{bmatrix} \cdot ft \qquad b = \begin{bmatrix} 0 \\ 0.457 \\ 0.914 \\ 1.829 \\ 2.743 \\ 3.658 \\ 4.572 \\ 5.486 \\ 6.553 \\ 6.706 \end{bmatrix} \cdot m \qquad P = \begin{bmatrix} 0 \\ 3.584 \cdot 10^{3} \\ 8.072 \cdot 10^{3} \\ 1.705 \cdot 10^{4} \\ 2.605 \cdot 10^{4} \\ 3.506 \cdot 10^{4} \\ 4.409 \cdot 10^{4} \\ 5.313 \cdot 10^{4} \\ 6.369 \cdot 10^{4} \\ 6.521 \cdot 10^{4} \end{bmatrix} \cdot \frac{N}{m^{2}}$$

(Step 4) 1. Calculate Average Pressure Over Aquifer Using Trapezoidal Rule

$i := 0 \,..\, R$

$$PRES := \frac{1}{A} \cdot \left[\sum_{i} \frac{P_i + P_{i+1}}{2} \cdot \left[\left[b_i - b_{i+1} \right] \cdot -1 \right] \right]$$

$$PRES = 3.212 \cdot 10^{4} \cdot \frac{N}{m^{2}}$$

where:

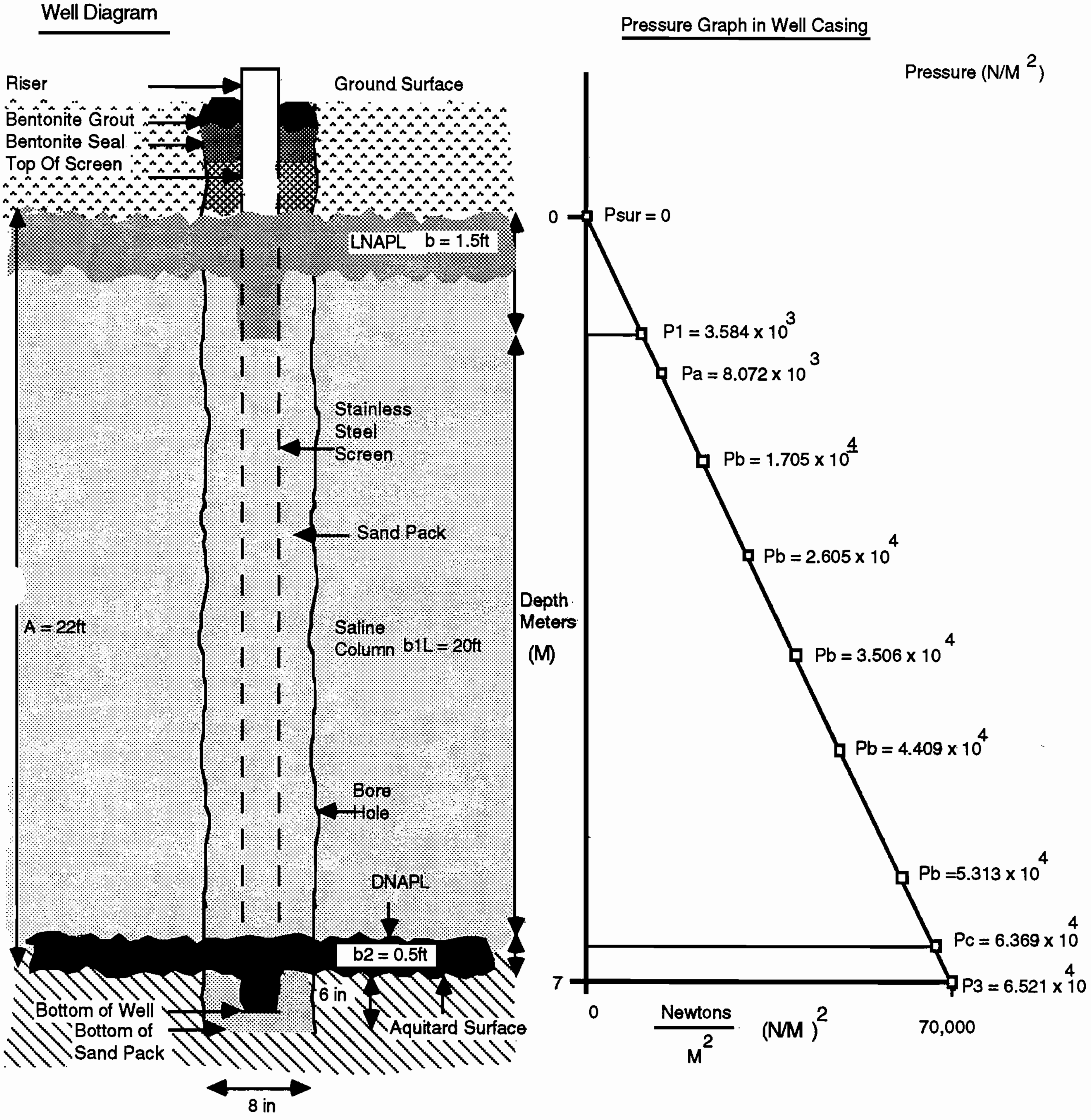
$\frac{P_i + P_{i+1}}{2} \cdot \frac{m^2}{N}$	$b_{i+1} \cdot \frac{1}{m}$	$b_i \cdot \frac{1}{m}$	$\left[b_i - b_{i+1} \right] \cdot -1 \cdot \frac{1}{m}$
$1.792 \cdot 10^{3}$	0.457	0	0.457
$5.828 \cdot 10^{3}$	0.914	0.457	0.457
$1.256 \cdot 10^{4}$	1.829	0.914	0.915
$2.155 \cdot 10^{4}$	2.743	1.829	0.914
$3.056 \cdot 10^{4}$	3.658	2.743	0.915
$3.958 \cdot 10^{4}$	4.572	3.658	0.914
$4.861 \cdot 10^{4}$	5.486	4.572	0.914
$5.841 \cdot 10^{4}$	6.553	5.486	1.067
$6.445 \cdot 10^{4}$	6.706	6.553	0.153

(Step 5) 1. Calculation of Corrected Piezometric Head

$$\Phi := \frac{PRES}{\delta W} + \frac{A}{2} + Z$$

$$\Phi = 38.755 \cdot ft$$

Figure D-1
Diagram To Illustrate Equivalent Piezometric Head Calculation For a Hypothetical Monitoring Well



Average Pressure	3.212×10^4
Measured Piezometric Head	39.0 ft
Corrected Piezometric Head	38.755 ft

APPENDIX E

THEORETICAL CALCULATION OF TIDAL INFLUENCE

E.1 Introduction

As discussed in Section 3.2.4, the following calculation was used to evaluate the theoretical tidal influence in the Shallow Aquifer at the Cascade Pole Site (Figure 3-21). The Method (Pandit et al., 1991) assumes a constant storativity and permeability in the Shallow Aquifer. The storativity and hydraulic conductivities used were calculated based on hydraulic conductivity test data collected on site and measured tidal influences at wells inland from the East Bay of Budd Inlet.

Method For Calculating Theoretical Tidal Influence at a Point Inland From the Ocean (Pandit et al., 1981)

Storativity and Hydraulic Conductivity Values Used are Calibrated to Well # EW-3 and AG13-S and are Based on Field Measured Water Level Ranges. A Similar Calculation Was Performed at Several Locations to Generate Figure 3-21, in the SSI Report.

Calculations Were Performed Using the Computer Programming Software Mathcad by Mathsoft, Inc., Cambridge, Massachusetts.

Theoretical Data for EW-2

Basic Units $cm \equiv 1L$ $g \equiv 1M$ $sec \equiv 1T$

Derived Units

$m \equiv 100 \cdot cm$ $in \equiv 2.54 \cdot cm$ $ml \equiv 1 \cdot cm^3$

$min \equiv 60 \cdot sec$ $hr \equiv 60 \cdot min$ $day \equiv 24 \cdot hr$

$kg \equiv 1000 \cdot g$ $mg \equiv 0.001 \cdot g$ $ft \equiv 12 \cdot in$

$S := 0.02$	Storativity
$to := 12 \cdot hr$	Tidal Period
$K := 5.25 \cdot 10^{-3} \cdot \frac{cm}{sec}$	Hydraulic Conductivity
$b := 16 \cdot ft$	Saturated Thickness
$Yo := 6.5 \cdot ft$	Amplitude of Tide in Budd Inlet
$x := 120 \cdot ft$	Distance from East Bay of Budd Inlet

1.) Read in File of Time Period of Interest (to set up time axis)

$t := \mathrm{READPRN}\begin{bmatrix} x \\ \quad prn \end{bmatrix}$ $n := 25$

$t := t^{\langle 0 \rangle} \cdot hr$ $i := 1 \,..\, n - 1$

$$t = \begin{bmatrix} 0 \\ 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \\ 21 \\ 22 \\ 23 \\ 24 \end{bmatrix}$$

1b) Read in File to a Show Zero Line on Water Level Axis

$Z := \mathrm{READPRN}\begin{bmatrix} z \\ \quad prn \end{bmatrix}$ $j := 2$

$z := Z^{\langle 0 \rangle} \cdot ft$ $j := 0 \,..\, j - 1$

2.) Theoretical Formula to Calculate Water Table Elevation in Shallow Aquifer (Pandit et al., 1991). Calculates Yi at above time points.

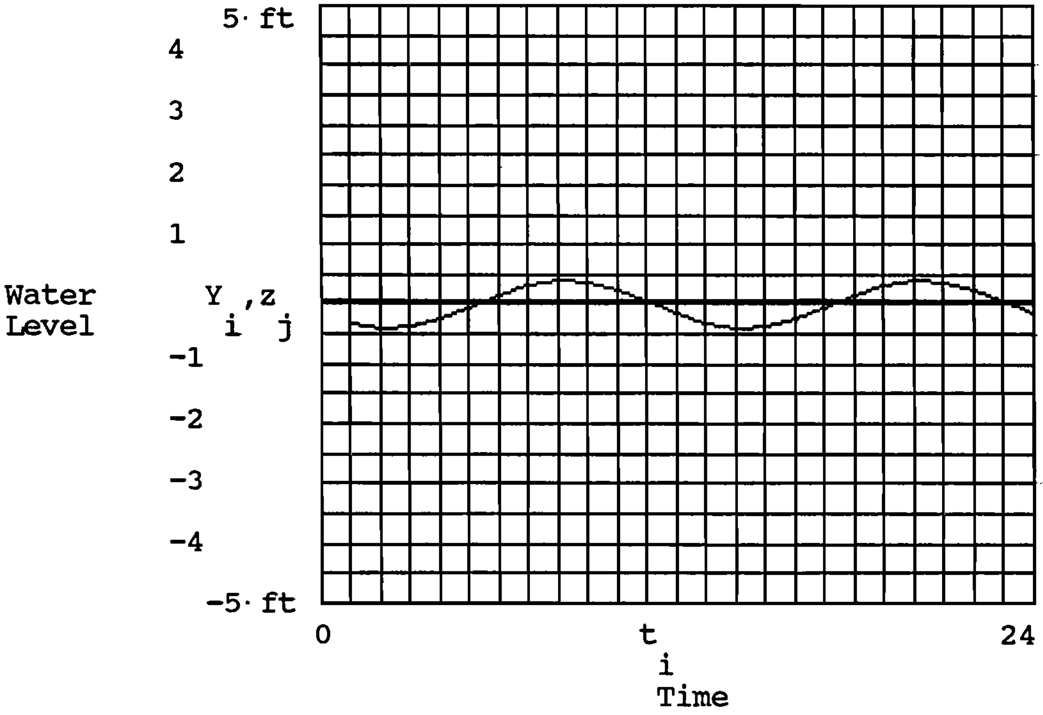
$$p := \left[\frac{\pi \cdot S}{to \cdot K \cdot b}\right]^{0.5} \qquad p = 7.537 \cdot 10^{-4} \cdot length^{-1}$$

$$Y_i := Yo \cdot \exp(-x \cdot p) \cdot \sin\left[2 \cdot \pi \cdot \frac{t_i}{to} - x \cdot p\right]$$

$$Y = \begin{bmatrix} 0 \\ -0.325 \\ -0.409 \\ -0.383 \\ -0.254 \\ -0.057 \\ 0.155 \\ 0.325 \\ 0.409 \\ 0.383 \\ 0.254 \\ 0.057 \\ -0.155 \\ -0.325 \\ -0.409 \\ -0.383 \\ -0.254 \\ -0.057 \\ 0.155 \\ 0.325 \\ 0.409 \\ 0.383 \\ 0.254 \\ 0.057 \\ -0.155 \end{bmatrix} \cdot \mathrm{ft}$$

3) Graph of Theoretical Water Table Fluctuation Versus Time (24 Hour Period). Tidal Range is the Distance From High to Low Tidal Elevation.

$$t := t \cdot \frac{1}{\mathrm{hr}}$$



References

Pandit, A., C.C. El-Khazen and S.P. Sivaramapillai. 1991. Ground Water. Vol. 29, No.2, pages 175-180.

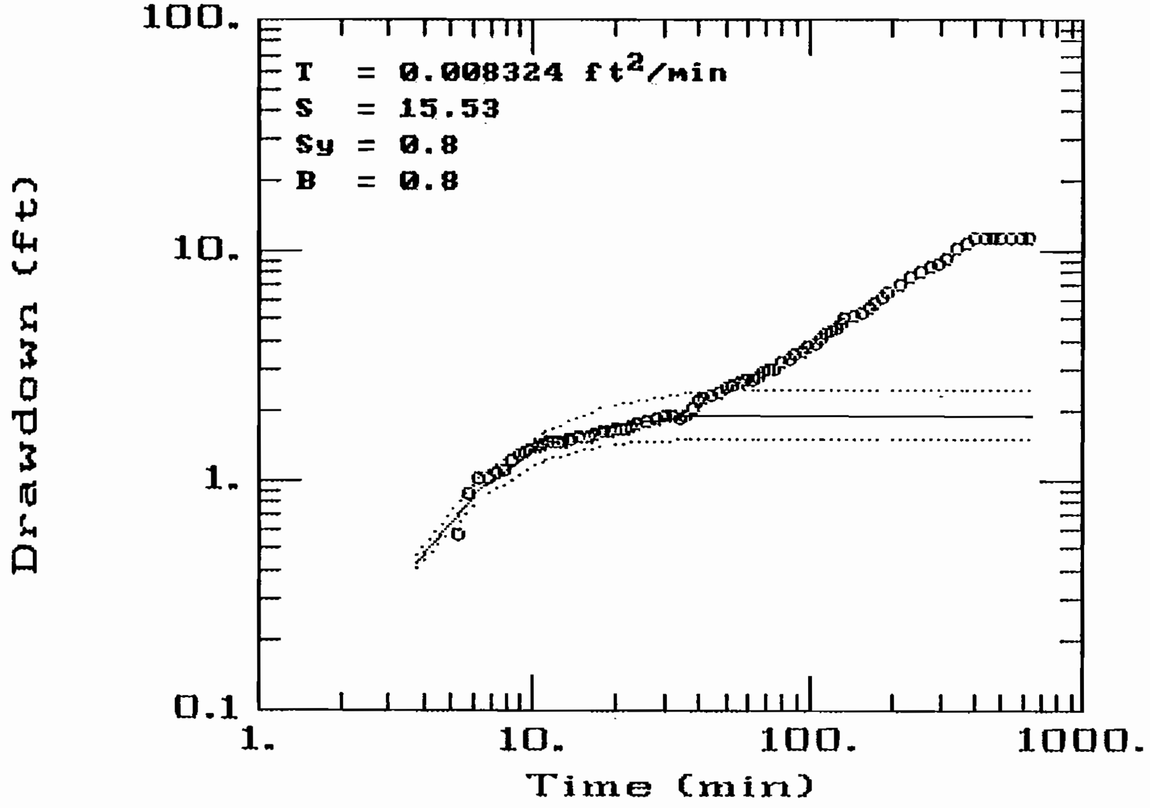
APPENDIX F

AQUIFER TEST RESULTS

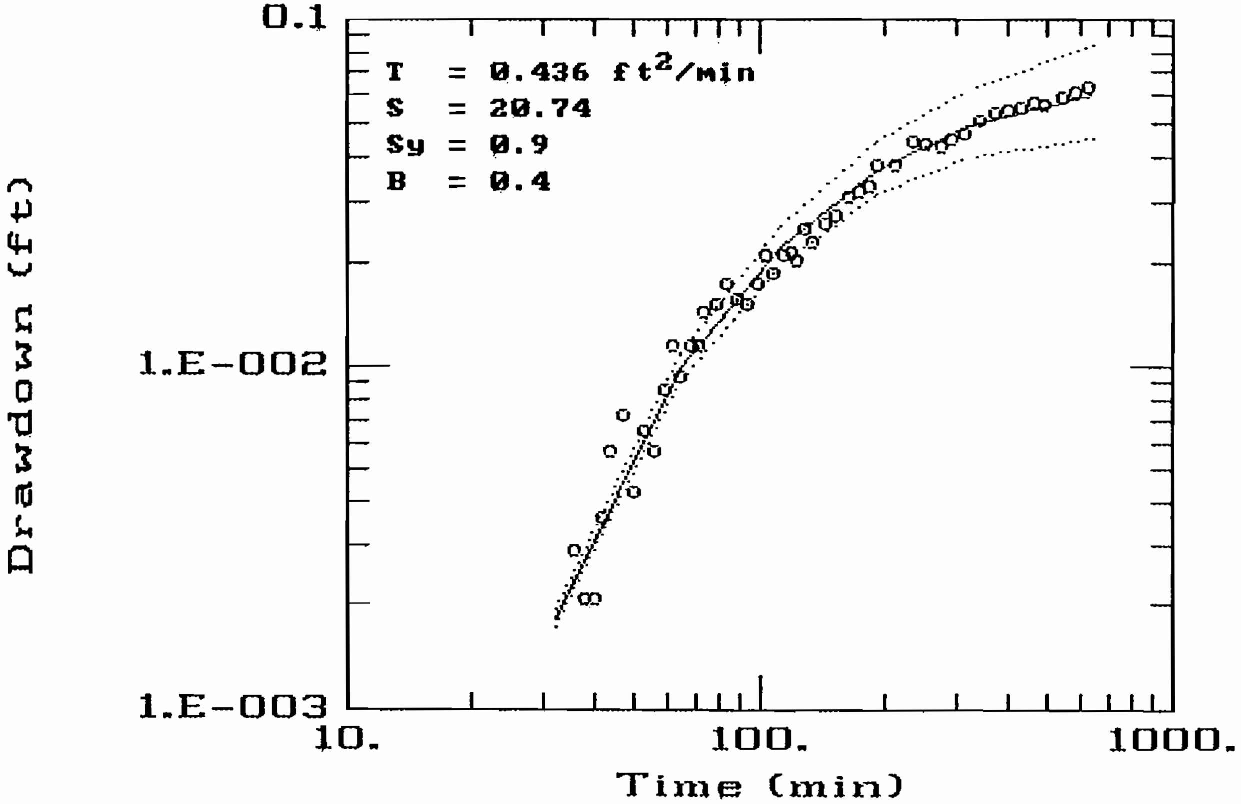
F.1 Introduction

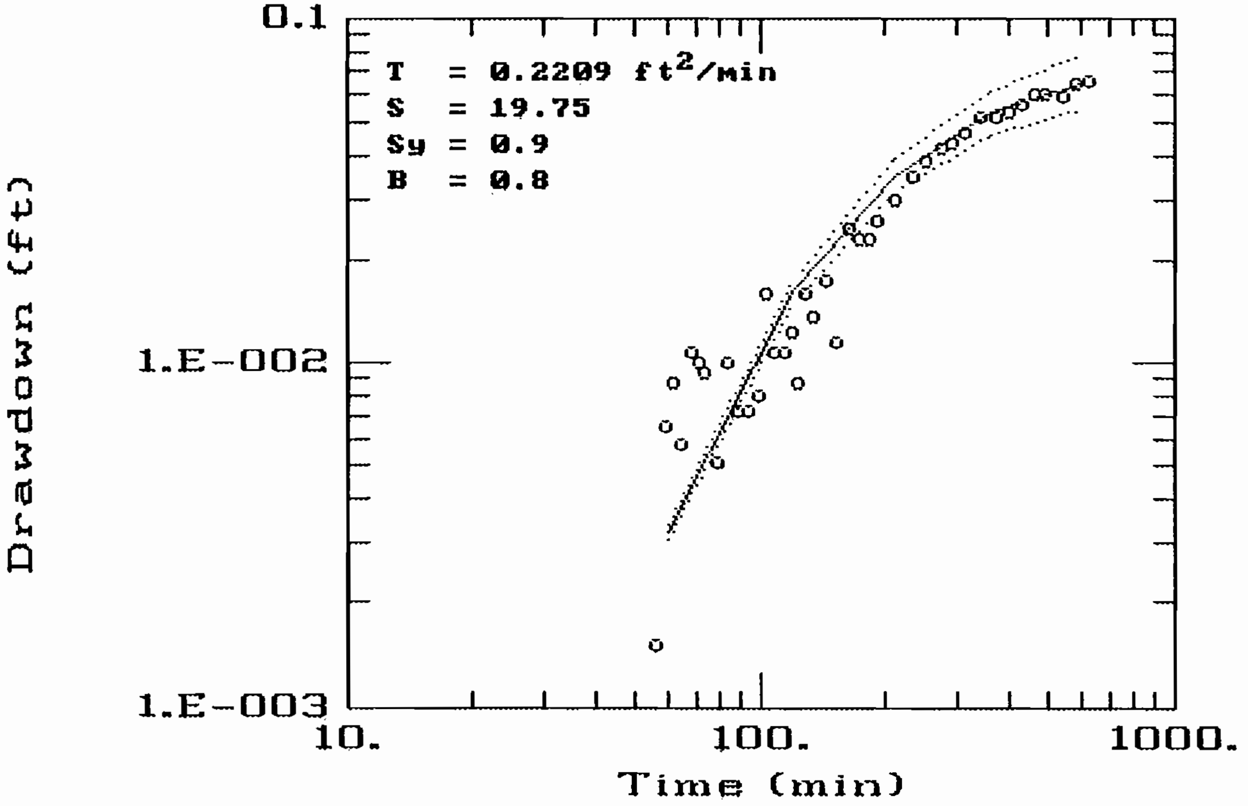
As discussed in Section 3.2.5, Aquifer Tests were analyzed using AQTESOLV Software by Geraghty and Miller Inc. This appendix presents graphs of drawdown and calculated Hydraulic Conductivities based on "best fit" matching of the data to the data evaluation type curves.

Drawdown At Pumping Well EW-2



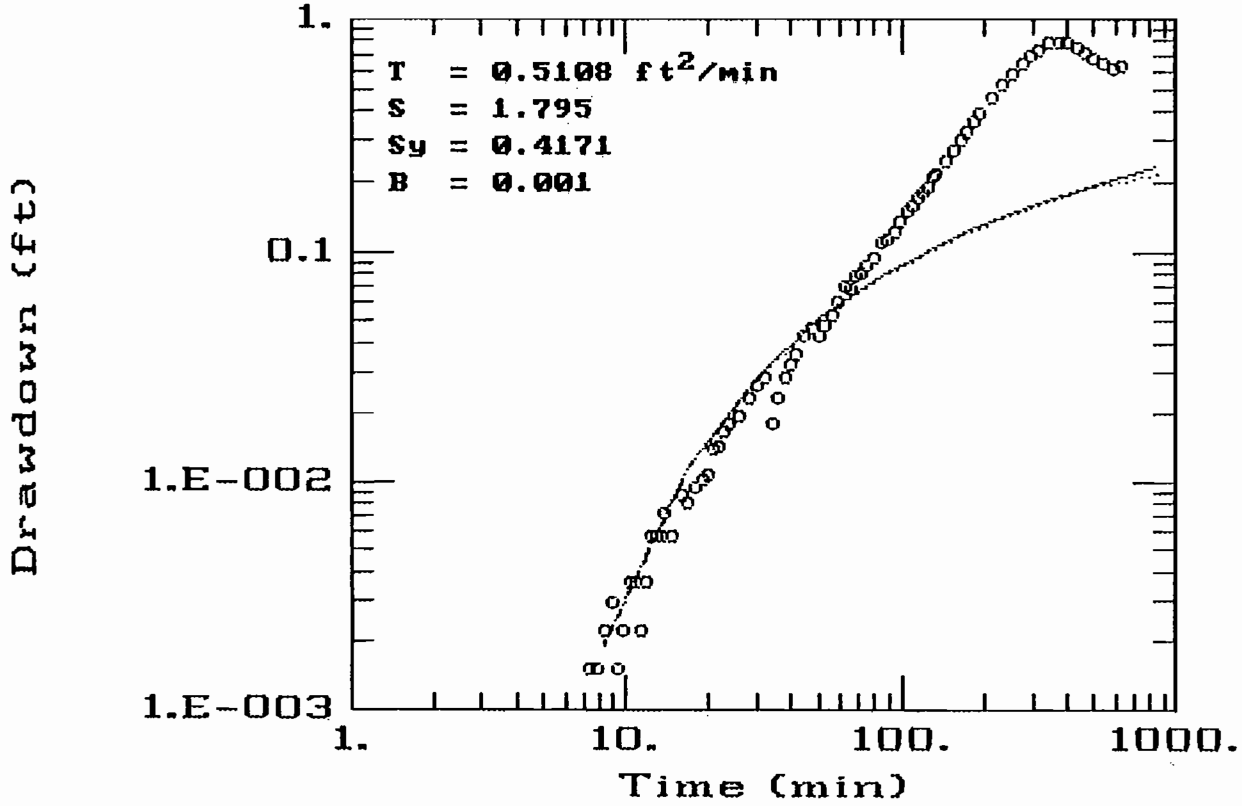
Pumping Well EW-2 Drawdown At Piez P10A



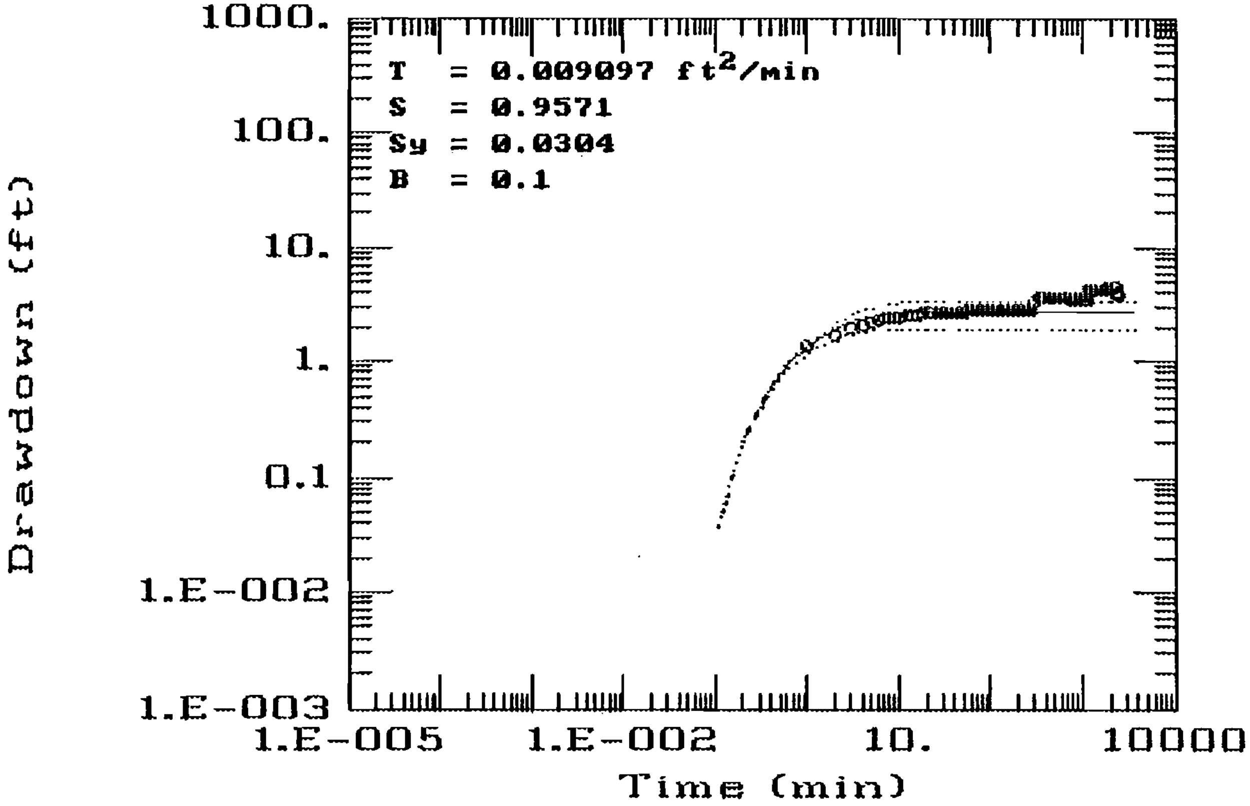


Pumping Well EW-2 Drawdown At Piez P10B

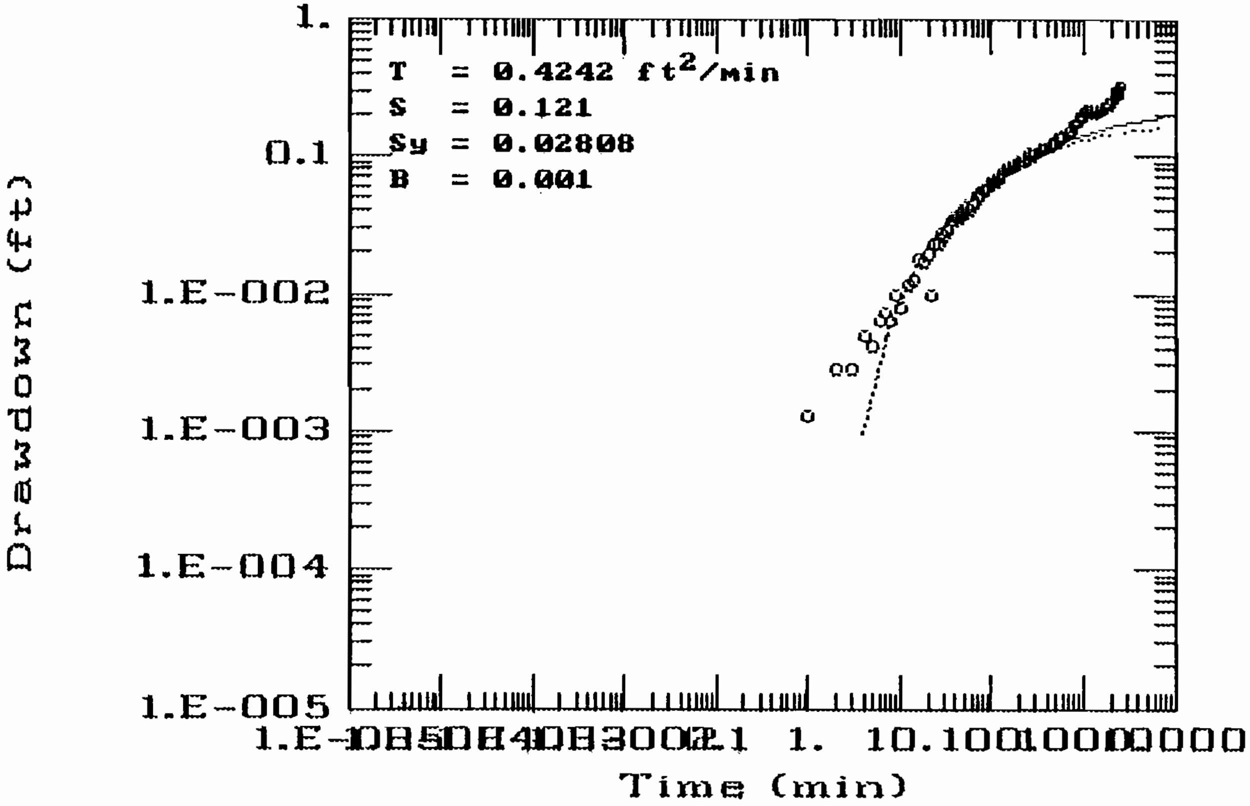
Pumping Well EW-2 Drawdown At Piez P11

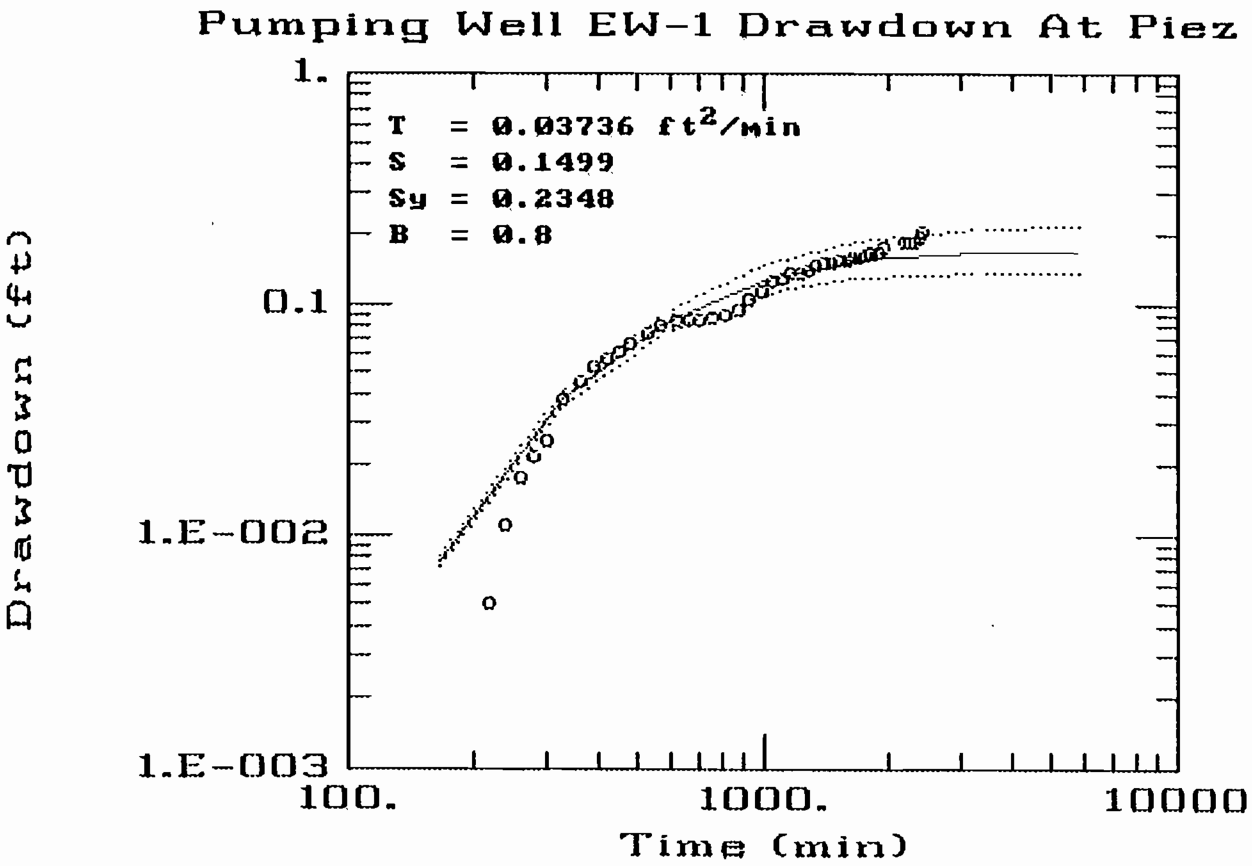


Pumping Well EW-1



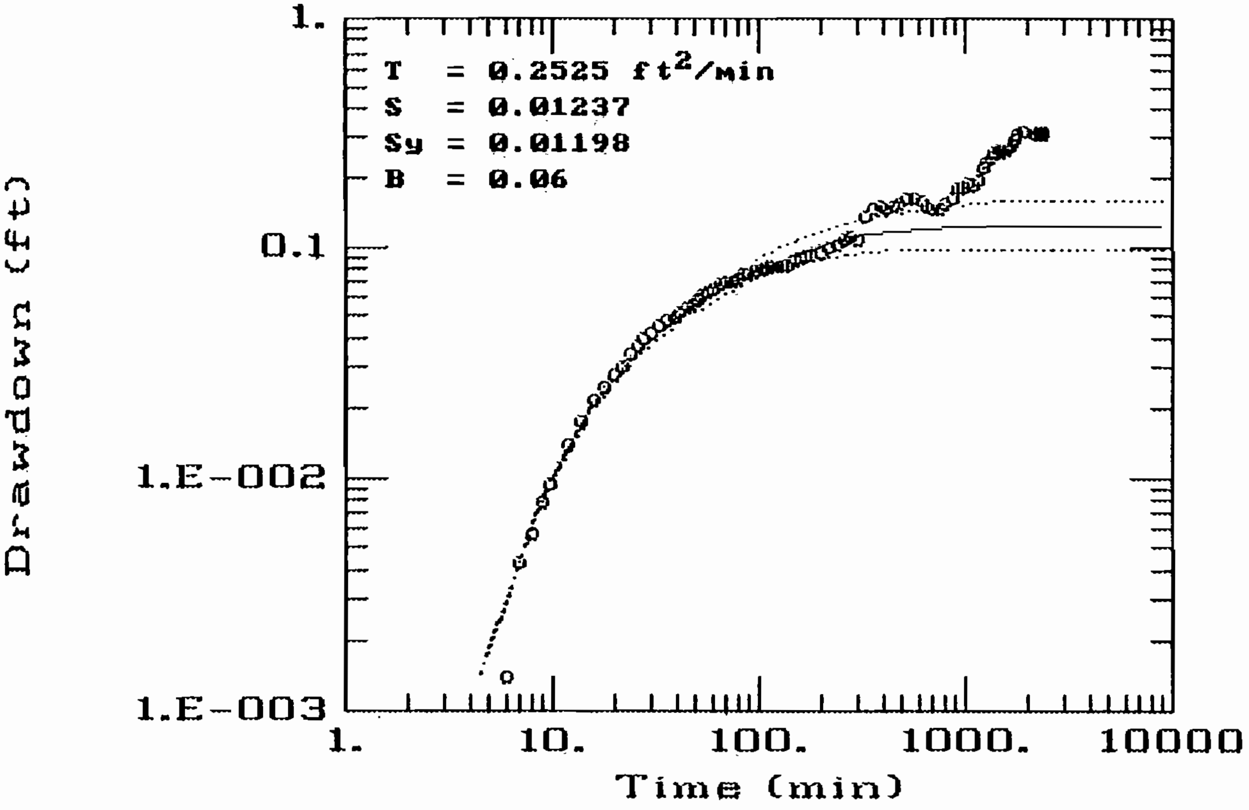
Pumping Well EW-1 Drawdown At Piez P1A



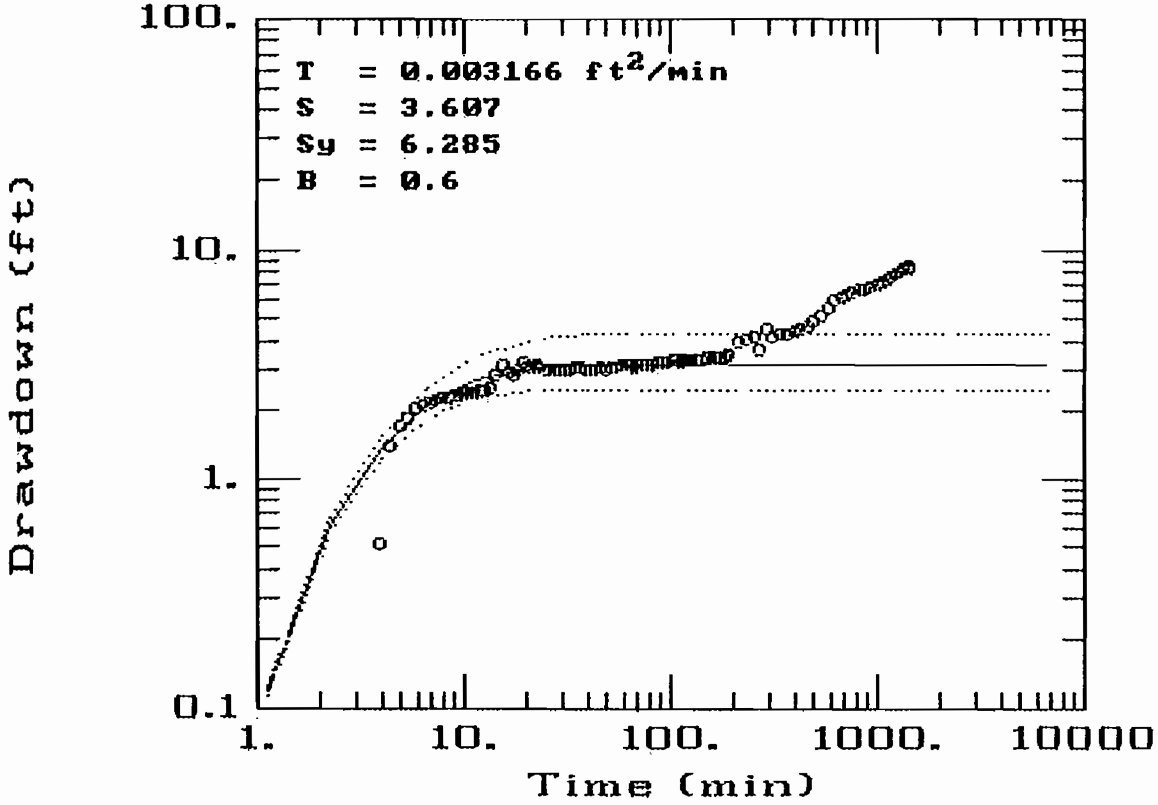


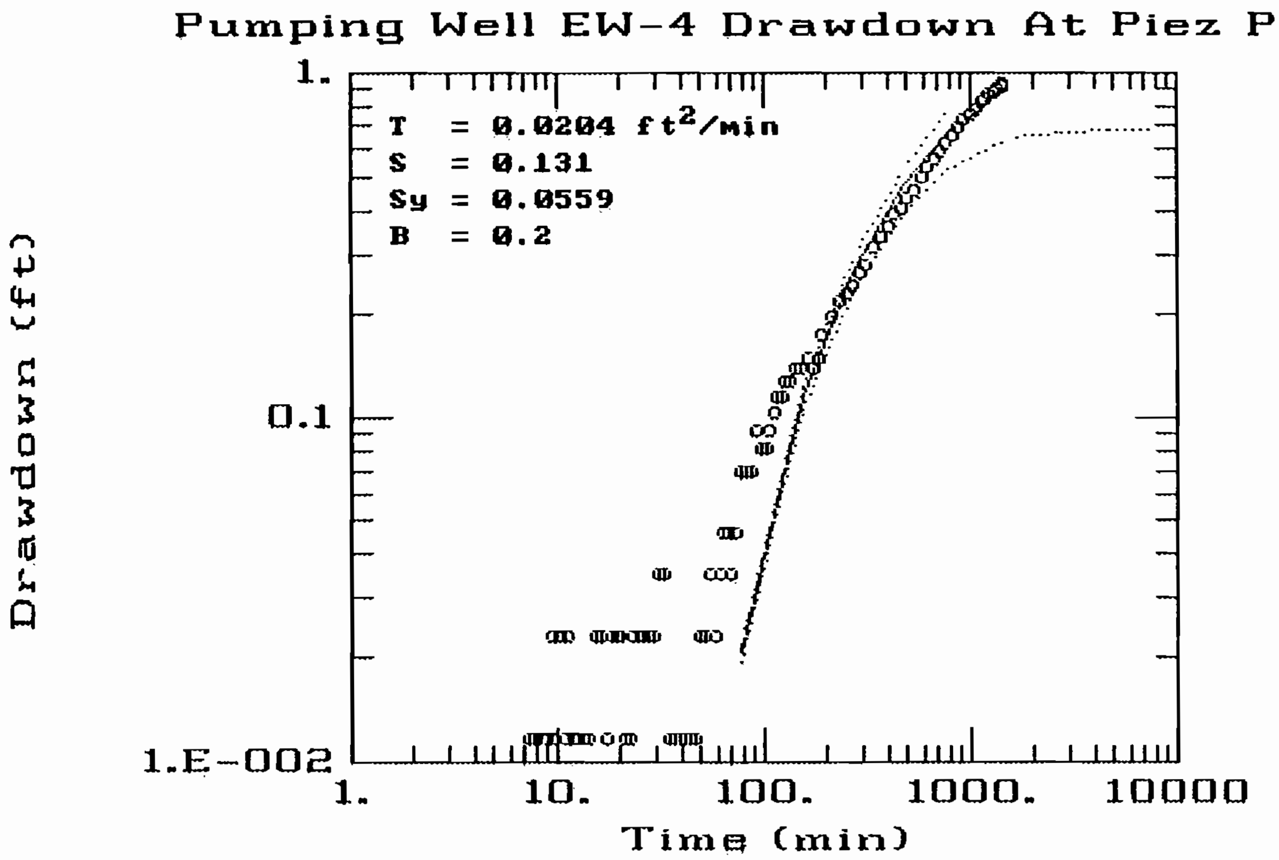
Pumping Well EW-1 Drawdown At Piez P2

Pumping Well EW-1 Drawdown At Piez P3

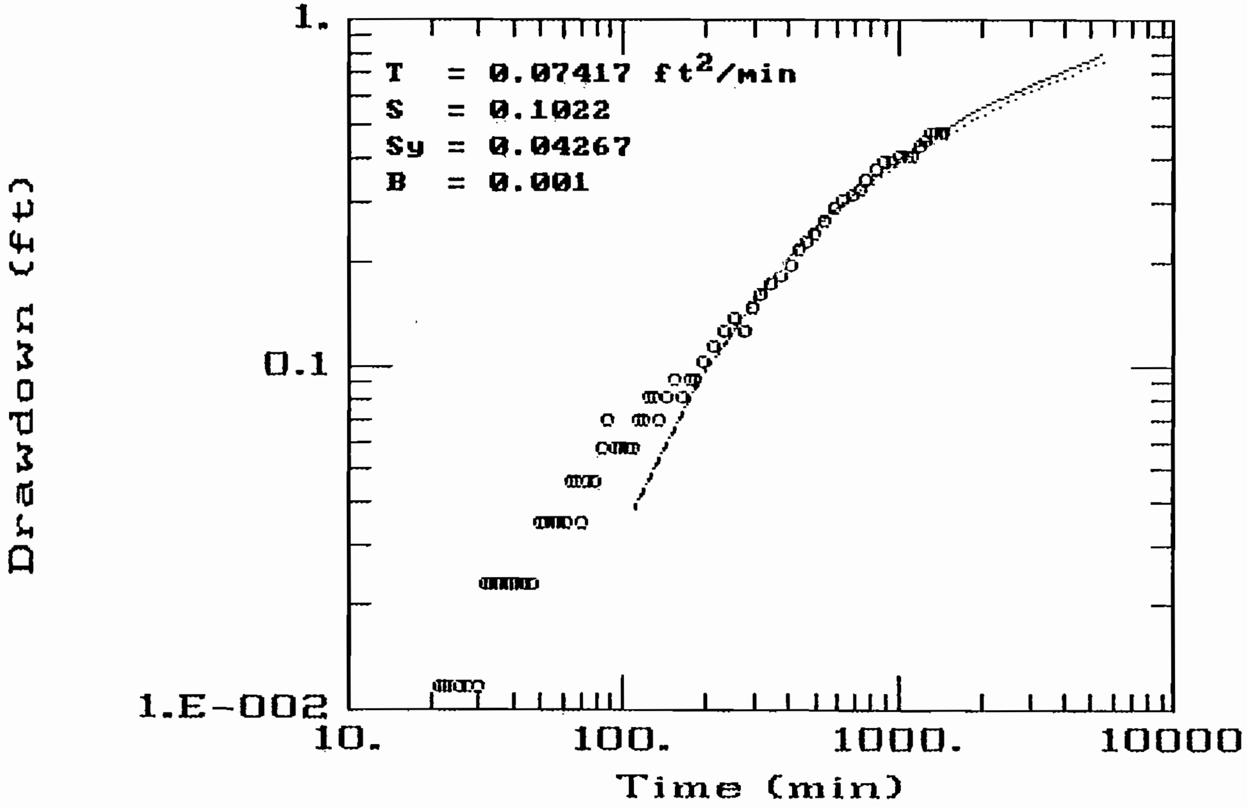


Drawdown At Pumping Well EW-4

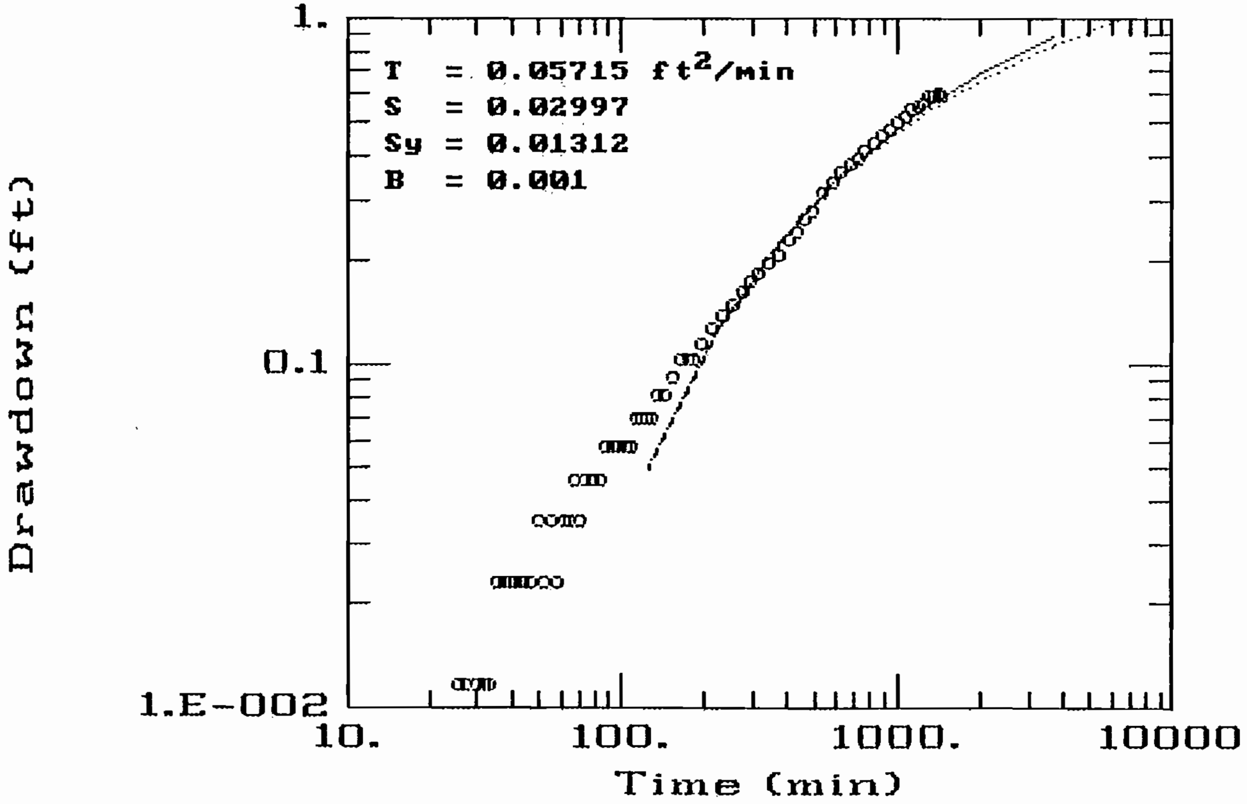



Pumping Well EW-4 Drawdown At Piez P4A
T = 0.0204 ft^2/min
S = 0.131
Sy = 0.0559
B = 0.2
Drawdown (ft)
1.
0.1
1.E-002
1.
10.
100.
1000.
10000
Time (min)

