U.S. Army Environmental Center

Remedial Investigations Report - Group 1A Sites, Volume II

Fort Devens, Massachusetts

April 1993
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Final

1ARI.PM4

APPENDIX A

WELL AND BORE LOGS

Appendix A contains well construction schematics and bore logs for wells installed at Shepley's Hill Landfill and Cold Spring Brook Landfill. A table is provided to clarify the identifiers assigned to the Shepley's Hill Landfill wells, and their corresponding aliases, if used. The well identifiers used at Cold Spring Brook Landfill are straightforward and require no further explanation. Also included are bore logs for locations SHL-14 and SHL-16 (which were drilled but were found to be dry holes and were then abandoned) and logs for four borings from which background soil samples were collected.

WELL IDENTIFICATION TABLE FOR SHEPLEY'S HILL LANDFILL

Location	SEA(1)	CONTEST(2)	E & E(3)	Status
SHL-1	BAR-1			Abandoned on 7/15/91(4)
SHL-1	WT-1/SHL-1A			Operational
SHL-2	WT-2/BAR-2A			Abandoned on 7/17/91(5)
SHL-2	BAR-2			Abandoned on 7/18/91(4)
SHL-3	WT-3			Operational
SHL-3	BAR-3			Closed with locked cap(4)
SHL-4	WT-4/BAR-4			Operational(5)
SHL-5	WT-5			Operational
SHL-5	BAR-5			Abandoned on 7/23/91(4)
SHL-6	WT-6			Operational
SHL-7	WT-7			Operational
SHL-8	WT-8/BAR-8			Destroyed and replaced by SHL-8S/D(5)
SHL-8S		SHL-8S		Operational (Shallow)
SHL-8D		SHL-8D		Operational (Deep)
SHL-9	WT-9/BAR-9			Operational(5)
SHL-10		N-1		Operational
SHL-11		N-2		Operational
SHL-12		N-3		Operational
SHL-13		N-4		Destroyed and replaced
SHL-15			SHL-15	Operational
SHL-17			SHL-17	Operational
SHL-18			SHL-18	Operational
SHL-19			SHL-19	Operational
SHL-20			SHL-20	Operational
SHL-21			SHL-21	Operational
SHL-22			SHL-22	Operational
SHL-23			SHL-23	Operational
SHL-24			SHL-24	Operational
SHL-25			SHL-25	Operational
POL-1				Operational
POL-2				Operational
POL-3				Operational

RC424

(1) Wells constructed by SEA Inc., in 1986
(2) Wells, including replacements, constructed by CONTEST in 1989
(3) Wells constructed by Ecology and Environment, Inc. in 1991
(4) BARCAD wells
(5) Hybrid: Wells that have a BARCAD unit in place below a regular well

Source: E & E, 1991

S E A Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corp.
FOREMAN: Bob Seymour
METHOD: Hollow Stem Auger & NX Core Barrel

SEA GEOLOGIST/ENGINEER: M. Gitten

BARCAD SAMPLER
No. 1

GROUNDWATER DEPTH : 12.55'
DATE : 3/7/86
DATUM : Casing

MONITORING WELL NO. BAR-1
JOB NO: 392-8511 CLIENT: Barson's
LOCATION: Ft. Devens Landfill
DATE
START: 1/28/86 FINISH: 1/30/86

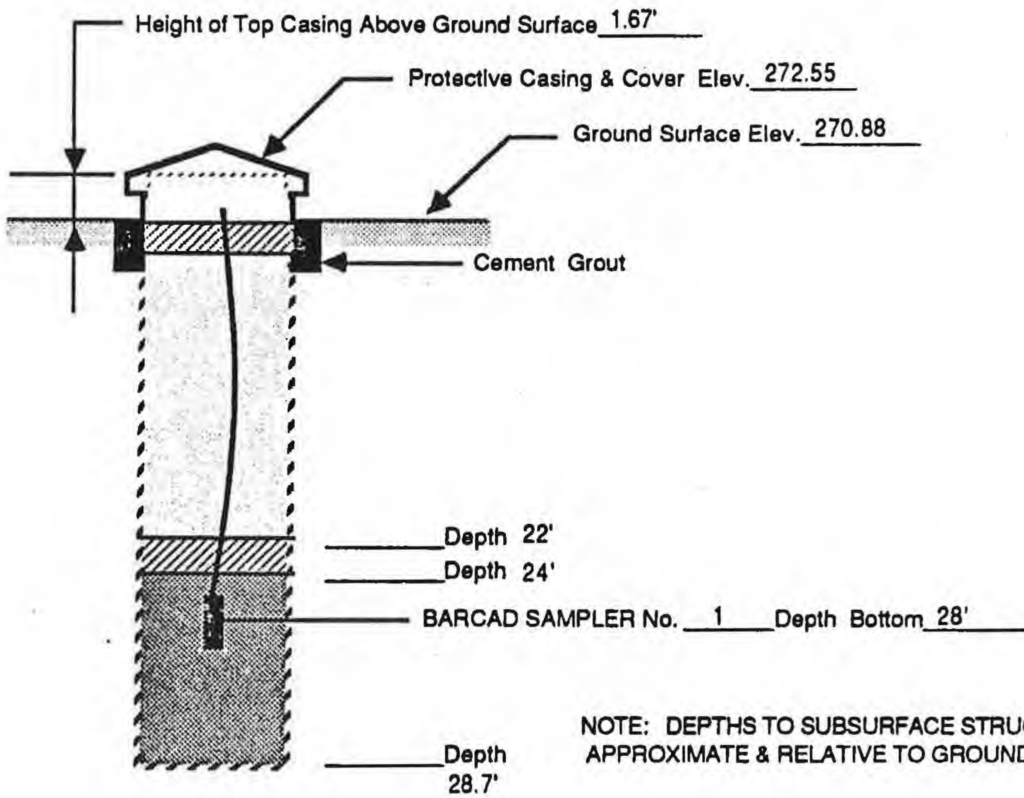
SOIL SAMPLES TAKEN: Yes

EQUIPMENT CLEANING: Yes
METHOD: Steam and methanol rinse

MATERIAL TO FACILITATE DRILLING: Yes
TYPE: Water

LEGEND

IMPERMEABLE SEAL   SAND FILTER   BACKFILL MATERIAL



NOTE: DEPTHS TO SUBSURFACE STRUCTURES ARE APPROXIMATE & RELATIVE TO GROUND SURFACE

MONITORING WELL CROSS-SECTION WITH BARCAD SAMPLER INSTALLATION

S E A Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corp
FOREMAN: Bob Seymour
METHOD: Hollow Stem Auger /Nx Core Barrel

SEA GEOLOGIST/ENGINEER: M Schultz

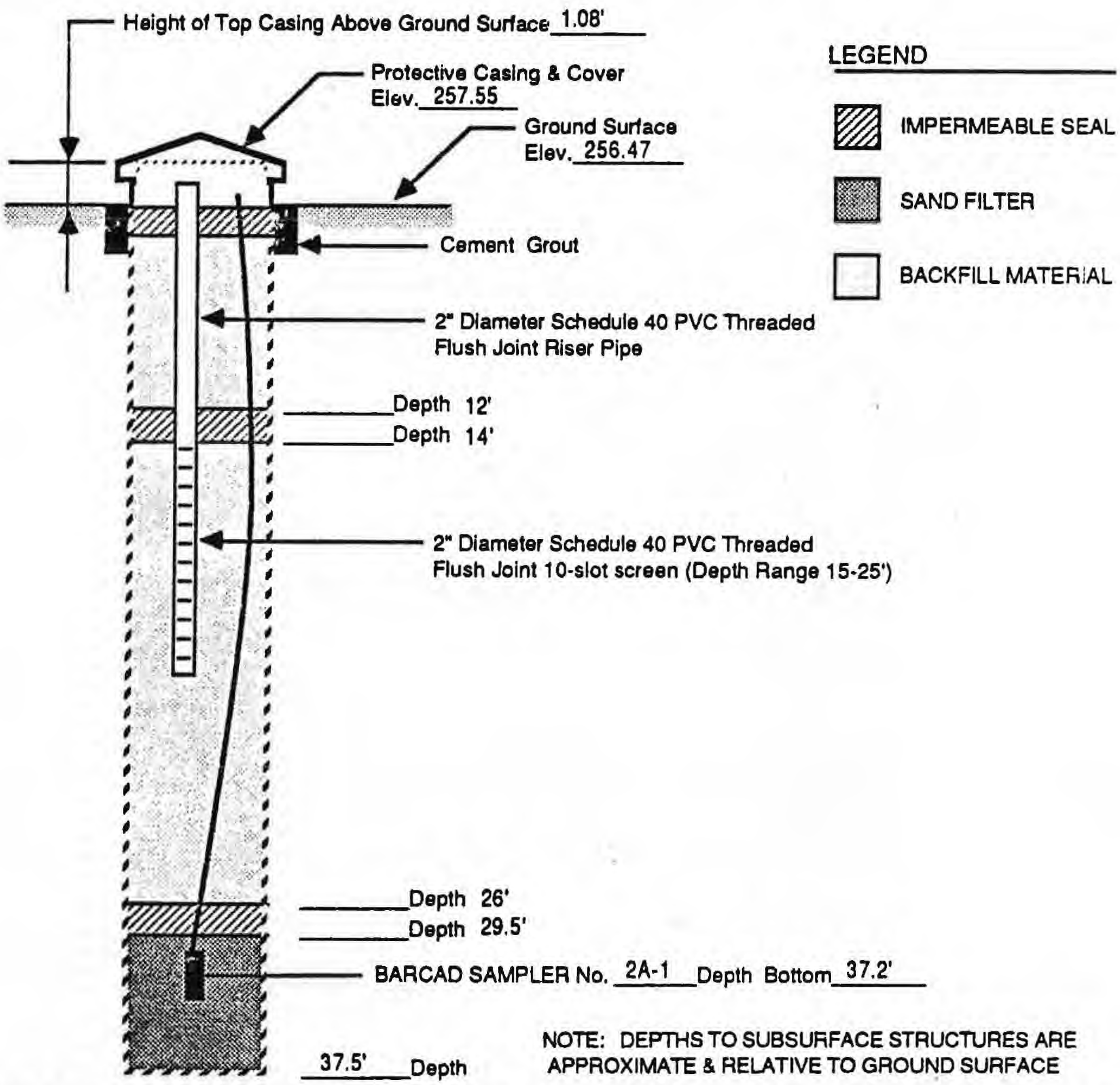
	BARCAD No. 1	WELL WT-2
GROUNDWATER DEPTH:	21.8'	22.0'
DATE:	3/7/86	3/7/86
DATUM:	T.C.	T.C.

MONITORING WELL NO. BAR-2A & WT-2
JOB NO: 392-8511 CLIENT: Barson's
LOCATION: Ft Devens Landfill
DATE
START: 1/31/86 FINISH: 2/3/86

SOIL SAMPLES TAKEN: No

EQUIPMENT CLEANING: Yes
METHOD: Steam & Methanol Rinse

MATERIAL TO FACILITATE DRILLING: Yes
TYPE: Water



NOTE: DEPTHS TO SUBSURFACE STRUCTURES ARE APPROXIMATE & RELATIVE TO GROUND SURFACE

MONITORING WELL CROSS-SECTION WITH BARCAD SAMPLER INSTALLATION

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Ft. Devens

Boring Log

Boring No. SEA-2
Ref. No. 392-8511

Contractor : Soil Exploration Corp. Date: 31 Jan-3 Feb 86
Engineer/Geologist : M. Gitten
Boring Location : See Site Plan
Ground Surface Elev. : 254.90 **Water Level :** 19.5' **Date :** 3 Feb. 86
Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon & NX Core Barrel
Casing at : 32'

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
0.5	S-1	13/4	0-1.1	79	Brown, find SAND, little coarse sand and fine gravel, trace inorganic silt with roots	(1)	Fine to medium SAND, little coarse sand and gravel (SP)
1				33			
1.5				50/1"			
2							
2.5							
3							
3.5							
4							
4.5	S-2	18/16	4-5.5	7	Brown, fine SAND, little medium to coarse sand and fine gravel		
5				13			
5.5				11			
6							
6.5							
7							
7.5							
8							
8.5							
9							
9.5	S-3	18/14	9-10.5	13	Brown, fine to medium SAND, little coarse sand and fine to medium gravel		
10				17			
10.5				20			
11							
11.5							
12							
12.5							
13							
13.5							
14							
14.5	S-4	18/15	14-15.5	10	Brown, fine SAND, little medium to coarse sand and fine gravel		
15				20			
15.5				23			
16							
16.5							
17							
17.5							
18							(18.0')
18.5							Fine SAND, trace inorganic silt (SP)
19							
19.5	S-5	18/18	19-20.5	12	Brown, fine SAND, trace inorganic silt		
20				17			
				16			

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(1) Blow counts high for S-1 due to frost penetration.
(2) Gravel pieces include both subangular and angular (rock fragments).
(3) All coring times in minutes.

Boring Log
Boring No. SEA-2
Ref. No. 392-8511

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Ft. Devens

Boring Log

Boring No. SEA-2
Ref. No. 392-8511

Contractor : Soil Exploration Corp. Date: 31 Jan-3 Feb 86
Engineer/Geologist : M. Gitten
Boring Location : See Site Plan
Ground Surface Elev. : 254.90 **Water Level :** 19.5' **Date :** 3 Feb. 86

Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon & NX Core Barrel
Casing at : 32'

Depth (ft)	Sample No.	Sample Pen (in) /Rec.	Sample Depth (ft)	Sample Blows/6"	Sample Description	Remarks	Stratum Description
20.5							Fine SAND, trace inorganic silt (SP)
21							
21.5							
22							
22.5							(22.5') Fine SAND, little inorganic silt with lenses of inorganic SILT (SM/ML)
23							
23.5							
24							
24.5	S-6	18/18	24-25.5	17	Brown, fine to coarse SAND, little inorganic silt with lenses of SILT		
25				20			
25.5				29			
26							
26.5							
27							
27.5							
28							
28.5							(28.0') Fine to coarse SAND, little fine to coarse gravel, trace inorganic silt (SW)
29						(2)	
29.5	S-7	18/12	29-30.5	18	Brown, fine to coarse SAND, little fine to coarse gravel, trace inorganic silt		
30				30			
30.5				28			
31							
31.5							
32							
32.5	S-8	0/0	32	100/0"			(32.0') Very hard to hard, dark grey, equiangular to slightly porphyritic biotite GRANODIORITE with few quartz stringers
33				Coring Time	Fresh to slightly weathered biotite GRANODIORITE, with closely to medium spaced, tight, planar joints; joints are flat (0° to 20°) to steeply dipping (45° to 70°), few quartz stringers	(3)	
33.5	C-1	60/55	32-37	10			
34							
34.5				8			
35		Recovery	= 92%				
35.5				9			
36							
36.5				11			
37							
37.5				8			
38							
38.5	C-2	24/22	37-39	12			
39							
39.5		Recovery	= 92%	12	Bottom of Exploration at 39'		(39.0)
40							

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V. Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(1) Blow counts high for S-1 due to frost penetration.
(2) Gravel pieces include both subangular and angular (rock fragments).
(3) All coring times in minutes.

Boring Log
Boring No. SEA-2
Ref. No. 392-8511

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

P2 xtra blows

S E A Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corp.
FOREMAN: Bob Seymour
METHOD: Hollow Stem Auger & NX Core Barrel

SEA GEOLOGIST/ENGINEER: J. Jammallo

MONITORING WELL NO. BAR-3
JOB NO: 392-8511 CLIENT: Barson's
LOCATION: Ft. Devens Landfill
DATE
START: 2/5/86 FINISH: 2/6/86

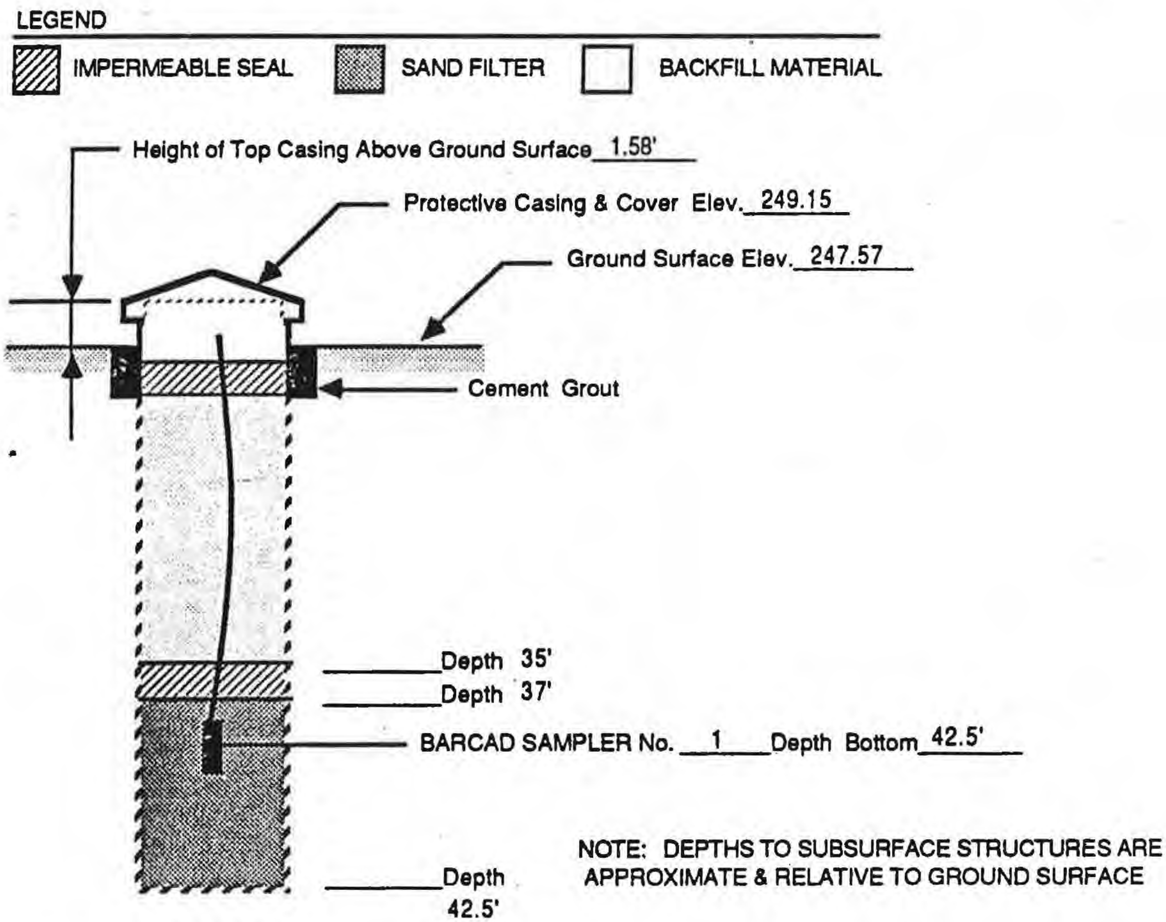
BARCAD SAMPLER
No. 1

SOIL SAMPLES TAKEN: Yes

GROUNDWATER DEPTH : 29.5'
DATE : 2/16/86
DATUM : G.S.

EQUIPMENT CLEANING: Yes
METHOD: Steam clean and methanol rinse

MATERIAL TO FACILITATE DRILLING: Yes
TYPE: Water



MONITORING WELL CROSS-SECTION WITH BARCAD SAMPLER INSTALLATION

S E A Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corp.
FOREMAN: Bob Seymour
METHOD: Hollow Stem Anger

SEA GEOLOGIST/ENGINEER: J. Jammallo

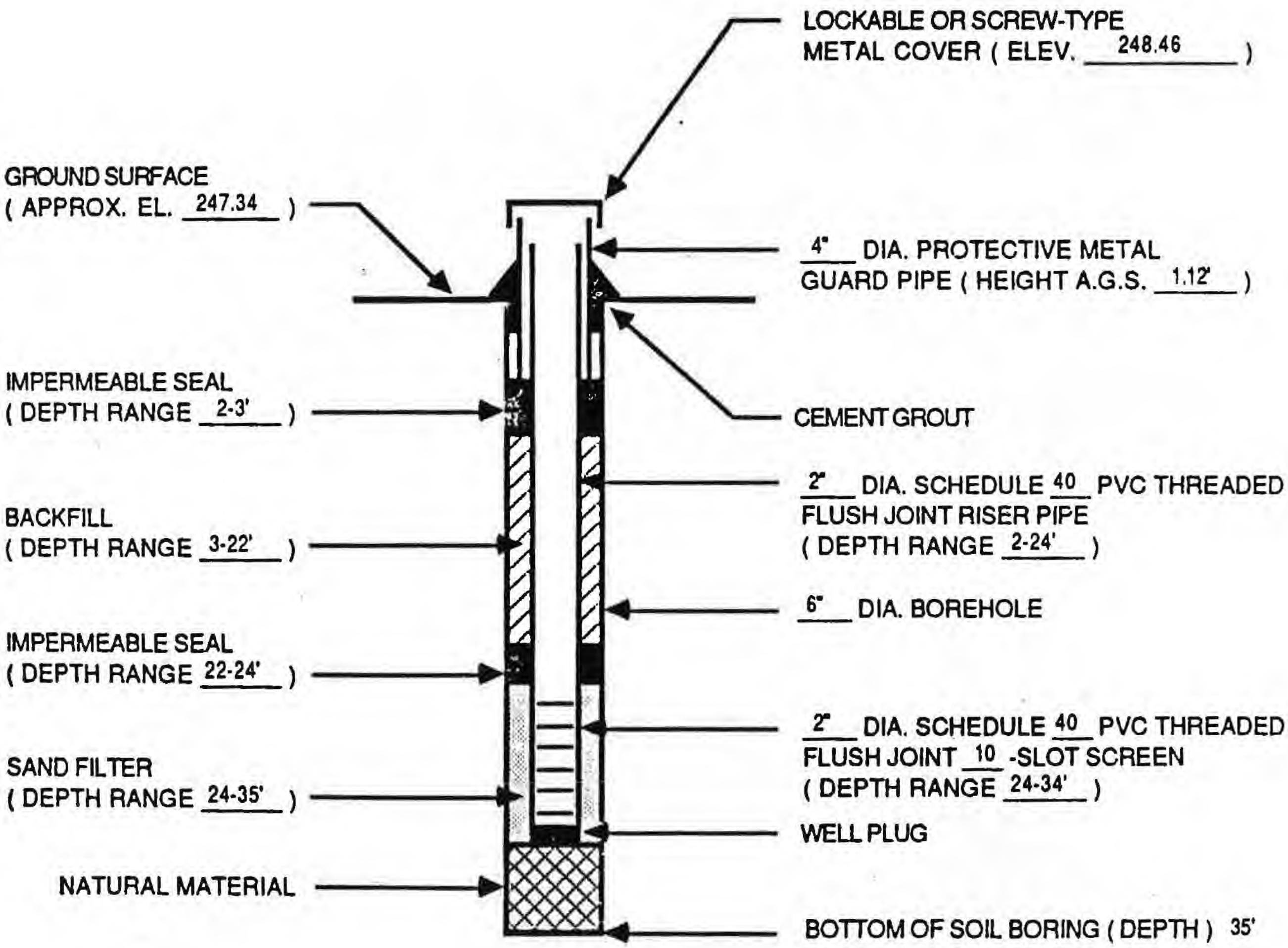
GROUNDWATER LEVEL:
DATE: 3/7/86
TIME:
FEET: 30.4'
METHOD: Tape
DATUM: T.C.

MONITORING WELL NO. WT-3
JOB NO: 392-8511 CLIENT: Barson's
LOCATION: Ft. Devens
DATE
START: 2/6/86 FINISH: 2/6/86

SOIL SAMPLES TAKEN: No

EQUIPMENT CLEANING: Yes
METHOD: Steam clean and methanol rinse

MATERIAL TO FACILITATE DRILLING: No
TYPE:



MONITORING WELL
CROSS SECTION SCHEMATIC

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Ft. Devens

Boring Log

Boring No. SEA-3
Ref. No. 392-8511

Contractor : Soil Exploration Corp. 5 Feb. & 6 Feb. 86
Engineer/Geologist : M. Schultz
Boring Location : See Site Plan
Ground Surface Elev. : 247.57 **Water Level :** 29.5' **Date :** 6 Feb. 86
Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon & NX Core Barrel
Casing at : 0'

Depth (ft)	Sample No.	Sample Pen (In) /Rec.	Sample Depth (ft)	Sample Blows/6"	Sample Description	Remarks	Stratum Description
0.5	S-1	---	0'-2'	---	Brown, fine to medium SAND, trace to little coarse sand and fine gravel with occasional roots	(1)	Fine to medium SAND, trace to little coarse sand and fine gravel (SP)
4.5	S-2	18/18	4-5.5	7	Brown, fine to medium SAND, trace coarse sand		
5				8			
5.5				10			
7.5							(7.5') Coarse to fine SAND, trace fine gravel (SW)
9.5	S-3	18/18	9-10.5	13	Brown, coarse to find SAND, trace fine gravel		
10				15			
10.5				16			
12.5							(12.5') Fine to medium SAND, trace coarse sand and fine gravel (SP)
14.5	S-4	18/15	14-15.5	7	Brown, fine SAND, trace to little medium to coarse sand and fine gravel		
15				8			
15.5				9			
19.5	S-5	18/16	19-20.5	7	Brown, fine to medium SAND , trace coarse sand		
20				9			
				9			

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(1) S-1 from auger.
(2) Sample S-6 and above dry.
(3) Samples S-7 wet.

Boring Log
Boring No. SEA-3
Ref. No. 392-8511

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SEA
S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Ft. Devens

Boring Log

Boring No. SEA-3
Ref. No. 392-8511

Contractor : Soil Exploration Corp. 5 Feb. & 6 Feb. 86
Engineer/Geologist : M. Schultz
Boring Location : See Site Plan
Ground Surface Elev. : 247.57 **Water Level :** 29.5' **Date :** 6 Feb. 86

Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon & NX Core Barrel
Casing at : 0'

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
20.5							Fine to medium SAND, trace to little coarse sand (SP)
21							
21.5							
22							
22.5							
23							
23.5							
24 / 24.5	S-6	18/15	24-25.5	15	Brown, fine SAND, trace to little coarse sand	(2)	
25				20			
25.5				22			
26							
26.5							
27							
27.5							
28							
28.5							
29 / 29.5	S-7	18/15	29-30.5	8	Brown, fine to medium SAND, trace coarse sand	(3)	
30				8			
30.5				9			
31							
31.5							
32							
32.5							
33							
33.5							
34 / 34.5	S-8	18/0	34-35.5	12			
35				16			
35.5				13			
36	S-9	18/0	35.5-37	8			
36.5				8			
37				10			
37.5	S-10	0/0	37.5-	50/0"			(37.5')
38				Coring Time	Fresh to slightly weathered biotite GRANODIORITE with very closely to closely spaced, tight, planar joints; joints flat (0°-20°) to very steeply dipping (70° to 90°)		Very hard to hard, dark grey, equigranular biotite GRANODIORITE
38.5				7.5			
39 / 39.5	C-1	60/	37.5 to				
40			42.5	11			
		Recovery=	70%				
				6			

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V. Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(1) S-1 from auger.
(2) Sample S-6 and above dry.
(3) Samples S-7 wet.

Boring Log
Boring No. SEA-3
Ref. No. 392-8511

P2 xtra blows 6

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill closure
Ft. Devens

Boring Log

Boring No. SEA-3
Ref. No. 392-8511

Contractor : Soil Exploration Corp.
Engineer/Geologist : M. Schultz
Boring Location : See Site Plan
Ground Surface Elev. : 247.57 **Water Level :** 29.5' **Date :** 6 Feb. 86
Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon + NX Core Barrel
Casing at : 0'

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
40.5				6			Very hard to hard, dark grey, equigranular biotite GRANODIORITE
41							
41.5				11			
42							
42.5					Bottom of exploration at 42.5		(42.5')
43							
43.5							
44							
44.5							
45							
45.5							
46							
46.5							
47							
47.5							
48							
48.5							
49							
49.5							
50							
50.5							
51							
51.5							
52							
52.5							
53							
53.5							
54							
54.5							
55							
55.5							
56							
56.5							
57							
57.5							
58							
58.5							
59							
59.5							
60							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:

Boring Log
Boring No. SEA-3
Ref. No. 392-8511

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

SEA Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corporation
FOREMAN: Bob Seymour
METHOD: Hollow Stem Auger & NX Cone Barrel

SEA GEOLOGIST/ENGINEER: J. Jammallo/M. Schultz

MONITORING WELL NO. BAR-4 & WT-4
JOB NO: 392-8511 CLIENT: Barson's
LOCATION: Fort Devens Landfill
DATE
START: 2/7/86 FINISH: 2/10/86

	BARCAD SAMPLER No. 1	BARCAD SAMPLER No. 2	WELL
GROUNDWATER DEPTH :	10.5'	10.5'	10.9'
DATE :	3/17/86	3/17/86	3/17/86
DATUM :	TC	TC	TC

SOIL SAMPLES TAKEN: Yes

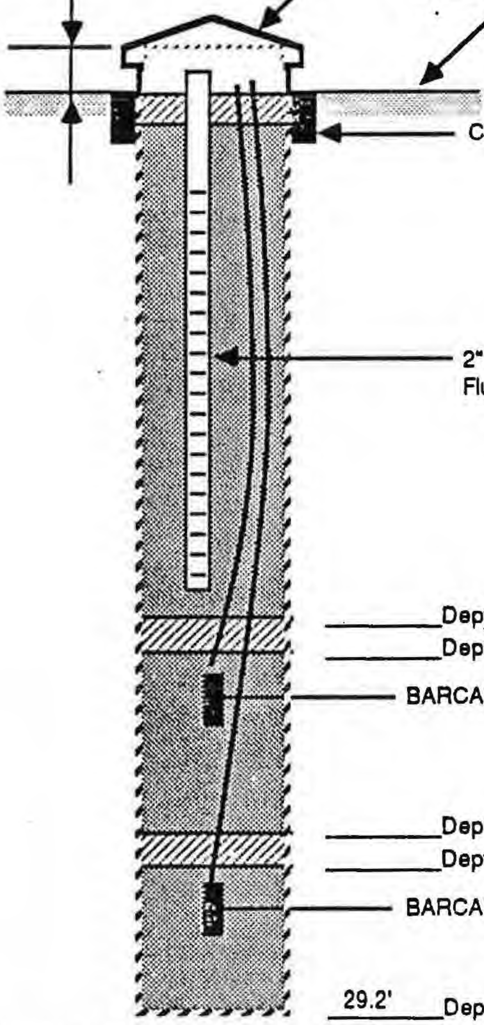
EQUIPMENT CLEANING: Yes
METHOD: Steam Clean and Methanol Rinse

MATERIAL TO FACILITATE DRILLING: Yes
TYPE: Water

Height of Top Casing Above Ground Surface 2.75'

Protective Casing & Cover
Elev. 228.75'

Ground Surface
Elev. 226.00'



Cement Grout

LEGEND

- IMPERMEABLE SEAL
- SAND FILTER
- BACKFILL MATERIAL

2" Diameter Schedule 40 PVC Threaded Flush Joint 10-slot screen (Depth Range 3.0' To 13.0')

Depth 14.0'
Depth 16.0'

BARCAD SAMPLER No. 2 Depth Bottom 18.5'

Depth 20.5'
Depth 23.0'

BARCAD SAMPLER No. 1 Depth Bottom 28.0'

29.2' Depth

NOTE: DEPTHS TO SUBSURFACE STRUCTURES ARE APPROXIMATE & RELATIVE TO GROUND SURFACE

MONITORING WELL CROSS-SECTION WITH BARCAD SAMPLER INSTALLATION

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Ft. Devens

Boring Log

Boring No. SEA-4
Ref. No. 392-8511

Contractor : Soil Exploration Corp. Date: 8 Feb. -10 Feb. 86
Engineer/Geologist : J. Jammallo
Boring Location : See Site Plan
Ground Surface Elev. : 226.00 **Water Level :** 8.8 **Date :** 10 Feb. 86

Casing Size : 3-1/4" I.D. Hollw Stem
Sampler : 1-3/8" Split Sppon & NX Core Barrel
Casing at : 0

Depth (ft)	Sample No.	Sample Pen (in) /Rec.	Sample Depth (ft)	Sample Blows/6"	Sample Description	Remarks	Stratum Description
0.5	S-1	---	0'-2	---	FILL: Fine to medium SAND, trace to little coarse sand and fine to coarse gravel, trace silt with occasional roots	(1)	FILL; Fine to medium SAND, trace to little coarse sand and fine to coarse gravel, trace silt with occasional roots (SP)
1 / 1.5							
2 / 2.5							
3 / 3.5							(3.0') Fine to medium SAND, little coarse sand and fine gravel (SP/SW)
4 / 4.5	S-2	18/8	4-5.5	8	Brown, fine to medium SAND, little coarse sand and fine gravel		
				5			
5 / 5.5				8			
6 / 6.5							
7 / 7.5							(7.5') Fine to coarse SAND (SW)
8 / 8.5							
9 / 9.5	S-3	18/16	9-10.5	4	Brown, fine to coarse SAND		
				5			
10 / 10.5				4			
11 / 11.5							
12 / 12.5							
13 / 13.5							
14 / 14.5	S-4	18/2	14-15.5	5	Brown, fine to coarse SAND, trace fine gravel		- Trace fine gravel below 14'
				3			
15 / 15.5				5			
16 / 16.5							
17 / 17.5							(17.5') Fine SAND, little to some coarse sand and fine gravel (SP/SW)
18 / 18.5							
19 / 19.5	S-5	18/10	19-20.5	6	Brown, fine SAND, little to some medium to coarse sand and fine gravel		
				6			
20				6			

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(1) S-1 from auger.
(2) All coring times in minutes

Boring Log
Boring No. SEA-4
Ref. No. 392-8511

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Ft. Devens

Boring Log

Boring No. SEA-4
Ref. No. 392-8511

Contractor : Soil Exploration Corp. Date: 8 Feb. -10 Feb. 86
Engineer/Geologist : J. Jammalio
Boring Location : See Site Plan
Ground Surface Elev. : 226.00 Water Level : 8.8 Date : 10 Feb. 86

Casing Size : 3-1/4" I.D. Hollw Stem
Sampler : 1-3/8" Split Sppon & NX Core Barrel
Casing at : 0

Depth (ft)	Sample No.	Pen (in) /Rec.	Sample Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
20.5							Fine SAND, little to some coarse sand and fine gravel (SP/SW)
21							
21.5							
22							
22.5							(22.5')
23							Silt and fine SAND, trace medium to coarse sand and gravel (SM)
23.5				15/2"-	Grey, SILT and fine SAND, trace medium to coarse sand and gravel (glacial fill)		
24	S-6		24-24.2	60/0"			(24.2')
24.5				CORING		(2)	Very hard to hard, dark grey, equigranular biotite GRANODIORITE
25	C-1	60/60	24.2-29.2	11	Fresh to slightly weathered, biotite GRANODIORITE with closely to medium spaced, tight, planar joints; steeply dipping (70° to 90°), some healed		
25.5							
26				8			
26.5		Recovery	= 100%				
27				8			
27.5							
28				7			
28.5							
29				9			(29.2)
29.5					Bottom of Exploration at 29.2'		
30							
30.5							
31							
31.5							
32							
32.5							
33							
33.5							
34							
34.5							
35							
35.5							
36							
36.5							
37							
37.5							
38							
38.5							
39							
39.5							
40							

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V. Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(1) S-1 from auger.
(2) All coring times in minutes

Boring Log
Boring No. SEA-4
Ref. No. 392-8511

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

P2 xtra blows

S E A Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corp.
FOREMAN: Bob Seymour
METHOD: 4" Seamless Casing, NX Core Barrel

SEA GEOLOGIST/ENGINEER: M. Schultz

MONITORING WELL NO. BAR-5
JOB NO: 392-8511 CLIENT: Barson's
LOCATION: Ft. Devens
DATE
START: 2/12/86 FINISH: 2/27/86

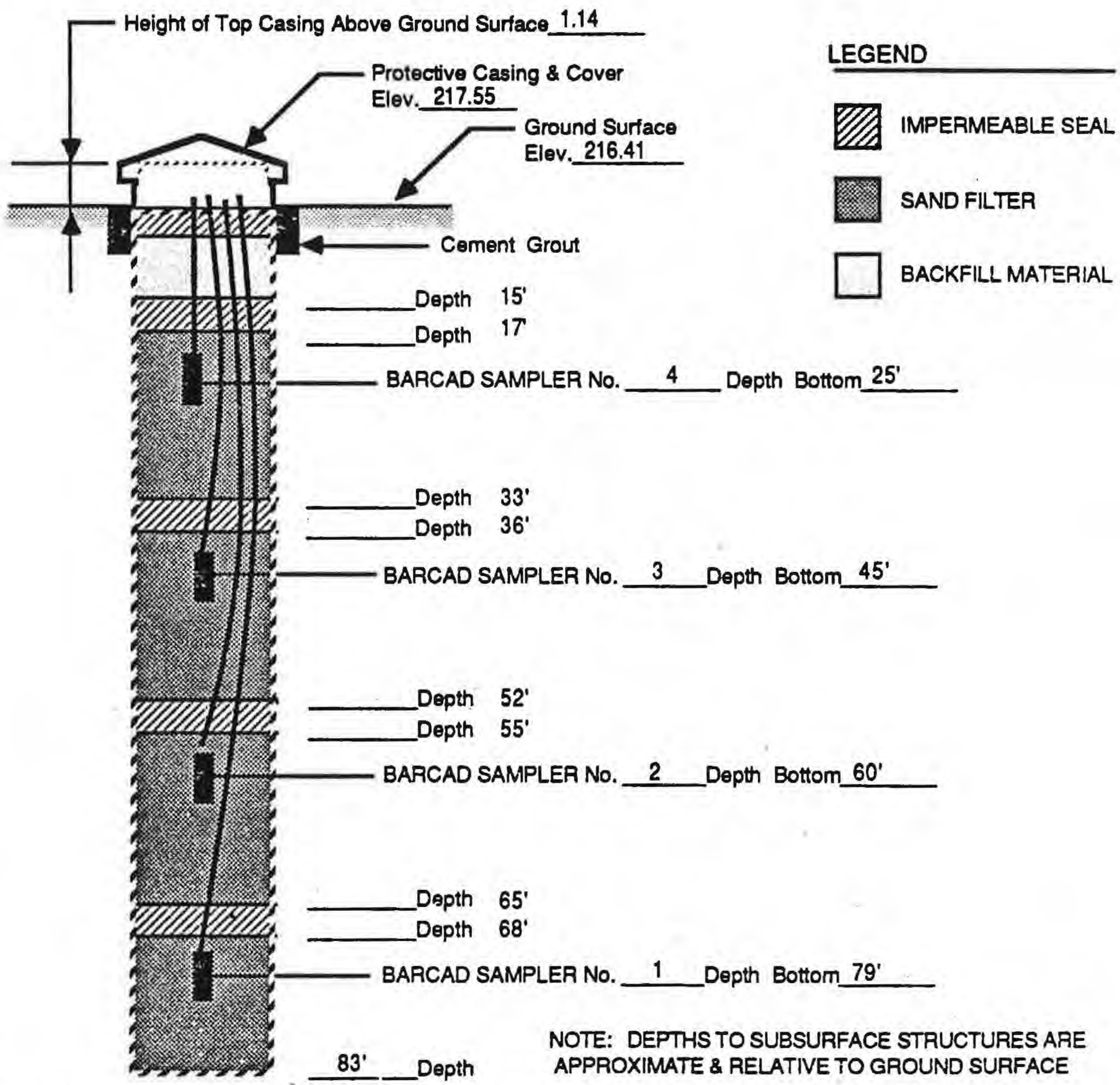
BARCAD SAMPLER

	No. 1	No. 2	No.3	No.4
GROUNDWATER DEPTH :	2.15'	3.50'	5.41'	4.2'
DATE :	3/7/86	3/7/86	3/7/86	3/7/86
DATUM :	T.C.	T.C.	T.C.	T.C.

SOIL SAMPLES TAKEN: Yes

EQUIPMENT CLEANING: Yes
METHOD: Steam clean and mehanol rinse

MATERIAL TO FACILITATE DRILLING: Yes
TYPE: Water



NOTE: DEPTHS TO SUBSURFACE STRUCTURES ARE APPROXIMATE & RELATIVE TO GROUND SURFACE

MONITORING WELL CROSS-SECTION WITH BARCAD SAMPLER INSTALLATION

recycled paper ecology and environment

S E A Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corp.
FOREMAN: Bob Seymour
METHOD: Hollow Stem Anger

SEA GEOLOGIST/ENGINEER: M. Gitten

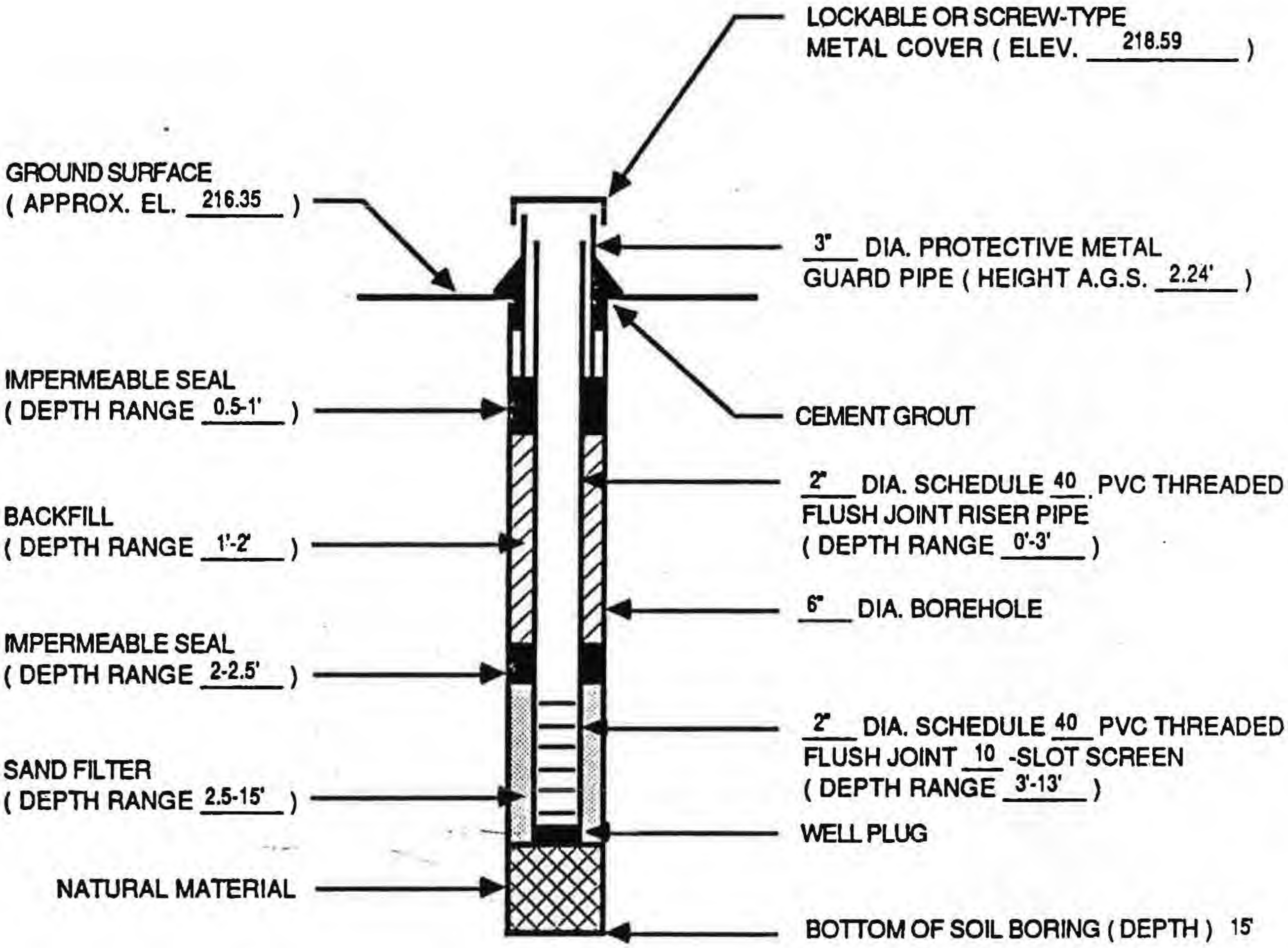
GROUNDWATER LEVEL:
DATE: 2/27/86
TIME: 0
FEET: 2'2"
METHOD: Tape
DATUM: G.S.

MONITORING WELL NO. WT-5
JOB NO: 392-8511 CLIENT: Barson's
LOCATION: Ft. Devens Landfill
DATE
START: 2/28/86 FINISH: 2/28/86

SOIL SAMPLES TAKEN: No

EQUIPMENT CLEANING: Yes
METHOD: Steam clean and methanol rinse

MATERIAL TO FACILITATE DRILLING: No
TYPE:



MONITORING WELL
CROSS SECTION SCHEMATIC

SEA
S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Ft. Devens

Boring Log

Boring No. SEA-5
Ref. No. 392-8511

Contractor : Soil Exploration Corp. Date: 12 Feb.-27 Feb. 86
Engineer/Geologist : M. Schultz
Boring Location : See Site Plan
Ground Surface Elev. : 216.41 **Water Level :** 2.2 **Date :** 27 Feb. 86
Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon & NX Core Barrel
Casing at : 0

Depth (ft)	Sample No.	Sample Pen (In) /Rec.	Sample Depth (ft)	Sample Blows/6"	Sample Description	Remarks	Stratum Description
0.5	S-1	—	0-2	—	Peat	(1)	Peat (PT)
							(0.5') Fine SAND, some organic silt, little medium sand and peat (SP/OL)
4.5	S-2	15/15	4-5.3	20	Dark Brown, fine SAND, some organic silt, little medium sand and peat		
				60			
				60/3"			
							(7.5') Fine to medium SAND, trace inorganic silt, coarse sand and fine gravel (SP)
9.5	S-3	18/12"	9-10.5	17	Brown, fine to medium SAND, trace, inorganic silt, coarse sand, and fine gravel		
				21			
				15			
14.5	S-4	18/18	14-15.5	4	Brown, fine SAND, little inorganic silt, trace fine gravel		(14.0') Fine SAND, little inorganic silt, trace fine gravel (SM)
				2			
				4			
							(17.5') Fine SAND, trace inorganic silt (SP)
19.5	S-5	18/18	19-20.5	2	Light brown, fine SAND, trace inorganic silt		
				2			
20				6			

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(1) Sample S-1 auger.
(2) No recovery first attempt, redrove sampler to obtain soil for classification.
(3) Drove casing to advance hole below 49 feet.
(4) Evidence of soil type on end of sampler.

Boring Log
Boring No. SEA-5
Ref. No. 392-8511

S E A Consultants Inc.
Engineers/Architects

Project : Barson Construction
Landfill Closure
Ft. Devens

Boring Log

Boring No. SEA-5
Ref. No. 392-8511

Contractor : Soil Exploration Corp. Date: 12 Feb.-27 Feb. 86
Engineer/Geologist : M. Schultz
Boring Location : See Site Plan
Ground Surface Elev. : 216.41 **Water Level :** 2.2 **Date :** 27 Feb. 86
Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon & NX Core Barrel
Casing at : 0

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
20.5							Fine SAND, trace inorganic silt (SP)
21							
21.5							
22							
22.5							
23							
23.5							
24							
24.5	S-6	18/18	24-25.5	5	Light brown, fine SAND, trace inorganic silt		
25							
25.5							
26							
26.5							
27							
27.5							
28							
28.5							
29							
29.5	S-7	18/18	29-30.5	1	Light brown, fine SAND, trace inorganic silt		
30							
30.5							
31							
31.5							
32							
32.5							
33							
33.5							
34							
34.5	S-8	18/18	34-35.5	4	Light brown, fine SAND, trace medium sand		- With trace medium sand below 34'
35				7			
35.5				7			
36							
36.5							
37							
37.5							
38							
38.5							
39							
39.5	S-9	18/12	39-40.5	6	Light brown, fine SAND, trace medium sand		
40				7			
				5			

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(1) Sample S-1 auger.
(2) No recovery first attempt, redrove sampler to obtain soil for classification.
(3) Drove casing to advance hole below 49 feet.
(4) Evidence of soil type on end of sampler.

Boring Log
Boring No. SEA-5
Ref. No. 392-8511

P2 xtra blows

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill closure
Ft. Devens

Boring Log

Boring No. SEA-5
Ref. No. 392-8511

Contractor : Soil Exploration Corp.
Engineer/Geologist : M. Schultz
Boring Location : See Site Plan
Ground Surface Elev. : 216.41 **Water Level :** 2.2' **Date :** 27 Feb. 86
Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon + NX Core Barrel
Casing at : 0'

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
40.5							Fine to medium SAND, trace inorganic silt (SP)
41 / 41.5							
42 / 42.5							
43 / 43.5							
44 / 44.5	S-10	18/0	44-45.5	11	Light brown, fine to medium SAND, trace inorganic silt	(2)	
45				22			
45.5				15			
46 / 46.5							
47 / 47.5							
48 / 48.5							
49 / 49.5	S-11	18/12	49-50.5	13	Reddish brown, fine SAND, trace inorganic silt	(3)	
50				18			
50.5				19			
51 / 51.5							
52 / 52.5							
53 / 53.5							(53.0') Fine to coarse SAND, little to some fine to coarse gravel, little inorganic silt (SM/GM)
54 / 54.5							
55	S-12	18/6	54.5-56	33	Brown, fine to coarse SAND, little to some fine gravel, little inorganic silt (glacial till)		
55.5				100			
56				60			
56.5							
57 / 57.5							
58 / 58.5							
59 / 59.5							
60	S-13	6/3	59.5-60	180/6"	Brown, fine to coarse GRAVEL and fine to coarse SAND, little silt		

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(2) No recovery first attempt, redrove sampler to obtain soil for classification.
(3) Drove casing to advance hole below 49 feet.
(4) Evidence of soil type on end of sampler.
(5) No recovery first attempt, redrove sampler to obtain soil for classification.

Boring Log
Boring No. SEA-5
Ref. No. 392-8511

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Ft. Devens

Boring Log

Boring No. SEA-5
Ref. No. 392-8511

Contractor : Soil Exploration Corp.
Engineer/Geologist : M. Schultz
Boring Location : See Site Plan
Ground Surface Elev. : 216.41
Water Level : 2.2'
Date : 27 Feb. 86
Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon + NX Core Barrel
Casing at : 0'

Depth (ft)	Sample No.	Pen (In) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
60.5							Fine to coarse SAND, little to some fine to coarse gravel, little inorganic silt (SM / GM)
61 / 61.5							
62 / 62.5							
63 / 63.5							
64 / 64.5							
65 / 65.5							
66 / 66.5							
67 / 67.5							
68 / 68.5							(68.0) Fine SAND, trace inorganic silt (SP)
69 / 69.5							
70	S-14	18/0	69.5-71	10	Brown, fine SAND, trace inorganic silt	(4)	
70.5				11			
71				15			
71.5							
72 / 72.5							
73 / 73.5							
74 / 74.5							
75 / 75.5							
76	S-15	18/0	75.5-77	8	Brown, fine SAND, trace inorganic silt	(5)	
76.5				12			
77				18			
77.5							
78 / 78.5	S-16	0/0	78	100/0"		(6)	(78.0)
79				Coring Time			
79.5	C-1	60/39	78-83	15	Fresh to slightly weathered, biotite GRANODIORITE with closely spaced, tight, planar joints; flat (0° to 20°) [Description Continued]		Very hard to hard, dark grey, equigranular biotite GRANODIORITE
80				18			

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(2) No recovery first attempt, redrove sampler to obtain soil for classification.
(3) Drove casing to advance hole below 49 feet.
(4) Evidence of soil type on end of sampler.
(5) No recovery first attempt, redrove sampler to obtain soil for classification.

Boring Log
Boring No. SEA-5
Ref. No. 392-8511

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc. Engineers/Architects	Project : Barson's Construction Landfill closure Ft. Devens	**Boring Log** Boring No. SEA-5 Ref. No. 392-8511

Contractor : Soil Exploration Corp.
Engineer/Geologist : M. Schultz
Boring Location : See Site Plan
Ground Surface Elev. : 216.41 Water Level : 2.2' Date : 27 Feb. 86
Casing Size : 3-1/4" I.D. Hollow Stem
Sampler : 1-3/8" I.D. Split Spoon + NX Core Barrel
Casing at : 0'

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
80.5 – 81	C-1			10	[Description continued...] and steeply dipping (45° to 70°) with some very steeply (70° to 90°) dipping healed joints - many seams below 81'	(7)	Very hard to hard, dark grey, equigranular biotite GRANODIORITE
81.5	(Continued)	Recovery	≈ 65%	5			
82.5 – 83				3	Bottom exploration at 83.0'		(83.0')
83.5 – 100							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(7) Lost circulation below 81 feet.

Boring Log
Boring No. SEA-5
Ref. No. 392-8511

SEA Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corporation
FOREMAN: Jim Campbell
METHOD: Hollow Stem Auger

SEA GEOLOGIST/ENGINEER: M.P. Clark

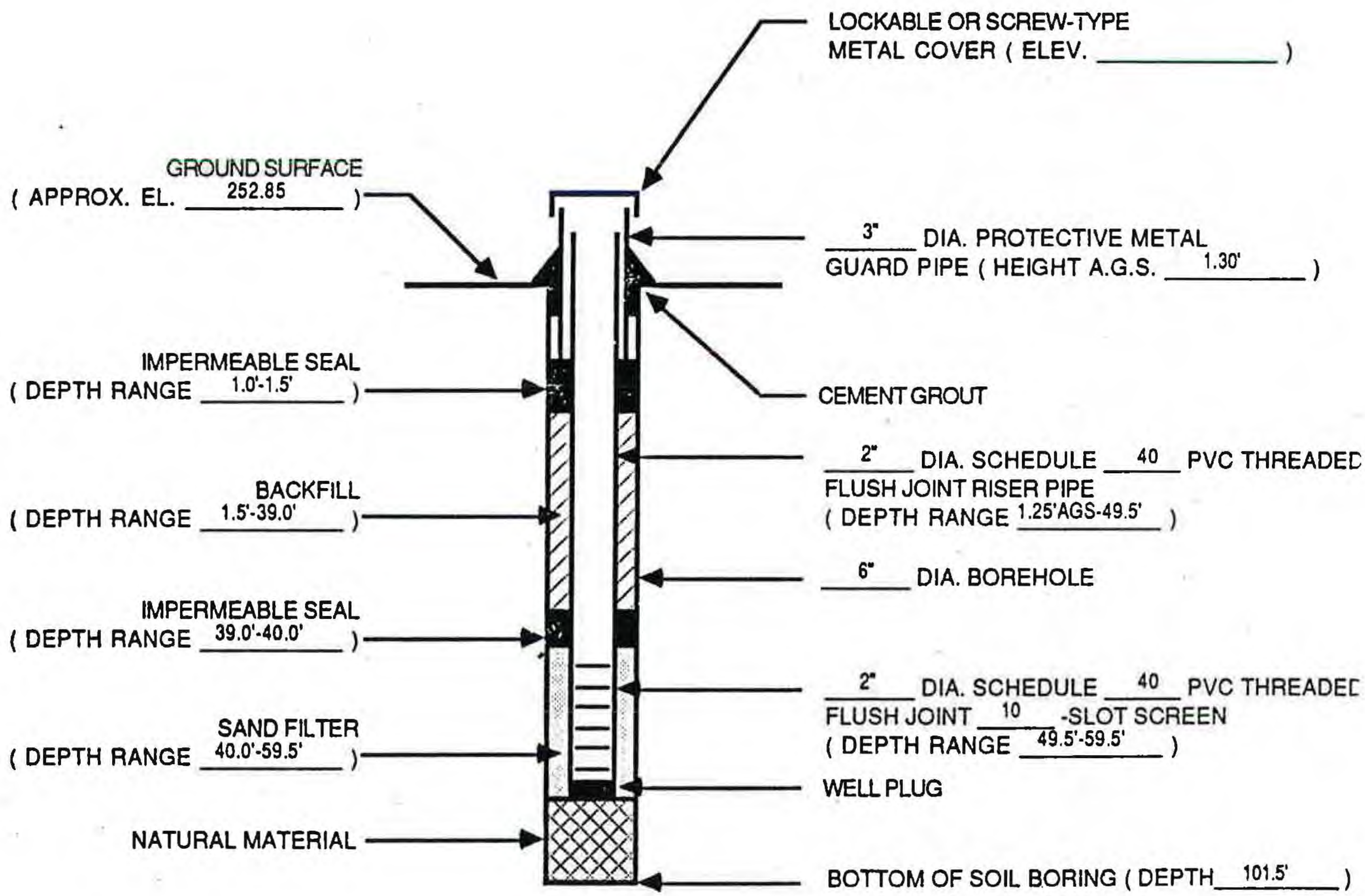
GROUNDWATER LEVEL:
DATE: 10/8/86
TIME: 10:00
FEET: 28.65
METHOD: Water Level Indicator
DATUM: Top of Casing

MONITORING WELL NO. WT-6
JOB NO: 392-8611 CLIENT: Barson's
LOCATION: Fort Devens Landfill
DATE
START: 8/25/86 FINISH: 8/26/86

SOIL SAMPLES TAKEN: Yes

EQUIPMENT CLEANING: Yes
METHOD: Steam Clean

MATERIAL TO FACILITATE DRILLING: Yes
TYPE: Water



MONITORING WELL
CROSS SECTION SCHEMATIC

S E A Consultants Inc.
Engineers/Architects

Project : Barsons' Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-6
Ref. No. 392-8611

Contractor : Soil Exploration Corporation
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 252.35' **Water Level :** 28.65' **Date :** 8/25-8/26/86
Casing Size : See Note A
Sampler : 1 3/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
0.5	S-1	6/6	0-0.5	1	S-1 Brown, fine SAND, little medium sand ,trace inorganic silt with roots.		Fine SAND, little medium sand, trace inorganic silt (SP)
1	S-1A	12/10	0.5-1.5	4	S-1A Brown to black fine SAND, little medium sand, trace inorganic silt		
1.5				7			
2							
2.5							
3							
3.5							
4							(4.5')
4.5							Medium SAND, little coarse and fine sand, trace inorganic silt (SW)
5	S-2	18/12	5-6.5	7	Tan to grey, fine to medium SAND, little coarse sand, trace inorganic silt		
5.5				6			
6				7			
6.5							
7							
7.5							
8							
8.5							
9							
9.5							
10	S-3	18/15	10-11.5	6	Tan to grey, medium to coarse SAND. little fine sand, trace inorganic silt		
10.5				5			
11				6			
11.5							
12							
12.5							
13							
13.5							
14							
14.5							
15	S-4	18/15	15-16.5	4	Tan to grey, medium SAND, little fine sand, trace inorganic silt		
15.5				4			
16				15			
16.5							
17							
17.5							
18							
18.5							
19							
19.5							
20	S-5	18/16	20-21.5	5	See Page 2 of 6 for Description		See Page 2 of 6 for Description

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA-6
Ref. No. 392-8611

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S E A Consultants Inc.
Engineers/Architects

Project : Barsons' Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-6
Ref. No. 392-8611

Contractor : Soil Exploration Corporation
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 252.35' **Water Level :** 28.65' **Date :** 8/25-8/26/86
Casing Size : See Note A
Sampler : 1 3/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
20.5				5	Tan to grey, medium SAND, little fine sand, trace inorganic silt		Medium to coarse SAND, little fine sand and fine gravel, trace inorganic silt (SW)
21 / 21.5				7			
22 / 22.5							
23 / 23.5							
24 / 24.5							
25 / 25.5	S-6	18/15	25-26.5	7	Tan to grey, medium to coarse SAND, little fine sand, trace inorganic silt		
26				11			
26.5				9			
27 / 27.5							
28 / 28.5							
29 / 29.5							
30 / 30.5	S-7	18/12	30-31.5	9	Brown to tan, coarse SAND, little fine to medium sand and fine gravel, trace inorganic silt		
31				10			
31.5				10			
32 / 32.5							
33 / 33.5							
34 / 34.5							
35 / 35.5	S-8	18/15	35-36.5	8	Brown to tan, coarse SAND and fine GRAVEL, trace inorganic silt		
36				8			
36.5				11			
37 / 37.5							
38 / 38.5							
39 / 39.5							
40							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA
Ref. No. 392-86

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-6
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 252.85'
Water Level : 28.65'
Date : 8/25-8/26/86
Casing Size : See Note A
Sampler : 13/8" S.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
40.5	S-9	18/15	40-41.5	6	Brown, medium to coarse SAND, little fine gravel , trace inorganic silt		Fine to medium SAND, little coarse sand and fine gravel, trace inorganic silt (SW)
41 / 41.5				12			
42 / 42.5				12			
43 / 43.5							
44 / 44.5							
45 / 45.5	S-10	18/16	45-46.5	9	Brown, medium SAND, little coarse sand and fine sand, trace inorganic silt		
46 / 46.5				4			
				6			
47 / 47.5							
48 / 48.5							
49 / 49.5							
50 / 50.5	S-11	18/15	50-51.5	5	Brown, fine to medium SAND, little coarse sand, trace inorganic silt		
51 / 51.5				6			
				5			
52 / 52.5							
53 / 53.5							
54 / 54.5							
55 / 55.5	S-12	18/14	55-56.5	10	Brown, fine to medium SAND, little coarse sand, trace inorganic silt		
56 / 56.5				12			
				12			
57 / 57.5							
58 / 58.5							
59 / 59.5							
60	S-13	18/12	60-61.5	11	See Page 4 of 6 for Description		See Page 4 of 6 for Description

Granular Soils Blows/Ft.	Density	Cohesive Soils Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA-6
Ref. No. 392-8611

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction Landfill Closure Fort Devens

Boring Log
Boring No. SEA-6
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 252.85'
Water Level : 28.65'
Date : 8/25-8/26/86
Casing Size : See Note A
Sampler : 13/8" S.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
60.5				9	Brown, fine to medium SAND, trace inorganic silt		Fine to medium SAND, little coarse sand, trace inorganic silt (SW)
61 / 61.5				9			
62 / 62.5							
63 / 63.5							
64 / 64.5							
65 / 65.5	S-14	18/16	65-66.5	12	Brown, fine to medium SAND, little coarse sand, trace inorganic silt		
66				14			
66.5				11			
67 / 67.5							
68 / 68.5							
69 / 69.5							
70 / 70.5	S-15	18/16	70-71.5	10	Brown, fine to medium SAND, little coarse sand, trace inorganic silt		
71				12			
71.5				13			
72 / 72.5							
73 / 73.5							
74 / 74.5							
75 / 75.5	S-16	18/8	75-76.5	10	Brown to tan, fine to medium SAND, little coarse sand, trace inorganic silt		
76				12			
76.5				16			
77 / 77.5							
78 / 78.5							(78.0') Fine SAND, trace inorganic silt (SP)
79 / 79.5							
80							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SE[illegible]
Ref. No. 392-[illegible]

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-6
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 252.85'
Water Level : 28.65'
Date : 8/25-8/26/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
80.5	S-17	18/16	80-81.5	9	Brown, fine SAND, trace inorganic silt		Fine to very fine SAND, trace inorganic silt (SP)
81				12			
81.5				12			
82							
82.5							
83							
83.5							
84							
84.5							
85							
85.5	S-18	18/12	85-86.5	10	Brown, fine SAND, trace inorganic silt		
86				9			
86.5				11			
87							
87.5							
88							
88.5							
89							
89.5							
90							
90.5	S-19	18/18	90-91.5	6	Brown to tan, very fine SAND, trace inorganic silt		
91				9			
91.5				11			
92							
92.5							
93							(93.0')
93.5							Fine SILTY SAND, trace clay (SM)
94							
94.5							
95							
95.5	S-20	18/12	95-96.5	4	Grey to blue, fine SILTY SAND, trace clay		
96				7			
96.5				9			
97							
97.5							
98							
98.5							
99							
99.5							
100	S-21	18/15	100-101.5	6	See Page 6 of 6 for Description		See Page 6 of 6 for Description

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA-6
Ref. No. 392-8611

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc. Engineers/Architects	Project : Barson's Construction Landfill Closure Fort Devens	Boring Log Boring No. SEA-6 Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 252.85'
Water Level : 28.65'
Date : 8/25-8/26/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
100.5							
101				9	Grey to blue, fine SILTY SAND,		Fine SILTY SAND, trace clay (SM)
101.5				7	trace clay		
102					(101.5') Bottom of Exploration		(101.5')
102.5							
103							
103.5							
104							
104.5							
105							
105.5							
106							
106.5							
107							
107.5							
108							
108.5							
109							
109.5							
110							
110.5							
111							
111.5							
112							
112.5							
113							
113.5							
114							
114.5							
115							
115.5							
116							
116.5							
117							
117.5							
118							
118.5							
119							
119.5							
120							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SE
Ref. No. 392-8

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corporation
FOREMAN: Jim Campbell
METHOD: Hollow Stem Auger/ Casing

SEA GEOLOGIST/ENGINEER: M.P. Clark

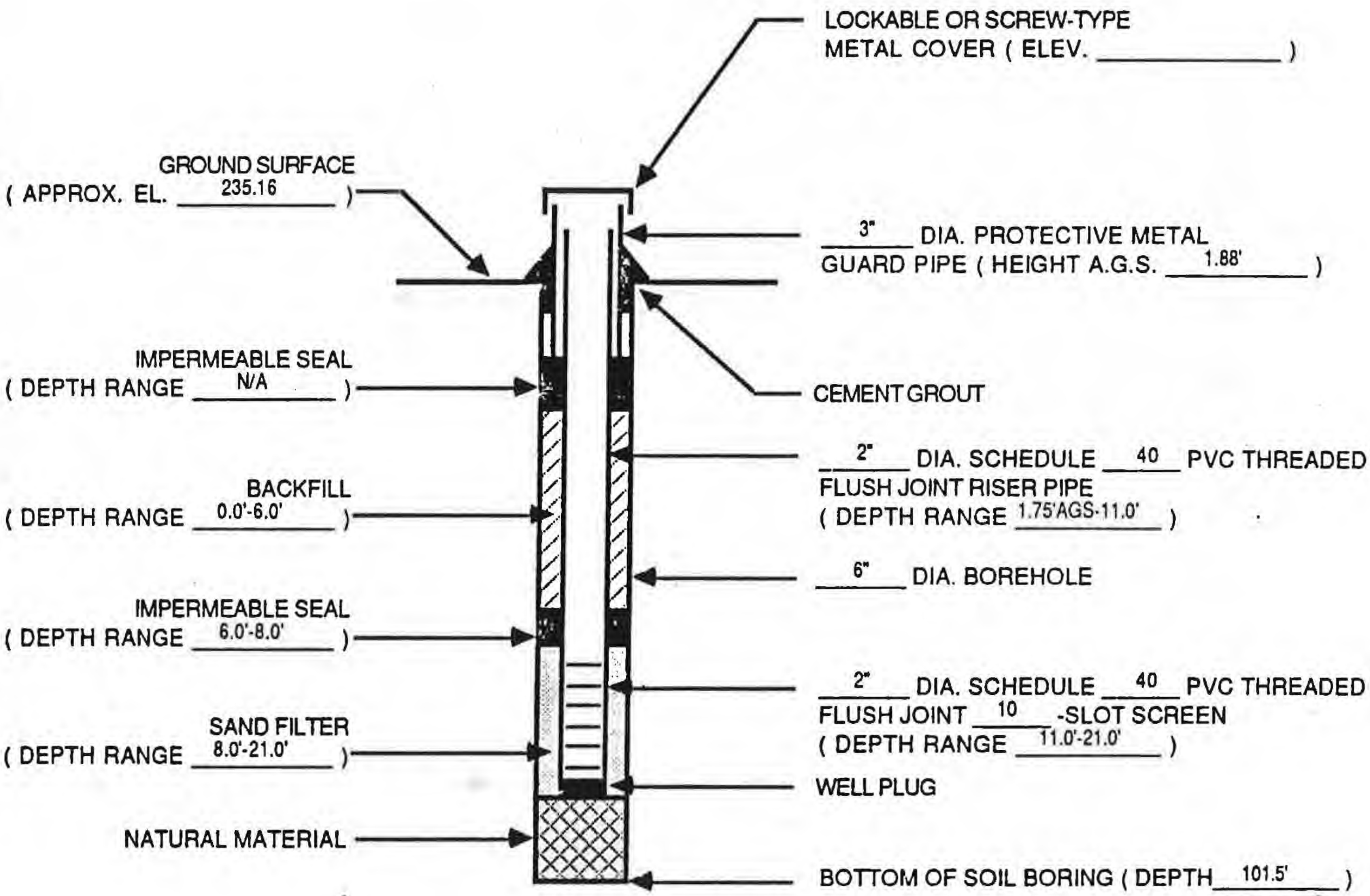
GROUNDWATER LEVEL:
DATE: 10/8/86
TIME: 11:00
FEET: 18.65
METHOD: Water Level Indicator
DATUM: Top of Casing

MONITORING WELL NO. WT-7
JOB NO: 392-8611 CLIENT: Barson's
LOCATION: Fort Deven's Landfill
DATE
START: 9/2/86 FINISH: 9/4/86

SOIL SAMPLES TAKEN: Yes

EQUIPMENT CLEANING: Yes
METHOD: Steam Clean

MATERIAL TO FACILITATE DRILLING: Yes
TYPE: Water



MONITORING WELL CROSS SECTION SCHEMATIC

S E A Consultants Inc.
Engineers/Architects

Project : Barsons' Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-7
Ref. No. 392-8611392.85

Contractor : Soil Exploration Corporation
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 235.16'
Water Level : 18.65'
Date : 9/2-9/4/86
Casing Size : See Note A
Sampler : 1 3/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
0.5	S-1	18/16	0-1.5	4	Tan to brown, fine to medium SAND, little coarse sand, trace inorganic silt		Fine to medium SAND, little coarse sand, trace inorganic silt (SW)
1				4			
1.5				4			
2							
2.5							
3							(3.0') Fine SAND, trace inorganic silt (SP)
3.5							
4							
4.5							
5 / 5.5	S-2	18/15	5- 6.5	6	Tan, fine SAND, trace inorganic silt		
6				7			
6.5				7			
7							
7.5							
8							
8.5							
9							
9.5							
10 / 10.5	S-3	18/15	10-11.5	7	Tan, fine SAND, trace inorganic silt		
11				8			
11.5				8			
12							
12.5							
13							
13.5							
14							
14.5							
15 / 15.5	S-4	18/15	15-16.5	5	Tan, fine SAND, trace inorganic silt		
16				8			
16.5				6			
17							
17.5							
18							
18.5							
19							
19.5							
20	S-5	18/15	20-21.5	4	See Page 2 of 6 for Description		See Page 2 of 6 for Description

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA-7
Ref. No. 392-861...

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barsons' Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-7
Ref. No. 392-8611392-861

Contractor : Soil Exploration Corporation
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 235.16'
Water Level : 18.65'
Date : 9/2-9/4/86
Casing Size : See Note A
Sampler : 1 3/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (In) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
20.5				7	Tan, fine SAND, trace inorganic silt		Very fine to fine SAND, trace inorganic silt (SP)
21 / 21.5				10			
22 / 22.5							
23 / 23.5							
24 / 24.5							
25	S-6	18/16	25-26.5	8	Tan, fine SAND, trace inorganic silt		
25.5				9			
26				8			
26.5							
27 / 27.5							
28 / 28.5							
29 / 29.5							
30	S-7	18/15	30-31.5	6	Brown, very fine SAND, trace inorganic silt		
30.5				8			
31				11			
31.5							
32 / 32.5							
33 / 33.5							
34 / 34.5							
35	S-8	18/12	35-36.5	5	Brown, fine SAND, trace inorganic silt		
35.5				4			
36				7			
36.5							
37 / 37.5							
38 / 38.5							
39 / 39.5							
40							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA-7
Ref. No. 392-86113

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-7
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 235.16'
Water Level : 18.65'
Date : 9/2-9/4/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
40.5	S-9	18/15	40-41.5	7	Brown, fine SAND, trace inorganic silt		Fine SAND, little to no medium to coarse sand, trace inorganic silt (SP)
41				9			
41.5				9			
42							
42.5							
43							
43.5							
44							
44.5							
45	S-10	18/12	45-46.5	9	Brown, fine SAND, little medium to coarse sand, trace inorganic silt		
45.5				10			
46				11			
46.5							
47							
47.5							
48							
48.5							
49							
49.5							
50	S-11	18/15	50-51.5	11	Brown, fine SAND, trace inorganic silt		
50.5				14			
51				16			
51.5							
52							
52.5							
53							
53.5							
54							
54.5							
55	S-12	18/12	55-56.5	11	Brown, fine sand, trace inorgenic silt		
55.5				13			
56				20			
56.5							
57							
57.5							
58							
58.5							
59							
59.5							
60	S-13	18/14	60-61.5	12	See Page 4 of 6 for Description		See Page 4 of 6 for Description

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA-7
Ref. No. 392-8611

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-7
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 235.16'
Water Level : 18.55'
Date : 9/2-9/4/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
60.5				12	Brown, fine SAND, trace inorganic silt		Fine SAND, some medium sand, trace inorganic silt (SP)
61				15			
61.5							
62							
62.5							
63							
63.5							
64							
64.5							
65	S-14	18/15	65-66.5	10	Brown, fine SAND, trace inorganic silt		
65.5				10			
66				16			
66.5							
67							
67.5							
68							
68.5							
69							
69.5							
70	S-15	18/15	70-71.5	8	Tan to brown, fine SAND, some medium sand, trace inorganic silt		
70.5				11			
71				11			
71.5							
72							
72.5							
73							
73.5							
74							
74.5							
75	S-16	18/14	75-76.5	12	Tan to brown, fine SAND, some medium sand, trace inorganic silt		
75.5				12			
76				16			
76.5							
77							
77.5							
78							
78.5							
79							
79.5							
80							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA-7
Ref. No. 392-8611

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-7
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 235.16' Water Level : 18.65' Date : 9/2-9/4/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
80.5	S-17	18/18	80-81.5	15	Brown, fine SAND, trace inorganic silt		Fine SAND, little to no medium sand, trace inorganic silt (SP)
81				16			
81.5				20			
82							
82.5							
83							
83.5							
84							
84.5							
85							
85.5	S-18	18/16	85-86.5	12	Brown, fine SAND, trace inorganic silt		
86				15			
86.5				19			
87							
87.5							
88							
88.5							
89							
89.5							
90							
90.5	S-19	18/15	90-91.5	15	Brown, fine SAND, trace inorganic silt		
91				15			
91.5				17			
92							
92.5							
93							
93.5							
94							
94.5							
95							
95.5	S-20	18/15	95-96.5	19	Brown, fine SAND, trace inorganic silt		
96				16			
96.5				19			
97							
97.5							
98							
98.5							
99							
99.5							
100	S-21	18/16	100'-101.5'	16	See Page 6 of 6 for Description		See Page 6 of 6 for Description

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 31/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA-7
Ref. No. 392-8611

Information on this log is a compilation of subsurface conditions and soil or rock classifications obtained from the field as well as laboratory testing of samples. Strata have been interpreted by commonly accepted procedures. The stratum lines may be transitional and approximate. Water level measurements have been made in the open boreholes at the time and location indicated, and may vary with time, geologic condition or construction activity.

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-7
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 235.16'
Water Level : 18.65'
Date : 9/2-9/4/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
100.5				20	Brown, fine SAND, little medium sand, trace inorganic silt		Fine SAND, little to no medium sand, trace inorganic silt
101				17	(101.5')		(101.5')
101.5					Bottom of Exploration		
102							
102.5							
103							
103.5							
104							
104.5							
105							
105.5							
106							
106.5							
107							
107.5							
108							
108.5							
109							
109.5							
110							
110.5							
111							
111.5							
112							
112.5							
113							
113.5							
114							
114.5							
115							
115.5							
116							
116.5							
117							
117.5							
118							
118.5							
119							
119.5							
120							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 31/4" I.D. Hollow Stem Auger

Boring Log
Boring No. SEA-7
Ref. No. 392-8611

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CON-TEST Inc.
WATER AND AIR ENGINEERING

LOG OF BORING NO. 8D&8S
DATE DRILLED: 2/14-2/19/90
PROJECT: FORT DEVENS
JOB # 8329
DETECTOR: TIP 2

SAMPLE NUMBER	BLOWS PER 6 INCHES	INCHES RECOVERED / INCHES DRIVEN	WATER ELEVATION	DEPTH IN FEET	WELL OR PIEZOMETER CONSTRUCTION (8D/8S)	GRAPHIC LOG	DESCRIPTION	TESTS
								PPB
	3,3,5	12/12	8D 8S	5'			12" LIGHT BROWN MEDIUM SAND. SOME ANGULAR BLACK ROCK FLECKS. WET.	.8
	4,5,6	12/12		10'			7" LIGHT FINE SAND BLACK FLECKS ROCK 5" LIGHT BROWN FINE SAND BLACK FLECKS ROCK	1.4
	3,5,6	18/18		15'			15" LIGHT BROWN FINE SAND 3" LIGHT BROWN MEDIUM-COURSE SAND SOME FINE GRAVEL SUBROUNDED	N.D.
	3,9,7	18/18		20'	BENTONITE SLURRY		18" MEDIUM BROWN MEDIUM-COURSE SAND TRACE OF SILT AND FINE GRAVEL	1.7
	4,3,5	18/18		25'			18" MEDIUM BROWN MEDIUM-COURSE SAND TRACE OF SILT AND FINE GRAVEL	1.8
				30'				

COMMENTS: AUGERS PLUGGED UP AFTER 25'. COULD NOT COLLECT A REPRESENTATIVE SAMPLE.

GEOLOGIST: A. SIMMONS DRAWN BY: J.A.D.

FILTER PACK: ____ TO ____
BENTONITE: 3' TO 6'
SCREEN: ____ TO ____
SLURRY: 6' TO 48'

WATER LEVEL MEASUREMENTS
▽:
DATUM:
PURGING:

CON-TEST Inc.
WATER AND AIR ENGINEERING

LOG OF BORING NO. 8D&8S
DATE DRILLED: 2/14-2/19/90
PROJECT: FORT DEVENS
JOB # 8329
DETECTOR: TIP 2

SAMPLE NUMBER	BLOWS PER 6 INCHES	INCHES RECOVERED / INCHES DRIVEN	WATER ELEVATION	DEPTH IN FEET	WELL OR PIEZOMETER CONSTRUCTION 8D/8S	GRAPHIC LOG	DESCRIPTION	TESTS
					BENTONITE SLURRY			1.0
				35'				N.D.
				40'				
				45'				0.8
				50'				1.4
				55'				.6
								N.D.
				60'				N.D.

COMMENTS:

GEOLOGIST: A. SIMMONS DRAWN BY: J.A.D.

FILTER PACK: 48' TO 60'
BENTONITE: TO
SCREEN: 53'8" TO 52'5"

WATER I
▽: 8S - 7.3
DATUM: TOP OF CASING
PURGING: 140 GALLONS

recycled paper

ecology and environment

CON-TEST Inc.
WATER AND AIR ENGINEERING

SAMPLE NUMBER	BLOWS PER 6 INCHES	INCHES RECOVERED / INCHES DRIVEN	WATER ELEVATION	DEPTH IN FEET	WELL OR PIEZOMETER CONSTRUCTION 8D/8S	GRAPHIC LOG	LOG OF BORING NO. 8D&8S DATE DRILLED: 2/14-2/19/90 PROJECT: FORT DEVENS JOB # 8329 DETECTOR: TIP 2 DESCRIPTION	TESTS
				65'	BENTONITE SLURRY			
				70'				
				75'				
				80'				
				85'				
				90'				

COMMENTS:

GEOLOGIST: A. SIMMONS DRAWN BY: J.A.D.

FILTER PACK: 66'6" TO 72'
BENTONITE: 60' TO 66'6"
SCREEN: 71' TO 69'6"

WATER LEVEL MEASUREMENTS
▽: 8D - 7.3
DATUM: TOP OF CASING
PURGING: 80 GALLONS

S E A Consultants Inc.
Engineers/Architects
Cambridge, MA. S. Portland, ME. Wethersfield, CT.

DRILLING CONTRACTOR: Soil Exploration Corporation
FOREMAN: Jim Campbell
METHOD: Auger, Drive and Wash

SEA GEOLOGIST/ENGINEER: M.P. Clark

MONITORING WELL NO. Bar-9 & WT-9
JOB NO: 392-8611 CLIENT: Barson's
LOCATION: Fort Deven's Landfill
DATE
START: 9/10/86 FINISH: 9/15/86

	BARCAD SAMPLER No. 1	BARCAD SAMPLER No. 2	WELL
GROUNDWATER DEPTH :	10.85	10.41	10.40
DATE :	10/8/86	10/8/86	10/8/86
DATUM :	Top	of	Casing

SOIL SAMPLES TAKEN:

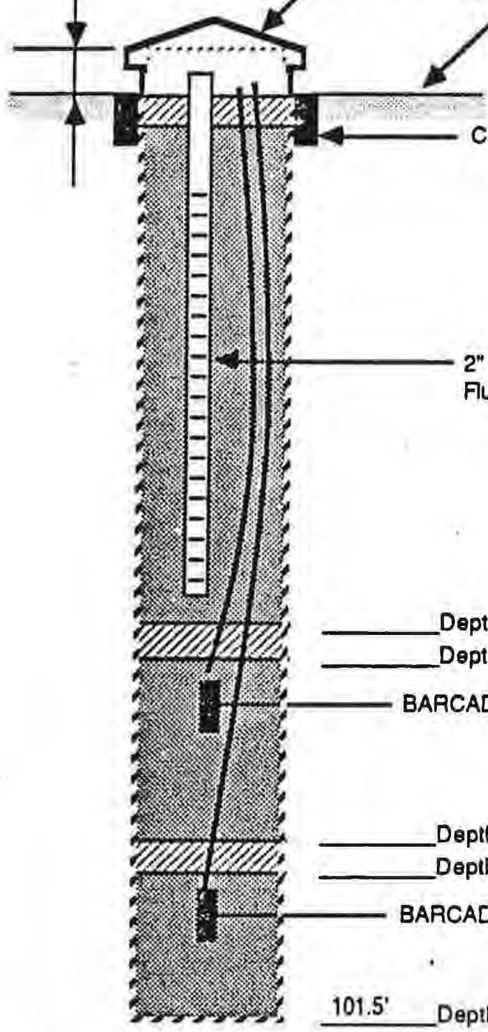
EQUIPMENT CLEANING: Yes
METHOD: Steam Clean

MATERIAL TO FACILITATE DRILLING: Yes
TYPE: Water

Height of Top Casing Above Ground Surface 1.28

Protective Casing & Cover
Elev. 224.22

Ground Surface
Elev. 222.94



Cement Grout

LEGEND

- IMPERMEABLE SEAL
- SAND FILTER
- BACKFILL MATERIAL

2" Diameter Schedule 40 PVC Threaded Flush Joint 10-slot screen (Depth Range 15.0' To 25.0')

Depth 30.0'
Depth 35.0'

BARCAD SAMPLER No. 2 Depth Bottom 40.0'

Depth 89.0'
Depth 94.0'

BARCAD SAMPLER No. 1 Depth Bottom 100.0'

101.5' Depth

NOTE: DEPTHS TO SUBSURFACE STRUCTURES ARE APPROXIMATE & RELATIVE TO GROUND SURFACE

MONITORING WELL CROSS-SECTION WITH BARCAD SAMPLER INSTALLATION

S E A Consultants Inc.
Engineers/Architects

Project : Barsons' Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SE A-9
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 222.94' **Water Level :** 10.40' **Date :** 9/10-9/15/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (In) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
0.5	S-1	18/16	0-1.5	1	Brown, fine SAND, little medium sand, trace roots		Fine SAND, little medium sand, trace roots (SP)
1				5			
1.5				4			(1.0') Fine to coarse SAND, little fine gravel (SW)
2							
2.5							
3							
3.5							
4							
4.5							
5							
5.5	S-2	18/15	5-6.5	4	Brown to tan, fine to coarse SAND, little fine gravel		
6				7			
6.5				6			
7							
7.5							
8							(8.0') Fine to coarse SAND, little fine gravel with occasional inorganic silt layers (SW - SM)
8.5							
9							
9.5							
10							
10.5	S-3	18/14	10-11.5	12	Brown to tan, fine to coarse SAND, little fine gravel with occasional inorganic silt layers		
11				14			
11.5				11			
12							
12.5							
13							
13.5							
14							
14.5							
15							
15.5	S-4	18/15	15-16.5	5	Brown to tan, fine to coarse SAND, little fine gravel with occasional inorganic silt layers		
16				6			
16.5				9			
17							
17.5							
18							
18.5							
19							
19.5							
20	S-5	18/12	20'-21.5'	9	See Page 2 of 6 for Description		See Page 2 of 6 for Description

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger
(1) Wash sample

Boring Log
Boring No. SE A-9
Ref. No. 392-8611

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S E A Consultants Inc.
Engineers/Architects

Project : Barsons' Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SE A-9
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 222.94'   Water Level : 10.40'   Date : 9/10-9/15/86
Casing Size : See Note A
Sampler : 13/8' I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
20.5				9	Brown, fine to coarse SAND, little fine gravel, trace inorganic silt		Fine to coarse SAND, little fine gravel, trace inorganic silt (SW-SM)
21 / 21.5				9			
22 / 22.5							(22.0') Silty fine SAND (SM)
23 / 23.5							
24 / 24.5							
25 / 25.5	S-6	18/12	25-26.5	6	Brown, silty fine SAND		
26				7			
26.5				9			
27 / 27.5							(27.0') Fine to medium SAND, little coarse sand, trace inorganic silt (SW-SM)
28 / 28.5							
29 / 29.5							
30 / 30.5	S-7	18/0	30-31.5	7	Brown to grey, fine to medium SAND, little coarse sand, trace inorganic silt	(1)	
31				7			
31.5				8			
32 / 32.5							
33 / 33.5							
34 / 34.5							
35 / 35.5	S-8	WASH	30-35		Brown to grey, fine to medium SAND, little coarse sand, trace inorganic silt		
36 / 36.5							
37 / 37.5							
38 / 38.5							
39 / 39.5							
40							

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger
(1) Wash sample

Boring Log
Boring No. SE A-9
Ref. No. 392-8611

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S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-9
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 222.94' **Water Level :** 10.40' **Date :** 9/10-9/15/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
40.5	S-9	WASH	35-40		Brown to grey, fine to coarse SAND, trace inorganic silt		Fine to coarse SAND, some to no fine gravel, trace to little inorganic silt (SW-SM)
41							
41.5							
42							
42.5							
43							
43.5							
44							
44.5							
45							
45.5	S-10	18/0	45-46.5	12	No recovery		
46				15			
46.5				19			
47							
47.5							
48							
48.5							
49							
49.5							
50							
50.5	S-11	18/16	50-51.5	17	Brown to gray, fine to coarse SAND, some fine gravel, little inorganic silt		
51				19			
51.5				14			
52							
52.5							
53							
53.5							
54							
54.5							
55							
55.5	S-12	18/15	55-56.5	18	Brown to grey, fine to coarse SAND, some fine gravel, little inorganic silt		
56				16			
56.5				13			
57							
57.5							
58							
58.5							
59							
59.5							
60	S-13	18/6	60'-61.5'	9	See Page 4 of 6 for Description		See Page 4 of 6 for Description

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger
(1) Wash sample

Boring Log
Boring No. SEA-9
Ref. No. 392-8611

S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-9
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 222.94'
Water Level : 10.40'
Date : 9/10-9/15/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
60.5				14	Brown, fine to medium SAND, little coarse sand and fine gravel, trace inorganic silt		Fine to medium SAND, little coarse sand and fine gravel, trace inorganic silt
61 / 61.5				14			
62 / 62.5							
63 / 63.5							(63.0') Fine to medium SAND, little coarse sand (SW)
64 / 64.5							
65 / 65.5	S-14	WASH	61.5-65		Grey, fine to medium SAND, little coarse sand	1	
66 / 66.5							
67 / 67.5							
68 / 68.5							
69 / 69.5							
70 / 70.5	S-15	WASH	65-70		Grey, fine to medium SAND, little coarse sand	1	
71 / 71.5							
72 / 72.5							
73 / 73.5							
74 / 74.5							
75 / 75.5	S-16	WASH	70-75		Grey, fine to medium SAND, little coarse sand	1	
76 / 76.5							
77 / 77.5							
78 / 78.5							
79 / 79.5							
80							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger
(1) Wash sample

Boring Log
Boring No. SEA-9
Ref. No. 392-8611

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S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-9
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 222.94'
Water Level : 10.40'
Date : 9/10-9/15/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
80.5	S-17	WASH	75-80		Grey, fine to medium SAND, little coarse sand, trace inorganic silt	1	Fine to medium SAND, little coarse sand, trace inorganic silt (SW)
81							
81.5							
82							
82.5							
83							
83.5							
84							
84.5							
85							
85.5	S-18	WASH	80-85		Grey, fine to medium SAND, little coarse sand, trace inorganic silt	1	
86							
86.5							
87							
87.5							
88							
88.5							
89							
89.5							
90							
90.5	S-19	WASH	85-90		Grey, fine to medium SAND, little coarse sand, trace inorganic silt	1	
91							
91.5							
92							
92.5							
93							
93.5							
94							
94.5							
95							
95.5	S-20	WASH	90-95		Grey, fine to medium SAND, little coarse sand, trace inorganic silt	1	
96							
96.5							
97							
97.5							
98							
98.5							
99							
99.5							
100	S-21	WASH	95-100		See Page 6 of 6 for Description		See Page 6 of 6 for Description

Granular Soils Blows/Ft.	Granular Soils Density	Cohesive Soils Blows/Ft.	Cohesive Soils Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger
(1) Wash sample

Boring Log
Boring No. SEA-9
Ref. No. 392-8611

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S E A Consultants Inc.
Engineers/Architects

Project : Barson's Construction
Landfill Closure
Fort Devens

Boring Log

Boring No. SEA-9
Ref. No. 392-8611

Contractor : Soil Exploration Corp.
Engineer/Geologist : M.P. Clark
Boring Location : See Site Plan
Ground Surface Elev. : 222.94'
Water Level : 10.40'
Date : 9/10-9/15/86
Casing Size : See Note A
Sampler : 13/8" I.D. Split Spoon
Casing at : N/A

Depth (ft)	Sample No.	Pen (in) /Rec.	Depth (ft)	Blows/6"	Sample Description	Remarks	Stratum Description
100.5					Grey, fine to medium SAND, little coarse sand, trace inorganic silt (101.5') Bottom of Exploration		Fine to medium SAND, little coars sand, trace inotganic silt (SW) (101.5')
101							
101.5							
102							
102.5							
103							
103.5							
104							
104.5							
105							
105.5							
106							
106.5							
107							
107.5							
108							
108.5							
109							
109.5							
110							
110.5							
111							
111.5							
112							
112.5							
113							
113.5							
114							
114.5							
115							
115.5							
116							
116.5							
117							
117.5							
118							
118.5							
119							
119.5							
120							

Granular Soils		Cohesive Soils	
Blows/Ft.	Density	Blows/Ft.	Density
0-4	V.Loose	<2	V. Soft
4-10	Loose	2-4	Soft
10-30	M. Dense	4-8	M. Stiff
30-50	Dense	8-15	Stiff
>50	V. Dense	15-30	V. Stiff
		>30	Hard

Remarks:
(A) 3 1/4" I.D. Hollow Stem Auger
(1) Wash sample

Boring Log
Boring No. SEA-9
Ref. No. 392-8611

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con-test

WATER AND AIR ENGINEERING

P.O. BOX 591
EAST LONGMEADOW
MASSACHUSETTS 01028
(413)525-1198

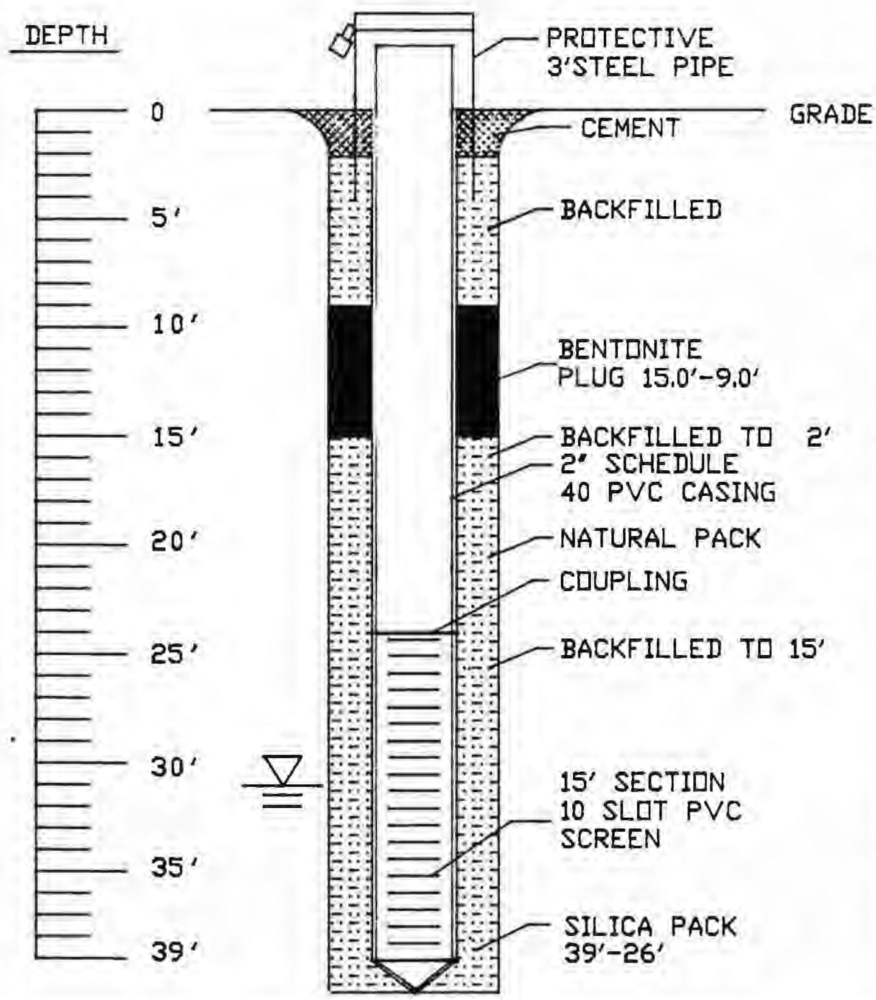
AS-BUILT WELL DIAGRAM & GEOLOGIC DESCRIPTION

WELL NO. 1 PROJECT NO. 7641

CLIENT: FORT DEVENS
PRJ. NAME: SANITARY LANDFILL
LOCATION: FT. DEVENS, MASS.
GEOLOGIST: DAVID A. MACLEAN
DATE OF DRILL: 10/31/88
START TIME: 9:30 FINISH TIME: 16:30

BORING SIZE: 8"
CASING TYPE: PVC
CASING ID: SCHEDULE #40
TYPE OF FILTER PACK: NEW JERSEY SAND

GROUND WATER OBSERVATION
31.32 FT ON 1/19/89 DATE
MEASURED FROM PVC CASING
@ ELEVATION 249.11'= GROUND
WATER ELEVATION 217.79'
BENCH MARK WT 2
DRAWN BY P.ROSSI
DATE 2/10/89
APPROVED BY
DATE



SAMPLE NO. AND DESCRIPTION

1-5' BROWN SAND WITH SOIL DEVELOPMENT OVER TAN, WELL SORTED, MEDIUM SAND.

2-10' TAN, WELL SORTED MEDIUM SAND.

3-15' TAN, WELL SORTED MEDIUM SAND.

4-20' TAN, WELL SORTED SAND.

5-25' TAN, WELL SORTED SAND.

6-30' TAN, WELL SORTED SAND WITH ONE SMALL GRAVEL LENSE; WET.

7-35' TAN, WELL SORTED FINE SAND.

8-40' TAN, WELL SORTED SAND OVER SILTER, POORLY SORTED SAND OVER PHYLITE. BEDROCK AT 39', ROCK CORE-FINE GRAINED, BIOTITE, CHLORITE, MUSCOVITE PELLITIC PHYLLITE TO SCHIST. STEEPLY DIPPING IRON STAINED JOINTS AT 60°- 65°
RECOVERY 78%
DRILLING TIMES/FT. 6-7-20-10-5
END OF BORING AT 45'

con-test

WATER AND AIR ENGINEERING

P.O. BOX 591
EAST LONGMEADOW
MASSACHUSETTS 01028
(413)525-1198

AS-BUILT WELL DIAGRAM & GEOLOGIC DESCRIPTION

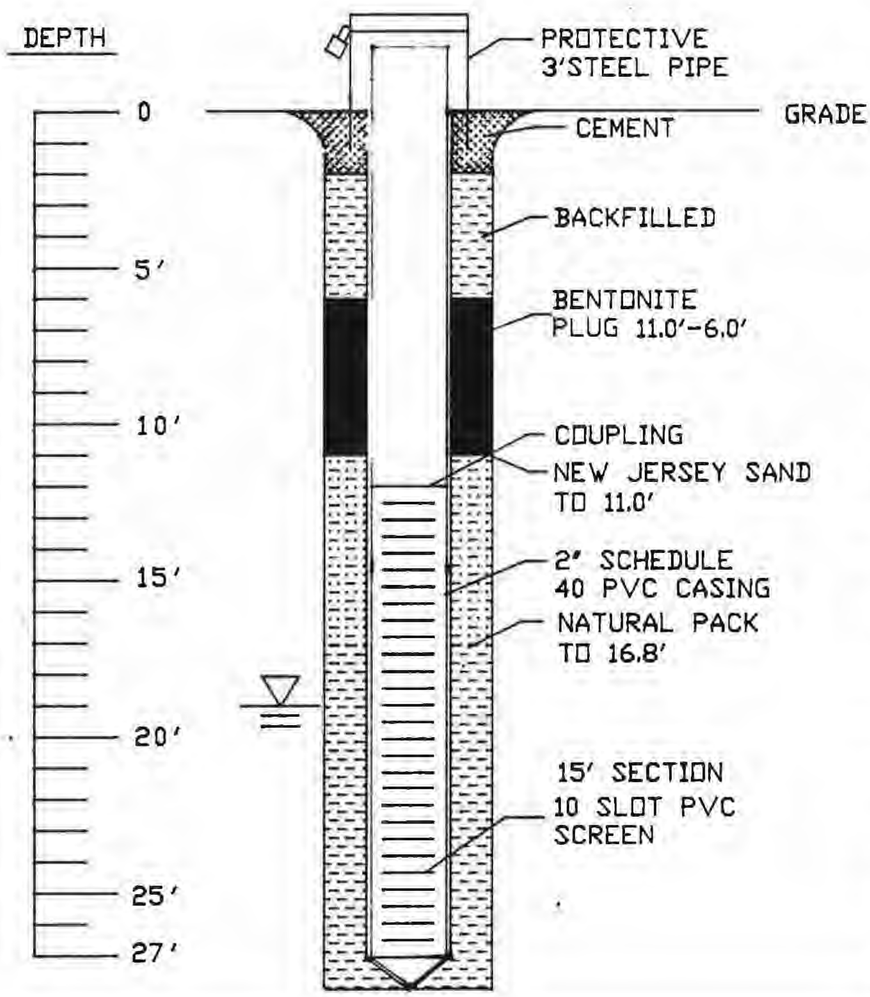
WELL NO. 2 PROJECT NO. 7641

CLIENT: FORT DEVENS
PRJ. NAME: SANITARY LANDFILL
LOCATION: FT. DEVENS, MASS.
GEOLOGIST: DAVID A. MACLEAN
DATE OF DRILL: 11/3/88
START TIME: 9:30 FINISH TIME: 16:30

BORING SIZE: 8"
CASING TYPE: SCHEDULE #40
CASING ID: PVC
TYPE OF FILTER PACK: NEW JERSEY SAND

GROUND WATER OBSERVATION

19.02 FT ON 1/19/89 DATE
MEASURED FROM PVC CASING
@ ELEVATION 236.43± GROUND
WATER ELEVATION 217.41'
BENCH MARK WT 2
DRAWN BY P.ROSSI
DATE 2/10/89
APPROVED BY
DATE



SAMPLE NO. AND DESCRIPTION

1-5' COARSE, POORLY SORTED SAND, MINOR SILT.
2-10' MEDIUM SAND, WELL SORTED, LITTLE SILT.
3-15' MEDIUM SAND, WELL SORTED, LITTLE SILT.
4-20' MEDIUM SAND, WELL SORTED, LITTLE SILT, SATURATED
5-25' MEDIUM SAND, WELL SORTED, LITTLE SILT.
6-30' MEDIUM SAND, WELL SORTED.
7-35' MEDIUM TO COARSE, POORLY SORTED SAND.
8-40' MEDIUM SAND POORLY SORTED.
BEDROCK CORE DESCRIPTION- COARSE GRAINED, LIGHT GREY, QUARTZ, PLAGIOCLASE, BIOTITE, FOLIATED GNIESS, STEEPLY DIPPING FOLIATION OF BETWEEN 60°- 70°
DRILLING TIMES/MIN. 5-5-7-5-2
78% RECOVERY
END OF BORING 45'

con-test

WATER AND AIR ENGINEERING

P.O. BOX 591
EAST LONGMEADOW
MASSACHUSETTS 01028
(413)525-1198

AS-BUILT WELL DIAGRAM & GEOLOGIC DESCRIPTION

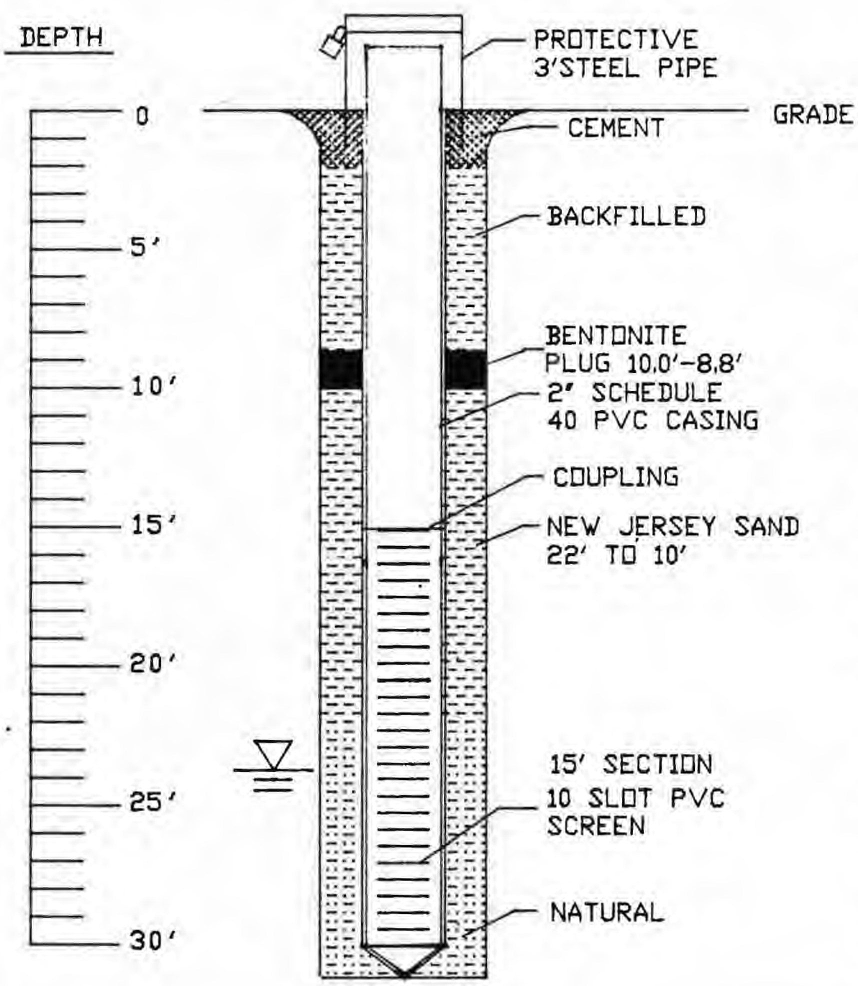
WELL NO. 3 PROJECT NO. 7641

CLIENT: FORT DEVENS
PRJ. NAME: SANITARY LANDFILL
LOCATION: FT. DEVENS, MASS.
GEOLOGIST: DAVID A. MACLEAN
DATE OF DRILL: 12/8/88
START TIME: 9:00 FINISH TIME: 16:00

BORING SIZE: 8"
CASING TYPE: PVC
CASING ID: SCHEDULE #40
TYPE OF FILTER PACK: NEW JERSEY SAND

GROUND WATER OBSERVATION

23.64 FT ON 1/19/89 DATE
MEASURED FROM PVC
@ ELEVATION 248.46= GROUND
WATER ELEVATION 224.82
BENCH MARK WT 2
DRAWN BY P.ROSSI
DATE 2/10/89
APPROVED BY
DATE



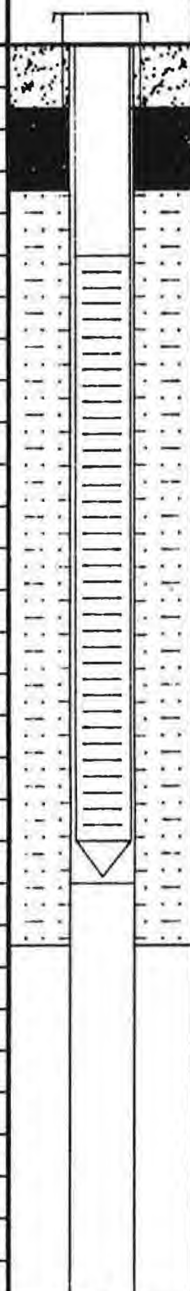
SAMPLE NO. AND DESCRIPTION

1-5' COARSE, POORLY SORTED SAND.
2-10' COARSE, POORLY SORTED SAND.
3-15' COARSE, POORLY SORTED SAND.
4-20' COARSE, POORLY SORTED SAND OVER MEDIUM WELL SORTED SAND.
5-25' COARSE, POORLY SORTED SAND.
6-30' COARSE, POORLY SORTED SAND.
7-35' COARSE, POORLY SORTED SAND.
8-40' COARSE, POORLY SORTED SAND.
9-45' COARSE, POORLY SORTED SAND.
10-50' COARSE, POORLY SORTED SAND.
11-55' FINE, MEDIUM TO WELL SORTED SAND.
12-60' FINE GRAINED SILTY SAND WITH COARSE GRAVEL.
END OF BORING 60'

CON-TEST Inc.
WATER AND AIR ENGINEERING

LOG OF BORING NO. 4
DATE DRILLED: 2/19/90
PROJECT: FORT DEVENS
JOB # 8329
DETECTOR: TIP 2

WELL OR PIEZOMETER CONSTRUCTION



SAMPLE NUMBER	BLOWS PER 6 INCHES	INCHES RECOVERED / INCHES DRIVEN	WATER ELEVATION	DEPTH IN FEET	DESCRIPTION	TESTS (ppb)
	4,8,10	7 / 18	▽	5'	4' MEDIUM BROWN SILTY FINE-MEDIUM SAND	0.4
					3' LIGHT BROWN FINE-COARSE SAND TRACE FINE GRAVEL	
	2,3,4	18 / 18		10'	18' MEDIUM BROWN FINE SAND	0.2
	2,1,2	18 / 18		15'	18' MEDIUM BROWN FINE SAND TRACE SILT	N.D.
	1,2,2	18 / 18		20'	18' MEDIUM BROWN FINE SAND TRACE SILT	N.D.
				25'		
				30'		

COMMENTS:

GEOLOGIST: DRAWN BY: J.A.D.

FILTER PACK: 3'6" TO 21'6"
BENTONITE: 3'6" TO 1'8"
SCREEN: 20' TO 5'

WATER LEVEL MEASUREMENTS
▽: 6.75'
DATUM: TOP OF CASING
PURGING: 75 GALLONS

DRILLING LOG of BORING No. SHL-14A

State	MASSACHUSETTS	Start Date	7/14/91
Location	FORT DEVENS	Completion Date	7/15/91
Drilling Firm	E & E DRILLING	Ground Elevation	270.00
Type of Drill	DIEDRICH D-50	Total Depth of Boring	27.7'
Driller	PAUL BARTH		
Geologist	LISA HELTON		

Elev.	Depth	Description	Lithology	Sample No. and Symbol	Blow Count	Remarks
270.00 / 270		Ground Surface				
	0–2	0.0'-2.0': SAND (SM): medium brown to light brown, low moisture, fine grained, loose, some silt, non-plastic; thick black rubber and burned twigs (fill) from 1'-1.5'.			11 10 12 13	Surface conditions: Grass covered slope above landfill. Spl Spn Run 1: 0.0'-2.0' 1.5' recovery. OVA: spoon (0 ppm), hole (> 1,000 ppm), head space (2 ppm). Augered from 2.0'-5.0'.
265	5–7	5.0'-7.0': SAND (SM): gray-brown, moderate moisture, coarse, loose, some silt, non-plastic; clear and brown plastics (fill) throughout.			6 6 6 7	Spl Spn Run 2: 5.0'-7.0' 0.5' recovery. OVA: spoon (40 ppm), hole (> 1,000 ppm), head space (59 ppm). Augered from 7.0'-10.0'.
260	10–12	10.0'-12.0': CLAY (CH): light gray, moderate moisture, high plasticity, trace silt; few large subangular phyllite cobbles (fill).			46 57/1"	Spl Spn Run 3: 10.0'-12.0' 0.4' recovery. OVA: spoon (6 ppm), hole (500 ppm), head space (200 ppm). Augered from 12.0'-13.0'. Auger refusal at 13.0'.
255	13–15	13.0'-18.4': GRANODIORITE TO GNEISS: boulders, hard.				Core Run 1: 13.0'-18.4' RQD: .7%.

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
	17						
	18						Core Run 2: 18.4'-24.0' RQD: 0%.
	19	18.4'-24.0': GRANODIORITE TO GNEISS: same as above.					
250-	20						
	21						
	22						
	23						
	24	24.0'-26.1: FOLIATED GRANITE					Core Run 3: 24.0'-27.7' RQD: 47%.
245-	25						
	26	26.1'-27.7': GRANODIORITE: hard, fractures at 24.8' and 26.2', sound.					Abandoned boring was tremie grouted to ground surface on 7/15/91.
	27						
							CONSTUCTION SUMMARY Cem.: 564 dry lbs., Cem./Bent.: 5%.

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DRILLING LOG of BORING No. SHL-14B

State	MASSACHUSETTS	Start Date	7/14/91
Location	FORT DEVENS	Completion Date	7/14/91
Drilling Firm	E & E DRILLING	Ground Elevation	270.00
Type of Drill	DIEDRICH D-50	Total Depth of Boring	15.0'
Driller	PAUL BARTH		
Geologist	LISA HELTON		

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
270.00		Ground Surface					
270	0	0.0'-5.0': SAND (SM): medium brown, low moisture, medium grained, some silt, non-plastic (fill).					Descriptions are based on the examination of auger cuttings. Auger Run 1: 0.0'-5.0' OVA: hole (14 ppm), head space (70 ppm).
265	5	5.0'-10.0': SAND (SM): same as above, except gray-brown, clear plastic and a plastic ring (used to hold 6-packs) observed in cuttings (fill).					Auger Run 2: 5.0'-10.0' OVA: hole (60 ppm), head space (120 ppm).
260	10	10.0'-15.0': SAND (SM): same as above; much trash (rags, plastic, metal can - fill).					Auger Run 3: 10.0'-15.0' OVA: hole (0 ppm), head space (20 ppm). Abandoned boring was tremie grouted to ground surface on 7/14/91.
255	15						CONSTUCTION SUMMMARY Cem.: 470 dry lbs., Cem./Bent.: 5%.

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DRILLING LOG of BORING No. SHL-14C

State	MASSACHUSETTS	Start Date	7/15/91
Location	FORT DEVENS	Completion Date	7/15/91
Drilling Firm	E & E DRILLING	Ground Elevation	270.00
Type of Drill	DIEDRICH D-50	Total Depth of Boring	12.0'
Driller	PAUL BARTH		
Geologist	LISA HELTON		

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
270.00		Ground Surface					
270	0	0.0'-5.0': SAND (SM): medium brown, low moisture, fine to medium grained, some silt, non-plastic (fill).					Descriptions are based on the examination of auger cuttings. Auger Run 1: 0.0'-5.0' OVA: hole (80 ppm), head space (6 ppm).
265	5	5.0'-10.0': SAND (SM): same as above; much trash (plastic, candy wrappers, rags - fill).					Auger Run 2: 5.0'-10.0' OVA: hole (500 ppm), head space (16 ppm).
260	10	10.0'-15.0': SAND (SM): same as above (fill).					Auger Run 3: 10.0'-12.0' Auger refusal at 12.0'. OVA: hole (600 ppm), head space (14 ppm).
	12						Abandoned boring was tremie grouted to ground surface on 7/15/91. CONSTUCTION SUMMMARY Cem.: 188 dry lbs., Cem./Bent.: 5%.

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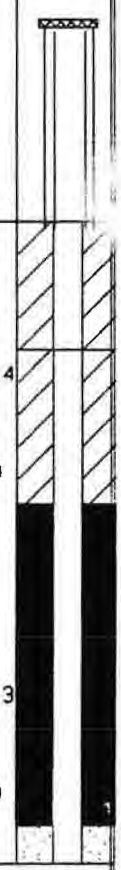
DRILLING LOG of WELL No. SHL-15

State	MASSACHUSETTS	Start Date	7/12/91
Location	FORT DEVENS	Completion Date	7/13/91
Drilling Firm	E & E DRILLING	Ground Elevation	259.03
Type of Drill	DIEDRICH D-50	Groundwater Depth	
Driller	PAUL BARTH	at completion	17.18 ∇
		on 12/12/91	16.89 ▼
Geologist	LISA HELTON	Total Depth of Boring	25.0'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
259.03		Ground Surface					Stickup = 1.72	
	1, 2	0.0'-2.0': sandy SILT (SM): brown-black, dry, loose, non-plastic, subangular cobbles and roots throughout.				3, 5, 10, 16	Spl Spn Run 1: 0.0'-2.0' 0.3' recovery. OVA: spoon and hole (0 ppm), head space (0.4 ppm). Collected archive sample. Augered from 2.0'-5.0'.	
255	3, 4, 5	2.0'-5.0': SAND (SP): gray-brown, dry, medium to coarse grained, loose, subrounded gravels throughout.						
250	6, 7, 8, 9					6, 10, 10, 9	Spl Spn Run 2: 5.0'-7.0' 0.8' recovery. OVA: spoon and hole (0 ppm), head space (0.3 ppm). Collected archive sample. Augered from 7.0'-10.0'.	



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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	11	10.0'-12.0': SAND (SP): gray-brown, moderate moisture, medium to coarse grained, loose, organics and subrounded pebbles throughout.				6 7 9 13	Spl Spn Run 3: 10.0'-12.0' 1.3' recovery. OVA: spoon and hole (0 ppm), head space (0.2 ppm). Collected archive sample. Augered from 12.0'-15.0'.	
	12							
	13							
245	14							
	15	15.0'-17.0': SAND (SP): same as above, except wet.				4 8 9 27	Spl Spn Run 4: 15.0'-17.0' 1.4' recovery. OVA: spoon and hole (0 ppm), head space (0.8 ppm). Collected archive sample. Augered from 17.0'-20.0'.	
	16							
	17							
	18							
240	19							
	20	20.0'-22.0': CLAY (CL): medium brown, wet, moderate plasticity, subrounded pebbles and cobbles throughout, little sand.				12 38 15 12	Spl Spn Run 5: 20.0'-22.0' 0.7' recovery. OVA: spoon and hole (0 ppm), head space (0.8 ppm). Collected archive sample. Augered from 22.0'-25.0'. OVA: hole (0 ppm).	
	21							
	22							

CONSTRUCTION SUMMARY
Well: Hole dia.: 10"
screen/casing dia.: 4",
slot size: 0.010".
Material Qty.:
Filter Pk.: 500lbs.
Bent. Pel.: 15 dry gallons,
Cem.: 564 dry lbs.,
Cem./Bent.: 5%.
Stickup measured from ground surface to top of inner casing.

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DRILLING LOG of BORING No. SHL-16A

State	MASSACHUSETTS	Start Date	6/15/91
Location	FORT DEVENS	Completion Date	6/15/91
Drilling Firm	E & E DRILLING	Ground Elevation	258.00
Type of Drill	DIEDRICH D-50	Total Depth of Boring	18.0'
Driller	PAUL BARTH		
Geologist	AMIN AYUBCHA		

Elev.	Depth	Description	Lithology	Sample No. and Symbol	Blow Count	Remarks
258.00		Ground Surface				
	0–2	0.0'-0.5': FILL: black, dry fill with mixture of sand, gravel, brick, debris, roots, vegetation, and charcoal.			6 6 7	Spl Spn Run : 0.0'-2.0' 1.8' recovery. OVA: spoon and hole (0 ppm), head space (0.2 ppm).
255	2–4	0.5'-2.5': SAND (SP): tan to brown, slightly moist, medium to coarse grained, with 1/4" size boulders; 60% quartz, <5% clay in matrix, low to very low plasticity, loose, mostly rounded elements.			8	Collected archive sample. Augered from 2.0'-5.0'.
250	4–9	2.5'-9.5': SAND (SP): gray, clear, trace of moisture, medium to coarse grained, 1/4-1/2" size boulders; 80-90% quartz, 5-10% micas, 10% other metamorphosed minerals, no plasticity, loose, slightly angular elements.			4 7 12 12	Spl Spn Run 2: 5.0'-7.0' 1.6' recovery. OVA: spoon and hole (0 ppm), head space (0.1 ppm). Collected archive sample. Augered from 7.0'-10.0'. Encountered a boulder at 9.5' BGS that was passed through with high pressure.
245	10–13	9.5'-14.0': SAND/GRAVEL (SP): gray-yellowish mixture, slightly moist, stiff, fine grained; 60% quartz, 10-15% silt in matrix, abundant quartz boulders, metamorphosed rock, slightly plastic, dense, glacial deposits; large boulders encounterted during drilling.			17 35 75 80	Large boulders from 9.5' downward. Spl Spn Run 3: 10.0'-12.0' 1.7' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 12.0'-15.0'
	14–15	14.0'-17.5': GLACIAL SILTY TILL (GM): brownish, wet, very fine silty sand with numerous large boulders of igneous quartzitic rocks; 80% quartz, 5% clay in matrix, low plasticity, slightly dense, stiff.			53 60	Spl Spn Run 4: 15.0'-17.0' 1.2' recovery. OVA: spoon

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
	17	subangular elements.					and hole (0 ppm). Collected archive sample. Water first encountered at 15' BGS. Augered 17.0'-17.5'. Abandoned boring was tremie grouted to surface on 6/15/91. CONSTRUCTION SUMMARY Cem.: 658 dry lbs., Cem./Bent.: 5%.

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DRILLING LOG of BORING No. SHL-16B

State	MASSACHUSETTS	Start Date	7/10/91
Location	FORT DEVENS	Completion Date	7/10/91
Drilling Firm	E & E DRILLING	Ground Elevation	258.00
Type of Drill	DIEDRICH D-50	Total Depth of Boring	23.7'
Driller	PAUL BARTH		
Geologist	LISA HELTON		

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
258.00		Ground Surface					
							Dry hole.
	1						
	2						
255	3						
	4						
	5						Abandoned boring. Boring was tremie grouted to ground surface on 7/10/91.
	6						
	7						
250	8						
	9						Auger refusal at 9.0'.
	10						
	11						MATERIAL QUANTITY: Cem.: 470 dry lbs. Cem./Bent.: 5%
	12						
245	13						
	14						
	15						

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
	17						
240-	18						
	19						
	20						
	21						
	22						
235-	23						

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DRILLING LOG of BORING No. SHL-16C

State	MASSACHUSETTS	Start Date	7/12/91
Location	FORT DEVENS	Completion Date	7/12/91
Drilling Firm	E & E DRILLING	Ground Elevation	258.00
Type of Drill	DIEDRICH D-50	Total Depth of Boring	9.0'
Driller	PAUL BARTH		
Geologist	LISA HELTON		

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
258.00		Ground Surface					
							Dry hole.
	1						
	2						
255	3						
	4						
	5						Abandoned boring. Boring was tremie grouted to ground surface on 7/12/91.
	6						
	7						
250	8						
	9						Auger refusal at 9.0'.
							MATERIAL QUANTITY: Cem.: 188 dry lbs. Cem./Bent.: 5%.

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DRILLING LOG of WELL No. SHL-17

State	MASSACHUSETTS	Start Date	6/14/91
Location	FORT DEVENS	Completion Date	6/14/91
Drilling Firm	E & E DRILLING	Ground Elevation	232.77
Type of Drill	DIEDRICH D-50	Groundwater Depth	
Driller	PAUL BARTH	at completion	6.20 ▽
		on 12/12/91	5.66 ▼
Geologist	AMIN AYUBCHA	Total Depth of Boring	17.0'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
232.77		Ground Surface					Stickup = 1.80	
	0–2	0.0'-0.25': TOPSOIL (MH): black clayey silt, 50-60% clay slightly moist, moderate plasticity, stiff, with vegetation.				3 12 17 23	Spl Spn Run 1: 0.0'-2.0' 1.5' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 2.0'-5.0'.	
230	2–6	0.25'-2.0': SAND (SP): gray, slightly moist, coarse grained with abundant boulders of quartz (gravel locally), >70% quartz, 5% clay in the matrix, loose, well rounded elements. 2.0'-6.0': SAND (SP): dark gray, wet, coarse grained, 50-60% quartz, 20-30% micas and other ferro-magnesian minerals, low or no plasticity, loose.				3 4 4 5	Spl Spn run 2: 5.0'-7.0' 1.3' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. First water encountered at 6' BGS. Augered from 7.0'-10.0'.	
225	6–10	6.0'-10.5': silty SAND (SM): gray, wet, 70-75% quartz, 5-10% micas and other ferro-magnesian minerals, low plasticity, loose, rare boulder.						

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DRILLING LOG of WELL NO. SHL-17

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
220	11 12 13 14 15 16 17	10.5'-17.0': SAND (SP): dark gray, wet, very coarse grained sand and gravellous sand, boulders of black metamorphic roks; some thin layers of clear silty sand, 60% quartz, >20% ferro-magnesians, low or no plasticity, loose, rare grains of feldspar.				1 2 3 4 5 6 6 7	Spl Spn Run 3: 10.0'-12.0' 1.7' recovery. OVA: spoon, hole, and head space (0 ppm). Collected samples: (1) 8oz. jar for TOC analysis, (2) 8oz. jars for Geotechnical archive. Augered from 12.0'-15.0'. Spl Spn Run 4: 15.0'-17.0' 1.8' recovery. OVA: spoon and head space (0 ppm), hole (0.2 ppm). Collected archive sample.	

CONSTUCTION SUMMARY
Well: Hole dia.: 10", screen/casing dia.: 4", slot size: 0.010".
Material Qty.:
Filter Pk.: 500lbs.
Bent. Pel.: 15 dry gallons,
Cem.: 470 dry lbs.,
Cem./Bent.: 5%.
Stickup measured from ground surface to top of inner casing.

USATHAMA, ARMY CORPS OF ENGINEERS

Ecology and Environment, Inc. Buffalo, New York

DRILLING LOG of WELL No. SHL-18

State	MASSACHUSETTS	Start Date	6/15/91
Location	FORT DEVENS	Completion Date	6/16/91
Drilling Firm	E & E DRILLING	Ground Elevation	236.59
Type of Drill	DIEDRICH D-50	Groundwater Depth	
Driller	PAUL BARTH	at completion	17.80 ▽
		on 12/12/91	17.12 ▼
Geologist	AMIN AYUBCHA	Total Depth of Boring	30.0'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
236.59		Ground Surface					Stickup = 1.80	
235	1–2	0.0'-10.0': SAND (SP): gray, slightly moist, fine to very fine grained, 80% quartz, <5% micas and other metamorphosed minerals. Trace of roots, low plasticity, slightly moist on top 1'. Mixture of rounded and angular grains.				2 3 4 6	Spl Spn Run 1: 0.0'-2.0' 1.8' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 2.0'-5.0'. Organic, blackish sand was observed at 4'-5' on auger cuttings.	
230	5–7					3 4 4 5	Spl Spn Run 2: 5.0'-7.0' 1.7' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from	
	8–9							

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
225	11–12	10.0'-15.0': SAND (SP): same as above, slightly coarser grained.				4, 8, 8, 10	7.0'-10.0'. Spl Spn Run 3: 10.0'-12.0' 1.6' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 12.0'-15.0'.	
220	15–17	15.0'-22.0': SAND (SP): same as 0-10' interval, wet at 16' BGS, small isolated boulders of quartz.				3, 5, 5, 6	Spl Spn Run 4: 15.0'-17.0' 1.8' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample Augered from 17.0'-20.0'.	
215	20–22					4, 3, 5, 5	Spl Spn Run 5: 20.0'-22.0' 1.8' recovery. OVA: spoon and hole (0 ppm). Collected archive sample and TOC sample. Split Spoon was pushed and a second spoon was driven to obtain a sufficient sample volume.. Augered from 22.0'-25.0'.	
210	22–30	22.0'-30.0': SAND (SP): same as above, highly saturated, slightly darker.				4, 3, 5, 5	Spl Spn Run 6: 25.0'-27.0' Collected archive sample. Augered from 27.0'-30.0'.	
							CONSTRUCTION SUMMARY Well: Hole dia.: 10", screen/casing dia.:	

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
							4". slot size: 0.010". Material Qty.: Filter Pk.: 900lbs. Bent. Pel.: 17.5 dry gallons, Cem.: 564 dry lbs., Cem./Bent.: 5%. Stickup measured from ground surface to top of inner casing.	

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DRILLING LOG of WELL No. SHL-19

State	MASSACHUSETTS	Start Date	6/16/91
Location	FORT DEVENS	Completion Date	6/17/91
Drilling Firm	E & E DRILLING	Ground Elevation	239.45
Type of Drill	DIEDRICH D-50	Groundwater Depth	
Driller	PAUL BARTH	at completion	22.00 ▽
		on 12/12/91	20.67 ▼
Geologist	AMIN AYUBCHA	Total Depth of Boring	31.0'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
239.45		Ground Surface					Stickup = 1.89	
	1 2 3 4	0.0'-1.0': SAND (SP): dark gray, slightly moist, fine grained, vegetation on top, 60-70% quartz, <4-5% clay in matrix, very low plasticity, loose, subangular to well rounded grains. 1.0'-4.5': SAND (SP): gray, dry, clear, fine to very fine grained quartz sand, 70-80% quartz, 5-10% ferro-magnesians of micas, no plasticity, slightly angular element.				1 1 2 4	Spl Spn Run 1: 0.0'-2.0' 1.7' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 2.0'-5.0'.	
235	5 6 7 8 9	4.5'-16.0': SAND (SP): dark gray, dry, medium to coarse grained, 60% quartz, 30-40% micas and metamorphosed rock debris, low to very low plasticity, loose, subangular grains, trace of oxidized minerals, occasional thin layer (2-3") of silty sand.				3 5 5 8	Spl Spn Run 2: 5.0'-7.0' 1.8' recovery. OVA: spoon, hole, and head space (0 ppm). Collecteed archive sample. Augered from 7.0'-10.0'.	
230								

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	11, 12, 13, 14					5 5 7 9	Spl Spn Run 3: 10.0'-12.0' 1.7' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 12.0'-15.0'.	
225	15					3 5	Spl Spn Run 4: 15.0'-17.0'	
	16, 17, 18, 19	16.0'-21.0': silty SAND (SM): white-grayish, dry, very similar to the 4.5-16' interval, loose, no plasticity, rounded to subangular grains, trace of isolated boulder of metamorphosed rock.				5 9	1.3' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 17.0'-20.0'.	
220	20					4 12	Spl Spn Run 5: 20.0'-22.0'	
215	21, 22, 23, 24, 25, 26, 27, 28, 29	21.0'-21.5': SAND (SM): same as above, slightly coarser, more sand than silt. 21.5'-22.0': SAND (SP): orange and black (organic), very wet, coarse grained, abundant boulders of quartz, 2" of oily black and rusty sand, numerous fragments of schist and granitic rock, 50-60% quartz, 30% metamorphosed ferro-magnesians and micas, no plasticity. 22.0'-30.0': SAND (SP): gray, wet, medium to coarse grained, some boulders of quartz, thin layer (2-3") of fine grained sand, 60-70% quartz, 5-10% metamorphosed ferro-magnesians, trace of oxidized grains, no plasticity, loose.				13 14 3 5 8 12	1.4' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 22.0'-25.0'. Water at 22' BGS. Measured after stabilization. Spl Spn Run 6: 25.0'-27.0' 1.5' recovery. OVA: spoon and hole (0 ppm), head space (0.4 ppm). Collected archive sample.	
210	30						Augered from 27.0'-31.0'. CONSTRUCTION SUMMARY Well: Hole dia.: 10", screen/casing dia.:	

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
							4:, slot size: 0.010". Material Qty.: Filter Pk.: 400lbs. Bent. Pel.: 20 dry gallons, Cem.: 564 dry lbs., Cem./Bent.: 5% Stickup measured from ground surface to top of inner casing.	

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DRILLING LOG of WELL No. SHL-20

State	MASSACHUSETTS	Start Date	7/10/91
Location	FORT DEVENS	Completion Date	7/13/91
Drilling Firm	E & E DRILLING	Ground Elevation	235.55
Type of Drill	ACKER 82	Groundwater Depth	
Driller	DON CAMPBELL	at completion	15.00 ▽
		on 12/12/91	17.63 ▼
Geologist	ROBERT A. MEYERS	Total Depth of Boring	64.0'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
235.55		Ground Surface					Stickup = 1.29	
235	1	0.0'-0.4': SILT (MH): tan, dry, with fine sand and some rounded gravel. 0.4'-2.0': SAND (MH): tan to brown, fine to medium grained, with some rounded to subangular gravel. Sand is composed of angular fragments of 90% quartz, 10% mafics, (<1%) mica for this split spoon.				4 6 10 14	Spl Spn Run 1: 0.0'-2.0' 1.2' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 2.0'-5.0'.	
	2							
	3							
	4							
	5							
230	6	5.0'-7.0': SAND (SP): tan to gray, moist, medium grained, with some limonitic staining, 90% quartz, 10% mafics, <1% mica.				4 5 5 6	Spl Spn Run 2: 5.0'-7.0' 1.0' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 7.0'-10.0'.	
	7							
	8							
	9							

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
225	10–15	10.0'-12.0': SAND (SP): same as above, dry, with less staining.				4 3 4 5	Spl Spn Run 3: 10.0'-12.0' 1.1' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 12.0'-15.0'.	
220	15–20	15.0'-17.0': SAND (SP): wet at 15.2', fine to medium grained, heavily stained with rust (limonitic), 90% quartz, 10% mafics, <1% mica.				5 5 7 6	Spl Spn Run 4: 15.0'-17.0' 1.7' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 17.0'-20.0'.	
215	20–25	20.0'-22.0': SAND (SP): saturated, fine to coarse grained, no staining, subrounded to angular, 75% quartz, 25% mafics, <1% mica.				4 7 7 6	Spl Spn Run 5: 20.0'-22.0' 1.4' recovery. OVA: spoon (5 ppm) and hole (60 ppm). (methane) Collected archive sample. Augered from 22.0'-25.0'.	
210	25–30	25.0'-27.0': SAND (SP): gray-brown, saturated, fine to coarse grained, 85% quartz, 13% mafics, 2% pink feldspar, <1% mica, rounded to angular grains.				0 2 3 4	Spl Spn Run 6: 25.0'-27.0' 1.8' recovery. OVA: spoon (4 ppm) and hole (80 ppm). (methane) Collected archive sample. Augered from 27.0'-30.0'.	
205	30–33	30.0'-32.0': SAND (SP): gray-brown, saturated, fine to coarse grained, with little rounded gravel, 90% quartz, 10% mafics, <1% mica, rounded to angular grains.				1 3 3 4	Spl Spn Run 7: 30.0'-32.0' 1.7' recovery. OVA: spoon (2 ppm) and hol (40 ppm). (methane) Collected archive sample.	

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	34						Augered from 32.0'-35.0'.	
200	35	35.0'-37.0': SAND (SP): gray-brown, saturated, fine to medium grained, 90% quartz, 10% mafics, <1% mica.				5 5 6 7	Spl Spn Run 8: 35.0'-37.0' 1.6' recovery. OVA: spoon (3 ppm) and hole (>100 ppm). (methane) Collected archive sample. Augered from 37.0'-40.0'.	
195	40	40.0'-42.0': SAND (SP): same as above, with few rounded pebbles of mafic material.				0 3 5 10	Spl Spn Run 9: 40.0'-42.0' 1.5' recovery. OVA: spoon (3 ppm) and hole (>100 ppm) (methane). Collected archive sample. Augered from 42.0'-45.0'.	
190	45	45.0'-47.0': SAND (SP): gray to tan, saturated, fine to coarse grained, 90% quartz, 10% mafic, <1% mica, rounded to angular grains.				11 11 17 25	Spl Spn Run 10: 45.0'-47.0' 1.8' recovery. OVA: spoon (3 ppm) and hole (80 ppm) (methane). Collected archive sample.	
185	48	48'-49': Cuttings are indicative of weathered granodiorite. 49.0'-54.0': DIARO-QUARTZITIC GNEISS: very hard, metamorphic, microcrystalline, with several high angle fractures and iron staining in fractures.					Attempted to auger from 47.0'-50.0'. Casing and split spoon refusal at 48'. Top of bedrock at 48'. Tri-cone roller bit used to drill from 48'-49'. Core Run 1: 49.0'-54.0'	
180	54	54.0'-59.0': DIARO-QUARTZITIC GNEISS: same as above.					Core Run 2: 54.0'-59.0'	

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	58							
	59	59.0'-64.0': DIARO-QUARTZITIC GNEISS: same as above, with an approximately 2' vertical fracture which has partially healed.					Core Run 3: 59.0'-64.0'	
175	60							
	61						CONSTRUCTION SUMMARY Well: Hole dia.: 10", screen/casing dia.: 4", slot size: 0.010". Stickup measured from ground surface to top of inner casing. All cuttings with head space readings above 10 ppm were containerized in 55-gallon drums.	
	62							
	63							
	64							

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DRILLING LOG of WELL No. SHL-21

State	MASSACHUSETTS	Start Date	6/18/91
Location	FORT DEVENS	Completion Date	6/19/91
Drilling Firm	E & E DRILLING	Ground Elevation	257.93
Type of Drill	ACKER 82	Groundwater Depth	
Driller	DON CAMPBELL	at completion	40.60 ∇
		on 12/12/91	42.66 ▼
Geologist	ROBERT A. MEYERS	Total Depth of Boring	53.0'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
257.93		Ground Surface					Stickup = 1.82	
	0–1	0.0'- 0.1': TOPSOIL (OL): organic material and sand; roots extend to 0.4'.				3 5 9 12	Spl Spn Run 1: 0.0'-2.0' 1.8' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 2.0'-5.0'.	
255	2–4	0.1'-2.0': SAND (SP): medium brown, slightly moist, fine to coarse, with some fine to coarse gravel and trace of cobbles; all materials range from rounded to subangular, loose, non-cohesive, 60% quartz, 25% feldspars, 10% ferro-magnesians, with little silt and clay in matrix.						
	5–7	5.0'-7.0': SAND (SP): light brown, moist, fine to coarse grained, loose, non-plastic, with little rounded (granite) gravel, angular to rounded, 80% clear quartz, 15% ferro-magnesians and mica, 5% feldspars.				5 7 9 13	Spl Spn Run 2: 5.0'-7.0' 1.2' recovery. OVA: spoon (0.1 ppm) and hole (0 ppm). Collected archive sample. Augered from 7.0'-10.0'.	
250	8–9							

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	10–12	10.0'-12.0': SAND (SM): light gray, dry, very fine to fine grained, loose, non-plastic, angular to subrounded, 90% quartz, 10% ferro-magnesians, mica, and feldspar.				5 8 10 12	Spl Spn Run 3: 10.0'-12.0' 1.2' recovery. OVA: spoon (0 ppm) and hole (0.2 ppm). Collected archive sample. Augered from 12.0'-15.0'.	
245	13							
	14							
	15	15.0'-17.0': SAND (SM): same as above, fine to very fine grained.				3 3 5 9	Spl Spn Run 4: 15.0'-17.0 1.5' recovery. OVA: spoon (0.1 ppm) and hole (0 ppm). Collected archive sample. Augered from 17.0'-20.0'.	
240	18							
	20	20.0'-22.0': SAND (SM): same composition as above, but slightly more finely grained, with some silt, slightly moist, no staining or inclusions.				5 9 11 12	Spl Spn Run 5: 20.0'-22.0' 1.9' recovery. OVA: spoon (0.1 ppm) and hole (0 ppm). Collected archive sample. Augered from 22.0'-25.0'.	
235	23							
	25	25.0'-27.0': SAND (SM): same as above, light gray to white, very slightly moist, with three (1/2") seams of tan silt, non-plastic, non-cohesive.				7 9 11 15	Spl Spn Run 6: 25.0'-27.0' 1.6' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 27.0'-30.0'.	
230	28							
	30	30.0'-32.0': SAND (MH): light gray to white, dry, very fine, non-plastic, non-cohesive, 90% quartz, 10% ferro-magnesians, mica, and feldspar.				3 5 8 11	Spl Spn Run 7: 30.0'-32.0' 1.5' recovery. OVA: spoon (0 ppm) and hole (0.4 ppm). Collected archive sample.	
225	33							

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	34						Augered from 32.0'-35.0'.	
	35	35.0'-37.0': SAND (MH): same as above.				5 10 15 17	Spl Spn Run 8: 35.0'-37.0' 1.7' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 37.0'-40.0'.	
220	38							
	40	40.0'-40.6': SAND (MH): same as above, slightly moist. 40.6'-42.0': SAND (MH): same very fine sand composition as above, with silt, wet, moderately firm (cohesive) due to moisture content, non-plastic; brown when wet, dries to light gray.				6 8 11 13	Spl Spn Run 9: 40.0'-42.0' 1.9' recovery. OVA: hole and head space (0 ppm). Collected archive sample. Water encountered at 40.6'. OVA spiked at 2 ppm when spoon was opened. Augered from 42.0'-45.0'.	
215	43							
	45	45.0'-47.0': SAND (MH): same as above, saturated.				3 3 4 5	Spl Spn Run 10: 45.0'-47.0' OVA: spoon (0.2 ppm) and hole (0 ppm). Collected archive sample. No further sampling due to sands flowing into auger. Sample (with duplicate) was taken for TOC analysis.	
210	48							
205	53						CONSTRUCTION SUMMARY Well: Hole dia.: 10", screen/casing dia: 4", slot size: 0.010 ". Material Qty.: Filter Pk.: 800lbs. Bent. Pel.: 15 dry gallons.	

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
							Cem.: 1,316 dry lbs., Cem./Bent.: 5%. Stickup measured from ground surface to top of inner casing.	

DRILLING LOG of WELL No. SHL-22

State	MASSACHUSETTS	Start Date	7/14/91
Location	FORT DEVENS	Completion Date	7/23/91
Drilling Firm	E & E DRILLING	Ground Elevation	219.58
Type of Drill	ACKER 82	Groundwater Depth	
Driller	DON CAMPBELL	at completion	8.50 ▽
		on 12/12/91	4.86 ▼
Geologist	ROBERT A. MEYERS	Total Depth of Boring	129.6'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
219.58		Ground Surface					Stickup = 0.91	
		0.0'-1.2': SAND (SP): tan, damp, loose, medium to coarse grained, with little fine sand, trace rounded pebbles, roots, 90% quartz, 10% mafics.				2 2 2 2	Spl Spn Run 1: 0.0'-2.0' 1.4' recovery. OVA: spoon and hole (0 ppm), head space (2 ppm). Collected archive sample. Augered from 2.0'-5.0'.	
		1.2'-1.4': SILT (MH): medium brown, damp, loose, organic silt with fine sand, rounded to angular sand grains, 90% quartz, 10% mafics.						
215		5.0'-5.8': SILT (MH): same as above, damp, compact, with some rounded pebbles; pebbles are crystalline, metamorphosed, and highly quartzitic.				22 37 47 47	Spl Spn Run 2: 5.0'-7.0' 1.8' recovery. OVA: spoon (5 ppm), hole (0 ppm), and head space (1.6 ppm). (methane) Collected archive sample. Augered from 7.0'-10.0'.	
210		5.8'-7.0': SAND (SP): medium to coarse, damp, compact, limonitic staining, trace roots, trace silt and clay, some rounded pebbles; pebbles are crystalline, metamorphosed, and highly quartzitic.						

