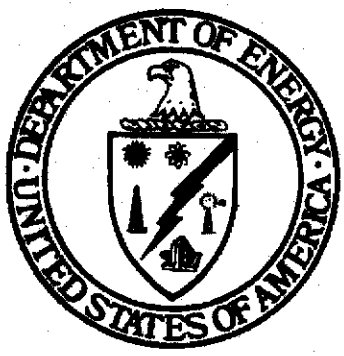
GWOU ADMINISTRATIVE RECORD
SECTION TITLE:
GW-200-202-1.06

DOE/OR/21548-745
CONTRACT NO. DE-AC05-86OR21548

HYDROGEOLOGICAL FIELD CHARACTERIZATION DATA FOR THE CHEMICAL PLANT AREA AND ORDNANCE WORKS AREA COLLECTED IN THE 1995 JOINT SAMPLING ACTIVITIES

WELDON SPRING SITE REMEDIAL ACTION PROJECT
WELDON SPRING, MISSOURI

JUNE 1998 **REV. 0**



U.S. Department of Energy
Oak Ridge Operations Office
Weldon Spring Site Remedial Action Project

Prepared by MK-Ferguson Company and Jacobs Engineering Group

MORRISON KNUDSEN CORPORATION
Environmental/Government Group

Weldon Spring Site Remedial Action Project
Contract No. DE-AC05-86OR21548

Rev. No. 0

PLAN TITLE: Hydrogeological Field Characterization Data for the Chemical Plant Area and Ordnance Works Area Collected in the 1995 Joint Sampling Activities

APPROVALS

Project Manager - Cell — Date: 6-25-98

Project Quality Manager — Date: 06/26/98

Deputy Project Director — Date: 6-26-98

Registered Geologist — Date: 06/29/98

STATE OF MISSOURI
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REGISTERED GEOLOGIST
06/29/98

DOE/OR/21548-745

Weldon Spring Site Remedial Action Project

Hydrogeological Field Characterization Data for the Chemical Plant Area and Ordnance Works Area Collected in the 1995 Joint Sampling Activities

Revision 0

June 1998

Prepared by

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and
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for the

U.S. DEPARTMENT OF ENERGY
Oak Ridge Operations Office
Under Contract DE-AC05-86OR21548

ABSTRACT

This document contains characterization field data forms that were prepared in support of the remedial investigation for the groundwater at the chemical plant area of the Weldon Spring site in 1995.

Detailed field records included in this document are drilling logs from installation of new monitoring wells; and slug, packer, and tracer test results from hydrogeological characterization.

The document was prepared to support the *Remedial Investigation for the Groundwater Operable Unit.*

SECTION 1: DRILLING LOGS

SECTION 2: MONITORING WELL DETAILS

SECTION 3: PACKER TEST RESULTS

SECTION 4: SLUG TEST RESULTS

SECTION 5. TRACER TEST RESULTS

SECTION 1:

DRILLING LOGS

WELDON SPRING SITE REMEDIAL ACTION PROJECT

BOREHOLE AND WELL COMPLETION LOG

HOLE NUMBER: MW-4024

SHEET 1 OF 2

NORTH (Y):

EAST (X):

TOC ELEVATION

GROUND ELEVATION

STICKUP

HYDR CONDUCTIVITY (cm/sec)