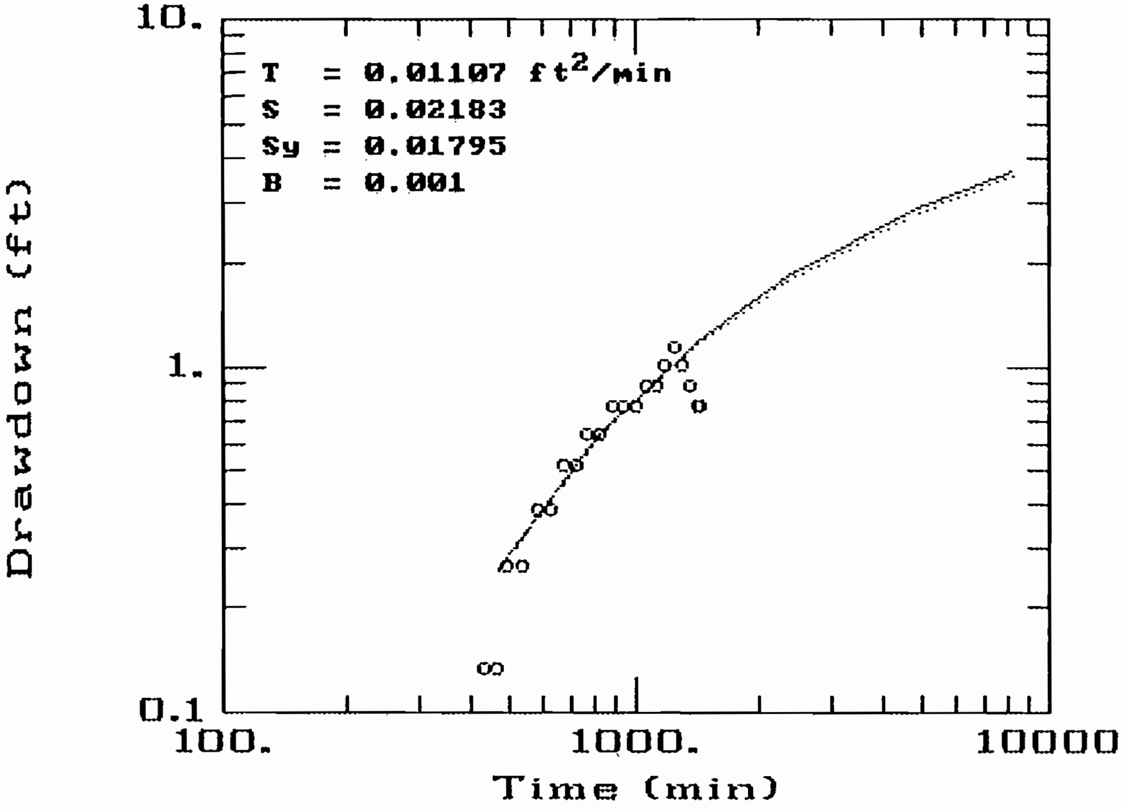
Pumping Well EW-4 Drawdown At Piez P5



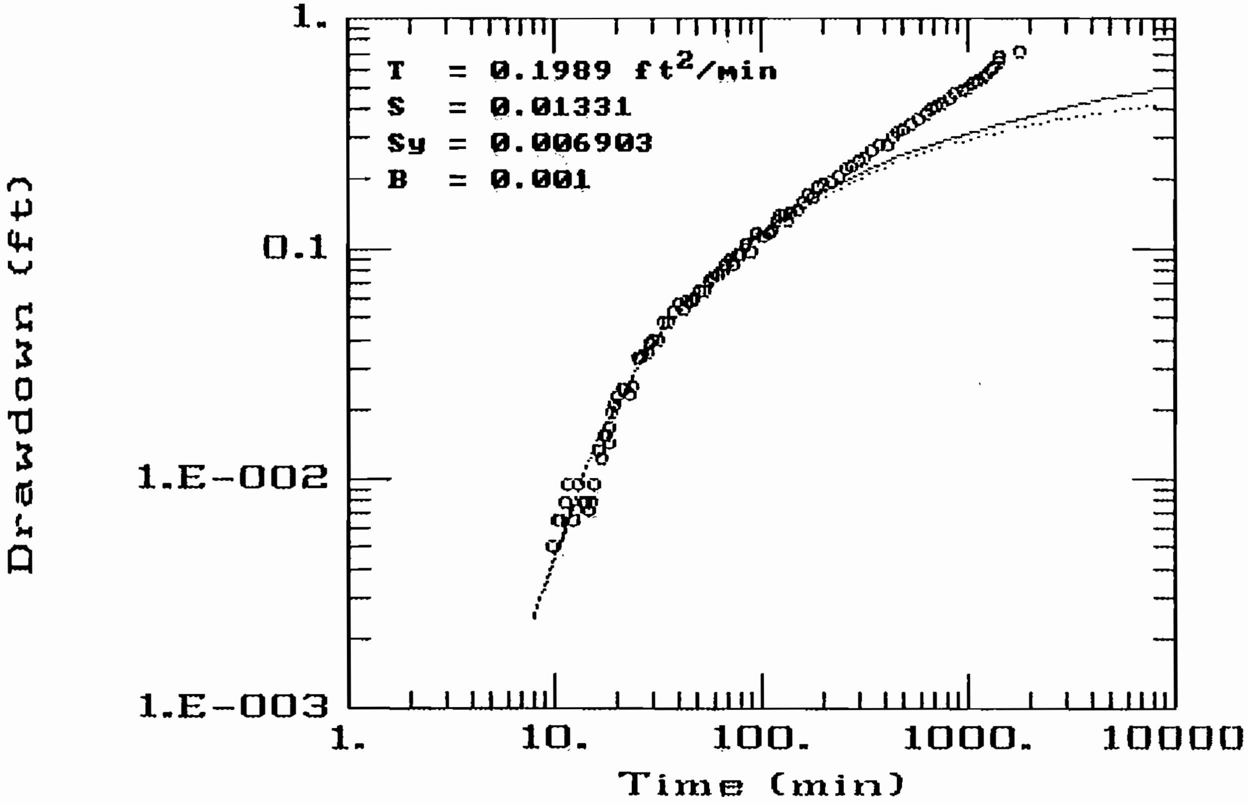
Pumping Well EW-4 Drawdown At Piez P6A



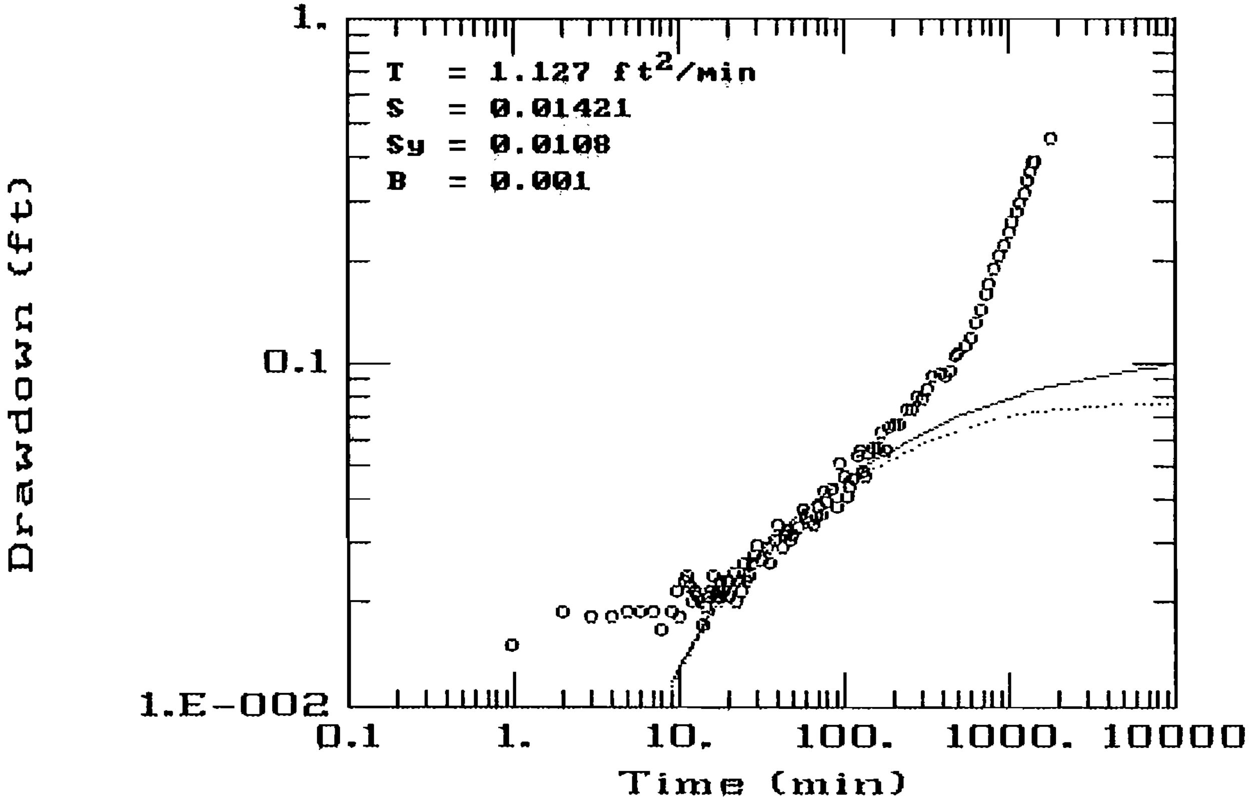
Pumping Well EW-4 Drawdown At Piez P6B



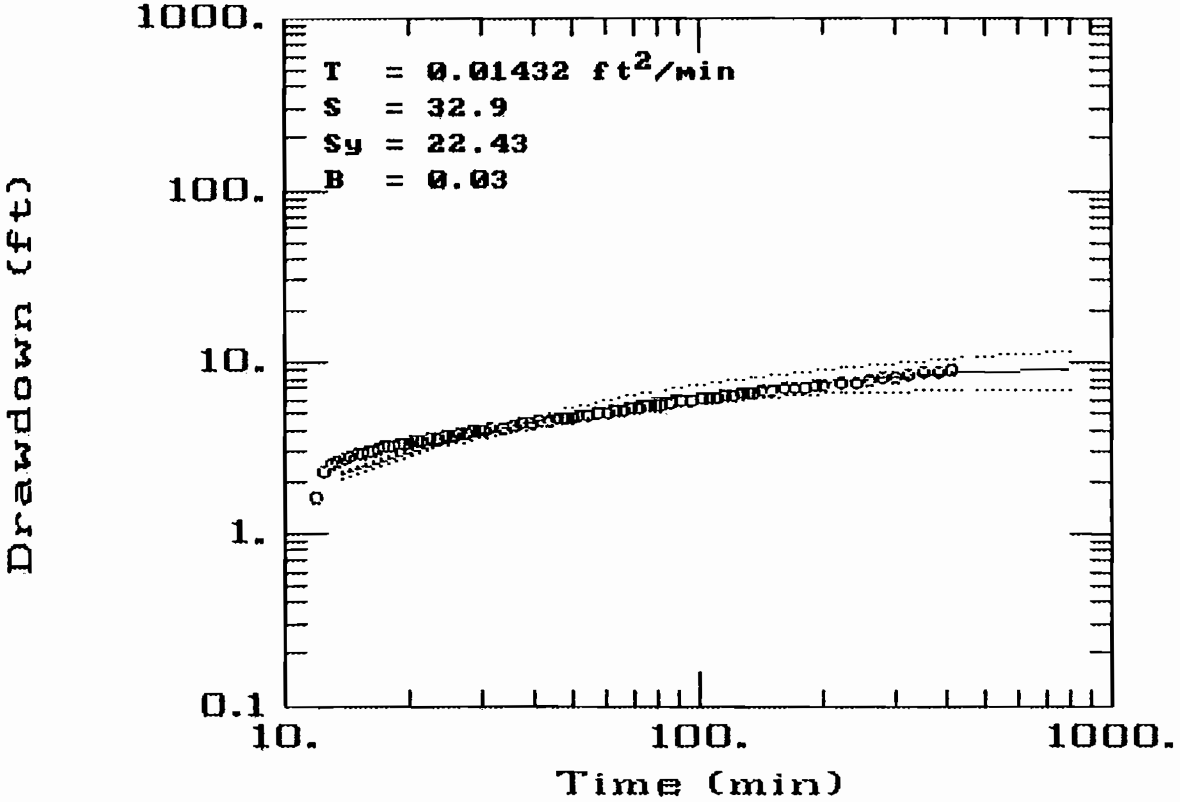
Pumping Well EW-4 Drawdown At Piez P8A



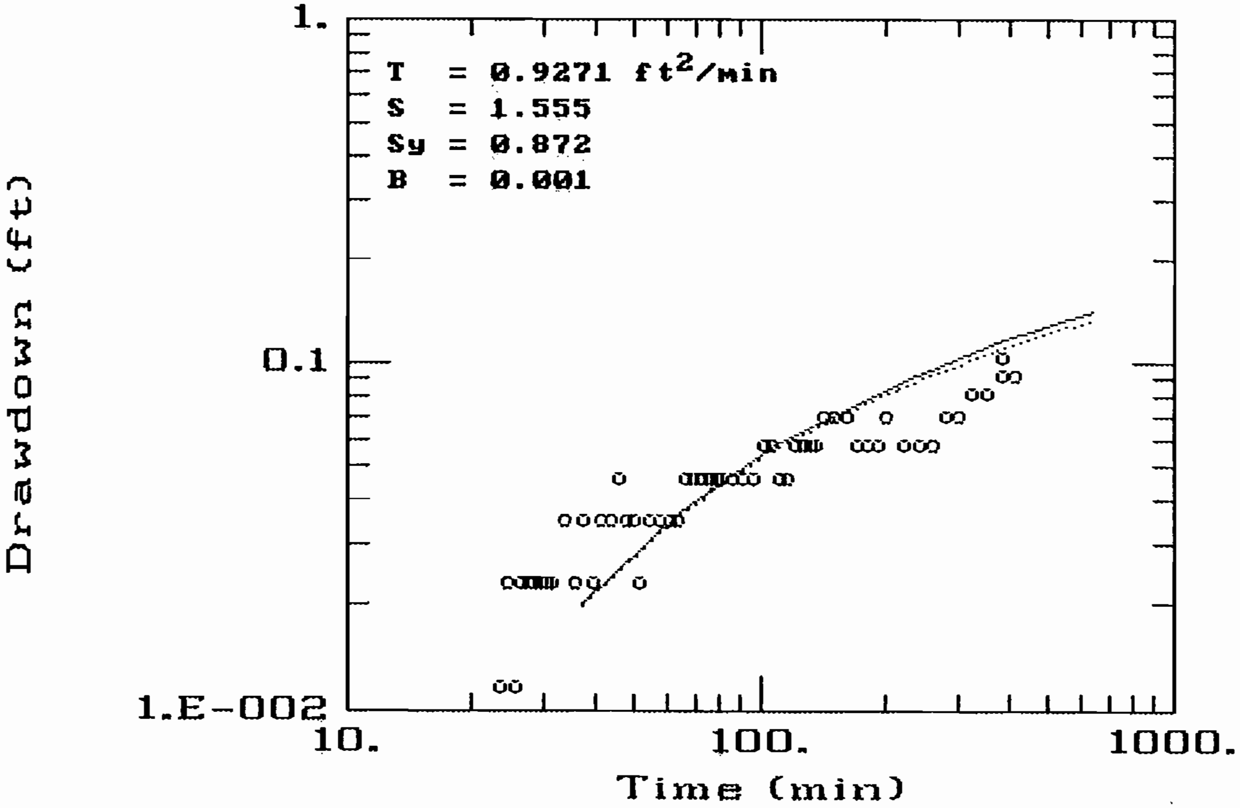
Pumping Well EW-4 Drawdown At Piez P8B



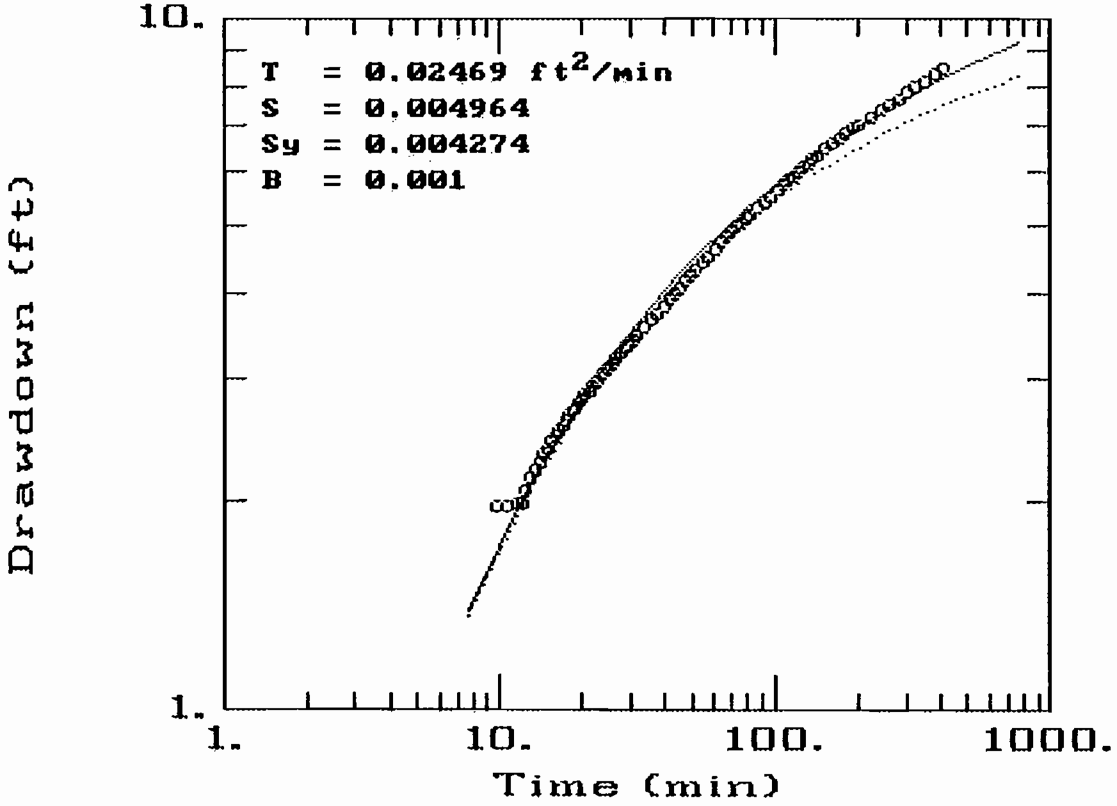
Drawdown At Pumping Well EW-6



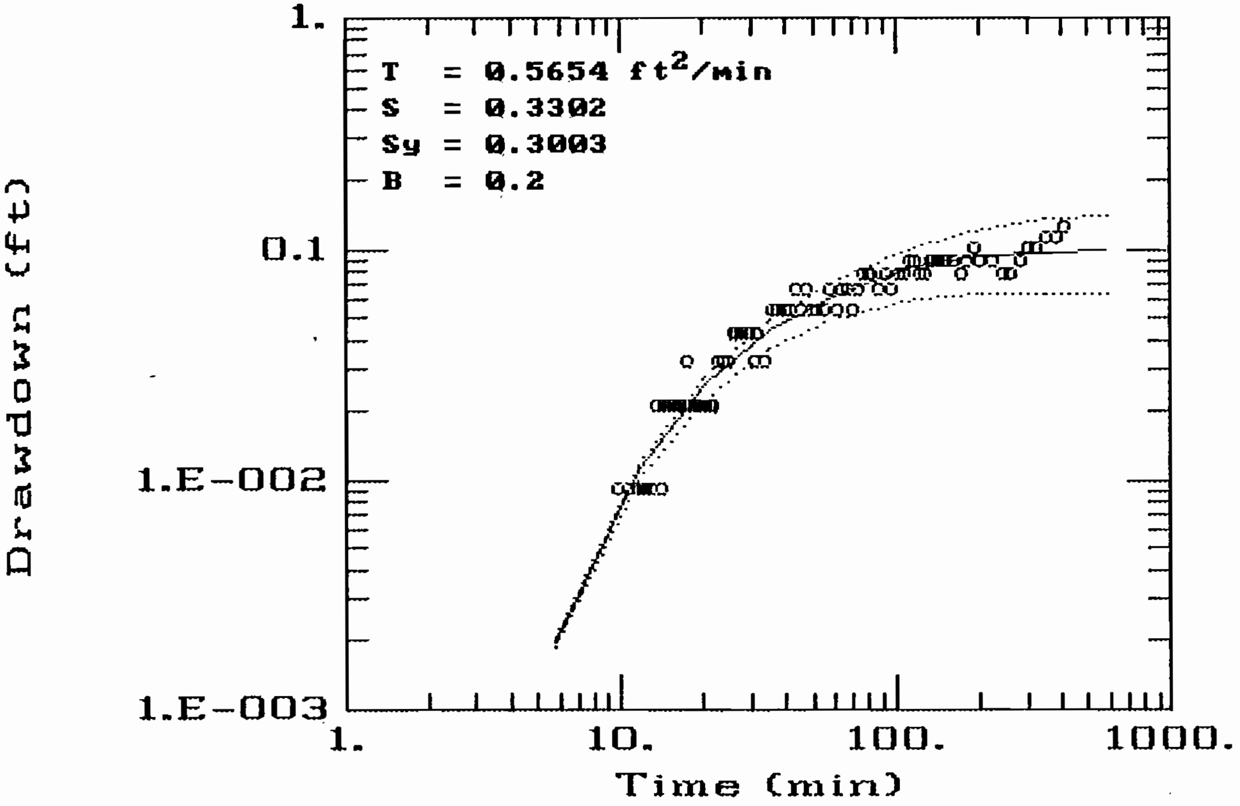
Pumping Well EW-6 Drawdown At Piez P14A



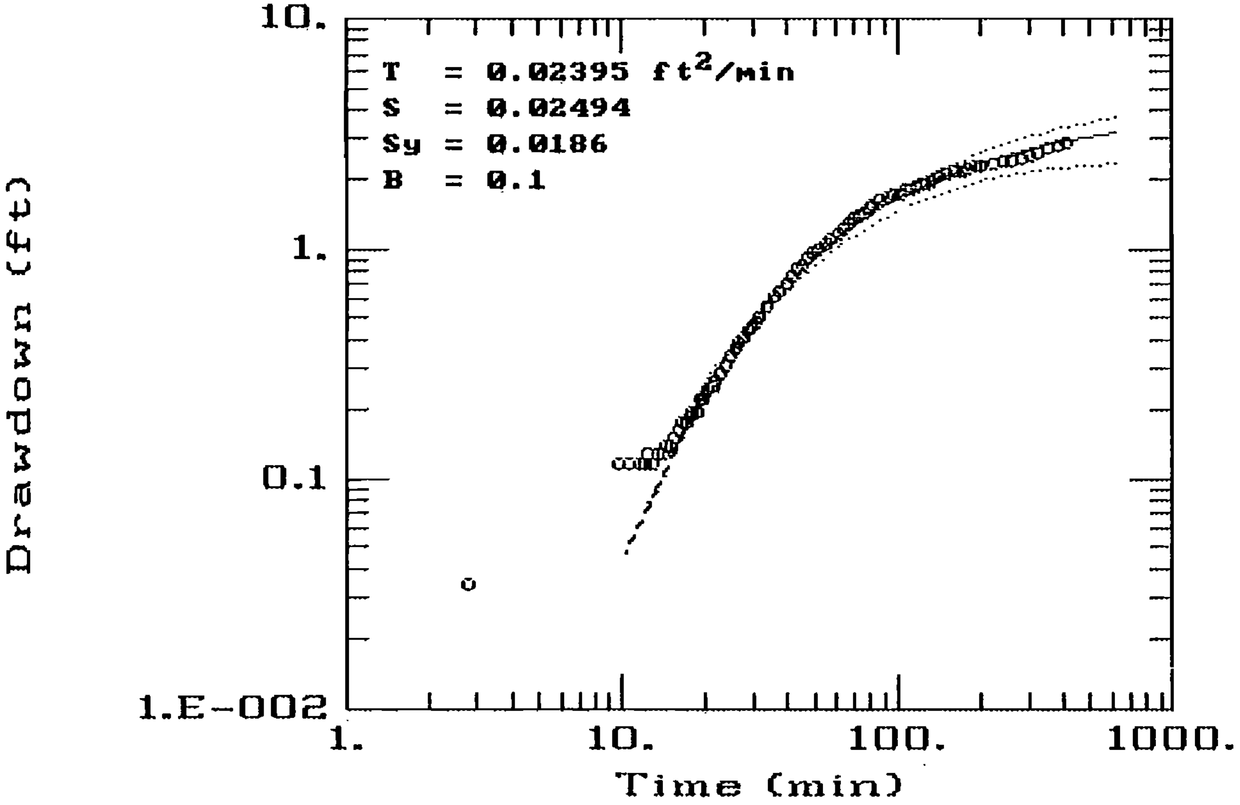
Pumping Well EW-6 Drawdown At Piez P14B



Pumping Well EW-6 Drawdown At Piez P15A



Pumping Well EW-6 Drawdown At Piez P15B



Raw Data Used to Calculate Aquifer Test Results

Date Wednesday March 20, 1991 12:04 PM
PlotFile A:\APTEW101.PRN
DataFile A:\APTEW-1.CPC
APTEW-1A.CPC
Time of First Log in Specified Window
33315.8042 0.804240740

Date	Time	Analog#01 EW-1....... FEET H2O...	Analog#02 P-1A....... FEET H2O...	Analog#03 P-1B....... FEET H2O...	Analog#04 P-2........ FEET H2O...	Analog#05 P-3........ FEET H2O...	Analog#06 SP-1....... FEET H2O...	Analog#07 N-27....... FEET H2O...	Analog#08 AG-1S...... FEET H2O...
33315.804241	0.804241	12.787	5.7728	8.726	7.3877	7.9348	10.129	10.33	10.162
33315.804935	0.804935	11.388	5.7714	8.7376	7.3891	7.9363	10.109	10.335	10.292
33315.80563	0.80563	11.056	5.7699	8.7462	7.3913	7.937	10.111	10.327	10.126
33315.806324	0.806324	10.818	5.7699	8.7513	7.3934	7.9363	10.116	10.33	10.173
33315.807019	0.807019	10.655	5.7678	8.7571	7.3942	7.9363	10.102	10.331	10.051
33315.807713	0.807713	10.551	5.7685	8.7628	7.3934	7.9348	10.105	10.337	10.209
33315.808407	0.808407	10.453	5.7663	8.7686	7.3949	7.9334	10.105	10.334	10.16
33315.809102	0.809102	10.391	5.7656	8.7722	7.3956	7.9305	10.119	10.331	10.112
33315.809796	0.809796	10.355	5.7663	8.7773	7.3949	7.9291	10.103	10.337	10.168
33315.810491	0.810491	10.308	5.7627	8.7809	7.3963	7.9269	10.113	10.337	10.208
33315.811185	0.811185	10.298	5.7649	8.7874	7.3956	7.9255	10.102	10.338	10.212
33315.812574	0.812574	10.239	5.7613	8.7982	7.3963	7.9211	10.113	10.338	10.242
33315.813963	0.813963	10.199	5.7598	8.8062	7.3963	7.9175	10.095	10.342	10.22
33315.815352	0.815352	10.178	5.7548	8.8191	7.3963	7.9132	10.099	10.337	10.173
33315.816741	0.816741	10.151	5.7555	8.83	7.3978	7.9103	10.111	10.339	10.244
33315.81813	0.81813	10.141	5.7533	8.8386	7.3978	7.9067	10.116	10.341	10.012
33315.819519	0.819519	10.139	5.7627	8.8487	7.3971	7.9045	10.113	10.342	10.205
33315.820907	0.820907	10.113	5.749	8.8603	7.3978	7.9009	10.105	10.345	10.222
33315.822296	0.822296	10.1	5.7497	8.8711	7.3971	7.898	10.109	10.342	10.135
33315.823685	0.823685	10.096	5.7454	8.8805	7.3971	7.8951	10.092	10.344	10.049
33315.825075	0.825075	10.08	5.7461	8.8928	7.3978	7.893	10.1	10.345	10.151
33315.827157	0.827157	10.064	5.744	8.9087	7.3971	7.8894	10.113	10.342	10.236
33315.829241	0.829241	10.076	5.7389	8.9209	7.3985	7.8865	10.105	10.35	10.082
33315.831324	0.831324	10.064	5.7389	8.9368	7.3985	7.885	10.111	10.351	10.185
33315.833407	0.833407	10.05	5.7375	8.9491	7.3992	7.8822	10.086	10.349	10.342
33315.835491	0.835491	10.038	5.7375	8.9628	7.3985	7.88	10.112	10.353	10.176
33315.837574	0.837574	10.025	5.7339	8.9765	7.3985	7.8785	10.102	10.352	10.231
33315.839657	0.839657	10.024	5.7339	8.9888	7.3992	7.8757	10.108	10.355	10.205
33315.841741	0.841741	10.015	5.7302	9.0018	7.3992	7.8728	10.112	10.355	10.181
33315.843824	0.843824	10.011	5.7317	9.0184	7.3992	7.8706	10.106	10.355	10.172
33315.845907	0.845907	10.01	5.7288	9.0314	7.3985	7.8692	10.111	10.355	10.313
33315.84938	0.84938	9.985	5.7266	9.0501	7.3978	7.8663	10.1	10.354	10.179
33315.852852	0.852852	9.9965	5.7209	9.0696	7.3992	7.8648	10.106	10.355	10.049
33315.856324	0.856324	9.9763	5.7194	9.0891	7.3999	7.8634	10.105	10.355	10.222
33315.859796	0.859796	9.9821	5.7151	9.1093	7.3985	7.8612	10.099	10.357	10.196
33315.863269	0.863269	9.9619	5.7144	9.1288	7.3992	7.8591	10.111	10.359	10.251
33315.866741	0.866741	9.9604	5.7122	9.1462	7.3992	7.8583	10.109	10.355	10.134
33315.870213	0.870213	9.9619	5.7108	9.1606	7.3999	7.8562	10.09	10.35	10.334
33315.873685	0.873685	9.998	5.7071	9.1815	7.3992	7.8554	10.119	10.347	10.238
33315.877157	0.877157	9.9936	5.7079	9.2003	7.3999	7.8547	10.105	10.354	10.165
33315.88063	0.88063	10.014	5.7064	9.2162	7.4007	7.8547	10.115	10.35	10.229
33315.884102	0.884102	9.9835	5.7021	9.2313	7.3999	7.8526	10.122	10.344	10.128
33315.887575	0.887575	9.9792	5.7043	9.2487	7.3999	7.8526	10.087	10.343	10.228
33315.894519	0.894519	9.9907	5.6985	9.2804	7.3992	7.8518	10.121	10.344	10.308
33315.901463	0.901463	9.9561	5.6927	9.31	7.3992	7.8511	10.121	10.339	10.168
33315.908407	0.908407	9.9561	5.6927	9.3375	7.3971	7.8475	10.128	10.339	10.257

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Date Wednesday March 20, 1991 12:04 PM
PlotFile A:\APTEW101.PRN
DataFile A:\APTEW-1.CPC
APTEW-1A.CPC
Time of First Log in Specified Window
33315.8042 0.804240740

Date	Time	Analog#01 EW-1....... FEET H2O...	Analog#02 P-1A....... FEET H2O...	Analog#03 P-1B....... FEET H2O...	Analog#04 P-2........ FEET H2O...	Analog#05 P-3........ FEET H2O...	Analog#06 SP-1....... FEET H2O...	Analog#07 N-27....... FEET H2O...	Analog#08 AG-1S...... FEET H2O...
33315.915352	0.915352	9.9402	5.6884	9.3627	7.3956	7.8446	10.113	10.33	10.399
33315.922296	0.922296	9.9474	5.6877	9.3894	7.3942	7.8424	10.1	10.324	9.9063
33315.929242	0.929242	9.9272	5.6833	9.4169	7.3913	7.8424	10.112	10.321	10.343
33315.94313	0.94313	9.9214	5.6804	9.4631	7.3877	7.8403	10.085	10.31	10.188
33315.957019	0.957019	9.9128	5.6804	9.5085	7.3826	7.8367	10.111	10.301	10.245
33315.970907	0.970907	9.9099	5.6775	9.5547	7.3768	7.8316	10.1	10.282	10.197
33315.984796	0.984796	9.8724	5.6696	9.5923	7.3703	7.8287	10.103	10.27	10.449
33315.998685	0.998685	9.8882	5.671	9.6284	7.366	7.8258	10.115	10.26	10.218
33316.012575	0.012575	9.38	5.6689	9.6616	7.3624	7.8266	10.103	10.254	10.247
33316.033407	0.033407	9.061	5.6646	9.6955	7.3501	7.7977	10.098	10.234	10.279
33316.054241	0.054241	9.1274	5.6595	9.7345	7.3422	7.7883	10.099	10.225	10.303
33316.075074	0.075074	9.1866	5.6573	9.7713	7.335	7.7861	10.121	10.213	10.366
33316.095907	0.095907	9.1418	5.6523	9.8067	7.3299	7.7869	10.098	10.213	10.305
33316.116741	0.116741	9.1202	5.6494	9.8392	7.3249	7.7861	10.102	10.213	10.235
33316.137575	0.137575	9.1433	5.6487	9.8688	7.3205	7.7825	10.087	10.214	10.089
33316.168824	0.168824	9.1101	5.6393	9.9092	7.3133	7.7731	10.092	10.211	10.204
33316.200074	0.200074	9.1072	5.6342	9.946	7.3068	7.771	10.109	10.213	10.183
33316.231324	0.231324	9.1837	5.6285	9.9828	7.3032	7.7775	10.092	10.242	10.215
33316.262574	0.262574	9.1765	5.6227	10.015	7.3025	7.7847	10.092	10.286	10.217
33316.293824	0.293824	9.2386	5.6169	10.053	7.3018	7.7869	10.087	10.327	10.186
33316.325075	0.325075	9.2198	5.6068	10.084	7.301	7.7869	10.09	10.35	10.217
33316.366741	0.366741	9.2241	5.596	10.116	7.2974	7.7796	10.105	10.342	10.212
33316.408407	0.408407	9.1664	5.5916	10.145	7.2931	7.7717	10.082	10.315	10.205
33316.450074	0.450074	9.162	5.5758	10.164	7.283	7.7558	10.089	10.272	10.405
33316.491741	0.491741	9.266	5.5707	10.192	7.2758	7.7544	10.085	10.24	10.107
33316.533407	0.533407	9.3584	5.557	10.199	7.2613	7.7436	10.079	10.201	10.317
33316.575074	0.575074	9.3584	5.5649	10.225	7.2606	7.7515	10.061	10.197	10.196
33316.616741	0.616741	8.4459	5.5555	10.226	7.2534	7.7385	10.067	10.181	10.186
33316.658407	0.658407	8.5152	5.5592	10.226	7.2512	7.7103	10.073	10.171	10.063
33316.700074	0.700074	8.5196	5.5664	10.233	7.2469	7.7038	10.069	10.163	10.145
33316.741741	0.741741	8.5282	5.5606	10.233	7.2411	7.6865	10.067	10.139	10.1
33316.783407	0.783407	8.5181	5.5584	10.234	7.2375	7.675	10.056	10.134	9.9063
33316.825074	0.825074	8.5037	5.5541	10.237	7.2368	7.6721	10.051	10.16	10.106
33316.866741	0.866741	8.4806	5.5527	10.243	7.2332	7.6735	10.021	10.204	10.025
33316.908407	0.908407	8.4661	5.5498	10.251	7.2317	7.6721	10.023	10.212	10.127
33316.950074	0.950074	8.4633	5.5454	10.259	7.231	7.6641	10.025	10.207	10.099
33316.991741	0.991741	8.4214	5.5426	10.259	7.2289	7.6533	10.036	10.176	9.8464
33317.033407	0.033407	8.381	5.5368	10.257	7.226	7.6367	10.015	10.135	9.8601
33317.075074	0.075074	8.3506	5.5353	10.254	7.2231	7.6237	9.998	10.103	9.9965
33317.116741	0.116741	8.4199	5.5288	10.247	7.2202	7.6194	9.9965	10.086	9.9821
33317.158406	0.158406	8.3968	5.5267	10.246	7.2137	7.6165	10.005	10.085	9.8384
33317.331631	0.331631	8.2987	5.4985	10.269	7.2021	7.6216	9.9922	10.212	9.7164
33317.37616	0.37616	8.2554	5.4884	10.274	7.2021	7.6151	9.9806	10.226	9.8659
33317.413409	0.413409	8.7347	5.4826	10.29	7.2007	7.6136	9.9792	10.212	10.015
33317.455023	0.455023	8.9426	5.4581	10.328	7.192	7.6223	9.9792	10.182	10.11
33317.484866	0.484866	8.9599	5.453	10.326	7.1834	7.6201	9.9821	10.149	9.7973

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Date Wednesday April 3, 1991 12:17 AM
PlotFile A:\ATE2A101.PRN
DataFile A:\ATEW-6A1.CPC
APTEW-2A.CPC
Time of First Log in Specified Window
33330.5494 0.549414351

Date	Time	Analog#01 EW-2....... FEET H2O...	Analog#02 P-10A...... FEET H2O...	Analog#03 P-10B...... FEET H2O...	Analog#04 P-11....... FEET H2O...	Analog#05 P-12....... FEET H2O...	Analog#06 P-13....... FEET H2O...	Analog#07 AG-2S...... FEET H2O...	Analog#08 N-27....... FEET H2O...
33330.549414	0.549414	11.242	5.357	6.6261	7.2729	6.3518	6.9083	5.866	10.307
33330.550109	0.550109	11.242	5.357	6.6246	7.2714	6.3496	6.9055	5.915	10.304
33330.550803	0.550803	11.242	5.3578	6.6246	7.2729	6.3489	6.9055	5.8847	10.303
33330.551498	0.551498	11.244	5.3585	6.6167	7.2729	6.346	6.904	5.8934	10.301
33330.552088	0.552088	11.286	5.3556	6.6275	7.2736	6.3467	6.9026	5.928	10.302
33330.552435	0.552435	11.453	5.3585	6.6232	7.2714	6.346	6.9026	5.8963	10.301
33330.552782	0.552782	11.445	5.3592	6.6261	7.2722	6.3446	6.9011	5.9107	10.3
33330.55313	0.55313	10.661	5.3578	6.6261	7.2714	6.3453	6.9004	5.8905	10.3
33330.553477	0.553477	10.363	5.357	6.6232	7.2714	6.3446	6.9004	5.8645	10.3
33330.553824	0.553824	10.239	5.3585	6.6225	7.2722	6.3446	6.8997	5.8963	10.301
33330.554171	0.554171	10.213	5.3578	6.6218	7.2729	6.3424	6.899	5.8977	10.301
33330.554519	0.554519	10.164	5.3578	6.6239	7.2714	6.3409	6.8982	5.9208	10.3
33330.554866	0.554866	10.158	5.3585	6.6225	7.2714	6.3395	6.8982	5.9107	10.3
33330.555213	0.555213	10.025	5.357	6.6246	7.2707	6.3395	6.8961	5.8703	10.3
33330.55556	0.55556	9.9705	5.3585	6.6232	7.27	6.3337	6.8975	5.8703	10.3
33330.555907	0.555907	9.9142	5.3585	6.6246	7.2714	6.3366	6.8968	5.9612	10.304
33330.556255	0.556255	9.8752	5.3578	6.6254	7.2707	6.3381	6.8961	5.928	10.302
33330.556602	0.556602	9.8507	5.3578	6.6268	7.2693	6.3373	6.8953	5.9266	10.301
33330.556949	0.556949	9.8233	5.3578	6.6268	7.2693	6.3431	6.8953	5.9093	10.303
33330.557296	0.557296	9.7915	5.3585	6.6268	7.2707	6.3359	6.8932	5.9468	10.301
33330.557644	0.557644	9.7857	5.3585	6.6239	7.2693	6.3345	6.8932	5.9728	10.299
33330.557991	0.557991	9.7973	5.3585	6.6268	7.2671	6.3345	6.8925	5.8919	10.301
33330.558338	0.558338	9.7872	5.3592	6.6261	7.2671	6.3359	6.8925	5.9179	10.3
33330.558685	0.558685	9.7626	5.3599	6.6261	7.2671	6.3345	6.891	5.9612	10.299
33330.559032	0.559032	9.7309	5.357	6.6246	7.2657	6.3323	6.8896	5.9122	10.298
33330.559727	0.559727	9.7222	5.3592	6.6275	7.2671	6.3301	6.8903	5.8948	10.3
33330.560421	0.560421	9.6977	5.3592	6.6268	7.2642	6.3301	6.8896	5.9425	10.299
33330.561116	0.561116	9.6544	5.3592	6.6275	7.2649	6.3323	6.8903	5.9454	10.302
33330.56181	0.56181	9.6356	5.3563	6.6275	7.2635	6.3294	6.8874	5.9107	10.301
33330.562505	0.562505	9.6226	5.3578	6.6268	7.2628	6.3236	6.8852	5.928	10.3
33330.563199	0.563199	9.5879	5.3578	6.6297	7.2621	6.3258	6.8838	5.9107	10.297
33330.563894	0.563894	9.5952	5.357	6.6261	7.2592	6.3236	6.8816	5.8862	10.292
33330.564588	0.564588	9.562	5.3563	6.6225	7.2585	6.3186	6.8787	5.8818	10.29
33330.565282	0.565282	9.5331	5.3549	6.6218	7.2563	6.3128	6.8766	5.8891	10.287
33330.565977	0.565977	9.5028	5.3556	6.6153	7.2548	6.3092	6.8751	5.9381	10.285
33330.567366	0.567366	9.4479	5.3549	6.6196	7.2534	6.307	6.8737	5.8963	10.286
33330.568755	0.568755	9.3974	5.3534	6.6167	7.2498	6.3012	6.8694	5.9078	10.281
33330.570144	0.570144	9.3512	5.352	6.6181	7.2462	6.3012	6.8636	5.8919	10.281
33330.571532	0.571532	9.3584	5.3549	6.6138	7.244	6.2933	6.8621	5.9122	10.272
33330.572921	0.572921	9.3829	5.3578	6.629	7.2548	6.2991	6.8701	5.9035	10.308
33330.57431	0.57431	9.3512	5.3541	6.6283	7.2498	6.2998	6.8658	5.9194	10.308
33330.575699	0.575699	9.2155	5.3549	6.6283	7.244	6.2955	6.8621	5.8876	10.3
33330.577088	0.577088	9.0408	5.3549	6.6246	7.2404	6.289	6.8585	5.9584	10.298
33330.578477	0.578477	8.9484	5.3534	6.6225	7.2368	6.2861	6.8542	5.8789	10.295
33330.579866	0.579866	8.905	5.3513	6.6167	7.2296	6.281	6.8499	5.9006	10.287
33330.581949	0.581949	8.83	5.3498	6.6153	7.226	6.2781	6.8491	5.902	10.29

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Date Wednesday April 3, 1991 12:17 AM
PlotFile A:\ATE2A101.PRN
DataFile A:\ATEW-6A1.CPC
APTEW-2A.CPC
Time of First Log in Specified Window
33330.5494 0.549414351

Date	Time	Analog#01 EW-2....... FEET H2O...	Analog#02 P-10A...... FEET H2O...	Analog#03 P-10B...... FEET H2O...	Analog#04 P-11....... FEET H2O...	Analog#05 P-12....... FEET H2O...	Analog#06 P-13....... FEET H2O...	Analog#07 AG-2S...... FEET H2O...	Analog#08 N-27....... FEET H2O...
33330.584032	0.584032	8.7361	5.3527	6.6246	7.2296	6.2774	6.8513	5.9035	10.305
33330.586116	0.586116	8.6596	5.3505	6.6261	7.2245	6.276	6.847	5.9208	10.305
33330.588199	0.588199	8.6221	5.3513	6.6246	7.2195	6.2724	6.8455	5.9381	10.302
33330.590282	0.590282	8.5427	5.3484	6.6196	7.2123	6.2673	6.8412	5.9078	10.295
33330.592366	0.592366	8.4907	5.3455	6.6174	7.2029	6.2608	6.8369	5.9093	10.288
33330.594449	0.594449	8.4358	5.3476	6.6203	7.2043	6.2587	6.8354	5.9136	10.3
33330.596532	0.596532	8.3174	5.3455	6.6153	7.1935	6.2485	6.8297	5.866	10.285
33330.598616	0.598616	8.2438	5.3455	6.616	7.192	6.2471	6.8275	5.9093	10.292
33330.600699	0.600699	8.2092	5.3426	6.6167	7.1848	6.2442	6.8246	5.8472	10.289
33330.604171	0.604171	8.007	5.3419	6.621	7.1776	6.2428	6.8246	5.8631	10.292
33330.607644	0.607644	7.8973	5.3397	6.616	7.1639	6.2392	6.8203	5.8804	10.289
33330.611116	0.611116	7.7529	5.3412	6.6189	7.1596	6.2384	6.8203	5.8761	10.302
33330.614588	0.614588	7.6389	5.3419	6.6189	7.1494	6.2327	6.8138	5.8833	10.299
33330.61806	0.61806	7.483	5.3397	6.6181	7.1379	6.2254	6.8102	5.8992	10.293
33330.621532	0.621532	7.2895	5.3361	6.6102	7.1227	6.2182	6.8022	5.8573	10.286
33330.625005	0.625005	7.0903	5.3383	6.6153	7.1148	6.2153	6.8008	5.9165	10.292
33330.628477	0.628477	6.9199	5.3361	6.6153	7.1032	6.2103	6.7979	5.9035	10.293
33330.631949	0.631949	6.7596	5.3354	6.6138	7.091	6.2031	6.7943	5.8616	10.293
33330.635421	0.635421	6.6283	5.3368	6.6174	7.083	6.2038	6.7936	5.9208	10.301
33330.638894	0.638894	6.4088	5.3318	6.6102	7.0643	6.1973	6.7849	5.8616	10.29
33330.642366	0.642366	6.237	5.3339	6.6124	7.0563	6.193	6.7856	5.902	10.298
33330.64931	0.64931	6.084	5.331	6.6088	7.0267	6.1821	6.7762	5.9035	10.293
33330.656255	0.656255	5.9035	5.3296	6.6145	7.0022	6.1785	6.7712	5.8775	10.305
33330.663199	0.663199	5.5873	5.326	6.6015	6.9668	6.1598	6.7582	5.8804	10.28
33330.670144	0.670144	5.3	5.3253	6.603	6.9423	6.1395	6.7539	5.8717	10.29
33330.677088	0.677088	4.9477	5.3238	6.603	6.9141	6.1504	6.7452	5.8515	10.288
33330.684032	0.684032	4.6518	5.3188	6.6001	6.8816	6.1374	6.7358	5.866	10.282
33330.697921	0.697921	4.0627	5.3188	6.5965	6.821	6.1237	6.7199	5.9064	10.28
33330.71181	0.71181	3.6209	5.313	6.5914	6.756	6.1049	6.7055	5.8501	10.269
33330.725699	0.725699	3.2311	5.3137	6.5878	6.6939	6.0919	6.6939	5.8443	10.264
33330.739588	0.739588	2.8427	5.3144	6.5842	6.6376	6.0868	6.686	5.8818	10.268
33330.753477	0.753477	2.4139	5.3123	6.5828	6.5871	6.0818	6.681	6.5142	10.264
33330.767366	0.767366	1.9606	5.3101	6.5792	6.5445	6.0832	6.6853	7.6981	10.259
33330.788199	0.788199	1.1738	5.3065	6.5741	6.4933	6.1244	6.7329	9.0797	10.251
33330.809032	0.809032	0.48077	5.3036	6.5741	6.4759	6.3063	6.8809	10.024	10.26
33330.829866	0.829866	0	5.3029	6.5727	6.4897	6.5387	7.0874	10.245	10.279
33330.850699	0.850699	0	5.3014	6.5698	6.5178	6.751	7.2787	10.272	10.293
33330.871532	0.871532	0	5.2993	6.5655	6.5532	6.9018	7.4129	10.267	10.31
33330.892367	0.892367	0	5.3007	6.5655	6.5922	6.9914	7.4938	10.176	10.324
33330.923616	0.923616	0	5.2978	6.5662	6.6376	7.0181	7.5198	9.8536	10.334
33330.954866	0.954866	0	5.295	6.5618	6.6579	6.9877	7.4714	9.1231	10.337
33330.986116	0.986116	0	5.2935	6.5604	6.647	6.9018	7.3667	8.2424	10.323

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PlotFile A:\A2EW4A01.PRN
DataFile A:\AP2EW-4A.CPC
APTEW-4A.CPC
Time of First Log in Specified Window
33323.4108 0.410809027

Date	Time	Analog#01 EW-4....... FEET H2O...	Analog#02 P-4B....... FEET H2O...	Analog#03 P-4A....... FEET H2O...	Analog#04 P-5........ FEET H2O...	Analog#05 P-6A....... FEET H2O...	Analog#06 P-6B....... FEET H2O...	Analog#07 P-7........ FEET H2O...	Analog#08 P-9........ FEET H2O...
33323.410809	0.410809	10.591	11.816	3.465	6.3756	5.1513	10.176	5.3245	2.8066
33323.411509	0.411509	10.591	11.816	3.4534	6.3871	5.1513	10.176	5.3245	2.8066
33323.412204	0.412204	10.591	11.816	3.4534	6.3756	5.1513	10.176	5.3245	2.8066
33323.412898	0.412898	10.591	11.816	3.4534	6.3756	5.1513	10.187	5.3245	2.7951
33323.413199	0.413199	10.58	11.816	3.4534	6.3756	5.1513	10.187	5.3245	2.8066
33323.413546	0.413546	10.072	11.816	3.4534	6.3756	5.1513	10.187	5.3245	2.8066
33323.413894	0.413894	9.2169	11.816	3.465	6.3871	5.1513	10.187	5.3245	2.8066
33323.414241	0.414241	8.8935	11.816	3.4534	6.3871	5.1513	10.176	5.3245	2.8066
33323.414588	0.414588	8.7318	11.816	3.4534	6.3756	5.1513	10.187	5.3245	2.8066
33323.414935	0.414935	8.547	11.816	3.4534	6.3871	5.1513	10.187	5.3361	2.8066
33323.415282	0.415282	8.5123	11.816	3.4534	6.3756	5.1513	10.187	5.3361	2.8066
33323.41563	0.41563	8.443	11.816	3.4534	6.3756	5.1513	10.176	5.3245	2.8066
33323.415977	0.415977	8.3853	11.816	3.4534	6.3756	5.1513	10.176	5.3245	2.8066
33323.416324	0.416324	8.3044	11.816	3.4534	6.3756	5.1513	10.176	5.3245	2.8066
33323.416671	0.416671	8.3391	11.816	3.4534	6.3756	5.1513	10.176	5.3245	2.8066
33323.417019	0.417019	8.2813	11.816	3.4534	6.3756	5.1513	10.176	5.3245	2.8066
33323.417366	0.417366	8.2929	11.816	3.4419	6.3756	5.1513	10.176	5.3245	2.8066
33323.417713	0.417713	8.2236	11.816	3.4534	6.3756	5.1513	10.176	5.3245	2.8066
33323.41806	0.41806	8.212	11.816	3.4419	6.3756	5.1513	10.176	5.3245	2.8066
33323.418407	0.418407	8.1889	11.816	3.4534	6.3756	5.1513	10.176	5.3245	2.8066
33323.418755	0.418755	8.1774	11.816	3.4419	6.3756	5.1513	10.176	5.3245	2.8182
33323.419102	0.419102	8.1658	11.816	3.4534	6.3756	5.1513	10.187	5.3245	2.8182
33323.419449	0.419449	8.1543	11.816	3.4534	6.3756	5.1513	10.187	5.3245	2.8182
33323.419796	0.419796	8.1427	11.816	3.4534	6.3756	5.1513	10.176	5.3361	2.8066
33323.420144	0.420144	8.0965	11.816	3.4534	6.3756	5.1513	10.187	5.3361	2.8182
33323.420838	0.420838	7.7154	11.816	3.4534	6.3756	5.1513	10.176	5.3361	2.8182
33323.421532	0.421532	7.4266	11.816	3.4419	6.3756	5.1513	10.176	5.3361	2.8066
33323.422227	0.422227	7.623	11.816	3.4419	6.3756	5.1513	10.187	5.3361	2.8066
33323.422921	0.422921	7.7154	11.816	3.4534	6.3871	5.1397	10.176	5.3361	2.8066
33323.423616	0.423616	7.5999	11.816	3.4419	6.3756	5.1513	10.176	5.3361	2.8066
33323.42431	0.42431	7.3227	11.816	3.4419	6.3756	5.1397	10.176	5.3361	2.8066
33323.425005	0.425005	7.4613	11.816	3.4419	6.3756	5.1513	10.187	5.3361	2.8066
33323.425699	0.425699	7.519	11.816	3.4534	6.364	5.1513	10.176	5.3361	2.8066
33323.426394	0.426394	7.4497	11.816	3.4534	6.364	5.1513	10.187	5.3361	2.8066
33323.427088	0.427088	7.4728	11.816	3.4419	6.364	5.1513	10.187	5.3361	2.7951
33323.428477	0.428477	7.6114	11.816	3.4419	6.364	5.1397	10.176	5.3361	2.8066
33323.429866	0.429866	7.5652	11.816	3.4419	6.364	5.1397	10.187	5.3361	2.7951
33323.431255	0.431255	7.5768	11.816	3.4419	6.364	5.1397	10.176	5.3361	2.8066
33323.432644	0.432644	7.5768	11.816	3.4303	6.3525	5.1397	10.176	5.3361	2.8066
33323.434032	0.434032	7.5652	11.816	3.4303	6.3525	5.1397	10.187	5.3361	2.8066
33323.435421	0.435421	7.519	11.816	3.4534	6.3525	5.1282	10.187	5.3476	2.7951
33323.43681	0.43681	7.5306	11.816	3.4534	6.3525	5.1282	10.187	5.3476	2.7951
33323.438199	0.438199	7.5652	11.816	3.4534	6.3525	5.1282	10.187	5.3476	2.7951
33323.439588	0.439588	7.5421	11.816	3.4534	6.3525	5.1282	10.176	5.3476	2.7835
33323.440977	0.440977	7.5652	11.816	3.4534	6.3525	5.1282	10.187	5.3361	2.7951
33323.44306	0.44306	7.4959	11.816	3.4534	6.3525	5.1282	10.187	5.3592	2.8066

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PlotFile A:\A2EW4A01.PRN
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Time of First Log in Specified Window
33323.4108 0.410809027

Date	Time	Analog#01 EW-4....... FEET H2O...	Analog#02 P-4B....... FEET H2O...	Analog#03 P-4A....... FEET H2O...	Analog#04 P-5........ FEET H2O...	Analog#05 P-6A....... FEET H2O...	Analog#06 P-6B....... FEET H2O...	Analog#07 P-7........ FEET H2O...	Analog#08 P-9........ FEET H2O...
33323.445144	0.445144	7.5537	11.816	3.4419	6.3409	5.1166	10.176	5.3361	2.7835
33323.447227	0.447227	7.5075	11.816	3.4419	6.3409	5.1282	10.187	5.3476	2.7835
33323.44931	0.44931	7.5075	11.816	3.4303	6.3409	5.1166	10.187	5.3476	2.7835
33323.451394	0.451394	7.4382	11.816	3.4419	6.3409	5.1282	10.199	5.3592	2.7951
33323.453477	0.453477	7.4382	11.816	3.4303	6.3409	5.1166	10.187	5.3476	2.7951
33323.45556	0.45556	7.4266	11.816	3.4188	6.3294	5.1166	10.187	5.3476	2.772
33323.457644	0.457644	7.4728	11.816	3.4188	6.3294	5.1051	10.187	5.3476	2.7951
33323.459727	0.459727	7.4151	11.816	3.4303	6.3409	5.1166	10.199	5.3592	2.7951
33323.46181	0.46181	7.392	11.816	3.4188	6.3294	5.1051	10.187	5.3476	2.7835
33323.465282	0.465282	7.392	11.816	3.3957	6.3294	5.1051	10.176	5.3361	2.7835
33323.468755	0.468755	7.3804	11.816	3.3957	6.3178	5.1051	10.187	5.3361	2.7835
33323.472227	0.472227	7.3227	11.816	3.3957	6.3063	5.0935	10.187	5.3476	2.7951
33323.475699	0.475699	7.3111	11.816	3.3726	6.3178	5.0935	10.176	5.3361	2.7951
33323.479171	0.479171	7.3458	11.816	3.3841	6.3178	5.0935	10.187	5.3361	2.7951
33323.482644	0.482644	7.2765	11.816	3.3841	6.3178	5.0935	10.187	5.3476	2.7835
33323.486116	0.486116	7.2649	11.816	3.3726	6.3178	5.0935	10.187	5.3361	2.7835
33323.489588	0.489588	7.2996	11.816	3.361	6.3063	5.082	10.187	5.3361	2.7951
33323.49306	0.49306	7.288	11.816	3.3495	6.3063	5.082	10.187	5.3361	2.7835
33323.496532	0.496532	7.2649	11.816	3.3495	6.2947	5.082	10.176	5.3361	2.7835
33323.500005	0.500005	7.2649	11.816	3.3379	6.2947	5.082	10.187	5.3361	2.7835
33323.503477	0.503477	7.2649	11.816	3.3379	6.3063	5.0704	10.187	5.3476	2.7951
33323.510421	0.510421	7.2418	11.816	3.3264	6.2947	5.0704	10.187	5.3476	2.7835
33323.517366	0.517366	7.1956	11.816	3.3264	6.2832	5.0589	10.187	5.3476	2.772
33323.52431	0.52431	7.1841	11.816	3.3148	6.2947	5.0473	10.187	5.3476	2.7835
33323.531255	0.531255	7.1379	11.816	3.3264	6.2832	5.0473	10.187	5.3592	2.7835
33323.538199	0.538199	7.1494	11.816	3.3148	6.2832	5.0473	10.199	5.3592	2.7951
33323.545144	0.545144	7.0917	11.816	3.2917	6.2716	5.0358	10.187	5.3476	2.772
33323.559032	0.559032	6.5488	11.816	3.2686	6.2601	5.0242	10.187	5.3476	2.772
33323.572921	0.572921	6.4911	11.816	3.2455	6.2485	5.0127	10.187	5.3476	2.772
33323.58681	0.58681	6.3756	11.816	3.234	6.237	5.0011	10.187	5.3476	2.772
33323.600699	0.600699	6.8376	11.816	3.2224	6.2485	4.9896	10.187	5.3476	2.7835
33323.614588	0.614588	6.0522	11.816	3.1993	6.2254	4.978	10.176	5.3476	2.7951
33323.628477	0.628477	6.3409	11.816	3.1878	6.2139	4.9665	10.176	5.3476	2.8066
33323.64931	0.64931	6.2832	11.816	3.1531	6.2023	4.9549	10.187	5.3476	2.8182
33323.670144	0.670144	6.2485	11.816	3.13	6.1908	4.9434	10.176	5.3361	2.8182
33323.690977	0.690977	6.1446	11.816	3.1069	6.1792	4.9203	10.176	5.3361	2.8066
33323.71181	0.71181	6.0291	11.816	3.0723	6.1561	4.9087	10.164	5.3361	2.8182
33323.732644	0.732644	5.9367	11.816	3.0607	6.1446	4.8856	10.164	5.3361	2.7835
33323.753477	0.753477	5.6826	11.816	3.0261	6.133	4.8741	10.152	5.3245	2.7835
33323.784727	0.784727	5.4169	11.816	3.003	6.1099	4.8394	10.152	5.3245	2.7489
33323.815977	0.815977	5.0242	11.816	2.9683	6.0868	4.8163	10.141	5.313	2.7258
33323.847227	0.847227	4.5969	11.816	2.9337	6.0753	4.7932	10.141	5.313	2.6911
33323.878477	0.878477	4.3312	11.816	2.899	6.0637	4.7701	10.129	5.3014	2.6796
33323.909727	0.909727	4.1926	11.816	2.8759	6.0522	4.7586	10.129	5.2899	2.6565
33323.940977	0.940977	4.054	11.816	2.8413	6.0291	4.7355	10.118	5.2899	2.6565
33323.982644	0.982644	3.8923	11.816	2.8066	6.006	4.7124	10.118	5.2899	2.6334

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Time of First Log in Specified Window
33323.4108 0.410809027

Date	Time	Analog#01 EW-4....... FEET H2O...	Analog#02 P-4B....... FEET H2O...	Analog#03 P-4A....... FEET H2O...	Analog#04 P-5........ FEET H2O...	Analog#05 P-6A....... FEET H2O...	Analog#06 P-6B....... FEET H2O...	Analog#07 P-7........ FEET H2O...	Analog#08 P-9........ FEET H2O...
33324.02431	0.02431	3.8808	11.816	2.772	5.9829	4.6893	10.106	5.2783	2.6103
33324.065977	0.065977	3.7075	11.816	2.7373	5.9829	4.6777	10.106	5.2783	2.6218
33324.107644	0.107644	3.4996	11.816	2.7142	5.9713	4.6546	10.106	5.2783	2.6218
33324.14931	0.14931	3.2802	11.816	2.6796	5.9713	4.6315	10.095	5.2783	2.668
33324.190977	0.190977	3.0376	11.816	2.6449	5.9713	4.6084	10.095	5.2783	2.7258
33324.232644	0.232644	2.8644	11.816	2.6218	5.9367	4.5969	10.083	5.2783	2.772
33324.27431	0.27431	2.7489	11.816	2.5987	5.9251	4.5853	10.072	5.2668	2.8066
33324.315977	0.315977	2.4601	11.816	2.5756	5.902	4.5622	10.083	5.2668	2.7604
33324.357644	0.357644	2.3677	11.816	2.5641	5.902	4.5622	10.095	5.2783	2.7373
33324.39931	0.39931	2.31	11.816	2.5525	5.902	4.5507	10.106	5.3014	2.7027
33324.414441	0.414441	2.0559	11.816	2.541	5.902	4.5622	10.106	5.3014	2.6911

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Date Wednesday March 27, 1991 3:30 PM
PlotFile A:\A2EW4B01.PRN
DataFile A:\AP2EW-4B.CPC
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Time of First Log in Specified Window
33323.4095 0.409509259

Date	Time	Analog#01 P-8A....... FEET H2O...	Analog#02 P-8B....... FEET H2O...	Analog#03 AG-1S...... FEET H2O...	Analog#04 EW-1....... FEET H2O...	Analog#05 EW-2....... FEET H2O...	Analog#06 AG-3S...... FEET H2O...	Analog#07 EW-11...... FEET H2O...
33323.409509	0.409509	4.4287	9.6832	10.359	9.9879	9.8911	12.512	10.268
33323.410201	0.410201	4.4366	9.6681	10.363	9.7828	9.9012	9.4031	10.26
33323.410896	0.410896	4.4323	9.6645	10.356	9.9879	9.9214	11.537	10.278
33323.41159	0.41159	4.4338	9.6652	10.356	9.6471	9.9445	9.7511	10.283
33323.412285	0.412285	4.4352	9.6652	10.339	9.7179	9.8839	10.2	10.244
33323.412979	0.412979	4.4316	9.6645	10.349	9.8608	9.9113	11.342	10.287
33323.413674	0.413674	4.4345	9.6645	10.346	9.9662	9.9359	11.472	10.298
33323.414368	0.414368	4.4366	9.6645	10.32	10.112	9.9128	11.231	10.295
33323.415063	0.415063	4.4345	9.6666	10.33	9.7164	9.9171	10.858	10.292
33323.415757	0.415757	4.4287	9.6645	10.337	9.65	9.9229	13.056	10.286
33323.416451	0.416451	4.4236	9.6616	10.324	9.793	9.9604	11.518	10.302
33323.416671	0.416671	4.4222	9.6652	10.327	9.5302	9.9316	10.32	10.297
33323.417019	0.417019	4.4222	9.6601	10.321	9.6659	9.9287	11.439	10.286
33323.417366	0.417366	4.4208	9.6594	10.326	9.5851	9.9171	11.014	10.284
33323.417713	0.417713	4.4193	9.6609	10.326	9.78	9.933	9.4912	10.286
33323.41806	0.41806	4.4222	9.663	10.326	9.445	9.9301	11.928	10.272
33323.418407	0.418407	4.4215	9.6616	10.32	9.689	9.9258	10.353	10.287
33323.418755	0.418755	4.4193	9.6623	10.321	9.6442	9.9258	11.102	10.29
33323.419102	0.419102	4.4208	9.663	10.331	9.6861	9.9301	11.182	10.292
33323.419449	0.419449	4.4208	9.6659	10.317	9.5851	9.9171	12.052	10.289
33323.419796	0.419796	4.4215	9.6637	10.317	9.6818	9.9316	11.172	10.298
33323.420144	0.420144	4.4208	9.6623	10.334	9.6515	9.9388	10.796	10.295
33323.420491	0.420491	4.4193	9.6616	10.314	9.6486	9.9301	11.185	10.292
33323.420838	0.420838	4.4157	9.6594	10.324	9.7641	9.9633	9.0667	10.3
33323.421185	0.421185	4.4164	9.6623	10.305	9.4638	9.9388	10.057	10.3
33323.421532	0.421532	4.4135	9.6616	10.323	9.7785	9.9532	9.3656	10.295
33323.42188	0.42188	4.4135	9.6601	10.301	9.8752	9.9359	9.6746	10.298
33323.422227	0.422227	4.4143	9.6623	10.323	9.6832	9.8998	11.746	10.305
33323.422574	0.422574	4.4121	9.6616	10.324	9.6024	9.8752	11.354	10.294
33323.422921	0.422921	4.4092	9.6601	10.342	9.8218	9.9258	11.048	10.311
33323.423269	0.423269	4.4078	9.6623	10.32	9.6197	9.9085	11.228	10.275
33323.423616	0.423616	4.4063	9.6601	10.321	9.6385	9.9243	11.257	10.292
33323.42431	0.42431	4.4042	9.6587	10.327	9.7944	9.8969	10.018	10.29
33323.425005	0.425005	4.4042	9.663	10.32	10.014	9.8926	8.9599	10.295
33323.425699	0.425699	4.4056	9.6601	10.314	9.4984	9.9272	12	10.291
33323.426394	0.426394	4.4034	9.6616	10.318	9.5894	9.8926	11.192	10.316
33323.427088	0.427088	4.3955	9.6572	10.291	10.181	9.9619	11.362	10.272
33323.427782	0.427782	4.3955	9.6601	10.314	9.471	9.933	8.9556	10.275
33323.428477	0.428477	4.3941	9.6594	10.314	9.6414	9.9272	10.235	10.275
33323.429171	0.429171	4.3933	9.6572	10.321	9.7886	9.9099	11.003	10.29
33323.429866	0.429866	4.3897	9.6558	10.305	9.5114	9.9402	10.48	10.267
33323.43056	0.43056	4.3883	9.6536	10.313	9.4508	9.8882	9.419	10.272
33323.431949	0.431949	4.389	9.6565	10.317	9.6601	9.9027	11.104	10.271
33323.433338	0.433338	4.3803	9.6544	10.291	9.5749	9.8738	9.2559	10.304
33323.434727	0.434727	4.3811	9.6572	10.317	9.6616	9.8983	11.68	10.298
33323.436116	0.436116	4.376	9.6529	10.31	9.9113	9.9171	10.09	10.288

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Date Wednesday March 27, 1991 3:30 PM
PlotFile A:\A2EW4B01.PRN
DataFile A:\AP2EW-4B.CPC
APTEW-4B.CPC
Time of First Log in Specified Window
33323.4095 0.409509259