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DRILLING LOG of WELL NO. SHL-22

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	11, 12, 13, 14	10.0'-12.0': SAND (SP): tan, loose, very fine to coarse, with some silt and trace gravel, trace limonitic staining, 90% quartz, 10% mafic, <1% mica.				3 4 5 9	Water at 8.5' BGS. Spl Spn Run 3: 10.0'-12.0' 1.9' recovery. OVA: spoon and hole (0 ppm), head space (9.8 ppm). Collected archive sample. Augered from 12.0'-15.0'.	
205	15, 16, 17, 18, 19	15.0'-17.0': SAND (SP): saturated, loose, medium to coarse grained, 90% quartz, 10% mafic, angular to subrounded grains, with trace gravel.				1 2 4 5	Spl Spn Run 4: 15.0'-17.0' 1.7' recovery. OVA: spoon and hole (0 ppm), head space (2.8 ppm). Collected archive sample. Augered from 17.0'-20.0'.	
200	20, 21, 22, 23, 24	20.0'-22.0': SAND (SP): saturated, loose, very fine to coarse grained, with trace silt and gravel, 90% quartz, 10% mafic.				2 4 7 13	Spl Spn Run 5: 20.0'-22.0' 1.8' recovery. OVA: spoon and hole (0 ppm), head space (4.5 ppm). Collected archive sample. Augered from 22.0'-25.0'.	
195	25, 26, 27, 28, 29	25.0'-27.0': SAND (SP): same as above, saturated, loose, with no gravel, <1% mica.				7 7 11 11	Spl Spn Run 6: 25.0'-27.0' 2.0' recovery. OVA: spoon and hole (0 ppm), head space (2.8 ppm). Collected archive sample. Augered from 27.0'-30.0'.	
190	30, 31, 32, 33	30.0'-32.0': SAND (SP): same composition as above, gray, saturated, loose, fine to medium grained, with some coarse sand, trace silt and gravel.				7 5 7 8	Spl Spn Run 7: 30.0'-32.0' 2.0' recovery. OVA: spoon and hole (0 ppm), head space (3.6 ppm).	

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
185	34						Collected archive sample. Augered from 32.0'-35.0'.	
	35–37	35.0'-37.0': SAND (SP): saturated, loose, coarse, 75% quartz, 15% mafics, 10% feldspar, with some gravel and some fine to medium grained sand; gravel composed of granitic and microcrystalline rocks.				3 8 8 12	Spl Spn Run 8: 35.0'-37.0' 1.7' recovery. OVA: spoon and hole (0 ppm), head space (3.8 ppm).	
180	38–39						Collected archive sample. Augered from 37.0'-40.0'.	
	40–42	40.0'-42.0': SAND (SP): gray, saturated, loose, medium grained, angular, trace fine sand and rounded gravel, 95% quartz, 5% mafics.				7 7 11 7	Spl Spn Run 9: 40.0'-42.0' 1.7' recovery. OVA: spoon and hole (0 ppm), head space (6.2 ppm).	
175	43–44						Collected archive sample. Augered from 42.0'-45.0'.	
	45–47	45.0 '-47.0': No recovery.				4 3 4 6	Spl Spn Run 1C: 45.0'-47.0' No recovery due to flowing sands. OVA: spoon and hole (0 ppm).	
170	48–49						Augered from 47.0'-50.0'.	
	50–52	50.0'-52.0': No recovery.				3 15 35 17	Spl Spn Run 11: 50.0'-52.0' No recovery due to flowing sands. The sample is being washed away by water. OVA: spoon and hole (0 ppm).	
165	53–54						Augered from 52.0'-55.0'.	
	55–56	55.0'-57.0': SAND (SP): fine to coarse grained, with angular to rounded grains of 80% quartz, and 20% mafics, trace silt and gravel.				3 3 5 10	Spl Spn Run 12: 55.0'-57.0' 1.2' recovery. OVA: spoon and hole (0	

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Corst.
160	58–62						ppm), head space (0.5 ppm). Collected archive sample. The sand rose 10' into the casing and was then sampled. The bottom of the casing is at 55' BGS. Augered from 57.0'-63.0'.	
155	63–64	63.0'-65.0': SAND (SP): gray, medium and coarse grained, with some fine sand/silt, some gravel, 80% quartz, 20% mafics.				32 15 18 22	Spl Spn Run 13: 63.0'-65.0' 1.1' recovery. OVA: spoon and hole (0 ppm), head space (4.5 ppm). Collected archive sample. Augered from 65.0'-73.0'.	
150	65–72							
145	73–74	73.0'-75.0': SAND (SM): gray, saturated, firm, fine grained, with some rounded gravel and trace coarse sand, 80% quartz, 20% mafics.				32 26 18 18	Spl Spn Run 14: 73.0'-75.0' 1.0' recovery. OVA: spoon and hole (0 ppm), head space (6 ppm). Collected archive sample. (methane) Augered from 75.0'-83.0'.	
140	75–80							

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	81							
	82							
	83	83.0'-85.0': SAND (SM): gray, saturated, medium grained, angular, with trace fine sand, 90% quartz, 10% mafics.				12 12 16 42	Spl Spn Run 15: 83.0'-85.0' 0.6' recovery. OVA: spoon and hole (0 ppm), head space (196 ppm). (methane) Collected archive sample. Some sand flowed back into casing, approximately 1'. Unable to sample beyond 85'.	
135	84							
	85	85.0'-115.0': TILL (SP): consists most probably of tight till, containing both gravel and cobbles.						
	86–89							
130	90–94							
125	95–99							
120	100–103							

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
115	105							
	106							
	107							
	108						Hit a large (9") cobble at 108' BGS.	
	109							
110	110							
	111							
	112							
	113							
	114							
105	115	115.0'-120.0': QUARTZO-FELDSPATHIC GNEISS: with quartz seams, few open 45 degree angle fractures, mostly mechanical breaks and healed fractures, contains mica.					Bedrock at 115' BGS. Natural sand pack at 115' BGS due to cave in. Unable to obtain a Geotechnical or TOC sample from within the screened interval (105'-115') due to increased grain size in that zone.	
	116							
	117							
	118							
	119							
100	120	120.0'-125.0': QUARTZO-FELDSPATHIC GNEISS: with mica, few open 45 degree angle fractures, mostly fractures healed with quartz or are mechanical breaks.					Core Run 1: 115.0'-120.0' 2.9' recovery. Core loss from top of core.	
	121							
	122							
	123							
	124						Core Run 2: 120.0'-125.0' 4.6' recovery.	
95	125	125.0'-129.6': QUARTZO-FELDSPATHIC GNEISS: same as above.					Core Run 3: 125.0'-129.6' 1.7' recovery. Core loss from bottom of hole.	
	126							
	127							

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DRILLING LOG of WELL NO. SHL-22

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	128						CONSTRUCTION SUMMARY Well: Hole dia.: 10", screen/casing dia.: 4", slot size: 0.010". Stickup measured from ground surface to top of inner casing.	
	129							
90								

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DRILLING LOG of WELL No. SHL-23

State	MASSACHUSETTS	Start Date	7/16/91
Location	FORT DEVENS	Completion Date	7/17/91
Drilling Firm	E & E DRILLING	Ground Elevation	240.37
Type of Drill	DIEDRICH D-50	Groundwater Depth	
Driller	PAUL BARTH	at completion	25.84 ▽
		on 12/12/91	24.11 ▼
Geologist	LISA HELTON	Total Depth of Boring	35.0'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
240.37		Ground Surface					Stickup = 1.77	
240	0–5	0.0'-2.0': SILT (MH): medium brown, dry, non-plastic, loose, fine grained; little sand, light brown, medium brown, clasts.				4 6 8 18	Spl Spn Run 1: 0.0'-2.0' 1.0' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 2.0'-5.0'.	
235	5–10	5.0'-7.0': SAND (SP): gray-brown, low moisture, loose, medium grained, trace silt, organics throughout.				3 5 6 7	Spl Spn Run 2: 5.0'-7.0' 1.7' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 7.0'-10.0'.	

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
230	10–15	10.0'-12.0': SAND (SP): same as above.				4 7 7 14	Spl Spn Run 3: 10.0'-12.0' 1.7' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 12.0'-15.0'.	
225	15–20	15.0'-17.0': SAND (SP): same as above, except medium to coarse grained, loose to medium compactness.				4 7 11 15	Spl Spn Run 4: 15.0'-17.0' 1.0' recovery. OVA: spoon, hole, and heac space (0 ppm). Collected archive sample. Augered from 17.0'-20.0'.	
220	20–25	20.0'-22.0': SAND (SW): same as above, except gravelly, moderate moisture.				9 12 14 20	Spl Spn Run 5: 20.0'-22.0' 1.0' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 22.0'-25.0'.	
215	25–27	25.0'-27.0': SAND (SW): gray-brown, wet, coarse grained, medium compactness, organics, gravelly.				10 17 17 20	Spl Spn Run 6: 25.0'-27.0' 1.2' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 27.0'-30.0'.	
	27–30	27.0'-30.0': SAND (SW): medium brown, wet, medium grained, some silt, non-plastic, gravelly.					OVA: hole and head space (0 ppm).	
210	30–33	30.0'-35.0': SAND (SW): medium brown, wet, medium grained, some silt, non-plastic, gravelly.					Augered from 30.0'-35.0'. OVA: hole and head space (0 ppm).	

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DRILLING LOG of WELL NO. SHL-23

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	34							
	35						CONSTRUCTION SUMMARY Well: Hole dia.: 10", screen/casing dia.: 4", slot size: 0.010". Material Qty.: Filter Pk.: 600lbs. Bent. Pel.: 17.5 dry gallons, Cem.: 517 dry lbs., Cem./Bent.: 5%. Stickup measured from ground surface to top of inner casing.	

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Ecology and Environment, Inc. Buffalo, New York

DRILLING LOG of WELL No. SHL-24

State	MASSACHUSETTS	Start Date	7/19/91
Location	FORT DEVENS	Completion Date	7/24/91
Drilling Firm	E & E DRILLING	Ground Elevation	237.68
Type of Drill	ACKER 82	Groundwater Depth	
Driller	DON CAMPBELL	at completion	15.30 ∇
		on 12/12/91	13.87 ▼
Geologist	ROBERT A. MEYERS	Total Depth of Boring	129.5'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
237.68		Ground Surface					Stickup = 1.92	
	0–2	0.0'-0.6': SILT (MH): dark brown, dry, with fine sand and trace roots.				5 8 2 4	Spl Spn Run 1: 0.0'-2.0' 1.8' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 2.0'-5.0'.	
235		0.6'-2.0': SAND (SP): tan, dry, fine to coarse grained, angular, 95% quartz, 5% mafics.						
230	5–7	5.0'-7.0': SAND (SP): dry, fine to coarse grained, subrounded to angular, with trace silt, 95% quartz, 5% mafics.				10 8 9 12	Spl Spn Run 2: 5.0'-7.0' 1.8' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 7.0'-10.0'.	

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
225	11 12 13 14	10.0'-12.0': SAND (SP): dry, fine to coarse grained, subrounded to angular, with trace silt, 90% quartz, 10% mafics.				5 8 8 11	Spl Spn Run 3: 10.0'-12.0' 1.8' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 12.0'-15.0'.	
220	15 16 17 18 19	15.0'-17.0': SAND (SP): tan, wet at 15', medium grained, some fine, trace coarse sand and gravel, limonitic staining.				4 4 7 7	Spl Spn Run 4: 15.0'-17.0' 1.2' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 17.0'-20.0'.	
215	20 21 22 23 24	20.0'-22.0': SAND (SP): same as above, saturated, no limonitic staining, <1% mica.				4 7 14 11	Spl Spn Run 5: 20.0'-22.0' 1.9' recovery. OVA: spoon (0.5 ppm), hole and head space (0 ppm). Collected archive sample. Augered from 22.0'-25.0'.	
210	25 26 27 28 29	25.0'-27.0': SAND (SP): tan, saturated, fine grained, trace coarse, angular to subangular, starting to flow, some silt, 95% quartz, 5% mafics.				4 4 8 13	Spl Spn Run 6: 25.0'-27.0' 1.6' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 27.0'-30.0'.	
205	30 31 32 33	30.0'-32.0': SAND (SP): same as above, trace coarse grained sand, no medium grained, flowing.				6 11 11 12	Spl Spn Run 7: 30.0'-32.0' 1.5' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample.	

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	34–35						Augered from 32.0'-35.0'.	
200	35–45	35.0'-37.0': SILT (MH): tan, saturated, trace very fine sand, flowing, no inclusions.				0 0 0 0	Spl Spn Run 8: 35.0'-37.0' 1.8' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 37.0'-40.0'.	
195		40.0'-42.0': SILT (MH): same as above.				0 0 8 10	Spl Spn Run 9: 40.0'-42.0' 2.0' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 42.0'-45.0'.	
190	45–57	45.0'-47.0': SAND (SP): tan, saturated, very fine to fine grained, angular, flowing, 99% quartz, 1% mafic.				0 10 14 16	Spl Spn Run 10: 45.0'-47.0' 1.2' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 47.0'-53.0'.	
185		53.0'-55.0': No recovery due to flowing sands, saturated.				9 13 24 21	Spl Spn Run 11: 53.0'-55.0' No recovery due to fine flowing sands. OVA: spoon, hole, and head space (0 ppm). Augered from 55.0'-63.0'.	

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
180	58							
	59							
	60							
	61							
	62							
175	63	63.0'-65.0': SAND (SP): tan, saturated, very fine to fine grained, flowing, with some silt, 95% quartz, 4% mafic, 1% mica, limonitic staining.				13 21 19 19	Spl Spn Run 12: 63.0'-65.0' 0.9' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 65.0'-73.0'.	
	64							
	65							
	66							
	67							
170	68							
	69							
	70							
	71							
	72							
165	73	73.0'-75.0': SAND (SP): tan, saturated, very fine to fine grained, flowing, with trace silt, limonitic staining.				14 11 14 21	Spl Spn Run 13: 73.0'-75.0' 1.3' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 75.0'-83.0'.	
	74							
	75							
	76							
	77							
160	78							
	79							
	80							

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	81							
	82							
155	83	83.0'-85.0': <u>SAND</u> (SP): gray to tan, saturated, very fine to fine grained, limonitic staining.				13 13 13 22	Spl Spn Run 14: 83.0'-85.0' 0.9' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. Augered from 85.0'-93.0'.	
	84							
	85							
	86							
	87							
150	88							
	89							
	90							
	91							
	92							
145	93	93.0'-95.0': <u>SILT</u> (MH): gray to tan, saturated, with some very fine to fine grained sand.				16 16 19 24	Spl Spn run 15: 93.0'-95.0' 0.6' recovery. OVA: spoon, hole, and head space (0 ppm). Collected archive sample. No Geotechnical or TOC samples taken from 95'-114.5' (bedrock) due to split spoon refusal.	
	94							
	95							
	96							
	97							
140	98							
	99							
	100							
	101							
	102							
135	103							

DRILLING LOG of WELL NO. SHL-24

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	105							
	106							
	107							
130	108							
	109							
	110							
	111							
	112							
125	113							
	114							
	115	114.5'-114.65': GRANITIC COBBLE 114.65'-119.5': PHYLLITE: gray, with mechanical breaks.					Core Run 1: 114.5'-119.5' 3.6' recovery. OVA: hole (0 ppm). Monitoring well did not actually penetrate into the bedrock.	
	116							
	117							
120	118							
	119							
	120	119.5'-124.5': PHYLLITE: same as above, with a single vertical fracture from 123.8'-124.5'; slickensides along vertical fracture.					Core Run 2: 119.5'-124.5' 4.6' recovery.	
	121							
	122							
115	123							
	124							
	125	124.5'-129.5': PHYLLITE: same as above, no vertical fractures.					Core Run 3: 124.5'-129.5' 1.3' recovery. Bottom of core left in the hole.	
	126							
	127							

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State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
110	128						CONSTRUCTION SUMMARY Well: Hole dia.: 10", screen/casing dia.: 4", slot size: 0.010'. Stickup measured from ground surface to top of inner casing.	
	129							

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DRILLING LOG of WELL No. SHL-25

State	MASSACHUSETTS	Start Date	7/17/91
Location	FORT DEVENS	Completion Date	7/18/91
Drilling Firm	E & E DRILLING	Ground Elevation	257.10
Type of Drill	DIEDRICH D-50	Groundwater Depth	
Driller	PAUL BARTH	at completion	24.00 ▽
		on 12/12/91	22.79 ▼
Geologist	WALTER KNOTTS	Total Depth of Boring	35.0'
			Lock #3217

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
257.10		Ground Surface					Stickup = 1.77	
	0–2	0.0'-12.0': SAND (SP): light medium brown, damp, medium dense, fine to coarse grained, quartzose, trace feldspar and mica, occasional igneous and metamorphic rock fragments.				6 7 7 8	Spl Spn Run 1: 0.0'-2.0' 1.6' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 2.0'-5.0'.	
255	2							
	5–7					6 16 14 14	Spl Spn Run 2: 5.0'-7.0' 1.5' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 7.0'-10.0'.	
250	7							
	9							

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DRILLING LOG of WELL NO. SH_-25

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	11					5 8 9 10	Spl Spn Run 3: 10.0'-12.0' 1.7' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 12.0'-15.0'.	
245	12	12.0'-29.0': <u>SAND</u> (SP): medium brown, moist, medium dense, very fine to fine, little silt, trace clay, quartzose, subangular to subrounded, trace mica.						
	13							
	14							
	15					6 10 9 7	Spl Spn Run 4: 15.0'-17.0' 1.7' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 17.0'-20.0'.	
	16							
240	17							
	18							
	19							
	20					5 7 9 14	Spl Spn Run 5: 20.0'-22.0' 1.6' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 22.0'-25.0'.	
	21							
235	22							
	23							
	24							
	25					4 7 7 14	Spl Spn Run 6: 25.0'-27.0' 1.8' recovery. OVA: spoon and hole (0 ppm). Collected archive sample. Augered from 27.0'-34.5' OVA: hole (0 ppm). CONSTRUCTION SUMMARY Well: Hole dia.: 10", screen/casing dia.: 4", slot size: 0.010". Material Qty.: Filter Pk.: 400lbs.	
	26							
230	27							
	28							
	29	29.0'-35.0': <u>SAND AND SILTY CLAY</u> (SP): medium brown, wet, dense, trace rock fragments - possibly till.						
	30							
	31							
225	32							
	33							

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DRILLING LOG of WELL NO. SHL-25

State MASSACHUSETTS Location FORT DEVENS

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks	Well Const.
	34						Bent. Pel.: 10 dry gallons. Cem.: 329 dry lbs.. Cem./Bent.: 5%. Stickup measured from ground surface to top of inner casing.	
	35							

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DRILLING LOG of BORING No. SOIL-17

State	MASSACHUSETTS	Start Date	8/29/91
Location	FORT DEVENS	Completion Date	8/29/91
Drilling Firm	E & E DRILLING	Ground Elevation	
Type of Drill	DIEDRICH D-50	Total Depth of Boring	10.0'
Driller	PAUL BARTH		
Geologist	AMIN AYUBCHA		

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
		Ground Surface					
	0–5	0.0'-5.0': SAND (SM): gray, moist, loose, medium to fine grained, 60-80% quartz, 30% ferro-magnesians, some medium size boulders of quartz and igneous rock.					Auger Run 1: 0.0'-5.0'
	5–10	5.0'-10.0': SAND (SM): same as above, moist, coarser, with larger size boulders.					Auger Run 2: 5.0'-10.0'
	10						Hand auger used at 10' to collect background soil sample for TAL analysis. OVA: 0 ppm throughout.

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DRILLING LOG of BORING No. SOIL-18

State	MASSACHUSETTS	Start Date	8/28/91
Location	FORT DEVENS	Completion Date	8/28/91
Drilling Firm	E & E DRILLING	Ground Elevation	
Type of Drill	DIEDRICH D-50	Total Depth of Boring	10.0'
Driller	PAUL BARTH		
Geologist	AMIN AYUBCHA		

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
		Ground Surface					
	0–1.5	0.0'-1.5': TOPSOIL (MH): gray, sandy, some silt and gravel with roots and vegetation.					Auger Run 1: 0.0'-5.0'
	1.5–8	1.5'-8.0': SAND/GRAVEL (SW): gray sand and gravel, dry, angular to subangular, 30-40% quartz, 20-30% silt, some silt in the matrix, 2.4" cobbles of quartz and metamorphosed rocks.					Auger Run 2: 5.0'-10.0'
	8–10	8.0'-10.0': SAND (SP): gray to dark brown, slightly moist, medium to coarse grained, 20-40% quartz, some silt in matrix, rare boulder, more ferro-magnesians.					Sample was collected from fly auger at 10'. The hole caved in as the auger was pulled out.

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DRILLING LOG of BORING No. SOIL-19

State	MASSACHUSETTS	Start Date	8/29/91
Location	FORT DEVENS	Completion Date	8/29/91
Drilling Firm	E & E DRILLING	Ground Elevation	
Type of Drill	DIEDRICH D-50	Total Depth of Boring	10.0'
Driller	PAUL BARTH		
Geologist	AMIN AYUBCHA		

Elev.	Depth	Description	Lithology	Sample No. and	Symbol	Blow Count	Remarks
		Ground Surface					
	0–1	0.0'-1.0': TOPSOIL (SM): dark gray, sandy, roots, vegetation.					Auger Run 1: 0.0'-5.0'
	1–5	1.0'-5.0': SAND (SP): gray to dark gray, moist, medium grained, abundant cobbles of quartz (2-3") and igneous rock, tending to a gravelous lithology, 70-80% quartz and 10-15% organics in top 2'.					
	5–10	5.0'-10.0': SAND (SP); same as above except less gravel, more homogeneous grain size with minor cobbles.					Auger Run 2: 5.0'-10.0'
	10						Hand auger used at 10' to collect background soil sample inside open hole. OVA: 0 ppm throughout.

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DRILLING LOG of BORING No. SOIL-20

State	MASSACHUSETTS	Start Date	8/29/91
Location	FORT DEVENS	Completion Date	8/29/91
Drilling Firm	E & E DRILLING	Ground Elevation	
Type of Drill	DIEDRICH D-50	Total Depth of Boring	10.0'
Driller	PAUL BARTH		
Geologist	AMIN AYUBCHA		

Elev.	Depth	Description	Lithology	Sample No. and Symbol	Blow Count	Remarks
		Ground Surface				
	0–0.5	0.0'-0.5': TOPSOIL (MH): yellowish-brown silty topsoil with vegetation.				Auger Run 1: 0.0'-5.0'
	0.5–5	0.5'-5.0': SILT/SILTY SAND (SM): yellowish-brown, fine to very fine sand and silt, 40-45% quartz, trace of micas, 5-15% clay in matrix. Dry, non-cohesive, <2% ferro-magnesians, some iron staining, rare boulders.				
	5–10	5.0'-10.0': SILT/SILTY SAND (SM): same as above, moist, with thin layers of medium grained sand, rich in ferro-magnesians.				Auger Run 2: 5.0'-10.0'
	10					Hand auger used at 10' to collect background soil sample. OVA: 0 ppm throughout.

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US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT: FT Devens

DATE: 13 July 1988

LOCATION: Cold Spring Brook Construction Debris Landfill

DRILLERS: Smithson, Rodriguez Jacobwith, Fox

DRILL RIG: Mobile B-53 with 6-inch Hollow Stem Auger

BORE HOLE: CBW-1

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
0		Sand, medium to fine grained, silt, and gravel, tan (fill material)	Dry
		Silt and sand, fine grained, siltstone, dark gray	Very difficult drilling
5			
		Sand, coarse to fine grained, trace of gravel, gray at top, tan below 8 feet	Saturated
10			
15		Bottom of Hole	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

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US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT: FT Devens

DATE: 13 July 1988

LOCATION: Cold Spring Brook Construction Debris Landfill

DRILLERS: Smithson, Rodriguez Jacobwith, Fox

DRILL RIG: Mobile B-53 with 6-inch Hollow Stem Auger

BORE HOLE: CBW- 2

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
0		Sand, coarse to fine grained, with trace of gravel, tan	Dry
5			
10			
15			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, I ... which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT: FT Devens | DATE: 13 July 1988

LOCATION: Cold Spring Brook Construction Debris Landfill | DRILLERS: Smithson, Rodriguez, Jacobwith, Fox

DRILL RIG: Mobile B-53 with 6-inch Hollow Stem Auger | BORE HOLE: CBW-2

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
15		Same as above	Damp
20		Sand, coarse to medium grained, and fine gravel, medium brown to tan. Gravel material is a gray sandstone and siltstone.	Saturated
25			
30			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT FT Devens

DATE 13 July 1988

LOCATION Cold Spring Brook Construction Debris Landfill

DRILLERS Smithson, Rodriguez Jacobwith, Fox

DRILL RIG Mobile B-53 with 6-inch Hollow Stem Auger

BORE HOLE CBW-2

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
30		Same as above	
35			
40		Sand, medium to fine grained tan	
45			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT FT Devens

DATE 13 July 1988

LOCATION Cold Spring Brook Construction Debris Landfill

DRILLERS Smithson, Rodriguez Jacobwith, Fox

DRILL RIG Mobile B-53 with 6-inch Hollow Stem Auger

BORE HOLE CBW-2

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
45		Same as above	
50			-2 feet of sand inside auger, drilling slower
55		Bottom of Hole	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

recycled paper

ecology and environment

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT FT Devens

DATE 13 July 1988

LOCATION Cold Spring Brook Construction Debris Landfill

DRILLERS Smithson, Rodriguez Jacobwith, Fox

DRILL RIG Mobile Drill B-53 with 6-inch Hollow Stem Auger

BORE HOLE CBW-3

(feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
0		Sand, medium to coarse grained, gravel, and cobbles, medium brown to tan	Dry
		Sand medium to coarse grained, and gravel, medium brown to tan	
5			
10			
15			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT FT Devens | DATE 13 July 1988

LOCATION Cold Spring Brook Construction Debris Landfill | DRILLERS Smithson, Rodriguez Jacobwith, Fox

DRILL RIG Mobile Drill B-53 with 6-inch Hollow Stem Auger | BORE HOLE CBW-3

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
15		Same as above	
			High percentage of gravel difficult drilling
20			
		Sand, coarse to medium grained, tan	Saturated
25			
30		Bottom of Hole	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT FT Devens DATE 15 July 1988

LOCATION Cold Spring Brook Construction Debris Landfill DRILLERS Smithson, Rodriguez Jacobwith, Fox

DRILL RIG General Hole Digger -Model 70 (2 man auger) with 4 inch solid stem auger BORE HOLE CBW-4

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
0		Peat and silt, dark brown	Dry
		Silt and clay with some organic matter, dark gray	Moist
5			Saturated
		Bottom of Hole	
10			
15			

AEHA Form 130, 1-Nov 82

Replaces HSHB Form 78, 1 Jun 80. which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT: FT Devens

DATE: 14 July 1988

LOCATION: Cold Spring Brook Construction Debris Landfill

DRILLERS: Smithson, Rodriguez Jacobwith, Fox

DRILL RIG: General Hole Digger -Model 70 (2 man auger) with 4 inch solid stem auger

BORE HOLE: CBW-6

DEPTH (Feet)	SAMPLE TYPE / BLOWS PER 6 IN.	DESCRIPTION	REMARKS
0		Organic silt and sand, dark brown	
		Sand, medium to very fine grained, tan	
5			Saturated
		Bottom of Hole	
10			
15			

AEHA Form 130, 1-Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

recycled paper

ecology and environment

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT FT Devens

DATE 14 July 1988

LOCATION Cold Spring Brook Construction Debris Landfill

DRILLERS Smithson, Rodriguez Jacobwith, Fox

DRILL RIG Mobile Drill B-53 with 6-inch Hollow Stem Auger

BORE HOLE CBW-7

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
0		Organic silt and sand, dark brown	Dry
		Sand, medium to very fine grained, with silt, trace of gravel, tan	Dry
5			
10			Moist
15			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT FT Devens

DATE 14 July 1988

LOCATION Cold Spring Brook Construction Debris Landfill

DRILLERS Smithson, Rodriguez Jacobwith, Fox

DRILL RIG Mobile Drill B-53 with 6-inch Hollow Stem Auger

BORE HOLE CBW-7

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
15		Same as above	
			-Saturated
20			
25		Bottom of Hole	
30			

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT FT Devens

DATE 16 July 1988

LOCATION Cold Spring Brook Construction Debris Landfill

DRILLERS Smithson, Rodriguez Jacobwith, Fox

DRILL RIG Mobile Drill B-53 with 6-inch Hollow Stem Auger

BORE HOLE CBW-8

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
0		Sand, medium to fine grained, and fine to coarse gravel, medium brown	Dry
5			
		Sand, coarse to fine grained, with fine gravel (gray) tan	Damp
10			
		Sand, medium to fine grained, silt and coarse gravel, medium brown	Moist
15		Sand, medium to very fine grained and silt, medium brown	Saturated

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

US ARMY ENVIRONMENTAL HYGIENE AGENCY

DRILLING LOG

(The proponent of this form is HSHB-ES)

PROJECT FT Devens DATE 16 July 1988

LOCATION Cold Spring Brook DRILLERS Smithson, Rodriguez

Construction Debris Landfill Jacobwith, Fox

DRILL RIG Mobile Drill B-53 BORE HOLE CBW-8

(Feet) DEPTH	SAMPLE TYPE / BLOWS PER 6 IN	DESCRIPTION	REMARKS
15		Same as above	
20			
25		Bottom of Hole	

AEHA Form 130, 1 Nov 82

Replaces HSHB Form 78, 1 Jun 80, which will be used.

APPENDIX B

SLUG TESTS

PREFACE

The material contained in this appendix includes the complete text of the "Aquifer Hydraulic Characterization" report being submitted to USATHAMA under separate cover. This report was written using information gathered during both SI and RI activities at Fort Devens.

AQUIFER
HYDRAULIC CHARACTERIZATION
(SLUG TESTING)
FORT DEVENS
AYER, MASSACHUSETTS

Delivery Order No. 0001
ELIN A004
December 1991

Prepared for:

Commander
United States Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, MD 21010-5400

Prepared by:
Ecology and Environment, Inc.
Arlington, VA 22209

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1. INTRODUCTION

The United States Army Toxic and Hazardous Materials Agency (USATHAMA) retained Ecology and Environment, Inc. (E & E) to conduct Remedial Investigations (RIs) at four Areas of Contamination (AOCs) within two landfills, and Site Investigations (SIs) at six Study Areas (SAs) at Fort Devens, in Ayer, Massachusetts.

As part of the RI/SI activities at the Fort Devens site, E & E conducted hydraulic conductivity tests in all existing wells and in the new wells installed by subcontractors under E & E's supervision during the summer of 1991. This report documents the results of the slug tests conducted for monitoring wells at Shepley's Hill Landfill, Cold Spring Brook Landfill, Explosive Ordnance Demolition (EOD) ranges, and Building No. 202. Section 2 of this report describes the objectives of the tests, while Sections 3 and 4 detail the field methodology and data reduction and interpretation methodologies. The results of the tests are summarized in Section 5, the retesting program is discussed in Section 6, and conclusions and recommendations are presented in Section 7. The data that resulted from the slug tests are reproduced in Appendix A. The retesting program data sheets are reproduced in Appendix B.

2. OBJECTIVES

E & E conducted hydraulic conductivity (slug) tests in the majority of existing wells and in all the new wells at Fort Devens. The main objectives of these tests were as follows:

- o To determine the hydraulic conductivity of the water-bearing geological formations near and around the installed monitoring wells. The hydraulic conductivity of a formation will indicate the capacity for water conductance in each geological unit that is tested.

- o To characterize and calculate the transmissivity of the water-bearing formations near and/or around the monitoring well screens. The transmissivity of an aquifer is the capacity of the aquifer to transmit water through a unit cross-sectional area of the formation.

- o To help determine the rate of groundwater flow.

- o To help evaluate mass loading of the contaminant from the groundwater to the surface water bodies.

- o To help estimate the transport rate of contaminants within the groundwater and from the groundwater to surface bodies such as Plow Shop Pond, Cold Spring Brook Pond, and adjacent streams.

3. FIELD METHODOLOGY

As originally planned, a total of 42 monitoring wells, including 17 new wells and 25 existing wells, were to be tested at the Fort Devens site. However, only 34 wells could be tested. Of the wells not tested, five (SHL-3, SHL-4, POL-2, EOD-2, EOD-3) did not have sufficient water, one was dry (SHL-1), one abandoned (SHL-2), and one permanently damaged (CSB-5). Table 3-1 summarizes the slug test data, providing information on those monitoring wells tested and the equipment used for the tests.

E & E conducted slug tests at the Fort Devens site using the Hermit 2000 electronic data logger and 10 and/or 20 pounds per square inch (PSI) transducers. To confirm the data in wells with technical difficulties of slug size and/or well condition, data were also collected using an electronic water level indicator. The field methodology used for conducting the slug test at the Fort Devens site is described below.

Slugs of various sizes (2 feet and 5 feet in length with 1.25-inch, 1.50-inch, and 3.75-inch outside diameters (OD)) were made from new PVC casing. The PVC slugs were filled with clean sand (commercial sand used for the well construction) and sealed at both ends.

E & E conducted both rising and falling head slug tests at each well. Both tests involved water displacement using various slug sizes. As the slug was lowered rapidly into a monitoring well, the water level rose in response. The water level then decreased as the well returned to equilibrium with the outside water level. The changes in the water level (with respect to time) were measured and recorded by the transducer and data logger. After the well had returned to its initial condition, the slug was rapidly removed causing an immediate drop in the water level. Measurements were again recorded as the water level returned to its original condition. E & E performed this procedure for each monitoring well tested.

OVA readings were taken before starting each test to determine if volatile organics from the well opening were possible health hazards. The total depth and depth to the water table were measured and recorded, and other data, pertinent to the tested well, were recorded on the slug test data sheet. Total depth and depth to the water were measured using a weighted tape and an audible electronic water level meter. These measurements were used to determine the length of the water column and to determine the appropriate slug length. A minimum of 3 to 4 feet of water was needed to run the slug test with a 2-foot slug.

With the Hermit 2000, two or more monitoring wells could be tested simultaneously. However, due to a generally fast well recovery, E & E tested all the wells individually, with the exception of monitoring

Table 3-1

SLUG TEST DATA

Well Number	Total Depth/TOC (TD in ft)	Water Depth/TOC (ft)	Casing Indisde Diameter (ID)	Slug Length and OD	Instrument Used/Date Remarks
SHL-1	Dry	-	2"	-	Well was dry
SHL-2	Abandoned	-	2"	-	Abandoned
SHL-3	33.7	30.80	2"	-	Insufficient water
SHL-4	13.7	11.30	2"	-	Insufficient water
SHL-5	13.54	5.73	2"	5'/1.25"	Hermit 2000/7-11-91
SHL-6	56.00	27.48	2"	5'/1.25"	Hermit 7-12-91
SHL-7	23.30	18.80	2"	2'/1.25"	Hermit 7-12-91
SHL-8S	56.00	10.29	2"	5'/1.25"	Hermit 7-14-91
SHL-8D	73.1	8.44	2"	5'/1.25"	Hermit 7-11-91
SHL-9	26.30	10.35	2"	5'/1.25"	Hermit 7-11-91
SHL-10	36.63	32.08	2"	2'/1.25"	Hermit 7-13-91
SHL-11	28.5	19.4	2"	5'/1.25"	Hermit 7-11-91
SHL-12	28.7	23.3	2"	2'/1.25"	Hermit 7-12-91
SHL-13	21.27	8.13	2"	5'/1.25"	Hermit 7-11-91
SHL-14	Bedrock	-	-	-	Not Constructed
SHL-15	26.58	19.44	4"	5'/1.5"	Hermit 7-14-91
SHL-16	Bedrock	-	-	-	Not Constructed
SHL-17	18.6	8.48	4"	5'/1.5"	Hermit 7-11-91
SHL-18	28.54	20.1	4"	5'/1.5"	Hermit 7-12-91
SHL-19	32.53	23.76	4"	5'/1.5"	Hermit 7-12-91
SHL-20	50.34	19.34	4"	5'/1.5"	Hermit 7-14-91
SHL-21	54.42	46.08	4"	5'/1.5"	Hermit
SHL-22	114.70	6.66	4"	5'/1.5"	Hermit Wtr Level Meter 8/7/91
SHL-23	33.2	27.40	4"	5'/1.5"	Hermit
SHL-24	119.00	15.86	4"	5'/1.5"	Hermit Wtr Level Meter 8-7-91
SHL-25	35.00	27.2	4"	5'/1.50"	Hermit Wtr Level Meter 8-7-91
POL-1	27.89	19.88	2"	5'/1.25"	Hermit 7-12-91
POL-2	30.55	28.75	2"	-	Insufficient Water
POL-3	31.98	26.82	2"	2'/1.25"	Hermit 7-12-91
B202-1	35.4	28.30	4"	5'/1.5"	Hermit 7-11-91
B202-2	40.24	31.86	4"	5'/1.5"	Hermit 7-12-91
B202-3	39.58	31.11	4"	5'/1.5"	Hermit 7-12-91
CSB-1	15.26	8.3	2"	5'/1.25"	Hermit 7-13-91
CSB-2	52.02	18.20	2"	5'/1.25"	Hermit 7-13-91
CSB-3	31.78	25.08	2"	5'/1.25"	Hermit 7-13-91
CSB-4	10.22	6.45	2"	2'/1.25"	Hermit 7-13-91
CSB-5	-	-	-	Out of Service,	Permanetly Damaged
CSB-6	9.62	5.10	2"	2'/1.25"	Hermit 7-13-91
CSB-7	24.56	16.71	2"	2'/1.25"	Hermit 7-13-91
CSB-8	25.02	18.34	2"	5'/1.25"	Hermit 7-13-91
EOD-1	27.24	20.92	4"	5'/1.5"	Hermit
EOD-2	27.14	25.96	4"	-	Insufficient Water
EOD-3	30.72	29.24	4"	-	Insufficient Water
EOD-4	37.06	31.80	4"	2'/1.25	Hermit

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wells SHL-8S and SHL-8D, which were constructed at different levels inside the same borehole. Prior to running any test, the scale factor, linearity, offset, and other transducer and test parameters were set on the data logger in accordance with the specifications provided by the data logger operations manual and transducer being used. E & E used Input 1, with a specific transducer, to test single wells. If an additional well was tested simultaneously, E & E used Input 2 and set corresponding parameters and transducers as Input 2. Once all the parameters are set, they do not need to be reset between tests. After the data logger is initially set, it is ready to record the data.

E & E rinsed all tapes, transducers, slugs and meters with distilled water before and after placement and at the time of slug removal from the monitoring well. The transducer probe, which is about 7 inches long, cannot fit inside a 2-inch well adjacent to the slug. Therefore, E & E lowered the transducer probe to the bottom of the monitoring well and then raised it a minimum of several inches to avoid interferences from potential sediment. Before testing each well, E & E carefully measured the rope connected to the slug to a length that allowed the slug to be completely submerged while allowing enough room for the transducer probe below the slug.

At each well location, the test number was entered into the data logger and recorded on the slug test data sheet. The slug was then lowered into the well and was held above the water level. The data logger reference value was then set at zero (since E & E was interested only in changes in water depth). The water level, as read by the transducer, was checked to ensure that the water level was stable and the drawdown was zero. If for some reason the drawdown indicated some change, the reference was reset at zero. The slug was then lowered quickly but steadily into the water at the same time the test was started on the data logger. The data logger then recorded the falling head data until the static level was reached or the water fell to within 10 percent of the initial elevation. The recovery time for the majority of the tested wells at Fort Devens was between a few minutes and 1 hour. After recording the head, drawdown, and time, E & E performed the rising head test. To start the rising head test, the slug was removed and simultaneously the start/stop button was depressed on the data logger. The rising head test was run as a step test and the data recorded as Step 1 rather than Step 0. This produced a separate data file for each falling and rising head test with both starting times as zero. After a minimum of 90 percent recovery to the initial water level, E & E recorded the drawdown and time and stopped the test.

4. DATA REDUCTION AND INTERPRETATION

E & E electronically transferred data collected in the field to an IBM or IBM compatible microcomputer for data reduction and interpretation. Since the data logger can only hold up to 10 tests, the recorded data were downloaded periodically to a computer and/or printed using an on-site printer. In most cases, both hard copies and diskettes were generated for the files. However, to avoid delay in field work, occasionally only diskette files or printouts were generated so the Hermit data logger could be made available for further slug testing.

The following steps were used in data reduction:

- o Checked the data transferred from the Hermit to floppy diskettes for corrections and completeness.
- o Generated a second type of file, which included only the time and drawdown, to be used by the slug interpretation package (SLUGIX).
- o Developed an in-house computer program to generate a printout of raw Hermit data files (Appendix A).
- o Imported the data into the SLUGIX file for interpretation.

The data were interpreted using SLUGIX. SLUGIX, a program written by Interpex in Denver, is designed to match the data to theoretical type curves to determine the hydraulic parameters of the tested media. Slug test data for unconfined aquifers were analyzed using the Bower and Rice (1976) method. This was the procedure for all Fort Devens monitoring wells since none of the well logs indicated confining conditions. Interpreted graphics files were used after a good match was obtained between the observed data and the average regression line, and were saved as input files to a Surfer graphics package. The graphics files were then used to plot the slug test (Appendix A).

The hydraulic conductivity and transmissivity values derived from the curve matching were then reviewed for consistency with the hydraulic conductivity of the type of formation encountered at the site (e.g., glacial till, silty sand, fine, or medium grain sands) as derived from literature.

5. SLUG TEST RESULTS

The results of the slug tests conducted at Fort Devens RI/SI site monitoring wells are summarized on Table 5-1.

Data for tests at SHL-6, SHL-23 and CSB-2 were missing from the data file when it was examined in the office. It was not clear if this was due to failure to record in the field or loss during data transfer. These wells were retested in December 1991. The retesting program is discussed in Section 6.

The calculated hydraulic conductivity values from the slug test results range from 2.3×10^{-8} feet per minute, which is the minimum value at SHL-24, to 0.25 feet per minute, which is the maximum value calculated for the well SHL-19 during the rising head test. It should be noted that the monitoring well SHL-24 indicated a very slow recovery during well development. This is consistent with the finding of the slug test regarding the hydraulic conductivity of the formation around the screen in this well. However, the hydraulic conductivity value of 0.25 feet per minute at SHL-19 may be related to interferences during the measurement process. In fact, the data seem to indicate significant fluctuation in the water level during the falling head test. Moreover, this elevated hydraulic conductivity value is not consistent with the conductivity value of 0.00265 feet per minute calculated for the falling head test conducted in the same well (see Table 5-1).

Although differences of an order of magnitude in the hydraulic conductivity as estimated from falling head and rising head tests conducted on the same well are not uncommon (see Table 5-1), this discrepancy at SHL-19 could not be resolved since each data set was internally consistent. The well was retested in December 1991. The retesting program is discussed in Section 6.

The calculated average hydraulic conductivity from the slug testing for the Fort Devens site is 0.0264 feet per minute, with a standard deviation of 0.0464 feet per minute. Calculated average conductivity values for each RI and SI site are as follows:

Site Name	Average Hydraulic Conductivity (in feet/minute)
Shepley's Hill Landfill RI Site	0.02530
Cold Spring Brook Landfill RI Site	0.0175
Building 202 SI Site	0.0770
EOD SI Site	0.000142

NOTE: The POL data were included in the Shepley's Hill Landfill site data.

Table 5-1

SLUG TEST DATA INTERPRETATION

File Name[1]	Hydraulic Conductivity (ft/min.)	Transmissivity (ft^2/min.)	Remarks
SHL-5A	0.023	0.183	
SHL-5B	0.0269	0.2098	
SHL-6A	-	-	No data
SHL-6B	-	-	No data
SHL-7A	0.0253	0.139	
SHL-7B	0.002659	0.0146	
SHL-8SA	0.01173	0.05292	
SHL-8SB	0.0014	0.0634	
SHL-8DA	0.00379	0.1732	
SHL-8DB	0.00615	0.2749	
SHL-9A	0.017	0.2713	
SHL-9B	0.0087	0.1389	
SHL-10A	0.00839	0.0382	
SHL-10B	0.0044	0.0198	
SHL-11A	0.000345	0.00316	
SHL-11B	0.000696	0.0063	
SHL-12A	0.01924	0.1050	
SHL-12B	0.02341	0.1278	
SHL-13A	0.0088	0.1161	
SHL-13B	0.000941	0.01236	
SHL-15A	0.01631	0.1164	
SHL-15B	0.042	0.3027	
SHL-17A	0.005460	0.0553	
SHL-17B	0.1761	1.783	
SHL-18A	0.029	0.2451	
SHL-18B	0.06923	0.0584	
SHL-19A	0.2543	2.231	
SHL-19B	0.00265	0.02324	
SHL-20A	0.057	1.76	
SHL-21A	0.0201	0.1673	
SHL-21B	0.0166	0.1388	
SHL-22	0.0004512	Unknown	Not used in the statistic
SHL-23A	---	---	Missing test data
SHL-23B	---	---	Missing test data
SHL-24	0.000000023	0.0000028	
SHL-25	0.000176	0.02094	
POL-1A	0.0005159	0.000552	
POL-1B	0.0005982	0.0006401	
POL-3A	0.0009442	0.004872	
POL-3B	0.001479	0.007631	

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[1] A = Rising head test
B = Falling head test

Table 5-1 (cont'd)
SLUG TEST DATA INTERPRETATION

File Name[1]	Hydraulic Conductivity (ft/min.)	Transmissivity (ft^2/min.)	Remarks
B202-1A	–	–	Bad data
B202-1B	0.1228	1.040	
B202-2A	0.03413	0.286	
B202-2B	0.02349	0.1969	
B202-3A	0.1065	0.9027	
B202-3B	0.09825	0.8322	
CSB-1A	0.0049	0.0345	
CSB-1B	0.0067	0.0469	
CSB-2A	–	–	No data
CSB-2B	–	–	No data
CSB-3A	0.00385	0.0258	
CSB-3B	0.000867	0.0058	
CSB-4A	0.000309	0.001103	
CSB-4B	0.0002535	0.000905	
CSB-6A	0.06503	0.2939	
CSB-6B	0.0729	0.3297	
CSB-7A	0.03341	0.2623	
CSB-7B	0.0188	0.1478	
CSB-8A	0.001683	0.0112	
CSB-8B	0.00129	0.0086	
EOD-1A	0.00000613	0.000748	
EOD-1B	0.0000301	0.003678	
EOD-4A	0.000138	0.0169	
EOD-4B	0.0000395	0.0048	
STATISTICAL ANALYSIS			
Maximum	0.25 (at SHL-19A)	2.231 (SHL-19A)	
Minimum	$2.3\ 10^{-8}$ (at SHL-24)	$2.8\ 10^{-6}$ (at SHL-24)	
Average	0.0264	0.2378	$\bar{x}$ and s based on 56 data
Standard Deviation (sD)	0.0464	0.460275	$\bar{x}$ and s based on 56 data
3* (sD)	0.14	1.38	

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[1] A = Rising head test
B = Falling head test

$\bar{x}$ = sample mean
s = sample standard deviation

It should be noted that the calculated values of hydraulic conductivity correspond to the hydraulic conductivity of fine- to medium-grain sand, which is the most widespread formation type encountered at the Fort Devens site.

The calculated transmissivity values range from 2.8×10^{-6} $feet^2$/minute (minimum at SHL-24) to 2.231 $feet^2$/minute (maximum at SHL-19A). Again, the maximum value is somewhat suspect and was not consistent between the rising and falling head tests of the same well.

The calculated average transmissivity is 0.2378 $feet^2$ per minute, with a standard deviation of 0.46028. The calculated transmissivity values are equivalent to those reported for silty, and fine- to very-fine-grain sand aquifers. The calculated average transmissivity value for each tested RI and SI site is as follows:

Site Name	Average Transmissivity Value (in $feet^2$/minute)
Shepley's Hill Landfill RI Site (including POLs)	0.2533
Cold Spring Brook Landfill RI Site	0.0974
Building 202, SI Site	0.6516
EOD, SI Site	0.0065

6. RETESTING PROGRAM

In December 1991, another attempt was made to test the hydraulic conductivity in wells at which unsuccessful attempts were made in July 1991. The following wells were revisited: SHL-1, SHL-4, SHL-6, SHL-19, SHL-22, SHL-23, CSB-2, POL-2, EOD-2, and EOD-4.

POL-2 and EOD-2 had insufficient water to permit a slug test. All the other wells recovered too quickly to give meaningful measurements, except to conclude that they exceeded 0.05 feet/minute, and are clearly in clean sands or equivalent.

The field log sheets are attached as Appendix B.

7. CONCLUSIONS

E & E tested a total of 34 wells at the Fort Devens RI and SI sites. The following are principal findings and conclusions of these tests.

- In general, the results of the slug tests confirm field observations made during the monitoring well installation, well development, and well purging (e.g., the lowest hydraulic parameters were identified for SHL-25, and EOD wells, which are among the less-productive wells at the site).

- Shepley's Hill Landfill water-bearing formations are characterized by an average hydraulic conductivity of 0.03 feet per minute and by an average transmissivity of 0.25 feet^2 per minute. Areas of elevated hydraulic conductivity are in the vicinity of SHL-17, SHL-19, and SHL-20. Areas of relatively low permeability or hydraulic conductivity are southwest of the landfill, in the area of underground storage tanks (POL wells), and near wells SHL-24 and SHL-25.

- The Cold Spring Brook Landfill aquifer is characterized by an average hydraulic conductivity of 0.02 feet per minute and by an average transmissivity of 0.09 feet^2 per minute. The areas of elevated hydraulic conductivity were located near wells CSB-6 and CSB-7 east of the landfill. The remaining tested area is characterized by relatively low hydraulic parameters indicating fine sand and silty sand formations. The aquifer beneath the Cold Spring Brook Landfill seemed to be composed of materials that are comparable to the water-bearing formations at Shepley's Hill Landfill.

- Both hydraulic conductivity and transmissivity of the water-bearing formations at Building 202, south of Shepley's Hill Landfill, were relatively higher than the Shepley's Hill Landfill aquifer. The aquifer in this area is composed of medium- to coarse-grain sands.

- The lowest hydrologic parameters were identified at the EOD range. These results are consistent with the slow rate of recharge and low yield of monitoring wells at the EOD range.

- Some wells did not yield usable results, either because of high hydraulic conductivity greater than 0.05 feet/minute, or because the thickness of saturated zone was too small to fully submerge the slug and the displacement was too low.

APPENDIX A
SLUG TEST DATA

Shepley's Hill Landfill Data

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-5A

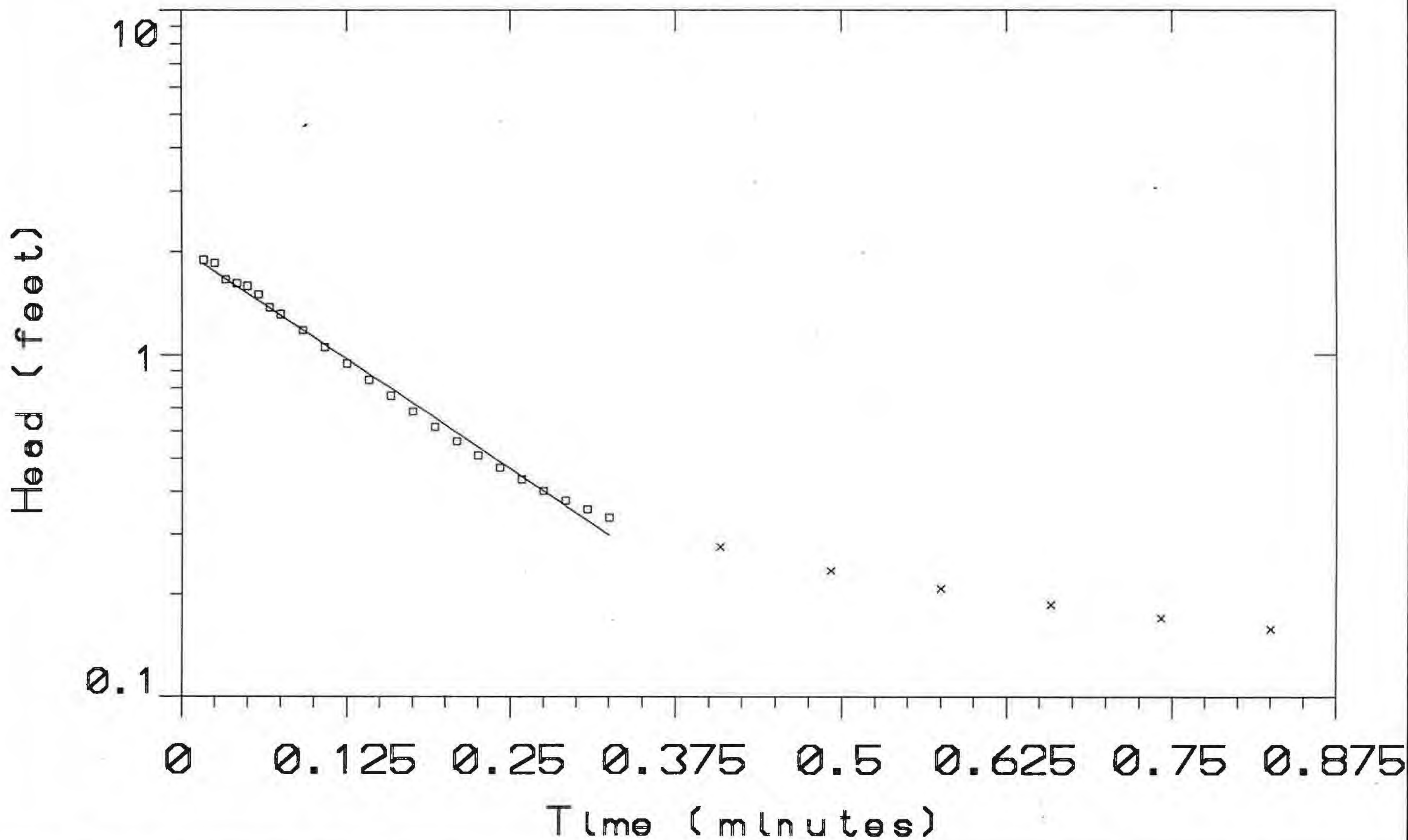
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	05:57	Date	07/12/91
Logger Test	3	INPUT 1: Level (F)	

Step 1 07/11 12:44:54

Elapsed Time	INPUT 1
0.0000	-1.667
0.0083	-4.128
0.0166	-1.663
0.0250	-1.894
0.0333	-1.856
0.0416	-1.660
0.0500	-1.619
0.0583	-1.591
0.0666	-1.502
0.0750	-1.376
0.0833	-1.315
0.1000	-1.179
0.1166	-1.053
0.1333	-0.942
0.1500	-0.844
0.1666	-0.759
0.1833	-0.683
0.2000	-0.616
0.2166	-0.559
0.2333	-0.509
0.2500	-0.468
0.2666	-0.433
0.2833	-0.401
0.3000	-0.376
0.3166	-0.354
0.3333	-0.335
0.4166	-0.275
0.5000	-0.234
0.5833	-0.208
0.6666	-0.186
0.7500	-0.170
0.8333	-0.158
0.9166	-0.151
1.0000	-0.142
1.0833	-0.136
1.1666	-0.126
1.2500	-0.123

Elapsed Time	INPUT 1
1.3333	-0.117
1.4166	-0.113
1.5000	-0.110
1.5833	-0.104
1.6666	-0.101
1.7500	-0.098
1.8333	-0.094
1.9166	-0.091
2.0000	-0.091
2.5000	-0.072
3.0000	-0.060
3.5000	-0.053
4.0000	-0.047
4.5000	-0.044
5.0000	-0.037
5.5000	-0.037
6.0000	-0.034
6.5000	-0.031
7.0000	-0.031
7.5000	-0.031
8.0000	-0.028
8.5000	-0.031
9.0000	-0.028
9.5000	-0.028
10.0000	-0.031
11.0000	-0.031
12.0000	-0.028
13.0000	-0.028
14.0000	-0.025
15.0000	-0.025
16.0000	-0.025
17.0000	-0.025

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .02350 ft/min

TRANSMISSIVITY: .1835 sq. ft/min

INITIAL HEAD: 1.894 ft

D[illegible]et: SHL-5A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 7.810

SCREEN: top: 3.540 base: 13.54

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water Tab[illegible]: 5.730 TD: 13.54

Fort Devens

Well: SHL-5A

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-5B

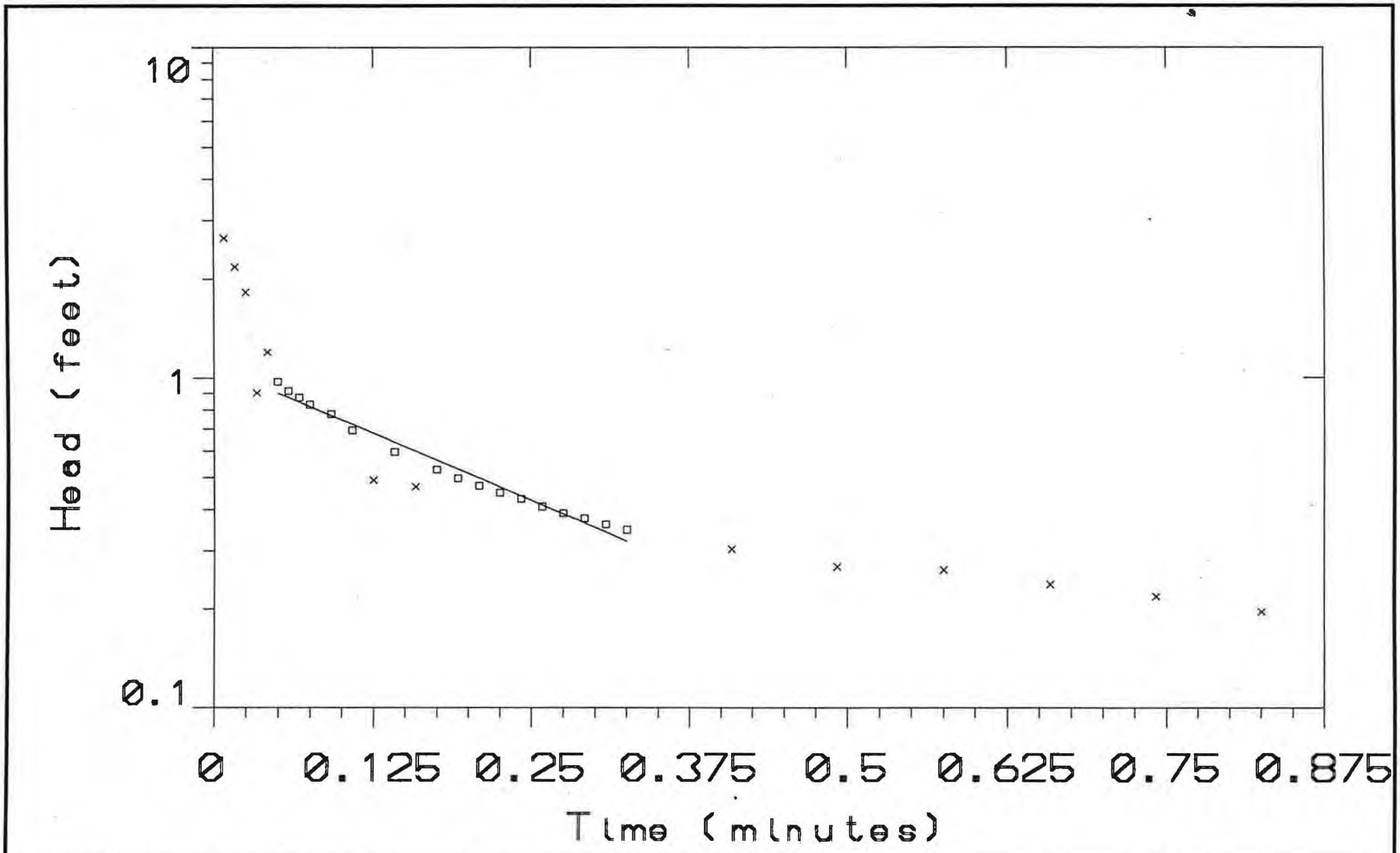
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	05:59	Date	07/12/91
Logger Test	3	INPUT 1: Level (F)	

Step 0 07/11 12:26:18

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	4.159
0.0166	2.657
0.0250	2.176
0.0333	1.822
0.0416	0.901
0.0500	1.198
0.0583	0.974
0.0666	0.914
0.0750	0.873
0.0833	0.831
0.1000	0.778
0.1166	0.695
0.1333	0.490
0.1500	0.597
0.1666	0.468
0.1833	0.528
0.2000	0.496
0.2166	0.471
0.2333	0.449
0.2500	0.430
0.2666	0.408
0.2833	0.389
0.3000	0.376
0.3166	0.360
0.3333	0.347
0.4166	0.303
0.5000	0.268
0.5833	0.262
0.6666	0.237
0.7500	0.218
0.8333	0.196
0.9166	0.177
1.0000	0.180
1.0833	0.158
1.1666	0.158
1.2500	0.148

Elapsed Time	INPUT 1
1.3333	0.145
1.4166	0.142
1.5000	0.136
1.5833	0.129
1.6666	0.126
1.7500	0.123
1.8333	0.120
1.9166	0.117
2.0000	0.113
2.5000	0.094
3.0000	0.088
3.5000	0.075
4.0000	0.069
4.5000	0.063
5.0000	0.056
5.5000	0.050
6.0000	0.047
6.5000	0.047
7.0000	0.041
7.5000	0.041
8.0000	0.037
8.5000	0.034
9.0000	0.034
9.5000	0.034
10.0000	0.031
11.0000	0.034
12.0000	0.028
13.0000	0.025
14.0000	0.025
15.0000	0.022
16.0000	0.018
17.0000	0.015
18.0000	0.022

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .02686 ft/min

TRANSMISSIVITY: .2098 sq. ft/min

INITIAL HEAD: 2.657 ft

D[illegible] Set: SHL-5B

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 7.810

SCREEN: top: 3.540 base: 13.54

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water T[illegible]: 5.730 TD: 13.54

Fort Devens

Well: SHL-5B

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-6A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	11:20	Date	07/12 /91
Logger Test	4	INPUT 1: Level (F)	

Step 1 07/12 10:36:20

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	0.000
0.0166	0.000
0.0250	0.000
0.0333	0.000
0.0416	0.000
0.0500	0.000
0.0583	0.000
0.0666	0.000
0.0750	0.000
0.0833	0.000
0.1000	0.000
0.1166	0.000
0.1333	0.000
0.1500	0.000
0.1666	0.000
0.1833	0.000
0.2000	0.000
0.2166	0.000
0.2333	0.000
0.2500	0.000
0.2666	0.000
0.2833	0.000
0.3000	0.000
0.3166	0.000
0.3333	0.000
0.4166	0.000
0.5000	0.000
0.5833	0.000
0.6666	0.000
0.7500	0.000
0.8333	0.000
0.9166	0.000
1.0000	0.000
1.0833	0.000
1.1666	0.000
1.2500	0.000

Elapsed Time	INPUT 1
1.3333	0.000
1.4166	0.000
1.5000	0.000
1.5833	0.000
1.6666	0.000
1.7500	0.000
1.8333	0.000
1.9166	0.000
2.0000	0.000
2.5000	0.000
3.0000	0.000
3.5000	0.000

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-6B

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	11:21	Date	07/12 /91
Logger Test	4	INPUT 1: Level (F)	

Step 0 07/12 10:32:55

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	0.000
0.0166	0.000
0.0250	0.000
0.0333	0.000
0.0416	0.000
0.0500	0.000
0.0583	0.000
0.0666	0.000
0.0750	0.000
0.0833	0.000
0.1000	0.000
0.1166	0.000
0.1333	0.000
0.1500	0.000
0.1666	0.000
0.1833	0.000
0.2000	0.000
0.2166	0.000
0.2333	0.000
0.2500	0.000
0.2666	0.000
0.2833	0.000
0.3000	0.000
0.3166	0.000
0.3333	0.000
0.4166	0.000
0.5000	0.000
0.5833	0.000
0.6666	0.000
0.7500	0.000
0.8333	0.000
0.9166	0.000
1.0000	0.000
1.0833	0.000
1.1666	0.000
1.2500	0.000

Elapsed Time	INPUT 1
1.3333	0.000
1.4166	0.000
1.5000	0.000
1.5833	0.000
1.6666	0.000
1.7500	0.000
1.8333	0.000
1.9166	0.000
2.0000	0.000
2.5000	0.000
3.0000	0.000
3.5000	0.000

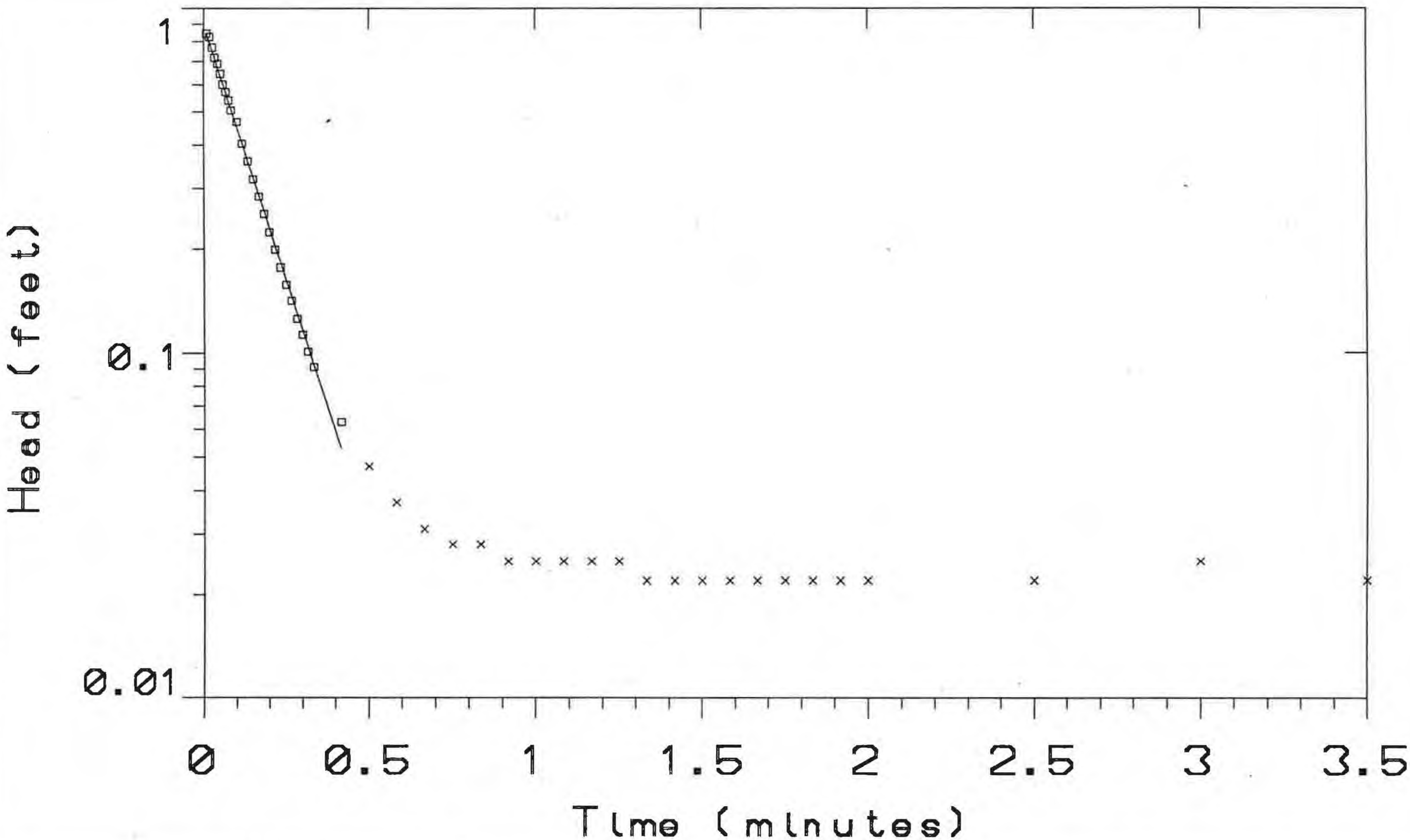
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-7A

Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	11:22		Date	07/12 /91
Logger Test	3		INPUT 1: Level (F)	

Step 1 07/12 09:19:35

Elapsed Time	INPUT 1
0.0000	-1.720
0.0083	-0.844
0.0166	-0.825
0.0250	-0.768
0.0333	-0.718
0.0416	-0.689
0.0500	-0.645
0.0583	-0.601
0.0666	-0.572
0.0750	-0.540
0.0833	-0.506
0.1000	-0.468
0.1166	-0.404
0.1333	-0.360
0.1500	-0.319
0.1666	-0.284
0.1833	-0.253
0.2000	-0.224
0.2166	-0.199
0.2333	-0.177
0.2500	-0.158
0.2666	-0.142
0.2833	-0.126
0.3000	-0.113
0.3166	-0.101
0.3333	-0.091
0.4166	-0.063
0.5000	-0.047
0.5833	-0.037
0.6666	-0.031
0.7500	-0.028
0.8333	-0.028
0.9166	-0.025
1.0000	-0.025
1.0833	-0.025
1.1666	-0.025
1.2500	-0.025

Elapsed Time	INPUT 1
1.3333	-0.022
1.4166	-0.022
1.5000	-0.022
1.5833	-0.022
1.6666	-0.022
1.7500	-0.022
1.8333	-0.022
1.9166	-0.022
2.0000	-0.022
2.5000	-0.022
3.0000	-0.025
3.5000	-0.022



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .02530 ft/min

TRANSMISSIVITY: .1391 sq. ft/min

INITIAL HEAD: .8440 ft

[illegible] set: SHL-7A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 5.500

SCREEN: top: 13.30 base: 23.30

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water Ta[illegible]: 17.80 TD: 23.30

Fort Devens

Well: SHL-7A

Fort Devens, Mass

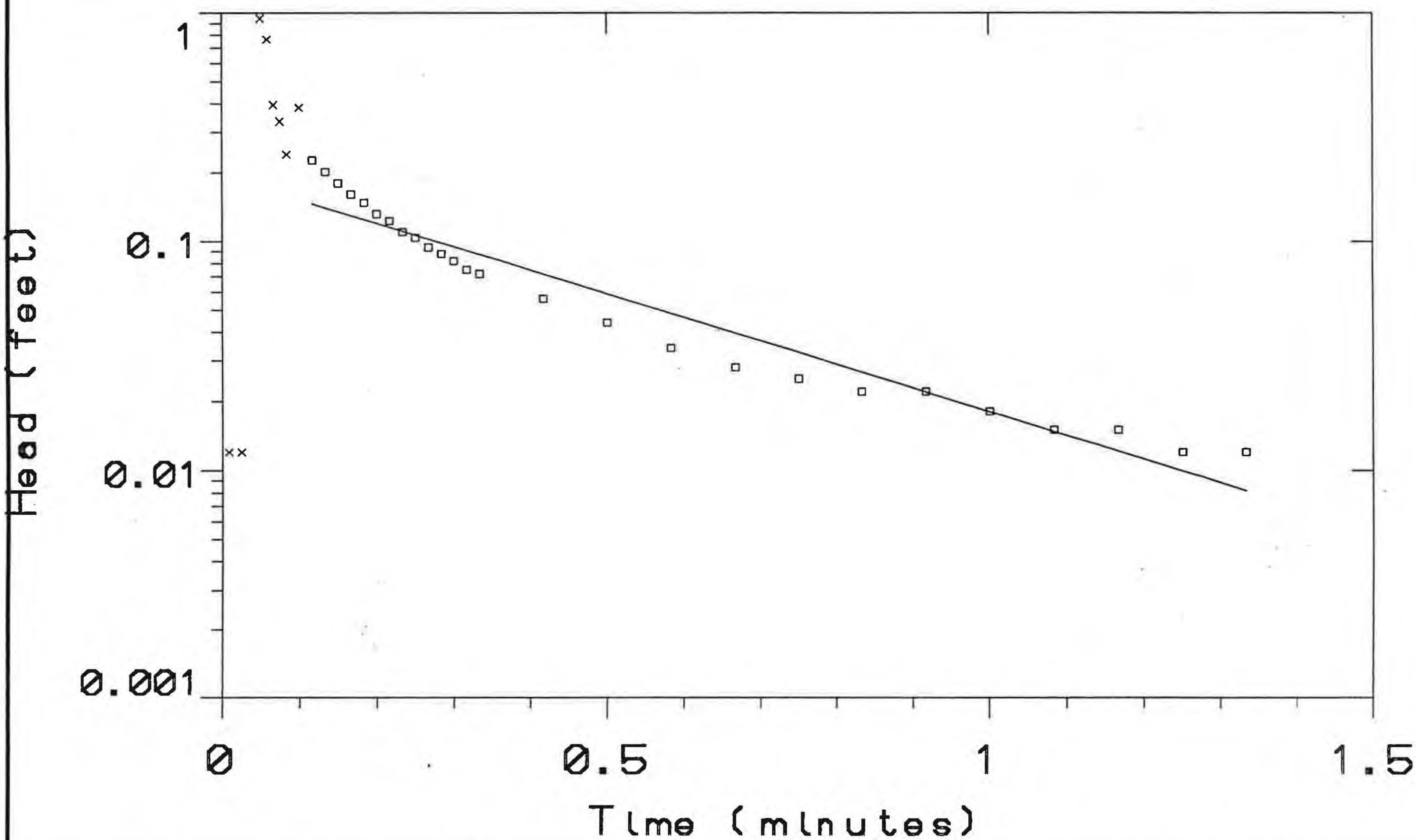
AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-7B

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	11:23	Date	07/12 /91
Logger Test	3	INPUT 1: Level	(F)

Step 0 07/12 09:16:56

Elapsed Time	INPUT 1
0.0000	0.009
0.0083	0.012
0.0166	0.000
0.0250	0.012
0.0333	-0.006
0.0416	-1.834
0.0500	0.945
0.0583	0.765
0.0666	0.395
0.0750	0.335
0.0833	0.240
0.1000	0.385
0.1166	0.227
0.1333	0.202
0.1500	0.180
0.1666	0.161
0.1833	0.148
0.2000	0.132
0.2166	0.123
0.2333	0.110
0.2500	0.104
0.2666	0.094
0.2833	0.088
0.3000	0.082
0.3166	0.075
0.3333	0.072
0.4166	0.056
0.5000	0.044
0.5833	0.034
0.6666	0.028
0.7500	0.025
0.8333	0.022
0.9166	0.022
1.0000	0.018
1.0833	0.015
1.1666	0.015
1.2500	0.012
1.3333	0.012
1.4166	0.009
1.5000	0.009
1.5833	0.009
1.6666	0.009
1.7500	0.006
1.8333	0.006
1.9166	0.003
2.0000	0.003
2.5000	0.000



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: 7.495E-5 m/sec	by: Ecology & Environment	Well: SHL-7B
TRANSMISSIVITY: .0004122 sq. m/sec	WELL DATA: Units: m	Fort Devens, Mass
INITIAL HEAD: .01200 m	AQUIFER: Endless	AYER
	THICKNESS: 5.500	
	SCREEN: top: 13.30 base: 23.30	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Table 17.80 TD: 23.30	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-8SA

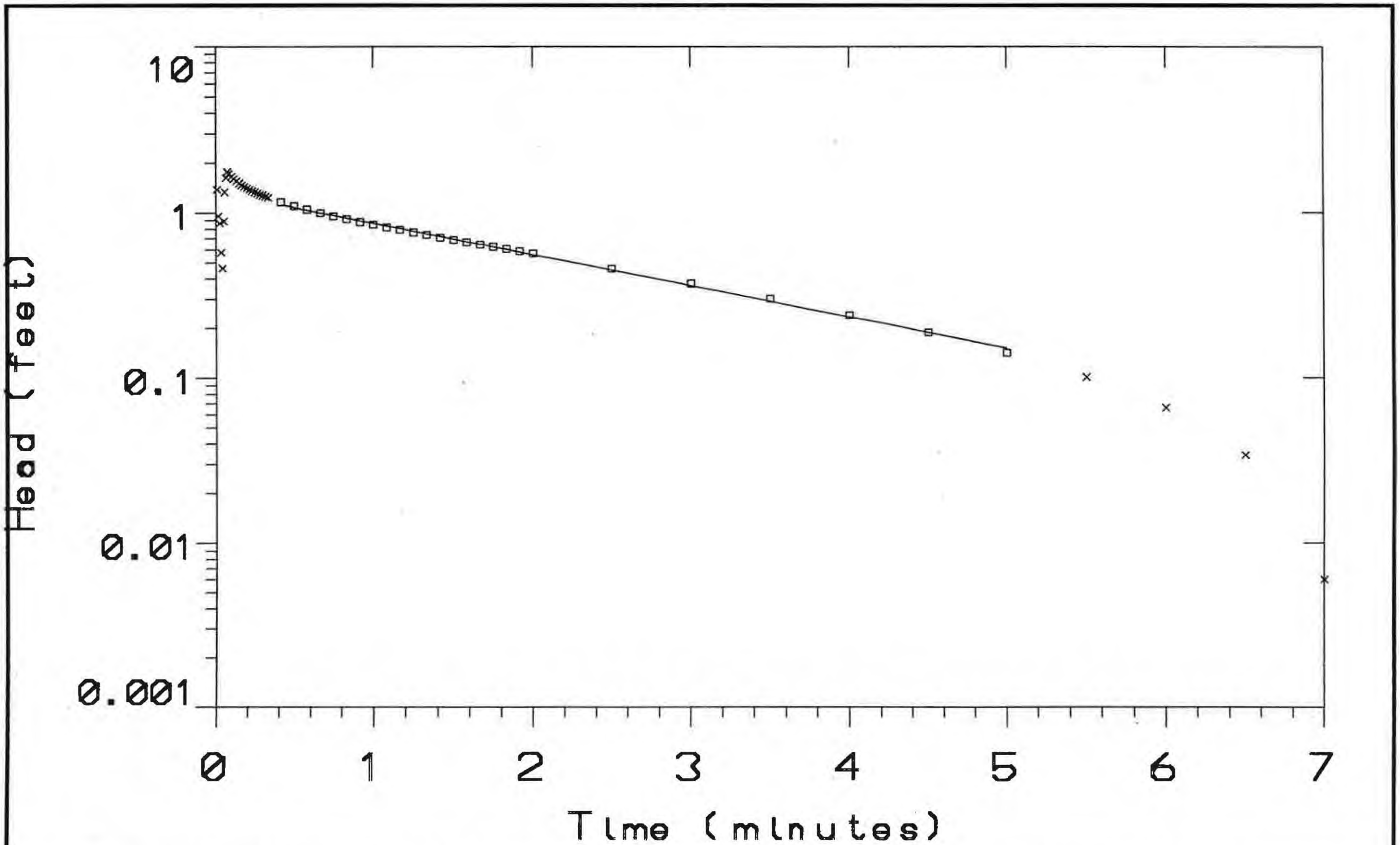
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:35	Date	07/15/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/14 13:45:46

Elapsed Time	INPUT 1
0.0000	-0.582
0.0083	-1.379
0.0166	-0.955
0.0250	-0.869
0.0333	-0.578
0.0416	-0.464
0.0500	-0.892
0.0583	-1.334
0.0666	-1.622
0.0750	-1.765
0.0833	-1.717
0.1000	-1.651
0.1166	-1.600
0.1333	-1.549
0.1500	-1.508
0.1666	-1.467
0.1833	-1.439
0.2000	-1.410
0.2166	-1.385
0.2333	-1.357
0.2500	-1.334
0.2666	-1.312
0.2833	-1.290
0.3000	-1.274
0.3166	-1.252
0.3333	-1.239
0.4166	-1.164
0.5000	-1.103
0.5833	-1.050
0.6666	-1.002
0.7500	-0.958
0.8333	-0.920
0.9166	-0.882
1.0000	-0.850
1.0833	-0.819
1.1666	-0.793
1.2500	-0.765

Elapsed Time	INPUT 1
1.3333	-0.737
1.4166	-0.711
1.5000	-0.689
1.5833	-0.667
1.6666	-0.645
1.7500	-0.626
1.8333	-0.607
1.9166	-0.588
2.0000	-0.569
2.5000	-0.461
3.0000	-0.373
3.5000	-0.303
4.0000	-0.240
4.5000	-0.189
5.0000	-0.142
5.5000	-0.101
6.0000	-0.066
6.5000	-0.034
7.0000	-0.006
7.5000	0.015
8.0000	0.041
8.5000	0.056
9.0000	0.075
9.5000	0.094

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .001173 ft/min	by: Ecology & Environment	Well: SHL8SA
TRANSMISSIVITY: .05292 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: 1.379 ft	AQUIFER: Endless	AYER
Da ... : SHL8SA	THICKNESS: 45.10	
	SCREEN: top: 10.80 base: 15.80	
	DIAMETER: casing: .2080 intake: .2080	
	DEPTH: Water Tab ... 10.90 TD: 56.00	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-8SB

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:37	Date	07/15/91
Logger Test	5	INPUT 1: Level (F)	

Step 0 07/14 13:05:38

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0000	0.037	1.3333	0.999
0.0083	2.100	1.4166	0.980
0.0166	2.100	1.5000	0.961
0.0250	2.100	1.5833	0.945
0.0333	2.100	1.6666	0.926
0.0416	2.100	1.7500	0.911
0.0500	2.100	1.8333	0.895
0.0583	2.100	1.9166	0.879
0.0666	1.562	2.0000	0.866
0.0750	1.708	2.5000	0.784
0.0833	1.784	3.0000	0.718
0.1000	1.648	3.5000	0.664
0.1166	1.638	4.0000	0.619
0.1333	1.616	4.5000	0.578
0.1500	1.600	5.0000	0.547
0.1666	1.572	5.5000	0.518
0.1833	1.556	6.0000	0.493
0.2000	1.534	6.5000	0.471
0.2166	1.512	7.0000	0.452
0.2333	1.496	7.5000	0.436
0.2500	1.480	8.0000	0.420
0.2666	1.464	8.5000	0.408
0.2833	1.448	9.0000	0.398
0.3000	1.432	9.5000	0.385
0.3166	1.420	10.0000	0.376
0.3333	1.404	11.0000	0.363
0.4166	1.350	12.0000	0.347
0.5000	1.300	13.0000	0.338
0.5833	1.255	14.0000	0.328
0.6666	1.217	15.0000	0.322
0.7500	1.183	16.0000	0.316
0.8333	1.151	17.0000	0.313
0.9166	1.119	18.0000	0.306
1.0000	1.094	19.0000	0.303
1.0833	1.069	20.0000	0.303
1.1666	1.043	21.0000	0.300
1.2500	1.021	22.0000	0.297

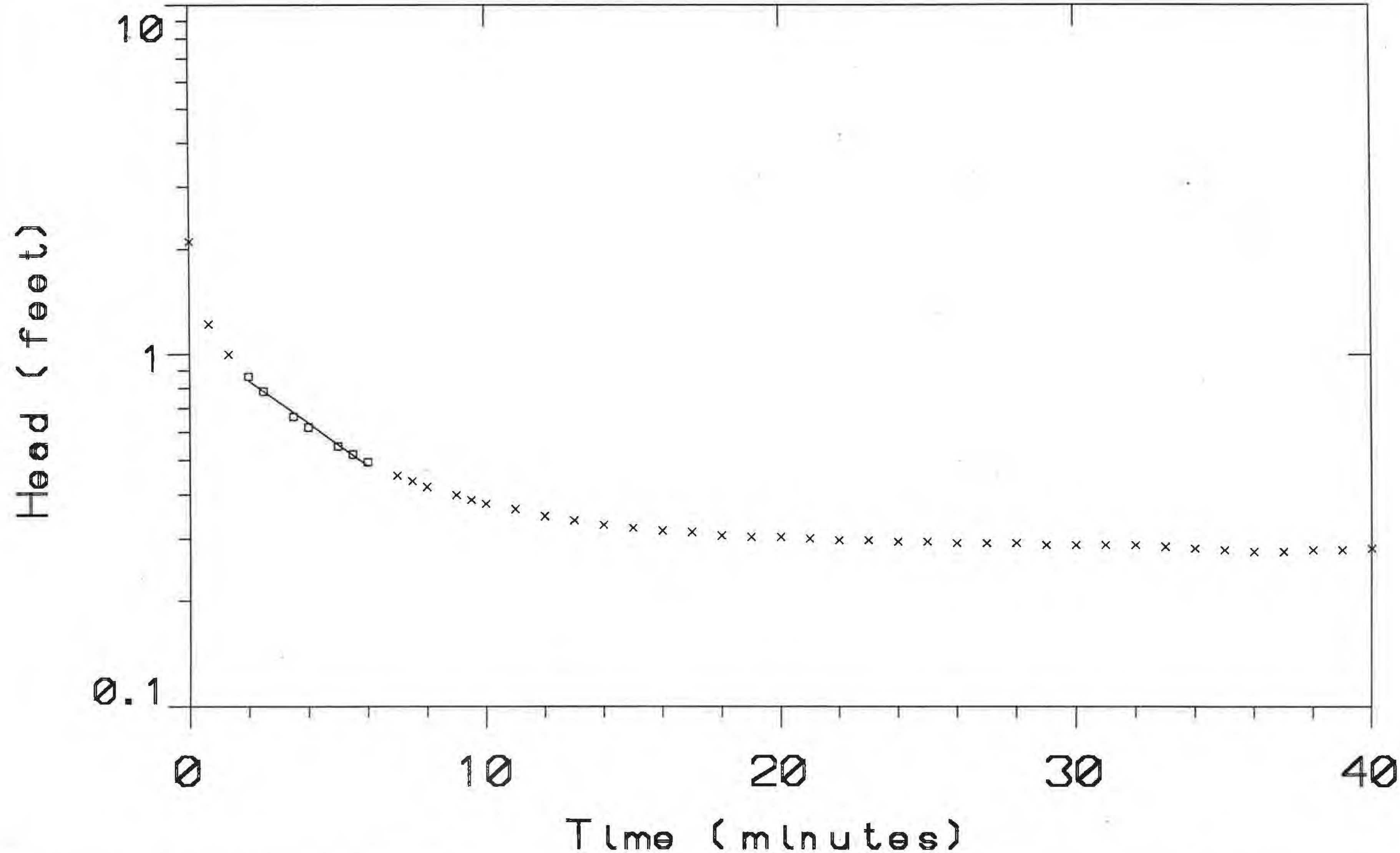
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-8SB

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:37	Date	07/15/91
Logger Test	5	INPUT 1: Level (F)	

Step 0 07/14 13:05:38

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
23.0000	0.297		
24.0000	0.294		
25.0000	0.294		
26.0000	0.291		
27.0000	0.291		
28.0000	0.291		
29.0000	0.287		
30.0000	0.287		
31.0000	0.287		
32.0000	0.287		
33.0000	0.284		
34.0000	0.281		
35.0000	0.278		
36.0000	0.275		
37.0000	0.275		
38.0000	0.278		
39.0000	0.278		
40.0000	0.281		

END



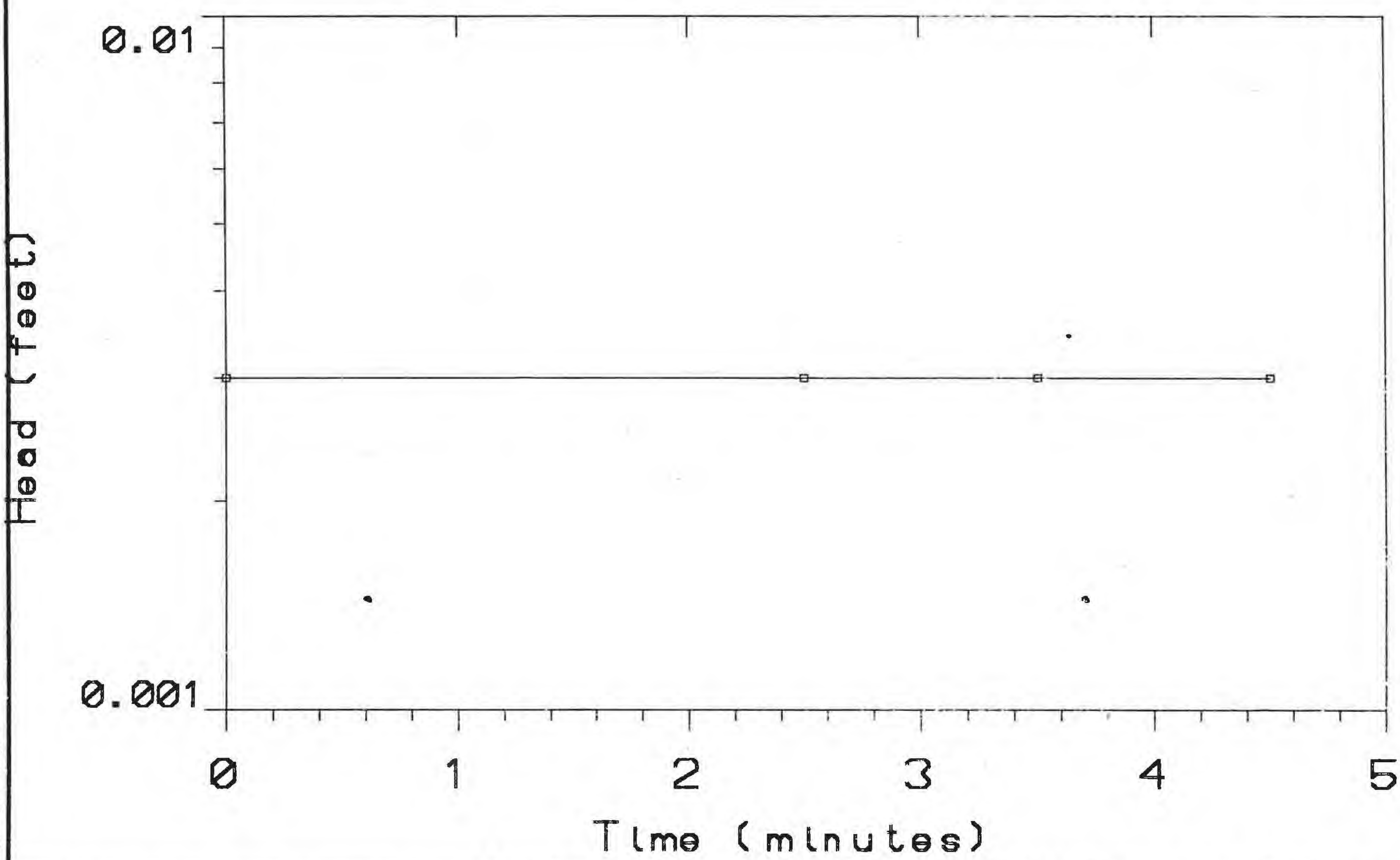
MODEL TYPE: BOUWER and RICE	for: USATHAMA	Ft. Devens
CONDUCTIVITY: .001386 ft/min	by: Ecology & Environment	Well: SHL8SB
TRANSMISSIVITY: .06335 sq. ft/min	WELL DATA: Units: ft	Ft. Devens, Mass
INITIAL HEAD: 2.100 ft	AQUIFER: Endless	AYER
Data Set: SHL8SB	THICKNESS: 45.71	
	SCREEN: top: 46.00 base: 56.00	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Table: 10.29 TD: 56.00	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-8DA

Reference	0.000		Scale Factor	16.000
SG	1.000		Offset	4.000
Linearity	0.000		Delay mSEC	50.000
Time	06:04		Date	07/12/91
Logger Test	1		INPUT 2: Level	(F)

Step 0 07/11 09:50:53

Elapsed Time	INPUT 2	Elapsed Time	INPUT 2
8.5000	-0.003		
9.0000	0.000		
9.5000	0.000		
10.0000	0.000		
11.0000	0.003		
12.0000	0.003		
13.0000	0.003		



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .003790 ft/min

TRANSMISSIVITY: .1732 sq. ft/min

INITIAL HEAD: 1.809 ft

Data Set: SHL-8DA | Date: 07-JUL-91

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 45.71

SCREEN: top: 10.29 base: 15.29

DIAMETER: casing: .2080 intake: .2080

DEPTH: Water Table: 10.29 TD: 56.00

Fort Devens

Well: SHL-8DA

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-8DB

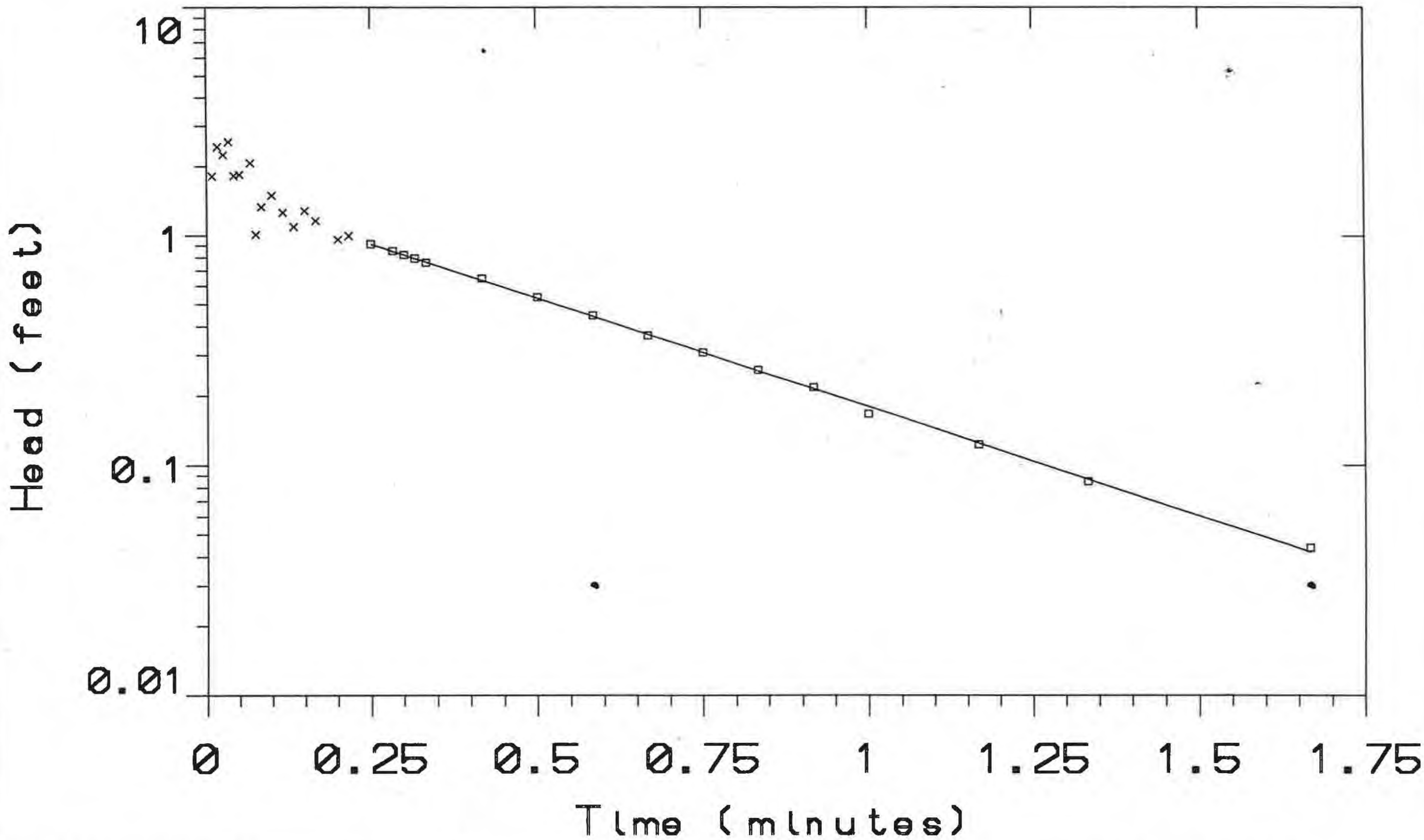
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	06:06	Date	07/12/91
Logger Test	1	INPUT 1: Level (F)	

Step 0 07/11 09:50:53

Elapsed Time	INPUT 1
0.0000	1.920
0.0083	1.809
0.0166	2.432
0.0250	2.242
0.0333	2.562
0.0416	1.818
0.0500	1.837
0.0583	1.812
0.0666	2.068
0.0750	1.009
0.0833	1.331
0.1000	1.496
0.1166	1.258
0.1333	1.091
0.1500	1.277
0.1666	1.157
0.1833	0.977
0.2000	0.961
0.2166	0.996
0.2333	0.967
0.2500	0.917
0.2666	0.885
0.2833	0.854
0.3000	0.822
0.3166	0.793
0.3333	0.762
0.4166	0.648
0.5000	0.537
0.5833	0.446
0.6666	0.366
0.7500	0.309
0.8333	0.259
0.9166	0.218
1.0000	0.167
1.0833	0.151
1.1666	0.123
1.2500	0.101

Elapsed Time	INPUT 1
1.3333	0.085
1.4166	0.072
1.5000	0.060
1.5833	0.050
1.6666	0.044
1.7500	0.037
1.8333	0.031
1.9166	0.028
2.0000	0.022
2.5000	0.012
3.0000	0.006
3.5000	0.003
4.0000	0.003
4.5000	0.000
5.0000	0.006
5.5000	-0.920
6.0000	-0.309
6.5000	-0.104
7.0000	-0.037
7.5000	-0.015
8.0000	-0.006

END



MODEL TYPE: BOUWER and RICE		for: USATHAMA	Fort Devens
CONDUCTIVITY: .006015 ft/min		by: Ecology & Environment	Well: SHL-8DB
TRANSMISSIVITY: .2749 sq. ft/min		WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: 1.809 ft		AQUIFER: Endless	AYER
		THICKNESS: 45.71	
		SCREEN: top: 10.29 base: 15.29	
Data Set: SHL-8DB	Date: 07-JUL-91	DIAMETER: casing: .2080 intake: .2080	
		DEPTH: Water Table: 10.29 TD: 56.00	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-8DB

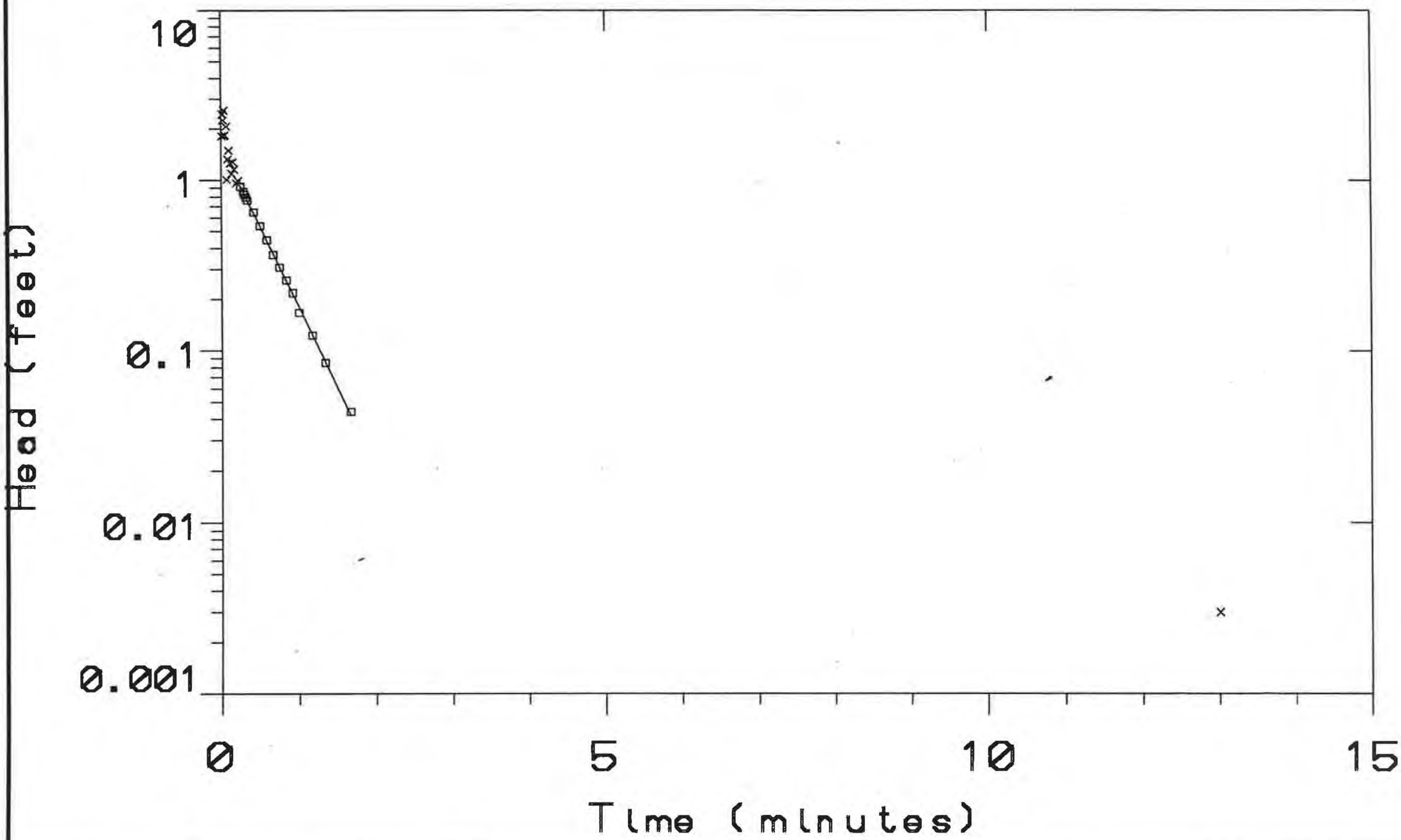
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	06:06	Date	07/12/91
Logger Test	1	INPUT 1: Level (F)	

Step 0 07/11 09:50:53

Elapsed Time	INPUT 1
0.0000	1.920
0.0083	1.809
0.0166	2.432
0.0250	2.242
0.0333	2.562
0.0416	1.818
0.0500	1.837
0.0583	1.812
0.0666	2.068
0.0750	1.009
0.0833	1.331
0.1000	1.496
0.1166	1.258
0.1333	1.091
0.1500	1.277
0.1666	1.157
0.1833	0.977
0.2000	0.961
0.2166	0.996
0.2333	0.967
0.2500	0.917
0.2666	0.885
0.2833	0.854
0.3000	0.822
0.3166	0.793
0.3333	0.762
0.4166	0.648
0.5000	0.537
0.5833	0.446
0.6666	0.366
0.7500	0.309
0.8333	0.259
0.9166	0.218
1.0000	0.167
1.0833	0.151
1.1666	0.123
1.2500	0.101

Elapsed Time	INPUT 1
1.3333	0.085
1.4166	0.072
1.5000	0.060
1.5833	0.050
1.6666	0.044
1.7500	0.037
1.8333	0.031
1.9166	0.028
2.0000	0.022
2.5000	0.012
3.0000	0.006
3.5000	0.003
4.0000	0.003
4.5000	0.000
5.0000	0.006
5.5000	-0.920
6.0000	-0.309
6.5000	-0.104
7.0000	-0.037
7.5000	-0.015
8.0000	-0.006
8.5000	-0.003
9.0000	0.000
9.5000	0.000
10.0000	0.000
11.0000	0.003
12.0000	0.003
13.0000	0.003

END



MODEL TYPE: BOUWER and RICE
CONDUCTIVITY: .006015 ft/min
TRANSMISSIVITY: .2749 sq. ft/min
INITIAL HEAD: 1.809 ft
Data Set: SHL-8DB

for: USATHAMA
by: Ecology & Environment
WELL DATA: Units: ft
AQUIFER: Endless
THICKNESS: 45.71
SCREEN: top: 10.29 base: 15.29
DIAMETER: casing: .2080 intake: .2080
DEPTH: Water Table: 10.29 TD: 56.00

Fort Devens

Well: SHL-8DB
Fort Devens, Mass
AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-9A

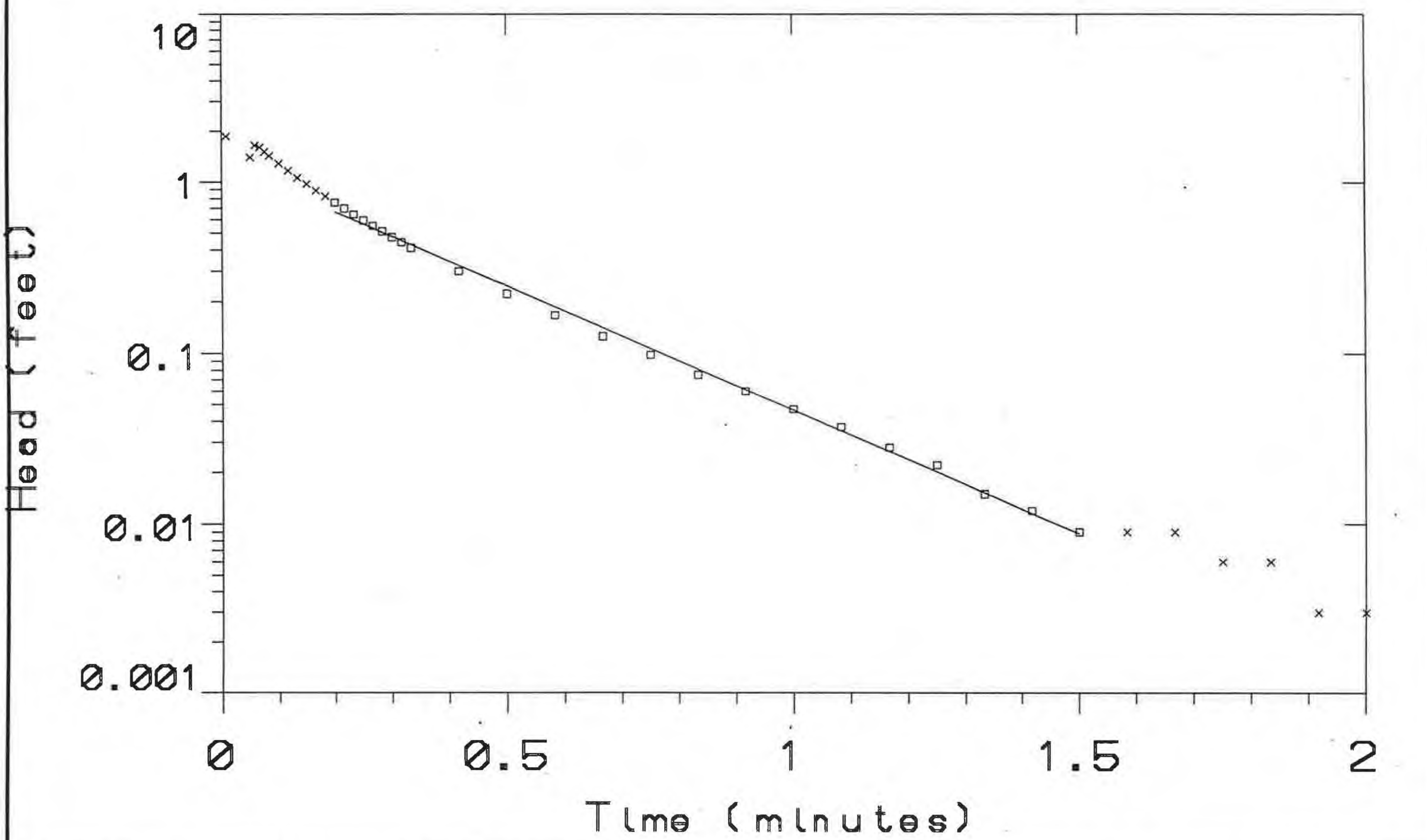
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	05:53	Date	07/12/91
Logger Test	4	INPUT 1: Level (F)	

Step 1 07/11 13:25:40

Elapsed Time	INPUT 1
0.0000	-0.259
0.0083	-1.859
0.0166	-0.793
0.0250	-0.506
0.0333	-0.996
0.0416	-0.980
0.0500	-1.401
0.0583	-1.644
0.0666	-1.600
0.0750	-1.508
0.0833	-1.426
0.1000	-1.287
0.1166	-1.167
0.1333	-1.062
0.1500	-0.974
0.1666	-0.892
0.1833	-0.822
0.2000	-0.759
0.2166	-0.699
0.2333	-0.645
0.2500	-0.594
0.2666	-0.553
0.2833	-0.512
0.3000	-0.474
0.3166	-0.442
0.3333	-0.411
0.4166	-0.300
0.5000	-0.221
0.5833	-0.167
0.6666	-0.126
0.7500	-0.098
0.8333	-0.075
0.9166	-0.060
1.0000	-0.047
1.0833	-0.037
1.1666	-0.028
1.2500	-0.022

Elapsed Time	INPUT 1
1.3333	-0.015
1.4166	-0.012
1.5000	-0.009
1.5833	-0.009
1.6666	-0.009
1.7500	-0.006
1.8333	-0.006
1.9166	-0.003
2.0000	-0.003
2.5000	0.000

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .01701 ft/min

TRANSMISSIVITY: .2713 sq. ft/min

INITIAL HEAD: 1.859 ft

Data Set: SHL-9A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 15.95

SCREEN: top: 16.30 base: 26.30

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water Table: 10.35 TD: 26.30

Fort Devens

Well: SHL-9A

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-9B

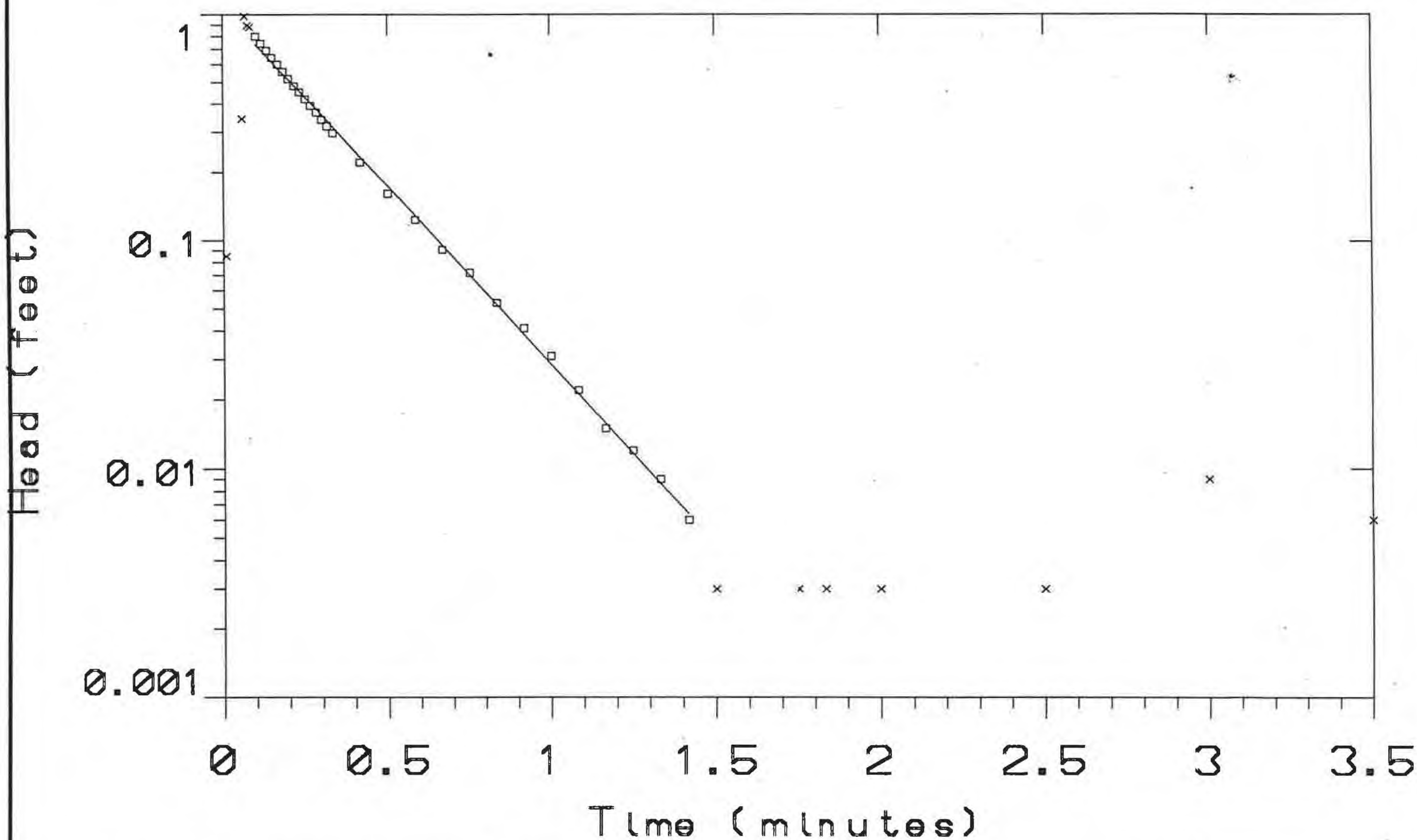
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	05:55	Date	07/12/91
Logger Test	4	INPUT 1: Level (F)	

Step 0 07/11 13:18:41

Elapsed Time	INPUT 1
0.0000	-0.003
0.0083	0.085
0.0166	8.107
0.0250	1.701
0.0333	1.331
0.0416	2.268
0.0500	1.591
0.0583	0.344
0.0666	0.980
0.0750	0.895
0.0833	0.882
0.1000	0.800
0.1166	0.743
0.1333	0.692
0.1500	0.642
0.1666	0.601
0.1833	0.559
0.2000	0.518
0.2166	0.480
0.2333	0.452
0.2500	0.420
0.2666	0.392
0.2833	0.366
0.3000	0.341
0.3166	0.319
0.3333	0.297
0.4166	0.221
0.5000	0.161
0.5833	0.123
0.6666	0.091
0.7500	0.072
0.8333	0.053
0.9166	0.041
1.0000	0.031
1.0833	0.022
1.1666	0.015
1.2500	0.012

Elapsed Time	INPUT 1
1.3333	0.009
1.4166	0.006
1.5000	0.003
1.5833	0.000
1.6666	0.000
1.7500	-0.003
1.8333	-0.003
1.9166	0.000
2.0000	-0.003
2.5000	-0.003
3.0000	-0.009
3.5000	-0.006
4.0000	-0.012
4.5000	-0.009
5.0000	-0.006
5.5000	-0.003
6.0000	0.000
6.5000	0.000
7.0000	0.000

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .008712 ft/min

TRANSMISSIVITY: .1389 sq. ft/min

INITIAL HEAD: .08500 ft

Data Set: SHL-9B

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 15.95

SCREEN: top: 16.30 base: 26.30

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water Table: 10.35 TD: 26.30

Fort Devens

Well: SHL-9B

Fort Devens, Mass

AYER

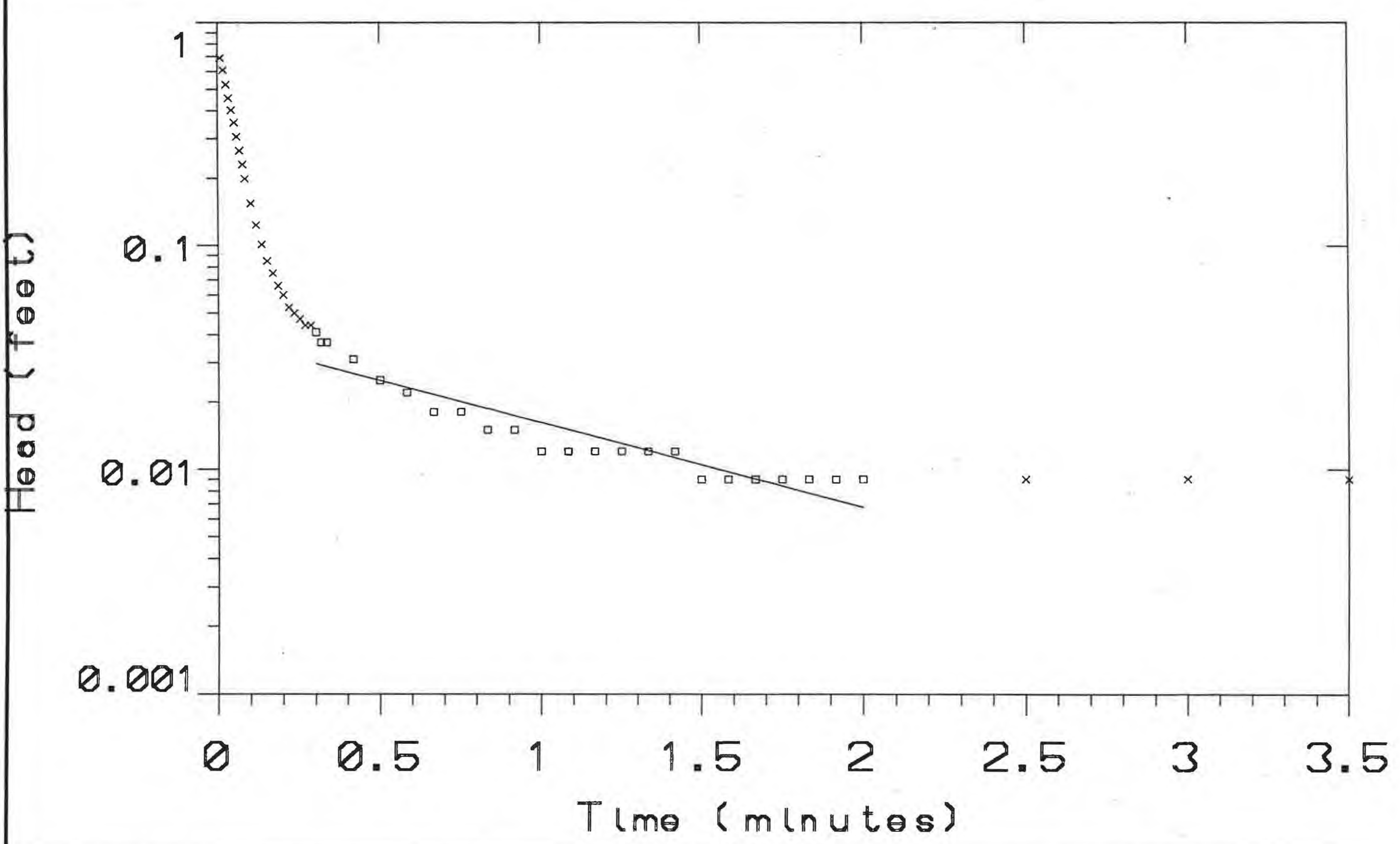
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-10A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:44	Date	07/15/91
Logger Test	3	INPUT 1: Level (F)	

Step 1 07/13 13:39:22

Elapsed Time	INPUT 1
0.0000	-0.154
0.0083	-0.692
0.0166	-0.610
0.0250	-0.525
0.0333	-0.455
0.0416	-0.401
0.0500	-0.354
0.0583	-0.306
0.0666	-0.265
0.0750	-0.230
0.0833	-0.199
0.1000	-0.154
0.1166	-0.123
0.1333	-0.101
0.1500	-0.085
0.1666	-0.075
0.1833	-0.066
0.2000	-0.060
0.2166	-0.053
0.2333	-0.050
0.2500	-0.047
0.2666	-0.044
0.2833	-0.044
0.3000	-0.041
0.3166	-0.037
0.3333	-0.037
0.4166	-0.031
0.5000	-0.025
0.5833	-0.022
0.6666	-0.018
0.7500	-0.018
0.8333	-0.015
0.9166	-0.015
1.0000	-0.012
1.0833	-0.012
1.1666	-0.012
1.2500	-0.012
1.3333	-0.012
1.4166	-0.012
1.5000	-0.009
1.5833	-0.009
1.6666	-0.009
1.7500	-0.009
1.8333	-0.009
1.9166	-0.009
2.0000	-0.009
2.5000	-0.009
3.0000	-0.009
3.5000	-0.009

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .008385 ft/min

TRANSMISSIVITY: .03815 sq. ft/min

INITIAL HEAD: .6920 ft

Data Set: SHL-10A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 4.550

SCREEN: top: 26.63 base: 36.63

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water Table: 32.08 TD: 36.63

Fort Devens

Well: SHL-10A

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-10B

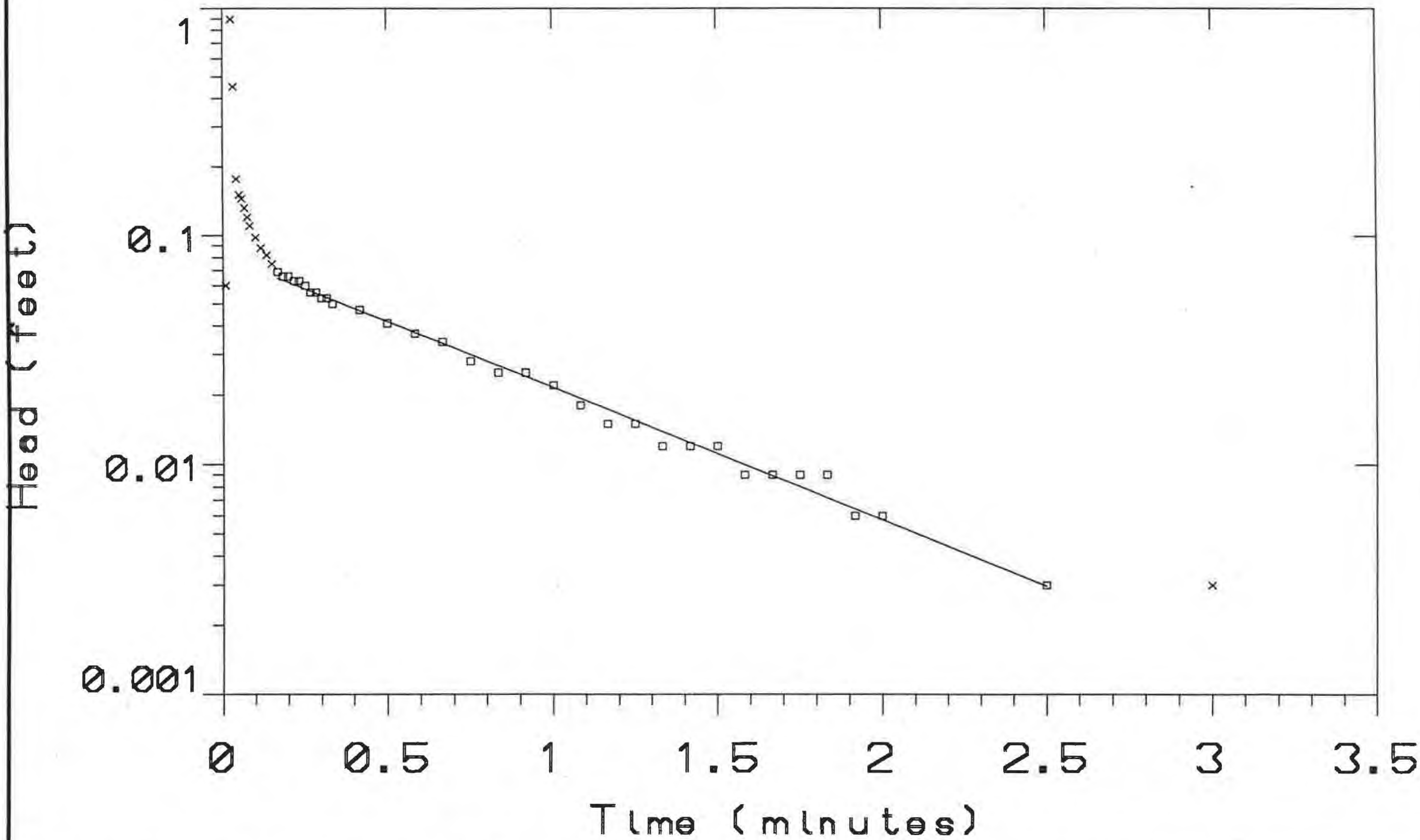
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:45	Date	07/15/91
Logger Test	3	INPUT 1: Level (F)	

Step 0 07/13 13:35:44

Elapsed Time	INPUT 1
0.0000	0.018
0.0083	0.060
0.0166	6.351
0.0250	0.895
0.0333	0.452
0.0416	0.177
0.0500	0.151
0.0583	0.145
0.0666	0.132
0.0750	0.120
0.0833	0.110
0.1000	0.098
0.1166	0.088
0.1333	0.082
0.1500	0.075
0.1666	0.069
0.1833	0.066
0.2000	0.066
0.2166	0.063
0.2333	0.063
0.2500	0.060
0.2666	0.056
0.2833	0.056
0.3000	0.053
0.3166	0.053
0.3333	0.050
0.4166	0.047
0.5000	0.041
0.5833	0.037
0.6666	0.034
0.7500	0.028
0.8333	0.025
0.9166	0.025
1.0000	0.022
1.0833	0.018
1.1666	0.015
1.2500	0.015

Elapsed Time	INPUT 1
1.3333	0.012
1.4166	0.012
1.5000	0.012
1.5833	0.009
1.6666	0.009
1.7500	0.009
1.8333	0.009
1.9166	0.006
2.0000	0.006
2.5000	0.003
3.0000	0.003
3.5000	0.000

END



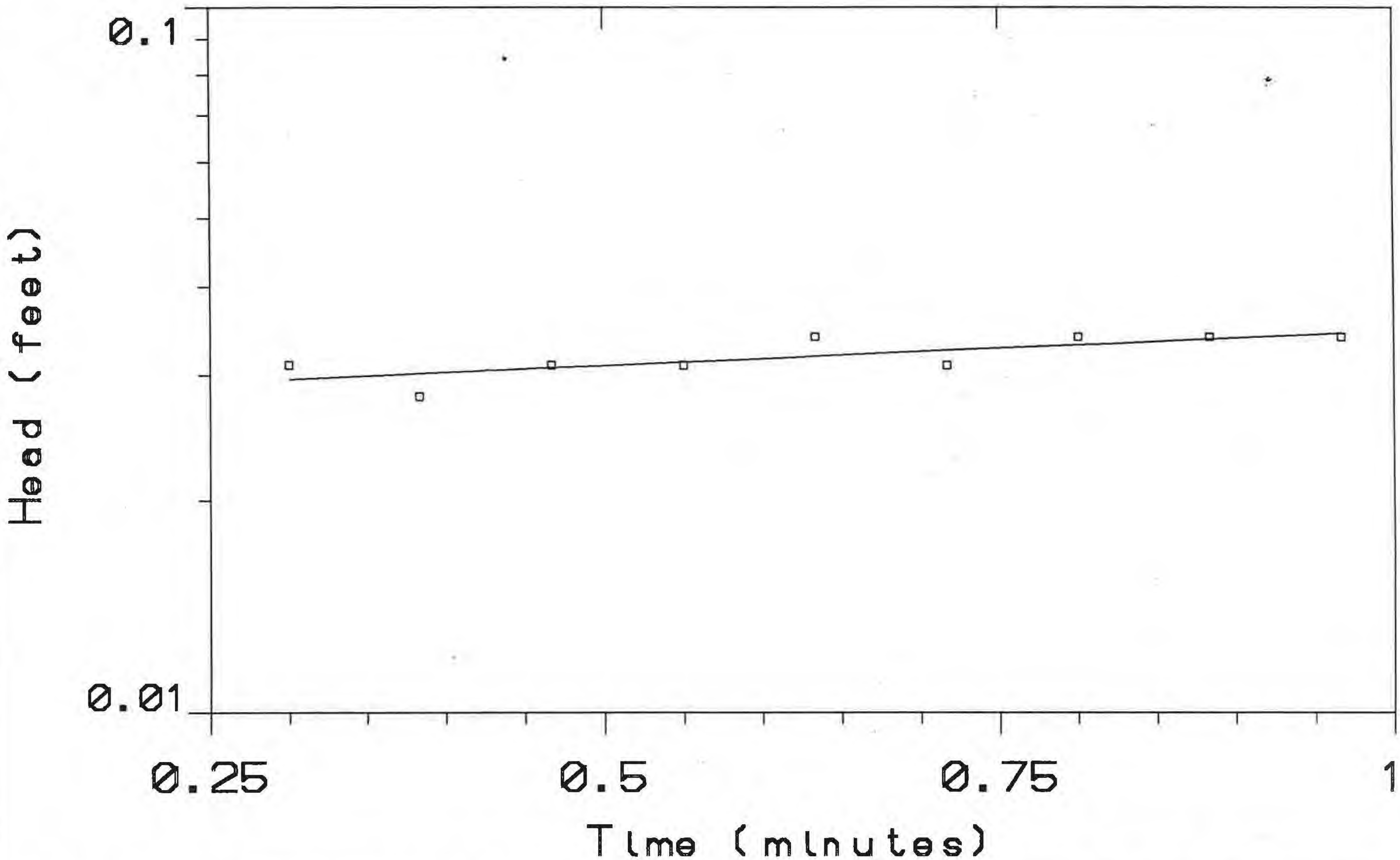
MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .004357 ft/min	by: Ecology & Environment	Well: SHL-10B
TRANSMISSIVITY: .01982 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .06000 ft	AQUIFER: Endless	AYER
Data Set: SHL-10B	THICKNESS: 4.550	
	SCREEN: top: 26.63 base: 36.63	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Table: 32.08 TD: 36.63	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-11A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	05:49	Date	07/12/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/11 14:33:39

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0000	-0.376	1.3333	0.034
0.0083	-0.009	1.4166	0.031
0.0166	-0.056	1.5000	0.031
0.0250	-0.455	1.5833	0.031
0.0333	-0.436	1.6666	0.031
0.0416	-0.474	1.7500	0.031
0.0500	-0.335	1.8333	0.034
0.0583	-0.408	1.9166	0.031
0.0666	-0.531	2.0000	0.031
0.0750	-0.518	2.5000	0.034
0.0833	-0.313	3.0000	0.031
0.1000	-0.110	3.5000	0.034
0.1166	-0.031	4.0000	0.028
0.1333	0.006	4.5000	0.028
0.1500	0.015	5.0000	0.025
0.1666	0.022	5.5000	0.018
0.1833	0.025	6.0000	0.022
0.2000	0.028	6.5000	0.018
0.2166	0.025	7.0000	0.025
0.2333	0.025	7.5000	0.022
0.2500	0.025	8.0000	0.031
0.2666	0.028	8.5000	0.028
0.2833	0.028	9.0000	0.025
0.3000	0.028	9.5000	0.018
0.3166	0.028	10.0000	0.018
0.3333	0.028	11.0000	0.018
0.4166	0.031	12.0000	0.022
0.5000	0.028	13.0000	0.018
0.5833	0.031	14.0000	0.015
0.6666	0.031	15.0000	0.022
0.7500	0.034	16.0000	0.025
0.8333	0.031	17.0000	0.025
0.9166	0.034	18.0000	0.028
1.0000	0.034	19.0000	0.025
1.0833	0.034	20.0000	0.025
1.1666	0.031	END	
1.2500	0.031		



MODEL TYPE: BOUWER and RICE	for: USATHAMA by: Ecology & Environment	Fort Devens
CONDUCTIVITY: .0001163 m/sec TRANSMISSIVITY: .001058 sq. m/sec INITIAL HEAD: .03100 m	WELL DATA: Units: m AQUIFER: Endless THICKNESS: 9.100 SCREEN: top: 18.50 base: 28.50 DIAMETER: casing: .3332 intake: .3332 DEPTH: Water Table: 19.40 TD: 28.50	Well: SHL-11A Fort Devens, Mass AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-11B

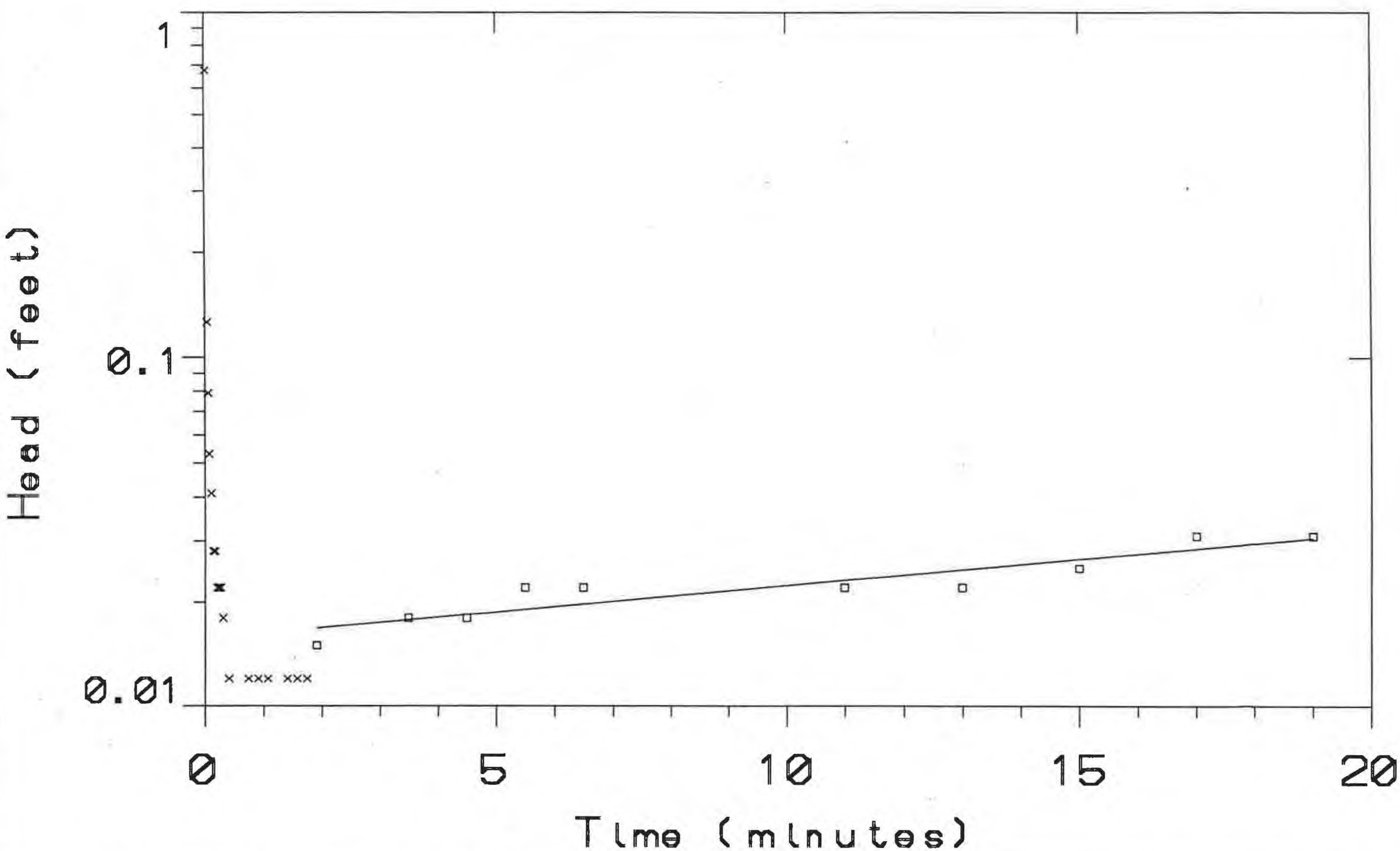
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	05:52	Date	07/12/91
Logger Test	5	INPUT 1: Level (F)	

Step 0 07/11 14:13:27

Elapsed Time	INPUT 1
0.0000	0.028
0.0083	0.031
0.0166	3.583
0.0250	0.917
0.0333	0.676
0.0416	0.022
0.0500	0.126
0.0583	0.098
0.0666	0.079
0.0750	0.066
0.0833	0.053
0.1000	0.041
0.1166	0.041
0.1333	0.031
0.1500	0.028
0.1666	0.028
0.1833	0.028
0.2000	0.022
0.2166	0.022
0.2333	0.018
0.2500	0.022
0.2666	0.022
0.2833	0.022
0.3000	0.018
0.3166	0.018
0.3333	0.022
0.4166	0.012
0.5000	0.018
0.5833	0.015
0.6666	0.012
0.7500	0.012
0.8333	0.009
0.9166	0.012
1.0000	0.009
1.0833	0.012
1.1666	0.012
1.2500	0.009

Elapsed Time	INPUT 1
1.3333	0.012
1.4166	0.012
1.5000	0.012
1.5833	0.012
1.6666	0.012
1.7500	0.012
1.8333	0.009
1.9166	0.015
2.0000	0.012
2.5000	0.022
3.0000	0.018
3.5000	0.018
4.0000	0.018
4.5000	0.018
5.0000	0.022
5.5000	0.022
6.0000	0.022
6.5000	0.022
7.0000	0.018
7.5000	0.018
8.0000	0.022
8.5000	0.018
9.0000	0.022
9.5000	0.018
10.0000	0.022
11.0000	0.022
12.0000	0.018
13.0000	0.022
14.0000	0.015
15.0000	0.025
16.0000	0.028
17.0000	0.031
18.0000	0.031
19.0000	0.031
20.0000	0.028

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .0006962 ft/min

TRANSMISSIVITY: .006336 sq. ft/min

INITIAL HEAD: .6760 ft

Data Set: SHL-11B

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 9.100

SCREEN: top: 18.50 base: 28.50

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water Table: 19.40 TD: 28.50

Fort Devens

Well: SHL-11B

Fort Devens, Mass

AYER

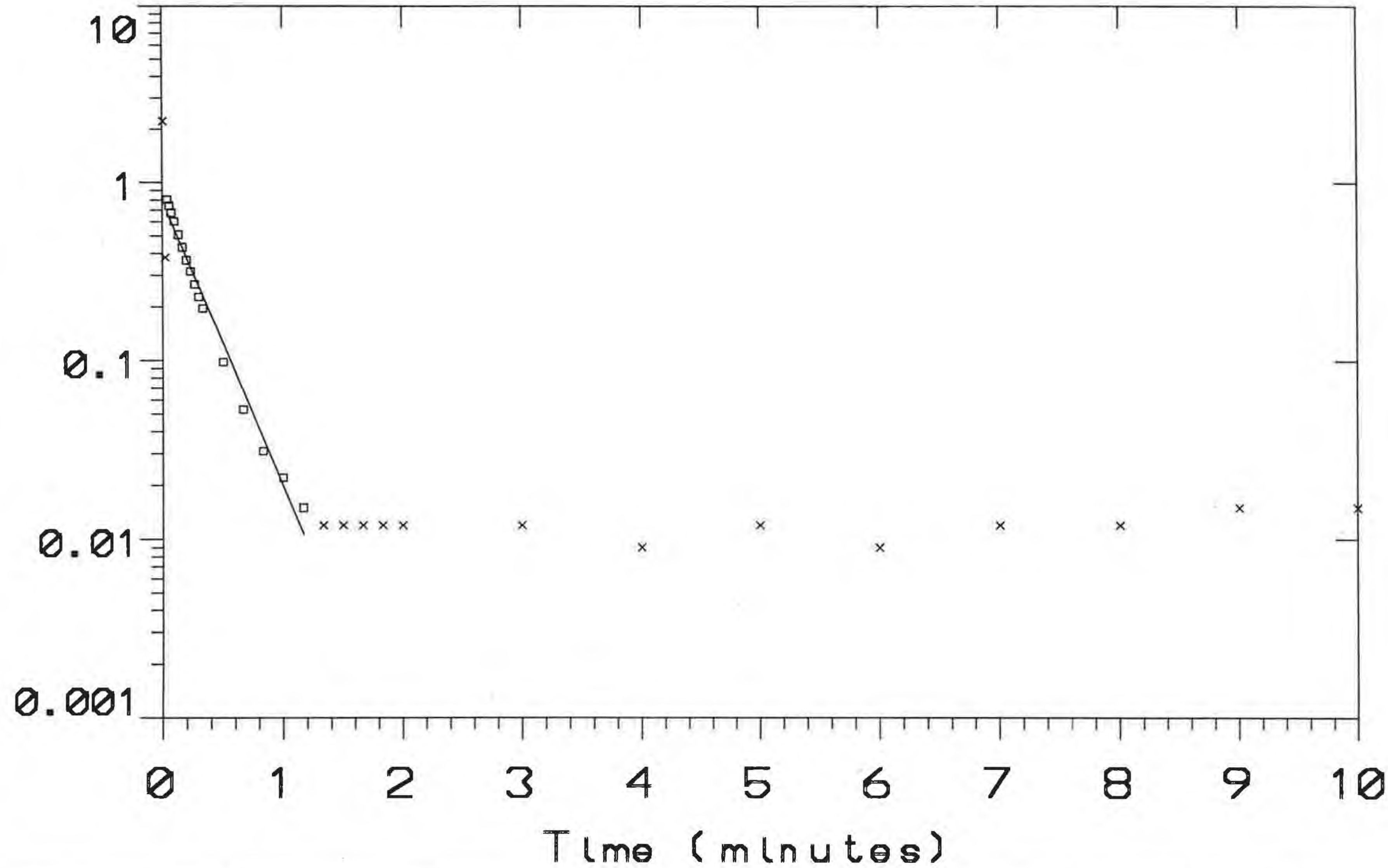
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-12A

Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	18:02		Date	07/12/91
Logger Test	0		INPUT 1: Level (F)	