WELL STATUS/COMMENTS: ACTIVE

LOCATION: EAST OF HWY 94 NEAR Prall

DRILLING CONTRACTOR: GEOTECHNOLOGY

DRILL RIG MAKE & MODEL: CME-750

HOLE SIZE & METHOD: 10" HSA/AIR-ROTARY

ANGLE FROM HORIZONTAL & BEARING: 90

BOTTOM OF HOLE (TD): 59.(

DRILL FLUIDS & ADDITIVES: WATER

CASING TYPE, DEPTH, SIZE: 2" SCHEDULE 40 PVC

BEDROCK: 23.(

DATE START: 04-25-1995

DATE FINISH: 06-20-1995

WATER LEVELS & DATES

LITHOLOGY BY: P. Patchin

DEPTH feet	SAMPLE	SAMPLE/RUN Number	PERCENT Recovery	N# or ROD	GRAPHIC LOG	SOIL/ROCK class	DESCRIPTION AND REMARKS	STRAT. UNIT
	CME-01		24/24"			ML	Topsoil, dark brown, grass/roots, organics.	TOPSOIL
	CME-02		60/60"			CL	CLAYEY SILT, yellowish brown (10YR5/8), slightly plastic, moist, approx. 30% to 40% clay, roots.	ROXANA SILT
						ML	SILTY CLAY, mottled yellowish brown (10YR5/8) and pale brown (10YR6/3), moderately plastic, moist.	
5							SILT, mottled light yellowish brown (2.5Y6/3) and yellowish brown (10YR5/8), non-plastic, dry to damp, blocky, very hard (pp=4.5+), abundant MnOx blebs.	
						CL/ML	CLAYEY SILT, mottled as above, moist, approx. 40% clay, stiff (pp=2.5)	
	CME-03		60/60"			ML/CH	SILTY CLAY, mottled as above, moderate to highly plastic, moist, approx 20% silt as pockets, very stiff.	FERNELVIEW
							SILT, as in 2 to 4 feet.	
10							SILTY CLAY, mottled light brownish grey (2.5Y6/3) and yellowish brown (10YR5/6), medium to highly plastic, slightly moist, predominantly yellowish brown from 7.9 to 10 feet with FeOx blebs abundant, predominantly light brownish grey from 10 to 14.6 feet. Also gravel and sand from 10 feet, gravel to 2", very hard.	
	CME-04		60/60"					
15						CL	SILTY CLAY with sand and gravel, approx. 15% medium to coarse sand and fine to medium gravel, gravel to 1", rounded and angular chert, siltstone, slightly moist, abundant MnOx, strong brown (7.5YR5/6), with minor light brownish grey (2.5Y6/3), hard, slightly plastic.	CLAY TILL
	CME-05		30/30"					
20	CME-06		24/24"			CL/GC	GRAVELLY CLAY/CLAYEY GRAVEL, approx 50/50, clay is pale yellow (5Y7/3), with minor strong brown (7.5YR5/6), moderately plastic, sandy, MnOx streaks. Gravel is angular chert, approx. 1 to 6", weathered, MnOx. (Sampler stuck at 18.5. Added approx 5 gallons water).	RESIDUUM
	CME-07		18/18"					
	CME-08		2/2"			lms/GC	LIMESTONE, coarse, very weathered, hard.	
	RUN-1		10/10	0		lms	No sample	
25	RUN-2		30/31"	19			Auger refusal at 24.3 feet. Top of bedrock.	
						GC/lms	LIMESTONE, coarse-crystalline, light olive gray (5Y6/1), slightly weathered, hard, fossiliferous, argillaceous, moderately weathered and chert nodules from 25.4 to 25.7 feet, low porosity.	WEATHERED-BK-lms
	RUN-3		50/50"	0			CLAY, yellowish grey (5Y7/2) to light olive grey (5Y5/2), very soft, slightly indurated, friable, slightly moist, with interbedded and brecciated limestone at 26' to 26.2', 27.7' to 27.8', and 29' to 29.1', locally thin angled ~5 degrees, bedding from 27.4' to 27.7' with greenish color, very soft, moist with limestone gravel from 28' to 29.9'.	
30						lms		
						GC		
	RUN-4		34/65"	17			Weathered BK limestone.	
35							LIMESTONE, argillaceous, light olive grey (5Y6/1), with some dark yellowish orange (10YR6/6) banding, very thin bedded, closely fractured with clay at above to 1" as partings, approx 35 degree bedding angle, medium weathered, solution features to 2" with FeOx and hematite. Clay filling, hard, to	

WELL DIAGRAM

ELEVATION (msl)

Protective Casing with Locked Cover, Cement Pad 2 ft. Diameter, Three Protective Posts

Inner Casing (2", Schedule 40 PVC)

Grout (Hye-Gen EnviroPlug)

-5- -10- -15- -20- -25- -30-

Sample Interval ☐ No Sample Taken

Porosity: ▼minimum ▼maximum ▼average

Clay from 30.9' to 32.2' and in 25.7' to 29.9', slightly

WELDON SPRING SITE REMEDIAL ACTION PROJECT

BOREHOLE AND WELL COMPLETION LOG

HOLE NUMBER: MW-4024

SHEET 2 OF 2

NORTH (Y):

EAST (X):