Date	Time	Analog#01 P-8A....... FEET H2O...	Analog#02 P-8B....... FEET H2O...	Analog#03 AG-1S...... FEET H2O...	Analog#04 EW-1....... FEET H2O...	Analog#05 EW-2....... FEET H2O...	Analog#06 AG-3S...... FEET H2O...	Analog#07 EW-11...... FEET H2O...
33323.437505	0.437505	4.371	9.6493	10.29	9.7843	9.9388	12.53	10.315
33323.438894	0.438894	4.3738	9.6544	10.313	9.8565	9.8911	9.715	10.287
33323.440282	0.440282	4.3695	9.6515	10.287	9.8189	9.8521	10.655	10.306
33323.441671	0.441671	4.3688	9.6507	10.297	9.4869	9.9344	11.452	10.29
33323.44306	0.44306	4.3681	9.6529	10.298	9.5518	9.9272	11.614	10.294
33323.444449	0.444449	4.3623	9.6515	10.308	9.6096	9.8854	10.905	10.272
33323.446532	0.446532	4.363	9.65	10.321	9.5273	9.9085	11.084	10.285
33323.448616	0.448616	4.3558	9.6457	10.274	9.7237	9.881	10.064	10.298
33323.450699	0.450699	4.3536	9.6479	10.295	9.6558	9.9373	10.155	10.296
33323.452782	0.452782	4.3529	9.6486	10.3	9.6645	9.92	11.668	10.292
33323.454866	0.454866	4.3486	9.6493	10.303	9.7078	9.9431	9.0263	10.31
33323.456949	0.456949	4.3428	9.6479	10.294	9.8594	9.9186	10.424	10.275
33323.459032	0.459032	4.3399	9.645	10.275	9.5201	9.9142	9.5648	10.293
33323.461116	0.461116	4.3428	9.6471	10.297	10.05	9.9344	9.7901	10.317
33323.463199	0.463199	4.3341	9.6406	10.269	9.7338	9.9344	11.843	10.254
33323.465282	0.465282	4.3334	9.6435	10.278	9.8189	9.9142	11.601	10.305
33323.468755	0.468755	4.3248	9.6399	10.265	9.4811	9.9142	11.562	10.27
33323.472227	0.472227	4.3312	9.645	10.279	9.959	9.9027	13.176	10.296
33323.475699	0.475699	4.3132	9.632	10.242	9.2082	9.8161	8.0807	10.243
33323.479171	0.479171	4.3146	9.6363	10.267	9.6832	9.8752	11.917	10.295
33323.482644	0.482644	4.3154	9.6421	10.268	9.5735	9.9214	10.012	10.296
33323.486116	0.486116	4.3132	9.6392	10.284	9.2472	9.92	9.868	10.273
33323.489588	0.489588	4.3103	9.637	10.262	9.445	9.9258	10.181	10.316
33323.49306	0.49306	4.2959	9.6298	10.268	9.6038	9.9229	10.883	10.293
33323.496532	0.496532	4.2894	9.6276	10.271	9.6154	9.8435	11.084	10.324
33323.500005	0.500005	4.2901	9.6349	10.252	10.109	9.8839	12.382	10.291
33323.503477	0.503477	4.298	9.6363	10.267	9.793	9.92	11.602	10.308
33323.506949	0.506949	4.2843	9.6284	10.258	9.523	9.8998	11.105	10.272
33323.513894	0.513894	4.2807	9.6262	10.254	9.8594	9.9099	12.628	10.305
33323.520838	0.520838	4.2713	9.6262	10.255	9.7121	9.9142	11.299	10.302
33323.527782	0.527782	4.2576	9.6204	10.249	9.7828	9.9214	10.817	10.286
33323.534727	0.534727	4.2627	9.6276	10.248	9.6211	9.9186	11.924	10.277
33323.541671	0.541671	4.2453	9.6183	10.249	10.124	9.9041	11.564	10.303
33323.548616	0.548616	4.2396	9.6168	10.248	10.033	9.8724	9.611	10.269
33323.562505	0.562505	4.2345	9.6175	10.232	10.061	9.9186	11.375	10.3
33323.576394	0.576394	4.2215	9.6103	10.22	9.8709	9.9056	10.864	10.292
33323.590282	0.590282	4.2085	9.6096	10.217	9.562	9.8536	9.9821	10.318
33323.604171	0.604171	4.1984	9.6031	10.197	9.9604	9.9316	11.686	10.296
33323.61806	0.61806	4.1876	9.6038	10.203	9.3468	9.9041	9.6284	10.315
33323.631949	0.631949	4.1797	9.5988	10.202	9.5952	9.9128	11.768	10.283
33323.652782	0.652782	4.1609	9.5916	10.207	10.095	9.8752	10.806	10.305
33323.673616	0.673616	4.1493	9.5894	10.204	10.308	9.8507	10.242	10.282
33323.694449	0.694449	4.1501	9.5916	10.206	10.001	9.907	11.04	10.296
33323.715282	0.715282	4.1284	9.5872	10.187	10.168	9.9128	10.772	10.259
33323.736116	0.736116	4.1118	9.5778	10.199	9.7395	9.8983	12.052	10.248
33323.756949	0.756949	4.1053	9.5757	10.173	10.311	9.8998	11.478	10.265

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Date Wednesday March 27, 1991 3:30 PM
PlotFile A:\A2EW4B01.PRN
DataFile A:\AP2EW-4B.CPC
APTEW-4B.CPC
Time of First Log in Specified Window
33323.4095 0.409509259

Date	Time	Analog#01 P-8A....... FEET H2O...	Analog#02 P-8B....... FEET H2O...	Analog#03 AG-1S...... FEET H2O...	Analog#04 EW-1....... FEET H2O...	Analog#05 EW-2....... FEET H2O...	Analog#06 AG-3S...... FEET H2O...	Analog#07 EW-11...... FEET H2O...
33323.788199	0.788199	4.0851	9.5692	10.139	10.141	9.8983	12.555	10.215
33323.819449	0.819449	4.0656	9.5634	10.144	10.138	9.8926	11.782	10.209
33323.850699	0.850699	4.0497	9.5511	10.096	9.9272	9.8579	11.084	10.262
33323.881949	0.881949	4.0295	9.5396	10.059	10.949	9.8897	10.318	10.185
33323.913199	0.913199	4.0165	9.5244	10.031	10.409	9.8926	10.148	10.233
33323.94445	0.94445	4.0035	9.5107	10.069	10.476	9.8623	9.4378	10.23
33323.986116	0.986116	3.9804	9.4919	10.041	10.928	9.8608	12.324	10.265
33324.027782	0.027782	3.9645	9.4746	10.008	10.112	9.8406	9.8493	10.206
33324.069449	0.069449	3.9443	9.4594	9.9994	9.7381	9.8334	11.785	10.248
33324.111116	0.111116	3.9306	9.4414	9.9994	11.374	9.842	10.217	10.188
33324.152782	0.152782	3.9133	9.4234	9.9864	10.656	9.8868	11.473	10.205
33324.194449	0.194449	3.8996	9.4068	9.9922	10.522	9.8825	12.321	10.194
33324.236116	0.236116	3.8801	9.3887	9.9676	10.731	9.8897	10.272	10.168
33324.277782	0.277782	3.8628	9.367	9.9676	10.844	9.8608	11.313	10.176
33324.319449	0.319449	3.8339	9.3439	9.9518	10.336	9.8608	10.814	10.191
33324.361116	0.361116	3.8129	9.3216	9.9287	10.529	9.8392	10.762	10.192
33324.402782	0.402782	3.7898	9.3006	9.8709	11.257	9.8132	8.6365	10.193
33324.418963	0.418963	3.7602	9.297	9.8752	11.076	9.7294	12.95	10.199
33324.644523	0.644523	3.7198	9.2364	9.7843	11.368	9.7569	12.12	10.231

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Date Thursday March 28, 1991 5:02 PM
PlotFile A:\ATEW6A01.PRN
DataFile A:\APTEW-6A.CPC
APTEW-6A.CPC
Time of First Log in Specified Window
33325.4170 0.417019675

Date	Time	Analog#01 EW-6....... FEET H2O...	Analog#02 P-14A...... FEET H2O...	Analog#03 P-14B...... FEET H2O...	Analog#04 P-15A...... FEET H2O...	Analog#05 P-15B...... FEET H2O...	Analog#06 AG-11S..... FEET H2O...	Analog#07 AG-12S..... FEET H2O...	Analog#08 N-27....... FEET H2O...
33325.41702	0.41702	14.899	4.5738	11.816	4.5853	10.233	10.037	6.7336	10.349
33325.418953	0.418953	14.923	4.5738	11.816	4.5853	10.199	10.037	6.7336	10.326
33325.42377	0.42377	14.923	4.5853	9.8406	4.5738	10.118	10.037	6.6759	10.268
33325.424472	0.424472	14.923	4.5853	9.8406	4.5738	10.118	10.037	6.6874	10.268
33325.425005	0.425005	14.83	4.5853	9.829	4.5738	10.118	10.037	6.5604	10.268
33325.425352	0.425352	13.282	4.5853	9.829	4.5738	10.118	10.037	6.7221	10.268
33325.425699	0.425699	12.636	4.5853	9.7366	4.5738	10.106	10.037	6.5026	10.268
33325.426046	0.426046	12.382	4.5853	9.6558	4.5738	10.118	10.037	6.7914	10.268
33325.426394	0.426394	12.266	4.5853	9.5865	4.5622	10.106	10.037	6.4911	10.268
33325.426741	0.426741	12.151	4.5738	9.5287	4.5738	10.106	10.048	6.6528	10.268
33325.427088	0.427088	12.058	4.5853	9.471	4.5622	10.095	10.048	6.8838	10.268
33325.427435	0.427435	11.966	4.5853	9.4248	4.5622	10.095	10.048	6.5604	10.268
33325.427782	0.427782	11.966	4.5853	9.367	4.5622	10.083	10.048	6.699	10.256
33325.42813	0.42813	11.92	4.5738	9.3208	4.5622	10.072	10.048	6.6643	10.256
33325.428477	0.428477	11.85	4.5738	9.2862	4.5622	10.06	10.037	6.5373	10.256
33325.428824	0.428824	11.804	4.5738	9.24	4.5622	10.06	10.037	6.5835	10.256
33325.429171	0.429171	11.735	4.5738	9.2053	4.5507	10.048	10.037	6.5142	10.245
33325.429519	0.429519	11.689	4.5622	9.1591	4.5622	10.037	10.037	6.7105	10.256
33325.429866	0.429866	11.642	4.5738	9.1129	4.5622	10.037	10.037	6.595	10.245
33325.430213	0.430213	11.619	4.5622	9.0783	4.5622	10.014	10.037	6.6297	10.256
33325.43056	0.43056	11.573	4.5738	9.0436	4.5622	10.014	10.048	6.6528	10.256
33325.430907	0.430907	11.55	4.5622	9.009	4.5622	10.002	10.048	6.6412	10.256
33325.431255	0.431255	11.504	4.5738	8.9628	4.5622	9.9907	10.06	6.8376	10.256
33325.431602	0.431602	11.458	4.5622	8.9281	4.5622	9.9792	10.048	6.6874	10.256
33325.431949	0.431949	11.411	4.5622	8.8935	4.5622	9.9676	10.06	6.595	10.256
33325.432644	0.432644	11.342	4.5738	8.8242	4.5507	9.9445	10.048	6.699	10.245
33325.433338	0.433338	11.273	4.5622	8.7664	4.5507	9.9214	10.048	6.6181	10.245
33325.434032	0.434032	11.203	4.5507	8.7087	4.5507	9.8868	10.048	6.6412	10.245
33325.434727	0.434727	11.157	4.5622	8.6394	4.5391	9.8637	10.037	6.6066	10.233
33325.435421	0.435421	11.088	4.5507	8.5932	4.5391	9.8406	10.025	6.699	10.233
33325.436116	0.436116	11.042	4.5507	8.5354	4.5391	9.8175	10.025	6.5142	10.233
33325.43681	0.43681	10.972	4.5507	8.4892	4.5391	9.7828	10.037	6.5488	10.245
33325.437505	0.437505	10.926	4.5507	8.443	4.5391	9.7713	10.048	6.595	10.245
33325.438199	0.438199	10.88	4.5507	8.3968	4.5507	9.7482	10.06	6.6874	10.245
33325.438894	0.438894	10.834	4.5507	8.3391	4.5391	9.7251	10.072	6.6759	10.245
33325.440282	0.440282	10.741	4.5391	8.2351	4.5507	9.6673	10.048	6.6759	10.233
33325.441671	0.441671	10.649	4.5507	8.1543	4.5276	9.6096	10.037	6.595	10.233
33325.44306	0.44306	10.557	4.5391	8.0734	4.5276	9.5749	10.025	6.6643	10.222
33325.444449	0.444449	10.464	4.5507	7.981	4.5276	9.5172	10.037	6.6066	10.222
33325.445838	0.445838	10.395	4.5391	7.9002	4.5276	9.471	10.037	6.5835	10.222
33325.447227	0.447227	10.326	4.5391	7.8193	4.516	9.4132	10.037	6.5835	10.222
33325.448616	0.448616	10.256	4.5276	7.7385	4.5276	9.3786	10.037	6.5142	10.222
33325.450005	0.450005	10.187	4.5391	7.6461	4.516	9.3208	10.048	6.5488	10.222
33325.451394	0.451394	10.118	4.5391	7.5768	4.5276	9.2746	10.048	6.5257	10.233
33325.452782	0.452782	10.048	4.5507	7.4959	4.5276	9.2515	10.048	6.6412	10.233
33325.454866	0.454866	9.9561	4.5391	7.3804	4.5276	9.1938	10.048	6.468	10.233

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Date Thursday March 28, 1991 5:02 PM
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APTEW-6A.CPC
Time of First Log in Specified Window
33325.4170 0.417019675

Date	Time	Analog#01 EW-6....... FEET H2O...	Analog#02 P-14A...... FEET H2O...	Analog#03 P-14B...... FEET H2O...	Analog#04 P-15A...... FEET H2O...	Analog#05 P-15B...... FEET H2O...	Analog#06 AG-11S..... FEET H2O...	Analog#07 AG-12S..... FEET H2O...	Analog#08 N-27....... FEET H2O...
33325.456949	0.456949	9.8637	4.5391	7.288	4.516	9.1245	10.048	6.3987	10.233
33325.459032	0.459032	9.7713	4.5391	7.1841	4.5276	9.0667	10.048	6.5257	10.233
33325.461116	0.461116	9.6789	4.5391	7.0801	4.516	9.009	10.037	6.5488	10.222
33325.463199	0.463199	9.6096	4.5276	6.9993	4.516	8.9397	10.037	6.5835	10.21
33325.465282	0.465282	9.5172	4.5276	6.9069	4.5276	8.8935	10.037	6.595	10.222
33325.467366	0.467366	9.4248	4.5276	6.826	4.516	8.8357	10.025	6.6066	10.199
33325.469449	0.469449	9.3555	4.5276	6.7567	4.5045	8.7895	10.014	6.5835	10.199
33325.471532	0.471532	9.2862	4.5276	6.6759	4.5045	8.7318	10.014	6.6181	10.199
33325.473616	0.473616	9.2169	4.5276	6.6181	4.5045	8.6971	10.037	6.4795	10.222
33325.477088	0.477088	9.1014	4.5276	6.5026	4.516	8.6163	10.048	6.5026	10.21
33325.48056	0.48056	8.9628	4.5276	6.3987	4.5045	8.5816	10.037	6.6412	10.21
33325.484032	0.484032	8.8704	4.5276	6.2947	4.516	8.5354	10.037	6.5373	10.21
33325.487505	0.487505	8.778	4.516	6.1908	4.5045	8.5008	10.025	6.5373	10.199
33325.490977	0.490977	8.6856	4.516	6.0868	4.5045	8.4546	10.025	6.5257	10.199
33325.494449	0.494449	8.6163	4.5276	5.9829	4.4929	8.4199	10.014	6.5257	10.187
33325.497921	0.497921	8.5239	4.5276	5.902	4.4929	8.3853	10.025	6.5488	10.187
33325.501394	0.501394	8.4315	4.516	5.8096	4.5045	8.3506	10.025	6.5257	10.187
33325.504866	0.504866	8.3622	4.516	5.7288	4.5045	8.316	10.014	6.5257	10.187
33325.508338	0.508338	8.2698	4.516	5.6479	4.4929	8.2698	10.014	6.5026	10.164
33325.51181	0.51181	8.2005	4.516	5.5786	4.4929	8.2351	10.014	6.4218	10.176
33325.515282	0.515282	8.1312	4.5045	5.4978	4.4929	8.2005	10.014	6.4333	10.176
33325.522227	0.522227	7.9926	4.5045	5.3592	4.4929	8.1427	10.014	6.3871	10.164
33325.529171	0.529171	7.8771	4.5045	5.2321	4.4929	8.0965	10.002	6.2947	10.141
33325.536116	0.536116	7.7847	4.516	5.1282	4.5045	8.0503	10.025	6.2139	10.164
33325.54306	0.54306	7.6692	4.516	5.0127	4.4929	8.0157	10.025	6.2716	10.164
33325.550005	0.550005	7.5537	4.516	4.8972	4.4814	7.9579	10.014	6.3178	10.141
33325.556949	0.556949	7.4613	4.5045	4.8048	4.4929	7.9464	10.014	6.1908	10.141
33325.570838	0.570838	7.2765	4.516	4.5969	4.4929	7.9002	10.014	6.0753	10.129
33325.584727	0.584727	7.1379	4.516	4.4236	4.5045	7.8655	10.025	6.0291	10.141
33325.598616	0.598616	6.9993	4.516	4.2966	4.5045	7.8193	10.025	6.0406	10.129
33325.612505	0.612505	6.8145	4.5045	4.1464	4.4929	7.7731	10.002	6.0291	10.118
33325.626394	0.626394	6.6297	4.5045	3.9963	4.4814	7.7038	9.9907	6.133	10.083
33325.640282	0.640282	6.4911	4.4929	3.8577	4.4814	7.6345	9.9907	6.1792	10.083
33325.661116	0.661116	6.2832	4.4929	3.6844	4.4698	7.5306	9.9792	6.3525	10.083
33325.681949	0.681949	6.0522	4.4698	3.5112	4.4698	7.4382	9.9676	6.4449	10.095
33325.68438	0.68438	6.0291	4.4814	3.4881	4.4698	7.4382	9.9792	6.4911	10.095
33325.702782	0.702782	5.8905	4.4814	3.361	4.4583	7.3458	9.9561	6.6412	10.095

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APPENDIX G

DATA VALIDATION

To: Roberta Haney
From: Lisa McLaughlin and Gary Wilson
Date: September 3, 1991
Project File No.: 490 5039.0101
Subject: Supplemental Site Investigation (SSI) Data Validation

This memorandum provides a summary of the data validation performed on analytical data for soil and groundwater samples collected as part of the Supplemental Site Investigation (SSI) for the Cascade Pole Site. Soil samples were taken from 23 borings and monitoring well installations and 10 test pit and surficial soil locations as part of the SSI. The analyses performed on soil samples collected from these locations are summarized in Tables G-1 and G-2. In addition, two rounds of groundwater and nonaqueous phase liquid (NAPL) sampling were performed as part of the SSI. The groundwater sampling program included 29 monitoring wells in the shallow aquifer, and 1 artesian and 11 monitoring wells in the deep aquifer. The analyses performed on groundwater samples and on NAPL samples are summarized in Table G-3 and Table G-4, respectively. In general, soil and groundwater data from the SSI are valid, with a few qualifications.

As required by the SSI Quality Assurance Project Plan (QAPP) and the Data Management Plan (DMP), data packages received from the laboratory included the results for blanks, duplicates, and matrix spikes and matrix spike duplicates, as well as sample receipt, extraction, and analyses dates. In addition, surrogate compound analyses were performed, where applicable, and the results included in the data validation process. The following criteria were considered during data validation:

- Sample Traceability
    - Chain of Custody
    - Sample Condition
- Sample Holding Times
- Extract Holding Times
- Surrogate Recovery Limits (where applicable)
- Recovery and Relative Percent Difference (RPD) limits for MS and MSD

- Detection Limits
- Blank and Laboratory Duplicate Results
- Check Standards (i.e., Blank Spikes)

As stated in the DMP, intralaboratory criteria were not included in this data validation process. All internal laboratory procedures (calibration, tuning, etc.) were the responsibility of the laboratory and were controlled by the laboratory QAPP.

I. Chain of Custody/Sample Condition

In all cases, chain of custody was maintained and the samples were received in good condition by ATI. On work order 9101-096, custody seals were omitted on soil samples from borings EB-1 and EB-4 and signatures from the courier are missing from the chain-of-custody form. The field crew and the analytical lab were interviewed and the timing of pick up from the site and delivery to the analytical lab were checked. These interviews and process reviews indicate that custody was maintained and that the samples in question were received in good condition. Therefore, no data were rejected or qualified on the basis of custody or sample condition.

Semi-Volatile Organics Analyses

The data validation procedures performed on all EPA Method 8270 and 8310 analyses are summarized in Tables G-5 and G-6.

Sample and Extract Holding Times

Sample and extract holding times were within allowable limits in the QAPP for the methods used for soil and groundwater samples. However, it should be noted that the QAPP for the field program did not specifically identify soil or concentrated waste (NAPL) sample and extract holding times for EPA Method 8270. A review of Method 8270 shows that the sample holding time for semivolatiles, for both the soil and the NAPL samples, is 14 days to extraction. Therefore, this was the sample holding time used for evaluating soil and NAPL analyses. The only samples for which holding times were exceeded were the three NAPL samples collected as part of the first groundwater sampling round (18 days versus 14 days). As a result of exceeding the sample holding times and the elevated constituent concentrations in these samples, all PAH data were assigned a J or UJ as qualifiers for these samples. The qualified data are summarized below:

Sample I.D.	Compound	Qualifier	Comments
CP-D-EW-7	All	J(+) / UJ(-)	Sample holding time exceeded
CP-D-EW-9	All	J(+) / UJ(-)	Sample holding time exceeded
CP-L-EW-1	All	J(+) / UJ(-)	Sample holding time exceeded

Surrogate Recovery Limits

Surrogate spike recoveries for PAH analyses are shown in Table G-5. Surrogate recoveries for the soil and NAPL samples were within acceptable ranges. Surrogate recoveries for groundwater samples were within acceptable ranges except for one sample from the first groundwater sampling round and four samples from the second groundwater monitoring round. Although below the acceptable lower limit, these samples had surrogate spike recoveries of greater than 10%. Therefore, it was not necessary to reject any of the data, but the PAH data for these five samples was qualified as J or UJ. The qualified data are summarized below:

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-G-N-7	03/14/91	All	J(+) / UJ(-)	Surrogate recovery outside of control limits, but greater than 10%.
CP-G-EW-1	06/18/91	All	J(+) / UJ(-)	Surrogate recovery outside of control limits, but greater than 10%.
CP-G-EW-1A	06/18/91	All	J(+) / UJ(-)	Surrogate recovery outside of control limits, but greater than 10%.

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-G-EW-10	06/18/91	All	J(+) / UJ(-)	Surrogate recovery outside of control limits, but greater than 10%.
CP-G-EW-5	06/18/91	All	J(+) / UJ(-)	Surrogate recovery outside of control limits, but greater than 10%.

Recoveries and Relative Percent Difference (RPD) Limits for MS, MSD, and Blank Spikes

A summary of MS and MSD recoveries and RPDs for both soil and groundwater samples as well as blank spikes, is provided in Table G-6. Some of the samples used by ATI for MS/MSD analyses were not from ESE sample sets, but from other sample sets from the Cascade Pole Site submitted by other ATI clients. These samples are identified by their ATI number.

In general, MS and MSD recoveries and RPDs were within acceptable ranges for soil and NAPL samples. One MSD recovery was 2% high for one surrogate (Sample ID = CP-S-EB-8-L). The other surrogate was within range. Additionally, both surrogates were within acceptable ranges for the associated MS. No action was taken.

For groundwater, MS and MSD recoveries and RPDs were generally within acceptable ranges. During the first groundwater sampling round, one sample had an MSD recovery and an RPD outside the QC limits. The sample used for the MS/MSD had high analyte levels present in the sample. Spike recoveries for the Full 8270 also were out of range, due to required dilutions for sample analysis. During the second groundwater sampling round, three out of five of the MS/MSD sets evaluated fell out of QC limits for spike recovery while two out of five fell out of QC limits for RPDs. In two of the three cases where MS/MSD recoveries were out of QC limits, these samples were only slightly outside the QC limits. In the third case, the MS/MSD was performed on a sample with high analyte concentrations which had to be diluted 100-fold, resulting into the spike being diluted out of range. Blank spikes were used as check standards throughout the SSI. Out of 16 blank spikes evaluated, two had a single target compound recovery outside of QC limits, and in both cases this spike recovery was only slightly outside of QC limits. The successful compliance with QC criteria for blank spikes demonstrates that the analytical process is in control. The spurious excursions of MS or MSD recoveries are attributable to matrix effects. Therefore, no action was taken.

Detection Limits

All soil and groundwater samples were found to be acceptable in terms of detection limits. In all cases where MQLs were raised, they were either raised in direct proportion to dilution required for sample analysis or were within limits set by the QAPP.

Blank and Laboratory Duplicate Sample Results

Soil samples had generally acceptable blank and duplicate sample results. Four sets of soil data from ATI (9101-040, 9101-065, 9101-082, and 9101-096) contained reagent blank contamination with Naphthalene for some of the samples associated with these work orders. For all but one of the samples (CP-S-EB-1-A), the Naphthalene contamination was present at less than five times the concentration present in the sample. For all of these samples, B was used as a data qualifier to indicate the presence of Napthalene in the associated reagent blank. For the one sample where Naphthalene was present at less than five times the amount detected in the associated reagent blank, this data was given the qualifier BU (to be considered undetected due to the level of contamination in the associated reagent blank). A field equipment rinsate blank was collected during the soil program (CP-S-B collected on 3/27/91). This field blank indicated no cross contamination as all results were non-detects.

No acceptance criteria for RPDs on duplicate soil sample results was established as part of the QAPP. Nonetheless, RPDs were calculated for duplicate soil samples, and results are presented in Table G-9. No soil data are qualified as a result of the duplicate sample results.

Groundwater samples had generally acceptable blank and duplicate sample results. There was no reagent blank contamination with PAHs for the EPA method 8270 results. However, there was Anthracene contamination associated with all of the EPA method 8310 results. In all cases for the 8310 analyses, Anthracene was present in samples at less than five times the concentration detected in the associated reagent blank. Therefore, all of the Anthracene data associated with the 8310 analyses are qualified with BU (to be considered undetected due to the level of contamination in the associated reagent blank).

Overall, six field equipment rinsate blanks were taken as part of the groundwater sampling program; four during the first groundwater sampling round and two during the second groundwater monitoring round. There were no significant field blank contamination indicated by blanks collected during the first groundwater sampling round. The field blank associated with ATI work order 9103-086 showed 0.065 μg/L of Napthalene during EPA method 8310 analyses, but this is barely above the detection limit and no contamination was indicated in the associated samples. Thus, no action was taken to qualify the data associated with this sample set. In addition, two of the field blanks (for ATI work orders 9103-101 and 9103-144) which underwent full EPA method 8270 analyses indicated the presence of 12 μg/L of Chloroform. However, this too was only slightly above the detection limit and no contamination was indicated in the associated samples. Likewise, no action was taken to qualify data associated with these sample sets.

During the second round groundwater analyses the EPA method 8310 analysis for the field blank associated with ATI work order number 9106-215 indicated contamination with 0.097 μg/L of Pyrene. As Pyrene was detected in the associated samples, a qualifier of F (to indicate field blank contamination as opposed to reagent blank contamination) was given to all data where Pyrene concentrations exceeded five times the level found in the associated field blank. A qualifier of UF was used on all data where the Pyrene concentrations were lower than five times the level found in the associated field blank. The EPA method 8270 and 8310 analyses for the field blank for ATI work order 9106-236 indicated field blank contamination with Acenaphthene, Fluorene, and Phenanthrene. In addition, the 8270 analysis indicated the presence of 2-Methylnapthalene and Dibenzofuran while the 8310 analysis indicated the presence of Anthracene, Fluoranthene, Pyrene, Benzo(a)Anthracene, Chrysene, Benzo(k) Fluoranthene, and

Benzo(a)Pyrene. In the case of the 8270 analysis, contaminant concentrations ranged from 12 to 29 μg/L. For the 8310 analysis, contaminant concentrations ranged from 0.030 to 14 μg/L. Data qualifiers were added to all PAH sample results associated with this field blank. In cases where the sample result is greater than five times the concentration found in the field blank, a data designator of F is used; where the result is less than five times the concentration found in the field blank, a data designator of UF is used.

Interviews were conducted with both field personnel and the ATI project manager to determine what may have caused the field blank contamination. It is unlikely that it is a laboratory problem, because contamination was found in the field blank via two separate analyses, whereas no reagent blank contamination was present (with the exception of low levels of Anthracene found in the reagent blank for the 8310 analyses). A new disposable bailer was used to obtain the samples from each of the wells involved and no contamination was evident in a sample of the DI water used on the site that day.

No acceptance criteria for RPDs on duplicate groundwater sample results was established as part of the QAPP. Nonetheless, RPDs calculated for duplicate groundwater analyses and results are presented in Table G-9. No groundwater data are qualified as a result of the duplicate sample results.

Data qualified as a result of both reagent blank and field blank contamination are summarized below:

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-S-EB-5-B	01/08/91	Naphthalene	B / BU	Naphthalene contamination (97 μg/L) of reagent blank. Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination
CP-S-EB-5-E	01/08/91			
CP-S-EB-2-J	01/09/91			
CP-S-EB-3-H	01/09/91			
CP-S-EB-3-I	01/09/91			
CP-S-EW-1-A	01/11/91			
CP-S-EW-1-D	01/11/91			
CP-S-EW-1-F	01/11/91			
CP-S-EW-1-L	01/11/91			
CP-S-EB-1-A	01/14/91			
CP-G-B	03/11/91	Anthracene	B / BU	Anthracene contamination (0.059 μg/L) of reagent blank. Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination
CP-G-AG-1D	03/11/91			
CP-G-AG-2D	03/11/91			
CP-G-AG-2DR	03/11/91			
CP-G-AG-3D	03/11/91			
CP-G-AG-4D	03/12/91	Anthracene	B / BU	Anthracene contamination (0.033 μg/L) of reagent blank. Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination
CP-G-AG-5D	03/12/91			
CP-G-AG-7D	03/12/91			
CP-G-AG-10D	03/12/91			
CP-G-AG-11D	03/12/91			
CP-G-B	03/12/91			
CP-G-AG-12D	03/13/91	Anthracene	B / BU	Anthracene contamination (0.037 μg/L) of reagent blank. Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination
CP-G-AG-13D	03/13/91			
CP-G-AG-15D	03/13/91			
CP-G-ART	03/13/91			
CP-G-B	03/13/91			
CP-G-AG-1D	06/19/91	Anthracene	B / BU	Anthracene contamination (0.043 μg/L) of reagent blank. Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination
CP-G-AG-3D	06/19/91			
CP-G-AG-4D	06/19/91			
CP-G-AG-5D	06/19/91			
CP-G-AG-10D	06/19/91			
CP-G-B	06/19/91			
		Pyrene	F / UF	Pyrene contamination of field blank. Data qualified as F when sample result > 5X contamination and UF when sample result < 5X contamination.

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-G-AG-2D CP-G-AG-2DA CP-G-AG-7D CP-G-AG-11D CP-G-AG-12D CP-G-AG-13D CP-G-AG-15D CP-G-ART	06/20/91 06/20/91 06/20/91 06/20/91 06/20/91 06/20/91 06/20/91 06/20/91	Anthracene	B / BU	Anthracene contamination (0.043 µg/L) of reagent blank. Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination
		Acenapthene Anthracene Benzo(a)Anthracene Benzo(k)Fluoranthene Benzo(a)Pyrene Chrysene Fluorene Fluoranthene Phenanthrene Pyrene	F / UF	Contamination of field blank with Acenaphthene(14 µg/L), Fluorene (8.6 µg/L), Phenanthrene(8.1 µg/L), Anthracene (1.0 µg/L), Fluoranthene (1.8 µg/L), Pyrene(0.86 µg/L), Benzo(a)Anthracene(0.11 µg/L), Chrysene(0.11 µg/L), Benzo(k) Fluoranthene(0.019 µg/L), and Benzo(a)Pyrene(0.030 µg/L). Data qualified as F when sample result > 5X contamination and UF when sample result < 5X contamination.
CP-G-EW-7 CP-G-AG-12S CP-G-N-7 CP-G-N24B CP-G-N26 CP-G-N27 CP-G-SP-1 CP-DI	06/20/91 06/20/91 06/20/91 06/21/91 06/21/91 06/21/91 06/21/91 06/21/91	2-Methylnapthalene Acenapthene Fluorene Phenanthrene Dibenzofuran	F / UF	Contamination of field blank with 2-Methylnaphthalene(12 µg/L), Acenaphthene(29 µg/L), Fluorene(16 µg/L), Phenanthrene(15 µg/L), and Dibenzofuran (15 µg/L). Data qualified as F when sample result > 5X contamination and UF when sample result < 5X contamination.

Chlorinated Phenols Analyses

Sample and Extract Holding Times

Sample and extract holding times were within allowable limits for the methods used for soil and groundwater samples. Sample and extract holding times for NAPL samples were not specifically mentioned in the QAPP for EPA Method 8040. Review of the method indicates that NAPL holding times should be the same as for soil. The holding times were met for NAPL samples, with two exceptions (CP-D-EW-7, 9). These two NAPL samples were extracted 18 days after collection, exceeding the 14 day criteria. Chlorinated Phenol data for these two samples were assigned a J or UJ, as summarized below:

Sample I.D.	Compound	Qualifier	Comments
CP-D-EW-7	All	J(+) / UJ(-)	Sample holding time exceeded
CP-D-EW-9	All	J(+) / UJ(-)	Sample holding time exceeded

Surrogate Recovery Limits

Surrogate spike recoveries for all EPA Method 8040 analyses are given in Table G-7. Surrogate recoveries for soil and NAPL samples were generally within acceptable ranges, as established in the QAPP. Two soil samples (CP-S-EB-7-F and CP-S-EB-7-I) had no surrogate recoveries due to required sample dilutions. In addition, one NAPL sample (CP-D-EW-9) also had a surrogate which was diluted out of range. Two soil samples had surrogate recoveries which were outside establishes ranges (CP-S-EB-5-D and CP-S-EP-7B), but greater than 10%. These two samples were given the data qualifiers J for positive results and UJ for non-detect results.

Of the 84 groundwater samples collected as part of the SSI, ten of the surrogate recoveries were diluted out of range, sixteen exceeded the 123% upper control limit, and one had a surrogate recovery of less than 10% with no dilution involved (CP-G-AG-7-D). For all samples where the surrogate recovery exceeded 123%, the positive results were flagged as J and all non-detect results as UJ. For the one sample where surrogate recovery was less than 10% and there was no dilution involved, positive results were flagged as J and non-detect results were flagged as R (unusable).

Data qualified as a result of surrogate recoveries are summarized below:

Sample ID	Sample Date	Compound	Qualifier	Comment
CP-S-EB-5-D	01/08/91	All	J(+) / UJ(-)	Surrogate recovery exceeded upper control limit for soil samples (122%).
CP-S-EP-7B	03/27/91	All	J(+) / UJ(-)	Surrogate recovery less than lower control limit for soils (19%), but greater than 10%.
CP-G-EW-5 CP-G-EW-11R CP-G-SP-1 CP-G-AG-2S CP-G-AG-5S CP-G-AG-11S CP-G-AG-13S CP-G-AG-5D CP-G-S-4	03/14/91 03/14/91 03/14/91 06/18/91 06/18/91 06/18/91 06/18/91 06/19/91 06/19/91	All	J(+) / UJ(-)	Surrogate recovery exceeded upper control limit for water samples (123%)
CP-G-AG-7D	06/20/91	All	J(+) / R(-)	Surrogate recovery less than 10%

Recoveries and Relative Percent Difference (RPD) limits for MS, MSD, and Blank Spikes

A summary of MS and MSD recoveries and RPDs for the EPA method 8040 analyses for the soil and groundwater samples as well as blank spikes can be found in Table G-8. Some of the samples used by ATI for MS/MSD analyses were not from ESE sample sets, but from other sample sets from the Cascade Pole Site submitted by other ATI clients. These samples are identified by their ATI sample numbers.

MS and MSD recoveries as well as RPDs for both soil and groundwater samples indicated a consistent problem with the derivitization and recovery of 2-chlorophenol throughout the sampling program. This derivitization problem was also evidenced during the evaluation of blank spikes and by elevated detection limits for 2-chlorophenol for both soil (1500 μg/L) and groundwater (50 μg/L). Based on the poor recoveries and the elevated detection limits, which greatly exceed those agreed to in the QAPP, all positive results for 2-chlorophenol from 8040 analyses are qualified as J and all non-detect results for this compound are qualified as R (unusable). There was no problem with the EPA method 8270 (semivolatile) results for 2-Chlorophenol.

Since completion of the QAPP, ATI has, consistent with the method, developed updated control limits for Method 8040, which differ in some cases from the limits set forth in the QAPP (see Attachment A). Data validation for Method 8040 has been performed using these updated control limits. MS/MSD recoveries for compounds other than 2-chlorophenol were generally acceptable. Three samples were diluted and matrix spike recoveries are therefore not available. (ATE 9103-144, 9106-215, and 9106-236).

Six of the eighteen total MS/MSD analyzed had at least one compound which was outside of the established limits. Except for 2,4-dichlorophenol, which is qualified below because of blank spike recoveries, the MS/MSD recoveries which do exceed established limits, occur randomly, in one, but not both the MS and MSD, and generally for only one or two compounds. Taken alone, therefore, the MS/MSD recoveries do not indicate the need for qualification of any data and no action was taken.

Blank spikes were used as check standards throughout the SSI. In general, blank spike recoveries were acceptable with the exception of 2-chlorophenol. Out of 34 blank spikes evaluated via EPA method 8040, 19 had at least one compound (aside from 2-chlorophenol) recovery outside of QAPP limits for spike recovery (MS/MSD). However, only 6 had one or more compounds (aside from 2-chlorophenol) outside of the revised control limits. These blank spikes were associated with 3 ATI work orders, 9101-108 (which had another blank spike within revised QC limits), 9101-199 (2), 9106-215, and 9106-236 (2). As 9101-108 had an acceptable blank spike also associated with it, no data qualifiers were recommended for this data. The blank spikes associated with 9106-199 and 9106-215 had only one compound out of QC limits aside from 2-chlorophenol, 2,4-dichlorophenol. The last work order, 9106-236, had two blank spikes; one which was out on 2,4-dichlorophenol only and the other which was out of revised control limits for everything but tetrachlorophenol and 2,4,5-trichlorophenol. Therefore, the 2,4-dichlorophenol data associated with these three work orders, or all groundwater samples from the second monitoring round, have been qualified as J for positive results and UJ for non-detect results.

Data qualified as a result of MS/MSD analyses and blank spike recoveries are summarized below:

Sample ID	Compound	Qualifier	Comments
All	2-Chlorophenol	J(+) / R(-)	Problems with compound derivitization, detection limits, and MS/MSD analyses throughout sampling and analysis program.
All Groundwater Samples, Second Monitoring Round	2,4-Dichlorophenol	J(+) / UJ(-)	Blank spike recoveries exceeded revised upper control limit for compound

Detection Limits

As mentioned in the previous section, due to derivitization problems encountered throughout the SSI for 2-Chlorophenol, the detection limit for this compound was raised to 1500 μg/L for soils and 50 μg/L for groundwater. Therefore, in combination with MS/MSD recovery problems, all data for this compound analyzed by EPA method 8040 was qualified as J for positive results and R (unusable) for non-detect results. The only other significant deviations of detection limits for this method from those proposed in the QAPP were for 2,4-dichlorophenol and 2,4,5-trichlorophenol, which were raised to 1.0 μg/L and 0.40 μg/L, respectively (instead of the 0.30 μg/L and 0.20 μg/L stated in the QAPP). However, these deviations are so minor that no action was taken to qualify the data. In all other cases where MQLs were raised, they were either increased in direct proportion to dilution requirements or were still within limits set by the QAPP.

Blank and Laboratory Duplicate Sample Results

Soil samples had generally acceptable blank results. Four ATI work orders for soil samples (9101-040, 9101-065, 9101-134, and 9101-156) had reagent blank contamination associated with some of their samples. ATI work orders 9101-040 and 9101-065 had 6.5 μg/L of tetrachlorophenol in one of their reagent blanks. ATI work orders 9101-134 and 9101-156 had 4800 μg/L of 2-chlorophenol in one of their reagent blanks. All sample results where the concentration of the compound was less than five times the amount detected in the associated reagent blank were designated as BU. If the concentration exceeded five times the level found in the associated reagent blank, the result was designated B. There was no contamination in the field blank associated with soil samples.

Groundwater samples also had generally acceptable blank results. Only one reagent blank (ATI work order 9106-236) and one field blank (ATI work order 9103-144) exhibited any contamination at all. ATI work order 9106-236 had 1.6 μg/L of pentachlorophenol and 0.45 μg/L of 2,4,5-trichlorophenol associated with one of its reagent blanks. All sample results where the concentration of a compound was less than five times the amount detected in the associated reagent blank were designated as BU. If the concentration exceeded five times the level found in the associated reagent blank, the result was designated B. ATI work order 9103-144 had trace amounts of pentachlorophenol (0.057 μg/L) in the associated field blank. All samples where the concentration of pentachlorophenol was less than five times the amount detected in the associated reagent blank were designated as UF. If the concentration exceeded five times the level found in the associated field blank, the result was designated F.

No acceptance criteria for RPDs on duplicate sample results was established as part of the QAPP. Nonetheless, RPDs were calculated for duplicate analyses for soil and groundwater and the results are presented in Table G-9. No data are qualified as a result of duplicate sample results.

Data qualified as a result of both reagent blank and field blank contamination are summarized as follows:

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-S-EB-5-D CP-S-EB-6-B CP-S-EB-7-F CP-S-EB-2-C CP-S-EB-3-A CP-S-EB-3-D	01/08/91 01/08/91 01/08/91 01/09/91 01/09/91 01/09/91	Tetrachlorophenol	B / BU	Tetrachlorophenol contamination (6.5 μg/kg) of associated reagent blank. Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination
CP-S-EB-12-L CP-S-EW-6-F CP-S-EW-6-J CP-S-EW-6-M CP-S-EW-6-N	01/18/91 01/21/91 01/21/91 01/21/91 01/21/91	2-Chlorophenol	B / BU	2-Chlorophenol contamination (4800 μg/kg) of associated reagent blank. Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination.
CP-G-EW-4 CP-G-EW-5 CP-G-EW-7 CP-G-EW-9 CP-G-EW-11 CP-G-EW-11R CP-G-N-7 CP-G-N-26 CP-G-N-27 CP-G-SP-1	03/14/91 03/14/91 03/14/91 03/14/91 03/14/91 03/14/91 03/14/91 03/14/91 03/14/91 03/14/91	Pentachlorophenol	F / UF	Pentachlorophenol contamination (0.057 μg/L) of field blank Data qualified as F when sample result > 5X contamination and UF when sample result < 5X contamination.

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-G-EW-7	06/20/91	Pentachlorophenol	B / BU	Pentachlorophenol (1.6 μg/L) and 2,4,5-TCP (0.47 μg/L) contamination found of associated reagent blank.
CP-G-AG-2D	06/20/91	2,4,5-Trichlorophenol		
CP-G-AG-2D-A	06/20/91			
CP-G-AG-7D	06/20/91			
CP-G-AG-11D	06/20/91			Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination.
CP-G-AG-12D	06/20/91			
CP-G-AG-13D	06/20/91			
CP-G-AG-15D	06/20/91			
CP-G-ART	06/20/91			
CP-G-AG-12S	06/20/91			
CP-G-B	06/21/91			
CP-DI	06/21/91			

Equipment Problems

ATI reported a problem with one of their GC columns during the analysis of one of the groundwater sampling sets (ATI work order 9106-236). Due to saturation problems on the GC used to run confirmation analyses, several samples had contaminant hits which could not be confirmed. All of the positive results for samples associated with this problem have been qualified with an N (unconfirmed hit). These data are summarized as follows:

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-G-N-7	06/20/91	2,4-Dichlorophenol	N (+)	Positive results could not be confirmed due to laboratory equipment problems.
CP-G-EW-7	06/20/91	Pentachlorophenol		
CP-G-AG-2D	06/20/91	2,4,5-Trichlorophenol		
CP-G-AG-2D-A	06/20/91	2,4,6-Trichlorophenol		
CP-G-AG-7D	06/20/91			
CP-G-AG-11D	06/20/91			
CP-G-AG-12D	06/20/91			
CP-G-AG-13D	06/20/91			
CP-G-AG-15D	06/20/91			
CP-G-AG-12S	06/20/91			

Dioxin and Furan Analyses

Dioxin and Furan analyses were data validated externally by David MacLean. His report is included as Attachment B.

Volatiles and Purgeable Aromatics Analyses

The data validation procedures performed on all EPA Method 8020 and 8240 analyses are summarized in Tables G-10 and G-11.

Sample and Extract Holding Times

Sample and extract holding times were within allowable limits for the methods used for all soil and groundwater samples. However, four samples analyzed by EPA method 8240 (associated with ATI work order 9106-215) were reanalyzed because the original analyses were collected at excessive dilutions. These repeat analyses were performed outside of sample holding times (25 days versus 14 days). Data for these samples have been qualified as estimates and given a J qualifier for positive data on a UJ qualifier for non-detects.

Sample ID	Sample Date	Analysis Date	Compound	Qualifier	Comments
CP-G-EW-11 CP-G-EW-11A CP-G-EW-3 CP-G-EW-9	06/19/91 06/19/91 06/19/91 06/19/91	07/14/91 07/14/91 07/14/91 07/14/91	All	J(+) / UJ(-)	Repeat analyses performed without dilution outside of sample holding times. Surrogate recoveries exceeded upper control limit of 115%.

Surrogate Recovery Limits

Surrogate spike recoveries for all volatile and purgeable aromatic analyses are given in Table G-10. Spike recoveries for all purgeable aromatic analyses were within acceptable ranges. Surrogate recoveries for all of the volatile analyses were within acceptable ranges with the exception of the reanalyses for the four samples previously mentioned. All of these samples had surrogate recoveries in excess of the upper control limit of 115% for groundwater samples. As all these results are already qualified as J for positive results and UJ for non-detect results, no further action was required.

Recoveries and Relative Percent Difference (RPD) Limits for MS, MSD, and Blank Spikes

A summary of Ms and MSD recoveries and RPDs for both soil and groundwater samples, as well as blank spikes, can be found in Table G-11. Most of the samples used by ATI for MS/MSD analyses were not from ESE sample sets, but from other sample sets from the Cascade Pole Site submitted by other ATI clients. These samples are simply identified by their ATI number. As none of the MS/MSD or blank spike analyses had any recoveries or RPDs outside of QC limits, no data were qualified.

Detection Limits

Volatile and purgeable aromatic analyses were found to be acceptable in terms of detection limits, with the exception of the purgeable aromatic analyses performed on two NAPL samples (CP-D-EW-7 and CP-D-EW-9). The analysis of CP-D-EW-7 had a dilution factor of 140 associated with it, but MQLs were raised to 7,000 times reagent blank values. The analyses of CP-D-EW-9 had a dilution factor of 3,300 associated with it, but MQLs were raised to 164,000 times reagent blank values. Therefore, as a result of the considerable dilutions required and the excessive MQLs, all data associated with these analyses have been qualified as J for positive results and UJ for non-detect results.

Sample ID	Compound	Qualifier	Comments
CP-D-EW-7	All	J(+) / UJ(-)	EPA method 8020. Dilution factor = 140 and MQLs raised to 7,000X reagent blank values.
CP-D-EW-9	All	J(+) / UJ(-)	EPA method 8020. Dilution factor = 3,300 and MQLs raised to 164,000X reagent blank values.

Blank and Laboratory Duplicate Sample Results

Soil and groundwater samples generally had acceptable blank and duplicate sample results. None of the blanks for the purgeable aromatic analyses contained measurable levels of contaminants. However, some contamination was indicted in the reagent blanks and the field blanks for the volatile organic analyses. Some of the reagent blanks for ATI work orders 9103-158, 9103-123, 9103-144, 9106-199, and 9106-215 had low levels of methylene chloride. As this is a common lab contaminant, data were qualified for this compound as BU when the sample result was less than ten times the concentration found in the associated reagent blank and B when the sample result was greater than ten times this concentration. Work order 9106-199 had one reagent blank that also contained 19 μg/L acetone. As acetone is also a common laboratory contaminant, associated sample results were qualified as B or BU depending on whether the result was less than or greater than ten times the contamination of the reagent blank. In addition, on ATI work order 9106-215, methylene chloride was found in elevated levels in all samples with high dilution rates. When these samples were reanalyzed, the methylene chloride levels dropped to the same levels as those found in the reagent blank. This problem was discussed with the ATI project manager. ATI decided that the methylene chloride found in the samples with high dilution rates was most likely due to lab contamination and that the elevated levels are due to enhancement caused by dilution (see Attachment C). Therefore, positive data for methylene chloride, associated with the original volatile analyses, were qualified as R (unusable). Finally, in addition to the methylene chloride contamination, one ATI work order 9103-144 had low level contamination with 1,1,2,2-trichloroethane (1 μg/L). However, this compound was not detected in any of the associated samples, so no action was taken.

Two trip blanks, associated with ATI work orders 9103-101 and 9103-123, indicated contamination with low levels of acetone. Therefore, any concentrations of this contaminant found in sample results were qualified as T (trip blank contamination) or TU depending on whether the result was less than or greater than 5X the trip blank contamination. Finally, three field blanks and one DI water blank, associated with ATI work orders 9103-101, 9103-144, and 9106-215 were found to be contaminated with low levels of chloroform (ranging from 12 to 23 μg/L). However, this compound was not detected in any of the associated samples, so no action was taken.

No acceptance criteria for RPDs on duplicate sample results was established as part of the QAPP. Nonetheless, RPDs were calculated for duplicate analyses for soil and groundwater and the results are presented in Table G-12. No data are qualified as a result of duplicate sample results.

Data qualified as a result of blank contamination are summarized below:

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-G-EW-11R T031591 CP-G-B T031491 CP-G-B	03/14/91 03/15/91 03/14/91 03/14/91 03/13/91	Methylene Chloride	B / BU	Reagent blank contamination with 5 μg/L methylene chloride. Data qualified as B when sample result > 10X contamination and BU when sample result <10 X contamination.
CP-G-EW-6	06/18/91	Methylene Chloride	B / BU	Reagent blank contamination with 3 μg/L methylene chloride Data qualified as B when sample result > 10X contamination and BU when sample result < 10X contamination.

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-G-AG-5S	06/18/91	Methylene Chloride Acetone	B / BU	Reagent blank contamination with 14 μg/L methylene chloride and 19 μg/L acetone. Data qualified as B when sample result > 10 X contamination and BU when sample result < 10X contamination.
CP-G-EW-11 CP-G-EW-11A CP-G-EW-3 CP-G-EW-9	06/19/91	Methylene Chloride	R (+)	Methylene chloride hits most likely due to lab contamination (Attachment C).
Reanalysis of: CP-G-EW-11 CP-G-EW-11A CP-G-EW-3 CP-G-EW-9	06/19/91	Methylene Chloride	B / BU	Reagent blank contamination with 9 μg/L methylene chloride. Data qualified as B when sample result > 10X contamination and BU when sample result < 10X contamination.

Pesticide and PCB Analyses

The data validation procedures performed on EPA Method 8080 analyses are summarized in Tables G-13 and G-14.

Sample and Extract Holding Times

Sample and extract holding times were within allowable limits for EPA method 8080 for all soil and groundwater samples. However, the sample holding time for two NAPL samples (CP-D-EW-1 and CP-L-EW-1) were exceeded (20 days versus 14 days). As a result of exceeding the sample holding times, all Pesticide and PCB data were assigned a J or UJ as qualifiers for these samples. The qualified data are summarized below:

Sample ID	Compound	Qualifier	Comments
CP-D-EW-1 CP-L-EW-1	All	J(+) / UJ(-)	Sample holding times exceeded

Surrogate Recovery Limits

Surrogate spike recoveries for all EPA method 8080 analyses are given in Table G-13. In general, surrogate recoveries were within acceptable limits. One or both surrogates were diluted out of range for four samples (CP-L-EW-1, CP-G-EW-11, CP-G-EW-11A, CP-G-EW-3) due to the presence of increased contaminant concentrations and matrix interferences. Two reagent blanks and one sample (CP-DI) had a single surrogate outside the QAPP limits. The laboratory, consistent with the analytical method, has updated its QC limits since the QAPP was approved. As the surrogates for sample CP-DI are within the more recent QC limits, no action was taken.

Recoveries and Relative Percent Difference (RPD) Limits for MS, MSD, and Blank Spikes

A summary of MS and MSD recoveries and RPDs for both soil and groundwater samples, as well as blank spikes, can be found in Table G-14. One of the samples used by ATI for MS/MSD analysis was not from an ESE sample set, but from another sample set from the Cascade Pole Site submitted by other ATI clients. This sample is identified by the ATI number. Only one sample, CP-G-AG-5S, had any recoveries or RPDs outside of QAPP QC limits, and it was only out on aldrin recovery and the RPD for P,P'-DDT. All other parameters were within acceptable QC limits. No action was taken.

Blank spike recoveries were used as check standards throughout the SSI. Only one blank spike associated with ATI work order 9103-144 had any spike recoveries or RPD outside of MS/MSD QAPP limits. The RPD for P,P'-DDT was the only parameter outside of QC limits (28 versus 20). All other parameters were within acceptable QC limits. No action was taken.

Detection Limits

Detection limits for pesticide and PCB analyses were generally acceptable. In most cases where MQLs were raised, they were raised in proportion to the dilution required for sample analysis. For two samples from the first groundwater monitoring round, CP-G-EW-3 and CP-G-EW-6, some detection limits were raised between 13 and 30 percent due to decreased sample volumes. No further action was taken.

Blank and Laboratory Duplicate Sample Results

There was no blank contamination associated with any of the pesticide and PCB analyses. In addition, there was only one positive duplicate sample result, CP-G-EW-11 (first groundwater sampling round) for aldrin. The RPD associated with this result was 21.

Metals Analyses

The data validation procedures performed on metals analyses are summarized in Table G-15.

Sample Holding Times

Sample holding times were within allowable limits for most soil and groundwater samples. Mercury analysis holding times were exceeded for three ATI work orders, 9103-101, 9103-123, and 9103-144 (first groundwater monitoring round). Therefore, all the mercury data associated with these sets has been qualified as J for positive results and UJ for non-detect results. The data qualified are summarized below:

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-G-AG-5S	03/12/91	Mercury	J(+) / UJ(-)	Sample holding time exceeded.
CP-G-EW-3	03/13/91			
CP-G-EW-6	03/13/91			
CP-G-B	03/13/91			
CP-G-EW-9	03/14/91			
CP-G-EW-11	03/14/91			
CP-G-EW-11R	03/14/91			
CP-G-B	03/14/91			

Recoveries and Relative Percent Difference (RPD) Limits for Matrix Spike and Blank Spikes

A summary of matrix spike recoveries and RPDs for both soil and groundwater samples, as well as blank spikes, can be found in Table G-15. Some of the samples used by ATI for MS/MSD analyses were not from ESE sample sets, but from other sample sets associated with the Cascade Pole Site which were submitted by other ATI clients. MS/MSD analyses carry far more weight in metals analyses than in organic analyses as metals analyses have no surrogate spiking requirements (EPA, 1988a & 1988b). Therefore, in cases where either MS or blank spike recoveries were high, data were qualified with a J for positive results and not qualified for non-detect results; where MS or blank spike recoveries were low, data were qualified with a J for positive results and UJ for non-detect results. If RPD was out of QC limits, data were qualified with a J for positive results and UJ for non-detect results. The qualified data are summarized below:

Sample ID	Sample Date	Compound	Qualifier	Comments
CP-S-EW-9-A CP-S-EW-9-D CP-S-EW-9-N	01/30/91	Chromium Nickel Vanadium	J(+) / UJ(-)	Matrix spike recoveries low for chromium, nickel, and vanadium
Field Blank 12391	01/23/91	Barium Mercury	J(+) / UJ(-) Ba J(+) Hg	RPD high for barium. Matrix spike high for mercury.
CP-S-EW-11-A CP-S-EW-11-D CP-S-EW-11-M CP-S-EW-11-Q	01/23/91	Calcium Chromium Nickel Vanadium	J(+) Ca J(+) / UJ(-) Cr, Ni, Vd	Matrix spike recovery high for calcium. Matrix spike recoveries low for chromium, nickel, and vanadium
CP-G-AG-5S	03/12/91	Potassium Thallium	J(+) K J(+) / UJ(-) Th	Matrix spike recovery high for potassium. Matrix spike recovery low for thallium.
CP-G-EW-3 CP-G-EW-6 CP-G-B	03/13/91	Antimony Cadmium Mercury Potassium	J(+) / UJ(-) At J(+) Hg,K,Cd	RPD high for antimony. Matrix spikes high for cadmium and mercury. Blank spike high for potassium.
CP-G-EW-9 CP-G-EW-11 CP-G-EW-11R CP-G-B	03/14/91	Mercury Cadmium Potassium	J(+)	Matrix spikes high for cadmium and mercury. Blank spike high for potassium
CP-S-ES-1 CP-S-ES-2	03/27/91	Aluminum Iron Manganese Mercury	J(+) / UJ(-) Al,Fe,Mn J(+) Hg	Matrix spikes low for aluminum, iron, and manganese. Matrix spike high for mercury.
CP-L-EW-1	03/15/91	Iron	J(+) / UJ(-)	Matrix spike low for iron.

Detection Limits

Detection limits for metals analyses were generally acceptable. In two instances (ATI work orders 9101-134 and 9103-158) the MQLs for antimony and arsenic were exceeded. The increased detection limits were noted in the analytical results. No additional action was taken.

Blank and Laboratory Duplicate Results

There were generally no problems associated with any of the reagent or field blanks, with two exceptions. The soil blank associated with ATI work order 9101-180 contained trace sodium and the reagent blank associated with ATI work order 9101-134 was contaminated with 62 ppb of calcium. In each case, the data were qualified as B (or F in the case of the field blank) when the sample result exceeded five times the contamination and BU (or UF in the case of the field blank) when the sample result was less than five times the contamination. The qualified sample results are summarized as follows:

Sample ID	Sample Date	Compound	Qualifier	Comments
Field blank	01/23/91	Sodium	F / UF	Sodium detected in soil blank.
CP-S-EB-11-A CP-S-EB-11-D CP-S-EW-11-M CP-S-EW-11-Q	01/23/91	Calcium	B / BU	Reagent blank contamination with 62 μg/L calcium. Data qualified as B when sample result > 5X contamination and BU when sample result < 5X contamination.