Step 1 07/12 12:48:18

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0083	2.2230		
0.0250	0.3790		
0.0416	0.8030		
0.0583	0.7400		
0.0750	0.6760		
0.1000	0.6040		
0.1333	0.5090		
0.1660	0.4330		
0.2000	0.3660		
0.2333	0.3160		
0.2666	0.2680		
0.3000	0.2270		
0.3333	0.1960		
0.5000	0.0980		
0.6666	0.0530		
0.8333	0.0310		
1.0000	0.0220		
1.1666	0.0150		
1.3333	0.0120		
1.5000	0.0120		
1.6666	0.0120		
1.8333	0.0120		
2.0000	0.0120		
3.0000	0.0120		
4.0000	0.0090		
5.0000	0.0120		
6.0000	0.0090		
7.0000	0.0120		
8.0000	0.0120		
9.0000	0.0150		
10.000	0.0150		

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	FORT DEVENS
CONDUCTIVITY: .01924 ft/min	by: Ecology & Environment	Well: SHL-12A
TRANSMISSIVITY: .1050 sq. ft/min	WELL DATA: Units: ft	FORT DEVENS
INITIAL HEAD: .9580 ft	AQUIFER: Endless	AYERS
Data Set: SHL-12A	THICKNESS: 5.460	
	SCREEN: top: 23.30 base: 25.30	
	DIAMETER: casing: .2080 intake: .2080	
	DEPTH: Water Table: 23.30 TD: 28.76	

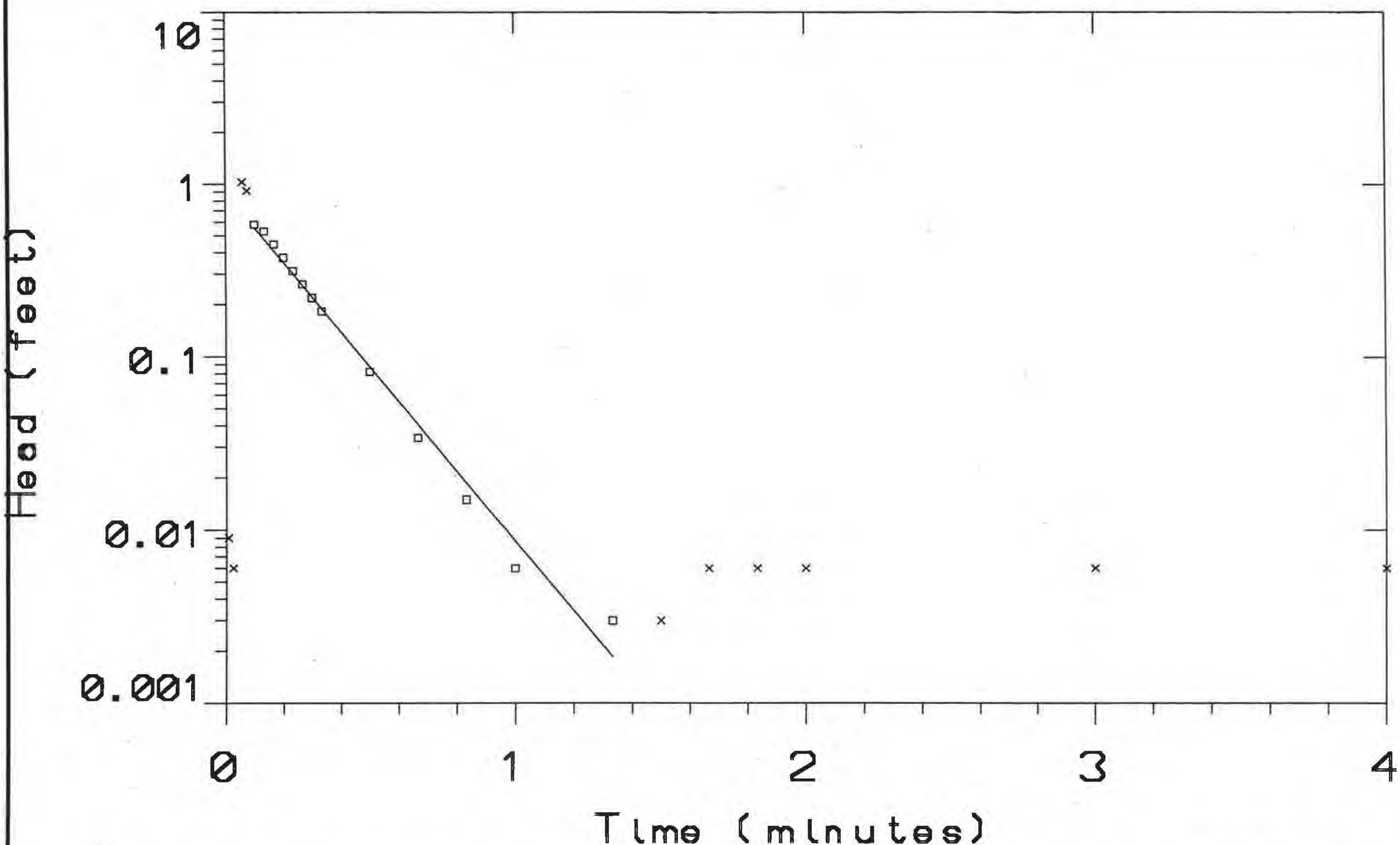
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-12B

Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	18:05		Date	07/12/91
Logger Test	0		INPUT 1: Level (F)	

Step 1 07/12 12:43:38

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0083	0.0090		
0.0250	0.0060		
0.0583	1.0280		
0.0750	0.9140		
0.1000	0.5820		
0.1333	0.5310		
0.1666	0.4460		
0.2000	0.3730		
0.2333	0.3130		
0.2666	0.2620		
0.3000	0.2180		
0.3333	0.1830		
0.5000	0.0820		
0.6666	0.0340		
0.8333	0.0150		
1.0000	0.0060		
1.3333	0.0030		
1.5000	0.0030		
1.6666	0.0060		
1.8333	0.0060		
2.0000	0.0060		
3.0000	0.0060		
4.0000	0.0060		

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	FORT DEVENS
CONDUCTIVITY: .02341 ft/min	by: Ecology & Environment	Well: SHL-12B
TRANSMISSIVITY: .1278 sq. ft/min	WELL DATA: Units: ft	FORT DEVENS
INITIAL HEAD: .9580 ft	AQUIFER: Endless	AYERS
Data Set: SHL-12B	THICKNESS: 5.460	
	SCREEN: top: 23.30 base: 25.30	
	DIAMETER: casing: .2080 intake: .2080	
	DEPTH: Water Table: 23.30 TD: 28.76	

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ecology and environment

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-13A

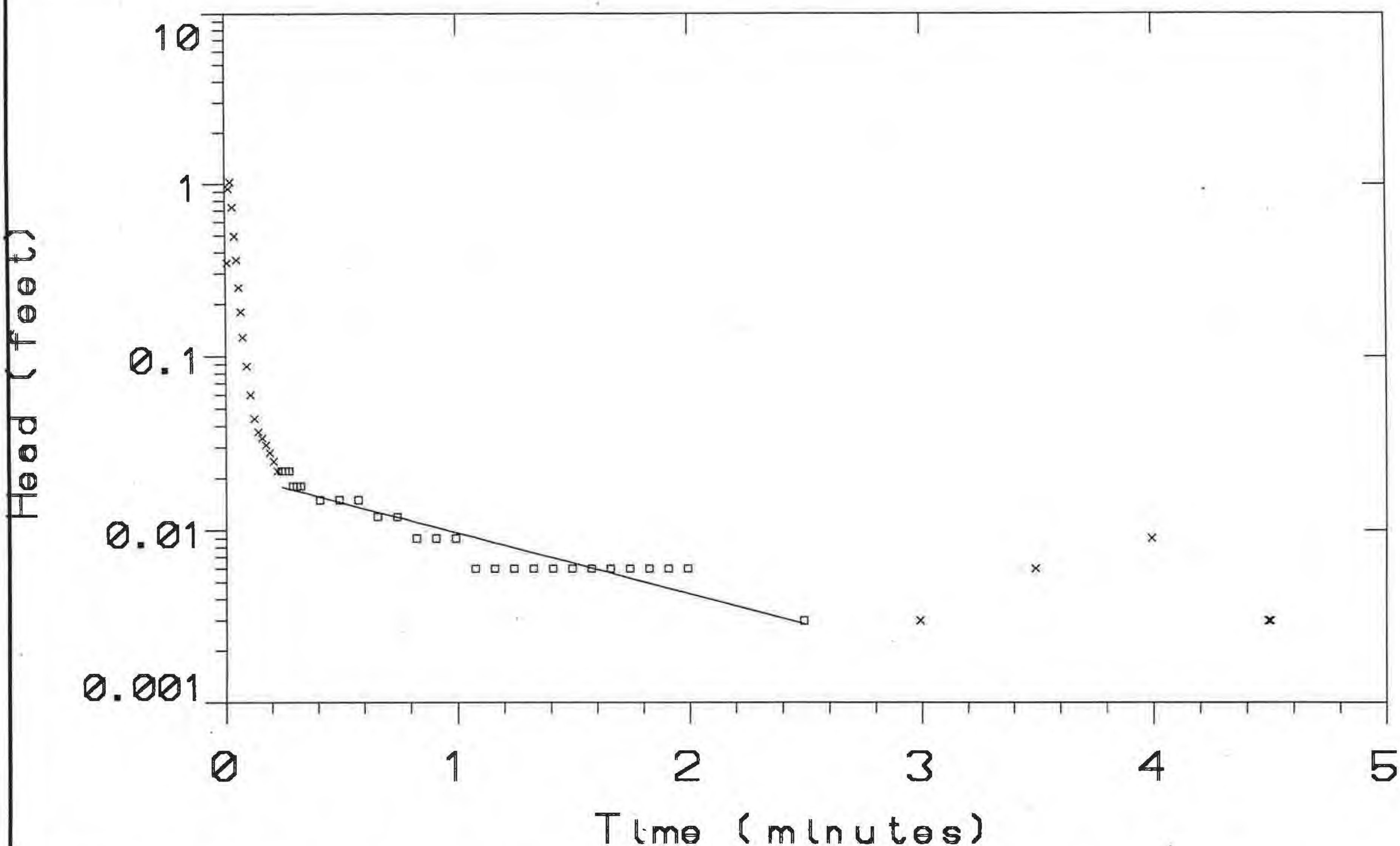
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	06:01	Date	07/12/91
Logger Test	2	INPUT 1: Level (F)	

Step 1 07/11 10:38:10

Elapsed Time	INPUT 1
0.0000	-0.022
0.0083	-2.233
0.0166	-0.347
0.0250	-0.936
0.0333	-1.024
0.0416	-0.733
0.0500	-0.496
0.0583	-0.360
0.0666	-0.249
0.0750	-0.180
0.0833	-0.129
0.1000	-0.088
0.1166	-0.060
0.1333	-0.044
0.1500	-0.037
0.1666	-0.034
0.1833	-0.031
0.2000	-0.028
0.2166	-0.025
0.2333	-0.022
0.2500	-0.022
0.2666	-0.022
0.2833	-0.022
0.3000	-0.018
0.3166	-0.018
0.3333	-0.018
0.4166	-0.015
0.5000	-0.015
0.5833	-0.015
0.6666	-0.012
0.7500	-0.012
0.8333	-0.009
0.9166	-0.009
1.0000	-0.009
1.0833	-0.006
1.1666	-0.006
1.2500	-0.006

Elapsed Time	INPUT 1
1.3333	-0.006
1.4166	-0.006
1.5000	-0.006
1.5833	-0.006
1.6666	-0.006
1.7500	-0.006
1.8333	-0.006
1.9166	-0.006
2.0000	-0.006
2.5000	-0.003
3.0000	-0.003
3.5000	0.006
4.0000	0.009
4.5000	0.003

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .008836 ft/min	by: Ecology & Environment	Well: SHL-13A
TRANSMISSIVITY: .1161 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .3470 ft	AQUIFER: Endless	AYER
Data Set: SHL-13A	THICKNESS: 13.14	
	SCREEN: top: 11.27 base: 21.27	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Table: 8.130 TD: 21.27	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-13B

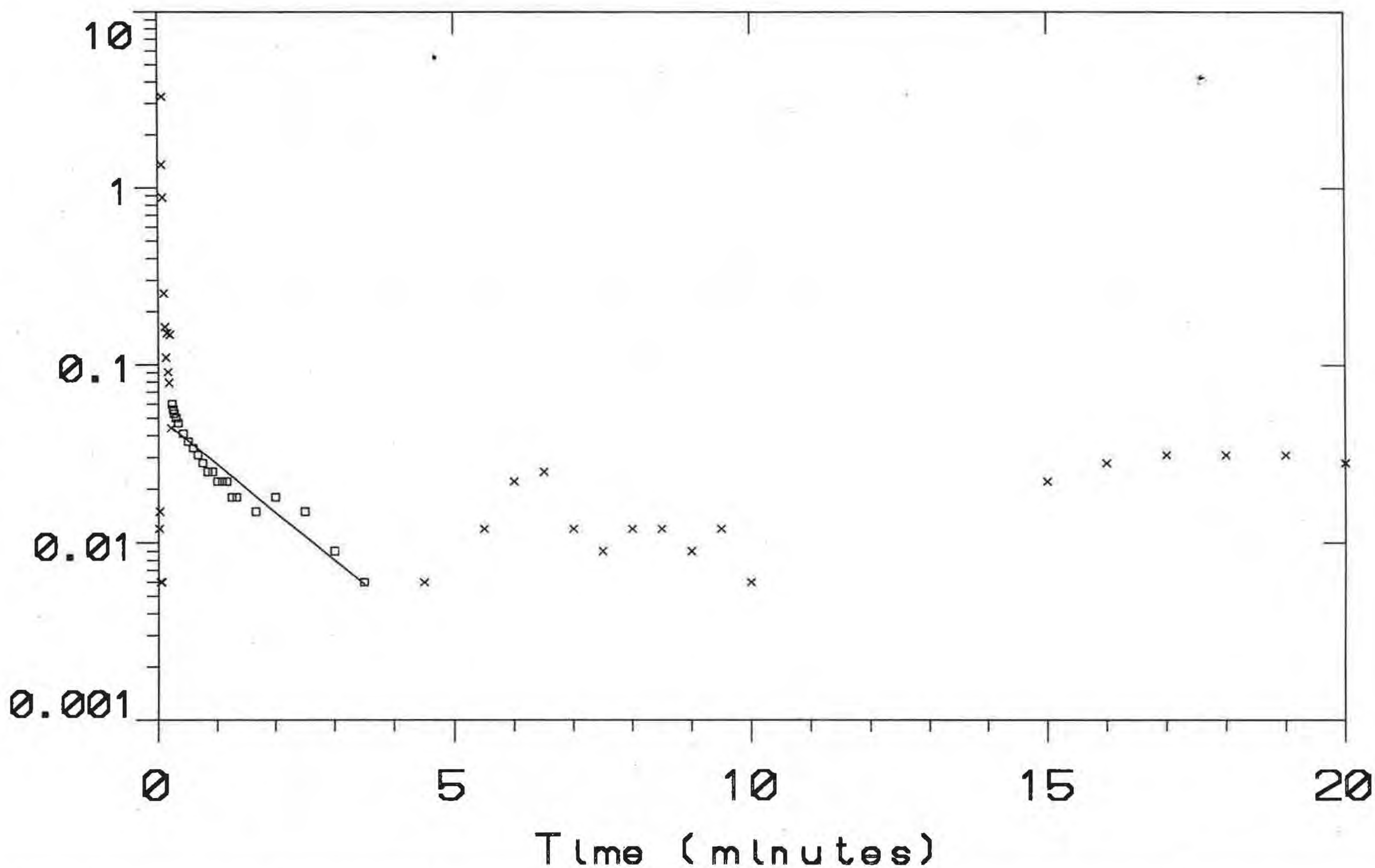
Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	06:02		Date	07/12/91
Logger Test	2		INPUT 1: Level (F)	

Step 0 07/11 10:27:25

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	0.000
0.0166	-0.012
0.0250	0.015
0.0333	0.000
0.0416	0.006
0.0500	0.000
0.0583	0.006
0.0666	1.350
0.0750	3.286
0.0833	0.882
0.1000	0.253
0.1166	0.164
0.1333	0.110
0.1500	0.151
0.1666	0.091
0.1833	0.079
0.2000	0.148
0.2166	0.044
0.2333	0.060
0.2500	0.056
0.2666	0.053
0.2833	0.050
0.3000	0.050
0.3166	0.050
0.3333	0.047
0.4166	0.041
0.5000	0.037
0.5833	0.034
0.6666	0.031
0.7500	0.028
0.8333	0.025
0.9166	0.025
1.0000	0.022
1.0833	0.022
1.1666	0.022
1.2500	0.018

Elapsed Time	INPUT 1
1.3333	0.018
1.4166	0.015
1.5000	0.015
1.5833	0.015
1.6666	0.015
1.7500	0.015
1.8333	0.015
1.9166	0.015
2.0000	0.018
2.5000	0.015
3.0000	0.009
3.5000	0.006
4.0000	0.006
4.5000	0.006
5.0000	0.006
5.5000	0.012
6.0000	0.022
6.5000	0.025
7.0000	0.012
7.5000	0.009
8.0000	0.012
8.5000	0.012
9.0000	0.009
9.5000	0.012
10.0000	0.006

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .0009411 ft/min	by: Ecology & Environment	Well: SHL-13B
TRANSMISSIVITY: .01236 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .01200 ft	AQUIFER: Endless	AYER
Data Set: SHL-13B	THICKNESS: 13.14	
	SCREEN: top: 11.27 base: 21.27	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Table: 8.130 TD: 21.27	

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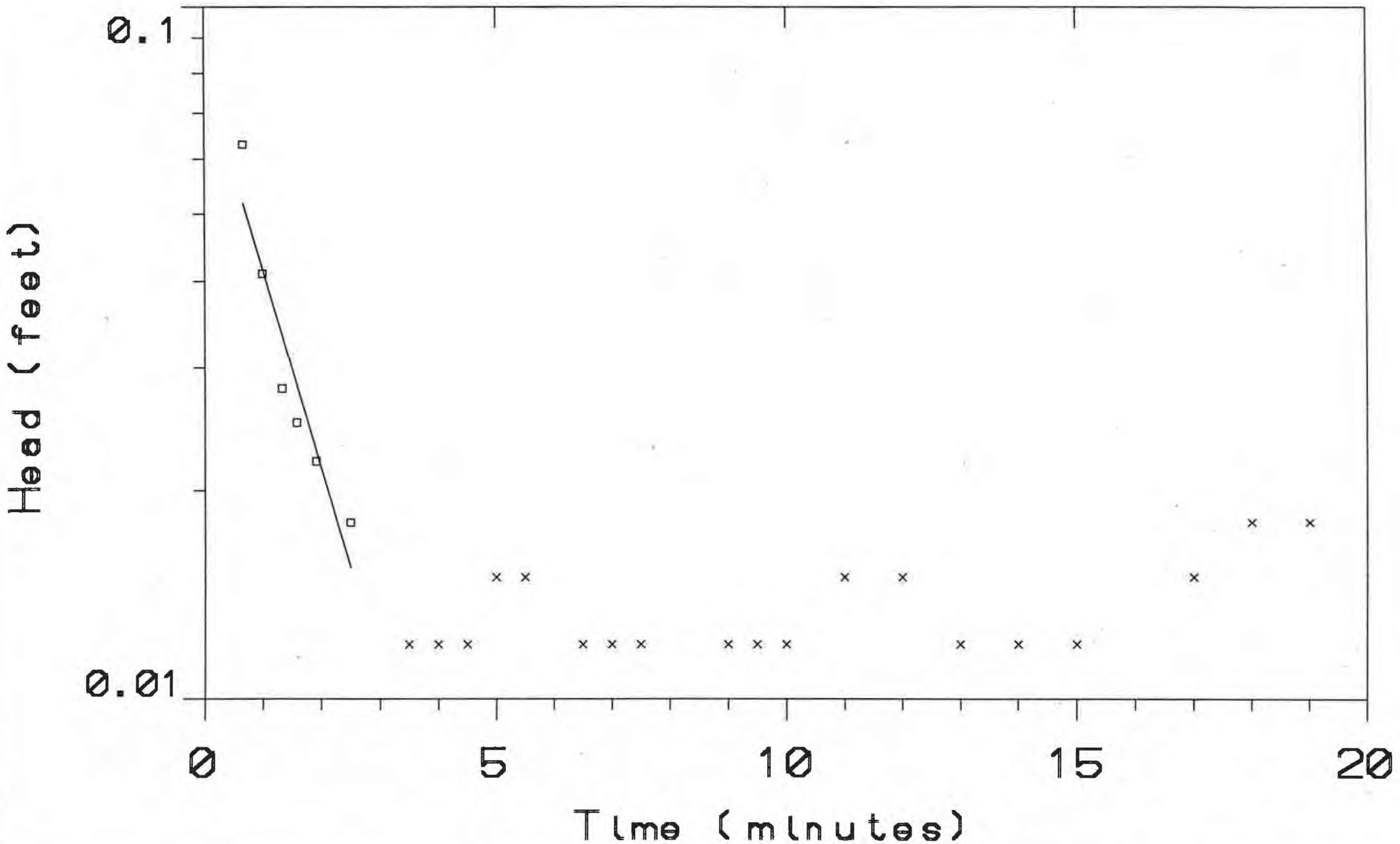
ecology and environment

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-15A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:28	Date	07/15/91
Logger Test	7	INPUT 1: Level (F)	

Step 1 07/14 15:12:56

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0000	-0.680	1.3333	-0.028
0.0083	-0.192	1.4166	-0.028
0.0166	-0.680	1.5000	-0.028
0.0250	-0.793	1.5833	-0.025
0.0333	-0.752	1.6666	-0.025
0.0416	-0.711	1.7500	-0.025
0.0500	-0.680	1.8333	-0.022
0.0583	-0.651	1.9166	-0.022
0.0666	-0.623	2.0000	-0.022
0.0750	-0.597	2.5000	-0.018
0.0833	-0.572	3.0000	-0.009
0.1000	-0.525	3.5000	-0.012
0.1166	-0.483	4.0000	-0.012
0.1333	-0.439	4.5000	-0.012
0.1500	-0.395	5.0000	-0.015
0.1666	-0.366	5.5000	-0.015
0.1833	-0.335	6.0000	-0.009
0.2000	-0.306	6.5000	-0.012
0.2166	-0.281	7.0000	-0.012
0.2333	-0.256	7.5000	-0.012
0.2500	-0.237	8.0000	-0.009
0.2666	-0.218	8.5000	-0.009
0.2833	-0.202	9.0000	-0.012
0.3000	-0.186	9.5000	-0.012
0.3166	-0.170	10.0000	-0.012
0.3333	-0.161	11.0000	-0.015
0.4166	-0.120	12.0000	-0.015
0.5000	-0.091	13.0000	-0.012
0.5833	-0.075	14.0000	-0.012
0.6666	-0.063	15.0000	-0.012
0.7500	-0.053	16.0000	-0.009
0.8333	-0.047	17.0000	-0.015
0.9166	-0.044	18.0000	-0.018
1.0000	-0.041	19.0000	-0.018
1.0833	-0.037	END	
1.1666	-0.034		
1.2500	-0.031		



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .01631 ft/min

TRANSMISSIVITY: .1164 sq. ft/min

INITIAL HEAD: .1920 ft

Data Set: SHL15

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 7.140

SCREEN: top: 16.58 base: 26.58

DIAMETER: casing: .6666 intake: .3332

DEPTH: Water Table: 19.44 TD: 26.58

Fort Devens

Well: SHL15A

Fort Devens, Mass

AYER

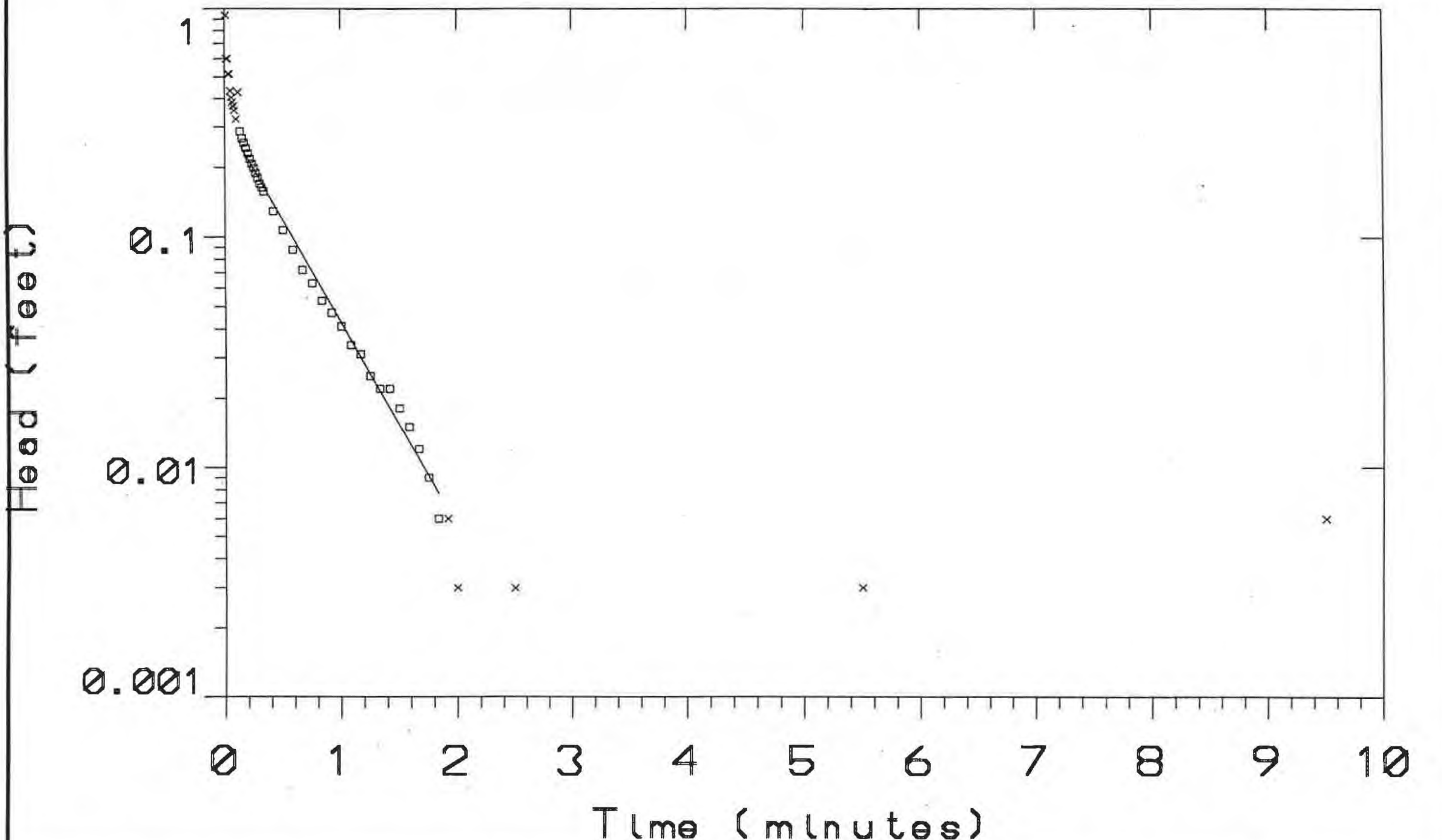
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-15B

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:30	Date	07/15/91
Logger Test	7	INPUT 1: Level (F)	

Step 0 07/14 15:10:04

Elapsed Time	INPUT 1
0.0000	-0.003
0.0083	0.933
0.0166	0.601
0.0250	0.601
0.0333	0.515
0.0416	0.515
0.0500	0.433
0.0583	0.404
0.0666	0.385
0.0750	0.370
0.0833	0.354
0.1000	0.325
0.1166	0.427
0.1333	0.287
0.1500	0.268
0.1666	0.256
0.1833	0.243
0.2000	0.230
0.2166	0.218
0.2333	0.208
0.2500	0.199
0.2666	0.189
0.2833	0.180
0.3000	0.170
0.3166	0.164
0.3333	0.158
0.4166	0.129
0.5000	0.107
0.5833	0.088
0.6666	0.072
0.7500	0.063
0.8333	0.053
0.9166	0.047
1.0000	0.041
1.0833	0.034
1.1666	0.031
1.2500	0.025
1.3333	0.022
1.4166	0.022
1.5000	0.018
1.5833	0.015
1.6666	0.012
1.7500	0.009
1.8333	0.006
1.9166	0.006
2.0000	0.003
2.5000	-0.003
3.0000	0.000

END



MODEL TYPE: BOUWER and RICE CONDUCTIVITY: .04239 ft/min TRANSMISSIVITY: .3026 sq. ft/min INITIAL HEAD: .9330 ft Data Set: SHL15B	for: USATHAMA by: Ecology & Environment WELL DATA: Units: ft AQUIFER: Endless THICKNESS: 7.140 SCREEN: top: 16.58 base: 26.58 DIAMETER: casing: .6666 intake: .3332 DEPTH: Water Table: 19.44 TD: 26.58	Fort Devens Well: SHL15B Fort Devens, Mass AYER

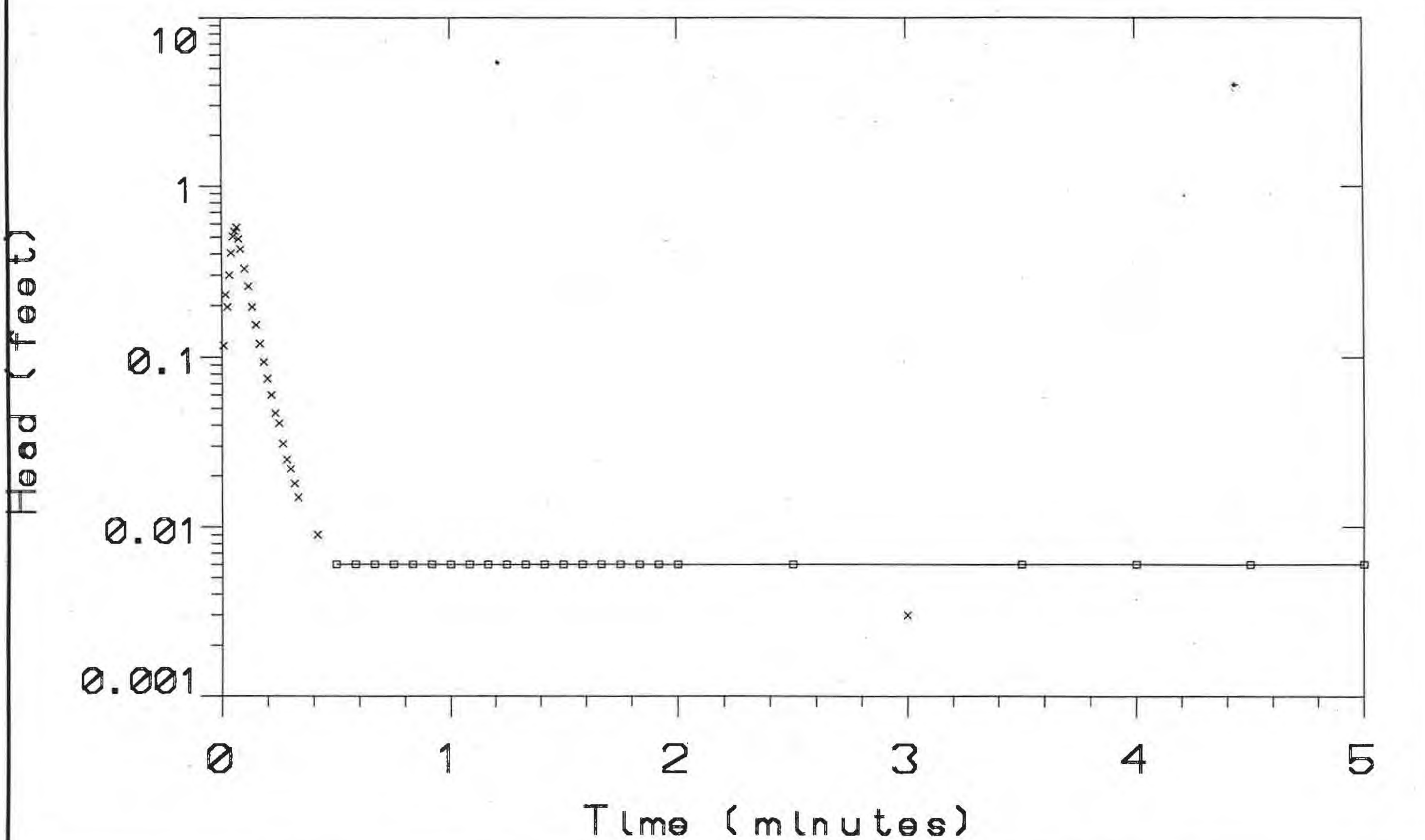
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-17A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	05:35	Date	07/12/91
Logger Test	8	INPUT 1: Level (F)	

Step 1 07/11 16:26:24

Elapsed Time	INPUT 1
0.0000	-0.173
0.0083	-0.117
0.0166	0.230
0.0250	-0.196
0.0333	-0.300
0.0416	-0.404
0.0500	-0.506
0.0583	-0.540
0.0666	-0.572
0.0750	-0.487
0.0833	-0.427
0.1000	-0.328
0.1166	-0.259
0.1333	-0.196
0.1500	-0.154
0.1666	-0.120
0.1833	-0.094
0.2000	-0.075
0.2166	-0.060
0.2333	-0.047
0.2500	-0.041
0.2666	-0.031
0.2833	-0.025
0.3000	-0.022
0.3166	-0.018
0.3333	-0.015
0.4166	-0.009
0.5000	-0.006
0.5833	-0.006
0.6666	-0.006
0.7500	-0.006
0.8333	-0.006
0.9166	-0.006
1.0000	-0.006
1.0833	-0.006
1.1666	-0.006
1.2500	-0.006
1.3333	-0.006
1.4166	-0.006
1.5000	-0.006
1.5833	-0.006
1.6666	-0.006
1.7500	-0.006
1.8333	-0.006
1.9166	-0.006
2.0000	-0.006
2.5000	-0.006
3.0000	-0.003
3.5000	-0.006
4.0000	-0.006
4.5000	-0.006
5.0000	-0.006
5.5000	-0.006
6.0000	-0.006
6.5000	-0.006
7.0000	-0.006
7.5000	-0.006
8.0000	-0.006
8.5000	-0.006
9.0000	-0.006
9.5000	-0.006

END



MODEL TYPE: BOUWER and RICE
CONDUCTIVITY: .005460 ft/min
TRANSMISSIVITY: .05526 sq. ft/min
INITIAL HEAD: .1170 ft
Data Set: SHL-17A

for: USATHAMA
by: Ecology & Environment
WELL DATA: Units: ft
AQUIFER: Endless
THICKNESS: 10.12
SCREEN: top: 8.600 base: 18.60
DIAMETER: casing: .6666 intake: .3332
DEPTH: Water Table: 8.480 TD: 18.60

Fort Devens

Well: SHL-17A
Fort Devens, Mass
AYER

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ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-17B

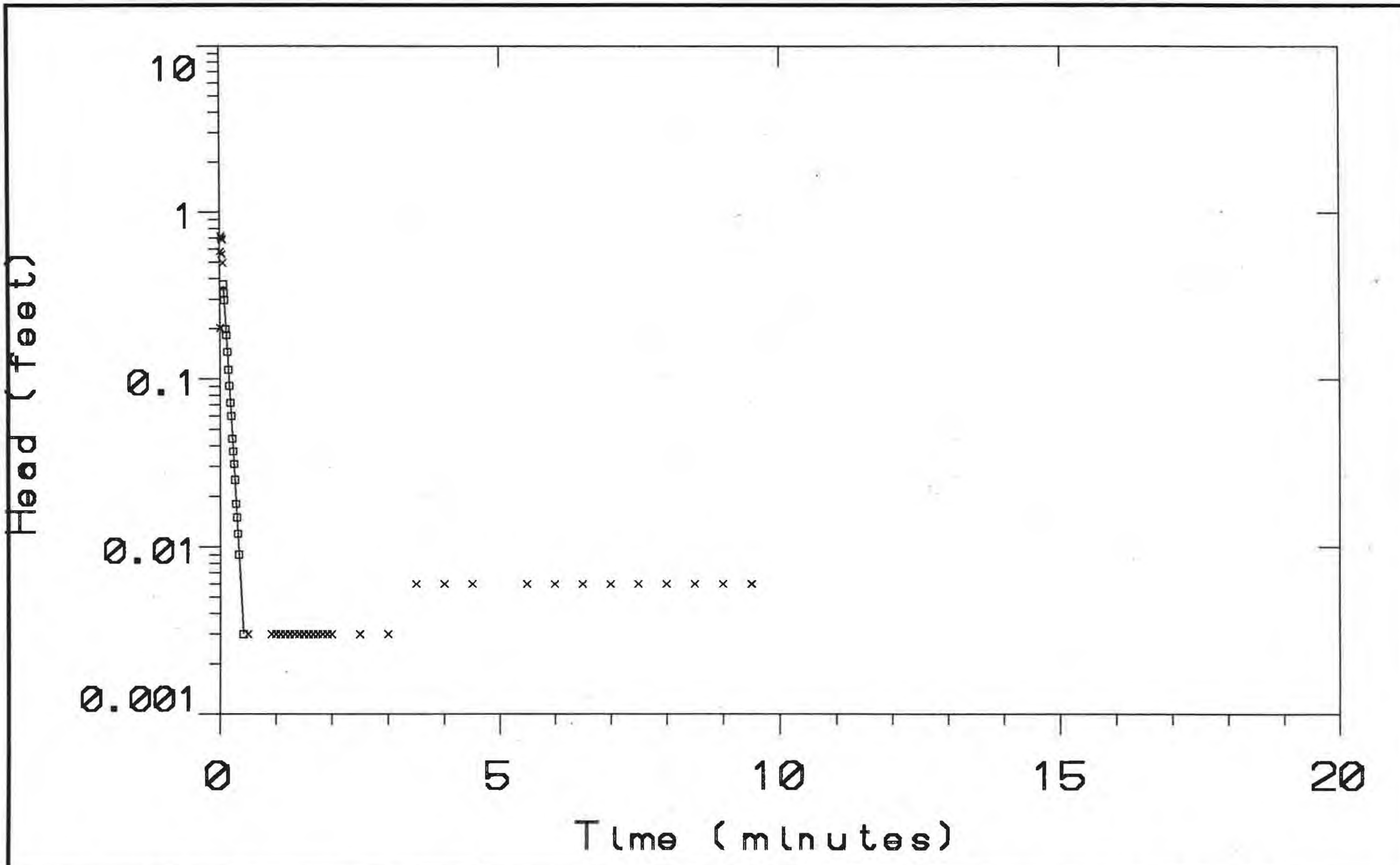
Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	05:37		Date	07/12/91
Logger Test	8		INPUT 1: Level (F)	

Step 0 07/11 16:21:54

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	0.202
0.0166	0.582
0.0250	0.718
0.0333	0.695
0.0416	0.559
0.0500	0.683
0.0583	0.496
0.0666	0.370
0.0750	0.328
0.0833	0.297
0.1000	0.199
0.1166	0.183
0.1333	0.145
0.1500	0.113
0.1666	0.091
0.1833	0.072
0.2000	0.060
0.2166	0.044
0.2333	0.037
0.2500	0.031
0.2666	0.025
0.2833	0.018
0.3000	0.015
0.3166	0.012
0.3333	0.009
0.4166	0.003
0.5000	0.003
0.5833	0.000
0.6666	0.000
0.7500	0.000
0.8333	0.000
0.9166	-0.003
1.0000	-0.003
1.0833	-0.003
1.1666	-0.003
1.2500	-0.003

Elapsed Time	INPUT 1
1.3333	-0.003
1.4166	-0.003
1.5000	-0.003
1.5833	-0.003
1.6666	-0.003
1.7500	-0.003
1.8333	-0.003
1.9166	-0.003
2.0000	-0.003
2.5000	-0.003
3.0000	-0.003
3.5000	-0.006
4.0000	-0.006
4.5000	-0.006

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .1761 ft/min	by: Ecology & Environment	Well: SHL-17B
TRANSMISSIVITY: 1.783 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .2020 ft	AQUIFER: Endless	AYER
Data Set: SHL-17B	THICKNESS: 10.12	
	SCREEN: top: 8.600 base: 18.60	
	DIAMETER: casing: .6666 intake: .3332	
	DEPTH: Water Table: 8.480 TD: 18.60	

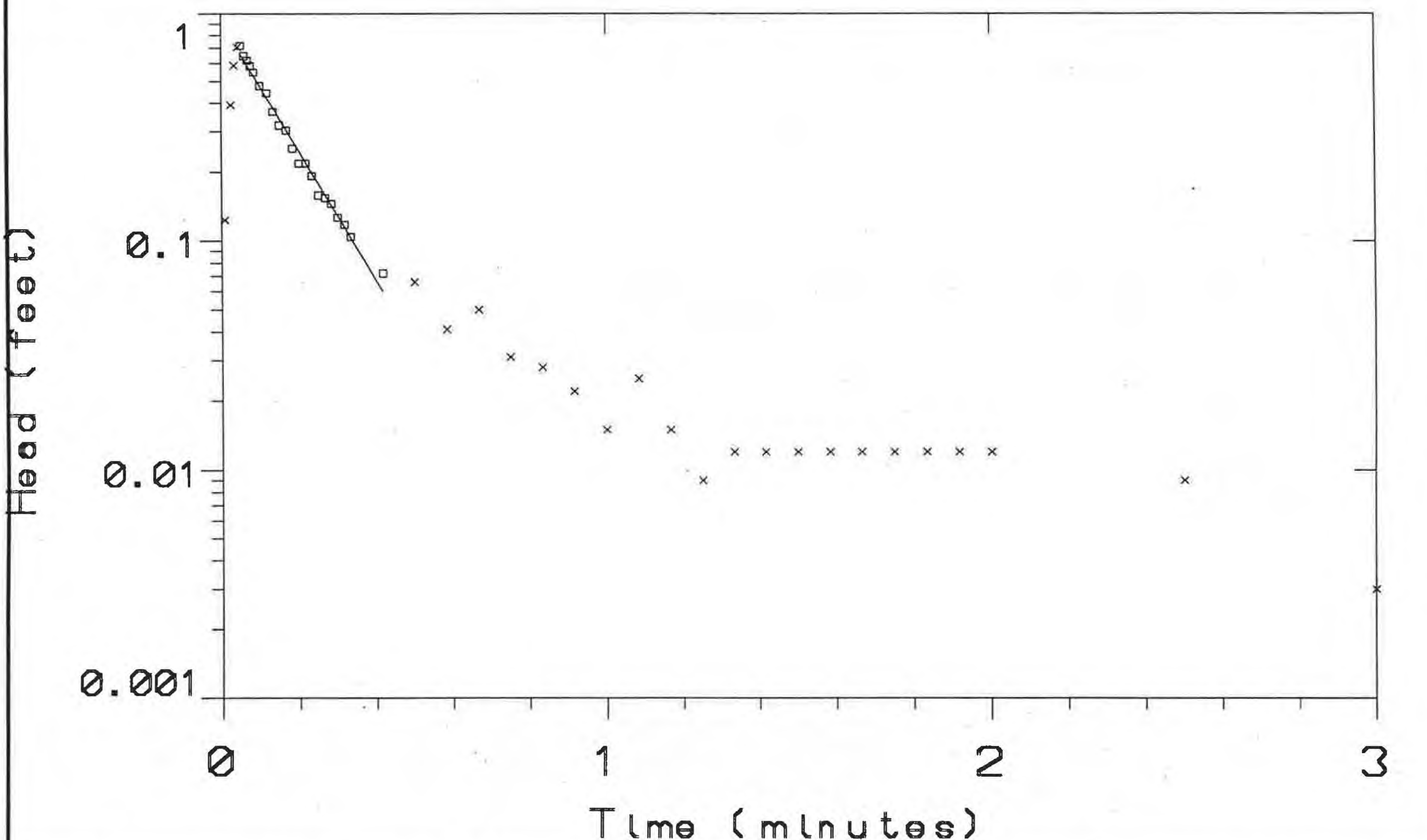
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-18A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	11:24	Date	07/12 /91
Logger Test	2	INPUT 1: Level (F)	

Step 1 07/12 09:00:45

Elapsed Time	INPUT 1
0.0000	-0.066
0.0083	-0.123
0.0166	0.025
0.0250	-0.392
0.0333	-0.588
0.0416	-0.708
0.0500	-0.718
0.0583	-0.648
0.0666	-0.619
0.0750	-0.585
0.0833	-0.547
0.1000	-0.477
0.1166	-0.442
0.1333	-0.366
0.1500	-0.319
0.1666	-0.303
0.1833	-0.253
0.2000	-0.218
0.2166	-0.218
0.2333	-0.192
0.2500	-0.158
0.2666	-0.154
0.2833	-0.145
0.3000	-0.126
0.3166	-0.117
0.3333	-0.104
0.4166	-0.072
0.5000	-0.066
0.5833	-0.041
0.6666	-0.050
0.7500	-0.031
0.8333	-0.028
0.9166	-0.022
1.0000	-0.015
1.0833	-0.025
1.1666	-0.015
1.2500	-0.009

Elapsed Time	INPUT 1
1.3333	-0.012
1.4166	-0.012
1.5000	-0.012
1.5833	-0.012
1.6666	-0.012
1.7500	-0.012
1.8333	-0.012
1.9166	-0.012
2.0000	-0.012
2.5000	-0.009
3.0000	-0.003



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .02904 ft/min	by: Ecology & Environment	Well: SHL-18A
TRANSMISSIVITY: .2451 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .1230 ft	AQUIFER: Endless	AYER
Data Set: SHL-18A	THICKNESS: 8.440	
	SCREEN: top: 18.54 base: 28.54	
	DIAMETER: casing: .6666 intake: .3332	
	DEPTH: Water Table: 20.10 TD: 28.54	

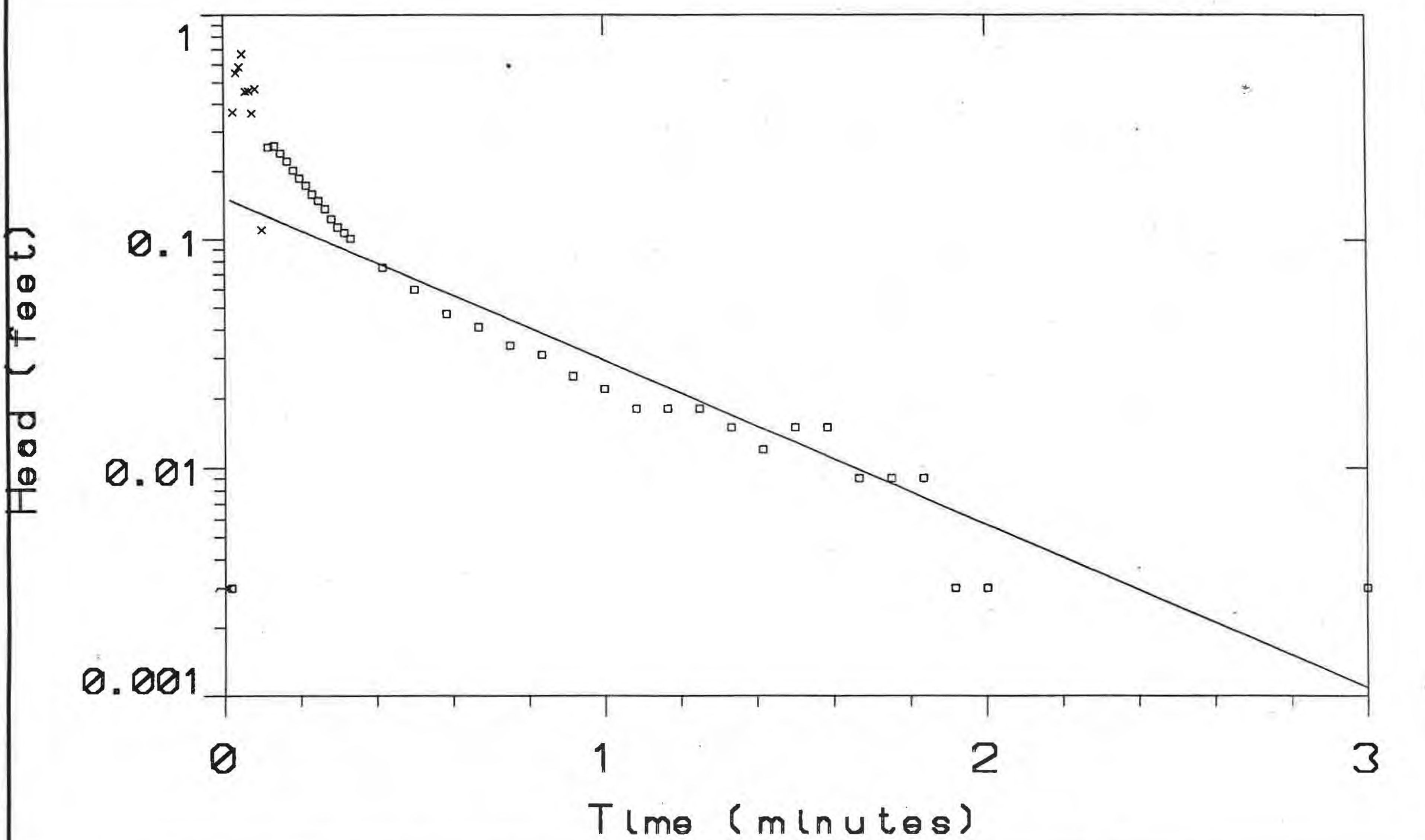
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-18B

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	11:25	Date	07/12 /91
Logger Test	2	INPUT 1: Level (F)	

Step 0 07/12 08:57:54

Elapsed Time	INPUT 1
0.0000	-0.003
0.0083	-0.003
0.0166	-0.003
0.0250	0.366
0.0333	0.550
0.0416	0.585
0.0500	0.670
0.0583	0.455
0.0666	0.458
0.0750	0.363
0.0833	0.468
0.1000	0.110
0.1166	0.256
0.1333	0.259
0.1500	0.240
0.1666	0.221
0.1833	0.202
0.2000	0.186
0.2166	0.173
0.2333	0.158
0.2500	0.148
0.2666	0.136
0.2833	0.123
0.3000	0.113
0.3166	0.107
0.3333	0.101
0.4166	0.075
0.5000	0.060
0.5833	0.047
0.6666	0.041
0.7500	0.034
0.8333	0.031
0.9166	0.025
1.0000	0.022
1.0833	0.018
1.1666	0.018
1.2500	0.018

Elapsed Time	INPUT 1
1.3333	0.015
1.4166	0.012
1.5000	0.015
1.5833	0.015
1.6666	0.009
1.7500	0.009
1.8333	0.009
1.9166	0.003
2.0000	0.003
2.5000	0.000



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .005687 ft/min	by: Ecology & Environment	Well: SHL-18B
TRANSMISSIVITY: .04800 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .003000 ft	AQUIFER: Endless	AYER
	THICKNESS: 8.440	
	SCREEN: top: 18.54 base: 28.54	
	DIAMETER: casing: .6666 intake: .3332	
	DEPTH: Water Table: 20.10 TD: 28.54	

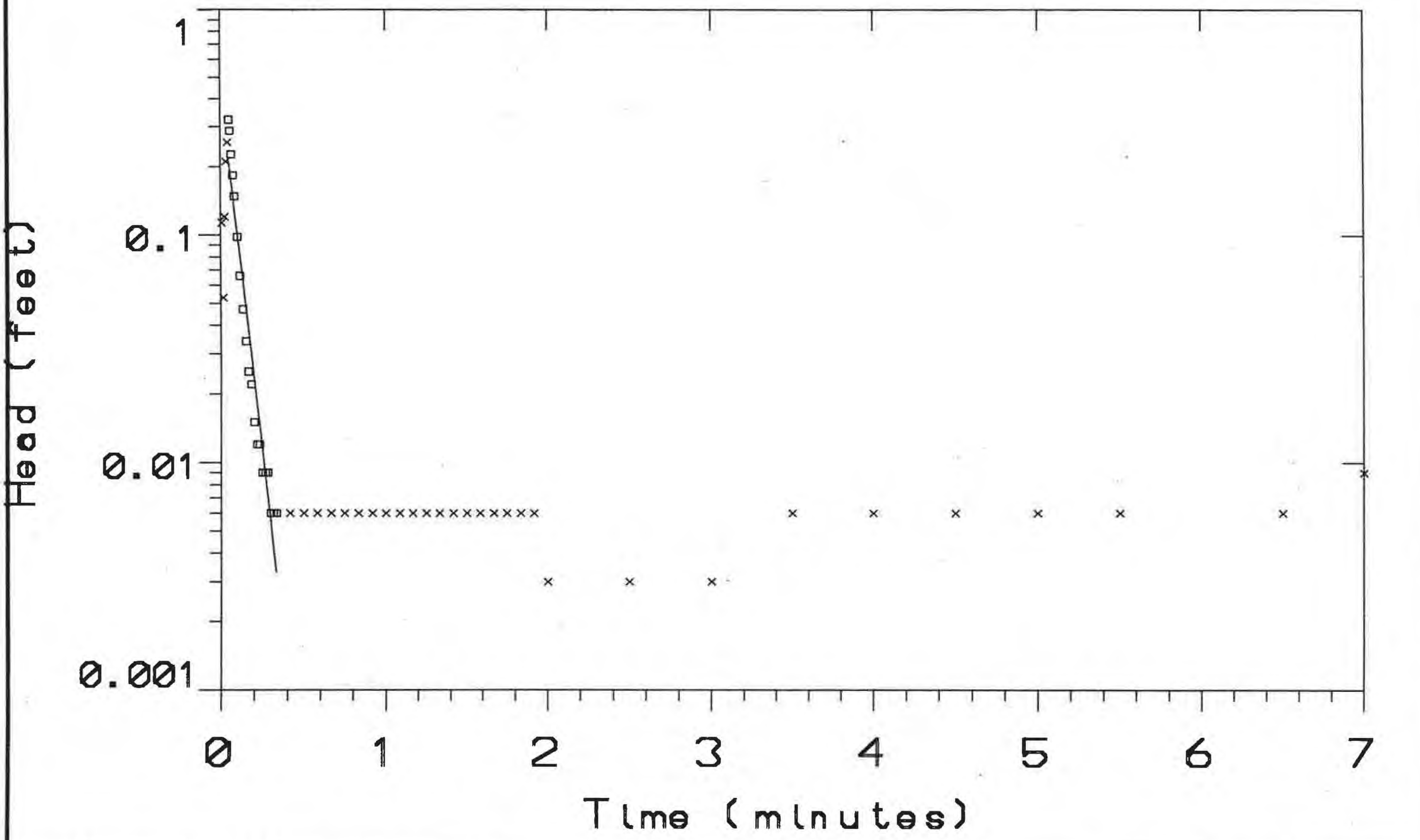
A-57

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-19A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	11:26	Date	07/12 /91
Logger Test	1	INPUT 1: Level (F)	

Step 1 07/12 07:50:03

Elapsed Time	INPUT 1
0.0000	-0.006
0.0083	-0.113
0.0166	-0.053
0.0250	-0.120
0.0333	-0.211
0.0416	-0.256
0.0500	-0.322
0.0583	-0.287
0.0666	-0.227
0.0750	-0.183
0.0833	-0.148
0.1000	-0.098
0.1166	-0.066
0.1333	-0.047
0.1500	-0.034
0.1666	-0.025
0.1833	-0.022
0.2000	-0.015
0.2166	-0.012
0.2333	-0.012
0.2500	-0.009
0.2666	-0.009
0.2833	-0.009
0.3000	-0.006
0.3166	-0.006
0.3333	-0.006
0.4166	-0.006
0.5000	-0.006
0.5833	-0.006
0.6666	-0.006
0.7500	-0.006
0.8333	-0.006
0.9166	-0.006
1.0000	-0.006
1.0833	-0.006
1.1666	-0.006
1.2500	-0.006
1.3333	-0.006
1.4166	-0.006
1.5000	-0.006
1.5833	-0.006
1.6666	-0.006
1.7500	-0.006
1.8333	-0.006
1.9166	-0.006
2.0000	-0.003
2.5000	-0.003
3.0000	-0.003
3.5000	-0.006
4.0000	-0.006
4.5000	-0.006
5.0000	-0.006
5.5000	-0.006
6.0000	0.000
6.5000	-0.006
7.0000	-0.009



MODEL TYPE: BOUWER and RICE
CONDUCTIVITY: .2543 ft/min
TRANSMISSIVITY: 2.231 sq. ft/min
INITIAL HEAD: .1100 ft
Data Set: SHL-19A

for: USATHAMA
by: Ecology & Environment
WELL DATA: Units: ft
AQUIFER: Endless
THICKNESS: 8.770
SCREEN: top: 22.53 base: 32.53
DIAMETER: casing: .6666 intake: .3332
DEPTH: Water Table: 23.76 TD: 32.53

Fort Devens

Well: SHL-19A

Fort Devens, Mass

AYER

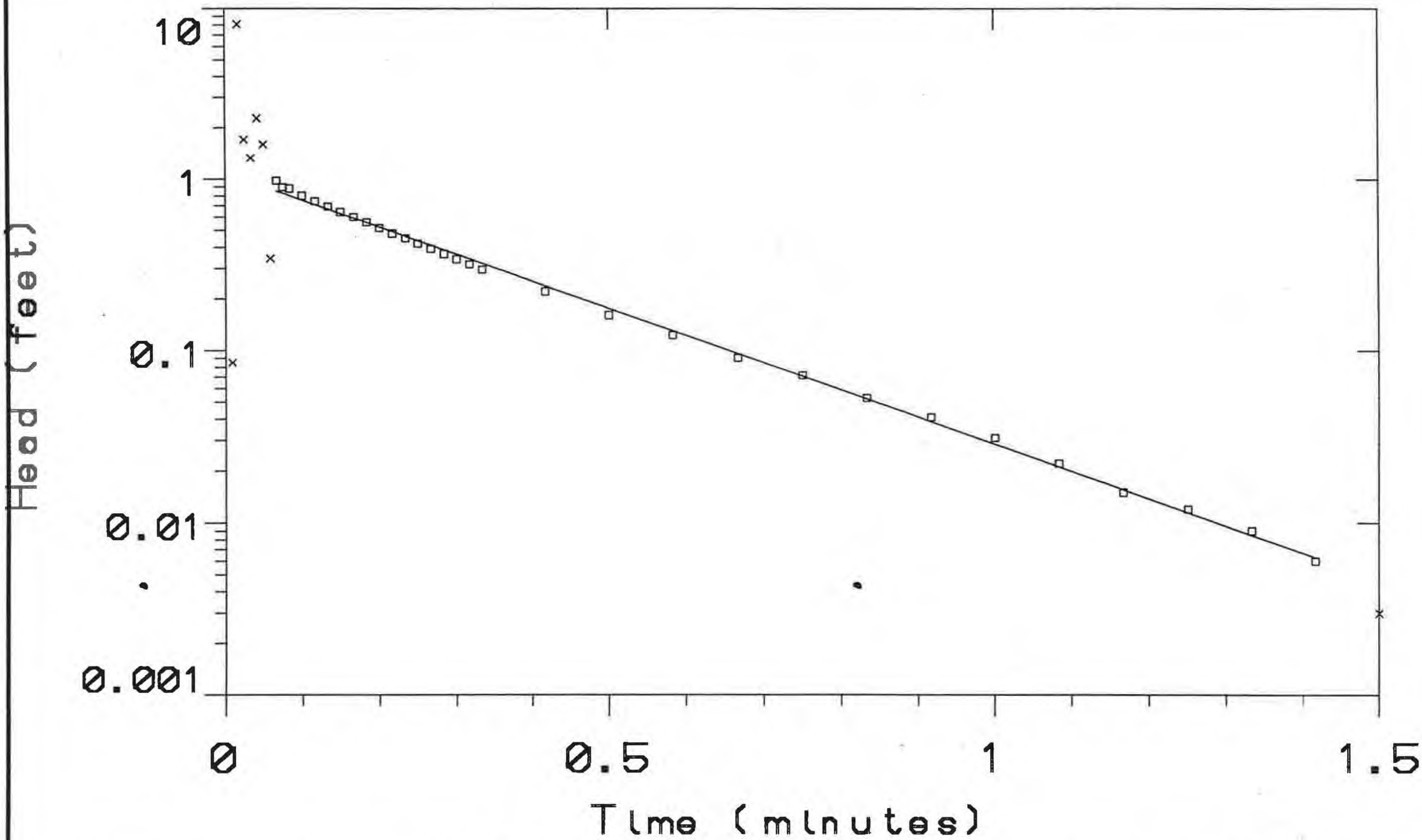
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-19B

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time		Date	07/12/91
Logger Test	1	INPUT 1: Level (F)	

Step 1 07/12

Elapsed Time	INPUT 1
0.0083	0.0850
0.0166	8.1070
0.0250	1.7010
0.0333	1.3310
0.0416	2.2680
0.0500	1.5910
0.0583	0.3440
0.0666	0.9800
0.0750	0.8950
0.0833	0.8820
0.1000	0.8000
0.1166	0.7430
0.1333	0.6920
0.1500	0.6420
0.1666	0.6010
0.1833	0.5590
0.2000	0.5180
0.2166	0.4800
0.2333	0.4520
0.2500	0.4200
0.2666	0.3920
0.2833	0.3660
0.3000	0.3410
0.3166	0.3190
0.3333	0.2970
0.4166	0.2210
0.5000	0.1610
0.5833	0.1230
0.6666	0.0910
0.7500	0.0720
0.8333	0.0530
0.9166	0.0410
1.0000	0.0310
1.0833	0.0220
1.1666	0.0150
1.2500	0.0120
1.3333	0.0090
1.4166	0.0060
1.5000	0.0030

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Well Slug Test Data
CONDUCTIVITY: .002650 ft/min	by: Ecology & Environment	Well: SHL-19B
TRANSMISSIVITY: .02324 sq. ft/min	WELL DATA: Units: ft AQUIFER: Endless THICKNESS: 8.770	FORT DEVENS, MASS
INITIAL HEAD: .08500 ft	SCREEN: top: 13.76 base: 28.76 DIAMETER: casing: .2500 intake: .2500	AYER
Data Set: SHL-19B Date: 13-JUL-91	DEPTH: Water Table: 23.76 TD: 32.53	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-20A

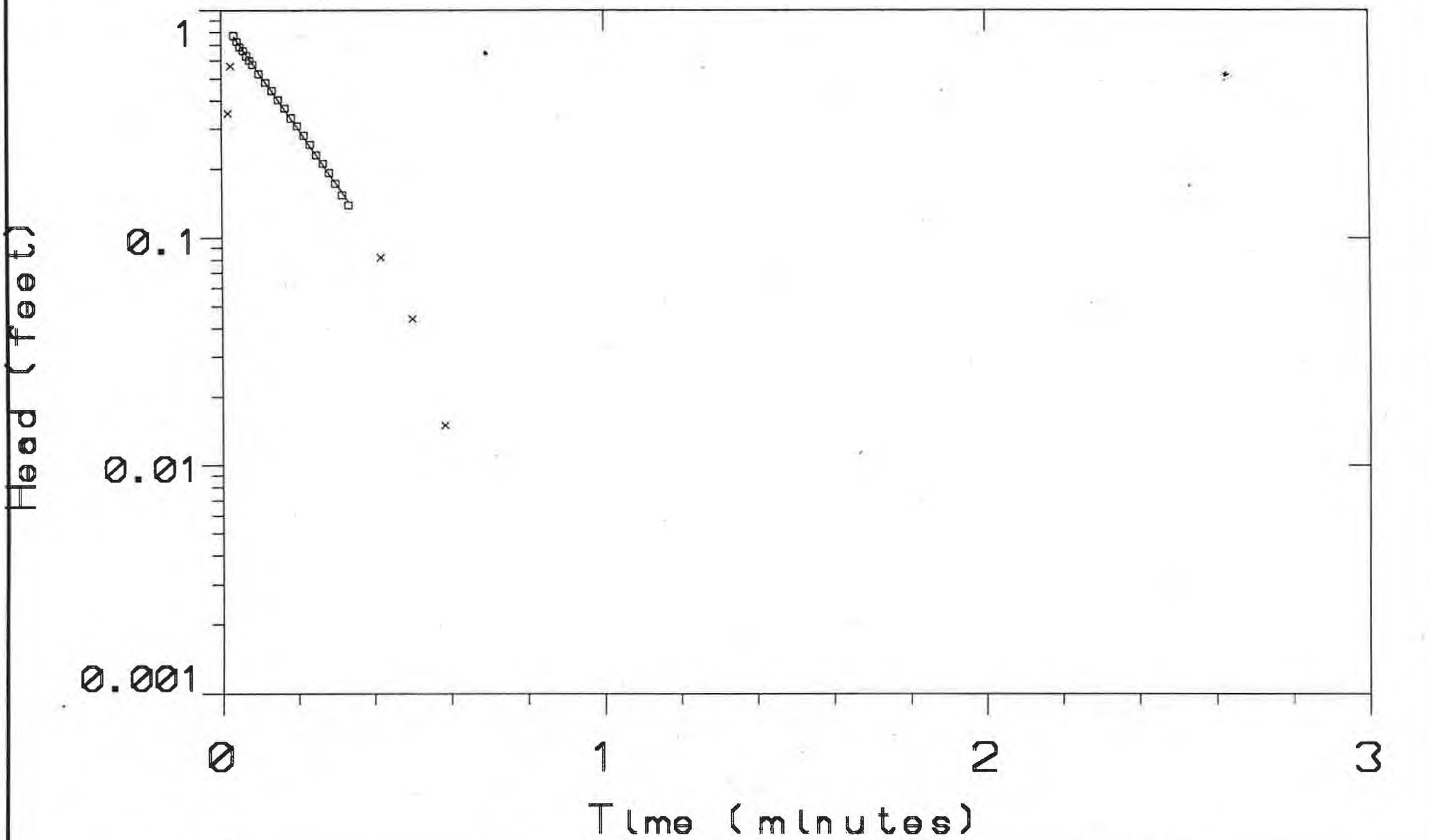
Reference	0.000	Scale Factor	r 10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:32	Date	07/15/91
Logger Test	6	INPUT 1: Level (F)	

Step 1 07/14 14:34:12

Elapsed Time	INPUT 1
0.0000	-0.142
0.0083	0.000
0.0166	-0.351
0.0250	-0.566
0.0333	-0.771
0.0416	-0.727
0.0500	-0.689
0.0583	-0.661
0.0666	-0.629
0.0750	-0.601
0.0833	-0.575
0.1000	-0.525
0.1166	-0.480
0.1333	-0.442
0.1500	-0.404
0.1666	-0.370
0.1833	-0.335
0.2000	-0.309
0.2166	-0.281
0.2333	-0.256
0.2500	-0.230
0.2666	-0.211
0.2833	-0.192
0.3000	-0.173
0.3166	-0.154
0.3333	-0.139
0.4166	-0.082
0.5000	-0.044
0.5833	-0.015
0.6666	0.000
0.7500	0.000
0.8333	0.000
0.9166	0.000
1.0000	0.000
1.0833	0.000
1.1666	0.000
1.2500	0.000

Elapsed Time	INPUT 1
1.3333	0.000
1.4166	0.000
1.5000	0.000
1.5833	0.000
1.6666	0.000
1.7500	0.000
1.8333	0.000
1.9166	0.000
2.0000	0.000
2.5000	0.000

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .05693 ft/min

TRANSMISSIVITY: 1.764 sq. ft/min

INITIAL HEAD: .3510 ft

Data Set: SHL-20A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 31.00

SCREEN: top: 40.34 base: 50.34

DIAMETER: casing: .6666 intake: .3332

DEPTH: Water Table: 19.34 TD: 50.34

Fort Devens

Well: SHL-20A

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-20B

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:34	Date	07/15/91
Logger Test	6	INPUT 1: Level (F)	

Step 0 07/14 14:31:38

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	0.000
0.0166	0.000
0.0250	-0.227
0.0333	0.000
0.0416	0.000
0.0500	0.000
0.0583	0.000
0.0666	0.000
0.0750	0.000
0.0833	0.000
0.1000	0.000
0.1166	0.000
0.1333	0.000
0.1500	0.000
0.1666	0.000
0.1833	0.000
0.2000	0.000
0.2166	0.000
0.2333	0.000
0.2500	0.000
0.2666	0.000
0.2833	0.000
0.3000	0.000
0.3166	0.000
0.3333	0.000
0.4166	0.000
0.5000	0.000
0.5833	0.000
0.6666	0.000
0.7500	0.000
0.8333	0.000
0.9166	0.000
1.0000	0.000
1.0833	0.000
1.1666	0.000
1.2500	0.000
1.3333	0.000
1.4166	0.000
1.5000	0.000
1.5833	0.000
1.6666	0.000
1.7500	0.000
1.8333	0.000
1.9166	0.000
2.0000	0.000
2.5000	0.000

END

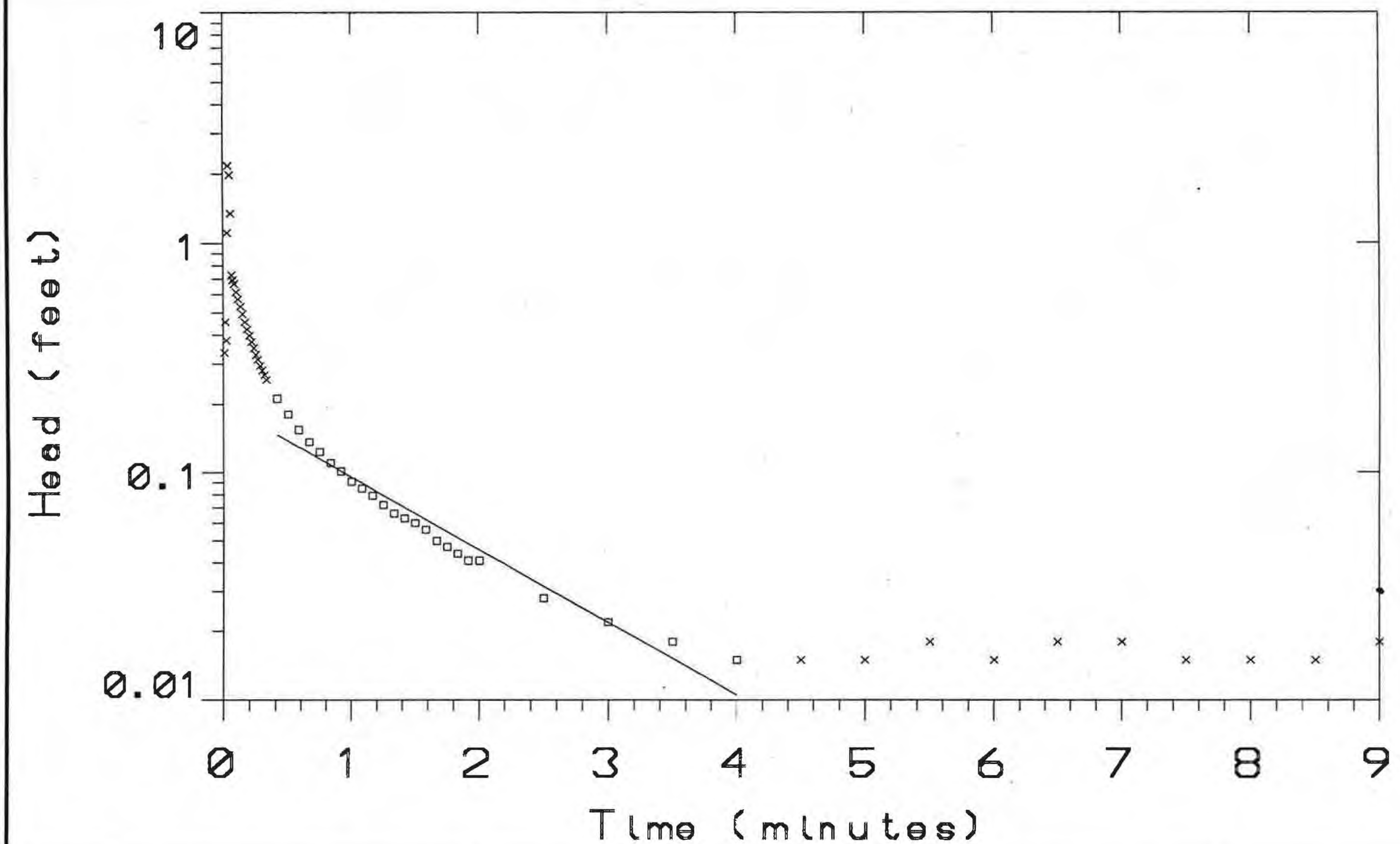
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-21A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:40	Date	07/15/91
Logger Test	4	INPUT 1: Level (F)	

Step 1 07/14 12:35:55

Elapsed Time	INPUT 1
0.0000	0.006
0.0083	-0.335
0.0166	0.455
0.0250	-0.379
0.0333	-1.113
0.0416	-2.173
0.0500	-1.977
0.0583	-1.350
0.0666	-0.727
0.0750	-0.695
0.0833	-0.667
0.1000	-0.616
0.1166	-0.572
0.1333	-0.531
0.1500	-0.493
0.1666	-0.455
0.1833	-0.423
0.2000	-0.398
0.2166	-0.373
0.2333	-0.351
0.2500	-0.328
0.2666	-0.313
0.2833	-0.294
0.3000	-0.281
0.3166	-0.268
0.3333	-0.256
0.4166	-0.211
0.5000	-0.180
0.5833	-0.154
0.6666	-0.136
0.7500	-0.123
0.8333	-0.110
0.9166	-0.101
1.0000	-0.091
1.0833	-0.085
1.1666	-0.079
1.2500	-0.072
1.3333	-0.066
1.4166	-0.063
1.5000	-0.060
1.5833	-0.056
1.6666	-0.050
1.7500	-0.047
1.8333	-0.044
1.9166	-0.041
2.0000	-0.041
2.5000	-0.028
3.0000	-0.022
3.5000	-0.018
4.0000	-0.015
4.5000	-0.015
5.0000	-0.015
5.5000	-0.018
6.0000	-0.015
6.5000	-0.018
7.0000	-0.018
7.5000	-0.015
8.0000	-0.015
8.5000	-0.015
9.0000	-0.018

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .02006 ft/min

TRANSMISSIVITY: .1673 sq. ft/min

INITIAL HEAD: .3350 ft

Data Set: SHL21A2

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 8.340

SCREEN: top: 44.42 base: 54.42

DIAMETER: casing: .6666 intake: .3332

DEPTH: Water Tab: 46.08 TD: 54.42

Fort Devens

Well: SHL21A

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-21B

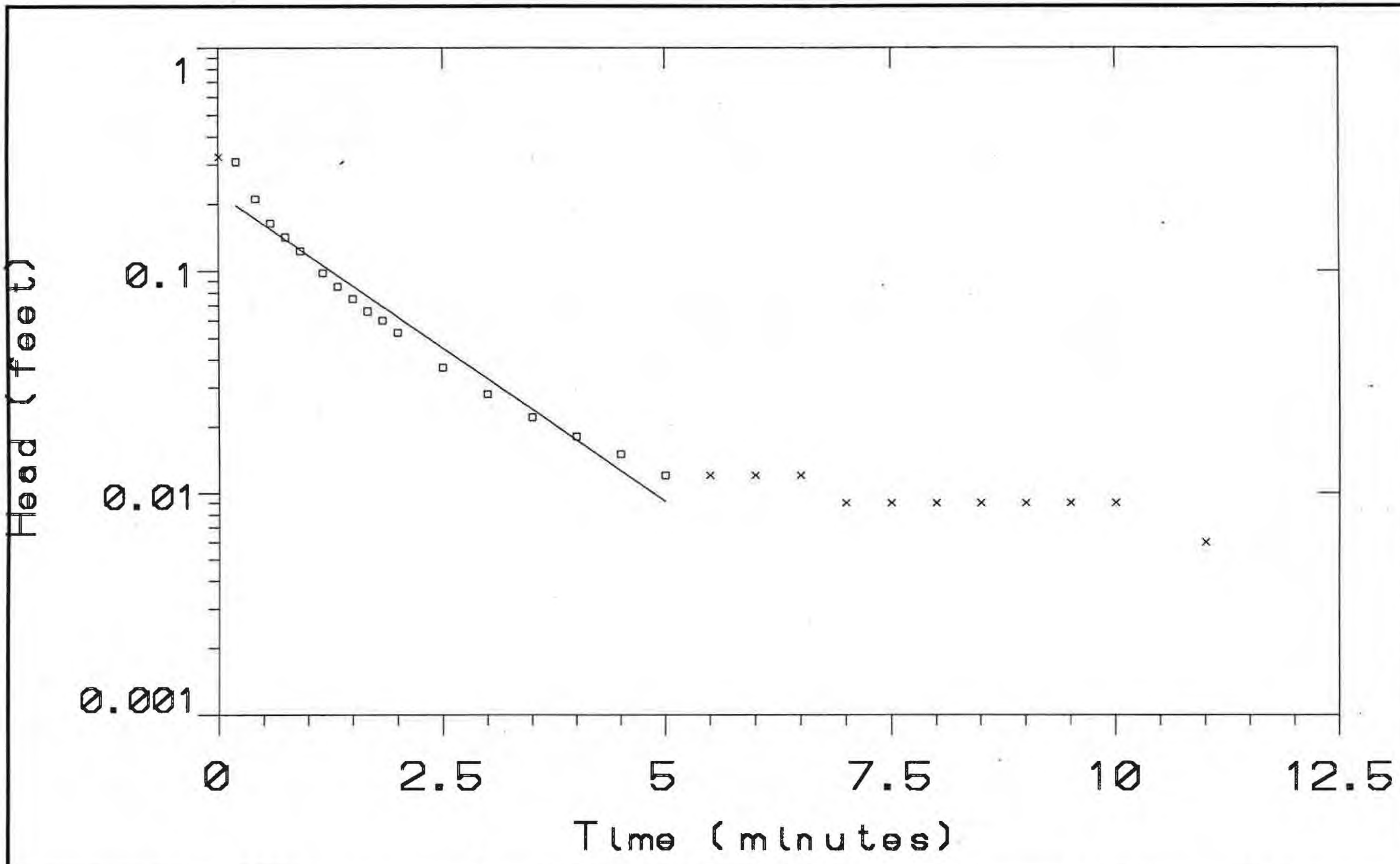
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:42	Date	07/15/91
Logger Test	4	INPUT 1: Level (F)	

Step 0 07/14 12:25:01

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	0.325
0.0166	-1.866
0.0250	0.695
0.0333	0.623
0.0416	0.518
0.0500	0.442
0.0583	0.449
0.0666	0.430
0.0750	0.417
0.0833	0.404
0.1000	0.385
0.1166	0.370
0.1333	0.357
0.1500	0.344
0.1666	0.332
0.1833	0.322
0.2000	0.309
0.2166	0.300
0.2333	0.291
0.2500	0.281
0.2666	0.272
0.2833	0.262
0.3000	0.256
0.3166	0.249
0.3333	0.240
0.4166	0.211
0.5000	0.186
0.5833	0.164
0.6666	0.154
0.7500	0.142
0.8333	0.132
0.9166	0.123
1.0000	0.113
1.0833	0.107
1.1666	0.098
1.2500	0.091

Elapsed Time	INPUT 1
1.3333	0.085
1.4166	0.082
1.5000	0.075
1.5833	0.072
1.6666	0.066
1.7500	0.063
1.8333	0.060
1.9166	0.056
2.0000	0.053
2.5000	0.037
3.0000	0.028
3.5000	0.022
4.0000	0.018
4.5000	0.015
5.0000	0.012
5.5000	0.012
6.0000	0.012
6.5000	0.012
7.0000	0.009
7.5000	0.009
8.0000	0.009
8.5000	0.009
9.0000	0.009
9.5000	0.009
10.0000	0.009
11.0000	0.006

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .01655 ft/min

TRANSMISSIVITY: .1380 sq. ft/min

INITIAL HEAD: .3250 ft

Da[illegible]: SHL21B2

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 8.340

SCREEN: top: 44.42 base: 54.42

DIAMETER: casing: .6666 intake: .3332

DEPTH: Water Tab[illegible] 46.08 TD: 54.42

Fort Devens

Well: SHL21B

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-22

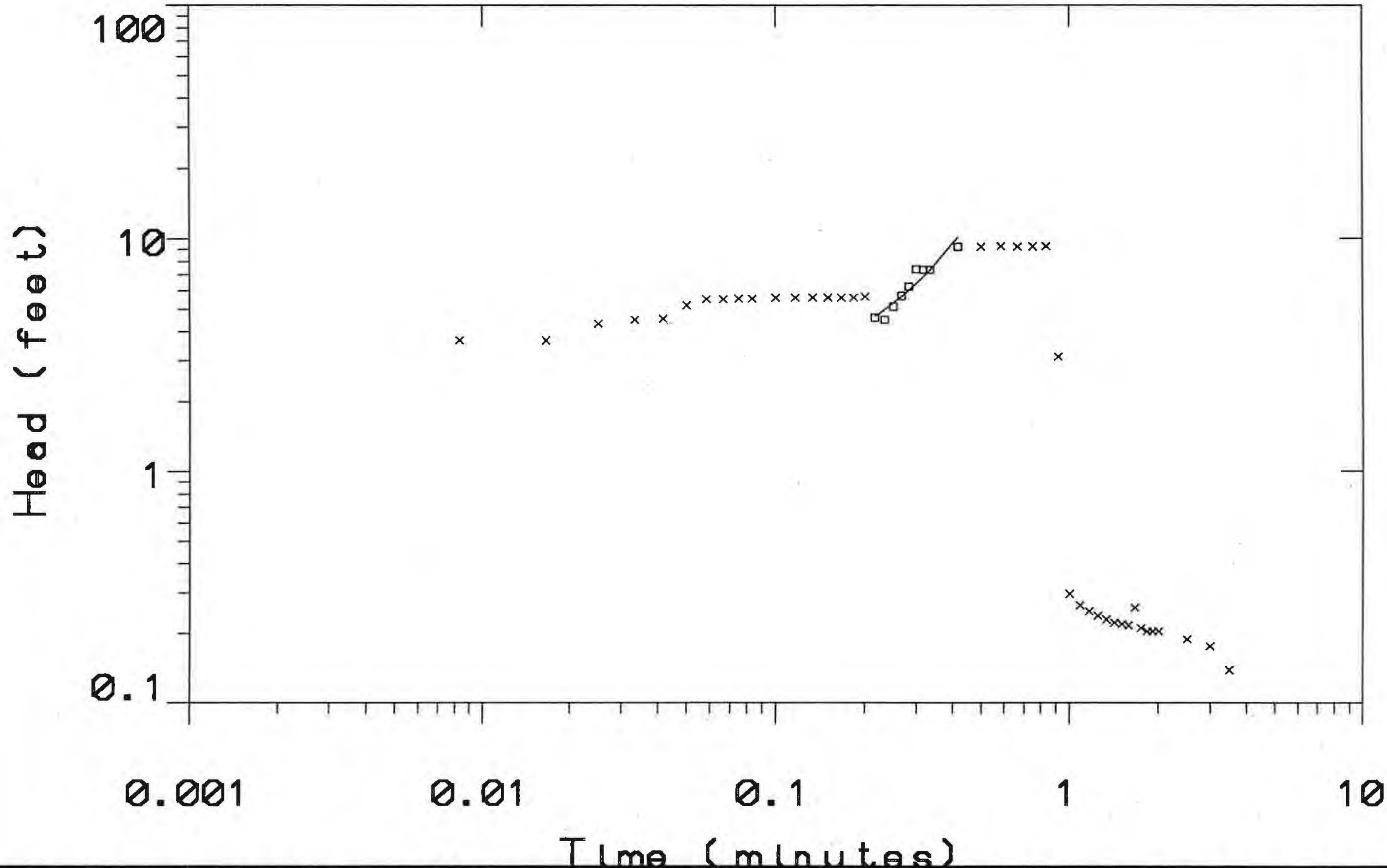
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time		Date	07/13/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/13

Elapsed Time	INPUT 1
0.0083	3.6570
0.0166	3.6510
0.0250	4.3130
0.0333	4.4800
0.0416	4.5340
0.0500	5.1740
0.0583	5.5080
0.0666	5.5050
0.0750	5.5270
0.0833	5.5300
0.1000	5.5810
0.1166	5.5840
0.1333	5.5810
0.1500	5.5810
0.1666	5.5840
0.1833	5.5870
0.2000	5.6280
0.2166	4.5650
0.2333	4.4580
0.2500	5.1020
0.2666	5.6750
0.2833	6.2080
0.3000	7.3560
0.3166	7.3180
0.3333	7.3180
0.4166	9.2100
0.5000	9.2040
0.5833	9.2320
0.6666	9.2010
0.7500	9.2230
0.8333	9.2420
0.9166	3.0990
1.0000	0.2960
1.0833	0.2640
1.1666	0.2490
1.2500	0.2390
1.3333	0.2300

Elapsed Time	INPUT 1
1.4166	0.2230
1.5000	0.2200
1.5833	0.2170
1.6666	0.2580
1.7500	0.2110
1.8333	0.2040
1.9166	0.2040
2.0000	0.2040
2.5000	0.1890
3.0000	0.1760
3.5000	0.1390

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: -.0004512 ft/min

TRANSMISSIVITY: UNKNOWN

INITIAL HEAD: 3.660 ft

D[illegible] t: SHL-22A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 122.0

SCREEN: top: 24.00 base: 122.0

DIAMETER: casing: .1520 intake: .1520

DEPTH: Water Tab[illegible] 0.000 TD: 122.0

Well Slug Test Data

Well: SHL-22

FORT DEVENS, MASS

AYER

ECOLOGY AND ENVIRONMENT

Water Level Indicator

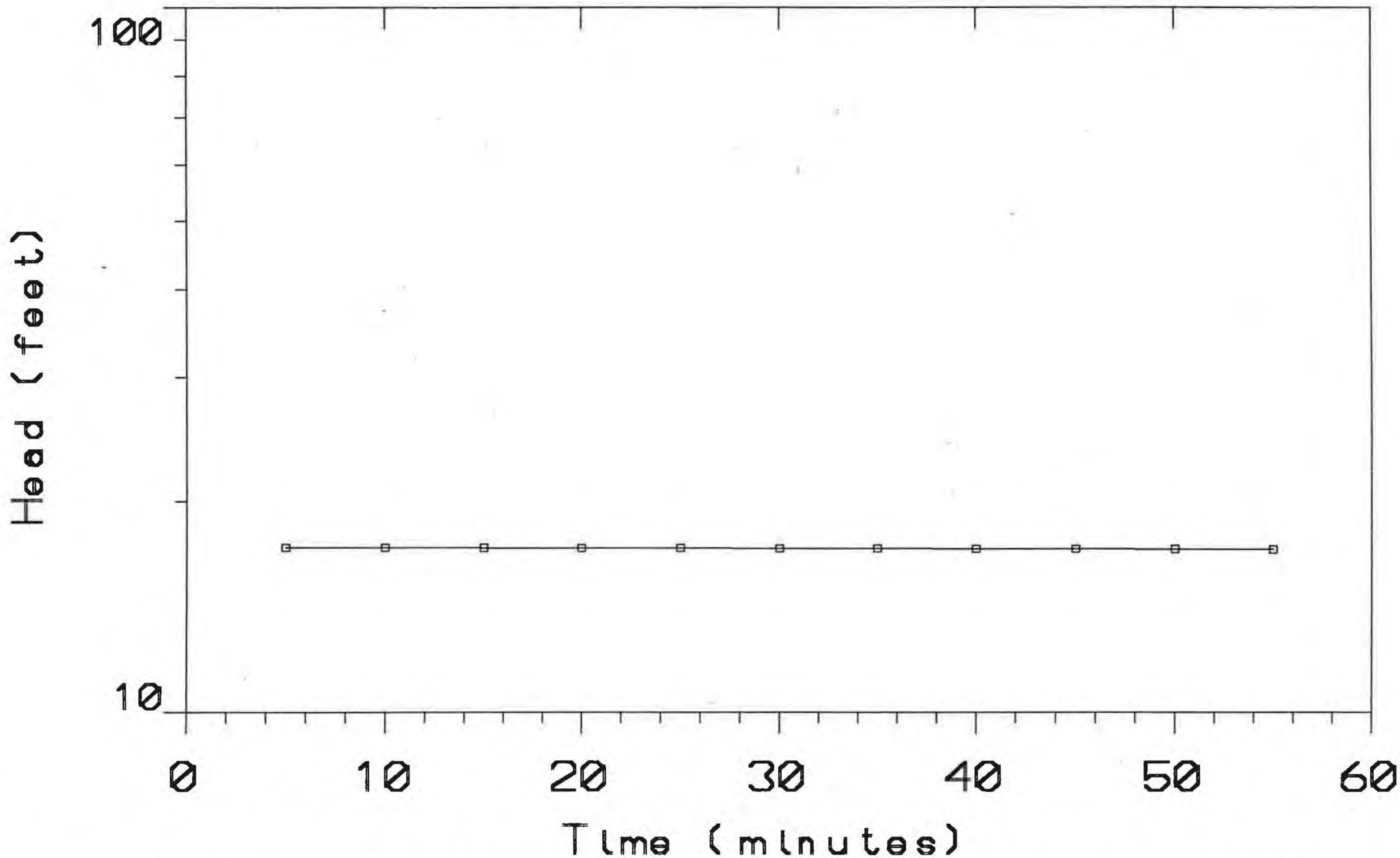
Monitoring Well SHL-24A

Date 08/07/91

Elapsed Time	INPUT 1
4.9900	17.2000
9.9900	17.1900
14.990	17.1800
19.990	17.1700
24.990	17.1600
29.990	17.1500
34.990	17.1300
39.990	17.1200
44.990	17.1200
49.990	17.1000
54.990	17.0700

END

Elapsed Time	INPUT 1



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Well Slug Test Data
CONDUCTIVITY: 2.271E-8 ft/min	by: Ecology & Environment	Well: SHL-24
TRANSMISSIVITY: 2.770E-6 sq. ft/min	WELL DATA: Units: ft	FORT DEVENS, MASS
INITIAL HEAD: 17.20 ft	AQUIFER: Endless	AYER
Data Set: SHL-24A	THICKNESS: 122.0	
	SCREEN: top: 24.00 base: 122.0	
	DIAMETER: casing: .1520 intake: .1520	
	DEPTH: Water Table: 0.000 TD: 122.0	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well SHL-25

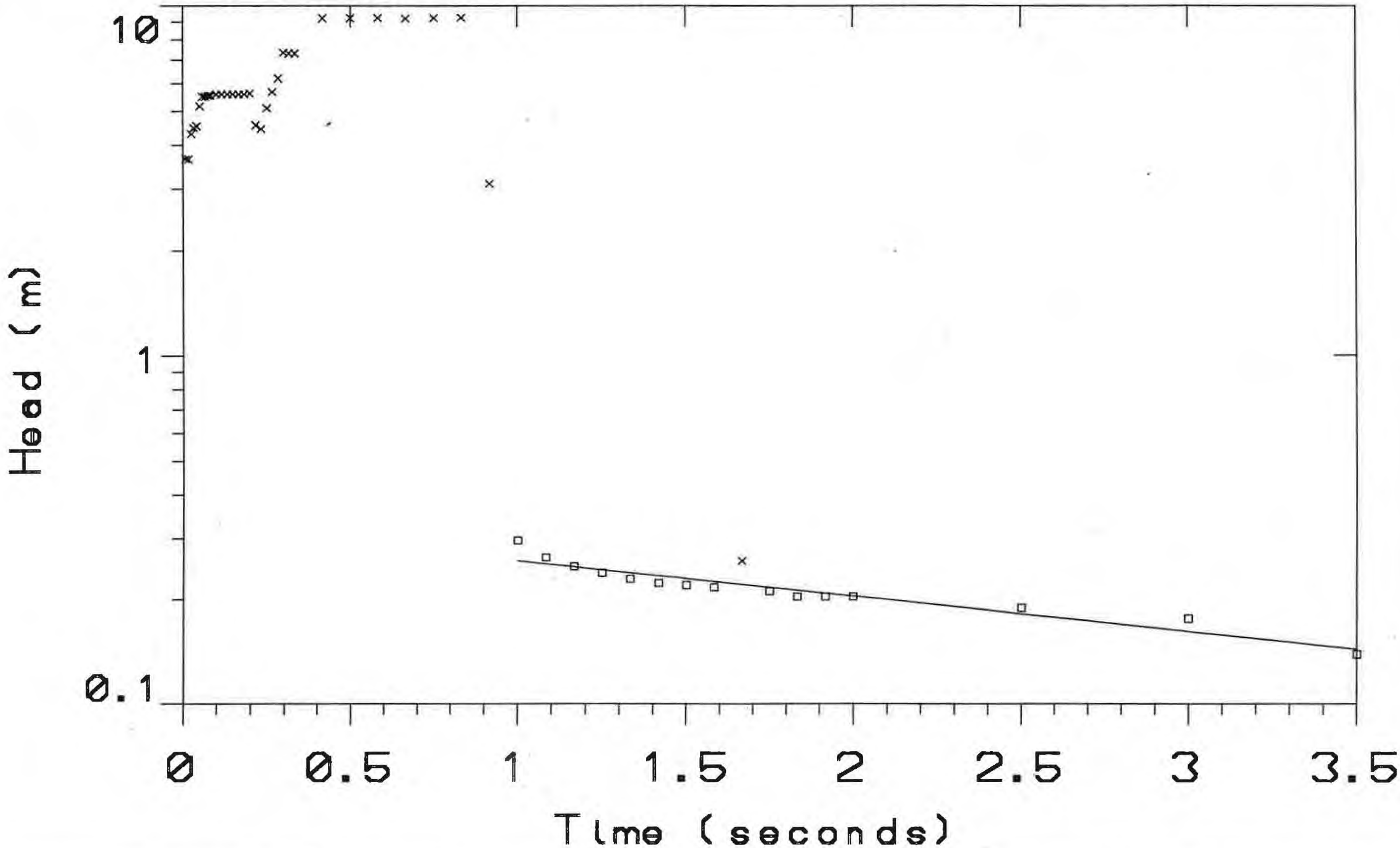
Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time			Date	07/13/91
Logger Test	5		INPUT 1: Level (F)	

Step 1 07/13

Elapsed Time	INPUT 1
0.0083	3.6570
0.0166	3.6510
0.0250	4.3130
0.0333	4.4800
0.0416	4.5340
0.0500	5.1740
0.0583	5.5080
0.0666	5.5050
0.0750	5.5270
0.0833	5.5300
0.1000	5.5810
0.1166	5.5840
0.1333	5.5810
0.1500	5.5810
0.1666	5.5840
0.1833	5.5870
0.2000	5.6280
0.2166	4.5650
0.2333	4.4580
0.2500	5.1020
0.2666	5.6750
0.2833	6.2080
0.3000	7.3560
0.3166	7.3180
0.3333	7.3180

END

Elapsed Time	INPUT 1



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .0001716 m/sec

TRANSMISSIVITY: .02094 sq. m/sec

INITIAL HEAD: 3.660 m

Date SHL-25A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: m

AQUIFER: Endless

THICKNESS: 122.0

SCREEN: top: 24.00 base: 122.0

DIAMETER: casing: [illegible] intake: .1520

DEPTH: Water Table: [illegible] TD: 122.0

Well Slug Test Data

Well: SHL-25

FORT DEVENS, MASS

AYER

Cold Spring Brook Landfill Data

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well csb-1a

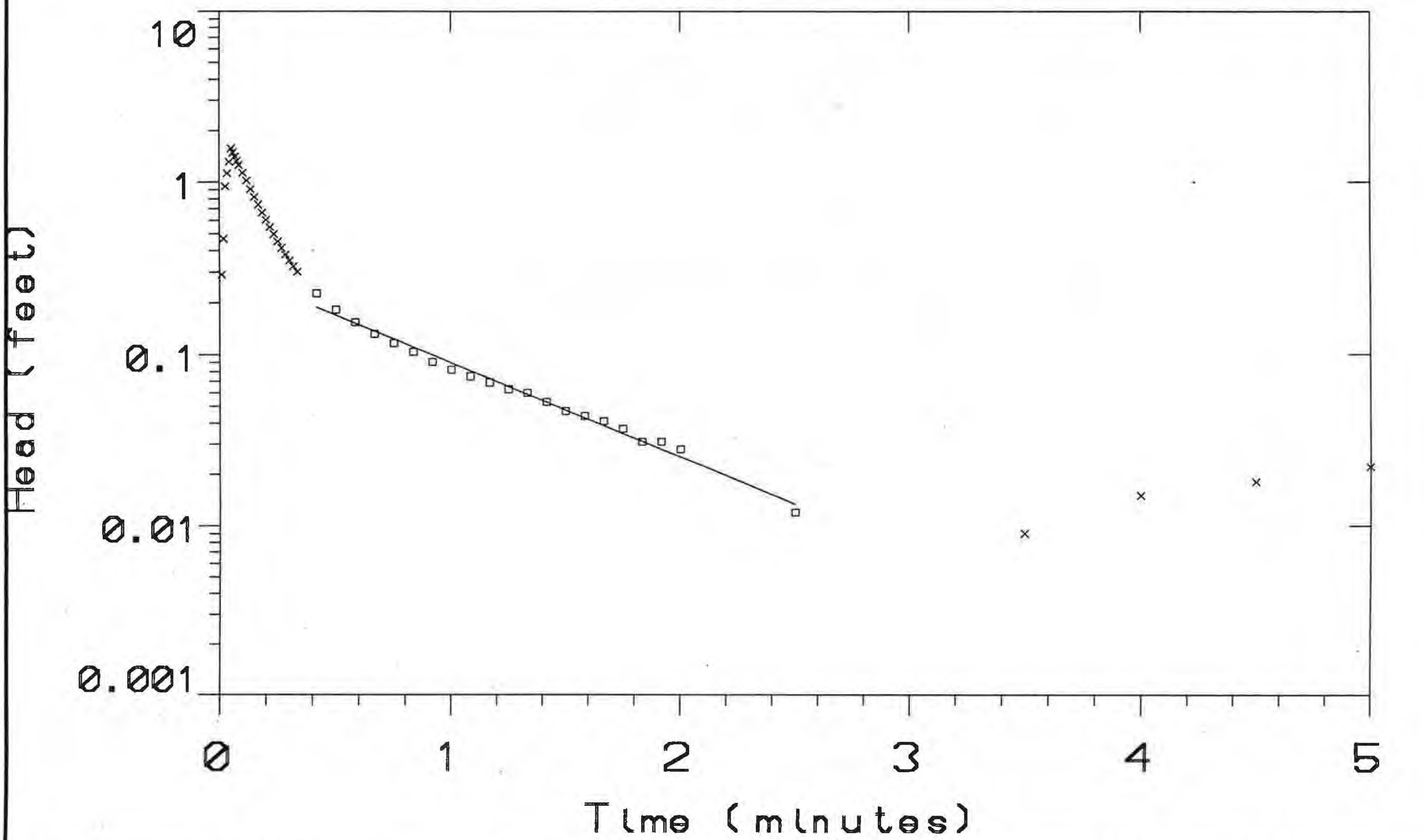
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:57	Date	07/15/91
Logger Test	0	INPUT 1: Level (F)	

Step 1 07/13 11:38:43

Elapsed Time	INPUT 1
0.0000	-0.771
0.0083	-0.291
0.0166	-0.468
0.0250	-0.942
0.0333	-1.126
0.0416	-1.315
0.0500	-1.572
0.0583	-1.489
0.0666	-1.407
0.0750	-1.325
0.0833	-1.258
0.1000	-1.129
0.1166	-1.018
0.1333	-0.907
0.1500	-0.819
0.1666	-0.740
0.1833	-0.667
0.2000	-0.604
0.2166	-0.547
0.2333	-0.499
0.2500	-0.452
0.2666	-0.414
0.2833	-0.379
0.3000	-0.351
0.3166	-0.325
0.3333	-0.303
0.4166	-0.227
0.5000	-0.183
0.5833	-0.154
0.6666	-0.132
0.7500	-0.117
0.8333	-0.104
0.9166	-0.091
1.0000	-0.082
1.0833	-0.075
1.1666	-0.069
1.2500	-0.063

Elapsed Time	INPUT 1
1.3333	-0.060
1.4166	-0.053
1.5000	-0.047
1.5833	-0.044
1.6666	-0.041
1.7500	-0.037
1.8333	-0.031
1.9166	-0.031
2.0000	-0.028
2.5000	-0.012
3.0000	0.000
3.5000	0.009
4.0000	0.015
4.5000	0.018
5.0000	0.022

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .004956 ft/min

TRANSMISSIVITY: .03449 sq. ft/min

INITIAL HEAD: .2910 ft

... Set: CSB-1A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 6.960

SCREEN: top: 5.260 base: 15.26

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water T... : 8.300 TD: 15.26

FORT DEVENS

Well: CSB-1A

FORT DEVENS, MASS

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-1B

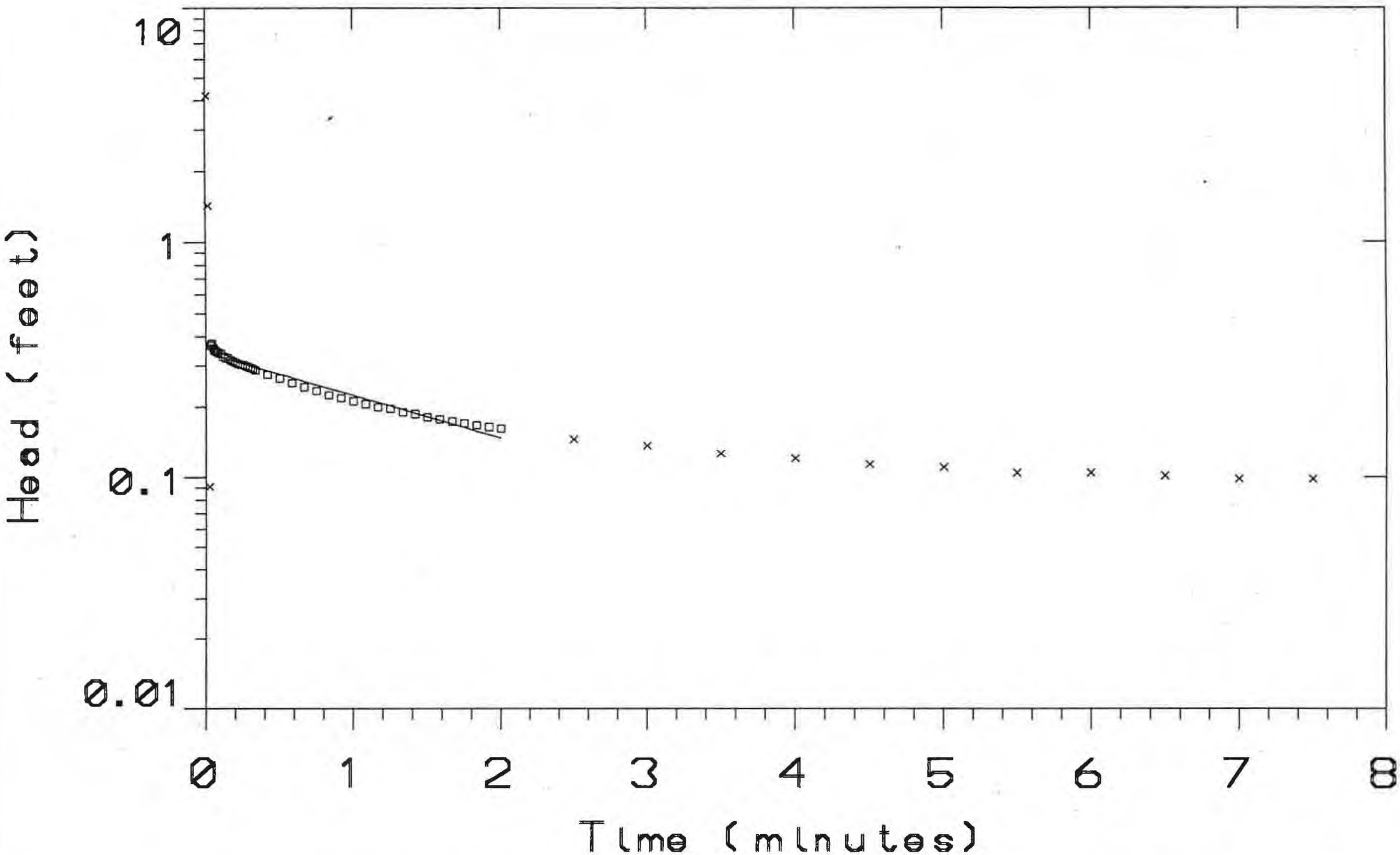
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:59	Date	07/15/91
Logger Test	0	INPUT 1: Level (F)	

Step 0 07/13 11:31:04

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	4.175
0.0166	1.429
0.0250	0.091
0.0333	0.366
0.0416	0.373
0.0500	0.357
0.0583	0.351
0.0666	0.347
0.0750	0.344
0.0833	0.341
0.1000	0.338
0.1166	0.328
0.1333	0.325
0.1500	0.322
0.1666	0.316
0.1833	0.313
0.2000	0.309
0.2166	0.306
0.2333	0.303
0.2500	0.303
0.2666	0.300
0.2833	0.297
0.3000	0.294
0.3166	0.291
0.3333	0.287
0.4166	0.275
0.5000	0.265
0.5833	0.253
0.6666	0.243
0.7500	0.234
0.8333	0.224
0.9166	0.218
1.0000	0.211
1.0833	0.205
1.1666	0.199
1.2500	0.196

Elapsed Time	INPUT 1
1.3333	0.189
1.4166	0.186
1.5000	0.180
1.5833	0.177
1.6666	0.173
1.7500	0.170
1.8333	0.167
1.9166	0.164
2.0000	0.161
2.5000	0.145
3.0000	0.136
3.5000	0.126
4.0000	0.120
4.5000	0.113
5.0000	0.110
5.5000	0.104
6.0000	0.104
6.5000	0.101
7.0000	0.098
7.5000	0.098

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .006732 ft/min	by: Ecology & Environment	Well: CSB-1B
TRANSMISSIVITY: .04685 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: 4.175 ft	AQUIFER: Endless	AYER
Da[illegible] [illegible]et: CSB-1B	THICKNESS: 6.960	
	SCREEN: top: 5.260 base: 15.26	
	DIAMETER: casing [illegible]3332 intake: .3332	
	DEPTH: Water Ta[illegible] 8.300 TD: 15.26	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-2A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:58	Date	07/13 /91
Logger Test	8	INPUT 1: Level (F)	

Step 1 07/13 09:00:59

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	0.000
0.0166	0.000
0.0250	0.000
0.0333	0.000
0.0416	0.000
0.0500	0.000
0.0583	0.000
0.0666	0.000
0.0750	0.000
0.0833	0.000
0.1000	0.000
0.1166	0.000
0.1333	0.000
0.1500	0.000
0.1666	0.000
0.1833	0.000
0.2000	0.000
0.2166	0.000
0.2333	0.000
0.2500	0.000
0.2666	0.000
0.2833	0.000
0.3000	0.000
0.3166	0.000
0.3333	0.000
0.4166	0.000
0.5000	0.000
0.5833	0.000
0.6666	0.000
0.7500	0.000
0.8333	0.000
0.9166	0.000
1.0000	0.000
1.0833	0.000
1.1666	0.000
1.2500	0.000

Elapsed Time	INPUT 1
1.3333	0.000
1.4166	0.000
1.5000	0.000
1.5833	0.000
1.6666	0.000
1.7500	0.000
1.8333	0.000
1.9166	0.000
2.0000	0.000

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-2B

Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	09:59		Date	07/13 /91
Logger Test	8		INPUT 1: Level (F)	

Step 0 07/13 08:58:13

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	0.000
0.0166	0.000
0.0250	0.000
0.0333	0.000
0.0416	0.000
0.0500	0.000
0.0583	0.000
0.0666	0.000
0.0750	0.000
0.0833	0.000
0.1000	0.000
0.1166	0.000
0.1333	0.000
0.1500	0.000
0.1666	0.000
0.1833	0.000
0.2000	0.000
0.2166	0.000
0.2333	0.000
0.2500	0.000
0.2666	0.000
0.2833	0.000
0.3000	0.000
0.3166	0.000
0.3333	0.000
0.4166	0.000
0.5000	0.000
0.5833	0.000
0.6666	0.000
0.7500	0.000
0.8333	0.000
0.9166	0.000
1.0000	0.000
1.0833	0.000
1.1666	0.000
1.2500	0.000

Elapsed Time	INPUT 1
1.3333	0.000
1.4166	0.000
1.5000	0.000
1.5833	0.000
1.6666	0.000
1.7500	0.000
1.8333	0.000
1.9166	0.000
2.0000	0.000
2.5000	0.000

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-3A

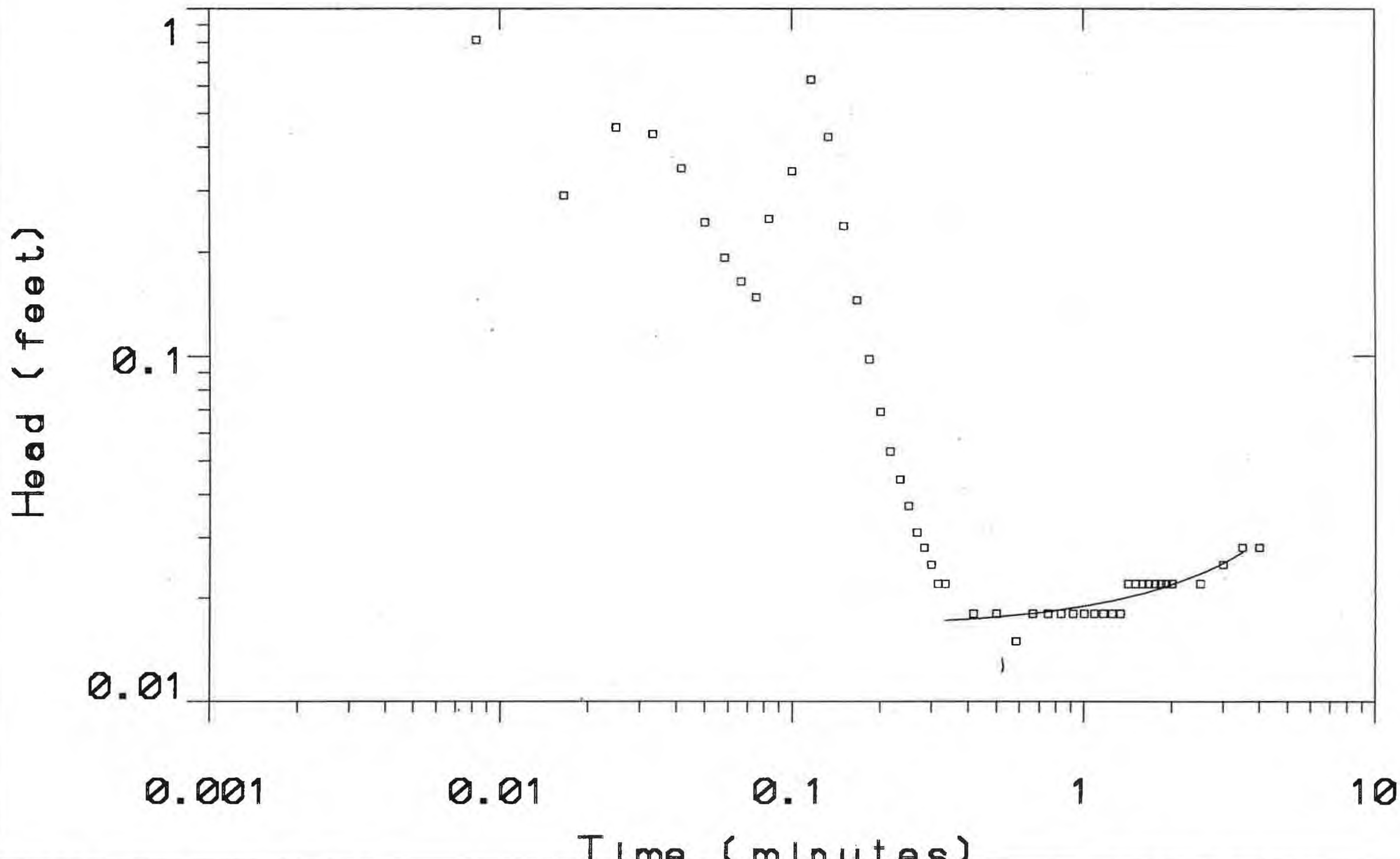
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:51	Date	07/15/91
Logger Test	1	INPUT 1: Level (F)	

Step 1 07/13 12:06:31

Elapsed Time	INPUT 1
0.0000	-0.262
0.0083	-0.812
0.0166	0.291
0.0250	-0.455
0.0333	-0.436
0.0416	-0.347
0.0500	-0.243
0.0583	-0.192
0.0666	-0.164
0.0750	-0.148
0.0833	-0.249
0.1000	-0.341
0.1166	-0.626
0.1333	-0.427
0.1500	-0.237
0.1666	-0.145
0.1833	-0.098
0.2000	-0.069
0.2166	-0.053
0.2333	-0.044
0.2500	-0.037
0.2666	-0.031
0.2833	-0.028
0.3000	-0.025
0.3166	-0.022
0.3333	-0.022
0.4166	-0.018
0.5000	-0.018
0.5833	-0.015
0.6666	-0.018
0.7500	-0.018
0.8333	-0.018
0.9166	-0.018
1.0000	-0.018
1.0833	-0.018
1.1666	-0.018
1.2500	-0.018

Elapsed Time	INPUT 1
1.3333	-0.018
1.4166	-0.022
1.5000	-0.022
1.5833	-0.022
1.6666	-0.022
1.7500	-0.022
1.8333	-0.022
1.9166	-0.022
2.0000	-0.022
2.5000	-0.022
3.0000	-0.025
3.5000	-0.028
4.0000	-0.028

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .003855 ft/min	by: Ecology & Environment	Well: CSB-3A
TRANSMISSIVITY: .02582 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .8000 ft	AQUIFER: Endless	AYER
Data Set: CSB-3A	THICKNESS: 6.700	
	SCREEN: top: 21.78 base: 31.78	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Table: 25.08 TD: 31.78	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-3B

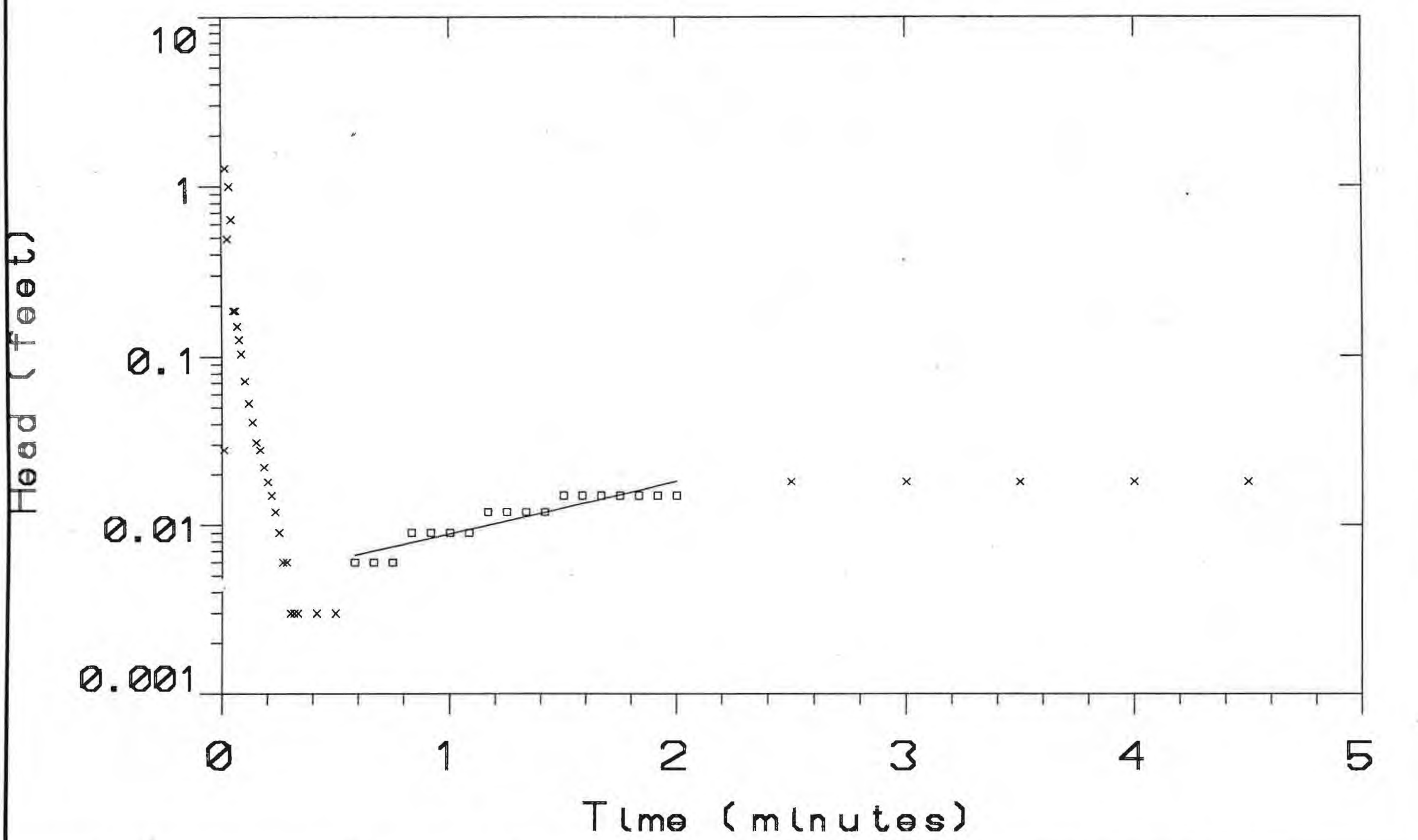
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:55	Date	07/15/91
Logger Test	1	INPUT 1: Level (F)	

Step 0 07/13 12:01:54

Elapsed Time	INPUT 1
0.0000	0.000
0.0083	0.028
0.0166	1.281
0.0250	-0.490
0.0333	0.999
0.0416	0.638
0.0500	0.186
0.0583	0.186
0.0666	0.151
0.0750	0.126
0.0833	0.104
0.1000	0.072
0.1166	0.053
0.1333	0.041
0.1500	0.031
0.1666	0.028
0.1833	0.022
0.2000	0.018
0.2166	0.015
0.2333	0.012
0.2500	0.009
0.2666	0.006
0.2833	0.006
0.3000	0.003
0.3166	0.003
0.3333	0.003
0.4166	-0.003
0.5000	-0.003
0.5833	-0.006
0.6666	-0.006
0.7500	-0.006
0.8333	-0.009
0.9166	-0.009
1.0000	-0.009
1.0833	-0.009
1.1666	-0.012
1.2500	-0.012

Elapsed Time	INPUT 1
1.3333	-0.012
1.4166	-0.012
1.5000	-0.015
1.5833	-0.015
1.6666	-0.015
1.7500	-0.015
1.8333	-0.015
1.9166	-0.015
2.0000	-0.015
2.5000	-0.018
3.0000	-0.018
3.5000	-0.018
4.0000	-0.018
4.5000	-0.018

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .0008672 ft/min

TRANSMISSIVITY: .005810 sq. ft/min

INITIAL HEAD: .02800 ft

Data Set: CSB-3B

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 6.700

SCREEN: top: 21.78 base: 31.78

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water Tab[illegible] 25.08 TD: 31.78

Fort Devens

Well: CSB-3B

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-4A

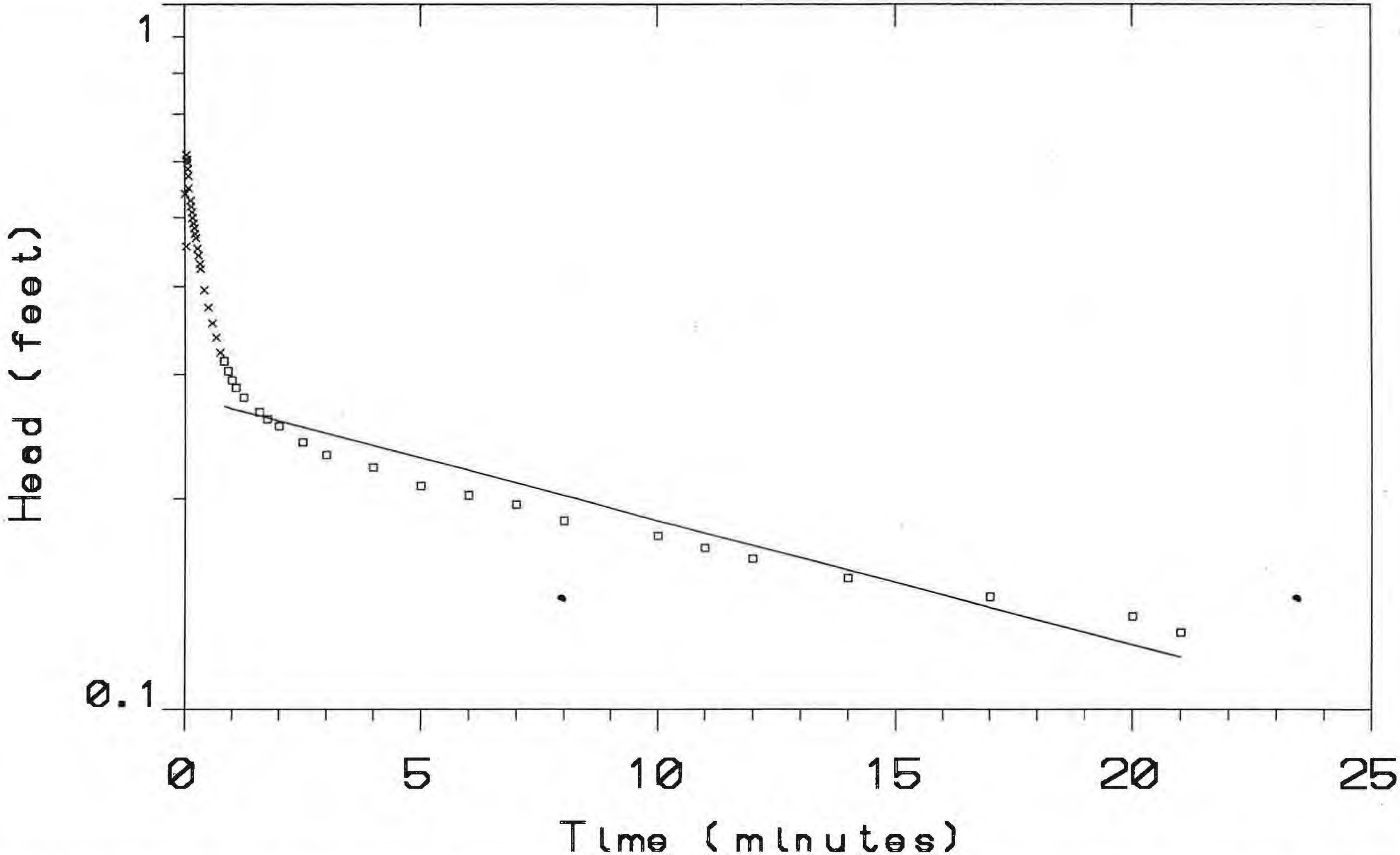
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time		Date	07/13/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/13

Elapsed Time	INPUT 1
0.0000	-0.423
0.0083	-0.540
0.0166	-0.471
0.0250	-0.455
0.0333	-0.483
0.0416	-0.613
0.0500	-0.604
0.0583	-0.597
0.0666	-0.585
0.0750	-0.572
0.0833	-0.550
0.1000	-0.534
0.1166	-0.528
0.1333	-0.518
0.1500	-0.509
0.1666	-0.499
0.1833	-0.490
0.2000	-0.483
0.2166	-0.474
0.2333	-0.468
0.2500	-0.461
0.2666	-0.452
0.2833	-0.442
0.3000	-0.436
0.3166	-0.430
0.3333	-0.423
0.4166	-0.395
0.5000	-0.373
0.5833	-0.354
0.6666	-0.338
0.7500	-0.322
0.8333	-0.313
0.9166	-0.303
1.0000	-0.294
1.0833	-0.287
1.1666	-0.281
1.2500	-0.278

Elapsed Time	INPUT 1
1.3333	-0.275
1.4166	-0.272
1.5000	-0.265
1.5833	-0.265
1.6666	-0.262
1.7500	-0.259
1.8333	-0.256
1.9166	-0.256
2.0000	-0.253
2.5000	-0.240
3.0000	-0.230
3.5000	-0.224
4.0000	-0.221
4.5000	-0.215
5.0000	-0.208
5.5000	-0.205
6.0000	-0.202
6.5000	-0.199
7.0000	-0.196
7.5000	-0.189
8.0000	-0.186
8.5000	-0.183
9.0000	-0.180
9.5000	-0.180
10.0000	-0.177
11.0000	-0.170
12.0000	-0.164
13.0000	-0.154
14.0000	-0.154
15.0000	-0.148
16.0000	-0.145
17.0000	-0.145
18.0000	-0.142
19.0000	-0.139
20.0000	-0.136
21.0000	-0.129

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .0003090 ft/min

TRANSMISSIVITY: .001103 sq. ft/min

INITIAL HEAD: .4230 ft

Data ...: CSB4A | Date: 13-JUL-91

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 3.570

SCREEN: top: 6.450 base: 8.450

DIAMETER: casing: .2080 intake: .2080

DEPTH: Water Table: .450 TD: 10.22

Well Slug Test Data

Well: CSB-4A

FORT DEVENS, MASS

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-4B

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time		Date	07/13/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/13

Elapsed Time	INPUT 1
0.0000	2.242
0.0083	1.249
0.0166	0.379
0.0250	0.616
0.0333	0.597
0.0416	0.585
0.0500	0.578
0.0583	0.575
0.0666	0.569
0.0750	0.578
0.0833	0.569
0.1000	0.566
0.1166	0.528
0.1333	0.521
0.1500	0.518
0.1666	0.515
0.1833	0.512
0.2000	0.506
0.2166	0.502
0.2333	0.502
0.2500	0.496
0.2666	0.493
0.2833	0.493
0.3000	0.493
0.3166	0.487
0.3333	0.490
0.4166	0.490
0.5000	0.480
0.5833	0.477
0.6666	0.477
0.7500	0.474
0.8333	0.471
0.9166	0.474
1.0000	0.464
1.0833	0.471
1.1666	0.471
1.2500	0.468

Elapsed Time	INPUT 1
1.3333	0.468
1.4166	0.468
1.5000	0.468
1.5833	0.468
1.6666	0.461
1.7500	0.468
1.8333	0.468
1.9166	0.468
2.0000	0.468
2.5000	0.468
3.0000	0.464
3.5000	0.464
4.0000	0.464
4.5000	0.464
5.0000	0.464
5.5000	0.464
6.0000	0.464
6.5000	0.458
7.0000	0.464
7.5000	0.464
8.0000	0.468
8.5000	0.464
9.0000	0.464
9.5000	0.464
10.0000	0.464
11.0000	0.464
12.0000	0.464
13.0000	0.464
14.0000	0.464
15.0000	0.464
16.0000	0.461
17.0000	0.464
18.0000	0.461
19.0000	0.461
20.0000	0.461
21.0000	0.461
22.0000	0.461

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-4B

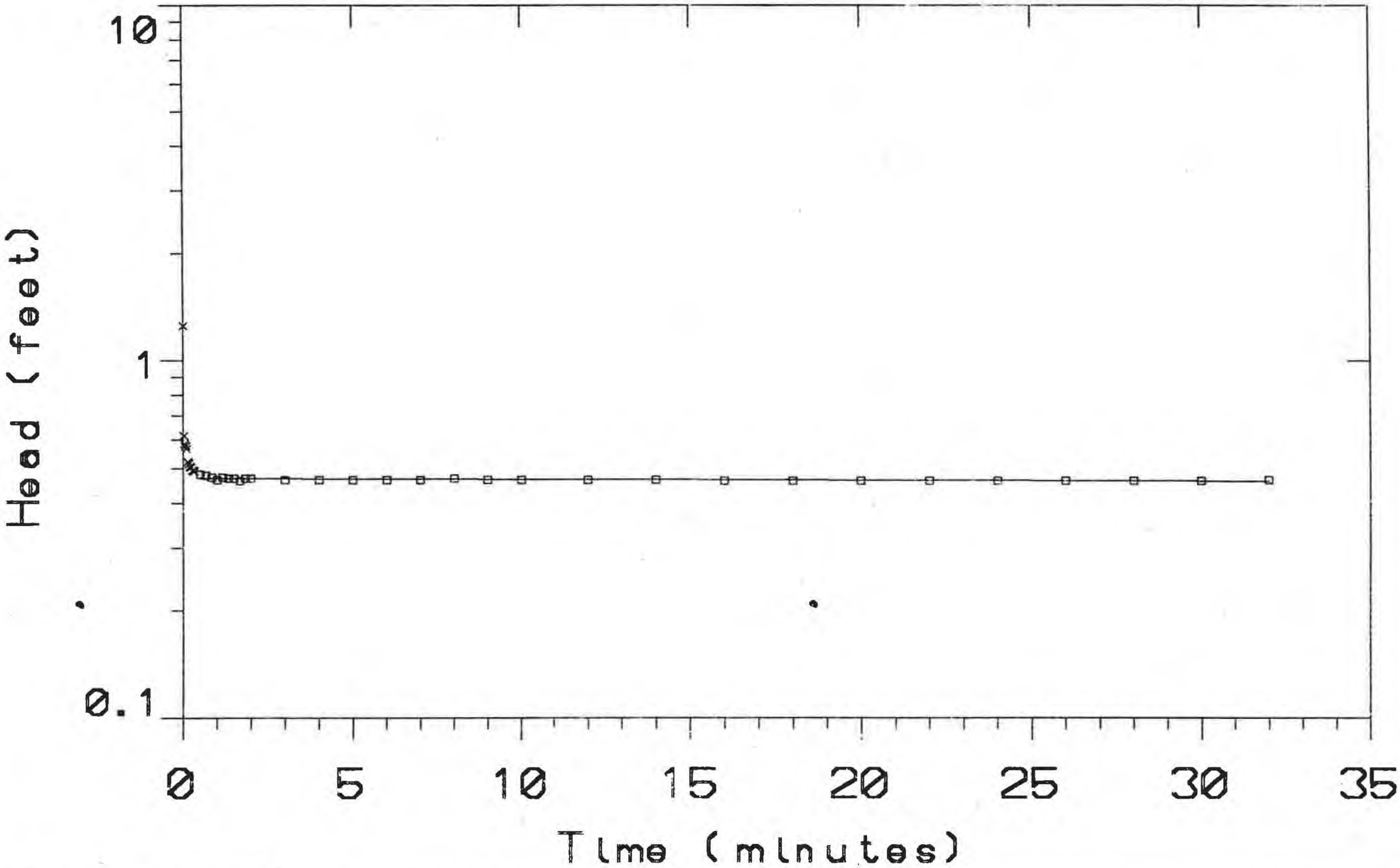
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time		Date	07/13/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/13

Elapsed Time	INPUT 1
23.0000	0.461
24.0000	0.461
25.0000	0.461
26.0000	0.461
27.0000	0.464
28.0000	0.461
29.0000	0.461
30.0000	0.461
31.0000	0.461
32.0000	0.464

END

Elapsed Time	INPUT 1



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .0002535 ft/min

TRANSMISSIVITY: .0009052 sq. ft/min

INITIAL HEAD: 2.242 ft

Data Set: CSB-4B | Date: 13-JUL-91

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 3.570

SCREEN: top: 6.450 base: 8.450

DIAMETER: casing: .2080 intake: .2080

DEPTH: Water Table: 6.450 TD: 10.22

Well Slug Test Data

Well: CSB-4B

FORT DEVENS, MASS

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-6A

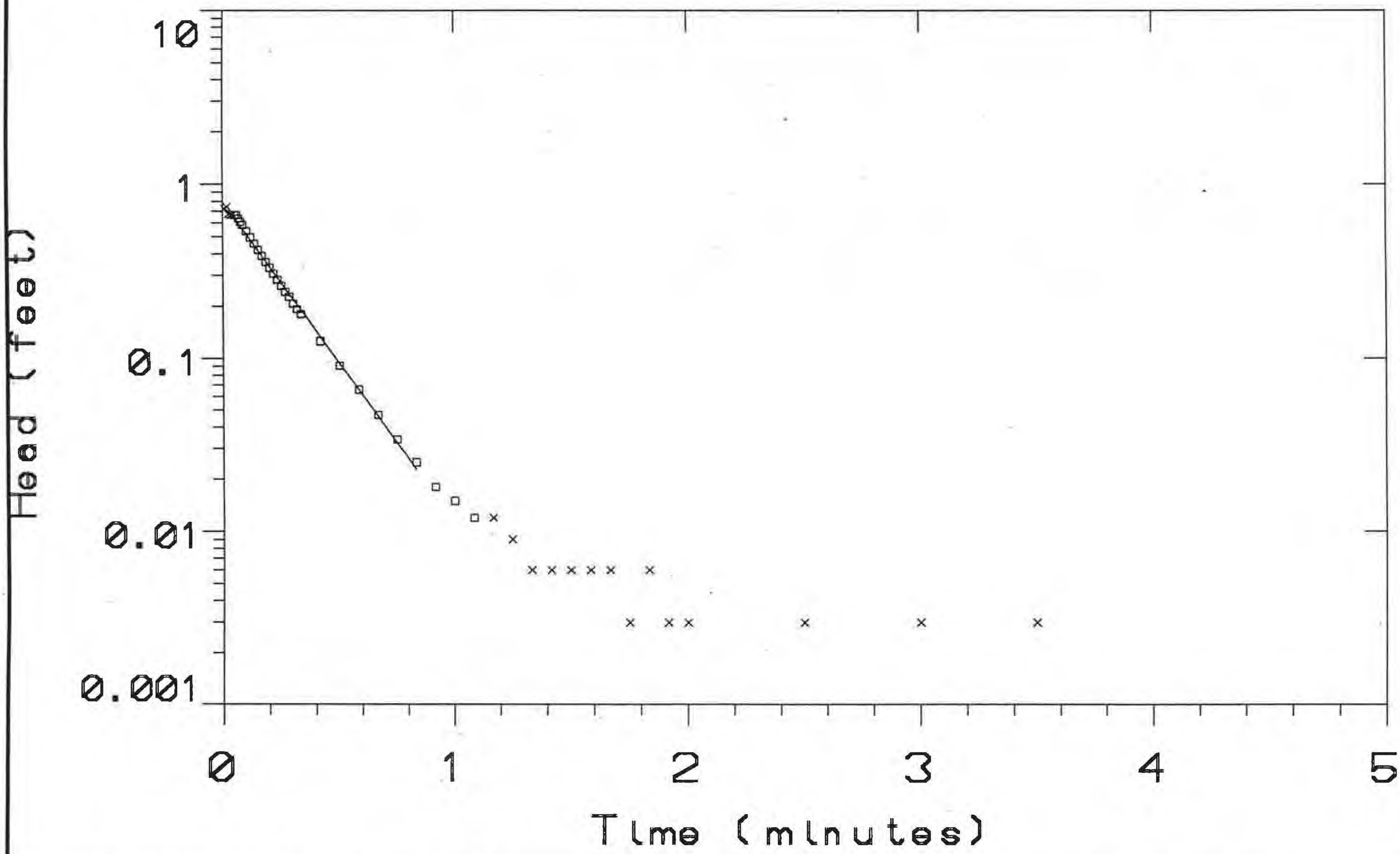
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	10:00	Date	07/13/91
Logger Test	7	INPUT 1: Level (F)	

Step 1 07/13 08:37:08

Elapsed Time	INPUT 1
0.0000	-0.120
0.0083	-0.724
0.0166	-0.743
0.0250	-0.673
0.0333	-0.667
0.0416	-0.670
0.0500	-0.664
0.0583	-0.664
0.0666	-0.635
0.0750	-0.607
0.0833	-0.585
0.1000	-0.537
0.1166	-0.496
0.1333	-0.458
0.1500	-0.420
0.1666	-0.389
0.1833	-0.357
0.2000	-0.332
0.2166	-0.306
0.2333	-0.284
0.2500	-0.262
0.2666	-0.243
0.2833	-0.227
0.3000	-0.208
0.3166	-0.192
0.3333	-0.180
0.4166	-0.126
0.5000	-0.091
0.5833	-0.066
0.6666	-0.047
0.7500	-0.034
0.8333	-0.025
0.9166	-0.018
1.0000	-0.015
1.0833	-0.012
1.1666	-0.012
1.2500	-0.009

Elapsed Time	INPUT 1
1.3333	-0.006
1.4166	-0.006
1.5000	-0.006
1.5833	-0.006
1.6666	-0.006
1.7500	-0.003
1.8333	-0.006
1.9166	-0.003
2.0000	-0.003
2.5000	-0.003
3.0000	-0.003
3.5000	-0.003

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .06503 ft/min	by: Ecology & Environment	Well: CSB-6A
TRANSMISSIVITY: .2939 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .7240 ft	AQUIFER: Endless	AYER
Data Set: CSB-6A	THICKNESS: 4.520	
	SCREEN: top: 7.620 base: 9.620	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Tab 5.100 TD: 9.620	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-6B

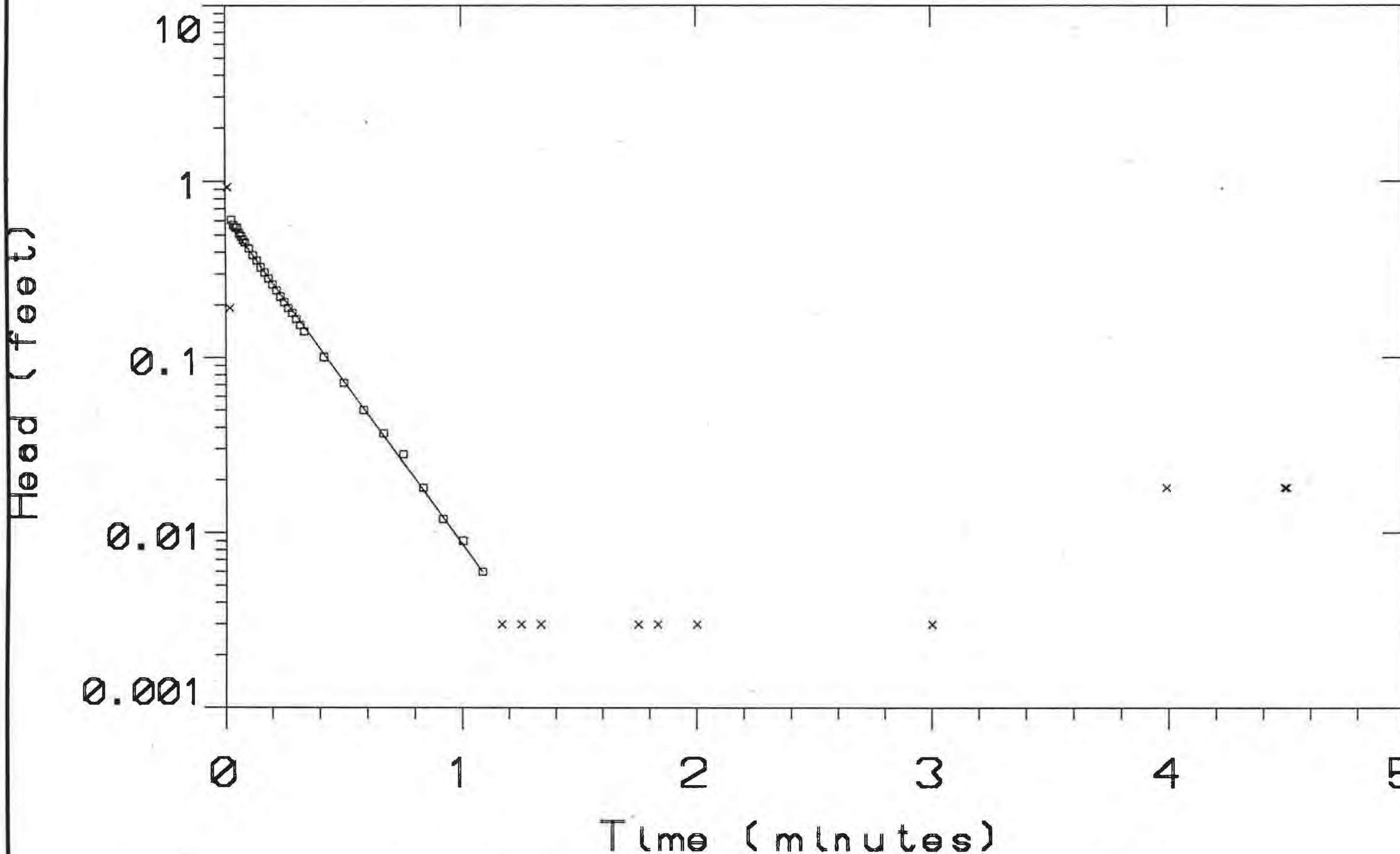
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	10:01	Date	07/13/91
Logger Test	7	INPUT 1: Level (F)	