WELL STATUS/COMMENTS: ACTIVE

LOCATION: EAST OF HWY 94 NEAR MONI

DEPTH feet	SAMPLE	SAMPLE/RUN Number	PERCENT Recovery	N# or RQD	GRAPHIC LOG	SOIL/ROCK class	DESCRIPTION AND REMARKS
40		RUN-5	52/60	32		GC chrt lms	Clay rubble. 35.4 CHERT, light grey (N7), very hard, as in 33.2' to 33.5'. Argillaceous LIMESTONE with interbedded brecciated and nodular chert, limestone is predominantly grayish orange (10YR7/4), with some minor dark yellowish orange (10YR6/6) in weathered zones, slightly to minor severely weathered, medium crystalline, thin bedded, fossiliferous, with leached clay partings, moderately hard, to hard, closely fractured stylolitic. Chert approx 40%, is predominantly brecciated with limestone, medium light grey (N6), slightly weathered, bedded at 37.6' to 38.3', fossiliferous, stylolite contact, very hard.
45		RUN-6	74/77	59			Clay partings with breccia Very argillaceous LIMESTONE and CHERT, 40% brecciated, limestone is dark yellowish orange (10YR6/6), porous, moderately weathered, moderately hard, very finely crystalline, with abundant MnOx specks, throughout rock matrix, minor stylolites, no fossils, solution features pinpoint to .2". Chert is light bluish grey (5B7/1), crytocrystalline, brecciated, with limestone with minor nodules, slightly fossiliferous, very hard, slightly weathered.
50		RUN-7	60/60	60			Argillaceous LIMESTONE and CHERT (50/50%), brecciated and interbedded, less weathered than at 44.2' to 46.2' and no FeOx. Limestone is yellowish grey (5Y8/1), finely crystalline, brecciated to thinly interbedded with chert, slightly to moderately weathered, hard to moderately hard, low reaction to HCl, minor pinpoint vugs in matrix, more weathering and vuggines near clay partings (dark grey to black), very stylolitic with clay coatings, closely fractured. Chert is pale blue (5PB7/2) to medium bluish grey (5B5/1), interbedded to brecciated with limestone, very hard, fractured, slightly weathered, slightly porous, fossiliferous.
55		RUN-8	60/60	86			Limestone has some moderate matrix porosity, some angled and wavy beddings.
60							Argillaceous LIMESTONE and CHERT as above. Clay parting in stylolite, brecciated and weathered, dark grey, no FeOx. Total depth 59 feet.
65							
70							
75							

SIRAI UNIT: WEATHERED-BK-lms; STRONGLY WEATHERED-BK-lms; WEATHERED-BK-lms

WELL DIAGRAM

Seal (1/4" Bentonite Pellets)

Centralizer

Screen (2" ID, 0.010 slot PVC)

Filter Pack (Sand #8-10/20)

Centralizer

Bottom Cap

ELEVATION

Sample Interval ☐ No Sample Taken ▼minimum ▼maximum ▼average

WELDON SPRING SITE REMEDIAL ACTION PROJECT

BOREHOLE AND WELL COMPLETION LOG

HOLE NUMBER: MW-402S

SHEET 1 OF 2

NORTH (Y)

EAST (X)

TOC ELEVATION

GROUND ELEVATION

STICKUP

HYDR CONDUCTIVITY (cm/sec)

WELL STATUS/COMMENTS: ACTIVE	LOCATION: OLD RAIL BED E. OF HWY [illegible]	
DRILLING CONTRACTOR: GEOTECHNOLOGY	DRILL RIG MAKE & MODEL: CME-750	
HOLE SIZE & METHOD: 10" HSA/AIR-ROTARY	ANGLE FROM HORIZONTAL & BEARING: 90	BOTTOM OF HOLE (TD): 53.7
DRILL FLUIDS & ADDITIVES: WATER	CASING TYPE, DEPTH, SIZE: 2" SCHEDULE 40 PVC	BEDROCK: 27.5
DATE START: 04-10-1995	DATE FINISH: 04-19-1995	WATER LEVELS & DATES