TABLE G-1
ANALYSES PERFORMED ON SOILS FROM MONITORING WELL INSTALLATION AND BORING PROGRAMS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Depth(Ft)	PAH	Phenols	Purgeable Aromatics	Metals	Dioxins/ Furans	Fate & Transport	Moisture Content
CP-S-EW-1-A	0-1.5	●√	●√		●√		●√	●√
CP-S-EW-1-B	1.5-3							●√
CP-S-EW-1-D	4.5-6	●√	●√		●√	●√		√
CP-S-EW-1-F	7.5-9	●√	●√					√
CP-S-EW-1-G	9-10.5					●√	●√	
CP-S-EW-1-L	16.5-18	●√	●√					√
CP-S-EW-1-M	18-19.5				●√			√
CP-S-EW-2-D	9-10	●√	●√					√
CP-S-EW-2-J	17.5-19	√	√					√
CP-S-EW-2-K	19-20	●√	●√					√
CP-S-EW-3-B	6-7.5(D)	●√	●√					√
CP-S-EW-3-C	10.5-12	●√	●√					√
CP-S-EW-3-G	16.5-18	●√	●√					√
CP-S-EW-3-J	21-22.5	●√	●√					√
CP-S-EW-4-A	0-0.5	●√	●√					√
CP-S-EW-4-E	6-7.5	●√	●√					√
CP-S-EW-4-I	13-14.5	●√	●√					√
CP-S-EW-4-L	18-19.5	●√	●√					√
CP-S-EW-5-E	6-7.5	●√	●√					√
CP-S-EW-5-D	6-7.5						●√	√
CP-S-EW-5-Q	23-23.5	●√	●√					

● - Final Project Plans and Additional Ecology Requirements (ESE, 1990) √ - Performed
D - Sample taken deeper than proposed S - Sample taken shallower than proposed

TABLE G-1
ANALYSES PERFORMED ON SOILS FROM MONITORING WELL INSTALLATION AND BORING PROGRAMS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Depth(Ft)	PAH	Phenols	Purgeable Aromatics	Metals	Dioxins/ Furans	Fate & Transport	Moisture Content
CP-S-EW-6-A	0-1.5	●✓	●✓					✓
CP-S-EW-6-C	3-4.5	●✓	●✓					✓
CP-S-EW-6-F	8.5-10	✓	✓					✓
CP-S-EW-6-J	14.5-16	●✓	●✓					✓
CP-S-EW-6-M	19.5-21	●✓	●✓				●✓	✓
CP-S-EW-6-N	3-4.5	✓	✓					✓
CP-S-EW-7-A	0-1.5	●✓	●✓			●✓		✓
CP-S-EW-7-E	6.5-8	●✓	●✓			●✓		✓
CP-S-EW-7-M	19-20	●✓	●✓					✓
CP-S-EW-8-A	0-1.5	●✓	●✓		●✓			✓
CP-S-EW-8-E	6-7.5	●✓	●✓		●✓		●✓	✓
CP-S-EW-8-L	17.5-19	●✓	●✓					✓
CP-S-EW-8-M	19-21.5				●✓			✓
CP-S-EW-9-A	0-1.5	●✓	●✓		●✓	●✓		●✓
CP-S-EW-9-C	3-4.5	●✓	●✓					●✓
CP-S-EW-9-D	4.5-6				●✓			✓
CP-S-EW-9-G	9-10.5					●✓	●✓	
CP-S-EW-9-M	19-20.5	●✓	●✓					✓
CP-S-EW-9-N	20-20.5				●✓		●✓	✓

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TABLE G-1
ANALYSES PERFORMED ON SOILS FROM MONITORING WELL INSTALLATION AND BORING PROGRAMS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Depth(Ft)	PAH	Phenols	Purgeable Aromatics	Metals	Dioxins/ Furans	Fate & Transport	Moisture Content
CP-S-EW-10-A	0-1.5	●✓	●✓					●✓
CP-S-EW-10-B	3-4.5							●✓
CP-S-EW-10-C	6-7.5	●✓	●✓	●✓				✓
CP-S-EW-10-I	16-17.5					●✓		
CP-S-EW-10-K	19.5-21	●✓	●✓					✓
CP-S-EW-10-L	17.5-19						●✓	
CP-S-EW-11-A	0-1.5	●✓	●✓		●✓	●✓	●✓	✓
CP-S-EW-11-C	3-4.5	●✓	●✓	●✓				✓
CP-S-EW-11-D	4.5-6				●✓			✓
CP-S-EW-11-H	11-12.5	●✓	●✓			●✓		✓
CP-S-EW-11-I	12.5-14						●✓	
CP-S-EW-11-L	17.5-19	●✓	●✓					✓
CP-S-EW-11-M	19-20.5				●✓		●✓	✓
CP-S-EW-11-N	3-4.5			✓				✓
CP-S-EW-11-O	11-12.5							
CP-S-EW-11-P	17.5-19	●✓	●✓					✓
CP-S-EW-11-Q	4.5-6				●✓			✓
CP-S-EB-1-A	0-1.5	●✓	●✓					✓
CP-S-EB-1-F	7.5-8.5	●✓	●✓					✓
CP-S-EB-1-J	13.5-15	●✓	●✓					✓
CP-S-EB-1-O	21-22.5	●✓	●✓				●✓	✓
CP-S-EB-2-C	3.5-4.5	●✓	●✓					✓
CP-S-EB-2-J	13.5-15	●✓	●✓					✓
CP-S-EB-2-N	19.5-21	●✓	●✓				●✓	✓

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TABLE G-1
ANALYSES PERFORMED ON SOILS FROM MONITORING WELL INSTALLATION AND BORING PROGRAMS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Depth(Ft)	PAH	Phenols	Purgeable Aromatics	Metals	Dioxins/ Furans	Fate & Transport	Moisture Content
CP-S-EB-3-A	2.5-4(D)	●✓	●✓			●✓		✓
CP-S-EB-3-B	6.5-8	●✓	●✓			●✓		✓
CP-S-EB-3-D	11.5-13	●✓	●✓				●✓	✓
CP-S-EB-3-H	18-19.5	●✓	●✓					✓
CP-S-EB-3-I	18-19.5	✓	✓					✓
CP-S-EB-4-A	0-1.5	●✓	●✓			●✓		✓
CP-S-EB-4-C	3-4.5	●✓	●✓			●✓		✓
CP-S-EB-4-E	6-7.5	●✓	●✓					✓
CP-S-EB-4-M	18-19.5	●✓	●✓					✓
CP-S-EB-5-A	0-2	●✓(2)	●✓(2)					✓
CP-S-EB-5-B	6.5-8	●✓	●✓					✓
CP-S-EB-5-D	11.5-13	●✓	●✓				●✓	✓
CP-S-EB-5-E	20-21.5	●✓	●✓					✓
CP-S-EB-6-B	3-4.5(D)	●✓	●✓					✓
CP-S-EB-6-C	4.5-6	●✓	●✓				●✓	✓
CP-S-EB-6-F	20-21.5	●✓	●✓					✓
CP-S-EB-7-C	3-4.5(D)	●✓	●✓					●✓
CP-S-EB-7-F	7.5-9	●✓	●✓					✓
CP-S-EB-7-I	12-13.5	●✓	●✓					✓
CP-S-EB-7-O	21-22	●✓	●✓					✓

● - Final Project Plans and Additional Ecology Requirements (ESE, 1990) ✓ - Performed
D - Sample taken deeper than proposed S - Sample taken shallower than proposed

TABLE G-1
ANALYSES PERFORMED ON SOILS FROM MONITORING WELL INSTALLATION AND BORING PROGRAMS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Depth(Ft)	PAH	Phenols	Purgeable Aromatics	Metals	Dioxins/ Furans	Fate & Transport	Moisture Content
CP-S-EB-8-A	0-1.5(S)	●√	●√			●√		√
CP-S-EB-8-E	6-7.5	●√	●√					√
CP-S-EB-8-J	14-15.5	●√	●√					√
CP-S-EB-8-M	20-21.5	●√	●√					√
CP-S-EB-9-B	1.5-3	●√	●√					√
CP-S-EB-9-D	4.5-6	●√	●√					√
CP-S-EB-9-H	11-12.5	●√	●√					√
CP-S-EB-9-M	19.5-21	●√	●√					√
CP-S-EB-10-B	1.5-3	●√	●√					√
CP-S-EB-10-E	6-7.5	●√	●√					√
CP-S-EB-10-I	12.5-14	●√	●√					√
CP-S-EB-10-M	19.5-21	●√	●√					√
CP-S-EB-11-A	0-1.5	●√	●√		●√(2)			√
CP-S-EB-11-D	4.5-6	●√	●√		●√(2)	●√		√
CP-S-EB-11-G	9-10.5						●√	
CP-S-EB-11-H	10.5-12	●√	●√			●√		√
CP-S-EB-11-L	17.5-19	●√	●√					√
CP-S-EB-12-B	1.5-3	●√	●√					√
CP-S-EB-12-G	9-10.5	●√	●√					√
CP-S-EB-12-L	17.5-19	●√	●√					√

● - Final Project Plans and Additional Ecology Requirements (ESE, 1990) √ - Performed
D - Sample taken deeper than proposed S - Sample taken shallower than proposed

TABLE G-2
ANALYSES PERFORMED ON SOILS FROM TEST PITS AND SURFACE LOCATIONS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Depth (Ft)	PAH	Phenols	Purgeable Aromatics	Metals	Dioxins/ Furans	Fate & Transport	Moisture Content
CP-S-EP-1-A	0.3	●✓	●✓					✓
CP-S-EP-2-A	1.7	●✓	●✓					✓
CP-S-EP-2-B	2.7	●✓	●✓					✓
CP-S-EP-2-C	1.7	●✓	●✓					✓
CP-S-EP-3-A	3.0	●✓	●✓					✓
CP-S-EP-3-B	1.8	●✓	●✓					✓
CP-S-EP-4-A	1.2	●✓	●✓					✓
CP-S-EP-5-A	2.3	●✓	●✓					✓
CP-S-EP-6-A	0.4	●✓	●✓					✓
CP-S-EP-7-A	3.0	●✓	●✓					✓
CP-S-EP-7-B	3.8	●✓	●✓					✓
CP-S-EP-8-A	3.3	●✓	●✓					✓
CP-S-ES-1	0.2-0.3	●✓	●✓		●✓	●✓		✓
CP-S-ES-2	0.2-0.3	●✓	●✓		●✓	●✓		✓

● - Proposed in Final Project Plans (ESE, 1990)   ✓ - Performed

TABLE G-3
ANALYSES PERFORMED ON GROUNDWATER FROM SHALLOW AND DEEP WELLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Date	PAH	Phenols	Volatiles	Metals	Pesticides/ PCB	pH	Total Dissolved Solids
CP-G-EW-1	3/13/91 (2) 6/18/91 (2)	●✓(2) ●✓(2)	●✓(2) ●✓(2)				●✓(2) ●	●✓(2) ●
CP-G-EW-2	3/13/91 6/18/91	●✓ ●✓	●✓ ●✓				●✓ ●	●✓ ●
CP-G-EW-3	3/13/91 6/19/91	●✓▲ ●✓▲	●✓ ●✓	●✓ ●✓	●✓ ●✓	●✓ ●✓	●✓ ●✓	●✓ ●✓
CP-G-EW-4	3/14/91 6/19/91	●✓ ●✓	●✓ ●✓				●✓ ●✓	●✓ ●✓
CP-G-EW-5	3/14/91 6/18/91	●✓ ●✓	●✓ ●✓				●✓ ●✓	●✓ ●✓
CP-G-EW-6	3/13/91 6/18/91	●✓▲ ●✓▲	●✓ ●✓	●✓ ●✓	●✓ ●✓	●✓ ●✓	●✓ ●	●✓ ●
CP-G-EW-7	3/14/91 6/20/91	●✓ ●✓	●✓ ●✓				●✓ ●✓	●✓ ●✓
CP-G-EW-8	3/13/91 6/18/91	●✓ ●✓	●✓ ●✓				●✓ ●	●✓ ●
CP-G-EW-9	3/14/91 6/19/91	●✓▲ ●✓▲	●✓ ●✓	●✓ ●✓	●✓ ●✓	●✓ ●✓	●✓ ●✓	●✓ ●✓
CP-G-EW-10	3/13/91 6/18/91	●✓ ●✓	●✓ ●✓				●✓ ●	●✓ ●

● - Proposed in Final Project Plans (ESE, 1990)
▲ - Full Method 8270

✓ - Performed
■ - Method 8310

TABLE G-3
ANALYSES PERFORMED ON GROUNDWATER FROM SHALLOW AND DEEP WELLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Date	PAH	Phenols	Volatiles	Metals	Pesticides/ PCB	pH	Total Dissolved Solids
CP-G-EW-11	3/14/91 (2) 6/19/91 (2)	●√▲(2) ●√▲(2)	●√(2) ●√(2)	●√(2) ●√(2)	●√(2) ●√(2)	●√(2) ●√(2)	●√(2) ●√(2)	●√(2) ●√(2)
CP-G-AG-1S	3/11/91 6/18/91	●√ ●√	●√ ●√				●√ ●	●√ ●
CP-G-AG-2S	3/11/91 6/18/91	●√ ●√	●√ ●√				●√ ●	●√ ●
CP-G-AG-3S	3/12/91 6/18/91	●√ ●√	●√ ●√				●√ ●	●√ ●
CP-G-AG-4S	3/12/91 6/18/91	●√ ●√	●√ ●√				●√ ●	●√ ●
CP-G-AG-5S	3/12/91 6/18/91	●√▲ ●√▲	●√ ●√	●√ ●√	●√ ●√	●√ ●√	●√ ●	●√ ●
CP-G-AG-7S	3/12/91 6/18/91	●√ ●√	●√ ●√				●√ ●	●√ ●
CP-G-AG-11S	3/12/91 6/18/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√
CP-G-AG-12S	3/12/91 6/20/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√
CP-G-AG-13S	3/13/91 6/18/91	●√ ●√	●√ ●√				●√ ●	●√ ●
CP-G-AG-15S	3/12/91 6/20/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√

● - Proposed in Final Project Plans (ESE, 1990)
▲ - Full Method 8270
√ - Performed
■ - Method 8310

TABLE G-3
ANALYSES PERFORMED ON GROUNDWATER FROM SHALLOW AND DEEP WELLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Date	PAH	Phenols	Volatiles	Metals	Pesticides/ PCB	pH	Total Dissolved Solids
CP-G-N-1	3/13/91 6/19/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√
CP-G-N-7	3/14/91 6/20/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√
CP-G-N-26	3/14/91 6/21/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√
CP-G-N-27	3/14/91 6/21/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√
CP-G-N-28	3/13/91 6/19/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√
CP-G-N-24B	3/15/91 6/21/91	●√ ●√	●√ ●√				● ●√	●√ ●√
CP-G-S-4	3/13/91 6/19/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√
CP-G-SP-1	3/14/91 6/21/91	●√ ●√	●√ ●√				●√ ●√	●√ ●√
CP-G-ART-1	3/13/91 6/20/91	●√■ ●√■	●√ ●√				●√ ●√	
CP-G-AG-1D	3/11/91 (2) 6/19/91 (2)	●√(2)■ ●√(2)■	●√ ●√				●√ ●√	
CP-G-AG-2D	3/11/91 (2) 6/20/91 (2)	●√■(2) ●√■(2)	●√(2) ●√(2)				●√ ●√	

● - Proposed in Final Project Plans (ESE, 1990)
▲ - Full Method 8270

√ - Performed
■ - Method 8310

TABLE G-3
ANALYSES PERFORMED ON GROUNDWATER FROM SHALLOW AND DEEP WELLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	Sample Date	PAH	Phenols	Volatiles	Metals	Pesticides/ PCB	pH	Total Dissolved Solids
CP-G-AG-3D	3/11/91 6/19/91	●√■ ●√■	●√ ●√				●√ ●√	
CP-G-AG-4D	3/12/91 6/19/91	●√■ ●√■	●√ ●√				●√ ●√	
CP-G-AG-5D	3/12/91 6/19/91	●√■ ●√■	●√ ●√				●√ ●√	
CP-G-AG-7D	3/12/91 6/20/91	●√■ ●√■	●√ ●√				●√ ●√	
CP-G-AG-10D	3/12/91 6/19/91	●√■ ●√■	●√ ●√				●√ ●√	
CP-G-AG-11D	3/12/91 6/20/91	●√■ ●√■	●√ ●√				●√ ●√	
CP-G-AG-12D	3/13/91 (2) 6/20/91 (2)	●√(2)■ ●√(2)■	●√ ●√				●√ ●√	
CP-G-AG-13D	3/13/91 6/20/91	●√■ ●√■	●√ ●√				●√ ●√	
CP-G-AG-15D	3/13/91 6/20/91	●√■ ●√■	●√ ●√				●√ ●√	

● - Proposed in Final Project Plans (ESE, 1990)
▲ - Full Method 8270

√ - Performed
■ - Method 8310

TABLE G-4
ANALYSES PERFORMED ON NAPL SAMPLES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

Sample ID	PAH	Phenols	Volatiles	Purgeable Aromatics	Metals	Pesticides/ PCBs	Dioxins/ Furans
CP-D-EW-1	✓*		✓		✓	✓	**
CP-D-EW-3	✓	✓		✓			✓
CP-D-EW-5	✓	✓		✓			
CP-D-EW-7	✓	✓		✓			
CP-D-EW-9	✓	✓		✓			
CP-L-EW-1	✓*		✓		✓	✓	✓

* Full 8270 was performed on these samples. Therefore, no modified EPA Method 8040 (Chlorinated Phenols) analyses were performed.

** Adequate sample could not be recovered for this analysis. Therefore, DNAPL from EW-3 was analyzed for Dioxins/Furans.

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9101-040	Reag. blank	N/A	N/A	N/A	1/15/91	1/19/91	soil	83	
9101-040	Reag. blank	N/A	N/A	N/A	1/16/91	1/22/91	soil	76	Naphthalene contamination = 97 ppb
9101-040-1	CP-S-EB-5-A	1/8/91	1/9/91	X	1/15/91	1/21/91	soil	81	
9101-040-1	CP-S-EB-5-A	1/8/91	1/9/91	X	1/15/91	1/21/91	soil	69	
9101-040-2	CP-S-EB-5-B	1/8/91	1/9/91	X	1/16/91	1/22/91	soil	73	
9101-040-4	CP-S-EB-5-D	1/8/91	1/9/91	X	1/15/91	1/21/91	soil	80	
9101-040-5	CP-S-EB-5-E	1/8/91	1/9/91	X	1/16/91	1/22/91	soil	74	
9101-040-6	CP-S-EB-6-B	1/8/91	1/9/91	X	1/15/91	1/19/91	soil	79	
9101-040-7	CP-S-EB-6-C	1/8/91	1/9/91	X	1/15/91	1/21/91	soil	99	Dilution factor = 4 for all
9101-040-8	CP-S-EB-6-F	1/8/91	1/9/91	X	1/15/91	1/21/91	soil	123	Dilution factor = 20 for all
9101-065	Reag. blank	N/A	N/A	N/A	1/15/91	1/19/91	soil	83	
9101-065	Reag. blank	N/A	N/A	N/A	1/16/91	1/22/91	soil	76	Naphthalene (NPT) contamination = 97 ppb
9101-065-1	CP-S-EB-2-C	1/9/91	1/10/91	X	1/15/91	1/21/91	soil	72	
9101-065-2	CP-S-EB-2-N	1/9/91	1/10/91	X	1/15/91	1/21/91	soil	75	
9101-065-3	CP-S-EB-2-J	1/9/91	1/10/91	X	1/16/91	1/22/91	soil	70	NPT contamination in blank (~3% of sample conc.) Dilution factor = 2 for Fluorene
9101-065-4	CP-S-EB-3-A	1/9/91	1/10/91	X	1/15/91	1/21/91	soil	63	Dilution factor = 4 for NPT and 2-MNPT
9101-065-5	CP-S-EB-3-B	1/9/91	1/10/91	X	1/15/91	1/22/91	soil	44	Dilution factor = 10 for all but NPT Dilution factor = 20 for NPT MQLs exceeded for method and adjusted for ANPT,IP, DBA, and BP to <1,000 uk/kg.
9101-065-6	CP-S-EB-3-D	1/9/91	1/10/91	X	1/15/91	1/22/91	soil	44	
9101-065-7	CP-S-EB-3-H	1/9/91	1/10/91	X	1/16/91	1/23/91	soil	77	NPT contamination in blank (~1% of sample conc.)
9101-065-8	CP-S-EB-3-I	1/9/91	1/10/91	X	1/16/91	1/23/91	soil	74	NPT contamination in blank (<1% of sample conc.)
9101-082	Reag. blank	N/A	N/A	N/A	1/16/91	1/22/91	soil	76	Naphthalene (NPT) contamination = 97 ppb
9101-082-1	CP-S-EW-1-A	1/11/91	1/11/91	X	1/16/91	1/28/91	soil	98	NPT contamination in blank (~14% of sample conc.) Dilution factor = 2 for all
9101-082-3	CP-S-EW-1-D	1/11/91	1/11/91	X	1/16/91	1/23/91	soil	109	NPT contamination in blank (<1% of sample conc.) Dilution factor = 10 for all Dilution factor = 20 for NPT,2-MNPT,PNT,ANT, and FANT
9101-082-5	CP-S-EW-1-L	1/11/91	1/11/91	X	1/16/91	1/23/91	soil	68	NPT contamination in blank (~1% of sample conc.)
9101-082-7	CP-S-EW-1-F	1/11/91	1/11/91	X	1/16/91	1/23/91	soil	100	NPT contamination in blank (<1% of sample conc.) MQLs exceeded for method and adjusted for DBA and BP to <400 uk/kg. Dilution factor = 10 for all
9101-108	Reag. blank	N/A	N/A	N/A	1/22/91	2/1/91	soil	68	
9101-108	Reag. blank	N/A	N/A	N/A	1/22/91	2/1/91	soil	62	Silica Gel Cleanup

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18–137 33–141	
9101-108-1	CP-S-EW-3-B	1/15/91	1/16/91	X	1/22/91	2/1/91	soil	63	
9101-108-2	CP-S-EW-3-C	1/15/91	1/16/91	X	1/22/91	2/4/91	soil	94	Silica Gel Cleanup Dilution factor = 20 for all Dilution factor = 40 for NPT and PNT MQL exceeded for DBA (20X blank MQL and 4.7X method MQL)
9101-108-3	CP-S-EW-3-G	1/15/91	1/16/91	X	1/22/91	2/4/91	soil	106	Silica Gel Cleanup Dilution factor = 20 for all Dilution factor = 100 for NPT,MNPT,ANP,F,PNT,ANT,DBF, FANT, and PYR
9101-108-4	CP-S-EW-3-J	1/15/91	1/16/91	X	1/22/91	2/4/91	soil	91	Silica Gel Cleanup Dilution factor = 5 for all Dilution factor = 10 for NPT,MNPT,ANP,F,PNT,ANT,DBF, FANT, and PYR
9101-108-5	CP-S-EW-5-E	1/15/91	1/16/91	X	1/22/91	2/4/91	soil	74	Dilution factor = 2 for all Dilution factor = 10 for 2-MNPT and PNT Dilution factor = 20 for NPT
9101-108-6	CP-S-EW-5-Q	1/15/91	1/16/91	X	1/22/91	2/3/91	soil	74	Dilution factor = 10 for NPT,MNPT,ANP,F,PNT,DBF, FANT, and PYR
9101-096	Reag. blank	N/A	N/A	N/A	1/16/91	1/22/91	soil	76	Naphthalene (NPT) contamination = 97 ppb
9101-096	Reag. blank	N/A	N/A	N/A	1/16/91	1/28/91	soil	104	
9101-096	Reag. blank	N/A	N/A	N/A	1/16/91	1/28/91	soil	97	Silica Gel Cleanup
9101-096-1	CP-S-EB-1-A	1/14/91	1/15/91	No Seals Transfer gap	1/16/91	1/22/91	soil	74	NPT contamination in blank (~44% of sample conc.)
9101-096-2	CP-S-EB-1-F	1/14/91	1/15/91	No Seals Transfer gap	1/16/91	1/29/91	soil	66	Silica Gel Cleanup
9101-096-3	CP-S-EB-1-O	1/14/91	1/15/91	No Seals Transfer gap	1/16/91	1/29/91	soil	65	
9101-096-4	CP-S-EB-1-J	1/14/91	1/15/91	No Seals Transfer gap	1/16/91	1/29/91	soil	126	Silica Gel Cleanup Dilution factor = 20 for all but ANP, BZA, CHRY, BaP, DBA, BZP, and surrogate
9101-096-5	CP-S-EB-4-A	1/14/91	1/15/91	No Seals Transfer gap	1/16/91	1/28/91	soil	53	
9101-096-6	CP-S-EB-4-C	1/14/91	1/15/91	No Seals Transfer gap	1/16/91	1/29/91	soil	62	
9101-096-7	CP-S-EB-4-M	1/14/91	1/15/91	No Seals Transfer gap	1/16/91	1/29/91	soil	78	Silica Gel Cleanup Dilution factor = 10

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil	18-137	
							water	33-141	
9101-096-8	CP-S-EB-4-E	1/14/91	1/15/91	No Seals Transfer gap	1/16/91	1/29/91	soil	70	
9101-128	Reag. blank	N/A	N/A	N/A	1/22/91	2/1/91	soil	68	
9101-128	Reag. blank	N/A	N/A	N/A	1/22/91	2/1/91	soil	62	Silica Gel Cleanup
9101-128-1	CP-S-EB-7-C	1/17/91	1/18/91	X	1/22/91	2/3/91	soil	81	Silica Gel Cleanup
9101-128-2	CP-S-EB-7-F	1/17/91	1/18/91	X			soil	77	Silica Gel Cleanup Dilution factor = 20 for all Dilution factor = 100 for NPT, 2-MNPT, and PNT MQLs for IP, DBA, and BP raised to 800 ug/kg
9101-128-3	CP-S-EB-7-I	1/17/91	1/18/91	X	1/22/91	2/4/91	soil	74	Silica Gel Cleanup Dilution factor = 20 for all Dilution factor = 200 for NPT, MNPT, ANP, F, PANT, DBF, FANT, and PYR MQLs for IP, DBA, and BP raised to 1800 ug/kg (up to 3400 ug/kg acceptable)
9101-128-4	CP-S-EB-7-O	1/17/91	1/18/91	X	1/22/91	2/4/91	soil	88	Silica Gel Cleanup Dilution factor = 20 for all Dilution factor = 100 for NPT, MNPT, ANP, F, PANT, ANT, DBF, FANT, AND BZA MQLs for IP, DBA, and BP raised to 800 ug/kg
9101-128-5	CP-S-EB-8-A	1/17/91	1/18/91	X	1/22/91	2/4/91	soil	98	Silica Gel Cleanup Dilution factor = 4 for all
9101-128-6	CP-S-EB-8-E	1/17/91	1/18/91	X	1/22/91	2/4/91	soil	81	Silica Gel Cleanup Dilution factor = 20 for all Dilution factor = 400 for NPT, MNPT, ANP, and PANT MQLs for IP, DBA, and BP raised to 800 ug/kg
9101-128-7	CP-S-EB-8-J	1/17/91	1/18/91	X	1/22/91	2/3/91	soil	83	Dilution factor=20 for NPT,MNPT,ANP,F,PANT,DBF, and FANT
9101-128-8	CP-S-EB-8-M	1/17/91	1/18/91	X	1/22/91	2/3/91	soil	78	Dilution factor = 4 for NPT, MNPT, and PANT
9101-128-9	CP-S-EW-2-D	1/16/91	1/18/91	X	1/22/91	2/5/91	soil	50	Silica Gel Cleanup Dilution factor = 4 for all Dilution factor = 50 for NPT, MNPT, ANP, F, PANT, DBF, FANT, and PYR MQL for DBA raised to 160 ug/kg
9101-128-10	CP-S-EW-2-J	1/16/91	1/18/91	X	1/22/91	2/5/91	soil	88	Dilution factor = 4 MQL for IP, DBA, and BP raised to 160 ug/kg
9101-128-11	CP-S-EW-2-K	1/16/91	1/18/91	X	1/22/91	2/5/91	soil	52	Dilution factor = 4 MQL for BaP, IP, DBA, and BP raised to 160 ug/kg
9101-134	Reag. blank	N/A	N/A	N/A	1/22/91	2/1/91	soil	68	

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18–137 33–141	
9101-134	Reag. blank	N/A	N/A	N/A	1/22/91	2/1/91	soil	62	Silica Gel Cleanup
9101-134	Reag. blank	N/A	N/A	N/A	1/30/91	2/11/91	soil	102	
9101-134	Reag. blank	N/A	N/A	N/A	1/30/91	2/11/91	soil	89	Silica Gel Cleanup
9101-134	Reag. blank	N/A	N/A	N/A	1/30/91	2/12/91	soil	77	
9101-134-1	CP-S-EB-11-A	1/18/91	1/19/91	X	1/22/91	2/7/91	soil	72	Silica Gel Cleanup
9101-134-2	CP-S-EB-11-D	1/18/91	1/19/91	X	1/22/91	2/12/91	soil	85	
9101-134-3	CP-S-EB-11-H	1/18/91	1/19/91	X	1/22/91	2/12/91	soil	84	
9101-134-4	CP-S-EB-11-L	1/18/91	1/19/91	X	1/30/91	2/12/91	soil	81	
9101-134-5	CP-S-EW-8-A	1/18/91	1/19/91	X	1/30/91	2/12/91	soil	81	Silica Gel Cleanup Dilution factor = 4 for all MQLs raised to 4X blank values
9101-134-6	CP-S-EW-8-E	1/18/91	1/19/91	X	1/30/91	2/12/91	soil	97	Silica Gel Cleanup Dilution factor = 4 for all Dilution factor = 20 for NPT, MNPT, and ANP MQLs raised to 4X blank values
9101-134-7	CP-S-EW-8-L	1/18/91	1/19/91	X	1/30/91	2/12/91	soil	78	Dilution factor = 2 for NPT
9101-134-8	CP-S-EW-4-A	1/18/91	1/19/91	X	1/30/91	2/12/91	soil	72	Silica Gel Cleanup
9101-134-9	CP-S-EW-4-E	1/18/91	1/19/91	X	1/30/91	2/12/91	soil	86	Silica Gel Cleanup Dilution factor = 20 for all Dilution factor = 100 for NPT MQLs raised to 35X blank values.
9101-134-10	CP-S-EW-4-L	1/18/91	1/19/91	X	1/30/91	2/12/91	soil	90	Dilution factor = 10 for all Dilution factor = 40 for NPT MQLs raised to 10X balnk values
9101-134-11	CP-S-EW-4-I	1/18/91	1/19/91	X	1/30/91	2/12/91	soil	56	Dilution factor = 5 for NPT, MNPT, and PNT
9101-134-13	CP-S-EB-12-B	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	68	
9101-134-14	CP-S-EB-12-G	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	65	
9101-134-15	CP-S-EB-12-L	1/18/91	1/19/91	X	1/30/91	2/15/91	soil	64	MQLs raised to approximately ~1.5X blank value
9101-156	Reag. blank	N/A	N/A	N/A	1/30/91	2/13/91	soil	68	Hydrocarbon contamination in blank(~430ug/kg)
9101-156	Reag. blank	N/A	N/A	N/A	1/31/91	2/13/91	soil	77	2-Hydroxy-propanoic acid contamination in blank(~870ug/kg)
9101-156	Reag. blank	N/A	N/A	N/A	1/31/91	2/12/91	soil	62	Silica Gel Cleanup
9101-156-1	CP-S-EW-6-A	1/21/91	1/22/91	X	1/30/91	2/12/91	soil	74	2-HPA contamination in blank at ~15% of sample conc.
9101-156-2	CP-S-EW-6-C	1/21/91	1/22/91	X	1/30/91	2/15/91	soil	65	HC contamination in blank at ~28% of sample conc.
9101-156-3	CP-S-EW-6-F	1/21/91	1/22/91	X	1/30/91	2/12/91	soil	77	
9101-156-4	CP-S-EW-6-J	1/21/91	1/22/91	X	1/30/91	2/12/91	soil	72	2-HPA contamination in blank at ~75% of sample conc.
9101-156-5	CP-S-EW-6-M	1/21/91	1/22/91	X	1/30/91	2/12/91	soil	71	HC contamination in blank at ~15% of sample conc.
9101-156-6	CP-S-EW-6-N	1/21/91	1/22/91	X	1/30/91	2/13/91	soil	63	HC contamination in blank at ~24% of sample conc.

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9101-156-7	CP-S-EW-7-A	1/21/91	1/22/91	X	1/30/91	2/13/91	soil	81	
9101-156-8	CP-S-EW-7-E	1/21/91	1/22/91	X	1/30/91	2/13/91	soil	78	Dilution factor = 4 for all Dilution factor = 200 for NPT,2-MNPT,ANP,F,PNT, and DBF.
9101-156-9	CP-S-EW-7-M	1/21/91	1/22/91	X	1/30/91	2/13/91	soil	70	Dilution factor = 2 for all Dilution factor = 10 for NPT and 2-MNPT
9101-156-10	CP-S-EW-9-A	1/21/91	1/22/91	X	1/31/91	2/14/91	soil	74	Silica Gel Cleanup Dilution factor = 4 for all
9101-156-11	CP-S-EW-9-C	1/21/91	1/22/91	X	1/31/91	2/14/91	soil	64	HC contamination in blank at ~31% of sample conc.
9101-156-14	CP-S-EW-9-M	1/21/91	1/22/91	X	1/31/91	2/14/91	soil	65	Dilution factor = 2 for all Dilution factor = 20 for NPT, 2-MNPT, ANP, and PNT
9101-169	Reag. blank	N/A	N/A	N/A	1/31/91	2/13/91	soil	68	HC contamination in blank (430ug/kg)
9101-169	Reag. blank	N/A	N/A	N/A	1/31/91	2/13/91	soil	62	Silica Gel Cleanup 2-Hydroxypropanoic acid in blank (870 ug/kg)
9101-169-1	CP-S-EW-10-A	1/21/91	1/23/91	X	1/31/91	2/18/91	soil	78	
9101-169-4	CP-S-EW-10-C	1/21/91	1/23/91	X	1/31/91	2/16/91	soil	54	
9101-169-5	CP-S-EW-10-K	1/21/91	1/23/91	X	1/31/91	2/16/91	soil	48	
9101-169-6	CP-S-EB-9-B	1/21/91	1/23/91	X	1/31/91	2/16/91	soil	75	Silica Gel Cleanup Dilution factor = 4 for all MQLs raised to 4X blank values
9101-169-7	CP-S-EB-9-D	1/21/91	1/23/91	X	1/31/91	2/16/91	soil	71	Dilution factor = 10 for all Dilution factor = 200 for NPT, MNPT, PNT, and FANT MQLs raised to 10X blank values
9101-169-8	CP-S-EB-9-H	1/21/91	1/23/91	X	1/31/91	2/16/91	soil	71	Dilution factor = 10 for all Dilution factor = 200 for NPT, MNPT, ANP, and PNT MQLs raised to 10X blank values
9101-169-9	CP-S-EB-9-M	1/21/91	1/23/91	X	1/31/91	2/16/91	soil	54	
9101-169-10	CP-S-EB-10-B	1/21/91	1/23/91	X	1/31/91	2/16/91	soil	86	Silica Gel Cleanup Dilution factor = 4 for all Dilution factor = 50 for MNPT, ANP, F, PNT, DBF, and FANT Dilution factor = 400 for NPT MQLs raised to 4X blank values.
9101-169-11	CP-S-EB-10-E	1/21/91	1/23/91	X	1/31/91	2/16/91	soil	76	Dilution factor = 10 for all Dilution factor = 50 for NPT, MNPT, ANP, and PNT MQLs raised to 10X blank values
9101-169-12	CP-S-EB-10-I	1/21/91	1/23/91	X	1/31/91	2/20/91	soil	74	Dilution factor = 10 for all Dilution factor = 200 for NPT and MNPT MQLs raised to 10X blank values

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9101-169-13	CP-S-EB-10-M	1/21/91	1/23/91	X	1/31/91	2/16/91	soil	69	Dilution factor = 10 for all MQLs raised to ~15X blank values
9101-180	Reag. blank	N/A	N/A	N/A	1/28/91	2/9/91	water	72	Hydrocarbon contamination in blank
9101-180-11	Field blank	1/23/91	1/24/91	X	1/28/91	2/17/91	water	75	Hydrocarbon contamination in blank
9101-180	Reag. blank	N/A	N/A	N/A	1/31/91	2/13/91	soil	68	Hydrocarbon contamination in blank
9101-180	Reag. blank	N/A	N/A	N/A	1/31/91	2/13/91	soil	62	Silica Gel Cleanup 2-HPA contamination in blank
9101-180-1	CP-S-EW-11-A	1/23/91	1/24/91	X	1/31/91	2/16/91	soil	72	Silica Gel Cleanup Dilution factor = 10 for all 2-MNPT MQL raised to 400 ug/kg (10X reagent blank)
9101-180-2	CP-S-EW-11-C	1/23/91	1/24/91	X	1/31/91	2/16/91	soil	60	Dilution factor= 10 for all 2-MNPT MQL raised to 400 ug/kg (10Xreagent blank) DBA MQL raised to 400 ug/kg (10Xreagent blank) BP MQL raised to 400 ug/kg (10Xreagent blank)
9101-180-4	CP-S-EW-11-H	1/23/91	1/24/91	X	1/31/91	2/17/91	soil	105	Dilution factor = 5 for all Dilution factor = 50 for NPT,2-MNPT,ANP,PNT, and F
9101-180-5	CP-S-EW-11-L	1/23/91	1/24/91	X	1/31/91	2/17/91	soil	69	Dilution factor = 2 for all
9101-180-9	CP-S-EW-11-P	1/23/91	1/24/91	X	1/31/91	2/18/91	soil	76	Dilution factor = 2 for all
9103-086	Reag. blank	N/A	N/A	N/A	3/13/91	3/15/91	water	73	Hydrocarbon contamination in blank (~120 ppb total)
9103-086	Reag. blank	N/A	N/A	N/A	3/18/91	3/28/91	water	88	Hydrocarbon contamination in blank (~128 ppb total)
9103-086-1	CP-F-ES-1	3/11/91	3/12/91	X	3/13/91	3/14/91	water	56	
9103-086-2	CP-F-ES-3	3/11/91	3/12/91	X	3/13/91	3/14/91	water	50	
9103-086-3	CP-F-ES-10	3/11/91	3/12/91	X	3/13/91	3/15/91	water	42	Dilution factor = 10 for NPT
9103-086-3	CP-F-ES-10R	3/11/91	3/12/91	X	3/13/91	3/15/91	water	38	Dilution factor = 10 for NPT
9103-086-4	CP-F-ES-11	3/12/91	3/12/91	X	3/13/91	3/14/91	water	55	
9103-086-5	CP-F-ES-13A	3/11/91	3/12/91	X	3/13/91	3/14/91	water	54	
9103-086-6	CP-F-ES-13B	3/11/91	3/12/91	X	3/13/91	3/14/91	water	57	
9103-086-7	CP-F-ES-B	3/11/91	3/12/91	X	3/13/91	3/15/91	water	69	Same hydrocarbons as detected in blank (~same conc.)
9103-086-8	CP-G-B	3/11/91	3/12/91	X	3/18/19	3/19/91	water	36	Same hydrocarbons as detected in blank (@ ~1/5 conc.)
9103-086-9	CP-G-AG-1S	3/11/91	3/12/91	X	3/18/19	3/23/91	water	42	Dilution factor = 20 for NPT, MNPT, and ANP.
9103-086-10	CP-G-AG-1D	3/11/91	3/12/91	X	3/18/19	3/23/91	water	84	Same hydrocarbon as detected in blank (@ ~1/5 conc.)
9103-086-11	CP-G-AG-2S	3/11/91	3/12/91	X	3/18/19	3/23/91	water	80	
9103-086	Reag. blank	N/A	N/A	X	3/18/19	4/4/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 58 Trace ANT found in blank (0.059ug/L)
9103-086-8	CP-G-B	3/11/91	3/12/91	X	3/18/19	4/5/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 56 ANT found at same level as blank contamination

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9103-086-10	CP-G-AG-1D	3/11/91	3/12/91	X	3/18/19	4/5/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 47 ANT found at same level as blank contamination
9103-086-12	CP-G-AG-2D	3/11/91	3/12/91	X	3/18/19	4/5/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 52 ANT found at same level as blank contamination
9103-086-13	CP-G-AG-3D	3/11/91	3/12/91	X	3/18/19	4/5/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 53 ANT found at same level as blank contamination
9103-086-14	CP-G-AG-2DR	3/11/91	3/12/91	X	3/18/19	4/5/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 53 ANT found at same level as blank contamination
9103-101	Reag. blank	N/A	N/A	N/A	3/18/19	3/23/91	water	87	
9103-101-1	CP-G-AG-4S	3/12/91	3/13/91	X	3/18/19	3/25/91	water	47	
9103-101-3	CP-G-AG-3S	3/12/91	3/13/91	X	3/18/19	3/25/91	water	43	Dilution factor = 100 for NPT and MNPT
9103-101-4	CP-G-AG-5S	3/12/91	3/13/91	X	3/18/19	3/25/91	water	55	Full Method 8270. Other Recoveries: Nitobenzene-d5=75% 2-Fluorobiphenyl=91% Phenol-d6=87% 2-Fluorophenol=73% 2,4,6-Tribromophenol=79%
9103-101-6	CP-G-AG-7S	3/12/91	3/13/91	X	3/18/19	3/25/91	water	61	
9103-101-10	CP-G-AG-11S	3/12/91	3/13/91	X	3/18/19	3/25/91	water	71	
9103-101-12	CP-G-AG-12S	3/12/91	3/13/91	X	3/18/19	3/25/91	water	41	
9103-101-13	CP-G-AG-15S	3/12/91	3/13/91	X	3/18/19	3/25/91	water	54	
9103-101-14	CP-G-B	3/12/91	3/13/91	X	3/18/19	3/29/91	water	85	Full Method 8270. Other recoveries: Nitrobenzene-d5=73% 2-Fluorobiphenyl=94% Phenol-d6=19%* 2-Fluorophenol=1%* 2,4,6-Trobromophenol-1%*
9103-101-16	CP-DI	3/13/91	3/13/91	X	3/18/19	3/30/91	water	79	Full Method 8270. Other recoveries: Nitrobenzene-d5=72% 2-Fluorobiphenyl=91% Phenol-d6=14%* 2-Fluorophenol=1%* 2,4,6-Trobromophenol-1%*
9103-101	Reag. blank	N/A	N/A	N/A	3/19/91	4/5/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 41 Trace ANT found in blank (0.033 ug/L)
9103-101	Reag. blank	N/A	N/A	N/A	3/20/91	4/7/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 58 Trace ANT found in blank (0.037 ug/L)
9103-101-2	CP-G-AG-4D	3/12/91	3/13/91	X	3/19/91	4/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 77 ANT found at ~2X blank contamination
9103-101-5	CP-G-AG-5D	3/12/91	3/13/91	X	3/19/91	4/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 68 ANT found at ~2X blank contamination
9103-101-7	CP-G-AG-7D	3/12/91	3/13/91	X	3/19/91	4/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 52 ANT found at ~2X blank contamination
9103-101-8	CP-G-AG-10D	3/12/91	3/13/91	X	3/19/91	4/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 65 ANT found at ~1.5X blank contamination

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9103-101-11	CP-G-AG-11D	3/12/91	3/13/91	X	3/19/91	4/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 102 ANT found at ~1/3 the level of blank contamination
9103-101-14	CP-G-B	3/12/91	3/13/91	X	3/19/91	4/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 65 ANT found at ~1.5X blank contamination
9103-158	Reag. blank	N/A	N/A	N/A	3/21/91	3/27/91	water	108	Hydrocarbon contamination in blank (134 ppb total)
9103-158-1	CP-G-N-24B	3/15/91	3/16/91	X	3/21/91	4/1/91	water	39	Dilution factor = 10 for all Dilution factor = 100 for 2-MNPT and PNT
9103-158-3	CP-D-EW-7	3/15/91	3/16/91	X	4/3/91	4/4/91	product	84	
9103-158-4	CP-D-EW-9	3/15/91	3/16/91	X	4/3/91	4/4/91	product	90	Dilution factor = 10 for all Dilution factor = 50 for NPT, and 2-MNPT. MQLs raised to 10X base value
9103-158	Reag. blank	N/A	N/A	N/A	4/3/91	4/4/91	non-aqueous	85	Full Method 8270. Other recoveries: Nitrobenzene-d5=91% 2-Fluorobiphenyl=101 Phenol-d6=88% 2-Fluorophenol=89% 2,4,6-Tribromophenol-89% MQLs raised for product samples
9103-158-2	CP-L-EW-1	3/15/91	3/16/91	X	4/3/91	4/4/91	product	76	Full Method 8270. Other recoveries: Nitrobenzene-d5=54% 2-Fluorobiphenyl=103% Phenol-d6=92% 2-Fluorophenol=92% 2,4,6-Tribromophenol-83% Dilution factor = 50 for NPT,2-MNPT,ANP,DBF,F,PNT,ANT,FANT, PYR,NB-d5,2-FBP,AND 2,4,6-TBP
9103-144	Reag. blank	N/A	N/A	N/A	3/21/91	3/27/91	water	108	
9103-144-1	CP-G-EW-4	3/14/91	3/15/91	X	3/21/91	3/28/91	water	43	Dilution factor=10 for 2-MNPT,ANP,F,DBF,4-MP,2,4-DMP,1-PHAA,&PCP Dilution factor = 100 for NPT and Phenol
9103-144-2	CP-G-EW-5	3/14/91	3/15/91	X	3/21/91	3/27/91	water	42	Dilution factor = 5 for NPT, 2-MNPT, and ANP.
9103-144-3	CP-G-EW-7	3/14/91	3/15/91	X	3/21/91	4/12/91	water	74	Dilution factor = 10 for all Dilution factor = 200 for NPT, 2-MNPT, ANP, F, PNT, and DBF MQLs raised to 10X base values
9103-144-4	CP-G-EW-9	3/14/91	3/15/91	X	3/21/91	4/12/91	water	43	Full Method 8270. Other recoveries: Nitrobenzene-d5=111% 2-Fluorobiphenyl=67 Phenol-d6=75% 2-Fluorophenol=76% 2,4,6-Tribromophenol-67% Dilution factor = 4 for all. MQLs raised to 4X blank values. Dilution factor = 40 for 2-MNPT, ANP, and PCP Dilution factor = 200 for NPT

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9103-144-5	CP-G-EW-11	3/14/91	3/15/91	X	3/21/91	4/12/91	water	56	Full Method 8270. Other recoveries: Nitrobenzene-d5=73% 2-Fluorobiphenyl=79% Phenol-d6=79% 2-Fluorophenol=74% 2,4,6-Tribromophenol-82% Dilution factor = 4 for all Dilution factor = 200 for NPT, 2-MNPT, and PCP MQLs raised to 4X base values.
9103-144-6	CP-G-EW-11R	3/14/91	3/15/91	X	3/21/91	4/12/91	water	53	Full Method 8270. Other recoveries: Nitrobenzene-d5=68% 2-Fluorobiphenyl=72% Phenol-d6=70% 2-Fluorophenol=63% 2,4,6-Tribromophenol-84% Dilution factor = 4 for all Dilution factor = 200 for NPT, 2-MNPT, and PCP MQLs raised to 4X base values.
9103-144-7	CP-G-N-7	3/14/91	3/15/91	X	3/21/91	4/12/91	water	31*	Dilution factor = 10 for all Dilution factor = 100 for NPT, 2-MNPT, ANP, F, PNT, and DBF MQLs raised to 10X base values
9103-144-8	CP-G-N-26	3/14/91	3/15/91	X	3/21/91	4/12/91	water	50	Dilution factor = 10 for all Dilution factor = 100 for NPT, 2-MNPT, ANP, F, PNT, and FANT MQLs raised to 10X base values
9103-144-9	CP-G-N-27	3/14/91	3/15/91	X	3/21/91	4/12/91	water	44	Dilution factor = 4 for all Dilution factor = 2 for NPT MQLs raised to 4X base values
9103-144-10	CP-G-SP-1	3/14/91	3/15/91	X	3/21/91	3/31/91	water	51	
9103-144-11	CP-G-B	3/14/91	3/15/91	X	3/21/91	3/31/91	water	81	Full Method 8270. Other recoveries: Nitrobenzene-d5=73% 2-Fluorobiphenyl=76% Phenol-d6=78% 2-Fluorophenol=73% 2,4,6-Tribromophenol=72%
9103-123	Reag. blank	N/A	N/A	N/A	3/20/91	3/25/91	water	87	Full Method 8270. Other recoveries: Nitrobenzene-d5=79% 2-Fluorobiphenyl=76% Phenol-d6=34% 2-Fluorophenol=50% 2,4,6-Tribromophenol=74%
9103-123	Reag. blank	N/A	N/A	N/A	3/20/91	3/25/91	water	87	
9103-123-1	CP-G-AG-12D	3/13/91	3/14/91	X	3/20/91	3/25/91	water	84	
9103-123-2	CP-G-AG-13S	3/13/91	3/14/91	X	3/20/91	3/25/91	water	82	
9103-123-5	CP-G-N-1	3/13/91	3/14/91	X	3/20/91	3/25/91	water	82	
9103-123-6	CP-G-N-28	3/13/91	3/14/91	X	3/20/91	3/25/91	water	56	Dilution factor = 25 for NPT, 2-MNPT, ANP, and PNT.
9103-123-7	CP-G-S-4	3/13/91	3/14/91	X	3/20/91	3/25/91	water	76	
9103-123-8	CP-G-EW-1	3/13/91	3/14/91	X	3/20/91	3/25/91	water	68	Dilution factor = 2 for ANPT, ANP, and F.
9103-123-9	CP-G-EW-1R	3/13/91	3/14/91	X	3/20/91	3/25/91	water	66	Dilution factor = 20 for NPT, 2-MNPT, ANP, F, PNT, DBF, and FANT.

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9103-123-10	CP-G-EW-3	3/13/91	3/14/91	X	3/20/91	3/26/91	water	44	Full Method 8270. Other recoveries: Nitrobenzene-d5=169%* 2-Fluorobiphenyl=37% Phenol-d6=44% 2-Fluorophenol=60% 2,4,6-Tribromophenol=68% Dilution factor = 25 for 2,4-MP, NPT, ANP, F, PCP, and PNT.
9103-123-11	CP-G-EW-8	3/13/91	3/14/91	X	3/20/91	3/27/91	water	64	Dilution factor = 20 for 2-MNPT and ANP and 50 for NPT.
9103-123-12	CP-G-EW-10	3/13/91	3/14/91	X	3/20/91	3/26/91	water	68	
9103-123-13	CP-G-EW-2	3/13/91	3/14/91	X	3/20/91	3/26/91	water	44	
9103-123-14	CP-G-EW-6	3/13/91	3/14/91	X	MISSING	MISSING	water		COC states that one of the VOAs for this location broke
9103-123-16	CP-G-B	3/13/91	3/14/91	X	3/20/91	3/26/91	water	59	Full Method 8270. Other recoveries: Nitrobenzene-d5=90%* 2-Fluorobiphenyl=88% Phenol-d6=41% 2-Fluorophenol=59% 2,4,6-Tribromophenol=61%
9103-123	Reag. blank	N/A	N/A	N/A	3/20/91	4/7/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 58 Trace ANT found in blank (0.037 ug/L)
9103-123-1	CP-G-AG-12D	3/13/91	3/14/91	X	3/20/91	4/7/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 70 ANT found at approximately 1.7X level of blank contamination.
9103-123-3	CP-G-AG-13D	3/13/91	3/14/91	X	3/20/91	4/7/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 67 ANT found at approximately 1.4X level of blank contamination.
9103-123-4	CP-G-AG-15D	3/13/91	3/14/91	X	3/20/91	4/7/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 58 ANT found at approximately 1.2X level of blank contamination.
9103-123-15	CP-G-ART	3/13/91	3/14/91	X	3/20/91	4/7/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 67 ANT found at approximately 1.8X level of blank contamination.
9103-123-16	CP-G-B	3/13/91	3/14/91	X	3/20/91	4/7/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 63 ANT found at approximately 1.3X level of blank contamination.
9103-263	Reag. blank	N/A	N/A	N/A	4/2/91	4/13/91	water	80	
9103-263	Reag. blank	N/A	N/A	N/A	4/3/91	4/8/91	water	72	Full Method 8270. Other recoveries: Nitrobenzene-d5=80% 2-Fluorobiphenyl=87% Phenol-d6=87% 2-Fluorophenol=83% 2,4,6-Tribromophenol=67% Low level hydrocarbon contamination of blank (65 ppb total)
9103-263-3	CP-G-B	3/27/91	3/27/91	X	4/3/91	4/13/91	water	77	Full Method 8270. Other recoveries: Nitrobenzene-d5=72% 2-Fluorobiphenyl=76% Phenol-d6=82% 2-Fluorophenol=81% 2,4,6-Tribromophenol=37% Low level hydrocarbon contamination of field blank (57 ppb total)
9103-263-4	CP-G-EW-6	3/27/91	3/27/91	X	4/3/91	4/13/91	water	73	Full Method 8270. Other recoveries: Nitrobenzene-d5=87% 2-Fluorobiphenyl=81% Phenol-d6=87% 2-Fluorophenol=86% 2,4,6-Tribromophenol=71% Low level hydrocarbon contamination of sample (32 ppb total)
9103-263	Reag. blank	N/A	N/A	N/A	4/9/91	4/27/91	soil	78	

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9103-263-5	CP-S-ES-1	3/27/91	3/27/91	X	4/9/91	4/25/91	soil	84	Dilution factor = 2 for all MQLs raised to slightly over 2X blank values
9103-263-6	CP-S-ES-2	3/27/91	3/27/91	X	4/9/91	4/25/91	soil	55	MQLs raised 10%
9103-263-7	CP-S-EP-1A	3/27/91	3/27/91	X	4/9/91	4/25/91	soil	50	MQLs raised 20%
9103-263-8	CP-S-EP-2A	3/27/91	3/27/91	X	4/9/91	4/25/91	soil	52	Dilution factor = 10 for PNT, FANT, and PYR MQLs raised 10%
9103-263-9	CP-S-EP-2B	3/27/91	3/27/91	X	4/9/91	4/25/91	soil	86	MQLs raised 12.5%
9103-263-10	CP-S-EP-2C	3/27/91	3/27/91	X	4/9/91	4/24/91	soil	86	MQLs raised 10%
9103-263-11	CP-S-EP-3A	3/27/91	3/27/91	X	4/9/91	4/25/91	soil	52	Dilution factor = 10 for CHRY, BbFANT, BkFANT, BaP, IP, DBA, & BP
9103-263-12	CP-S-EP-3B	3/27/91	3/27/91	X	4/9/91	4/24/91	soil	100	MQLs raised 5-10%
9103-263-13	CP-S-EP-4A	3/27/91	3/27/91	X	4/9/91	4/24/91	soil	92	MQLs raised 5-10%
9103-263-14	CP-S-EP-5A	3/27/91	3/27/91	X	4/9/91	4/24/91	soil	90	MQLs raised 5-10%
9103-263-15	CP-S-EP-6A	3/27/91	3/27/91	X	4/9/91	4/24/91	soil	78	MQLs raised 5-10%
9103-263-16	CP-S-EP-7A	3/27/91	3/27/91	X	4/9/91	4/24/91	soil	86	MQLs raised 5-10%
9103-263-17	CP-S-EP-7B	3/27/91	3/27/91	X	4/9/91	4/25/91	soil	84	MQLs raised 12.5%
9103-263-18	CP-S-EP-8A	3/27/91	3/27/91	X	4/9/91	4/25/91	soil	82	MQLs raised 5-10%
9103-263-19	CP-S-B	3/27/91	3/27/91	X	4/3/91	4/13/91	soil	85	
9106-199	Reag. blank	N/A	N/A	N/A	6/21/91	6/28/91	water	95	Full Method 8270. Other recoveries: Nitrobenzene-d5=85% 2-Fluorobiphenyl=93% Phenol-d6=97%* 2-Fluorophenol=87% 2,4,6-Tribromophenol=111%
9106-199	Reag. blank	N/A	N/A	N/A	6/25/91	7/2/91	water	78	Full Method 8270. Other recoveries: Nitrobenzene-d5=98% 2-Fluorobiphenyl=101% Phenol-d6=91%* 2-Fluorophenol=91% 2,4,6-Tribromophenol=116% Blank contamination with Bis(2-ethylhexyl)Phthalate
9106-199-1	CP-G-EW-1	6/18/91	6/19/91	X (MS)	6/25/91	7/12/91	water	22*	2-Fluorobiphenyl=87% Dilution factor = 4 for all except NPT (=100) and 2-MNPT (=10) MQLs raised to 4X blank values.
9106-199-2	CP-G-EW-1A	6/18/91	6/19/91	X (MS)	6/25/91	7/2/91	water	32*	2-Fluorobiphenyl=74% Dilution factor = 100 for NPT and = 4 for 2-MNPT, ANP, F, PNT, DBF, and FANT
9106-199-3	CP-G-EW-2	6/18/91	6/19/91	X (MS)	6/25/91	7/2/91	water	50	
9106-199-4	CP-G-EW-8	6/18/91	6/19/91	X (MS)	6/25/91	7/14/91	water	60	Dilution factor = 10 for all except NPT (=100) MQLs raised to 10X blank values.
9106-199-5	CP-G-EW-6	6/18/91	6/19/91	X (MS)	6/25/91	7/2/91	water	72	Full Method 8270. Other recoveries: Nitrobenzene-d5=93% 2-Fluorobiphenyl=98% Phenol-d5=104%* 2-Fluorophenol=86% 2,4,6-Tribromophenol=114%
9106-199-6	CP-G-AG-1S	6/18/91	6/19/91	X (MS)	6/21/91	6/28/91	water	57	Dilution factor = 100 for NPT and = 4 for 2-MNPT

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9106-199-7	CP-G-AG-4S	6/18/91	6/19/91	X (MS)	6/21/91	7/1/91	water	35	
9106-199-8	CP-G-AG-5S	6/18/91	6/19/91	X (MS)	6/21/91	7/1/91	water	70	Full Method 8270. Other recoveries: Nitrobenzene-d5=87% 2-Fluorobiphenyl=97% Phenol-d5=98%* 2-Fluorophenol=84% 2,4,6-Tribromophenol=109%
9106-199-9	CP-G-EW-10	6/18/91	6/19/91	X (MS)	6/21/91	7/1/91	water	31*	2-Fluorobiphenyl = 111% Dilution factor = 10 for all except NPT (= 100) MQLs raised to 10X blank values
9106-199-10	CP-G-AG-2S	6/18/91	6/19/91	X (MS)	6/21/91	6/28/91	water	83	
9106-199-11	CP-G-AG-3S	6/18/91	6/19/91	X (MS)	6/21/91	6/28/91	water	50	Dilution factor = 4 for 2-MNPT and = 100 for NPT
9106-199-12	CP-G-AG-13S	6/18/91	6/19/91	X (MS)	6/21/91	6/28/91	water	70	Dilution factor = 4 for NPT
9106-199-13	CP-G-EW-5	6/18/91	6/19/91	X (MS)	6/21/91	7/12/91	water	27*	2-Fluorobiphenyl = 68 Dilution factor = 4 for all except NPT and 2-MNPT (= 100) MQLs raised to 4X blank values
9106-199-14	CP-G-AG-11S	6/18/91	6/19/91	X (MS)	6/21/91	6/30/91	water	66	
9106-199-15	CP-G-AG-7S	6/18/91	6/19/91	X (MS)	6/21/91	6/30/91	water	35	Dilution factor = 100 for NPT and 2-MNPT
9106-215	Reag. blank	N/A	N/A	N/A	6/26/91	7/2/91	water	73	Full Method 8270. Other recoveries: Nitrobenzene-d5=88% 2-Fluorobiphenyl=83% Phenol-d5=48% 2-Fluorophenol=65% 2,4,6-Tribromophenol=110%
9106-215	Reag. blank	N/A	N/A	N/A	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 71 ANT contamination in blank (= 0.043 ug/L)
9106-215-1	CP-G-EW-4	6/19/91	6/20/91	X	6/26/91	7/3/91	water	57	Dilution factor = 10 for all except NPT and 2-MNPT (= 100). MQLs raised to 10X blank values.
9106-215-2	CP-G-AG-5D	6/19/91	6/20/91	X	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 71 ANT found in sample at ~2.6X level of blank contamination.
9106-215-3	CP-G-S-4	6/19/91	6/20/91	X	6/26/91	7/3/91	water	85	Dilution factor = 10 for all except NPT (= 100). MQLs raised to 10X blank values.
9106-215-4	CP-G-N-28	6/19/91	6/20/91	X	6/26/91	7/3/91	water	94	Dilution factor=10 for all except NPT,2-MNPT,PNT, and FANT(=100) MQLs raised to 10X blank values.
9106-215-5	CP-G-EW-11	6/19/91	6/20/91	X	6/26/91	7/3/91	water	89	Full Method 8270. Other recoveries: Nitrobenzene-d5=129%* 2-Fluorobiphenyl=113% Phenol-d5=39% 2-Fluorophenol=52% 2,4,6-Tribromophenol=112% Dilution factor = 10 for all except NPT, 2-MNPT, and PCP(= 100) MQLs raised to 10X blank values.