Step 0 07/13 08:33:58

Elapsed Time	INPUT 1
0.0000	0.186
0.0083	0.929
0.0166	0.192
0.0250	0.607
0.0333	0.569
0.0416	0.553
0.0500	0.550
0.0583	0.512
0.0666	0.493
0.0750	0.471
0.0833	0.455
0.1000	0.420
0.1166	0.385
0.1333	0.357
0.1500	0.328
0.1666	0.306
0.1833	0.284
0.2000	0.262
0.2166	0.243
0.2333	0.224
0.2500	0.208
0.2666	0.192
0.2833	0.180
0.3000	0.167
0.3166	0.154
0.3333	0.142
0.4166	0.101
0.5000	0.072
0.5833	0.050
0.6666	0.037
0.7500	0.028
0.8333	0.018
0.9166	0.012
1.0000	0.009
1.0833	0.006
1.1666	0.003
1.2500	0.003

Elapsed Time	INPUT 1
1.3333	0.003
1.4166	0.000
1.5000	0.000
1.5833	0.000
1.6666	0.000
1.7500	-0.003
1.8333	-0.003
1.9166	0.000
2.0000	-0.003
2.5000	0.000
3.0000	-0.003

END



ecology and environment

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MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .07294 ft/min	by: Ecology & Environment	Well: CSB-6B
TRANSMISSIVITY: .3297 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .9290 ft	AQUIFER: Endless	AYER
Da' Set: CSB-6B	THICKNESS: 4.520	
	SCREEN: top: 7.620 base: 9.620	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Ta' · 5.100 TD: 9.620	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-7A

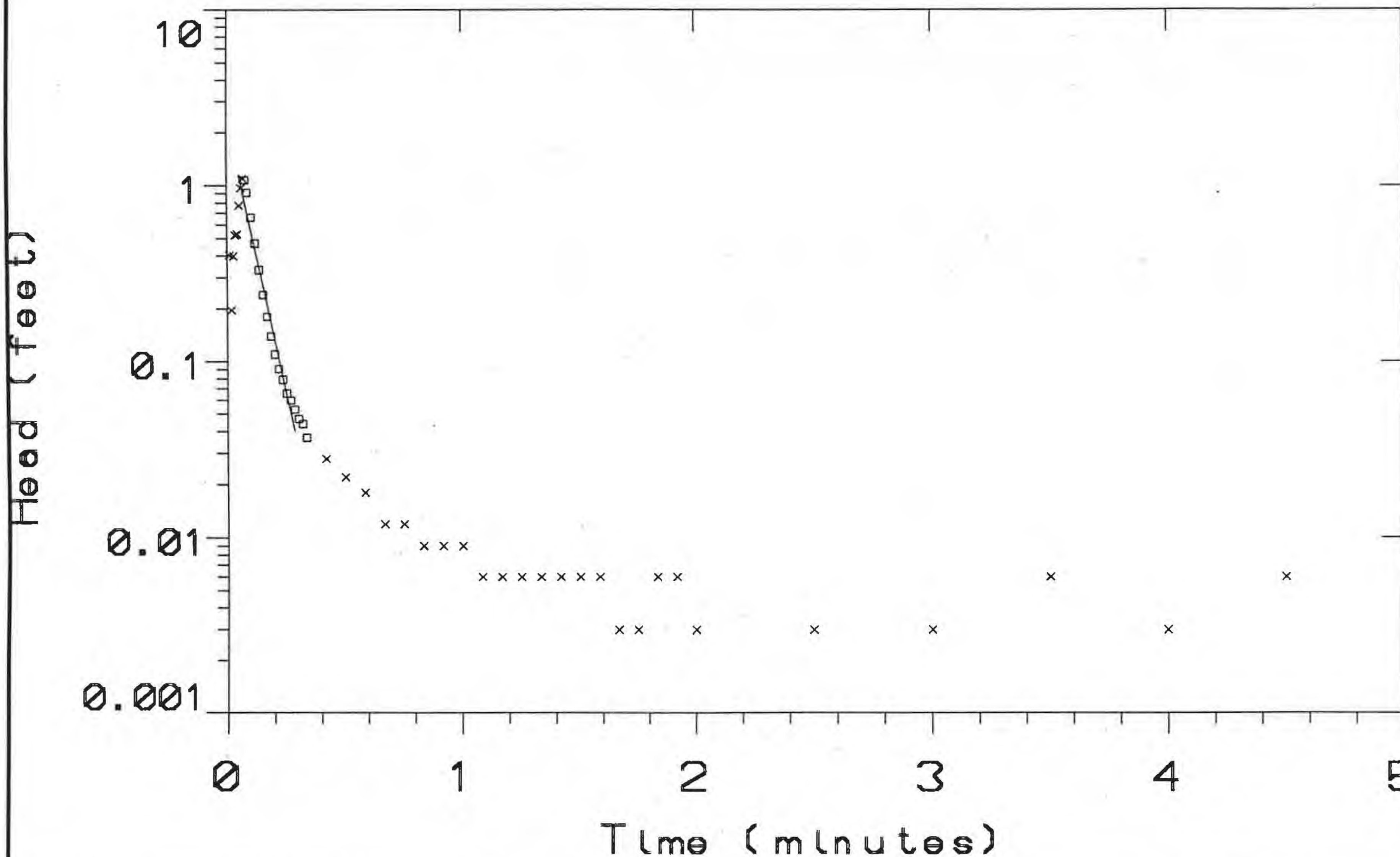
Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	10:02		Date	07/13/91
Logger Test	6		INPUT 1: Level (F)	

Step 1 07/13 08:12:24

Elapsed Time	INPUT 1
0.0000	-0.610
0.0083	-0.401
0.0166	-0.196
0.0250	-0.398
0.0333	-0.525
0.0416	-0.531
0.0500	-0.774
0.0583	-0.967
0.0666	-1.094
0.0750	-1.072
0.0833	-0.914
0.1000	-0.661
0.1166	-0.471
0.1333	-0.332
0.1500	-0.240
0.1666	-0.180
0.1833	-0.139
0.2000	-0.110
0.2166	-0.091
0.2333	-0.079
0.2500	-0.066
0.2666	-0.060
0.2833	-0.053
0.3000	-0.047
0.3166	-0.044
0.3333	-0.037
0.4166	-0.028
0.5000	-0.022
0.5833	-0.018
0.6666	-0.012
0.7500	-0.012
0.8333	-0.009
0.9166	-0.009
1.0000	-0.009
1.0833	-0.006
1.1666	-0.006
1.2500	-0.006

Elapsed Time	INPUT 1
1.3333	-0.006
1.4166	-0.006
1.5000	-0.006
1.5833	-0.006
1.6666	-0.003
1.7500	-0.003
1.8333	-0.006
1.9166	-0.006
2.0000	-0.003
2.5000	-0.003
3.0000	-0.003
3.5000	-0.006
4.0000	-0.003
4.5000	-0.006

END



ecology and environment

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recycled paper

MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .03341 ft/min

TRANSMISSIVITY: .2623 sq. ft/min

INITIAL HEAD: .4010 ft

Data Set: CSB-7A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 7.850

SCREEN: top: 14.56 base: 24.56

DIAMETER: casing: .3332 intake: .3332

DEPTH: Water Tab 16.71 TD: 24.56

Fort Devens

Well: CSB-7A

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-7B

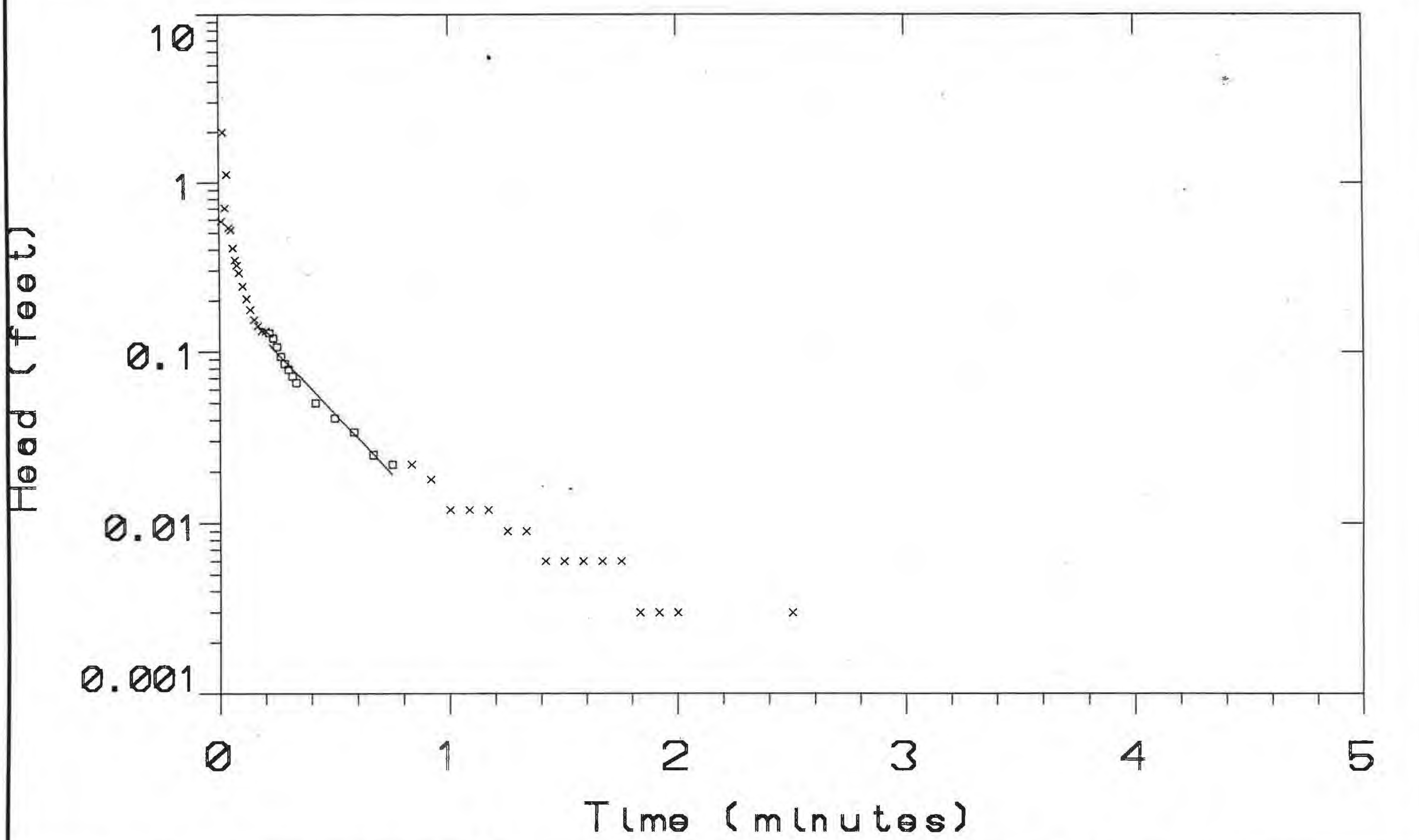
Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	10:03		Date	07/13/91
Logger Test	6		INPUT 1: Level (F)	

Step 0 07/13 08:09:27

Elapsed Time	INPUT 1
0.0000	0.028
0.0083	0.588
0.0166	1.992
0.0250	0.705
0.0333	1.119
0.0416	0.537
0.0500	0.521
0.0583	0.408
0.0666	0.347
0.0750	0.322
0.0833	0.291
0.1000	0.243
0.1166	0.205
0.1333	0.177
0.1500	0.154
0.1666	0.142
0.1833	0.132
0.2000	0.132
0.2166	0.129
0.2333	0.120
0.2500	0.107
0.2666	0.094
0.2833	0.085
0.3000	0.079
0.3166	0.072
0.3333	0.066
0.4166	0.050
0.5000	0.041
0.5833	0.034
0.6666	0.025
0.7500	0.022
0.8333	0.022
0.9166	0.018
1.0000	0.012
1.0833	0.012
1.1666	0.012
1.2500	0.009

Elapsed Time	INPUT 1
1.3333	0.009
1.4166	0.006
1.5000	0.006
1.5833	0.006
1.6666	0.006
1.7500	0.006
1.8333	0.003
1.9166	0.003
2.0000	0.003
2.5000	0.003
3.0000	0.000

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .01883 ft/min	by: Ecology & Environment	Well: CSB-7B
TRANSMISSIVITY: .1478 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .5880 ft	AQUIFER: Endless	AYER
Data Set: CSB-7B	THICKNESS: 7.850	
	SCREEN: top: 14.56 base: 24.56	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Table: 16.71 TD: 24.56	

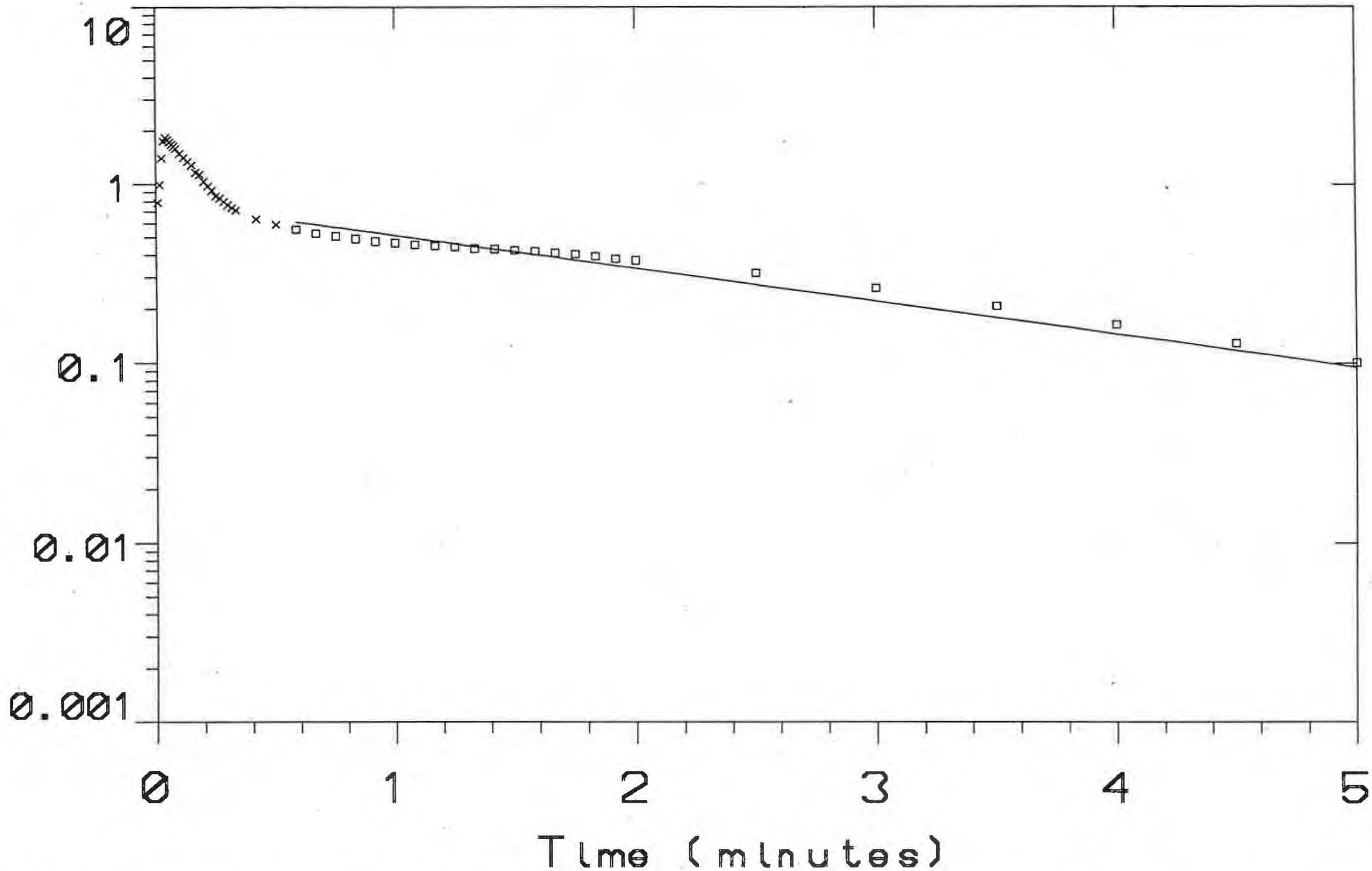
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-8A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:47	Date	07/15/91
Logger Test	2	INPUT 1: Level (F)	

Step 1 07/13 12:34:34

Elapsed Time	INPUT 1
0.0000	-0.888
0.0083	-0.787
0.0166	-0.990
0.0250	-1.401
0.0333	-1.746
0.0416	-1.825
0.0500	-1.777
0.0583	-1.723
0.0666	-1.673
0.0750	-1.629
0.0833	-1.581
0.1000	-1.486
0.1166	-1.407
0.1333	-1.341
0.1500	-1.281
0.1666	-1.164
0.1833	-1.135
0.2000	-1.037
0.2166	-0.974
0.2333	-0.923
0.2500	-0.857
0.2666	-0.835
0.2833	-0.797
0.3000	-0.765
0.3166	-0.737
0.3333	-0.714
0.4166	-0.635
0.5000	-0.591
0.5833	-0.556
0.6666	-0.528
0.7500	-0.509
0.8333	-0.493
0.9166	-0.477
1.0000	-0.468
1.0833	-0.458
1.1666	-0.452
1.2500	-0.446
1.3333	-0.436
1.4166	-0.433
1.5000	-0.427
1.5833	-0.420
1.6666	-0.411
1.7500	-0.404
1.8333	-0.395
1.9166	-0.382
2.0000	-0.373
2.5000	-0.319
3.0000	-0.262
3.5000	-0.208
4.0000	-0.164
4.5000	-0.129
5.0000	-0.101
5.5000	-0.079
6.0000	-0.060
6.5000	-0.047
7.0000	-0.037
7.5000	-0.028
8.0000	-0.025
8.5000	-0.022
9.0000	-0.018

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .001683 ft/min	by: Ecology & Environment	Well: CSB-8A
TRANSMISSIVITY: .01124 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .7870 ft	AQUIFER: Endless	AYER
Data Set: CSB-8A	THICKNESS: 6.680	
	SCREEN: top: 15.02 base: 25.02	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Table: 18.34 TD: 25.02	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well CSB-8B

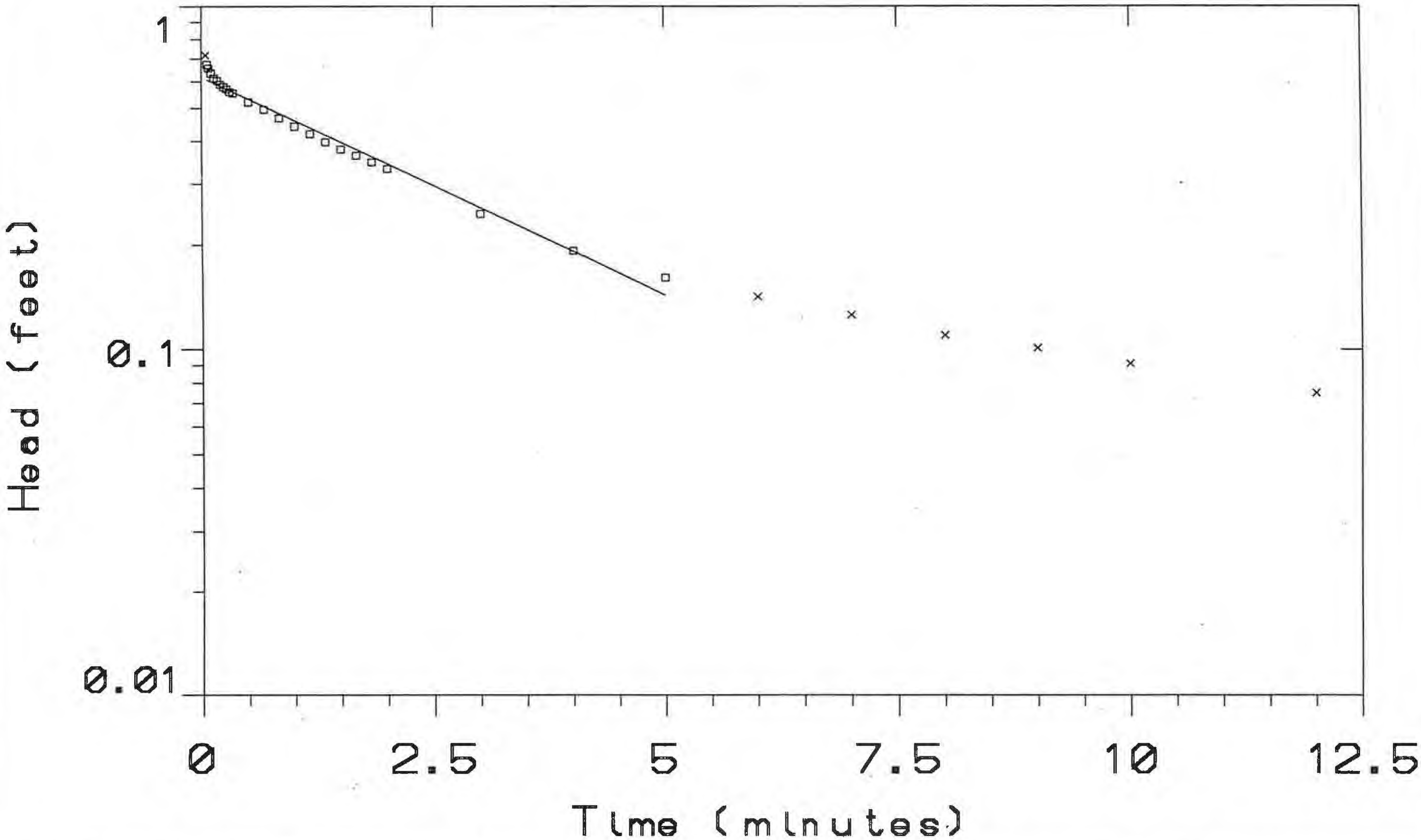
Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	09:49		Date	07/15/91
Logger Test	2		INPUT 1: Level (F)	

Step 0 07/13 12:22:32

Elapsed Time	INPUT 1
0.0000	0.050
0.0083	7.813
0.0166	1.822
0.0250	-1.186
0.0333	0.759
0.0416	0.718
0.0500	0.689
0.0583	0.673
0.0666	0.670
0.0750	0.657
0.0833	0.651
0.1000	0.635
0.1166	0.626
0.1333	0.613
0.1500	0.607
0.1666	0.604
0.1833	0.594
0.2000	0.588
0.2166	0.582
0.2333	0.578
0.2500	0.572
0.2666	0.569
0.2833	0.566
0.3000	0.559
0.3166	0.556
0.3333	0.553
0.4166	0.537
0.5000	0.521
0.5833	0.509
0.6666	0.496
0.7500	0.480
0.8333	0.468
0.9166	0.455
1.0000	0.442
1.0833	0.430
1.1666	0.420
1.2500	0.408

Elapsed Time	INPUT 1
1.3333	0.398
1.4166	0.389
1.5000	0.379
1.5833	0.370
1.6666	0.363
1.7500	0.354
1.8333	0.347
1.9166	0.338
2.0000	0.332
2.5000	0.284
3.0000	0.246
3.5000	0.218
4.0000	0.192
4.5000	0.173
5.0000	0.161
5.5000	0.148
6.0000	0.142
6.5000	0.136
7.0000	0.126
7.5000	0.117
8.0000	0.110
8.5000	0.104
9.0000	0.101
9.5000	0.094
10.0000	0.091
11.0000	0.085
12.0000	0.075

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .001286 ft/min	by: Ecology & Environment	Well: CSB-8B
TRANSMISSIVITY: .008591 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .7180 ft	AQUIFER: Endless	AYER
Data Set: CSB-8B	THICKNESS: 6.680	
	SCREEN: top: 15.02 base: 25.02	
	DIAMETER: casing: .3332 intake: .3332	
	DEPTH: Water Table: 18.34 TD: 25.02	

Building 202 Data

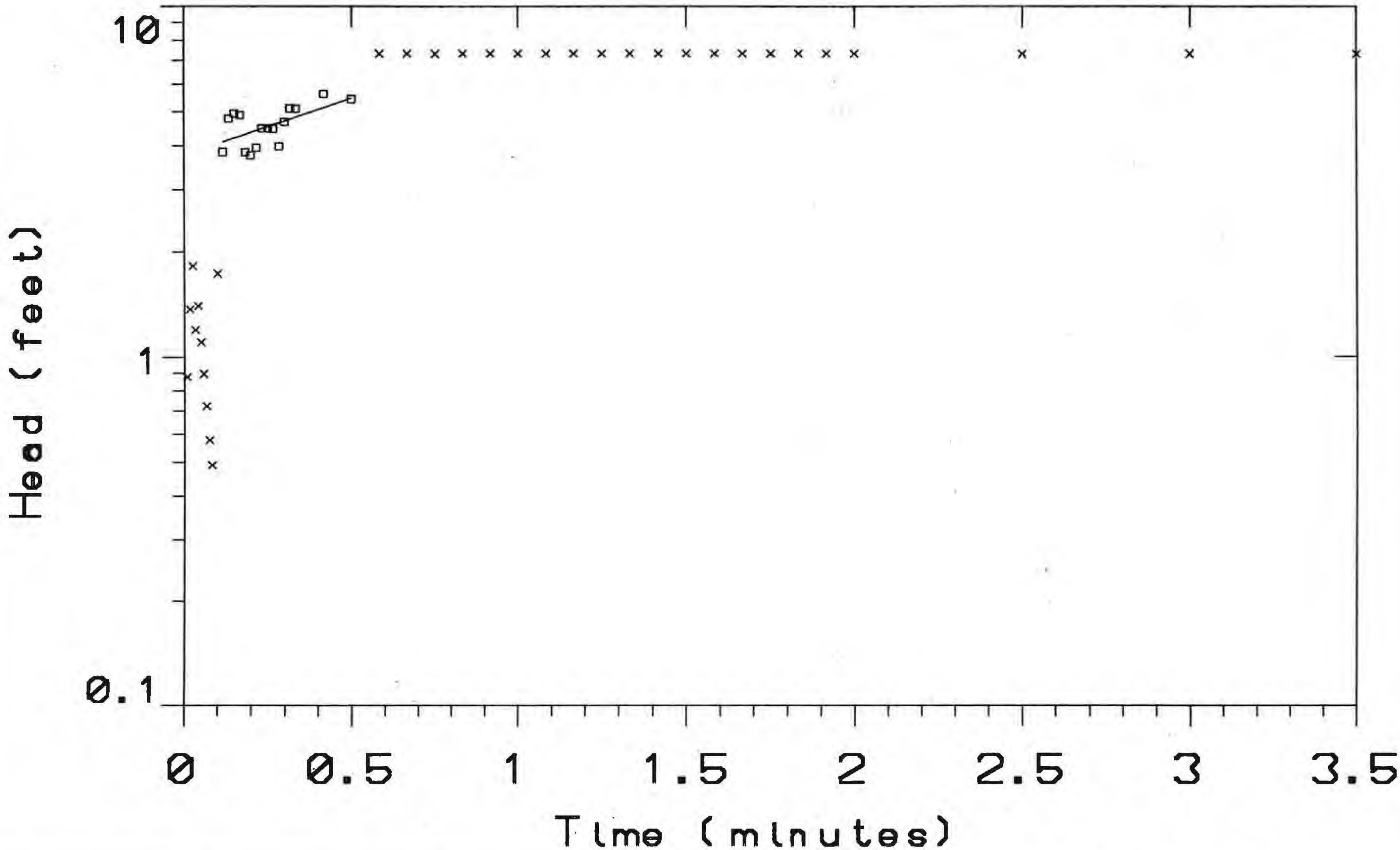
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well B202-1A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	05:43	Date	07/12/91
Logger Test	6	INPUT 1: Level (F)	

Step 1 07/11 15:33:54

Elapsed Time	INPUT 1
0.0000	0.003
0.0083	-0.876
0.0166	-1.369
0.0250	-1.818
0.0333	-1.195
0.0416	-1.401
0.0500	-1.103
0.0583	-0.895
0.0666	-0.724
0.0750	-0.578
0.0833	-0.490
0.1000	-1.730
0.1166	-3.846
0.1333	-4.789
0.1500	-4.940
0.1666	-4.893
0.1833	-3.843
0.2000	-3.767
0.2166	-3.954
0.2333	-4.488
0.2500	-4.479
0.2666	-4.475
0.2833	-3.992
0.3000	-4.672
0.3166	-5.111
0.3333	-5.102
0.4166	-5.617
0.5000	-5.437
0.5833	-7.316
0.6666	-7.332
0.7500	-7.319
0.8333	-7.322
0.9166	-7.322
1.0000	-7.326
1.0833	-7.326
1.1666	-7.326
1.2500	-7.326
1.3333	-7.326
1.4166	-7.329
1.5000	-7.332
1.5833	-7.329
1.6666	-7.326
1.7500	-7.326
1.8333	-7.322
1.9166	-7.322
2.0000	-7.322
2.5000	-7.313
3.0000	-7.316
3.5000	-7.313

END



MODEL TYPE: BOUWER and RICE CONDUCTIVITY: -.05928 ft/min TRANSMISSIVITY: UNKNOWN INITIAL HEAD: .8760 ft Date : B202-1A	for: USATHAMA by: Ecology & Environment WELL DATA: Units: ft AQUIFER: Endless THICKNESS: 7.100 SCREEN: top: 25.40 base: 35.40 DIAMETER: casing: .6666 intake: .3332 DEPTH: Water Table: 28.30 TD: 35.40	FORT DEVENS Well: B202-1A FORT DEVENS, MASS Macon

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well B202-1b

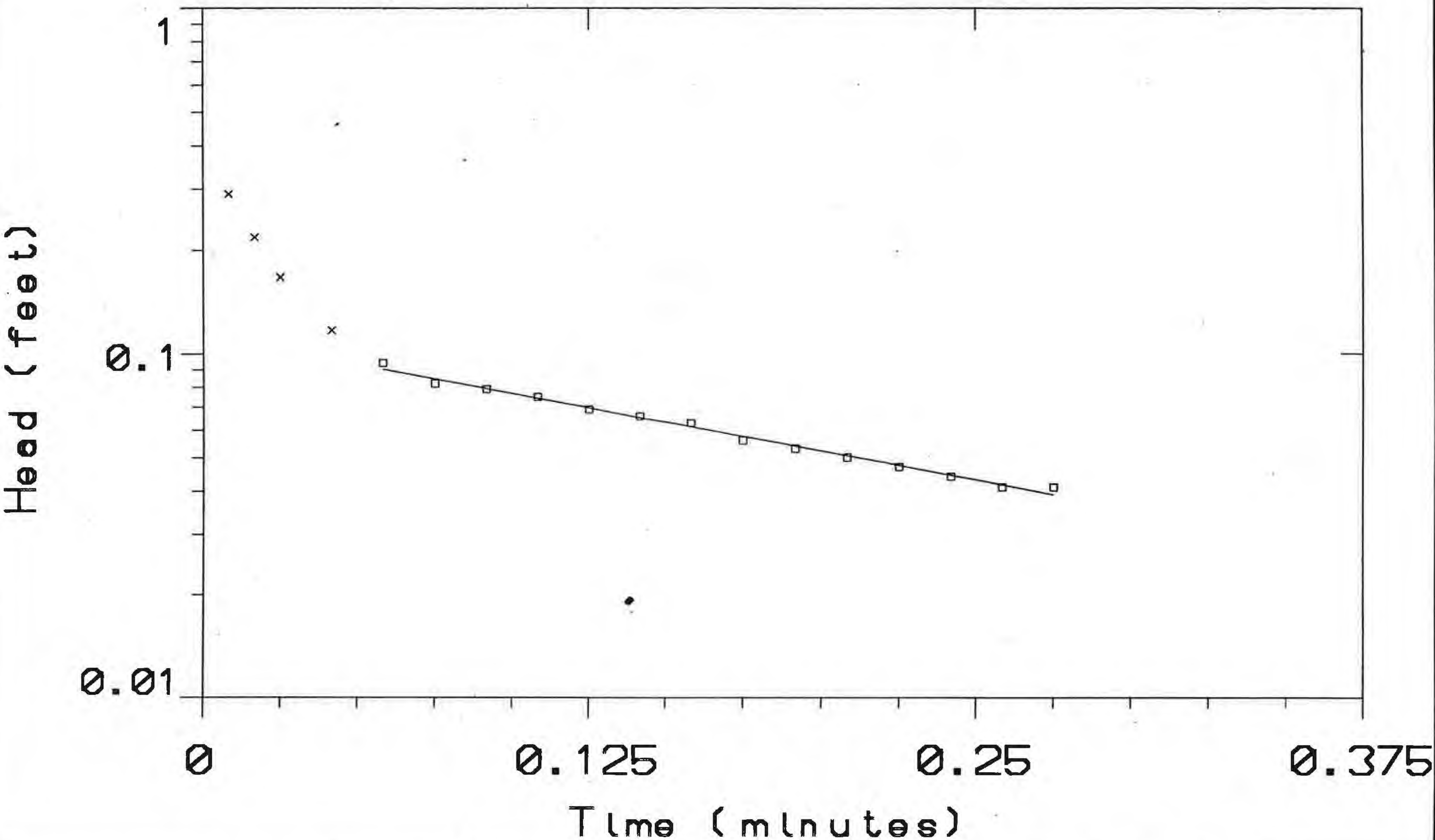
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	05:47	Date	07/12/91
Logger Test	6	INPUT 1: Level (F)	

Step 0 07/11 15:29:56

Elapsed Time	INPUT 1
0.0000	0.012
0.0083	0.047
0.0166	0.094
0.0250	2.695
0.0333	1.331
0.0416	0.676
0.0500	0.423
0.0583	0.395
0.0666	0.291
0.0750	0.218
0.0833	0.167
0.1000	0.117
0.1166	0.094
0.1333	0.082
0.1500	0.079
0.1666	0.075
0.1833	0.069
0.2000	0.066
0.2166	0.063
0.2333	0.056
0.2500	0.053
0.2666	0.050
0.2833	0.047
0.3000	0.044
0.3166	0.041
0.3333	0.041
0.4166	0.031
0.5000	0.028
0.5833	0.025
0.6666	0.018
0.7500	0.018
0.8333	0.015
0.9166	0.015
1.0000	0.012
1.0833	0.012
1.1666	0.009
1.2500	0.009

Elapsed Time	INPUT 1
1.3333	0.006
1.4166	0.006
1.5000	0.003
1.5833	0.003
1.6666	0.003
1.7500	0.003
1.8333	0.003
1.9166	0.003
2.0000	0.003
2.5000	0.003
3.0000	0.003
3.5000	0.006
4.0000	0.003

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	FORT DEVENS
CONDUCTIVITY: .1228 ft/min	by: Ecology & Environment	Well: B202-1B
TRANSMISSIVITY: 1.040 sq. ft/min	WELL DATA: Units: ft	FORT DEVENS, MASS
INITIAL HEAD: .2910 ft	AQUIFER: Endless	AYER
Data: B202-1B	THICKNESS: 8.470	
	SCREEN: top: 29.58 base: 39.58	
	DIAMETER: casing: .666 intake: .3332	
	DEPTH: Water Table: 31.11 TD: 39.58	

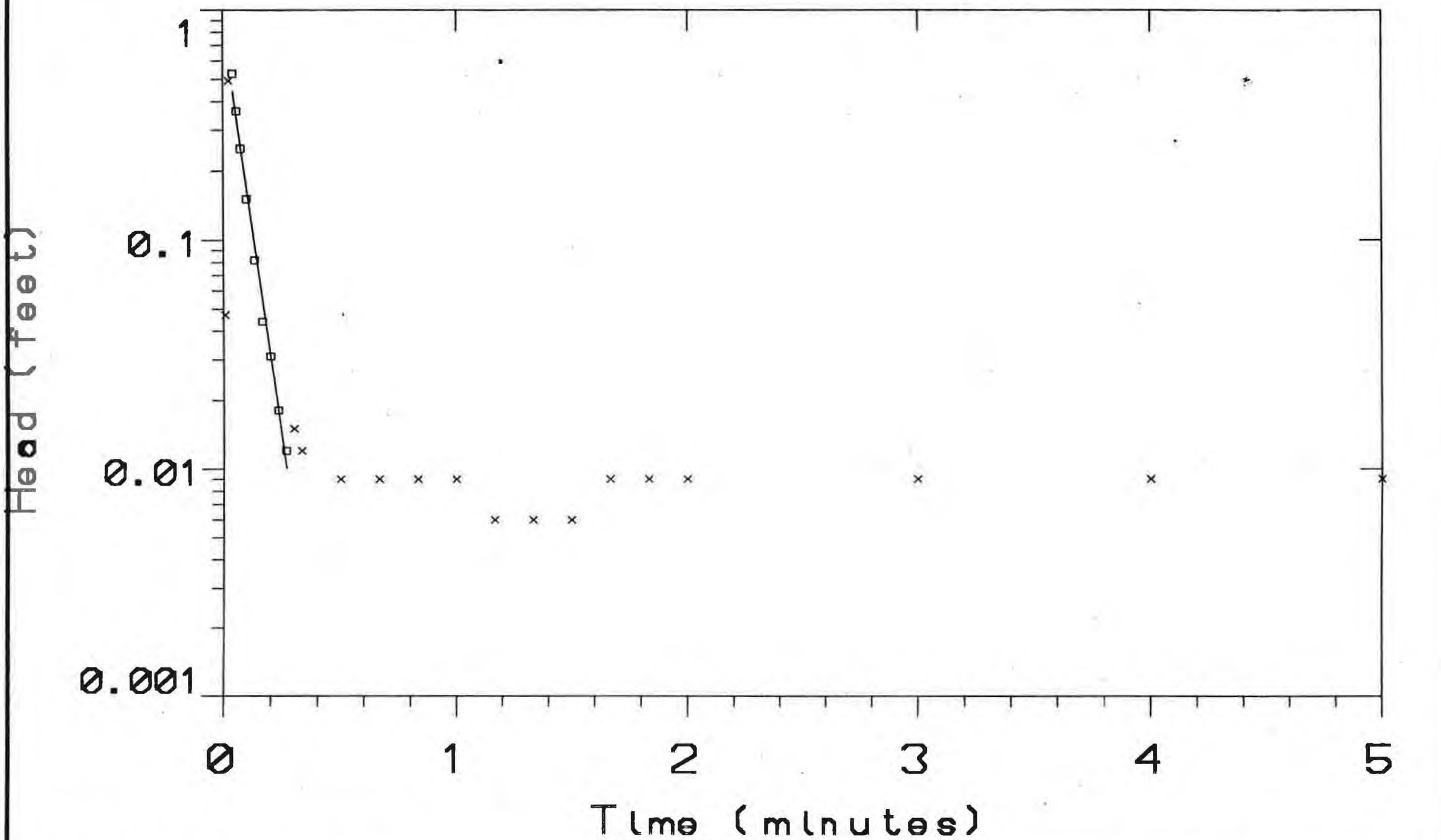
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well B202-2A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time		Date	07/12/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/12

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0083	0.0470		
0.0250	0.4930		
0.0416	0.5280		
0.0583	0.3630		
0.0750	0.2490		
0.1000	0.1510		
0.1333	0.0820		
0.1666	0.0440		
0.2000	0.0310		
0.2333	0.0180		
0.2666	0.0120		
0.3000	0.0150		
0.3333	0.0120		
0.5000	0.0090		
0.6666	0.0090		
0.8333	0.0090		
1.0000	0.0090		
1.1666	0.0060		
1.3333	0.0060		
1.5000	0.0060		
1.6660	0.0090		
1.8333	0.0090		
2.0000	0.0090		
3.0000	0.0090		
4.0000	0.0090		
5.0000	0.0090		

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	FORT DEVENS
CONDUCTIVITY: .03413 ft/min	by: Ecology & Environment	Well: B202-2A
TRANSMISSIVITY: .2860 sq. ft/min	WELL DATA: Units: ft	FORT DEVENS
INITIAL HEAD: .1040 ft	AQUIFER: Endless	AYERS
Data Set: B202-2A	THICKNESS: 8.380	
	SCREEN: top: 31.86 base: 36.86	
	DIAMETER: casing: .2500 intake: .2500	
	DEPTH: Water Table: 31.86 TD: 40.24	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well B202-2B

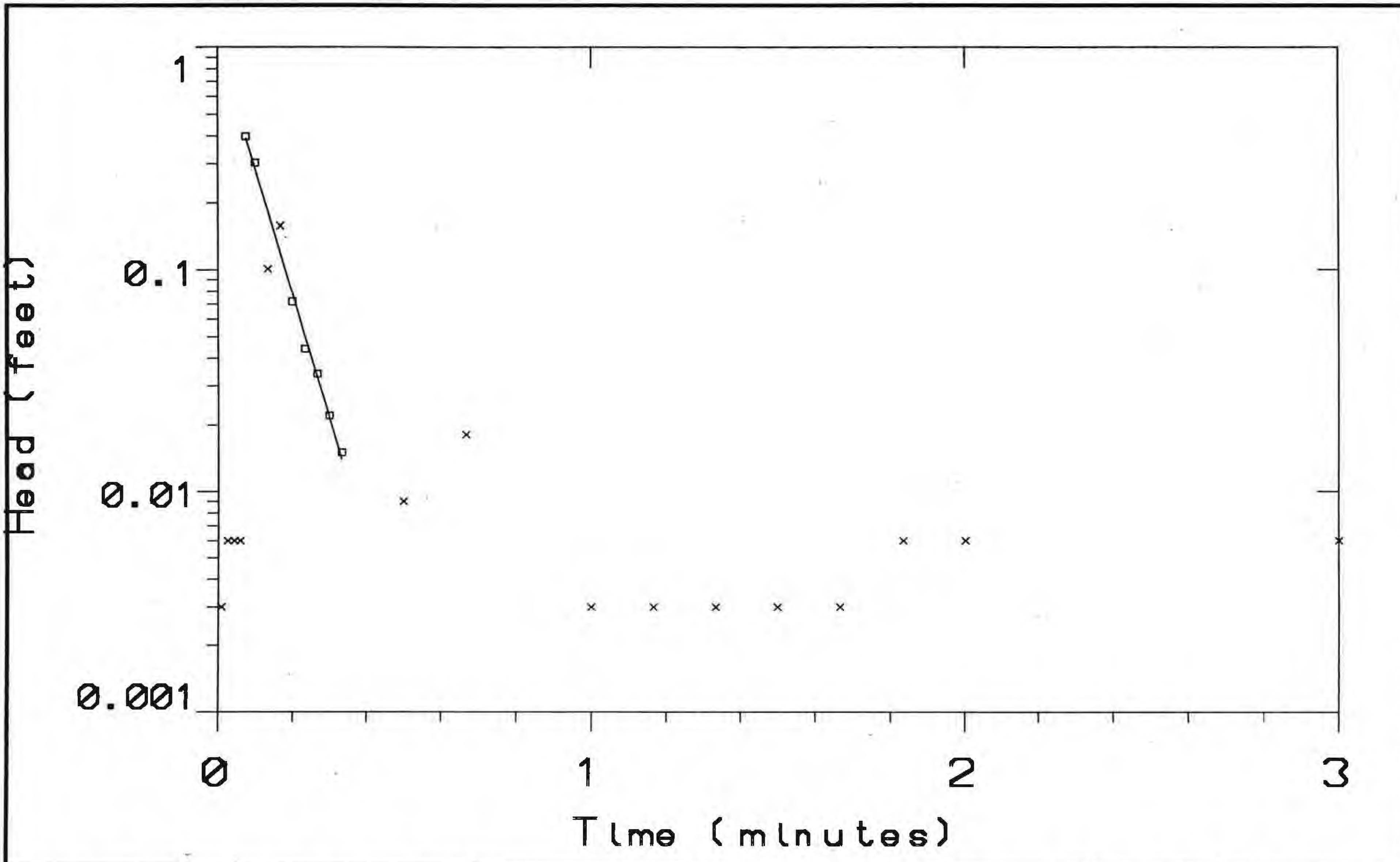
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time		Date	07/12/91
Logger Test	5	INPUT 1: Level	(F)

Step 1 07/12

Elapsed Time	INPUT 1
0.0083	0.0030
0.0250	0.0060
0.0416	0.0060
0.0583	0.0060
0.0750	0.3980
0.1000	0.3030
0.1333	0.1010
0.1666	0.1580
0.2000	0.0720
0.2333	0.0440
0.2666	0.0340
0.3000	0.0220
0.3333	0.0150
0.5000	0.0090
0.6666	0.0180
1.0000	0.0030
1.1666	0.0030
1.3333	0.0030
1.5000	0.0030
1.6660	0.0030
1.8333	0.0060
2.0000	0.0060
3.0000	0.0060

Elapsed Time	INPUT 1

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	FORT DEVENS
CONDUCTIVITY: .02349 ft/min	by: Ecology & Environment	Well: B202-2B
TRANSMISSIVITY: .1969 sq. ft/min	WELL DATA: Units: ft	FORT DEVENS
INITIAL HEAD: .1040 ft	AQUIFER: Endless	AYERS
Data Set: B202-2B	THICKNESS: 8.380	
	SCREEN: top: 31.86 base: 36.86	
	DIAMETER: casing: .2500 intake: .2500	
	DEPTH: Water Table: 31.86 TD: 40.24	

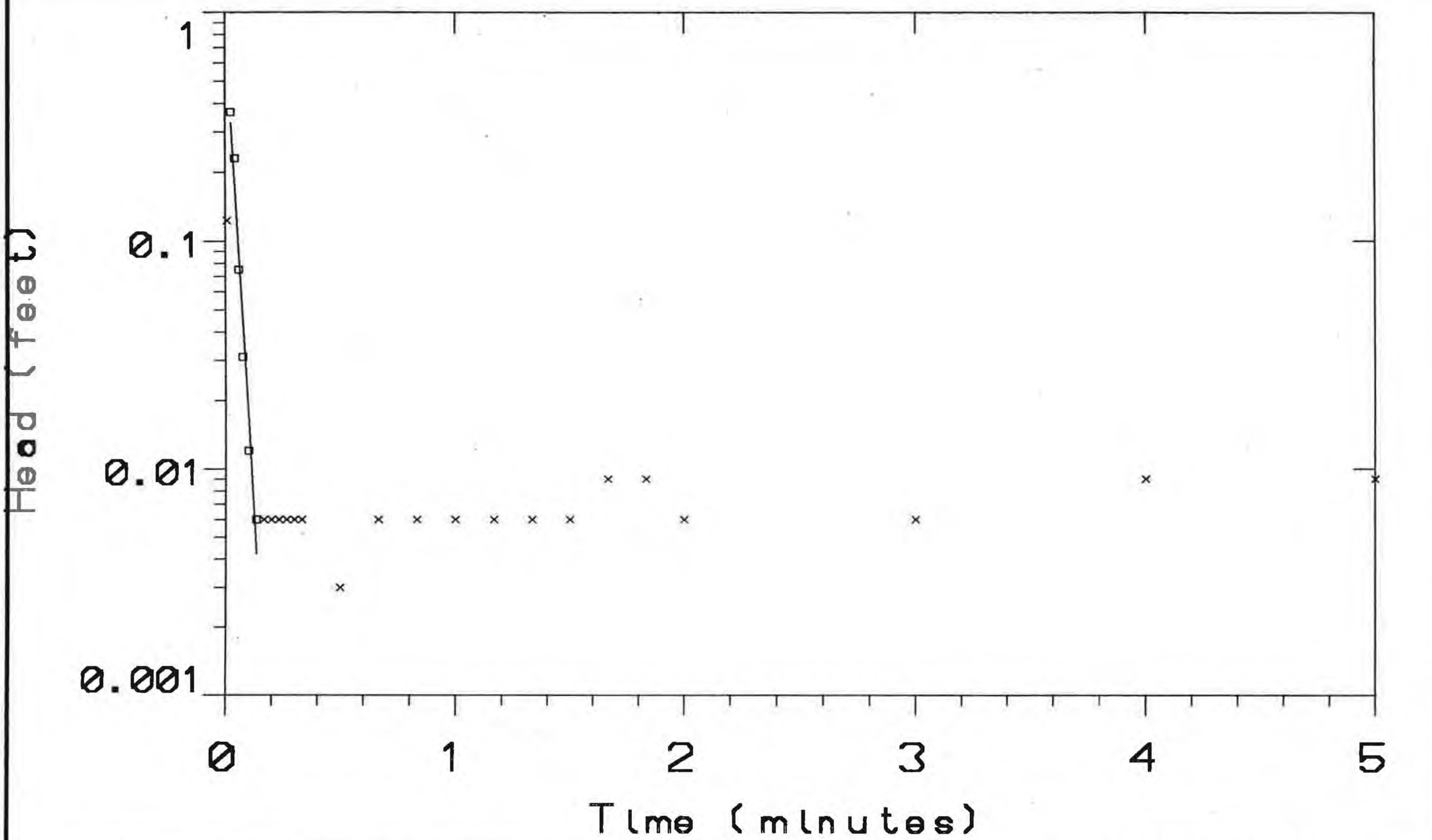
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well B202-3A

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time		Date	07/12/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/12

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0083	0.1230		
0.0250	0.3660		
0.0416	0.2300		
0.0583	0.0750		
0.0750	0.0310		
0.1000	0.0120		
0.1333	0.0060		
0.1666	0.0060		
0.2000	0.0060		
0.2333	0.0060		
0.2666	0.0060		
0.3000	0.0060		
0.3333	0.0060		
0.5000	0.0030		
0.6666	0.0060		
0.8333	0.0060		
1.0000	0.0060		
1.1666	0.0060		
1.3333	0.0060		
1.5000	0.0060		
1.6660	0.0090		
1.8333	0.0090		
2.0000	0.0060		
3.0000	0.0060		
4.0000	0.0090		
5.0000	0.0090		

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	FORT DEVENS
CONDUCTIVITY: .1065 ft/min	by: Ecology & Environment	Well: B202-3A
TRANSMISSIVITY: .9027 sq. ft/min	WELL DATA: Units: ft	FORT DEVENS
INITIAL HEAD: .1610 ft	AQUIFER: Endless	AYERS
Data Set: B202-3A	THICKNESS: 8.470	
	SCREEN: top: 31.11 base: 36.11	
	DIAMETER: casing: .2500 intake: .2500	
	DEPTH: Water Table: 31.11 TD: 39.58	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well B202-3B

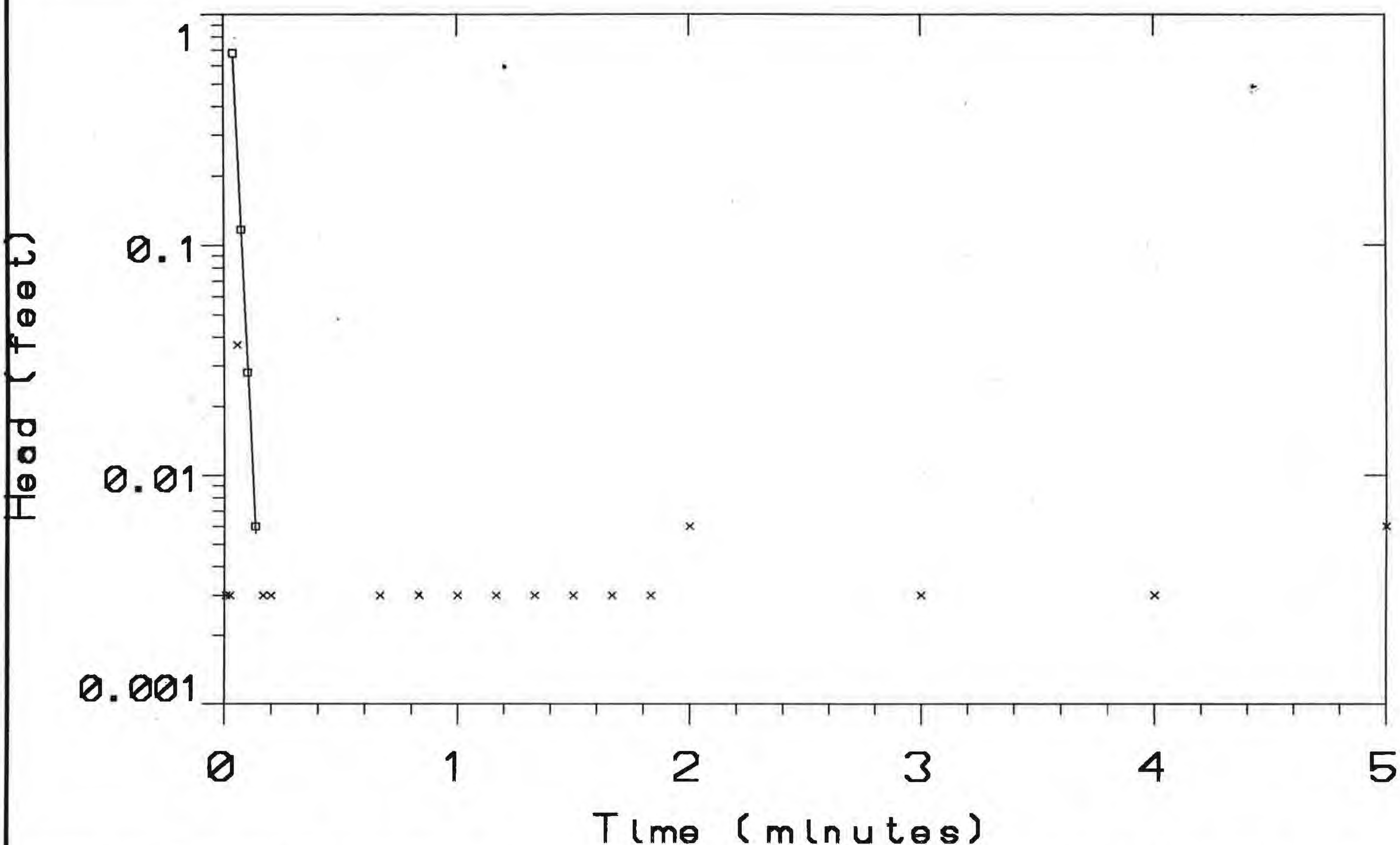
Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time			Date	07/12/91
Logger Test	5		INPUT 1: Level	(F)

Step 1 07/12

Elapsed Time	INPUT 1
0.0083	0.0030
0.0250	0.0030
0.0416	0.6800
0.0583	0.0370
0.0750	0.1170
0.1000	0.0280
0.1333	0.0060
0.1666	0.0030
0.2000	0.0030
0.6666	0.0030
0.8333	0.0030
1.0000	0.0030
1.1666	0.0030
1.3333	0.0030
1.5000	0.0030
1.6660	0.0030
1.8333	0.0030
2.0000	0.0060
3.0000	0.0030
4.0000	0.0030
5.0000	0.0060

Elapsed Time	INPUT 1

END



MODEL TYPE: BOUWER and RICE CONDUCTIVITY: .09825 ft/min TRANSMISSIVITY: .8322 sq. ft/min INITIAL HEAD: .1610 ft Data Set: B202-3B	for: USATHAMA by: Ecology & Environment WELL DATA: Units: ft AQUIFER: Endless THICKNESS: 8.470 SCREEN: top: 31.11 base: 36.11 DIAMETER: casing: .2500 intake: .2500 DEPTH: Water Table: 31.11 TD: 39.58	FORT DEVENS Well: B202-3B FORT DEVENS AYERS

POL Data

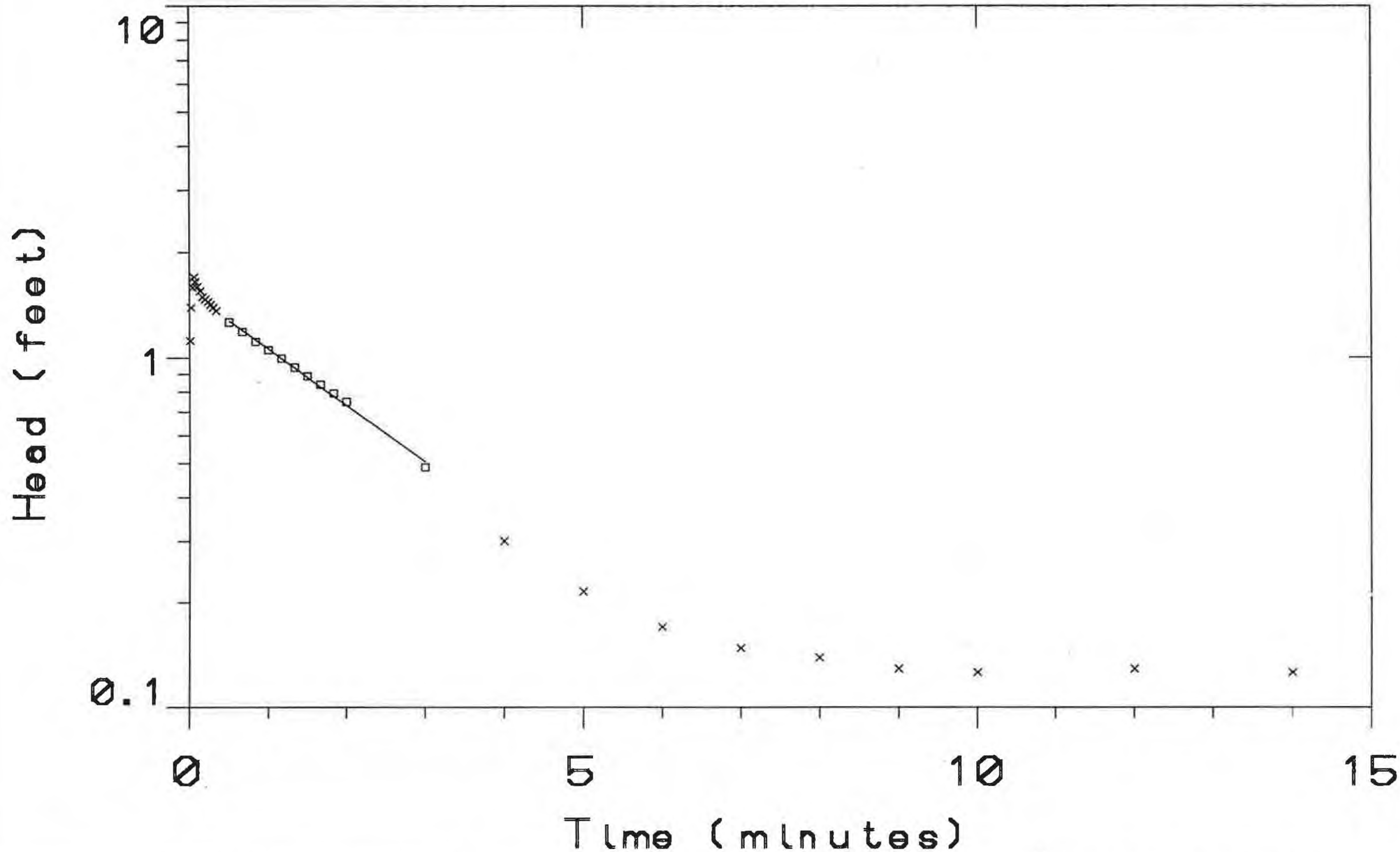
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well POL-1A

Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time			Date	07/12/91
Logger Test	5		INPUT 1: Level	(F)

Step 1 07/12

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0083	1.1190		
0.0250	1.3910		
0.0416	1.5910		
0.0583	1.6980		
0.0750	1.6510		
0.1000	1.6000		
0.1333	1.5530		
0.1666	1.4930		
0.2000	1.4700		
0.2333	1.4450		
0.2666	1.4170		
0.3000	1.3910		
0.3330	1.3600		
0.5000	1.2650		
0.6666	1.1860		
0.8333	1.1130		
1.0000	1.0530		
1.1666	0.9960		
1.3330	0.9390		
1.5000	0.8880		
1.6660	0.8410		
1.8333	0.7930		
2.0000	0.7490		
3.0000	0.4870		
4.0000	0.3000		
5.0000	0.2150		
6.0000	0.1700		
7.0000	0.1480		
8.0000	0.1390		
9.0000	0.1290		
10.000	0.1260		
12.000	0.1290		
14.000	0.1260		

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	FORT DEVENS
CONDUCTIVITY: .0005159 ft/min	by: Ecology & Environment	Well: POL-1A
TRANSMISSIVITY: .0005520 sq. ft/min	WELL DATA: Units: ft	FORT DEVENS
INITIAL HEAD: .9330 ft	AQUIFER: Endless	AYERS
Data set: POL-1A	THICKNESS: 1.070	
	SCREEN: top: 19.88 base: 28.82	
	DIAMETER: casing: .2080 intake: .2080	
	DEPTH: Water Tab 1.000 TD: 27.89	

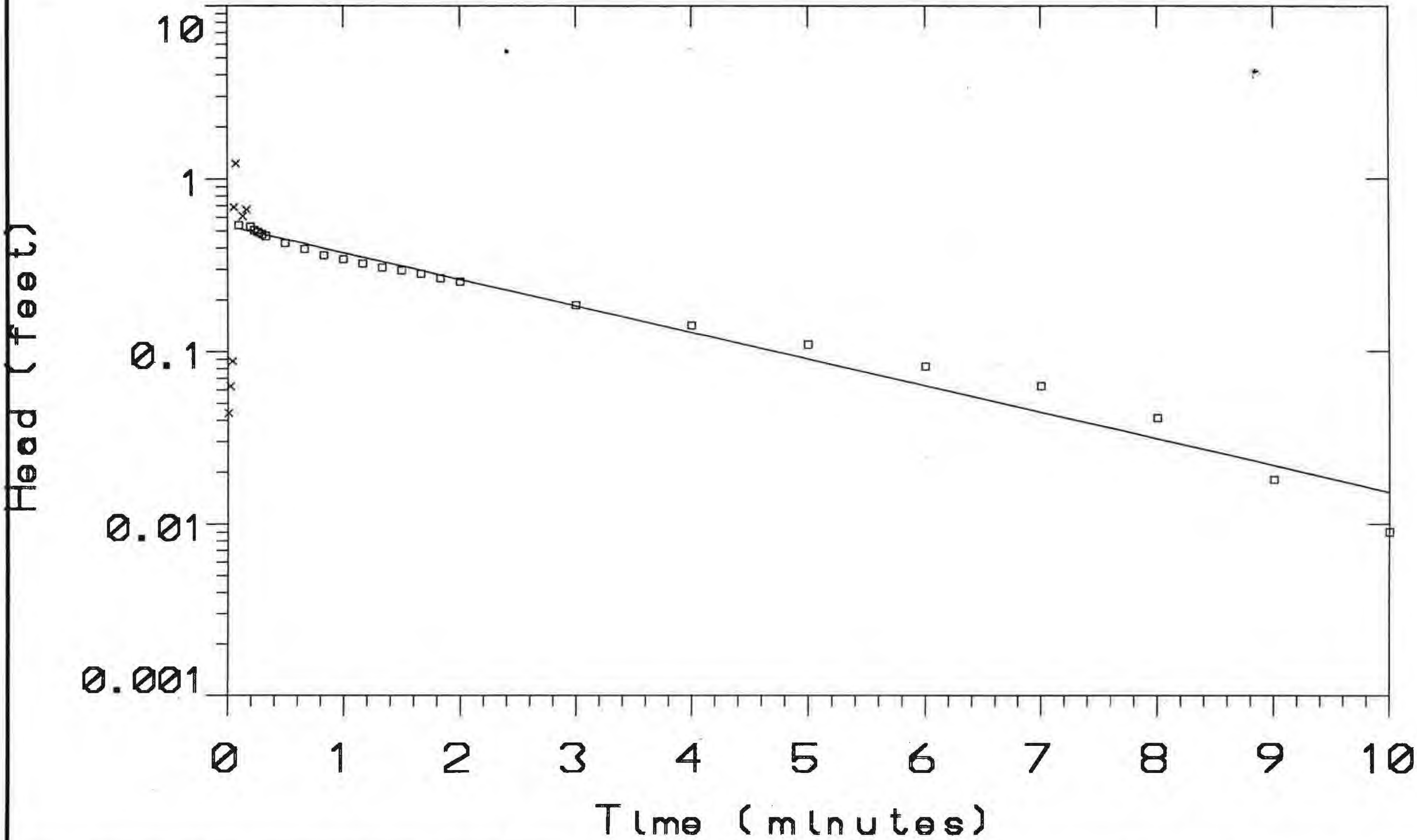
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well POL-1B

Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time			Date	07/12/91
Logger Test	5		INPUT 1: Level (F)	

Step 1 07/12

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0083	0.0440		
0.0250	0.0630		
0.0416	0.0880		
0.0583	0.6890		
0.0750	1.2330		
0.1000	0.5400		
0.1333	0.6100		
0.1666	0.6640		
0.2000	0.5310		
0.2333	0.5060		
0.2666	0.4930		
0.3000	0.4800		
0.3330	0.4680		
0.5000	0.4270		
0.6666	0.3950		
0.8333	0.3630		
1.0000	0.3440		
1.1666	0.3250		
1.3330	0.3090		
1.5000	0.2970		
1.6660	0.2840		
1.8333	0.2680		
2.0000	0.2560		
3.0000	0.1860		
4.0000	0.1420		
5.0000	0.1100		
6.0000	0.0820		
7.0000	0.0630		
8.0000	0.0410		
9.0000	0.0180		
10.000	0.0090		

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	FORT DEVENS
CONDUCTIVITY: .0005982 ft/min	by: Ecology & Environment	Well: POL-1B
TRANSMISSIVITY: .0006401 sq. ft/min	WELL DATA: Units: ft	FORT DEVENS
INITIAL HEAD: .9330 ft	AQUIFER: Endless	AYERS
Data Set: POL-1B	THICKNESS: 1.070	
	SCREEN: top: 19.88 base: 28.82	
	DIAMETER: casing: .2080 intake: .2080	
	DEPTH: Water Tab[illegible] 26.82 TD: 27.89	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well POL-3A

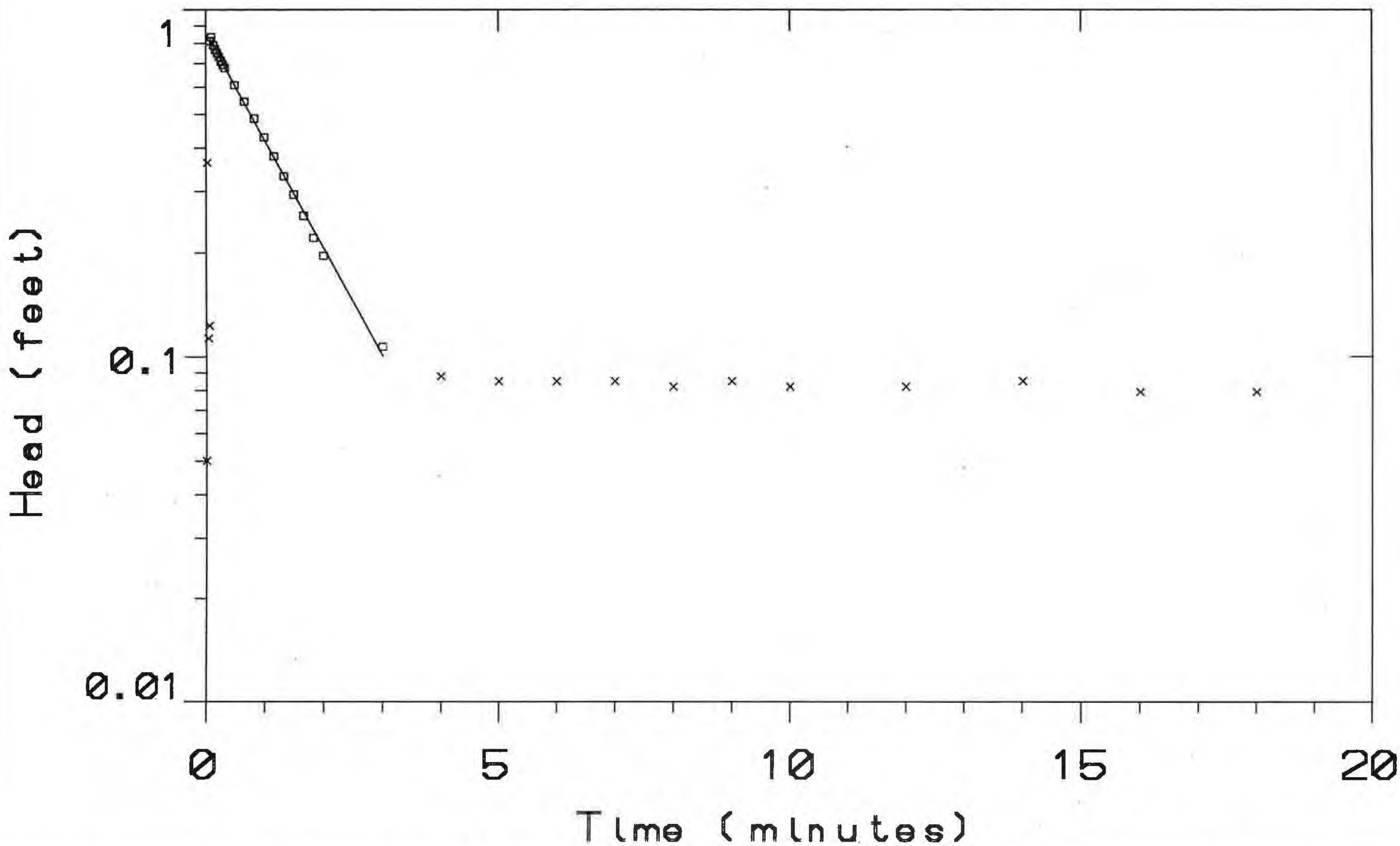
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time		Date	07/12/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/12

Elapsed Time	INPUT 1
0.0083	0.0500
0.0250	0.3630
0.0416	0.1130
0.0583	0.1230
0.0750	0.8120
0.1000	0.8350
0.1333	0.7900
0.1666	0.7680
0.2000	0.7490
0.2333	0.7300
0.2666	0.7110
0.3000	0.6950
0.3330	0.6800
0.5000	0.6070
0.6666	0.5440
0.8333	0.4870
1.0000	0.4300
1.1666	0.3790
1.3330	0.3320
1.5000	0.2940
1.6660	0.2560
1.8333	0.2210
2.0000	0.1960
3.0000	0.1070
4.0000	0.0880
5.0000	0.0850
6.0000	0.0850
7.0000	0.0850
8.0000	0.0820
9.0000	0.0850
10.000	0.0820
12.000	0.0820
14.000	0.0850
16.000	0.0790
18.000	0.0790

Elapsed Time	INPUT 1

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .0009442 ft/min

TRANSMISSIVITY: .004872 sq. ft/min

INITIAL HEAD: .1770 ft

Data Set: POL-3A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 5.160

SCREEN: top: 26.82 base: 28.82

DIAMETER: casing: .2080 intake: .2080

DEPTH: Water Table: 26.82 TD: 31.98

FORT DEVENS

Well: POL-3A
FORT DEVENS
AYERS

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well POL-3B

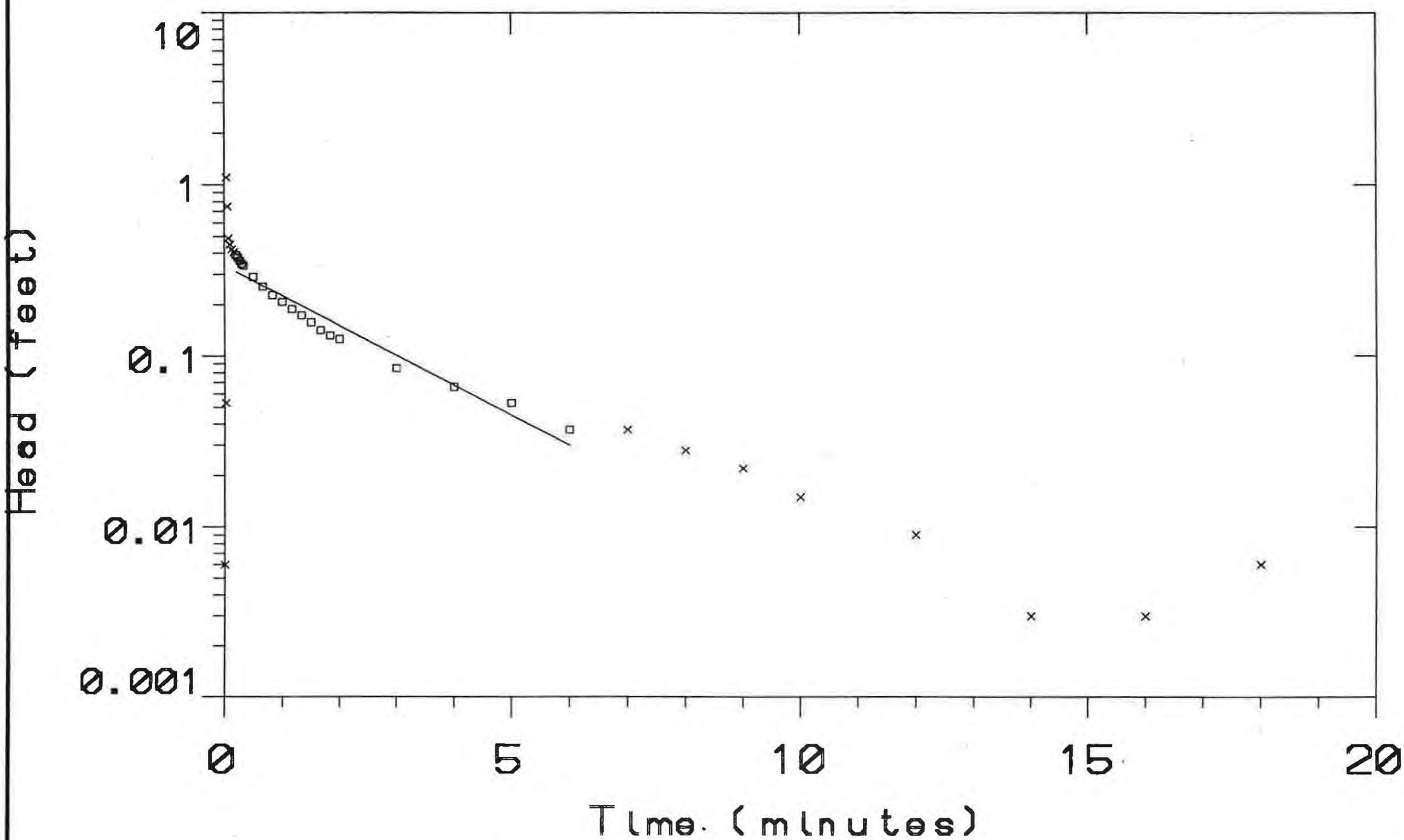
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	09:35	Date	07/12/91
Logger Test	5	INPUT 1: Level (F)	

Step 1 07/12

Elapsed Time	INPUT 1
0.0083	0.0060
0.0250	0.0530
0.0416	1.1030
0.0583	0.7490
0.0750	0.4870
0.1000	0.4490
0.1333	0.4200
0.1666	0.4040
0.2000	0.3890
0.2333	0.3760
0.2666	0.3600
0.3000	0.3470
0.3330	0.3380
0.5000	0.2910
0.6666	0.2560
0.8333	0.2270
1.0000	0.2080
1.1666	0.1890
1.3330	0.1730
1.5000	0.1580
1.6660	0.1420
1.8333	0.1320
2.0000	0.1260
3.0000	0.0850
4.0000	0.0660
5.0000	0.0530
6.0000	0.0370
7.0000	0.0370
8.0000	0.0280
9.0000	0.0220
10.000	0.0150
12.000	0.0090
14.000	0.0030
16.000	0.0030
18.000	0.0060

Elapsed Time	INPUT 1

- END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: .001479 ft/min

TRANSMISSIVITY: .007631 sq. ft/min

INITIAL HEAD: .1770 ft

Data Set: POL-3B

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 5.160

SCREEN: top: 26.82 base: 28.82

DIAMETER: casing: .2080 intake: .2080

DEPTH: Water Tab[illegible] 26.82 TD: 31.98

FORT DEVENS

Well: POL-3B
FORT DEVENS
AYERS

EOD Data

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well EOD-1A

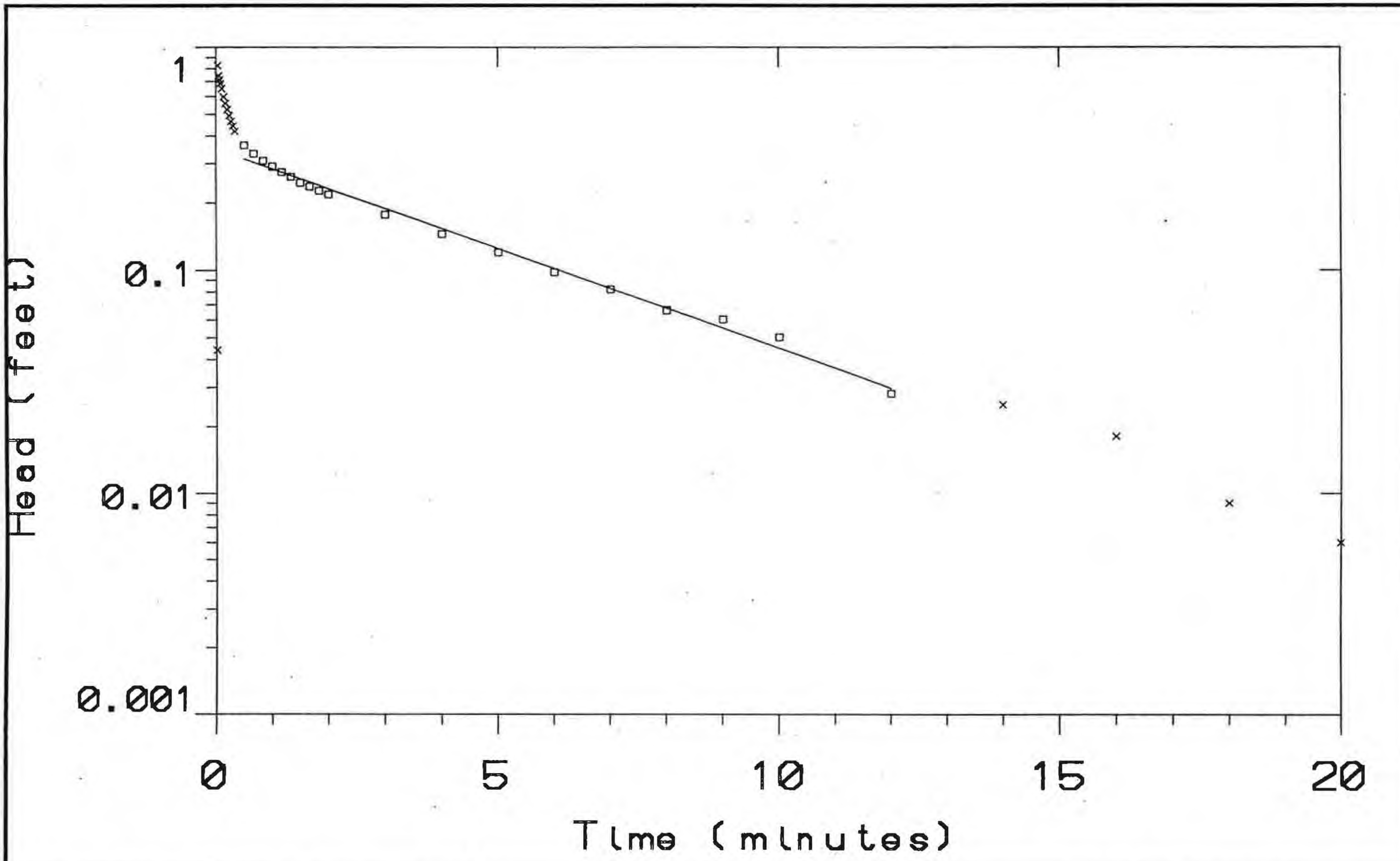
Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	06:13		Date	07/18/91
Logger Test	0		INPUT 1: Level (F)	

Step 1 07/17 08:25:27

Elapsed Time	INPUT 1
0.0000	-0.632
0.0083	-0.044
0.0166	-0.493
0.0250	-0.825
0.0333	-0.752
0.0416	-0.743
0.0500	-0.730
0.0583	-0.711
0.0666	-0.699
0.0750	-0.686
0.0833	-0.670
0.1000	-0.651
0.1166	-0.626
0.1333	-0.597
0.1500	-0.575
0.1666	-0.559
0.1833	-0.540
0.2000	-0.525
0.2166	-0.506
0.2333	-0.493
0.2500	-0.477
0.2666	-0.464
0.2833	-0.452
0.3000	-0.442
0.3166	-0.433
0.3333	-0.420
0.4166	-0.385
0.5000	-0.363
0.5833	-0.344
0.6666	-0.332
0.7500	-0.319
0.8333	-0.309
0.9166	-0.300
1.0000	-0.291
1.0833	-0.281
1.1666	-0.275
1.2500	-0.265

Elapsed Time	INPUT 1
1.3333	-0.262
1.4166	-0.256
1.5000	-0.246
1.5833	-0.243
1.6666	-0.237
1.7500	-0.234
1.8333	-0.227
1.9166	-0.224
2.0000	-0.218
2.5000	-0.196
3.0000	-0.177
3.5000	-0.154
4.0000	-0.145
4.5000	-0.129
5.0000	-0.120
5.5000	-0.107
6.0000	-0.098
6.5000	-0.088
7.0000	-0.082
7.5000	-0.072
8.0000	-0.066
8.5000	-0.066
9.0000	-0.060
9.5000	-0.053
10.0000	-0.050
11.0000	-0.041
12.0000	-0.028
13.0000	-0.028
14.0000	-0.025
15.0000	-0.018
16.0000	-0.018
17.0000	-0.015
18.0000	-0.009
19.0000	-0.009
20.0000	-0.006

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: 6.128E-6 ft/min

TRANSMISSIVITY: .0007476 sq. ft/min

INITIAL HEAD: .04400 ft

De[illegible] Set: EOD-1A

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 122.0

SCREEN: top: 24.00 base: 122.0

DIAMETER: casing: .1520 intake: .1520

DEPTH: Water Tab[illegible] 0.000 TD: 122.0

Fort Devens

Well: EOD-1A

Fort Devens, Mass

AYER

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well EOD-1B

Reference	0.000		Scale Factor	10.036
SG	1.000		Offset	-0.029
Linearity	0.000		Delay mSEC	50.000
Time	06:15		Date	07/18/91
Logger Test	0		INPUT 1: Level (F)	

Step 0 07/17 08:03:05

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1
0.0000	0.006	1.3333	0.309
0.0083	0.006	1.4166	0.303
0.0166	4.317	1.5000	0.297
0.0250	2.442	1.5833	0.291
0.0333	-0.177	1.6666	0.284
0.0416	0.610	1.7500	0.281
0.0500	0.588	1.8333	0.275
0.0583	0.534	1.9166	0.268
0.0666	0.506	2.0000	0.265
0.0750	0.483	2.5000	0.243
0.0833	0.518	3.0000	0.221
0.1000	0.477	3.5000	0.205
0.1166	0.452	4.0000	0.189
0.1333	0.442	4.5000	0.173
0.1500	0.436	5.0000	0.161
0.1666	0.442	5.5000	0.151
0.1833	0.427	6.0000	0.145
0.2000	0.420	6.5000	0.139
0.2166	0.417	7.0000	0.129
0.2333	0.414	7.5000	0.123
0.2500	0.411	8.0000	0.117
0.2666	0.408	8.5000	0.107
0.2833	0.404	9.0000	0.094
0.3000	0.401	9.5000	0.091
0.3166	0.398	10.0000	0.085
0.3333	0.398	11.0000	0.075
0.4166	0.385	12.0000	0.066
0.5000	0.376	13.0000	0.066
0.5833	0.370	14.0000	0.056
0.6666	0.360	15.0000	0.050
0.7500	0.354	16.0000	0.053
0.8333	0.347	17.0000	0.050
0.9166	0.341	18.0000	0.044
1.0000	0.335	19.0000	0.041
1.0833	0.328	20.0000	0.044
1.1666	0.322	21.0000	0.041
1.2500	0.316	22.0000	0.047

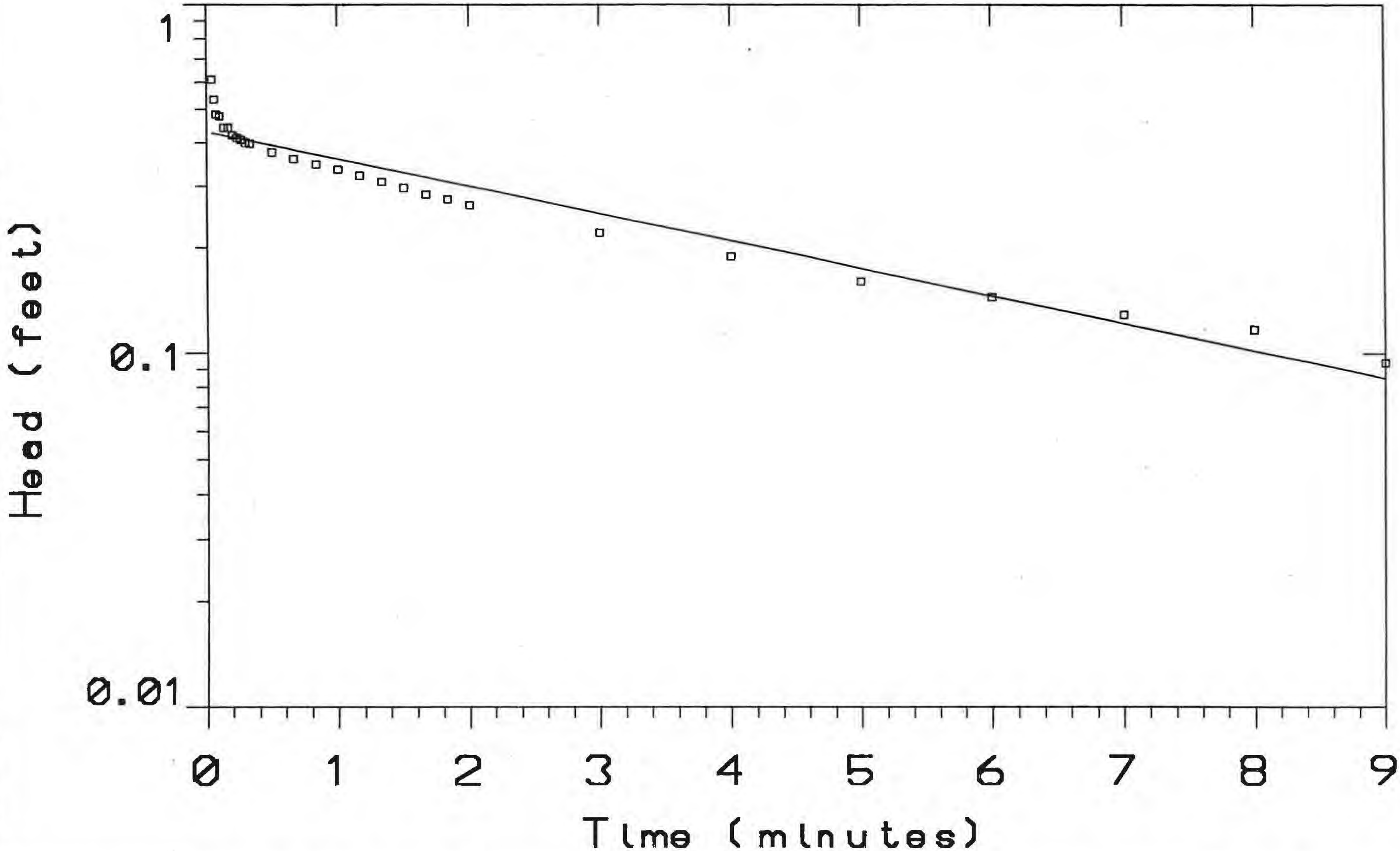
ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well EOD-1B

Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	06:15	Date	07/18/91
Logger Test	0	INPUT 1: Level (F)	

Step 0 07/17 08:03:05

Elapsed Time	INPUT 1	Elapsed Time	INPUT 1

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: 4.062E-5 ft/min	by: Ecology & Environment	Well: EOD-1B
TRANSMISSIVITY: .004956 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .6100 ft	AQUIFER: Endless	AYER
	THICKNESS: 122.0	
	SCREEN: top: 24.00 base: 122.0	
	DIAMETER: casing: .1520 intake: .1520	
	DEPTH: Water Table: 0.000 TD: 122.0	

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well EOD-4A

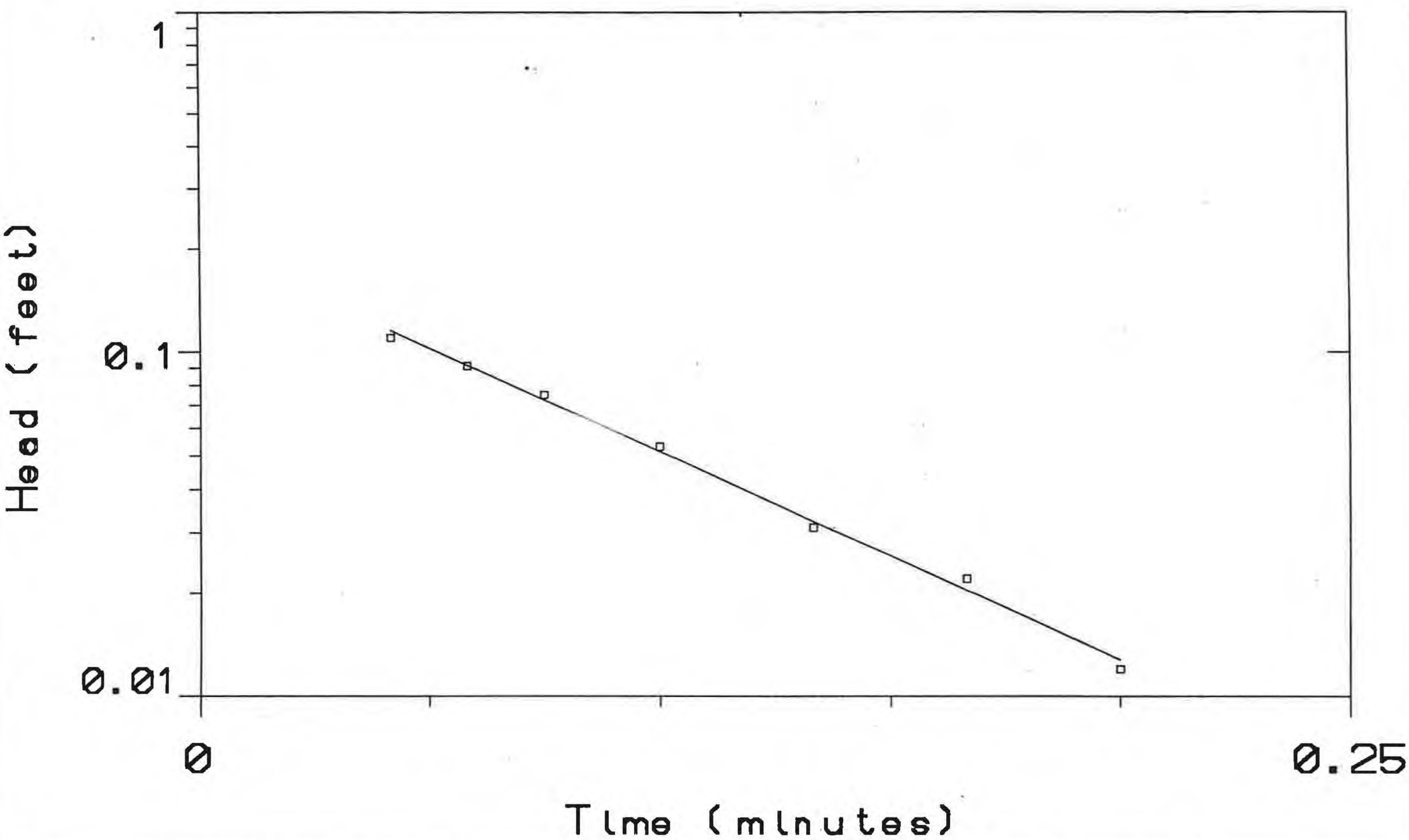
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	06:07	Date	07/18/91
Logger Test	1	INPUT 1: Level (F)	

Step 1 07/17 09:27:00

Elapsed Time	INPUT 1
0.0000	0.009
0.0083	0.253
0.0166	0.161
0.0250	0.088
0.0333	-0.129
0.0416	-0.110
0.0500	-0.101
0.0583	-0.091
0.0666	-0.079
0.0750	-0.075
0.0833	-0.066
0.1000	-0.053
0.1166	-0.041
0.1333	-0.031
0.1500	-0.025
0.1666	-0.022
0.1833	-0.015
0.2000	-0.012
0.2166	-0.009
0.2333	-0.006
0.2500	-0.006
0.2666	-0.003
0.2833	-0.003
0.3000	0.000
0.3166	0.000
0.3333	0.000
0.4166	0.000
0.5000	-0.006
0.5833	-0.009
0.6666	-0.012
0.7500	-0.018
0.8333	-0.018
0.9166	-0.022
1.0000	-0.025
1.0833	-0.025
1.1666	-0.028
1.2500	-0.028

Elapsed Time	INPUT 1
1.3333	-0.028
1.4166	-0.031
1.5000	-0.031
1.5833	-0.031
1.6666	-0.031
1.7500	-0.031
1.8333	-0.031
1.9166	-0.031
2.0000	-0.031
2.5000	-0.031
3.0000	-0.028
3.5000	-0.025
4.0000	-0.025
4.5000	-0.018
5.0000	-0.018
5.5000	-0.015
6.0000	-0.015
6.5000	-0.012
7.0000	-0.009
7.5000	-0.009
8.0000	-0.009
8.5000	-0.006
9.0000	-0.006
9.5000	-0.006
10.0000	-0.003
11.0000	-0.003
12.0000	0.000
13.0000	0.000
14.0000	0.003

END



MODEL TYPE: BOUWER and RICE	for: USATHAMA	Fort Devens
CONDUCTIVITY: .001998 ft/min	by: Ecology & Environment	Well: EOD-4A
TRANSMISSIVITY: .2438 sq. ft/min	WELL DATA: Units: ft	Fort Devens, Mass
INITIAL HEAD: .1100 ft	AQUIFER: Endless	AYER
	THICKNESS: 122.0	
	SCREEN: top: 24.00 base: 122.0	
	DIAMETER: casing: .1520 intake: .1520	
	DEPTH: Water Table: 0.000 TD: 122.0	

recycled paper

ecology and environment

ECOLOGY AND ENVIRONMENT
SE2000
Environmental Logger
Unit# 569
Monitoring Well EOD-4B

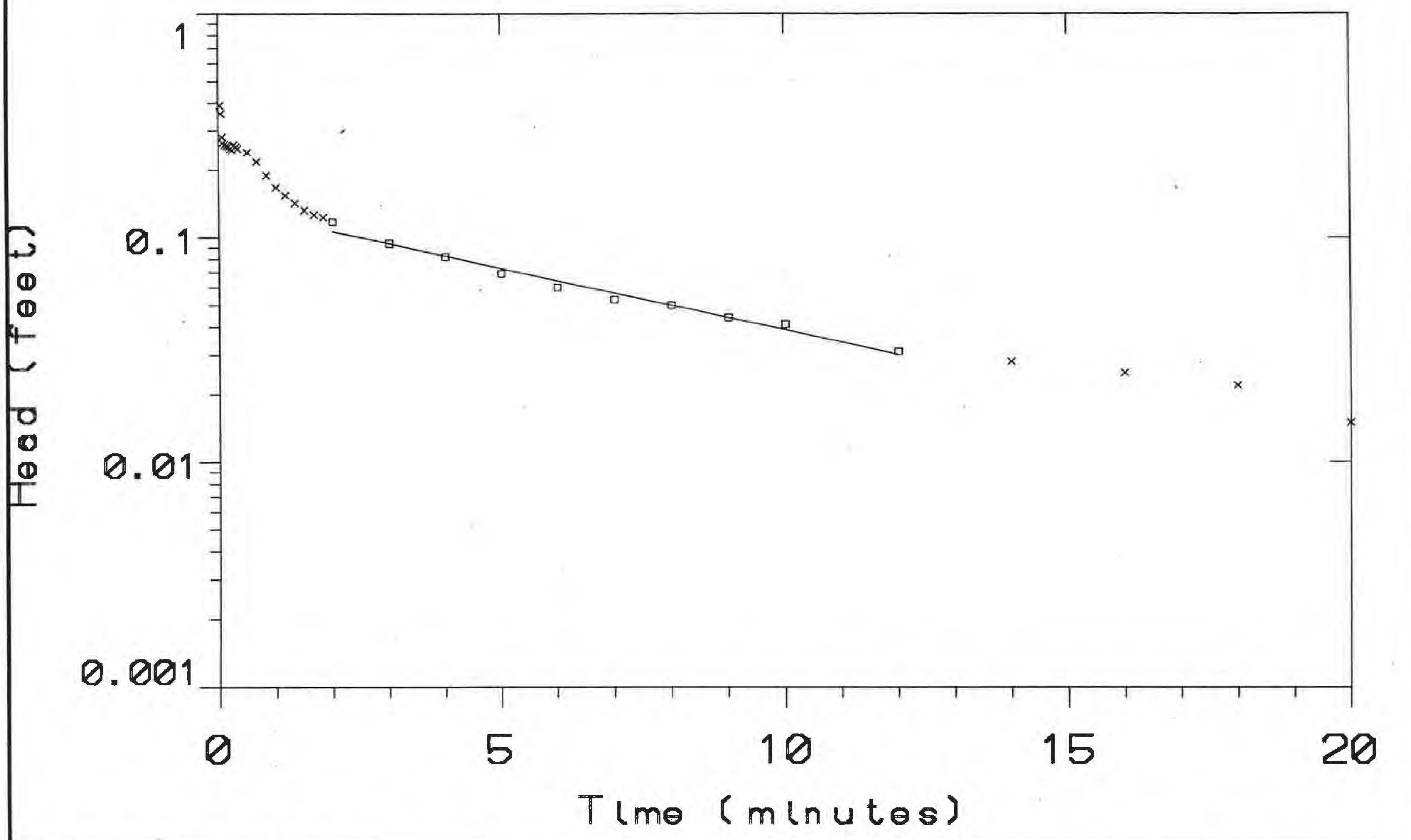
Reference	0.000	Scale Factor	10.036
SG	1.000	Offset	-0.029
Linearity	0.000	Delay mSEC	50.000
Time	06:09	Date	07/18/91
Logger Test	1	INPUT 1: Level (F)	

Step 0 07/17 09:05:51

Elapsed Time	INPUT 1
0.0000	-0.003
0.0083	-0.003
0.0166	0.025
0.0250	0.389
0.0333	0.335
0.0416	0.357
0.0500	0.319
0.0583	0.281
0.0666	0.281
0.0750	0.265
0.0833	0.268
0.1000	0.259
0.1166	0.256
0.1333	0.256
0.1500	0.256
0.1666	0.253
0.1833	0.249
0.2000	0.249
0.2166	0.246
0.2333	0.246
0.2500	0.287
0.2666	0.259
0.2833	0.256
0.3000	0.253
0.3166	0.249
0.3333	0.249
0.4166	0.246
0.5000	0.240
0.5833	0.234
0.6666	0.218
0.7500	0.202
0.8333	0.189
0.9166	0.177
1.0000	0.167
1.0833	0.161
1.1666	0.154
1.2500	0.148

Elapsed Time	INPUT 1
1.3333	0.142
1.4166	0.139
1.5000	0.132
1.5833	0.126
1.6666	0.126
1.7500	0.123
1.8333	0.123
1.9166	0.117
2.0000	0.117
2.5000	0.104
3.0000	0.094
3.5000	0.085
4.0000	0.082
4.5000	0.072
5.0000	0.069
5.5000	0.066
6.0000	0.060
6.5000	0.060
7.0000	0.053
7.5000	0.053
8.0000	0.050
8.5000	0.047
9.0000	0.044
9.5000	0.041
10.0000	0.041
11.0000	0.034
12.0000	0.031
13.0000	0.028
14.0000	0.028
15.0000	0.025
16.0000	0.025
17.0000	0.022
18.0000	0.022
19.0000	0.015
20.0000	0.015
21.0000	0.015

END



MODEL TYPE: BOUWER and RICE

CONDUCTIVITY: 3.954E-5 ft/min

TRANSMISSIVITY: .004825 sq. ft/min

INITIAL HEAD: .3890 ft

Data Set: EOD-4B

for: USATHAMA

by: Ecology & Environment

WELL DATA: Units: ft

AQUIFER: Endless

THICKNESS: 122.0

SCREEN: top: 24.00 base: 122.0

DIAMETER: casing: .1520 intake: .1520

DEPTH: Water Table: 0.000 TD: 122.0

Fort Devens

Well: EOD-4B

Fort Devens, Mass

AYER

APPENDIX B
RETESTING PROGRAM DATA SHEETS

12/7/91

WJ

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

3.240
.024
3.224

WELL NO: SHL-1
TOTAL DEPTH: 8.88' KD
SLUG TYPE: ~~1.25"x2'~~ PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 09:50
~~HERMIT TEST No.:~~ manually tested
ENDTIME: 1026

SITE: FORT DEVENS
DEPTH TO THE WATER: 3.24' T.O.C.
SLUG SIZES (L/D): 2' x 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
0951:05	5 sec	3.00	
0951:10	10 sec	3.01	
0951:15	15 sec	3.01	
0951:30	30 sec	3.02	
0951:40	40 sec	3.03	
0951:50	50 sec	3.03	
0952:00	1 min	3.04	
0952:30	1.5 min	3.05	
0953:00	2.00 min	3.06	
0956:00	5.00 min	3.12	
0958:00	7.00 min	3.13	
1001:00	10.00 min	3.15	
1006:00	15.00 min	3.16	
1011:00	20.00	3.16	
1021:00	30.00 min	3.16	
1026:00	35.00 "	3.16	END OF TEST
	40.00 "		
	45.00 "		
	50.00 "		
	60.00 "		
	65.00 "		
	70.00 "		
	75.00 "		
	80.00 "		
	85 "		

Note: Stop the test if 90% static water level is recovered

12/7/91

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

3.24 or 3.16 after falling head

WELL NO: SHL-1
TOTAL DEPTH: 8.88' T.O.C.
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 10:26
~~HERMIT TEST NO.:~~ manually tested
END TIME: 1041

SITE: FORT DEVENS
DEPTH TO THE WATER: 3.16 T.O.C.
SLUG SIZES (L/D): 2' × 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1026:05	5 sec	missed reading	
1026:10	10 sec	3.349	
1026:15	15 sec	3.38	
1026:30	30 sec	3.37	
1026:40	40 sec	3.36	
1026:50	50 sec	3.35	
1027:00	1 min	3.34	
1027:30	1.5 min	3.32	
1028:00	2.00 min	3.30	
1031:00	5.00 min	3.23	
1033:00	7.00 min	3.20	
1036:00	10.00 min	3.18	
1041:00	15.00 min	3.15	END OF TEST
	20.00		
	30.00 min		
	35.00		
	40.00		
	45.00		
	50.00		
	60.00		
	65.00		
	70.00		
	75.00		
	80.00		
	85		

Note: stop the test if 90% static water level is recovered

12/7/91

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: SHL-4
TOTAL DEPTH: 13.89 T.O.C.
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 1619
~~PERMIT TEST NO.:~~ manually tested
END TIME: 1620

SITE: FORT DEVENS
DEPTH TO THE WATER: 10.86' T.O.C.
SLUG SIZES (L/D): 2' × 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL, K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1619:05	5 sec	10.79	
1619:10	10 sec	10.83	
1619:15	15 sec	10.85	
1619:30	30 sec	10.85	
1619:40	40 sec	10.85	
1619:50 ~~1620~~	50 sec	10.86	
1620:00	1 min	10.86	END OF TEST
	1.5 min		
	2.00 min		
	5.00 min		
	7.00 min		
	10.00 min		
	15.00 min		
	20.00		
	30.00 min		
	35.00 "		
	40.00 "		
	45.00 "		
	50.00 "		
	60.00 "		
	65.00 "		
	70.00 "		
	75:00 "		
	80:00 "		
	85 "		

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Note: stop the test if 90% static water level is measured

7 DECEMBER 1991

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: SHL-4
TOTAL DEPTH: 13.89' T.O.C.
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 1621
~~HERMIT TEST No.:~~ manually tested
ENDTIME: 1622

SITE: FORT DEVENS
DEPTH TO THE WATER: 10.86' T.O.C.
SLUG SIZES (L/D): 2' × 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1621:05	5 sec	missed reading	
1621:10	10 sec	10.98	
1621:15	15 sec	10.90	
1621:30	30 sec	10.86	
1621:40	40 sec	10.86	
1621:50	50 sec	10.86	
1622:00	1 min	10.86	END OF TEST

Note: Stop the test if 90% static water level is recovered

7 DECEMBER 1991

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: SHL-6
TOTAL DEPTH:
SLUG TYPE:
VOLUME OF WATER REMOVED:
STARTING TIME:
HERMIT TEST NO.:
END TIME:

SITE:
DEPTH TO THE WATER:
SLUG SIZES (L/D):
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL:

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
	Well recovered before first measurement		
	could be taken.		

Note: Stop the test if 90% static water level is recovered

7 DECEMBER 1991

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: SHL-19
TOTAL DEPTH: 32.79' T.O.C.
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 1418
~~HERMIT TEST NO:~~ manually tested
ENDTIME:

SITE: FORT DEVENS
DEPTH TO THE WATER: 23.20' T.O.C.
SLUG SIZES (L,D): 5' × 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1418:05	5 sec	23.20'	
1418:10	10 sec	23.20'	
1418:15	15 sec	23.19'	
1418:30	30 sec	23.19'	
1418:40	40 sec	23.19'	END OF TEST
	BEGIN SLUG OUT	TEST (DEPTH TO WATER =	23.19' T.O.C.)
1420:05	5 sec	missed reading	
1420:10	10 sec	23.19'	
1420:15	15 sec	23.19'	END OF TEST
	This well was	stabilizing too quickly	
	for accurate/	meaningful manual	
	testing.		

Note: Stop the test if 90% static water level is recovered

7 DECEMBER 1991

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: SHL-22
TOTAL DEPTH: ~115
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 1219
~~HERMIT TEST NO.:~~ manually tested
ENDTIME: 1229

SITE: FORT DEVENS
DEPTH TO THE WATER: 6.81' T.O.C.
SLUG SIZES (L/D): 5' × 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1219:05	5 sec	6.30	
1219:10	10 sec	6.31	
1219:15	15 sec	6.33	
1219:30	30 sec	6.36	
1219:40	40 sec	6.38	
1219:50	50 sec	6.41	
1220:00	1 min	6.43	
1220:30	1.5 min	6.48	
1221:00	2 min	6.58	
1224:00	5 min	6.71	
1226:00	7 min	6.76	
1229:00	10 min	6.80	END OF TEST

Attempted to use the 5' × 3" slug, but it was too wide and would jam when being lowered into this well.

Note: Stop the test if 90% static water level is recovered

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ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: SHL-22
TOTAL DEPTH: ~115
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 1230
~~HERMIT TEST NO.:~~ manually tested
END TIME: 1245

SITE: FORT DEVENS
DEPTH TO THE WATER: 6.80'
SLUG SIZES (L,D): 5' x 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1230:05	5 sec	7.35	
1230:10	10 sec	7.33	
1230:15	15 sec	7.31	
1230:30	30 sec	7.29	
1230:40	40 sec	7.26	
1230:50	50 sec	7.24	
1231:00	1 min	7.22	
1231:30	1.5 min	7.16	
1232:00	2.00 min	7.12	
1235:00	5.00 min	6.95	
1237:00	7.00 min	6.89	
1240:00	10.00 min	6.85	
1245:00	15.00 min	6.82	END OF TEST
	20.00		
	30.00 min		
	35.00 "		
	40.00 "		
	45.00 "		
	50.00 "		
	60.00 "		
	65.00 "		
	70.00 "		
	75.00 "		
	80:00 "		
	85 "		

Note: stop the test if 90% static water level is recovered

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: SHL-23
TOTAL DEPTH: 35.45 T.O.C.
SLUG TYPE: P.V.C.
VOLUME OF WATER REMOVED:
STARTING TIME: 1302
~~HERMIT TEST No.:~~ manually tested
END TIME: 13817

SITE: FORT DEVENS
DEPTH TO THE WATER: 26.48' T.O.C.
SLUG SIZES (L/D): 5' x 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1302:05	5 sec	26.27	
1302:10	10 sec	26.30	
1302:15	15 sec	26.33	
1302:30	30 sec	26.38	
1302:40	40 sec	26.40	
1302:50	50 sec	26.42	
1303:00	1 min	26.43	
1303:30	1.5 min	26.45	
1304:00	2 min	26.45	
1307:00	5 min	26.46	
1309:06	7 min	26.47	
1312:00	10 min	26.47	
1317:00	15 min	26.47	END OF TEST

Note: stop the test if 90% static water level is recovered

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ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: SHL-23
TOTAL DEPTH: 35.45' T.O.C.
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 1321
~~HERMIT TEST NO.:~~ manually tested
ENDTIME: 1326

SITE: FORT DEVENS
DEPTH TO THE WATER: 26.47' T.O.C.
SLUG SIZES (L/D): 5' × 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
13.21:05	5 sec	missed reading	
1321:10	10 sec	missed reading	
1321:15	15 sec	26.66	
1321:30	30 sec	26.58	
1321:40	40 sec	26.55	
1321:50	50 sec	26.53	
1322:00	1 min	26.52	
1322:30	1.5 min	26.50	
1323:00	2.00 min	26.49	
1326:00	5.00 min	26.47	END OF TEST
	7.00 min		
	10.00 min		
	15.00 min		
	20.00		
	30.00 min		
	35.00		
	40.00		
	45.00		
	50.00		
	60.00		
	65.00		
	70.00		
	75:00		
	80:00		
	85		

Note: stop the test if 90% static water level is recovered

7 DECEMBER 1991

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: CSB-2
TOTAL DEPTH: 52.43' T.O.C.
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 1519
~~HERMIT TEST NO.:~~ manually tested
END TIME: 1521

SITE: FORT DEVENS
DEPTH TO THE WATER: 17.91' T.O.C.
SLUG SIZES (L/D): 5' × 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1519:05	5 sec	missed reading	
1519:10	10 sec	17.94	
1519:15	15 sec	17.91	
1519:30	30 sec	17.91	
1519:40	40 sec	17.91	
1519:50	50 sec	17.91	
1520:00	1 minute	17.91	
1520:30	1.5 min	17.91	
1521:00	2 min	17.91	END OF TEST

Note: stop the test if 90% static water level is recovered

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7 DECEMBER 1991

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: CSB-2
TOTAL DEPTH: 52.43' T.O.C
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME: 1517
~~HERMIT TEST NO.:~~ manually tested
ENDTIME: 1519

SITE: FORT DEVENS
DEPTH TO THE WATER: 17.95' T.O.C
SLUG SIZES (L/D): 5' x 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: M. HECKEL
K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1517:05	5 sec	17.88	
1517:10	10 sec	17.90	
1517:15	15 sec	17.91	
1517:30	30 sec	17.91	
1517:40	40 sec	17.91	
1517:50	50 sec	17.91	
1518:00	1 min	17.91	
1518:30	1.5 min	17.91	
1519:00	2.00 min	17.91	END OF TEST
	5.00 min		
	7.00 min		
	10.00 min		
	15.00 min		
	20.00		
	30.00 min		
	35.00		
	40.00		
	45.00		
	50.00		
	60.00		
	65.00		
	70.00		
	75.00		
	80:00		
	85		

Note: stop the test if 90% static water level is recovered

10 DEC 1991

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: POL-2
TOTAL DEPTH: 29.25
SLUG TYPE:
VOLUME OF WATER REMOVED:
STARTING TIME:
HERMIT TEST NO.:
END TIME:

SITE: FORT DEVENS
DEPTH TO THE WATER: 28.71
SLUG SIZES (L/D):
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: K DAVISON
S ROBERTS

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
	INSUFFICEINT WATER VOLUME		
	TO PERFORM TEST		

Note: stop the test if 90% static water level is measured

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13 DECEMBER 1991

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: EOD-2
TOTAL DEPTH: 26.6' T.O.R.
SLUG TYPE:
VOLUME OF WATER REMOVED:
STARTING TIME:
HERMIT TEST NO.:
END TIME:

SITE: FORT DEVENS
DEPTH TO THE WATER: 25.3' T.O.R.
SLUG SIZES (L/D):
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL:

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
	INSUFFICIENT	WATER VOLUME	
	TO PERFORM	TEST	

Note: Stop the test if 90% static water level is recovered

13 DECEMBER 1991

ECOLOGY AND ENVIRONMENT INC.

SLUG TEST DATA SHEET

WELL NO: EOD -4
TOTAL DEPTH: 36.10' T.O.R.
SLUG TYPE: PVC
VOLUME OF WATER REMOVED:
STARTING TIME:
~~[illegible]~~ manually tested
ENDTIME:

SITE: FORT DEVENS 26
DEPTH TO THE WATER: 31.[redacted] T.O.R.
SLUG SIZES ~~(I.D.)~~: 2" x 1.25"
RISING OR FALLING HD OR BOTH: R,F,B
E+E PERSONNEL: S. NEWCHURCH, B. KOWALCYZK, K. DAVISON

TIME	LAPSE OF TIME	HEAD VALUE	REMARKS
1340:05	5 sec	missed	
	10 sec	31.08	
	15 sec	31.10	
	20 sec	31.11	
1340:30	30 sec	31.15	
	40 sec	31.12	
	50 sec	31.12	
1341:00 ~~1340:00~~	1 min	31.125	
1341:30	1.5 min	31.13	
1342:00	2 min	31.13	
1345:00	5 min	31.14	
1347:00	7 min	31.15	
~~1350:00~~	10 min	31.15	
1355:00	15 min	31.15	
1400:00	20 min	31.15	END OF TEST
	30 min		
	35 min		
	40 min		
	45 min		
NOTE: TEST PERFORMED WITHIN THREE HOURS			
OF SAMPLING WELL			

Note: stop the test if 90% static water level is recovered

APPENDIX C

IRDMIS LEVEL 3 DATA

APPENDIX C

The enclosed high density 3.5" diskette comprises Appendix C. This diskette contains all IRDMIS Level 3 data collected as part of the Remedial Investigation of Fort Devens Group 1A sites. These data are presented in two ways:

- ASCII files containing easy to follow tables of analytical results for each sampling medium; and
- ASCII files containing the analytical results for each medium in a data-only format to facilitate exchange of information with other software (such as dBase or Lotus).

The following files are condensed and included on this diskette:

File Name	Contents
o TBL_CSO.RI	Table of soil analytical results
o TBL_CSE.RI	Table of sediment analytical results
o TBL_CGW.RI	Table of ground water analytical results
o TBL_CSW.RI	Table of surface water analytical results
o ASCII_SO.RI	Data-only format of soil analytical results
o ASCII_SE.RI	Data-only format of sediment analytical results
o ASCII_GW.RI	Data-only format of ground water analytical results
o ASCII_SW.RI	Data-only format of surface analytical results
o DV_CQC.OUT	Data-only format of quality control sample results.

To extract this information from its condensed form, follow the instructions given in the file README.TXT, also included on the diskette. A printed copy of the README.TXT file is provided on the following pages.

File: Readme.txt 26 March 1992

IRDMIS Level 3 Ft. Devens Group 1A RI Analytical Data Files

This diskette contains the following files: TBL_RI.EXE, ASCII_RI.EXE, and ASCII_QC.EXE. These files are self-extracting executable files, which hold all data in a condensed format.

FILE CONTENTS

TBL_RI.EXE contains the ASCII files:

TBL_CSO.RI	Chemical Soil Table	187,450 bytes,
TBL_CSE.RI	Chemical Sediment Table	948,063 bytes,
TBL_CGW.RI	Chemical Ground Water Table	2,328,641 bytes,
TBL_CSW.RI	Chemical Surface Water Table	857,300 bytes.

ASCII_RI.EXE contains the ASCII files:

ASCII_SO.RI	Chemical Soil Data	103,813 bytes,
ASCII_SE.RI	Chemical Sediment Data	551,287 bytes,
ASCII_GW.RI	Chemical Ground Water Data	1,206,221 bytes,
ASCII_SW.RI	Chemical Surface Water Data	448,951 bytes.

ASCII_QC.EXE contains the ASCII file:

DV_CQC.OUT	Chemical QC Data	1,370,382 bytes.

Please note the space requirements for these files when preparing to extract the data.

FILE STRUCTURE

The four table files, when extracted, will be in an easy to follow format with titles, page numbers, headings, and data in a columnar layout. The four files will be in ASCII format, and will be ready to be printed.

The data files (except file DV_CQC.OUT), when extracted, will have the following structure:

Field Name	Columns	Data Type	Description
SA	1-2	Numeric 2,0	Study area
INST	3-4	Character 2	Installation
LAB	5-6	Character 2	Lab
LOT	7-9	Character 3	Lot number
SITETYPE	10-13	Character 4	Site type
SITEID	14-23	Character 10	Site id
SAMPPROG	24-26	Character 3	Program
SAMPDATE	27-34	Character 8	Sample date
LAB	35-36	Character 2	Lab
TESTNAME	37-42	Character 6	Test name
METHNO	43-46	Character 4	Test method number
SAMPDEPTH	47-54	Character 8	Sample depth
MEASBOOL	55-56	Character 2	Code indicates test result
VAL	57-66	Character 10	Result of test
UNITSMEAS	67-70	Character 4	Unit of measure
FLAGCODE	71	Character 1	Flag
FSANNO	72-79	Character 8	Field sample number

The file DV_CQC.OUT, when extracted, will have the following structure:

Field Name	Columns	Data Type	Description
INST	1-2	Character 2	Installation
LAB	3-4	Character 2	Lab
LOT	5-7	Character 3	Lot number
QC_TYPE	8-11	Character 4	QC type
SAMP_TYPE	12	Character 1	Sample type
SAMPPROG	13-15	Character 3	Program
SAMPDATE	16-23	Character 8	Date sample collected
LAB	24-25	Character 2	Lab
TESTNAME	26-31	Character 6	Test name
METHNO	32-35	Character 4	Test method number
SAMPDEPTH	36-43	Numeric 8,1	Sample depth
MEASBOOL	44-45	Character 2	Code indicates test result
VAL	46-57	Numeric 12,3	Result of test
UNITMEAS	58-61	Character 4	Unit of measure
FLAGCODE	62	Character 1	Flag
FSANNO	63-70	Character 8	Field sample number

INSTRUCTIONS FOR EXTRACTING FILES

The instructions for extracting information from any of the three executable files on this diskette are as follows:

- o Place the diskette in the 3.5" disk drive on a PC,
- o From the DOS prompt of the area in which the information is to be transferred type the command -
  <drive letter>:<executable file name>

  Example: to extract the four table files from the diskette which is in the "B" drive and place them into a hard disk area called "C:\IRDMIS", go to the C:\IRDMIS\> prompt and type the command; B:TBL_RI.

End of file: Readme.txt

APPENDIX D

QA/QC RESULTS

(The field sampling and analytical programs for the Group 1A sites (RIs at Shepley's Hill Landfill and Cold Spring Brook Landfill) were integrated with the programs for the site investigations (SIs) for Group 1B sites. The general conclusions of the QA/QC program apply to the entire program and are necessarily reported as such. Data specific to the 1A sites are reported separately).

Table D-1

SUMMARY OF FIELD BLANK/RINSATES
FOR FORT DEVENS SI/RI
UNITS = μg/l

Sample Date	Method	Test Name	Concentration	Site ID
06/27/91	Metal	Arsenic	3.050	Zulu1
		Barium	7.290	Zulu1
		Calcium	6600.000	Zulu1
		Iron	51.700	Zulu1
		Potassium	510.000	Zulu1
		Magnesium	1700.000	Zulu1
		Sodium	2640.000	Zulu1
		Zinc	53.700	Zulu1
	Pest	Beta-Benzenehexachloride	0.113 U	Zulu1
		P,P'-DDT	0.113 U	Zulu1
	Explosives		ND	Zulu1
	VOAs		ND	Zulu1
	BNA		ND	Zulu1
06/28/91	Metals	Barium	9.010	Zulu1
		Calcium	7000.000	Zulu1
		Copper	7.960	Zulu1
		Iron	61.100	Zulu1
		Potassium	581.000	Zulu1
		Magnesium	1800.000	Zulu1
		Sodium	2790.000	Zulu1
		Zinc	58.200	Zulu1
	Pest	Beta-Benzenehexachloride	0.153 U	Zulu1
		4,4'-DDT	0.146 U	Zulu1
	VOA	1,2-Dichloroethane	1.180	Zulu1
	Explosives		ND	Zulu1
	TPHC		<1160	Zulu1
	BNA		ND	Zulu1
07/02/91	TPHC		<1160	B202
07/09/91	Metal	Calcium	93.500	LF11
		Sodium	253.000	LF11
	Pest	Alpha-Benzenehexachloride	0.032 U	LF11
		Beta-Benzenehexachloride	0.147 U	LF11
	VOA	Methylene Chloride	8.800	LF11
	TPHC		<1160	LF11
	BNA		ND	LF11
07/11/91	Metal	Barium	41.100 X	LF11
		Calcium	98.700	LF11
		Sodium	237.000	LF11
	VOA	Methylene Chloride	7.400	LF11
	Pest		ND	LF11
	TPHC		<1160	LF11
	BNA		ND	LF11
07/17/91		Total Organic Carbon	140000.000	SE-Zulu1
07/18/91	Metals	Calcium	53.700	EOD
		Copper	12.800	EOD
		Vanadium	4.640	EOD
	Pest	Heptachlor	0.024 U	EOD
	VOA	Methylene Chloride	9.020	EOD
	Explosives		ND	EOD
	Anions		ND	EOD
	TPHC		<1160	EOD
	BNA		ND	EOD
	Hard	Total Hardness*	0.248	EOD

RC424

ND = All compounds in analysis not detected. Detection limits for multi-parameter tests are included in Appendix C.
VOAs = Volatile Organic Compounds
PEST = Pesticide/Polychlorinated Biphenyls
BNA = Base Neutral/Acid Extractable Organic Compounds
TPHC = Total Petroleum Hydrocarbons
U = Not confirmed on a second column
X = Exceeds calibration range

* Result reported in mg/l

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-1 (cont.)

**SUMMARY OF FIELD BLANK/RINSATES
FOR FORT DEVENS SI/RI
UNITS = µg/l**

Sample Date	Method	Test Name	Concentration	Site ID
07/23/91	Hard	Total Hardness*	0.300	B202
	Metals	Barium	1.670	B202
		Calcium	145.000	B202
		Iron	40.500	B202
		Silver	2.030	B202
	VOA	Methylene Chloride	41.200	B202
	Pest		ND	B202
	Anions		ND	B202
	TPHC		<1160	B202
	BNA		ND	B202
08/02/91	Metals	Aluminum	132.000	Zulu2
		Aluminum	90.800	Zulu2
		Barium	1.630	Zulu2
		Barium	1.590	Zulu2
		Calcium	92.400	EOD
		Calcium	78.500	Zulu2
		Calcium	159.000	Zulu2
		Cadmium	3.210	Zulu2
		Copper	4.840	EOD
		Copper	5.240	Zulu2
		Iron	34.900	EOD
		Iron	29.600	Zulu2
		Vanadium	4.220	EOD
	VOA	Methylene Chloride	784.000	EOD
		Methylene Chloride	26.500	Zulu2
		Methylene Chloride	13.700	Zulu2
	Pest		ND	Zulu2 and EOD
	Explosives		ND	Zulu2 and EOD
	Anions		ND	Zulu2 and EOD
	TPHC		<1160	Zulu2 and EOD
	BNAs		ND	Zulu2 and EOD
08/06/91	Metal	Barium	4.190	SHL
		Calcium	133.000	SHL
		Zinc	97.400	SHL
	Pest		ND	SHL
	VOA	Acetone	5.300	SHL
		Methylene Chloride	30.400	SHL
	Explosives		ND	SHL
	BNA		ND	SHL

RC424

ND = All compounds in analysis not detected. Detection limits for multi-parameter tests are included in Appendix C.
VOAs = Volatile Organic Compounds
PEST = Pesticide/Polychlorinated Biphenyls
BNA = Base Neutral/Acid Extractable Organic Compounds
TPHC = Total Petroleum Hydrocarbons
U = Not confirmed on a second column
X = Exceeds calibration range

* Result reported in mg/l

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-1 (cont.)

SUMMARY OF FIELD BLANK/RINSATES
FOR FORT DEVENS SI/RI
UNITS = μg/l

Sample Date	Method	Test Name	Concentration	Site ID
08/15/91	Metal	Calcium	66.900	SE-SHL
		Calcium	63.300	SOIL BACKGROUND
		Copper	9.290	SE-SHL
		Copper	14.700	SOIL BACKGROUND
		Iron	68.600	SE-SHL
		Iron	85.100	SOIL BACKGROUND
		Nickel	15.500	SOIL BACKGROUND
	VOA	Methylene Chloride	8.530	SE-SHL
		Methylethyl Ketone	12.000	SE-SHL
	Pest		ND	SE-SHL
	Explosives		ND	SE-SHL
	BNA		ND	SE-SHL
08/21/91	Metal	Calcium	77.200	CSB/Leachate Soil
		Copper	6.680	CSB/Leachate Soil
		Iron	28.300	CSB/Leachate Soil
	VOA	Methylene Chloride	9.410	CSB/Leachate Soil
	Pest		ND	CSB/Leachate Soil
	BNA		ND	CSB/Leachate Soil
08/22/91		Total Hardness*	0.300	CSB/Leachate Soil
	Metal	Barium	5.360	CSB/Leachate Soil
		Calcium	114.000	CSB/Leachate Soil
		Iron	41.200	CSB/Leachate Soil
		Zinc	78.000	CSB/Leachate Soil
	Anions	Nitrate	42.900	CSB/Leachate Soil
	VOA	Methylene Chloride	8.630	CSB/Leachate Soil
	Pest		ND	CSB/Leachate Soil
	Explosives		ND	CSB/Leachate Soil
	TPHC		<1160	CSB/Leachate Soil
	BNA		ND	CSB/Leachate Soil
08/23/91	Metal	Barium	2.590	SE-CSB
		Calcium	107.000	SE-CSB
		Copper	9.100	SE-CSB
		Iron	30.500	SE-CSB
	Pest	Heptachlor	0.026 U	SE-CSB
	VOA	Methylene Chloride	8.040	SE-CSB
		Methylethyl Ketone	15.000	SE-CSB
	Explosives		ND	SE-CSB
	TPHC		<1160	SE-CSB
	BNA		ND	SE-CSB
12/09/91	Metal	Calcium	150.000	SHL
		Iron	31.900	SHL
	Anions	Nitrate	13.600	SHL
	VOA	Methylene Chloride	7.940	SHL
	Pest		ND	SHL
	Explosives		ND	SHL
	TPHC		<1160	SHL
	BNA		ND	SHL

RC424

ND = All compounds in analysis not detected. Detection limits for multi-parameter tests are included in Appendix C.
VOAs = Volatile Organic Compounds
PEST = Pesticide/Polychlorinated Biphenyls
BNA = Base Neutral/Acid Extractable Organic Compounds
TPHC = Total Petroleum HydrocarbonsU = Not confirmed on a second column
U = Not confirmed on a second column
X = Exceeds calibration range

* Result reported in mg/l

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-2

SUMMARY OF TRIP BLANK RESULTS FOR FORT DEVENS SI/RI INVESTIGATIONS UNITS = $\mu g/l$

Shipping Date	Methylene Chloride	Acetone	Chloromethane	Site ID/Type
Round 1				
6/22/91	37.300	<10.00	<1.600	Zulu1/Bore
6/22/91	46.100	<10.00	<1.600	Zulu1/Bore
6/22/91	21.600	<10.00	<1.600	Zulu1/Bore
6/22/91	97.100	<10.00	<1.600	Zulu1/Bore
6/27/91	<5.400	<10.00	<1.600	Zulu1/Bore
6/27/91	6.370	<10.00	<1.600	Zulu1/Bore
6/27/91	<5.400	<10.00	<1.600	Zulu1/Bore
7/8/91	18.000	61.000	<1.600	LF11
7/8/91	12.000	31.000	<1.600	LF11
7/12/91*	8.630	10.000	1.280	Zulu1/Bore
7/12/91	9.510	20.000	<1.600	Zulu2/Bore
8/1/91	10.800	<10.000	<1.600	SHL/Waste
8/1/91	12.70	<10.000	3.650	EOD/Groundwater
8/1/91	12.70	<10.000	3.580	Zulu2/Bore
8/6/91	9.510	5.800	<1.600	SHL-Groundwater
8/7/91	7.060	<10.000	<1.600	SHL+CBS/Groundwater
8/13/91	9.120	<10.000	2.50	SHL/Surface Water
8/14/91	14.700	10.000	14.900	SHL/Surface Water
8/15/91	16.700	<10.000	3.850	SHL/Surface Water
8/20/91	34.300	13.000	8.110	CSB/Waters
8/21/91	9.020	<10.000	6.760	CSB/Waters
8/22/91	9.220	<10.000	8.110	CSB/Waters
8/23/91	11.800	<10.000	2.640	SHL+CSB/Waters
8/28/91	11.800	<10.000	8.110	SHL/Wastes
Mean	18.5	23.5	5.77	
Standard Deviation (STD)	20.8	20.4	3.93	
Mean+3 X STD	80.9	84.7	17.6	

Shipping Date	Methylene Chloride	Acetone	Chloroform	Site ID/Type
Round 2				
12/3/91	4.020	<10.000	<0.830	SHL/Groundwater
12/4/91	4.310	<10.000	<0.830	SHL/Groundwater
12/5/91	4.610	<10.000	<0.830	SHL+POL/Groundwater
12/6/91	4.220	<10.000	<0.830	SHL+POL/Groundwater
12/7/91	5.880	<10.000	<0.830	SHL+CSB/Groundwater
12/9/91	7.650	<10.000	<0.830	CSB/Groundwater
12/10/91	5.490	<10.000	0.996	CSB,POL+B202/ Groundwater
12/11/91	5.390	<10.000	<0.830	EOD/Groundwater
12/13/91	4.800	<10.000	0.996	
Mean	5.15	--	0.996	
Standard Deviation (STD)	1.13	--	0.0	
Mean+3 X STD	8.54	--	0.996	

RC424

* 1,2-Dichloroethane was also detected at 1.550 $\mu g/l$

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-3

SUMMARY OF METHOD BLANK RESULTS FOR FORT DEVENS SI/RI INVESTIGATIONS

Lot	Method	Test Name	Concentration
CBH	Pest-S	Heptachlor	0.003^{U}
		P,P'-DDT	0.019^{U}
CBI	Pest-S	Delta-Benzenehexachloride	0.006
CBJ	Pest-S	Heptachlor	0.001^{U}
CBK	Pest-W	Alpha-Benzenehexachloride	0.012^{U}
		P,P'-DDT	0.157^{U}
CBL	Pest-S	Beta-Benzenehexachloride	0.011^{U}
		Heptachlor	0.001^{C}
		P,P'-DDT	0.044^{U}
CBM	Pest-W	Beta-Benzenehexachloride	0.174^{U}
		P,P'-DDT	0.199^{U}
CBN	Pest-S	Beta-Benzenehexachloride	0.010^{U}
		Heptachlor	0.002^{U}
		P,P'-DDT	0.045^{U}
CBO	Pest-S	Beta-Benzenehexachloride	0.012^{U}
		Endosulfan Sulfate	0.099^{U}
		Heptachlor	0.003^{U}
CBR	Pest-W	Heptachlor	0.017^{U}
CBS	Pest-S		
CBT	Pest-W	Heptachlor	0.013^{U}
CBU	Pest-S	Heptachlor	0.001
CBV	Pest-W	Heptachlor	0.021^{U}
CBY	Pest-W	Heptachlor	0.028
CCA	Pest-W	Endosulfan Sulfate	0.151^{U}
		Heptachlor	0.034^{U}
CCC	Pest-W	Heptachlor	0.018^{U}
CCL	Pest-W	Endosulfan Sulfate	0.155^{U}
CCN	Pest-W	Endosulfan Sulfate	0.177^{U}
CDG	Pest-W	Endrin	0.009^{U}
MDR	Metals-W	Aluminum	118.000
		Iron	297.000
MDW	Metals-W	Copper	22.700
MEA	Metals-S	Vanadium	2.690
MEC	Metals-W	Barium	1.580
MEL	Metals-W	Copper	8.390
SFX	BNA-S	Benzoic Acid	0.520
		Tetradecanoic Acid	0.300
		Hexadecanoic Acid	2.000
SFY	BNA-S	Bis (2-Ethylhexyl) Phthalate	0.690
		Benzoic Acid	0.650
		Hexadecanoic Acid	2.000
SFZ	BNA-W	Bis (2-Ethylhexyl) Phthalate	3.200

RC424

Note: Soil blanks reported in µg/g
Water blanks reported in µg/l

Pest-W = Pesticide/PCB-Water
Pest-S = Pesticide/PCB-Soil
BNA-W = Base Neutral/Acid Extractable - Water
BNA-S = Base Neutral/Acid Extractable - Soil
VOA-W = Volatile Organic Compounds - Water
VOA-S = Volatile Organic Compounds - Soil
U = Result not confirmed on a second column
C = Result confirmed

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-3 (cont.)

SUMMARY OF METHOD BLANK RESULTS FOR FORT DEVENS SI/RI INVESTIGATIONS

Lot	Method	Test Name	Concentration
SGA	BNA-S	Benzoic Acid	0.320
		Pentadecanoic Acid	0.200
		Hexadecanoic Acid	2.000
		Octadecanoic Acid	0.200
SGB	BNA-S	Benzoic Acid	0.500
SGC	BNA-S	Benzoic Acid	0.800
		Hexadecanoic Acid	0.600
		Octadecanoic Acid	0.200
SGD	BNA-S	Benzoic Acid	0.780
		Pentadecanoic Acid	0.400
		Hexadecanoic Acid	1.000
SGF	BNA-S	Benzoic Acid	0.820
		Hexadecanoic Acid	1.000
SGI	BNA-S	Benzoic Acid	0.590
		Hexadecanoic Acid	0.500
SGK	BNA-S	Hexadecanoic Acid	0.700
SGN	BNA-S	Benzaldehyde	0.200
		Benzoic Acid	0.700
		Hexadecanoic Acid	0.700
SGO	BNA-S	Benzoic Acid	0.740
		Hexadecanoic Acid	0.700
SGQ	BNA-S	Tetradecanoic Acid	0.300
		Pentadecanoic Acid	0.600
		Hexadecanoic Acid	2.000
		Pentanoic Acid	0.200
		Heptanoic Acid	0.500
SHA	BNA-S	Tetradecanoic Acid	0.200
		Pentadecanoic Acid	0.600
		Hexadecanoic Acid	2.000
		Heptanoic Acid	0.400
		Octadecanoic Acid	0.300
SHC	BNA-S	Benzoic Acid	0.300
		Tetradecanoic Acid	0.200
		Heptanoic Acid	0.400
SHK	BNA-S	Benzoic Acid	0.440
		Hexadecanoic Acid	0.200
SIK	BNA-W	2-Butoxyethanol	5.000
SIN	BNA-W	2-Butoxyethanol	4.000
SIO	BNA-S	Benzoic Acid	0.500
		Hexadecanoic Acid	2.000
		C17 Alkane	0.200
		Octadecanoic Acid	0.300
VEX	VOA-S	Methylene Chloride	0.008
VEZ	VOA-S	Acetone	0.012
		Methylene Chloride	0.008
VFA	VOA-S	Acetone	0.180
		Methylene Chloride	0.013
		Methylethyl Ketone	0.015

RC424

Note: Soil blanks reported in μg/g
Water blanks reported in μg/l

Pest-W = Pesticide/PCB-Water
Pest-S = Pesticide/PCB-Soil
BNA-W = Base Neutral/Acid Extractable - Water
BNA-S = Base Neutral/Acid Extractable - Soil
VOA-W = Volatile Organic Compounds - Water
VOA-S = Volatile Organic Compounds - Soil
U = Result not confirmed on a second column
C = Result confirmed

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-3 (cont.)