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9106-215-6	CP-G-EW-11A	6/19/91	6/20/91	X	6/26/91	7/3/91	water	91	Full Method 8270. Other recoveries: Nitrobenzene-d5=111% 2-Fluorobiphenyl=106% Phenol-d5=0%* 2-Fluorophenol=42% 2,4,6-Tribromophenol=109% Dilution factor = 10 for all except NPT and PCP(= 100) MQLs raised to 10X blank values.
9106-215-7	CP-G-AG-15S	6/20/91	6/20/91	X	6/26/91	7/9/91	water	52	Dilution factor = 4 for all. MQLs raised to 4X blank values.
9106-215-9	CP-G-AG-1D	6/19/91	6/20/91	X	6/26/91	7/3/91	water	70	
9106-215-9	CP-G-AG-1D	6/19/91	6/20/91	X	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 70 ANT found in sample at ~2.6X level of blank contamination.
9106-215-10	CP-G-AG-3D	6/19/91	6/20/91	X	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 66 ANT found in sample at ~1.6X level of blank contamination.
9106-215-11	CP-G-AG-4D	6/19/91	6/20/91	X	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 63 ANT found in sample at ~2.2X level of blank contamination.
9106-215-12	CP-G-EW-3	6/19/91	6/20/91	X	6/26/91	7/3/91	water	95	Full Method 8270. Other recoveries: Nitrobenzene-d5=183%* 2-Fluorobiphenyl=107% Phenol-d5=46% 2-Fluorophenol=46% 2,4,6-Tribromophenol=151%* Dilution factor = 10 for all except NPT,2-MNPT,PNT and PCP(=100) MQLs raised to 10X blank values.
9106-215-13	CP-G-EW-9	6/19/91	6/20/91	X	6/26/91	7/3/91	water	89	Full Method 8270. Other recoveries: Nitrobenzene-d5=76% 2-Fluorobiphenyl=114% Phenol-d5=25% 2-Fluorophenol=40% 2,4,6-Tribromophenol=98% Dilution factor = 10 for all except NPT, 2-MNPT, DBF, F, PNT, ANT,FANT, and PCP(= 100). MQLs raised to 10X blank values.
9106-215-14	CP-G-N-1	6/19/91	6/20/91	X	6/26/91	7/10/91	water	84	
9106-215-15	CP-G-AG-10D	6/19/91	6/20/91	X	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 63 ANT found in sample at ~1.1X level of blank contamination.
9106-215-16	CP-G-B	6/19/91	6/20/91	X	6/26/91	7/2/91	water	79	Full Method 8270. Other recoveries: Nitrobenzene-d5=76% 2-Fluorobiphenyl=86% Phenol-d5=39% 2-Fluorophenol=55% 2,4,6-Tribromophenol=104%
9106-215-16	CP-G-B	6/19/91	6/20/91	X	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 65 ANT found in sample at ~1.2X level of blank contamination.
9106-236	Reag. blank	N/A	N/A	N/A	6/27/91	7/22/91	water	76	Full Method 8270. Other recoveries: Nitrobenzene-d5=86% 2-Fluorobiphenyl=97% Phenol-d5=54% 2-Fluorophenol=64% 2,4,6-Tribromophenol=89%
9106-236	Reag. blank	N/A	N/A	N/A	6/28/91	7/16/91	water	65	Full Method 8270. Other recoveries: Nitrobenzene-d5=76% 2-Fluorobiphenyl=91% Phenol-d5=101%* 2-Fluorophenol=82% 2,4,6-Tribromophenol=93%

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18-137 33-141	
9106-236	Reag. blank	N/A	N/A	N/A	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 71 ANT contamination in blank (= 0.043 ug/L)
9106-236-1	CP-G-EW-7	6/20/91	6/21/91	X	6/27/91	7/22/91	water	63	Dilution factor = 10 for all except NPT and 2-MNPT(= 100) MQLs raised to 10X blank values
9106-236-2	CP-G-N-7	6/20/91	6/21/91	X	6/27/91	7/24/91	water	86	Dilution factor = 4 for all Dilution factor = 200 for NPT and 2-MNPT Dilution factor = 100 for ANP,F, PNT, ANT, DBF, FANT, and PYR MQLs raised to 4X blank values
9106-236-3	CP-G-AG-2D	6/20/91	6/21/91	X	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 75 ANT found in sample at ~1.4X level of blank contamination.
9106-236-4	CP-G-AG-2D-A	6/20/91	6/21/91	X	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 72 ANT found in sample at ~1.3X level of blank contamination.
9106-236-5	CP-G-AG-11D	6/20/91	6/21/91	X	6/24/91	7/8/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 73 ANT found in sample at ~2.2X level of blank contamination.
9106-236-6	CP-G-ART	6/20/91	6/21/91	X	6/24/91	7/10/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 72 ANT found in sample at ~1.3X level of blank contamination.
9106-236-7	CP-G-AG-12S	6/20/91	6/21/91	X	6/27/91	7/22/91	water	67	
9106-236-8	CP-G-AG-7D	6/20/91	6/21/91	X	6/24/91	7/9/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 69 ANT found in sample at ~1.3X level of blank contamination.
9106-236-9	CP-G-AG-12D	6/20/91	6/21/91	X	6/27/91	7/22/91	water	71	
9106-236-9	CP-G-AG-12D	6/20/91	6/21/91	X	6/24/91	7/10/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 68 ANT found in sample at ~2.8X level of blank contamination.
9106-236-10	CP-G-AG-13D	6/20/91	6/21/91	X	6/24/91	7/10/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 66 ANT found in sample at ~1.5X level of blank contamination.
9106-236-11	CP-G-AG-15D	6/20/91	6/21/91	X	6/24/91	7/11/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 68 ANT found in sample at ~1.4X level of blank contamination.
9106-236-12	CP-G-SP-1	6/21/91	6/21/91	X	6/28/91	7/16/91	water	35	Dilution factor = 10 for all except NPT(= 50) MQLs raised to 10X blank values
9106-236-13	CP-G-N-24B	6/21/91	6/21/91	X	6/28/91	7/16/91	water	42	Dilution factor = 10 for all
9106-236-14	CP-G-N-26	6/21/91	6/21/91	X	6/28/91	7/17/91	water	49	Dilution factor = 10 for all except NPT, 2-MNPT, ANP, F, PNT, ANT, DBF, FANT, and PYR(= 50). MQLs raised to 10X blank values.
9106-236-15	CP-G-N-27	6/21/91	6/21/91	X	6/28/91	7/17/91	water	36	Dilution factor = 10 for all except NPT, 2-MNPT, PNT, ANT, and PYR(= 50). MQLs raised to 10X blank values.
9106-236-16	CP-G-B	6/21/91	6/21/91	X	6/28/91	7/16/91	water	68	Field blank contamination with 2-MNPT(12 ppb), ANP(29 ppb), F (16 ppb), PNT(15 ppb), and DBF(15 ppb).

TABLE G-5
SUMMARY OF QA/QC SURROGATE RESULTS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Terphenyl-d14	Comments
	QC Limits						soil water	18–137 33–141	
9106-236-16	CP-G-B	6/21/91	6/21/91	X	6/24/91	7/11/91	water	N/A	METHOD 8310. 2-Chloroanthracene recovery = 69 ANT found in sample at ~23.3X level of blank contamination. Field blank contamination with ANP(14 ppb), F(8.6), PNT(8.1ppb), ANT(1.0 ppb), FANT(1.8 ppb), PYR(0.86 ppb), BA(0.11 ppb), CRY (0.11 ppb), BKF(0.019 ppb), and BAP(0.030 ppb) Dilution factor = 10 for ANP, F, and PNT.
9106-236-17	CP-DI	6/21/91	6/21/91	X	6/28/91	7/16/91	water	65	Full Method 8270. Other recoveries: Nitrobenzene-d5=82% 2-Fluorobiphenyl=95% Phenol-d5=104%* 2-Fluorophenol=82% 2,4,6-Tribromophenol=90%
9106-236-17	CP-DI	6/21/91	6/21/91	X	6/24/91	7/11/91	water	61	METHOD 8310. 2-Chloroanthracene recovery = 61 ANT found in sample at ~0.8X level of blank contamination.

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* Surrogate recovery outside of EPA method limits

TABLE G-6
SUMMARY OF QA/QC RECOVERY RESULTS
SEMI-VOLATILE ORGANICS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed	ACENAPHTHENE RECOVERY, %			PYRENE RECOVERY, %			COMMENTS
						MS	MSD	RPD, %	MS	MSD	RPD, %	
	QC Limits			8270	Water	46-118		31	26-127		31	
				8270	Soil	31-137		19	35-142		36	
				8310	Water	46-102		22	62-115		15	
9101-040-1	CP-S-EB-5-A	1/8/91	1/9/91	1/15/91	1/21/91	111	112	1	94	78	12	Also used for WO# 9101-065
9101-065-7	CP-S-EB-3-H	1/9/91	1/10/91	1/16/91	1/23/91	75	90	8	74	82	6	Also used for WO#'s 9101-082, 9101-096, and 9101-040
9101-134-1	CP-S-EB-11-A	1/18/91	1/19/91	1/22/91	2/7/91	70	69	2	60	64	6	Also used for WO# 9101-128
9101-134-7	CP-S-EB-8-L	1/18/91	1/19/91	1/30/91	2/12/91	127	139*	9	100	101	1	
9101-096-6	CP-S-EB-4-C	1/14/91	1/15/91	1/16/91	1/29/91	87	77	12	21	64	11	
9101-156-6	CP-S-EW-6-N	1/21/91	1/22/91	1/30/91	2/13/91	88	84	5	72	69	4	Also used for WO#s 9101-180 & 9101-134 and 9101-169
9101-162-9	?	?	?	1/28/91	2/9/91	96	101	5	78	82	6	
9103-086-3	CP-F-ES-10	3/11/91	3/12/91	3/13/91	3/15/91	80	79	1	55	51	6	Also used for WO# 9103-101
9103-086	Blank Spike	N/A	N/A	3/13/91	3/15/91	92			78			
9103-086	Blank Spike	N/A	N/A	3/18/91	4/4/91	41*	48	16	77	72	6	METHOD 8310 DBA recoveries and RPD outside contract limits
9103-101	CP-F-ES-10	3/11/91	3/12/91	3/13/91	3/15/91	82	81	1	55	52	6	FULL METHOD 8270. Phenol and 4-Nitrophenol outside QAPP limits, but inside EPA method limits.
9103-101	Blank Spike	N/A	N/A	3/18/91	3/23/91	90			78			FULL METHOD 8270. N-Nitroso-Di-N-Propylamine and 4-Nitrophenol outside QAPP limits, but inside EPA method limits.
9103-101	CP-G-AG-15D	3/13/91	3/14/91	3/20/91	4/7/91	63	63	1	75	78	4	METHOD 8310 All recoveries and RPDs within contract limits
9103-101	Blank Spike	N/A	N/A	3/19/91	4/5/91	47			64			METHOD 8310 DBA recovery outside contract limits
9103-101	Blank Spike	N/A	N/A	3/20/91	4/7/91	52			70			METHOD 8310 All recoveries within contract limits
9103-158	Blank Spike	N/A	N/A	3/21/91	3/27/91	65			61			Also used for WO# 9103-144
9103-158	Blank Spike	N/A	N/A	4/3/91	4/4/91	93	93	0	86	81	6	FULL METHOD 8270. Phenol outside QAPP limits, but inside EPA method limits.

TABLE G-6
SUMMARY OF QA/QC RECOVERY RESULTS
SEMI-VOLATILE ORGANICS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed	ACENAPHTHENE RECOVERY, %			PYRENE RECOVERY, %			COMMENTS
						MS	MSD	RPD, %	MS	MSD	RPD, %	
	QC Limits			8270	Water	46-118		31	26-127		31	
				8270	Soil	31-137		19	35-142		36	
				8310	Water	46-102		22	62-115		15	
9103-144-1	CP-G-EW-4	3/14/91	3/15/91	3/21/91	4/12/91	65	220*	26	101	203*	67*	FULL METHOD 8270. 1,2,4-TCB, ANP, N-N-DI-N-PA, PCP, P, 2-CP, 4-C-3-MP, and 4-NP also outside of QAPP limits MS/MSD also used for WO# 9103-158
9103-123-2	CP-G-AG-13S	3/13/91	3/14/91	3/20/91	3/25/91	76	62	15	76	78	3	FULL METHOD 8270. 1,2,4-TCB, 2,4-DNT, N-N-DI-N-PA, 1,4-DCB, PCP, 2-CP, and 4-NP each had at least one QC paramater out of QAPP limits due to matrix effects.
9103-123	Blank Spike	N/A	N/A	3/20/91	3/25/91	82			76			FULL METHOD 8270. All other spikes within QAPP limits
9103-123-4	CP-G-AG-15D	3/13/91	3/14/91	3/20/91	4/7/91	63	63	1	75	78	4	METHOD 8310 All recoveries and RPDs within contract limits
9103-123	Blank Spike	3/13/91	3/14/91	3/20/91	4/7/91	52			70			
9103-263	Blank Spike	N/A	N/A	4/2/91	4/13/91	85	90	5	73	75	3	
9103-263	Blank Spike	N/A	N/A	4/3/91	4/8/91	89	100	12	75	88	16	FULL METHOD 8270. Phenol outside QAPP limits, but within EPA method limits
9103-263-7	CP-S-EP-1A	3/27/91	3/27/91	4/9/91	4/25/91	87	93	7	49	42	8	
9106-199-12	CP-G-AG-13S	6/18/91	6/19/91	6/21/91	7/1/91	38*	45*	5	59	66	12	FULL METHOD 8270. All other recoveries and RPDs within QAPP limits
9106-199	Blank Spike	N/A	N/A	6/21/91	6/28/91	86			74			FULL METHOD 8270. Phenol and 4-Nitrophenol outside QAPP limits, but within EPA method limits ?????
9106-215-4	CP-G-N-28	6/19/91	6/20/91	6/26/91	7/3/91	0*	0*	56*	0*	0*	75*	FULL METHOD 8270. 1,2,4-TCB, ANP, N-N-DI-N-PA, PCP, 4-C-3-MP, and 4-NP also outside of QAPP limits
9106-215	Blank Spike	N/A	N/A	6/26/91	7/3/91	75			65			FULL METHOD 8270. All other recoveries within QAPP limits.
9106-215	9106-236-8	?	?	6/24/91	7/9/91	46	56	20	67	66	2	METHOD 8310. All other recoveries and RPDs within QAPP limits
9106-215	Blank Spike	N/A	N/A	6/24/91	7/9/91	48			60			METHOD 8310. PYR and DBA outside QAPP control limits, but within control limits currently in use in the laboratory.
9106-236	9106-205-2	?	?	6/26/91	7/13/91	74	64	15	62	50	20	
9106-236	9106-293-3	?	?	6/28/91	7/17/91	45*	39*	13	51	30	50*	FULL METHOD 8270. All other recoveries except 2-CP and 3-C-4-CP within QAPP limits. All other RPDs except 1,4-DCB and PCP within QAPP limits.
9106-236	Blank Spike	N/A	N/A	6/28/91	7/16/91	46			33			FULL METHOD 8270. All other recoveries within QAPP limits.

TABLE G-6
SUMMARY OF QA/QC RECOVERY RESULTS
SEMI-VOLATILE ORGANICS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	Date Extracted	Date Analyzed	ACENAPHTHENE RECOVERY, %			PYRENE RECOVERY, %			COMMENTS
						MS	MSD	RPD, %	MS	MSD	RPD, %	
	QC Limits			8270	Water	46-118		31	26-127		31	
				8270	Soil	31-137		19	35-142		36	
				8310	Water	46-102		22	62-115		15	
9106-236	CP-G-AG-7D	6/20/91	6/21/91	6/24/91	7/9/91	46	56	20	67	66	2	METHOD 8310. All other recoveries and RPDs within QAPP limits except for DBA.
9106-236	Blank Spike	N/A	N/A	6/24/91	7/8/91	48			60*			METHOD 8310. All other recoveries and RPDs within QAPP limits except for DBA.

8/28/91

* Spike Recovery outside QAPP limits

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9101-040	Reag. blank	N/A	N/A	N/A	1/15/91	1/23/91	soil	58	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-040	Reag. blank	N/A	N/A	N/A	1/15/91	1/23/91	soil	25	Silica Gel Cleanup 2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-040	Reag. blank	N/A	N/A	N/A	1/16/91	1/23/91	soil	83	Silica Gel Cleanup TCP contamination = 6.5 ppb 2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-040-1	CP-S-EB-5-A	1/8/91	1/9/91	X	1/15/91	1/24/91	soil	87	Silica Gel Cleanup Dilution factor = 20 for PCP
9101-040-1	CP-S-EB-5-A	1/8/91	1/9/91	X	1/15/91	1/24/91	soil	79	Silica Gel Cleanup Dilution factor = 20 for PCP
9101-040-2	CP-S-EB-5-B	1/8/91	1/9/91	X	1/16/91	1/23/91	soil	67	Silica Gel Cleanup Dilution factor = 10 for PCP
9101-040-4	CP-S-EB-5-D	1/8/91	1/9/91	X	1/15/91	1/24/91	soil	129*	Dilution factor = 20 for 2,4,6-TCP Dilution factor = 200 for PCP and TCP TCP in reagent blank (~1% of sample concentration)
9101-040-5	CP-S-EB-5-E	1/8/91	1/9/91	X	1/16/91	1/24/91	soil	106	Silica Gel Cleanup Dilution factor = 40 for PCP and TCP
9101-040-6	CP-S-EB-6-B	1/8/91	1/9/91	X	1/15/91	1/24/91	soil	111	Dilution factor = 10 for PCP TCP in reagent blank (~9% of sample concentration)
9101-040-7	CP-S-EB-6-C	1/8/91	1/9/91	X	1/15/91	1/25/91	soil	104	Silica Gel Cleanup Dilution factor = 50 for TCP Dilution factor = 1000 for PCP
9101-040-8	CP-S-EB-6-F	1/8/91	1/9/91	X	1/15/91	1/25/91	soil	117	Dilution factor = 100 for TCP and 2,4,5-TCP Dilution factor = 500 for PCP TCP in reagent blank (~.2% of sample concentration)
9101-065	Reag. blank	N/A	N/A	N/A	1/15/91	1/23/91	soil	58	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg TCP contaminantion = 6.5 ug/kg
9101-065	Reag. blank	N/A	N/A	N/A	1/15/91	1/23/91	soil	25	Silica Gel Cleanup 2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-065	Reag. blank	N/A	N/A	N/A	1/16/91	1/23/91	soil	83	Silica Gel Cleanup 2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-065-1	CP-S-EB-2-C	1/9/91	1/10/91	X	1/15/91	1/29/91	soil	93	TCP in reagent blank (~43% of sample concentration)
9101-065-2	CP-S-EB-2-N	1/9/91	1/10/91	X	1/15/91	1/29/91	soil	81	2-CP MQL shown as 2100 ug/kg (600 ug/kg higher than blanks)
9101-065-3	CP-S-EB-2-J	1/9/91	1/10/91	X	1/16/91	1/29/91	soil	95	Silica Gel Cleanup

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9101-065-4	CP-S-EB-3-A	1/9/91	1/10/91	X	1/15/91	1/29/91	soil	104	Dilution factor = 50 for PCP 2-CP and 2,4-DCP MQLs raised to 58X blank values. TCP in reagent blank (~3% of sample concentration)
9101-065-5	CP-S-EB-3-B	1/9/91	1/10/91	X	1/15/91	1/29/91	soil	76	Silica Gel Cleanup 2-CP MQL shown as 3800 ug/kg (76X higher than blanks) 2,4-DCP MQL shown as 75 ug/kg (~75 times higher than blanks)
9101-065-6	CP-S-EB-3-D	1/9/91	1/10/91	X	1/15/91	1/29/91	soil	85	2-CP MQL shown as 2100 ug/kg (~70 times higher than blanks) 2,4-DCP MQL shown as 860 ug/kg (~17 times higher than set limit) TCP in reagent blank (~4% of sample concentration) Dilution factor = 20 for 2,4-DCP, PCP, and TCP
9101-065-7	CP-S-EB-3-H	1/9/91	1/10/91	X	1/16/91	1/30/91	soil	79	Silica Gel Cleanup Dilution factor = 10 for PCP and TCP
9101-065-8	CP-S-EB-3-I	1/9/91	1/10/91	X	1/16/91	1/29/91	soil	82	Silica Gel Cleanup 2,4-DCP MQL shown as 1500 ug/kg (~30 times higher than set limit) Dilution factor = 50 for 2,4-DCP, PCP, and TCP
9101-082	Reag. blank	N/A	N/A	N/A	1/16/91	1/23/91	soil	83	Silica Gel Cleanup 2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-082-1	CP-S-EW-1-A	1/11/91	1/11/91	X	1/16/91	1/30/91	soil	48	Silica Gel Cleanup 2-CP MQL shown as 30000 ug/kg (20 times higher than blanks) 2,4-DCP MQL shown as 600 ug/kg (~20 times higher than blanks) 2,4,5-TCP MQL shown as 200 ug/kg (~20 times higher than blanks) 2,4,6-TCP MQL shown as 120 ug/kg (~20 times higher than blanks) Dilution factor = 20 for all but PCP (dilution factor = 500)
9101-082-3	CP-S-EW-1-D	1/11/91	1/11/91	X	1/16/91	1/30/91	soil	101	Silica Gel Cleanup 2-CP MQL shown as 30000 ug/kg (20 times higher than blanks) 2,4-DCP MQL shown as 600 ug/kg (~20 times higher than blanks) 2,4,5-TCP MQL shown as 200 ug/kg (~20 times higher than blanks) 2,4,6-TCP MQL shown as 120 ug/kg (~20 times higher than blanks) Dilution factor = 20 for all but PCP (dilution factor = 1000) and TCP (dilution factor = 500)
9101-082-5	CP-S-EW-1-L	1/11/91	1/11/91	X	1/16/91	1/30/91	soil	52	Silica Gel Cleanup Dilution factor = 20 for all except PCP and TCP (= 200). MQLs raised to 20X blank values

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9101-082-7	CP-S-EW-1-F	1/11/91	1/11/91	X	1/16/91	1/30/91	soil	90	Silica Gel Cleanup Dilution factor = 20 for all except PCP(= 500) and TCP(= 250). MQLs raised to 20X blank values
9101-108	Reag. blank	N/A	N/A	N/A	1/22/91	2/2/91	soil	63	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-108	Reag. blank	N/A	N/A	N/A	1/22/91	2/2/91	soil	34	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg Silica Gel Cleanup
9101-108-1	CP-S-EW-3-B	1/15/91	1/16/91	X	1/22/91	2/2/91	soil	89	Dilution factor = 5 for surrogate
9101-108-2	CP-S-EW-3-C	1/15/91	1/16/91	X	1/22/91	2/4/91	soil	79	Silica Gel Cleanup Dilution factor = 20 for PCP and surrogate
9101-108-3	CP-S-EW-3-G	1/15/91	1/16/91	X	1/22/91	2/4/91	soil	76	Silica Gel Cleanup Dilution factor = 100 for TCP, 2,4,5-TCP, and surrogate Dilution factor= 500 for PCP
9101-108-4	CP-S-EW-3-J	1/15/91	1/16/91	X	1/22/91	2/4/91	soil	66	Dilution factor = 20 for PCP and surrogate
9101-108-5	CP-S-EW-5-E	1/15/91	1/16/91	X	1/22/91	2/4/91	soil	83	Dilution factor= 10 for TCP and surrogate Dilution factor = 100 for PCP
9101-108-6	CP-S-EW-5-Q	1/15/91	1/16/91	X	1/22/91	2/5/91	soil	85	Dilution factor = 10 for PCP, TCP, and surrogate
9101-096	Reag. blank	N/A	N/A	N/A	1/16/91	1/22/91	soil	83	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-096	Reag. blank	N/A	N/A	N/A	1/16/91	2/1/91	soil	47	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-096	Reag. blank	N/A	N/A	N/A	1/16/91	2/1/91	soil	42	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg Silica Gel Cleanup
9101-096-1	CP-S-EB-1-A	1/14/91	1/15/91	No seals Transfer gap	1/16/91	1/30/91	soil	85	Dilution factor = 10 for TCP Dilution factor = 100 for PCP 2-CP MQL shown as 2400 ug/kg (900 ug/kg higher than blanks) Silica Gel Cleanup
9101-096-2	CP-S-EB-1-F	1/14/91	1/15/91	No seals Transfer gap	1/16/91	2/2/91	soil	68	Dilution factor = 10 for PCP Silica Gel Cleanup 2-CP MQL shown as 2200 ug/kg (700 ug/kg higher than blanks)
9101-096-3	CP-S-EB-1-O	1/14/91	1/15/91	No seals Transfer gap	1/16/91	2/3/91	soil	69	Dilution factor = 20 for PCP, TCP,and surrogate
9101-096-4	CP-S-EB-1-J	1/14/91	1/15/91	No seals Transfer gap	1/16/91	2/2/91	soil	60	Dilution factor = 20 for PCP, TCP, 2,4,5-T, 2,4,6-T, and surrogate Silica Gel Cleanup 2-CP MQL shown as 2100 ug/kg (600 ug/kg higher than blanks)
9101-096-5	CP-S-EB-4-A	1/14/91	1/15/91	No seals Transfer gap	1/16/91	2/2/91	soil	69	Dilution factor = 10 for PCP and surrogate

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10–123 19–122	
9101-096-6	CP-S-EB-4-C	1/14/91	1/15/91	No seals Transfer gap	1/16/91	2/2/91	soil	65	
9101-096-7	CP-S-EB-4-M	1/14/91	1/15/91	No seals Transfer gap	1/16/91	2/4/91	soil	96	Dilution factor = 5 for all 2-CP MQL shown as 16000 ug/kg (~11 times higher than blanks) Silica Gel Cleanup
9101-096-8	CP-S-EB-4-E	1/14/91	1/15/91	No seals Transfer gap	1/16/91	2/2/91	soil	76	Dilution factor = 10 for PCP, TCP, and surrogate
9101-128	Reag. Blank	N/A	N/A	N/A	1/22/91	2/2/91	soil	63	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-128	Reag. Blank	N/A	N/A	N/A	1/22/91	2/2/91	soil	34	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg Silica Gel Cleanup
9101-128-1	CP-S-EB-7-C	1/17/91	1/18/91	X	1/22/91	2/5/91	soil	62	Silica Gel Cleanup Dilution factor = 20 for surrogate Dilution factor = 200 for PCP
9101-128-2	CP-S-EB-7-F	1/17/91	1/18/91	X	1/22/91	2/6/91	soil	NR*	Silica Gel Cleanup Dilution factor = 20,000 for PCP Dilution factor = 50 for TCP
9101-128-3	CP-S-EB-7-I	1/17/91	1/18/91	X	1/22/91	2/13/91	soil	NR*	Dilution factor = 10,000 for all 2-CP MQL shown as 34,000,000 ug/kg (~23,000X higher than blanks) 2,4-DCP MQL shown as 680,000 ug/kg (~23,000X higher than blanks) 2,4,5-TCP MQL shown as 230,000 ug/kg (~23,000X higher than blanks) 2,4,6-TCP MQL shown as 140,000 ug/kg (~23,000X higher than blanks)
9101-128-4	CP-S-EB-7-O	1/17/91	1/18/91	X	1/22/91	2/13/91	soil	107	Dilution factor = 10 for all Dilution factor = 2000 for PCP Dilution factor = 250 for TCP 2-CP MQL shown as 15,000 ug/kg (10X higher than blanks) 2,4-DCP MQL shown as 300 ug/kg (10X higher than blanks) 2,4,6-TCP MQL shown as 60 ug/kg (10X higher than blanks)
9101-128-5	CP-S-EB-8-A	1/17/91	1/18/91	X	1/22/91	2/13/91	soil	81	Dilution factor = 20 for all Dilution factor = 20,000 for PCP Dilution factor = 2000 for TCP 2-CP MQL shown as 30,000 ug/kg (20X higher than blanks) 2,4-DCP MQL shown as 600 ug/kg (20X higher than blanks) 2,4,6-TCP MQL shown as 120 ug/kg (20X higher than blanks)

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9101-128-6	CP-S-EB-8-E	1/17/91	1/18/91	X	1/22/91	2/5/91	soil	66	Silica Gel Cleanup Dilution factor = 50 for TCP, 2,4,5-TCP, 2,4,6-TCP, and surrogate Dilutuion factor = 2,000 for PCP 2,4,5-TCP MQL shown as 500 ug/kg (~83X higher than blanks) 2,4,6-TCP MQL shown as 300 ug/kg (50X higher than blanks)
9101-128-7	CP-S-EB-8-J	1/17/91	1/18/91	X	1/22/91	2/6/91	soil	66	Dilution factor = 20 for TCP and surrogate Dilution factor = 500 for PCP
9101-128-8	CP-S-EB-8-M	1/17/91	1/18/91	X	1/22/91	2/5/91	soil	78	Dilution factor = 10 for surrogate Dilution factor = 100 for PCP
9101-128-9	CP-S-EW-2-D	1/16/91	1/18/91	X	1/22/91	2/6/91	soil	98	Silica Gel Cleanup Dilution factor = 10 for 2,4,5-TCP and surrogate Dilution factor = 250 for PCP and TCP
9101-128-10	CP-S-EW-2-J	1/16/91	1/18/91	X	1/22/91	2/6/91	soil	86	Dilution factor = 10 for PCP, TCP, and surrogate
9101-128-11	CP-S-EW-2-K	1/16/91	1/18/91	X	1/22/91	2/6/91	soil	71	Dilution factor = 10 for PCP, TCP, and surrogate
9101-134	Reag. blank	N/A	N/A	N/A	1/22/91	2/2/91	soil	63	2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-134	Reag. blank	N/A	N/A	N/A	1/22/91	2/2/91	soil	34	Silica Gel Cleanup 2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-134	Reag. blank	N/A	N/A	N/A	1/30/91	2/14/91	soil	75	Dilution factor = 4 for surrogate 2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-134	Reag. blank	N/A	N/A	N/A	1/30/91	2/14/91	soil	64	Blank contamination with 2-CP (4800ug/kg)
9101-134	Reag. blank	N/A	N/A	N/A	1/30/91	2/14/91	soil	65	Silica Gel Cleanup 2-Chlorophenol not derivatized. MQL raised to 1500 ug/kg
9101-134-1	CP-S-EB-11-A	1/18/91	1/19/91	X	1/22/91	2/8/91	soil	78	Silica Gel Cleanup Dilution factor = 10 for PCP
9101-134-2	CP-S-EB-11-D	1/18/91	1/19/91	X	1/22/91	2/5/91	soil	66	
9101-134-3	CP-S-EB-11-H	1/18/91	1/19/91	X	1/22/91	2/8/91	soil	72	Dilution factor = 10 for PCP
9101-134-4	CP-S-EB-11-L	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	99	Dilution factor = 4 for surrogate
9101-134-5	CP-S-EW-8-A	1/18/91	1/19/91	X	1/30/91	2/15/91	soil	61	Silica Gel Cleanup Dilution factor = 20 for PCP and surrogate
9101-134-6	CP-S-EW-8-E	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	74	Silica Gel Cleanup Dilution factor = 20 for all Dilution factor = 200 for TCP Dilution factor = 5000 for PCP MQLs raised to 20X reagent blank

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9101-134-7	CP-S-EW-8-L	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	67	Dilution factor = 100 for TCP Dilution factor = 1000 for PCP
9101-134-8	CP-S-EW-4-A	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	80	Silica Gel Cleanup Dilution factor = 5 for all Dilution factor = 500 for PCP MQLs raised to 5X blank values
9101-134-9	CP-S-EW-4-E	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	106	Silica Gel Cleanup Dilution factor = 20 for all Dilution factor = 500 TCP Dilution factor = 5000 for PCP MQLs raised to ~20X blank values
9101-134-10	CP-S-EW-4-L	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	94	Silica Gel Cleanup Dilution factor = 5 for all Dilution = 500 for PCP and TCP MQLs raised to 5X blank values
9101-134-11	CP-S-EW-4-I	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	90	Dilution factor = 20 for all Dilution factor = 200 for PCP and TCP MQLs raised to ~20X blank values
9101-134-13	CP-S-EB-12-B	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	81	Silica Gel Cleanup Dilution factor = 4 for surrogate
9101-134-14	CP-S-EB-12-G	1/18/91	1/19/91	X	1/30/91	2/15/91	soil	103	Dilution factor = 10 for surrogate
									2-CP contamination in associated blanks.
9101-134-15	CP-S-EB-12-L	1/18/91	1/19/91	X	1/30/91	2/14/91	soil	105	Dilution factor = 20 for all
9101-156	Reag. blank	N/A	N/A	N/A	1/30/91	2/14/91	soil	64	2-CP contamination of blank. (~4800 ug/kg)
9101-156	Reag. blank	N/A	N/A	N/A	1/31/91	2/15/91	soil	56	Silica Gel Cleanup MQL for 2-CP raised to 1500 ug/kg
9101-156	Reag. blank	N/A	N/A	N/A	1/31/91	2/15/91	soil	84	Dilution factor= 4 for surrogate MQL for 2-CP raised to 1500 ug/kg
9101-156-1	CP-S-EW-6-A	1/21/91	1/22/91	X	1/30/91	2/15/91	soil	87	Dilution factor= 4 for surrogate
9101-156-2	CP-S-EW-6-C	1/21/91	1/22/91	X	1/30/91	2/14/91	soil	73	
9101-156-3	CP-S-EW-6-F	1/21/91	1/22/91	X	1/30/91	2/15/91	soil	68	Dilution factor = 10 for PCP and surrogate 2-CP in reagent blank (~58% of sample conc.)
9101-156-4	CP-S-EW-6-J	1/21/91	1/22/91	X	1/30/91	2/15/91	soil	64	Dilution factor = 20 for PCP. 2-CP in reagent blank (~49% of sample conc.)

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9101-156-5	CP-S-EW-6-M	1/21/91	1/22/91	X	1/30/91	2/15/91	soil	68	Dilution factor = 10 for PCP 2-CP in reagent blank (~67% of sample conc.)
9101-156-6	CP-S-EW-6-N	1/21/91	1/22/91	X	1/30/91	2/15/91	soil	74	Dilution factor = 4 for surrogate 2-CP in reagent blank (~52% of sample conc.)
9101-156-7	CP-S-EW-7-A	1/21/91	1/22/91	X	1/30/91	2/17/91	soil	81	Dilution factor = 5 for surrogate
9101-156-8	CP-S-EW-7-E	1/21/91	1/22/91	X	1/30/91	2/15/91	soil	85	Dilution factor = 5 for all Dilution factor = 500 for PCP 2-CP MQL raised to 7500 ug/kg (5X higher than blanks) 2,4-DCP MQL raised to 150 ug/kg (5X higher than blanks) 2,4,5-TCP MQL raised to 50 ug/kg (5X higher than blanks) 2,4,6-TCP MQL raised to 30 ug/kg (5X higher than blanks)
9101-156-9	CP-S-EW-7-M	1/21/91	1/22/91	X	1/30/91	2/16/91	soil	56	Dilution factor = 50 for PCP and TCP
9101-156-10	CP-S-EW-9-A	1/21/91	1/22/91	X	1/31/91	2/15/91	soil	84	Silica Gel Cleanup Dilution factor = 5 for all Dilutionfactor = 100 for PCP
9101-156-11	CP-S-EW-9-C	1/21/91	1/22/91	X	1/31/91	2/15/91	soil	102	Dilution factor = 4 for surrogate
9101-156-14	CP-S-EW-9-M	1/21/91	1/22/91	X	1/31/91	2/15/91	soil	108	Dilution factor = 5 for all Dilution factor = 500 for PCP and TCP
9101-169	Reag. blank	N/A	N/A	N/A	1/31/91	2/15/91	soil	84	Dilution factor = 4 for surrogate 2-CP not derivatized. MQL raised to 1500 ug/kg.
9101-169	Reag. blank	N/A	N/A	N/A	1/31/91	2/15/91	soil	56	Silica Gel Cleanup 2-CP not derivatized. MQL raised to 1500 ug/kg.
9101-169-1	CP-S-EW-10-A	1/21/91	1/23/91	X	1/31/91	2/17/91	soil	72	Silica Gel Cleanup Dilution factor = 10 for TCP and surrogate Dilution factor = 100 for PCP
9101-169-4	CP-S-EW-10-C	1/21/91	1/23/91	X	1/31/91	2/17/91	soil	66	Dilution factor = 20 for PCP and surrogate
9101-169-5	CP-S-EW-10-K	1/21/91	1/23/91	X	1/31/91	2/17/91	soil	74	Dilution factor = 20 for PCP
9101-169-6	CP-S-EB-9-B	1/21/91	1/23/91	X	1/31/91	2/18/91	soil	86	Silica Gel Cleanup Dilution factor = 10 for all Dilution factor = 500 for TCP and PCP MQLs raised to 10X blank values
9101-169-7	CP-S-EB-9-D	1/21/91	1/23/91	X	1/31/91	2/18/91	soil	96	Silica Gel Cleanup Dilution factor = 5 for all Dilution factor = 2000 for PCP and TCP MQLs raised to 5X blank values

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9101-169-8	CP-S-EB-9-H	1/21/91	1/23/91	X	1/31/91	2/18/91	soil	110	Silica Gel Cleanup Dilution factor = 5 for all Dilution factor = 1000 for PCP MQLs raised to 5X blank values
9101-169-9	CP-S-EB-9-M	1/21/91	1/23/91	X	1/31/91	2/17/91	soil	71	Dilution factor = 50 for PCP, TCP, and surrogate
9101-169-10	CP-S-EB-10-B	1/21/91	1/23/91	X	1/31/91	2/18/91	soil	94	Silica Gel Cleanup Dilution factor = 10 for all Dilution factor = 500 for TCP Dilution factor = 1000 for PCP MQLs raised to 10X blank values
9101-169-11	CP-S-EB-10-E	1/21/91	1/23/91	X	1/31/91	2/18/91	soil	111	Silica Gel Cleanup Dilution factor = 5 for all Dilution factor = 500 for TCP Dilution factor = 5000 for PCP MQLs raised to 5X blank values
9101-169-12	CP-S-EB-10-I	1/21/91	1/23/91	X	1/31/91	2/18/91	soil	96	Silica Gel Cleanup Dilution factor = 5 for all Dilution factor = 500 for TCP Dilution factor = 5000 for PCP MQLs raised to 5X blank values
9101-169-13	CP-S-EB-10-M	1/21/91	1/23/91	X	1/31/91	2/18/91	soil	103	Dilution factor = 10 for all Dilution factor = 200 for PCP MQLs raised to 10X blank values
9101-180	Reag. blank	N/A	N/A	N/A	1/28/91	2/16/91	water	68	MQL for 2-CP = 50 ug/kg
9101-180-11	Field blank	1/23/91	1/24/91	X	1/28/91	2/16/91	water	50	Trace PCP found (0.12 ug/kg)
9101-180	Reag. blank	N/A	N/A	N/A	1/31/91	2/15/91	soil	84	Dilution factor = 4 for surrogate 2-CP MQL for 2-CP raised to 1500 ug/kg
9101-180	Reag. blank	N/A	N/A	N/A	1/31/91	2/15/91	soil	56	Silica Gel Cleanup. 2-CP MQL = 1500ug/kg.
9101-180-1	CP-S-EW-11-A	1/23/91	1/24/91	X	1/31/91	2/18/91	soil	57	Silica Gel Cleanup Dilution factor = 10 for all Dilution factor = 500 for PCP and TCP MQLs raised to 5X higher than blanks

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9101-180-2	CP-S-EW-11-C	1/23/91	1/24/91	X	1/31/91	2/18/91	soil	95	Silica Gel Cleanup Dilution factor = 5 for all Dilution factor = 500 for TCP Dilution factor = 1000 for PCP MQLs raised to 5X higher than blanks
9101-180-4	CP-S-EW-11-H	1/23/91	1/24/91	X	1/31/91	2/18/91	soil	91	Silica Gel Cleanup Dilution factor = 5 for all Dilution factor = 1000 for PCP and TCP MQLs raused to 5X higher than blanks
9101-180-5	CP-S-EW-11-L	1/23/91	1/24/91	X	1/31/91	2/18/91	soil	100	Dilution factor = 5 for all Dilution factor = 50 for PCP
9101-180-9	CP-S-EW-11-P	1/23/91	1/24/91	X	1/31/91	2/18/91	soil	91	Dilution factor = 5 for all Dilution factor = 200 for all
9103-086	Reag. blank	N/A	N/A	N/A	3/14/91	3/16/91	water	80	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50 ug/L, 1.0 ug/L, and 0.40 ug/L respectively.
9103-086	Reag. blank	N/A	N/A	N/A	3/18/91	3/25/91	water	73	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50 ug/L, 1.0 ug/L, and 0.40 ug/L respectively.
9103-086-1	CP-F-ES-1	3/11/91	3/12/91	X	3/14/91	3/16/91	water	79	
9103-086-2	CP-F-ES-3	3/11/91	3/12/91	X	3/14/91	3/17/91	water	92	
9103-086-3	CP-F-ES-10	3/11/91	3/12/91	X	3/14/91	3/17/91	water	80	Dilution factor = 1 for 2-CP and 2,4,6-TCP Dilution factor = 100 for 2,4-DCP, TCP, 2,4,5-TCP, and surrogate Dilution factor = 4000 for PCP
9103-086-3Dup	CP-F-ES-10R	3/11/91	3/12/91	X	3/14/91	3/17/91	water	73	Dilution factor = 100 for all Dilution factor = 4000 fpr PCP MQLs raised to 100X blank values.
9103-086-4	CP-F-ES-11	3/12/91	3/12/91	X	3/14/91	3/17/91	water	83	
9103-086-5	CP-F-ES-13A	3/11/91	3/12/91	X	3/14/91	3/17/91	water	88	Dilution factor = 10 for PCP and TCP
9103-086-6	CP-F-ES-13B	3/11/91	3/12/91	X	3/14/91	3/17/91	water	89	
9103-086-7	CP-F-ES-B	3/11/91	3/12/91	X	3/14/91	3/16/91	water	37	
9103-086-8	CP-G-B	3/11/91	3/12/91	X	3/14/91	3/16/91	water	69	
9103-086-9	CP-G-AG-1S	3/11/91	3/12/91	X	3/18/19	3/25/91	water	115	Dilution factor = 50 for PCP, TCP, and 2,4,5-TCP
9103-086-10	CP-G-AG-1D	3/11/91	3/12/91	X	3/18/19	3/25/91	water	82	Dilution factor = 50 for PCP and TCP
9103-086-11	CP-G-AG-2S	3/11/91	3/12/91	X	3/18/19	3/25/91	water	84	
9103-086-12	CP-G-AG-2D	3/11/91	3/12/91	X	3/18/19	3/25/91	water	98	Dilution factor = 20 for PCP and TCP
9103-086-13	CP-G-AG-3D	3/11/91	3/12/91	X	3/18/19	3/25/91	water	54	

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9103-086-14	CP-G-AG-2DR	3/11/91	3/12/91	X	3/18/19	3/25/91	water	94	Dilution factor = 20 for PCP and TCP
9103-101	Reag. blank	N/A	N/A	N/A	3/19/91	3/29/91	water	41	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50 ug/L, 1.0 ug/L, and 0.40 ug/L respectively.
9103-101	Reag. blank	N/A	N/A	N/A	3/20/91	4/5/91	water	63	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50 ug/L, 1.0 ug/L, and 0.40 ug/L respectively.
9103-101-1	CP-G-AG-4S	3/12/91	3/13/91	X	3/19/91	3/29/91	water	101	Dilution factor = 20 for PCP and TCP
9103-101-2	CP-G-AG-4D	3/12/91	3/13/91	X	3/19/91	3/29/91	water	57	
9103-101-3	CP-G-AG-3S	3/12/91	3/13/91	X	3/19/91	4/1/91	water	93	Dilution factor = 5000 for PCP Dilution factor = 500 for TCP and 2,4,5-TCP
9103-101-4	CP-G-AG-5S	3/12/91	3/13/91	X	3/19/91	4/2/91	water	85	
9103-101-5	CP-G-AG-5D	3/12/91	3/13/91	X	3/19/91	3/29/91	water	92	
9103-101-6	CP-G-AG-7S	3/12/91	3/13/91	X	3/19/91	4/1/91	water	112	Dilution factor = 1000 for PCP Dilution factor = 100 for TCP
9103-101-7	CP-G-AG-7D	3/12/91	3/13/91	X	3/19/91	3/29/91	water	48	
9103-101-8	CP-G-AG-10D	3/12/91	3/13/91	X	3/19/91	3/29/91	water	72	
9103-101-10	CP-G-AG-11S	3/12/91	3/13/91	X	3/19/91	3/29/91	water	101	
9103-101-11	CP-G-AG-11D	3/12/91	3/13/91	X	3/19/91	4/1/91	water	87	Dilution factor = 5 for TCP
9103-101-12	CP-G-AG-12S	3/12/91	3/13/91	X	3/19/91	4/1/91	water	90	
9103-101-13	CP-G-AG-15S	3/12/91	3/13/91	X	3/19/91	4/1/91	water	77	
9103-101-14	CP-G-B	3/12/91	3/13/91	X	3/19/91	4/1/91	water	58	
9103-101-16	CP-DI	3/13/91	3/13/91	X	3/20/91	4/5/91	water	69	
9103-158	Reag. blank	N/A	N/A	X	3/22/91	4/15/91	water	41	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50 ug/L, 1.0 ug/L, and 0.40 ug/L respectively.
9103-158-1	CP-G-N-24B	3/15/91	3/16/91	X	3/22/91	4/15/91	water	NR*	Dilution factor = 100 for all Dilution factor = 200,000 for PCP Dilution factor = 50,000 for TCP Surrogate diluted out of range
9103-158	Reag. blank	N/A	N/A	N/A	4/15/91	4/18/91	non-aqueou	78	MQLs raised to pure product levels
9103-158-3	CP-D-EW-7	3/15/91	3/16/91	X	4/15/91	4/18/91	product	97	
9103-158-4	CP-D-EW-9	3/15/91	3/16/91	X	4/15/91	4/18/91	product	NR*	Dilution factor = 500 for all Dilution factor = 5,000 for PCP Surrogate diluted out of range
9103-144	Reag. blank	N/A	N/A	N/A	3/21/91	4/11/91	water	68	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50 ug/L, 1.0 ug/L, and 0.40 ug/L respectively.

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9103-144-1	CP-G-EW-4	3/14/91	3/15/91	X	3/21/91	4/14/91	water	NR*	Dilution factor = 200 for all Dilution factor = 5000 for PCP and TCP MQLs raised to 200X base values Surrogate diluted out of range
9103-144-2	CP-G-EW-5	3/14/91	3/15/91	X	3/21/91	4/11/91	water	169 *	Dilution factor = 10 for all Dilution factor = 500 for PCP, TCP, and 2,4,5-TCP MQLs raised to 10X base values Surrogate out of limits due to matrix interference
9103-144-3	CP-G-EW-7	3/14/91	3/15/91	X	3/21/91	4/11/91	water	78	Dilution factor = 20 for all Dilution factor = 200 for PCP
9103-144-4	CP-G-EW-9	3/14/91	3/15/91	X	3/21/91	4/11/91	water	89	Dilution factor = 10 for all Dilution factor = 200 for TCP Dilution factor = 2000 for PCP MQLs raised to 20X base values
9103-144-5	CP-G-EW-11	3/14/91	3/15/91	X	3/21/91	4/11/91	water	120	Dilution factor = 10 for all Dilution factor = 5000 for TCP and 2,4,5-TCP Dilution factor = 20000 for PCP MQLs raised to 10X base values
9103-144-6	CP-G-EW-11R	3/14/91	3/15/91	X	3/21/91	4/11/91	water	175 *	Dilution factor = 10 for all Dilution factor = 2000 for TCP and 20000 for PCP MQLs raised to 10X base values Surrogate out of limits due to matrix interference
9103-144-7	CP-G-N-7	3/14/91	3/15/91	X	3/21/91	4/11/91	water	83	Dilution factor = 10 for all Dilution factor = 20 for PCP MQLs raised to 10X base values
9103-144-8	CP-G-N-26	3/14/91	3/15/91	X	3/21/91	4/15/91	water	91	Dilution factor = 20 for all Dilution factor = 5000 for TCP Dilution factor = 50000 for PCP MQLs raised to 20 X base values
9103-144-9	CP-G-N-27	3/14/91	3/15/91	X	3/21/91	4/15/91	water	NR*	Dilution factor = 5000 for all Dilution factor = 50000 for PCP Surrogate diluted out of range

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9103-144-10	CP-G-SP-1	3/14/91	3/15/91	X	3/21/91	4/11/91	water	141* *	Dilution factor = 10 for all Dilution factor = 1000 for TCP Dilution factor = 10000 for PCP MQLs raised to 10X blank values
9103-144-12	CP-G-B	3/14/91	3/15/91	X	3/21/91	4/11/91	water	68	Slight PCP contamination (0.057ug/L)
9103-123	Reag. blank	N/A	N/A	N/A	3/20/91	4/5/91	water	63	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50 ug/L, 1.0 ug/L, and 0.40 ug/L respectively.
9103-123-1	CP-G-AG-12D	3/13/91	3/14/91	X	3/20/91	4/5/91	water	76	
9103-123-2	CP-G-AG-13S	3/13/91	3/14/91	X	3/20/91	4/9/91	water	52	Dilution factor = 20 for all MQLs raised to 20X blank values
9103-123-3	CP-G-AG-13D	3/13/91	3/14/91	X	3/20/91	4/5/91	water	70	
9103-123-4	CP-G-AG-15D	3/13/91	3/14/91	X	3/20/91	4/5/91	water	65	
9103-123-5	CP-G-N-1	3/13/91	3/14/91	X	3/20/91	4/5/91	water	84	Dilution factor = 20 for PCP and TCP
9103-123-6	CP-G-N-28	3/13/91	3/14/91	X	3/20/91	4/5/91	water	84	Dilution factor = 200 for 2,4,5-TCP and 2000 for PCP and TCP
9103-123-7	CP-G-S-4	3/13/91	3/14/91	X	3/20/91	4/5/91	water	70	Dilution factor = 4 for PCP
9103-123-8	CP-G-EW-1	3/13/91	3/14/91	X	3/20/91	4/6/91	water	78	Dilution factor = 1000 for 2,4,5-TCP and 2,4,6-TCP Dilution factor = 10,000 for PCP and TCP
9103-123-9	CP-G-EW-1R	3/13/91	3/14/91	X	3/20/91	4/6/91	water	87	Dilution factor = 1000 for TCP, 2,4,5-TCP, and 2,4,6-TCP Dilution factor = 10,000 for PCP
9103-123-10	CP-G-EW-3	3/13/91	3/14/91	X	3/20/91	4/10/91	water	NR*	Dilution factor = 1000 for all Dilution factor = 5000 for PCP MQLs raised to 1000X blank values Surrogate diluted out of range
9103-123-11	CP-G-EW-8	3/13/91	3/14/91	X	3/20/91	4/10/91	water	NR*	Dilution factor = 1000 for all Dilution factor = 5000 for PCP and TCP MQLs raised to 1000X blank values Surrogate diluted out of range
9103-123-12	CP-G-EW-10	3/13/91	3/14/91	X	3/20/91	4/6/91	water	93	Dilution factor = 20 for TCP and 2,4,5-TCP and 200 for PCP
9103-123-13	CP-G-EW-2	3/13/91	3/14/91	X	3/20/91	4/6/91	water	93	Dilution factor = 1000 for TCP and 5000 for PCP
9103-123-14	CP-G-EW-6	3/13/91	3/14/91	X	3/20/91	4/6/91	water	59	
9103-123-15	CP-G-ART	3/13/91	3/14/91	X	3/20/91	4/6/91	water	82	
9103-123-16	CP-G-B	3/13/91	3/14/91	X	3/20/91	4/6/91	water	47	
9103-263	Reag. blank	N/A	N/A	N/A	4/2/91	4/17/91	water	18	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50 ug/L, 1.0 ug/L, and 0.40 ug/L respectively.

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9103-263	Reag. blank	N/A	N/A	N/A	4/9/91	4/24/91	soil	66	MQL for 2-CP raised to 1500 ug/L
9102-263-4	CP-G-EW-6	3/27/91	3/27/91	X	4/3/91	4/13/91	water	71	Full Method 8270
9103-263-5	CP-S-ES-1	3/27/91	3/27/91	X	4/9/91	4/23/91	soil	71	Dilution factor = 20 for all and 50 for PCP MQLs raised to 20X blank values
9103-263-6	CP-S-ES-2	3/27/91	3/27/91	X	4/9/91	4/24/91	soil	57	Dilution factor = 20 for all MQLs raised to 20X blank values
9103-263-7	CP-S-EP-1A	3/27/91	3/27/91	X	4/9/91	4/24/91	soil	57	Dilution factor = 20 for all and 50 for PCP MQLs raised to 20X blank values
9103-263-8	CP-S-EP-2A	3/27/91	3/27/91	X	4/9/91	4/23/91	soil	83	Dilution factor = 5 for all and 50 for PCP MQLs raised to 5X blank values
9103-263-9	CP-S-EP-2B	3/27/91	3/27/91	X	4/9/91	4/22/91	soil	79	Dilution factor = 20 for PCP
9103-263-10	CP-S-EP-2C	3/27/91	3/27/91	X	4/9/91	4/22/91	soil	76	Dilution factor = 5 for all and 50 for PCP MQLs raised to 5X blank values
9103-263-11	CP-S-EP-3A	3/27/91	3/27/91	X	4/9/91	4/24/91	soil	67	Dilution factor = 20 for all and 100 for PCP MQLs raised to 20X blank values
9103-263-12	CP-S-EP-3B	3/27/91	3/27/91	X	4/9/91	4/19/91	soil	88	
9103-263-13	CP-S-EP-4A	3/27/91	3/27/91	X	4/9/91	4/22/91	soil	68	
9103-263-14	CP-S-EP-5A	3/27/91	3/27/91	X	4/9/91	4/19/91	soil	79	
9103-263-15	CP-S-EP-6A	3/27/91	3/27/91	X	4/9/91	4/22/91	soil	80	
9103-263-16	CP-S-EP-7A	3/27/91	3/27/91	X	4/9/91	4/19/91	soil	88	
9103-263-17	CP-S-EP-7B	3/27/91	3/27/91	X	4/9/91	4/22/91	soil	17*	
9103-263-18	CP-S-EP-8A	3/27/91	3/27/91	X	4/9/91	4/19/91	soil	81	
9103-263-19	CP-S-B	3/27/91	3/27/91	X	4/2/91	4/17/91	water	64	
9106-199	Reag. blank	N/A	N/A	N/A	6/20/91	7/20/91	water	81	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50, 1.0, and 0.40 ug/L respectively.
9106-199	Reag. blank	N/A	N/A	N/A	6/22/91	7/16/91	water	56	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50, 1.0, and 0.40 ug/L respectively.
9106-199-1	CP-G-EW-1	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	54	Dilution factor = 100 for all except PCP and TCP (= 20,000). MQLs raised to 100X blank values.
9106-199-2	CP-G-EW-1A	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	55	Dilution factor = 100 for all except PCP and TCP (= 20,000). MQLs raised to 100X blank values.
9106-199-3	CP-G-EW-2	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	116	Dilution factor = 5 for all except PCP (= 2000) and TCP and 2,4,5-TCP (= 100). MQLs raised to 5X blank values.

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9106-199-4	CP-G-EW-8	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	63	Dilution factor = 100 for all except PCP and TCP (= 20,000). MQLs raised to 100X blank values.
9106-199-5	CP-G-EW-6	6/18/91	6/19/91	X (MS)	6/20/91	7/17/91	water	124	
9106-199-6	CP-G-AG-1S	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	53	Dilution factor = 100 for all except PCP (= 500). MQLs raised to 100X blank values.
9106-199-7	CP-G-AG-4S	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	103	Dilution factor = 5 for all except for PCP (= 50). MQLs raised to 5 times blank values.
9106-199-8	CP-G-AG-5S	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	134*	
9106-199-9	CP-G-EW-10	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	75	Dilution factor = 100 for all except PCP(= 20,000) and TCP(= 500). MQLs raised to 100X blank values.
9106-199-10	CP-G-AG-2S	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	148*	
9106-199-11	CP-G-AG-3S	6/18/91	6/19/91	X (MS)	6/20/91	7/17/91	water	108	Dilution factor = 5 for all except PCP(= 10,000) and TCP(= 200). MQLs raised to 5X blank values.
9106-199-12	CP-G-AG-13S	6/18/91	6/19/91	X (MS)	6/20/91	7/18/91	water	132*	Dilution factor = 5 for all. MQLs raised to 5X blank values.
9106-199-13	CP-G-EW-5	6/18/91	6/19/91	X (MS)	6/20/91	7/17/91	water	97	Dilution factor = 10 for all except PCP(=2,000) and TCP and 2,4,5-TCP(= 500). MQLs raised to 10X blank values.
9106-199-14	CP-G-AG-11S	6/18/91	6/19/91	X (MS)	6/22/91	7/17/91	water	149*	
9106-199-15	CP-G-AG-7S	6/18/91	6/19/91	X (MS)	6/22/91	7/17/91	water	121	Dilution factor = 5 for all except PCP(= 20,000) and TCP(= 5,000). MQLs raised to 5X blank values.
9106-215	Reag. blank	N/A	N/A	N/A	6/26/91	7/19/91	water	43	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50, 1.0, and 0.40 ug/L respectively.
9106-215-1	CP-G-EW-4	6/19/91	6/20/91	X	6/26/91	7/21/91	water	NR*	Dilution factor = 1000 for all except PCP(= 10,000) MQLs raised to 1000X blank values
9106-215-2	CP-G-AG-5D	6/19/91	6/20/91	X	6/26/91	7/20/91	water	130*	
9106-215-3	CP-G-S-4	6/19/91	6/20/91	X	6/26/91	7/27/91	water	175*	
9106-215-4	CP-G-N-28	6/19/91	6/20/91	X	6/26/91	7/21/91	water	NR*	Dilution factor = 1000 for all except PCP(= 20,000) MQLs raised to 1000X blank values
9106-215-5	CP-G-EW-11	6/19/91	6/20/91	X	6/26/91	7/21/91	water	48	Dilution factor = 100 for all except PCP(= 40,000) and TCP(= 2000) MQLs raised to 100X blank values
9106-215-6	CP-G-EW-11A	6/19/91	6/20/91	X	6/26/91	7/21/91	water	51	Dilution factor = 100 for all except PCP(= 40,000) and TCP(= 2000) MQLs raised to 100X blank values
9106-215-7	CP-G-15-S	6/20/91	6/20/91	X	6/26/91	7/20/91	water	161*	
9106-215-9	CP-G-AG-1D	6/19/91	6/20/91	X	6/26/91	7/20/91	water	123	Dilution factor = 100 for PCP and 20 for TCP and 2,4,5-TCP

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CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9106-215-10	CP-G-AG-3D	6/19/91	6/20/91	X	6/26/91	7/20/91	water	115	
9106-215-11	CP-G-AG-4D	6/19/91	6/20/91	X	6/26/91	7/20/91	water	49	
9106-215-12	CP-G-EW-3	6/19/91	6/20/91	X	6/26/91	7/21/91	water	NR*	Dilution factor = 1000 for all except PCP(= 20,000) MQLs raised to 1000X blank values
9106-215-13	CP-G-EW-9	6/19/91	6/20/91	X	6/26/91	7/21/91	water	NR*	Dilution factor = 1000 for all except PCP(= 20,000) MQLs raised to 1000X blank values
9106-215-14	CP-G-N-1	6/19/91	6/20/91	X	6/26/91	7/20/91	water	144*	Dilution factor = 10 for PCP
9106-215-15	CP-G-AG-10D	6/19/91	6/20/91	X	6/26/91	7/20/91	water	77	
9106-215-16	CP-G-B	6/19/91	6/20/91	X	6/26/91	7/20/91	water	56	
9106-236	Reag. blank	6/20/91	6/21/91	N/A	6/27/91	7/28/91	water	18	Dilution factor = 5 for PCP PCP(1.6ug/L) and 2,4,5-TCP (0.47 ug/L) contamination found in blank. MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50, 1.0, and 0.40 ug/L respectively.
9106-236	Reag. blank	6/20/91	6/21/91	N/A	6/28/91	7/28/91	water	96	MQLs for 2-CP, 2,4-DCP, and 2,4,5-TCP raised to 50, 1.0, and 0.40 ug/L respectively.
9106-236-1	CP-G-EW-7	6/20/91	6/21/91	X	6/27/91	7/30/91	water	98	Dilution factor = 10 for all. MQLs raised to 20X blank values. PCP found at ~3000X and 2,4,5-TCP found at ~57X blank contamination. Hits of PCP, TCP, 2,4,5-TCP, & 2,4,6-TCP could not be confirmed by analysis on second column.
9106-236-2	CP-G-N-7	6/20/91	6/21/91	X	6/27/91	7/30/91	water	83	Dilution factor = 50 for all except PCP(= 200). MQLs raised to 50X blank values. PCP hit could not be confirmed by 2nd column analysis.
9106-236-3	CP-G-AG-2D	6/20/91	6/21/91	X	6/27/91	7/30/91	water	141*	PCP found at ~0.3X blank contamination. PCP hit could not be confirmed by 2nd column analysis.
9106-236-4	CP-G-AG-2D-A	6/20/91	6/21/91	X	6/27/91	7/28/91	water	73	PCP found at ~0.1X blank contamination PCP hit could not be confirmed by 2nd column analysis.
9106-236-5	CP-G-AG-11D	6/20/91	6/21/91	X	6/27/91	7/28/91	water	134*	PCP found at ~0.2X blank contamination. PCP hit could not be confirmed by 2nd column analysis.
9106-236-6	CP-G-ART	6/20/91	6/21/91	X	6/27/91	7/28/91	water	43	
9106-236-7	CP-G-AG-12S	6/20/91	6/21/91	X	6/27/91	7/30/91	water	179 *	PCP found at ~0.1X blank contamination. PCP and 2,4,6-TCP hits could not be confirmed by 2nd column analysis.
9106-236-8	CP-G-AG-7D	6/20/91	6/21/91	X	6/27/91	7/28/91	water	4 *	PCP found at ~0.05X blank contamination. PCP hit could not be confirmed by 2nd column analysis.
9106-236-9	CP-G-AG-12D	6/20/91	6/21/91	X	6/27/91	7/28/91	water	32	Dilution factor = 5 for PCP. PCP found at ~0.4X blank contamination. 2,4-DCP and PCP hits could not be confirmed by 2nd column analysis.