SUMMARY OF METHOD BLANK RESULTS FOR FORT DEVENS SI/RI INVESTIGATIONS

Lot	Method	Test Name	Concentration
VFB	VOA-S	Acetone	0.010
		Methylene Chloride	0.007
VFC	VOA-S	Acetone	0.022
		Methylene Chloride	0.010
VFD	VOA-W	Methylene Chloride	6.100
VFE	VOA-W	Methylene Chloride	7.000
VFF	VOA-W	Methylene Chloride	6.600
VFG	VOA-W	Methylene Chloride	7.500
VFI	VOA-S	Acetone	0.023
		Methylene Chloride	0.011
VFJ	VOA-S	Methylene Chloride	0.010
VFK	VOA-W	Methylene Chloride	8.500
VFL	VOA-W	Methylene Chloride	8.000
VFN	VOA-S	Acetone	0.037
		Methylene Chloride	0.007
VFO	VOA-W	Methylene Chloride	7.000
VFP	VOA-S	Acetone	0.036
		Methylene Chloride	0.005
VFQ	VOA-W	Acetone	16.000
		Methylene Chloride	7.000
VFR	VOA-W	Acetone	16.000
		Methylene Chloride	27.000
VFS	VOA-W	Methylene Chloride	9.600
VFU	VOA-W	Methylene Chloride	7.200
VFV	VOA-W	Methylene Chloride	8.500
VFW	VOA-S	Acetone	0.027
		Methylene Chloride	0.009
		Methylethyl Ketone	0.013
VFX	VOA-S	Acetone	0.016
		Methylene Chloride	0.006
VFZ	VOA-W	Methylene Chloride	12.000
VGB	VOA-S	Acetone	0.034
		Methylene Chloride	0.008
		UNK172	0.003
VGC	VOA-W	Methylene Chloride	12.000
VGE	VOA-W	Methylene Chloride	8.500
VGG	VOA-W	Acetone	10.000
		Methylene Chloride	7.300
VHD	VOA-W	Methylene Chloride	4.400
		Methyl-N-Butyl Ketone	6.200
VHG	VOA-W	Methylene Chloride	4.100
VHJ	VOA-W	Methylene Chloride	4.400
VHK	VOA-W	Methylene Chloride	4.400
VHL	VOA-W	Methylene Chloride	5.600
VHQ	VOA-W	Methylene Chloride	5.200
VHS	VOA-W	Methylene Chloride	5.300
VHU	VOA-S	Methylene Chloride	0.007

RC424

Note: Soil blanks reported in $\mu g/g$
Water blanks reported in $\mu g/l$

Pest-W = Pesticide/PCB-Water
Pest-S = Pesticide/PCB-Soil
BNA-W = Base Neutral/Acid Extractable - Water
BNA-S = Base Neutral/Acid Extractable - Soil
VOA-W = Volatile Organic Compounds - Water
VOA-S = Volatile Organic Compounds - Soil
U = Result not confirmed on a second column
C = Result confirmed

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-4

AREA OF CONTAMINATION 5
FIELD DUPLICATE RESULTS IN μg/l
LEACHATE SOIL

Parameter	SEL-SHL-3	SEL-SHL-3 DUP	RPD
Total Organic Carbon	17400.000	11500.000	40
Aluminum	16000.000	18000.000	12
Arsenic	9.300	7.200	25
Barium	31.600	30.600	3.0
Beryllium	<0.078	0.150	--
Calcium	3200.000	4200.000	27
Chromium	16.200	15.900	1.9
Copper	14.300	15.900	11
Iron	13000.000	17000.000	27
Lead	47.800	50.800	6.9
Magnesium	4300.000	4500.000	4.6
Manganese	240.000	240.000	0.0
Mercury	0.086	0.101	16
Potassium	1100.000	980.000	12
Sodium	160.000	154.000	3.8
Vanadium	30.700	45.900	40
Methylene Chloride	0.011	0.012	8.7

RC424

RPD = Relative Percent Difference

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-5

AREA OF CONTAMINATION 5
FIELD DUPLICATE RESULTS IN $\mu g/l$
FIRST ROUND GROUNDWATER

Parameter	SHL-8S	SHL-8S DUP	RPD
Chloride	7300.000	8200.000	12
Nitrate	36.000	40.400	12
Sulfate	2530.000	2510.000	0.8
Pyrene	<10.000	85.500	--
Arsenic	4.150	4.880	16
Barium	11.900	6.680	56
Calcium	7800.000	7400.000	5.3
Copper	14.300	9.740	38
Iron	102.000	93.700	8.5
Lead	6.020	<4.740	--
Magnesium	1200.000	1100.000	8.7
Manganese	2000.000	1900.000	5.1
Potassium	1170.000	1100.000	6.2
Zinc	158.000	39.600	120
Methylene Chloride	8.530	6.860	22
Alpha Chlordane	0.024*	0.008*	100
Heptachlor	0.038*	0.023*	49

RC424

RPD = Relative Percent Difference
* Result not confirmed on a second column

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-6

AREA OF CONTAMINATION 5
FIELD DUPLICATE RESULTS IN μg/l
FIRST ROUND GROUNDWATER

Parameter	SHL-21	SHL-21 DUP	RPD
Chloride	2360.000	2340.000	0.8
Nitrate	188.000	190.000	1.0
Sulfate	14000.000	11000.000	24
Aluminum	304.000	607.000	66
Arsenic	3.410	6.360	60
Barium	12.000	13.000	8.0
Calcium	11000.000	12000.000	8.7
Copper	19.900	23.900	18
Iron	458.000	900.000	65
Lead	8.900	14.600	48
Magnesium	1600.000	1600.000	0.0
Manganese	390.000	410.000	5.0
Potassium	1430.000	1310.000	8.6
Sodium	2420.000	2360.000	2.5
Zinc	39.200	28.300	32
Methylene Chloride	9.610	7.250	28

RC424

RPD = Relative Percent Difference

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-7

AREA OF CONTAMINATION 5
FIELD DUPLICATE RESULTS IN µg/l
SECOND ROUND GROUNDWATER

Parameter	SHL-15	SHL-15A	RPD
Alkalinity	4000.000	2000.000	67
Total Kjeldahl Nitrogen	223.000	165.000	30
Chloride	5700.000	5600.000	1.8
Nitrate	2600.000	2800.000	7.4
Sulfate	13000.000	13000.000	0.0
Bromide	125.000	121.000	3.2
Aluminum	7600.000	6900.000	9.6
Arsenic	130.000	140.000	7.4
Barium	71.000	68.000	4.3
Beryllium	1.240	0.534	79
Cadmium	44.700	<2.670	--
Calcium	9300.000	10000.000	7.2
Chromium	<4.470	19.100	--
Copper	71.500	13.900	135
Iron	14000.000	10000.000	33
Lead	26.200	29.700	12
Magnesium	2600.000	2790.000	7.0
Manganese	770.000	740.000	4.0
Potassium	2850.000	2400.000	17
Sodium	2870.000	<15000.000	--
Vanadium	75.000	4.370	178
Zinc	64.500	53.100	19
Methylene Chloride	4.510	4.310	162

RC424

RPD = Relative Percent Difference

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-8

AREA OF CONTAMINATION 5
FIELD DUPLICATE RESULTS IN µg/l
SURFACE WATER

Parameter	SW-SHL-8	SW-SHL-8 DUP	RPD
Alkalinity	24400.000	23000.000	5.9
Total Kjeldahl Nitrogen	614.000	442.000	32
Total Hardness	35300.000	39000.000	10
Total Suspended Solids	400.000	800.000	67
Chloride	49000.000	45000.000	8.5
Sulfate	5030.000	4550.000	10
Arsenic	2.990	3.340	11
Barium	4.090	4.210	2.9
Calcium	12000.000	13000.000	8.0
Copper	14.600	5.620	89
Iron	538.000	290.000	60
Magnesium	2000.000	2400.000	18
Manganese	7.810	11.700	40
Nickel	17.900	<8.760	--
Potassium	830.000	807.000	2.8
Sodium	22000.000	24000.000	8.7
Methylene Chloride	7.750	8.730	12
Beta-BHC	0.040*	0.041*	2.5

RC424

RPD = Relative Percent Difference
* Result not confirmed on a second column

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-9

AREA OF CONTAMINATION 5
FIELD DUPLICATE RESULTS IN $\mu g/g$
SEDIMENTS

Parameter	SE-SHL-8	SE-SHL-8 DUP	RPD
Total Organic Carbon	29500.000	22500.000	27
Aluminum	23000.000	4400.000	136
Arsenic	170.000	35.000	131
Barium	210.000	40.100	136
Beryllium	1.150	0.214	137
Cadmium	60.200	10.800	139
Calcium	6100.000	1200.000	134
Chromium	950.000	190.000	133
Copper	54.600	11.000	133
Iron	73000.000	15000.000	132
Lead	202.000	48.600	122
Magnesium	6900.000	1400.000	132
Manganese	8800.000	1700.000	135
Mercury	6.070	<0.260	--
Nickel	70.100	12.100	141
Potassium	2350.000	549.000	124
Vanadium	74.800	13.300	140
Acetone	0.369	0.088	123
Methylene Chloride	0.072	0.022	106
Methylethylketone	<0.010	0.039	--

RC424

RPD = Relative Percent Difference

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-10

AREA OF CONTAMINATION 40
FIELD DUPLICATE RESULTS IN μg/g
LEACHATE SOIL

Parameter	SL-CSB-2	SL-CSB-2 DUP	RPD
Total Organic Carbon	5010.000	3900.000	25
Anthracene	0.514	0.736	36
Benzo(A)Anthracene	1.040	1.260	19
Benzo(A)Pyrene	1.300	1.500	14
Benzo(B)Fluoranthene	0.969	1.250	25
Benzo(g,h,i)Perylene	0.373	0.429	14
Benzo(k)Fluoranthene	1.720	1.890	9.4
Fluoranthene	2.560	3.110	19
Indeno(1,2,3-C,D)pyrene	0.275	0.307	11
Phenanthrene	1.110	1.640	38
Pyrene	2.490	3.210	25
Aluminum	10000.000	9500.000	5.1
Arsenic	22.000	22.000	0.0
Barium	23.600	21.600	8.8
Beryllium	0.128	0.123	4.0
Calcium	<1300.000	1400.000	--
Chromium	24.300	23.100	5.1
Copper	13.000	12.500	3.9
Iron	16000.000	13000.000	21
Lead	35.200	36.400	3.3
Magnesium	4800.000	4800.000	0.0
Manganese	230.000	250.000	8.3
Mercury	0.095	<0.026	--
Nickel	15.200	13.700	10
Potassium	1300.000	1200.000	8.0
Sodium	123.000	74.200	49
Vanadium	16.000	14.900	7.1
Methylene Chloride	0.006	0.006	0.0

RC424

RPD = Relative Percent Difference

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-11

AREA OF CONTAMINATION 40
FIELD DUPLICATE RESULTS IN $\mu g/l$
FIRST ROUND GROUNDWATER

Parameter	CSB-4	CSB-4 DUP	RPD
Methylene Chloride	7.350	7.350	0.0

RC424

RPD = Relative Percent Difference

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-12

AREA OF CONTAMINATION 40
FIELD DUPLICATE RESULTS IN µg/l
SECOND ROUND GROUNDWATER

Parameter	CSB-1	CSB-1A	RPD
Alkalinity	30000.000	452000.000	40
Total Kjeldahl Nitrogen	182.000	156.000	15
Chloride	2900.000	2900.000	0.0
Nitrate	1100.000	1200.000	8.7
Sulfate	8400.000	8300.000	1.2
Aluminum	5600.000	6300.000	12
Arsenic	10.900	8.540	24
Barium	33.400	34.600	3.5
Calcium	14000.000	14000.000	0.0
Chromium	6.120	9.130	39
Copper	11.400	12.700	11
Iron	6300.000	7200.000	13
Lead	5.580	7.120	24
Magnesium	3100.000	3200.000	3.2
Manganese	2400.000	2560.000	6.4
Potassium	1550.000	1670.000	7.4
Sodium	3320.000	<15000.000	--
Zinc	92.000	95.100	3.3
Methylene Chloride	5.200	5.200	0.0
1,3,5-Trinitrobenzene	1.350	1.320	2.2
1,3-Dinitrobenzene	2.860	2.710	5.4

RC424

RPD = Relative Percent Difference

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-13

AREA OF CONTAMINATION 40
FIELD DUPLICATE RESULTS IN μg/l
SECOND ROUND GROUNDWATER

Parameter	CSB-7	CSB-7A	RPD
Alkalinity	2000.000	2000.000	0.0
Total Kjeldahl Nitrogen	91.300	156.000	52
Chloride	3800.000	3800.000	0.0
Nitrate	63.800	62.100	2.7
Sulfate	8100.000	8100.000	0.0
Aluminum	9100.000	7200.000	23
Arsenic	29.000	25.000	15
Barium	63.000	58.000	8.3
Calcium	5000.000	4700.000	6.2
Chromium	9.150	8.580	6.4
Copper	16.700	14.800	12
Iron	10000.000	9000.000	10
Lead	15.100	12.700	17
Magnesium	2900.000	2500.000	15
Manganese	350.000	300.000	15
Potassium	1470.000	1390.000	5.6
Sodium	24000.000	23000.000	4.2
Vanadium	4.180	<4.000	--
Zinc	22.000	<19.400	--
Methylene Chloride	5.200	5.290	1.7

RC424

RPD = Relative Percent Difference

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-14

AREA OF CONTAMINATION 40
FIELD DUPLICATE RESULTS IN µg/l
SURFACE WATERS

Parameter	SW-CSB-6	SW-CSB-6 DUP	RPD
Alkalinity	58600.000	61000.000	4.0
Total Kjeldahl Nitrogen	526.000	476.000	10
Total Harndess	56500.000	68500.000	19
Total Suspended Solids	4000.000	6400.000	46
Chloride	20000.000	20000.000	0.0
Nitrate	<24.300	47.000	--
Sulfate	5290.000	5310.000	0.4
Arsenic	5.790	5.440	6.2
Barium	9.710	10.700	9.7
Calcium	19000.000	24000.000	23
Chromium	<4.470	4.660	--
Iron	1200.000	1300.000	8.0
Magnesium	3000.000	2900.000	3.4
Manganese	85.600	86.900	1.5
Potassium	1530.000	1560.000	1.9
Zinc	<19.400	21.200	--
Methylene Chloride	6.670	6.860	2.8
Alpha-BHC	0.013*	0.013*	0.0

RC424

RPD = Relative Percent Difference
* Result not confirmed on a second column

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-15

AREA OF CONTAMINATION 40
FIELD DUPLICATE RESULTS IN µg/g
SEDIMENTS

Parameter	SE-CSB-6	SE-CSB-6 DUP	RPD
Total Organic Carbon	57600.000	40200.000	36
Total Petroleum Hydrocarbons	213.000	<74.400	--
Benzo(A)Anthracene	0.734	0.911	22
Benzo(A)Pyrene	1.090	1.340	21
Benzo(B)Fluoranthene	0.878	1.190	30
Chrysene	1.140	1.500	27
Fluoranthene	2.050	2.710	28
Pyrene	2.180	2.910	29
Aluminum	17000.000	36000.000	72
Arsenic	43.000	59.000	31
Barium	52.300	120.000	78
Beryllium	0.408	0.656	47
Chromium	38.300	76.200	66
Copper	19.600	45.000	79
Iron	20000.000	36000.000	57
Lead	78.700	109.000	32
Magnesium	5100.000	12000.000	81
Manganese	500.000	750.000	40
Mercury	0.138	0.180	26
Nickel	13.400	33.500	86
Potassium	2100.000	4200.000	67
Sodium	217.000	431.000	66
Vanadium	24.900	52.800	72
Acetone	0.036	0.088	84
Methylene Chloride	0.026	0.035	30
Endrin	0.165	<0.075	--
P,P'-DDD	0.723	0.718	0.7
P,P'-DDE	0.138	<0.040	--

RC424

RPD = Relative Percent Difference

-- RPD could not be calculated because one value was a detection limit

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table D-16

VOLATILE ORGANICS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-17
Units = μg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,1-Dichloroethene	<1.420	44	50	88	45	90	14
Benzene	<2.400	50	50	100	51	71	11
Trichloroethene	<0.500	45	50	90	44	76	14
Toluene	<8.700	55	51	108	54	76	13
Chlorobenzene	<1.400	53	50	106	53	75	13

RC424

ND = Not detected

Source: E & E, 1992

Table D-17

PESTICIDES/PCBS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-17
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added MS	/ MSD	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
Dieldrin	<0.022	0.372	0.400	0.400	93.0	0.408	102.0	9.2
Endrin	<0.008	0.102	0.080	0.080	126.3	0.109	136.3	7.6
alpha-Chlordane	<0.002	0.023	0.040	0.040	56.5	0.027	67.5	17
Heptachlor	<0.008	0.038	0.040	0.040	95.3	0.044	110.5	15
Lindane	<0.033	0.374	0.400	0.400	93.5	0.394	98.5	5.2
2,2-Bis(p-chlorophenyl)-1,1-dichloroethane	<0.020	0.678	0.800	0.800	84.9	0.839	104.9	21
Aroclor 1016	<0.068	4.219	4.000	4.000	105.5	4.474	111.8	5.8
Aroclor 1260	<0.075	1.949	4.000	4.000	48.8	1.982	49.5	1.4

RC424

ND = Not detected

Source: E & E, 1992

Table D-18

EXPLOSIVES
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-17
Units = $\mu g/g$

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,3,5-Trinitrobenzene	.024	8.98	9.88	90.7	9.12	92.0	1.5
1,3-Dinitrobenzene	<0.270	8.94	9.84	90.8	8.95	91.0	0.2
2,4,6-Trinitrotoluene	0.054	18.1	20.5	88.1	17.9	87.2	1.0
2,4-Dinitrotoluene	0.101	17.5	21.7	80.3	17.2	78.8	1.9
2,6-Dinitrotoluene	<1.110	18.8	22.5	83.4	18.4	81.6	2.1
Cyclotetramethylene-tetranitramine	<0.869	16.0	21.9	73.0	15.8	72.3	0.9
Nitrobenzene	<1.540	43.2	48.6	88.8	43.7	89.9	1.2
Hexahydro-1,3,5-trinitro-1,3,4-triazine	<0.617	20.1	21.7	92.7	20.3	93.7	1.0
N-Methyl-N-2,4,6-tetra-nitroaniline	<0.191	6.68	7.69	86.8	6.70	87.2	0.4

RC424

Source: E & E, 1992

Table D-19

METALS
MATRIX SPIKE RESULTS FOR SAMPLE SHL-17
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery
Aluminum	4,000	4,200	800	25.0
Antimony	<51.200	430	500	86.0
Barium	23	32.4	15.0	62.7*
Beryllium	<0.341	2.91	3.5	83.1
Cadmium	<2.670	34.5	40	86.2
Calcium	9,800	7,700	370	-561.57
Chromium	5.47	40.4	45	77.6
Cobalt	<25.000	138	180	76.7
Copper	7.53	43.3	45	79.5
Iron	4,400	3,900	400	-125
Magnesium	1,500	4,100	400	650
Manganese	88.4	212	160	77.2
Mercury	<0.566	2.762	3.0	92.1
Nickel	<8.760	96.0	120	80.0
Potassium	1,350	4,100	2,400	114.6
Sodium	<15000	<15000	2,800	0
Thallium	<114.000	1,220	1,600	76.2
Vanadium	<4.000	52.9	89.8	58.9*
Zinc	88.3	192	94.9	109.3

RC424

ND = Not detected

*This recovery is outside EPA CLP limits

Source: E & E, 1992

Table D-20

ANIONS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-17
Units = $\mu g/l$

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
Bromide	<50.000	717.16	759.75	94.4	708.62	93.3	1.2
Chloride	2,895.95	4,532.82	1,484.85	110.2	3,776.54	59.3	60.1
Fluoride	16.55	744.44	767.33	94.9	731.66	93.2	1.8
Nitrate	0.69	749.59	762.75	98.2	736.98	96.5	1.7
Nitrite	630.28	880.06	149.95	166.6	644.28	9.3	178.8
Phosphate	<33.000	707.656	750.26	94.3	697.32	92.9	1.5
Sulfate	11,880.04	15,126.7	4,008.0	81.0	13,509.1	40.6	66.4

RC424

ND = Not detected

Source: E & E, 1992

Table D-21

VOLATILE ORGANICS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-08D
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,1-Dichloroethene	<1.420	44.9	50	90	50.5	101	12
Benzene	<2.400	48.3	50	97	56.2	112	14
Trichloroethene	<0.500	38.2	50	76	44.9	90	17
Toluene	<8.700	43.3	51	85	48.5	95	11
Chlorobenzene	<1.400	41.4	50	83	48.1	96	14

RC424

ND = Not detected

Source: E & E, 1992

Table D-22

PESTICIDES/PCBS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-08D
Units = µg/g

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added MS	/ MSD	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
alpha-Chlordane	.00489	.01727	.04	.04	30.9*	.02087	39.9	25.4
Dieldrin	<0.022	0.27519	.04	.04	68.8	0.31451	78.6	13.3
Endrin	<0.008	0.14395	.08	.08	179.9*	0.10617	132.7	30.2
Heptachlor	.05009	.07210	.04	.04	55.0	.07646	65.9	18.0
Lindane	<0.033	0.31382	0.4	0.4	78.4	0.36280	90.7	14.5
2,2-Bis(p-Chlorophenyl)-1,1-dichloroethane	<0.020	0.42962	0.8	0.8	53.7	0.50094	62.6	15.3
Aroclor 1016	<0.068	4.19095	4.0	4.0	104.8	4.25381	106.3	1.4
Aroclor 1260	<0.075	1.63242	4.0	4.0	40.8	1.70179	42.5	4.1

RC424

*This recovery is outside EPA CLP limits

Source: E & E, 1992

Table D-23

METALS
MATRIX SPIKE RESULTS FOR SAMPLE SHL-08D
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery
Aluminum	128.4	837.9	800	88.7
Antimony	<51.200	517.2	500	102.2
Arsenic	<3.090	16.806	15.0	112.0
Barium	15.87	35.22	15	129.0*
Beryllium	<0.341	3.138	3.5	89.2
Cadmium	<2.670	44.5	40	111.3
Calcium	16200	15400	370	0.0
Chromium	<4.470	43.3	45	90.3
Cobalt	<25.000	170	180	91.4
Copper	13.00	63.39	45	112.0
Iron	251.4	520.5	400	67.3*
Lead	6.99	33.976	30.0	89.9
Magnesium	2887	3468	400	145.3
Manganese	2144	2442	160	186.3
Mercury	<0.566	2.439	3.0	81.3
Nickel	<8.760	118.9	120	97.2
Potassium	1778	4836	2400	127.4*
Selenium	<4.100	13.348	15.0	89.0
Sodium	<15000	17450	2800	170.4*
Thallium	<114.000	1327	1600	82.9
Vanadium	<4.000	62	64	91.9
Zinc	179.2	247.0	160	42.4*

RC424

ND = Not detected

*This recovery is outside EPA CLP limits

Source: E & E, 1992

Table D-24

ANIONS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-08D
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
Bromide	33.75	745.36	759.75	93.7	755.44	95.0	1.4
Chloride	6,046.94	7,030.77	1,484.85	66.3	6,948.91	60.7	8.7
Fluoride	31.99	756.26	767.33	94.4	744.29	92.8	1.7
Nitrate	3.41	762.61	762.75	99.5	753.97	98.4	1.1
Nitrite	784.47	818.76	149.95	22.9	833.69	32.8	35.8
Phosphate	<33.000	651.029	750.26	86.8	678.498	90.4	4.1
Sulfate	10,553.45	14,407.8	4,008.0	96.2	13,815.0	81.4	16.7

RC424

ND = Not detected

Source: E & E, 1992

Table D-25

PESTICIDES/PCBS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-23
Units = $\mu g/l$

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added MS	/ MSD	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
Dieldrin	<0.022	0.39	0.40	0.4	97	0.37	94	3.0
Endrin	<0.008	0.080	0.08	0.08	100	0.074	93	7.2
alpha-Chlordane	<0.002	0.033	0.040	0.04	84	0.033	82	2.4
Heptachlor	<0.008	0.038	0.040	0.04	94	0.036	90	4.3
Lindane	<0.033	0.32	0.40	0.4	81	0.31	79	2.5
2,2-Bis(p-chlorophenyl)-1,1-dichloroethane	<0.020	0.69	0.80	0.80	86	0.66	82	4.8
Aroclor 1016	<0.068	3.8	4.00	4.0	96	3.9	97	1.0
Aroclor 1260	<0.075	4.07	4.00	4.0	102	4.3	109	6.6

RC424

ND = Not detected

Source: E & E, 1992

Table D-26

PESTICIDES/PCBS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-23
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added MS	/ MSD	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,2,4-Trichlorobenzene	<2.800	80	75	75	107	61	81	0
1,4-Dichlorobenzene	<4.400	76	76	76	100	56	74	30
2,4-Dinitrotoluene	<1.160	64	77	77	83	54	70	17
2-Chlorophenol	<10.000	31	149	149	21*	100	67	104*
3-Methyl-4-chlorophenol	<10.000	78	152	152	51	110	72	34
4-Nitrophenol	<50.000	ND	148	148	0*	21	14	200*
Acenapthene	<14.000	79	73	73	108	45	62	54*
Nitrosodi-N-propylamine	<4.500	81	76	76	107	77	101	6
Pentachlorophenol	<50.000	ND	152	152	0	72	47	200*
Phenol	<10.000	41	150	150	27	51	34	23
Pyrene	<17.000	83	74	74	112	94	127	13

RC424

ND = Not detected

* This value outside EPA CLP limits

Source: E & E, 1992

Table D-27

EXPLOSIVES
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SHL-23
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,3,5-Trinitrobenzene	<0.388	9.20	9.86	93.3	9.24	93.7	0.4
1,3-Dinitrobenzene	<0.270	9.06	9.77	92.7	9.12	93.3	0.7
2,4,6-Trinitrotoluene	<0.767	18.7	20.7	90.3	18.7	90.3	0.0
2,4-Dinitrotoluene	<1.160	18.3	20.9	87.6	18.2	87.1	0.5
2,6-Dinitrotoluene	<1.110	18.5	21.0	88.1	18.6	88.6	0.5
Cyclotetramethylene-tetranitramine (HMX)	<0.869	19.1	21.5	88.8	19.3	89.8	1.0
Nitrobenzene	<1.540	41.0	45.3	90.5	40.9	90.3	0.2
Cyclonite (RDX)	<0.617	20.2	21.1	95.7	20.4	96.7	1.0
N-Methyl-N,2,4,6-tetra-nitroaniline	<0.191	4.17	4.57	91.2	4.21	92.1	1.0

RC424

ND = Not detected

Source: E & E, 1992

Table D-28

VOLATILE ORGANICS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SE-SHL-16
Units = μg/g

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,1-Dichloroethene	<0.019	51	50	102	46	92	10
Benzene	<0.003	53	50	106	57	114	7
Trichloroethene	<0.004	48	50	96	52	104	8
Toluene	<0.008	55	51	108	56	110	2
Chlorobenzene	<0.003	52	50	104	55	110	6

RC424

ND = Not detected

Source: E & E, 1992

Table D-29

PESTICIDES/PCBS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SE-SHL-16
Units = μg/g

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added MS	/ MSD	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
Aldrin	<0.081	.0516	.0775	.0766	66.6	.0433	56.5	16.3
Dieldrin	<0.052	.029	.0388	.0383	74.7	.0242	63.2	16.8
Endrin	<0.075	.0763	.0775	.0766	98.5			
gamma-Chlordane	<0.038	.042	.0388	.0383	108.2	.0298	77.8	32.7
Heptachlor	.0062	.0133	.00775	.00776	91.6	.0112	64.4	
Lindane	<0.047	.0257	.0194	.0192	132.5	.0237	123.4	7.1
2,2-Bis(p-Chlorophenyl)-1,1-dichloroethane	.0022	.0547	.0775	.0766	67.7	.0451	56.0	19.0
Aroclor 1016	<0.704	0.496	0.397	0.377	124.9	0.429	113.8	9.3
Aroclor 1260	<0.538	0.534	0.397	0.377	134.5	0.496	131.6	2.2

RC424

Source: E & E, 1992

Table D-30

METALS
MATRIX SPIKE RESULTS FOR SAMPLE SE-SHL-16
Units = μg/g

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery
Aluminum	1,589	2,220	300	210.3
Antimony	<3.420	75.36	100	75.4
Barium	17.49	29.73	16	76.5
Beryllium	0.08081	1.528	2	72.4
Cadmium	3.96	14.80	10	108.4
Calcium	433.60	435.40	80	2.2
Chromium	74.7	101.8	40	67.8*
Cobalt	<1.420	27.64	40	69.1*
Copper	4.356	16.72	16	77.3
Iron	5,783	5,778	40	-12.5
Magnesium	490.5	933.2	100	442.7
Manganese	668.4	595.9	16	-453.1
Mercury	<0.260	0.35	0.65	53.8*
Nickel	4.255	24.37	25	80.5
Potassium	237.4	516.5	240	116.3
Sodium	<52.000	259.5	280	92.7
Thallium	<16.600	243	320	75.9
Vanadium	5.06	28.79	30	79.1
Zinc	38.82	53.2	18	79.9

RC424

ND = Not detected

*This recovery is outside EPA CLP limits

Source: E & E, 1992

Table D-31

TOTAL ORGANIC CARBON AND TOTAL RECOVERABLE PETROLEUM HYDROCARBON MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Sample ID Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added MS	/ MSD	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
SE-CSB-06 TPHC (μg/g)	76.0	637	544	545	103.2	653	105.9	2.48
SW-CSB-06 TPHC (μg/l)	1,060	14,100	16,400	16,400	85.9	14,300	87.1	1.4
SE-SHL-16 Total Organic Carbon (μg/g)	22,500	26,600	4,000	6,200	102.5	28,800	101.6	0.9
SE-CSB-06 Total Organic Carbon (μg/g)	57,500	63,600	5,819	2,787	105	60,000	90	15.4
SW-CSB-06 Total Kjeldahl Nitrogen (μg/l)	513	1,077.5	500	500	112.9	1,140	125.4	10.5

RC424

**This recovery is outside E & E, Inc.'s advisory limits

Source: E & E, 1992

Table D-32

PESTICIDES/PCBS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE CSB-2
Units = $\mu g/l$

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added MS	/ MSD	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
Dieldrin	<0.022	0.35	0.40	0.4	87	0.34	84	3.5
Endrin	<0.008	0.076	0.080	0.08	96	0.075	94	2.1
alpha-Chlordane	<0.002	0.032	0.040	0.04	79	0.031	77	2.6
Heptachlor	<0.008	0.039	0.040	0.04	97	0.038	96	1.0
Lindane	<0.033	0.31	0.40	0.4	78	0.30	76	2.6
2,2-Bis(p-chlorophenyl)-1,1-dichloroethane	<0.020	0.62	0.80	0.8	78	0.60	76	2.6
Aroclor 1016	<0.068	3.50	4.00	4.0	87	3.4	86	1.2
Aroclor 1260	<0.075	4.30	4.00	4.0	108	4.2	105	2.8

RC424

ND = Not detected

Source: E & E, 1992

Table D-33

PESTICIDES/PCBS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE CSB-2
Units = μg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added MS	/ MSD	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,2,4-Trichlorobenzene	<2.800	34	75	75	45.3	34	45.3	0
1,4-Dichlorobenzene	<4.400	59	76	76	77.6	63	82.9	7
2,4-Dinitrotoluene	<1.160	67	77	77	87.0	68	88.3	1
2-Chlorophenol	<10.000	ND	150	150	0*	ND	0*	0*
3-Methyl-4-chlorophenol	<10.000	ND	150	150	0*	ND	0*	0*
4-Nitrophenol	<50.000	20	150	150	13.3	36	24	57*
Acenapthene	<14.000	64	73	73	87.7	68	93.2	6
Nitrosodi-N-propylamine	<4.500	58	76	76	76.3	61	80.3	5
Pentachlorophenol	<50.000	15	150	150	10*	45	30.0	100*
Phenol	<10.000	ND	150	150	0*	ND	0*	0*
Pyrene	<17.000	34	74	74	45.9	33	44.6	3

RC424

ND = Not detected

* This value is outside EPA CLP limits

Source: E & E, 1992

Table D-34

VOLATILE ORGANICS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SE-CSB-06
Units = µg/g

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,1-dichloroethene	<0.019	44.7	50	89	50.1	96	12
Benzene	<0.003	44.4	50	89	49.7	99	11
Trichloroethene	<0.004	43.2	50	86	47.8	96	11
Toluene	<0.008	46.6	51	91	47.6	93	2
Chlorobenzene	<0.003	42.4	50	85	43.5	87	2

RC424

ND = Not detected

Source: E & E, 1992

Table D-35

PESTICIDES/PCBS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SE-CSB-06
Units = µg/g

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added MS	/ MSD	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
Aldrin	<0.081	.0473	0.08	.0798	59.1	.0502	62.9	6.2
Dieldrin	<0.052	.0228	0.04	.0399	57.0	.0239	59.9	5.0
Endrin	.0210	.0592	0.08	.0798	47.8	.0614	50.6	5.8
gamma-Chlordane	.0121	.0364	.0400	.04	60.8	.0389	67.2	10.0
Heptachlor	<0.280	.0116	0.008	0.00798	145.0	.0115	144.1	0.6
Lindane	<0.047	0.0243	0.02	.0199	121.5	0.0248	124.6	2.5
2,2-Bis(p-Chlorophenyl)-1,1-dichloroethane	0.244	.259	.08	.0798	18.1	0.279	44.1	83.5
Aroclor 1016	<0.704	0.469	0.4	0.4	117.2	0.462	116.1	1.0
Aroclor 1260	<0.538	0.484	0.4	0.398	121.0	.470	118.1	2.4

RC424

Source: E & E, 1992

Table D-36

METALS
MATRIX SPIKE RESULTS FOR SAMPLE SE-CSB-06
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery
Aluminum	5,149	3,542	300	-535.7
Antimony	<3.420	63.33	100	63.3*
Arsenic	1.5	3.675	1.5	145.0*
Barium	18.81	27.11	16	51.9*
Beryllium	0.1268	1.809	2	84.1
Cadmium	<0.424	11.56	10	115.6
Calcium	1,330	1,254	80	-95.0
Chromium	12.61	43.49	40	77.2
Cobalt	<1.420	23.09	40	57.7*
Copper	6.366	16.91	16	65.9*
Iron	6,438	4,532	40	-4,765.0
Lead	<73.000	2.990	3.0	67.1
Magnesium	1,479	1,033	100	-446.0
Manganese	161.3	166.2	16	30.6
Mercury	0.049	0.415	0.350	104.7
Nickel	3.910	22.71	25	75.2
Potassium	757.9	665.4	240	-38.5*
Silver	<0.086	0.330	0.3	110.0
Sodium	77.14	282.3	280	73.3*
Thallium	<16.600	235.1	320	73.5*
Vanadium	7.776	30.08	30	74.3*
Zinc	44.12	61.55	18	96.8

RC424

ND = Not detected

*This recovery is outside EPA CLP limits

Source: E & E, 1992

Table D-37

VOLATILE ORGANICS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SW-CSB-06
Units = $\mu g/l$

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,1-Dichloroethene	<18.000	46.4	50	93	50	100	7
Benzene	<2.400	46.5	50	93	51.2	102	9
Trichloroethene	<7.000	38.6	50	77	41.8	84	9
Toluene	<8.700	39.6	51	78	43.3	85	8
Chlorobenzene	<1.400	38.2	50	76	41.9	84	10

RC424

ND = Not detected

Source: E & E, 1992

Table D-38

EXPLOSIVES
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SE-CSB-06
Units = µg/g

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
1,3,5-Trinitrobenzene	<0.352	0.677	2.07	32.7	0.499	24.1	30.2
1,3-Dinitrobenzene	<0.304	1.11	2.11	52.5	1.01	47.9	9.1
2,4,6-Trinitrotoluene	<0.931	1.55	3.92	39.6	0.648	16.5	82.3*
2,4-Dinitrotoluene	<0.390	2.31	4.34	53.2	2.24	51.7	2.9
2,6-Dinitrotoluene	<0.530	2.27	3.97	57.1	2.31	58.1	1.8
2-Nitrotoluene	<1.590	10.8	13.2	81.8	11.2	84.9	3.7
Cyclotetramethylene-tetranitramine (HMX)	<0.755	3.41	3.95	86.3	3.44	87.1	0.9
Nitrobenzene	<0.330						
Cyclonite (RDX)	<0.455	3.01	4.13	73.0	3.58	86.6	17.1
N-Methyl-N,2,4,6-tetra-nitroaniline	<1.040	0.834	3.87	21.6	1.64	42.3	64.9*

RC424

ND = Not detected

* This value is outside E & E's advisory limits

Source: E & E, 1992

Table D-39

METALS
MATRIX SPIKE RESULTS FOR SAMPLE SW-CSB-06
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery
Aluminum	26.82	1,185	800	144.8
Antimony	<51.200	57.55	500	115.1
Arsenic	<3.090	20.6	20.0	103
Barium	9.724	39.77	15	200.3*
Beryllium	<0.341	3.4027	3.5	97.2
Cadmium	<2.670	55.92	40	139.8*
Calcium	15,180	22,410	370	1,954.1*
Chromium	<4.470	46.13	45	102.5
Cobalt	10.61	248.7	180	132.3*
Copper	5.639	65.50	45	133.0*
Iron	1,146	3,787	400	660.2*
Lead	<4.740	33.6	30.0	112
Magnesium	1,496	2,321	400	206.3*
Manganese	80.51	147.7	160	42.0*
Mercury	<0.566	3.18	3.0	106.1
Nickel	3.274	11.69	120	94.7
Potassium	2,209	6,016	2,400	158.6*
Selenium	<4.100	16.1	20.0	80.5
Sodium	419,200	332,300	2,800	-3,103.6
Thallium	<1100.000	1,403	1,600	87.7
Vanadium	<4.000	63.25	64	98.8
Zinc	15.80	194.0	160	111.4

RC424

*This recovery is outside EPA CLP limits

Source: E & E, 1992

Table D-40

ANIONS
MATRIX SPIKE/MATRIX SPIKE DUPLICATE
RESULTS FOR SAMPLE SW-CSB-06
Units = µg/l

Parameter	Sample Concentration	Spiked Sample Concentration	Concentration of Spike Added	Percent Recovery	Duplicate Spiked Concentration	Percent Recovery	RPD
Chloride	4,627.92	16,388.36	1,484.85	792.0*	17,309.05	854*	7.5
Nitrite	30.04	183.67	149.92	109.1	194.14	116.1	6.2
Sulfate	4,957.72	11,505.2	4,008.0	163.4	12,322.6	183.8*	11.8

RC424

ND = Not detected

*This value is outside E & E's advisory limits

Source: E & E, 1992

Table D-41

**SUMMARY OF RI FIELD QUALITY CONTROL REQUIREMENTS
SHEPLEY'S HILL LANDFILL**

Site Name	Analysis	Number of Samples Round One	Number of Samples Round Two
Shepley's Hill	TCL (groundwater rinsate)	1	1
AOC 4,5,18	TCL (groundwater duplicate)	2	1
	TCL (surface water duplicate)*	1	0
	TCL (pond sediment duplicate)	1	0
	TCL (pond sediment rinsate)	1	0
	TCL (leachate soil duplicate)	1	0
	TAL (groundwater rinsate)	1	1
	TAL (groundwater duplicate)	2	1
	TAL (surface water duplicate)	1	0
	TAL (pond sediment rinsate)	1	0
	TAL (pond sediment duplicate)	1	0
	TAL (leachate soil duplicate)	1	0
	Explosives (groundwater rinsate)	1	1
	Explosives (groundwater duplicate)	2	1
	Explosives (surface water duplicate)	1	0
	Explosives (pond sediment rinsate)	1	0
	Explosives (pond sediment duplicate)	1	0
	TOC (pond sediment duplicate)	1	0
	TOC (leachate soil duplicate)	1	0
	Ions (groundwater duplicate)[a]	2	1
	Ions (groundwater rinsate)	0	1
	Water Quality (surface water duplicate)[b]	1	0
	TCL VOA (trip blanks)	8	5

RC424

TAL: Target Analyte List
TCL: Target Compound List
TOC: Total Organic Carbon
VOA: Volatile Organic Compounds

* One surface water was not analyzed for TCL volatiles due to a laboratory accident.
a Ions: chloride, fluoride, sulfate, nitrate, nitrite, bromide, and total Kjeldahl nitrogen (Cations: calcium, potassium, and magnesium are included in TAL).
b Water quality parameters include chloride, total Kjeldahl nitrogen, nitrate-nitrogen, sulfates, total phosphorous, hardness, alkalinity, and total suspended solids.

Source: E & E, 1992

Table D-42

SUMMARY OF RI FIELD QUALITY CONTROL REQUIREMENTS
COLD SPRING BROOK LANDFILL

Site Name	Analysis	Number of Samples Round One	Number of Samples Round Two
Cold Spring Brook Landfill AOC 40	TCL (groundwater rinsate)	1	0
	TCL (groundwater duplicate)	1	2
	TCL (surface water duplicate)	1	0
	TCL (pond sediment rinsate)	1	0
	TCL (pond sediment duplicate)	1	0
	TCL (surface soil rinsate)	1	0
	TCL (surface soil duplicate)	1	0
	TAL (groundwater rinsate)*	1	0
	TAL (groundwater duplicate)	1	2
	TAL (surface water duplicate)	1	0
	TAL (pond sediment rinsate)	1	0
	TAL (pond sediment duplicate)	1	0
	TAL (surface soil rinsate)	1	0
	TAL (surface soil duplicate)	1	0
	Explosives (groundwater rinsate)*	1	0
	Explosives (groundwater duplicate)	1	2
	Explosives (surface water duplicate)	1	0
	Explosives (pond sediment rinsate)	1	0
	Explosives (pond sediment duplicate)	1	0
	TOC (surface soil duplicate)	1	0
	TOC (pond sediment duplicate)	1	0
	Ions (groundwater rinsate)[a]*	1	0
	Ions (groundwater duplicate)	1	2
	TPHC (groundwater rinsate)	1	0
	TPHC (groundwater duplicate)	1	2
	TPHC (surface water duplicate)	1	0
	TPHC (pond sediment rinsate)	1	0
	TPHC (pond sediment duplicate)	1	0
	Water Quality (surface water duplicate)[b]	7	0
	TCL VOA (trip blanks)	4	3

RC424

TAL: Target Analyte List
TCL: Target Compound List
TOC: Total Organic Carbon
TPHC: Total Petroleum Hydrocarbons
VOA: Volatile Organic Compounds

* Only limited volume could be obtained from well CSB-4
a Ions: chloride, fluoride, sulfate, nitrate, nitrite, bromide, and total kjeldahl nitrogen (Cations: calcium, potassium, and magnesium are included in TAL)
b Water quality parameters include chloride, total kjeldahl nitrogen, nitrate-nitrogen, sulfates, total phosphorous, hardness, alkalinity, and total suspended solids

Source: E & E, 1992

APPENDIX E

ECOLOGICAL INVESTIGATION DATA

This appendix contains data supporting the ecological characterization performed under the RI at Shepley's Hill Landfill and at Cold Spring Brook Landfill. Included in this appendix are two sets of forms that were completed for each site. These forms are: the New England Corps of Engineers Wetlands Delineation Dataform, version 28Mar91, and the U.S. Fish and Wildlife Service Wetlands Functions Evaluation forms.

All forms were completed during the field surveys conducted by Ecology and Environment, Inc. during August 1991.

Project Title: Fort Devens Shepley's Hill | File Number: N/A
Transect: N/A | Plot: 1 wetland | Date: 8-15-91

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Tree:			
	Acer rubrum	394/394	100	FAC
	Liana:			
	none	—	—	—
	Sapling:			
	Quercus coccinea	2/2	100	UPL
	Shrubs:			
	Viburnum lentago	2/7	29	FACW
	Vaccinium corymbosm	2/7	29	FACW
	Herb:			
	Carex bromoides	15/100	15	FACW
	Thelypteris thelypteroides	50/100	50	FACW

Tally (Dominants ONLY):	OBL: 0	FACW: 4	FAC: 1	FACU: 0	UPL: 1	SUM: 6

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 5/6 x100 = 83

Describe Vegetation Disturbance: None

Describe Problem Vegetation: None

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL | Soil Taxonomy: Ochric Udipsamments

Corps of Engineers Regional Drainage Class: poorly drained | Criterion: 3a

Is Published Soil Survey Available? Yes ☒ No ☐ Title/Date: Middlesex Co, 1924

Soil Type Mapped: Deerfield loamy sand

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-12"	A	7.5YR 3/0	N/A	loamy sand
12"-24"	B	7.5YR 5/4	7.5YR 5/8 common	loamy sand

Remarks:

Sketch Landscape Position:

recycled paper

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ecology and environment

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☐	☑	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☐	☐	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions). unknown
☐	☑	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☑	☐	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO
☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No
- ☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
- ☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
- ☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No
- ☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
- ☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

recycled paper

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New England Corps of Engineers Wetland Delineation Dataform --- Version 28MAR91

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observation in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

- Depth to Free Water: >24"
- Depth to Saturation: >24"
- Describe Altered Hydrology: none

☐ Inundated	☐ Saturated in upper 12in.	☒ Water Marks
☒ Oxidized Rhizospheres	☐ Drift Lines	☐ Water Stained Leaves
☐ Water-borne Sediment Deposits	☐ Surface Scoured Areas	☒ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☐ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☐ Shallow Root Systems	☐ Floating Leaves	☐ Aerenchyma in Roots & stems
☐ Polymorphic Leaves	hummocks	

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks:

CONCLUSIONS

Project Title: Shepleys Hill Landfill

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 1 (wetland) Date: 8-15-91

	Yes	No
Hydrophytic Vegetation Criterion Met?	☑	☐
Hydric Soils Criterion Met?	☑	☐
Wetland Hydrology Criterion Met?	☑	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☑ No ☐

Remarks:

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Project Title: Fort Deven Shepley's Hill	File Number: N/A
Transect: N/A Plot: 1 upland	Date: 8-15-91

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Trees:			
	Quercus coccinea	520/540	96	UPL
	Liana:			
	none			
	Sapling:			
	Quercus coccinea	20/40	50	UPL
	Quercus alba	10/40	25	FACU
	Shrub:			
	Gaylussacia baccata	75/80	94	FACU
	Herb:			
	none			

Tally (Dominants ONLY):	OBL:	FACW:	FAC:	FACU: 2	UPL: 2	SUM: 4

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 0/4 x 100 = 0

Describe Vegetation Disturbance: None

Describe Problem Vegetation: None

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL	Soil Taxonomy: Ochric Udipsamments
Corps of Engineers Regional Drainage Class: well drained	Criterion: E
Is Published Soil Survey Available? Yes ☒ No ☐	Title/Date: Middlesex Co., 1924
Soil Type Mapped:	Deerfield loamy sand

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-2"	O	7.5YR 3/0	N/A	Sapric
2-18"	A	7.5YR 5/6	N/A	loamy sand

Remarks:

Sketch Landscape Position:

SOIL DET[illegible]	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC. 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

☐ ☑ All dominant plants are OBLIGATE.

☐ ☑ All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.

☐ ☑ Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).

☐ ☑ The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☑ The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☑ The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO

☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No

☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (∝,∝,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

recycled paper

ecology and environment

New England Corps of Engineers Wetland Delineation Dataform --- Version 28MAR91

[illegible]TA & [illegible]ETERMINATION [illegible]YDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observ[illegible] light of the season, recent weather conditions, and watershed [illegible] 3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:

Stream, lake or tidal gage — Identification:

Aerial Photograph — Identification:

Other — Identification:

☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: > 24"

Depth to Saturation: > 24"

Describe Altered Hydrology:

☐ Inundated ☐ Saturated in upper 12in. ☐ Water Marks

☐ Oxidized Rhizospheres ☐ Drift Lines ☐ Water Stained Leaves

☐ Water-borne Sediment Deposits ☐ Surface Scoured Areas ☐ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores ☐ Buttressed Trees ☐ Hypertrophied Lenticels

☐ Stooling ☐ Adventitious Roots ☐ Inflated Leaves, Stems, or Roots

☐ Shallow Root Systems ☐ Floating Leaves ☐ Aerenchyma in Roots & stems

☐ Polymorphic Leaves

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks: No apparent hydrological indicators.

CONCLUSIONS

Project Title: Shepley's Hill Landfill

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 1 (upland) Date: 8-15-91

	Yes	No
Hydrophytic Vegetation Criterion Met?	☐	☑
Hydric Soils Criterion Met?	☐	☑
Wetland Hydrology Criterion Met?	☐	☑

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☑

Remarks:

Project Title: Fort Devens Shepley's Hill

File Number: N/A

Transect: N/A Plot: 2 Wetland Date: 8-16-91

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Trees:			
	Acer rubrum	30/30	100	FAC
	Liana: none			
	Sapling:			
	Acer rubrum	60/70	86	FAC
	Shrub:			
	Cornus amomum	25/90	28	FACW
	Hamamelis virginiana	25/90	28	FAC
	Alnus serrulata	20/90	22	OBL
	Herb:			
	Thelypteris thelypteroides	15/40	38	FACW
	Impatiens capensis	15/40	38	FACW

Tally (Dominants ONLY):	OBL: 1	FACW: 3	FAC: 3	FACU: 0	UPL: 0	SUM: 7

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 7/7 x 100 = 100

Describe Vegetation Disturbance: None

Describe Problem Vegetation: None

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL Soil Taxonomy: Typic Quartzipsamments

Corps of Engineers Regional Drainage Class: poorly drained Criterion: 3a

Is Published Soil Survey Available? Yes [X] No [ ] Title/Date: Middlesex Co, 1924

Soil Type Mapped: Carver loamy coarse sand, 8-15%

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidixed rhizospheres, etc.
0-6"	A	7.5YR 4/6	N/A	loamy coarse sand
6-24"	B	7.5YR 3/0	N/A	fine sandy loam

Remarks: A horizon probably eroded from slope into wetland (over B horizon).

Sketch Landscape Position:

recycled paper

E-7

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SOIL DETEI...ION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☐	☑	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☑	☐	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☐	☑	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☑	☐	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO
☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No
- ☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
- ☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
- ☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No
- ☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
- ☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

recycled paper

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...A & ...TERMINATION ...DROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
- Stream, lake or tidal gage — Identification: ________
- Aerial Photograph — Identification: ________
- Other — Identification: ________

☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 10"

Depth to Saturation: 0"

Describe Altered Hydrology: none

☐ Inundated	☒ Saturated in upper 12in.	☒ Water Marks
☐ Oxidized Rhizospheres	☐ Drift Lines	☐ Water Stained Leaves
☐ Water-borne Sediment Deposits	☐ Surface Scoured Areas	☐ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☐ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☒ Shallow Root Systems	☐ Floating Leaves	☒ Aerenchyma in Roots & stems
☐ Polymorphic Leaves		

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks:

E-8

CONCLUSIONS

Project Title: Shepley's Hill Landfill

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A **Plot:** 2 (wetland) **Date:** 8-16-91

	Yes	No
Hydrophytic Vegetation Criterion Met?	☑	☐
Hydric Soils Criterion Met?	☑	☐
Wetland Hydrology Criterion Met?	☑	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☑ No ☐

Remarks: This wetland is a narrow strip that occurs along the shore of Plow Shop Pond. Width varies. Therefore, this is not a point but rather a long narrow rectangle.

Project Title: Fort Devens Shepley's Hill	File Number: N/A
Transect: N/A Plot: 2 upland	Date: 8-16-91

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Tree:			
	Quercus alba	404.3/736.4	55	FACU
	Quercus coccinea	273.2/736.4	37	UPL
	Liana:			
	none			
	Sapling:			
	Quercus coccinea	20/45	44	UPL
	Acer rubrum	15/45	33	FAC
	Shrubs:			
	Vaccinium vacillans	25/25	100	UPL
	Herb:			
	~~W~~ Gaultheria procumbens	50/50	100	FACU

Tally (Dominants ONLY):	OBL:	FACW:	FAC: 1	FACU: 2	UPL: 3	SUM: 6

100 × Dominant(OBL+FACW+FAC)/Tally Sum = 1/6 × 100 = 17

Describe Vegetation Disturbance: None

Describe Problem Vegetation:

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL	Soil Taxonomy: Typic Quartzipsamments

Corps of Engineers Regional Drainage Class: well drained Criterion: E

Is Published Soil Survey Available? Yes ☒ No ☐ Title/Date: Middlesex Co., 1924

Soil Type Mapped: Carver loamy coarse sand, 8-15%

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-2"	O	7.5YR 3/2	N/A	sapric
2-24"	A	7.5YR 4/6	N/A	fine sandy loam

Remarks:

Sketch Landscape Position:

recycled paper

E-9

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recycled paper

SOIL D[illegible] [illegible]ON	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No

☐ ☑ All dominant plants are OBLIGATE.

☐ ☑ All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.

☐ ☑ Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).

☐ ☑ The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☑ The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☑ The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO

☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No

☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

ecology and environment

New England Corps of Engineers Wetland Delineation Dataform --- Version 28MAR91

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observa[illegible] light of the season, recent weather conditions, and watershed a[illegible] etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:

Stream, lake or tidal gage Identification: ______

Aerial Photograph Identification: ______

Other Identification: ______

☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: >24"

Depth to Saturation: >24"

Describe Altered Hydrology: none

☐ Inundated ☐ Saturated in upper 12in. ☐ Water Marks

☐ Oxidized Rhizospheres ☐ Drift Lines ☐ Water Stained Leaves

☐ Water-borne Sediment Deposits ☐ Surface Scoured Areas ☐ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores ☐ Buttressed Trees ☐ Hypertrophied Lenticels

☐ Stooling ☐ Adventitious Roots ☐ Inflated Leaves, Stems, or Roots

☐ Shallow Root Systems ☐ Floating Leaves ☐ Aerenchyma in Roots & stems

☐ Polymorphic Leaves

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks: No apparent hydrological indicators

CONCLUSIONS

Project Title: Shepley's Hill Landfill

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 2 (upland) Date: 8-16-91

	Yes	No
Hydrophytic Vegetation Criterion Met?	☐	☑
Hydric Soils Criterion Met?	☐	☑
Wetland Hydrology Criterion Met?	☐	☑

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☑

Remarks:

Project Title: Fort Devens Cold Spring Brook	File Number: N/A
Transect: N/A Plot: 1 (wetland)	Date: 13 Aug. 1991

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Tree:			
	none	—	—	—
	Sapling:			
	none	—	—	—
	Shrub:			
	Cornus amomum	15/25	60	FACW
	Liana:			
	none	—	—	—
	Herb:			
	Juncus effusus	25/75	33	FACW
	Typha latifolia	25/75	33	OBL

Tally (Dominants ONLY):	OBL: 1	FACW: 2	FAC: 0	FACU: 0	UPL: 0	SUM: 3

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 100%

Describe Vegetation Disturbance: none

Describe Problem Vegetation: none

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL | Soil Taxonomy: Terric Medisapr's

Corps of Engineers Regional Drainage Class: Very poorly drained Criterion: A 3

Is Published Soil Survey Available? Yes ☑ No ☐ Title/Date: Worcester Co, 1985

Soil Type Mapped: Swansea muck

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-5"	O	10YR 2/2	few / low	sapric, fine sandy loam
5-12"	A	10YR 3/2	few / low	fine sandy loam

Remarks:

Sketch Landscape Position:

SOIL DETE[illegible]

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☑	☐	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☑	☐	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☑	☐	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes No
☐ ☑ 1. Within 8 inches of the soil surface there are:

Yes No
☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☑ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No
☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: I. hydrophytes are prevalent, II. there is no evidence of altered hydrology, and III. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

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[illegible]A & [illegible]ERMINATION [illegible]DROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observation in light of the season, recent weather conditions, and watershed alter[illegible]
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
Stream, lake or tidal gage Identification: ______
Aerial Photograph Identification: ______
Other Identification: ______
☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 1 to 1 1/2 "

Depth to Saturation: surface

Describe Altered Hydrology: none

☐ Inundated	☒ Saturated in upper 12in.	☐ Water Marks
☐ Oxidized Rhizospheres	☐ Drift Lines	☐ Water Stained Leaves
☐ Water-borne Sediment Deposits	☐ Surface Scoured Areas	☒ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☐ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☐ Shallow Root Systems	☐ Floating Leaves	☒ Aerenchyma in Roots & stems
☐ Polymorphic Leaves		

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks: • adjacent to open water / pond
• culvert draining this area is blocked.

CONCLUSIONS

Project Title: Cold Spring Brook

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 1 (wetland) Date: 13 Aug. 1991

	Yes	No
Hydrophytic Vegetation Criterion Met?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Criterion Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

Remarks:

Project Title: Fort Devens Cold Spring Brook
File Number: N/A

Transect: N/A **Plot:** 2 (wetland) **Date:** 13 Aug. 1991

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
Tree:	Acer rubrum	39.2/39.2	100%	FAC
Liana:	none	—	—	—
Sapling:	Acer rubrum	40/40	100%	FAC
Shrub:	Vaccinium corymbosum	70/90	77%	FACW
	Alnus serrulata	20/90	22%	OBL
Herb:	Osmunda cinnamomea	20/60	33%	FACW
	Thelypteris thelypteroides	15/60	25%	FACW

Tally (Dominants ONLY):	OBL:	FACW:	FAC:	FACU:	UPL:	SUM:
	1	3	2	0	0	6

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 100 x 6/6 = 100%

Describe Vegetation Disturbance: none

Describe Problem Vegetation: none

DATA -- SOIL **Soil Taxonomy:** Ochric Histoquef

Corps of Engineers Regional Drainage Class: very poorly drained **Criterion:** A3

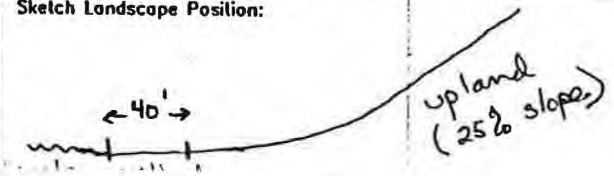
Is Published Soil Survey Available? Yes [X] No [ ] **Title/Date:** Worcester Co, 1985

Soil Type Mapped: Sudbury fine sandy loam

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidixed rhizospheres, etc.
0-4"	O	10YR - 3/2	few/low	Sapric
4-12"	A	10YR - 2/2	few/low	fine sandy loam

Remarks: Mapped soil type (Sudbury) does not extend this far down slope. Soils at this point similar to Scarboro mucky fine sandy loam

Sketch Landscape Position:



New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

recycled paper

ecology and environment

SOIL DETE[illegible]ATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☐	☑	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☐	☑	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☑	☐	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes	NO	
☐	☐	1. Within 8 inches of the soil surface there are:

Yes	No	
☐	☐	a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
☐	☐	b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
☐	☐	c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐	☐	2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes	No	
☐	☐	a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
☐	☐	b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: I. hydrophytes are prevalent, II. there is no evidence of altered hydrology, and III. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

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[illegible]A & [illegible]TERMINATION [illegible]YDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observation [illegible] light of the season, recent weather conditions, and watershed alter[illegible] 3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:

Stream, lake or tidal gage	Identification:	
Aerial Photograph	Identification:	
Other	Identification:	

☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 1" ~ 1½"

Depth to Saturation: 0"

Describe Altered Hydrology: none

☐ Inundated	☒ Saturated in upper 12in.	☒ Water Marks
☐ Oxidized Rhizospheres	☒ Drift Lines	☒ Water Stained Leaves
☐ Water-borne Sediment Deposits	☐ Surface Scoured Areas	☐ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☐ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☒ Shallow Root Systems	☐ Floating Leaves	☐ Aerenchyma in Roots & stems
☐ Polymorphic Leaves		

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks:

CONCLUSIONS

Project Title: Cold Spring Brook

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 2 (wetland) Date: 13 Aug. 1991

	Yes	No
Hydrophytic Vegetation Criterion Met?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Criterion Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

Remarks:

Project Title: Fort Devens Cold Spring Brook	File Number: N/A
Transect: N/A Plot: 2 (upland)	Date: 13 Aug. 1991

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Tree:			
	Quercus coccinea	153.8/366.7	41%	UPL
	Quercus alba	116.2/366.7	32%	FACU
	Pinus strobus	76.9/366.7	21%	FACU
	Liana:			
	none	—	—	—
	Sapling:			
	Quercus coccinea	30/30	100%	UPL
	Shrub:			
	Kalmia angustifolia	50/70	71%	FAC
	Herb:			
	Lycopodium obscurum	10/15	67%	FACU

Tally (Dominants ONLY):	OBL: 0	FACW: 0	FAC: 1	FACU: 3	UPL: 2	SUM: 6

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 100% x 0/6 = 0%

Describe Vegetation Disturbance: none

Describe Problem Vegetation: none

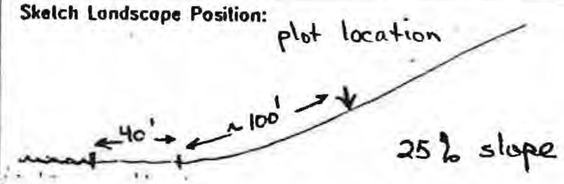
New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL	Soil Taxonomy: Ochric Histoquel
Corps of Engineers Regional Drainage Class: well drained	Criterion: E
Is Published Soil Survey Available? Yes [X] No [ ]	Title/Date: Worcester Co, 1985
Soil Type Mapped: Sudbury fine sandy loam, 0-8%	

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidixed rhizospheres, etc.
0-2"	O	10 YR - 3/1	N/A	Sapric
2-8"	A	10 YR - 4/3	N/A	fine sandy loam
8-24"	B	10 YR - 5/6	N/A	fine sandy loam

Remarks:

Sketch Landscape Position:



SOIL DETER...

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☐	☑	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☐	☑	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☐	☑	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes	NO	
☐	☐	1. Within 8 inches of the soil surface there are:
☐	☐	a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
☐	☐	b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
☐	☐	c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.
☐	☐	2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:
☐	☐	a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
☐	☐	b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

recycled paper

ecology and environment

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

& ...ERMINATION ...DROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
Stream, lake or tidal gage — Identification: ______
Aerial Photograph — Identification: ______
Other — Identification: ______
☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: >24"

Depth to Saturation: >24"

Describe Altered Hydrology: none

☐ Inundated	☐ Saturated in upper 12in.	☐ Water Marks
☐ Oxidized Rhizospheres	☐ Drift Lines	☐ Water Stained Leaves
☐ Water-borne Sediment Deposits	☐ Surface Scoured Areas	☐ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☐ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☐ Shallow Root Systems	☐ Floating Leaves	☐ Aerenchyma in Roots & stems
☐ Polymorphic Leaves		

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks: no evidence of hydrological modification

CONCLUSIONS

Project Title: Cold Spring Brook

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 2 (upland) Date: 13 Aug. 1991

	Yes	No
Hydrophytic Vegetation Criterion Met?	☐	☑
Hydric Soils Criterion Met?	☐	☑
Wetland Hydrology Criterion Met?	☐	☑
IS THIS DATAPOINT WITHIN A WETLAND?	☐	☑

Remarks:

E-16

Project Title: Fort Devens Cold Spring Brook **File Number:** N/A

Transect: N/A **Plot:** 3 (wetland) **Date:** 13 Aug. 1991

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Tree:			
	Acer rubrum	10/10	100%	FAC
	Sapling:			
	Acer rubrum	15/30	50%	FAC
	Betula papyrifera	10/30	33%	FACU
	Shrub:			
	Spiraea latifolia	25/45	55%	FAC
	Rubus hispidus	15/45	33%	FACW
	Liana:			
	none	—	—	—
	Herb:			
	Thelypteris thelypteroides	60/70	86%	FACW

Tally (Dominants ONLY):	OBL: 0	FACW: 2	FAC: 3	FACU: 1	UPL: 0	SUM: 6

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 100 × 5/6 = 83%

Describe Vegetation Disturbance: none

Describe Problem Vegetation: none

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL **Soil Taxonomy:** Typic Medisaprists

Corps of Engineers Regional Drainage Class: very poorly drained **Criterion:** A 1

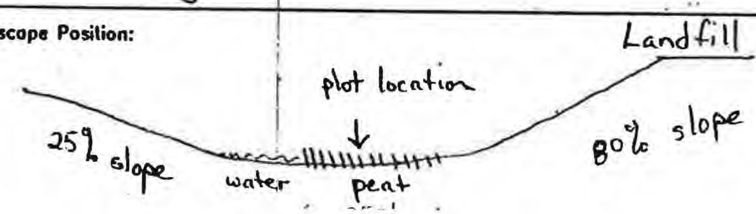
Is Published Soil Survey Available? Yes ☒ No ☐ **Title/Date:** Worcester Co., 1985

Soil Type Mapped: water

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidixed rhizospheres, etc.
0-36"	O	7.5YR 2/0	N/A	fibric

Remarks: This wetland is located on a peat deposit which is mapped as "water" on soil survey.

Sketch Landscape Position:



E-17

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☐	☑	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☑	☐	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☑	☐	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO
☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No
- ☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
- ☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
- ☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No
- ☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
- ☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

recycled paper

ecology and environment

New England Corps of Engineers Wetland Delineation Dataform --- Version 28MAR91

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observation in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
- Stream, lake or tidal gage — Identification: ______
- Aerial Photograph — Identification: ______
- Other — Identification: ______

☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 12"
Depth to Saturation: 4"
Describe Altered Hydrology: ______

☐ Inundated	☒ Saturated in upper 12in.	☒ Water Marks
☐ Oxidized Rhizospheres	☐ Drift Lines	☐ Water Stained Leaves
☐ Water-borne Sediment Deposits	☐ Surface Scoured Areas	☒ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☐ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☒ Shallow Root Systems	☐ Floating Leaves	☐ Aerenchyma in Roots & stems
☐ Polymorphic Leaves		

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks:

CONCLUSIONS

Project Title: Cold Spring Brook
Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 3 (wetland) Date: 13 Aug. 1991

	Yes	No
Hydrophytic Vegetation Criterion Met?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Criterion Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

Remarks:

E-18

Project Title: Fort Devens Cold Spring Brook		File Number: N/A	
Transect: N/A	Plot: 3 (upland)	Date: 13 Aug. 1991	

DATA -- VEGETATION Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
Tree:			
none	—	—	—
Sapling:			
Pinus resinosus	15/20	75%	FACU
Shrub:			
Rhus typhina	30/60	50%	UPL
Rubus occidentalis	20/60	33%	UPL
Liana:			
none	—	—	—
Herb:			
Panicum sp.	80/90	88%	unknown

Tally (Dominants ONLY):	OBL:	FACW:	FAC:	FACU:	UPL:	SUM:
	0	0	0	1	2	4

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 100 x 3/4 = 75%

Describe Vegetation Disturbance: none

Describe Problem Vegetation: none

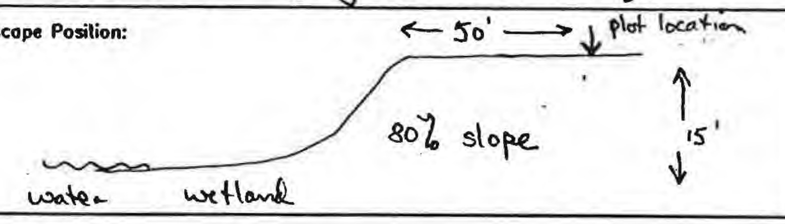
New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL	Soil Taxonomy: N/A
Corps of Engineers Regional Drainage Class: well drained	Criterion: E
Is Published Soil Survey Available? Yes ☒ No ☐	Title/Date: Worcester, 1985
Soil Type Mapped: Udorthents	

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-5"	A	N/A	N/A	N/A

Remarks: Plot located within landfill (not capped). Soils are heavily disturbed and there are many obstructions (e.g. cement slabs).

Sketch Landscape Position:



recycled paper

recycled paper

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☐	☑	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☐	☑	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☐	☑	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO
☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No
- ☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
- ☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
- ☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No
- ☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
- ☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

ecology and environment

New England Corps of Engineers Wetland Delineation Dataform --- Version 28MAR91

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observation in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
- Stream, lake or tidal gage Identification: ____
- Aerial Photograph Identification: ____
- Other Identification: ____

☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: unknown. Apparently >24"

Depth to Saturation: unknown. Apparently >24"

Describe Altered Hydrology: landfill – 15' of fill.

☐ Inundated	☐ Saturated in upper 12in.	☐ Water Marks
☐ Oxidized Rhizospheres	☐ Drift Lines	☐ Water Stained Leaves
☐ Water-borne Sediment Deposits	☐ Surface Scoured Areas	☐ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☐ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☐ Shallow Root Systems	☐ Floating Leaves	☐ Aerenchyma in Roots & stems
☐ Polymorphic Leaves		

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks: no evidence of hydrology indicators.

CONCLUSIONS

Project Title: Cold Spring Brook

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 3 (upland) Date: 13 Aug. 1991

	Yes	No
Hydrophytic Vegetation Criterion Met?	☐	☑
Hydric Soils Criterion Met?	☐	☑
Wetland Hydrology Criterion Met?	☐	☑

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☑

Remarks:

E-20

Project Title: Fort Devens Cold Spring Brook	File Number: N/A
Transect: N/A Plot: 4 (wetland)	Date: 13 Aug. 1991

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Tree:			
	Pinus strobus	1961.77 / 2559.22	77%	FACU
	Acer rubrum	597.45 / 2559.22	23%	FAC
	Liana:			
	none	—	—	—
	Sapling:			
	none	—	—	—
	Shrub:			
	Corylus americana	6/10	60%	FACU
	Herb:			
	Osmunda cinnamomea	75/90	83%	FACW

Tally (Dominants ONLY):	OBL: 0	FACW: 1	FAC: 1	FACU: 2	UPL: 0	SUM: 4

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 100 x 2/4 = 50%

Describe Vegetation Disturbance: none

Describe Problem Vegetation: none

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL Soil Taxonomy: Ochric Histoquept

Corps of Engineers Regional Drainage Class: poorly drained Criterion B3a

Is Published Soil Survey Available? Yes ☒ No ☐ Title/Date: Worcester, 1985

Soil Type Mapped: Ninigret fine sandy loam

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidixed rhizospheres, etc.
0-5"	O	7.5YR 2/0	N/A	sapric
5-16"	A	7.5YR 5/0	N/A	fine sandy loam
16-24"	B	7.5YR 3/2	N/A	fine sandy loam

Remarks: Plot located in area with indications of wetland hydrology.

Sketch Landscape Position:

SOIL DETERMINATION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☐	☑	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☐	☐	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions). unknown
☐	☑	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☑	☐	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO
☐ ☐ 1. Within 6 inches of the soil surface there are:

Yes No
- ☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
- ☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
- ☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No
- ☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
- ☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

DATA & DETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
- Stream, lake or tidal gage — Identification: ______
- Aerial Photograph — Identification: ______
- Other — Identification: ______

☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: > 24"

Depth to Saturation: >24"

Describe Altered Hydrology: none

☐ Inundated	☐ Saturated in upper 12in.	☒ Water Marks
☐ Oxidized Rhizospheres	☐ Drift Lines	☒ Water Stained Leaves
☐ Water-borne Sediment Deposits	☐ Surface Scoured Areas	☒ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☒ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☒ Shallow Root Systems	☐ Floating Leaves	☐ Aerenchyma in Roots & stems
☐ Polymorphic Leaves		

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks:

CONCLUSIONS

Project Title: Cold Spring Brook

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 4 (wetland) Date: 13 Aug. 1991

	Yes	No
Hydrophytic Vegetation Criterion Met?	☑	☐
Hydric Soils Criterion Met?	☑	☐
Wetland Hydrology Criterion Met?	☑	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☑ No ☐

Remarks:

New England Corps of Engineers Wetland Delineation Dataform — Version 28MAR91

Project Title: Fort Devens Cold Spring Brook **File Number:** N/A

Transect: N/A **Plot:** 4 (upland) **Date:** 13 Aug. 1991

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Tree:			
	Quercus coccinea	438.06 / 750.52	58%	UPL
	Pinus strobus	176.63 / 750.52	24%	FACU
	Liana:			
	none	—	—	—
	Sapling:			
	none	—	—	—
	Shrub:			
	Corylus americana	20/25	80%	FACU
	Herb:			
	Lycopodium obscurum	5/10	50%	FACU
	Maianthemum canadense	5/10	50%	UPL

Tally (Dominants ONLY):	OBL:	FACW:	FAC:	FACU:	UPL:	SUM:
	0	0	0	3	2	5

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 100 x 0/5 = 0 %

Describe Vegetation Disturbance: none

Describe Problem Vegetation: none

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL **Soil Taxonomy:** Ochric Histoquept

Corps of Engineers Regional Drainage Class: well drained soils **Criterion:**

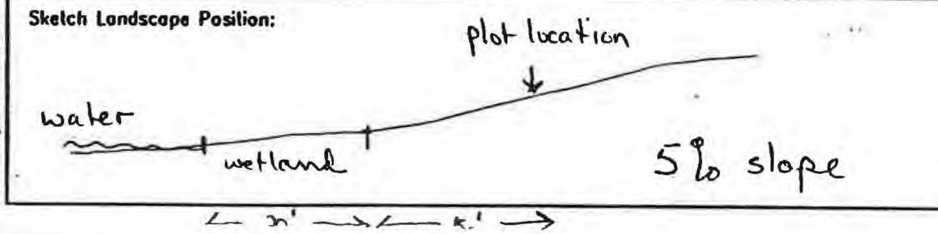
Is Published Soil Survey Available? Yes ☒ No ☐ **Title/Date:** Worcester Co., 1985

Soil Type Mapped: Ninigret fine sandy loam

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidixed rhizospheres, etc.
0-6"	A	10YR- 4/3	N/A	fine sandy loam
6-24"	B	10YR 5/6	N/A	fine sandy loam

Remarks:

Sketch Landscape Position:



recycled paper

ecology and environment

SOIL DETERMINATION	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes No
☐ ☑ All dominant plants are OBLIGATE.

☐ ☑ All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.

☐ ☑ Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).

☐ ☑ The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☑ The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.

☐ ☑ The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO
☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No
☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR

☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR

☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No
☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.

☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,–Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

DATA & DETERMINATION HYDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observations in light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
Stream, lake or tidal gage Identification: ______
Aerial Photograph Identification: ______
Other Identification: ______
☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: > 24"

Depth to Saturation: >24"

Describe Altered Hydrology: none

☐ Inundated ☐ Saturated in upper 12in. ☐ Water Marks
☐ Oxidized Rhizospheres ☐ Drift Lines ☐ Water Stained Leaves
☐ Water-borne Sediment Deposits ☐ Surface Scoured Areas ☐ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:
☐ Pneumatophores ☐ Buttressed Trees ☐ Hypertrophied Lenticels
☐ Stooling ☐ Adventitious Roots ☐ Inflated Leaves, Stems, or Roots
☐ Shallow Root Systems ☐ Floating Leaves ☐ Aerenchyma in Roots & stems
☐ Polymorphic Leaves

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks: no evidence of hydrological indicators

CONCLUSIONS

Project Title: Cold Spring Brook

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 4 (upland) Date: 13 Aug. 1991

	Yes	No
Hydrophytic Vegetation Criterion Met?	☐	☑
Hydric Soils Criterion Met?	☐	☑
Wetland Hydrology Criterion Met?	☐	☑

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☑

Remarks:

New England Corps of Engineers Wetland Delineation Dataform — Version 28MAR91

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Project Title: Fort Devens Cold Spring Brook	File Number: N/A
Transect: N/A Plot: 5 (wetland)	Date: 14 Aug 1991

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Tree:			
	Acer rubrum	190.77/323.44	59%	FAC
	Pinus strobus	132.67/323.44	41%	FACU
	Sapling:			
	Ulmus americana	40/80	50%	FACW
	Acer rubrum	35/80	44%	FAC
	Shrub:			
	Hamamelis virginiana	10/30	30%	FAC
	Cornus amomum	10/30	30%	FACW
	Herb:			
	Leersia oryzoides	30/90	33%	OBL
	Impatiens capensis	20/90	22%	FACW
	Osmunda cinnamomea	20/90	22%	FACW

Tally (Dominants ONLY):	OBL: 1	FACW: 4	FAC: 3	FACU: 1	UPL: 0	SUM: 9

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 100 x 8/9 = 89%

Describe Vegetation Disturbance: none

Describe Problem Vegetation: none

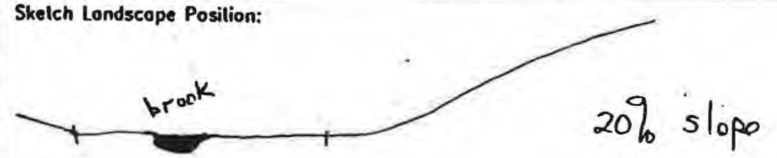
New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL	Soil Taxonomy: Terric Medisaprists
Corps of Engineers Regional Drainage Class: very poorly drained	Criterion: A3
Is Published Soil Survey Available? Yes [X] No [ ]	Title/Date:
Soil Type Mapped: Swansea muck	

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-5"	O	7.5YR 2/0	N/A	sapric
5-20"	A	7.5YR 4/0	N/A	mucky fine sandy loam
20"-24"	B	7.5YR 6/0	N/A	fine sandy loam

Remarks:

Sketch Landscape Position:



SOIL DETE[illegible]ION

NOTE:
1. "NO" in all the following is evidence that the soil is NOT HYDRIC
2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate.
3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☐	☑	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☑	☐	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☑	☐	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO
☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No
- ☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
- ☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
- ☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No
- ☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
- ☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (∝,∝,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

[illegible]ATA & [illegible]ETERMINATION HYDROLOGY

NOTE:
1. Hydrology is often the most difficult feature to observe.
2. Interpretations must consider the appropriateness of the observati[illegible] — light of the season, recent weather conditions, and watershed alterati[illegible], etc.
3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:
- Stream, lake or tidal gage — Identification:
- Aerial Photograph — Identification:
- Other — Identification:

☒ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: 1"

Depth to Saturation: 0"

Describe Altered Hydrology: none

☐ Inundated	☒ Saturated in upper 12in.	☒ Water Marks
☐ Oxidized Rhizospheres	☐ Drift Lines	☒ Water Stained Leaves
☐ Water-borne Sediment Deposits.	☐ Surface Scoured Areas	☒ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☐ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☒ Shallow Root Systems	☐ Floating Leaves	☐ Aerenchyma in Roots & stems
☐ Polymorphic Leaves		

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks:

CONCLUSIONS

Project Title: Cold Spring Brook

Delineator: Robin Dingle, Chuck Rosenburg

Transect: N/A Plot: 5 (wetland) Date: 14 Aug. 1991

	Yes	No
Hydrophytic Vegetation Criterion Met?	☒	☐
Hydric Soils Criterion Met?	☒	☐
Wetland Hydrology Criterion Met?	☒	☐

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☒ No ☐

Remarks:

Project Title: Fort Devens Cold Spring Brook		File Number: N/A
Transect: N/A	Plot: 5 (upland)	Date: 14 Aug 1991

DATA -- VEGETATION	Stratum and Species (DOMINANTS ONLY)	Dominance Ratio	Percent Dominance	NWI Status
	Tree:			
	Pinus strobus	983.63/1494.72	66%	FACU
	Acer rubrum	331.3/1494.72	22%	FAC
	Liana:			
	none	—	—	—
	Sapling:			
	Pinus strobus	10/35	29%	FACU
	Acer rubrum	10/35	29%	FAC
	Shrub:			
	Corylus americana	20/35	57%	FACU
	Herb:			
	Maianthemum canadense	10/34	29%	UPL
	Lycopodium tristachyum	10/34	29%	UPL

Tally (Dominants ONLY):	OBL: 0	FACW: 0	FAC: 2	FACU: 3	UPL: 2	SUM: 7

100 x Dominant(OBL+FACW+FAC)/Tally Sum = 100 x 2/7 = 29%

Describe Vegetation Disturbance: none

Describe Problem Vegetation: none

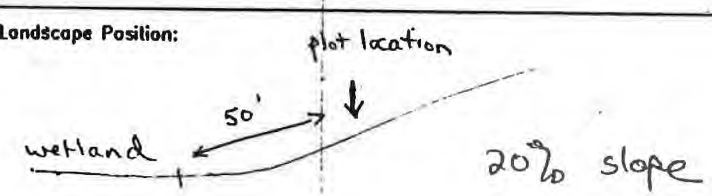
New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

DATA -- SOIL	Soil Taxonomy: Ochric Histoquept
Corps of Engineers Regional Drainage Class: well drained	Criterion: E
Is Published Soil Survey Available? Yes ☒ No ☐	Title/Date: Worcester Co, 1985
Soil Type Mapped: Ninigret fine sandy loam	

Depth	Horizon	Matrix Color (Munsell, Moist)	Color of Mottles (Munsell, Moist) Abundance/Contrast	USDA Texture, iron or manganese nodules or concretions, restrictive layers, root distribution, oxidized rhizospheres, etc.
0-5"	O	N/A	N/A	leaf litter
5-18"	A	7.5YR 4/3	N/A	fine sandy loam
18-24	B	7.5YR 4/6	N/A	sandy loam

Remarks:

Sketch Landscape Position:



SOIL DET[illegible]ON	NOTE: 1. "NO" in all the following is evidence that the soil is NOT HYDRIC 2. This checklist is valid for use by the New England Corps of Engineers; use outside the six New England States may be inappropriate. 3. This interpretive routine may be inappropriate in unusual cases.

Yes	No	
☐	☑	All dominant plants are OBLIGATE.
☐	☑	All dominant plants are FACULTATIVE WET AND OBLIGATE and the topographic boundary is abrupt.
☐	☑	Soil is frequently PONDED or FLOODED for a duration longer than two weeks during the growing season. (attach an explanation of the basis for your conclusions).
☐	☑	The soil meets the Corps of Engineers regional criteria as a VERY POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a POORLY DRAINED SOIL* and there is no evidence of altered hydrology.
☐	☑	The soil meets the Corps of Engineers regional criteria as a SOMEWHAT POORLY DRAINED SOIL that has either of the following two characteristics*:

Yes NO

☐ ☐ 1. Within 8 inches of the soil surface there are:

Yes No

- ☐ ☐ a. soil mottles within an A or Ap horizon and the subsoil is mottled throughout; OR
- ☐ ☐ b. common to many, distinct or prominent mottles with a matrix of chroma 3 or less; OR
- ☐ ☐ c. distinct or prominent oxidized rhizospheres and the subsoil is mottled throughout.

☐ ☐ 2. Within 24 inches of the soil surface, there are mottles which are common to many, distinct or prominent, and that are chroma 2 or less, and one of the following:

Yes No

- ☐ ☐ a. In the horizon that lies within 10 inches of the soil surface and directly beneath a dark** A or Ap horizon, the matrix is chroma 3 or less; the mottles are at least 10% in abundance and distinct or prominent.
- ☐ ☐ b. When a dark** Ap horizon is between 10 and 14 inches thick, wetness morphology may be masked by organic matter. Normally, these problem situations will be considered hydric when: i. hydrophytes are prevalent, ii. there is no evidence of altered hydrology, and iii. in the horizon that lies directly beneath the Ap horizon, the matrix color is chroma 3 or less and mottles are at least 10% in abundance and distinct or prominent.

☐ Check here and attach a description of your procedures and conclusions if one of the following options were chosen for your hydric soil determination: measured redox potentials, colormetric test for ferrous iron test (α,α,-Dipyridil), or other measurements and observations.

* Typically in New England, soils having these morphologies will be classified in an aquic suborder or an aquic subgroup in soil taxonomy.
** Note: a dark A or Ap is defined as having a value of 3 or less and a chroma of 2 or less

Remarks:

recycled paper

ecology and environment

New England Corps of Engineers Wetland Delineation Dataform -- Version 28MAR91

[illegible]TA & [illegible]TERMINATION [illegible]YDROLOGY	NOTE: 1. Hydrology is often the most difficult feature to observe. 2. Interpretations must consider the appropriateness of the observation [illegible] light of the season, recent weather conditions, and watershed alterations, etc. 3. Interpretation of hydrology may require repeated observations over more than one season.

☐ Recorded Data:

Stream, lake or tidal gage	Identification:
Aerial Photograph	Identification:
Other	Identification:

☑ No Recorded Data Available

REPORT ANY OF THE FOLLOWING OBSERVATIONS:

Depth to Free Water: >24"

Depth to Saturation: >24"

Describe Altered Hydrology: none

☐ Inundated	☐ Saturated in upper 12in.	☐ Water Marks
☐ Oxidized Rhizospheres	☐ Drift Lines	☐ Water Stained Leaves
☐ Water-borne Sediment Deposits	☐ Surface Scoured Areas	☐ Wetland Drainage Patterns

☐ No Evidence of Significant Hydrological Modification AND there is one or more Morphological Plant Adaptation SUCH AS:

☐ Pneumatophores	☐ Buttressed Trees	☐ Hypertrophied Lenticels
☐ Stooling	☐ Adventitious Roots	☐ Inflated Leaves, Stems, or Roots
☐ Shallow Root Systems	☐ Floating Leaves	☐ Aerenchyma in Roots & stems
☐ Polymorphic Leaves		

☐ Hydric Soils and NO visible evidence of significant hydrological modification

Remarks: No evidence of hydrological indicators

CONCLUSIONS

Project Title: Cold Spring Brook

Delineator: Robin Dinglo, Chuck Rosenburg

Transect: N/A Plot: 5 (upland) Date: 14 Aug. 1991

	Yes	No
Hydrophytic Vegetation Criterion Met?	☐	☑
Hydric Soils Criterion Met?	☐	☑
Wetland Hydrology Criterion Met?	☐	☑

IS THIS DATAPOINT WITHIN A WETLAND? Yes ☐ No ☑

Remarks:

E-28

WETLAND INVENTORY DATA

Key
- L Low
- M Moderate
- H High
- U Unfavorable
- A Absent
- P Perennial
- E Ephemeral

Project No. UC 2061

Wetland No. Shepleys Hill Wetland : Plow Shop Pond Compl

ECOLOGICAL ELEMENTS

Wetland Subclasses
- ☒ Stream or Brookside Wetland
- Open Fresh Water
  - ☒ Non-vegetated Subclass
- Deep Fresh Marsh
  - ☐ Dead Woody ☐ Shrub
  - ☐ Scrub-Shrub ☐ Robust
  - ☐ Narrow-leaved ☐ Broad-leaved
- Shallow Fresh Marsh
  - ☐ Robust ☐ Narrow-leaved
  - ☐ Broad-leaved ☒ Floating-leaved
- Floodplain/Flats
  - ☐ Emergent
  - ☐ Shrubs and Trees
- Wet Meadow
  - ☐ Ungrazed ☐ Grazed
- Shrub Swamp
  - ☐ Sapling ☐ Bushy
  - ☐ Compact ☐ Aquatic
- Wooded Swamp
  - ☐ Deciduous ☐ Evergreen
- Bog
  - ☐ Shrub ☐ Wooded
  - ☐ Cranberry ☐ Moss
- Fen
  - ☐ Emergent ☐ Shrub

Dominant Wetland Class
- ☒ Stream or Brookside Wetland
- ☒ Open Fresh Water
- ☐ Deep Fresh Marsh
- ☐ Shallow Fresh Marsh
- ☐ Yearly Floodplain
- ☐ Wet Meadow
- ☐ Shrub Swamp
- ☐ Wooded Swamp
- ☐ Bog
- ☐ Fen
- ☐ Other ____________

Wetland Class Richness
☐ >5 ☐ 4 ☐ 3 ☒ 2 ☐ 1

Subclass Richness (Lateral Diversity)
☐ >10 ☐ 9-6 ☒ 5-4 ☐ 3-2 ☐ 1

Vegetative Interspersion
☐ H ☐ M ☒ L

Surrounding Habitat
- ☐ >90% of 2 or more listed types
- ☒ 50-90% of 1 or more; 90% of 1
- ☐ <50% of 1 or more of listed types

Cover Type
- ☒ 26-75% scattered
- ☐ 26-75% peripheral
- ☐ >75% or <25% scattered
- ☐ 100% cover; >75% or <25% peripheral

Percent Open Water
☐ 0-33% ☒ 34-66% ☐ 67-95% ☐ 96-100%

Vegetative Species Richness
☐ H ☒ M ☐ L

Proportion of Wildlife Food Plants
☐ H ☒ M ☐ L

Vegetative Density
☐ H ☒ M ☐ L

Wetland Juxtaposition Favorability
☐ H ☒ M ☐ U

TOPOGRAPHICAL ELEMENTS

Topographic Configuration
- ☐ Closed Basin
- ☐ Semi-closed Basin
- ☒ Valley
- ☐ Hillside

Size
- ☒ Large ≥4.6 acres
- ☐ Medium 1.1-4.5
- ☐ Small ≤1 acre

Wetland Gradient
☒ Slight 0-3% ☐ Steep >3%

Surrounding Slopes
☐ Slight 0-3% ☒ Steep >3%

Topographic Position in Watershed
☒ Upper ☐ Intermediate ☐ Lower

GEOLOGICAL ELEMENTS

Surficial Geologic Material Underlying Wetland
- ☒ Till ☒ Alluvium
- ☐ Stratified Sand and Gravel
- ☒ Stratified Fine Sand and Silt

Bedrock Underlying Wetland
- ☒ Igneous and Metamorphic
- ☒ Sedimentary

Soil Type/Permeability
☐ Peat/H ☒ Mineral/M ☐ Muck/L

Dominant Surficial Geological Material of Watershed
- ☒ Till ☒ Alluvium
- ☐ Stratified Sand and Gravel
- ☐ Stratified Fine Sand and Silt

Thickness of Organics
☒ <1 foot ☐ 1-5 feet ☐ >5 feet

SPECIAL ELEMENTS

- ☒ Rare and/or Endangered Species (transient eagle)
- ☐ Aquatic Study Area
- ☐ Sanctuary or Refuge
- ☐ Wildlife Management Area
- ☐ Fisheries Management Area
- ☐ Educational Study Area
- ☐ Historical Area
- ☒ Other Species of concern

Note: people fish in the pond.

HYDROLOGICAL ELEMENTS

Hydrologic Position of Wetland
- ☐ Perched Wetland
- ☒ Water Table Wetland
- ☐ Water/Artesian Wetland
- ☐ Artesian Wetland

Groundwater Relationship
- ☐ Discharge Wetland
- ☐ Recharge Wetland
- ☒ Combination

Transmissivity of Aquifer
- ☐ Low <10,000 gal/day/ft
- ☒ Moderate 10,000 - 40,000 gal/day/ft
- ☐ High >40,000 gal/day/ft

Dominant Hydrologic Condition
☐ 1 ☐ 2 ☐ 3 ☐ 4 ☒ 5 ☐ 6

Connection by Surface Water to a Riparian System
☒ Yes ☐ No

Watershed Land Use
- ☐ Rural
- ☒ Rural/Residential
- ☒ Urban
- ☒ Industrial
- ☐ Other ____________

Water Level Fluctuation
☐ H ☒ L ☐ Vernal Pool

Groundwater Outflow From Wetland
☐ Absent ☒ Present

Inlet
☐ A ☐ P ☐ E
☐ Present, to wetland ____________

Inlet
☐ A ☐ P ☐ E
☐ Present, to wetland ____________

Inlet
☐ A ☐ P ☐ E
☐ Present, to wetland ____________

Inlet
☐ A ☐ P ☐ E
☐ Present, to wetland ____________

Inlet
☐ A ☐ P ☐ E
☐ Present, to wetland ____________

Outlet
☐ A ☐ P ☐ E
☐ Present, to wetland ____________

Outlet
☐ A ☒ P ☐ E
☐ Present, to wetland ____________

Percent Wetlands Bordering Open Water vs. Upland
☐ <33% ☐ 34-66% ☒ 67-100%
☐ Does not border

Fetch
☒ >2000 ft. ☐ <2000 ft.

Depth of Lake
☐ Deep >6 ft. ☒ Shallow <6 ft.

SOCIO-ECONOMICAL ELEMENTS

Hydrologically Connected to a
- ☒ Small stream
- ☐ River
- ☒ ~~Lake~~ Pond
- ☐ Combination
- ☐ Not connected

Public Access to Wetland
- ☒ Within 100 ft. of road
- ☒ Access by passable waterway
- ☐ Isolated

Surrounding Population Density
- ☐ <½ person/acre (<320/mi²)
- ☒ 0.5 - 1.9 p/a (320-1220/mi²)
- ☐ >2 p/a (>1220/mi²)

Local Scarcity to Nearest Similar Type
- ☒ <200 feet
- ☐ 201 to 1000 feet
- ☐ >1000 feet

Known Crop Value or Potential
- ☒ None
- ☐ Supports 1 family for part of year Type ____________
- ☐ Supports viable commercial interest Type ____________

Legal Accessibility to Wetland
☒ Public ☐ Private ☒ Restricted

Cultural Significance
☒ Archeological/Historic ☐ None

Figure 9. Biological Function Model

Elements	Element Weight	Condition Weight	
Unique Fisheries[a]	NA[b]	NA	Present
		NA	Not Present
Presence of Endangered or Threatened Species[a]	NA	NA	Present
		NA	Not Present
Dominant Wetland Class	5	1	Stream or Brookside wetland
		6	Open fresh water
		6	Deep fresh marsh(aquatic bed)
		6	Shallow fresh marsh
		5	Yearly flooded floodplain
		2	Wet meadow
		4	Shrub swamp
		2	Wooded swamp (deciduous)
		4	Wooded swamp (coniferous)
		3	Bog
Number of Wetland Classes (Richness)	4	5	>5
		4	4
		3	3
		2	2
		1	1
Number of Wetland Subclasses (Richness)	3	5	>10
		4	6-9
		3	4-5
		2	2-3
		1	1
Vegetative Interspersion	4	3	High
		2	Moderate
		1	Low
Surrounding Habitat	3	3	>90% of two or more of listed types
		2	50-90% of one or more 90% of one
		1	<50% of one or more listed
Water/Cover Ratio (Cover Types)	3	4	25-75% scattered
		2	25-75% peripheral
		3	75% or <25% scattered
		1	100% cover:>75% or 25% peripheral
Number of Plant Species (Vegetative Species Richness)	2	1	Low
		2	Medium
		3	High
Proportion of Wildlife Food Plants	1	1	Low
		2	Moderate
		3	High
Vegetative Density	2	3	High
		2	Moderate
		1	Low
Wetland Juxtaposition	3	3	Highly favorable
		2	Moderately favorable
		0	Unfavorable
Hydrological Position (Groundwater Connection)	2	1	Perched wetland
		4	Water table wetland
		3	Water table/artesian wetland
		3	Artesian wetland
Water Level Fluctuation	1	2	Low
		1	Vernal pool
		0	High

Figure 9 (continued)

Elements	Element Weight	Condition Weight	Conditions
Surface Water	1	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Percent Wetland Bordering on Open water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
Size	5	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 29-158 Mean 93	

110 Mod.

[a] Supportive factors
[b] not applicable

Figure 10. Hydrologic Support Function Model

Elements	Element Weight	Condition Weight	Conditions
Size	4	3	Large ≥ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small ≤ 1.0 acres
Topographic Configuration	1	3	Semi-closed basin
		2	Valley
		1	Hillside
		0	Closed Basin
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		0	Condition 6
Water Level Fluctuation	2	2	Low
		1	High
Outlet	4	2	Perennial Outlet
		1	Ephemeral Outlet
		1	Groundwater Outflow
		0	Absent
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Percent Wetland[a] Bordering on Open Water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
		Range 6-70[b] Mean 36	

63 High

[a] Applies only to those wetlands with an outlet
[b] Total value for one inlet and one outlet only.

Figure 11. Groundwater Function Model

Elements	Element Weight	Condition Weight	Conditions
Surficial Geology	3	1	Till
		4	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium
Organic Material	2	3	Absent
		2	High permeability
		1	Low permeability
Hydrologic Position	3	2	Perched wetland
		4	Water table wetland
		2	Water table/artesian wetland
		1	Artesian wetland
Transmissivity of Aquifer	4	1	Low <10,000 gal/day/ft
		2	Med. 10,000-40,000 gal/day/ft
		3	High >40,000 gal/day/ft
Inlet	1	1	Absent
		3	Perennial
		2	Ephemeral
Outlet	2	3	Absent
		2	Perennial
		1	Ephemeral
Size	3	3	Large ≤ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≥ 1.0 acres
		Range 20-68[a] Mean 44	57 High

[a] Total value for one inlet and one outlet only. Some wetlands may have more than one inlet or outlet but the range above is for wetlands with only one inlet and one outlet.

Figure 12. Storm and Flood Water Storage Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	2	1	Stream or brookside wetland
		1	Open fresh water
		2	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly flooded floodplain
		3	Wet meadow
		5	Shrub swamp
		4	Wooded swamp
		3	Bog
Percent Open Water	2	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	4	3	High
		2	Moderate
		1	Low
Topographic Configuration	2	4	Closed Basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in Watershed	3	3	Upper
		2	Intermediate
		1	Lower

Figure 12 (continued)

Elements	Element Weight	Condition Weight	Conditions
Surficial Material of Watershed	2	4	Till
		1	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium
Surficial Geologic Material of Wetland Banks	2	1	Till
		4	Stratified sand and gravel
		2	Stratified find sand /and silt
		3	Alluvium
Organic Material	1	2	High permeability
		1	Low permeability
		0	Absent
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	4	1	Not part of riparian system
		2	Part of riparian system
Water Level Fluctuation	3	2	High
		1	Low
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	1	1	Perennial
		2	Ephemeral
		0	Absent
Size	4	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 31-123 Mean 77	88 Mod.

[a] Total value for one inlet and one outlet only. Some wetlands may have more than one inlet or outlet but the range above is for wetlands with only one inlet and one outlet.

Figure 13. Shoreline Protection Function Model

Element	Element Weight	Condition Weight	Condition
Wetland Borders[a] Lake or Stream	NA[b]	NA	Yes
		NA	No
Vegetative Density	3	0	Open fresh water
		0	Stream and brookside
		1	Deep fresh marsh (aquatic bed)
		2	Shallow fresh marsh
		4	Yearly floodplan
		1	Wet meadow
		4	Shrub swamp
		4	Wood swamp
		3	Bog
Surficial Material Underlying wetland	1	2	Till
		1	Stratified sand and gravel
		4	Stratified find sand and silt
		3	Alluvium
Fetch (Lakes only)	4	2	Over 2000 ft.
		1	Under 2000 ft.
Depth of Lake	1	2	Deep 6 ft.
		1	Shallow 6 ft.
		Range 3-32 Mean 17	16

[a] preemtive
[b] not applicable

Figure 14. Water Quality Maintenance Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	1	Stream or brookside wetland
		0	Open fresh water
		3	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly floodplain
		3	Wet meadow
		4	Shrub Swamp
		2	Wooded swamp
		2	Bog
Percent open water	1	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	3	3	High
		2	Moderate
		1	Low
Topographic Configuration	3	4	Closed Basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in Watershed	2	1	Upper
		2	Intermediate
		3	Lower
Organic Material	1	1	High permeability
		2	Low permeability
		0	Absent

Figure 14 (continued)

Elements	Element Weight	Condition Weight	Conditions
Dominant Hydrologic Type	4	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	2	1	Not part of the riparian system
		2	Part of riparian system
Inlet	2	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	3	2	Perennial
		1	Ephemeral
		0	Absent
Size	4	3	Large ≥ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 18-98[a] Mean 58	70 Mod.

[a] Total value for one inlet and one outlet only.
Some wetlands may have more than one inlet or outlet but the range above is only for wetlands with one inlet and one outlet.

Figure 15. Cultural and Economic Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream of brookside
		0	Open fresh water
		4	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		2	Wet meadow
		3	Shrub swamp
		5	Wooded swamp (deciduous)
		6	Wooded swamp (coniferous)
		3	Bog
Access	3	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	8	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 11 Mean 34	49 High

Figure 16. Recreational Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	3	0	Stream or brookside
		0	Open fresh water
		6	Deep fresh marsh
		5	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		2	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		2	Bog
Percent Open Water	3	1	0-33%
		2	34-66%
		3	67-95%
		0	96-100%
Surface Water Association	4	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Access to Public	2	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	4	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
Legal Access	2	2	Yes
		1	No
Output from Biological Function	3	3	High 116-158
		2	Moderate 73-115
		1	Low 29-72

Range 11-74
Mean 42

56 High

Figure 17. Aesthetic Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream or brookside wetland
		0	Open fresh water
		5	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		3	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		5	Bog
Number of Subclasses (Richness)	3	4	6-9
		3	4-5
		2	2-3
		1	1
Percent Open Water	4	1	0-33%
		3	34-66%
		4	67-95%
		0	96-100%
Access to Public	3	3	Within 100 ft. of road
		2	Access by passable waterway
		1	Isolated
Local Scarcity	3	1	<200 ft. to nearest similar type
		2	201-1000 ft to nearest similar type
		3	>1000 ft. to nearest Similar type

Range 9-66
Mean 37

59 High

Figure 18. Educational Function Model

Elements	Element Weight	Condition Weight	Conditions
Subclass Richness (Lateral Diversity)	3	4	6-9
		3	4-5
		2	2-3
		1	1
Access to Public	4	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated

Range 7-24
Mean 15

21 High

WETLAND INVENTORY DATA

Key

- L Low
- M Moderate
- H High
- U Unfavorable
- A Absent
- P Perennial
- E Ephemeral

Project No. UC2061

Wetland No. Shepleys Hill W...

forested / scrub-sh...

ECOLOGICAL ELEMENTS

Wetland Subclasses

- [x] Stream or Brookside Wetland
- Open Fresh Water
  - [ ] Non-vegetated Subclass
- Deep Fresh Marsh
  - [ ] Dead Woody
  - [ ] Shrub
  - [ ] Scrub-Shrub
  - [ ] Robust
  - [ ] Narrow-leaved
  - [ ] Broad-leaved
- Shallow Fresh Marsh
  - [ ] Robust
  - [ ] Narrow-leaved
  - [ ] Broad-leaved
  - [ ] Floating-leaved
- Floodplain/Flats
  - [ ] Emergent
  - [ ] Shrubs and Trees
- Wet Meadow
  - [ ] Ungrazed
  - [ ] Grazed
- Shrub Swamp
  - [ ] Sapling
  - [x] Bushy
  - [ ] Compact
  - [ ] Aquatic
- Wooded Swamp
  - [x] Deciduous
  - [ ] Evergreen
- Bog
  - [ ] Shrub
  - [ ] Wooded
  - [ ] Cranberry
  - [ ] Moss
- Fen
  - [ ] Emergent
  - [ ] Shrub

Dominant Wetland Class

- [x] Stream or Brookside Wetland
- [ ] Open Fresh Water
- [ ] Deep Fresh Marsh
- [ ] Shallow Fresh Marsh
- [ ] Yearly Floodplain
- [ ] Wet Meadow
- [x] Shrub Swamp
- [x] Wooded Swamp
- [ ] Bog
- [ ] Fen
- [ ] Other ________

Wetland Class Richness

[ ] >5 [ ] 4 [ ] 3 [x] 2 [ ] 1

Subclass Richness (Lateral Diversity)

[ ] >10 [ ] 9-6 [ ] 5-4 [x] 3-2 [ ] 1

Vegetative Interspersion

[ ] H [x] M [ ] L

Surrounding Habitat

- [x] >90% of 2 or more listed types
- [ ] 50-90% of 1 or more; 90% of 1
- [ ] <50% of 1 or more of listed types

Cover Type

- [x] 26-75% scattered
- [ ] 26-75% peripheral
- [ ] >75% or <25% scattered
- [ ] 100% cover; >75% or <25% peripheral

Percent Open Water

[x] 0-33% [ ] 34-66% [ ] 67-95% [ ] 96-100%

Vegetative Species Richness

[ ] H [x] M [ ] L

Proportion of Wildlife Food Plants

[ ] H [x] M [ ] L

Vegetative Density

[x] H [ ] M [ ] L

Wetland Juxtaposition Favorability

[x] H [ ] M [ ] U

TOPOGRAPHICAL ELEMENTS

Topographic Configuration

- [ ] Closed Basin
- [ ] Semi-closed Basin
- [x] Valley
- [ ] Hillside

Size

- [ ] Large ≥4.6 acres
- [x] Medium 1.1-4.5
- [ ] Small ≤1 acre

Wetland Gradient

[x] Slight 0-3% [ ] Steep >3%

Surrounding Slopes

[ ] Slight 0-3% [x] Steep >3%

Topographic Position in Watershed

[x] Upper [ ] Intermediate [ ] Lower

GEOLOGICAL ELEMENTS

Surficial Geologic Material Underlying Wetland

- [x] Till
- [x] Alluvium
- [ ] Stratified Sand and Gravel
- [x] Stratified Fine Sand and Silt

Bedrock Underlying Wetland

- [x] Igneous and Metamorphic
- [x] Sedimentary

Soil Type/Permeability

[ ] Peat/H [x] Mineral/M [ ] Muck/L

Dominant Surficial Geological Material of Watershed

- [x] Till
- [x] Alluvium
- [ ] Stratified Sand and Gravel
- [ ] Stratified Fine Sand and Silt

Thickness of Organics

[ ] <1 foot [ ] 1-5 feet [ ] >5 feet

SPECIAL ELEMENTS

- [ ] Rare and/or Endangered Species
- [ ] Aquatic Study Area
- [ ] Sanctuary or Refuge
- [ ] Wildlife Management Area
- [ ] Fisheries Management Area
- [ ] Educational Study Area
- [ ] Historical Area
- [x] Other Species of Concern

HYDROLOGICAL ELEMENTS

Hydrologic Position of Wetland

- [ ] Perched Wetland
- [x] Water Table Wetland
- [ ] Water/Artesian Wetland
- [ ] Artesian Wetland

Groundwater Relationship

- [x] Discharge Wetland
- [ ] Recharge Wetland
- [ ] Combination

Transmissivity of Aquifer

- [ ] Low <10,000 gal/day/ft
- [x] Moderate 10,000 - 40,000 gal/day/ft
- [ ] High >40,000 gal/day/ft

Dominant Hydrologic Condition

[ ] 1 [ ] 2 [ ] 3 [ ] 4 [x] 5 [ ] 6

Connection by Surface Water to a Riparian System

[x] Yes [ ] No

Watershed Land Use

- [ ] Rural
- [x] Rural/Residential
- [x] Urban
- [x] Industrial
- [ ] Other ________

Water Level Fluctuation

[ ] H [x] L [ ] Vernal Pool

Groundwater Outflow From Wetland

[ ] Absent [x] Present

Inlet

[x] A [ ] P [ ] E

[ ] Present, to wetland ________

Inlet

[ ] A [ ] P [ ] E

[ ] Present, to wetland ________

Inlet

[ ] A [ ] P [ ] E

[ ] Present, to wetland ________

Inlet

[ ] A [ ] P [ ] E

[ ] Present, to wetland ________

Inlet

[ ] A [ ] P [ ] E

[ ] Present, to wetland ________

Outlet

[ ] A [x] P [ ] E

[ ] Present, to wetland ________

Outlet

[ ] A [ ] P [ ] E

[ ] Present, to wetland ________

Percent Wetlands Bordering Open Water vs. Upland

[x] <33% [ ] 34-66% [ ] 67-100%

[ ] Does not border

Fetch

[x] >2000 ft. [ ] <2000 ft.

Depth of Lake

[ ] Deep >6 ft. [x] Shallow <6 ft.

SOCIO-ECONOMICAL ELEMENTS

Hydrologically Connected to a

- [x] Small stream
- [ ] River
- [ ] Lake
- [ ] Combination
- [ ] Not connected

Public Access to Wetland

- [ ] Within 100 ft. of road
- [x] Access by passable waterway
- [ ] Isolated

Surrounding Population Density

- [ ] <½ person/acre (<320/mi²)
- [x] 0.5 - 1.9 p/a (320-1220/mi²)
- [ ] >2 p/a (>1220/mi²)

Local Scarcity to Nearest Similar Type

- [ ] <200 feet
- [x] 201 to 1000 feet
- [ ] >1000 feet

Known Crop Value or Potential

- [x] None
- [ ] Supports 1 family for part of year Type ________
- [ ] Supports viable commercial inter... Type ________

Legal Accessibility to Wetland

[x] Public [ ] Private [x] Restricted

Cultural Significance

[x] Archeological/Historic [ ] None

Figure 9. Biological Function Model

Elements	Element Weight	Condition Weight	
Unique Fisheries[a]	NA[b]	NA	Present
		NA	Not Present
Presence of Endangered or Threatened Species[a]	NA	NA	Present
		NA	Not Present
Dominant Wetland Class	5	1	Stream or Brookside wetland
		0	Open fresh water
		4	Deep fresh marsh(aquatic bed)
		5	Shallow fresh marsh
		5	Yearly flooded floodplain
		2	Wet meadow
		4	Shrub swamp
		2	Wooded swamp (deciduous)
		4	Wooded swamp (coniferous)
		3	Bog
Number of Wetland Classes (Richness)	4	5	≥6
		4	4
		3	3
		2	2
		1	1
Number of Wetland Subclasses (Richness)	3	5	>10
		4	6-9
		3	4-5
		2	2-3
		1	1
Vegetative Interspersion	4	3	High
		2	Moderate
		1	Low
Surrounding Habitat	3	3	>90% of two or more of listed types
		2	50-90% of one or more 90% of one
		1	<50% of one or more listed
Water/Cover Ratio (Cover Types)	3	4	25-75% scattered
		2	25-75% peripheral
		3	75% or <25% scattered
		1	100% cover:>75% or 25% peripheral
Number of Plant Species (Vegetative Species Richness)	2	1	Low
		2	Medium
		3	High
Proportion of Wildlife Food Plants	1	1	Low
		2	Moderate
		3	High
Vegetative Density	2	3	High
		2	Moderate
		1	Low
Wetland Juxtaposition	3	3	Highly favorable
		2	Moderately favorable
		0	Unfavorable
Hydrological Position (Groundwater Connection)	2	1	Perched wetland
		4	Water table wetland
		3	Water table/artesian wetland
		3	Artesian wetland
Water Level Fluctuation	1	2	Low
		1	Normal pool
		0	High

Figure 9 (continued)

Elements	Element Weight	Condition Weight	Conditions
Surface Water	1	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Percent Wetland Bordering on Open water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
Size	5	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 29-158 Mean 93	

99 Mod.

[a] Preemptive factors
[b] Not applicable

Figure 10. Hydrologic Support Function Model

Elements	Element Weight	Condition Weight	Conditions
Size	4	3	Large ≥ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small ≤ 1.0 acres
Topographic Configuration	1	3	Semi-closed basin
		2	Valley
		1	Hillside
		0	Closed Basin
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		0	Condition 6
Water Level Fluctuation	2	2	Low
		1	High
Outlet	4	2	Perennial Outlet
		1	Ephemeral Outlet
		1	Groundwater Outflow
		0	Absent
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Percent Wetland[a] Bordering on Open Water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
		Range 6-70[b] Mean 36	

51 High

[a] Applies only to those wetlands with an outlet
[b] Total value for one inlet and one outlet only.

Figure 11. Groundwater Function Model

Elements	Element Weight	Condition Weight	Conditions
Surficial Geology	3	1	Till
		4	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium
Organic Material	2	3	Absent
		2	High permeability
		1	Low permeability
Hydrologic Position	5	2	Perched wetland
		4	Water table wetland
		2	Water table/artesian wetland
		1	Artesian wetland
Transmissivity of Aquifer	4	1	Low <10,000 gal/day/ft
		2	Med. 10,000-40,000 gal/day/ft
		3	High >40,000 gal/day/ft
Inlet	1	1	Absent
		3	Perennial
		2	Ephemeral
Outlet	2	3	Absent
		2	Perennial
		1	Ephemeral
Size	3	3	Large ≤ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≥ 1.0 acres
		Range 20-68[a] Mean 44	54 Mod.

[a] Total value for one inlet and one outlet only. Some wetlands may have more than one inlet or outlet but the range above is for wetlands with only one inlet and one outlet.

Figure 12. Storm and Flood Water Storage Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	2	1	Stream or brookside wetland
		1	Open fresh water
		2	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly flooded floodplain
		3	Wet meadow
		5	Shrub swamp
		4	Wooded swamp
		3	Bog
Percent Open Water	2	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	4	3	High
		2	Moderate
		1	Low
Topographic Configuration	2	4	Closed Basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in Watershed	3	3	Upper
		2	Intermediate
		1	Lower

Figure 12 (continued)

Elements	Element Weight	Condition Weight	Conditions
Surficial Material of Watershed	2	4	Till
		1	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium
Surficial Geologic Material of Wetland Banks	2	1	Till
		4	Stratified sand and gravel
		2	Stratified fine sand and silt
		3	Alluvium
Organic Material	1	2	High permeability
		1	Low permeability
		0	Absent
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	4	1	Not part of riparian system
		2	Part of riparian system
Water Level Fluctuation	3	2	High
		1	Low
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	1	1	Perennial
		2	Ephemeral
		0	Absent
Size	4	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 31-123 Mean 77	94 Mod.

[a]Total value for one inlet and one outlet only. Some wetlands may have more than one inlet or outlet but the range above is for wetlands with only one inlet and one outlet.

Figure 13. Shoreline Protection Function Model

Element	Element Weight	Condition Weight	Condition
Wetland Borders[a] Lake or Stream	NA[b]	NA	Yes
		NA	No
Vegetative Density	3	0	Open fresh water
		0	Stream and brookside
		1	Deep fresh marsh (aquatic bed)
		2	Shallow fresh marsh
		4	Yearly floodplan
		3	Wet meadow
		4	Shrub swamp
		4	Wood swamp
		3	Bog
Surficial Material Underlying wetland	1	2	Till
		1	Stratified sand and gravel
		4	Stratified find sand and silt
		3	Alluvium
Fetch (Lakes only)	4	2	Over 2000 ft.
		1	Under 2000 ft.
Depth of Lake	1	2	Deep 6 ft.
		1	Shallow 6 ft.
		Range 3-32 Mean 17	22

[a]preemtive

[b]not applicable

Figure 14. Water Quality Maintenance Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	1	Stream or brookside wetland
		0	Open fresh water
		3	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly floodplain
		3	Wet meadow
		4	Shrub Swamp
		2	Wooded swamp
		2	Bog
Percent open water	1	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	3	3	High
		2	Moderate
		1	Low
Topographic Configuration	3	4	Closed Basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in Watershed	2	1	Upper
		2	Intermediate
		3	Lower
Organic Material	1	1	High permeability
		2	Low permeability
		0	Absent

Figure 14 (continued)

Elements	Element Weight	Condition Weight	Conditions
Dominant Hydrologic Type	4	1'	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	2	1	Not part of the riparian system
		2	Part of riparian system
Inlet	2	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	3	2	Perennial
		1	Ephemeral
		0	Absent
Size	4	3	Large ≥ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 18-98[a] Mean 58	66 Mod.

[a]Total value for one inlet and one outlet only.
Some wetlands may have more than one inlet or outlet but the range above is only for wetlands with one inlet and one outlet.

Figure 15. Cultural and Economic Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream of brookside
		0	Open fresh water
		4	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		2	Wet meadow
		3	Shrub swamp
		5	Wooded swamp (deciduous)
		6	Wooded swamp (coniferous)
		3	Bog
Access	3	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	8	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 11 Mean 34	42 Mod.

Figure 16. Recreational Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	3	0	Stream or brookside
		0	Open fresh water
		6	Deep fresh marsh
		5	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		2	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		2	Bog
Percent Open Water	3	1	0-33%
		2	34-66%
		3	67-95%
		0	96-100%
Surface Water Association	4	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Access to Public	2	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	4	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
Legal Access	2	2	Yes
		1	No
Output From Biological Function	3	3	High 116-158
		2	Moderate 73-115
		1	Low 29-72

Range 11-74
Mean 42

33 Mod

Figure 17. Aesthetic Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream or brookside wetland
		0	Open fresh water
		5	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		3	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		5	Bog
Number of Subclasses (Richness)	3	4	6-9
		2	2-3
		1	1
Percent Open Water	4	1	0-33%
		3	34-66%
		4	67-95%
		0	96-100%
Access to Public	3	3	Within 100 ft. of road
		2	Access by passable waterway
		1	Isolated
Local Scarcity	3	1	<200 ft. to nearest similar type
		2	201-1000 ft to nearest similar type
		3	>1000 ft. to nearest Similar type

Range 9-66
Mean 37

34 Mod.

Figure 18. Educational Function Model

Elements	Element Weight	Condition Weight	Conditions
Subclass Richness (Lateral Diversity)	3	4	6-9
		3	4-5
		2	2-3
		1	1
Access to Public	4	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated

Range 7-24
Mean 15

14 Mod.

WETLAND INVENTORY DATA

Key

- L Low
- M Moderate
- H High
- U Unfavorable
- A Absent
- P Perennial
- E Ephemeral

Project No. UC 2061
Wetland No. Cold Spring Brook Comp.

ECOLOGICAL ELEMENTS

Wetland Subclasses
☒ Stream or Brookside Wetland
Open Fresh Water
  ☒ Non-vegetated Subclass
Deep Fresh Marsh
  ☐ Dead Woody ☐ Shrub
  ☐ Scrub-Shrub ☐ Robust
  ☐ Narrow-leaved ☒ Broad-leaved
Shallow Fresh Marsh
  ☐ Robust ☐ Narrow-leaved
  ☐ Broad-leaved ☐ Floating-leaved
Floodplain/Flats
  ☐ Emergent
  ☐ Shrubs and Trees
Wet Meadow
  ☐ Ungrazed ☐ Grazed
Shrub Swamp
  ☐ Sapling ☒ Bushy
  ☐ Compact ☐ Aquatic
Wooded Swamp
  ☒ Deciduous ☐ Evergreen
Bog
  ☐ Shrub ☐ Wooded
  ☐ Cranberry ☐ Moss
Fen
  ☐ Emergent ☐ Shrub

Dominant Wetland Class
☒ Stream or Brookside Wetland
☐ Open Fresh Water
☐ Deep Fresh Marsh
☐ Shallow Fresh Marsh
☐ Yearly Floodplain
☐ Wet Meadow
☐ Shrub Swamp
☐ Wooded Swamp
☐ Bog
☐ Fen
☐ Other ______

Wetland Class Richness
☐>5 ☒4 ☐3 ☐2 ☐1
Subclass Richness (Lateral Diversity)
☐>10 ☐9-6 ☒5-4 ☐3-2 ☐1
Vegetative Interspersion
☐H ☒M ☐L
Surrounding Habitat
☒>90% of 2 or more listed types
☐ 50-90% of 1 or more; 90% of 1
☐<50% of 1 or more of listed types
Cover Type
☐26-75% scattered
☒26-75% peripheral
☐>75% or <25% scattered
☐100% cover; >75% or <25% peripheral
Percent Open Water
☐0-33% ☒34-66% ☐67-95% ☐96-100%
Vegetative Species Richness
☒H ☐M ☐L
Proportion of Wildlife Food Plants
☐H ☒M ☐L
Vegetative Density
☒H ☐M ☐L
Wetland Juxtaposition Favorability
☐H ☒M ☐U

TOPOGRAPHICAL ELEMENTS

Topographic Configuration
☐ Closed Basin
☐ Semi-closed Basin
☒ Valley
☐ Hillside
Size
☒ Large ≥4.6 acres
☐ Medium 1.1-4.5
☐ Small ≤1 acre
Wetland Gradient
☒ Slight 0-3% ☐ Steep >3%
Surrounding Slopes
☐ Slight 0-3% ☒ Steep >3%
Topographic Position in Watershed
☒ Upper ☐ Intermediate ☐ Lower

GEOLOGICAL ELEMENTS

Surficial Geologic Material Underlying Wetland
☒ Till ☒ Alluvium
☒ Stratified Sand and Gravel
☐ Stratified Fine Sand and Silt
Bedrock Underlying Wetland
☒ Igneous and Metamorphic
☒ Sedimentary
Soil Type/Permeability
☒ Peat/H ☒ Mineral/M ☐ Muck/L
Dominant Surficial Geological Material of Watershed
☒ Till ☒ Alluvium
☐ Stratified Sand and Gravel
☐ Stratified Fine Sand and Silt
Thickness of Organics
☒ <1 foot ☒ 1-5 feet ☐ >5 feet

SPECIAL ELEMENTS

☐ Rare and/or Endangered Species
☐ Aquatic Study Area
☐ Sanctuary or Refuge
☐ Wildlife Management Area
☐ Fisheries Management Area
☐ Educational Study Area
☐ Historical Area
☐ Other ______

HYDROLOGICAL ELEMENTS

Hydrologic Position of Wetland
☐ Perched Wetland
☒ Water Table Wetland
☐ Water/Artesian Wetland
☐ Artesian Wetland
Groundwater Relationship
☐ Discharge Wetland
☐ Recharge Wetland
☒ Combination
Transmissivity of Aquifer
☐ Low <10,000 gal/day/ft
☒ Moderate 10,000 - 40,000 gal/day/ft
☐ High >40,000 gal/day/ft
Dominant Hydrologic Condition
☐1 ☐2 ☐3 ☐4 ☒5 ☐6
Connection by Surface Water to a Riparian System
☒ Yes ☐ No
Watershed Land Use
☐ Rural
☒ Rural/Residential
☒ Urban
☒ Industrial
☐ Other ______
Water Level Fluctuation
☐H ☒L ☐Vernal Pool
Groundwater Outflow From Wetland
☒ Absent ☐ Present

Inlet
☒A ☐P ☐E
☐ Present, to wetland ______
Inlet
☐A ☐P ☐E
☐ Present, to wetland ______
Inlet
☐A ☐P ☐E
☐ Present, to wetland ______
Inlet
☐A ☐P ☐E
☐ Present, to wetland ______
Inlet
☐A ☐P ☐E
☐ Present, to wetland ______
Outlet
☐A ☒P ☐E
☐ Present, to wetland ______
Outlet
☐A ☐P ☐E
☐ Present, to wetland ______
Percent Wetlands Bordering Open Water vs. Upland
☐ <33% ☐ 34-66% ☒ 67-100%
☐ Does not border
Fetch
☒ >2000 ft. ☐ <2000 ft.
Depth of Lake
☐ Deep >6 ft. ☒ Shallow <6 ft.

SOCIO-ECONOMICAL ELEMENTS

Hydrologically Connected to a
☒ Small stream
☐ River
☐ Lake
☐ Combination
☐ Not connected
Public Access to Wetland
☒ Within 100 ft. of road
☐ Access by passable waterway
☐ Isolated
Surrounding Population Density
☐ <½ person/acre (<320/mi²)
☒ 0.5 - 1.9 p/a (320-1220/mi²)
☐ >2 p/a (>1220/mi²)
Local Scarcity to Nearest Similar Type
☐ <200 feet
☐ 201 to 1000 feet
☒ >1000 feet
Known Crop Value or Potential
☒ None
☐ Supports 1 family for part of year
  Type ______
☐ Supports viable commercial interest
  Type ______
Legal Accessibility to Wetland
☐ Public ☐ Private ☒ Restricted
Cultural Significance
☒ Archeological/Historic ☐ None

Figure 9. Biological Function Model

Elements	Element Weight	Condition Weight	
Unique Fisheries[a]	NA[b]	NA	Present
		NA	Not Present
Presence of Endangered or Threatened Species[a]	NA	NA	Present
		NA	Not Present
Dominant Wetland Class	5	1	Stream or Brookside wetland
		0	Open fresh water
		4	Deep fresh marsh(aquatic bed)
		5	Shallow fresh marsh
		5	Yearly flooded floodplain
		2	Wet meadow
		4	Shrub swamp
		2	Wooded swamp (deciduous)
		4	Wooded swamp (coniferous)
		3	Bog
Number of Wetland Classes (Richness)	4	5	>6
		4	4
		3	3
		2	2
		1	1
Number of Wetland Subclasses (Richness)	3	5	>10
		4	6-9
		3	4-5
		2	2-3
		1	1
Vegetative Interspersion	4	3	High
		2	Moderate
		1	Low
Surrounding Habitat	3	3	>90% of two or more of listed types
		2	50-90% of one or more 90% of one
		1	<50% of one or more listed
Water/Cover Ratio (Cover Types)	3	4	25-75% scattered
		2	25-75% peripheral
		3	75% or <25% scattered
		1	100% cover;>75% or 25% peripheral
Number of Plant Species (Vegetative Species Richness)	2	1	Low
		2	Medium
		3	High
Proportion of Wildlife Food Plants	1	1	Low
		2	Moderate
		3	High
Vegetative Density	2	3	High
		2	Moderate
		1	Low
Wetland Juxtaposition	3	3	Highly favorable
		2	Moderately favorable
		0	Unfavorable
Hydrological Position (Groundwater Connection)	2	1	Perched wetland
		4	Water table wetland
		3	Water table/artesian wetland
		3	Artesian wetland
Water Level Fluctuation	1	2	Low
		1	Vernal pool
		0	High

Figure 9 (continued)

Elements	Element Weight	Condition Weight	Conditions
Surface Water	1	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Percent Wetland Bordering on Open water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
Size	5	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 23-158 Mean 93	126 High

[a] Interactive factors
[b] Not applicable

Figure 10. Hydrologic Support Function Model

Elements	Element Weight	Condition Weight	Conditions
Size	4	3	Large ≥ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small ≤ 1.0 acres
Topographic Configuration	1	3	Semi-closed basin
		2	Valley
		1	Hillside
		0	Closed Basin
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		0	Condition 6
Water Level Fluctuation	2	2	Low
		1	High
Outlet	4	2	Perennial Outlet
		1	Ephemeral Outlet
		1	Groundwater Outflow
		0	Absent
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Percent Wetland[a] Bordering on Open Water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
		Range 6-70[b] Mean 36	63 High

[a] Applies only to those wetlands with an outlet
[b] Total value for one inlet and one outlet only.

Figure 11. Groundwater Function Model

Elements	Element Weight	Condition Weight	Conditions
Surficial Geology	3	1	Till
		4	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium
Organic Material	2	3	Absent
		2	High permeability
		1	Low permeability
Hydrologic Position	5	2	Perched wetland
		4	Water table wetland
		2	Water table/artesian wetland
		1	Artesian wetland
Transmissivity of Aquifer	4	1	Low <10,000 gal/day/ft
		2	Med. 10,000-40,000 gal/day/ft
		3	High >40,000 gal/day/ft
Inlet	1	1	Absent
		3	Perennial
		2	Ephemeral
Outlet	2	3	Absent
		2	Perennial
		1	Ephemeral
Size	3	3	Large ≤ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≥ 1.0 acres
		Range 20-68[a] Mean 44	

[a] Total value for one inlet and one outlet only. Some wetlands may have more than one inlet or outlet but the range above is for wetlands with only one inlet and one outlet.

55 Mod.

Figure 12. Storm and Flood Water Storage Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	2	1	Stream or brookside wetland
		1	Open fresh water
		2	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly flooded floodplain
		3	Wet meadow
		5	Shrub swamp
		4	Wooded swamp
		3	Bog
Percent Open Water	2	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	4	3	High
		2	Moderate
		1	Low
Topographic Configuration	2	4	Closed Basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in watershed	3	3	Upper
		2	Intermediate
		1	Lower

Figure 12 (continued)

Elements	Element Weight	Condition Weight	Conditions
Surficial Material of Watershed	2	4	Till
		1	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium
Surficial Geologic Material of Wetland Zones	2	1	Till
		4	Stratified sand and gravel
		2	Stratified fine sand and silt
		3	Alluvium
Organic Material	1	2	High permeability
		1	Low permeability
		0	Absent
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	4	1	Not part of riparian system
		2	Part of riparian system
Water Level Fluctuation	3	2	High
		1	Low
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	1	1	Perennial
		2	Ephemeral
		0	Absent
Size	4	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 31-123 Mean 77	

94 Mod.

[a] Total value for one inlet and one outlet only. Some wetlands may have more than one inlet or outlet but the range above is for wetlands with only one inlet and one outlet.

Figure 13. Shoreline Protection Function Model

Element	Element Weight	Condition Weight	Condition
Wetland Borders[a] Lake or Stream	NA[b]	NA	Yes
		NA	No
Vegetative Density	3	0	Open fresh water
		0	Stream and brookside
		1	Deep fresh marsh (aquatic bed)
		2	Shallow fresh marsh
		4	Yearly floodplain
		1	Wet meadow
		4	Shrub swamp
		4	Wood swamp
		3	Bog
Surficial Material Underlying wetland	1	2	Till
		1	Stratified sand and gravel
		4	Stratified fine sand and silt
		3	Alluvium
Fetch (Lakes only)	4	2	Over 2000 ft.
		1	Under 2000 ft.
Depth of Lake	1	2	Deep 6 ft.
		1	Shallow 6 ft.
		Range 3-32 Mean 17	16

[a]preemptive
[b]not applicable

Figure 14. Water Quality Maintenance Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	1	Stream or brookside wetland
		0	Open fresh water
		3	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly floodplain
		3	Wet meadow
		4	Shrub Swamp
		2	Wooded swamp
		2	Bog
Percent open water	1	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	3	3	High
		2	Moderate
		1	Low
Topographic Configuration	3	4	Closed Basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in Watershed	2	1	Upper
		2	Intermediate
		3	Lower
Organic Material	1	1	High permeability
		2	Low permeability
		0	Absent

Figure 14 (continued)

Elements	Element Weight	Condition Weight	Conditions
Dominant Hydrologic Type	4	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	2	1	Not part of the riparian system
		2	Part of riparian system
Inlet	2	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	3	2	Perennial
		1	Ephemeral
		0	Absent
Size	4	3	Large ≥ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 18-98[a] Mean 58	74 High

[a]Total value for one inlet and one outlet only.
Some wetlands may have more than one inlet or outlet but the range above is only for wetlands with one inlet and one outlet.

Figure 15. Cultural and Economic Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream of brookside
		0	Open fresh water
		4	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		2	Wet meadow
		3	Shrub swamp
		5	Wooded swamp (deciduous)
		6	Wooded swamp (coniferous)
		3	Bog
Access	3	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	8	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 11-57 Mean 34	49 High

Figure 16. Recreational Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	3	0	Stream or brookside
		0	Open fresh water
		6	Deep fresh marsh
		5	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		2	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		2	Bog
Percent Open Water	3	1	0-33%
		2	34-66%
		3	67-95%
		0	96-100%
Surface Water Association	4	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Access to Public	2	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	4	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
Legal Access	2	2	Yes
		1	No
Output From Biological Function	3	3	High 116-150
		2	Moderate 73-115
		1	Low 29-72
		Range 11-74 Mean 42	57 High

Figure 17. Aesthetic Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream or brookside wetland
		0	Open fresh water
		5	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		3	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		5	Bog
Number of Subclasses (Richness)	2	4	6-9
		3	4-5
		2	2-3
		1	1
Percent Open Water	4	1	0-33%
		5	34-66%
		4	67-95%
		0	96-100%
Access to Public	3	3	Within 100 ft. of road
		2	Access by passable waterway
		1	Isolated
Local Scarcity	3	1	<200 ft. to nearest similar type
		2	201-1000 ft to nearest similar type
		3	>1000 ft. to nearest similar type
		Range 9-66 Mean 37	59 High

Figure 18. Educational Function Model

Elements	Element Weight	Condition Weight	Conditions
Subclass Richness (Lateral Diversity)	3	4	6-9
		3	4-5
		2	2-3
		1	1
Access to Public	4	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
		Range 7-24 Mean 15	21 High

Key

L Low
M Moderate
H High
U Unfavorable
A Absent
P Perennial
E Ephemeral

WETLAND INVENTORY DATA

Project No. UC 2061
Wetland No. Cold Spring Brook East of Marine ...

ECOLOGICAL ELEMENTS

Wetland Subclasses
[X] Stream or Brookside Wetland
Open Fresh Water
[ ] Non-vegetated Subclass
Deep Fresh Marsh
[ ] Dead Woody [ ] Shrub
[ ] Scrub-Shrub [ ] Robust
[ ] Narrow-leaved [ ] Broad-leaved
Shallow Fresh Marsh
[ ] Robust [ ] Narrow-leaved
[ ] Broad-leaved [ ] Floating-leaved
Floodplain/Flats
[ ] Emergent
[X] Shrubs and Trees
Wet Meadow
[ ] Ungrazed [ ] Grazed
Shrub Swamp
[ ] Sapling [ ] Bushy
[ ] Compact [ ] Aquatic
Wooded Swamp
[ ] Deciduous [ ] Evergreen
Bog
[ ] Shrub [ ] Wooded
[ ] Cranberry [ ] Moss
Fen
[ ] Emergent [ ] Shrub

Dominant Wetland Class
[X] Stream or Brookside Wetland
[ ] Open Fresh Water
[ ] Deep Fresh Marsh
[ ] Shallow Fresh Marsh
[ ] Yearly Floodplain
[ ] Wet Meadow
[ ] Shrub Swamp
[ ] Wooded Swamp
[ ] Bog
[ ] Fen
[ ] Other ______

Wetland Class Richness
[ ] >5 [ ] 4 [ ] 3 [ ] 2 [X] 1
Subclass Richness (Lateral Diversity)
[ ] >10 [ ] 9-6 [ ] 5-4 [X] 3-2 [ ] 1
Vegetative Interspersion
[X] H [ ] M [ ] L
Surrounding Habitat
[ ] >90% of 2 or more listed types
[X] 50-90% of 1 or more; 90% of 1
[ ] <50% of 1 or more of listed types
Cover Type
[ ] 26-75% scattered
[ ] 26-75% peripheral
[ ] >75% or <25% scattered
[X] 100% cover; >75% or <25% peripheral
Percent Open Water
[X] 0-33% [ ] 34-66% [ ] 67-95% [ ] 96-100%
Vegetative Species Richness
[X] H [ ] M [ ] L
Proportion of Wildlife Food Plants
[ ] H [X] M [ ] L
Vegetative Density
[X] H [ ] M [ ] L
Wetland Juxtaposition Favorability
[ ] H [X] M [ ] U

TOPOGRAPHICAL ELEMENTS

Topographic Configuration
[ ] Closed Basin
[ ] Semi-closed Basin
[X] Valley
[ ] Hillside
Size
[ ] Large ≥4.6 acres
[X] Medium 1.1-4.5
[ ] Small ≤1 acre
Wetland Gradient
[X] Slight 0-3% [ ] Steep >3%
Surrounding Slopes
[ ] Slight 0-3% [X] Steep >3%
Topographic Position in Watershed
[X] Upper [ ] Intermediate [ ] Lower

GEOLOGICAL ELEMENTS

Surficial Geologic Material Underlying Wetland
[X] Till [X] Alluvium
[ ] Stratified Sand and Gravel
[X] Stratified Fine Sand and Silt
Bedrock Underlying Wetland
[X] Igneous and Metamorphic
[X] Sedimentary
Soil Type/Permeability
[ ] Peat/H [X] Mineral/M [ ] Muck/L
Dominant Surficial Geological Material of Watershed
[X] Till [X] Alluvium
[ ] Stratified Sand and Gravel
[ ] Stratified Fine Sand and Silt
Thickness of Organics
[X] <1 foot [ ] 1-5 feet [ ] >5 feet

SPECIAL ELEMENTS

[ ] Rare and/or Endangered Species
[ ] Aquatic Study Area
[ ] Sanctuary or Refuge
[ ] Wildlife Management Area
[ ] Fisheries Management Area
[ ] Educational Study Area
[ ] Historical Area
[ ] Other ______

HYDROLOGICAL ELEMENTS

Hydrologic Position of Wetland
[ ] Perched Wetland
[X] Water Table Wetland
[ ] Water/Artesian Wetland
[ ] Artesian Wetland
Groundwater Relationship
[ ] Discharge Wetland
[ ] Recharge Wetland
[X] Combination
Transmissivity of Aquifer
[ ] Low <10,000 gal/day/ft
[X] Moderate 10,000 - 40,000 gal/day/ft
[ ] High >40,000 gal/day/ft
Dominant Hydrologic Condition
[ ] 1 [ ] 2 [X] 3 [ ] 4 [ ] 5 [ ] 6
Connection by Surface Water to a Riparian System
[X] Yes [ ] No
Watershed Land Use
[ ] Rural
[X] Rural/Residential
[X] Urban
[X] Industrial
[ ] Other ______
Water Level Fluctuation
[ ] H [X] L [ ] Vernal Pool
Groundwater Outflow From Wetland
[X] Absent [ ] Present

Inlet
[ ] A [X] P [ ] E
[ ] Present, to wetland ______
Inlet
[ ] A [ ] P [ ] E
[ ] Present, to wetland ______
Inlet
[ ] A [ ] P [ ] E
[ ] Present, to wetland ______
Inlet
[ ] A [ ] P [ ] E
[ ] Present, to wetland ______
Inlet
[ ] A [ ] P [ ] E
[ ] Present, to wetland ______
Outlet
[ ] A [ ] P [ ] E
[ ] Present, to wetland ______
Outlet
[ ] A [X] P [ ] E
[ ] Present, to wetland ______
Percent Wetlands Bordering Open Water vs. Upland
[X] <33% [ ] 34-66% [ ] 67-100%
[ ] Does not border
Fetch
[ ] >2000 ft. [X] <2000 ft.
Depth of Lake
[ ] Deep >6 ft. [ ] Shallow <6 ft.

SOCIO-ECONOMICAL ELEMENTS

Hydrologically Connected to a
[X] Small stream
[ ] River
[ ] Lake
[ ] Combination
[ ] Not connected
Public Access to Wetland
[X] Within 100 ft. of road
[ ] Access by passable waterway
[ ] Isolated
Surrounding Population Density
[ ] <½ person/acre (<320/mi²)
[X] 0.5 - 1.9 p/a (320-1220/mi²)
[ ] >2 p/a (>1220/mi²)
Local Scarcity to Nearest Similar Type
[ ] <200 feet
[ ] 201 to 1000 feet
[X] >1000 feet
Known Crop Value or Potential
[X] None
[ ] Supports 1 family for part of year
Type ______
[ ] Supports viable commercial int...
Type ______
Legal Accessibility to Wetland
[ ] Public [ ] Private [X] Restricted
Cultural Significance
[X] Archeological/Historic [ ] None

Figure 9. Biological Function Model

Elements	Element Weight	Condition Weight	
Unique Fisheries[a]	NA[b]	NA	Present
		NA	Not Present
Presence of Endangered or Threatened Species[a]	NA	NA	Present
		NA	Not Present
Dominant Wetland Class	5	1	Stream or Brookside wetland
		0	Open fresh water
		4	Deep fresh marsh(aquatic bed)
		5	Shallow fresh marsh
		5	Yearly flooded floodplain
		2	Wet meadow
		4	Shrub swamp
		2	Wooded swamp (deciduous)
		4	Wooded swamp (coniferous)
		3	Bog
Number of Wetland Classes (Richness)	4	5	≥5
		4	4
		3	3
		2	2
		1	1
Number of Wetland Subclasses (Richness)	3	5	>10
		4	6-9
		3	4-5
		2	2-3
		1	1
Vegetative Interspersion	4	3	High
		2	Moderate
		1	Low
Surrounding Habitat	3	3	>90% of two or more of listed types
		2	50-90% of one or more 90% of one
		1	<50% of one or more listed
Water/Cover Ratio (Cover Types)	3	4	25-75% scattered
		2	25-75% peripheral
		3	75% or <25% scattered
		1	100% cover:>75% or 25% peripheral
Number of Plant Species (Vegetative Species Richness)	2	1	Low
		2	Medium
		3	High
Proportion of Wildlife Food Plants	1	1	Low
		2	Moderate
		3	High
Vegetative Density	2	3	High
		2	Moderate
		1	Low
Wetland Juxtaposition	3	3	Highly favorable
		2	Moderately favorable
		0	Unfavorable
Hydrological Position (Groundwater Connection)	2	1	Perched wetland
		4	Water table wetland
		3	Water table/artesian wetland
		3	Artesian wetland
Water Level Fluctuation	1	2	Low
		1	Vernal pool
		0	High

Figure 9 (continued)

Elements	Element Weight	Condition Weight	Conditions
Surface Water	1	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Percent Wetland Bordering on Open water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
Size	5	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 29-158 Mean 93	

[a]Representative factors
[b]Not applicable

102 Mod.

Figure 10. Hydrologic Support Function Model

Elements	Element Weight	Condition Weight	Conditions
Size	4	3	Large ≥ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small ≤ 1.0 acres
Topographic Configuration	1	3	Semi-closed basin
		2	Valley
		1	Hillside
		0	Closed Basin
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Water Level Fluctuation	2	2	Low
		1	High
Outlet	4	2	Perennial Outlet
		1	Ephemeral Outlet
		1	Groundwater Outflow
		0	Absent
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Percent Wetland[a] Bordering on Open Water	4	1	<33%
		2	34-66%
		3	67-100%
		0	Does not border
		Range 6-75[b] Mean 36	

[a] Applies only to those wetlands with an outlet
[b] Total value for one inlet and one outlet only.

43 Mod.

Figure 11. Groundwater Function Model

Elements	Element Weight	Condition Weight	Conditions
Surficial Geology	3	1	Till
		4	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium
Organic Material	2	3	Absent
		2	High permeability
		1	Low permeability
Hydrologic Position	5	2	Perched wetland
		4	Water table wetland
		2	Water table/artesian wetland
		1	Artesian wetland
Transmissivity of Aquifer	4	1	Low <10,000 gal/day/ft
		2	Med. 10,000-40,000 gal/day/ft
		3	High >40,000 gal/day/ft
Inlet	1	1	Absent
		3	Perennial
		2	Ephemeral
Outlet	2	3	Absent
		2	Perennial
		1	Ephemeral
Size	3	3	Large ≤ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≥ 1.0 acres
	Range 20-68* Mean 44	56	High

*Total value for one inlet and one outlet only. Some wetlands may have more than one inlet or outlet but the range above is for wetlands with only one inlet and one outlet.

Figure 12. Storm and Flood Water Storage Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	2	1	Stream or brookside wetland
		1	Open fresh water
		2	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly flooded floodplain
		3	Wet meadow
		5	Shrub swamp
		4	Wooded swamp
		3	Bog
Percent Open Water	2	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	4	3	High
		2	Moderate
		1	Low
Topographic Configuration	2	4	Closed Basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in Watershed	3	3	Upper
		2	Intermediate
		1	Lower

Figure 12 (continued)

Elements	Element Weight	Condition Weight	Conditions
Surficial Material of Watershed	2	4	Till
		1	Stratified sand and gravel
		3	Stratified fine sand and silt
		2	Alluvium
Surficial Geologic Material of Wetland Banks	2	1	Till
		4	Stratified sand and gravel
		2	Stratified find sand and silt
		3	Alluvium
Organic Material	1	2	High permeability
		1	Low permeability
		0	Absent
Dominant Hydrologic Type	5	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	4	1	Not part of riparian system
		2	Part of riparian system
Water Level Fluctuation	3	2	High
		1	Low
Inlet	1	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	1	1	Perennial
		2	Ephemeral
		0	Absent
Size	4	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
	Range 31-123 Mean 77	88	Mod.

*Total value for one inlet and one outlet only. Some wetlands may have more than one inlet or outlet but the range above is for wetlands with only one inlet and one outlet.

Figure 13. Shoreline Protection Function Model

Element	Element Weight	Condition Weight	Condition
Wetland Borders[a] Lake or Stream	NA[b]	NA	Yes
		NA	No
Vegetative Density	2	0	Open fresh water
		0	Stream and brookside
		1	Deep fresh marsh (aquatic bed)
		2	Shallow fresh marsh
		4	Yearly floodplain
		1	Wet meadow
		4	Shrub swamp
		4	Wood swamp
		3	Bog
Surficial Material Underlying wetland	1	2	Till
		1	Stratified sand and gravel
		4	Stratified fine sand and silt
		3	Alluvium
Fetch (Lakes only)	4	2	Over 2000 ft.
		1	Under 2000 ft.
Depth of Lake	1	2	Deep 6 ft.
		1	Shallow 6 ft.
		Range 3-12 Mean 17	21

[a]preemptive
[b]not applicable

Figure 14. Water Quality Maintenance Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	1	Stream or brookside wetland
		0	Open fresh water
		3	Deep fresh marsh (aquatic bed)
		4	Shallow fresh marsh
		4	Yearly floodplain
		3	Wet meadow
		4	Shrub Swamp
		2	Wooded swamp
		2	Bog
Percent open water	1	3	0-33%
		2	34-66%
		1	67-95%
		0	96-100%
Vegetative Density	3	3	High
		2	Moderate
		1	Low
Topographic Configuration	3	4	Closed Basin
		3	Semi-closed basin
		2	Valley
		1	Hillside
Topographic Position in Watershed	2	1	Upper
		2	Intermediate
		3	Lower
Organic Material	1	1	High permeability
		2	Low permeability
		0	Absent

Figure 14 (continued)

Elements	Element Weight	Condition Weight	Conditions
Dominant Hydrologic Type	4	1	Condition 1
		2	Condition 2
		3	Condition 3
		4	Condition 4
		5	Condition 5
		6	Condition 6
Hydrologic Connection	2	1	Not part of the riparian system
		2	Part of riparian system
Inlet	2	2	Perennial
		1	Ephemeral
		0	Absent
Outlet	3	2	Perennial
		1	Ephemeral
		0	Absent
Size	4	3	Large ≥ 4.6 acres
		2	Moderate 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 18-98[a] Mean 58	70 Mod.

[a]Total value for one inlet and one outlet only.
Some wetlands may have more than one inlet or outlet but the range above is only for wetlands with one inlet and one outlet.