TABLE G-7
SUMMARY OF QA/QC SURROGATE RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Tribromophenol	Comments (1)
	QC Limits						water soil	10-123 19-122	
9106-236-10	CP-G-AG-13D	6/20/91	6/21/91	X	6/27/91	7/28/91	water	121	PCP found at ~0.2X blank contamination. PCP hit could not be confirmed by 2nd column analysis.
9106-236-11	CP-G-AG-15D	6/20/91	6/21/91	X	6/27/91	7/28/91	water	113	PCP found at ~0.1X blank contamination. PCP hit could not be confirmed by 2nd column analysis.
9106-236-12	CP-G-SP-1	6/21/91	6/21/91	X	6/28/91	7/30/91	water	99	Dilution factor = 10 for all except PCP(= 100,000) and TCP(= 10,000). MQLs raised to 10X blank values.
9106-236-13	CP-G-N-24B	6/21/91	6/21/91	X	6/28/91	7/30/91	water	240 *	Dilution factor = 20 for all except PCP(= 200,000) and TCP(= 20,000). MQLs raised to 20X blank values.
9106-236-14	CP-G-N-26	6/21/91	6/21/91	X	6/28/91	7/30/91	water	133	Dilution factor = 100 for all except PCP(= 200,000) and TCP(= 10,000). MQLs raised to 100X blank values.
9106-236-15	CP-G-N-27	6/21/91	6/21/91	X	6/28/91	7/30/91	water	NR *	Dilution factor = 1000 for all except PCP(= 100,000) and TCP(=40,000). MQLs raised to 1000X blank values.
9106-236-16	CP-G-B	6/21/91	6/21/91	X	6/28/91	7/28/91	water	14	PCP contamination of field blank (0.11 ug/L).
9106-236-17	CP-DI	6/21/91	6/21/91	X	6/28/91	7/28/91	water	44	PCP contamination of DI blank(= 0.20ug/L).

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* Surrogate recovery outside of EPA method limits

** Surrogate not recoverable due to required sample dilution

TABLE G-8
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID Sample ID	QC Limits	9101-040-1 CP-S-EB-5-A	9101-040 Blank Spike	9101-040 Blank Spike	9101-040 Blank Spike	9101-065-3 CP-S-EB-2-J	9101-065 Blank Spike	9101-065 Blank Spike	9101-065 Blank Spike
Date Sampled		1/8/91				1/9/91			
Date Received		1/9/91				1/10/91			
Date Extracted		1/15/91	1/15/91	1/15/91	1/16/91	1/16/91	1/15/91	1/15/91	1/16/91
Date Analyzed		1/24/91	1/23/91	1/23/91	1/23/91	1/29/91	1/23/91	1/23/91	1/23/91
2-Chlorophenol Recovery (1)									
Spike, %	29-137	NR *	22 *	NR *	NR *	NR *	22 *	NR *	NR *
Spike Duplicate, %		NR *				NR *			
Relative Percent Difference	20	NR *				NR *			
2,4-Dichlorophenol Recovery									
Spike, %	39-124	110	95	59	74	63	95	59	74
Spike Duplicate, %		134 *				77			
Relative Percent Difference	20	17				16			
Pentachlorophenol Recovery									
Spike, %	38-128	90	99	75	119	56	99	75	119
Spike Duplicate, %		-50 *				45			
Relative Percent Difference	30	8				12			
Tetrachlorophenol Recovery									
Spike, %		155	122	82	100	97	122	82	100
Spike Duplicate, %		185				94			
Relative Percent Difference		14				3			
2,4,5-Trichlorophenol Recovery									
Spike, %		48	61	26	27	43	61	26	27
Spike Duplicate, %		56				33			
Relative Percent Difference		16				26			
2,4,6-Trichlorophenol Recovery									
Spike, %		48	102	45	57	90	102	45	57
Spike Duplicate, %		58				83			
Relative Percent Difference		17				8			
COMMENTS		Silica Gel Cleanup		Silica Gel Cleanup	Silica Gel Cleanup	Silica Gel Cleanup		Silica Gel Cleanup	Silica Gel Cleanup

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NR,NA - Spike not attainable

* Spike recovery outside QAPP limits

TABLE G-8
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID Sample ID	QC Limits	9101-082 Blank Spike	9101-128 9101-108 9101-134-2 CP-S-EB-11-D	9101-108 Blank Spike	9101-108 Blank Spike	9101-096 CP-S-EB-2-J	9101-096-5 CP-S-EB-4-A	9101-096 Blank Spike
Date Sampled			1/18/91			1/9/91	1/14/91	
Date Received			1/19/91			1/10/91	1/15/91	
Date Extracted		1/16/91	1/22/91	1/22/91	1/22/91	1/16/91	1/16/91	1/16/91
Date Analyzed		1/23/91	2/5/91	2/2/91	2/2/91	1/29/91	2/2/91	1/23/91
2-Chlorophenol Recovery (1)								
Spike, %	29-137	NR *	NR *	NR *	NR *	NR *	36	NR *
Spike Duplicate, %			NR *			NR *	27	
Relative Percent Difference	20		NR *			NR *	27	
2,4-Dichlorophenol Recovery								
Spike, %	39-124	74	8 *	72	34 *	63	85	74
Spike Duplicate, %			40			77	95	
Relative Percent Difference	20		56 *			16	11	
Pentachlorophenol Recovery								
Spike, %	38-128	119	14 *	23 *	12 *	56	61	119
Spike Duplicate, %			43			45	98	
Relative Percent Difference	30		52 *			12	10	
Tetrachlorophenol Recovery								
Spike, %		100	72	72	36	97	124	100
Spike Duplicate, %			110			94	131	
Relative Percent Difference			42			3	5	
2,4,5-Trichlorophenol Recovery								
Spike, %		27	15	30	15	43	40	27
Spike Duplicate, %			30			33	42	
Relative Percent Difference			66			26	6	
2,4,6-Trichlorophenol Recovery								
Spike, %		57	22 *	40	19 *	90	55	57
Spike Duplicate, %			40			83	57	
Relative Percent Difference			56 *			8	4	
COMMENTS		Silica Gel Cleanup			Silica Gel Cleanup	Silica Gel Cleanup		Silica Gel Cleanup

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TABLE G-8
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID Sample ID	QC Limits	9101-096 Blank Spike	9101-096 Blank Spike	9101-134 9101-128 Blank Spike	9101-134 9101-128 Blank Spike	9101-169 9101-134 9101-180 9101-156-2 CP-S-EW-6-C	9101-169 9101-156 9101-134-4 CP-S-EB-11-L	9101-134 9101-156 Blank Spike	9101-134 Blank Spike
Date Sampled						1/30/91	1/18/91	N/A	N/A
Date Received						1/31/91	1/19/91	N/A	N/A
Date Extracted		1/16/91		1/22/91	1/22/91	1/30/91	1/30/91	1/30/91	1/30/91
Date Analyzed		2/1/91		2/2/91	2/2/91	2/14/91	2/14/91	2/14/91	2/14/91
2-Chlorophenol Recovery (1)									
Spike, %	29-137	NR *	NR *	NR *	NR	98	71	NR *	62
Spike Duplicate, %						103	69		
Relative Percent Difference	20					5	2		
2,4-Dichlorophenol Recovery									
Spike, %	39-124	78	49	72	34 *	70	98	53	78
Spike Duplicate, %						73	90		
Relative Percent Difference	20					4	9		
Pentachlorophenol Recovery									
Spike, %	38-128	28 *	21 *	23 *	12 *	46	80	46	46
Spike Duplicate, %						71	83		
Relative Percent Difference	30					22	2		
Tetrachlorophenol Recovery									
Spike, %		87	56	72	36	127	136	105	117
Spike Duplicate, %						140	138		
Relative Percent Difference						10	2		
2,4,5-Trichlorophenol Recovery									
Spike, %		28	18	30	15	32	49	16	20
Spike Duplicate, %						35	45		
Relative Percent Difference						10	9		
2,4,6-Trichlorophenol Recovery									
Spike, %		38	24 *	40	19 *	54	75	38	50
Spike Duplicate, %						58	63		
Relative Percent Difference						7	18		
COMMENTS		QC Limits Exceeded	QC Limits Exceeded Silica Gel Cleanup	Same as WO# 9101-108	Silica Gel Cleanup Same as WO# 9101-108				

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TABLE G-8
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID Sample ID	QC Limits	9101-134 Blank Spike	9101-169 9101-180 9101-156 Blank Spike	9101-169 9101-180 9101-156 Blank Spike	9101-180 9101-133-14 ?	9101-180 Blank Spike	9103-086-3 CP-F-ES-10	9103-086 9103-085-4 ?
Date Sampled		N/A	N/A	N/A	?		3/11/91	?
Date Received		N/A	N/A	N/A	?		3/12/91	?
Date Extracted		1/30/91	1/31/91	1/31/91	1/23/91	1/28/91	3/14/91	3/18/91
Date Analyzed		2/14/91	2/15/91	2/15/91	2/12/91		3/17/91	3/25/91
2-Chlorophenol Recovery (1)								
Spike, %	29-137	NR	NR *	NR *	NR *	83	NR *	NR *
Spike Duplicate, %					NR *		11 *	NR *
Relative Percent Difference	20				NA *		NA *	NA *
2,4-Dichlorophenol Recovery								
Spike, %	39-124	51	46	76	66	49	NA *	70
Spike Duplicate, %					63		NA *	97
Relative Percent Difference	20				4		NA *	32 *
Pentachlorophenol Recovery								
Spike, %	38-128	34 *	34 *	49	52	53	NA *	78
Spike Duplicate, %					54		NA *	75
Relative Percent Difference	30				4		NA *	4
Tetrachlorophenol Recovery								
Spike, %		70	72	122	96	111	NA	131
Spike Duplicate, %					96		NA	134
Relative Percent Difference					0		NA	2
2,4,5-Trichlorophenol Recovery								
Spike, %		13	15	24	25	32	NA	13
Spike Duplicate, %					27		NA	36
Relative Percent Difference					8		NA	94
2,4,6-Trichlorophenol Recovery								
Spike, %		31 *	27 *	45	32 *	45	30 *	30 *
Spike Duplicate, %					34 *		29 *	48
Relative Percent Difference					7 *		1 *	47 *
COMMENTS			Silica Gel Cleanup			Extraction Date Off		

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TABLE G-8
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID Sample ID	QC Limits	9103-086 Blank Spike	9103-086 Blank Spike	9103-101-10 CP-G-AG-11SX	9103-101 9103-123-2 CP-G-AG-13S	9103-101 Blank Spike	9103-123 9103-101 Blank Spike	9103-158 Blank Spike	9103-158 Blank Spike
Date Sampled		N/A	N/A	3/12/91	3/13/91	N/A	N/A	N/A	N/A
Date Received		N/A	N/A	3/13/91	3/14/91	N/A	N/A	N/A	N/A
Date Extracted		3/14/91	3/18/91	3/19/91	3/20/91	3/19/91	3/20/91	3/22/91	4/15/91
Date Analyzed		3/16/91	3/25/91	3/29/91	4/9/91	3/29/91	4/5/91	4/15/91	4/18/91
2-Chlorophenol Recovery (1)									
Spike, %	29-137	19 *	NR *	NR *	NR *	NR *	46	*	NR
Spike Duplicate, %				NR *	NR *				28 *
Relative Percent Difference	20			NA *	NA *				NA *
2,4-Dichlorophenol Recovery									
Spike, %	39-124	82	78	86	182 *	98	71	71	85
Spike Duplicate, %				107	177 *				105
Relative Percent Difference	20			21 *	3				21 *
Pentachlorophenol Recovery									
Spike, %	38-128	42	49	75	106	56	76	60	74
Spike Duplicate, %				78	95				76
Relative Percent Difference	30			3	4				3
Tetrachlorophenol Recovery									
Spike, %		107	105	143	305 *	120	131	115	121
Spike Duplicate, %				162	268 *				144
Relative Percent Difference				13	13				17
2,4,5-Trichlorophenol Recovery									
Spike, %		38	18	31	157	44	24	32	42
Spike Duplicate, %				40	143				49
Relative Percent Difference				24	10				14
2,4,6-Trichlorophenol Recovery									
Spike, %		46	23 *	51	77	53	34 *	37	50
Spike Duplicate, %				67	70				63
Relative Percent Difference				14	9				22 *
COMMENTS									

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TABLE G-8
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID Sample ID	QC Limits	9103-086 Blank Spike	9103-086 Blank Spike	9103-101-10 CP-G-AG-11SX	9103-101 9103-123-2 CP-G-AG-13S	9103-101 Blank Spike	9103-123 9103-101 Blank Spike	9103-158 Blank Spike	9103-158 Blank Spike
Date Sampled		N/A	N/A	3/12/91	3/13/91	N/A	N/A	N/A	N/A
Date Received		N/A	N/A	3/13/91	3/14/91	N/A	N/A	N/A	N/A
Date Extracted		3/14/91	3/18/91	3/19/91	3/20/91	3/19/91	3/20/91	3/22/91	4/15/91
Date Analyzed		3/16/91	3/25/91	3/29/91	4/9/91	3/29/91	4/5/91	4/15/91	4/18/91
2-Chlorophenol Recovery (1)									
Spike, %	29-137	19 *	NR *	NR *	NR *	NR *	46	*	NR
Spike Duplicate, %				NR *	NR *				28 *
Relative Percent Difference	20			NA *	NA *				NA *
2,4-Dichlorophenol Recovery									
Spike, %	39-124	82	78	86	182 *	98	71	71	85
Spike Duplicate, %				107	177 *				105
Relative Percent Difference	20			21 *	3				21 *
Pentachlorophenol Recovery									
Spike, %	38-128	42	49	75	106	56	76	60	74
Spike Duplicate, %				78	95				76
Relative Percent Difference	30			3	4				3
Tetrachlorophenol Recovery									
Spike, %		107	105	143	305 *	120	131	115	121
Spike Duplicate, %				162	268 *				144
Relative Percent Difference				13	13				17
2,4,5-Trichlorophenol Recovery									
Spike, %		38	18	31	157	44	24	32	42
Spike Duplicate, %				40	143				49
Relative Percent Difference				24	10				14
2,4,6-Trichlorophenol Recovery									
Spike, %		46	23 *	51	77	53	34 *	37	50
Spike Duplicate, %				67	70				63
Relative Percent Difference				14	9				22 *
COMMENTS									

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TABLE G-8
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID		9103-144-2	9103-144	9103-263	9103-263-15	9103-263	9106-199	9106-199
Sample ID	QC Limits	CP-G-EW-5	Blank Spike	Blank Spike	CP-S-EP-6A	Blank Spike	CP-G-AG-13S	9106-203-12
Date Sampled		3/14/91	N/A	N/A	3/27/91	N/A	6/18/91	?
Date Received		3/15/91	N/A	N/A	3/27/91	N/A	6/19/91	?
Date Extracted		3/21/91	3/21/91	4/2/91	4/9/91	4/9/91	6/20/91	6/22/91
Date Analyzed		4/11/91	4/17/91	4/17/91	4/22/91	4/19/91	7/18/91	7/17/91
2-Chlorophenol Recovery (1)								
Spike, %	29-137	NR *	53	NR *	NR *	16 *	NR *	24 *
Spike Duplicate, %		NR *		NR *	NR *		NR *	30
Relative Percent Difference	20	NA *		NA *	NA *		NA *	22 *
2,4-Dichlorophenol Recovery								
Spike, %	39-124	NA *	65	96	66	28 *	5240 *	1254 *
Spike Duplicate, %		NA *		89	65		5940 *	1248 *
Relative Percent Difference	20	NA *		7	2		13	0
Pentachlorophenol Recovery								
Spike, %	38-128	NA *	35	69	64	35 *	49	88
Spike Duplicate, %		NA *		84	35 *		98	96
Relative Percent Difference	30	NA *		19	35 *		17	7
Tetrachlorophenol Recovery								
Spike, %		NA	107	136	119	82	238 *	132
Spike Duplicate, %		NA		132	95		364 *	131
Relative Percent Difference		NA		3	22		42 *	1
2,4,5-Trichlorophenol Recovery								
Spike, %		NA	29	55	35	28	178 *	185 *
Spike Duplicate, %		NA		92	28		180 *	196 *
Relative Percent Difference		NA		50	24		1	6
2,4,6-Trichlorophenol Recovery								
Spike, %		141 *	31	52	38	29 *	0 *	146 *
Spike Duplicate, %		184 *		41	30 *		0 *	148 *
Relative Percent Difference		26		24 *	23 *		17	2
COMMENTS								

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TABLE G-8
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
CHLORINATED PHENOLS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID Sample ID	QC Limits	9106-199 Blank Spike	9106-199 Blank Spike	9106-215 CP-G-EW-4	9106-215 Blank Spike	9106-236 CP-G-EW-7	9106-236 Blank Spike	9106-236 Blank Spike
Date Sampled		N/A	N/A	6/19/91	N/A	6/20/91	N/A	N/A
Date Received		N/A	N/A	6/20/91	N/A	6/21/91	N/A	N/A
Date Extracted		6/20/91	6/22/91	6/26/91	6/26/91	6/27/91	6/28/91	6/27/91
Date Analyzed		7/17/91	7/16/91	7/21/91	7/19/91	7/30/91	7/28/91	7/28/91
2-Chlorophenol Recovery (1)								
Spike, %	29-137	15 *	25 *	NR *	NR *	NR *	NR *	NR *
Spike Duplicate, %				NR *		NR *		
Relative Percent Difference	20			NA *		NA *		
2,4-Dichlorophenol Recovery								
Spike, %	39-124	675 *	812 *	NR *	664 *	NR *	510 *	687 *
Spike Duplicate, %				NR *		NR *		
Relative Percent Difference	20			NA *		NA *		
Pentachlorophenol Recovery								
Spike, %	38-128	78	87	NR *	88	NR *	66	196 *
Spike Duplicate, %				NR *		NR *		
Relative Percent Difference	30			NA *		NA *		
Tetrachlorophenol Recovery								
Spike, %		100	101	NR *	91	NR *	83	202 *
Spike Duplicate, %				NR *		NR *		
Relative Percent Difference				NA *		NA *		
2,4,5-Trichlorophenol Recovery								
Spike, %		119	119	NR *	61	NR *	97	100
Spike Duplicate, %				NR *		NR *		
Relative Percent Difference				NA *		NA *		
2,4,6-Trichlorophenol Recovery								
Spike, %		114	102	NR *	78	NR *	63	155 *
Spike Duplicate, %				NR *		NR *		
Relative Percent Difference				NA *		NA *		
COMMENTS								

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TABLE G-9
RPDS FOR DUPLICATE SAMPLE ANALYSES
PAH AND CHLORINATED PHENOL ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

PAH	CP-S-EB-3-H 01/09/91 18-19.5' ug/Kg		CP-S-EB-3-I 01/09/91 18-19.5' ug/Kg		RPD	CP-S-EB-5-A 01/08/91 0-2' ug/Kg		CP-S-EB-5-A 01/08/91 0-2' ug/Kg		RPD	CP-S-EW-6-C 01/21/91 3-4.5' ug/Kg	
Acenaphthene	5200		7700		39	700		500		33	54	
Acenaphthylene	170		310		58	430		430		0	<40	
Anthracene	1700		2800		49	3200		2500		25	69	
Benzo(a)Anthracene	630		1200		62	600		310		64	<40	
Dibenzo(a,h)Anthracene	<40		<40		NC/ND	160		160		0	<40	
Chrysene	560		980		55	950		540		55	<40	
Dibenzofuran	2600		4200		47	300		200		40	29	J
Fluoranthene	3500		6100		54	2100		1400		40	27	J
Benzo(b)Fluoranthene	340		680		67	1600		1100		37	<40	
Benzo(k)Fluoranthene	100		210		71	320		310		3	<40	
Fluorene	3400		5400		45	640		430		39	27	J
2-Methylnaphthalene	6600		11000		50	850		600		34	82	
Naphthalene	9300	B	16000	B	53	4100		3100		28	64	
Benzo(g,h,i)Perylene	<40		<40		NC/ND	760		670		13	<40	
Phenanthrene	7800		12000		42	1900		1300		38	71	
Pyrene	2300		4000		54	1900		1200		45	<40	
Benzo(a)Pyrene	210		470		76	980		830		17	<40	
Indeno(1,2,3,cd)Pyrene	<40		<40		NC/ND	710		670		6	<40	
PHENOLS												
2-Chlorophenol	<1500	UJ	<1500	UJ	NC/ND	<1500	UJ	<1500	UJ	NC/ND	<1500	UJ
2,4-Dichlorophenol	<30		<1500	UJ	NC/ND	44		53		19	<30	
Pentachlorophenol	150		190		24	350		460		27	12	
Tetrachlorophenol	260		280		7	35		36		3	<6	
2,4,5-Trichlorophenol	24		33		32	<10		<10		NC/ND	<10	
2,4,6-Trichlorophenol	<6		<6		NC/ND	<6		<6		NC/ND	<6	

NC/ND - Not calculable as at least one of the results involved was a non-detect

* - Method 8310

N/A - Not analyzed

TABLE G-9
RPDS FOR DUPLICATE SAMPLE ANALYSES
PAH AND CHLORINATED PHENOL ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

PAH	CP-S-EW-6-N 01/21/91 3-4.5' ug/Kg		RPD	CP-S-EW-11-L 01/23/91 17.5-19 ug/Kg		CP-S-EW-11-P 01/23/91 17.5-19 ug/Kg		RPD	CP-G-EW-1 03/13/91 ug/L		CP-G-EW-1R 03/13/91 ug/L		RPD
Acenaphthene	37	J	37	5200		6100		16	440		760		53
Acenaphthylene	<40		NC/ND	<80		<80		NC/ND	<11		20		NC/ND
Anthracene	45		42	1500		1700		13	77		98		24
Benzo(a)Anthracene	<40		NC/ND	600		750		22	26		38		38
Dibenzo(a,h)Anthracene	<40		NC/ND	<80		<80		NC/ND	<11		<10		NC/ND
Chrysene	<40		NC/ND	570		770		30	26		37		35
Dibenzofuran	<40		NC/ND	2500		3100		21	210		350		50
Fluoranthene	<40		NC/ND	3200		4200		27	160		250		44
Benzo(b)Fluoranthene	<40		NC/ND	<80		470		NC/ND	19		16		17
Benzo(k)Fluoranthene	<40		NC/ND	<80		150		NC/ND	<11		12		NC/ND
Fluorene	<40		NC/ND	3100		3600		15	270		410		41
2-Methylnaphthalene	74		10	8700		1000		159	210		1000		131
Naphthalene	74		14	12000		15000		22	<11		3200		NC/ND
Benzo(g,h,i)Perylene	<40		NC/ND	<80		<80		NC/ND	<11		<10		NC/ND
Phenanthrene	46		43	6700		8000		18	440		780		56
Pyrene	<40		NC/ND	2300		2800		20	100		140		33
Benzo(a)Pyrene	<40		NC/ND	<80		71	J	NC/ND	<11		12		NC/ND
Indeno(1,2,3,cd)Pyrene	<40		NC/ND	<80		<80		NC/ND	<11		<10		NC/ND
PHENOLS													
2-Chlorophenol	9200	BU	NC/ND	<7500	UJ	<7500	UJ	NC/ND	<50	UJ	<50	UJ	NC/ND
2,4-Dichlorophenol	<30		NC/ND	<150		<150		NC/ND	<1		<1		NC/ND
Pentachlorophenol	12		0	440		390	J	12	4100		4100		0
Tetrachlorophenol	<6		NC/ND	100		98		2	1900	J	2000		5
2,4,5-Trichlorophenol	<10		NC/ND	<50		<50		NC/ND	<400		<400		NC/ND
2,4,6-Trichlorophenol	<6		NC/ND	<30		<30		NC/ND	<200		<200		NC/ND

NC/ND - Not calculable as at least one of the results involved was a non-detect

* - Method 8310

N/A - Not analyzed

TABLE G-9
RPDS FOR DUPLICATE SAMPLE ANALYSES
PAH AND CHLORINATED PHENOL ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

PAH	CP-G-EW-1 06/18/91 ug/L		CP-G-EW-1A 06/18/91 ug/L		RPD	CP-G-EW-11 03/14/91 ug/L		CP-G-EW-11R 03/14/91 ug/L		RPD	CP-G-EW-11 06/19/91 ug/L	
Acenaphthene	440	J	360	J	20	300		280		7	390	
Acenaphthylene	<40	UJ	<10	UJ	NC/ND	<40		<40		NC/ND	<100	
Anthracene	170	J	170	J	0	<40		<40		NC/ND	<100	
Benzo(a)Anthracene	55	J	31	J	56	<40		<40		NC/ND	<100	
Dibenzo(a,h)Anthracene	<40	UJ	<10	UJ	NC/ND	<40		<40		NC/ND	<100	
Chrysene	57	J	31	J	59	<40		<40		NC/ND	<100	
Dibenzofuran	290	J	220	J	27	130		130		0	190	
Fluoranthene	370	J	190	J	64	10	J	10	J	0	<100	
Benzo(b)Fluoranthene	<40	UJ	14	J	NC/ND	<40		<40		NC/ND	<100	
Benzo(k)Fluoranthene	<40	UJ	6.6	J	NC/ND	<40		<40		NC/ND	<100	
Fluorene	290	J	230	J	23	110		96		14	160	
2-Methylnaphthalene	1300	J	780	J	50	1200		1200		0	1500	
Naphthalene	6600	J	5500	J	18	7600		7900		4	7300	
Benzo(g,h,i)Perylene	<40	UJ	<10	UJ	NC/ND	<40		<40		NC/ND	<100	
Phenanthrene	690	J	410	J	51	69		67		3	150	
Pyrene	180	J	86	J	71	7.2	J	7.5	J	4	<100	
Benzo(a)Pyrene	<40	UJ	14	J	NC/ND	<40		<40		NC/ND	<100	
Indeno(1,2,3,cd)Pyrene	<40	UJ	<10	UJ	NC/ND	<40		<40		NC/ND	<100	
PHENOLS												
2-Chlorophenol	<5000	UJ	<5000	UJ	NC/ND	<500	UJ	<500	UJ	NC/ND	<5000	UJ
2,4-Dichlorophenol	<100		<10		NC/ND	<10		<10	UJ	NC/ND	<100	
Pentachlorophenol	8000		7700		4	6400		6100	J	5	9500	
Tetrachlorophenol	1200		1200	J	0	1500		1700	J	13	3200	
2,4,5-Trichlorophenol	<40		110		NC/ND	<2000		<800	UJ	NC/ND	56	
2,4,6-Trichlorophenol	<20		<20		NC/ND	3.7		3.7	J	0	<20	

NC/ND - Not calculable as at least one of the results involved was a non-detect

* - Method 8310

N/A - Not analyzed

TABLE G-9
RPDS FOR DUPLICATE SAMPLE ANALYSES
PAH AND CHLORINATED PHENOL ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

PAH	CP-G-EW-11A 06/19/91 ug/L		RPD	CP-G-AG-2D 03/11/91* ug/L		CP-G-AG-2DR 03/11/91* ug/L		RPD	CP-G-AG-2D 06/20/91* ug/L		CP-G-AG-2DA 06/20/91* ug/L		RPD
Acenaphthene	380		3	<.05		<.05		NC/ND	0.07	UF	<.05	UF	NC/ND
Acenaphthylene	<100		NC/ND	<.2		<.2		NC/ND	<.2		<.2		NC/ND
Anthracene	<100		NC/ND	0.06	B	0.06	B	0	0.06	BUF	0.06	BU	0
Benzo(a)Anthracene	<100		NC/ND	<.01		<.01		NC/ND	<.01	UF	<.01	UF	NC/ND
Dibenzo(a,h)Anthracene	<100		NC/ND	<.01		<.01		NC/ND	<.01		<.01		NC/ND
Chrysene	<100		NC/ND	<.01		<.01		NC/ND	0.02	UF	0.02	UF	0
Dibenzofuran	190		0	N/A		N/A		N/A	N/A		N/A		N/A
Fluoranthene	<100		NC/ND	<.01		0.03		NC/ND	0.12	UF	0.13	UF	8
Benzo(b)Fluoranthene	<100		NC/ND	<.01		<.01		NC/ND	<.01		<.01		NC/ND
Benzo(k)Fluoranthene	<100		NC/ND	<.01		<.01		NC/ND	<.01	UF	<.01	UF	NC/ND
Fluorene	170		6	<.02		<.02		NC/ND	0.04	UF	0.03	UF	29
2-Methylnaphthalene	1300		14	N/A		N/A		N/A	N/A		N/A		N/A
Naphthalene	7100		3	<.05		<.05		NC/ND	<.05		<.05		NC/ND
Benzo(g,h,i)Perylene	<100		NC/ND	<.02		<.02		NC/ND	<.02		<.02		NC/ND
Phenanthrene	150		0	<.01		0.01		NC/ND	0.08	UF	0.08	UF	0
Pyrene	<100		NC/ND	<.01		0.02		NC/ND	0.14	UF	0.14	UF	0
Benzo(a)Pyrene	<100		NC/ND	<.01		<.01		NC/ND	<.01	UF	<.01	UF	NC/ND
Indeno(1,2,3,cd)Pyrene	<100		NC/ND	<.02		<.02		NC/ND	<.02		<.02		NC/ND
PHENOLS													
2-Chlorophenol	<5000	UJ	NC/ND	<50	UJ	<50	UJ	NC/ND	<50	UJ	<50	UJ	NC/ND
2,4-Dichlorophenol	<100	UJ	NC/ND	<1		<1		NC/ND	<1	UJ	<1		NC/ND
Pentachlorophenol	9800	J	3	8		6.7		18	0.38	NBU	0.18	NB	71
Tetrachlorophenol	3300	J	3	2.4	J	1.7	J	34	<.2	UJ	<.2		NC/ND
2,4,5-Trichlorophenol	66	J	16	<.4		<.4		NC/ND	<.4	UJ	<.4		NC/ND
2,4,6-Trichlorophenol	<200	UJ	NC/ND	<.2		<.2		NC/ND	<.2	UJ	<.2		NC/ND

NC/ND - Not calculable as at least one of the results involved was a non-detect
* - Method 8310
N/A - Not analyzed

TABLE G-10
SUMMARY OF QA/QC SURROGATE RESULTS
VOLATILES AND PURGEABLE AROMATICS ANALYSES**
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Bromofluorobenzene	Comments
	QC Limits						soil water	74-121 86-115	
9101-156	Reag. blank	N/A	N/A	N/A	1/23/91	1/25/91	soil	100	
9101-156-2	CP-S-EW-6-C	1/21/91	1/22/91	X	1/23/91	1/25/91	soil	81	
9101-180	Reag. blank	N/A	N/A	N/A	N/A	1/25/91	water	95	
9101-180-11	Field blank	1/23/91	1/24/91	X	N/A	1/25/91	water	94	
9101-180	Reag. blank	N/A	N/A	N/A	1/26/91	1/29/91	soil	105	
9101-180-2	CP-S-EW-11-C	1/23/91	1/24/91	X	1/26/91	1/29/91	soil	84	
9101-180-7	CP-S-EW-11-N	1/23/91	1/24/91	X	1/26/91	1/29/91	soil	87	
9101-169	Reag. blank	N/A	N/A	N/A	1/26/91	1/29/91	soil	105	
9101-169-4	CP-S-EW-10-C	1/21/91	1/23/91	X	1/26/91	1/29/91	soil	89	
9103-101	Reag. blank	N/A	N/A	N/A	N/A	3/21/91	water	101	METHOD 8240 / 1,2-DCA-d4 = 104% / Toluene-d8 = 102%
9103-101-4	CP-G-AG-5S	3/12/91	3/13/91	X	N/A	3/21/91	water	97	METHOD 8240 / 1,2-DCA-d4 = 95% / Toluene-d8 = 91%
9103-101-14	CP-G-B	3/12/91	3/13/91	X	N/A	3/21/91	water	90	METHOD 8240 / 1,2-DCA-d4 = 92% / Toluene-d8 = 92% Chloroform contamination = 12 ug/L
9103-101-15	T031391	3/13/91	3/13/91	X	N/A	3/21/91	water	94	METHOD 8240 / 1,2-DCA-d4 = 97% / Toluene-d8 = 92% Acetone contamination = 18 ug/L
9103-101-16	CP-DI	3/13/91	3/13/91	X	N/A	3/21/91	water	97	METHOD 8240 / 1,2-DCA-d4 = 95% / Toluene-d8 = 98% Chloroform contamination = 13 ug/L
9103-158	Reag. blank	N/A	N/A	N/A	N/A	3/27/91	water	96	METHOD 8240 / 1,2-DCA-d4 = 96% / Toluene-d8 = 101% Blank contamination with 5 ppb methylene chloride.
9103-158-2	CP-L-EW-1	3/15/91	3/16/91	X	N/A	3/27/91	product	102	METHOD 8240 / 1,2-DCA-d4 = 96% / Toluene-d8 = 96%
9103-158	Reag. blank	N/A	N/A	N/A	N/A	3/27/91	water	99	
9103-158	Reag. blank	N/A	N/A	N/A	N/A	3/28/91	water	99	
9103-158-3	CP-D-EW-7	3/15/91	3/16/91	X	3/28/91	3/29/91	product	96	Dilution factor = 140 for all. MQLs raised to 7000X blank values.
9103-158-4	CP-D-EW-9	3/15/91	3/16/91	X	3/26/91	3/27/91	product	102	Dilution factor = 3300 for all. MQLs raised to 164,000X blank values.
9103-144	Reag. blank	N/A	N/A	N/A	N/A	3/22/91	water	101	METHOD 8240 / 1,2-DCA-d4 = 103% / Toluene-d8 = 102% Blank contamination with 5 ppb MeCl2
9103-144	Reag. blank	N/A	N/A	N/A	N/A	3/25/91	water	96	METHOD 8240 / 1,2-DCA-d4 = 103% / Toluene-d8 = 102% Blank contamination with 1 ppb 1,1,2,2-TCA

** EPA Method 8020 unless otherwise specified in comments section.

TABLE G-10
SUMMARY OF QA/QC SURROGATE RESULTS
VOLATILES AND PURGEABLE AROMATICS ANALYSES**
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Bromofluorobenzene	Comments
	QC Limits						soil water	74-121 86-115	
9103-144	Reag. blank	N/A	N/A	N/A	N/A	3/26/91	water	104	METHOD 8240 / 1,2-DCA-d4 = 99% / Toluene-d8 = 108%
9103-144-4	CP-G-EW-9	3/14/91	3/15/91	X	N/A	3/26/91	water	103	METHOD 8240 / 1,2-DCA-d4 = 104% / Toluene-d8 = 101% Dilution factor = 10 for Xylenes
9103-144-5	CP-G-EW-11	3/14/91	3/15/91	X	N/A	3/26/91	water	99	METHOD 8240 / 1,2-DCA-d4 = 102% / Toluene-d8 = 100%
9103-144-6	CP-G-EW-11R	3/14/91	3/15/91	X	N/A	3/22/91	water	95	METHOD 8240 / 1,2-DCA-d4 = 98% / Toluene-d8 = 94% MeCl2 found at same level as blank contamination
9103-144-11	T031591	3/14/91	3/15/91	X	N/A	3/23/91	water	104	METHOD 8240 / 1,2-DCA-d4 = 108% / Toluene-d8 = 107% MeCl2 found at same level as blank contamination
9103-144-12	CP-G-B	3/14/91	3/15/91	X	N/A	3/26/91	water	98	METHOD 8240 / 1,2-DCA-d4 = 109% / Toluene-d8 = 99% Chloroform contamination = 12 ug/L
9103-123	Reag. blank	N/A	N/A	N/A	N/A	3/22/91	water	101	METHOD 8240 / 1,2-DCA-d4 = 103% / Toluene-d8 = 102% Blank contamination with 5 ppb MeCl2
9103-123	Reag. blank	N/A	N/A	N/A	N/A	3/25/91	water	96	METHOD 8240 / 1,2-DCA-d4 = 103% / Toluene-d8 = 102% Blank contamination with 1 ppb 1,1,2,2-TCA
9103-123-10	CP-G-EW-3	3/13/91	3/14/91	X	N/A	3/26/91	water	100	METHOD 8240 / 1,2-DCA-d4 = 109% / Toluene-d8 = 104%
9103-123-14	CP-G-EW-6	3/13/91	3/14/91	X	N/A	3/22/91	water	98	METHOD 8240 / 1,2-DCA-d4 = 100% / Toluene-d8 = 101%
9103-123-16	CP-G-B	3/13/91	3/14/91	X	N/A	3/22/91	water	101	METHOD 8240 / 1,2-DCA-d4 = 104% / Toluene-d8 = 101% MeCl2 found at same level as blank contamination
9103-123-17	T031491	3/14/91	3/14/91	X	N/A	3/22/91	water	98	METHOD 8240 / 1,2-DCA-d4 = 110% / Toluene-d8 = 101% MeCl2 found at same level as blank contamination 21 ppb Acetone found in trip blank
9106-199	Reag. blank	N/A	N/A	N/A	N/A	6/26/91	water	103	METHOD 8240 / 1,2-DCA-d4 = 100% / Toluene-d8 = 97% Blank contamination with 3 ppb MeCl2
9106-199	Reag. blank	N/A	N/A	N/A	N/A	6/27/91	water	102	METHOD 8240 / 1,2-DCA-d4 = 99% / Toluene-d8 = 98% Blank contamination with 14 ppb MeCl2 and 19 ppb Acetone

** EPA Method 8020 unless otherwise specified in comments section.

TABLE G-10
SUMMARY OF QA/QC SURROGATE RESULTS
VOLATILES AND PURGEABLE AROMATICS ANALYSES**
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Bromofluorobenzene	Comments
	QC Limits						soil water	74-121 86-115	
9106-199-5	CP-G-EW-6	6/18/91	6/19/91	X	N/A	6/26/91	water	102	METHOD 8240 / 1,2-DCA-d4 = 104% / Toluene-d8 = 96% MeCl2 found at same level as blank contamination
9106-199-8	CP-G-AG-5S	6/18/91	6/19/91	X	N/A	6/27/91	water	99	METHOD 8240 / 1,2-DCA-d4 = 104% / Toluene-d8 = 99% MeCl2 and Acetone found at same level as blank contamination
9106-215	Reag. blank	N/A	N/A	N/A	N/A	6/27/91	water	102	METHOD 8240 / 1,2-DCA-d4 = 100% / Toluene-d8 = 97% Blank contamination with 7 ppb MeCl2
9106-215	Reag. blank	N/A	N/A	N/A	N/A	7/14/91	water	114	METHOD 8240 / 1,2-DCA-d4 = 100% / Toluene-d8 = 97% Blank contamination with 9 ppb MeCl2
9106-215-5	CP-G-EW-11	6/19/91	6/20/91	X	N/A	6/27/91	water	108	METHOD 8240 / 1,2-DCA-d4 = 105% / Toluene-d8 = 104% Dilution factor = 100 MeCl2 found at ~186X level of blank contamination
9106-215-5	CP-G-EW-11	6/19/91	6/20/91	X	N/A	7/14/91	water	124*	METHOD 8240 / 1,2-DCA-d4 = 121%* / Toluene-d8 = 116%* Repeat analysis w/ no dilution performed outside of hold time MeCl2 found at same level as blank contamination
9106-215-6	CP-G-EW-11A	6/19/91	6/20/91	X	N/A	6/28/91	water	100	METHOD 8240 / 1,2-DCA-d4 = 100% / Toluene-d8 = 95% Dilution factor = 100 MeCl2 found at ~157X level of blank contamination
9106-215-6	CP-G-EW-11A	6/19/91	6/20/91	X	N/A	7/14/91	water	125*	METHOD 8240 / 1,2-DCA-d4 = 146%* / Toluene-d8 = 121%* Repeat analysis w/ no dilution performed outside of hold time MeCl2 found at same level as blank contamination
9106-215-8	T062091 (Blank)	N/A	6/20/91	X	N/A	6/28/91	water	100	METHOD 8240 / 1,2-DCA-d4 = 100% / Toluene-d8 = 94% MeCl2 found at ~6.3X level of blank contamination
9106-215-12	CP-G-EW-3	6/19/91	6/20/91	X	N/A	6/28/91	water	99	METHOD 8240 / 1,2-DCA-d4 = 102% / Toluene-d8 = 96% Dilution factor = 100 MeCl2 found at ~20X level of blank contamination
9106-215-12	CP-G-EW-3	6/19/91	6/20/91	X	N/A	7/14/91	water	123*	METHOD 8240 / 1,2-DCA-d4 = 125%* / Toluene-d8 = 118%* Repeat analysis w/ no dilution performed outside of hold time MeCl2 found at same level as blank contamination

** EPA Method 8020 unless otherwise specified in comments section.

TABLE G-10
SUMMARY OF QA/QC SURROGATE RESULTS
VOLATILES AND PURGEABLE AROMATICS ANALYSES**
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	COC	Date Extracted	Date Analyzed	Matrix	Surrogate Recovery, % Bromofluorobenzene	Comments
	QC Limits						soil water	74-121 86-115	
9106-215-13	CP-G-EW-9	6/19/91	6/20/91	X	N/A	6/28/91	water	99	METHOD 8240 / 1,2-DCA-d4 = 99% / Toluene-d8 = 95% Dilution factor = 100 MeCl2 found at ~186X level of blank contamination
9106-215-13	CP-G-EW-9	6/19/91	6/20/91	X	N/A	7/14/91	water	135*	METHOD 8240 / 1,2-DCA-d4 = 171%* / Toluene-d8 = 120%* Repeat analysis w/ dilution = 5 performed outside of hold time MeCl2 found at ~16X level of blank contamination
9106-215-16	CP-G-B	6/19/91	6/20/91	X	N/A	6/28/91	water	106	METHOD 8240 / 1,2-DCA-d4 = 112% / Toluene-d8 = 105% MeCl2 found at ~1.7X level of blank contamination Contamination of field blank with 23 ppb Chloroform

8/28/91

* Surrogate recovery outside of EPA method limits

** EPA Method 8020 unless otherwise specified in comments section.

TABLE G-11
SUMMARY OF QA/QC RECOVERY AND CHECK STANDARD RESULTS
VOLATILES AND PURGEABLE AROMATICS ANALYSES*
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID			9101-156	9101-180-11	9101-169 9101-180 9101-189-11	9103-101 9103-127-7
Sample ID	QC Limits	QC Limits	Blank Spike	Field blank	?	?
Date Sampled				1/23/91	?	?
Date Received				1/24/91	?	?
Date Extracted				N/A	1/26/91	N/A
Date Analyzed				1/25/91	1/29/91	3/19/91
Matrix	Water	Soil	Soil	Water	Soil	Water
Benzene						
Spike, %	70-121 (8020)	59-120 (8020)	88	95	86	97
Spike Duplicate, %	67-126 (8240)	66-142 (8240)		95	82	101
Relative Percent Difference	20 (8020) / 23 (8240)	20 (8020) / 21 (8240)		0	5	4
Chlorobenzene						
Spike, %	69-122 (8020)	63-120 (8020)	98	94	91	94
Spike Duplicate, %	74-120 (8240)	59-132 (8240)		95	88	102
Relative Percent Difference	20 (8020) / 21 (8240)	20 (8020) / 19 (8240)		1	3	8
Toluene						
Spike, %	56-135 (8020)	61-120 (8020)	99	100	88	93
Spike Duplicate, %	68-123 (8240)	57-134 (8240)		99	84	96
Relative Percent Difference	20 (8020) / 30 (8240)	20 (8020) / 20 (8240)		1	4	4
Total Xylenes						
Spike, %	62-128 (8020)	34-144 (8020)	130	95	91	
Spike Duplicate, %				95	88	
Relative Percent Difference	20 (8020)	20 (8020)		1	4	
1,1-Dichloroethene						
Spike, %	57-133 (8240)	59-148 (8240)				90
Spike Duplicate, %						94
Relative Percent Difference	24 (8240)	22 (8240)				5
Trichloroethene						
Spike, %	64-127 (8240)	64-130 (8240)				92
Spike Duplicate, %						97
Relative Percent Difference	23 (8240)	25 (8240)				4
COMMENTS			METHOD 8020	METHOD 8020	METHOD 8020	METHOD 8240

8/27/91

* EPA method 8020 unless otherwise specified in comments section.

TABLE G-11
SUMMARY OF QA/QC RECOVERY AND CHECK STANDARD RESULTS
VOLATILES AND PURGEABLE AROMATICS ANALYSES*
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	9103-158	9103-158	9103-158 9103-140-2	9103-144 9103-123	9103-144 9103-098-8	9106-199 9106-203-12	9106-215 9106-189-8
Sample ID	1033343-02	Blank Spike	?	T031491	?	?	?
Date Sampled	?	N/A	?	N/A	?	?	?
Date Received	?	N/A	?	3/14/91	?	?	?
Date Extracted	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Date Analyzed	3/29/91	3/27/91	3/20/91	3/22/91	3/25/91	6/26/91	6/27/91
Matrix	Water	Water	Poduct	Water	Water	Water	Water
Benzene							
Spike, %	90	98	97	105	112	114	98
Spike Duplicate, %	97		93	101	108	112	96
Relative Percent Difference	8		4	4	4	1	2
Chlorobenzene							
Spike, %	97	103	97	108	109	102	95
Spike Duplicate, %	101		94	104	106	95	91
Relative Percent Difference	4		3	4	3	7	4
Toluene							
Spike, %	92	100	98	99	108	107	94
Spike Duplicate, %	97		95	99	106	100	92
Relative Percent Difference	5		2	0	2	4	2
Total Xylenes							
Spike, %			98				
Spike Duplicate, %			94				
Relative Percent Difference			4				
1,1-Dichloroethene							
Spike, %	70	93		92	98	90	85
Spike Duplicate, %	77			86	91	85	82
Relative Percent Difference	10			7	8	6	4
Trichloroethene							
Spike, %	92	103		102	106	107	97
Spike Duplicate, %	95			98	100	99	92
Relative Percent Difference	3			4	6	8	5
COMMENTS	METHOD 8240	METHOD 8240	METHOD 8020	METHOD 8240	METHOD 8240	METHOD 8240	METHOD 8240

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* EPA method 8020 unless otherwise specified in comments section.

TABLE G-12
RPDs FOR DUPLICATE SAMPLE RESULTS
VOLATILE ANALYSIS
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

VOLATILES	CP-G-EW-11 03/14/91 ug/L		CP-G-EW-11R 03/14/91 ug/L		RPD	CP-G-EW-11 06/19/91 ug/L		CP-G-EW-11A 06/19/91 ug/L		RPD	CP-G-EW-11* 06/19/91 ug/L		CP-G-EW-11A* 06/19/91 ug/L		RPD
Acetone	11		<10		NC/ND	<1000		<1000		NC/ND	6	J	9	J	40
Benzene	2		<1		NC/ND	<100		<100		NC/ND	2	J	3	J	40
Bromodichloromethane	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Bromoform	<5		<5		NC/ND	<500		<500		NC/ND	<5	UJ	<5	UJ	NC/ND
Bromomethane	<10		<10		NC/ND	<1000		<1000		NC/ND	<10	UJ	<10	UJ	NC/ND
2-Butanone	<10		<10		NC/ND	<1000		<1000		NC/ND	<10	UJ	<10	UJ	NC/ND
Carbon Disulfide	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Carbon Tetrachloride	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Chlorobenzene	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Chloroethane	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Chloroform	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Chloromethane	<10		<10		NC/ND	<1000		<1000		NC/ND	<10	UJ	<10	UJ	NC/ND
Dibromochloromethane	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
1,1-Dichloroethane	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
1,2-Dichloroethane	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
1,1-Dichloroethene	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
1,2-Dichloroethene (Total)	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
1,2-Dichloropropane	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Cis-1,3-Dichloropropene	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Trans-1,3-Dichloropropene	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Ethylbenzene	86		10		158	<100		<100		NC/ND	78	J	87	J	11
2-Hexanone	<10		<10		NC/ND	<1000		<1000		NC/ND	<10	UJ	<10	UJ	NC/ND
4-Methyl-2-Pentanone	<10		<10		NC/ND	<1000		<1000		NC/ND	<10	UJ	<10	UJ	NC/ND
Methylene Chloride	<5		6	BU	NC/ND	1300	B	1100	B	17	5	BU	7	BU	33
Styrene	75		8		161	<100		<100		NC/ND	72	J	80	J	11
1,1,2,2-Tetrachloroethane	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Tetrachloroethene	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Toluene	35		4		159	<100		<100		NC/ND	36	J	41	J	13
1,1,1-Trichloroethane	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
1,1,2-Trichloroethane	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Trichloroethene	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Vinyl Acetate	<10		<10		NC/ND	<1000		<1000		NC/ND	<10	UJ	<10	UJ	NC/ND
Vinyl Chloride	<1		<1		NC/ND	<100		<100		NC/ND	<1	UJ	<1	UJ	NC/ND
Total Xylenes	280		33		158	160		160		0	260	J	290	J	11

NC/ND – Not calculable as at least one of the results involved was a non-detect

* – Repeat analysis run outside of sample holding time

TABLE G-13
SUMMARY OF QA/QC SURROGATE RESULTS
PESTICIDES AND PCB ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	Chain of Custody	Date Extracted	Date Analyzed	Matrix	Surrogate Recoveries		Comments
								Decachlorobiphenyl	Dibutylchlorendate	
9102-015	Reag. blank	N/A	N/A	N/A	2/21/91	2/23/91	Water	148 *	80	
9102-015	CP-D-EW-1	2/1/91	2/2/91	X	2/21/91	2/22/91	Water	76	55	Sample hold time exceeded.
9103-123	Reag. blank	N/A	N/A	N/A	3/20/91	3/29/91	Water	93	83	
9103-123-10	CP-G-EW-3	3/13/91	3/14/91	X	3/20/91	4/7/91	Water	124	58	Detection limits raised slightly due to decreased sample volume.
9103-123-14	CP-G-EW-6	3/13/91	3/14/91	X	3/20/91	3/30/91	Water	111	86	Detection limit raised slightly due to decreased sample volume.
9103-123-16	CP-G-B	3/13/91	3/14/91	X	3/20/91	3/30/91	Water	57	51	
9103-220	Reag. blank	N/A	N/A	N/A	3/27/91	3/29/91	Water	132 *	101	Surrogate outside of QAPP limits, but not outside current lab QA/QC limits
9103-220-1	CP-G-AG-5S	3/22/91	3/22/91	X	3/27/91	3/29/91	Water	118	89	
9103-220-2	CP-G-B	3/22/91	3/22/91	X	3/27/91	3/29/91	Water	110	95	
9103-220-3	CP-DI	3/22/91	3/22/91	X	3/27/91	3/29/91	Water	41 *	32	Surrogate outside of QAPP limits, but not outside current lab QA/QC limits
9103-158	Reag. blank	N/A	N/A	N/A	4/5/91	4/7/91	Non-Aqueou	109	82	
9103-158-2	CP-L-EW-1	3/15/91	3/16/91	X	4/5/91	4/11/91	Product	* *	143	Dilution factor = 10 for all Dilution factor = 500 for Lindane Surrogate out of limits due to matrix interference. Sample hold time exceeded.
9103-144	Reag. blank	N/A	N/A	N/A	3/21/91	3/25/91	Water	111	80	
9103-144-4	CP-G-EW-9	3/14/91	3/15/91	X	3/21/91	3/26/91	Water	125	88	

TABLE G-13
SUMMARY OF QA/QC SURROGATE RESULTS
PESTICIDES AND PCB ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID	Sample ID	Date Sampled	Date Received	Chain of Custody	Date Extracted	Date Analyzed	Matrix	Surrogate Recoveries		Comments
								Decachlorobiphenyl	Dibutylchlorendate	
9103-144-5	CP-G-EW-11	3/14/91	3/15/91	X	3/21/91	3/26/91	Water	47	41	
9103-144-6	CP-G-EW-11R	3/14/91	3/15/91	X	3/21/91	3/26/91	Water	39	31	
9103-144-12	CP-G-B	3/14/91	3/15/91	X	3/21/91	3/26/91	Water	104	78	
9103-123	Reag. blank	N/A	N/A	N/A	3/20/91	3/29/91	Water	93	83	
9103-123-10	CP-G-EW-3	3/13/91	3/14/91	X	3/20/91	4/7/91	Water	124	58	Detection limits raised slightly due to decreased sample volume (13-20%)
9103-123-14	CP-G-EW-6	3/13/91	3/14/91	X	3/20/91	3/30/91	Water	111	86	Detection limits raised slightly due to decreased sample volume (28-30%)
9103-123-16	CP-G-B	3/13/91	3/14/91	X	3/20/91	3/30/91	Water	57	51	
9106-199	Reag. blank	N/A	N/A	N/A	6/25/91	7/8/91	Water	104	94	
9106-199-5	CP-G-EW-6	6/18/91	6/19/91	X	6/25/91	7/9/91	Water	92	77	
9106-199-8	CP-G-AG-5S	6/18/91	6/19/91	X	6/25/91	7/9/91	Water	88	72	
9106-215	Reag. blank	N/A	N/A	N/A	6/26/91	7/8/91	Water	122	105	
9106-215-5	CP-G-EW-11	6/19/91	6/20/91	X	6/26/91	7/18/91	Water	* *	* *	Dilution factor = 500 due to PCP concentrations
9106-215-6	CP-G-EW-11A	6/19/91	6/20/91	X	6/26/91	7/18/91	Water	* *	* *	Dilution factor = 500 due to PCP concentrations
9106-215-12	CP-G-EW-3	6/19/91	6/20/91	X	6/26/91	7/17/91	Water	96	* *	Dilution factor = 20 due to PCP concentrations
9106-215-13	CP-G-EW-9	6/19/91	6/20/91	X	6/26/91	7/17/91	Water	73	82	Dilution factor = 100 due to PCP concentrations
9106-215-16	CP-G-B	6/19/91	6/20/91	X	6/26/91	7/9/91	Water	96	90	

TABLE G-14
SUMMARY OF QA/QC C SPIKE RECOVERY AND CHECK STANDARD RESULTS
PESTICIDES AND PCB
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID		9102–015	9102–015	9103–123	9103–220–1	9103–220	9103–158	9103–144	9103–123	9106–199	9106–199	9106–215
Sample ID	QC Limits	CP–D–EW–1	Blank Spike	Blank Spike	CP–G–AG–5S	Blank Spike	Blank Spike	Blank Spike	Blank Spike	9106–203–12	Blank Spike	Blank Spike
Date Sampled		2/1/91	N/A	N/A	3/22/91	N/A	N/A	N/A	N/A	?	N/A	N/A
Date Received		2/2/91	N/A	N/A	3/22/91	N/A	N/A	N/A	N/A	?	N/A	N/A
Date Extracted		2/21/91	2/21/91	3/20/91	3/27/91	3/27/91	4/5/91	3/21/91	3/20/91	3/20/91	6/25/91	6/26/91
Date Analyzed		2/22/91	2/23/91	3/29/91	3/29/91	3/29/91	4/7/91	3/26/91	3/29/91	3/29/91	7/8/91	7/8/91
Gamma–BHC (Lindane)												
Spike, %	45–120	175 (1)	91	60	80	62	104	73	60	78	75	78
Spike Duplicate, %					79		104	62			74	
Relative Percent Difference	20				1		0	17			1	
Heptachlor												
Spike, %	43–120	90	100	70	53	70	109	87	70	73	86	85
Spike Duplicate, %					46		109	75			86	
Relative Percent Difference	20				14		0	14			0	
Aldrin												
Spike, %	44–120	160 (1)	87	53	38 *	57	101	63	53	53	79	78
Spike Duplicate, %					32 *		101	52			81	
Relative Percent Difference	20				17		0	20			1	
Dieldrin												
Spike, %	45–125	103	98	76	62	87	102	90	76	90	106	103
Spike Duplicate, %					56		102	76			108	
Relative Percent Difference	20				10		0	17			2	
Endrin												
Spike, %	57–135	104	95	76	66	89	98	92	76	114	113	111
Spike Duplicate, %					60		99	78			118	
Relative Percent Difference	20				10		2	16			4	
P,P'–DDT												
Spike, %	32–120	121	87	70	46	86	102	85	70	92	98	104
Spike Duplicate, %					36		100	64			104	
Relative Percent Difference	20				25 *		1	28 *			7	
COMMENTS												

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(1) Out of Limits due to Matrix Interference

(2) MQLs 3X higher than water MQLs

TABLE G-15
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
METALS ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID		9101–082		9101–156		9101–180		9101–180		9101–134		9103–101		9103–123		9103–144		9103–263		9103–158		9106–199		9106–215	
Date Sampled	QC Limits	1/11/90		1/30/91		1/23/91		1/23/91		1/18/91		3/12/91		3/13/91		3/14/91		3/27/91		3/15/91		6/18/91		6/19/91	
Date Received		1/11/90		1/31/91		1/24/91		1/24/91		1/19/91		3/13/91		3/14/91		3/15/91		3/27/91		3/16/91		6/19/91		6/20/91	
Reagent Blank		OK		OK		OK		OK		OK*		OK		OK		OK		OK		OK		OK		OK	
Matrix Spike(s)		9101–083–6		9101–156–12		9101–180–11		9101–180–10	1	9101–134–12	1	9103–144–4	1	9103–123–16	1	9103–144		9103–263–6	1	9103–092–1	1	106437–03	1	CP–G–EW–3	1
		9101–083–10		9101–195–12				9101–195–12	2	9101–156–10	2	9103–144–12	2	9103–144–12	2			9104–184–6	2	9103–158–2	2	106418–06	2	CP–G–B	2
								9101–156–10	3					9103–265–10	3					9103–275–4	3	106385–07	3	106469–04	3
														9104–002–1	4					9105–121–2	4	106412–04	4		
																						106444–05	5		
																						106437–05	6		
Matrix		soil		soil		soil		soil		soil		water		water		water		soil		product		water		water	
Aluminum																									
Date Prepared		1/21/91		2/12/90		2/14/91		2/14/91		2/1/91		4/3/91		4/3/91		4/3/91		4/15/91		3/28/91		6/26/91		6/26/91	
Date Analyzed		2/7/91		2/20/91		2/27/91		2/20/91		2/17/91		4/12/91		4/12/91		4/12/91		4/19/91		5/10/91		6/26/91		6/26/91	
RPD		8		10/0		6		0	2	2	1	0	2	0	2	0		0		5	1	NC/ND	1	NC/ND	1
MS Recovery, %		NA				100		NA	2	NA		92	2	92	2	92		*		90		85		85	
BS Recovery, %		90		86		119		86		119								117							
Antimony																									
Date Prepared		1/15/91		2/12/90		2/14/91		2/14/91		2/1/91		4/3/91		4/3/91		4/3/91		4/15/91		3/28/91		6/26/91		6/26/91	
Date Analyzed		1/29/91		2/20/91		2/18/91		2/27/91		2/17/91		4/4/91		4/20/91		4/18/91		4/20/91		5/10/91		6/30/91		6/26/91	
RPD	30	0		0		0		0	1	0		NC/ND	1	57	3	NC/ND		NC/ND		NC/ND	1	NC/ND	1	NC/ND	1
MS Recovery, %	50–150	67		107		110		91	1	118		104	1	112	3	88		108		89	2	90		90	
Arsenic																									
Date Prepared		1/15/91		2/12/90		2/14/91		2/14/91		2/1/91		4/3/91		4/3/91		4/3/91		4/15/91		3/28/91		6/26/91		6/26/91	
Date Analyzed		1/23/91		2/20/91		2/25/91		2/20/91		2/17/91		4/12/91		4/11/91		4/11/91		4/24/91		5/10/91		6/26/91		6/30/91	
RPD	30	4		0		0		0	1	0		NC/ND	1	NC/ND	1	NC/ND		0		NC/ND	1	0	2	NC/ND	2
MS Recovery, %	56–122	85		72		94		97	1	NA		102	1	102	1	100		89		111	2	75		100	
BS Recovery, %	0.5					80				80															
Barium																									
Date Prepared		1/15/91		2/12/90		2/14/91		2/14/91		2/1/91		4/3/91		4/3/91		4/3/91		4/15/91		5/29/91		6/26/91		6/26/91	
Date Analyzed		1/30/91		2/20/91		2/27/91		2/20/91		2/17/91		4/12/91		4/12/91		4/12/91		4/19/91		6/4/91		6/26/91		6/26/91	
RPD	30	20		6		40		6	2	0		0	2	0	2	0		2		1	4	0	1	0	1
MS Recovery, %	58–142	95		72		107		72	2	90		94	2	94	2	94		88		103		90		90	
Beryllium																									
Date Prepared		1/15/91		2/12/90		2/14/91		2/14/91		2/1/91		4/3/91		4/3/91		4/3/91		4/15/91		3/28/91		6/26/91		6/26/91	
Date Analyzed		1/25/91		2/20/91		2/27/91		2/20/91		2/17/91		4/12/91		4/12/91		4/12/91		4/19/91		5/10/91		6/26/91		6/26/91	
RPD	30	0		0		0		0	2	0		NC/ND	2	NC/ND	2	NC/ND		NC/ND		NC/ND	1	NC/ND	1	NC/ND	1
MS Recovery, %	70–115	100		104		98		104	2	NA		81	2	81	2	81		69		78,92	1,4	90		90	
BS Recovery, %						112				112															
Cadmium																									
Date Prepared		1/15/91		2/12/90		2/14/91		2/14/91		2/1/91		4/3/91		4/3/91		4/3/91		4/15/91		3/28/91		6/26/91		6/26/91	
Date Analyzed		1/16/91		2/20/91		2/25/91		2/20/91		2/17/91		4/3/91		4/8/91		4/8/91		4/19/91		5/10/91		6/26/91		6/26/91	
RPD	30	17		0		0		0	2	0		NC/ND	1	NC/ND	2	NC/ND		4		NC/ND	1	NC/ND	1	NC/ND	1
MS Recovery, %	57–129	97		61		100		61	2	NA		115	1	130	2	130		79		92	2	85		85	
BS Recovery, %						89				89															

TABLE G-15
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
METALS ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID		9101–082	9101–156	9101–180	9101–180	9101–134	9103–101	9103–123	9103–144	9103–263	9103–158	9106–199	9106–215
Calcium													
Date Prepared		1/15/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	5/29/91	6/26/91	6/26/91
Date Analyzed		1/31/91	2/20/91	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	6/4/91	7/2/91	7/2/91
RPD	30	12	0	15	0 2	14	2 2	2 2	2	1	0 4	0 3	29 2
MS Recovery, %	75–125	NA	NA	NA	NA 2	NA	87 2	88 2	88	N/A	N/A	88	91
BS Recovery, %		105	126	109	126	109							
Chromium													
Date Prepared		1/15/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		1/30/91	2/20/91	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	5/10/91	6/26/91	6/26/91
RPD	30	3	0	0	0 2	6	NC/ND 2	NC/ND 2	NC/ND	0	NC/ND 1	NC/ND 1	NC/ND 1
MS Recovery, %	68–116	90	64	105	64 2	89	96 2	96 2	96	80	100,96 1,2	85	85
Cobalt													
Date Prepared		1/21/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		2/7/91	2/20/91	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	5/10/91	6/26/91	6/26/91
RPD		11	0	0	0 2	0	NC/ND 2	NC/ND 2	NC/ND	2	NC/ND 1	NC/ND 1	NC/ND 1
MS Recovery, %		88	64	102	64 2	81	91 2	91 2	91	81	100,92 1,2	88	88
BS Recovery, %								84	84				
Copper													
Date Prepared		1/15/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	5/29/91	6/26/91	6/26/91
Date Analyzed		1/18/91	2/20/91	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	6/4/91	6/26/91	6/26/91
RPD	30	7	0	0	0 2	12	0 2	0 2	0	0	6 4	NC/ND 1	NC/ND 1
MS Recovery, %	65–115	75	75	90	75 2	88	70 2	70 2	70	92	95,90 4,2	90	90
Iron													
Date Prepared		1/15/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	5/29/91	6/26/91	6/26/91
Date Analyzed		1/30/91	2/20/91	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	6/4/91	7/2/91	7/2/91
RPD	30	0	1	9	1 2	1	12 2	12 2	12	0	0 4	13 3	NC/ND 2
MS Recovery, %	71–115	NA	NA	112	NA 2	NA	96 2	96 2	96	*	*	104	99
BS Recovery,%		90	116	89	116	89				106	101		
Lead													
Date Prepared		1/15/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		1/16/91	2/20/91	2/25/91	2/20/91	2/17/91	4/23/91	4/23/91	4/23/91	4/19/91	5/10/91	6/30/91	6/30/91
RPD	30	0	0	0	0 2	0	NC/ND 1	NC/ND 1	NC/ND	0	NC/ND 1	NC/ND 4	NC/ND 2
MS Recovery, %	57–141	100	68	104	68 2	NA	96 1	90 1	80	78	85 2	90	90
BS Recovery, %				103		103							
Magnesium													
Date Prepared		1/15/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	5/29/91	6/26/91	6/26/91
Date Analyzed		1/31/91	2/20/91	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	6/4/91	7/2/91	7/2/91
RPD	30	0	3	0	1 2	0	0 2	0 2	0	3	9 4	0 3	0 2
MS Recovery, %	75–125	NA	NA	NA	NA 2	NA	89 2	89 2	89	N/A	N/A	103	102
BS Recovery, %		101	78	91	78	91							
Manganese													
Date Prepared		1/15/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	5/29/91	6/26/91	6/26/91
Date Analyzed		1/30/91	2/20/91	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	6/4/91	6/26/91	6/26/91
RPD	30	8	0	0	0 2	0	0 2	0 2	0	5	0 4	0 1	0 1
MS Recovery, %	75–125	81	108	106	108 2	86	91 2	92 2	92	67	95	87	87

TABLE G-15
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
METALS ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID		9101-082	9101-156	9101-180	9101-180	9101-134	9103-101	9103-123	9103-144	9103-263	9103-158	9106-199	9106-215
Mercury													
Date Prepared		1/15/91	2/12/90	2/20/91	2/14/91	2/1/91	4/12/91	4/3/91	4/3/91	4/29/91	4/9/91	6/26/91	6/26/91
Date Analyzed		1/17/91	2/20/91	2/20/91	2/15/91	2/15/91	4/12/91	4/12/91	4/12/91	4/29/91	4/9/91	6/28/91	6/28/91
RPD	30	0	0	0	0 2	0	NC/ND 1	NC/ND 4	NC/ND	NC/ND	NC/ND	NC/ND 5	NC/ND 3
MS Recovery, %	77–124	114	110	150	103 2	110	130 1	135 4	135	130	96	100	102
BS Recovery, %				125			115	115	115	98			
Molybdenum													
Date Prepared		1/21/91		2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		2/7/91	2/12/90	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	5/10/91	6/26/91	6/26/91
RPD		0	0	0	0 2	0	NC/ND 2	NC/ND 2	NC/ND	NC/ND	NC/ND 1	NC/ND 1	NC/ND 1
MS Recovery, %		84	127	96	127 2	72	95 2	95 2	95	92	125,104 1,2	88	88
Nickel													
Date Prepared		1/15/91		2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		1/18/91	2/12/90	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	5/10/91	6/26/91	6/26/91
RPD	30	7	0	0	0 2	0	NC/ND 2	NC/ND 2	NC/ND	7	NC/ND 1	0 1	0 1
MS Recovery, %	64–118	73	58	105	58 2	74	92 2	92 2	92	82	100,88 1,2	85	85
Potassium													
Date Prepared		1/15/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		1/31/91	2/20/91	2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	5/10/91	7/2/91	7/2/91
RPD	30	5	4	0	4 2	0	NC/ND 2	NC/ND 2	NC/ND	2	0 1	3 3	NC/ND 2
MS Recovery, %	75–125	NA	NA	NA	NA 2	NA				N/A	93 2	104	101
BS Recovery, %		99		98	78	98	127	128	128				
Selenium													
Date Prepared		1/15/91	2/12/90	2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		1/23/91	2/20/91	2/19/91	2/15/91	2/19/91	4/24/91	4/11/91	4/11/91	4/30/91	5/10/91	7/2/91	7/2/91
RPD	30	0	0	3	0 1	0	NC/ND 1	NC/ND 1	NC/ND	NC/ND	NC/ND 1	NC/ND 6	NC/ND 2
MS Recovery, %	51–123	120	87	88	94 1	82	88 1	64 1	76	48	119 2	83	83
Silver													
Date Prepared		1/15/91		2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		1/21/91	2/12/90	2/27/91	2/20/91	2/19/91	4/12/91	4/12/91	4/12/91	5/10/91	5/10/91	6/26/91	6/26/91
RPD	30	0	0	0	0 2	0	NC/ND 2	NC/ND 2	NC/ND	NC/ND	NC/ND 1	NC/ND 1	NC/ND 1
MS Recovery, %	61–115	76	84	NA	84 2	NA		79 2	79	86	88 2	90	90
BS Recovery, %				97		97	79						
Sodium													
Date Prepared		1/15/91		2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	5/29/91	6/26/91	6/26/91
Date Analyzed		1/31/91		2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	6/4/91	7/2/91	7/2/91
RPD	30	17	0	12	0 2	7	7 2	7 2	7	0	4 4	2 3	0 2
MS Recovery, %	75–125	NA	NA	NA	NA 2	NA	98 2	96 2	96	N/A	N/A	90	89
BS Recovery, %		98		80		80							
Thallium													
Date Prepared		1/15/91		2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		1/29/91		2/26/91	2/21/91	2/21/91	4/4/91	4/20/91	4/22/91	4/22/91	5/7/91	7/1/91	7/1/91
RPD	30	0	0	0	0 3	0	NC/ND 1	NC/ND 3	NC/ND	NC/ND	NC/ND 2	NC/ND 2	NC/ND 2
MS Recovery, %	47–119	75	96	100	96 3	96	36 1	92 3	108	108	N/A	95	105
BS Recovery, %							96						

TABLE G-15
SUMMARY OF QA/QC SPIKE RECOVERY RESULTS
METALS ANALYSES
SUPPLEMENTAL SITE INVESTIGATION REPORT
CASCADE POLE SITE

ATI ID		9101–082	9101–156	9101–180	9101–180	9101–134	9103–101	9103–123	9103–144	9103–263	9103–158	9106–199	9106–215
Vanadium													
Date Prepared		1/21/91		2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	3/28/91	6/26/91	6/26/91
Date Analyzed		2/7/91		2/27/91	2/20/91	2/17/91	4/12/91	4/12/91	4/12/91	4/19/91	5/10/91	6/26/91	6/26/91
RPD	30	8	0	0	0 2	5	NC/ND 2	NC/ND 2	NC/ND	3	NC/ND 1	NC/ND 1	NC/ND 1
MS Recovery, %	66–115	85	64	96	64 2	90	93 2	93 2	93	75	117,112 1,2	88	88
Zinc													
Date Prepared		1/15/91		2/14/91	2/14/91	2/1/91	4/3/91	4/3/91	4/3/91	4/15/91	5/29/91	6/26/91	6/26/91
Date Analyzed		1/17/91		2/27/91	2/20/91	2/21/91	4/12/91	4/12/91	4/12/91	4/19/91	6/4/91	7/2/91	7/2/91
RPD		15	0	0	0 2	33	15 2	15 2	15	2	2 4	NC/ND 3	NC/ND 1
MS Recovery, %		74	69	120	69 2	82	95 2	95 2	95	93	95	101	84
COMMENTS		Samples: CP-S-EW-1-A CP-S-EW-1-D CP-S-EW-1-M	Samples: CP-S-EW-9-A CP-S-EW-9-D CP-S-EW-9-N	Trace Sodium in Soil Blank Used field blank as Matrix Spike Samples: FB12391	Samples: CP-S-EW-11-A CP-S-EW-11-D CP-S-EW-11-M CP-S-EW-11-Q	Blank Contamination with Calcium (62 ppb MQLs for At and As 10X Method MQLs Samples: CP-S-EB-11-A CP-S-EB-11-D CP-S-EW-8-A CP-S-EW-8-E CP-S-EW-8-M	Mercury hold time exceeded by 3 day Samples: CP-G-AG-15S	Mercury hold time exceeded by 2 day Samples: CP-G-EW-3 CP-G-EW-6 CP-G-B	Mercury hold time exceeded by 2 days Samples: CP-G-EW-9 CP-G-EW-11 CP-G-EW-11R CP-G-B	Samples: CP-S-ES-1 CP-S-ES-2	Samples: CP-L-EW-1	Samples: CP-G-EW-6 CP-G-AG-5S	Samples: CP-G-EW-11 CP-G-EW-11A CP-G-EW-3 CP-G-EW-9 CP-G-B

8/27/91

APPENDIX G

ATTACHMENT A

CONTROL LIMITS

METHOD 8040

CHLORINATED PHENOLS BY GC/ECD (DERIVITIZED)

EFFECTIVE SEPTEMBER 1, 1991

SOIL SPIKE RECOVERY	% RECOVERY	RPD
2-Chlorophenol	0 - 109	62
2,4-Dichlorophenol	27 - 167	42
Pentachlorophenol	17 - 112	45
Tetrachlorophenol	48 - 216	33
2,4,5-Trichlorophenol	2 - 92	48
2,4,6-Trichlorophenol	15 - 99	44

These control limits were calculated from a limited number of data points from the same project. They should be viewed as advisory when applied to other projects.

APPENDIX G

ATTACHMENT B

David MacLean
6422 Alloway Court
Springfield, VA 22152
July 7, 1991

Ms. Lisa McLaughlin.
Environmental Science and Engineering
One Overlook Drive
Unit 16
Amherst, NH 03031

RE: Contract Work Assignment
Project #: 4905034 SDG #:
Lab Name: Triangle Laboratories
Site Name: Cascade Pole Site
Dioxins: soil; CP-S-EB-3-A, CP-S-EB-3-B, CP-S-EW-1-D, CP-S-EW-1-G, CP-S-EB-4-A, CP-S-EB-4-C, CP-S-EB-8A, CP-S-EB-11-D, CP-S-EB-11-H, CP-S-ES-1, CP-S-ES-2, CP-S-EW-7A, CP-S-EW-7E, CP-S-EW-9A, CP-S-EW-9G, CP-S-EW-11-A CP-S-EW-11-H, CP-S-EW-11-O, CP-S-EW-11-I, product: CP-L-EW-1, CP-D-EW-3,

Dear Ms McLaughlin:

A validation was performed on the dioxin, polychlorinated dibenzodioxins and dibenzofurans (PCDD and PCDF), analytical data from 19 soil and two liquid "product" samples collected by ESE at the Cascade Pole Site (CPL). The data were evaluated based on the following parameters specified in the Final Quality Assurance Project Plan (QAPP) and Final Data Management Plan, October 17, 1990 as designated from the following list. The QAPP specifies that items on the following list marked L are the responsibility of the laboratory and not included in this data validation.

_x_data completeness
_x_sample traffic
_x_holding times
___performance evaluation samples
_L_initial calibrations
_x_continuing calibrations (check standards)
_L_retention time markers
___laboratory (method) blanks
___field blanks
___internal, surrogate, and recovery standard recoveries
___matrix spike/matrix spike duplicate
___field duplicates
_L_daily column chromatography
_L_recovery standard area
_L_peak resolution
_L_toxic equivalent factor
_x_sample analysis
_x_compound identification

___compound quantitation
_x_detection limits
_x_appropriate choice of method
x - All criteria were met for this parameter

The laboratory used PCDD/PCDF modified by use of additional standards draft and not officially promulgated SW-846 method 8290, October, 1989 "Determination of Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans by High Resolution Gas Chromatography/High Resolution Mass Spectrometry". This method is a not yet EPA promulgated high resolution GCMS dioxin draft method which laboratories have used as written but with different performance and QA/QC limits for several years. The laboratory reported that many laboratories use data management SOP's and performance and QA/QC criteria from EPA promulgated SW-846 8290 and EPA 1613 draft high resolution GCMS dioxin methods for data generated by this method.

The data package was evaluated with guidance from Standard Practice, "Data Validation: Dioxin Analysis" No. ESAT-01-007, Date 4-1-88 DRAFT by Weston ESAT Division obtained from Region I EPA, the validation criteria in the QAPP, Final Data Management Plan, draft EPA Method 8290, and "Polychlorinated Dibenzodioxins and Dibenzofurans Data User Manual" by Triangle Laboratories (TLI). The information in the TLI Data User Manual comes from methods 8290, 1613, and 23 (air only) Methods and TLI experience in PCDD and PCDF analysis. This reviewer recently assessed TLI for accreditation by the American Association for Laboratory Accreditation.

DATA COMPLETENESS

All items required to document the factors listed above as applied to the samples analyzed were in the data package.

SAMPLE TRAFFIC

Shipment of samples from Analytical Technologies Inc. (ATI), receipt at TLI, and internal sample transfers, extractions, spikes and analyses within TLI were completely documented. Numerous QA/QC checks by persons other than the analyst were signed off at TLI.

HOLDING TIMES

Method 8290 specifies that all samples must be extracted and analyzed within 30 and 45 days respectively after collection versus six months holding time for soils specified in the QAPP. TLI analyzed extracted and analyzed all samples within six and 20 days respectively after receipt at TLI. The samples were stored in the laboratory in the dark at a temperature above freezing as required in method 8290.

PERFORMANCE EVALUATION SAMPLES

No external Performance Evaluation Samples were submitted to TLI with the samples from CPL.

CALIBRATIONS

All continuing calibrations (check standards) met method 8290 requirements for absolute value of RRF's and % deviation (%D <25 or 30%) from the respective average RRF of the corresponding initial calibrations.

LABORATORY (METHOD) BLANKS

Laboratory (method) Blanks consisting of sodium sulfate for solid matrices and water for aqueous matrices were analyzed with each sample batch. With two exceptions no blank contained more than TLI allowed amount of more than 1/3 the Theoretical Method Quantitation Limit (TMQL) or more than 5% of the analyte concentration in any associated sample. The two exceptions were two laboratory blanks containing .18 ppb OCDD and .02 ppb OCDF. A less stringent requirement applies to acceptable concentrations of HPCDD's, HPCDF's, OCDD, and HCDD's in laboratory blanks. The reviewer noted small OCDD concentrations in several laboratory blanks.

Associated samples: CP-S-EW-11-A CP-S-EW-11-H, CP-S-EW-11-O, CP-S-EW-11-I

Action: No action was taken because the concentration of OCDD and OCDF in the blanks was sufficiently small not to effect sample results.

FIELD BLANK

This reviewer did not identify any sample as a field blank which could be used as a Field Blank to determine environmental background and for analyte fortification and analysis. There was no rinsate blank (field equipment blank) to verify absence of contamination of field sampling equipment in this SDG.

INTERNAL, SURROGATE, and RECOVERY STANDARD RECOVERIES

IS Compound	Recovery%	Code	Associated Samples
13C12-789HxCDF	35.6	A	CP-D-EW-3
13C12-789HpCDF	32.6	B	CP-D-EW-3
13C12OCDD	158	C	CP-D-EW-3
13C12OCDD	149	C	CP-S-ES-2
13C12OCDD	36.2*	C	CP-S-EB-8A
13C12OCDD	184*	C	CP-L-EW-1

Associated Analytes

A: 123678HxCDD, 123478HxCDD,

B: 123678HxCDF, 123478HxCDF, 123789HxCDF, 234678HxCDF,

C: OCDD, OCDF

Method 8290 specifies a recovery range of 40-120% recovery for internal standards (IS). The laboratory considers IS recoveries from 40-130% for tetra thru hexa PCDD's and PCDF's and 25-130% for hepta and octa PCDD's and PCDF's acceptable and has declared valid IS recoveries of <40 or 25% acceptable if the IS signal/noise ratio exceeds

10:1. All IS, Surrogate, and RS must meet mass ratio and retention time (RT) criteria.

Action: no action was taken because no standard was invalidated on % recovery alone.

* The mass ratio was outside the acceptable range because of quantitative sample matrix interference to be discussed under Compound Quantitation.

Associated Samples: CP-S-EB-8A, CP-L-EW-1

Action: estimate positive (J) for OCDD and OCDF because mass ratio for this OCDD IS was outside the acceptable range for OCDD.

A more widespread problem which qualified data as estimated (J) was evidence of quantitative interference by unknown matrix constituents which increase or decrease observed standard or analyte HRGC/HRMS response. This problem will be discussed under Compound Quantitation.

MATRIX SPIKE, MATRIX SPIKE DUPLICATE

No sample for which an MS and MSD analysis were requested was reported with these samples. Therefore, there is no direct information of the effect of one or more sample matrices on the recovery of an added known amount of analyte to the samples. Usually an MS/MSD is required for each batch of samples or one MS/MSD per 20 samples whichever is more frequent. The laboratory observed that unknown matrix compounds created a quantitative interference by unknown matrix constituents which increased or decreased observed standard or analyte HRGC/HRMS response.

FIELD DUPLICATE

This reviewer was not able to identify any field duplicate samples in this SDG.

COMPOUND IDENTIFICATION

All analytes reported as identified were correctly identified based on retention time and ratio of masses.

The laboratory reported matrix related quantitative interferences which may be negative or positive in mass channels and at RT's for both analytes and standards.

COMPOUND QUANTITATION

The laboratory reported that unknown compounds in some samples either increased or decreased the observed HRGC/HRMS responses in the same mass channels and RT's of internal, surrogate, and recovery standards and analytes as follows.

Associated Compounds and samples are documented per the following codes in exhibit A

S - quantitative matrix interference with one or more

standards
A - quantitative matrix interference with analyte(s)

Action: estimate (J) all positive results because of observed quantitative matrix interference with one or more associated standards and/or specific analyte

The laboratory qualified concentrations of several analytes HPCDD's, HPCDF's, OCDD, and OCDF as minimum concentrations because their concentrations exceeded the calibration ranges of the HRGC/HRMS. Two samples were reanalyzed to bring the concentrations of these compounds into calibration range.

Associated compounds and samples are documented in exhibit A

M - HRGC/HRMS signal saturated, concentration reported is a minimum estimated value.

Action: estimate (J) all positive results for analytes whose concentrations exceed the the calibration ranges of the HRGC/HRMS.

When required results for 2378TCDD and 2378TCDF were confirmed on a different HRGC column designed to separate TCDF compounds.

When one or more results for an analyte in a specific sample were available, the following criteria were used to decide which result to list on the result tables.

Unqualified results were listed in preference to qualified results.

2378TCDF results on the DB-225 confirmation column were listed if results on this column were unqualified.

Results of analysis of the diluted samples were used for compounds whose concentrations exceeded the calibration ranges of the HRGC/HRMS in the undiluted samples.

DETECTION LIMITS

Detection limits specific to sample and analyte based on estimating analyte concentration which give a signal/noise ratio of 2.5 were calculated correctly per method 8290 and TLI Data User Manual.

All other QA/QC met performance criteria listed in the QAPP and Final Data Management Plan as described in EPA Method 8290 and the Data User Manual. Analytical results were validated against only the criteria listed in the QAPP and Final Data Management Plan. Documentation is enclosed in the form of data tables and exhibit A.

Sincerely,

David MacLean
Consulting Chemist

Sample Tracking Summary

Cascade Pole Site　　Project No 4905034

ESE Sample No	Date Received TLI	Date Extracted	Date Analyzed
CP-S- EW-1-D	1/15/91	1/16/91	2/3/91 © 2/6/91
CP-S- EW-1-G.	1/15/91	1/16/91	2/4/91 © 2/6/91
CP-S- EB-3-A	1/15/91	1/16/91	© 2/6/91 2/3/91 + 3/20/91
CP-S EB-3-B	1/15/91	1/16/91	2/4/91 © 2/6/91
CP-S- EB-4-A	1/16/91	1/17 91	2/7/91 © 2/8/91
CP-S- EB-4-C	1/16/91	1/17/91	2/7/91
CP-S- EB-8-A	1/19/91	1/24/91	2/13/91
CP-S- EB-11-D	1/22/91	1/24/91	2/8/91 © 2/12/91
CP-S- EB-11-H	1/22/91	1/24/91	2/8/91 © 2/13/91
CP-S- ES-1	4/2/91	4/2/91	4/17/91 © 4/28/91
CP-S- ES 2	4/2/91	4/2/91	4/23/91 © 4/28/91
CP-S- EW-7-A	1/24/91	1/29/91	2/15/91
CP-S- EW-7-E	1/24/91	1/29/91	2/17/91
CP-S- EW-9-A	1/24/91	1/29/91	2/17/91
CP-S- EW-9-G	1/24/91	1/29/91	2/17/91
CP-S- EW-11-A	1/26/91	1/31/91	© 2/23/91 2/14/91
CP-S- EW-11-H	1/26/91	1/31/91	© 2/23/91 2/14/91
CP-S- EW-11-O	1/26/91	1/31/91	© 2/23/91 2/14/91
CP-S EW-10-I	1-26-91	1/31/91	2/14/91
CP-L-EW'	3/22/91	3/26/91	© 4/4/91 4/2/3/91
CP-D- EW-3	3 22 3/3/91 DBm	3/22/91	© 3/27/91 3/26/91

QA/QC DATA SUMMARY FORM: ORGANICS Exhibit A

SOIL SAMPLES
(μg/Kg)

ite Name: Cascade Pole Site

4905034

ase #: ______ Sampling Date(s): Jan-Feb, 1991

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)

S - Quantitative matrix interference with standard
A - " " " with analyte
M - HRGC/HRMS signal saturated Jmin estimated

QL	COMPOUND									
	Sample No.	9101-065	9101-065	9101-082	9101-082	9101-096	9101-096	9101-128		
	Dilution Factor	-4	-5	-3	-4	-5	-6	-5		
	% Moisture									
	Location	CP-S-EB 3-A	CP-S-EB -3-B	CP-S-EW -1-D	CP-S-EW -1-G	CP-S-EB -4-A	CP-S-EB -4-C	CP-S-EB -8A		
	2378-TCDD			S						
	12378-PeCDD			S						
	123478-HxCDD				S					
	123678-HxCDD				S					
	123789-HxCDD	A	A	A	S	A		A		
	1234678-HpCDD				S			M		
	OCDD				S,M			M,A S		
	2378-TCDF			S						
	12378-PeCDF			S						
	23478-PeCDF									
	123478-HxCDF				S					
	123678-HxCDF				S					
	234678-HxCDF				S			A		
	123789-HxCDF				S					
	1234678-HpCDF			M	S					
	1234789-HpCDF				S					
	OCDF				S			S		
	Total TCDD			S						
	Total PeCDD			S				A		
	Total HxCDD			M	S					
	Total HpCDD			M	S,M			S		
	Total TCDF			S						
	Total PeCDF			S				A		
	Total HxCDF			M	S					
	Total HpCDF			M	S					

QA/QC ~~DATA~~ SUMMARY FORM: ORGANICS Exhibit A

SOIL SAMPLES
(µg/Kg)

ite Name: Cascade Pole Site
4905034
ase #: ______ Sampling Date(s): ______

S - Quantitative matrix interference with standard
A - " " " with analyte
M - HRGC/HRMS Signal saturated Jmin estimated

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)

QL										
	Sample No.	9101-134	9101-134	9103-263	9103-263	9101-156	9101-156-	9101-156	9101-156	
	Dilution Factor	1,0 -2	1,0 -3	1,0 -5	1,0 -6	1,0 -7	1,0 -8	1,0 -10	1,0 -13	
	% Moisture									
	Location	CP-S-EB -11-D	CP-S-EB -11-H	CP-S-ES -1	CP-S-ES -2	CP-S-EW -7A	CP-S-EW -7E	CP-S-EW -9A	CP-S-EW -9G	
	COMPOUND									
	2378-TCDD									
	12378-PeCDD									
	123478-HxCDD						S	S		
	123678-HxCDD						S	S		
	123789-HxCDD			A			S	S		
	1234678-HpCDD				M		S	A, S		
	OCDD			M	M		S	M, S		
	2378-TCDF									
	12378-PeCDF									
	23478-PeCDF						S	S		
	123478-HxCDF						S	S		
	123678-HxCDF						S	S		
	234678-HxCDF						S	S		
	123789-HxCDF						S	S		
	1234678-HpCDF						S	S		
	1234789-HpCDF						S	S		
	OCDF						S	S		
	Total TCDD									
	Total PeCDD			A						
	Total HxCDD						S	S		
	Total HpCDD				M		S	S		
	Total TCDF									
	Total PeCDF			A	A					
	Total HxCDF						S	S		
	Total HpCDF						S	S		

Page 3 of 3

QA/QC ~~DATA~~ SUMMARY FORM: ORGANICS Exhibit A

Site Name: Cascade Pole Site
4905034
Case #: ______ **Sampling Date(s):** ______

SOIL SAMPLES
(µg/Kg)

To calculate sample quantitation limit: (QL * Dilution Factor) / ((100 - % moisture)/100)

S - Quantitative matrix interference with standard
A " " " " analyte
M HRGC/HRMS signal saturated Jmin estimated

QL	Sample No., Dilution Factor % Moisture Location									
		9101-180	9101-180	9101-180	9101-169	9103=158	9102-015			
		1,0 -1	1,0 -4	1,0 - P	1,0 - 3	1,0 -2	10.0 - 2			
				EW	EW					
		CP-S-EW	CP-S-EW	CP-S-11	CP-S-10	CP-L-EW	CP-D-EW			
		-11-A	-11-H	11-O	10-I	1 -1	-3			
QL	COMPOUND									
	2378-TCDD	S	S							
	12378-PeCDD	S	S							
	123478-HxCDD			S			S, A			
	123678-HxCDD	M		S			S			
	123789-HxCDD			S		A	S			
	1234678-HpCDD	M	M	S, M		M	S, M			
	OCDD	M	M	S, M		M, S	M			
	2378-TCDF									
	12378-PeCDF	S	S							
	23478-PeCDF	S	S				A			
	123478-HxCDF			S			S, A			
	123678-HxCDF			S			S,			
	234678-HxCDF			S		A	S, A			
	123789-HxCDF			S			S, A			
	1234678-HpCDF	M,		S			S			
	1234789-HpCDF	M, A		S			S			
	OCDF	M, S		S		A	A, S			
	Total TCDD	S, A	S	A		A				
	Total PeCDD	S, A	S	A		A				
	Total HxCDD	M	M	S			S, A			
	Total HpCDD	M	M	S, M		M	S, A M			
	Total TCDF		S	A		A				
	Total PeCDF	M, S, A	S	A		A				
	Total HxCDF	M	M	S		M	S, A			
	Total HpCDF	M, A	M	S			S, A			

DATA SUMMARY FORM: O R G A N I C S

ite Name: Cascade Pole Site

ase #: 4905034 Sampling Date(s): January - Feb, 1991

SOIL SAMPLES

(µg/Kg)

E = EMPC (Estimated Maximum Possible Concentration)

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)

QL																			
	Sample No.	9101-065		9101-065		9101-082		9101-082		9101-096		9101-096		9101-128					
	Dilution Factor	1.0 -4		1.0 -5		1.0 -3		1.0 -4		1.0 -5		1.0 -6		1.0 -5					
	% Moisture	15.59		13.40		13.53		12.40		15.85		17.38		20.02					
	Location	CP-S-EB -3-A		CP-S-EB -3-B		CP-S-EW -1-D		CP-S-EW -1-G		CP-S-EB -4-A		CP-S-EB -4-C		CP-S-EB -8A					
	COMPOUND																		
	2378-TCDD	.005		.002		ND	J	ND		.002E		ND		.02					
	12378-PeCDD	.02		.09		.009	J	E.002		.01		ND		.57					
	123478-HxCDD	.07		.47		.08		.02	J	.03		.002		2.0					
	123678-HxCDD	2.0		7.0		4.8		.64	J	.16	J	.01		23.7					
	123789-HxCDD	.29	J	1.5	J	.75	J	.16	J	.09		.006		6.6	J				
	1234678-HpCDD	54.3		194		22.8	J	19.7	J	3.2		.20		398	J				
	OCDD	483		1730		49.6	J	74.2	J	23.3		1.5		1330	J				
	2378-TCDF	.02		.03		.31	J	.04		.003		ND		.33					
	12378-PeCDF	.36		.88		.97	J	.12		.01		ND		1.1					
	23478-PeCDF	.48		1.4		1.1	J	.14		.01E		ND		.92					
	123478-HxCDF	1.3		3.6		2.4		.29	J	.02		.002E		2.7					
	123678-HxCDF	.31		.87		.62		.08	J	.01		ND		1.3					
	234678-HxCDF	.33		1.3		1.0		.13	J	.03E		.003		2.5	J				
	123789-HxCDF	.07		.14		.16		.02E	J	.002E		ND		.15					
	1234678-HpCDF	4.9		14.0		7.3	J	1.6	J	.21		.02E		27.9					
	1234789-HpCDF	.45		1.4		.77		.10	J	.01E		ND		1.6					
	OCDF	6.8		21.2		11.6		3.1	J	.46		.03		69.8	J				
	Total TCDD	.10		.02		.005	J	.003		.004		ND		.07					
	Total PeCDD	.09		.46		.19	J	.02		.05		ND		2.0	J				
	Total HxCDD	6.5		29.9		22.2		4.0	J	.84		.04		99.6					
	Total HpCDD	52.1		437		45.3		49.6	J	6.4		.42		800	J				
	Total TCDF	.18		.10		.92	J	.12		.03		ND		1.2					
	Total PeCDF	6.1		15.2		10.8	J	1.7		.24		.01		22.0	J				
	Total HxCDF	9.6		35.6		5.8	J	6.2	J	.64		.03		95.1					
	Total HpCDF	17.9		39.1		21.4	J	7.5	J	.74		.03		116					

DATA SUMMARY FORM: O R G A N I C S

ite Name: Cascade Pole Site
4905034
ase #: ______ Sampling Date(s): January - Feb, 1991

SOIL SAMPLES
(µg/Kg)

EMPC - Estimated Maximum Possible Concentrations Only

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.	9101-065		9101-065		9101-082		9101-082		9101-096		9101-096		9101-128-					
	Dilution Factor	1.0 -4		1.0 -5		1.0 -3		1.0 -4		1.0 -5		1.0 -6		1.0 5					
	% Moisture	15.59		13.40		13.53		12.40		15.85		17.38		20.02					
	Location	CP-S-EB -3-A		CP-S-EB -3-A		CP-S-EW -1-D		CP-S-EW -1-G		CP-S-EB -4-A		CP-S-EB -4-C		CP-S-EB -8-A					
QL	COMPOUND																		
	2378-TCDD					.004	J												
	12378-PeCDD							.002		.002									
	123478-HxCDD																		
	123678-HxCDD																		
	123789-HxCDD																		
	1234678-HpCDD																		
	OCDD																		
	2378-TCDF																		
	12378-PeCDF																		
	23478-PeCDF									.01									
	123478-HxCDF											.002							
	123678-HxCDF																		
	234678-HxCDF									.03									
	123789-HxCDF							.02	J	.002									
	1234678-HpCDF											.02							
	1234789-HpCDF									.01									
	OCDF																		
	Total TCDD	.04		.09		.04	J	.01		.009				.13					
	Total PeCDD	.12		.53		.23	J	.06		.07				2.1					
	Total HxCDD	6.5		29.9		22.2	J					.05		99.6	J				
	Total HpCDD																		
	Total TCDF			.99		.94	J	.13						1.3					
	Total PeCDF			15.2			J	1.8	J	.24		.02							
	Total HxCDF	19.6		36.0		24.6	J	6.3	J	.67		.04		95.2					
	Total HpCDF									.74		.05							

DATA SUMMARY FORM: O R G A N I C S

Site Name: Cascade Pole Site

Case #: 4905034 Sampling Date(s): Jan-Feb, 1991

SOIL SAMPLES
(µg/Kg)

E= EMPC (Estimated Maximum Possible Concentration)

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.	9101-134	9101-134	9103-263	9103-263	9101-156	9101-156-	9101-156	9101-156	
	Dilution Factor	1,0 -2	1,0 -73	1,0 -5	1,0 -6	1,0 -7	1,0 -8	1,0 -10	1,0 -13	
	% Moisture	14,99	15,92	14,54	10,21	6,21	13,52	7,58	12,61	
	Location	CP-S-EB -11-D	CP-S-EB -11-H	CP-S-ES -1	CP-S-ES -2	CP-S-EW -7A	CP-S-EW -7E	CP-S-EW -9A	CP-S-EW -7G	
QL	COMPOUND									
	2378-TCDD	.002E	ND	.005	.002	ND	ND	.004	ND	
	12378-PeCDD	.003	ND	.05	.02	.009	.005E	.04	ND	
	123478-HxCDD	.004	.005	.19	.12	.02	.009 J	.10 J	ND	
	123678-HxCDD	.02	.04	.72	.87	.12	.13 J	.70 J	.08	
	123789-HxCDD	.01	.02	.44 J	.29	.05	.03 J	.32 J	.006	
	1234678-HpCDD	.49	.76	17.7	18.1 J	2.3	3.2 J	18.8 J	1.5	
	OCDD	4.3	6.7	58.3 J	44.7 J	17.7	25.1 J	117 J	11.4	
	2378-TCDF	.001	.003	.02	.03	.003	.006	.01	.005	
	12378-PeCDF	.003	.004E	.05	.09	.006	.02	.05	.02E	
	23478-PeCDF	.003	.003E	.04	.08	.007	.01	.04	.02	
	123478-HxCDF	.004	.006	.18	.40	.01	.04 J	.11 J	.05	
	123678-HxCDF	.002	.002	.07	.11	.006	.01 J	.05 J	.01	
	234678-HxCDF	.005	.007	.07	.10	.01	.01 J	.06 J	.01	
	123789-HxCDF	ND	ND	.009	.03	ND	.003E J	.01 J	.004	
	1234678-HpCDF	.03	.05E	1.1	1.9	.15	.24 J	.97 J	.26	
	1234789-HpCDF	.002	.004	.08	.13	.007	.02 J	.07 J	.02	
	OCDF	.10	.18	1.6	1.5	.27	.59 J	2.8 J	.32	
	Total TCDD	.008	.01	.10	.02	.009	.005	.02	ND	
	Total PeCDD	.01	.009	.28 J	.07	.03	.005	.12	ND	
	Total HxCDD	.13	.18	5.0	4.3	.50	.61 J	5.5 J	.31	
	Total HpCDD	1.0	1.6	39.5	36.6 J	4.2	6.6 J	52.9 J	2.6	
	Total TCDF	.007	.007	.19	.10	.01	.02	.06	.009	
	Total PeCDF	.03	.05	.90 J	1.3 J	.14	.19	.89	.26	
	Total HxCDF	.07	.15	3.8	7.6	.50	.87 J	3.4 J	1.1	
	Total HpCDF	.12	.14	4.1	7.7	.53	1.0 J	3.8 J	1.1	

DATA SUMMARY FORM: ORGANICS

Site Name: Cascade Pole Site
Case #: 4905034 Sampling Date(s): Jan-Feb, 1991

SOIL SAMPLES (µg/Kg)

EMPC Estimate Maximum Possible Concentration Only

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)

	Sample No.	9101-134	9101-134	9103-263	9103-263	9101-156	9101-156-	9101-156	9101-156	
	Dilution Factor	1.0 -2	1.0 -2	1.0 -5	1.0 -6	1.0 -7	1.0 -8	1.0 -10	1.0 -13	
	% Moisture	14.99	15.92	14.54	10.21	6.21	13.52	7.58	12.61	
	Location	CP-S-EB -11-D	CP-S-EB -11-H	CP-S-ES -1	CP-S-ES -2	CP-S-EW -7A	CP-S-EW -7E	CP-S-EW -7A	CP-S-EW -7G	
QL	COMPOUND									
	2378-TCDD	.002		.004						
	12378-PeCDD						.005			
	123478-HxCDD									
	123678-HxCDD									
	123789-HxCDD									
	1234678-HpCDD									
	OCDD									
	2378-TCDF									
	12378-PeCDF		.004							
	23478-PeCDF		.003						.02	
	123478-HxCDF									
	123678-HxCDF									
	234678-HxCDF									
	123789-HxCDF						.003 J			
	1234678-HpCDF		.05							
	1234789-HpCDF									
	OCDF									
	Total TCDD	.01	.02	.12				.03		
	Total PeCDD	.02	.02	.43 J	.10	.06	.01	.23		
	Total HxCDD						.03 J	5.6 J		
	Total HpCDD					4.2	.02 J			
	Total TCDF	.01	.01		.07	.02	.23	.06	.01	
	Total PeCDF	.04	.06	.91 J	1.3	.15	.87	.93	.29	
	Total HxCDF		.15		7.7	.50		.13		
	Total HpCDF		.14					3.8 J	1.1	

DATA SUMMARY FORM: ORGANICS

Site Name: Cascade Pole Site

4905034
Case #: ______ **Sampling Date(s):** Jan - Feb, 1991

SOIL SAMPLES
(µg/Kg)

E
''
EMPC, Estimated Maximum Possible Concentration

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)

QL																			
	Sample No.	9101-180		9101-180		9101-180		9101-169		9103=158		9102-015							
	Dilution Factor	1,0 - 1		1,0 - 4		1,0 - 8		1,0 - 3		1,0 - 2		10,0 - 2							
	% Moisture	27,79		20,40		22,64		21,34											
	Location	CP-S-EW -11-A		CP-S-EW 11-H		CP-S-~~H~~ ~~O~~ EW-11-O		CP-S-~~10~~ ~~-E~~ EW-10-I		CP-L-EW 1 -1		CP-D-EW -3							
QL	COMPOUND																		
	2378-TCDD	,18	J	,008	J	ND		ND		ND		ND							
	12378-PeCDD	1,8	J	,14	J	,03		ND		,26 E		ND							
	123478-HxCDD	5,4		,48		,08	J	ND		2,6		4,2	J						
	123678-HxCDD	14,4	J	2.4		,56	J	,07		109		98,4	J						
	123789-HxCDD	8,3		1,2		,18	J	,006		17,0	J	42,7	J						
	1234678-HpCDD	59,4	J	31,7	J	15,4	J	1,2		2180	J	4780	J						
	OCDD	54.4	J	49,0	J	44,0	J	10.5		2960	J	3780	J						
	2378-TCDF	,49		,02		,02		ND		,25		1,6							
	12378-PeCDF	1,4	J	,14	J	,06 E		ND		22,3		5,1							
	23478-PeCDF	2,0	J	,23	J	.08		ND		25,0		5,0							
	123478-HxCDF	6.0		,78		,31	J	ND		93,3		37,2	J						
	123678-HxCDF	1,4		,16		,05	J	ND		15,2		5,1	J						
	234678-HxCDF	1,6		,18		,06	J	ND		28,0	J	10,7	J						
	123789-HxCDF	ND		,03		,02	J	ND		4,5		,44	J						
	1234678-HpCDF	13,5	J	3,5		,99	J	,04		292		270	J						
	1234789-HpCDF	2,3	J	,27		,09	J	ND		15,5		15,9	J						
	OCDF	29,7	J	9,1		1,7	J	,37		134	J	357	J						
	Total TCDD	4,0		,14	J	,02	J	ND		,25	J	ND							
	Total PeCDD	16,3	J	,62	J	,19	J	,10 E		6,2	J	3,0							
	Total HxCDD	66,9	J	20,2	J	3,8	J	,16		621		1020	J						
	Total HpCDD	134	J	68,3	J	32,4	J	2,9		4510	J	10660	J						
	Total TCDF	2,3		,19	J	,07	J	ND		21,3	J	3.0							
	Total PeCDF	13,2	J	2,7	J	,88	J	,003 E		356	J	44,7	J						
	Total HxCDF	13,1	J	16,3	J	3,6	J	.05		1530	J	502	J						
	Total HpCDF	41,2	J	10,8	J	3,7	J	,23		1210		1940	J						

DATA SUMMARY FORM: ORGANICS

Site Name: Cascade Pole Site

Case #: 4905034 Sampling Date(s): Jan-Feb, 1991

SOIL SAMPLES only EMPC (Estimated Maximum Possible Concentration)
(µg/Kg)

To calculate sample quantitation limit:
(QL * Dilution Factor) / ((100 - % moisture)/100)

	Smple No.	9101-180		9101-180		9101-180		9101-169		9103=158		9102-015							
	Dilution Factor	1.0 - 1		1.0 - 4		1.0 - 8		1.0 - 3		1.0 - 2		10.0 - 2							
	% Moisture	27.79		20.40		22.64		21.34											
	Location	CP-S-EW -11-A		CP-S-EW -11-H		CP-S-~~H~~ -~~0~~ EW-11-0		CP-S-~~10~~ - I EW-10-I		CP-L-EW 1 -1		CP-D-EW -3							
QL	COMPOUND																		
	2378-TCDD																		
	12378-PeCDD									.26									
	123478-HxCDD																		
	123678-HxCDD																		
	123789-HxCDD																		
	1234678-HpCDD																		
	OCDD																		
	2378-TCDF																		
	12378-PeCDF					.06													
	23478-PeCDF																		
	123478-HxCDF																		
	123678-HxCDF																		
	234678-HxCDF																		
	123789-HxCDF																		
	1234678-HpCDF																		
	1234789-HpCDF																		
	OCDF																		
	Total TCDD	3.4	J	.22	J	.03		.10				.43							
	Total PeCDD			1.2	J	.20				6.9	J	8.5							
	Total HxCDD	111	J	20.2	J	3.8						1020	J						
	Total HpCDD																		
	Total TCDF	2.1	J	.21	J	.08													
	Total PeCDF	26.1	J	2.9	J	.94		.003		21.4	J	48.4	J						
	Total HxCDF	52.5	J	10.8	J	3.6				362	J	503	J						
	Total HpCDF																		

David MacLean
6422 Alloway Court
Springfield, VA 22152
August 23, 1991

Ms. Lisa McLaughlin
Environmental Science and Engineering
One Overlook Drive
Unit 16
Amherst, NH 03031

RE: Contract Work Assignment
Project # 4905034 SDG #:
Lab Name: Triangle Laboratories Inc.
Site Name: Cascade Pole Site
Dioxins: soil: CP-S-EB-3-B

Dear Ms. McLaughlin:

In answer to your question about analytical results for sample CP-S-EB-3-B, Lab # 9101-065-5, included in the data validation of dioxin analytical data from the Cascade Pole Site # 4905034 reported July 7, 1991 my comments follow.

This soil sample was extracted and analyzed twice for the polychlorinated dibenzodioxins and dibenzofurans (PCDD and PCDF). The sample was analyzed a second time using a .50g instead of a 5.65 g sample because the concentrations of 1234678HpCDD, OCDD, Total HpCDD, Total HxCDF, Total HpCDF exceeded the linear range of the GCMS analytical system. The laboratory qualified (flagged) these results with an "S".

The results of these two analyses agreed within 50% for all compounds except those not detected in the analysis of the smaller .50g sample and 3 out of 5 analytes whose concentrations exceeded the linear range of the GCMS on the first 5.65g sample.

This reviewer chose to list in the data summary the concentrations of analyte from analysis of the 5.65g sample except 1234678HpCDD, OCDD, Total HpCDD, Total HxCDF, and Total HpCDF. The concentrations from analysis for these 5 analytes in the .50g sample were listed because the concentrations of all 5 but OCDD were in the linear range of the GCMS analytical system.

Data Summary

Compound	Conc5.65g spl ppb	Flag	conc.50g spl ppb	Flag
1234678HpCDD	61.8	S	194*	
OCDD	127	S	1730*	S
Total HxCDD	29.9*		26.8	
Total HpCDD	116	S	437*	
Total HxCDF	26.0	S	35.6*	
Total HpCDF	43.8	S	39.1*	

S - GCMS system saturated, analyte concentration exceeds linear range of GCMS analytical system.
* - analyte concentration listed on data summary forms for sample CP-S-EB-3-B.

Please let me know about any other questions on the validation of this dioxin data package.

Sincerely,

David MacLean
Consulting Chemist

APPENDIX G

ATTACHMENT C

ACCESSION: 9106-215

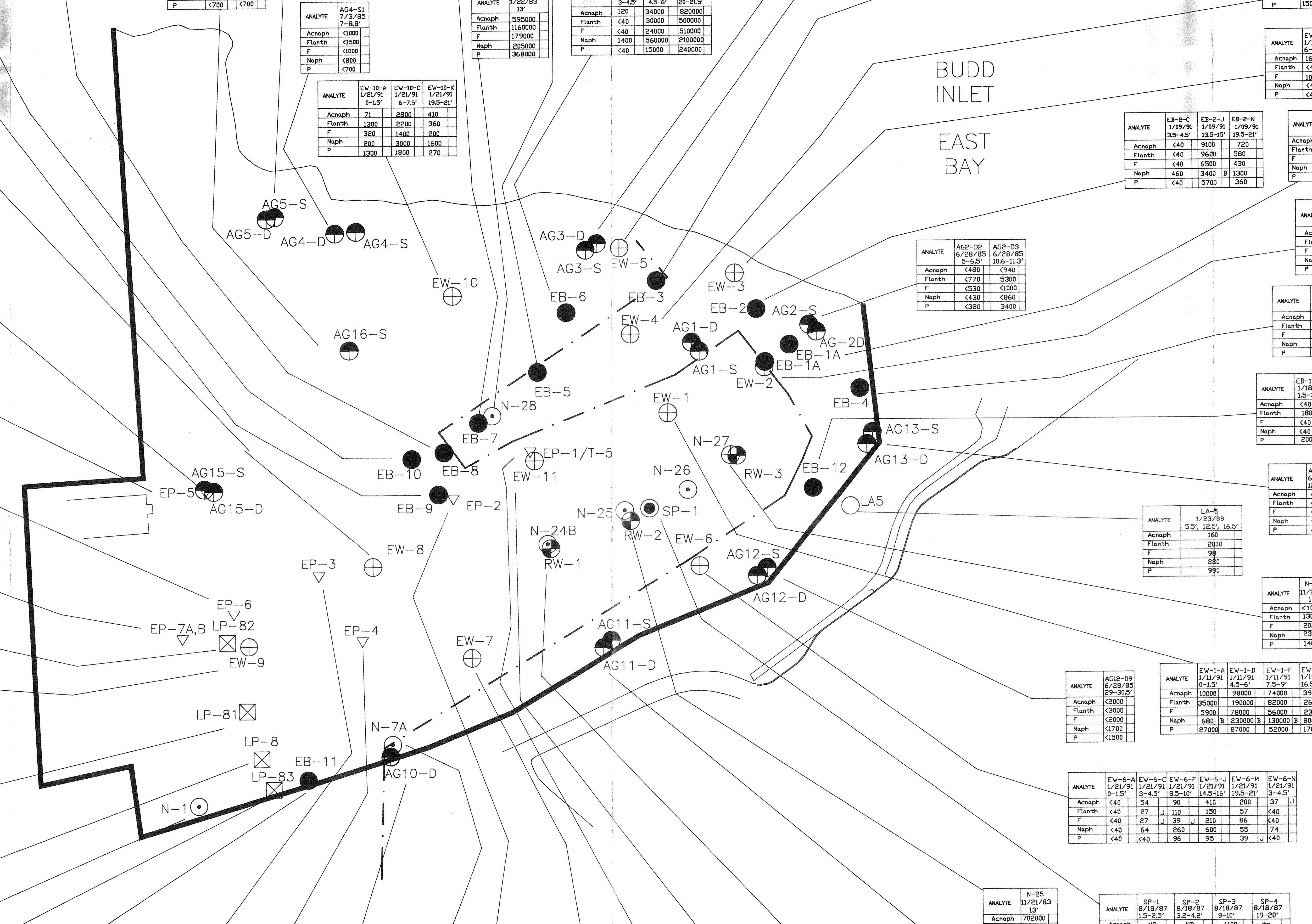
RE: Methylene Chloride Results, Volatile Analysis

Samples 9106-215-5, -6, -12, and -13 exhibited high levels of methylene chloride contamination when analyzed on 6/27 and 6/28. The samples were all re-analyzed on 7/14. The methylene chloride results were substantially lower.

The methylene chloride hits in the initial analysis are likely due to the methylene chloride contamination in the lab, as indicated by the blank. The high level is due to enhancement caused by the dilution factor. Without the dilution factor, the methylene chloride is at a level close to the blank contamination. The methylene chloride found during the second analysis on 7/14 is also indicative of lab contamination. With the exception of 9106-215-13, the values on the second run were not taken from diluted analyses.