Figure 15. Cultural and Economic Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream of brookside
		0	Open fresh water
		4	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		2	Wet meadow
		3	Shrub swamp
		5	Wooded swamp (deciduous)
		6	Wooded swamp (coniferous)
		3	Bog
Access	3	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	8	3	Large ≥ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small ≤ 1.0 acres
		Range 11 Mean 34	37 Mod

Figure 16. Recreational Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	3	0	Stream or brookside
		0	Open fresh water
		6	Deep fresh marsh
		5	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		2	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		2	Bog
Percent Open Water	3	1	0-33%
		2	34-66%
		3	67-95%
		0	96-100%
Surface Water Association	4	1	Connected to a small stream
		2	Connected to a river
		3	Connected to a lake
		4	Connected to a combination
		0	Not connected
Access to Public	2	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
Size	4	3	Large $\geq$ 4.6 acres
		2	Medium 1.1-4.5 acres
		1	Small $\leq$ 1.0 acres
Legal Access	2	2	Yes
		1	No
Output from Biological Function	3	3	High 116-158
		2	Moderate 73-115
		1	Low 29-72
		Range 11-74 Mean 42	35 Mod.

Figure 17. Aesthetic Function Model

Elements	Element Weight	Condition Weight	Conditions
Dominant Wetland Class	4	0	Stream or brookside wetland
		0	Open fresh water
		5	Deep fresh marsh
		4	Shallow fresh marsh
		0	Yearly flooded floodplain
		0	Wet meadow
		2	Shrub swamp
		3	Wooded swamp (deciduous)
		3	Wooded swamp (coniferous)
		5	Bog
Number of Subclasses (Richness)	3	4	6-9
		2	2-3
		1	1
Percent Open Water	4	1	0-33%
		3	34-66%
		4	67-95%
		0	96-100%
Access to Public	3	3	Within 100 ft. of road
		2	Access by passable waterway
		1	Isolated
Local Scarcity	3	1	<200 ft. to nearest similar type
		2	201-1000 ft to nearest similar type
		3	>1000 ft. to nearest Similar type
		Range 9-66 Mean 37 36	Mod.

Figure 18. Educational Function Model

Elements	Element Weight	Condition Weight	Conditions
Subclass Richness (Lateral Diversity)	3	4	6-9
		3	4-5
		2	2-3
		1	1
Access to Public	4	3	Within 100' of road
		2	Access by passable waterway
		1	Isolated
		Range 7-24 Mean 15	18 Mod.

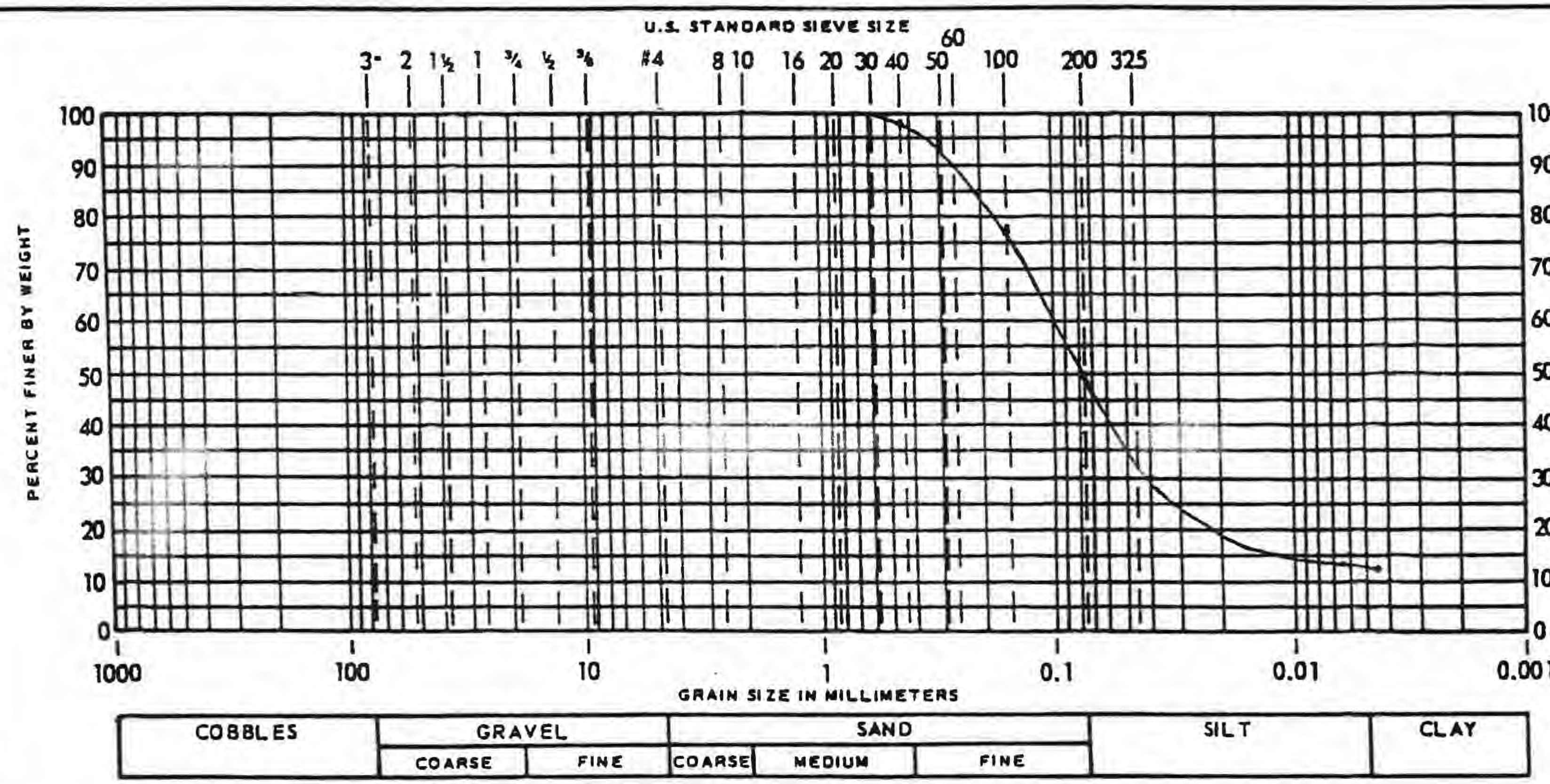
APPENDIX F

GEOTECHNICAL DATA

TABULATION OF TEST DATA (FOR RI SAMPLES)

Sample Number	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt	Clay	Colloids	Atterberg Limits	Unified Soil Classification
	Particle Size Distribution (Percent)								
SE-SHL-01			1	15	72	12			ML
SE-SHL-02			17	79					SP
SE-SHL-03			2	7	57	24			CL
SE-SHL-04			1	22	58	19			
SE-SHL-05			1	14	65	20			ML
SE-SHL-06			2	36	43	19			
SE-SHL-07			21	68					SP-SM
SE-SHL-08	2	4	47	45					SP
SE-SHL-09			1	37	36	26			
SE-SHL-10			3	58	13	26			
SE-SHL-11			2	38	37	23			
SE-SHL-12	18	6	37	37					SP
SE-SHL-13			3	88					SP-SM
SE-SHL-14	18	6	36	38					SP
SE-SHL-15	21	9	43	25					SW
SHL-14B	6	6	48	37					SP
SHL-15	33	11	18	32					SP-SM
SHL-21				69	25	6		NON-PLASTIC	SP-SM
SHL-22	34	16	27	17					SW-SM
SHL-23		1	40	53					SP-SM
SHL-24			1	97					SP
SHL-25			1	90					SP-SM
SE-CSB-01	52	10	18	16					GP-SP
SE-CSB-02			24	69					SP-SM
SE-CSB-03		1	6	51	35	7			SM
SE-CSB-04		1	13	64	13	9			SM
SE-CSB-05		1	24	69					SP-SM
SE-CSB-06		1	15	45	25	14			SC
SE-CSB-07		1	10	49	24	16			SC
SE-CSB-08	2	2	8	51	22	15			SC
SE-CSB-09	1	2	3	22	55	17			ML
SE-CSB-10	1	4	43	49					SP

SOIL CLASSIFICATION SHEET



PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SE-SHL-01

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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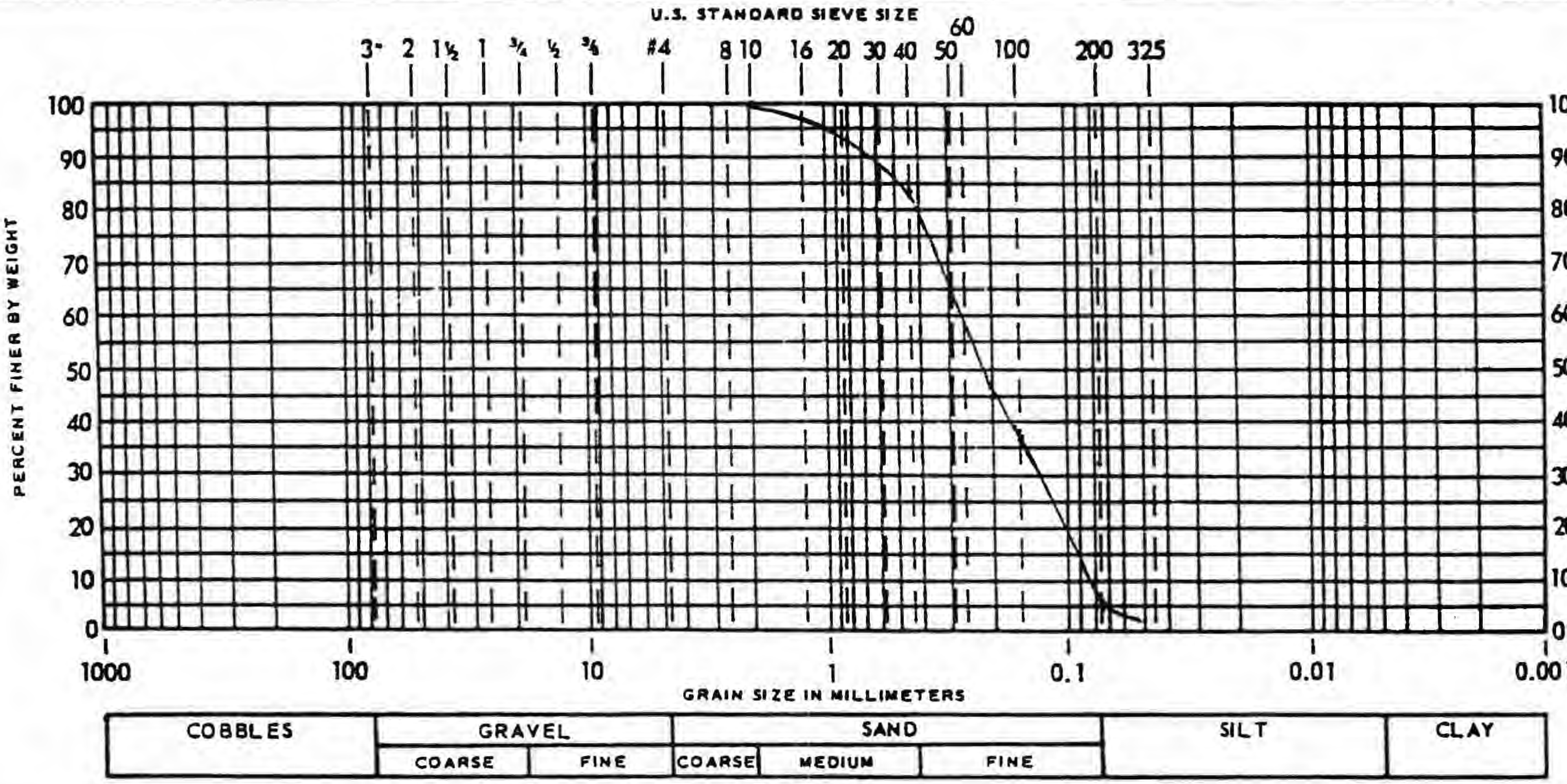

PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SE-SHL-02

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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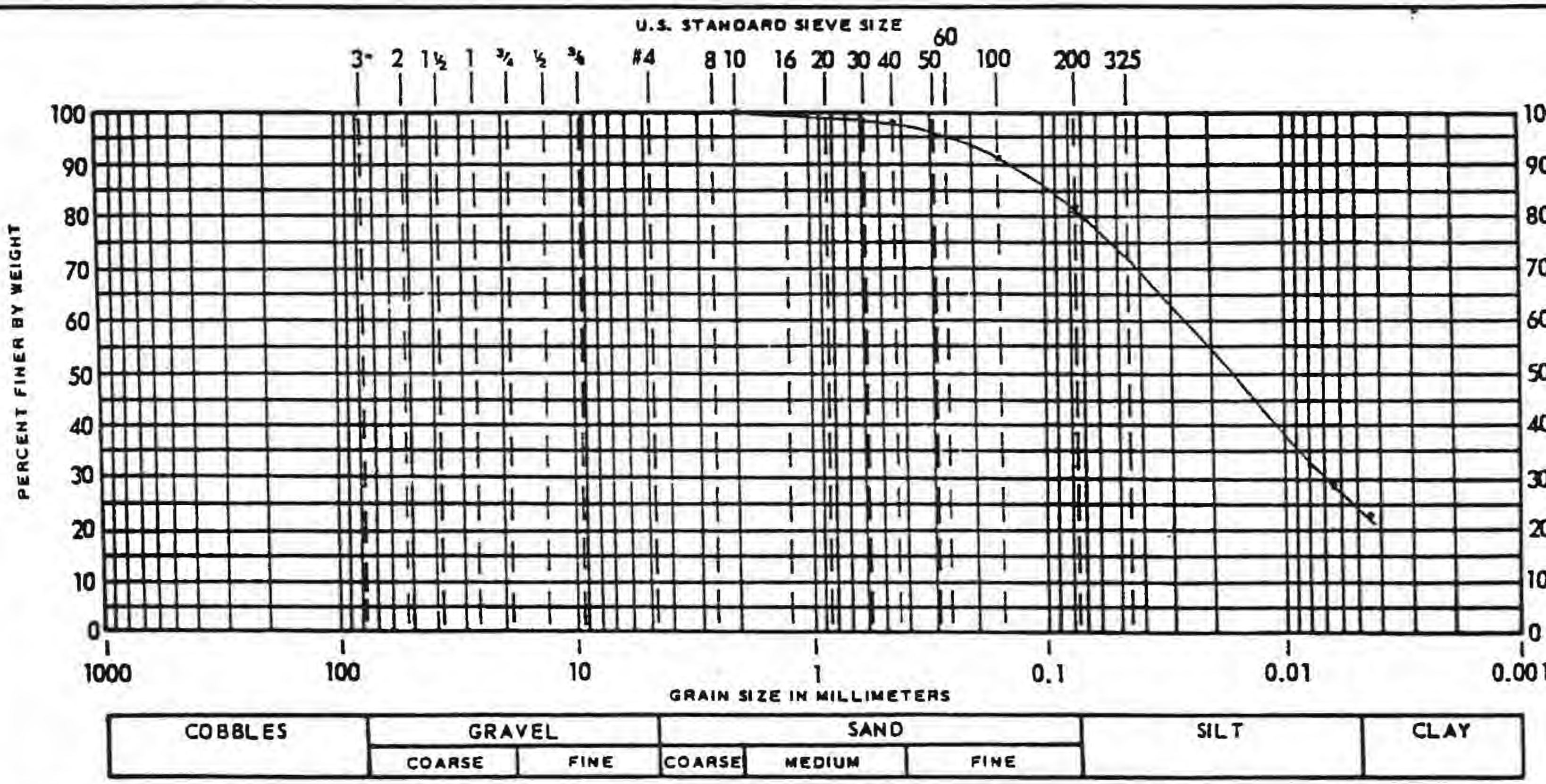

PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SE-SHL-03

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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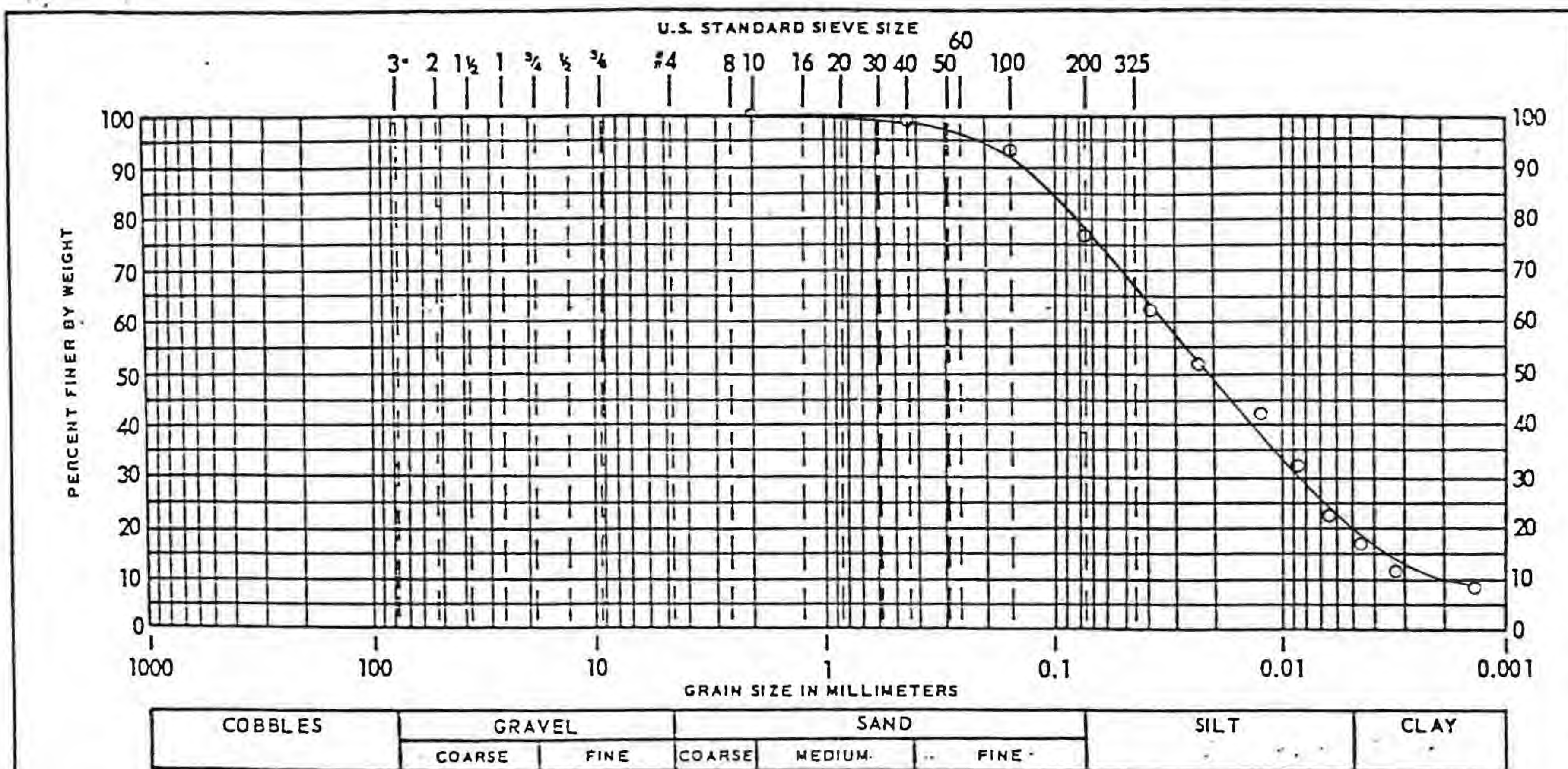
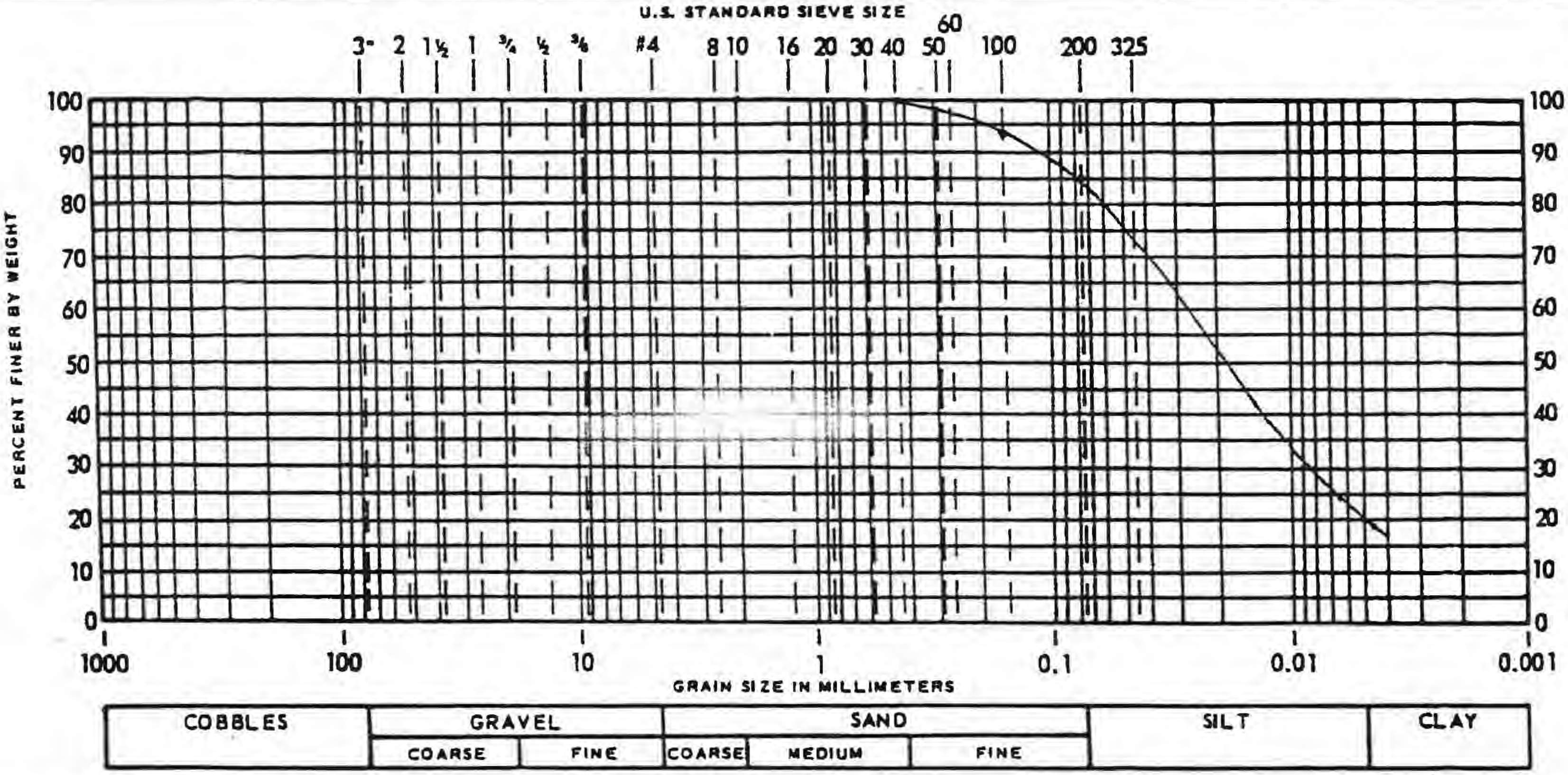


F-8

PROJECT Fort Devens/USATHAMA Project No. UC 2061 BORING NO. SAMPLE NO. SE-SHL-04 DEPTH CLASSIFICATION	NATURAL % MOISTURE LIQUID LIMIT PLASTIC LIMIT PLASTICITY INDEX COLOR REMARKS T.T.L. Job No. CM-13551	Toledo Testing Laboratory, Inc.

SOIL CLASSIFICATION SHEET



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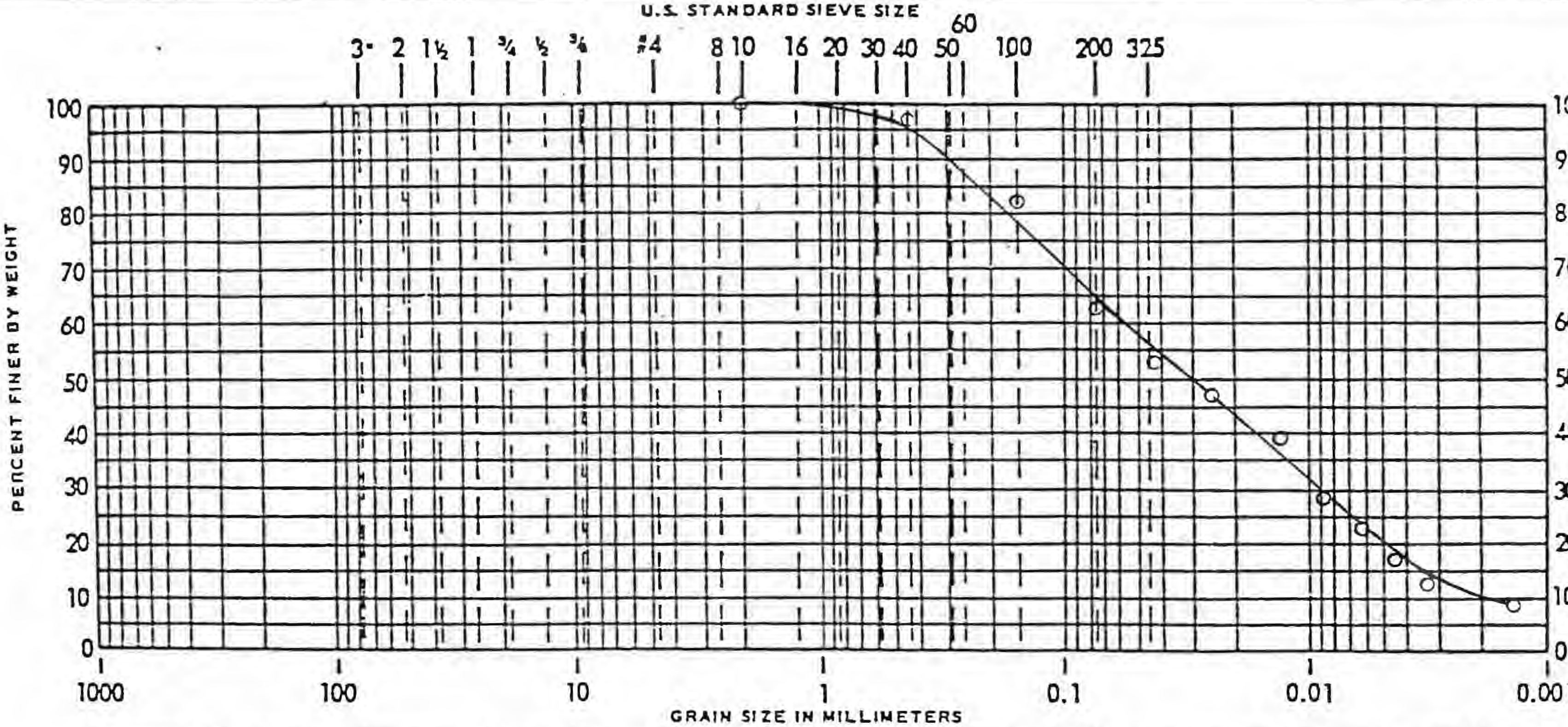
SAMPLE NO. SE-SHL-05	PLASTIC LIMIT	
DEPTH	PLASTICITY INDEX	
CLASSIFICATION	COLOR	
	REMARKS T.T.L. Job No. CM-13551	

SOIL CLASSIFICATION SHEET



COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

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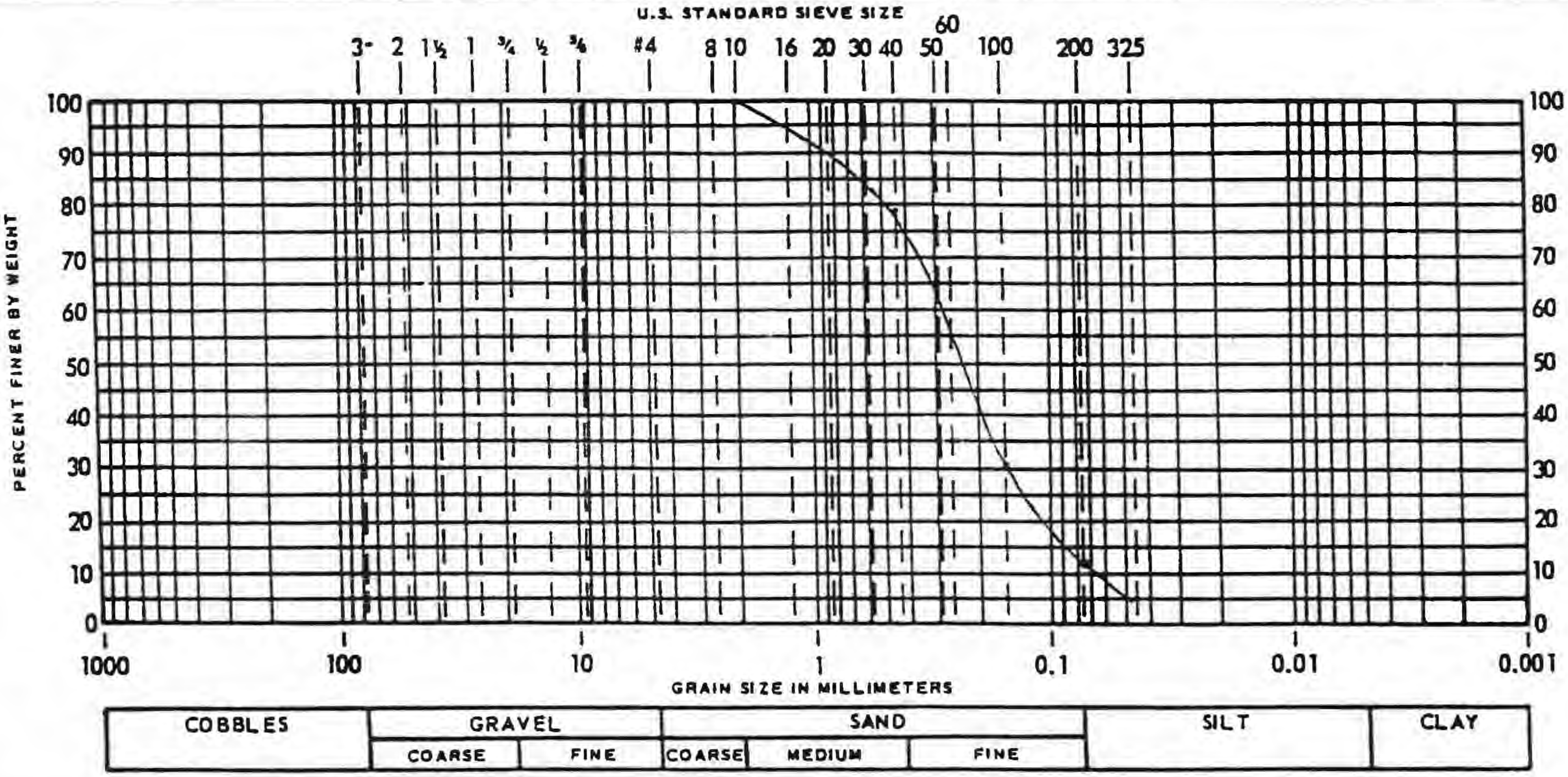

PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SE-SHL-07

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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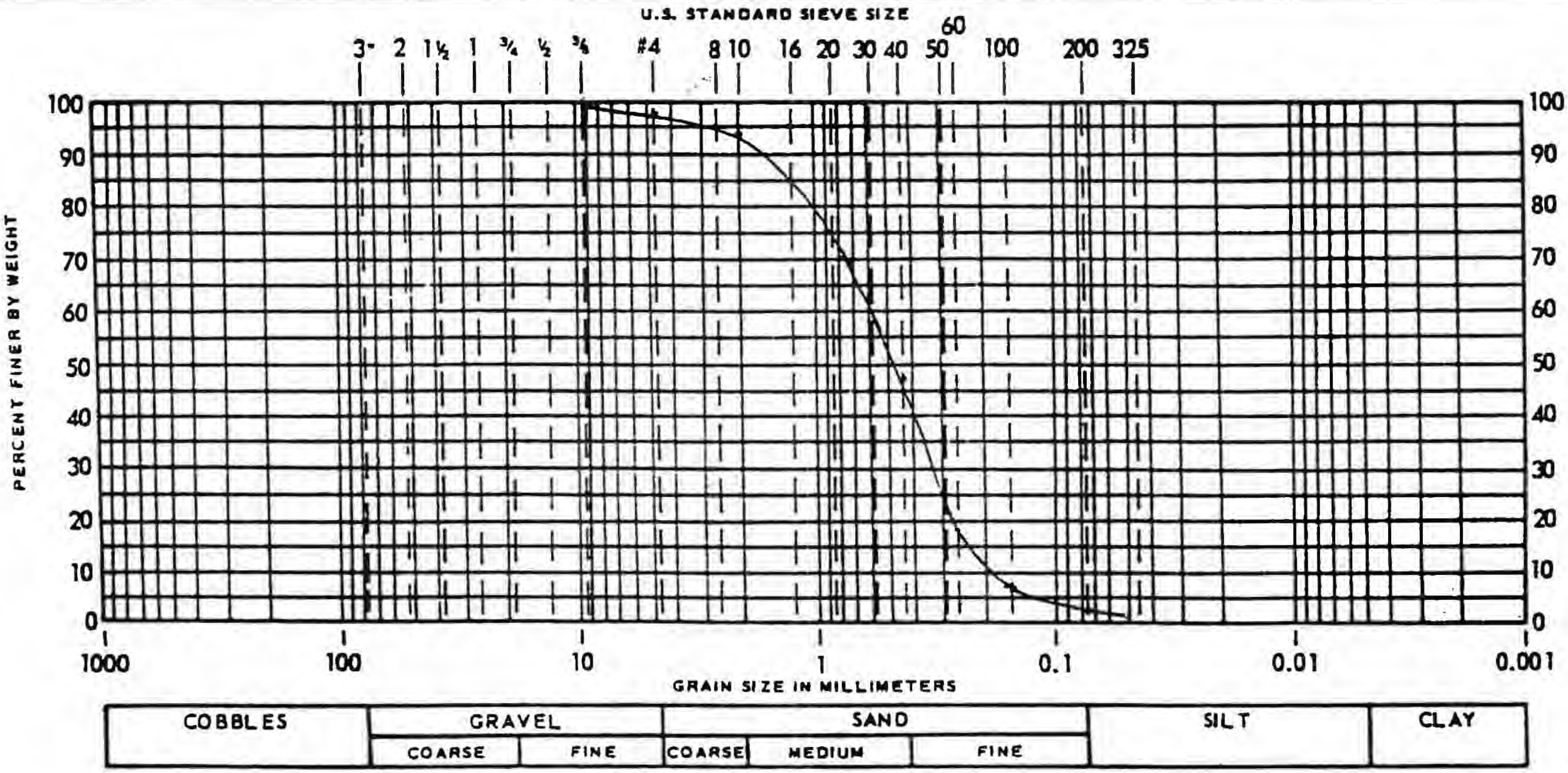

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SAMPLE NO. SE-SHL-08	PLASTIC LIMIT	
DEPTH	PLASTICITY INDEX	
CLASSIFICATION	COLOR	
	REMARKS T.T.L. Job No. CM-13551	

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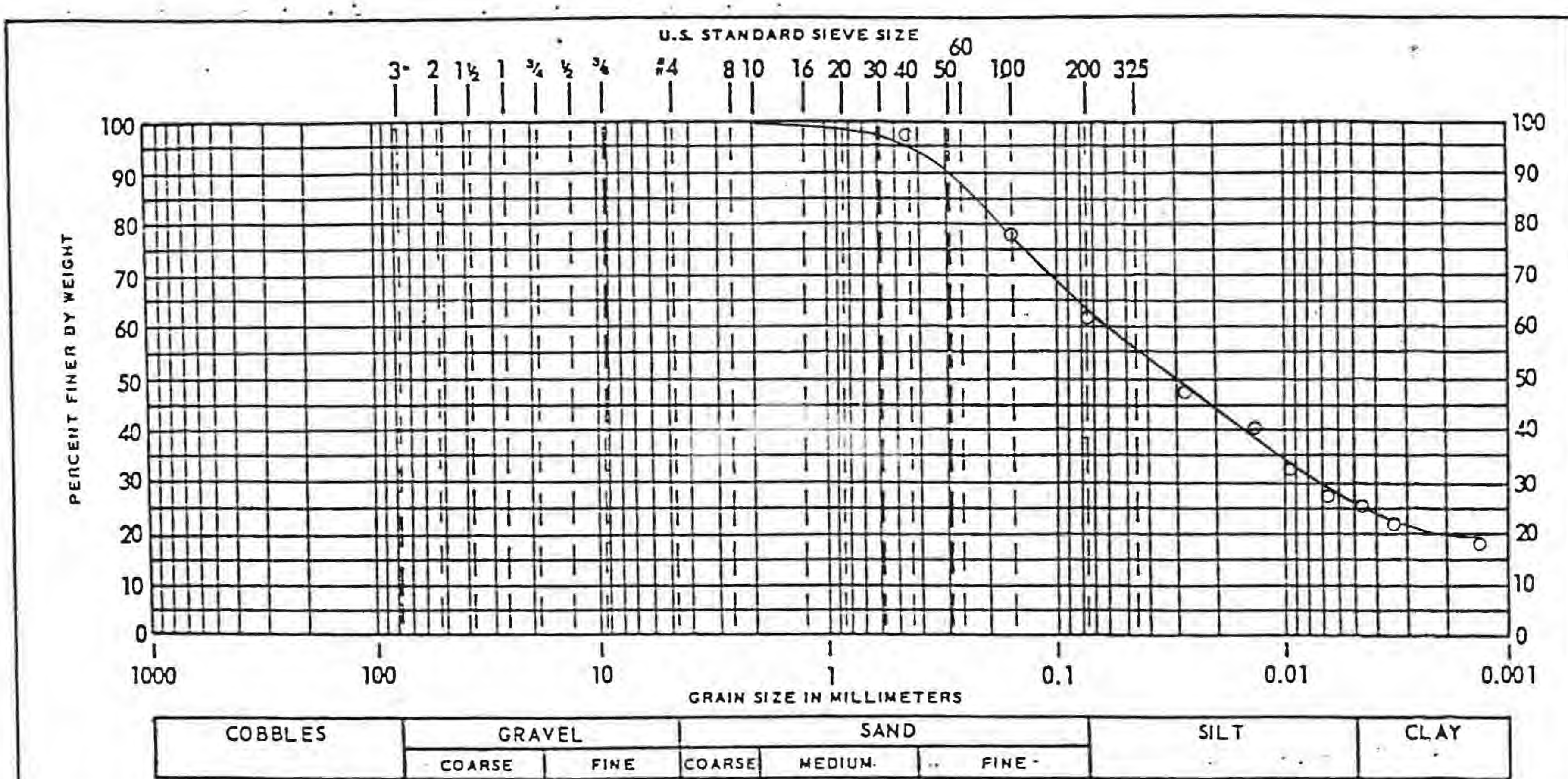

PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SE-SHL-09

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job CM-13551

Toledo Testing Laboratory, Inc.

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ecology and environment

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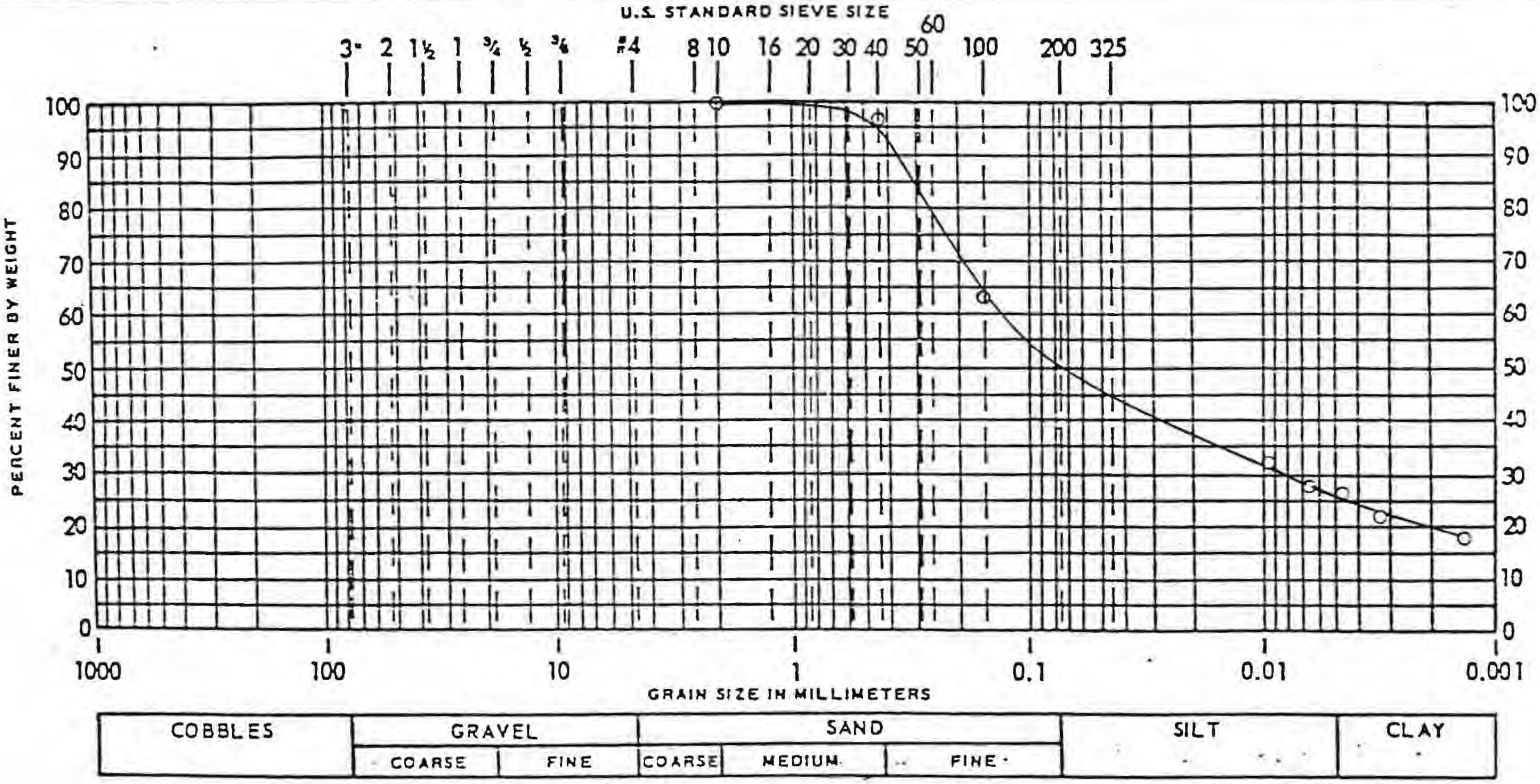

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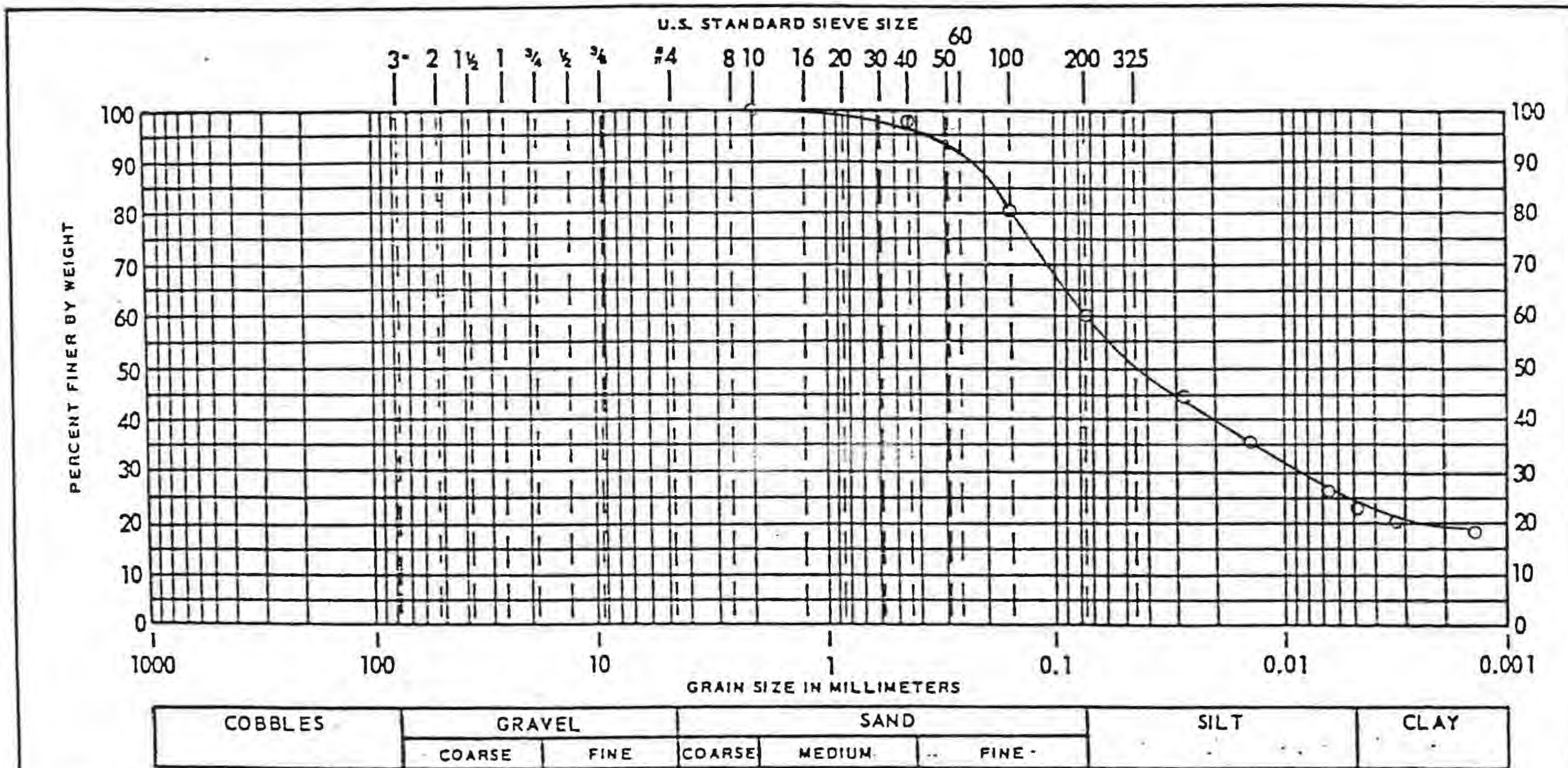
SAMPLE NO. SE-SHL-10	PLASTIC LIMIT	
DEPTH	PLASTICITY INDEX	
	COLOR	
CLASSIFICATION	REMARKS T.T.L. Job No. CM-13551	

SOIL CLASSIF.ATION SHEET



PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SE-SHL-11

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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ecology and environment

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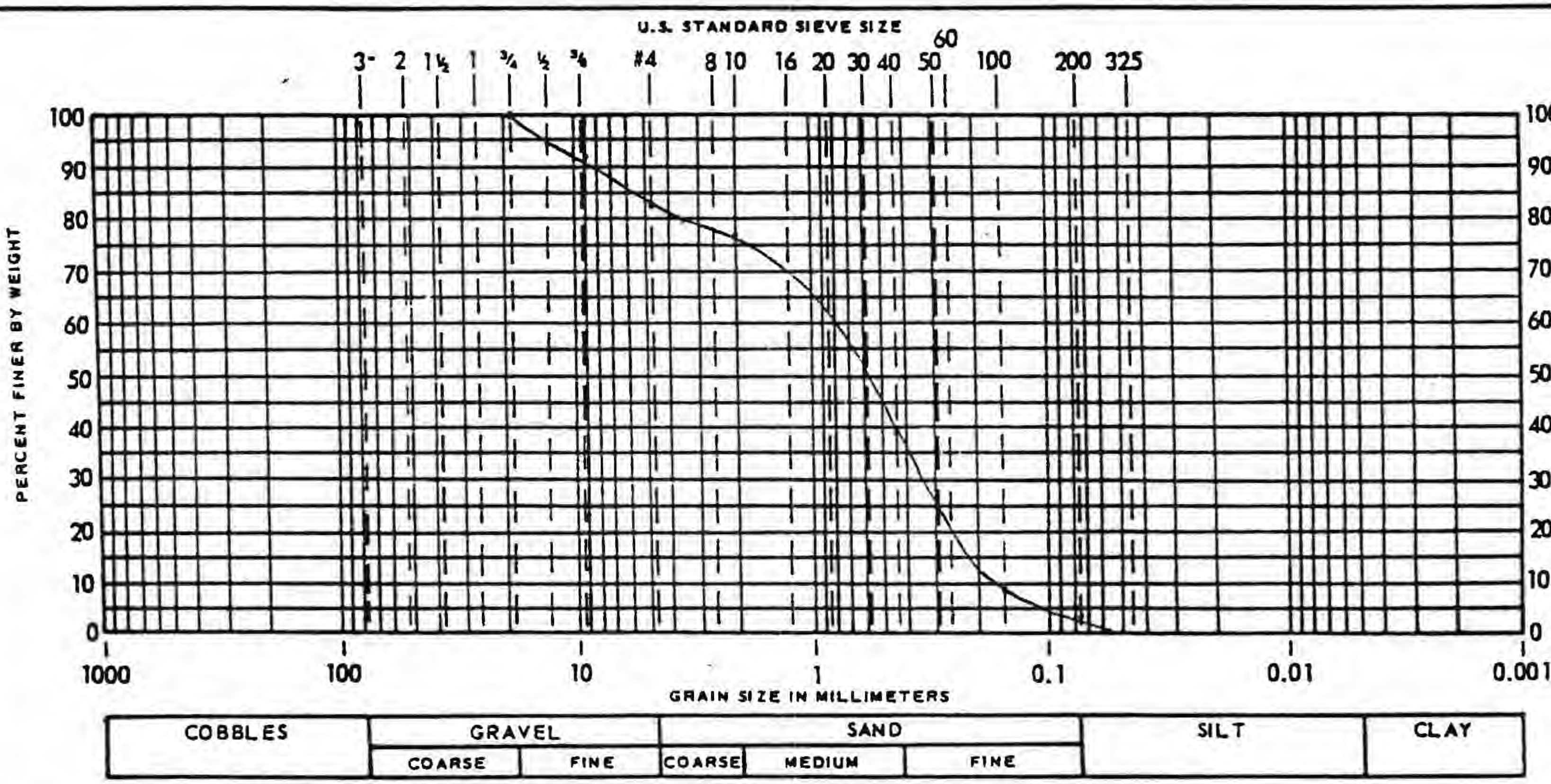

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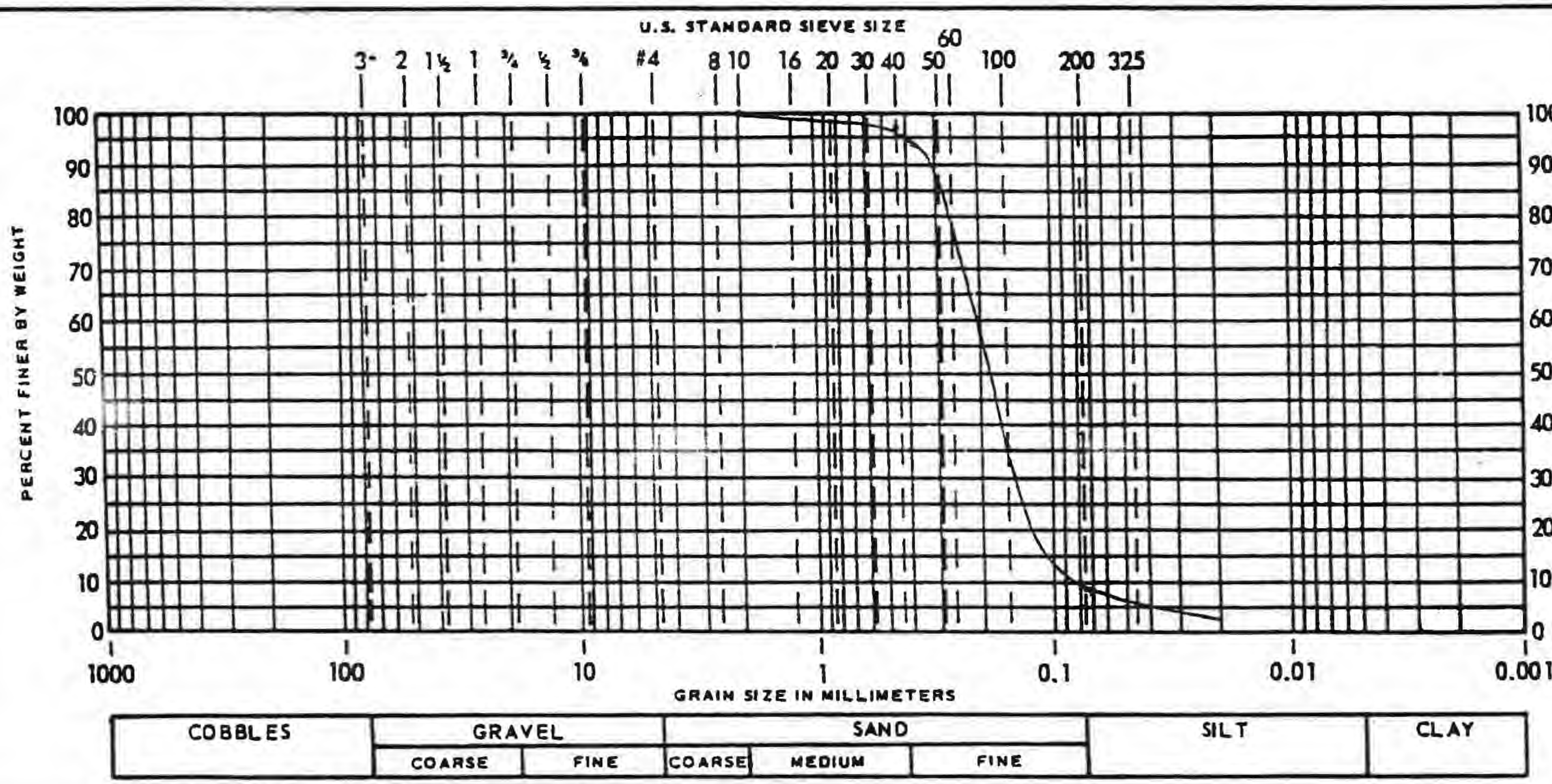

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SAMPLE NO. SE-SHL-13	PLASTIC LIMIT	
DEPTH	PLASTICITY INDEX	
CLASSIFICATION	COLOR	
	REMARKS T.T.L. Job No. CM-13551	

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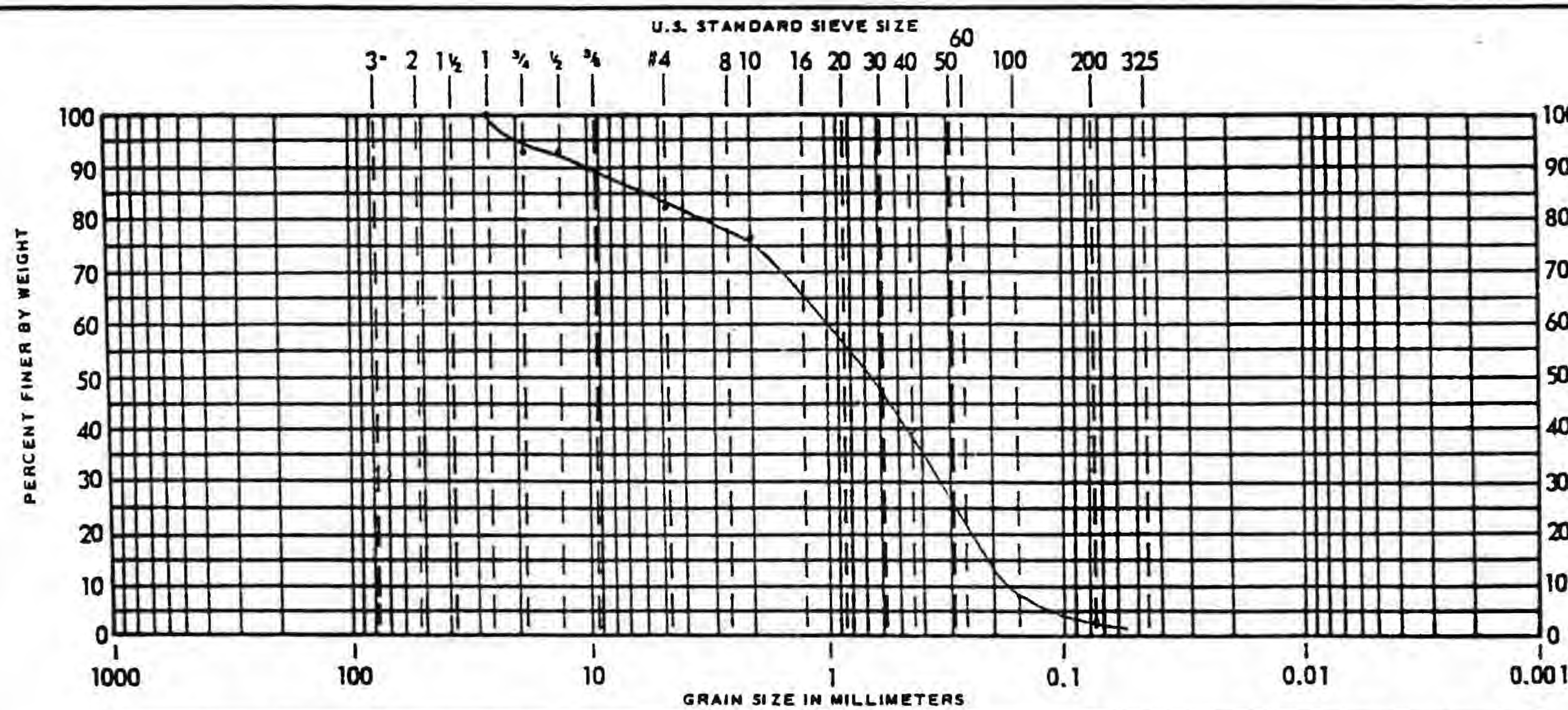

COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

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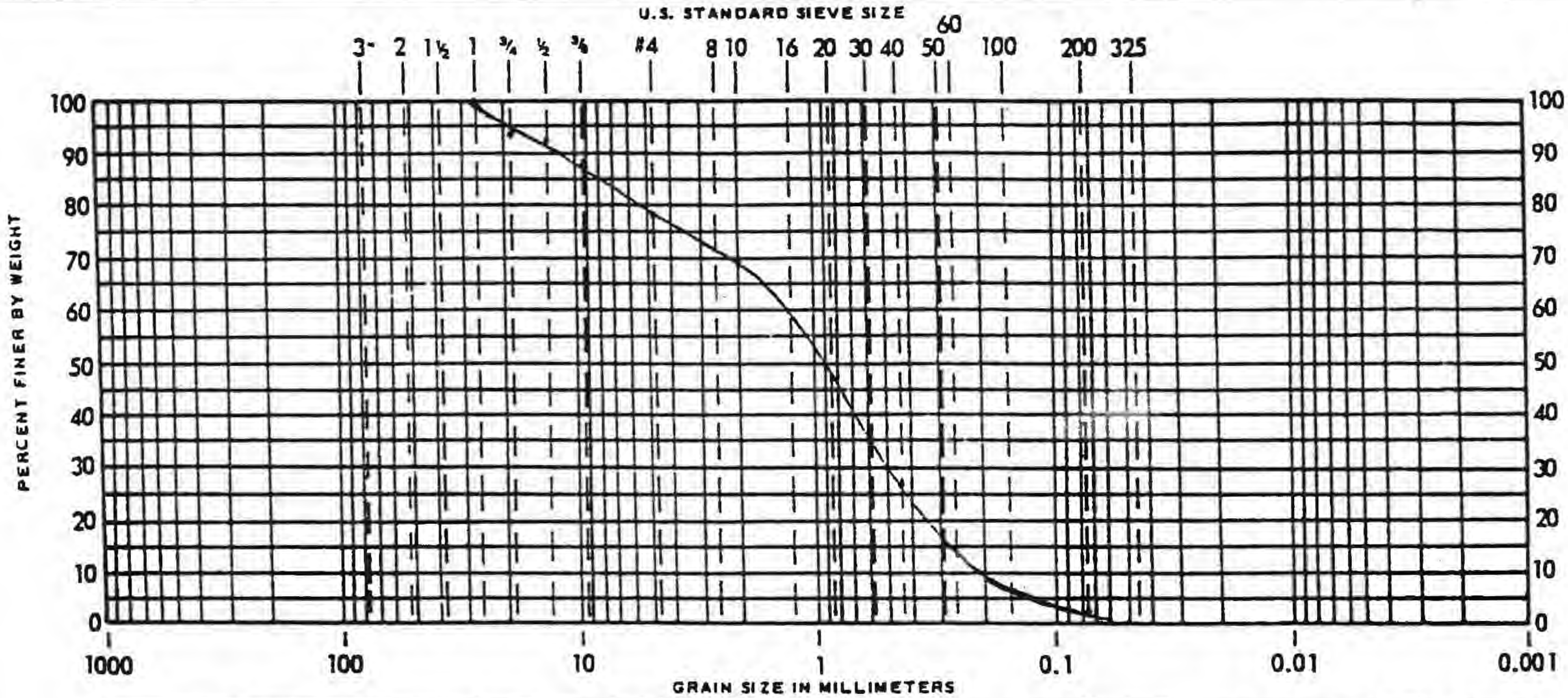
SOIL CLASSIFICATION SHEET



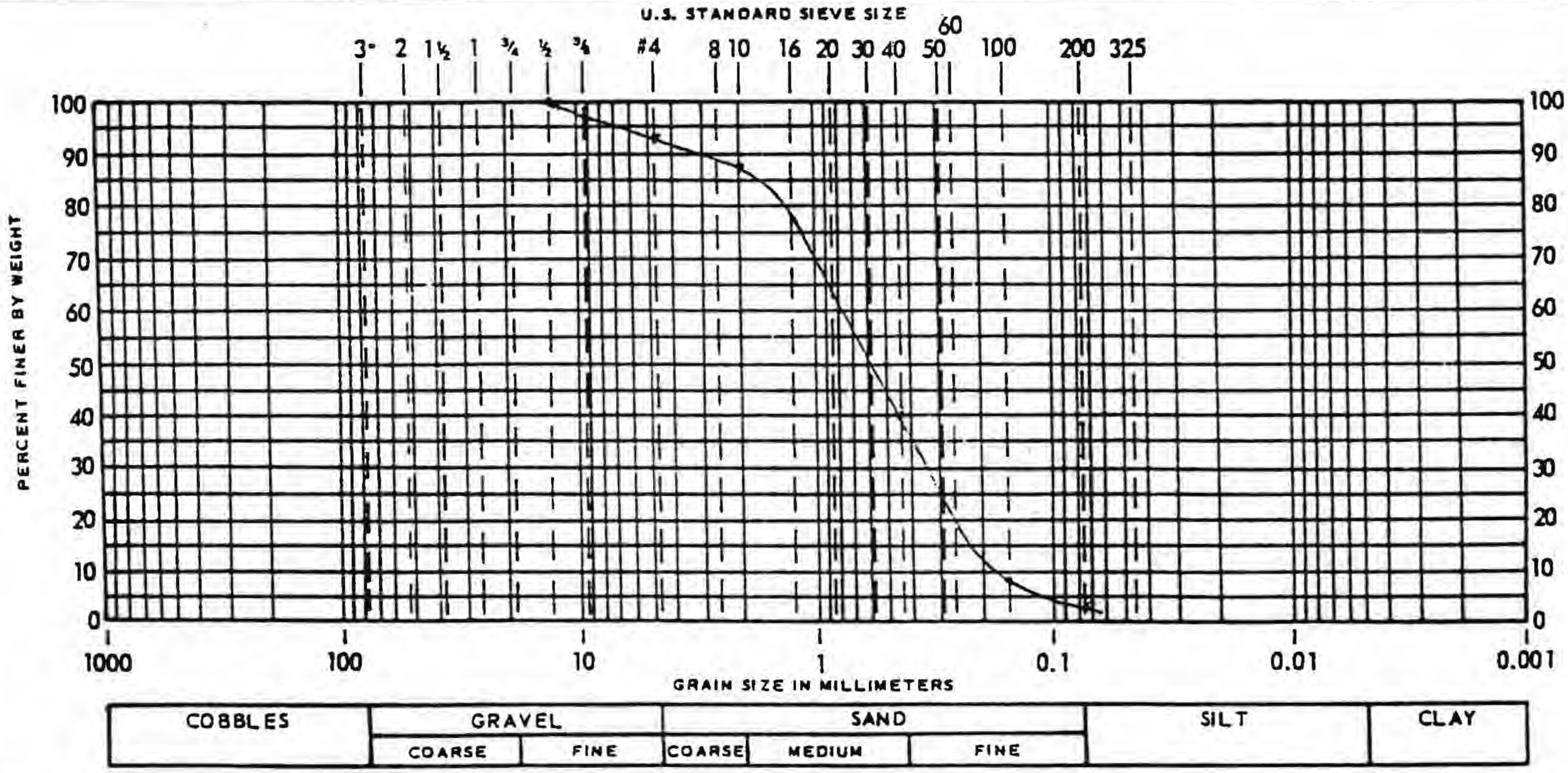
COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

PROJECT Fort Devens/USATHAMA
Project No. UC 2061
BORING NO.
SAMPLE NO. SE-SHL-15
DEPTH
CLASSIFICATION

NATURAL % MOISTURE
LIQUID LIMIT
PLASTIC LIMIT
PLASTICITY INDEX
COLOR
REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

SOIL CLASSIFICATION SHEET



PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SHL-14B

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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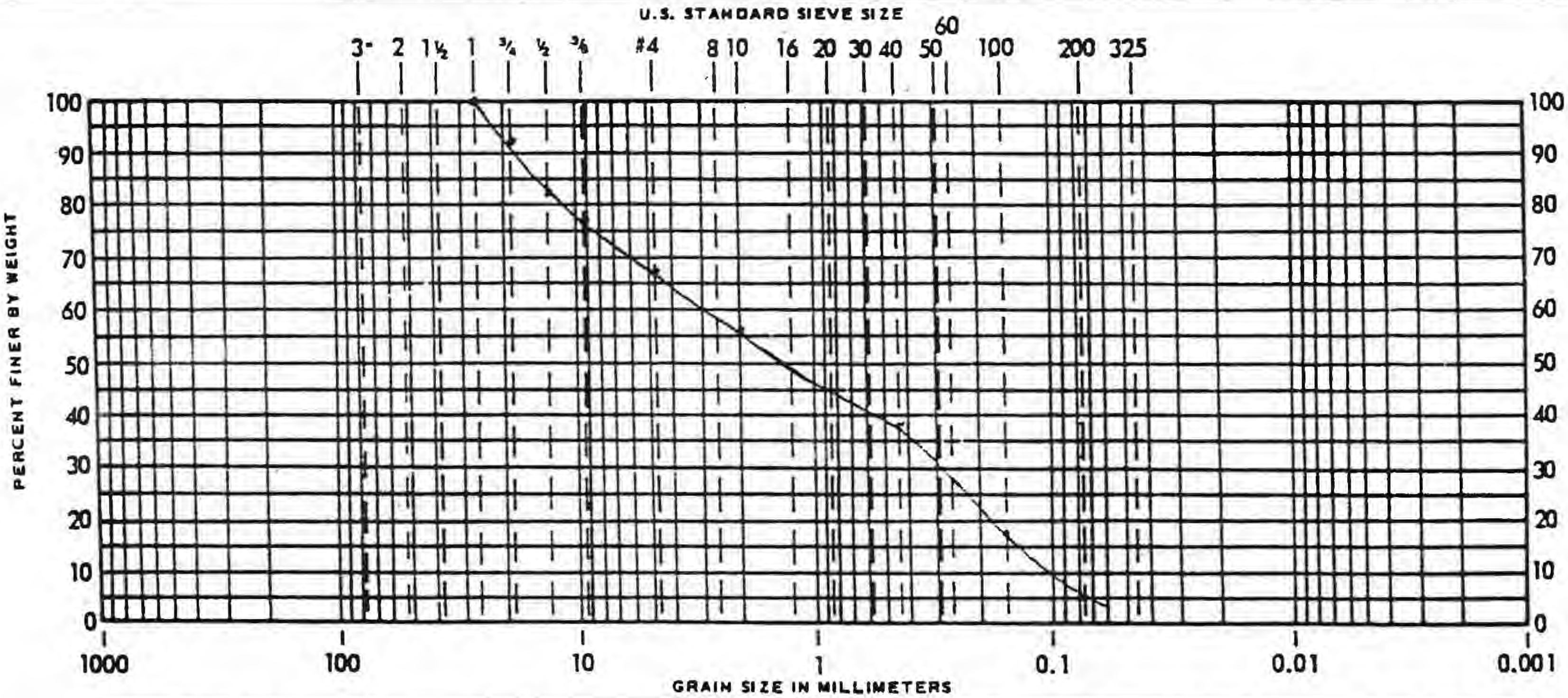

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	COARSE	FINE	COARSE	MEDIUM	FINE		

PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SHL-15

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

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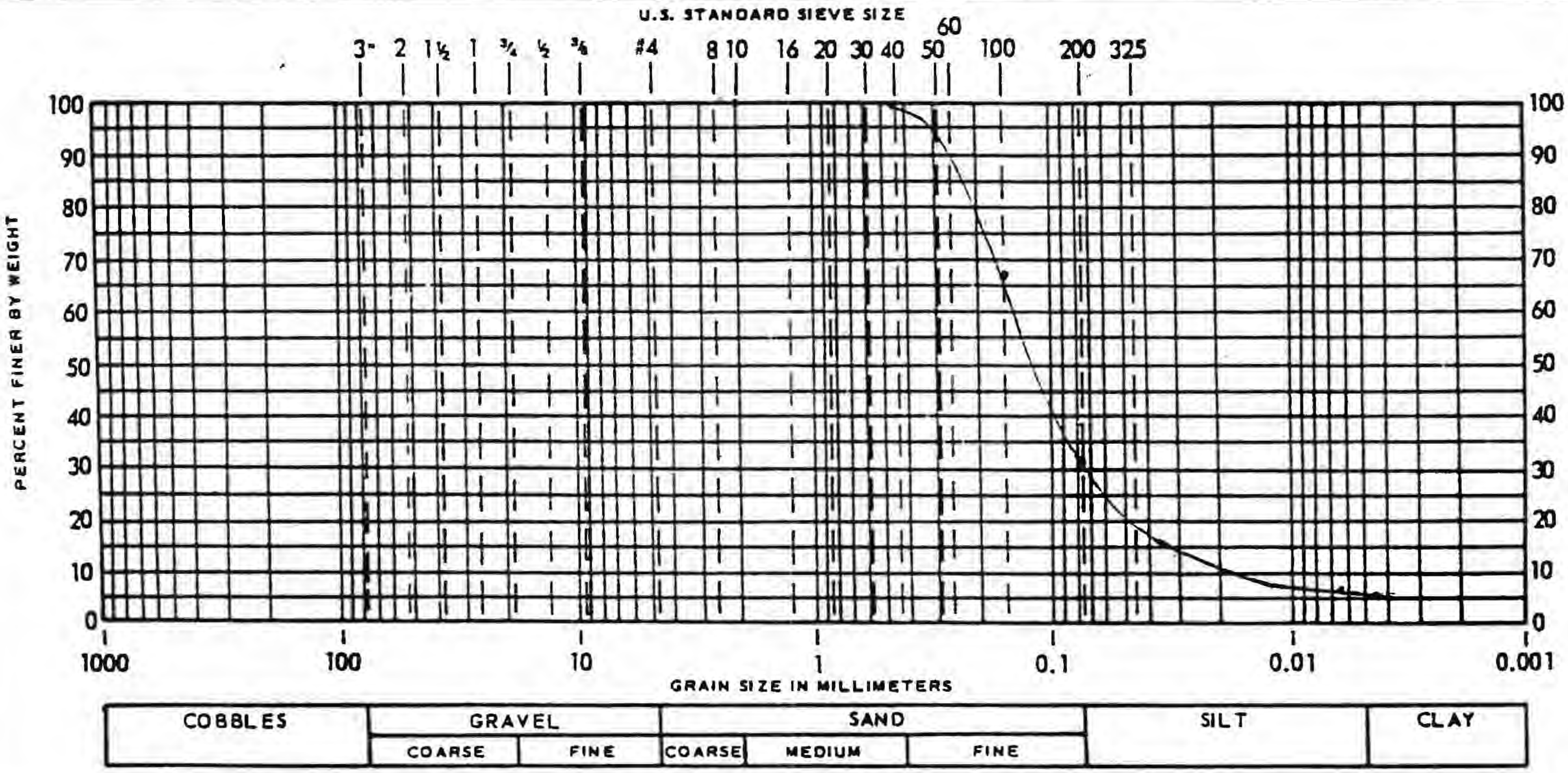
ecology and environment

SOIL CLASSIFICATION SHEET



PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SHL-21

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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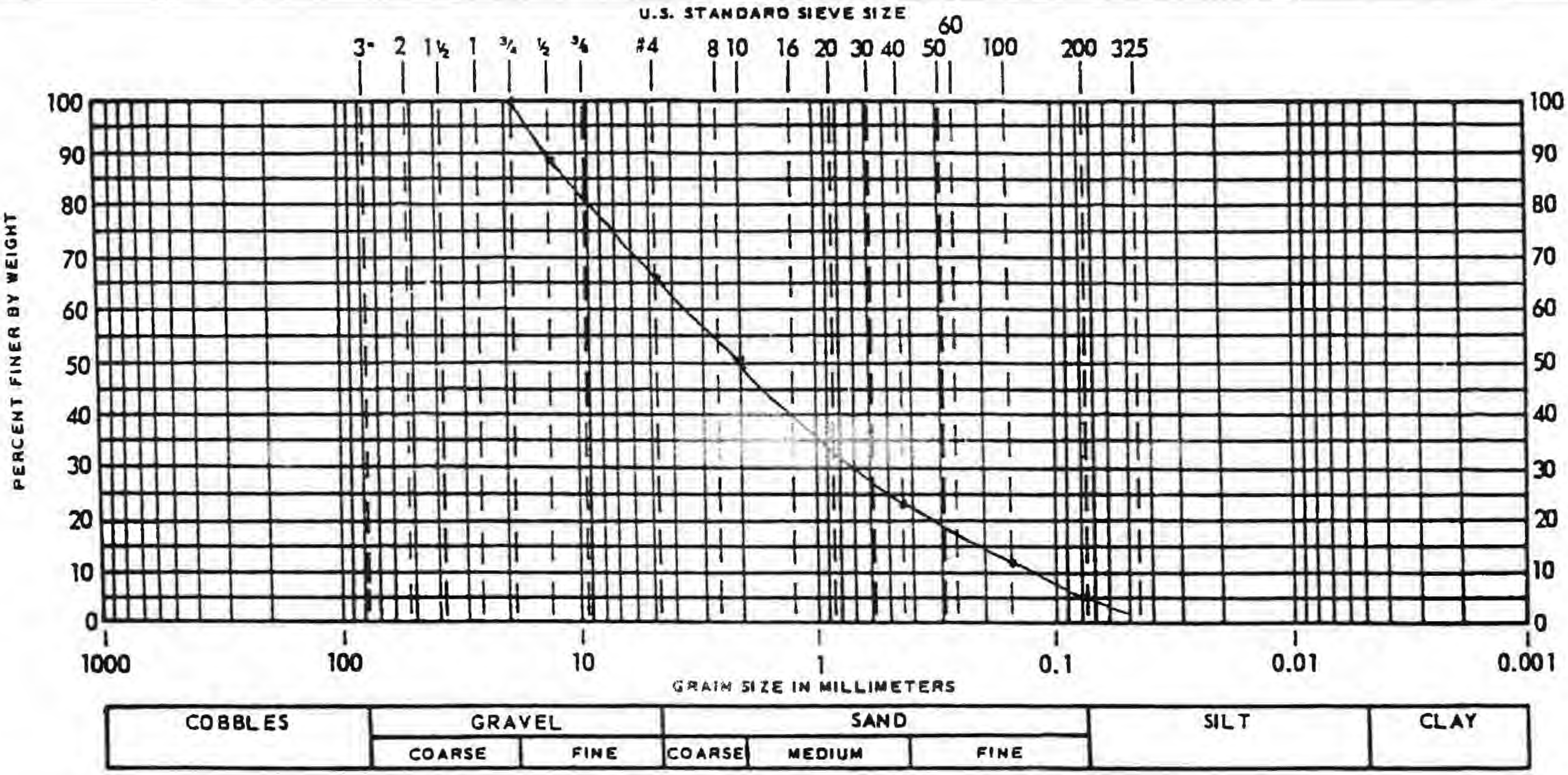

PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SHL-22

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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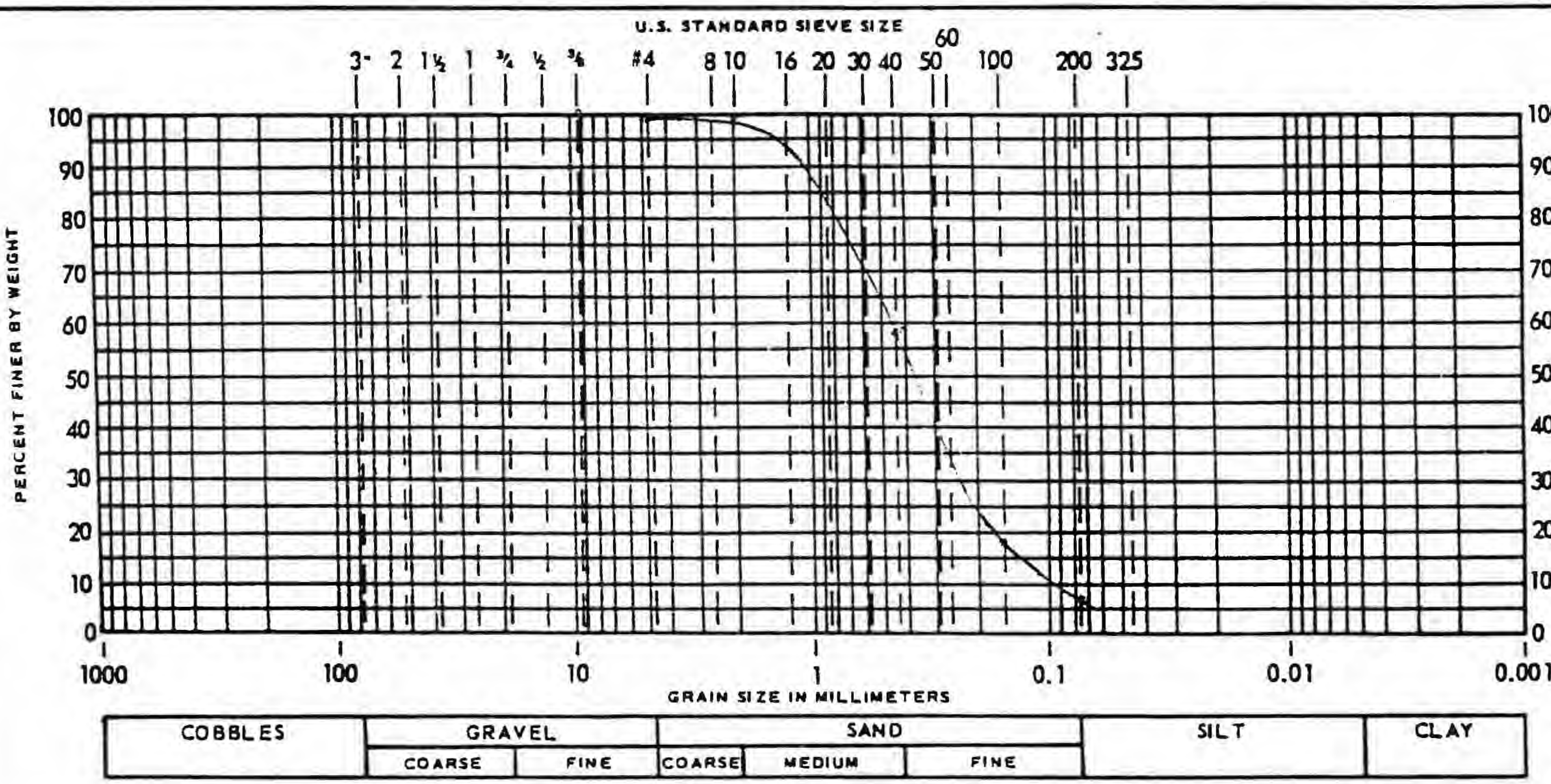

PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SHL-23

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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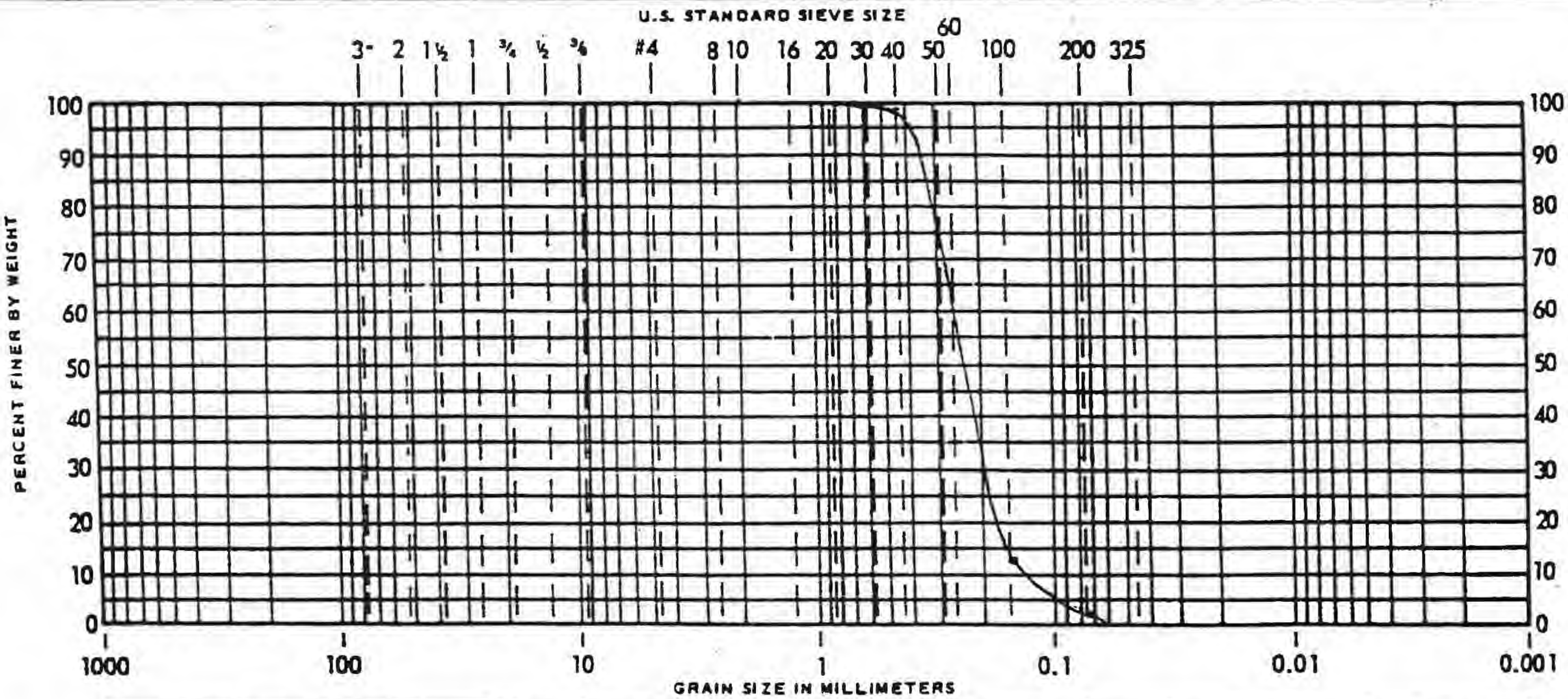

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	COARSE	FINE	COARSE	MEDIUM	FINE		

PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SHL-24

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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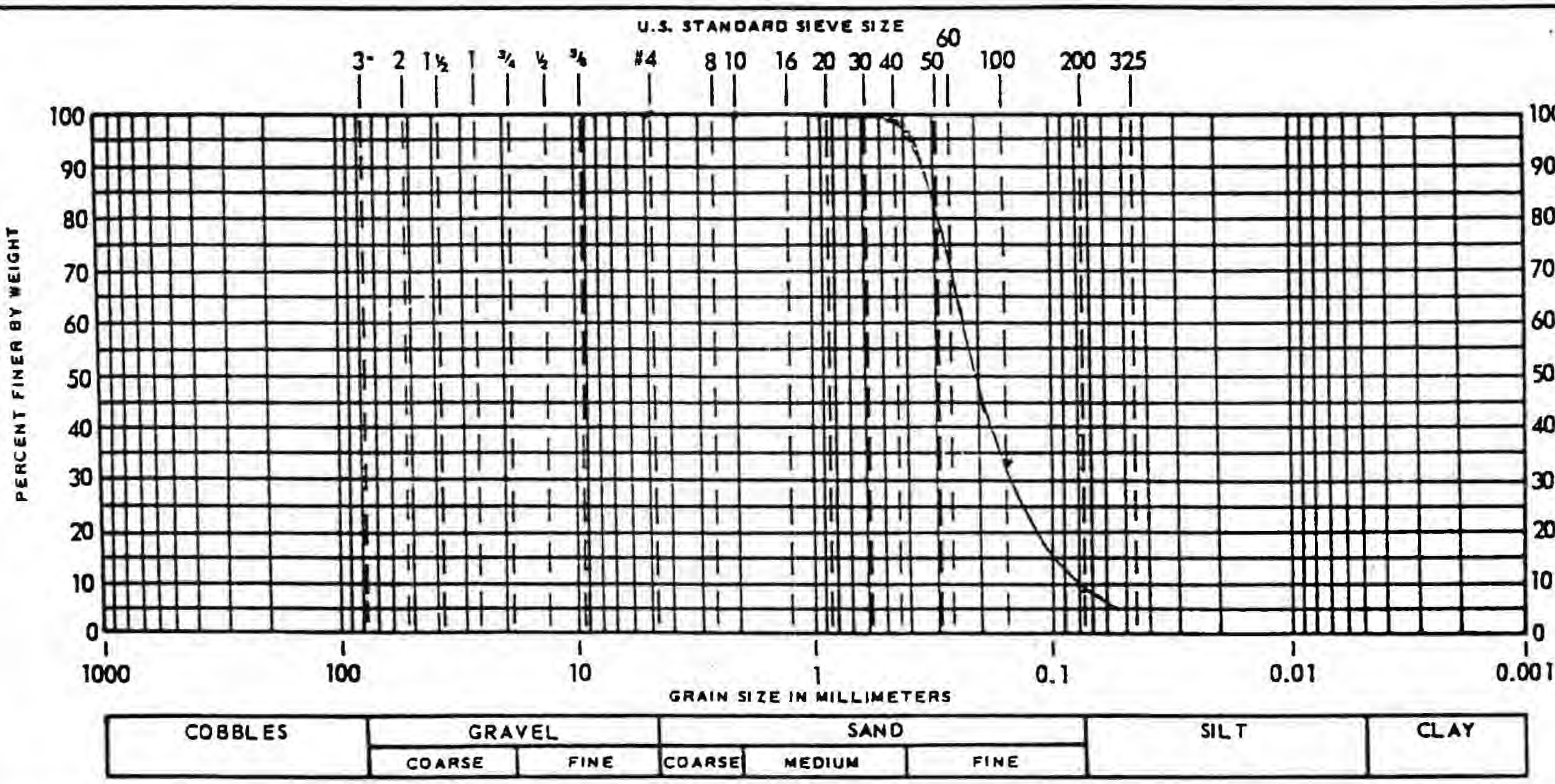

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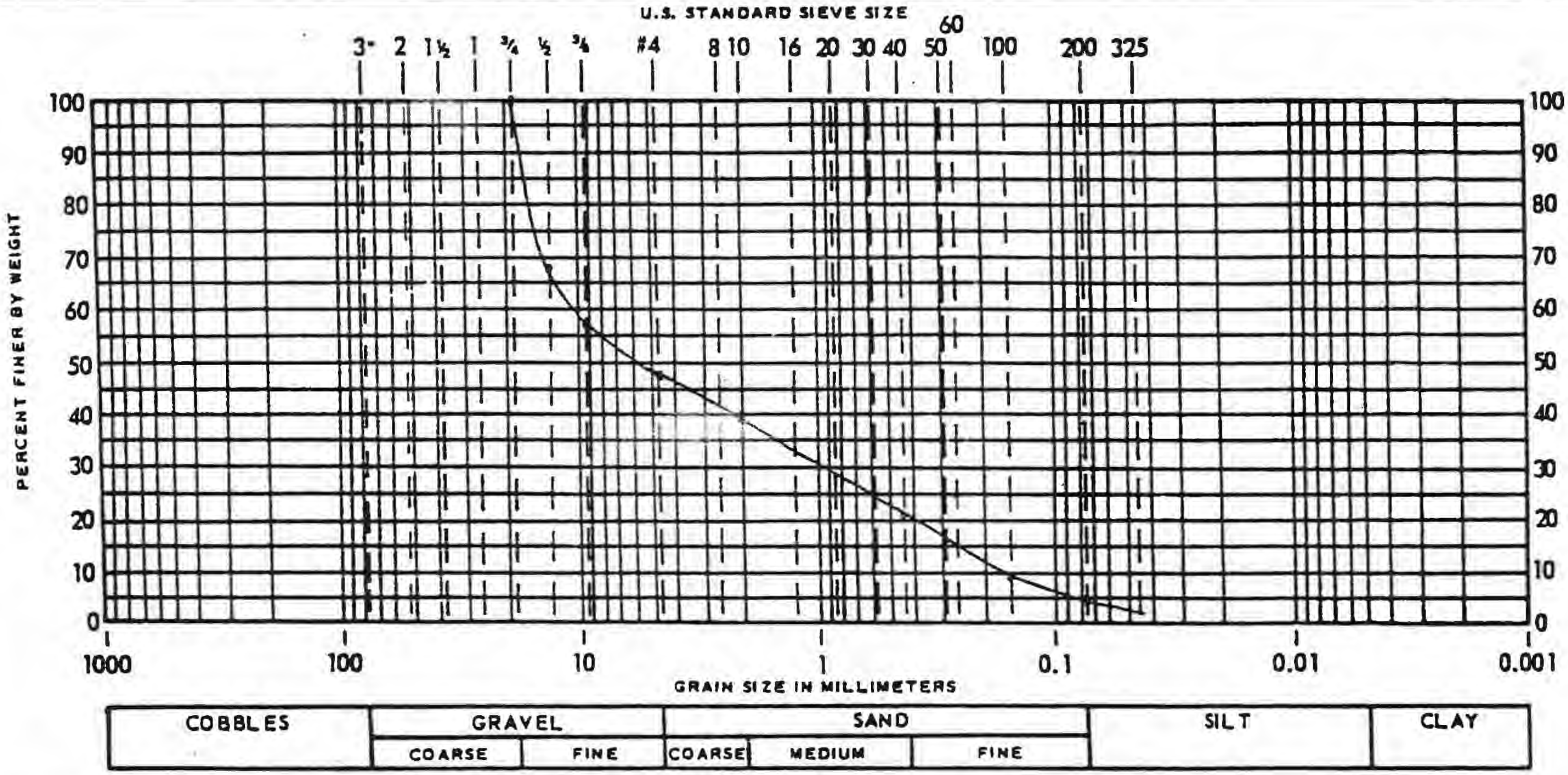
BORING NO.	**LIQUID LIMIT**	
SAMPLE NO. SHL-25	**PLASTIC LIMIT**	
DEPTH	**PLASTICITY INDEX**	
CLASSIFICATION	**COLOR**	
	REMARKS T.T.L. Job No. CM-13551	

SOIL CLASSIFICATION SHEET



PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SE-CSB-01

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

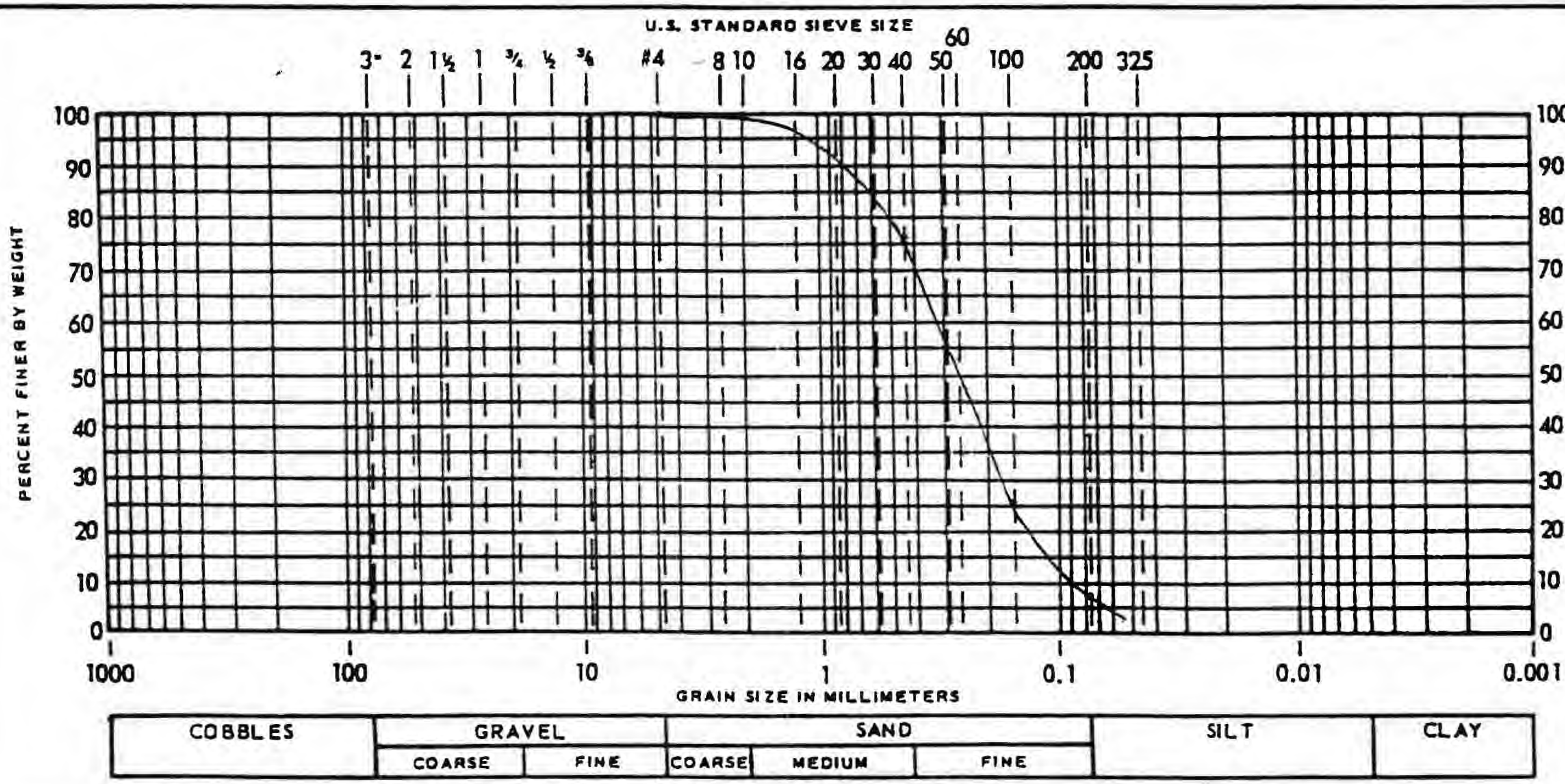
PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

SOIL CLASSIFICATION SHEET



PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SE-CSB-02

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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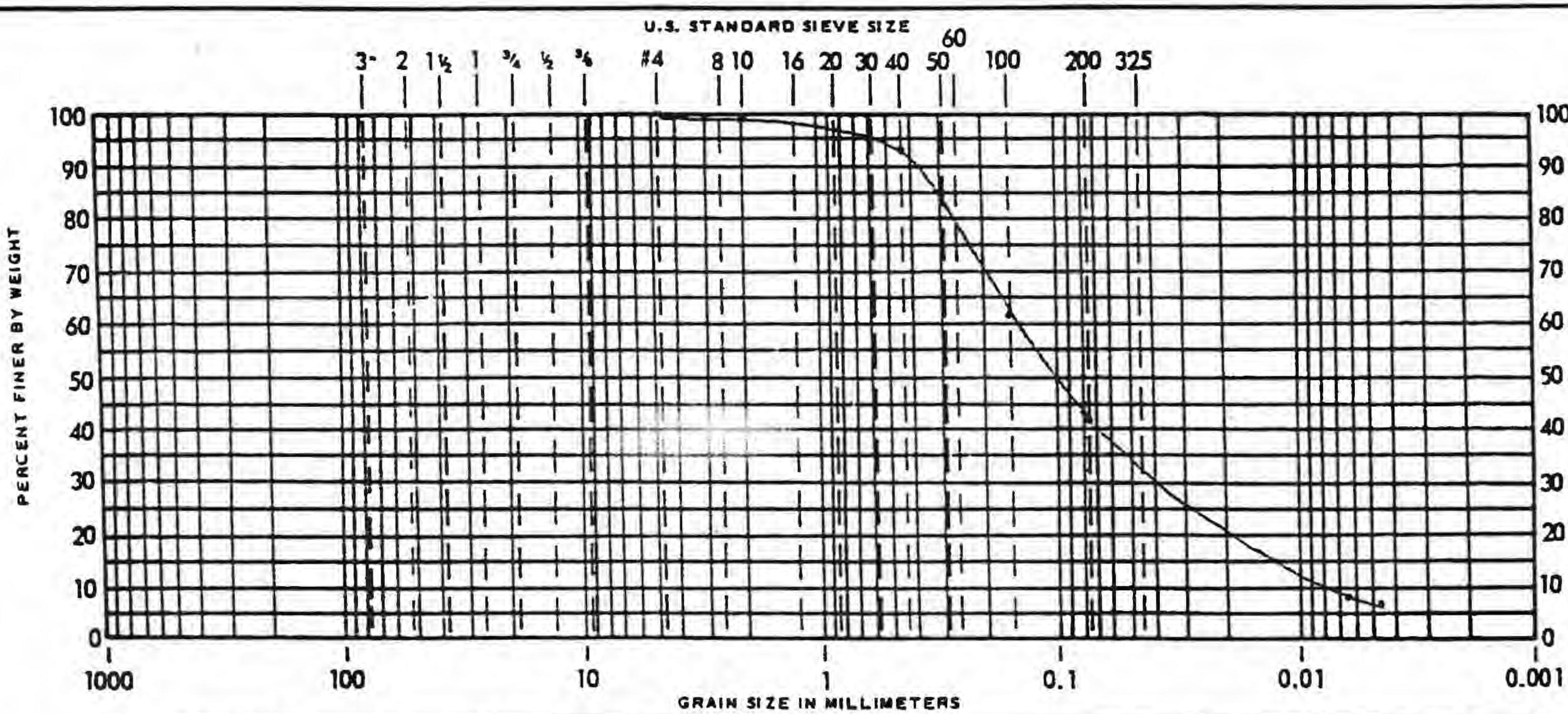
SOIL CLASSIFICATION SHEET



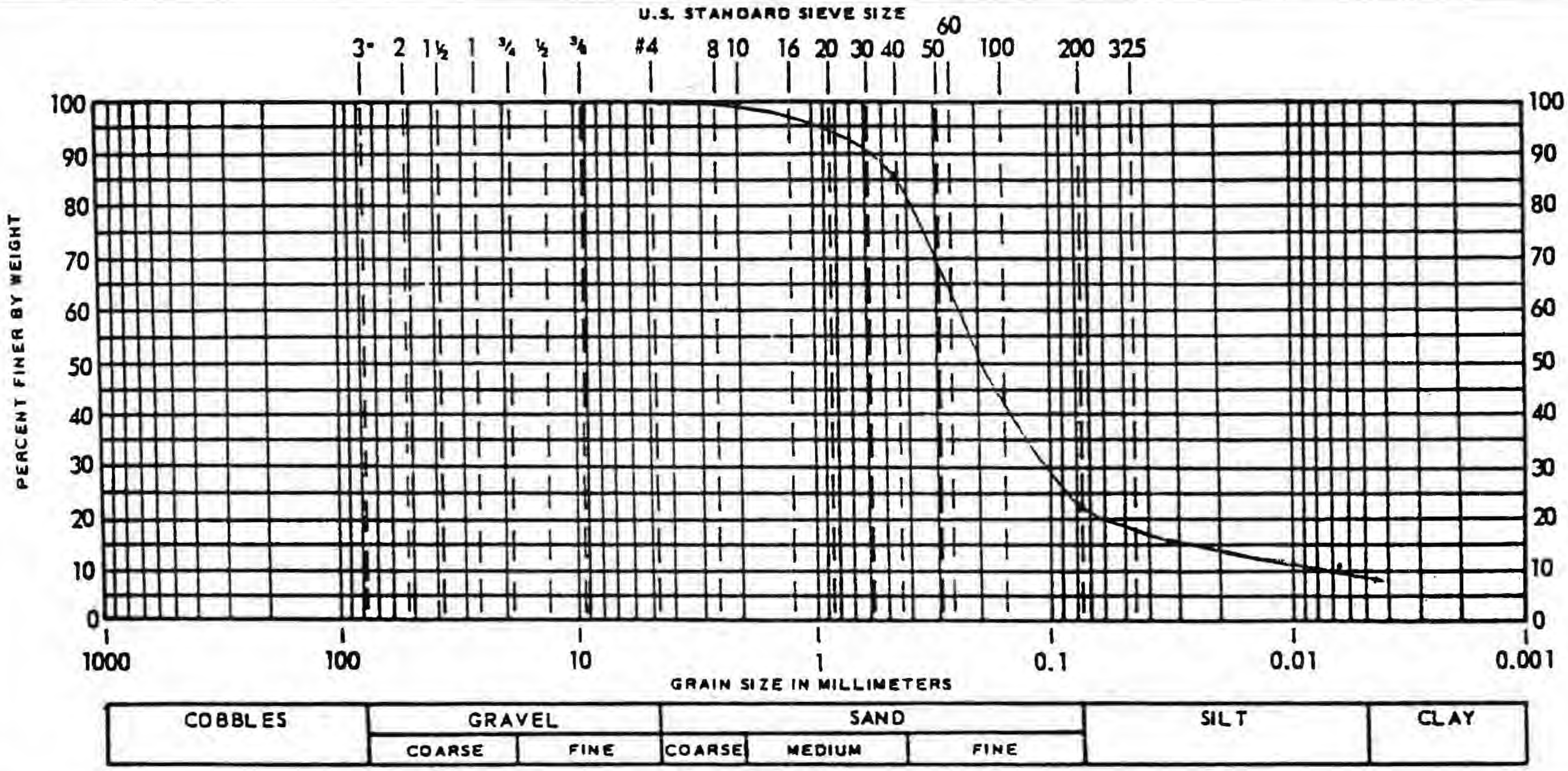
COBBLES	GRAVEL		SAND			SILT	CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE		

PROJECT	Fort Devens/USATHAMA Project No. UC 2061
BORING NO.	
SAMPLE NO.	SE-CSB-03
DEPTH	
CLASSIFICATION	

NATURAL % MOISTURE	
LIQUID LIMIT	
PLASTIC LIMIT	
PLASTICITY INDEX	
COLOR	
REMARKS	T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

SOIL CLASSIFICATION SHEET



PROJECT Fort Devens/USATHAMA
Project No. UC 2061

BORING NO.

SAMPLE NO. SE-CSB-04

DEPTH

CLASSIFICATION

NATURAL % MOISTURE

LIQUID LIMIT

PLASTIC LIMIT

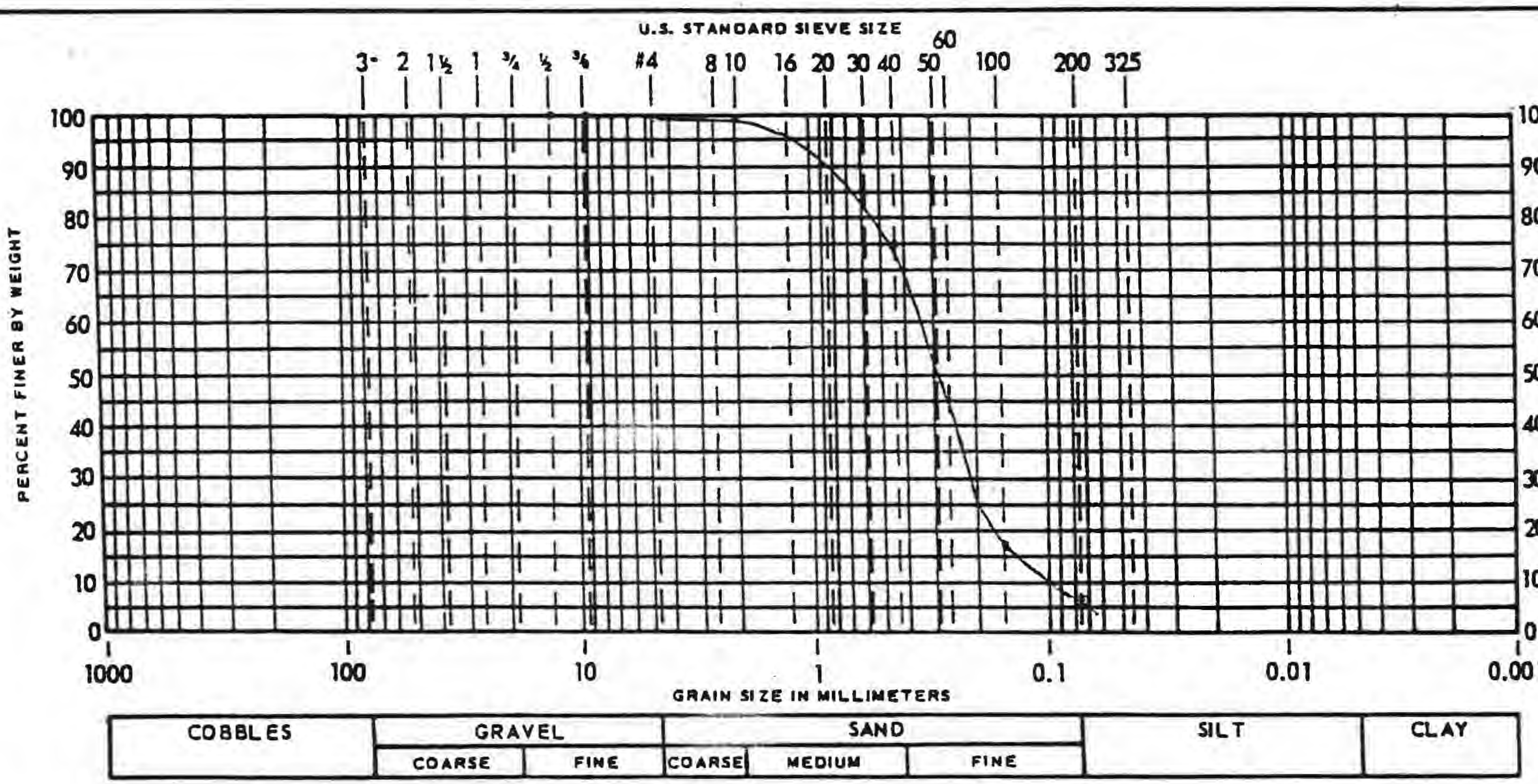
PLASTICITY INDEX

COLOR

REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

SOIL CLASSIFICATION SHEET



PROJECT Fort Devens/USATHAMA
Project No. UC 2061
BORING NO.
SAMPLE NO. SE-CSB-05
DEPTH
CLASSIFICATION

NATURAL % MOISTURE
LIQUID LIMIT
PLASTIC LIMIT
PLASTICITY INDEX
COLOR
REMARKS T.T.L. Job No. CM-13551

Toledo Testing Laboratory, Inc.

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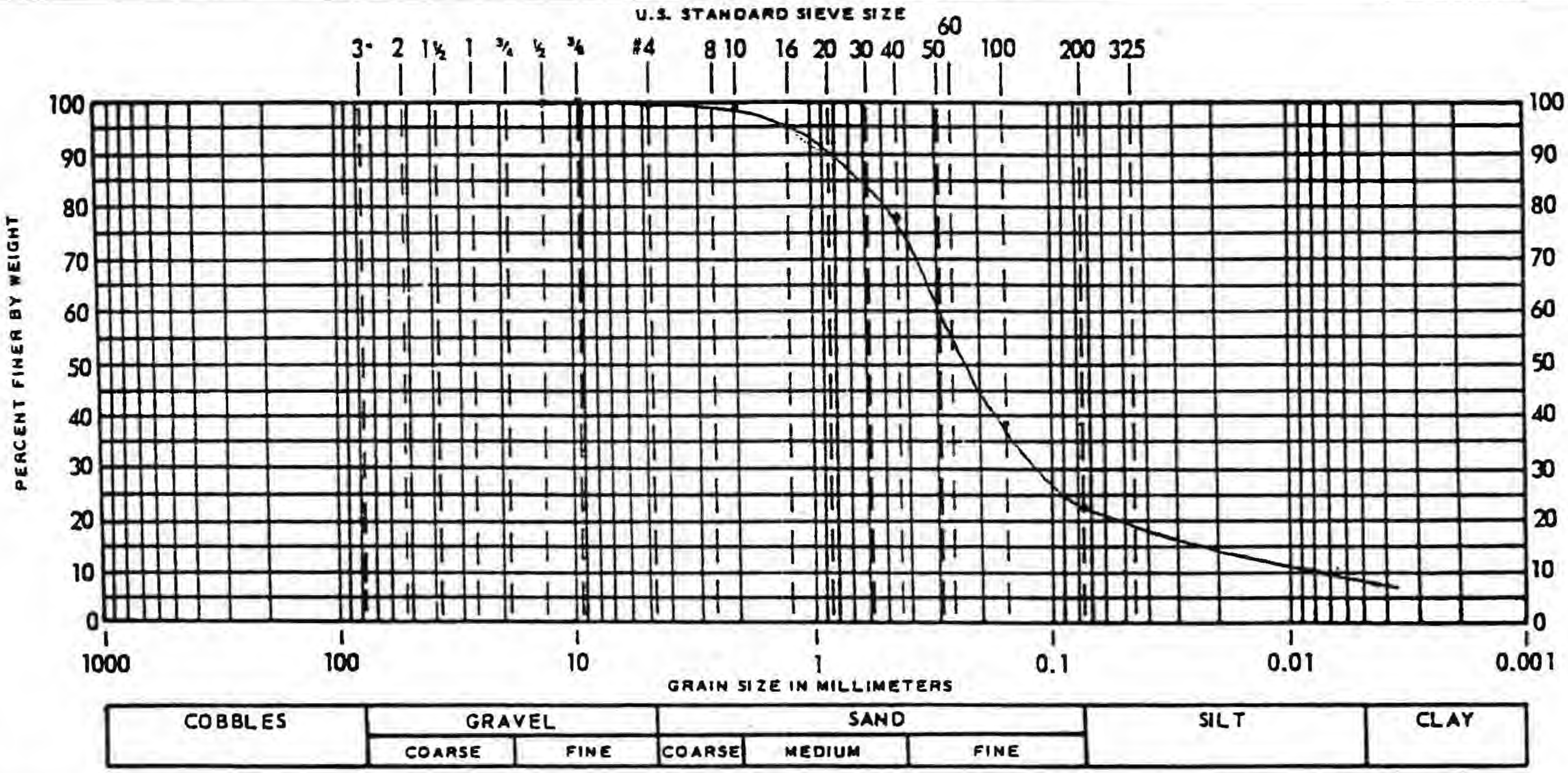
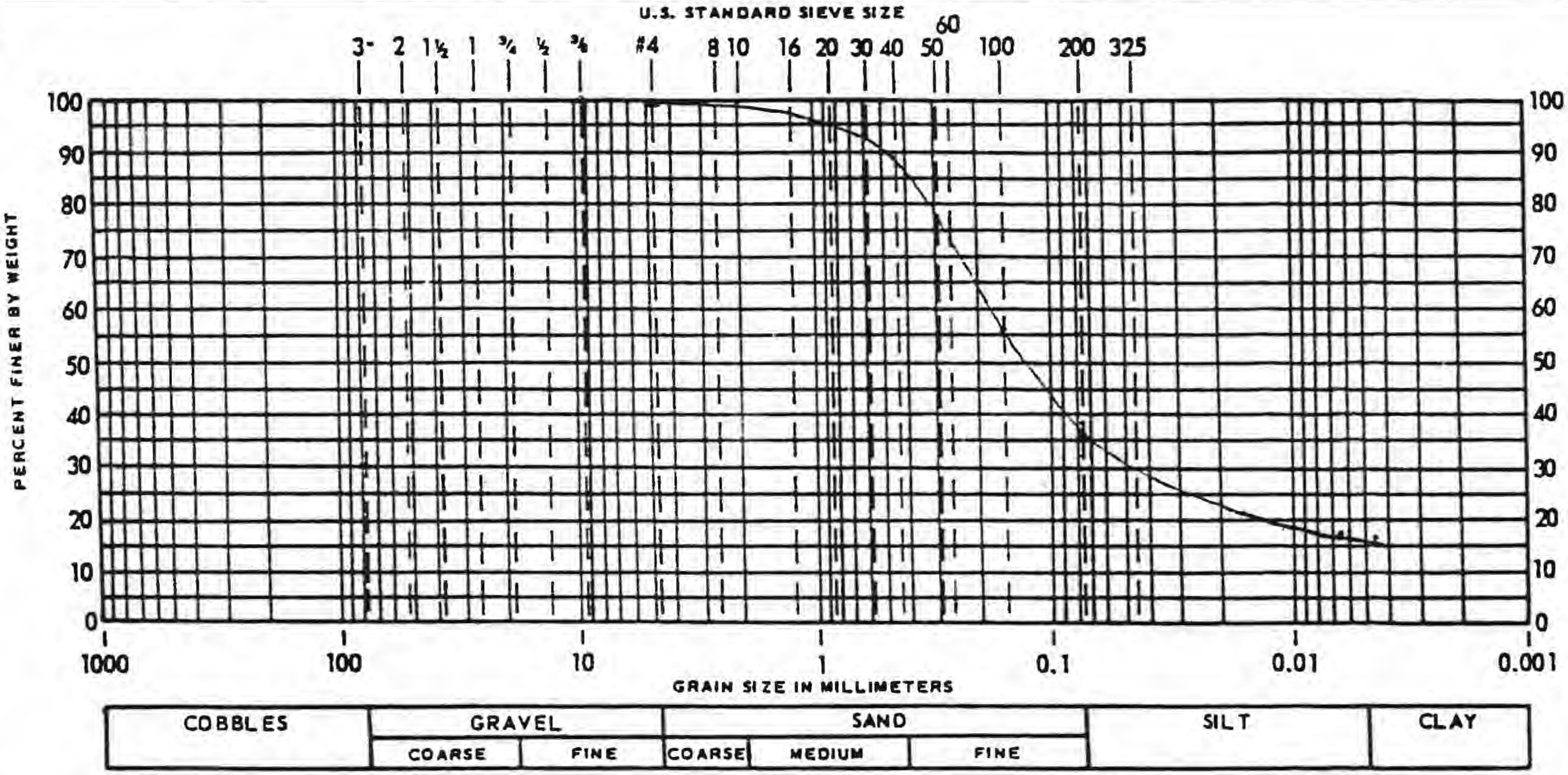


PROJECT Fort Devens/USATHAMA Project No. UC 2061 BORING NO. SAMPLE NO. SE-CSB-06 DEPTH CLASSIFICATION	NATURAL % MOISTURE LIQUID LIMIT PLASTIC LIMIT PLASTICITY INDEX COLOR REMARKS T.T.L. Job No. CM-13551	Toledo Testing Laboratory, Inc.

SOIL CLASSIFICATION SHEET



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DEPTH	PLASTICITY INDEX	
CLASSIFICATION	COLOR	
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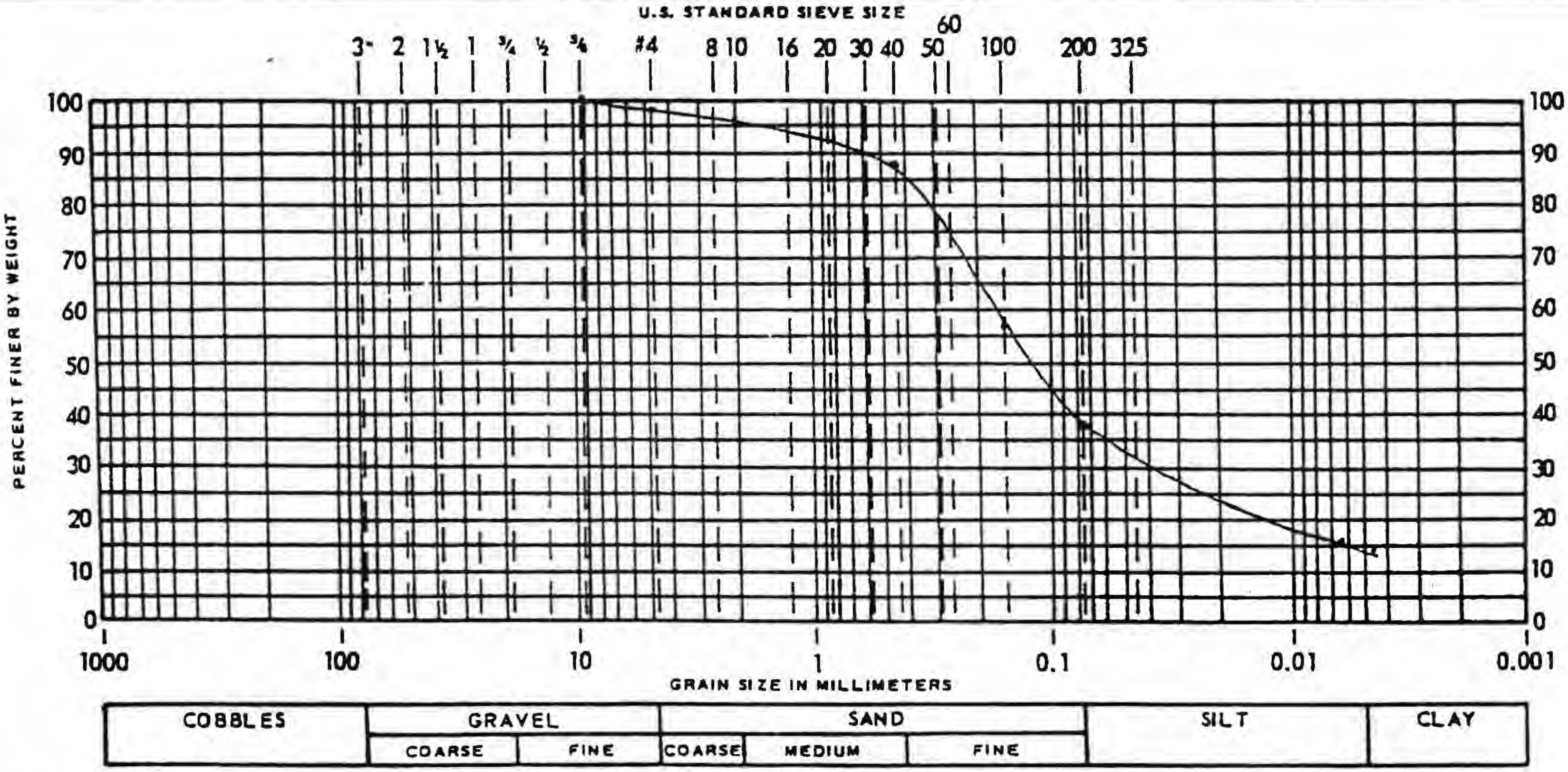

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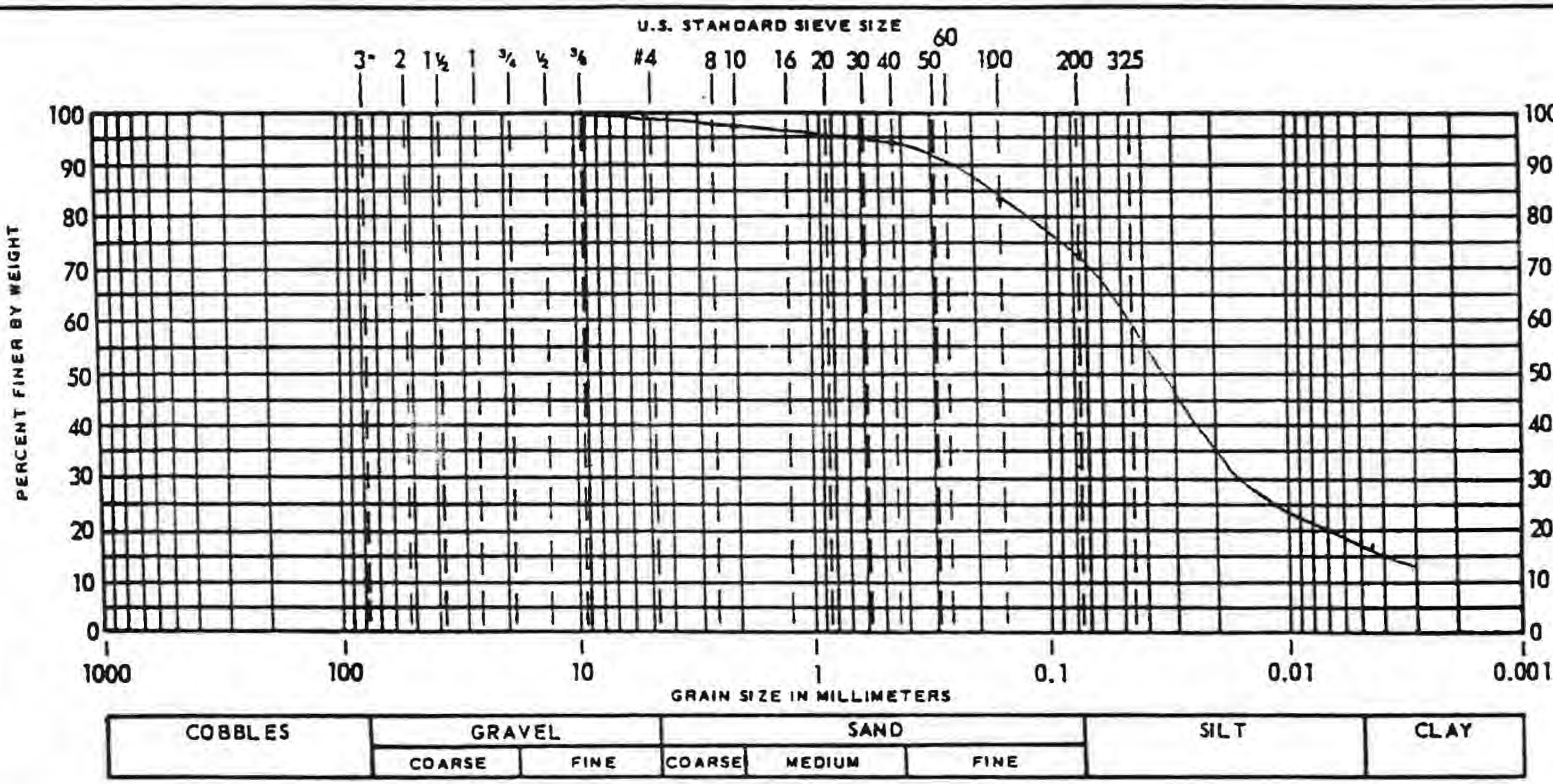
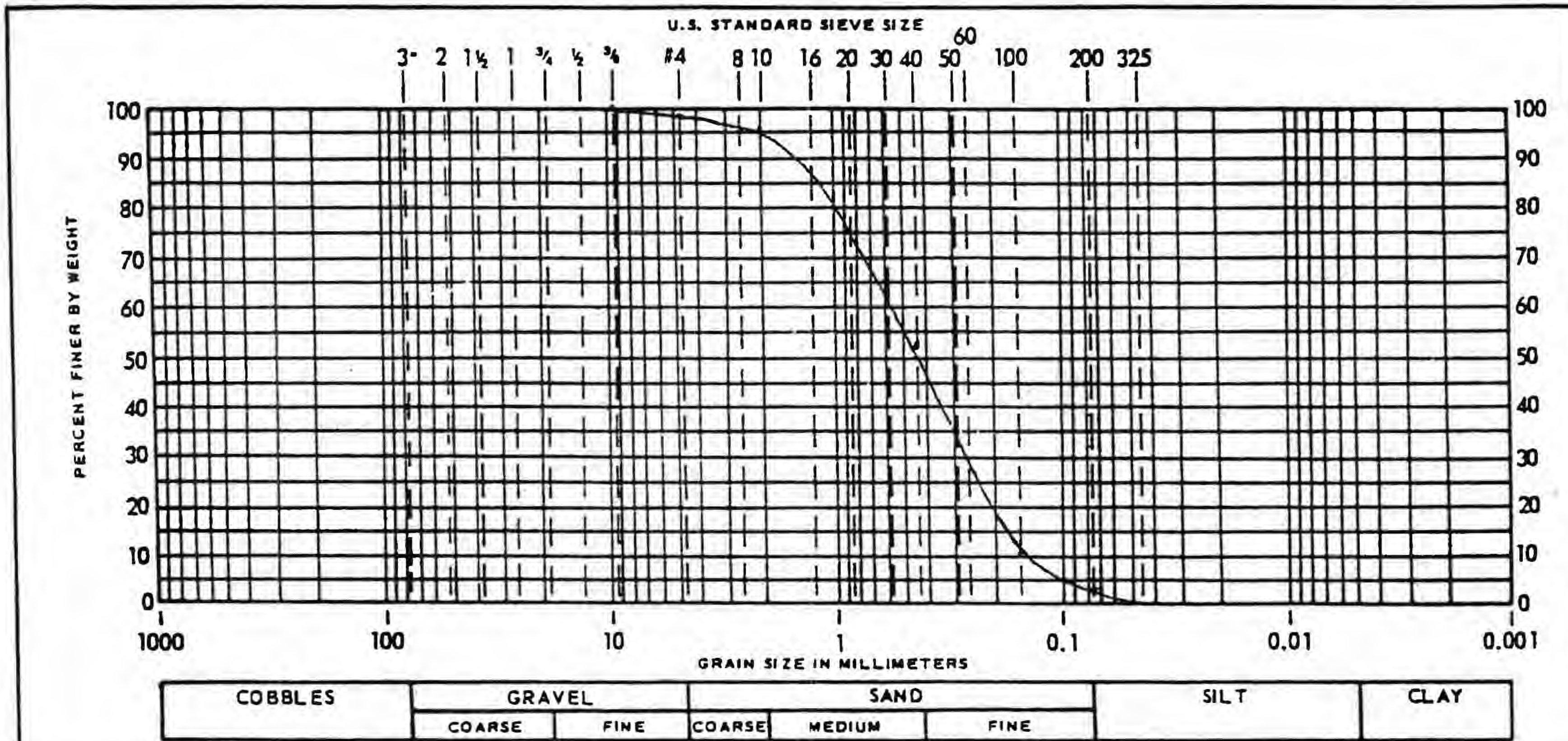
SAMPLE NO. SE-CSB-08	PLASTIC LIMIT	
DEPTH	PLASTICITY INDEX	
CLASSIFICATION	COLOR	
	REMARKS T.T.L. Job No. CM-13551	

SOIL CLASSIFICATION SHEET



PROJECT Fort Devens/USATHAMA Project No. UC 2061	NATURAL % MOISTURE	Toledo Testing Laboratory, Inc.
BORING NO.	LIQUID LIMIT	
SAMPLE NO. SE-CSB-09	PLASTIC LIMIT	
DEPTH	PLASTICITY INDEX	
CLASSIFICATION	COLOR	
	REMARKS T.T.L. Job No. CM-13551	

SOIL CLASSIFICATION SHEET



PROJECT Fort Devens/USATHAMA Project No. UC 2061	NATURAL % MOISTURE	Toledo Testing Laboratory, Inc.
BORING NO.	LIQUID LIMIT	
SAMPLE NO. SE-CSB-10	PLASTIC LIMIT	
DEPTH	PLASTICITY INDEX	
CLASSIFICATION	COLOR	
	REMARKS T.T.L. Job No. CM-13551	

APPENDIX G

AIR MONITORING REPORT

UC2070/RC372

AIR MONITORING REPORT FOR FORT DEVENS, MASSACHUSETTS

Contract No. DAAA15-90-D0012
Delivery Order No. 0001
ELIN A004

January 1992

Prepared for

Commander, U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland 21010-5401

Prepared by

Ecology and Environment, Inc.
Arlington, Virginia 22209

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1. INTRODUCTION

On 12 to 25 August 1991, Ecology and Environment, Inc. (E & E) conducted an air quality survey at Fort Devens, Massachusetts. The survey was conducted at the Shepley's Hill Landfill and Cold Spring Brook Landfill as part of the remedial investigation being conducted by E & E under Contract DAAA15-90-D0012, Delivery Order No. 0001. The objective of this study was to determine the ambient concentrations of volatile organic compounds (VOCs) and respirable particulate matter upwind and downwind of the two landfills. These measurements are to be used during the baseline risk assessment as source strength input parameters.

E & E obtained the required information with the following efforts, which are summarized in this report: meteorological monitoring (Section 2), sample site selection (Section 3), particulate matter sampling (Section 4), and VOC sampling (Section 5). Analytical results for samples collected at Shepley's Hill Landfill and Cold Spring Brook Landfill are summarized in Section 6, and a discussion of these results is included in Section 7. Supporting data used to generate this report are included as appendices: meteorological data (Appendix A), wind roses (Appendix B), calibration data (Appendix C), and laboratory results (Appendix D).

2. METEOROLOGICAL MONITORING

The purpose of meteorological monitoring was to collect data that could be used to select appropriate sampling locations, and would document the meteorological conditions under which the air samples were taken. E & E monitored the following meteorological parameters: temperature, relative humidity, wind speed, wind direction, and barometric pressure. These parameters were monitored for the duration of the air quality survey. The standard deviation of wind direction, sigma theta, was calculated in real time from the wind direction measurements. Meteorological data are presented in Appendix A.

2.1 EQUIPMENT

The meteorological monitoring equipment consisted of a temperature/relative humidity sensor, a wind speed sensor, and a wind direction sensor mounted on a cross-arm atop a 5-meter aluminum tower secured by guy wires. A weather-proof box at the base of the tower housed an Odessa Engineering DSM-3260 data storage module and the barometric pressure sensor. The sensors were connected to a junction box mounted on the tower, which, in turn, was connected by a main cable to the data storage module. The system was powered by a 9-volt deep cycle marine battery. The data were accessed with a laptop computer and Odessa Engineering's ENVICOM software.

2.2 SITING THE METEOROLOGICAL STATION

The meteorological station was sited using the criteria set forth in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV -- Meteorological Measurements prepared by the U.S. Environmental Protection Agency (EPA) in 1989. In this document, EPA recommends that a meteorological tower should be sited in "open terrain," which is defined as an area where the horizontal distance between the instruments and any obstruction is at least 10 times the height of that obstruction. The meteorological station was sited in the middle of Shepley's Hill Landfill (see Figure -1) in accordance with these criteria.

3. SAMPLE SITE SELECTION

Sampling locations were selected based upon the on-site meteorological monitoring data and the physical constraints of the site. The type of sample collected also influenced the choice of sample locations. In general, there must be free, unobstructed flow around the sampler in order to obtain a representative sample. Obstructions can be in the form of changes in topography, vegetation, and buildings. E & E attempted to site all samplers using the following criteria:

- sampler intakes should be approximately in the breathing zone (1.5 to 2 meters above the ground);
- samplers should be located at a horizontal distance of at least twice the height of any nearby obstructions;
- samplers should have unrestricted airflow in an arc of 270 degrees around the sampler; and
- samplers should be placed at a minimum distance of 25 meters from a roadway.

3.1 SHEPLEY'S HILL LANDFILL

Air samples were collected at Shepley's Hill for respirable particulate (PM-10) and VOCs. Two PM-10 samples were collected downwind of the landfill and one upwind (background) sample was collected for each of two sampling events. Four VOC samples were collected downwind of the landfill and one background sample was collected upwind during each of the two sampling events. Data from the on-site meteorological monitoring were reviewed to determine the prevailing wind patterns at the landfill and the nature and extent of any diurnal wind shifts. Since the Shepley's Hill Landfill is wooded on all sides, downwind samples were placed on the landfill as far downwind as possible while still meeting the siting criteria. The locations of the downwind PM-10 and VOC samplers are shown in Figure 3-1. The upwind samplers were located to the west of Shepley's Hill in a field next to the elementary school.

3.2 COLD SPRING BROOK LANDFILL

The Cold Spring Brook Landfill is in a low-lying, densely-vegetated area that prevented sampler placement according to the conventions listed above. Samplers were placed directly on the landfill. The PM-10 sampler was placed within the only clearing on the site and the VOC sampler was placed in proximity to monitoring well CSB-04 (see Figure 3-2). The dense vegetation covering the site yields low wind speeds, thus decreasing the dispersion of pollutants leaving the site. Sampling directly on the landfill helped in determining whether any contaminants were emitted from the landfill area. However, downwind transport could not be quantified by sampling.

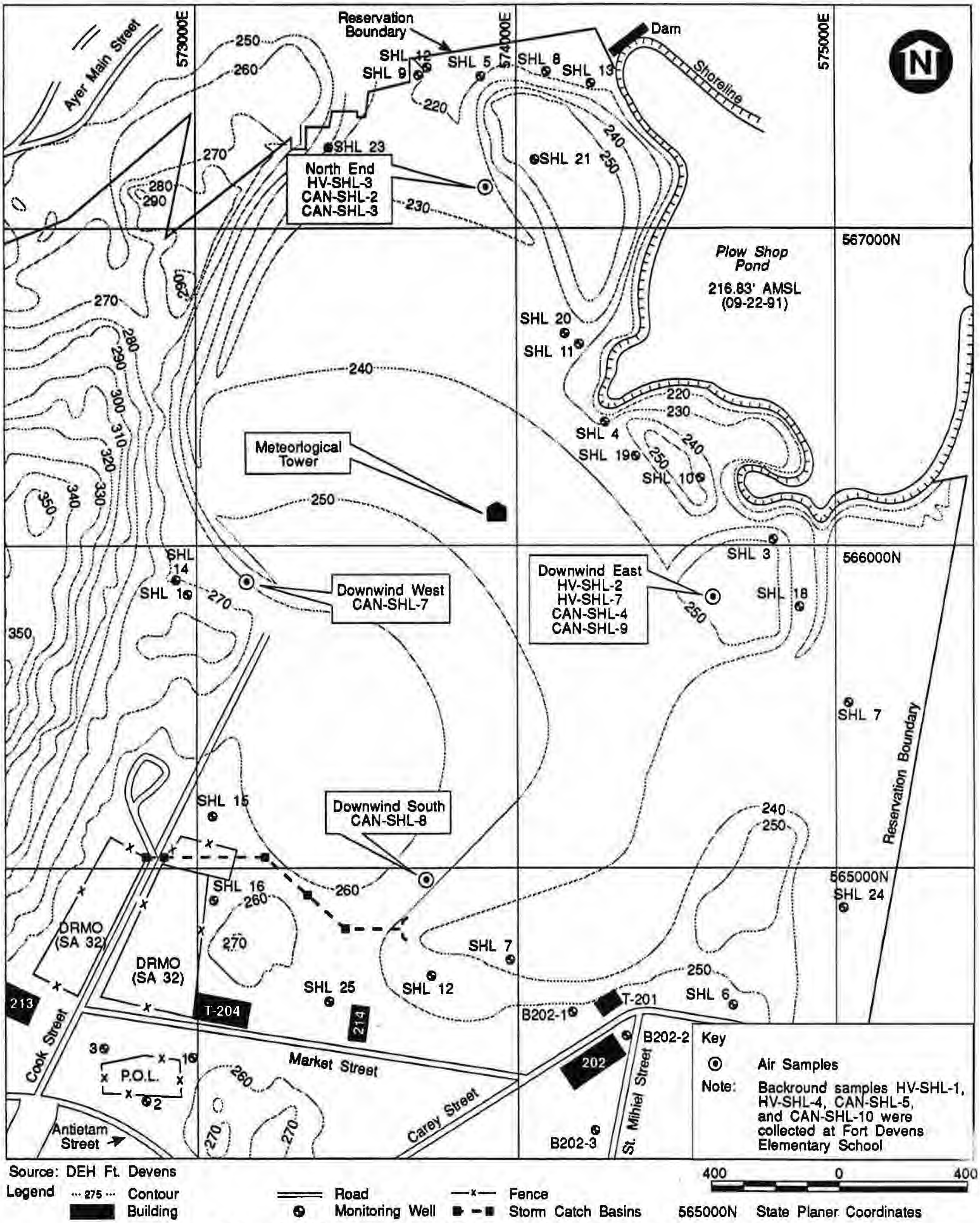

Figure 3-1 LOCATION OF AIR SAMPLES AT SHEPLEY'S HILL LANDFILL

SHL5.CDR

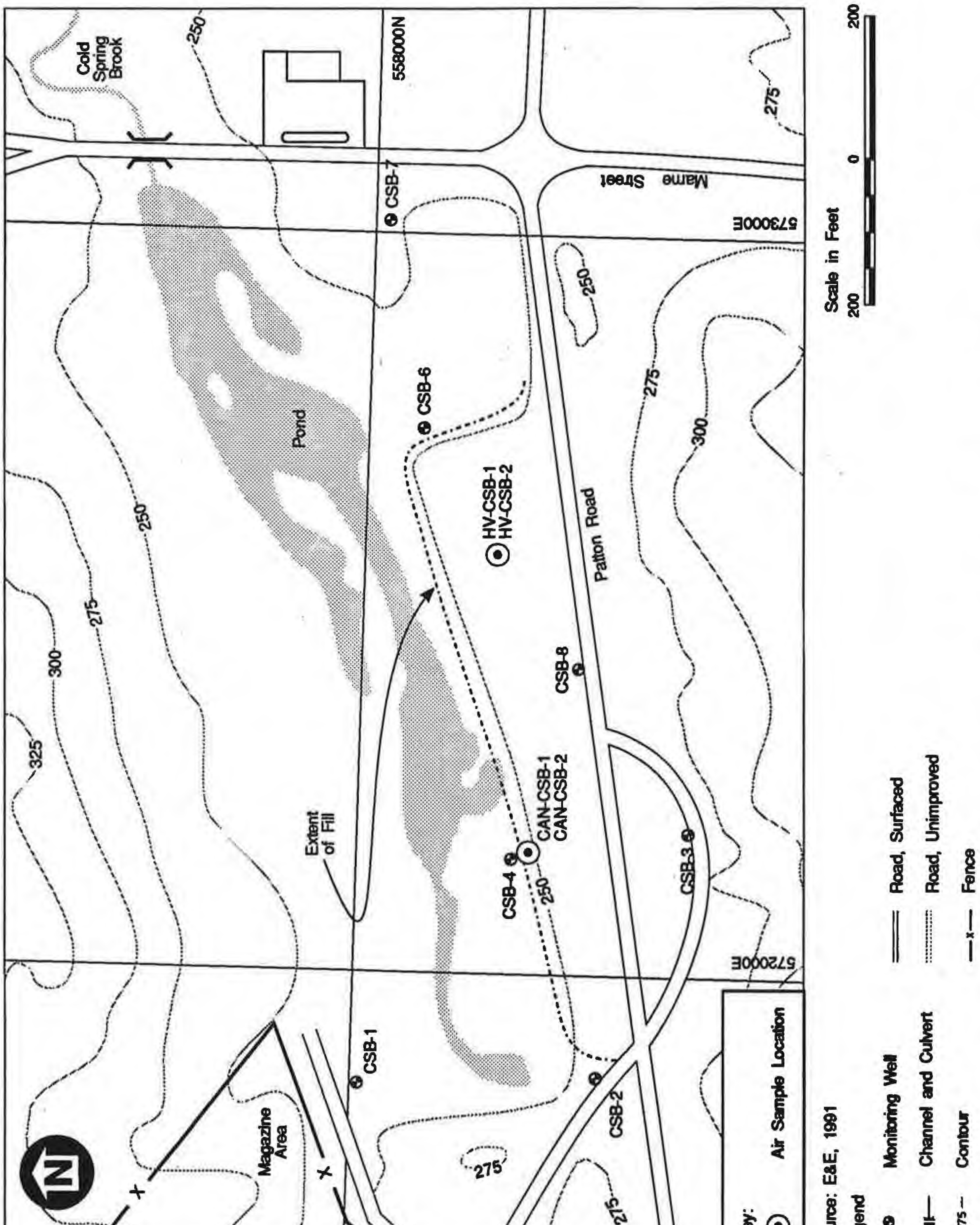

Figure 3-2 LOCATION OF AIR SAMPLES AT COLD SPRING BROOK LANDFILL

CSB@2001.CDR

4. RESPIRABLE PARTICULATE MATTER (PM-10) SAMPLING

Metal contamination has been associated with both the Shepley's Hill Landfill and the Cold Spring Brook Landfill. The air pathway for exposure to metals is through inhalation of respirable particulate matter. Respirable particulate matter (PM-10) is defined as particulate matter with a diameter of 10 microns or less. The EPA reference method for determination of the ambient concentration of PM-10 is given in 40 CFR 50 Appendix J. This method requires drawing an air sample at a constant flow rate first through a size-selective inlet, where particles greater than 10um are removed, and then through a filter medium. The filter medium can be weighed to determine the total mass of PM-10. The 24-hour sample is accurately timed and the mass concentration of PM-10 can then be determined by the total volume of air sampled. The equipment used to sample PM-10 at Fort Devens was the General Metal Works HVPM-10 which consists of a high volume blower and filter housing, mass flow controller, size selective inlet, digital timer, and flow event recorder. The filter media used in this equipment is an 8 x 10 inch glass fiber filter. The samplers were programmed to run for 24 hours for each sample.