APPENDIX H

CONCENTRATION DATA MAPS



ANALYTE	EB-10-B 1/17/91 1.5-3'	EB-10-E 1/17/91 6-7.5'	EB-10-I 1/17/91 12.5-14'	EB-10-M 1/17/91 19.5-21
Acnaph	67000	71000	60000	4200
Flanth	35000	43000	29000	<610
F	47000	52000	35000	1700
Naph	3500000	330000	880000	42000
P	23000	30000	19000	<610

ANALYTE	EB-8-A 1/17/91 0-1.5'	EB-8-E 1/17/91 6-7.5'	EB-8-J 1/17/91 14-15.5'	EB-8-M 1/17/91 20-21.5'
Acnaph	2000	220000	100000	5000
Flanth	5100	57000	26000	2400
F	1200	81000	30000	2800
Naph	7400	2900000	160000	27000
P	43000	44000	19000	2100

ANALYTE	EB-9-B 1/21/91 1.5-3'	EB-9-D 1/21/91 4.5-6'	EB-9-H 1/21/91 11-12.5'	EB-9-M 1/21/91 19.5-21'
Acnaph	520	68000	210000	1200
Flanth	15000	84000	59000	430
F	250	54000	57000	520
Naph	1100	1100000	970000	6700
P	12000	37000	38000	280

ANALYTE	AG5-D2 6/28/85 8-9.5'	AG5-D7 6/28/85 30-31.5'	AG5-D8 6/28/85 38-39.5'
Acnaph	<500	<950	<510
Flanth	<760	<1400	<760
F	<500	<950	<510
Naph	<430	<800	<430
P	<380	<700	<380

ANALYTE	EB-7-C 1/17/91 3-4.5'	EB-7-F 1/17/19 7.5-9'	EB-7-I 1/17/91 12-13.5'	EB-7-O 1/17/91 21-22'
Acnaph	2000	140000	620000	360000
Flanth	7300	100000	400000	190000
F	1600	110000	490000	220000
Naph	250	930000	3700000	990000
P	7900	72000	290000	140000

ANALYTE	AG16-S2 7/10/85 8-9.5'	AG16-S4 7/10/85 14-15.5'
Acnaph	<1000	<1000
Flanth	<1500	<1500
F	<1000	<1000
Naph	<800	<800
P	<700	<700

ANALYTE	AG4-D1 6/28/85 9-10.5'	AG4-D6 6/28/85 24-25.5'	AG4-D8 6/28/85 43-44.5'
Acnaph	<480	<940	<480
Flanth	<770	<1600	<770
F	<530	<1000	<530
Naph	<430	<860	<430
P	<380	<800	<380

ANALYTE	AG4-S1 7/3/85 7-8.8'
Acnaph	<1000
Flanth	<1500
F	<1000
Naph	<800
P	<700

ANALYTE	EW-10-A 1/21/91 0-1.5'	EW-10-C 1/21/91 6-7.5'	EW-10-K 1/21/91 19.5-21'
Acnaph	71	2800	410
Flanth	1300	2200	360
F	320	1400	200
Naph	200	3000	1600
P	1300	1800	270

ANALYTE	N-28 1/22/83 13'
Acnaph	595000
Flanth	1160000
F	179000
Naph	205000
P	368000

ANALYTE	EB-5-A 1/08/91 0-2'	EB-5-B 1/08/91 6.5-8'	EB-5-D 1/08/91 11.5-13'	EB-5-E 1/08/91 20-21.5'
Acnaph	700	6600	4400	11000
Flanth	2100	4400	2900	8100
F	640	4400	3000	7800
Naph	4100	33000 B	5500	41000 B
P	1900	2400	2000	4900

ANALYTE	EB-6-B 1/08/91 3-4.5'	EB-6-C 1/08/91 4.5-6'	EB-6-F 1/08/91 20-21.5'
Acnaph	120	34000	820000
Flanth	<40	30000	500000
F	<40	24000	510000
Naph	1400	560000	2100000
P	<40	15000	240000

ANALYTE	AG3-D2 7/01/85 8.8-9.3'	AG3-D7 7/01/85 24-25.5'	AG3-D8 7/01/85 38-39.5'
Acnaph	<1000	<1000	<1000
Flanth	<1500	<1500	<1500
F	<1000	<1000	<1000
Naph	<800	<800	<800
P	<700	<700	<700

ANALYTE	EW-5-E 1/15/91 6-7.5'	EW-5-Q 1/15/91 23-24.5'
Acnaph	14000	30000
Flanth	12000	17000
F	9700	19000
Naph	150000	90000
P	7700	12000

ANALYTE	EB-3-A 1/09/91 2.5-4'	EB-3-B 1/09/91 6.5-8'	EB-3-D 1/09/91 11.5-13'	EB-3-H 1/09/91 18-19.5'	EB-3-I 1/09/91 18-19.5'
Acnaph	9900	110000	4300	5200	7700
Flanth	5900	120000	4000	3500	6100
F	5600	84000	2000	3400	5400
Naph	94000	620000	14000	9300 B	16000 B
P	3800	70000	3100	2300	4000

ANALYTE	EW-4-A 1/18/91 0-0.5'	EW-4-E 1/18/91 6-7.5'	EW-4-I 1/18/91 13-14.5'	EW-4-L 1/18/91 18-19.5'
Acnaph	<40	170000	6800	45000
Flanth	1100	110000	4700	29000
F	<40	120000	3700	30000
Naph	<40	1000000	39000	200000
P	1500	81000	4300	24000

ANALYTE	EW-3-B 1/15/91 6-7.5'	EW-3-C 1/15/91 10.5-12'	EW-3-G 1/15/91 16.5-18'	EW-3-J 1/15/91 21-22.5'
Acnaph	160	150000	400000	23000
Flanth	<40	140000	370000	18000
F	100	100000	330000	1500
Naph	<40	230000	600000	67000
P	<40	91000	310000	12000

ANALYTE	EB-2-C 1/09/91 3.5-4.5'	EB-2-J 1/09/91 13.5-15'	EB-2-N 1/09/91 19.5-21'
Acnaph	<40	9100	720
Flanth	<40	9600	580
F	<40	6500	430
Naph	460	3400 B	1300
P	<40	5700	360

ANALYTE	EB-1-A 1/14/91 0-1.5'	EB-1-F 1/14/91 7.5-8.5'	EB-1-J 1/14/91 13.5-15'	EB-1-O 1/14/91 21-22.5'
Acnaph	170	2000	110000	5300
Flanth	2100	14000	92000	5900
F	120	350	81000	4000
Naph	220 B	350	130000	8900
P	1200	12000	62000	3800

ANALYTE	EW-2-D 1/16/91 9-10'	EW-2-J 1/16/91 17.5-19'	EW-2-K 1/16/91 19-20'
Acnaph	150000	24000	14000
Flanth	170000	21000	12000
F	100000	15000	8300
Naph	140000	38000	22000
P	110000	14000	7900

ANALYTE	AG2-D2 6/28/85 5-6.5'	AG2-D3 6/28/85 10.6-11.3'
Acnaph	<480	<940
Flanth	<770	5300
F	<530	<1000
Naph	<430	<860
P	<380	3400

ANALYTE	EB-4-A 1/14/91 0-1.5'	EB-4-C 1/14/91 3-4.5'	EB-4-E 1/14/91 6-7.5'	EB-4-M 1/14/91 18-19.5'
Acnaph	98	24 C	1400	72000
Flanth	210	<40	990	94000
F	72	<40	810	63000
Naph	<40	<40	2800	94000
P	180	<40	780	71000

ANALYTE	EB-12-B 1/18/91 1.5-3'	EB-12-G 1/18/91 9-10.5'	EB-12-L 1/18/91 17.5-19'
Acnaph	<40	<40	590
Flanth	180	<40	1400
F	<40	<40	200
Naph	<40	<40	1100
P	200	<40	1600

ANALYTE	AG13-D6 6/28/85 12-13.5'	AG13-D17 6/28/85 32-33.5'
Acnaph	<2000	<2000
Flanth	<3000	<3000
F	<2000	<2000
Naph	<1700	<1700
P	<1500	<1500

ANALYTE	LA-5 1/23/89 5.5', 12.5', 16.5'
Acnaph	160
Flanth	2000
F	98
Naph	280
P	990

ANALYTE	N-27 11/21/83 13'
Acnaph	<10
Flanth	130
F	2020
Naph	2320
P	140

ANALYTE	AG12-D9 6/28/85 29-30.5'
Acnaph	<2000
Flanth	<3000
F	<2000
Naph	<1700
P	<1500

ANALYTE	EW-1-A 1/11/91 0-1.5'	EW-1-D 1/11/91 4.5-6'	EW-1-F 1/11/91 7.5-9'	EW-1-L 1/11/91 16.5-18'
Acnaph	10000	98000	74000	3900
Flanth	35000	190000	82000	2600
F	5900	78000	56000	2300
Naph	680 B	230000 B	130000 B	8000 B
P	27000	87000	52000	1700

ANALYTE	EW-6-A 1/21/91 0-1.5'	EW-6-C 1/21/91 3-4.5'	EW-6-F 1/21/91 8.5-10'	EW-6-J 1/21/91 14.5-16'	EW-6-M 1/21/91 19.5-21'	EW-6-N 1/21/91 3-4.5'
Acnaph	<40	54	90	410	200	37 J
Flanth	<40	27 J	110	150	57	<40
F	<40	27 J	39 J	210	86	<40
Naph	<40	64	260	600	55	74
P	<40	<40	96	95	39 J	<40

ANALYTE	N-25 11/21/83 13'
Acnaph	702000
Flanth	312000
F	174000
Naph	203000
P	75000

ANALYTE	SP-1 8/18/87 1.5-2.5'	SP-2 8/18/87 3.2-4.2'	SP-3 8/18/87 9-10'	SP-4 8/18/87 19-20'
Acnaph	ND	ND	4100	tr
Flanth	1100	tr	3800	ND
F	ND	ND	3000	ND
Naph	tr	ND	1100	4400
P	830	tr	2500	ND

ANALYTE	N-24 11/21/83 13'
Acnaph	62800
Flanth	40400
F	15700
Naph	14200
P	7830

ANALYTE	AG11-D7 6/28/85 17-17.5'	AG11-D11 6/28/85 32-33.5'	AG11-D18 6/28/85 59-60.5'
Acnaph	<2000	<2000	<2000
Flanth	<3000	<3000	<3000
F	<2000	<2000	<2000
Naph	<1900	<1700	<1700
P	<1500	<1500	<1500

ANALYTE	EW-11-A 1/23/91 0-1.5'	EW-11-C 1/23/91 3-4.5'	EW-11-H 1/23/91 11-12.5'	EW-11-L 1/23/91 17.5-19'	EW-11-P 1/23/91 17.5-19'
Acnaph	17000	17000	130000	5200	6100
Flanth	63000	37000	99000	3200	4200
F	11000	11000	33000	3100	3600
Naph	840	30000	350000	12000	15000
P	43000	30000	30000	2300	2800

ANALYTE	EP-1A 3/27/91 0.3 BC
Acnaph	91
Flanth	1600
F	200
Naph	340
P	1500

ANALYTE	EW-7-A 1/21/91 0-1.5'	EW-7-E 1/21/91 6.5-8'	EW-7-M 1/21/91 19-20'
Acnaph	<160	67000	7600
Flanth	<160	21000	2000
F	<160	29000	3500
Naph	<160	290000	34000
P	<160	17000	1400

ANALYTE	EP-2A 3/27/91 1.7'	EP-2B 3/27/91 2.7'	EP-2C 3/27/91 1.7'
Acnaph	110	<45	<44
Flanth	13000	49	160
F	5300	1700	640
Naph	2800	5200	2100
P	13000	52	200

ANALYTE	N-7A 1/17/83 13'
Acnaph	308000
Flanth	25800
F	79900
Naph	75600
P	9280

ANALYTE	AG10-D4 6/28/85 14-15'	AG10-D6 6/28/85 20-21.5'	AG10-D14 6/19/85 37-38.5'
Acnaph	15700	<2000	<2000
Flanth	5300	<3000	<3000
F	<2000	<2000	<2000
Naph	4000	<1700	<1700
P	4400	<1500	<1500

ANALYTE	EP-4A 3/27/91 1.2'
Acnaph	<43
Flanth	<43
F	<43
Naph	<43
P	<43

ANALYTE	EP-3A 3/27/91 3'	EP-3B 3/27/91 1.8'
Acnaph	130	45
Flanth	2000	<43
F	280	<43
Naph	580	290
P	2400	<43

ANALYTE	EB-11-A 1/18/91 0-1.5'	EB-11-D 1/18/91 4.5-6'	EB-11-H 1/18/91 10.5-12'	EB-11-L 1/18/91 17.5-19'
Acnaph	32 J	<40	290	1200
Flanth	150	<40	150	230
F	<40	<40	150	500
Naph	<40	<40	1300	4100
P	140	<40	<40	190

ANALYTE	LP-83
Acnaph	
Flanth	ND
F	DATA
Naph	
P	

ANALYTE	N-1
Acnaph	
Flanth	ND
F	DATA
Naph	
P	

ANALYTE	LP-8B 1/18/91
Acnaph	<40
Flanth	<40
F	<40
Naph	<40
P	<40

ANALYTE	LP-81B 1/18/91
Acnaph	<40
Flanth	<40
F	<40
Naph	<40
P	<40

ANALYTE	EW-9-A 1/12/91 0-1.5'	EW-9-C 1/12/91 3-4.5'	EW-9-M 1/12/91 19-20.5'
Acnaph	5400	40 J	17000
Flanth	7800	88	4800
F	2900	<40	6700
Naph	670	<40	81000
P	5000	59	2900

ANALYTE	LP-82R 1/19/91
Acnaph	<10
Flanth	<10
F	<10
Naph	<10
P	<10

ANALYTE	EP-7A 3/27/91 3'	EP-7B 3/27/91 3.8'
Acnaph	<43	<45
Flanth	<43	<45
F	<43	<45
Naph	<43	<45
P	<43	<45

ANALYTE	EP-6A 3/27/91 0.4'
Acnaph	<43
Flanth	<43
F	<43
Naph	<43
P	<43

ANALYTE	EP-5A 3/27/91 2.3'
Acnaph	<43
Flanth	240
F	41
Naph	<43
P	280

ANALYTE	AG15-D5 6/24/85 10-11.5'	AG15-D22 6/24/85 56-57.5'
Acnaph	<510	<520
Flanth	<760	<780
F	<510	<520
Naph	<430	<440
P	<380	<400

ANALYTE	EW-8-A 1/18/91 0-1.5'	EW-8-E 1/18/91 6-7.5'	EW-8-L 1/18/91 17.5-19'
Acnaph	<160	43000	3200
Flanth	1100	13000	1400
F	<160	16000	1700
Naph	4000	170000	15000
P	1600	12000	1200

LEGEND

— · — 1930-1980 SHORELINE

▬ APPROXIMATE FORMER LEASED PROPERTY BOUNDARY

AG3-S LOCATION OF MONITORING WELL INSTALLED BY AGI, INC., IN 1986. S INDICATES A SHALLOW AQUIFER WELL, D INDICATES A DEEP LOWER AQUIFER WELL.

N-28 ⊙ LOCATION OF MONITORING WELL INSTALLED BY CASCADE POLE COMPANY IN NOVEMBER 1983.

RW-1 LOCATION OF RECOVERY WELL INSTALLED BY AGI, INC, IN MARCH 1988.

SP-1 ◉ LOCATION OF MONITORING WELL TO DETECT DNAPL, INSTALLED BY AGI, INC., IN OCTOBER 1987.

EB-7 ● LOCATION OF BORING CONDUCTED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE), IN JANUARY 1991.

EW-9 ⊕ LOCATION OF MONITORING WELL INSTALLED BY ENVIRONMENTAL SCIENCE & ENGINEERING (ESE), IN JANUARY 1991.

EP1 ▽ LOCATION OF TEST PIT CONDUCTED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC., (ESE), IN MARCH 1991.

LA5 ○ LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSC. INC., IN JANUARY 1989.

LP-81 ☒ LOCATION OF TEST PIT CONDUCTED BY LANDAU ASSOCIATES, INC., IN JANUARY 1991.

ANALYTE	EP-6A	
Acnaph	ND	Acnaph - acenaphtene
Flanth	ND	Flanth - Fluoranthene
F	ND	F - Fluorene
Naph	ND	Naph - Naphthalene
P	ND	P - Pyrene

ANALYTE CONCENTRATIONS IN ug/kg

B.C. - BELOW CONDUIT
ND - NOT DETECTED
N/A - NOT ANALYZED
J - THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY
B - BLANK CONTAMINATION

NOTE: BASE PLAN PREPARED FROM "CASCADE POLE SITE", PROVIDED BY DEGROSS AERIAL MAPPING, BOTHELL, WASHINGTON. TO A SCALE OF 1 INCH=50 FEET. BASE PHOTOGRAPH TAKEN JULY 20, 1990.

0 250 500
SCALE IN FEET

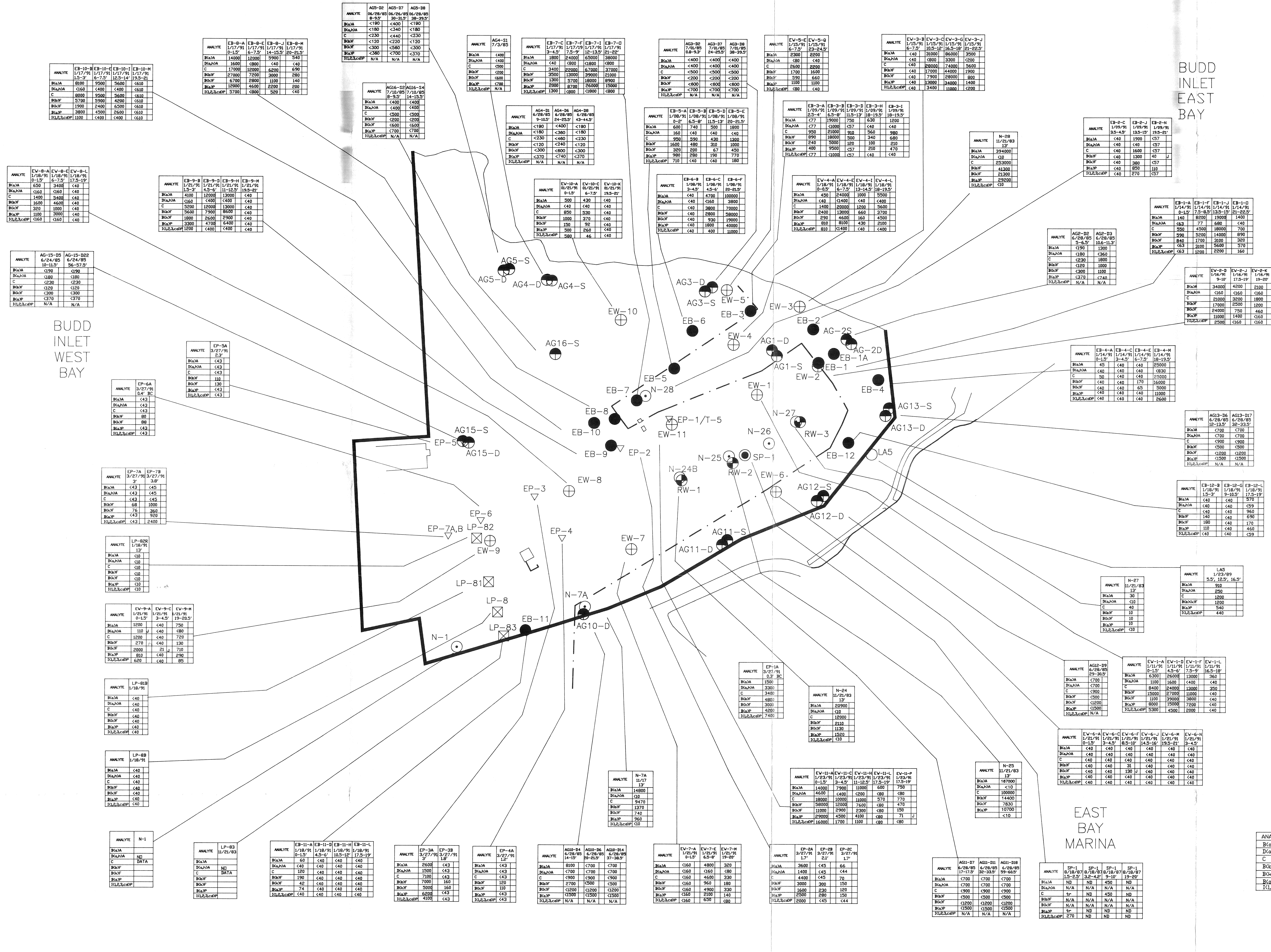
FILE: NCARPAH.DWG

ESE
A CILCORP Company.
Environmental
Science &
Engineering, Inc.

SUPPLEMENTAL SITE INVESTIGATION
CASCADE POLE SITE
OLYMPIA, WASHINGTON

PLATE 3
NONCARCINOGENIC PAH MAP
FOR SOIL

SCALE: *AS SHOWN* | REVISION: *0* | DRAWN BY: Marcos Peroza | DATE: *7/10/92*



LEGEND

— · — 1930-1980 SHORELINE

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EB-7 ● LOCATION OF BORINGS CONDUCTED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC. (ESE), IN JANUARY 1991.

EW-9 ⊕ LOCATION OF MONITORING WELL INSTALLED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC., (ESE), IN JANUARY 1991.

EP1 ▽ LOCATION OF TEST PIT CONDUCTED BY E.S.E. Inc. IN MARCH 1991.

LA5 ○ LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY, 1989.

LP-81 ☒ LOCATION OF TEST PIT CONDUCTED BY LANDAU ASSOCIATES, Inc. IN JANUARY 1991.

LW-1 ⊕ LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY 1991.

ANALYTE	EB-1-A	
B(a)A	170	B(a)A -Benzo(a)Anthracene
D(a<h)A	2100	D(a,h)A - Dibenzo(a,h)Anthracene
C	120	C - Chrysene
B(b)F	220	B(b)F - Benzo(b)Fluoranthene
B(k)F	1200	B(k)F - Benzo(k)Fluoranthene
B(a)P	ND	B(a)P - Benzo(a)Pyrene
I(1,2,3,cd)P	ND	I(1,2,3,cd)P - Indeno(1,2,3,cd)Pyrene

ANALYTE CONCENTRATION IN ug/kg.

B.C. - BELOW CONDUIT
ND - NOT DETECTED
N/A - NOT ANALYZED
J - THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY.
TR - TRACE

NOTE: BASE PLAN PREPARED FROM "CASCADE POLE SITE", PROVIDED BY DEGROSS AERIAL MAPPING, BOTHELL, WASHINGTON. TO A SCALE OF 1 INCH=50 FEET. BASE PHOTOGRAPH TAKEN JULY 20, 1990.

FILE: CARPAH.DWG

Environmental Science & Engineering, Inc.
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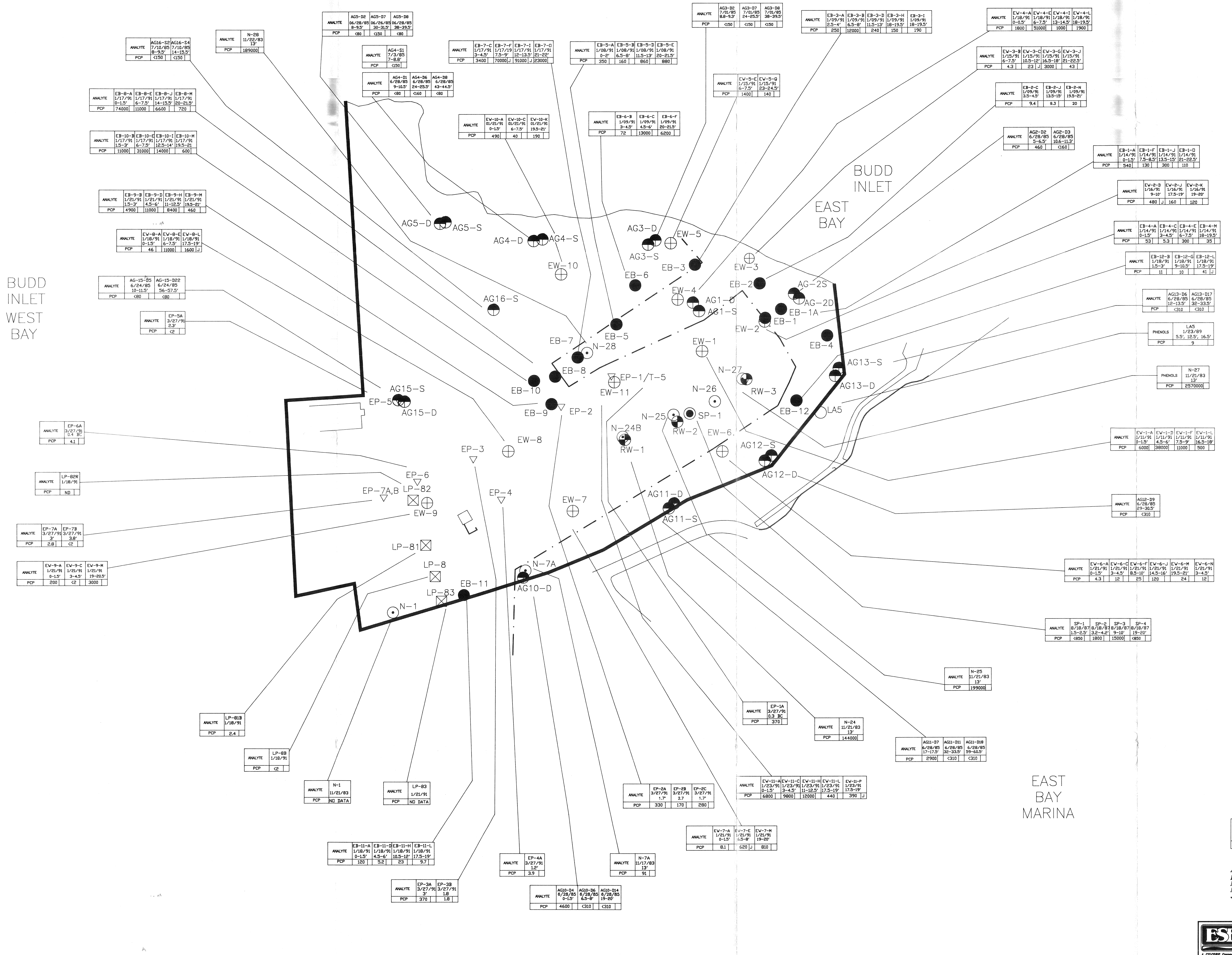
SUPPLEMENTAL SITE INVESTIGATION
CASCADE POLE SITE
OLYMPIA, WASHINGTON

PLATE 4
CARCINOGENIC PAH MAP FOR SOIL

SCALE: *AS SHOWN*	REVISION: *0*	DRAWN BY: *Marcos Pereza*	DATE: *7/10/92*



0 250 500

SCALE IN FEET

NOTE: BASE PLAN PREPARED FROM "CASCADE POLE SITE", PROVIDED BY DEGROSS AERIAL MAPPING, BOTHELL, WASHINGTON. TO A SCALE OF 1 INCH=50 FEET. BASE PHOTOGRAPH TAKEN JULY 20, 1990.

LEGEND

— · — 1930-1980 SHORELINE

▬ APPROXIMATE FORMER LEASED PROPERTY BOUNDARY

AG3-S ◒ LOCATION OF MONITORING WELL INSTALLED BY AGI, INC., IN 1986. S INDICATES A SHALLOW AQUIFER WELL, D INDICATES A DEEP LOWER AQUIFER WELL.

N-28 ⊙ LOCATION OF MONITORING WELL INSTALLED BY CASCADE POLE COMPANY IN NOVEMBER 1983.

RW-1 ◕ LOCATION OF RECOVERY WELL INSTALLED BY AGI, INC., IN MARCH 1988.

SP-1 ◉ LOCATION OF MONITORING WELL TO DETECT DNAPL. INSTALLED BY AGI, INC., IN OCTOBER 1987.

EB-7 ● LOCATION OF BORINGS CONDUCTED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC., (ESE), IN JANUARY 1991.

EW-9 ⊕ LOCATION OF MONITORING WELL INSTALLED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC., (ESE), IN JANUARY 1991.

EP1 ▽ LOCATION OF TEST PITS CONDUCTED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC., IN MARCH 1991.

LA5 ○ LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY 1989.

LP-81 ☒ LOCATION OF TEST PIT CONDUCTED BY LANDAU ASSOCIATES, INC., IN JANUARY 1991.

ANALYTE	N-25 11/21/83 13'		
PCP	199000		PENTACHLOROPHENOL

ANALYTE CONCENTRATION IN ug/kg.
B.C.– BELOW CONDUIT
N/A – NOT ANALYZED
N/D – NOT DETECTED
J – THE ASSOCIATED NUMERICAL VALUE IS AN ESTIMATED QUANTITY.

ESE Environmental Science & Engineering, Inc.
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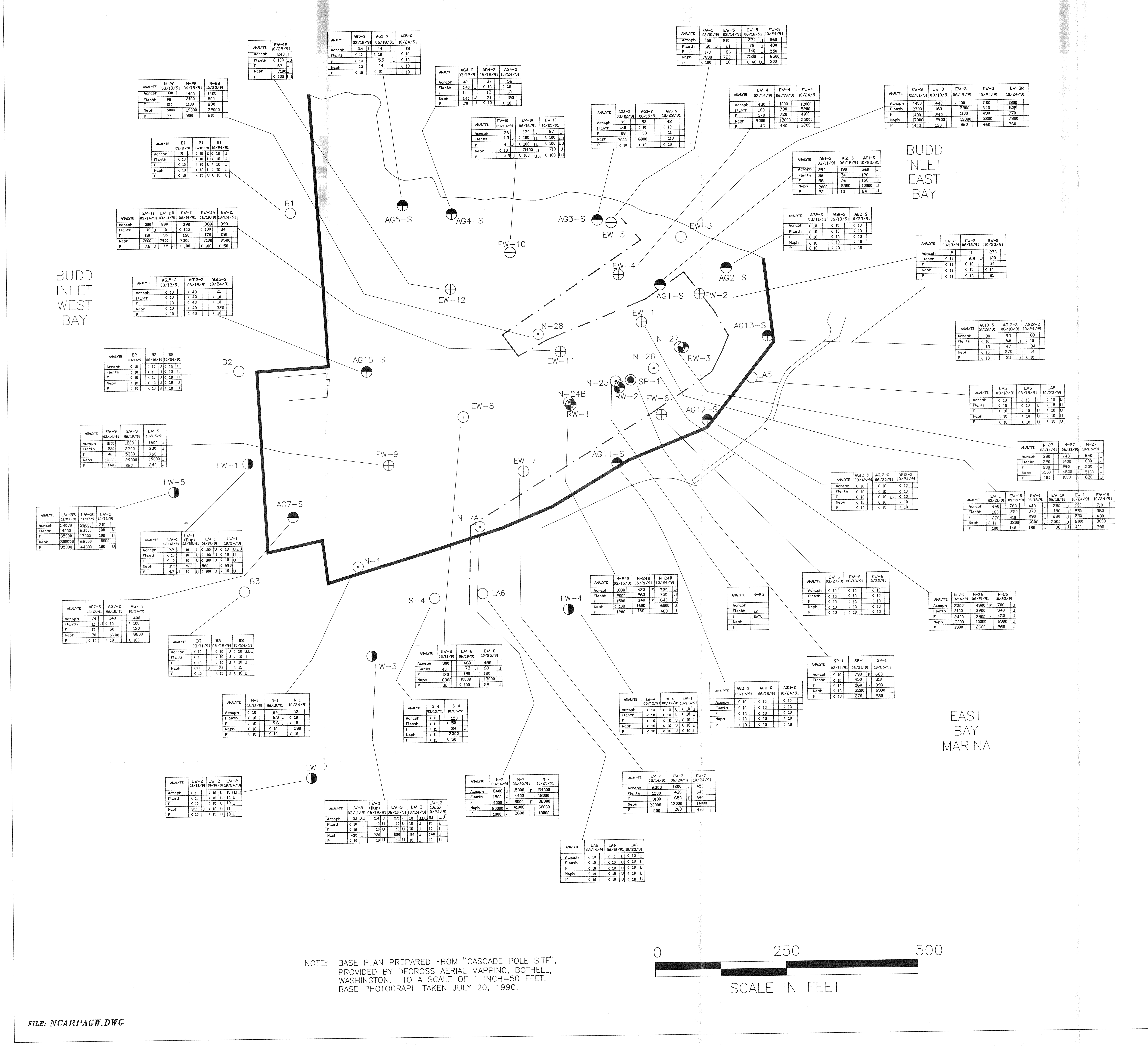
SUPPLEMENTAL SITE INVESTIGATION
CASCADE POLE SITE
OLYMPIA, WASHINGTON

PLATE 5
PCP CONCENTRATION MAP
FOR SOIL

SCALE: *AS SHOWN* | REVISION: *0* | DRAWN BY: *Marcos Pereza* | DATE: *7/10/92*

FILE: PCP.DWG



ANALYTE	EW-12 10/25/91
Acnaph	240 J
Flanth	< 100 UJ
F	67 J
Naph	7100 J
P	< 100 UJ

ANALYTE	AG5-S 03/12/91	AG5-S 06/18/91	AG5-S 10/24/91
Acnaph	3.4 J	14	13
Flanth	< 10	< 10	< 10
F	< 10	5.9 J	< 10
Naph	15	44	< 10
P	< 10	< 10	< 10

ANALYTE	N-28 03/13/91	N-28 06/19/91	N-28 10/25/91
Acnaph	330	1400	1400
Flanth	98	2100	800
F	150	1100	890
Naph	5000	19000	22000
P	77	800	610

ANALYTE	AG4-S 03/12/91	AG4-S 06/18/91	AG4-S 10/24/91
Acnaph	42	37	58
Flanth	1.40 J	< 10	< 10
F	11	12	13
Naph	1.40 J	31	150
P	.70 J	< 10	< 10

ANALYTE	EW-5 02/01/91	EW-5 03/14/91	EW-5 06/18/91	EW-5 10/24/91
Acnaph	400	210	270 J	860
Flanth	50 J	21	78 J	480
F	170	86	140 J	550
Naph	7800	720	7500 J	6500
P	< 100	18	< 40 UJ	300

ANALYTE	EW-4 03/14/91	EW-4 06/19/91	EW-4 10/24/91
Acnaph	430	1000	12000
Flanth	180	730	5200
F	170	720	4100
Naph	9000	12000	55000
P	46	440	3700

ANALYTE	EW-3 02/01/91	EW-3 03/13/91	EW-3 06/19/91	EW-3 10/24/91	EW-3R 10/24/91
Acnaph	4400	440	< 100	1100	1800
Flanth	2700	160	2300	640	1200
F	1400	240	1100	490	770
Naph	17000	2900	13000	5800	7800
P	1400	130	860	460	760

ANALYTE	B1 03/11/91	B1 06/18/91	B1 10/24/91
Acnaph	1.5 J	< 10 U	< 10 U
Flanth	< 10	< 10 U	< 10 U
F	< 10	< 10 U	< 10 U
Naph	< 10	< 10 U	< 10 U
P	< 10	< 10 U	< 10 U

ANALYTE	EW-10 03/13/91	EW-10 06/18/91	EW-10 10/25/91
Acnaph	26	130 J	87 J
Flanth	4.3 J	< 100 UJ	< 100 UJ
F	4 J	< 100 UJ	< 100 UJ
Naph	< 10	5400 J	710 J
P	4.8 J	< 100 UJ	< 100 UJ

ANALYTE	AG3-S 03/12/91	AG3-S 06/19/91	AG3-S 10/23/91
Acnaph	93	93	42
Flanth	1.40 J	< 10	< 10
F	28	38	11
Naph	7600	6000	110
P	< 10	< 10	< 10

ANALYTE	AG1-S 03/11/91	AG1-S 06/18/91	AG1-S 10/23/91
Acnaph	290	130	560 J
Flanth	36	24	120 J
F	88	76	160 J
Naph	2000	5300	10000 J
P	22	13	84 J

ANALYTE	EW-11 03/14/91	EW-11R 03/14/91	EW-11 06/19/91	EW-11A 06/19/91	EW-11 10/24/91
Acnaph	300	280	390	380	390
Flanth	10 J	10 J	< 100	< 100	34
F	110	96	160	170	150
Naph	7600	7900	7300	7100	9500
P	7.2 J	7.5 J	< 100	< 100	< 50

ANALYTE	AG2-S 03/11/91	AG2-S 06/18/91	AG2-S 10/23/91
Acnaph	< 10	< 10	< 10
Flanth	< 10	< 10	< 10
F	< 10	< 10	< 10
Naph	< 10	< 10	< 10
P	< 10	< 10	< 10

ANALYTE	EW-2 03/13/91	EW-2 06/18/91	EW-2 10/23/91
Acnaph	15	11	270
Flanth	< 11	6.9 J	120
F	< 11	< 10	54
Naph	< 11	< 10	< 10
P	< 11	< 10	81

ANALYTE	AG15-S 03/12/91	AG15-S 06/19/91	AG15-S 10/24/91
Acnaph	< 10	< 40	21
Flanth	< 10	< 40	< 10
F	< 10	< 40	< 10
Naph	< 10	< 40	320
P	< 10	< 40	< 10

ANALYTE	AG13-S 3/13/91	AG13-S 06/18/91	AG13-S 10/24/91
Acnaph	30	93	80
Flanth	< 10	6.6 J	< 10
F	13	47	34
Naph	< 10	270	14
P	< 10	3.1 J	< 10

ANALYTE	B2 03/11/91	B2 06/18/91	B2 10/24/91
Acnaph	< 10	< 10 U	< 10 U
Flanth	< 10	< 10 U	< 10 U
F	< 10	< 10 U	< 10 U
Naph	< 10	< 10 U	< 10 U
P	< 10	< 10 U	< 10 U

ANALYTE	LA5 03/12/91	LA5 06/18/91	LA5 10/23/91
Acnaph	< 10	< 10 U	< 10 U
Flanth	< 10	< 10 U	< 10 U
F	< 10	< 10 U	< 10 U
Naph	< 10	< 10 U	< 10 U
P	< 10	< 10 U	< 10 U

ANALYTE	EW-9 03/14/91	EW-9 06/19/91	EW-9 10/25/91
Acnaph	1200	1800	1600 J
Flanth	220	2700	330 J
F	420	5300	760 J
Naph	10000	29000	19000 J
P	140	860	240 J

ANALYTE	N-27 03/14/91	N-27 06/21/91	N-27 10/25/91
Acnaph	380	740 F	840 J
Flanth	220	1400	800 J
F	200	990 F	550 J
Naph	5500	4800	5100 J
P	180	1000	620 J

ANALYTE	AG12-S 03/12/91	AG12-S 06/20/91	AG12-S 10/24/91
Acnaph	< 10	< 10	< 10
Flanth	< 10	< 10	< 10
F	< 10	< 10 UF	< 10
Naph	< 10	< 10	< 10
P	< 10	< 10	< 10

ANALYTE	EW-1 03/13/91	EW-1R 03/13/91	EW-1 06/18/91	EW-1A 06/18/91	EW-1 10/24/91	EW-1R 10/24/91
Acnaph	440	760	440 J	380 J	900	710
Flanth	160	250	370 J	190 J	550	380
F	270	410	290 J	230 J	550	430
Naph	< 11	3200	6600 J	5500 J	2100	3000
P	100	140	180 J	86 J	400	290

ANALYTE	LW-5B 11/07/91	LW-5C 11/07/91	LW-5 12/03/91
Acnaph	54000	36000	210
Flanth	14000	63000	100 U
F	35000	17000	100 U
Naph	300000	68000	10000
P	95000	44000	100 U

ANALYTE	LW-1 03/13/91	LW-1 (Dup) 03/22/91	LW-1 06/19/91	LW-1 10/24/91
Acnaph	2.2 J	10 U	< 100 U	< 10 U,UJ
Flanth	< 10	10 U	< 100 U	< 10 U
F	< 10	10 U	< 100 U	< 10 U
Naph	390	520	580	< 810
P	4.7 J	10 U	< 100 U	< 10 U

ANALYTE	AG7-S 03/12/91	AG7-S 06/18/91	AG7-S 10/24/91
Acnaph	74	140	400
Flanth	1.1 J	< 10	< 100
F	17	60	130
Naph	20	6700	8800
P	< 10	< 10	< 100

ANALYTE	B3 03/11/91	B3 06/18/91	B3 10/24/91
Acnaph	< 10	< 10 U	< 10 U,UJ
Flanth	< 10	< 10 U	< 10 U
F	< 10	< 10 U	< 10 U
Naph	2.8 J	24	< 11
P	< 10	< 10 U	< 10 U

ANALYTE	N-24B 03/15/91	N-24B 06/21/91	N-24B 10/24/91
Acnaph	1800	420 F	750 J
Flanth	2000	260	750 J
F	1500	340 F	640 J
Naph	< 100	1600	6000 J
P	1200	160	480 J

ANALYTE	N-25
Acnaph	
Flanth	NO
F	DATA
Naph	
P	

ANALYTE	EW-6 03/27/91	EW-6 06/18/91	EW-6 10/25/91
Acnaph	< 10	< 10	< 10
Flanth	< 10	< 10	< 10
F	< 10	< 10	< 10
Naph	< 10	< 10	< 10
P	< 10	< 10	< 10

ANALYTE	N-26 03/14/91	N-26 06/21/91	N-26 10/25/91
Acnaph	3300	4300 F	700 J
Flanth	2100	3900	340 J
F	2400	3800 F	450 J
Naph	13000	10000	6900 J
P	1300	2600	280 J

ANALYTE	EW-8 03/13/91	EW-8 06/18/91	EW-8 10/25/91
Acnaph	300	460	480
Flanth	40	73 J	68 J
F	120	190	180
Naph	8900	10000	13000
P	32	< 100	52 J

ANALYTE	SP-1 03/14/91	SP-1 06/21/91	SP-1 10/25/91
Acnaph	< 10	790 F	680
Flanth	< 10	450	310
F	< 10	560 F	390
Naph	< 10	3200	6900
P	< 10	270	230

ANALYTE	N-1 03/13/91	N-1 06/19/91	N-1 10/24/91
Acnaph	< 10	24	13
Flanth	< 10	6.3 J	< 10
F	< 10	9.6 J	< 10
Naph	< 10	< 10	580
P	< 10	< 10	< 10

ANALYTE	S-4 03/13/91	S-4 10/25/91
Acnaph	< 11	150
Flanth	< 11	< 50
F	< 11	34 J
Naph	< 11	3300
P	< 11	< 50

ANALYTE	LW-4 03/12/91	LW-4 06/19/91	LW-4 10/23/91
Acnaph	< 10	< 10 U	< 10 U
Flanth	< 10	< 10 U	< 10 U
F	< 10	< 10 U	< 10 U
Naph	< 10	< 10 U	< 10 U
P	< 10	< 10 U	< 10 U

ANALYTE	AG11-S 03/12/91	AG11-S 06/18/91	AG11-S 10/24/91
Acnaph	< 10	< 10	< 10
Flanth	< 10	< 10	< 10
F	< 10	< 10	< 10
Naph	< 10	< 10	< 10
P	< 10	< 10	< 10

ANALYTE	LW-2 03/22/91	LW-2 06/18/91	LW-2 10/24/91
Acnaph	< 10	< 10 U	10 U,UJ
Flanth	< 10	< 10 U	10 U
F	< 10	< 10 U	10 U
Naph	3.2 J	< 10 U	11
P	< 10	< 10 U	10 U

ANALYTE	LW-3 03/11/91	LW-3 (Dup) 06/19/91	LW-3 06/19/91	LW-3 10/24/91	LW-13 (Dup) 10/24/91
Acnaph	3.1 J,J	5.4 J	5.5 J	10 U,UJ	5.1 J,J
Flanth	< 10	10 U	10 U	10 U	10 U
F	< 10	10 U	10 U	10 U	10 U
Naph	430 J	220	250	34 J	140 J
P	< 10	10 U	10 U	10 U	10 U

ANALYTE	N-7 03/14/91	N-7 06/20/91	N-7 10/25/91
Acnaph	8400 J	15000 F	54000
Flanth	1500 J	4400	18000
F	4000 J	9000 F	32000
Naph	20000 J	41000	60000
P	1000 J	2600	13000

ANALYTE	EW-7 03/14/91	EW-7 06/20/91	EW-7 10/24/91
Acnaph	6300	1200 F	450
Flanth	1500	430	640
F	3100	650 F	690
Naph	23000	13000	14000
P	1100	260	470

ANALYTE	LA6 03/14/91	LA6 06/18/91	LA6 10/23/91
Acnaph	< 10	< 10 U	< 10 U
Flanth	< 10	< 10 U	< 10 U
F	< 10	< 10 U	< 10 U
Naph	< 10	< 10 U	< 10 U
P	< 10	< 10 U	< 10 U

NOTE: BASE PLAN PREPARED FROM "CASCADE POLE SITE", PROVIDED BY DEGROSS AERIAL MAPPING, BOTHELL, WASHINGTON. TO A SCALE OF 1 INCH=50 FEET. BASE PHOTOGRAPH TAKEN JULY 20, 1990.

LEGEND

- 1930-1980 SHORELINE
- APPROXIMATE FORMER LEASED PROPERTY BOUNDARY
- AG3-S LOCATION OF MONITORING WELL INSTALLED BY AGI, INC., IN 1986. S INDICATES A SHALLOW AQUIFER WELL, D INDICATES A DEEP LOWER AQUIFER WELL.
- N-1 LOCATION OF MONITORING WELL INSTALLED BY CASCADE POLE COMPANY IN NOVEMBER 1983.
- RW-1 LOCATION OF RECOVERY WELL INSTALLED BY AGI, INC. IN MARCH 1988.
- SP-1 LOCATION OF MONITORING WELL TO DETECT DNAPL INSTALLED BY AGI, INC, IN OCTOBER 1987
- EW-9 LOCATION OF MONITORING WELL INSTALLED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC., (ESE), IN JANUARY 1991. EW-12 INSTALLED IN OCTOBER 1991.
- LA5 LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY 1989.
- B1 LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY 1989.
- LW-1 LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY 1991. LW-5 INSTALLED IN OCTOBER 1991.

ANALYTE	N-24B 03/15/91		
Acnaph	1800		Acnaph - Acenaphthene
Flanth	2000		Flanth - Fluoranthene
F	1500		F - Fluorene
Naph	ND		Naph - Naphthalene
P	1200		P - Pyrene

ANALYTE CONCENTRATIONS IN ug/l.

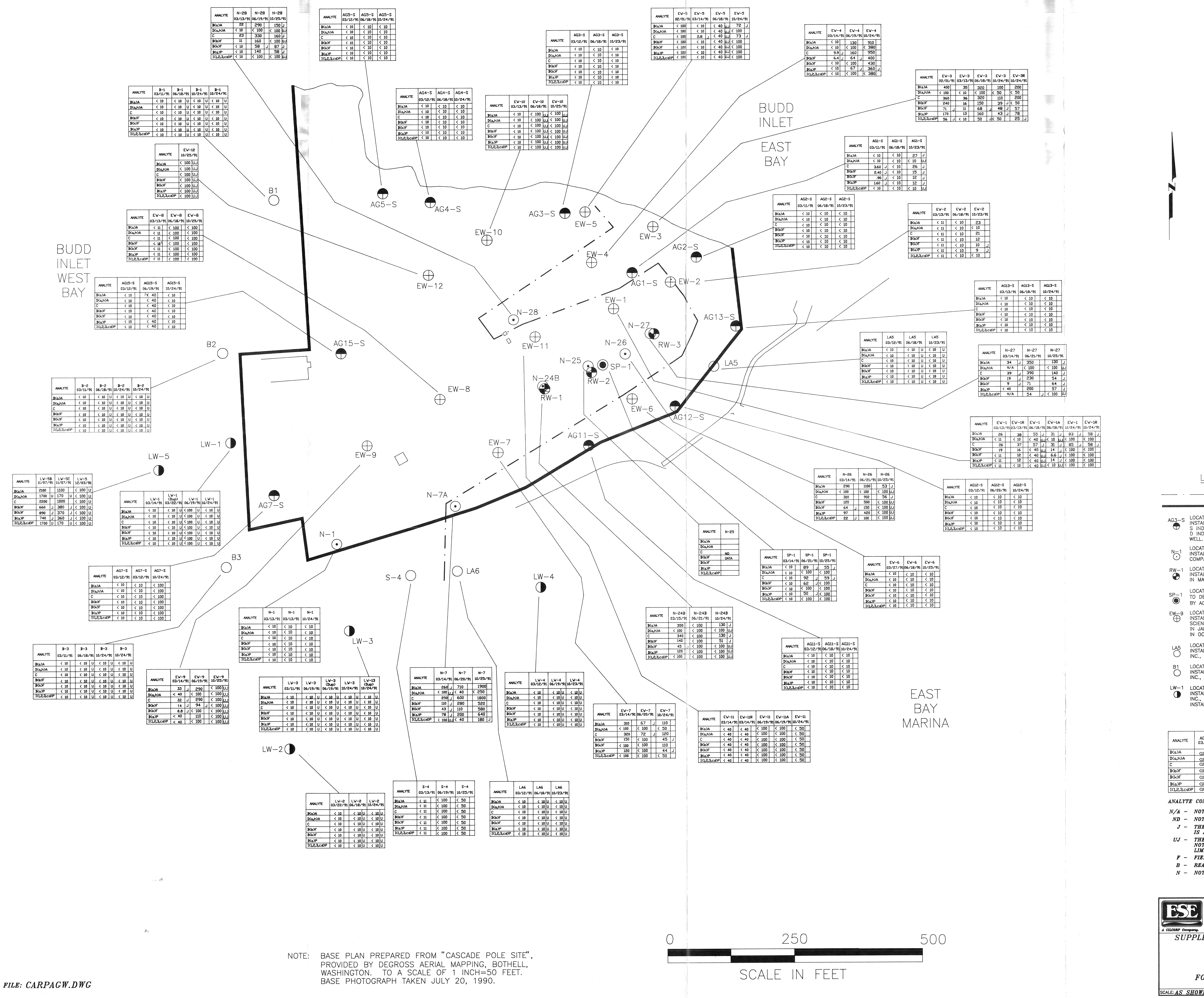
N/A - NOT ANALYZED.
ND - NOT DETECTED.
J - THE ASSOCIATED NUMBERICAL VALUE IS AN ESTIMATED QUANTITY.
UJ - THE MATERIAL WAS ANALYZED FOR, BUT WAS NOT DETECTED. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY.
F - FIELD BLANK CONTAMINATION.
B - REAGENT BLANK CONTAMINATION.
N - NOT CONFIRMED BY 2ND COLUMN ANALYSIS.

ESE Environmental Science & Engineering, Inc.
A CILCORP Company.

SUPPLEMENTAL SITE INVESTIGATION
CASCADE POLE SITE
OLYMPIA, WASHINGTON
PLATE 6
NONCARCINOGENIC PAH MAP
FOR GROUNDWATER IN THE
SHALLOW AQUIFER

SCALE: AS SHOWN | REVISION: | DRAWN BY: Marcos Peroza | DATE: 7/10/92

FILE: NCARPAGW.DWG



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LEGEND

— · —	1930–1980 SHORELINE
▬	APPROXIMATE FORMER LEASED PROPERTY BOUNDARY.
AG3–S	LOCATION OF MONITORING WELL INSTALLED BY AGI. INC., IN 1986 S INDICATES A SHALLOW AQUIFER WELL, D INDICATES A DEEP LOWER AQUIFER WELL.
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LW–1 ◐	LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY 1991. LW–5 INSTALLED IN OCTOBER 1991.

ANALYTE	AG–12S 03/12/91		
B(a)A	<10		Benzo(a)Anthracene
D(a,h)A	<10		Dibenzo(a,h)Anthracene
C	<10		Chrysene
B(b)F	<10		Benzo(b)Fluoranthene
B(k)F	<10		Benzo(k)Fluoranthene
B(a)P	<10		Benzo(a)Pyrene
I(1,2,3,cd)P	<10		Indeno(1,2,3,cd)Pyrene

ANALYTE CONCENTRATIONS IN ug/l.

N/A – NOT ANALYZED.
ND – NOT DETECTED.
J – THE ASSOCIATED NUMBERICAL VALUE IS AN ESTIMATED QUANTITY.
UJ – THE MATERIAL WAS ANALYZED FOR, BUT WAS NOT DETECTED. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY.
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ESE Environmental Science & Engineering, Inc.
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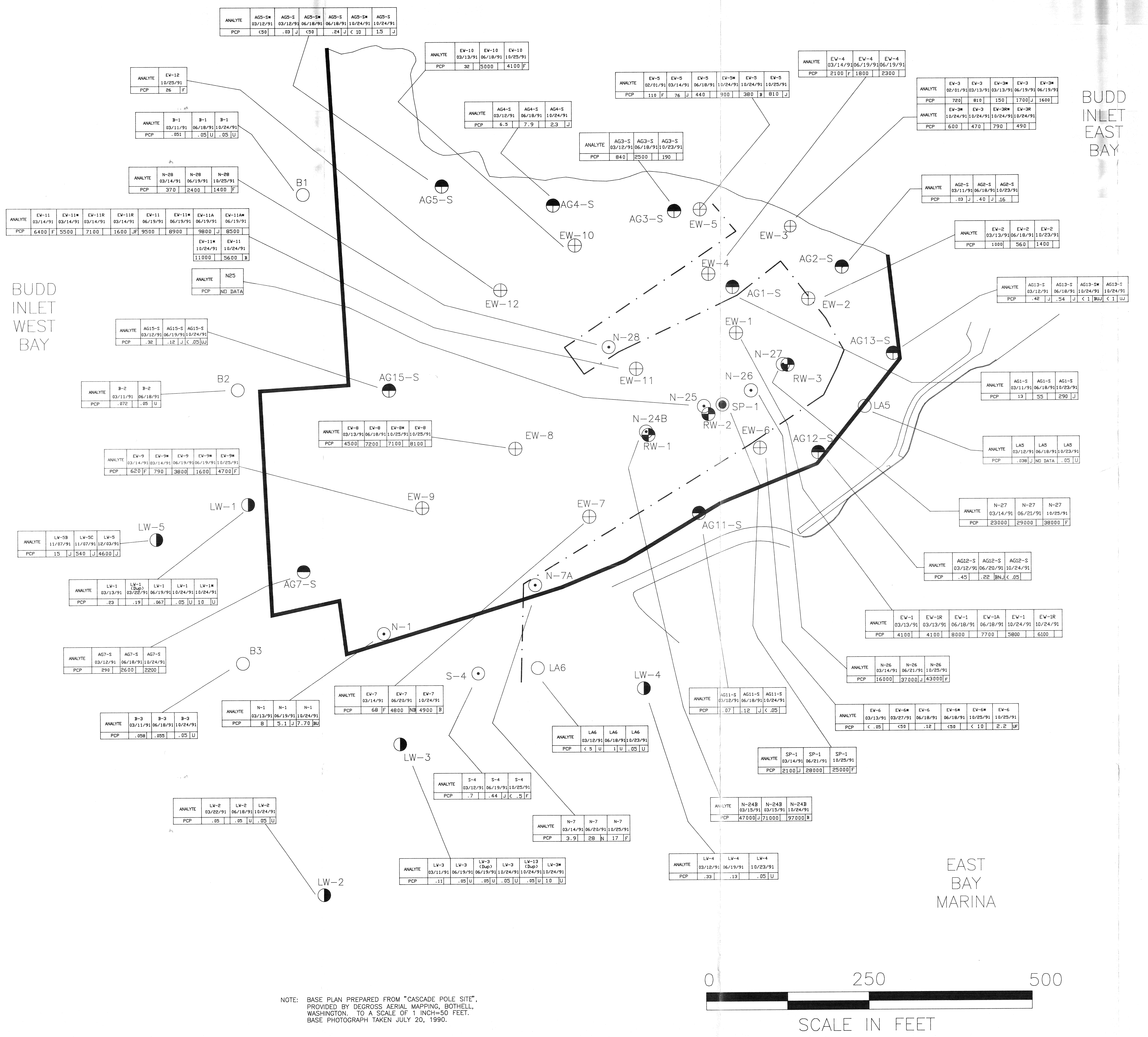
SUPPLEMENTAL SITE INVESTIGATION
CASCADE POLE SITE
OLYMPIA, WASHINGTON
PLATE 7
CARCINOGEN PAH MAP
FOR GROUNDWATER IN THE
SHALLOW AQUIFER

SCALE: *AS SHOWN*	REVISION:	DRAWN BY: Marcos Peroza	DATE: 7/10/92

FILE: CARPAGW.DWG



ANALYTE	AG5-S* 03/12/91	AG5-S 03/12/91	AG5-S* 06/18/91	AG5-S 06/18/91	AG5-S* 10/24/91	AG5-S 10/24/91
PCP	<50	.03 J	<50	.24 J	< 10	1.5 J

ANALYTE	EW-10 03/13/91	EW-10 06/18/91	EW-10 10/25/91
PCP	32	5000	4100 F

ANALYTE	EW-12 10/25/91
PCP	26 F

ANALYTE	B-1 03/11/91	B-1 06/18/91	B-1 10/24/91
PCP	.051	.05 U	.05 U

ANALYTE	N-28 03/14/91	N-28 06/19/91	N-28 10/25/91
PCP	370	2400	1400 F

ANALYTE	EW-11 03/14/91	EW-11* 03/14/91	EW-11R 03/14/91	EW-11R 03/14/91	EW-11 06/19/91	EW-11* 06/19/91	EW-11A 06/19/91	EW-11A* 06/19/91	EW-11* 10/24/91	EW-11 10/24/91
PCP	6400 F	5500	7100	1600 JF	9500	8900	9800 J	8500	11000	5600 B

ANALYTE	N25
PCP	NO DATA

ANALYTE	AG15-S 03/12/91	AG15-S 06/19/91	AG15-S 10/24/91
PCP	.32	.12 J	< .05 UJ

ANALYTE	B-2 03/11/91	B-2 06/18/91
PCP	.072	.05 U

ANALYTE	AG4-S 03/12/91	AG4-S 06/18/91	AG4-S 10/24/91
PCP	6.5	7.9	2.3 J

ANALYTE	AG3-S 03/12/91	AG3-S 06/18/91	AG3-S 10/23/91
PCP	840	2500	190

ANALYTE	EW-5 02/01/91	EW-5 03/14/91	EW-5 06/18/91	EW-5* 10/24/91	EW-5 10/24/91	EW-5 10/25/91
PCP	110 F	76 J	440	900	380 B	810 J

ANALYTE	EW-4 03/14/91	EW-4 06/19/91	EW-4 06/19/91
PCP	2100 F	1800	2300

ANALYTE	EW-3 02/01/91	EW-3 03/13/91	EW-3* 03/13/91	EW-3 06/19/91	EW-3* 06/19/91
PCP	720	810	150	1700 J	1600

ANALYTE	EW-3* 10/24/91	EW-3 10/24/91	EW-3R* 10/24/91	EW-3R 10/24/91
PCP	600	470	790	490

ANALYTE	AG2-S 03/11/91	AG2-S 06/18/91	AG2-S 10/23/91
PCP	.03 J	.40 J	.16

ANALYTE	EW-2 03/13/91	EW-2 06/18/91	EW-2 10/23/91
PCP	1000	560	1400

ANALYTE	AG13-S 03/12/91	AG13-S 06/18/91	AG13-S* 10/24/91	AG13-S 10/24/91
PCP	.42 J	.54 J	< 1 BUJ	< 1 UJ

ANALYTE	AG1-S 03/11/91	AG1-S 06/18/91	AG1-S 10/23/91
PCP	13	55	290 J

ANALYTE	LA5 03/12/91	LA5 06/18/91	LA5 10/23/91
PCP	.038 J	NO DATA	.05 U

ANALYTE	N-27 03/14/91	N-27 06/21/91	N-27 10/25/91
PCP	23000	29000	38000 F

ANALYTE	AG12-S 03/12/91	AG12-S 06/20/91	AG12-S 10/24/91
PCP	.45	.22 BNJ	< .05

ANALYTE	EW-1 03/13/91	EW-1R 03/13/91	EW-1 06/18/91	EW-1A 06/18/91	EW-1 10/24/91	EW-1R 10/24/91
PCP	4100	4100	8000	7700	5800	6100

ANALYTE	N-26 03/14/91	N-26 06/21/91	N-26 10/25/91
PCP	16000	37000 J	43000 F

ANALYTE	EW-6 03/13/91	EW-6* 03/27/91	EW-6 06/18/91	EW-6* 06/18/91	EW-6* 10/25/91	EW-6 10/25/91
PCP	< .05	<50	.12	<50	< 10	2.2 UF

ANALYTE	SP-1 03/14/91	SP-1 06/21/91	SP-1 10/25/91
PCP	2100 J	28000	25000 F

ANALYTE	N-24B 03/15/91	N-24B 03/15/91	N-24B 10/24/91
PCP	47000 J	71000	97000 B

ANALYTE	AG11-S 03/12/91	AG11-S 06/18/91	AG11-S 10/24/91
PCP	.07	.12 J	< .05

ANALYTE	LW-4 03/12/91	LW-4 06/19/91	LW-4 10/23/91
PCP	.33	.13	.05 U

ANALYTE	LA6 03/12/91	LA6 06/18/91	LA6 10/23/91
PCP	< 5 U	1 U	.05 U

ANALYTE	N-7 03/14/91	N-7 06/20/91	N-7 10/25/91
PCP	3.9	28 N	17 F

ANALYTE	S-4 03/12/91	S-4 06/19/91	S-4 10/25/91
PCP	.7	.44 J	< .5 F

ANALYTE	LW-3 03/11/91	LW-3 06/19/91	LW-3 (Dup) 06/19/91	LW-3 10/24/91	LW-13 (Dup) 10/24/91	LW-3* 10/24/91
PCP	.11	.05 U	.05 U	.05 U	.05 U	10 U

ANALYTE	LW-2 03/22/91	LW-2 06/18/91	LW-2 10/24/91
PCP	.05	.05 U	.05 U

ANALYTE	EW-7 03/14/91	EW-7 06/20/91	EW-7 10/24/91
PCP	68 F	4800 NB	4900 B

ANALYTE	N-1 03/13/91	N-1 06/19/91	N-1 10/24/91
PCP	8	5.1 J	7.70 BU

ANALYTE	B-3 03/11/91	B-3 06/18/91	B-3 10/24/91
PCP	.058	.055	.05 U

ANALYTE	AG7-S 03/12/91	AG7-S 06/18/91	AG7-S 10/24/91
PCP	290	2600	2200

ANALYTE	LW-1 03/13/91	LW-1 (Dup) 03/22/91	LW-1 06/19/91	LW-1 10/24/91	LW-1* 10/24/91
PCP	.23	.19	.067	.05 U	10 U

ANALYTE	LW-5B 11/07/91	LW-5C 11/07/91	LW-5 12/03/91
PCP	15 J	540 J	4600 J

ANALYTE	EW-9 03/14/91	EW-9* 03/14/91	EW-9 06/19/91	EW-9* 06/19/91	EW-9* 10/25/91
PCP	620 F	790	3800	1600	4700 F

ANALYTE	EW-8 03/13/91	EW-8 06/18/91	EW-8* 10/25/91	EW-8 10/25/91
PCP	4500	7200	7100	8100

NOTE: BASE PLAN PREPARED FROM "CASCADE POLE SITE", PROVIDED BY DEGROSS AERIAL MAPPING, BOTHELL, WASHINGTON. TO A SCALE OF 1 INCH=50 FEET. BASE PHOTOGRAPH TAKEN JULY 20, 1990.

FILE: *PCPPAGW.DWG*

LEGEND

— · — · —	1930-1980 SHORELINE
▬	APPROXIMATE FORMER LEASED PROPERTY BOUNDARY
AG3-S ◒	LOCATION OF MONITORING WELL INSTALLED BY AGI, INC., IN 1986. S INDICATES A SHALLOW AQUIFER WELL.
N-1 ⊙	LOCATION OF MONITORING WELL INSTALLED BY CASCADE POLE COMPANY IN NOVEMBER 1983.
RW-1 ◍	LOCATION OF RECOVERY WELL INSTALLED BY AGI, INC. IN MARCH 1988.
SP-1 ◉	LOCATION OF MONITORING WELL TO DETECT DNAPL INSTALLED BY AGI, INC., IN OCTOBER 1987.
EW-9 ⊕	LOCATION OF MONITORING WELL INSTALLED BY ENVIRONMENTAL SCIENCE & ENGINEERING, INC., (ESE) IN JANUARY 1991. EW-12 INSTALLED IN OCTOBER 1991.
LA5 ○	LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY 1989.
B1 ○	LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY 1989.
LW-1 ◑	LOCATION OF MONITORING WELL INSTALLED BY LANDAU ASSOCIATES, INC., IN JANUARY 1991. LW-5 INSTALLED IN OCTOBER 1991.

ANALYTE	EW-3 03/13/91	EW-3* 03/13/91	
PCP	810	150	PENTACHLOROPHENOL

Chlorinated phenolics analyzed by modified EPA method 8040 unless indicated with an "*".
* Chlorinated phenolics analyzed by EPA method 8270.

ANALYTE CONCENTRATIONS IN ug/l.

N/A – NOT ANALYZED.
ND – NOT DETECTED.
J – THE ASSOCIATED NUMBERICAL VALUE IS AN ESTIMATED QUANTITY.
UJ – THE MATERIAL WAS ANALYZED FOR, BUT WAS NOT DETECTED. THE SAMPLE QUANTITATION LIMIT IS AN ESTIMATED QUANTITY.
F – FIELD BLANK CONTAMINATION.
B – REAGENT BLANK CONTAMINATION.
N – NOT CONFIRMED BY 2ND COLUMN ANALYSIS.

ESE
A CILCORP Company.
Environmental
Science &
Engineering, Inc.

SUPPLEMENTAL SITE INVESTIGATION
CASCADE POLE SITE
OLYMPIA, WASHINGTON
PLATE 8
PCP CONCENTRATION MAP
FOR GROUNDWATER IN THE
SHALLOW AQUIFER

SCALE: *AS SHOWN* | REVISION: | DRAWN BY: Marcos Peroza | DATE: *7/10/92*