4.1 ANALYSIS OF PM-10 SAMPLES

Upon completion of sampling, the filters were sent to the analytical laboratory where the total particulate mass of each sample was determined gravimetrically. Following determination of total mass, each filter was then cut into one inch strips, digested with an acid solution, and analyzed for the presence of various metals. The PM-10 samples from Shepley's Hill Landfill were analyzed for lead, cadmium, arsenic, and total chromium. The PM-10 sample taken at Cold Spring Brook was analyzed for selenium, silver, and arsenic. The background samples and field blanks were analyzed for all of the metals listed above. Arsenic, cadmium, chromium, lead, and selenium were analyzed by graphite furnace atomic absorption and silver was analyzed by inductively coupled plasma spectroscopy.

4.2 SAMPLING PROCEDURES

4.2.1 Calibration

The HVPM-10 samplers were calibrated on site before being deployed in the field. Calibration of a high volume sampler refers to calibration of the sampler's flow-rate indicator. Once calibrated, the flow-rate indicator provides an accurate reading of the sample flow rate from which the volume of the sampled air can be calculated (EPA-60/4-77-027a 1983). The calibration procedure consists of the following steps:

- Assemble calibration equipment and install calibration orifice on sampler;

- Perform a check to ensure that there are no leaks in the sampling system;
- Install 18-hole plate in orifice device;
- Turn on sampler and allow to warm up;
- Record ambient pressure (Ta), barometric pressure (Pa), orifice serial number and calculated flow rate (Qa), calibration curve slope (m), y-intercept (b), and linear regression (r).
- Record manometer deflection (ΔP H2O);
- Record event recorder response (I);
- Repeat last five steps with 13-, 10-, 7-, and 5-holed plates, then turn off sampler;
- Calculate Qa: $Qa=1/m\{\sqrt{\Delta H2O(Ta/Pa)}\}-b$;
- Correct recorder response to actual conditions: $IC=I[\sqrt{(Ta/Pa)}]$;
- Correct calibration to seasonal conditions: $ms=m/[\sqrt{(Ts/Ps)}]$, $bs=b/[\sqrt{(Ts/Ps)}]$;
- Calculate the set point flow rate (SFR) for the mass flow controller: $SFR=1.13(Ps/Pstd)(Tstd/Ts)$;
- Calculate the set point recorder response (SSP) for the mass flow controller: $SSP=\{[m(SFR)+b][\sqrt{(Ps/Ts)}]\}$; and
- Install filter, turn on sampler, and set mass flow controller to calibrated set point.

The calibration sheets for each of the PM-10 samplers used at Fort Devens are presented in Appendix A.

5. VOC SAMPLE COLLECTION

Ambient VOC samples were collected in 6-liter SUMMA polished stainless steel canisters in accordance with EPA Method TO-14, "Determination of Volatile Organic Compounds (VOCs) in Ambient Air Using SUMMA Passivated Canister Sampling and Gas Chromatographic Analysis." This method is found in EPA document 600/4-84-041, Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air. Samples were drawn through Scientific Instrumentation Specialists (SIS) model AGS-1/D automated canister samplers. The AGS-1/D consists of a pump, timer, and flow controller. Tha AGS-1/D was used to collect a pressurized sample of approximately 14 liters over a period of 8 hours.

5.1 VOC SAMPLING PROCEDURES

E & E used the following sampling and calibration procedures:

- Connect sampler to 12-volt battery.
- Measure sampler flow rate with a Buck Primary Gasflow Calibrator and adjust flow rate to approximately 30 cc/minute and record.
- Connect a 6-liter canister to sampler which is certified clean by analytical laboratory.
- Program an 8-hour sampling period on the sampler timer.
- Open valve on canister and record initial pressure.

When sampling is completed:

- Record final pressure in canister.
- Close valve on canister.
- Check and record final flow rate using Buck Primary Gasflow Calibrator.

5.2 VOC ANALYSIS

Upon completion of sampling, E & E sent the canisters to an analytical laboratory for analysis for VOCs by gas chromatography/mass spectrometry following EPA Method TO-14. E & E requested analytical results for 39 volatile organic compounds. The detection limit was 1 ppb.

6. ANALYTICAL RESULTS

6.1 SHEPLEY'S HILL LANDFILL

6.1.1 PM-10/Metals Sampling Results

PM-10 levels of 12 to 32 micrograms per cubic meter (µg/m^3) were found in the 24-hour samples taken at Shepley's Hill Landfill (see Table 6-1). Trace levels of cadmium, lead, and chromium were found in the upwind, downwind, and field blank PM-10 samples taken at Shepley's Hill Landfill. These trace levels are believed to be background levels since they were found in similar concentrations in all samples and the field blank.

6.1.2 VOC Sampling Results

The VOCs toluene, xylene, and dichlorodifluoromethane were detected at very low concentrations in the canister samples taken at Shepley's Hill Landfill (see Table 6-2). Toluene and xylene are constituents of motor vehicle exhaust. Dichlorodifluoromethane is a common propellant used in aerosol spray products. Sources for these VOCs are present at Fort Devens and in the surrounding areas. No VOCs were detected in the field blank (CAN-SHL-11). Toluene, xylene, and dichlorodifluoromethane were present in the upwind samples (CAN-SHL-5 and 10) at concentrations which suggest that the VOCs found in the downwind samples are background levels.

6.2 COLD SPRING BROOK

6.2.1 PM-10/Metals Sampling Results

PM-10 levels of 25 and 56 µg/m^3 were found at the Cold Spring Brook Landfill (Table 6-1). One of the two samples (HV-CSB-1) contained a trace amount of selenium (0.002 µg/m3) and the other sample (HV-CSB-2) contained no detectable concentrations of cadmium, chromium, lead, arsenic, silver, or lead.

6.2.2 VOC Sampling Results

Sample CAN-CSB-1 contained 1.3 and 3.1 parts per billion (ppb) of toluene and xylene, respectively (Table 6-2). Sample CAN-CSB-2 contained 1.1 ppb of dichlorodifluoromethane. These are believed to be background concentrations since similar species and concentrations were observed upwind of Shepley's Hill landfill. All other VOCs were non-detectable in the samples analyzed.

Table 6-1

PM-10/METALS RESULTS ($\mu g/m^3$)

Sample #	Location	Total Mass	Cd	Cr	Pb	Se
HV-SHL-1	Fort Devens Elementary (8/15 - 8/16)	26.44	0.0002	0.001	0.005	
HV-SHL-2	Downwind East (8/15 - 8/16)	31.79	0.0005	0.002	0.01	
HV-SHL-3	Downwind North (8/15 - 8/16)	30.47	0.0002	0.01	0.005	
HV-SHL-4	Fort Devens Elementary (8/16 - 8/17)	30.85	0.0002	0.002	0.003	
HV-SHL-7	Downwind East (8/24 - 8/25)	15.93	0.0002	0.002	0.01	
HV-SHL-8	Downwind South (8/24 - 8/25)	12.73	0.0002	0.001	0.003	
HV-SHL-9	Field Blank (8/15 - 8/25)		0.0001	0.002	0.0006	
HV-CSB-1	800' East 400' North (8/17 - 8/18)	56.21				0.002
HV-CSB-2	800' East 400' North (8/24 - 8/25)	25.54				

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* Arsenic and Silver not detected in any samples.

Table 6-2

VOC ANALYTICAL RESULTS (ppb)

Sample #	Location	Toluene	Xylene	Dichlorodifluoro-methane
CAN-SHL-1	Met. Tower	1.7		
CAN-SHL-2	Northend	4.9		
CAN-SHL-3	Northend	1.3		1.1
CAN-SHL-4	Downwind East	1.1		
CAN-SHL-5	Fort Devens Elementary	1.4		1.1
CAN-SHL-6	Met. Tower	1.4		
CAN-SHL-7	Downwind West			
CAN-SHL-8	Met. Tower	1.3		1.4
CAN-SHL-9	Downwind East	1.3		1.2
CAN-SHL-10	Fort Devens Elementary	4.5	1.3	1.1
CAN-SHL-11	Trip Blank			
CAN-CSB-1	Near Well CSB-04	1.3	3.1	
CAN-CSB-2	Near Well CSB-04			1.1
Method Blank				

RC372

7. DISCUSSION

As can be seen from Tables 6-1 and 6-2, none of the samples at either landfill had concentrations of PM-10, metals, or VOCs that were significantly above background. This indicates that the air pathway is not a significant route of exposure for these contaminants under these sampling conditions. This is consistent with the fact that both landfills are capped and the only pathways for emissions are through the vents (Shepley's Hill) and out the edges of the caps. The wind roses (Appendix B) and the site map (Figure 2-1) for all sampling periods demonstrate that the "downwind" samples were in fact downwind of the landfills and that the background samples were upwind of the landfills.

APPENDIX A

METEOROLOGICAL DATA

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

CHAN NAME		Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS		Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE		50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET		-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL		01	02	03	04	05	06
08/14/91	00:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	01:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	02:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	03:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	04:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	05:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	06:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	07:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	08:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	09:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	10:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/14/91	11:00:00	31.6	248.6	2.7	48.7	29.52	46.5
08/14/91	12:00:00	33.3	237.1	2.7	44.6	29.50	55.8
08/14/91	13:00:00	33.9	294.5	5.3	43.7	29.47	34.0
08/14/91	14:00:00	33.8	301.5	5.4	45.2	29.46	27.3
08/14/91	15:00:00	33.8	290.3	6.1	45.4	29.46	22.0
08/14/91	16:00:00	32.5	284.8	6.1	49.6	29.48	20.8
08/14/91	17:00:00	31.3	269.0	7.3	51.5	29.49	16.0
08/14/91	18:00:00	30.9	264.2	6.4	50.9	29.46	15.2
08/14/91	19:00:00	29.4	239.5	5.3	61.0	29.48	11.8
08/14/91	20:00:00	25.4	235.8	3.0	71.2	29.51	13.8
08/14/91	21:00:00	25.6	267.8	2.5	78.2	29.56	15.0
08/14/91	22:00:00	25.1	225.3	2.3	80.9	29.65	18.3
08/14/91	23:00:00	25.0	232.7	4.7	80.9	29.66	10.9
Daily average		30.1	261.3	4.7	58.2	29.52	22.8

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID:

CHAN NAME	Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS	Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE	50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET	-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL	01	02	03	04	05	06
08/15/91 00:00:00	25.0	235.3	4.7	78.3	29.66	11.6
08/15/91 01:00:00	25.0	233.2	4.1	78.4	29.65	12.1
08/15/91 02:00:00	24.8	237.3	4.1	80.8	29.55	12.5
08/15/91 03:00:00	25.2	233.1	5.1	79.4	29.55	12.7
08/15/91 04:00:00	25.1	236.6	4.8	80.7	29.54	12.9
08/15/91 05:00:00	25.3	220.9	4.9	79.8	29.54	13.5
08/15/91 06:00:00	24.8	227.8	3.7	83.3	29.54	15.8
08/15/91 07:00:00	25.4	236.3	4.6	83.3	29.60	13.7
08/15/91 08:00:00	25.3	227.2	5.1	81.1	29.54	14.5
08/15/91 09:00:00	24.5	224.3	6.2	80.5	29.53	13.8
08/15/91 10:00:00	24.6	225.0	6.5	80.7	29.54	14.9
08/15/91 11:00:00	24.7	219.1	6.5	81.0	29.53	14.8
08/15/91 12:00:00	24.7	213.5	7.6	80.8	29.51	14.2
08/15/91 13:00:00	25.0	214.9	6.0	80.7	29.49	15.6
08/15/91 14:00:00	26.4	200.6	6.9	76.6	29.49	16.3
08/15/91 15:00:00	24.9	191.2	6.7	84.2	29.53	16.3
08/15/91 16:00:00	25.8	207.5	6.0	84.5	29.52	15.1
08/15/91 17:00:00	25.2	228.2	4.8	84.1	29.51	14.5
08/15/91 18:00:00	23.6	271.6	7.2	84.6	29.52	21.1
08/15/91 19:00:00	19.6	239.8	4.6	100.2	29.53	17.7
08/15/91 20:00:00	19.6	271.6	3.8	100.8	29.49	24.8
08/15/91 21:00:00	20.4	224.0	2.8	100.8	29.48	20.5
08/15/91 22:00:00	21.4	237.9	5.4	100.8	29.49	13.1
08/15/91 23:00:00	20.3	246.4	5.3	100.8	29.49	15.2
Daily average	24.0	229.3	5.3	85.2	29.53	15.3

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

CHAN NAME		Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS		Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE		50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET		-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL		01	02	03	04	05	06
08/16/91	00:00:00	19.6	264.1	8.8	100.6	29.49	11.5
08/16/91	01:00:00	20.8	260.2	7.5	100.6	29.50	13.4
08/16/91	02:00:00	21.4	251.6	4.4	100.8	29.50	17.8
08/16/91	03:00:00	21.4	242.4	4.2	100.8	29.50	19.7
08/16/91	04:00:00	21.3	228.3	4.1	100.8	29.51	14.6
08/16/91	05:00:00	20.9	220.9	4.0	100.8	29.52	17.3
08/16/91	06:00:00	20.7	230.7	4.0	100.7	29.54	19.3
08/16/91	07:00:00	22.6	226.3	4.6	92.8	29.58	15.9
08/16/91	08:00:00	25.0	244.6	4.9	85.0	29.54	21.6
08/16/91	09:00:00	25.0	291.2	6.8	77.3	29.64	21.6
08/16/91	10:00:00	25.4	308.2	8.7	69.9	29.67	20.0
08/16/91	11:00:00	27.2	324.7	8.7	66.9	29.67	19.4
08/16/91	12:00:00	29.1	305.4	8.6	62.6	29.67	22.7
08/16/91	13:00:00	29.8	313.2	8.7	57.6	29.64	20.5
08/16/91	14:00:00	29.2	321.3	8.8	55.6	29.56	20.3
08/16/91	15:00:00	29.4	321.5	7.9	53.5	29.53	21.5
08/16/91	16:00:00	29.9	311.4	7.3	52.0	29.52	20.0
08/16/91	17:00:00	29.9	310.6	6.8	52.5	29.53	15.6
08/16/91	18:00:00	29.4	306.9	5.1	54.0	29.53	15.2
08/16/91	19:00:00	28.7	292.6	2.9	62.3	29.64	12.4
08/16/91	20:00:00	25.2	194.0	2.1	79.4	29.69	20.8
08/16/91	21:00:00	22.8	150.1	0.4	95.3	29.72	86.4
08/16/91	22:00:00	20.7	234.4	1.3	100.5	29.73	48.8
08/16/91	23:00:00	20.0	134.6	1.1	100.8	29.66	45.3
Daily average		24.8	262.1	5.5	80.1	29.59	23.4

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

CHAN NAME		Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS		Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE		50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET		-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL		01	02	03	04	05	06
08/17/91	00:00:00	20.6	178.5	0.5	100.8	29.66	51.8
08/17/91	01:00:00	20.9	140.6	0.7	100.8	29.65	35.2
08/17/91	02:00:00	20.9	262.8	2.2	100.8	29.66	28.8
08/17/91	03:00:00	20.7	184.1	1.3	100.8	29.66	26.6
08/17/91	04:00:00	20.6	207.3	1.8	100.8	29.66	40.2
08/17/91	05:00:00	20.5	111.9	0.8	100.8	29.66	55.5
08/17/91	06:00:00	20.9	201.0	1.8	100.8	29.66	32.3
08/17/91	07:00:00	23.2	219.3	3.7	96.7	29.67	30.6
08/17/91	08:00:00	24.9	227.9	4.5	81.6	29.66	20.1
08/17/91	09:00:00	29.2	228.8	4.7	72.4	29.69	25.3
08/17/91	10:00:00	29.3	226.7	6.4	65.2	29.71	20.2
08/17/91	11:00:00	31.9	217.6	9.5	57.3	29.69	15.6
08/17/91	12:00:00	33.8	219.2	11.1	51.7	29.66	15.3
08/17/91	13:00:00	34.3	220.6	10.6	49.8	29.58	17.3
08/17/91	14:00:00	34.6	222.7	10.7	48.6	29.53	18.4
08/17/91	15:00:00	34.4	229.5	9.8	50.1	29.50	17.5
08/17/91	16:00:00	33.6	222.6	10.1	51.7	29.49	16.0
08/17/91	17:00:00	30.1	221.8	11.3	57.4	29.50	13.4
08/17/91	18:00:00	29.2	221.3	10.5	60.0	29.50	14.2
08/17/91	19:00:00	29.2	223.0	9.9	62.7	29.51	14.2
08/17/91	20:00:00	25.5	222.4	8.0	69.3	29.53	12.3
08/17/91	21:00:00	24.8	219.1	7.2	74.8	29.63	13.3
08/17/91	22:00:00	25.4	226.8	7.7	79.5	29.64	13.0
08/17/91	23:00:00	24.8	221.9	7.9	86.1	29.55	13.4
Daily average		26.8	211.6	6.3	75.8	29.61	23.3

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

CHAN NAME	Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS	Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE	50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET	-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL	01	02	03	04	05	06
08/18/91 00:00:00	23.7	218.6	6.5	95.1	29.54	15.1
08/18/91 01:00:00	21.2	223.9	3.1	99.3	29.52	23.4
08/18/91 02:00:00	20.4	251.3	1.8	100.7	29.51	29.2
08/18/91 03:00:00	19.8	182.5	2.2	100.8	29.50	43.2
08/18/91 04:00:00	20.0	205.0	2.8	100.8	29.49	23.1
08/18/91 05:00:00	20.6	220.8	5.8	100.8	29.49	15.2
08/18/91 06:00:00	20.9	225.5	4.7	100.8	29.50	20.4
08/18/91 07:00:00	23.9	221.1	4.9	99.1	29.50	15.7
08/18/91 08:00:00	25.0	223.3	6.1	89.2	29.49	18.2
08/18/91 09:00:00	25.9	231.5	8.2	81.0	29.50	17.9
08/18/91 10:00:00	28.8	238.8	10.7	73.2	29.49	16.3
08/18/91 11:00:00	29.2	236.7	10.9	68.2	29.47	17.1
08/18/91 12:00:00	29.6	241.3	10.5	62.9	29.51	17.0
08/18/91 13:00:00	30.8	259.8	12.5	55.8	29.53	16.8
08/18/91 14:00:00	31.5	258.4	12.7	55.1	29.53	17.4
08/18/91 15:00:00	31.8	243.0	11.7	55.4	29.52	16.0
08/18/91 16:00:00	29.6	268.9	12.0	58.0	29.51	17.9
08/18/91 17:00:00	23.0	280.8	4.3	83.3	29.50	41.1
08/18/91 18:00:00	23.2	186.6	2.4	100.6	29.52	38.2
08/18/91 19:00:00	21.8	211.7	2.4	100.8	29.55	51.6
08/18/91 20:00:00	21.1	181.8	2.1	100.8	29.62	43.7
08/18/91 21:00:00	20.9	207.4	1.3	100.8	29.66	51.2
08/18/91 22:00:00	20.9	172.8	0.9	100.8	29.67	58.7
08/18/91 23:00:00	21.0	130.5	1.3	100.8	29.66	32.2
Daily average	24.4	221.8	5.9	86.8	29.53	27.4

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

CHAN NAME		Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS		Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE		50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET		-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL		01	02	03	04	05	06
08/19/91	00:00:00	21.3	92.6	2.0	100.8	29.66	40.6
08/19/91	01:00:00	20.7	93.7	4.5	100.8	29.65	10.4
08/19/91	02:00:00	20.8	230.6	0.6	100.8	29.66	64.7
08/19/91	03:00:00	21.5	170.6	2.3	100.8	29.64	32.2
08/19/91	04:00:00	21.6	120.2	2.9	100.8	29.65	28.2
08/19/91	05:00:00	21.3	129.8	3.3	100.8	29.65	14.0
08/19/91	06:00:00	21.5	79.0	2.0	100.8	29.59	25.6
08/19/91	07:00:00	21.4	36.7	2.9	100.8	29.53	28.1
08/19/91	08:00:00	21.3	46.7	3.8	100.8	29.50	27.5
08/19/91	09:00:00	21.3	62.3	5.0	100.8	29.50	34.8
08/19/91	10:00:00	20.4	57.7	5.9	100.8	29.50	34.4
08/19/91	11:00:00	19.9	71.5	7.1	100.8	29.41	29.6
08/19/91	12:00:00	20.0	37.4	11.8	100.8	29.31	23.2
08/19/91	13:00:00	21.2	28.9	17.8	100.8	29.15	15.7
08/19/91	14:00:00	20.3	24.9	22.1	100.8	28.98	14.6
08/19/91	15:00:00	19.7	15.2	24.8	100.8	28.94	17.5
08/19/91	16:00:00	19.4	93.2	27.8	100.8	28.93	20.5
08/19/91	17:00:00	20.1	336.7	22.4	100.8	28.99	16.7
08/19/91	18:00:00	20.3	324.5	20.3	100.8	29.13	15.9
08/19/91	19:00:00	20.7	334.2	13.0	100.8	29.30	16.4
08/19/91	20:00:00	20.5	282.7	10.8	100.8	29.34	20.8
08/19/91	21:00:00	19.7	283.1	9.9	100.8	29.50	15.5
08/19/91	22:00:00	21.0	277.1	8.1	97.1	29.51	16.1
08/19/91	23:00:00	21.1	279.4	7.4	94.8	29.49	14.2
Daily average		20.7	146.2	9.9	100.3	29.40	24.1

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

		Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN NAME		Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS		Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE		50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET		-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL		01	02	03	04	05	06
08/20/91	00:00:00	20.3	286.8	4.5	98.4	29.53	18.1
08/20/91	01:00:00	19.5	299.4	4.0	100.7	29.58	20.1
08/20/91	02:00:00	17.9	283.6	3.4	100.8	29.66	23.1
08/20/91	03:00:00	16.6	290.6	3.8	100.8	29.67	15.2
08/20/91	04:00:00	15.6	235.9	3.2	100.8	29.68	17.0
08/20/91	05:00:00	16.6	213.6	1.2	100.8	29.70	77.9
08/20/91	06:00:00	16.1	221.2	1.4	100.8	29.72	45.9
08/20/91	07:00:00	18.5	105.4	1.8	99.8	29.70	36.9
08/20/91	08:00:00	19.6	41.0	2.9	92.1	29.69	33.3
08/20/91	09:00:00	20.4	54.5	3.7	79.5	29.66	36.0
08/20/91	10:00:00	20.7	62.2	3.7	80.2	29.66	35.7
08/20/91	11:00:00	23.2	102.9	5.7	76.3	29.68	22.0
08/20/91	12:00:00	22.6	110.5	6.3	77.7	29.73	20.4
08/20/91	13:00:00	21.4	121.0	7.3	78.1	29.73	17.5
08/20/91	14:00:00	20.5	99.0	5.9	82.6	29.73	19.8
08/20/91	15:00:00	20.5	84.5	5.4	83.6	29.68	26.8
08/20/91	16:00:00	20.7	89.5	5.6	88.9	29.66	23.1
08/20/91	17:00:00	19.9	95.4	7.1	93.6	29.67	20.1
08/20/91	18:00:00	18.4	81.4	4.5	99.0	29.68	26.8
08/20/91	19:00:00	16.1	80.2	4.2	100.2	29.69	27.9
08/20/91	20:00:00	15.5	22.7	3.7	100.8	29.71	18.6
08/20/91	21:00:00	15.3	16.7	4.8	100.8	29.71	14.1
08/20/91	22:00:00	15.3	26.4	5.2	100.8	29.71	18.4
08/20/91	23:00:00	15.3	22.1	5.1	100.8	29.71	14.4
Daily average		18.6	126.9	4.3	93.2	29.68	26.2

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

CHAN NAME	Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS	Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE	50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET	-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL	01	02	03	04	05	06
08/21/91 00:00:00	15.3	31.1	4.7	100.8	29.70	22.0
08/21/91 01:00:00	15.3	36.7	4.1	100.8	29.69	26.9
08/21/91 02:00:00	15.2	51.4	3.7	100.8	29.68	23.2
08/21/91 03:00:00	15.0	45.7	4.7	100.8	29.67	26.6
08/21/91 04:00:00	15.0	65.2	5.1	100.8	29.66	29.2
08/21/91 05:00:00	16.8	31.4	5.0	100.8	29.67	24.8
08/21/91 06:00:00	16.6	21.6	5.1	100.8	29.69	16.5
08/21/91 07:00:00	16.6	30.7	5.1	100.8	29.67	19.7
08/21/91 08:00:00	16.7	52.9	4.5	100.8	29.67	33.5
08/21/91 09:00:00	16.1	51.7	4.2	100.8	29.66	26.0
08/21/91 10:00:00	15.0	32.0	4.6	100.8	29.66	21.2
08/21/91 11:00:00	15.3	43.2	4.2	100.8	29.67	27.6
08/21/91 12:00:00	15.9	44.6	4.1	100.8	29.73	25.6
08/21/91 13:00:00	16.4	59.2	3.1	100.8	29.72	30.8
08/21/91 14:00:00	16.6	105.7	3.5	100.8	29.71	19.8
08/21/91 15:00:00	17.1	84.0	1.8	100.8	29.70	25.7
08/21/91 16:00:00	19.3	261.1	1.9	100.8	29.70	46.5
08/21/91 17:00:00	19.6	196.1	2.4	100.8	29.70	23.6
08/21/91 18:00:00	18.3	186.3	3.7	100.8	29.71	12.8
08/21/91 19:00:00	16.7	197.2	2.9	100.8	29.73	14.1
08/21/91 20:00:00	16.8	211.5	2.7	100.8	29.71	18.1
08/21/91 21:00:00	16.5	177.3	2.2	100.8	29.68	25.9
08/21/91 22:00:00	16.1	199.7	1.6	100.8	29.72	51.8
08/21/91 23:00:00	16.7	141.2	2.3	100.8	29.65	31.2
Daily average	16.5	98.2	3.6	100.8	29.69	26.0

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

CHAN NAME	Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS	Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE	50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET	-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL	01	02	03	04	05	06
08/22/91 00:00:00	16.7	206.1	2.1	100.8	29.65	37.4
08/22/91 01:00:00	16.3	194.9	1.6	100.8	29.72	44.8
08/22/91 02:00:00	16.1	281.0	2.0	100.8	29.73	37.2
08/22/91 03:00:00	16.4	197.1	1.9	100.8	29.73	32.5
08/22/91 04:00:00	17.1	202.8	1.3	100.8	29.73	27.9
08/22/91 05:00:00	16.2	226.3	1.2	100.8	29.67	29.5
08/22/91 06:00:00	17.1	213.4	2.1	100.8	29.66	27.3
08/22/91 07:00:00	20.3	239.2	4.5	100.8	29.67	11.4
08/22/91 08:00:00	22.8	242.1	4.3	96.0	29.66	22.4
08/22/91 09:00:00	25.1	279.2	6.0	81.4	29.65	24.7
08/22/91 10:00:00	24.7	280.6	6.5	73.2	29.73	22.7
08/22/91 11:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 12:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 13:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 14:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 15:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 16:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 17:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 18:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 19:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 20:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 21:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 22:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/22/91 23:00:00	Miss	Miss	Miss	Miss	Miss	Miss
Daily average	18.8	231.9	3.0	96.6	29.69	29.0

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID:

CHAN NAME	Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS	Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE	50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET	-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL	01	02	03	04	05	06
08/25/91 00:00:00	16.3	261.5	1.4	100.6	30.23	17.1
08/25/91 01:00:00	15.4	0.0	0.0	100.8	30.24	20.6
08/25/91 02:00:00	14.5	181.4	1.3	100.8	30.24	14.2
08/25/91 03:00:00	12.2	269.4	1.8	100.8	30.25	16.9
08/25/91 04:00:00	11.6	265.0	0.8	100.8	30.25	13.1
08/25/91 05:00:00	11.1	173.4	1.4	100.8	30.27	15.6
08/25/91 06:00:00	12.3	256.5	0.5	100.8	30.29	20.5
08/25/91 07:00:00	16.1	7.9	3.0	94.5	30.29	15.3
08/25/91 08:00:00	20.1	37.9	4.4	78.2	30.29	26.6
08/25/91 09:00:00	21.1	72.9	3.7	71.9	30.29	40.1
08/25/91 10:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 11:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 12:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 13:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 14:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 15:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 16:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 17:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 18:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 19:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 20:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 21:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 22:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/25/91 23:00:00	Miss	Miss	Miss	Miss	Miss	Miss
Daily average	14.6	159.0	1.7	96.8	30.26	18.4

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

CHAN NAME		Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS		Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE		50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET		-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL		01	02	03	04	05	06
08/23/91	00:00:00	20.6	160.3	3.6	99.0	29.72	36.7
08/23/91	01:00:00	21.0	220.5	5.4	92.9	29.73	15.5
08/23/91	02:00:00	21.3	230.7	6.3	90.1	29.73	14.6
08/23/91	03:00:00	21.3	235.8	5.9	90.4	29.73	14.2
08/23/91	04:00:00	21.4	241.2	5.5	89.4	29.67	17.3
08/23/91	05:00:00	21.1	255.5	6.5	88.0	29.66	13.0
08/23/91	06:00:00	20.8	244.1	3.8	90.4	29.68	19.8
08/23/91	07:00:00	21.2	141.8	1.5	84.3	29.71	35.2
08/23/91	08:00:00	21.9	276.4	2.8	82.6	29.73	34.4
08/23/91	09:00:00	24.7	270.9	4.6	77.1	29.73	19.7
08/23/91	10:00:00	27.7	294.0	6.4	66.3	29.73	21.8
08/23/91	11:00:00	29.5	326.2	6.5	58.2	29.72	26.2
08/23/91	12:00:00	30.1	336.5	7.6	53.6	29.71	21.3
08/23/91	13:00:00	29.8	335.9	6.4	49.4	29.71	28.6
08/23/91	14:00:00	28.9	319.4	7.3	46.1	29.70	20.4
08/23/91	15:00:00	29.4	169.8	6.0	46.5	29.70	24.8
08/23/91	16:00:00	29.7	354.5	4.1	45.3	29.71	20.2
08/23/91	17:00:00	30.2	267.0	4.1	44.7	29.72	23.3
08/23/91	18:00:00	29.3	179.4	1.5	52.1	29.76	30.6
08/23/91	19:00:00	25.3	310.3	1.2	70.4	29.86	49.9
08/23/91	20:00:00	23.7	284.8	1.5	85.4	29.90	32.5
08/23/91	21:00:00	20.1	179.8	1.9	99.6	29.88	28.5
08/23/91	22:00:00	20.2	181.4	2.5	100.8	29.87	21.5
08/23/91	23:00:00	21.2	4.2	4.6	100.6	29.89	10.0
Daily average		24.6	242.5	4.5	75.1	29.75	24.2

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

CHAN NAME	Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS	Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE	50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET	-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL	01	02	03	04	05	06
08/24/91 00:00:00	20.7	9.9	4.5	100.2	29.90	10.8
08/24/91 01:00:00	20.2	15.7	2.8	97.3	29.92	16.4
08/24/91 02:00:00	19.8	28.4	3.9	87.7	30.02	22.8
08/24/91 03:00:00	16.5	100.0	3.4	91.2	30.06	21.5
08/24/91 04:00:00	16.0	16.2	3.4	92.3	30.07	20.1
08/24/91 05:00:00	15.6	93.7	4.0	96.7	30.09	10.2
08/24/91 06:00:00	15.6	177.4	3.2	99.6	30.10	13.5
08/24/91 07:00:00	17.0	8.4	4.6	92.9	30.08	13.4
08/24/91 08:00:00	19.8	36.5	4.8	77.5	30.04	21.6
08/24/91 09:00:00	20.4	45.0	5.1	67.3	30.03	28.9
08/24/91 10:00:00	20.8	37.2	5.5	63.3	30.06	26.5
08/24/91 11:00:00	23.9	73.0	4.0	59.5	30.11	37.8
08/24/91 12:00:00	25.3	36.2	4.7	57.7	30.09	36.7
08/24/91 13:00:00	25.1	99.4	3.2	55.9	30.08	49.9
08/24/91 14:00:00	24.7	48.2	3.7	56.5	30.07	44.3
08/24/91 15:00:00	25.2	48.2	3.6	55.9	30.06	39.1
08/24/91 16:00:00	26.1	67.2	3.7	54.3	30.05	34.6
08/24/91 17:00:00	26.9	104.8	4.7	54.6	30.06	26.3
08/24/91 18:00:00	24.0	116.8	8.3	65.2	30.08	16.1
08/24/91 19:00:00	20.4	121.7	7.1	73.9	30.07	15.5
08/24/91 20:00:00	20.8	97.9	3.4	73.3	30.07	24.1
08/24/91 21:00:00	20.2	41.4	2.9	76.5	30.10	24.3
08/24/91 22:00:00	17.8	8.7	2.6	83.8	30.11	14.1
08/24/91 23:00:00	15.3	257.4	1.9	94.8	30.18	10.3
Daily average	20.7	70.4	4.1	76.2	30.06	24.1

DAILY DATA SUMMARY

NAME: E&E LOCATION: Ft.Devens STATION ID: 1

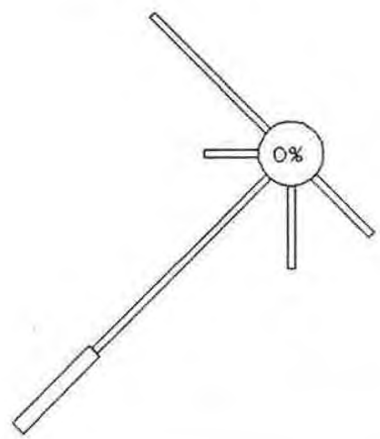
CHAN NAME	Temp	W.DIR	W.SPD	R.Hum	Press	Sigél
CHAN UNITS	Deg.C	DEG.	MPH	%	in Hg	deg
FULL SCALE	50.0	360.0	100.0	100.0	32.00	99.9
ZERO OFFSET	-30.0	0.0	0.0	0.0	26.00	0.0
START / CHANNEL	01	02	03	04	05	06
08/13/91 00:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/13/91 01:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/13/91 02:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/13/91 03:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/13/91 04:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/13/91 05:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/13/91 06:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/13/91 07:00:00	Miss	Miss	Miss	Miss	Miss	Miss
08/13/91 08:00:00	25.0	66.9	1.3	28.3	27.53	63.8
08/13/91 09:00:00	27.8	45.6	1.5	58.9	29.69	57.6
08/13/91 10:00:00	29.8	44.2	3.6	50.7	29.72	50.2
08/13/91 11:00:00	29.7	63.8	4.4	47.4	29.69	48.5
08/13/91 12:00:00	29.3	74.0	4.1	46.1	29.66	48.7
08/13/91 13:00:00	30.0	69.0	4.5	45.0	29.56	47.4
08/13/91 14:00:00	33.0	78.6	4.5	41.5	29.52	47.9
08/13/91 15:00:00	32.9	66.3	4.1	41.6	29.50	46.2
08/13/91 16:00:00	33.5	79.5	4.9	41.6	29.48	39.2
08/13/91 17:00:00	34.1	70.3	4.8	40.4	29.48	32.6
08/13/91 18:00:00	32.3	32.0	5.3	43.8	29.47	22.9
08/13/91 19:00:00	29.2	17.5	4.3	56.3	29.48	19.0
08/13/91 20:00:00	25.0	229.3	3.6	68.2	29.51	16.4
08/13/91 21:00:00	24.9	232.1	3.5	74.0	29.53	11.9
08/13/91 22:00:00	24.7	179.3	3.5	77.2	29.54	15.6
08/13/91 23:00:00	22.8	234.1	2.5	82.8	29.58	33.0
Daily average	29.1	99.4	3.8	53.1	29.46	37.1

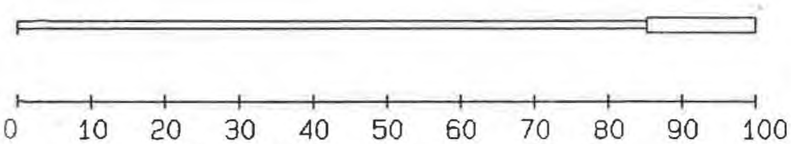
APPENDIX B

WIND ROSES

WIND DATA 1500 8/16/91 - 1600 8/17/91
PM-10 SAMPLES SHL-004 TO SHL-006

↑ N



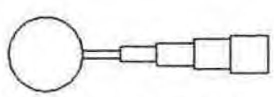


WIND SPEED SUMMARY

CUMULATIVE WIND SPEED SUMMARY (PERCENT)

MAGNITUDE	1	2	3	4	5	TOTAL
NORTH	0.0	0.0	0.0	0.0	0.0	0.0
NORTHEAST	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHEAST	11.1	0.0	0.0	0.0	0.0	11.1
SOUTH	11.1	0.0	0.0	0.0	0.0	11.1
SOUTHWEST	33.3	14.8	0.0	0.0	0.0	48.1
WEST	7.4	0.0	0.0	0.0	0.0	7.4
NORTHWEST	22.2	0.0	0.0	0.0	0.0	22.2
TOTAL	85.2	14.8	0.0	0.0	0.0	

WINDS	100.0
CALM	0.0
TOTAL	100.0



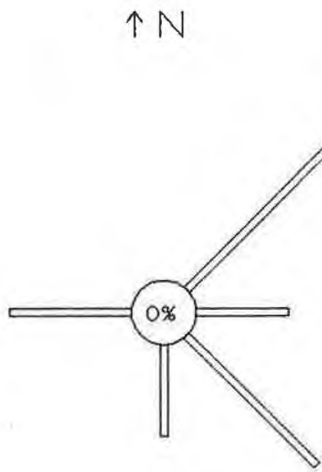
CALM 1 2 3 4 5

MAGNITUDE: CALM - S = 0 : 1 - 0<S<=10 : 2 - 10<S<=21 :
(S=~~KNOTS~~) 3 - 21<S<=33 : 4 - 33<S<=47 : 5 - S>47
Mph

recycled paper

ecology and environment

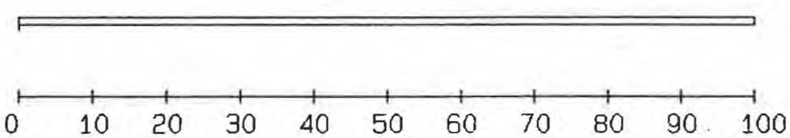
WIND DATA 0900 8/24/91 - 0900 8/25/91
PM-10 SAMPLES SHL.007 & SHL-008



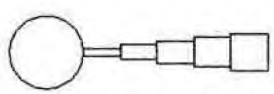
CUMULATIVE WIND SPEED SUMMARY (PERCENT)

MAGNITUDE	1	2	3	4	5	TOTAL
NORTH	0.0	0.0	0.0	0.0	0.0	0.0
NORTHEAST	33.3	0.0	0.0	0.0	0.0	33.3
EAST	12.5	0.0	0.0	0.0	0.0	12.5
SOUTHEAST	25.0	0.0	0.0	0.0	0.0	25.0
SOUTH	12.5	0.0	0.0	0.0	0.0	12.5
SOUTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
WEST	16.7	0.0	0.0	0.0	0.0	16.7
NORTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	0.0	0.0	0.0	0.0	

WINDS	100.0
CALM	0.0
TOTAL	100.0

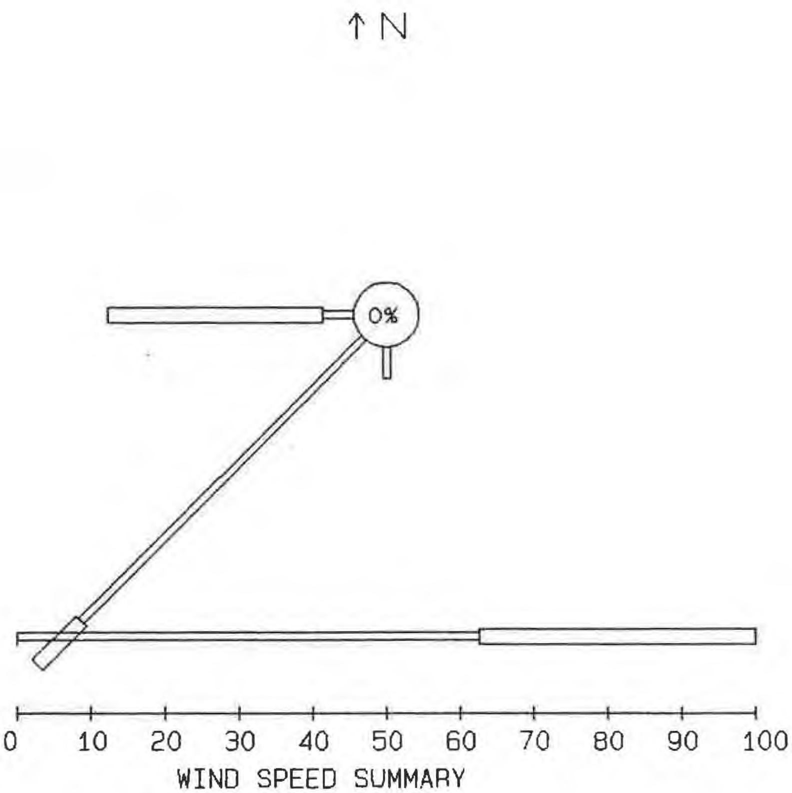


WIND SPEED SUMMARY



MAGNITUDE: CALM - S = 0 : 1 - 0<S<=10 : 2 - 10<S<=21 :
(S=~~KNOTS~~) 3 - 21<S<=33 : 4 - 33<S<=47 : 5 - S>47
MPH

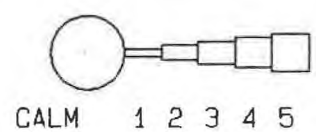
WIND DATA 1700 8/17/91 - 1700 8/18/91
PM-10 SAMPLE CSB-001



CUMULATIVE WIND SPEED SUMMARY (PERCENT)

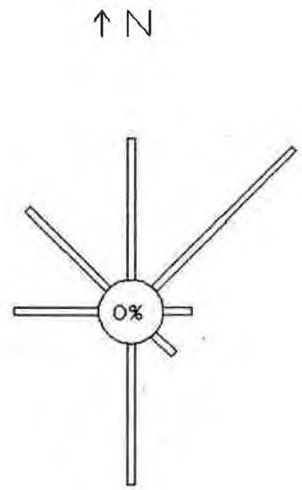
MAGNITUDE	1	2	3	4	5	TOTAL
NORTH	0.0	0.0	0.0	0.0	0.0	0.0
NORTHEAST	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHEAST	0.0	0.0	0.0	0.0	0.0	0.0
SOUTH	4.2	0.0	0.0	0.0	0.0	4.2
SOUTHWEST	54.2	8.3	0.0	0.0	0.0	62.5
WEST	4.2	29.2	0.0	0.0	0.0	33.3
NORTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	62.5	37.5	0.0	0.0	0.0	

WINDS	100.0
CALM	0.0
TOTAL	100.0



MAGNITUDE: CALM - S = 0 : 1 - 0<S<=10 : 2 - 10<S<=21 :
(S=~~KNOTS~~) 3 - 21<S<=33 : 4 - 33<S<=47 : 5 - S>47
M

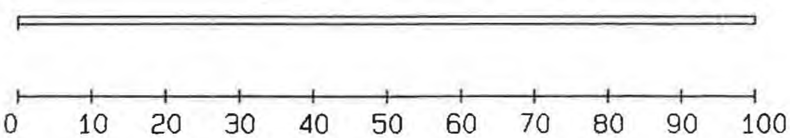
WIND DATA 0800 8/24/91 - 0900 8/25/91
PM-10 SAMPLE CSB-002



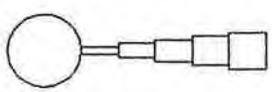
CUMULATIVE WIND SPEED SUMMARY (PERCENT)

MAGNITUDE	1	2	3	4	5	TOTAL
NORTH	19.2	0.0	0.0	0.0	0.0	19.2
NORTHEAST	26.9	0.0	0.0	0.0	0.0	26.9
EAST	3.8	0.0	0.0	0.0	0.0	3.8
SOUTHEAST	3.8	0.0	0.0	0.0	0.0	3.8
SOUTH	19.2	0.0	0.0	0.0	0.0	19.2
SOUTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
WEST	11.5	0.0	0.0	0.0	0.0	11.5
NORTHWEST	15.4	0.0	0.0	0.0	0.0	15.4
TOTAL	100.0	0.0	0.0	0.0	0.0	

WINDS	100.0
CALM	0.0
TOTAL	100.0

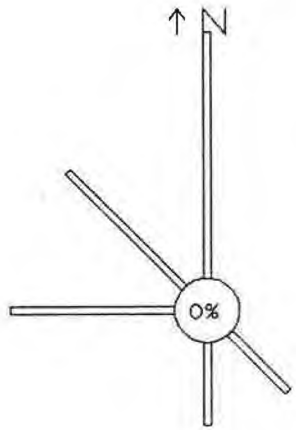


WIND SPEED SUMMARY



MAGNITUDE: CALM - S = 0 : 1 - 0<S<=10 : 2 - 10<S<=21 :
(S=~~KNOTS~~) 3 - 21<S<=33 : 4 - 33<S<=47 : 5 - S>47

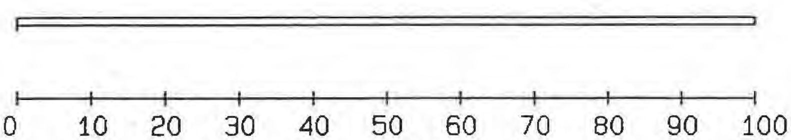
WIND DATA 0700 - 1600 8/23/91
VOC SAMPLES SHL-001 TO SHL-005



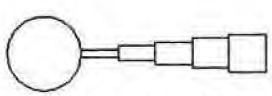
CUMULATIVE WIND SPEED SUMMARY (PERCENT)

MAGNITUDE	1	2	3	4	5	TOTAL
NORTH	33.3	0.0	0.0	0.0	0.0	33.3
NORTHEAST	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHEAST	11.1	0.0	0.0	0.0	0.0	11.1
SOUTH	11.1	0.0	0.0	0.0	0.0	11.1
SOUTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
WEST	22.2	0.0	0.0	0.0	0.0	22.2
NORTHWEST	22.2	0.0	0.0	0.0	0.0	22.2
TOTAL	100.0	0.0	0.0	0.0	0.0	

WINDS	100.0
CALM	0.0
TOTAL	100.0

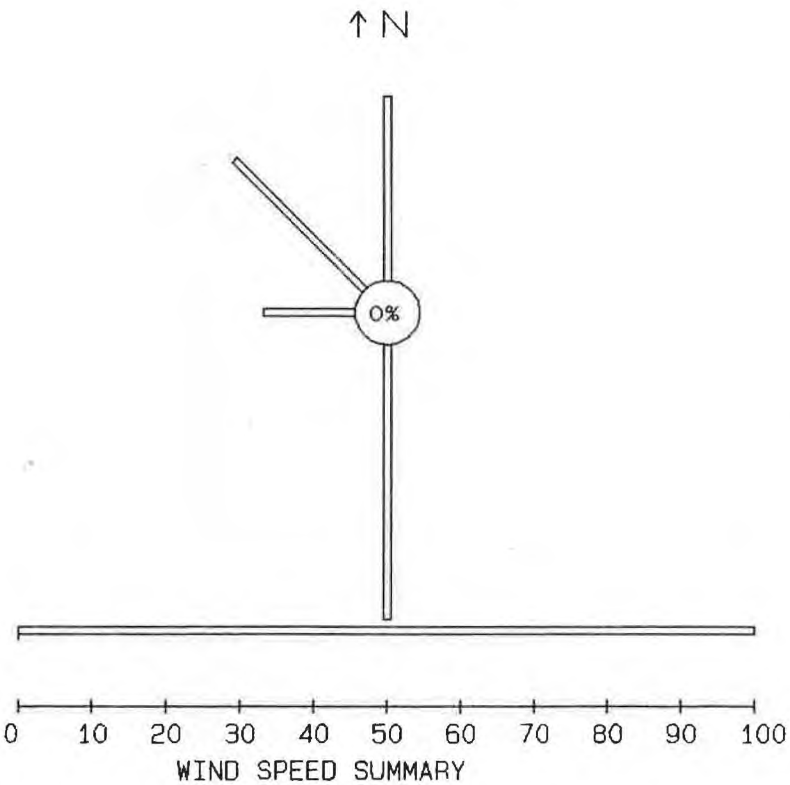


WIND SPEED SUMMARY



MAGNITUDE: CALM - S = 0 : 1 - 0<S<=10 : 2 - 10<S<=21 :
(S=~~KNOTS~~) 3 - 21<S<=33 : 4 - 33<S<=47 : 5 - S>47
MPH

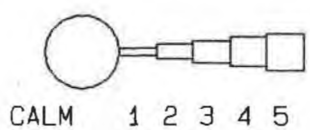
WIND DATA 1600 - 0000 8/23/91
VOC SAMPLES SHL-006 TO SHL-010



CUMULATIVE WIND SPEED SUMMARY (PERCENT)

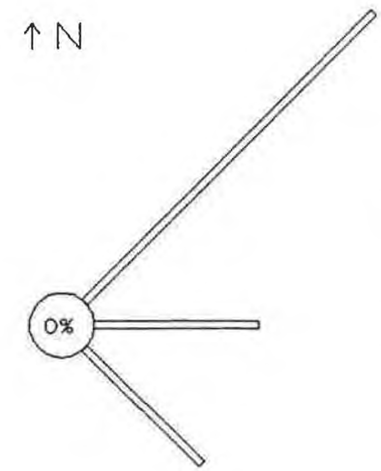
MAGNITUDE	1	2	3	4	5	TOTAL
NORTH	25.0	0.0	0.0	0.0	0.0	25.0
NORTHEAST	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHEAST	0.0	0.0	0.0	0.0	0.0	0.0
SOUTH	37.5	0.0	0.0	0.0	0.0	37.5
SOUTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
WEST	12.5	0.0	0.0	0.0	0.0	12.5
NORTHWEST	25.0	0.0	0.0	0.0	0.0	25.0
TOTAL	100.0	0.0	0.0	0.0	0.0	

WINDS	100.0
CALM	0.0
TOTAL	100.0



MAGNITUDE: CALM - S = 0 : 1 - 0<S<=10 : 2 - 10<S<=21 :
(S=~~KNOTS~~) 3 - 21<S<=33 : 4 - 33<S<=47 : 5 - S>47
MPH

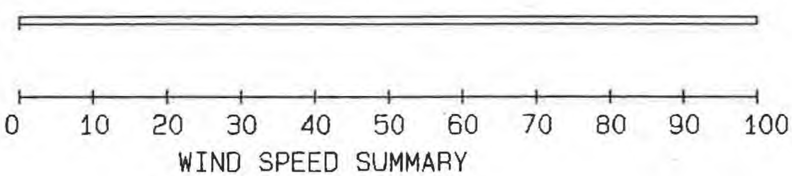
WIND DATA 0900 - 1700 8/24/91
VOC SAMPLE CSB-001

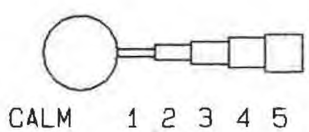


CUMULATIVE WIND SPEED SUMMARY (PERCENT)

MAGNITUDE	1	2	3	4	5	TOTAL
NORTH	0.0	0.0	0.0	0.0	0.0	0.0
NORTHEAST	55.6	0.0	0.0	0.0	0.0	55.6
EAST	22.2	0.0	0.0	0.0	0.0	22.2
SOUTHEAST	22.2	0.0	0.0	0.0	0.0	22.2
SOUTH	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
WEST	0.0	0.0	0.0	0.0	0.0	0.0
NORTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	0.0	0.0	0.0	0.0	

WINDS	100.0
CALM	0.0
TOTAL	100.0

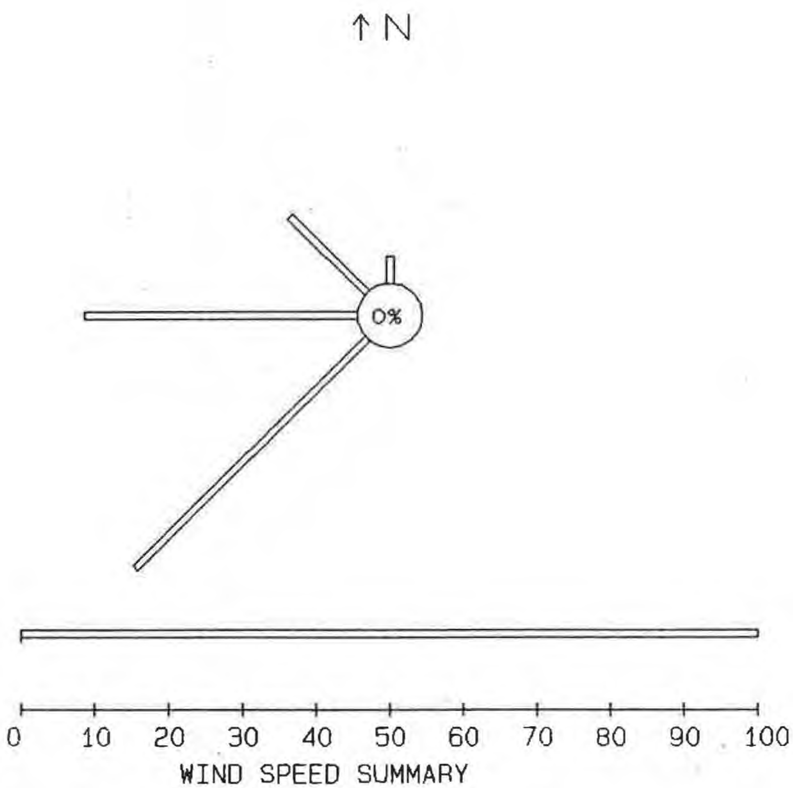




MAGNITUDE: CALM - S = 0 : 1 - 0<S<=10 : 2 - 10<S<=21 :
(S=KNOTS) 3 - 21<S<=33 : 4 - 33<S<=47 : 5 - S>47

M/14

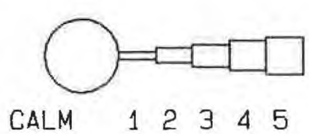
WIND DATA 1200 8/15/91 - 1400 8/16/91
. PM-10 SAMPLES SHL-001 TO SHL-003



CUMULATIVE WIND SPEED SUMMARY (PERCENT)

MAGNITUDE	1	2	3	4	5	TOTAL
NORTH	3.7	0.0	0.0	0.0	0.0	3.7
NORTHEAST	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHEAST	0.0	0.0	0.0	0.0	0.0	0.0
SOUTH	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHWEST	44.4	0.0	0.0	0.0	0.0	44.4
WEST	37.0	0.0	0.0	0.0	0.0	37.0
NORTHWEST	14.8	0.0	0.0	0.0	0.0	14.8
TOTAL	100.0	0.0	0.0	0.0	0.0	

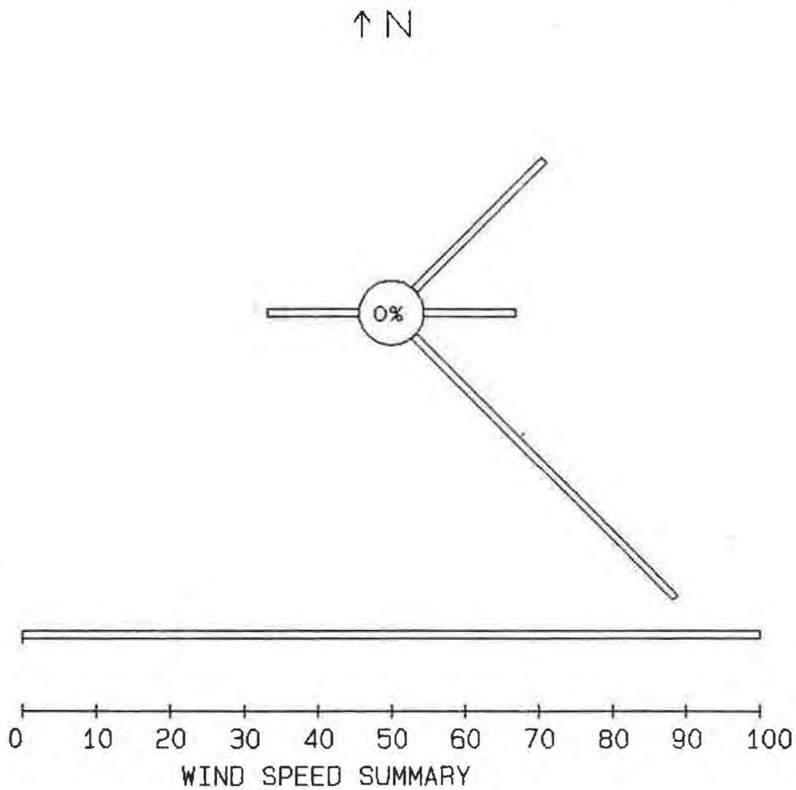
WINDS	100.0
CALM	0.0
TOTAL	100.0



MAGNITUDE: CALM - S = 0 : 1 - 0<S<=10 : 2 - 10<S<=21 :
(S=K~~NOTS~~) 3 - 21<S<=33 : 4 - 33<S<=47 : 5 - S>47
MPH

WDR HV 123

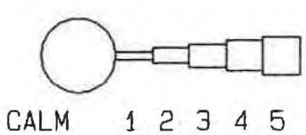
WIND DATA 1600 - 0000 8/24/91
VOC SAMPLE CSB-002



CUMULATIVE WIND SPEED SUMMARY (PERCENT)

MAGNITUDE	1	2	3	4	5	TOTAL
NORTH	0.0	0.0	0.0	0.0	0.0	0.0
NORTHEAST	25.0	0.0	0.0	0.0	0.0	25.0
EAST	12.5	0.0	0.0	0.0	0.0	12.5
SOUTHEAST	50.0	0.0	0.0	0.0	0.0	50.0
SOUTH	0.0	0.0	0.0	0.0	0.0	0.0
SOUTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
WEST	12.5	0.0	0.0	0.0	0.0	12.5
NORTHWEST	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	100.0	0.0	0.0	0.0	0.0	

WINDS	100.0
CALM	0.0
TOTAL	100.0



MAGNITUDE: CALM - S = 0 : 1 - 0<S<=10 : 2 - 10<S<=21 :
(S=~~KNOT~~S) 3 - 21<S<=33 : 4 - 33<S<=47 : 5 - S>47
MPH

APPENDIX C

CALIBRATION DATA

Table 4.3 MFC Calibration Data Sheet

HVPM10 SAMPLER CALIBRATION DATA SHEET
MASS FLOW CONTROLLED UNIT

Sampler Location: SHERLEYS HILL LANDFILL FT DEVENS Date: 8/18/91

Conditions: Ta(K): 301.4 Pa(mmHg): 749.1
Ts(K): 301.4 Ps(mmHg): 750.1

Sampler Model: IP-10 Sampler S/N: CAE 1170 Motor No:.

Orifice S/N: S49 Orifice Cal. Date: 8/30/90 Orifice Model: 25A

Orifice Qa Cal. Relationship: m= 1.27 b= -0.40 r= .9998

Calibration Conducted by: TWF

Cal. Point	Plate No.	Total ΔH20	Qa(orifice) flow rate m3/min	Sampler Response I	Corrected Response IC
1	18	5.90	1.53	1.66	1.05
2	13	4.80	1.41	1.49	0.94
3	10	3.75	1.28	1.30	0.82
4	7	2.50	1.10	1.03	0.65
5	5	1.55	0.94	.80	0.50

Qa(orifice): = 1/m [√ΔH20(Ta/Pa)] - b]
IC = I (√(Ta/Pa)]
Sampler's Qa Calibration Relationship:
Qa(orifice), x-axis, IC, y-axis
m= 0.93 b= -0.38 r= .999
Set Point Flow Rate: 1.13
SFR = 1.13(Ps/Pa)(Ta/Ts)

Sampler Seasonally Adjusted
Calibration Relationship
ms = 1.47 bs= -0.6
ms = m /[√(Ts/Ps)]
bs = b /[√(Ts/Ps)]
Sampler Set Point: 1.06

Table 4.3 MFC Calibration Data Sheet

HVPM10 SAMPLER CALIBRATION DATA SHEET
MASS FLOW CONTROLLED UNIT

Sampler Location: Shepleys Hill Landfill Ft Devens Date: 8/18/91

Conditions: Ta(K): 301.4 Pa(mmHg): 749.1
Ts(K): 301.4 Ps(mmHg): 750.1

Sampler Model: IP-10 Sampler S/N: CAE 1170 Motor No:.

Orifice S/N: S49 Orifice Cal. Date: 8/30/90 Orifice Model: 25A

Orifice Qa Cal. Relationship: m= 1.27 b= -0.40 r= .9998

Calibration Conducted by: TWF

Cal. Point	Plate No.	Total ΔH20	Qa(orifice) flow rate m3/min	Sampler Response I	Corrected Response IC
1	18	5.90	1.53	1.66	1.05
2	13	4.80	1.41	1.49	0.94
3	10	3.75	1.28	1.30	0.82
4	7	2.50	1.10	1.03	0.65
5	5	1.55	0.94	.80	0.50

Qa(orifice): = 1/m [√ΔH20(Ta/Pa)] - b]
IC = I {√(Ta/Pa)]
Sampler's Qa Calibration Relationship:
Qa(orifice), x-axis, IC, y-axis
m= 0.93 b= -0.38 r= .999
Set Point Flow Rate: 1.13
SFR = 1.13(Ps/Pa)(Ta/Ts)

Sampler Seasonally Adjusted Calibration Relationship
ms = 1.47 bs= -0.6
ms = m /[√(Ts/Ps)]
bs = b /[√(Ts/Ps)]
Sampler Set Point: 1.06

1.58

HVPM10 SAMPLER CALIBRATION DATA SHEET
MASS FLOW CONTROLLED UNIT

Sampler Location: Shepley's Hill Landfill- Ft. Devens Date: 8-15-91

Conditions: Ta(K): 298.6 Pa(mmHg): 749.8

Ts(K): 299.2 Ps(mmHg): 749.6

Sampler Model: IP-10 Sampler S/N: CAE 1556 Motor No:.

Orifice S/N: S-49 Orifice Cal. Date: 8-30-90 Orifice Model: 25A

Orifice Qa Cal. Relationship: m= 1.27 b= -0.40 r= .9998

Calibration Conducted by: TWF

Cal. Point	Plate No.	Total ΔH20	Qa(orifice) flow rate m3/min	Sampler Response I	Corrected Response IC
1	18	5.75	1.51	54.0	34.0
2	13	4.45	1.37	49.0	30.9
3	10	3.45	1.24	43.5	27.4
4	7	2.30	1.07	35.5	22.4
5	5	1.50	0.93	28.0	17.6

Qa(orifice): = 1/m [$\sqrt{\Delta H20(Ta/Pa)}$ - b]
IC = I ($\sqrt{(Ta/Pa)}$)
Sampler's Qa Calibration Relationship:
Qa(orifice), x-axis, IC, y-axis
m= 28.33 b= -8.2 r= 0.997
Set Point Flow Rate: 1.127
SFR = 1.13(Ps/Pa)(Ta/Ts)

Sampler Seasonally Adjusted Calibration Relationship
ms = 44.97 bs= -13.05
ms = m /[$\sqrt{(Ts/Ps)}$]
bs = b /[$\sqrt{(Ts/Ps)}$]
Sampler Set Point: 37.5

recycled paper ecology and environment

HVPM10 SAMPLER CALIBRATION DATA SHEET
MASS FLOW CONTROLLED UNIT

Sampler Location: SHEPLEY'S HILL LANDFILL - FT DEVENS Date: 8-15-91

Conditions: Ta(K): 298.6 Pa(mmHg): 749.8
Ts(K): 299.2 Ps(mmHg): 749.6

Sampler Model: IP-10-8000 Sampler S/N: 134-11-88 CAE 1170 Motor No:.

Orifice S/N: S49 Orifice Cal. Date: 8-30-90 Orifice Model: 25A

Orifice Qa Cal. Relationship: m= 1.27 b= -0.40 r= .9998

Calibration Conducted by: TWF

Cal. Point	Plate No.	Total ΔH20	Qa(orifice) flow rate m3/min	Sampler Response I	Corrected Response IC
1	18	5.70	1.50	1.75	1.10
2.	13	4.50	1.37	1.57	0.99
3	10	3.50	1.25	1.37	0.86
4	7	2.30	1.07	1.10	0.69
5	5	1.45	0.92	0.83	0.52

Qa(orifice): = 1/m [√ΔH20(Ta/Pa)] - b]
IC = I (√(Ta/Pa)]
Sampler's Qa Calibration Relationship:
Qa(orifice), x-axis, IC, y-axis
m= 1.00 b= -0.39 r= .999
Set Point Flow Rate: 1.127
SFR = 1.13(Ps/Pa)(Ta/Ts)

Sampler Seasonally Adjusted
Calibration Relationship
ms = .63 bs= -0.25
ms = m /[√(Ts/Ps)]
bs = b /[√(Ts/Ps)]
Sampler Set Point: 1.16

HVPM10 SAMPLER CALIBRATION DATA SHEET
MASS FLOW CONTROLLED UNIT

Sampler Location: FT DEVENS BACKGROUND   Date: 8-15-91

Conditions: Ta(K): 298.1   Pa(mmHg): 750.6
Ts(K): 299.2   Ps(mmHg): 749.6

Sampler Model: IP-10   Sampler S/N: CAE 1557   Motor No:.

Orifice S/N: S49   Orifice Cal. Date: 8-30-90   Orifice Model: 25A

Orifice Qa Cal. Relationship: m= 1.27 b= -0.40 r= .9998

Calibration Conducted by: TWF

Cal. Point	Plate No.	Total ΔH20	Qa(orifice) flow rate m3/min	Sampler Response I	Corrected Response IC
1	18	5.65	1.50	61	38.43
2	13	4.40	1.36	54	34.02
3	10	3.45	1.24	48	30.24
4	7	2.30	1.07	39	24.57
5	5	1.45	0.92	30	18.90

Qa(orifice): = 1/m [$\sqrt{\Delta H20(Ta/Pa)}$ - b]
IC = I [$\sqrt{(Ta/Pa)}$]
Sampler's Qa Calibration Relationship:
Qa(orifice), x-axis, IC, y-axis
m= 33.5 b= -11.57 r= .999
Set Point Flow Rate: 1.125
SFR = 1.13(Ps/Pa)(Ta/Ts)

Sampler Seasonally Adjusted
Calibration Relationship
ms = 53.2 bs= -18.4
ms = m /[$\sqrt{(Ts/Ps)}$]
bs = b /[$\sqrt{(Ts/Ps)}$]
Sampler Set Point: ~~41.3~~ 41.4

APPENDIX D

LABORATORY REPORTS

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Ecology & Environment
368 Pleasantview Drive
Lancaster, NY 14086

Date: September 27, 1991

Attn: Tom Ferrera

Project Number 41072

This is the Certificate of Analysis for the following samples:

Client Project ID:	Ecology & Environment; Fort Devens RI
Date Received:	August 28, 1991
Work Order:	X1-08-196
Number of Samples:	10
Sample Type:	Air

I. Introduction

Ten air samples arrived at ITAS Cincinnati on August 28, 1991. The samples were labeled as follows:

HV-SHL-1	HV-SHL-8
HV-SHL-2	HV-SHL-9
HV-SHL-3	HV-CSB-01
HV-SHL-4	HV-CSB-02
HV-SHL-7	HV-SHL-5 (1)

(1) This sample was not included on any Ecology & Environment paperwork submitted.

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. The data will include sample identification information, the analytical results, and the appropriate detection limits.

The analyses requested and methods used are listed on the following page.

Reviewed and Approved by:

Lauri Rotella

Lauri Rotella
Project Manager
108196

II. Analytical Results/Methodology (con't)

* Arsenic, Cadmium, Chromium, Lead and Selenium by Graphite Furnace Atomic Absorption

* Silver by Inductively Coupled Plasma Spectroscopy

* Total particulate analyzed gravimetrically

III. Quality Control

Immediately following the analytical data for the samples can be found the QA/QC information that pertains to these samples. The purpose of this information is to demonstrate that the data enclosed is scientifically valid and defensible. This QA/QC data is used to assess the laboratory's performance during the analysis of the samples it accompanies. All quantitations were performed within the calibrated range of the analytical instrument.

Client: Ecology & Environment
Work Order: X1-08-196
10819602

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analytical Results, mg

Client Sample ID	Lab No.	Filter #	Total Particulate
HV-SHL-1	01	89952161	44
HV-SHL-2	02	89952164	46
HV-SHL-3	03	89952163	49
HV-SHL-4	04	89952165	55
HV-SHL-7	05	89952170	24
HV-SHL-8	06	89952171	21
HV-SHL-9	07	89952172	ND
HV-CSB-01	08	89952168	81
HV-CSB-02	09	89952169	38
HV-SHL-5	10	89952166	59
Detection Limit			0.002

ND = Not detected above the reported detection limit

Client: Ecology & Environment
Work Order: X1-08-196
10819603

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analytical Results, ug

Client Sample ID	HV-SHL-1	HV-SHL-2	HV-SHL-3	HV-SHL-4	
Lab No.	01	02	03	04	
Analyte					Detection Limit
Arsenic	ND	ND	ND	ND	2
Cadmium	0.4	0.7	0.3	0.4	0.1
Chromium	2.3	2.4	9.5	2.9	0.2
Lead	7.9	8.2	7.8	4.6	0.9
Selenium	ND	-	-	ND	2
Silver	ND	-	-	ND	0.5

Client Sample ID	HV-SHL-7	HV-SHL-8	HV-SHL-9	HV-CSB-01	
Lab No.	05	06	07	08	
Analyte					Detection Limit
Arsenic	ND	ND	ND	ND	2
Cadmium	0.3	0.4	0.2	-	0.1
Chromium	2.4	1.9	3.1	-	0.2
Lead	8.0	5.4	0.96	-	0.9
Selenium	-	-	ND	3.2	2
Silver	-	-	ND	ND	0.5

Client Sample ID	HV-CSB-02	HV-SHL-5	
Lab No.	09	10	
Analyte			Detection Limit
Arsenic	ND	ND	2
Cadmium	-	0.4	0.1
Chromium	-	4.2	0.2
Lead	-	12	0.9
Selenium	ND	-	2
Silver	ND	-	0.5

ND = Not detected above the reported detection limit
- = Not requested

Quality Assurance Data

Quality Control
Standard Reference Solution

Analyte	Theoretical Value	Percent Recovery
Arsenic	0.075	92.5
Cadmium	0.0075	95.3
Chromium	0.0075	88.0
Lead	0.075	101
Selenium	0.075	85.5
Silver	1	110

ecology and environment, inc.
368 PLEASANTVIEW DRIVE, LANCASTER, NEW YORK 14086, TEL. 716/684-8060
International Specialists in the Environment

X1-08-196

CHAIN-OF-CUSTODY RECORD

Page

Project No.: UC-2061 | Project Name: Fort Devens RI | Project Manager: Bob King

Samplers (Signatures): Matthew Kim [signature] | Field Team Leader: Keith Davison

Analysis: Total mass; Pb, Cd, As, Cr (total); Se, Ag, As

	STATION NUMBER	DATE	TIME	COMP	GRAB	AIR	SAMPLE INFORMATION EXPECTED COMPOUNDS (Concentration)*	STATION LOCATION	NUMBER OF CONTAINERS	Total mass	Pb, Cd, As, Cr (total)	Se, Ag, As				REMARKS Filter #
✓	SHL-1	8/15/91				✓	Metals / Particulates	ELEM	1	✓	✓	✓				8995261
✓	SHL-2	"				✓		DWE	1	✓	✓					8995264
✓	SHL-3	"				✓		DWN	1	✓	✓					8995263
✓	SHL-4	8/16/91				✓		ELEM	1	✓	✓	✓				8995265
✓	SHL-7	8/24/91				✓		DWE	1	✓	✓					8995270
✓	SHL-8	8/24/91				✓		DWS	1	✓	✓					8995271
✓	SHL-9	8/24/91				✓		BLANK	1	✓	✓	✓				8995272 BLANK
✓	CSB-01	8/18/91				✓		800E 400N	1	✓		✓				8995268
✓	CSB-02	8/24/91				✓		800E 400N	1	✓		✓				8995269

Relinquished By (Signature)	Date/Time	Received By (Signature)	Relinquished By (Signature)	Date/Time	Received By (Signature)	Ship Via
T.W. [signature]	8/26/91 1420					FED EX
Relinquished By (Signature)	Date/Time	Received By (Signature)	Relinquished By (Signature)	Date/Time	Received By (Signature)	BL/Airbill Number
Relinquished By (Signature)	Date/Time	Received For Laboratory By (Signature)	Relinquished By (Signature)	Date/Time	Received For Laboratory By (Signature) [signature] 8/27/91	798 2990 337

Distribution: Original Accompanies Shipment, Copy to Coordinator Field Files
*See CONCENTRATION RANGE on back of form.

ecology and environment, inc.
368 PLEASANTVIEW DRIVE, LANCASTER, NEW YORK 14086, TEL. 716/684-8060
International Specialists in the Environment

XI-08-196

CHAIN-OF-CUS

Project No.: UC-2061	Project Name: Fort Devens RI	Project Manager: Bob King
Samplers: (Signatures) Matthew Kim [signature]		Field Team Leader: Keith Dav

	STATION NUMBER	DATE	TIME	SAMPLE TYPE COMP	GRAB	AIR	SAMPLE INFORMATION EXPECTED COMPOUNDS (Concentration)*	STATI
HV-	SHL-1	8/15/91				✓	Metals / Particulates	ELE
HV-	SHL-2	"				✓		DWE
HV-	SHL-3	"				✓		DWN
HV-	SHL-4	8/16/91				✓		ELE
HV-	SHL-7	8/24/91				✓		DW
HV-	SHL-8	8/24/91				✓		DW
HV-	SHL-9	8/24/91				✓		BLAN
HV-	CSB-01	8/18/91				✓		800E
HV-	CSB-02	8/23/91				✓		800E

Relinquished By: (Signature)	Date/Time:	Received By: (Signature)	Relinquished By: (Signature)
TW [signature]	8/26/91 1420		
Relinquished By: (Signature)	Date/Time:	Received By: (Signature)	Relinquished By: (Signature)
Relinquished By: (Signature)	Date/Time:	Received For Laboratory By: (Signature)	Relinquished By: (Signature)

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files
*See CONCENTRATION RANGE on back of form.

INTERNATIONAL TECHNOLOGY CORPORATION

ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

Ecology & Environment
368 Pleasantview Drive
Lancaster, NY 14086

Date: October 7, 1991

Attn: Mr. Tom Ferrera

Job Number 41072

This is the Certificate of Analysis for the following samples:

Client Project ID:	Ecology & Environment
Date Received:	August 28, 1991
Work Order:	X1-08-195
Number of Samples:	13
Sample Type:	Air

I. Introduction

Thirteen canister samples arrived at ITAS Cincinnati on August 28, 1991. The samples were labeled as follows:

Canister # SHL-1	Canister # SHL-6	Canister # SHL-11
Canister # SHL-2	Canister # SHL-7	Canister # CSB-1
Canister # SHL-3	Canister # SHL-8	Canister # CSB-2
Canister # SHL-4	Canister # SHL-9	
Canister # SHL-5	Canister # SHL-10	

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. The data will include sample identification information, the analytical results, and the appropriate detection limits.

The analysis requested was Volatile Organics by Gas Chromatography/Mass Spectrometry EPA Method TO14.

The analyses were performed at Air Toxics, LTD. under ITAS Subcontract.

Reviewed and Approved by:

Lauri Rotella

Lauri Rotella
Project Manager
108195

III. Quality Control

Immediately following the analytical data for the samples can be found the QA/QC information that pertains to these samples. The purpose of this information is to demonstrate that the data enclosed is scientifically valid and defensible. This QA/QC data is used to assess the laboratory's performance during the analysis of the samples it accompanies. All quantitations were performed within the calibrated range of the analytical instrument.

IV. Comments

As part of routine Internal Quality Control, a method spike was analyzed with these samples. The recovery for Benzyl Chloride (59%) on this analysis was below internal acceptance limits (70-130).

Client: Ecology and Environment
Work Order: X1-08-195
10819502

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID		Canister # SHL-1	
Lab Sample No		01	
Date analayzed:		9/20/91	Detection Limit
Dilution Factor:	1.0		
Toluene		1.7	1
Benzene		ND	1
1,2-Dichloroethane		ND	1
Total Xylenes		ND	1
Carbon Tetrachloride		ND	1
Chloroethane		ND	1
Chloroform		ND	1
Chloromethane		ND	1
trans-1,2-Dichloroethene		ND	1
cis-1,2-Dichloroethene		ND	1
Dichloromethane		ND	1
Tetrachloroethene		ND	1
1,1,1-Trichloroethane		ND	1
Trichloroethene		ND	1
Vinyl Chloride		ND	1
1,1-Dichloroethene		ND	1
3-Chloropropene		ND	1
1,1,2-Trichlorotrifluoroethane		ND	1
1,1-Dichloroethane		ND	1
1,1,2-Trichloroethane		ND	1
Chlorobenzene		ND	1
1,2-Dichloropropane		ND	1
cis-1,3-Dichloropropene		ND	1
trans-1,3-Dichloropropene		ND	1
Ethyl Benzene		ND	1
1,1,2,2-Tetrachloroethane		ND	1
Benzyl Chloride		ND	1
1,3-Dichlorobenzene		ND	1
1,4-Dichlorobenzene		ND	1
1,2-Dichlorobenzene		ND	1
Carbon Disulfide		ND	1
Styrene		ND	1
1,3-Butadiene		ND	1
Hexachlorobutadiene		ND	1
n-Pentane		ND	1
n-Octane		ND	1
Cumene		ND	1
1,2,4-Trichlorobenzene		ND	1
Dichlorodifluoromethane		ND	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819503

IT ANALYTICAL SERVICES
CINCINNATI, OH

	Analyte Concentration, PPBV	
Client Sample ID	Canister # SHL-2	
Lab Sample No	02	
Date analayzed:	9/20/91	Detection
Dilution Factor: 2.2		Limit
Toluene	4.9	3
Benzene	ND	3
1,2-Dichloroethane	ND	3
Total Xylenes	ND	3
Carbon Tetrachloride	ND	3
Chloroethane	ND	3
Chloroform	ND	3
Chloromethane	ND	3
trans-1,2-Dichloroethene	ND	3
cis-1,2-Dichloroethene	ND	3
Dichloromethane	ND	3
Tetrachloroethene	ND	3
1,1,1-Trichloroethane	ND	3
Trichloroethene	ND	3
Vinyl Chloride	ND	3
1,1-Dichloroethene	ND	3
3-Chloropropene	ND	3
1,1,2-Trichlorotrifluoroethane	ND	3
1,1-Dichloroethane	ND	3
1,1,2-Trichloroethane	ND	3
Chlorobenzene	ND	3
1,2-Dichloropropane	ND	3
cis-1,3-Dichloropropene	ND	3
trans-1,3-Dichloropropene	ND	3
Ethyl Benzene	ND	3
1,1,2,2-Tetrachloroethane	ND	3
Benzyl Chloride	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	3
1,2-Dichlorobenzene	ND	3
Carbon Disulfide	ND	3
Styrene	ND	3
1,3-Butadiene	ND	3
Hexachlorobutadiene	ND	3
n-Pentane	ND	3
n-Octane	ND	3
Cumene	ND	3
1,2,4-Trichlorobenzene	ND	3
Dichlorodifluoromethane	ND	3

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819504

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID	Canister # SHL-3	
Lab Sample No	03	
Date analayzed:	9/20/91	Detection Limit
Dilution Factor: 1.0		
Toluene	1.3	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	1.1	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819505

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID	Canister # SHL-4	
Lab Sample No	04	
Date analayzed:	9/20/91	Detection
Dilution Factor: 1.0		Limit
Toluene	1.1	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	ND	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819507

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID	Canister # SHL-5	
Lab Sample No	05	
Date analayzed:	9/21/91	Detection Limit
Dilution Factor: 1.0		
Toluene	1.4	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	1.1	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819506

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID	Canister # SHL-6	
Lab Sample No	06	
Date analayzed:	9/21/91	Detection
Dilution Factor: 1.0		Limit
Toluene	1.4	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	ND	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819508

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID	Canister # SHL-7	
Lab Sample No	07	
Date analayzed:	9/21/91	Detection
Dilution Factor: 1.0		Limit
Toluene	ND	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	ND	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819509

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID	Canister # SHL-8	
Lab Sample No	08	
Date analayzed:	9/21/91	Detection Limit
Dilution Factor: 1.0		
Toluene	1.3	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	1.4	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819510

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID	Canister # SHL-9	
Lab Sample No	09	
Date analayzed:	9/21/91	Detection
Dilution Factor: 1.0		Limit
Toluene	1.3	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	1.2	1

ND = Not detected at or below the reported detection limit

Analyte Concentration, PPBV

Client Sample ID	Canister # SHL-10	
Lab Sample No	10	
Date analayzed:	9/21/91	Detection
Dilution Factor: 1.0		Limit
Toluene	4.5	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	1.3	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	1.1	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819512

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

	Canister # SHL-11	
Client Sample ID	Canister #	
	SHL-11	
Lab Sample No	11	
Date analayzed:	9/21/91	Detection
Dilution Factor: 1.0		Limit
Toluene	ND	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	ND	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819513

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

	Canister # CSB-1	
Client Sample ID	Canister # CSB-1	
Lab Sample No	12	
Date analayzed:	9/21/91	Detection Limit
Dilution Factor: 1.0		
Toluene	1.3	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	3.1	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	ND	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819514

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID		Canister # CSB-2	
Lab Sample No		13	
Date analayzed:		9/21/91	Detection
Dilution Factor:	1.0		Limit
		------------	----------
Toluene		ND	1
Benzene		ND	1
1,2-Dichloroethane		ND	1
Total Xylenes		ND	1
Carbon Tetrachloride		ND	1
Chloroethane		ND	1
Chloroform		ND	1
Chloromethane		ND	1
trans-1,2-Dichloroethene		ND	1
cis-1,2-Dichloroethene		ND	1
Dichloromethane		ND	1
Tetrachloroethene		ND	1
1,1,1-Trichloroethane		ND	1
Trichloroethene		ND	1
Vinyl Chloride		ND	1
1,1-Dichloroethene		ND	1
3-Chloropropene		ND	1
1,1,2-Trichlorotrifluoroethane		ND	1
1,1-Dichloroethane		ND	1
1,1,2-Trichloroethane		ND	1
Chlorobenzene		ND	1
1,2-Dichloropropane		ND	1
cis-1,3-Dichloropropene		ND	1
trans-1,3-Dichloropropene		ND	1
Ethyl Benzene		ND	1
1,1,2,2-Tetrachloroethane		ND	1
Benzyl Chloride		ND	1
1,3-Dichlorobenzene		ND	1
1,4-Dichlorobenzene		ND	1
1,2-Dichlorobenzene		ND	1
Carbon Disulfide		ND	1
Styrene		ND	1
1,3-Butadiene		ND	1
Hexachlorobutadiene		ND	1
n-Pentane		ND	1
n-Octane		ND	1
Cumene		ND	1
1,2,4-Trichlorobenzene		ND	1
Dichlorodifluoromethane		1.1	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819518

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID	Method Blank	
Lab Sample No		
Date analayzed:	9/20/91	Detection
Dilution Factor: 1.0		Limit
Toluene	ND	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	ND	1

ND = Not detected at or below the reported detection limit

Client: Ecology and Environment
Work Order: X1-08-195
10819516

IT ANALYTICAL SERVICES
CINCINNATI, OH

Analyte Concentration, PPBV

Client Sample ID	Method Blank	
Lab Sample No		
Date analayzed:	9/21/91	Detection
Dilution Factor: 1.0		Limit
Toluene	ND	1
Benzene	ND	1
1,2-Dichloroethane	ND	1
Total Xylenes	ND	1
Carbon Tetrachloride	ND	1
Chloroethane	ND	1
Chloroform	ND	1
Chloromethane	ND	1
trans-1,2-Dichloroethene	ND	1
cis-1,2-Dichloroethene	ND	1
Dichloromethane	ND	1
Tetrachloroethene	ND	1
1,1,1-Trichloroethane	ND	1
Trichloroethene	ND	1
Vinyl Chloride	ND	1
1,1-Dichloroethene	ND	1
3-Chloropropene	ND	1
1,1,2-Trichlorotrifluoroethane	ND	1
1,1-Dichloroethane	ND	1
1,1,2-Trichloroethane	ND	1
Chlorobenzene	ND	1
1,2-Dichloropropane	ND	1
cis-1,3-Dichloropropene	ND	1
trans-1,3-Dichloropropene	ND	1
Ethyl Benzene	ND	1
1,1,2,2-Tetrachloroethane	ND	1
Benzyl Chloride	ND	1
1,3-Dichlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1
Carbon Disulfide	ND	1
Styrene	ND	1
1,3-Butadiene	ND	1
Hexachlorobutadiene	ND	1
n-Pentane	ND	1
n-Octane	ND	1
Cumene	ND	1
1,2,4-Trichlorobenzene	ND	1
Dichlorodifluoromethane	ND	1

ND = Not detected at or below the reported detection limit

Quality Assurance Data

Surrogate Recovery, Percent

Client Sample ID	Lab No.	Octofluoro-toluene	4-Bromofluoro-benzene	1,2-Dichloro-benzene-d4
Canister # SHL-1	01	90	102	89
Canister # SHL-2	02	85	114	96
Canister # SHL-3	03	90	111	84
Canister # SHL-4	04	86	113	88
Canister # SHL-5	05	91	107	91
Canister # SHL-6	06	89	104	89
Canister # SHL-7	07	87	115	97
Canister # SHL-8	08	90	104	93
Canister # SHL-9	09	92	102	90
Canister # SHL-10	10	90	105	91
Canister # SHL-11	11	101	90	79
Canister # CSB-1	12	88	101	84
Canister # CSB-2	13	91	102	88
Method Blank	9/20/91	107	94	85
Method Blank	9/21/91	108	92	83

Client: Ecology and Environment
Work Order: X1-08-195
10819550

IT ANALYTICAL SERVICES
CINCINNATI, OH

Client Sample ID: Method Spike

Lab Sample No

Date analyzed:	9/21/91	Detection
Dilution Factor: 1.0	% recovery	Limit
Toluene	94	1
Benzene	100	1
1,2-Dichloroethane	95	1
Total Xylenes	101	1
Carbon Tetrachloride	97	1
Chloroethane	103	1
Chlor[illegible]	99	1
Chloromethane	106	1
trans-1,2-Dichloroethene	NS	1
cis-1,2-Dichloroethene	97	1
Dichloromethane	98	1
Tetrachloroethene	105	1
1,1,1-Trichloroethane	104	1
Trichloroethene	111	1
Vinyl Chloride	103	1
1,1-Dichloroethene	105	1
3-Chloropropene	92	1
1,1,2-Trichlorotrifluoroethane	109	1
1,1-Dichloroethane	100	1
1,1,2-Trichloroethane	103	1
Chlorobenzene	102	1
1,2-Dichloropropane	101	1
cis-1,3-Dichloropropene	82	1
trans-1,3-Dichloropropene	95	1
Ethyl Benzene	102	1
1,1,2,2-Tetrachloroethane	94	1
Benzyl Chloride	59 Q	1
1,3-Dichlorobenzene	[illegible]	1
1,4-Dichlorobenzene	93	1
1,2-Dichlorobenzene	95	1
Carbon Disulfide	83	1
Styrene	93	1
1,3-Butadiene	104	1
Hexachlorobutadiene	89	1
n-Pentane	86	1
n-Octane	88	1
Cumene	86	1
1,2,4-Trichlorobenzene	85	1
Dichlorodifluoromethane	103	1

Q = Outside internal acceptance limits

APPENDIX H

EM-31 AND MAGNETOMETER SURVEYS AT COLD SPRING BROOK LANDFILL

UC2053/RC276

EM-31 AND MAGNETOMETER SURVEY
AT COLD SPRING BROOK LANDFILL
FORT DEVENS
AYER, MASSACHUSETTS

Delivery Order 0001
ELIN A004
November 1991

Prepared for:

Commander
United States Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, MD 21010-5400

Prepared by:
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Arlington, VA 22209

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1. INTRODUCTION

Ecology and Environment, Inc. (E & E) prepared this report on the geophysical investigation conducted at Cold Spring Brook Landfill at Fort Devens in Ayer, Massachusetts, under contract to the United States Army Toxic and Hazardous Materials Agency (USATHAMA).

The geophysical survey, conducted from June 3 to June 6, 1991, consisted of an EM-31 (electromagnetic terrain conductivity) survey and magnetometry survey. This report documents the results of both surveys. The objectives of this report are described in Section 2, while the methods used in conducting the surveys are described in Section 3. Interpretation of the data obtained from the survey area is provided in Section 4, and E & E's conclusions and recommendations are summarized in Section 5. For the geophysical survey performed at this site, field data are provided in Appendix A and contour maps in Appendix B.

2. OBJECTIVES

E & E designed the geophysical survey program at Cold Spring Brook Landfill to achieve several general goals. The main objectives of the proposed geophysical surveys at this RI site were:

- To delineate the actual boundaries of the landfill. Although the northern boundary of the landfill is defined by the southern edge of Cold Spring Brook Pond and the base of the very obvious break in slope of the fill material onto the wetland, the landfill's southern, eastern, and western boundaries were not known.
- To optimize and provide cost effective surface and/or subsurface sampling locations in and around the landfill.
- To identify subsurface site conditions with regard to buried, conductive wastes.
- To delineate (if possible) the groundwater contamination plume.

3. SURVEY METHODOLOGY

To meet the main objective of the geophysical survey, which is to delineate landfill boundaries at Cold Spring Brook, E & E designed and implemented a grid survey. Where possible, E & E maintained the grid traverse lines perpendicular to the expected landfill boundaries.

The grid survey was established and extended behind the area reported to contain the Cold Spring Brook Landfill (see Figure 3-1). The x- and y-axes of the survey grid were generally oriented in a east to west and north to south direction, respectively. Patton Road runs generally east to west in this area, and was, therefore, used as reference. Two east to west oriented traverse lines (Y=260 and Y=280) are actually located directly on Patton Road. Survey grid coordinate (0,-80) is located in the southwest corner of the contour map. Semi-permanent stakes or painted areas mark the starting and ending points of the traverse lines.

E & E surveyed an area of 600 feet by 950 feet, which remained the same for both the EM-31 survey and the magnetometer survey, although the station spacing varies. Terrain conductivity and magnetic field were measured along traverse lines 50 feet apart, at 20- and 10-foot intervals. The 10-foot data interval is the recommended spacing used for the magnetic survey. At each station, both vertical and horizontal dipole readings in a north to south orientation were recorded. The exploration depths of the EM-31 in the vertical and horizontal dipole modes are 18 feet and 9 feet, respectively. These depths are considered adequate to delineate buried waste materials that may be encountered during the investigation at Cold Spring Brook Landfill. To minimize interferences created by surface magnetic objects, the magnetometer was mounted on a 6-foot staff so that, in effect, measurements were made 6 feet above ground surface.

To ensure proper functioning and calibration of instruments used in the field, E & E performed a series of checks recommended by the manufacturer prior to starting the geophysical survey. As part of quality assurance and quality control (QA/QC), an EM-31 calibration line was established approximately 500 feet west of the survey grid in an undisturbed clean area. Reported readings, both before and after the EM-31 survey, were taken at calibration or background line to confirm repeatability and proper calibration of the EM-31 conductivity meter. The background readings were taken at Stations 1, 2, 3, and 4, from west to east, in both the vertical and horizontal dipole modes.

EM-31 background data are reported on Table 3-1.

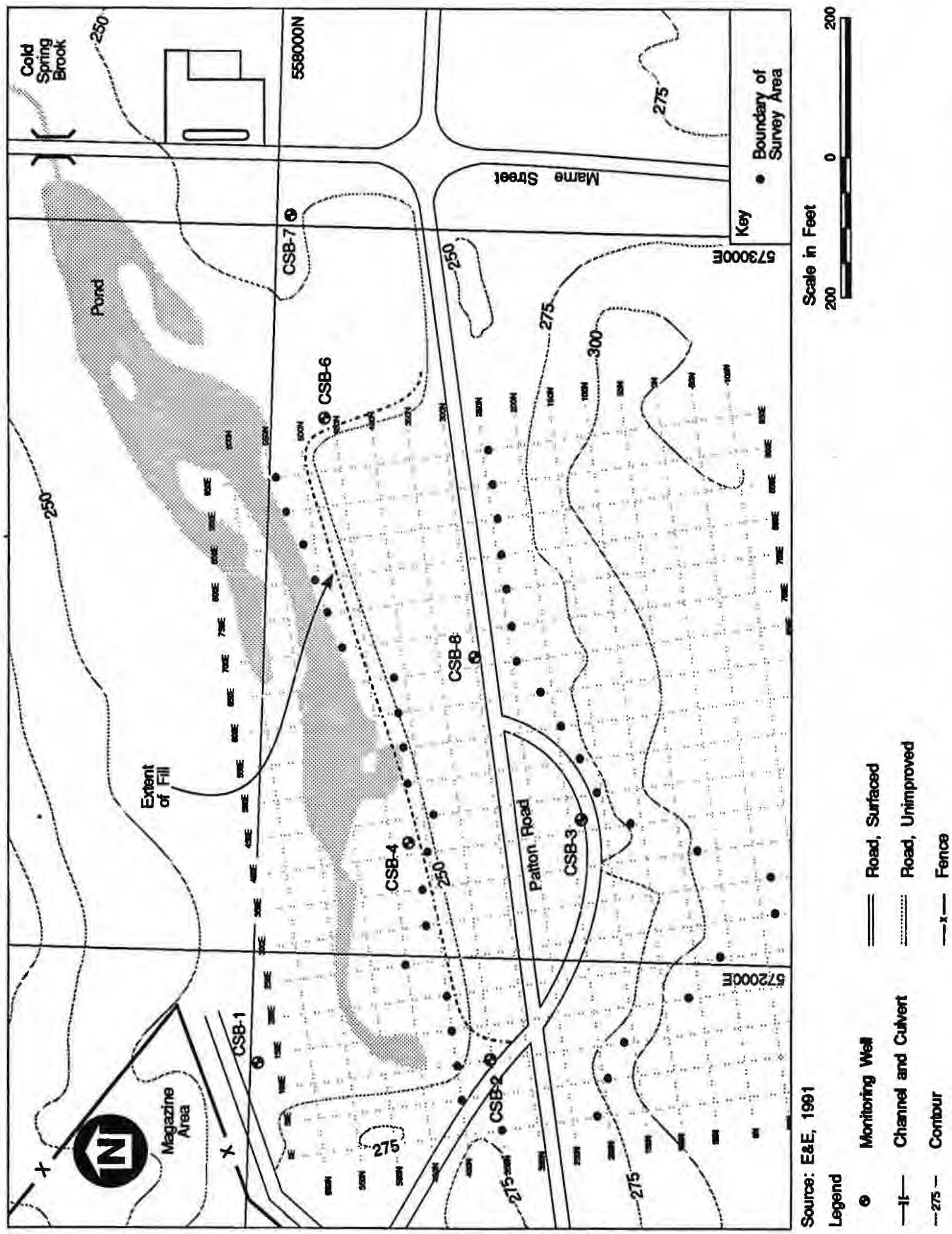


Figure 3-1 COLD SPRING BROOK LANDFILL, GEOPHYSICAL INVESTIGATION TRAVERSE LINE MAP

TABLE 3-1

EM-31 Background Data

Background Station No.	Vertical Dipole (millimhos/meter)	Horizontal Dipole (millimhos/meter)	
1	3.4	3.0	
2	3.8	3.2	Background taken
3	3.6	3.2	before EM-31
4	3.6	3.2	survey
1	3.3	3.0	
2	3.8	3.2	Background taken
3	3.6	3.3	after EM-31
4	3.6	3.2	survey

The negligible change in background readings ensures proper functioning of the EM-31 throughout the survey. This consistency will allow the amount of diurnal variation (natural change in the earth's field magnetics), which would occur during the daily survey, to be accurately measured. Also, as part of magnetic QA/QC, a diurnal station was set up at station 250N/350E. A series of five readings were taken at the diurnal station before, during, and after the magnetic survey.

4. INSTRUMENTATION

The terrain conductivity survey was conducted using an EM-31 conductivity meter. The EM-31 conductivity meter, manufactured by Geonic Ltd., is a portable, one-person unit that has two coils separated by a fiber pole.

The instrument is calibrated by the manufacturer to provide a direct reading of subsurface conductivity in millimhos per meter (mmhos./m). Data can be recorded in a field notebook or data sheet or in a data logger. EM-31 data at Fort Devens were recorded in an Omni data logger Model 516GE-64-A. The data logger is connected to the EM-31 conductivity meter through a cable and carried by the person conducting the survey. Prior to starting the survey, the EM-31 conductivity meter was calibrated and checked as recommended by the manufacturer and the appropriate survey parameters were set in an Omni data logger. The use of the data logger in this survey reduced the chance of potential mistakes or errors that may occur in handwritten readings, and expedited completion of the survey.

Magnetic surveying at Cold Spring Brook Landfill was accomplished through the use of a Proton Precession Magnetometer (a portable model G-856 magnetometer manufactured by EG&G Geometrics). The mode in which the magnetometer was used had a sensitivity capable of measuring the absolute value of the earth's magnetic field to within 0.1 gamma. This instrument is battery operated, and has a digital LED display and an electronic memory capable of storing more than 1,000 readings. The memory was transferred electronically to a computer for data processing.

5. DATA REDUCTION AND INTERPRETATION METHODOLOGY

Data collected infield for both EM-31 conductivity and magnetic field measurements were subject to data reduction. Steps used in data reduction and interpretation of terrain conductivity and total magnetic field data are described below.

Terrain Conductivity Data:

- Terrain conductivity data recorded infield through the data logger were transferred to a computer. A hard copy of data is produced.
- The recorded data are checked for correctness.
- Conductivity values for both horizontal and vertical dipoles are plotted and contoured on maps along each traverse line.
- The terrain conductivity contour maps are examined for elevated and/or lowered conductivity values (anomalies) that could not be attributed to known, naturally existing or manmade subsurface conditions or cultural features.

Magnetic data:

- Magnetic data recorded into the memory of the magnetometer were electronically transferred into a computer. A hard copy of the data is produced.
- Data from traverse lines were plotted by computer as magnetic field profile lines, with the magnetic field as the y-axis and the distance in feet as the x-axis. Data were also plotted by computer to produce the magnetic field contour map.
- Anomalies that represented magnetic objects were identified on profiles and the contour map.
- Anomalies caused by surficial objects (such as pipe racks, steel, or iron materials) were identified by reference to the site map and field notes taken during the survey.
- Areas where the magnetic field had been disturbed by buried ferro-magnetic objects were identified.
- Magnetic anomalies were correlated with the terrain conductivity anomalies for further confirmation of identified buried conductive wastes.

6. SURVEY RESULTS

6.1 TERRAIN CONDUCTIVITY (EM-31) SURVEY RESULTS

The EM-31 survey was intended to define the landfill boundaries and to identify possible buried conductive wastes. The results of the EM-31 survey are presented in the following sections.

6.1.1 Landfill Boundaries

The northern and eastern boundaries of the landfill were marked by the edges of the Cold Spring Brook Pond and the base of the very obvious break in slope of the fill material onto the wetland. The southern and western boundaries of the landfill were identified through EM-31 traverse lines 1 through 20 (see Figure 3-1). Figures 6-1 and 6-2 indicate that the southern and western boundaries of the landfill are defined by the transitional zone between and anomalous area identified north of Patton Road and an apparent undisturbed area, identified south of Patton Road. The transitional zone, or southern boundary of the landfill, is marked by a conductivity contour line of 6 or 7 mmhos./m, which coincides also with the location of Patton Road.

The western boundary of the landfill is marked by the conductivity contour line 6 or 7 mmhos./m, which runs north to south along line Nos. 3 and 4 (see Figures 6-1 and 6-2).

The consistency of the finding on landfill boundaries by both vertical and horizontal dipoles indicate that the waste materials may be buried 20 feet or more below ground surface.

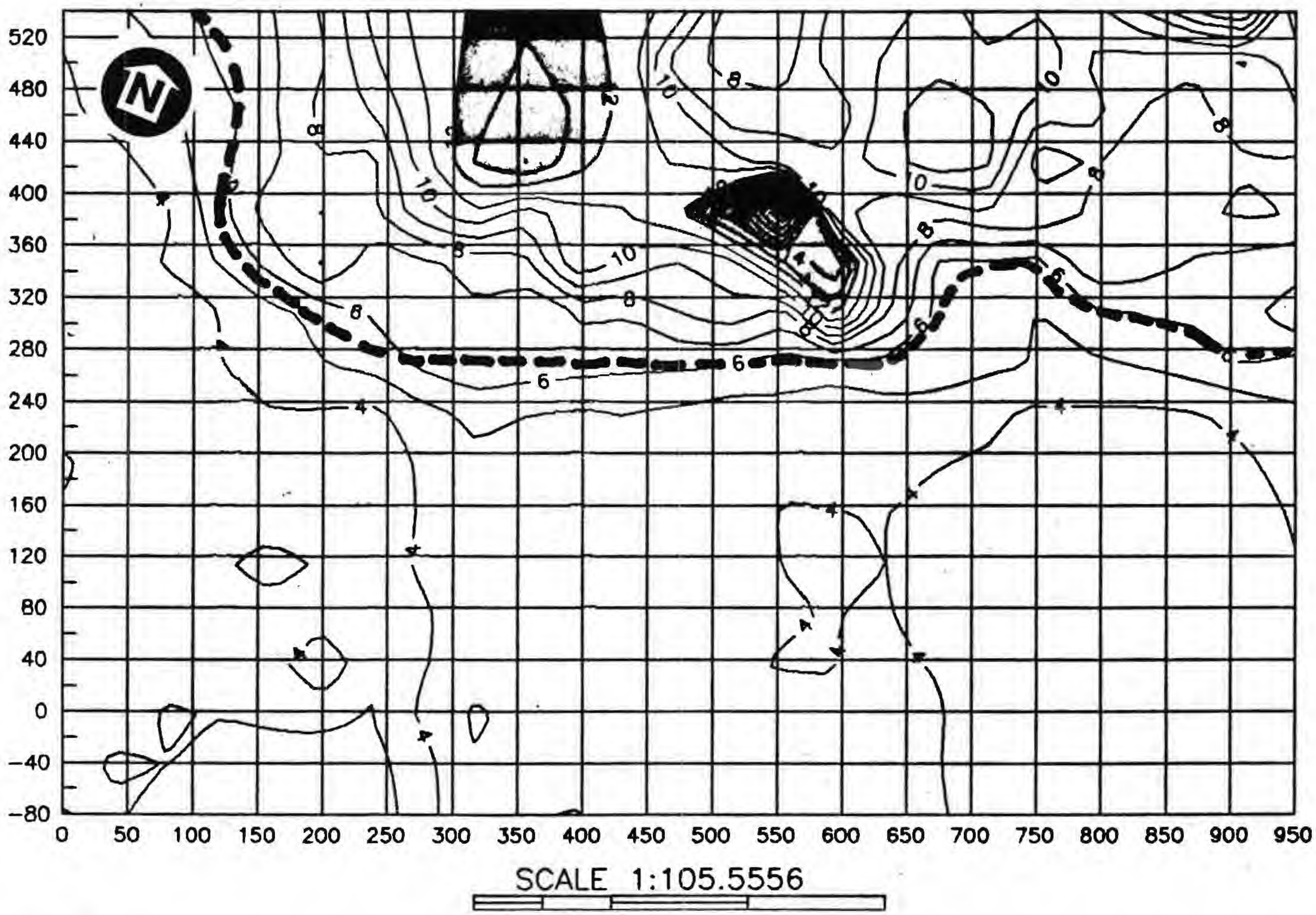
A small undisturbed zone was identified on lines 15 (700E) and 16 (750E) north of Patton Road. This zone may be the access road to the landfill with minimum or no buried waste.

6.1.2 Landfill Grid Survey

In addition to the identification of the landfill boundaries at Cold Spring Brook, the geophysical survey conducted systematically over the entire landfill grid defined areas of potential buried waste that may warrant further investigation.

Examination of terrain conductivity contour maps (see Figures 6-1 and 6-2) indicated the following:

- o Figure 6-1: This figure shows two areas of elevated conductivity identified by conductivity values, higher than 12 mmhos./m. An anomaly was identified in the northern section of traverse lines 7, 8, and 9. This anomaly is indicative of buried construction debris with small amounts of iron or steel materials. The second anomaly was identified on traverse lines 11, 12, and 13, between 320 and 400 north coordinates. This



Legend:

—12— Terrain Conductivity Contour (millimhos/meter)

Areas of Elevated Conductivity

— — Interpreted Approximate Landfill Boundaries

Figure 6-1 COLD SPRING BROOK LANDFILL, GEOPHYSICAL INVESTIGATION EM-31, HORIZONTAL DIPOLE, TERRAIN CONDUCTIVITY CONTOUR MAP

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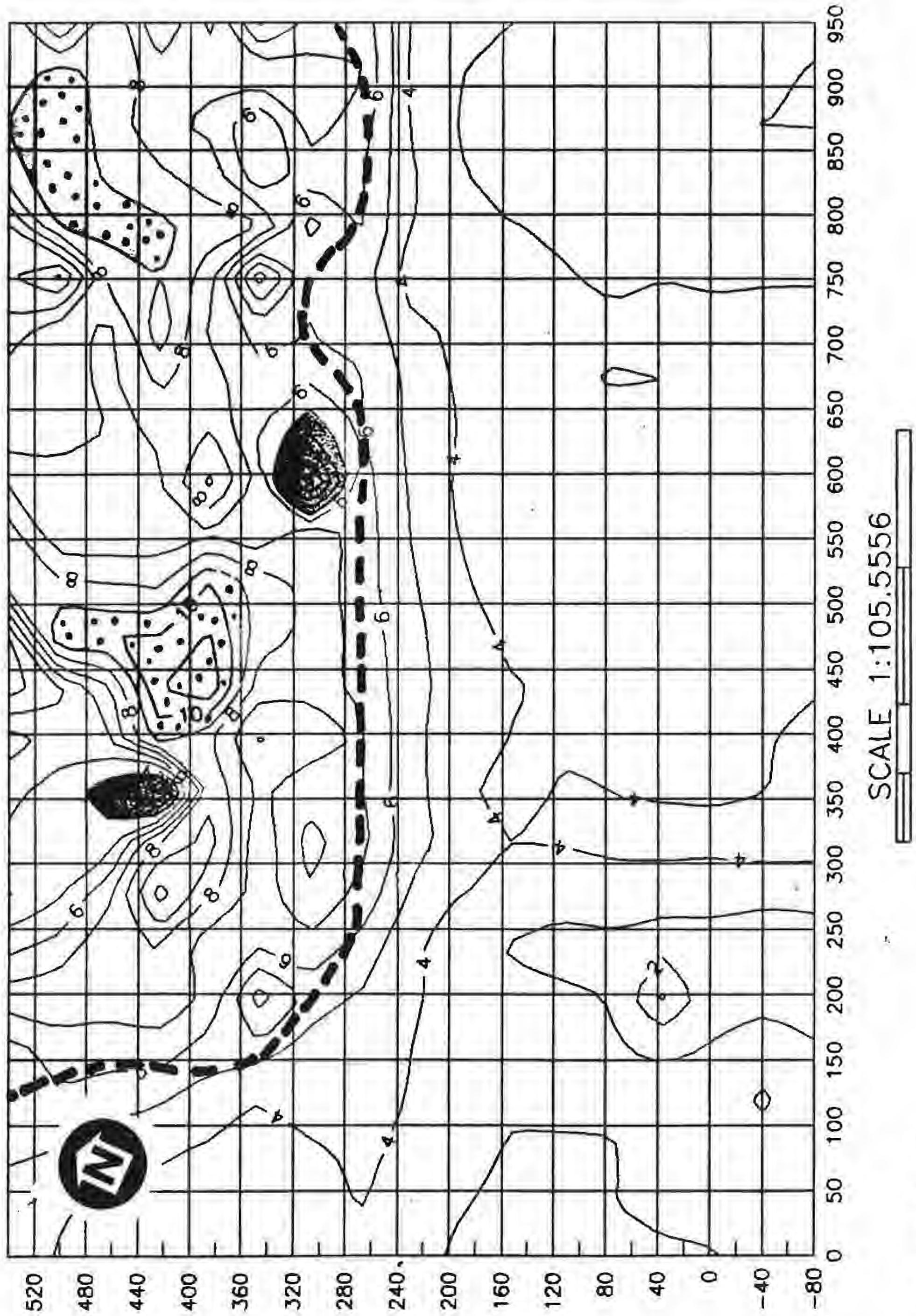

Legend:

— 12 — Terrain Conductivity Contour (millimhos/meter)

Areas of Elevated Conductivity

Areas of Lowered Conductivity

— — Interpreted Approximate Landfill Boundaries

Figure 6-2 COLD SPRING BROOK LANDFILL, GEOPHYSICAL INVESTIGATION EM-31, VERITCAL DIPOLE, TERRAIN CONDUCTIVITY CONTOUR MAP

anomaly indicates near surface or shallow buried conductive wastes, possibly including buried metallic pipes and rebars.

- Figure 6-2: This figure shows two areas of elevated conductivity. One area of elevated conductivity was identified on traverse lines 9, 10, and 11. This anomaly is indicative of buried wastes at depths greater than 10 feet. A second area of elevated conductivity was detected on traverse lines 17, 18, and 19. The relatively low intensity of this anomaly is indicative of buried construction debris with few ferro-magnetic constituents.

  Two lowered conductivity anomalies were also detected. These anomalies may be associated with negative readings that may be indicative of buried concrete and/or steel pipes.

6.2 MAGNETIC SURVEY RESULTS

6.2.1 Landfill Boundaries

Similar to the EM-31 contour maps, the magnetic contour map (see Figure 6-3) indicated a high intensity magnetic zone, north of Paton Road, contrasting with a zone free of magnetic anomalies, south of Paton Road. The southern and western boundaries of the landfill are interpreted as a linear transitional area between the identified magnetic zone and the zone free of anomaly.

The results of the magnetic survey with regard to the landfill boundaries are in perfect correlation with the findings of the EM-31 survey described above.

6.2.2 Landfill Grid Survey

The total magnetic field map (see Figure 6-3), similar to the EM-31 contour maps, indicates the presence of trends of magnetic anomalies that are described as follows:

- An east to west trend of magnetic field was identified on traverse lines 5 through 11 at 350 and 370 north coordinates. This may be indicative of possible trenching at the landfill. It should be noted that this trend of magnetic anomaly is also identified on the terrain conductivity contour maps, and may indicate a buried depth of greater than 10 feet.

- A north to northeast trend of magnetic field with high intensity and elevated gradient was identified on traverse lines 12 and 13. This trend of magnetic field may be indicative of a significant amount of buried ferro-magnetic materials. Field observation in this area revealed the possibility of buried construction debris along north to northeast trenches.

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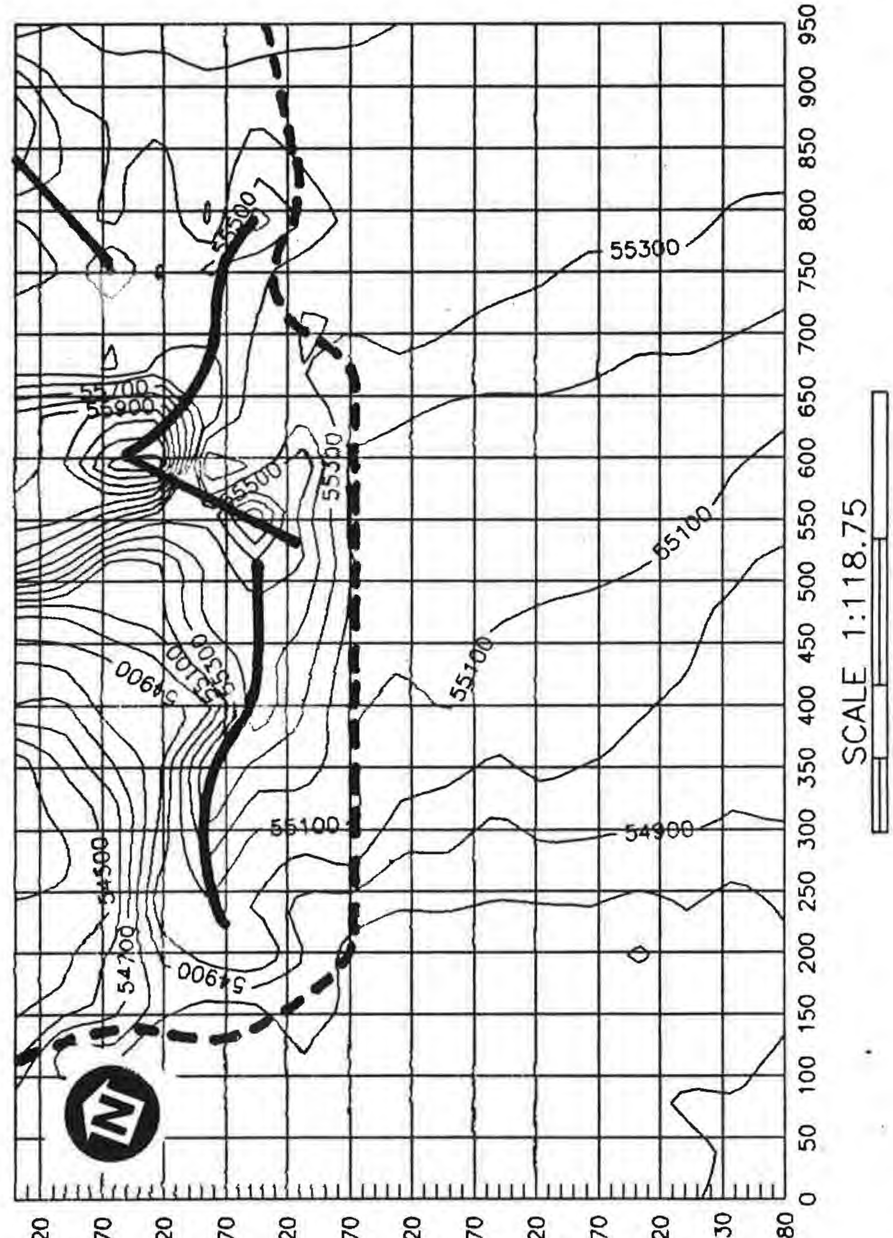


Legend:
— 12 — Terrain Conductivity Contour (millimhos/meter)
— — Interpreted Approximate Landfill Boundaries
—— Trend of Magnetic Anomaly

Figure 6-3 COLD SPRING BROOK LANDFILL, GEOPHYSICAL INVESTIGATION MAGNETIC SURVEY CONTOUR MAP

- Two minor trends of magnetic field were identified on traverse lines 14 through 18. These trends indicate the possibility of small portions of isolated, buried waste.

7. CONCLUSIONS AND RECOMMENDATIONS

Based on the interpretation of the data discussed in Section 4, the locations of the existing monitoring wells are appropriate, and the locations chosen for the surface water/sediment samples are suitable for detecting any possible contaminant migration downgradient of the Cold Spring Brook Landfill. See Figure 3-1 for existing monitoring well locations, surface water/sediment sample locations, and for the approximate boundaries of the landfill.

Due to the high electromagnetic conductivity and magnetic readings obtained directly in the fill area, along with the visual sightings of partially buried drums and metal debris, any future drilling should be performed outside the known fill area.

7.1 CONCLUSIONS

A combined geophysical technique, including terrain conductivity (EM-31) and magnetic surveys, was conducted at Cold Spring Brook Landfill as part of the RI. The principal conclusions of these surveys are:

- o Southern and western boundaries of the landfill were identified through both EM-31 and magnetic survey data. The identified landfill boundaries coincide with a conductivity contour line of 6 or 7 mmhos./m.

- o The area south of Patton Road is free of any EM-31 and/or magnetic anomalies, therefore, no landfilling seemed to occur in this area.

- o The area north of Patton Road, in contrast with the area south of the road, indicated presence of several zones of buried wastes including buried construction debris, concrete, and metal pipes.

7.2 RECOMMENDATIONS

Based on the results of the geophysical surveys conducted at Cold Spring Brook, E & E recommends the following:

- o To confirm the findings of the geophysical survey with regard to the boundaries of the landfill, 5 to 10 test pits should be excavated along the identified boundaries.

- o To confirm the nature and extent of identified buried waste, test pits and/or borings should be conducted in anomalous zones detected by the EM-31 and magnetic surveys.

- o The findings of geophysical anomalies should be correlated with the results of all media sampling conducted at this site. This will be performed as part of the RI report.

APPENDIX A

EM-31 AND MAGNETOMETER SURVEY DATA
COLD SPRING BROOK LANDFILL

TERRAIN CONDUCTIVITY DATA

EM-31, "VERTICAL DIPOLE"

COLD SPRING BROOK LANDFILL

FORT DEVENS, MASSACHUSETTS

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 0 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
200.00	2.92	
220.00	3.26	
240.00	3.24	
260.00	3.56	
280.00	3.82	
300.00	3.36	
320.00	3.44	
340.00	3.54	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 50 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
180.00	2.98	
200.00	3.14	
220.00	3.64	
240.00	3.62	
260.00	4.22	
280.00	4.06	
300.00	3.52	
320.00	3.34	
340.00	3.56	
360.00	3.66	
380.00	3.58	
400.00	3.40	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 100 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
160.00	2.98	
180.00	3.36	
200.00	3.28	
220.00	3.62	
240.00	4.24	
260.00	4.24	
280.00	4.28	
300.00	4.08	
320.00	4.00	
340.00	4.40	
360.00	1.60	
380.00	4.54	
400.00	4.58	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 150 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
40.00	3.16	
60.00	2.86	
80.00	3.20	
100.00	3.00	
120.00	3.52	
140.00	3.04	
160.00	3.38	
180.00	3.34	
200.00	3.62	
220.00	3.76	
240.00	4.20	
260.00	4.44	
280.00	4.96	
300.00	4.98	
320.00	4.14	
340.00	5.46	
360.00	5.74	
380.00	5.02	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 200 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
0.00	2.86	
20.00	2.82	
40.00	0.38	
60.00	2.86	
80.00	2.96	
100.00	3.12	
120.00	3.18	
140.00	3.00	
160.00	3.32	
180.00	3.02	
200.00	3.38	
220.00	4.06	
240.00	4.50	
260.00	4.76	
280.00	5.14	
300.00	5.60	
320.00	5.10	
340.00	3.76	
360.00	3.38	
380.00	6.56	
400.00	7.64	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 250 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
-80.00	2.66	
-60.00	1.64	
-40.00	2.56	
-20.00	2.32	
0.00	2.50	
20.00	2.64	
40.00	2.50	
60.00	2.64	
80.00	2.74	
100.00	2.54	
120.00	2.60	
140.00	2.08	
160.00	3.40	
180.00	3.42	
200.00	3.46	
220.00	3.96	
240.00	4.54	
260.00	5.50	
280.00	6.42	
300.00	7.16	
320.00	7.00	
340.00	7.02	
360.00	6.80	
380.00	4.74	
400.00	9.50	
420.00	8.58	
440.00	7.46	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 300 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
-80.00	4.18	
-60.00	4.04	
-40.00	4.36	
-20.00	4.20	
0.00	4.18	
20.00	4.46	
40.00	4.32	
60.00	4.52	
80.00	4.24	
100.00	4.06	
120.00	4.36	
140.00	4.18	
160.00	4.76	
180.00	4.04	
200.00	4.84	
220.00	5.10	
240.00	5.68	
260.00	7.04	
280.00	8.00	
300.00	8.74	
320.00	8.42	
340.00	6.86	
360.00	4.42	
380.00	9.08	
400.00	12.16	
420.00	11.62	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 350 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
20.00	3.84	
40.00	4.00	
60.00	3.90	
80.00	4.08	
100.00	4.04	
120.00	4.50	
140.00	0.86	
160.00	4.50	
180.00	4.04	
200.00	4.90	
220.00	4.56	
240.00	5.88	
260.00	6.84	
280.00	7.46	
300.00	8.08	
320.00	7.18	
340.00	6.30	
360.00	8.16	
380.00	7.38	
400.00	11.66	
420.00	-1.24	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 400 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
100.00	3.70	
120.00	3.72	
140.00	4.22	
160.00	3.96	
180.00	4.08	
200.00	4.54	
220.00	5.08	
240.00	5.54	
260.00	6.80	
280.00	7.50	
300.00	7.12	
320.00	5.40	
340.00	3.34	
360.00	11.30	
380.00	6.24	
400.00	13.02	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 450 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
140.00	4.02	
160.00	4.16	
180.00	4.52	
200.00	4.86	
220.00	4.80	
240.00	5.64	
260.00	6.64	
280.00	7.26	
300.00	7.16	
320.00	8.42	
340.00	6.70	
360.00	9.24	
380.00	13.12	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 500 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
160.00	3.32	
180.00	4.10	
200.00	4.44	
220.00	5.18	
240.00	5.22	
260.00	6.34	
280.00	7.08	
300.00	5.30	
320.00	10.48	
340.00	9.20	
360.00	7.52	
380.00	13.84	
400.00	6.00	
420.00	8.78	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 550 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
180.00	3.64	
200.00	4.22	
220.00	4.90	
240.00	5.10	
260.00	5.84	
280.00	7.58	
300.00	8.06	
320.00	8.48	
340.00	5.06	
360.00	9.56	
380.00	4.54	
400.00	12.60	
420.00	6.16	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 600 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
200.00	3.86	
220.00	4.42	
240.00	5.32	
260.00	5.80	
280.00	6.42	
300.00	5.18	
320.00	-8.68	
340.00	6.16	
360.00	8.36	
380.00	10.22	
400.00	6.72	
420.00	7.08	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 650 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
240.00	4.90	
260.00	6.02	
280.00	6.50	
300.00	6.10	
320.00	6.24	
340.00	5.96	
360.00	7.24	
380.00	7.94	
400.00	6.70	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 700 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
240.00	4.72	
260.00	5.58	
280.00	6.40	
300.00	6.42	
320.00	5.64	
340.00	6.04	
360.00	6.82	
380.00	4.68	
400.00	10.52	
420.00	9.72	
440.00	9.22	
460.00	5.68	
480.00	6.52	
500.00	8.76	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 750 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
240.00	3.58	
260.00	4.92	
280.00	6.30	
300.00	5.84	
320.00	6.30	
340.00	0.52	
360.00	6.46	
380.00	7.38	
400.00	7.70	
420.00	8.90	
440.00	9.24	
460.00	7.92	
480.00	9.88	
500.00	3.56	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 800 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
240.00	4.38	
260.00	5.72	
280.00	6.92	
300.00	3.68	
320.00	6.18	
340.00	6.42	
360.00	12.84	
380.00	8.64	
400.00	7.78	
420.00	9.28	
440.00	9.96	
460.00	9.18	
480.00	10.38	
500.00	10.24	
520.00	6.66	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 850 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
240.00	4.12	
260.00	5.38	
280.00	7.54	
300.00	7.10	
320.00	7.00	
340.00	4.46	
360.00	0.52	
380.00	7.68	
400.00	7.14	
420.00	7.70	
440.00	7.46	
460.00	8.10	
480.00	9.46	
500.00	9.40	
520.00	10.74	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 900 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
240.00	4.10	
260.00	5.94	
280.00	8.58	
300.00	8.48	
320.00	6.44	
340.00	7.96	
360.00	8.88	
380.00	9.04	
400.00	3.18	
420.00	8.28	
440.00	8.18	
460.00	8.54	
480.00	9.36	
500.00	10.06	
520.00	9.72	
540.00	7.80	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 950 E
INSTRUMENT: EM-31

Station No.	Conductivity (Vertical Dipole)	Remarks
240.00	4.20	
260.00	5.98	
280.00	7.46	
300.00	6.70	
320.00	5.72	
340.00	3.32	
360.00	8.22	
380.00	8.12	
400.00	8.48	
420.00	5.60	
440.00	8.30	
460.00	9.26	
480.00	6.44	
500.00	5.78	
520.00	9.76	
540.00	8.86	

TERRAIN CONDUCTIVITY DATA
EM-31, "HORIZONTAL DIPOLE"
COLD SPRING BROOK LANDFILL
FORT DEVENS, MASSACHUSETTS

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 0 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
200.00	2.84	
220.00	3.44	
240.00	3.24	
260.00	4.06	
280.00	3.54	
300.00	3.84	
320.00	3.34	
340.00	3.98	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 50 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
180.00	3.58	
200.00	3.40	
220.00	3.92	
240.00	3.38	
260.00	3.82	
280.00	3.76	
300.00	3.42	
320.00	3.36	
340.00	3.30	
360.00	3.76	
380.00	3.36	
400.00	3.50	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 100 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
160.00	3.58	
180.00	3.60	
200.00	3.76	
220.00	3.12	
240.00	4.08	
260.00	4.00	
280.00	3.24	
300.00	3.52	
320.00	4.00	
340.00	3.98	
360.00	5.22	
380.00	4.06	
400.00	4.72	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 150 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
40.00	3.24	
60.00	3.14	
80.00	3.44	
100.00	3.18	
120.00	2.36	
140.00	3.26	
160.00	3.60	
180.00	3.24	
200.00	3.82	
220.00	3.86	
240.00	3.90	
260.00	4.38	
280.00	4.56	
300.00	4.38	
320.00	4.92	
340.00	5.36	
360.00	7.20	
380.00	7.58	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 200 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
0.00	3.18	
20.00	3.16	
40.00	5.44	
60.00	2.36	
80.00	3.66	
100.00	3.28	
120.00	3.02	
140.00	3.54	
160.00	3.48	
180.00	3.78	
200.00	3.88	
220.00	3.86	
240.00	3.94	
260.00	4.88	
280.00	5.06	
300.00	5.54	
320.00	5.10	
340.00	7.62	
360.00	9.12	
380.00	6.76	
400.00	7.54	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 250 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
-80.00	2.72	
-60.00	1.22	
-40.00	3.28	
-20.00	2.68	
0.00	3.20	
20.00	3.20	
40.00	2.78	
60.00	2.58	
80.00	3.14	
100.00	3.28	
120.00	3.76	
140.00	3.38	
160.00	3.54	
180.00	3.16	
200.00	3.62	
220.00	3.20	
240.00	4.06	
260.00	5.26	
280.00	5.74	
300.00	5.80	
320.00	6.96	
340.00	6.20	
360.00	5.72	
380.00	7.44	
400.00	9.14	
420.00	7.46	
440.00	8.94	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 300 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
-80.00	4.48	
-60.00	5.26	
-40.00	4.34	
-20.00	4.54	
0.00	5.50	
20.00	4.66	
40.00	4.72	
60.00	5.16	
80.00	4.32	
100.00	4.74	
120.00	4.56	
140.00	4.78	
160.00	4.56	
180.00	4.62	
200.00	4.92	
220.00	5.14	
240.00	5.62	
260.00	6.50	
280.00	7.42	
300.00	7.04	
320.00	7.08	
340.00	7.30	
360.00	7.38	
380.00	9.78	
400.00	14.52	
420.00	12.02	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 350 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
20.00	4.70	
40.00	4.12	
60.00	3.68	
80.00	4.38	
100.00	4.34	
120.00	5.10	
140.00	5.12	
160.00	4.38	
180.00	4.60	
200.00	4.34	
220.00	4.80	
240.00	5.28	
260.00	6.14	
280.00	7.02	
300.00	6.06	
320.00	6.24	
340.00	6.34	
360.00	9.78	
380.00	8.92	
400.00	10.72	
420.00	14.38	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 400 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
100.00	4.40	
120.00	4.92	
140.00	4.80	
160.00	4.00	
180.00	4.40	
200.00	5.20	
220.00	4.66	
240.00	5.14	
260.00	6.12	
280.00	6.84	
300.00	7.32	
320.00	7.02	
340.00	10.82	
360.00	11.20	
380.00	10.62	
400.00	11.24	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 450 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
140.00	4.20	
160.00	4.22	
180.00	4.20	
200.00	4.74	
220.00	5.22	
240.00	4.84	
260.00	5.76	
280.00	6.72	
300.00	7.08	
320.00	7.08	
340.00	8.68	
360.00	10.74	
380.00	10.84	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 500 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
160.00	4.28	
180.00	4.46	
200.00	4.56	
220.00	3.68	
240.00	4.96	
260.00	5.98	
280.00	6.52	
300.00	8.12	
320.00	10.28	
340.00	7.94	
360.00	8.70	
380.00	13.70	
400.00	14.34	
420.00	9.94	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 550 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
180.00	3.92	
200.00	4.22	
220.00	4.16	
240.00	5.02	
260.00	5.30	
280.00	6.06	
300.00	6.58	
320.00	8.46	
340.00	11.38	
360.00	15.22	
380.00	24.92	
400.00	10.52	
420.00	9.98	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 600 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
200.00	4.14	
220.00	4.48	
240.00	4.50	
260.00	4.88	
280.00	6.46	
300.00	8.78	
320.00	19.06	
340.00	16.72	
360.00	11.10	
380.00	8.76	
400.00	8.20	
420.00	9.26	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 650 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
240.00	4.78	
260.00	5.42	
280.00	5.74	
300.00	5.94	
320.00	5.62	
340.00	6.14	
360.00	5.76	
380.00	7.06	
400.00	9.94	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 700 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
240.00	4.44	
260.00	5.20	
280.00	5.62	
300.00	5.50	
320.00	5.82	
340.00	5.62	
360.00	6.28	
380.00	9.22	
400.00	9.62	
420.00	10.86	
440.00	15.60	
460.00	10.64	
480.00	11.92	
500.00	9.58	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 750 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
240.00	3.84	
260.00	4.64	
280.00	5.28	
300.00	4.56	
320.00	5.62	
340.00	4.72	
360.00	7.44	
380.00	9.00	
400.00	8.82	
420.00	7.42	
440.00	7.52	
460.00	9.48	
480.00	9.64	
500.00	11.06	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 800 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
240.00	4.04	
260.00	4.38	
280.00	5.28	
300.00	6.14	
320.00	5.66	
340.00	6.16	
360.00	11.56	
380.00	7.22	
400.00	7.86	
420.00	7.82	
440.00	9.08	
460.00	9.68	
480.00	8.34	
500.00	8.70	
520.00	8.64	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 850 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
240.00	3.90	
260.00	4.42	
280.00	6.16	
300.00	6.22	
320.00	5.94	
340.00	7.10	
360.00	7.38	
380.00	6.92	
400.00	8.54	
420.00	6.58	
440.00	7.54	
460.00	7.16	
480.00	7.42	
500.00	8.00	
520.00	10.28	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 900 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
240.00	4.20	
260.00	5.86	
280.00	6.32	
300.00	6.20	
320.00	6.16	
340.00	6.16	
360.00	7.28	
380.00	8.36	
400.00	8.24	
420.00	7.90	
440.00	7.92	
460.00	8.60	
480.00	8.14	
500.00	7.74	
520.00	7.84	
540.00	16.40	

TERRAIN CONDUCTIVITY SURVEY

CLIENT: U.S. Army/USATHAMA
LOCATION: Fort Devens, Mass
DATE: 6-6-91

PROJECT NUMBER: UC2000
LINE NUMBER: 950 E
INSTRUMENT: EM-31

Station No.	Conductivity (Horizontal Dipole)	Remarks
240.00	5.00	
260.00	4.94	
280.00	6.48	
300.00	7.12	
320.00	8.86	
340.00	6.18	
360.00	6.70	
380.00	8.32	
400.00	6.72	
420.00	7.86	
440.00	8.02	
460.00	8.90	
480.00	8.82	
500.00	9.72	
520.00	9.74	
540.00	8.14	

APPENDIX B

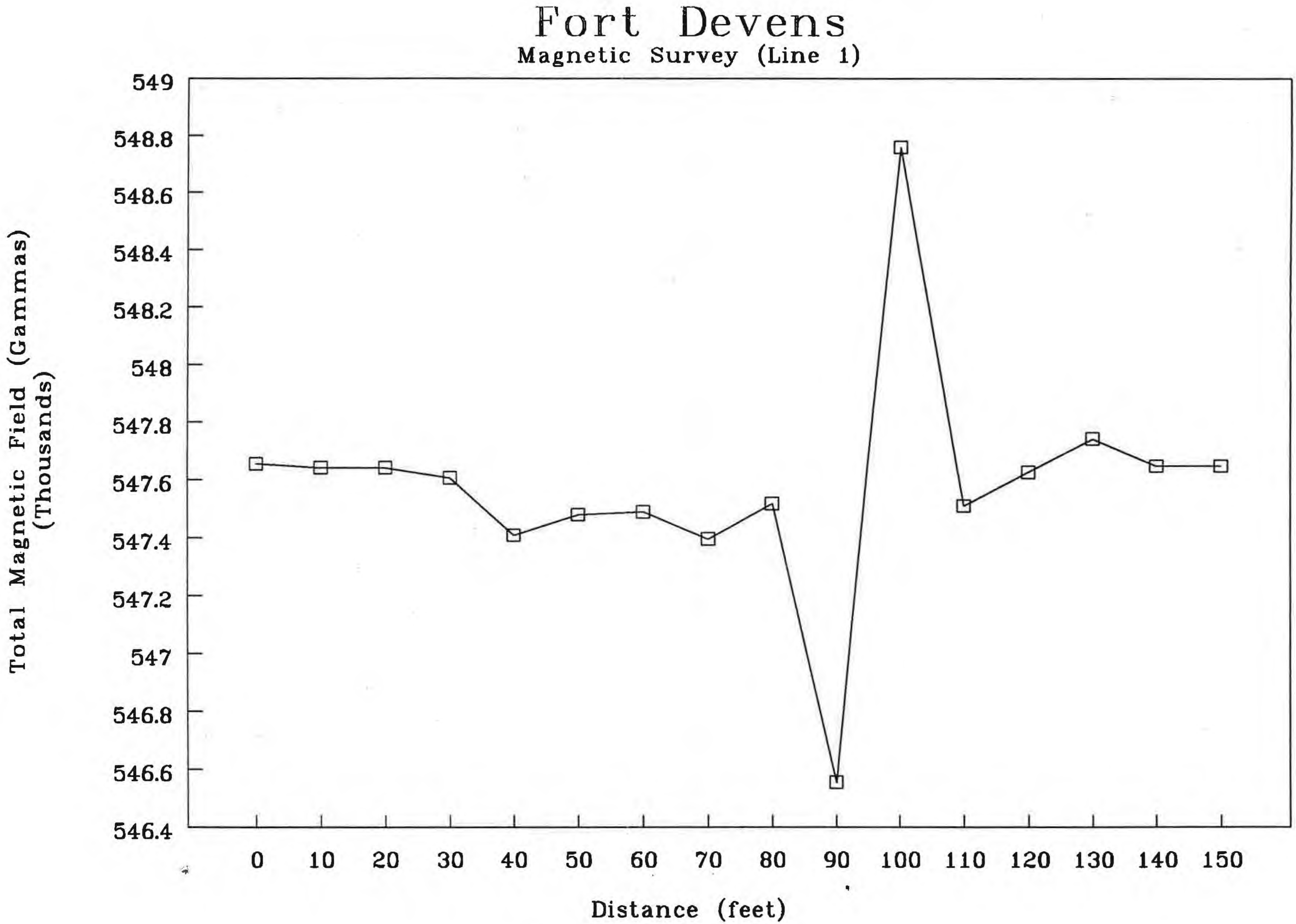
MAGNETIC SURVEY DATA

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 1

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 1	0	0	10:44:40	54765.6
003/ 1	1	10	10:46:10	54764.1
003/ 1	2	20	10:46:39	54764.1
003/ 1	3	30	10:47:46	54760.5
003/ 1	4	40	10:48:12	54740.8
003/ 1	5	50	10:48:28	54748.0
003/ 1	6	60	10:48:46	54749.0
003/ 1	7	70	10:49:22	54739.6
003/ 1	8	80	10:49:41	54751.8
003/ 1	9	90	10:50:03	54655.5
003/ 1	10	100	10:50:26	54875.9
003/ 1	11	110	10:51:30	54750.9
003/ 1	12	120	10:52:00	54762.5
003/ 1	13	130	10:52:20	54774.2
003/ 1	14	140	10:52:46	54764.7
003/ 1	15	150	10:53:20	54764.7


Fort Devens
Magnetic Survey (Line 1)
Total Magnetic Field (Gammas)
(Thousands)
549
548.8
548.6
548.4
548.2
548
547.8
547.6
547.4
547.2
547
546.8
546.6
546.4
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

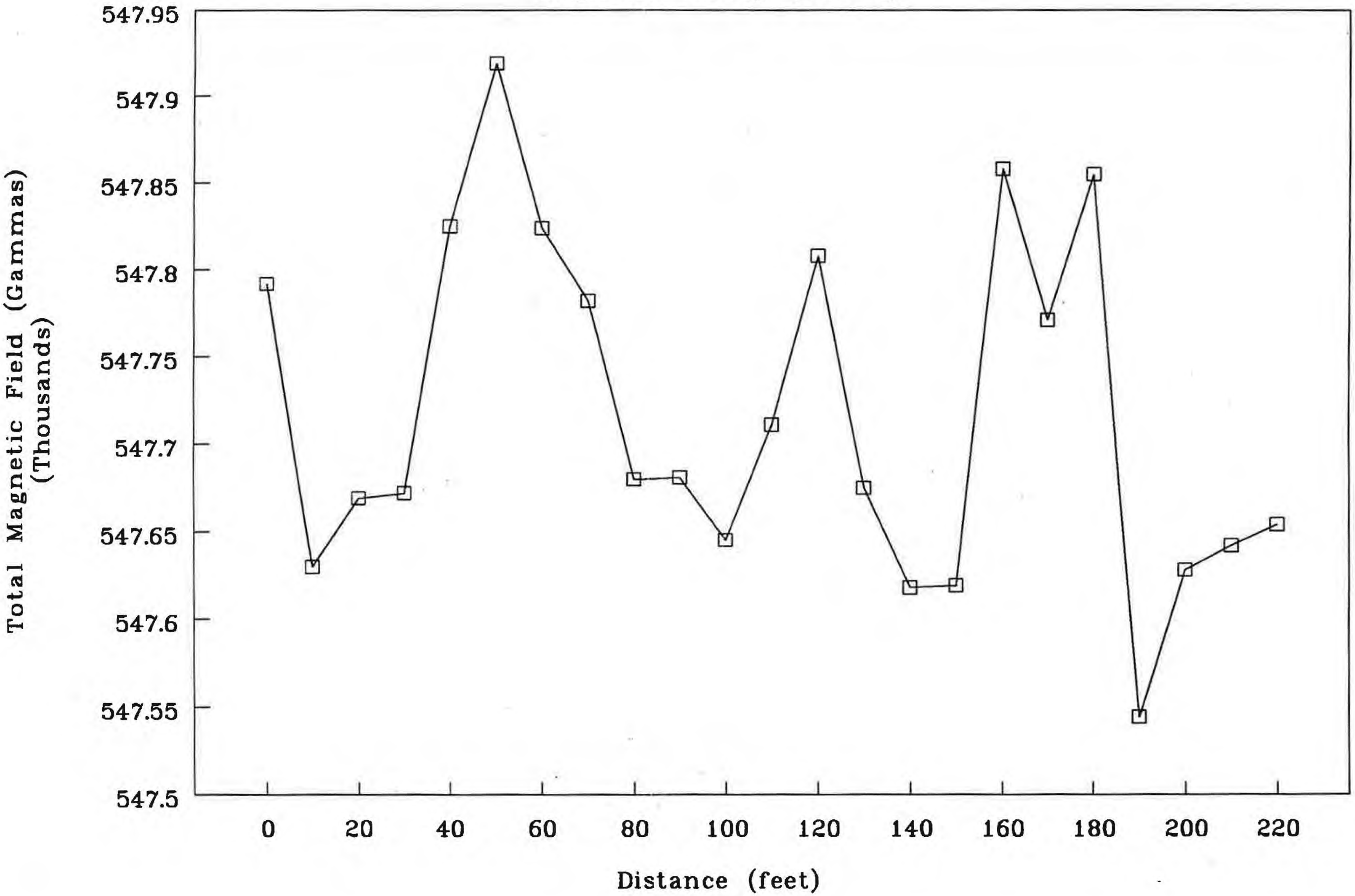
FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 2

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 2	16	0	10:56:31	54779.2
003/ 2	17	10	10:57:16	54763.0
003/ 2	18	20	10:57:39	54766.9
003/ 2	19	30	10:58:08	54767.2
003/ 2	20	40	10:58:30	54782.5
003/ 2	21	50	10:58:52	54791.9
003/ 2	22	60	10:59:13	54782.4
003/ 2	23	70	10:59:58	54778.2
003/ 2	24	80	11:00:14	54768.0
003/ 2	25	90	11:00:51	54768.1
003/ 2	26	100	11:01:07	54764.5
003/ 2	27	110	11:01:25	54771.1
003/ 2	28	120	11:01:44	54780.8
003/ 2	29	130	11:02:05	54767.5
003/ 2	30	140	11:02:23	54761.8
003/ 2	31	150	11:02:42	54761.9
003/ 2	32	160	11:03:00	54785.8
003/ 2	33	170	11:03:20	54777.1
003/ 2	34	180	11:03:47	54785.5
003/ 2	35	190	11:04:07	54754.4
003/ 2	36	200	11:04:25	54762.8
003/ 2	37	210	11:04:47	54764.2
003/ 2	38	220	11:05:06	54765.4

Fort Devens

Magnetic Survey (Line 2)

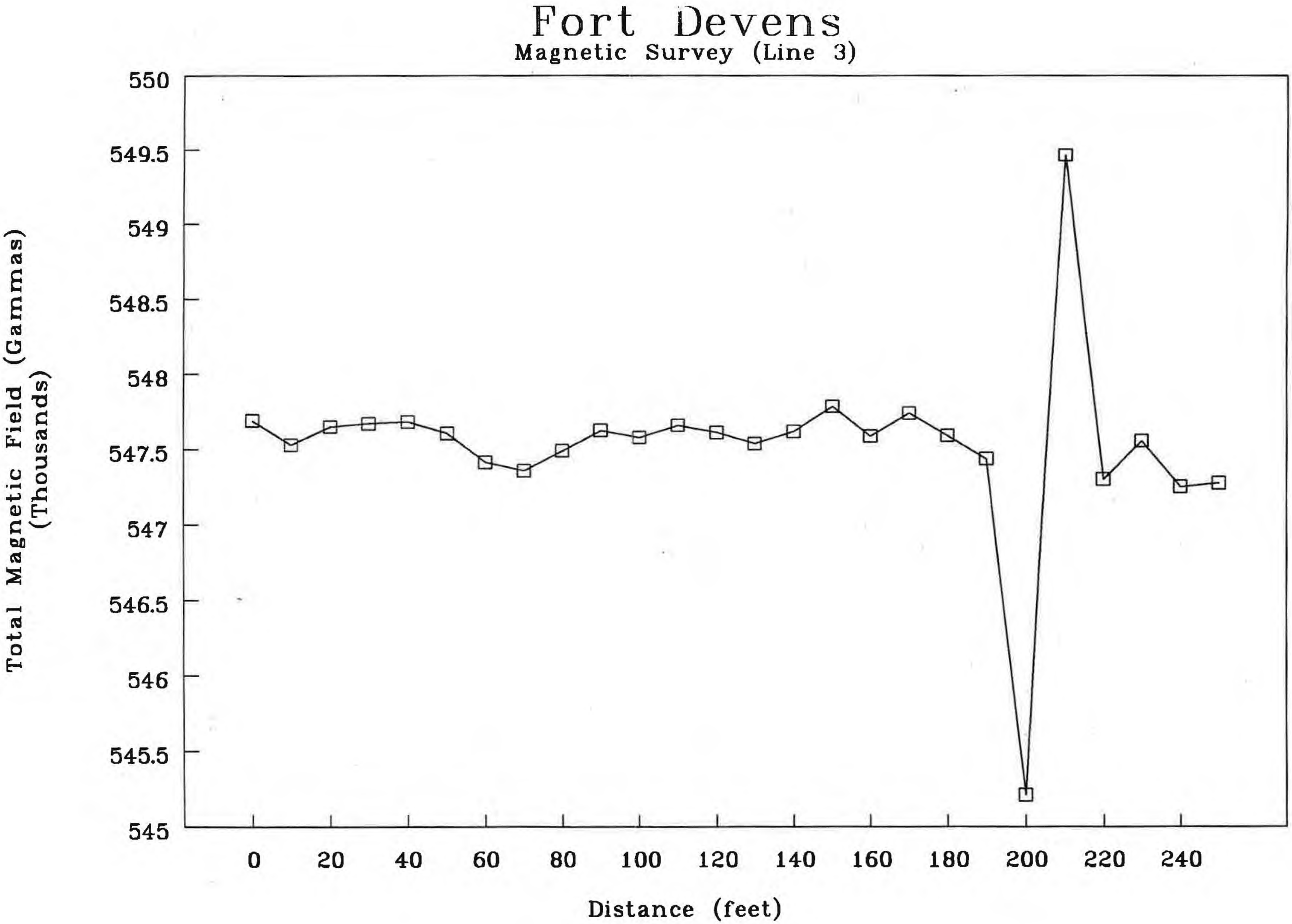


ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 3

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 3	39	0	11:08:59	54768.9
003/ 3	40	10	11:09:50	54753.0
003/ 3	41	20	11:10:10	54764.9
003/ 3	42	30	11:10:28	54767.1
003/ 3	43	40	11:11:12	54768.2
003/ 3	44	50	11:11:37	54760.5
003/ 3	45	60	11:12:19	54741.3
003/ 3	46	70	11:12:40	54735.6
003/ 3	47	80	11:13:05	54748.9
003/ 3	48	90	11:13:34	54762.5
003/ 3	49	100	11:13:53	54757.9
003/ 3	50	110	11:14:10	54765.8
003/ 3	51	120	11:14:35	54761.1
003/ 3	52	130	11:15:14	54753.8
003/ 3	53	140	11:15:30	54761.8
003/ 3	54	150	11:16:05	54778.4
003/ 3	55	160	11:16:35	54758.7
003/ 3	56	170	11:16:56	54773.8
003/ 3	57	180	11:17:16	54759.0
003/ 3	58	190	11:17:32	54743.6
003/ 3	59	200	11:17:48	54521.0
003/ 3	60	210	11:18:08	54946.8
003/ 3	61	220	11:18:31	54730.0
003/ 3	62	230	11:18:49	54755.4
003/ 3	63	240	11:19:07	54724.9
003/ 3	64	250	11:19:25	54727.5


Fort Devens
Magnetic Survey (Line 3)
Total Magnetic Field (Gammas)
(Thousands)
550
549.5
549
548.5
548
547.5
547
546.5
546
545.5
545
0
20
40
60
80
100
120
140
160
180
200
220
240
Distance (feet)

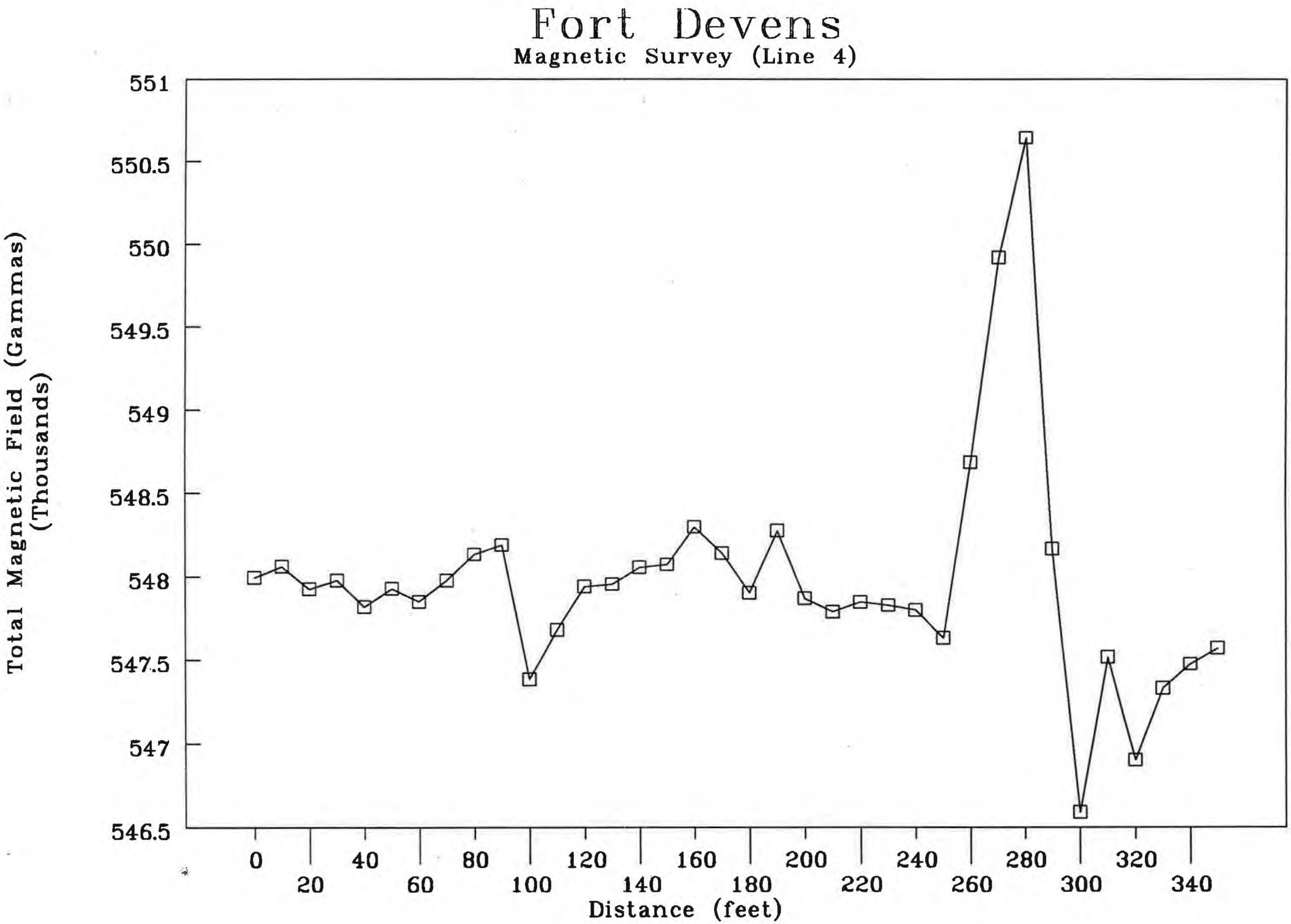
B-8

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 4

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 4	65	0	11:21:46	54799.4
003/ 4	66	10	11:22:25	54806.1
003/ 4	67	20	11:22:53	54792.6
003/ 4	68	30	11:23:08	54797.7
003/ 4	69	40	11:23:24	54781.9
003/ 4	70	50	11:23:39	54792.9
003/ 4	71	60	11:24:01	54785.1
003/ 4	72	70	11:24:18	54797.8
003/ 4	73	80	11:24:33	54813.6
003/ 4	74	90	11:24:48	54819.2
003/ 4	75	100	11:25:04	54738.6
003/ 4	76	110	11:25:19	54768.1
003/ 4	77	120	11:25:33	54794.0
003/ 4	78	130	11:25:49	54795.6
003/ 4	79	140	11:26:05	54805.7
003/ 4	80	150	11:26:21	54807.3
003/ 4	81	160	11:26:38	54829.9
003/ 4	82	170	11:26:53	54814.3
003/ 4	83	180	11:27:10	54790.4
003/ 4	84	190	11:27:25	54827.8
003/ 4	85	200	11:27:44	54786.9
003/ 4	86	210	11:28:24	54778.9
003/ 4	87	220	11:28:39	54784.7
003/ 4	88	230	11:28:54	54782.8
003/ 4	89	240	11:29:10	54779.9
003/ 4	90	250	11:29:51	54763.2
003/ 4	91	260	11:30:20	54868.3
003/ 4	92	270	11:30:39	54992.0
003/ 4	93	280	11:31:01	55064.7
003/ 4	94	290	11:31:18	54816.6
003/ 4	95	300	11:31:36	54659.0
003/ 4	96	310	11:31:54	54751.7
003/ 4	97	320	11:32:24	54690.1
003/ 4	98	330	11:32:44	54733.1
003/ 4	99	340	11:34:18	54747.5
003/ 4	100	350	11:36:45	54757.0



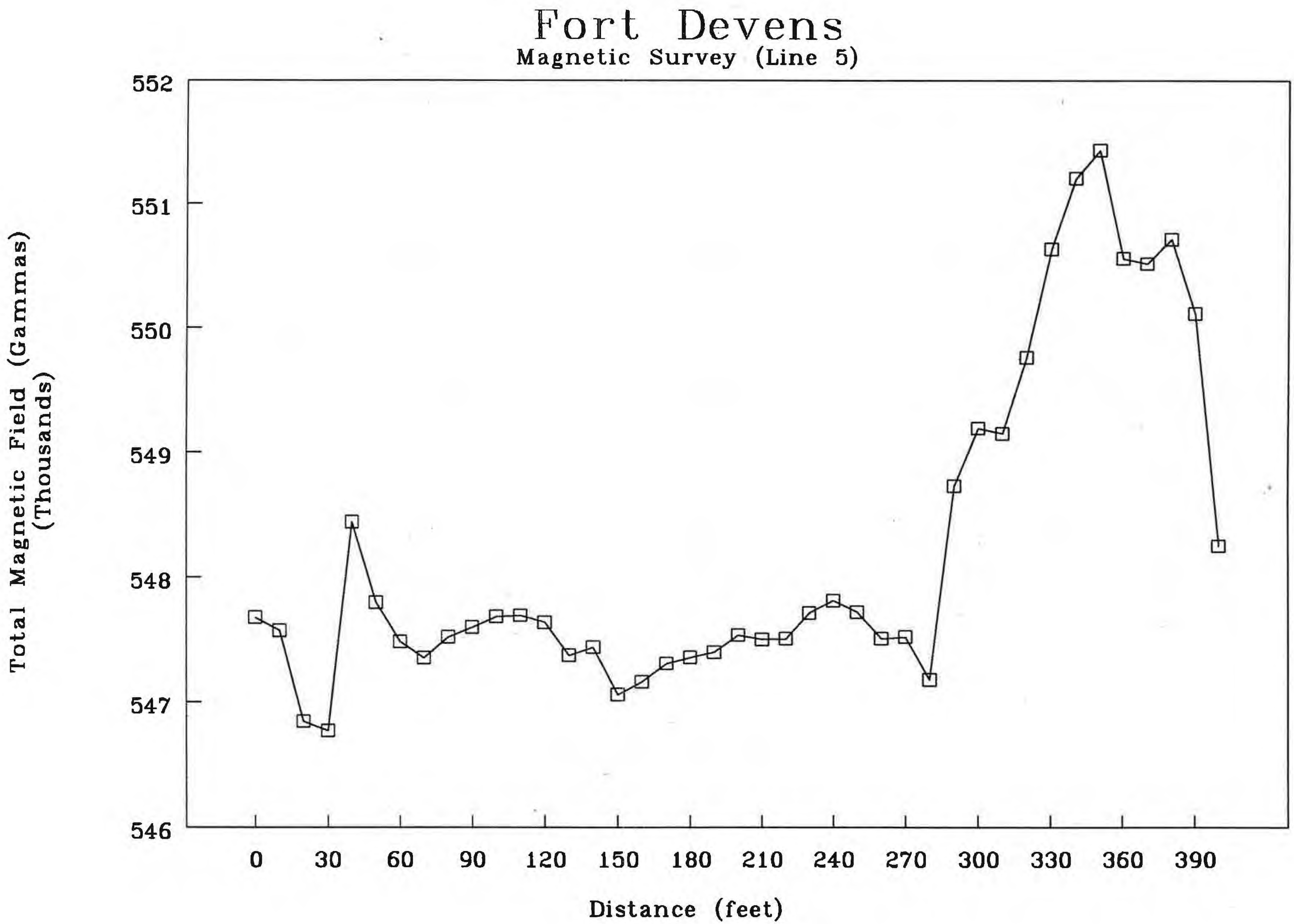
Fort Devens
Magnetic Survey (Line 4)
Total Magnetic Field (Gammas)
(Thousands)
551
550.5
550
549.5
549
548.5
548
547.5
547
546.5
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 5

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 5	101	0	11:37:25	54767.8
003/ 5	102	10	11:37:41	54757.1
003/ 5	103	20	11:38:16	54684.6
003/ 5	104	30	11:38:38	54677.0
003/ 5	105	40	11:39:00	54844.1
003/ 5	106	50	11:39:21	54779.9
003/ 5	107	60	11:39:44	54748.3
003/ 5	108	70	11:39:59	54735.4
003/ 5	109	80	11:40:14	54752.0
003/ 5	110	90	11:40:32	54759.8
003/ 5	111	100	11:41:08	54768.3
003/ 5	112	110	11:41:44	54769.2
003/ 5	113	120	11:42:06	54763.8
003/ 5	114	130	11:42:23	54737.3
003/ 5	115	140	11:42:46	54743.7
003/ 5	116	150	11:43:01	54706.0
003/ 5	117	160	11:43:17	54716.0
003/ 5	118	170	11:43:33	54730.6
003/ 5	119	180	11:43:48	54735.6
003/ 5	120	190	11:44:02	54740.0
003/ 5	121	200	11:44:31	54753.5
003/ 5	122	210	11:44:49	54750.1
003/ 5	123	220	11:45:06	54750.5
003/ 5	124	230	11:45:20	54771.2
003/ 5	125	240	11:45:35	54781.1
003/ 5	126	250	11:45:51	54771.9
003/ 5	127	260	11:46:20	54750.8
003/ 5	128	270	11:46:34	54752.0
003/ 5	129	280	11:46:57	54717.6
003/ 5	130	290	11:47:30	54872.6
003/ 5	131	300	11:47:59	54918.8
003/ 5	132	310	11:48:15	54914.8
003/ 5	133	320	11:48:34	54976.3
003/ 5	134	330	11:48:48	55063.4
003/ 5	135	340	11:49:05	55120.7
003/ 5	136	350	11:49:22	55143.5
003/ 5	137	360	11:49:41	55055.9
003/ 5	138	370	11:49:56	55051.5
003/ 5	139	380	11:50:12	55071.3
003/ 5	140	390	11:50:28	55011.6
003/ 5	141	400	11:53:49	54824.8


Fort Devens
Magnetic Survey (Line 5)
Total Magnetic Field (Gammas) (Thousands)
552
551
550
549
548
547
546
0
30
60
90
120
150
180
210
240
270
300
330
360
390
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 6

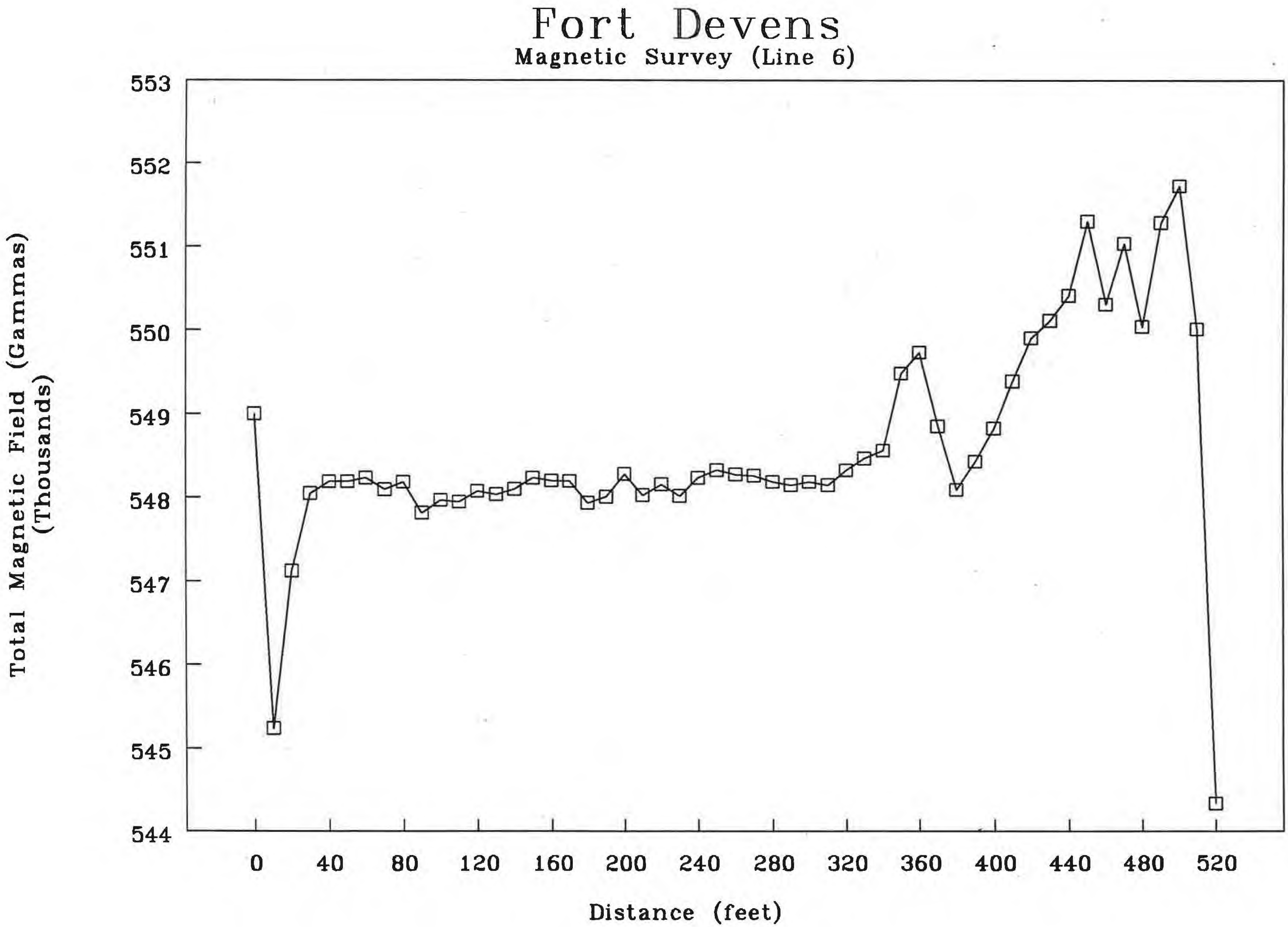
LINE #	SITE #	FEET	TIME	GAMMAS
003/ 6	142	0	11:54:21	54900.0
003/ 6	143	10	11:54:44	54524.1
003/ 6	144	20	11:55:05	54712.5
003/ 6	145	30	11:55:25	54805.0
003/ 6	146	40	11:55:53	54818.9
003/ 6	147	50	11:56:10	54819.1
003/ 6	148	60	11:56:29	54823.3
003/ 6	149	70	11:56:51	54809.8
003/ 6	150	80	11:57:28	54818.7
003/ 6	151	90	11:58:26	54781.8
003/ 6	152	100	11:58:45	54797.3
003/ 6	153	110	11:59:17	54795.3
003/ 6	154	120	11:59:33	54807.8
003/ 6	155	130	11:59:51	54803.9
003/ 6	156	140	12:00:05	54810.4
003/ 6	157	150	12:00:21	54823.4
003/ 6	158	160	12:00:36	54820.0
003/ 6	159	170	12:00:52	54819.5
003/ 6	160	180	12:01:07	54793.6
003/ 6	161	190	12:01:21	54800.9
003/ 6	162	200	12:01:36	54827.8
003/ 6	163	210	12:01:51	54802.7
003/ 6	164	220	12:02:10	54815.5
003/ 6	165	230	12:02:27	54802.2
003/ 6	166	240	12:02:42	54823.7
003/ 6	167	250	12:03:08	54832.7
003/ 6	168	260	12:03:24	54827.6
003/ 6	169	270	12:03:38	54825.8
003/ 6	170	280	12:03:55	54818.4
003/ 6	171	290	12:04:09	54814.9
003/ 6	172	300	12:04:23	54818.5
003/ 6	173	310	12:04:37	54814.9
003/ 6	174	320	12:04:50	54832.5
003/ 6	175	330	12:07:24	54846.7
003/ 6	176	340	12:07:40	54856.1
003/ 6	177	350	12:07:56	54948.2
003/ 6	178	360	12:08:12	54973.1
003/ 6	179	370	12:09:04	54884.8
003/ 6	180	380	12:09:22	54809.0
003/ 6	181	390	12:09:39	54842.5
003/ 6	182	400	12:09:55	54882.5

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 6

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 6	183	410	12:10:11	54938.6
003/ 6	184	420	12:10:27	54990.1
003/ 6	185	430	12:10:42	55011.5
003/ 6	186	440	12:10:58	55040.8
003/ 6	187	450	12:11:14	55129.8
003/ 6	188	460	12:11:31	55030.2
003/ 6	189	470	12:11:48	55103.4
003/ 6	190	480	12:12:12	55004.0
003/ 6	191	490	12:12:31	55128.5
003/ 6	192	500	12:12:45	55172.7
003/ 6	193	510	12:13:00	55001.0
003/ 6	194	520	12:13:21	54434.0



Fort Devens
Magnetic Survey (Line 6)
553
552
551
550
549
548
547
546
545
544
Total Magnetic Field (Gammas) (Thousands)
0
40
80
120
160
200
240
280
320
360
400
440
480
520
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 7

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 7	195	0	13:22:56	54890.5
003/ 7	196	10	13:23:52	54882.6
003/ 7	197	20	13:24:11	54895.8
003/ 7	198	30	13:24:32	54910.3
003/ 7	199	40	13:24:51	54893.9
003/ 7	200	50	13:25:07	54899.9
003/ 7	201	60	13:25:21	54898.6
003/ 7	202	70	13:25:38	54912.0
003/ 7	203	80	13:25:52	54953.7
003/ 7	204	90	13:26:06	54874.1
003/ 7	205	100	13:26:41	54887.6
003/ 7	206	110	13:26:59	54908.6
003/ 7	207	120	13:27:14	54912.8
003/ 7	208	130	13:27:29	54916.1
003/ 7	209	140	13:27:43	54910.9
003/ 7	210	150	13:27:56	54915.5
003/ 7	211	160	13:28:10	54922.2
003/ 7	212	170	13:28:26	54915.7
003/ 7	213	180	13:28:40	54929.3
003/ 7	214	190	13:28:54	54922.8
003/ 7	215	200	13:29:08	54911.2
003/ 7	216	210	13:29:25	54941.7
003/ 7	217	220	13:30:06	54908.9
003/ 7	218	230	13:30:22	54827.5
003/ 7	219	240	13:30:46	54892.6
003/ 7	220	250	13:31:00	54912.1
003/ 7	221	260	13:31:14	54919.0
003/ 7	222	270	13:31:28	54982.8
003/ 7	223	280	13:31:41	54933.5
003/ 7	224	290	13:32:08	54950.5
003/ 7	225	300	13:32:22	54950.2
003/ 7	226	310	13:32:36	54956.4
003/ 7	227	320	13:32:50	54954.4
003/ 7	228	330	13:33:04	54978.0
003/ 7	229	340	13:33:31	55053.1
003/ 7	230	350	13:34:02	55131.4
003/ 7	231	360	13:34:17	55311.9
003/ 7	232	370	13:34:35	55299.1
003/ 7	233	380	13:34:53	55046.9
003/ 7	234	390	13:35:15	55059.1
003/ 7	235	400	13:35:29	55026.2

ECOLOGY AND ENVIRONMENT, INC.

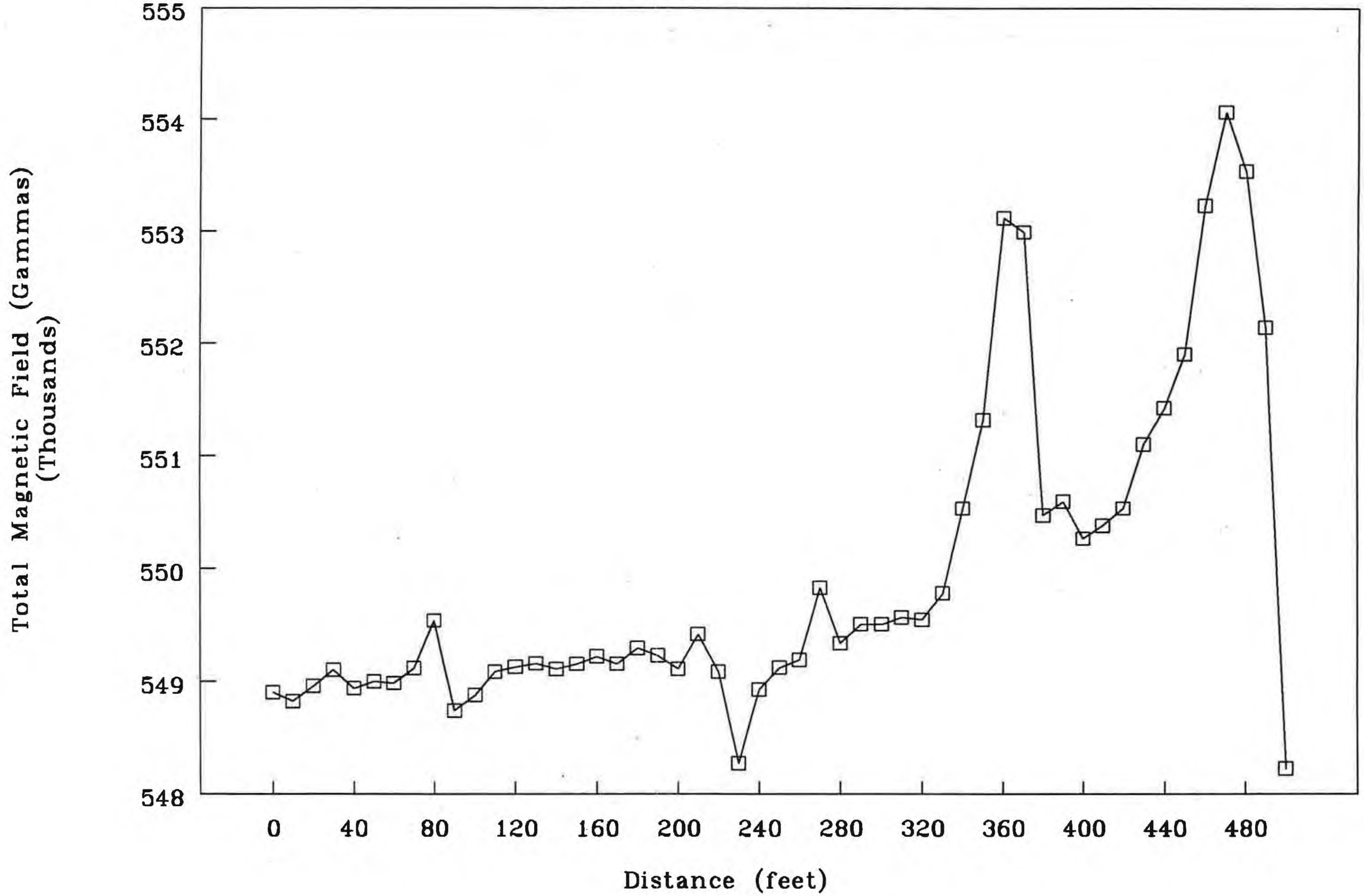
FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 7

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 7	236	410	13:35:46	55037.9
003/ 7	237	420	13:36:00	55053.1
003/ 7	238	430	13:36:20	55109.8
003/ 7	239	440	13:36:37	55141.8
003/ 7	240	450	13:36:53	55190.0
003/ 7	241	460	13:37:07	55322.9
003/ 7	242	470	13:37:23	55406.6
003/ 7	243	480	13:37:42	55353.4
003/ 7	244	490	13:37:59	55214.3
003/ 7	245	500	13:38:29	54822.4

Fort Devens

Magnetic Survey (Line 7)

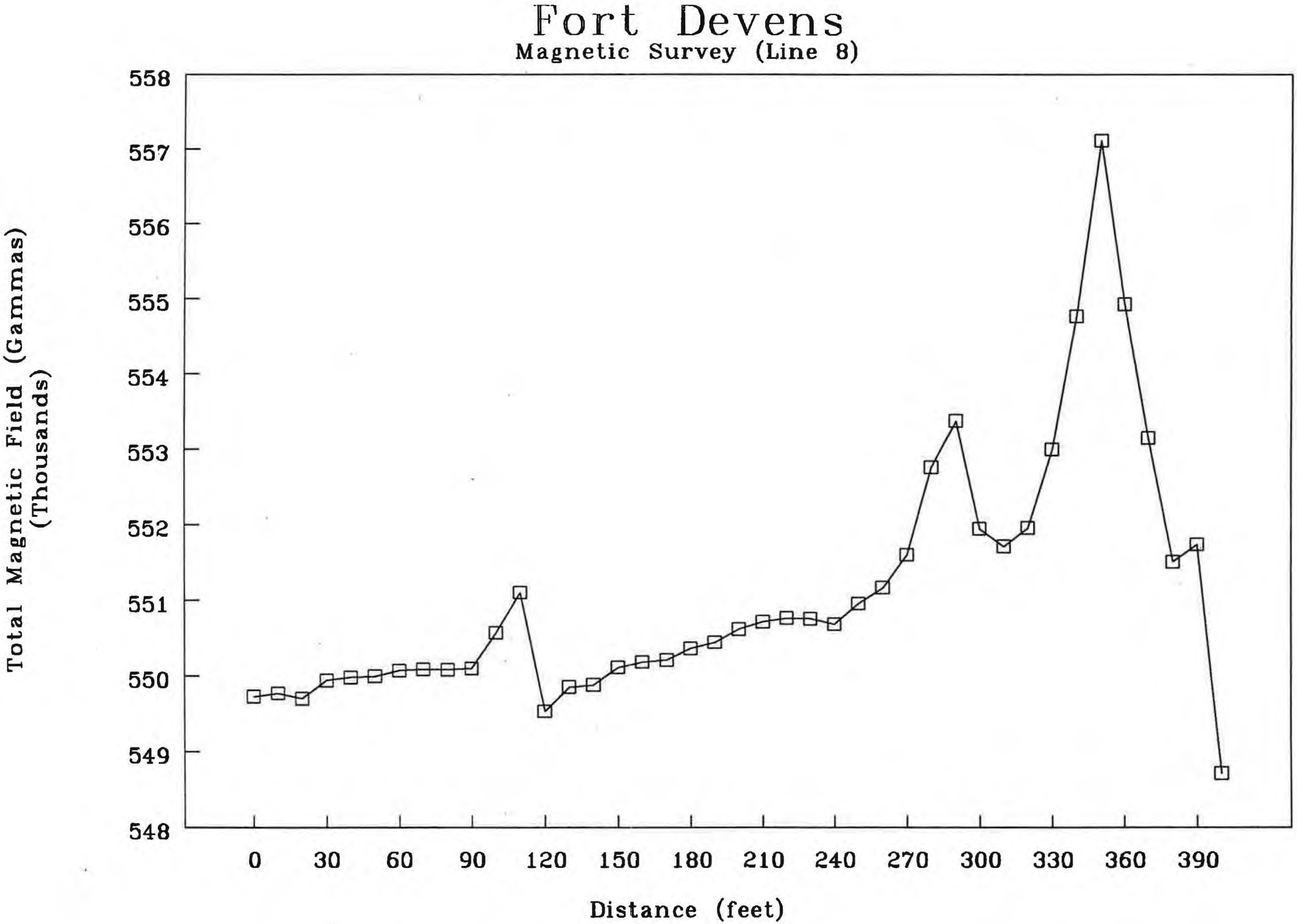


ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 8

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 8	246	0	13:43:21	54972.8
003/ 8	247	10	13:44:01	54977.2
003/ 8	248	20	13:44:15	54970.3
003/ 8	249	30	13:44:31	54993.8
003/ 8	250	40	13:44:45	54997.9
003/ 8	251	50	13:44:59	54999.7
003/ 8	252	60	13:45:14	55006.9
003/ 8	253	70	13:45:28	55008.6
003/ 8	254	80	13:45:44	55008.3
003/ 8	255	90	13:45:59	55009.9
003/ 8	256	100	13:46:13	55057.1
003/ 8	257	110	13:46:29	55110.5
003/ 8	258	120	13:46:46	54953.3
003/ 8	259	130	13:47:02	54985.3
003/ 8	260	140	13:47:17	54988.1
003/ 8	261	150	13:47:32	55011.5
003/ 8	262	160	13:47:46	55018.5
003/ 8	263	170	13:47:59	55021.3
003/ 8	264	180	13:48:13	55036.6
003/ 8	265	190	13:48:27	55044.7
003/ 8	266	200	13:48:41	55061.8
003/ 8	267	210	13:48:55	55071.6
003/ 8	268	220	13:49:08	55076.6
003/ 8	269	230	13:49:23	55075.3
003/ 8	270	240	13:49:37	55068.4
003/ 8	271	250	13:49:52	55095.5
003/ 8	272	260	13:50:05	55116.9
003/ 8	273	270	13:50:20	55160.3
003/ 8	274	280	13:50:35	55275.6
003/ 8	275	290	13:50:50	55337.5
003/ 8	276	300	13:51:05	55194.8
003/ 8	277	310	13:51:18	55171.1
003/ 8	278	320	13:51:32	55195.4
003/ 8	279	330	13:51:46	55299.4
003/ 8	280	340	13:52:01	55477.2
003/ 8	281	350	13:52:16	55711.8
003/ 8	282	360	13:52:31	55492.9
003/ 8	283	370	13:52:47	55314.8
003/ 8	284	380	13:53:03	55151.1
003/ 8	285	390	13:53:18	55174.1
003/ 8	286	400	13:53:33	54871.1

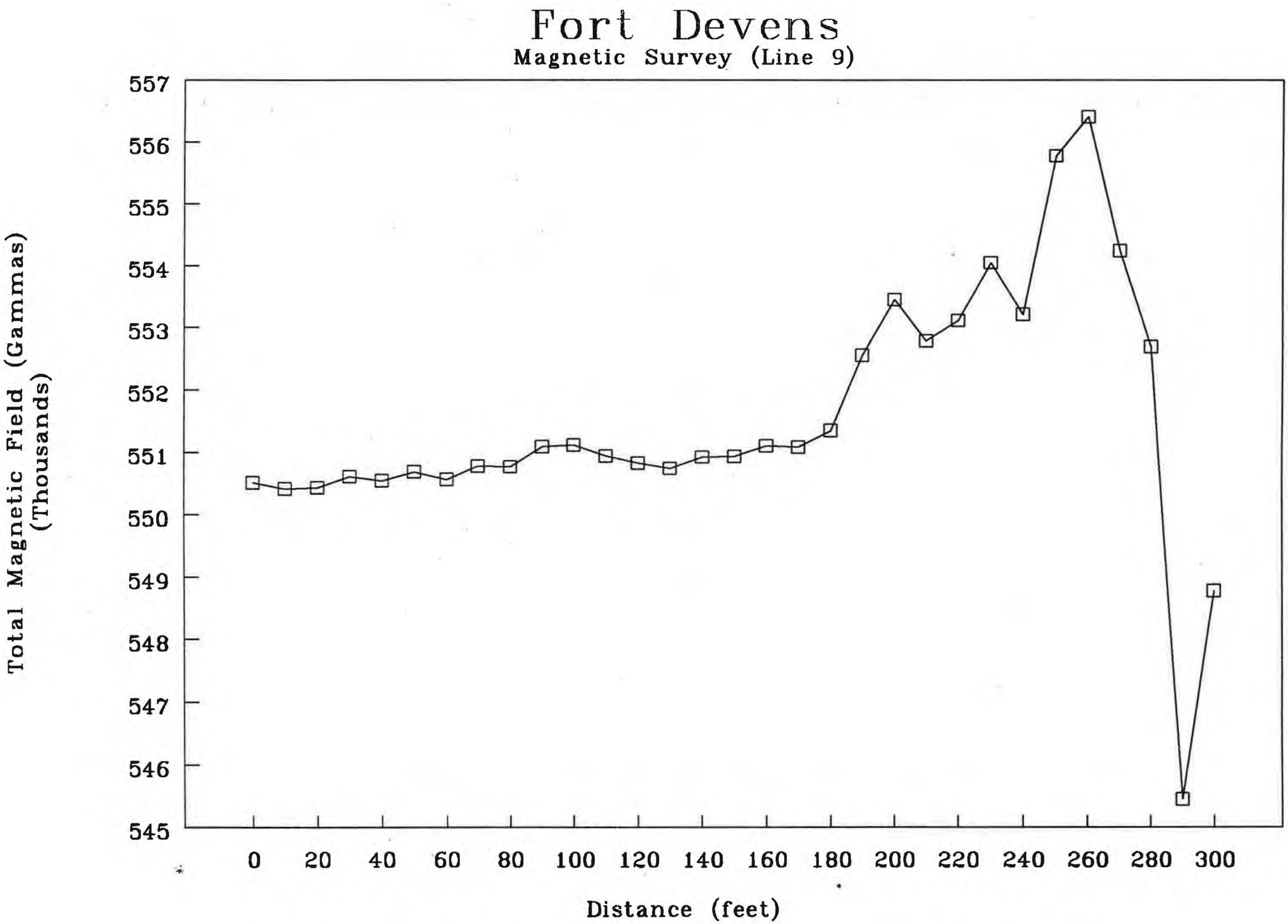

Fort Devens
Magnetic Survey (Line 8)
Total Magnetic Field (Gammas)
(Thousands)
558
557
556
555
554
553
552
551
550
549
548
0
30
60
90
120
150
180
210
240
270
300
330
360
390
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 9

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 9	287	0	13:55:50	55051.3
003/ 9	288	10	13:56:14	55041.2
003/ 9	289	20	13:56:27	55043.0
003/ 9	290	30	13:56:44	55061.1
003/ 9	291	40	13:56:58	55054.1
003/ 9	292	50	13:57:13	55068.6
003/ 9	293	60	13:57:26	55056.5
003/ 9	294	70	13:57:48	55077.7
003/ 9	295	80	13:58:04	55076.5
003/ 9	296	90	13:58:18	55109.3
003/ 9	297	100	13:58:32	55111.6
003/ 9	298	110	13:58:47	55093.8
003/ 9	299	120	13:59:00	55082.4
003/ 9	300	130	13:59:13	55074.0
003/ 9	301	140	13:59:26	55092.1
003/ 9	302	150	13:59:39	55093.5
003/ 9	303	160	14:00:00	55110.5
003/ 9	304	170	14:00:14	55108.6
003/ 9	305	180	14:00:43	55134.4
003/ 9	306	190	14:01:00	55255.8
003/ 9	307	200	14:01:13	55345.2
003/ 9	308	210	14:01:29	55278.3
003/ 9	309	220	14:01:42	55310.9
003/ 9	310	230	14:01:57	55404.6
003/ 9	311	240	14:02:10	55321.0
003/ 9	312	250	14:02:25	55578.1
003/ 9	313	260	14:02:39	55641.0
003/ 9	314	270	14:02:54	55424.1
003/ 9	315	280	14:03:07	55269.4
003/ 9	316	290	14:03:28	54544.9
003/ 9	317	300	14:03:45	54877.5



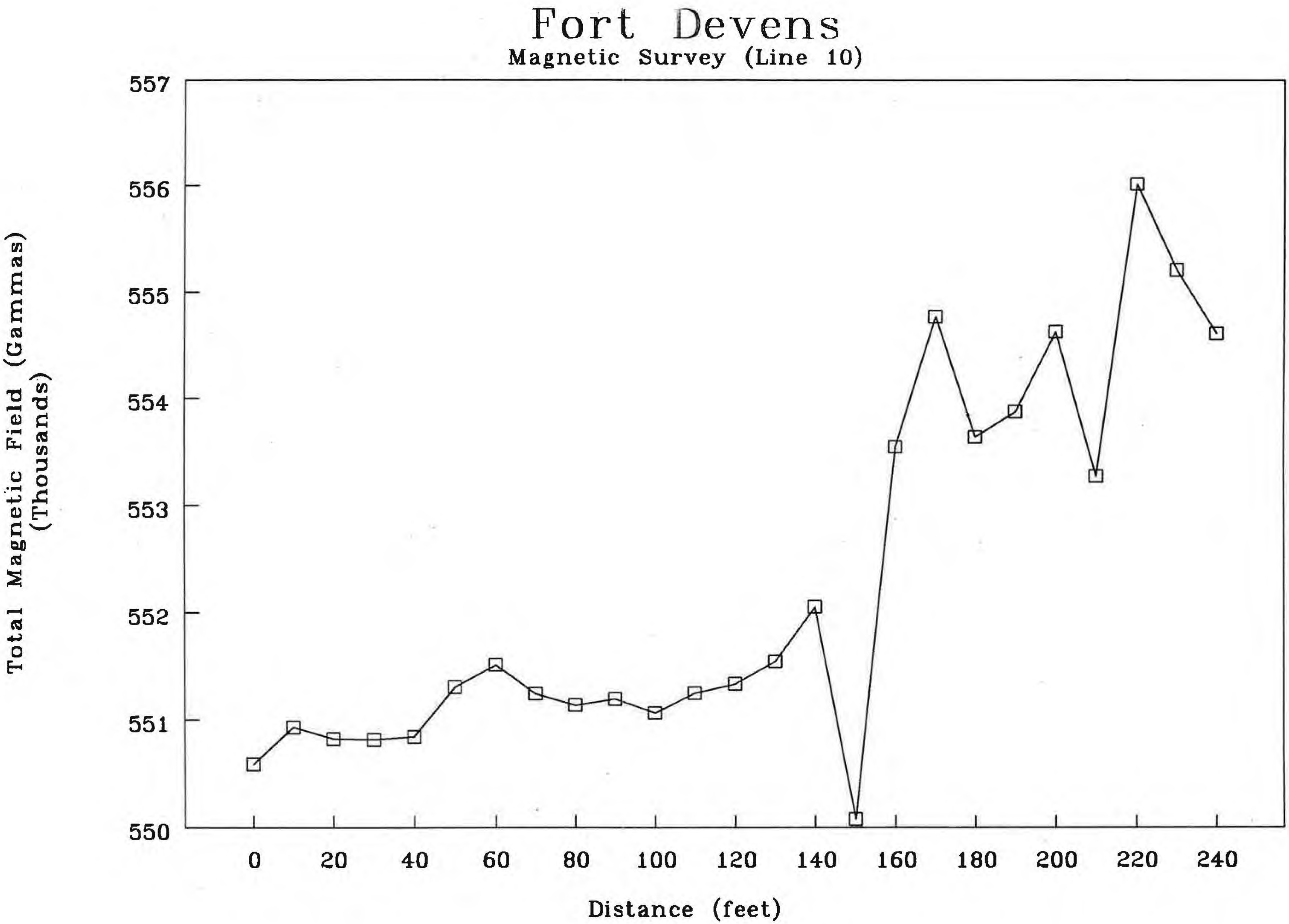
Fort Devens
Magnetic Survey (Line 9)
Total Magnetic Field (Gammas)
(Thousands)
557
556
555
554
553
552
551
550
549
548
547
546
545
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 10

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 10	318	0	14:05:46	55058.8
003/ 10	319	10	14:06:32	55093.3
003/ 10	320	20	14:06:50	55082.4
003/ 10	321	30	14:07:14	55081.5
003/ 10	322	40	14:08:09	55084.3
003/ 10	323	50	14:08:28	55130.7
003/ 10	324	60	14:08:41	55151.1
003/ 10	325	70	14:08:55	55124.6
003/ 10	326	80	14:09:09	55113.8
003/ 10	327	90	14:09:23	55119.4
003/ 10	328	100	14:09:36	55106.3
003/ 10	329	110	14:09:50	55124.9
003/ 10	330	120	14:12:27	55133.3
003/ 10	331	130	14:13:15	55154.7
003/ 10	332	140	14:13:28	55205.5
003/ 10	333	150	14:13:42	55008.0
003/ 10	334	160	14:13:58	55354.7
003/ 10	335	170	14:14:13	55477.0
003/ 10	336	180	14:14:27	55363.8
003/ 10	337	190	14:14:44	55387.5
003/ 10	338	200	14:14:58	55462.5
003/ 10	339	210	14:15:13	55327.0
003/ 10	340	220	14:15:27	55601.7
003/ 10	341	230	14:15:41	55521.0
003/ 10	342	240	14:15:57	55461.2

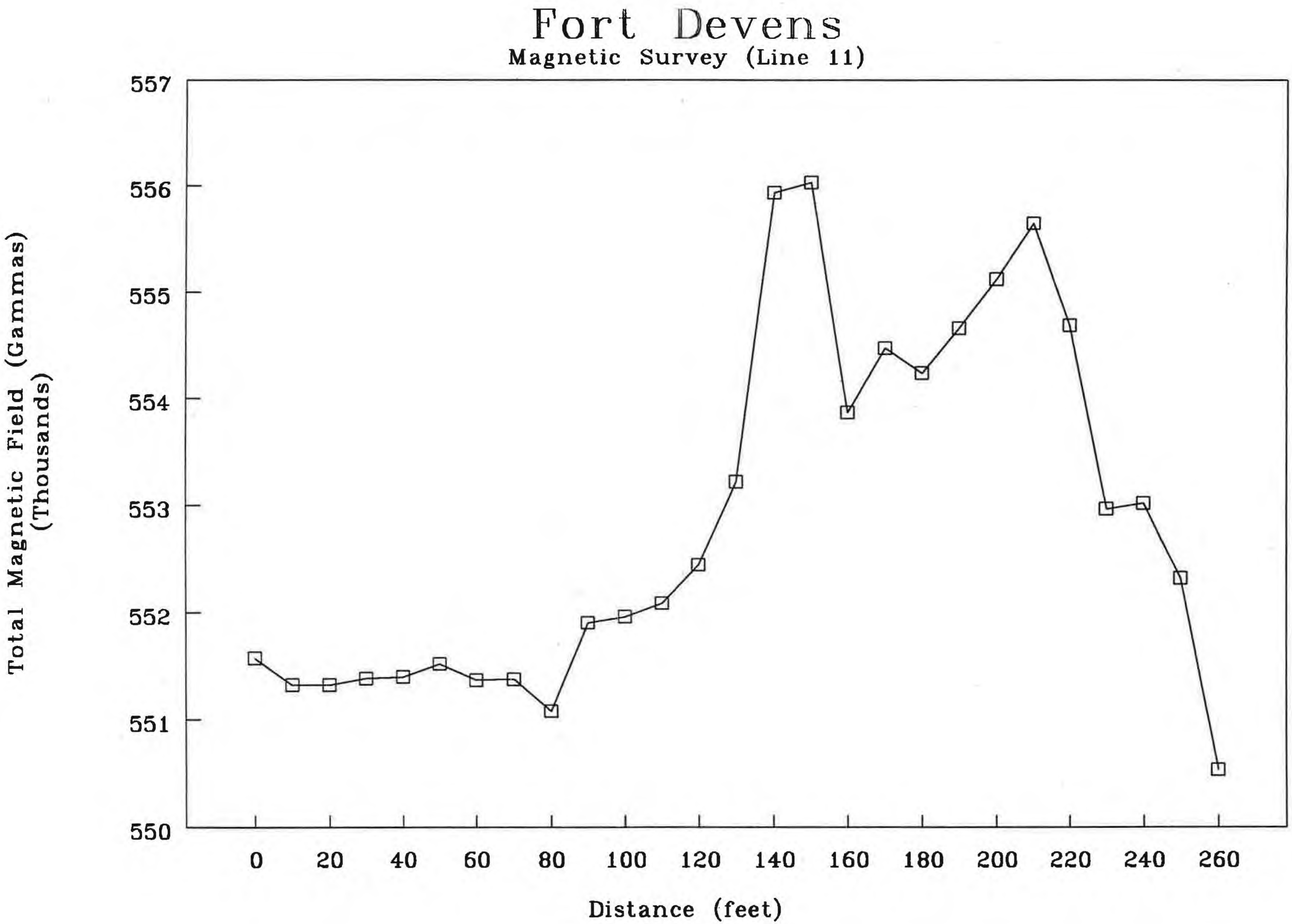

Fort Devens
Magnetic Survey (Line 10)
557
556
555
554
553
552
551
550
Total Magnetic Field (Gammas)
(Thousands)
0
20
40
60
80
100
120
140
160
180
200
220
240
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 11

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 11	343	0	14:31:10	55157.7
003/ 11	344	10	14:31:30	55132.3
003/ 11	345	20	14:31:44	55132.5
003/ 11	346	30	14:32:03	55138.4
003/ 11	347	40	14:32:19	55140.1
003/ 11	348	50	14:32:37	55152.3
003/ 11	349	60	14:32:51	55137.2
003/ 11	350	70	14:33:05	55137.9
003/ 11	351	80	14:33:18	55108.1
003/ 11	352	90	14:33:46	55190.5
003/ 11	353	100	14:34:02	55196.3
003/ 11	354	110	14:34:51	55208.9
003/ 11	355	120	14:35:26	55244.8
003/ 11	356	130	14:35:47	55321.8
003/ 11	357	140	14:36:01	55593.4
003/ 11	358	150	14:36:16	55603.1
003/ 11	359	160	14:36:29	55386.6
003/ 11	360	170	14:36:43	55447.5
003/ 11	361	180	14:36:56	55423.6
003/ 11	362	190	14:37:13	55466.1
003/ 11	363	200	14:37:28	55512.3
003/ 11	364	210	14:37:44	55564.4
003/ 11	365	220	14:38:02	55468.7
003/ 11	366	230	14:38:16	55296.6
003/ 11	367	240	14:38:30	55302.0
003/ 11	368	250	14:38:44	55232.0
003/ 11	369	260	14:39:01	55053.6


Fort Devens
Magnetic Survey (Line 11)
Total Magnetic Field (Gammas)
(Thousands)
557
556
555
554
553
552
551
550
0
20
40
60
80
100
120
140
160
180
200
220
240
260
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 12

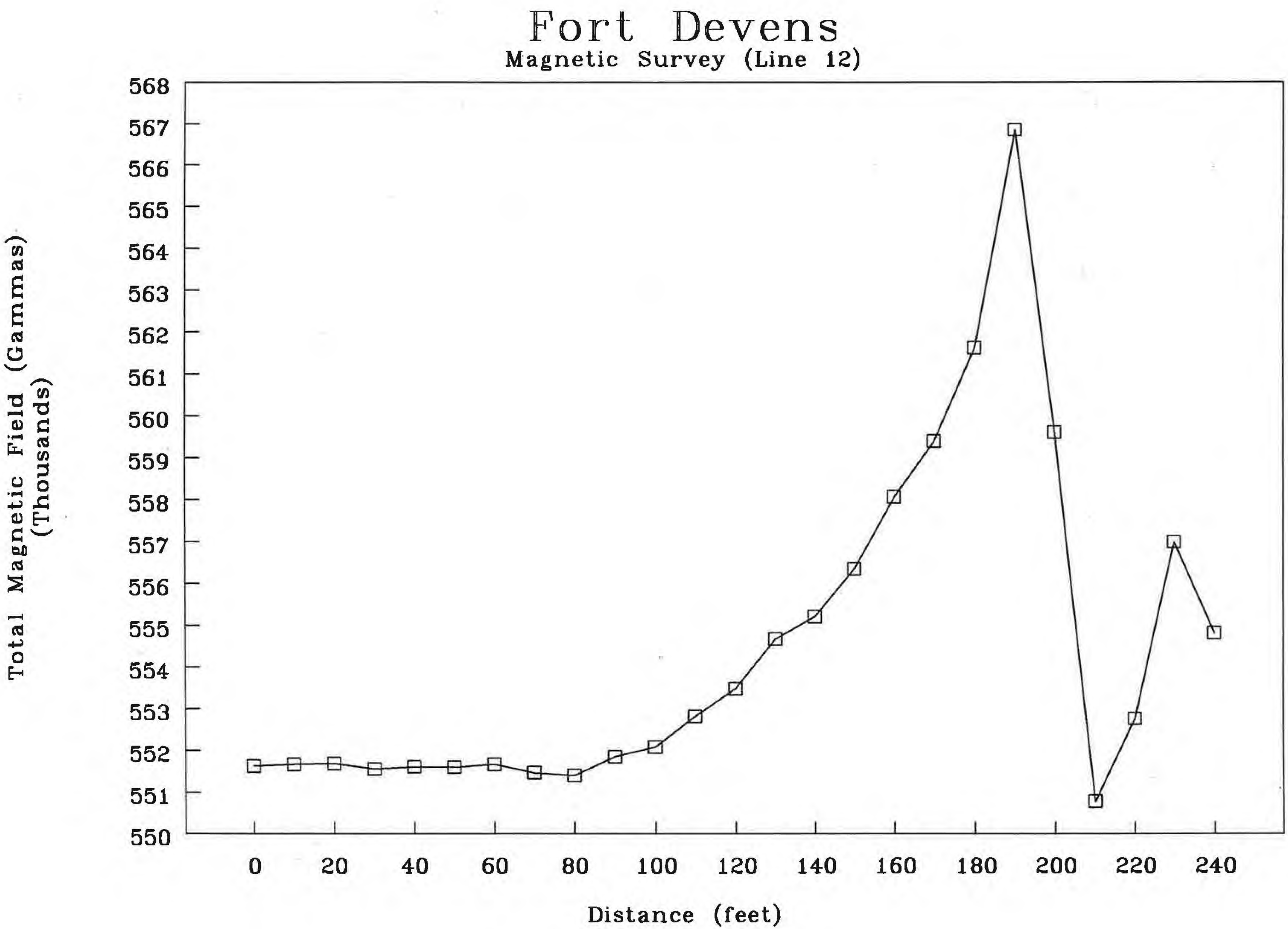
LINE #	SITE #	FEET	TIME	GAMMAS
003/ 12	370	0	14:42:06	55163.2
003/ 12	371	10	14:42:30	55166.3
003/ 12	372	20	14:42:45	55169.1
003/ 12	373	30	14:42:59	55155.8
003/ 12	374	40	14:43:13	55160.8
003/ 12	375	50	14:43:27	55159.6
003/ 12	376	60	14:43:40	55167.1
003/ 12	377	70	14:44:08	55147.4
003/ 12	378	80	14:44:25	55139.9
003/ 12	379	90	14:44:39	55185.4
003/ 12	380	100	14:45:09	55208.7
003/ 12	381	110	14:45:27	552[illegible].2
003/ 12	382	120	14:45:40	55348.9
003/ 12	383	130	14:45:56	55467.2
003/ 12	384	140	14:46:11	55520.8
003/ 12	385	150	14:46:41	55635.5
003/ 12	386	160	14:47:06	55806.2
003/ 12	387	170	14:47:21	55939.4
003/ 12	388	180	14:47:35	56162.0
003/ 12	389	190	14:47:53	56685.2
003/ 12	390	200	14:48:12	55961.2
003/ 12	391	210	14:48:31	55078.5
003/ 12	392	220	14:48:47	55276.3
003/ 12	393	230	14:49:04	55699.5
003/ 12	394	240	14:49:18	55481.4

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 12

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 12	370	0	14:42:06	55163.2
003/ 12	371	10	14:42:30	55166.3
003/ 12	372	20	14:42:45	55169.1
003/ 12	373	30	14:42:59	55155.8
003/ 12	374	40	14:43:13	55160.8
003/ 12	375	50	14:43:27	55159.6
003/ 12	376	60	14:43:40	55167.1
003/ 12	377	70	14:44:08	55147.4
003/ 12	378	80	14:44:25	55139.9
003/ 12	379	90	14:44:39	55185.4
003/ 12	380	100	14:45:09	55208.7
003/ 12	381	110	14:45:27	55282.2
003/ 12	382	120	14:45:40	55348.9
003/ 12	383	130	14:45:56	55467.2
003/ 12	384	140	14:46:11	55520.8
003/ 12	385	150	14:46:41	55635.5
003/ 12	386	160	14:47:06	55806.2
003/ 12	387	170	14:47:21	55939.4
003/ 12	388	180	14:47:35	56162.0
003/ 12	389	190	14:47:53	56685.2
003/ 12	390	200	14:48:12	55961.2
003/ 12	391	210	14:48:31	55078.5
003/ 12	392	220	14:48:47	55276.3
003/ 12	393	230	14:49:04	55699.5
003/ 12	394	240	14:49:18	55481.4



ecology and environment

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ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 13

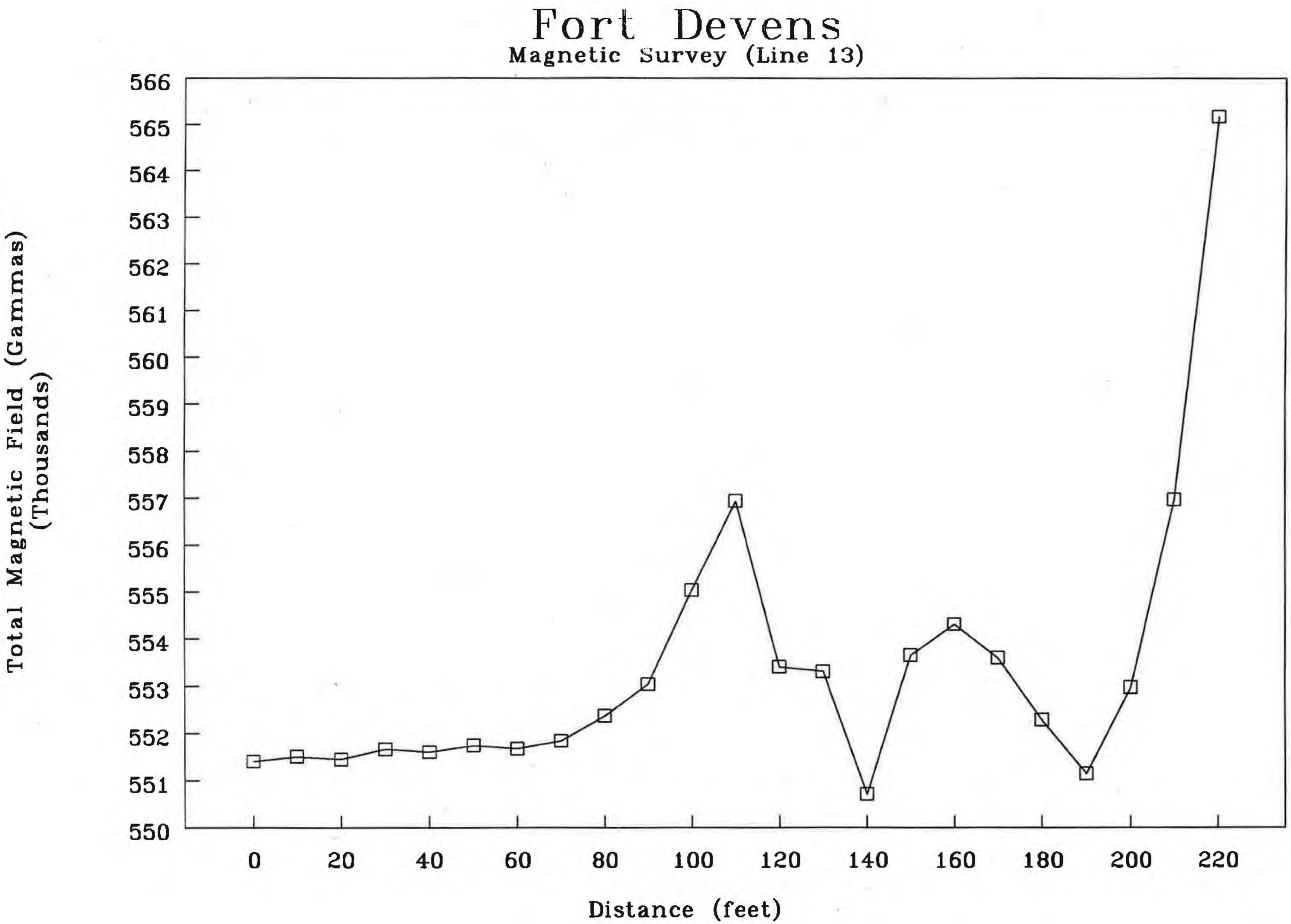
LINE #	SITE #	FEET	TIME	GAMMAS
003/ 13	395	0	14:55:21	55141.2
003/ 13	396	10	14:55:45	55151.6
003/ 13	397	20	14:55:58	55145.5
003/ 13	398	30	14:56:36	55167.0
003/ 13	399	40	14:56:50	55161.3
003/ 13	400	50	14:57:04	55174.9
003/ 13	401	60	14:57:51	55168.1
003/ 13	402	70	14:58:16	55184.6
003/ 13	403	80	14:58:43	55237.7
003/ 13	404	90	14:59:06	55304.1
003/ 13	405	100	14:59:19	55504.3
003/ 13	406	110	14:59:36	55693.8
003/ 13	407	120	14:59:54	55340.6
003/ 13	408	130	15:00:08	55331.2
003/ 13	409	140	15:00:22	55071.3
003/ 13	410	150	15:00:38	55365.3
003/ 13	411			

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 13

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 13	395	0	14:55:21	55141.2
003/ 13	396	10	14:55:45	55151.6
003/ 13	397	20	14:55:58	55145.5
003/ 13	398	30	14:56:36	55167.0
003/ 13	399	40	14:56:50	55161.3
003/ 13	400	50	14:57:04	55174.9
003/ 13	401	60	14:57:51	55168.1
003/ 13	402	70	14:58:16	55184.6
003/ 13	403	80	14:58:43	55237.7
003/ 13	404	90	14:59:06	55304.1
003/ 13	405	100	14:59:19	55504.3
003/ 13	406	110	14:59:36	55693.8
003/ 13	407	120	14:59:54	55340.6
003/ 13	408	130	15:00:08	55331.2
003/ 13	409	140	15:00:22	55071.3
003/ 13	410	150	15:00:38	55365.3
003/ 13	411	160	15:00:52	55431.1
003/ 13	412	170	15:01:15	55359.6
003/ 13	413	180	15:01:29	55228.7
003/ 13	414	190	15:01:45	55114.7
003/ 13	415	200	15:01:59	55297.1
003/ 13	416	210	15:02:15	55696.3
003/ 13	417	220	15:02:30	56518.0

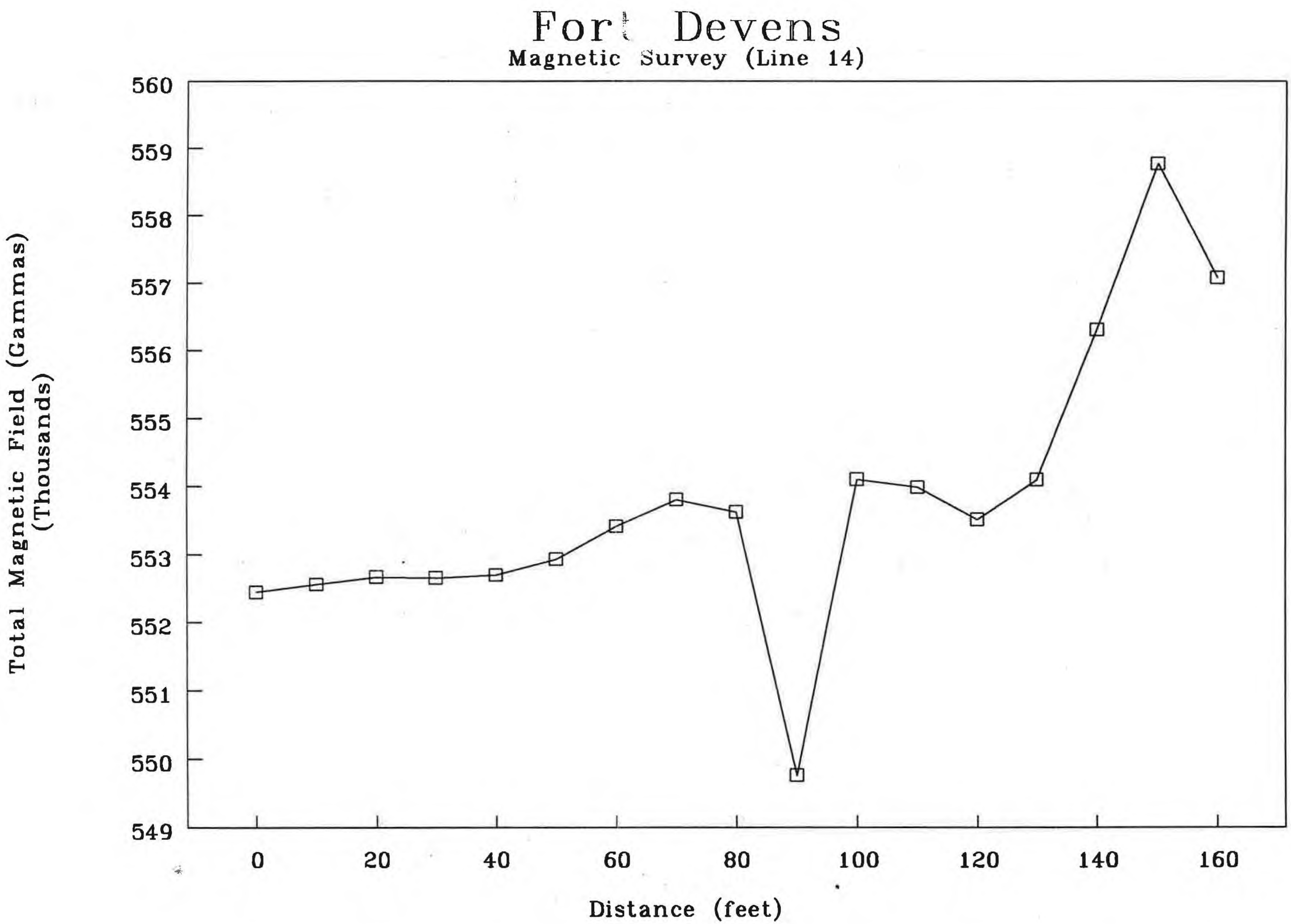

Fort Devens
Magnetic Survey (Line 13)
Total Magnetic Field (Gammas)
(Thousands)
566
565
564
563
562
561
560
559
558
557
556
555
554
553
552
551
550
0
20
40
60
80
100
120
140
160
180
200
220
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 14

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 14	418	0	15:04:35	55244.9
003/ 14	419	10	15:05:00	55256.5
003/ 14	420	20	15:05:17	55267.0
003/ 14	421	30	15:05:35	55266.1
003/ 14	422	40	15:05:54	55270.3
003/ 14	423	50	15:06:09	55293.2
003/ 14	424	60	15:06:24	55342.0
003/ 14	425	70	15:06:44	55380.6
003/ 14	426	80	15:06:59	55362.8
003/ 14	427	90	15:07:32	54976.5
003/ 14	428	100	15:07:46	55410.3
003/ 14	429	110	15:08:05	55398.9
003/ 14	430	120	15:08:18	55351.3
003/ 14	431	130	15:08:37	55409.5
003/ 14	432	140	15:08:51	55631.3
003/ 14	433	150	15:09:09	55877.9
003/ 14	434	160	15:09:26	55708.6

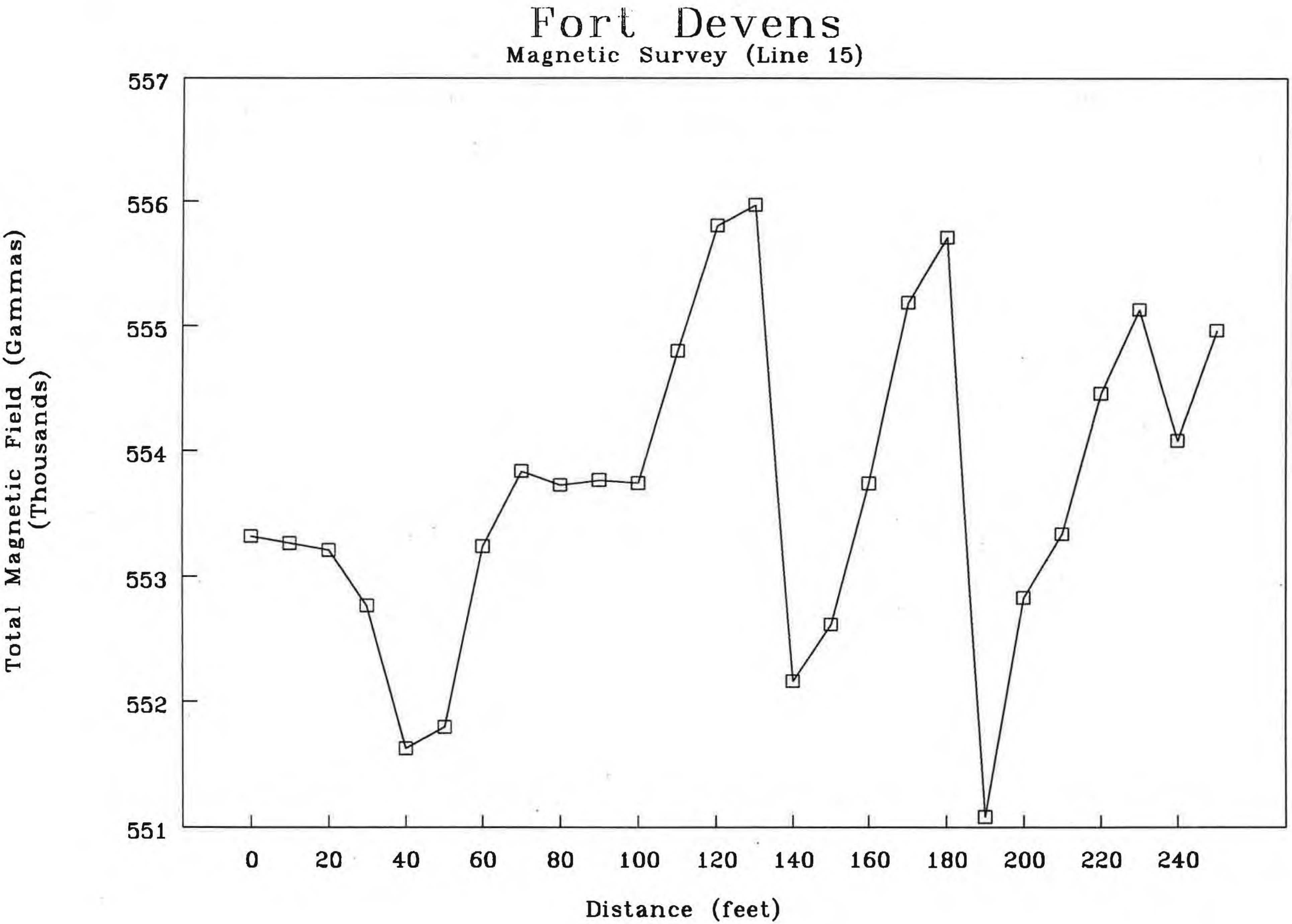

Fort Devens
Magnetic Survey (Line 14)
Total Magnetic Field (Gammas)
(Thousands)
560
559
558
557
556
555
554
553
552
551
550
549
0
20
40
60
80
100
120
140
160
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 15

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 15	435	0	15:12:22	55331.9
003/ 15	436	10	15:12:58	55326.4
003/ 15	437	20	15:13:30	55321.0
003/ 15	438	30	15:13:49	55276.4
003/ 15	439	40	15:14:12	55162.9
003/ 15	440	50	15:14:27	55179.6
003/ 15	441	60	15:14:43	55323.8
003/ 15	442	70	15:14:59	55383.6
003/ 15	443	80	15:15:16	55372.6
003/ 15	444	90	15:15:30	55376.4
003/ 15	445	100	15:15:45	55374.3
003/ 15	446	110	15:15:58	55480.2
003/ 15	447	120	15:16:13	55581.1
003/ 15	448	130	15:16:27	55597.5
003/ 15	449	140	15:16:44	55216.0
003/ 15	450	150	15:16:59	55261.3
003/ 15	451	160	15:17:20	55373.8
003/ 15	452	170	15:17:34	55519.1
003/ 15	453	180	15:17:51	55571.3
003/ 15	454	190	15:18:07	55108.6
003/ 15	455	200	15:18:22	55282.7
003/ 15	456	210	15:18:36	55333.6
003/ 15	457	220	15:18:58	55445.7
003/ 15	458	230	15:19:14	55513.5
003/ 15	459	240	15:19:29	55407.9
003/ 15	460	250	15:19:45	55496.8



Fort Devens
Magnetic Survey (Line 15)
Total Magnetic Field (Gammas)
(Thousands)
557
556
555
554
553
552
551
0
20
40
60
80
100
120
140
160
180
200
220
240
Distance (feet)

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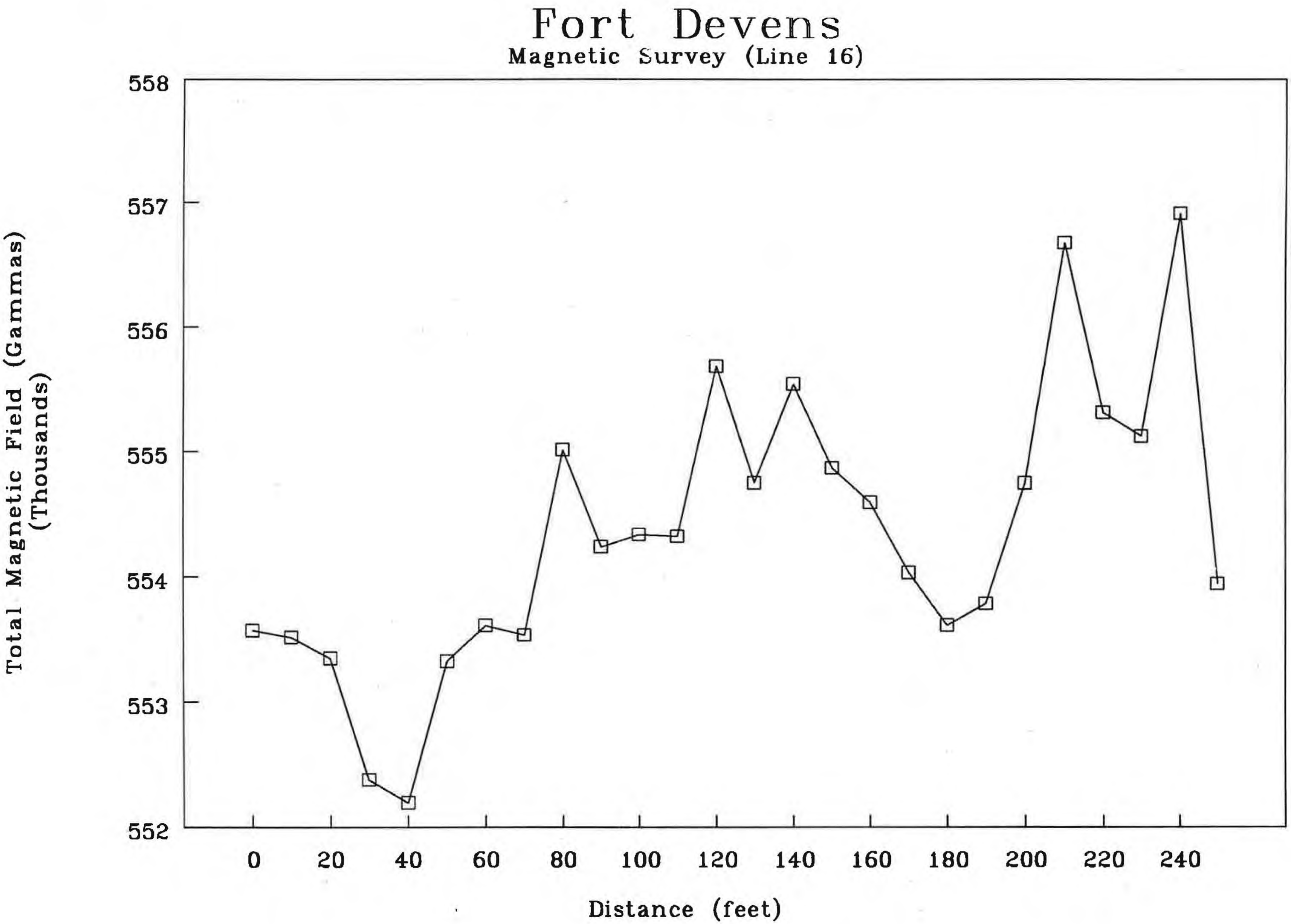
ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 16

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 16	461	0	15:27:20	55357.1
003/ 16	462	10	15:27:41	55351.7
003/ 16	463	20	15:28:02	55335.1
003/ 16	464	30	15:28:27	55237.8
003/ 16	465	40	15:28:43	55219.6
003/ 16	466	50	15:28:57	55332.8
003/ 16	467	60	15:29:15	55361.2
003/ 16	468	70	15:29:32	55353.7
003/ 16	469	80	15:29:57	55501.3
003/ 16	470	90	15:30:12	55423.7
003/ 16	471	100	15:30:29	55433.6
003/ 16	472	110	15:30:43	55432.3
003/ 16	473	120	15:30:56	55568.7
003/ 16	474	130	15:31:10	55474.9
003/ 16	475	140	15:31:24	55554.4
003/ 16	476	150	15:31:39	55486.6
003/ 16	477	160	15:31:54	55459.3
003/ 16	478	170	15:32:09	55403.3
003/ 16	479	180	15:32:23	55361.2
003/ 16	480	190	15:32:37	55378.5
003/ 16	481	200	15:32:53	55474.4
003/ 16	482	210	15:33:08	55667.7
003/ 16	483	220	15:33:25	55531.0
003/ 16	484	230	15:33:40	55512.1
003/ 16	485	240	15:33:55	55691.3
003/ 16	486	250	15:34:11	55394.2


Fort Devens
Magnetic Survey (Line 16)
Total Magnetic Field (Gammas)
(Thousands)
558
557
556
555
554
553
552
0
20
40
60
80
100
120
140
160
180
200
220
240
Distance (feet)

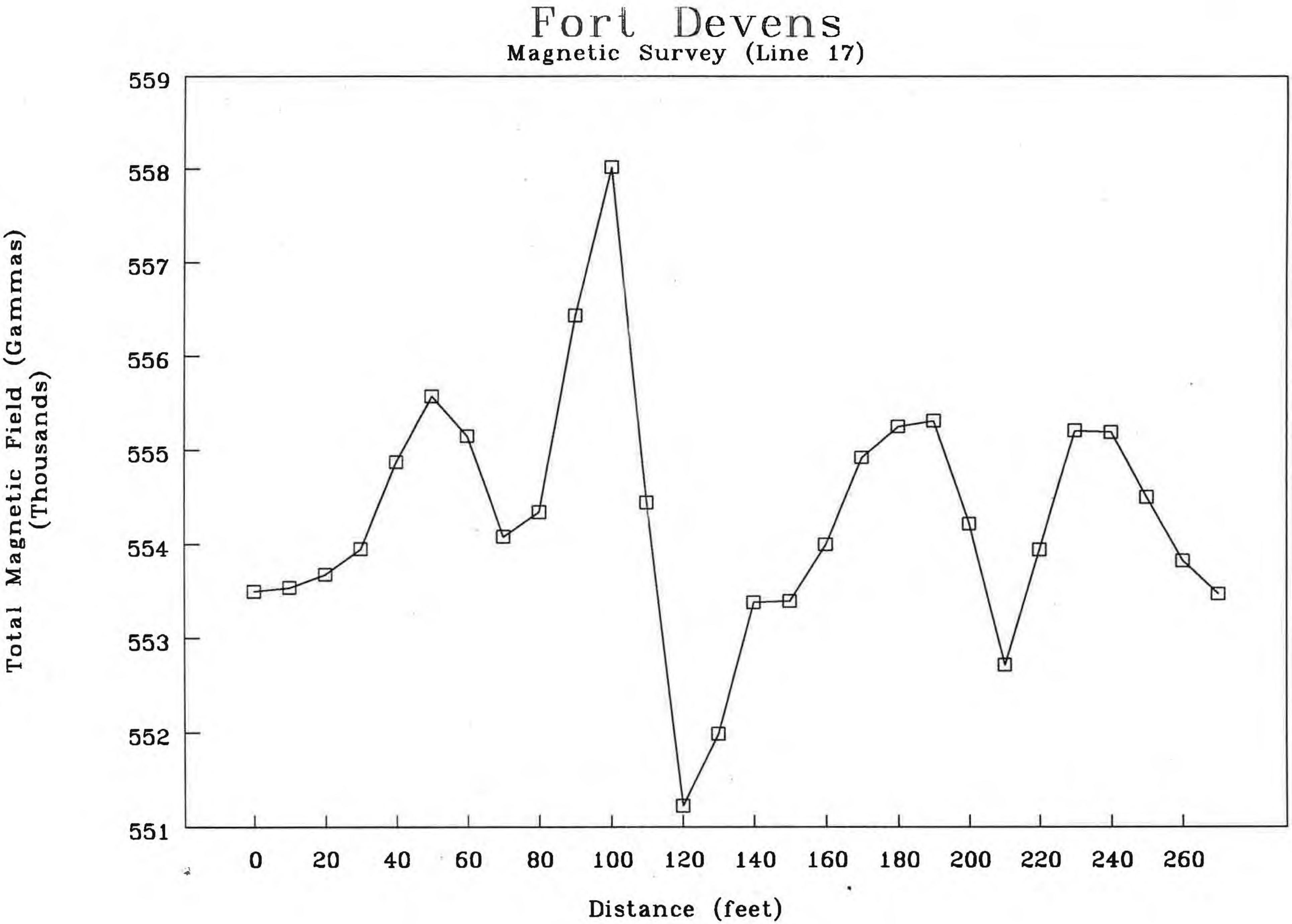
B-38

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 17

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 17	487	0	15:36:05	55350.1
003/ 17	488	10	15:36:30	55353.9
003/ 17	489	20	15:36:49	55367.8
003/ 17	490	30	15:37:12	55394.6
003/ 17	491	40	15:37:39	55486.8
003/ 17	492	50	15:37:55	55557.2
003/ 17	493	60	15:38:14	55514.7
003/ 17	494	70	15:38:27	55408.0
003/ 17	495	80	15:38:43	55433.8
003/ 17	496	90	15:38:57	55643.4
003/ 17	497	100	15:39:13	55802.2
003/ 17	498	110	15:39:30	55444.0
003/ 17	499	120	15:39:45	55122.7
003/ 17	500	130	15:39:59	55198.9
003/ 17	501	140	15:40:14	55338.2
003/ 17	502	150	15:40:29	55339.4
003/ 17	503	160	15:40:44	55399.5
003/ 17	504	170	15:41:19	55491.8
003/ 17	505	180	15:41:36	55524.9
003/ 17	506	190	15:41:51	55531.0
003/ 17	507	200	15:42:08	55421.2
003/ 17	508	210	15:42:23	55271.9
003/ 17	509	220	15:42:40	55393.8
003/ 17	510	230	15:42:53	55520.4
003/ 17	511	240	15:43:11	55518.8
003/ 17	512	250	15:43:27	55449.0
003/ 17	513	260	15:43:43	55382.2
003/ 17	514	270	15:43:59	55346.8

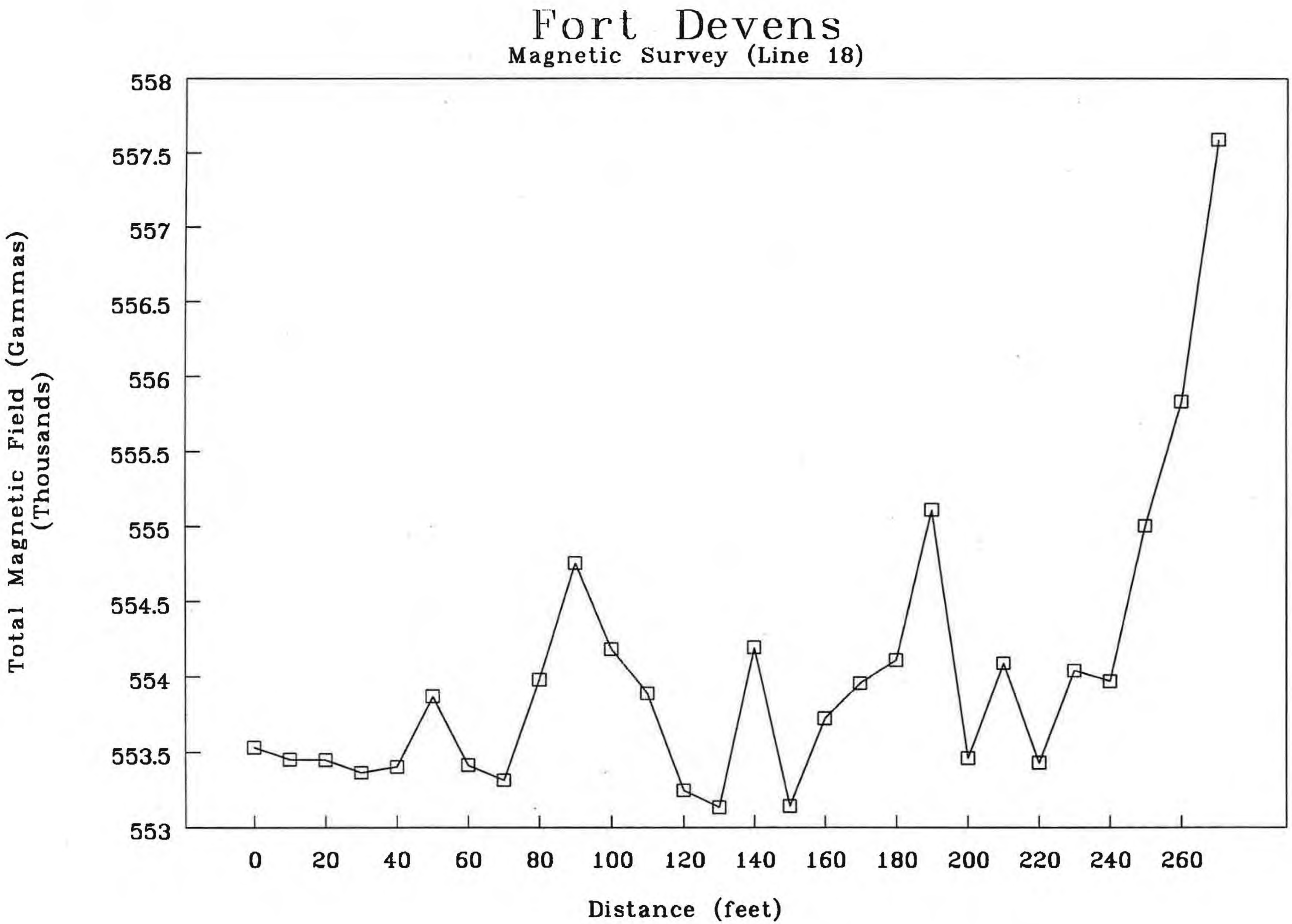

Fort Devens
Magnetic Survey (Line 17)
Total Magnetic Field (Gammas) (Thousands)
559
558
557
556
555
554
553
552
551
0
20
40
60
80
100
120
140
160
180
200
220
240
260
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 18

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 18	515	0	15:45:54	55353.3
003/ 18	516	10	15:46:15	55345.3
003/ 18	517	20	15:46:29	55345.2
003/ 18	518	30	15:46:46	55336.6
003/ 18	519	40	15:47:10	55340.6
003/ 18	520	50	15:47:27	55387.3
003/ 18	521	60	15:47:42	55341.5
003/ 18	522	70	15:48:00	55331.4
003/ 18	523	80	15:48:24	55398.1
003/ 18	524	90	15:48:42	55475.9
003/ 18	525	100	15:48:58	55418.6
003/ 18	526	110	15:49:12	55389.1
003/ 18	527	120	15:49:30	55324.8
003/ 18	528	130	15:49:44	55313.7
003/ 18	529	140	15:50:00	55419.6
003/ 18	530	150	15:50:14	55314.4
003/ 18	531	160	15:50:29	55372.6
003/ 18	532	170	15:50:47	55395.7
003/ 18	533	180	15:51:01	55411.2
003/ 18	534	190	15:51:15	55511.0
003/ 18	535	200	15:51:30	55346.3
003/ 18	536	210	15:52:26	55409.1
003/ 18	537	220	15:52:41	55342.8
003/ 18	538	230	15:53:11	55404.1
003/ 18	539	240	15:53:30	55397.0
003/ 18	540	250	15:53:47	55500.2
003/ 18	541	260	15:54:02	55583.2
003/ 18	542	270	15:54:17	55759.1



Fort Devens
Magnetic Survey (Line 18)
Total Magnetic Field (Gammas)
(Thousands)
558
557.5
557
556.5
556
555.5
555
554.5
554
553.5
553
0
20
40
60
80
100
120
140
160
180
200
220
240
260
Distance (feet)

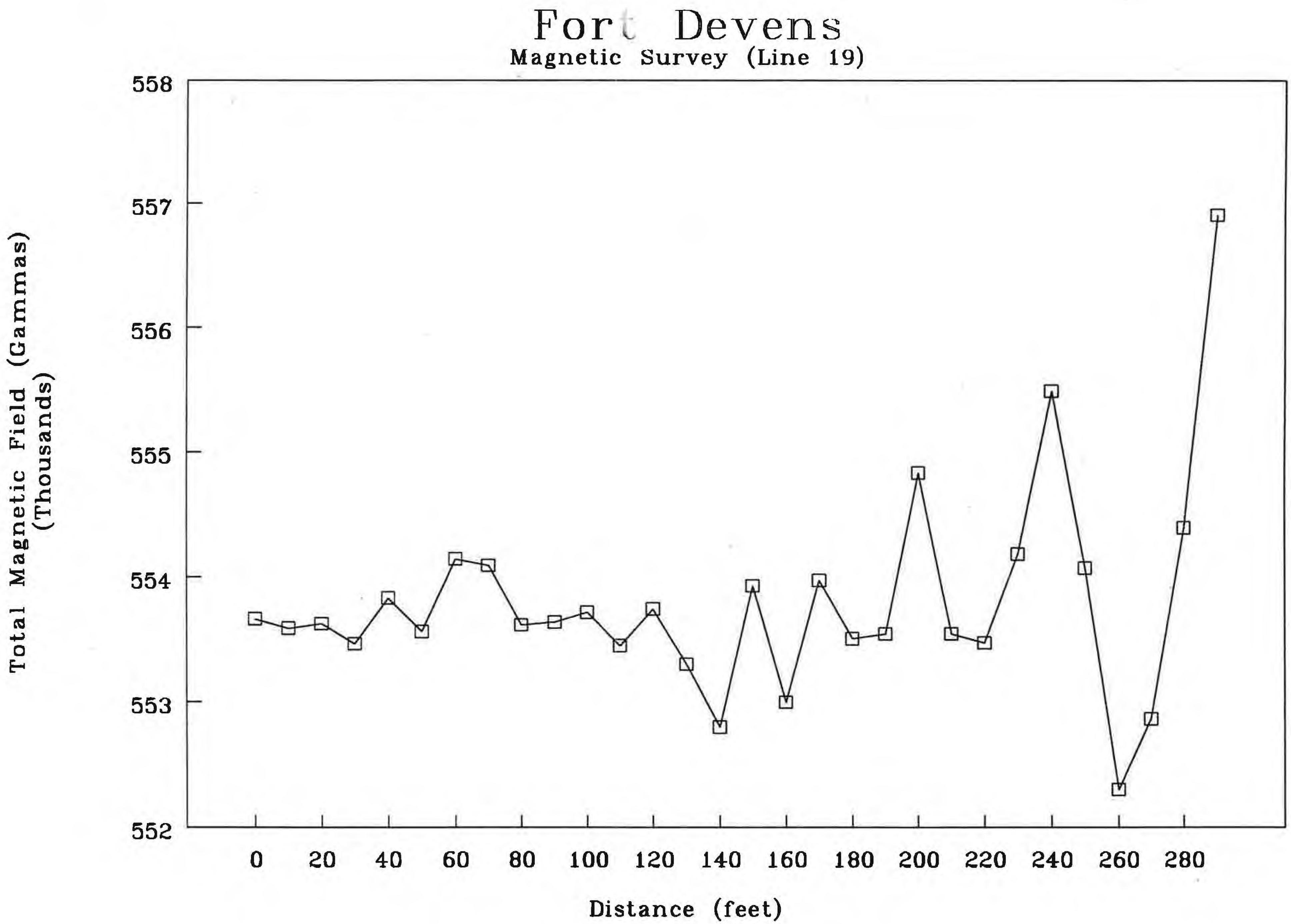
B-42

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 19

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 19	543	0	15:57:06	55366.5
003/ 19	544	10	15:57:25	55358.8
003/ 19	545	20	15:57:43	55362.4
003/ 19	546	30	15:57:58	55346.3
003/ 19	547	40	15:58:28	55383.1
003/ 19	548	50	15:58:44	55356.1
003/ 19	549	60	15:59:01	55414.5
003/ 19	550	70	15:59:17	55409.0
003/ 19	551	80	15:59:38	55361.5
003/ 19	552	90	15:59:55	55363.6
003/ 19	553	100	16:00:10	55371.6
003/ 19	554	110	16:00:36	55344.9
003/ 19	555	120	16:00:51	55374.1
003/ 19	556	130	16:01:15	55330.0
003/ 19	557	140	16:01:37	55279.9
003/ 19	558	150	16:01:56	55392.9
003/ 19	559	160	16:02:12	55299.7
003/ 19	560	170	16:02:25	55397.0
003/ 19	561	180	16:02:40	55350.2
003/ 19	562	190	16:02:55	55354.3
003/ 19	563	200	16:03:11	55482.9
003/ 19	564	210	16:03:24	55354.4
003/ 19	565	220	16:03:39	55347.0
003/ 19	566	230	16:03:56	55418.2
003/ 19	567	240	16:04:13	55548.7
003/ 19	568	250	16:04:28	55407.0
003/ 19	569	260	16:04:47	55230.0
003/ 19	570	270	16:05:04	55286.4
003/ 19	571	280	16:05:22	55439.2
003/ 19	572	290	16:05:39	55691.0



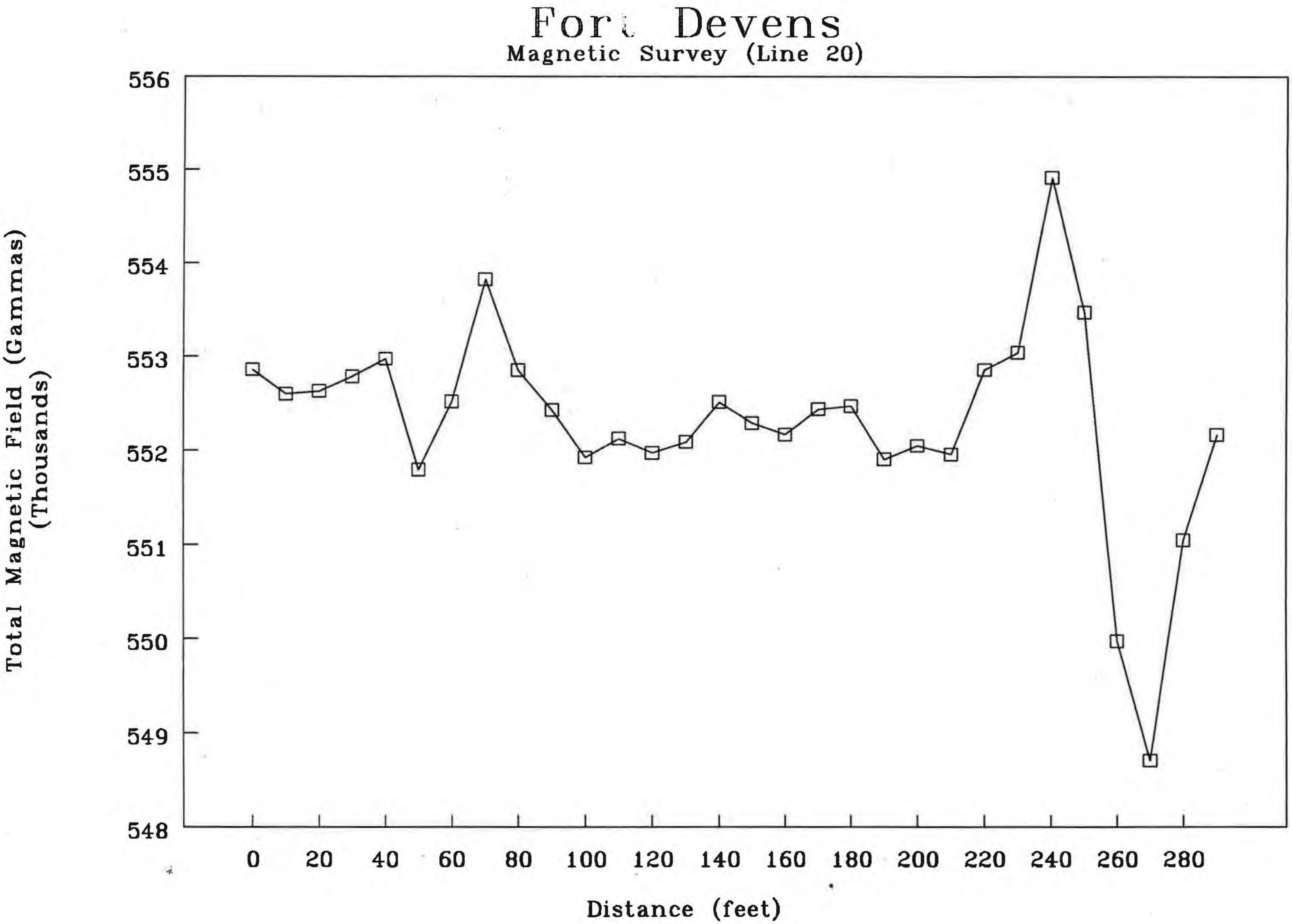
Fort Devens
Magnetic Survey (Line 19)
Total Magnetic Field (Gammas)
(Thousands)
558
557
556
555
554
553
552
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
Distance (feet)

ECOLOGY AND ENVIRONMENT, INC.

FORT DEVENS
MAGNETIC SURVEY DATA

TRAVERSE LINE # 003/ 20

LINE #	SITE #	FEET	TIME	GAMMAS
003/ 20	573	0	16:08:42	55285.9
003/ 20	574	10	16:09:17	55260.1
003/ 20	575	20	16:09:30	55263.2
003/ 20	576	30	16:09:45	55278.9
003/ 20	577	40	16:09:59	55297.4
003/ 20	578	50	16:10:20	55179.0
003/ 20	579	60	16:10:39	55251.6
003/ 20	580	70	16:10:55	55382.8
003/ 20	581	80	16:11:10	55285.4
003/ 20	582	90	16:11:25	55242.5
003/ 20	583	100	16:11:38	55192.0
003/ 20	584	110	16:11:52	55212.0
003/ 20	585	120	16:12:11	55196.9
003/ 20	586	130	16:12:23	55208.9
003/ 20	587	140	16:12:38	55251.2
003/ 20	588	150	16:12:54	55228.6
003/ 20	589	160	16:13:08	55216.6
003/ 20	590	170	16:13:21	55243.3
003/ 20	591	180	16:13:37	55247.0
003/ 20	592	190	16:13:51	55190.2
003/ 20	593	200	16:14:08	55204.2
003/ 20	594	210	16:14:23	55195.2
003/ 20	595	220	16:14:37	55285.7
003/ 20	596	230	16:14:52	55304.1
003/ 20	597	240	16:15:06	55491.1
003/ 20	598	250	16:15:19	55346.8
003/ 20	599	260	16:15:39	54996.8
003/ 20	600	270	16:15:57	54870.6
003/ 20	601	280	16:16:17	55104.3
003/ 20	602	290	16:16:39	55216.3


Fort Devens
Magnetic Survey (Line 20)
Total Magnetic Field (Gammas)
(Thousands)
556
555
554
553
552
551
550
549
548
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
Distance (feet)

APPENDIX I

WATER QUALITY AND GENERAL ANALYTICAL PARAMETERS

Table I-1

**SUMMARY OF ANALYTICAL RESULTS
FOR SOIL BORINGS
UNITS = $\mu g/g$**

Well Boring	TOC
SHL-17	519.000
SHL-18	240.000
SHL-19	290.000
SHL-20	< 420.000
SHL-21	120.000
SHL-23	490.000
SHL-25	590.000

RC424

TOC = Total Organic Carbon

Source: USATHAMA IRDMIS Level 3/
E & E, 1992

Table I-2

INSTALLATION RESTORATION PROGRAM
CHEMICAL SUMMARY REPORT FOR SHEPLEY'S HILL LANDFILL
SURFACE WATER - FILE TYPE: CSW
STUDY AREA: 5 SITE TYPE: POND UNITS: UGL

		SITES								
Test	Parameter	SW-SHL-01	SW-SHL-02	SW-SHL-03	SW-SHL-04	SW-SHL-05	SW-SHL-06	SW-SHL-07	SW-SHL-08	SW-SHL-09
ALK	ALKALINITY**	25.000	24.600	25.000	27.400	28.000	29.000	27.600	24.400	24.400
ANIONS	CHLORIDE	39000.000	42000.000	42000.000	44000.000	44000.000	45000.000	43000.000	49000.000	45000.000
	NITRATE	< 24.300	143.000	40.100	< 24.300	< 24.300	< 24.300	38.700	< 24.300	< 24.300
	SULFATE	5660.000	5440.000	5510.000	5340.000	5370.000	5300.000	5120.000	5030.000	3980.000
HARD	TOTAL HARDNESS**	34.900	34.900	35.300	34.900	36.100	36.100	32.800	35.300	36.100
TSS	TOTAL SUSPENDED SOLIDS**	4.400	2.000	2.400	2.400	1.600	2.000	1.200	0.400	2.400
TKN	TOTAL KJELDAHL NITROGEN	472.000	526.000	474.000	537.000	530.000	556.000	507.000	614.000	472.000
P4	TOTAL PHOSPHORUS	< 28.300	< 28.300	< 28.300	36.300	< 28.300	< 28.300	< 28.300	< 28.300	< 28.300

RC424

**Result reported in mg/l

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table I-2 (cont.)

INSTALLATION RESTORATION PROGRAM
CHEMICAL SUMMARY REPORT FOR SHEPLEY'S HILL LANDFILL
SURFACE WATER - FILE TYPE: CSW
STUDY AREA: 5 SITE TYPE: POND UNITS: UGL

		SITES					
Test	Parameter	SW-SHL-10	SW-SHL-11+	SW-SHL-12	SW-SHL-13	SW-SHL-14	SW-SHL-15
ALK	ALKALINITY**	26.000	27.200	24.000	26.000	32.400	33.000
ANIONS	CHLORIDE	43000.000	46000.000	43000.000	66000.000	44000.000	43000.000
	NITRATE	< 24.300	< 24.300	< 24.300	< 24.300	33.300	28.700
	SULFATE	4960.000	5210.000	11000.000	5380.000	4990.000	5200.000
HARD	TOTAL HARDNESS**	37.800	36.100	30.300	35.700	36.500	38.200
TSS	TOTAL SUSPENDED SOLIDS**	0.800	2.000	2.000	5.200	1.600	2.800
TKN	TOTAL KJELDAHL NITROGEN	428.000	507.000	539.000	1110.000	532.000	556.000
P4	TOTAL PHOSPHORUS	< 28.300	< 28.300	< 28.300	55.700	< 28.300	< 28.300

RC424

+ Volatiles for SW-SHL-11 were lost in a laboratory accident
**Result reported in mg/l

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table I-3

INSTALLATION RESTORATION PROGRAM
CHEMICAL SUMMARY REPORT FOR COLD SPRING BROOK SURFACE WATER - FILE TYPE: CSW
STUDY AREA: 40 SITE TYPE: POND UNITS: UGL

Test	Parameter	SITES								
		SW-CSB-01	SW-CSB-02	SW-CSB-03	SW-CSB-04	SW-CSB-05	SW-CSB-06	SW-CSB-07	SW-CSB-08	SW-CSB-09
ALK	ALKALINITY**	55.200	71.200	68.600	72.400	62.400	58.600	61.400	60.200	61.600
ANIONS	CHLORIDE	17000.000	17000.000	18000.000	19000.000	19000.000	20000.000	20000.000	20000.000	20000.000
	NITRATE	70.300	96.200	99.600	85.400	33.400	24.300	28.800	34.300	49.200
	SULFATE	13000.000	11000.000	12000.000	6010.000	5170.000	5290.000	5190.000	5190.000	5540.000
HARD	TOTAL HARDNESS**	68.500	84.800	85.200	80.200	71.000	56.500	59.000	71.000	69.000
TSS	TOTAL SUSPENDED SOLIDS**	6.000	6.400	3.600	3.600	1.200	4.000	2.800	7.200	3.200
TKN	TOTAL KJELDAHL NITROGEN	810.000	570.000	583.000	514.000	476.000	526.000	463.000	411.000	415.000
P4	TOTAL PHOSPHORUS	34.200	36.300	47.100	47.100	< 28.300	< 47.100	< 28.300	< 28.300	< 28.300

RC424

** Result reported in mg/L

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table I-3 (cont.)

INSTALLATION RESTORATION PROGRAM
CHEMICAL SUMMARY REPORT FOR - COLD SPRING BROOK
SURFACE WATER - FILE TYPE: CSW
STUDY AREA: 40 SITE TYPE: POND UNITS: UGL

		SITES
Test	Parameter	SW-CSB-10
ALK	ALKALINITY**	58.800
ANIONS	CHLORIDE	20000.000
	NITRATE	64.900
	SULFATE	5580.000
HARD	TOTAL HARDNESS**	57.300
TSS	TOTAL SUSPENDED SOLIDS**	14.800
TKN	TOTAL KJELDAHL NITROGEN	470.000
P4	TOTAL PHOSPHORUS	< 28.300

RC424

** Result reported in mg/L

Source: USATHAMA IRDMIS Level 3/E & E, 1992

Table I-4

WATER QUALITY PARAMETERS
FIELD MEASUREMENTS
PLOW SHOP POND
AOC 5

Site ID	DO* mg/l	Temperature (°F)	pH	Conductivity (μmhos/cm)
SW-SHL-01	8.06	82.4	6.88	228
SW-SHL-02	9.70	80.1	6.85	208
SW-SHL-03	8.61	91.1	7.44	241
SW-SHL-04	8.90	94.0	8.36	256
SW-SHL-05	7.06	78.0	6.75	203
SW-SHL-06	8.68	82.7	7.10	213
SW-SHL-07	8.96	95.1	7.83	233
SW-SHL-08	8.85	83.5	7.19	210
SW-SHL-09	8.07	89.3	6.06	212
SW-SHL-10	7.76	76.0	7.97	194
SW-SHL-11	8.15	75.5	7.55	191
SW-SHL-12	5.15	76.1	6.25	199
SW-SHL-13	8.66	75.1	6.90	190
SW-SHL-14	6.6	80.6	6.1	220
SW-SHL-15	6.1	77.3	6.6	177

RC424

* Dissolved oxygen (DO) measured in 1 liter polyethylene bottles

Source: E & E, August 1991

Table I-5

WATER QUALITY PARAMETERS
FIELD MEASUREMENTS
COLD SPRING BROOK
AOC 40

Site ID	DO* mg/l	Temperature (°F)	pH	Conductivity (µmhos/cm)
SW-CSB-01	5.02	81.4	6<pH<7	246
SW-CSB-02	5.12	73.6	6<pH<7	237
SW-CSB-03	4.05	72.3	6<pH<7	239
SW-CSB-04	4.22	69.0	6<pH<7	240
SW-CSB-05	5.35	68.3	6	213
SW-CSB-06	4.05	74.4	6<pH<7	248
SW-CSB-07	5.7	66.6	6<pH<7	234
SW-CSB-08	5.22	78.0	6<pH<7	255
SW-CSB-09	2.94	68.0	6<pH<7	224
SW-CSB-10	5.12	68.6	6<pH<7	243

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* Dissolved oxygen (DO) measured in 1 liter polyethylene bottles

Source: E & E, August 1991

Table I-6

SOLID CONTENT FOR SEDIMENTS

Sample	Percent Moisture	Percent Solid	Comparison to % Solid Criteria
SE-CSB-01	72.2	27.8	<30
SE-CSB-02	86.2	13.8	<30
SE-CSB-03	43.7	56.3	>30
SE-CSB-04	62.5	37.5	>30
SE-CSB-05	31.6	68.4	>30
SE-CSB-06	64.4	35.6	>30
SE-CSB-07	72.1	27.9	<30
SE-CSB-08	64.0	36.0	>30
SE-CSB-09	82.6	17.4	<30
SE-CSB-10	24.6	75.4	>30
SE-SHL-01	55.1	44.9	>30
SE-SHL-02	92.9	7.1	<30
SE-SHL-03	81.1	18.9	<30
SE-SHL-04	84.2	15.8	<30
SE-SHL-05	74.2	25.8	<30
SE-SHL-06	84.3	15.7	<30
SE-SHL-07	51.6	48.4	>30
SE-SHL-08	91.6	8.4	<30
SE-SHL-09	91.5	8.5	<30
SE-SHL-10	91.8	8.2	<30
SE-SHL-11	90.4	9.6	<30
SE-SHL-12	74.7	25.3	<30
SE-SHL-13	92.4	7.6	<30
SE-SHL-14	32.0	68.0	>30
SE-SHL-15	16.2	83.8	>30

RC424

Source: E & E 1992

APPENDIX J

FACILITY-WIDE WATER LEVEL MEASUREMENTS BY PERIOD

Under the RI program, Ecology and Environment, Inc., was tasked to take three rounds of groundwater level measurements at 83 monitoring wells at Fort Devens. Of these 83 wells identified by installation personnel, 79 wells were both accessible and functional. The three rounds of groundwater level measurements are presented in this Appendix.

ROUND 1: INSTALLATION-WIDE GROUNDWATER LEVEL MEASUREMENTS
COLLECTED 30 AUGUST 1991

Well Name	Time Msmnt Taken	Well Depth (*)	Ground Surface Elev.	Inner Riser Elev.	Outer Riser Elev.	Water Level (*)	Depth BGS	Ground Water Elevation	Comments
SHL-1	0818	6.3	271.00	272.44	273.16	6.30	---	---	Well dry
SHL-3	0808	32.5	247.42	247.71	248.50	30.04	28.96	218.46	Measured from outer steel casing
SHL-4	0804	11.4	226.73	228.71	228.76	10.92	8.94	217.79	
SHL-5	0745	12.2	217.81	218.53	218.77	3.90	3.18	214.63	
SHL-6	0835	56.0	252.58	253.82	254.17	27.48	26.24	226.34	
SHL-7	0830	20.7	235.59	237.13	238.14	17.79	15.24	220.35	Measured from outer steel casing
SHL-8S	0750	54.0	220.04	221.85	222.04	7.64	5.83	214.21	
SHL-8D	0751	71.0	220.04	221.66	222.04	7.44	5.82	214.22	
SHL-9	0741	24.6	221.83	222.86	223.29	9.00	7.97	213.86	
SHL-10	0810	34.1	247.44	248.80	249.48	30.68	29.32	218.12	
SHL-11	0801	26.4	234.86	236.34	236.83	18.86	17.38	217.48	
SHL-12	0824	26.9	248.28	249.51	249.91	22.30	21.07	227.21	
SHL-13	0752	19.0	220.01	221.58	222.18	7.07	5.50	214.51	
SHL-15	0858	24.5	259.03	260.75	261.04	18.70	16.98	242.05	
SHL-17	0822	16.3	232.77	234.57	234.91	7.50	5.70	227.07	
SHL-18	0813	26.4	236.59	238.39	238.64	18.88	17.08	219.51	
SHL-19	0806	30.3	239.45	241.34	241.62	22.76	20.87	218.58	
SHL-20	0800	48.3	235.55	236.84	236.90	19.24	17.95	217.60	
SHL-21	0756	52.4	257.93	259.75	259.94	45.24	43.42	214.51	
SHL-22	0739	>100.0	219.58	220.49	221.25	6.66	5.75	213.83	
SHL-23	0737	33.2	240.37	242.14	242.35	27.40	25.63	214.74	
SHL-24	0833	>100.0	237.68	239.60	239.76	15.60	13.68	224.00	
SHL-25	0855	31.2	257.10	258.87	259.10	24.76	22.99	234.11	
Staffing Guage SG-SHL-1	---	---	---	---	---	---	---	---	
CSB-1	1221	12.3	247.69	250.11	250.39	7.72	5.30	242.39	
CSB-2	1219	50.3	258.38	260.07	260.28	18.18	16.49	241.89	
CSB-3	1213	31.7	265.32	267.48	267.47	25.34	23.18	242.14	
CSB-4	1215	6.8	244.44	247.54	247.69	5.03	1.93	242.51	
CSB-6	1208	5.3	242.67	246.39	246.64	4.38	0.66	242.01	
CSB-7	1205	21.9	255.50	257.83	257.81	15.94	13.61	241.89	
CSB-8	1211	22.6	258.52	260.77	260.82	18.26	16.01	242.51	
Staffing Guage SG-CSB-1	---	---	---	---	---	---	---	---	
POL-1	0906	27.2	257.78	259.77	259.85	19.01	17.02	240.76	
POL-2	0904	29.3	258.65	259.42	260.79	28.78	26.64	232.01	Measured from outer steel casing
POL-3	0901	30.8	260.18	261.94	262.30	25.14	23.38	236.80	

(*) = Measured from PVC inner well riser unless otherwise noted

ROUND 1: INSTALLATION-WIDE GROUNDWATER LEVEL MEASUREMENTS
COLLECTED 30 AUGUST 1991

Well Name	Time Msmnt Taken	Well Depth (*)	Ground Surface Elev.	Inner Riser Elev.	Outer Riser Elev.	Water Level (*)	Depth BGS	Ground Water Elevation	Comments
B202-1	0840	33.7	252.98	254.43	254.75	27.35	25.90	227.08	
B202-2	0837	38.4	256.71	258.37	258.53	31.12	29.46	227.25	
B202-3	—	37.5	256.46	258.32	258.56	30.43	28.57	227.89	
EOD-1	0809	—	348.16	349.89	350.13	19.31	17.58	330.58	Measured 20 September 1991
EOD-2	0816	—	348.18	349.93	350.17	25.37	23.62	324.56	Measured 20 September 1991
EOD-3	0820	—	341.84	343.67	343.92	27.29	25.46	316.38	Measured 20 September 1991
EOD-4	0822	—	350.40	352.12	352.30	31.65	29.93	320.47	Measured 20 September 1991
2680W-1	1043	13.4	334.49	334.44	334.49	8.44	8.49	326.00	
2680W-2	1040	7.6	332.53	332.44	332.53	7.60	—	—	Well dry
2680W-3	1038	13.7	332.19	332.04	332.19	9.78	9.93	322.26	
WWTMW-01	1025	8.3	215.61	217.71	218.29	6.12	4.02	211.59	
WWTMW-01A	0957	15.2	219.37	220.88	220.91	13.66	12.15	207.22	
WWTMW-02	1000	20.7	222.57	225.73	225.88	17.52	14.36	208.21	
WWTMW-02A	1004	20.7	223.40	225.47	225.63	18.64	16.57	206.83	
WWTMW-03	1007	13.0	214.22	216.79	217.09	10.44	7.87	206.35	
WWTMW-04	1010	12.8	215.23	217.79	218.19	10.22	7.66	207.57	
WWTMW-06	1015	17.7	231.99	234.54	234.91	15.14	12.59	219.40	
WWTMW-07	1019	28.3	240.60	243.08	243.17	25.72	23.24	217.36	
WWTMW-08	1023	10.3	217.09	219.43	219.75	8.00	5.66	211.43	
WWTMW-09	0954	8.2	209.85	212.29	212.72	5.72	3.28	206.57	
WWTMW-10	0952	10.8	212.06	214.74	215.14	8.34	5.66	206.40	
WWTMW-11	0949	11.0	211.58	214.57	214.71	8.08	5.09	206.49	
WWTMW-12	0945	16.6	217.87	221.49	221.51	13.96	10.34	207.53	
WWTMW-13	0943	15.2	216.95	220.10	220.08	12.02	8.87	208.08	
WWTMW-14	1520	10.8	216.74	219.14	219.57	8.50	6.10	210.64	
AAFES-1D	1110	24.5	296.27	298.73	298.84	21.92	19.46	276.81	
AAFES-2	1125	28.7	300.65	302.71	302.79	21.22	19.16	281.49	
AAFES-3	1128	31.2	308.72	308.53	308.72	25.44	25.63	283.09	
AAFES-4	1130	29.2	310.19	310.00	310.19	23.94	24.13	286.06	
AAFES-5	1132	27.2	301.06	300.82	301.06	27.20	—	—	Well dry
AAFES-6	1134	25.5	297.64	300.00	300.06	23.18	20.82	276.82	
AAFES-7	1136	13.0	256.96	259.42	259.49	7.56	5.10	251.86	
GE-01	1050	19.8	334.78	336.89	336.86	16.86	14.75	320.03	
GE-03	1052	24.3	337.08	339.64	339.67	12.50	9.94	327.14	
UST-01	1056	24.3	346.87	347.68	348.89	16.26	14.24	332.63	Measured from outer steel casing
UST-02	1054	27.0	347.54	349.51	349.85	18.49	16.52	331.02	
3602W-01	0910	14.2	356.46	356.19	356.46	9.22	9.49	346.97	Measured 3 September 1991
3602W-02	0900	14.5	356.91	356.58	356.91	10.42	10.75	346.16	Measured 3 September 1991
3602W-03	1102	14.3	357.18	356.82	357.18	10.72	11.08	346.10	
3602W-04	1100	10.1	355.65	355.40	355.65	7.53	7.78	347.87	

(*) = Measured from PVC inner well riser unless otherwise noted

ROUND 1: INSTALLATION-WIDE GROUNDWATER LEVEL MEASUREMENTS
COLLECTED 30 AUGUST 1991

Well Name	Time Msmnt Taken	Well Depth (*)	Ground Surface Elev.	Inner Riser Elev.	Outer Riser Elev.	Water Level (*)	Depth BGS	Ground Water Elevation	Comments
3622W-01	1109	16.8	364.33	364.11	364.33	12.20	12.42	351.91	
3622W-02	1110	13.6	362.92	362.66	362.92	11.48	11.74	351.18	
3622W-03	1112	13.9	362.72	362.50	362.72	11.38	11.60	351.12	
3622W-04	1106	13.5	363.84	363.57	363.84	6.21	6.48	357.36	
EA-04	1230	29.1	253.12	252.89	253.12	23.00	23.23	229.89	
EA-05	0930	29.1	250.04	249.89	250.04	20.59	20.74	229.30	Measured 3 September 1991

(*) = Measured from PVC inner well riser unless otherwise noted

ROUND 2: INSTALLATION-WIDE GROUNDWATER LEVEL MEASUREMENTS
COLLECTED 12 DECEMBER 1991

Well Name	Time Msmnt Taken	Well Depth (*)	Ground Surface Elev.	Inner Riser Elev.	Outer Riser Elev.	Water Level (*)	Depth BGS	Ground Water Elevation	Comments
SHL-1	0932	8.88	271.00	272.44	273.16	2.84	0.68	270.32	Measured from outer steel casing
SHL-3	0746	34.14	247.42	247.71	248.50	30.16	29.08	218.34	Measured from outer steel casing
SHL-4	0808	13.82	226.73	228.71	228.76	10.61	8.63	218.10	
SHL-5	0858	13.60	217.81	218.53	218.77	2.51	1.79	216.02	
SHL-6	0715	57.66	252.58	253.82	254.17	27.70	26.46	226.12	
SHL-7	0730	23.70	235.59	237.13	238.14	17.92	15.37	220.22	Measured from outer steel casing
SHL-8S	0844	56.03	220.04	221.85	222.04	7.07	5.26	214.78	
SHL-8D	0855	72.94	220.04	221.66	222.04	6.77	5.15	214.89	
SHL-9	0912	26.09	221.83	222.86	223.29	8.03	7.00	214.83	
SHL-10	0756	36.18	247.44	248.80	249.48	30.68	29.32	218.12	
SHL-11	0820	28.11	234.86	236.34	236.83	18.53	17.05	217.81	
SHL-12	0942	28.57	248.28	249.51	249.91	22.25	21.02	227.26	
SHL-13	0835	19.52	220.01	221.58	222.18	6.46	4.89	215.12	
SHL-15	0936	26.47	259.03	260.75	261.04	18.16	16.44	242.59	
SHL-17	0950	18.52	232.77	234.57	234.91	7.46	5.66	227.11	
SHL-18	0738	28.49	236.59	238.39	238.64	18.92	17.12	219.47	
SHL-19	0803	32.50	239.45	241.34	241.62	22.56	20.67	218.78	
SHL-20	0815	50.52	235.55	236.84	236.90	18.92	17.63	217.92	
SHL-21	0828	54.25	257.93	259.75	259.94	44.48	42.66	215.27	
SHL-22	0909	>100.00	219.58	220.49	221.25	5.77	4.86	214.72	
SHL-23	0920	35.26	240.37	242.14	242.35	25.88	24.11	216.26	
SHL-24	0725	>100.00	237.68	239.60	239.76	15.79	13.87	223.81	
SHL-25	1008	36.14	257.10	258.87	259.10	24.56	22.79	234.31	
Staffing Guage									
SG-SHL-1	—	—	—	—	—	—	—	—	
CSB-1	1109	15.22	247.69	250.11	250.39	7.14	4.72	242.97	
CSB-2	1102	25.05	258.38	260.07	260.28	17.67	15.98	242.40	
CSB-3	1056	32.03	265.32	267.48	267.47	24.81	22.65	242.67	
CSB-4	1116	10.30	244.44	247.54	247.69	9.07	5.97	238.47	
CSB-6	1030	9.53	242.67	246.39	246.64	3.39	-0.33	243.00	Well hasp broke
CSB-7	1045	24.45	255.50	257.83	257.81	13.70	11.37	244.13	
CSB-8	1050	25.30	258.52	260.77	260.82	17.52	15.27	243.25	
Staffing Guage									
SG-CSB-1	—	—	—	—	—	—	—	—	
POL-1	1138	29.16	257.78	259.77	259.85	18.99	17.00	240.78	
POL-2	1129	31.74	258.65	259.42	260.79	28.70	26.56	232.09	Measured from outer steel casing
POL-3	1134	31.71	260.18	261.94	262.30	25.52	23.76	236.42	

(*) = Measured from PVC inner well riser unless otherwise noted

ROUND 2: INSTALLATION-WIDE GROUNDWATER LEVEL MEASUREMENTS
COLLECTED 12 DECEMBER 1991

Well Name	Time Msmnt Taken	Well Depth (*)	Ground Surface Elev.	Inner Riser Elev.	Outer Riser Elev.	Water Level (*)	Depth BGS	Ground Water Elevation	Comments
B202-1	1143	35.38	252.98	254.43	254.75	27.42	25.97	227.01	
B202-2	1149	40.31	256.71	258.37	258.53	31.28	29.62	227.09	
B202-3	0705	39.56	256.46	258.32	258.56	30.58	28.72	227.74	
EOD-1	0927	26.74	348.16	349.89	350.13	18.18	16.45	331.71	Measured 13 December 1991
EOD-2	0914	26.60	348.18	349.93	350.17	25.30	23.55	324.63	Measured 13 December 1991
EOD-3	0938	30.22	341.84	343.67	343.92	23.60	21.77	320.07	Measured 13 December 1991
EOD-4	0942	36.10	350.40	352.12	352.30	31.14	29.42	320.98	Measured 13 December 1991
2680W-1	1349	13.06	334.49	334.44	334.49	8.03	8.08	326.41	
2680W-2	1352	7.86	332.53	332.44	332.53	7.86	---	---	Well dry
2680W-3	1343	13.72	332.19	332.04	332.19	9.37	9.52	322.67	Inner casing damaged
WWTMW-01	0847	25.34	215.61	217.71	218.29	7.01	4.91	210.70	
WWTMW-01A	0808	34.43	219.37	220.88	220.91	14.35	12.84	206.53	
WWTMW-02	0931	35.08	222.57	225.73	225.88	19.82	16.66	205.91	
WWTMW-02A	0926	32.68	223.40	225.47	225.63	19.88	17.81	205.59	
WWTMW-03	0918	23.58	214.22	216.79	217.09	11.87	9.30	204.92	
WWTMW-04	0910	24.10	215.23	217.79	218.19	11.56	9.00	206.23	
WWTMW-06	0900	22.43	231.99	234.54	234.91	13.48	10.93	221.06	
WWTMW-07	1332	36.45	240.60	243.08	243.17	24.51	22.03	218.57	
WWTMW-08	0816	21.77	217.09	219.43	219.75	9.17	6.83	210.26	
WWTMW-09	0825	21.65	209.85	212.29	212.72	7.08	4.64	205.21	
WWTMW-10	0801	23.15	212.06	214.74	215.14	9.56	6.88	205.18	
WWTMW-11	0753	55.58	211.58	214.57	214.71	9.79	6.80	204.78	
WWTMW-12	1432	60.82	217.87	221.49	221.51	15.95	12.33	205.54	
WWTMW-13	1412	25.56	216.95	220.10	220.08	14.50	11.35	205.60	
WWTMW-14	1423	22.04	216.74	219.14	219.57	10.29	7.89	208.85	
AAFES-1D	1043	31.39	296.27	298.73	298.84	21.10	18.64	277.63	
AAFES-2	1027	33.46	300.65	302.71	302.79	25.41	23.35	277.30	
AAFES-3	0956	22.58	308.72	308.53	308.72	22.51	22.70	286.02	
AAFES-4	---	---	310.19	310.00	310.19	26.86	---	---	Under construction debris
AAFES-5	1031	29.22	301.06	300.82	301.06	23.88	24.12	276.94	
AAFES-6	1038	26.95	297.64	300.00	300.06	21.69	19.33	278.31	
AAFES-7	1049	15.61	256.96	259.42	259.49	8.04	5.58	251.38	
GE-01	1357	22.09	334.78	336.89	336.86	13.95	11.84	322.94	
GE-03	1402	27.08	337.08	339.64	339.67	11.68	9.12	327.96	
UST-01	1409	26.55	346.87	347.68	348.89	15.91	13.89	332.98	Measured from outer steel casing
UST-02	1406	28.98	347.54	349.51	349.85	17.89	15.92	331.62	
3602W-01	---	---	356.46	356.19	356.46	---	---	---	Area under piles of plowed snow
3602W-02	1438	14.23	356.91	356.58	356.91	8.94	9.27	347.64	
3602W-03	1427	14.19	357.18	356.82	357.18	9.80	10.16	347.02	
3602W-04	1423	10.79	355.65	355.40	355.65	5.98	6.23	349.42	

(*) = Measured from PVC inner well riser unless otherwise noted

ROUND 2: INSTALLATION-WIDE GROUNDWATER LEVEL MEASUREMENTS
COLLECTED 12 DECEMBER 1991

Well Name	Time Msmnt Taken	Well Depth (*)	Ground Surface Elev.	Inner Riser Elev.	Outer Riser Elev.	Water Level (*)	Depth BGS	Ground Water Elevation	Comments
3622W-01	1446	16.76	364.33	364.11	364.33	10.46	10.68	353.65	
3622W-02	1450	13.60	362.92	362.66	362.92	8.79	9.05	353.87	
3622W-03	1454	13.96	362.72	362.50	362.72	9.36	9.58	353.14	
3622W-04	1456	13.28	363.84	363.57	363.84	5.59	5.86	357.98	
EA-04	---	---	253.12	252.89	253.12	---	---	---	Under construction debris
EA-05	---	---	250.04	249.89	250.04	---	---	---	Under construction debris

(*) = Measured from PVC inner well riser unless otherwise noted

ROUND 3: INSTALLATION-WIDE GROUNDWATER LEVEL MEASUREMENTS
COLLECTED 18 AND 19 MARCH 1992

Well Name	Time Msmnt Taken	Well Depth (*)	Ground Surface Elev.	Inner Riser Elev.	Outer Riser Elev.	Water Level (*)	Depth BGS	Ground Water Elevation	Comments
SHL-1	0857	---	271.00	272.44	273.16	---	---	---	Well obstructed below ground surface
SHL-3	1035	33.66	247.42	247.71	248.50	30.37	29.29	218.13	Measured from outer steel casing
SHL-4	1016	13.50	226.73	228.71	228.76	10.95	8.97	217.76	Well hasp broken - cannot be locked
SHL-5	0922	13.06	217.81	218.53	218.77	3.73	3.01	214.80	
SHL-6	0844	57.43	252.58	253.82	254.17	28.33	27.09	225.49	
SHL-7	1103	23.24	235.59	237.13	238.14	18.53	15.98	219.61	Measured from outer steel casing
SHL-8S	0929	55.77	220.04	221.85	222.04	7.68	5.87	214.17	
SHL-8D	0926	72.70	220.04	221.66	222.04	7.53	5.91	214.13	
SHL-9	1004	25.82	221.83	222.86	223.29	9.05	8.02	213.81	
SHL-10	1117	35.75	247.44	248.80	249.48	31.02	29.66	217.78	
SHL-11	0948	27.89	234.86	236.34	236.83	18.79	17.31	217.55	
SHL-12	1135	28.11	248.28	249.51	249.91	23.05	21.82	226.46	
SHL-13	0934	20.36	220.01	221.58	222.18	7.07	5.50	214.51	
SHL-15	1158	26.19	259.03	260.75	261.04	18.31	16.59	242.44	
SHL-17	1141	15.15	232.77	234.57	234.91	8.22	6.42	226.35	
SHL-18	1111	28.20	236.59	238.39	238.64	19.48	17.68	218.91	
SHL-19	1012	32.22	239.45	241.34	241.62	23.16	21.27	218.18	
SHL-20	0955	50.27	235.55	236.84	236.90	19.20	17.91	217.64	
SHL-21	0941	54.00	257.93	259.75	259.94	45.33	43.51	214.42	
SHL-22	0912	>100.00	219.58	220.49	221.25	7.05	6.14	213.44	
SHL-23	0904	34.95	240.37	242.14	242.35	27.61	25.84	214.53	
SHL-24	1051	>100.00	237.68	239.60	239.76	16.45	14.53	223.15	
SHL-25	1148	35.84	257.10	258.87	259.10	25.36	23.59	233.51	
Staffing Guage									
SG-SHL-1	1045	---	---	---	---	1.82	---	216.78	
CSB-1	1312	14.94	247.69	250.11	250.39	7.20	4.78	242.91	
CSB-2	1306	51.81	258.38	260.07	260.28	17.56	15.87	242.51	
CSB-3	1249	31.55	265.32	267.48	267.47	24.76	22.60	242.72	
CSB-4	1256	10.01	244.44	247.54	247.69	4.10	1.00	243.44	
CSB-6	1230	8.99	242.67	246.39	246.64	3.57	-0.15	242.82	Well hasp broken - cannot be locked
CSB-7	1223	24.05	255.50	257.83	257.81	14.11	11.78	243.72	
CSB-8	1247	24.99	258.52	260.77	260.82	17.54	15.29	243.23	
Staffing Guage									
SG-CSB-1	1259	---	---	---	---	2.21	---	242.76	
POL-1	1243	28.88	257.78	259.77	259.85	19.01	17.02	240.76	
POL-2	1257	29.51	258.65	259.42	260.79	29.11	26.97	231.68	Measured from outer steel casing
POL-3	1251	31.41	260.18	261.94	262.30	26.00	24.24	235.94	

(*) = Measured from PVC inner well riser unless otherwise noted

ROUND 3: INSTALLATION-WIDE GROUNDWATER LEVEL MEASUREMENTS
COLLECTED 18 AND 19 MARCH 1992

Well Name	Time Msmnt Taken	Well Depth (*)	Ground Surface Elev.	Inner Riser Elev.	Outer Riser Elev.	Water Level (*)	Depth BGS	Ground Water Elevation	Comments
B202-1	0829	35.10	252.98	254.43	254.75	28.14	26.69	226.29	
B202-2	0837	40.07	256.71	258.37	258.53	31.92	30.26	226.45	
B202-3	---	---	256.46	258.32	258.56	---	---	---	Access to well denied
EOD-1	0853	26.50	348.16	349.89	350.13	19.60	17.87	330.29	
EOD-2	0847	26.38	348.18	349.93	350.17	25.36	23.61	324.57	
EOD-3	0840	29.88	341.84	343.67	343.92	27.28	25.45	316.39	
EOD-4	0824	35.69	350.40	352.12	352.30	31.12	29.40	321.00	
2680W-1	1734	12.80	334.49	334.44	334.49	8.87	8.92	325.57	
2680W-2	1742	7.56	332.53	332.44	332.53	7.56	---	---	Well dry
2680W-3	1739	13.44	332.19	332.04	332.19	9.82	9.97	322.22	
WWTMW-01	1426	25.01	215.61	217.71	218.29	7.42	5.32	210.29	
WWTMW-01A	1435	34.20	219.37	220.88	220.91	15.37	13.86	205.51	
WWTMW-02	1357	34.82	222.57	225.73	225.88	20.97	17.81	204.76	
WWTMW-02A	1401	32.56	223.40	225.47	225.63	20.96	18.89	204.51	
WWTMW-03	1406	23.45	214.22	216.79	217.09	13.12	10.55	203.67	
WWTMW-04	1412	24.86	215.23	217.79	218.19	12.79	10.23	205.00	
WWTMW-06	1456	22.17	231.99	234.54	234.91	13.43	10.88	221.11	
WWTMW-07	1501	36.09	240.60	243.08	243.17	25.45	22.97	217.63	
WWTMW-08	1442	21.42	217.09	219.43	219.75	9.84	7.50	209.59	
WWTMW-09	1345	21.39	209.85	212.29	212.72	8.35	5.91	203.94	
WWTMW-10	1338	22.94	212.06	214.74	215.14	10.94	8.26	203.80	
WWTMW-11	1332	55.44	211.58	214.57	214.71	11.11	8.12	203.46	
WWTMW-12	1547	60.56	217.87	221.49	221.51	16.91	13.29	204.58	
WWTMW-13	1527	25.24	216.95	220.10	220.08	15.53	12.38	204.57	
WWTMW-14	1536	21.75	216.74	219.14	219.57	10.26	7.86	208.88	
AAFES-1D	1459	31.12	296.27	298.73	298.84	21.71	19.25	277.02	
AAFES-2	1455	33.15	300.65	302.71	302.79	26.35	24.29	276.36	
AAFES-3	1432	25.33	308.72	308.53	308.72	23.84	24.03	284.69	
AAFES-4	1440	26.86	310.19	310.00	310.19	26.86	---	---	Well dry
AAFES-5	1447	29.69	301.06	300.82	301.06	24.74	24.98	276.08	
AAFES-6	1508	26.69	297.64	300.00	300.06	22.51	20.15	277.49	140 ppm HNu reading
AAFES-7	1514	15.36	256.96	259.42	259.49	9.12	6.66	250.30	
GE-01	1748	22.87	334.78	336.89	336.86	16.12	14.01	320.77	
GE-03	1751	26.80	337.08	339.64	339.67	12.61	10.05	327.03	
UST-01	1758	26.32	346.87	347.68	348.89	16.55	14.53	332.34	Measured from outer steel casing
UST-02	1754	28.92	347.54	349.51	349.85	18.73	16.76	330.78	
3602W-01	---	---	356.46	356.19	356.46	---	---	---	Area under 10" of sand
3602W-02	1538	13.95	356.91	356.58	356.91	9.01	9.34	347.57	
3602W-03	1532	13.90	357.18	356.82	357.18	9.40	9.76	347.42	
3602W-04	1525	10.48	355.65	355.40	355.65	6.81	7.06	348.59	

(*) = Measured from PVC inner well riser unless otherwise noted

ROUND 3: INSTALLATION-WIDE GROUNDWATER LEVEL MEASUREMENTS
COLLECTED 18 AND 19 MARCH 1992

Well Name	Time Msmnt Taken	Well Depth (*)	Ground Surface Elev.	Inner Riser Elev.	Outer Riser Elev.	Water Level (*)	Depth BGS	Ground Water Elevation	Comments
3622W-01	1551	16.47	364.33	364.11	364.33	13.70	13.92	350.41	
3622W-02	1555	13.32	362.92	362.66	362.92	11.28	11.54	351.38	
3622W-03	1601	13.69	362.72	362.50	362.72	11.34	11.56	351.16	
3622W-04	1605	13.05	363.84	363.57	363.84	6.75	7.02	356.82	
EA-04	1415	28.85	253.12	252.89	253.12	23.74	23.97	229.15	
EA-05	---	---	250.04	249.89	250.04	---	---	---	Unable to open well cap

(*) = Measured from PVC inner well riser unless otherwise noted