LITHOLOGY BY: P. Patchin

DEPTH feet	SAMPLE	SAMPLE/RUN Number	PERCENT Recovery	RQD or ROD	GRAPHIC LOG	SOIL/ROCK class	DESCRIPTION AND REMARKS	STRAT. UNIT
0			0 100					
	CME-01	27/29"				CL	Topsoil, organics.	TOPSOIL
							SILTY CLAY, mottled reddish yellow (7.5YR6/6) and light olive brown (2.5Y5/3), medium plasticity becoming more plastic at 2.5 ft., stiff, slightly moist, MnOx stringers, slightly blocky. Very plastic and moist at 4 to 5 ft.	
	CME-02	60/60"						
5						ML	CLAYEY SILT, strong brown (7.5YR5/6) to light yellowish brown (10YR6/4), stiff to very stiff, increased MnOx, abundant FeOx stains, organics, wavy bedding.	FERNELVIEW
	CME-03	60/60"				CH	CLAY with less than 5% gravel, mottled greenish brown (2.5Y5/2) with minor strong brown (7.5YR5/6), stiff, slightly moist to moist, grading to clayey silt.	
						ML		
10							CLAYEY SILT, mottled at 5.0 to 7.5 feet, dry to slightly damp, minor interbedded clay, abundant organics and MnOx from 7' to 13.2'.	
	CME-04	60/60"						
						CH	CLAY, mottled grayish brown (2.5Y5/2) and strong brown (7.5YR5/6), plastic, minor fine to very coarse angular gravel (5%), stiff to very stiff, blocky with some slickensides, fractured, organics along fractures, damp, color is predominately strong brown from 16.5 to 18 ft., very plastic 13.2 to 14.8 ft. with subangular chert gravel to 1.5", MnOx nodules abundant, FeOx nodules starting at 16.5'	CLAY TILL
15	CME-05	24/24"						
	CME-06	36/36"				CL	GRAVELLY CLAY, approx. 30% large subangular chert gravel, clay color dark red (2.5YR4/6) mottled with grayish brown (2.5Y5/2), medium plastic, very abundant black MnOx veinlets, dry to slightly moist, very stiff.	
20						GC Chrt		
	CME-07	34/36"					CLAYEY GRAVEL, approx. 30% gravel, high plasticity clay, pockets of silt, gravel very angular chert to 3" with weathering rinds, dry to damp, abundant FeOx on chert, MnOx stringers, last 1.5 ft. primarily chert, very fractured.	RESIDUUM
25	CME-08						GRAVELLY CLAY, strong brown (7.5YR5/8), moderately plastic, slightly moist, approx. 20% gravel to 2", angular chert, MnOx streaks.	
	RUN-1		0				CLAYEY GRAVEL, as at 20 ft., 80% angular chert gravel to 3", very weathered and stained. Clay as at 26.2, predominantly dry to slightly moist, clay lenses from 26.7 to 27 ft.	
	RUN-2	58/58"	48			lms	Top of Bedrock at 27.5 ft. Set 3" casing at 27.5.	
30							ARGILLACEOUS LIMESTONE (65%) and chert, interbedded and brecciated, limestone is grayish orange (10YR7/4) to dark yellowish orange (10YR6/6), very argillaceous with zones of higher calcium carbonate, finely crystaline, hard to moderately hard, moderate to severely weathered, slightly porous, abundant MnOx specks. Chert is brecciated to nodular, nodules to 2", very hard, light gray (N7) to medium gray (N4), fossiliferous, fractured. Limestone slightly stylolitic.	WEATHERED-BR-lms
	RUN-3	71/71"	68					
35							Severely weathered and broken, abundant FeOx, some clay.	

WELL DIAGRAM

ELEVATION

Protective Casing with Locked Cover, Cement Pad 2 ft. Diameter Three Protective Posts

Inner Casing (2", Schedule 40 PVC)

Grout (Wyo-Ben Envirogrout)

-5 -10 -15 -20 -25 -30

Sample Interval ☐ No Sample Taken ▽ Minimum ▽ Maximum ▽ Average

Argillaceous limestone and chert as above.

WELDON SPRING SITE REMEDIAL ACTION PROJECT

BOREHOLE AND WELL COMPLETION LOG

HOLE NUMBER: MW-4025

SHEET 2 of 2

NORTH (Y):

EAST (X):

WELL STATUS/COMMENTS: ACTIVE

LOCATION: OLD RAIL BED E. OF HWY [illegible]

DEPTH feet	SAMPLE	SAMPLE/RUN Number	PERCENT Recovery	N# or RQD	GRAPHIC LOG	SOIL/ROCK class	DESCRIPTION AND REMARKS	STRAT. UNIT
40		RUN-4	66/66	70		lms	Very argillaceous with abundant FeOx stains, higher porosity.	WEATHERED-BK-lms
							Argillaceous limestone and chert, as above.	
45		RUN-5	54/56	55			Very weathered and broken.	
							Very weathered with pinpoint to .1" vugs, abundant FeOx and high porosity, high clay content, very little HCl reaction.	
50		RUN-6	54/64	43			Argillaceous limestone and chert, as above.	
							Gradual color change to grayish yellow (5YR8/4, increase in styolites and chert (40%), increase clay/silt content, moderate to high porosity, weathered.	
55							Total coring depth 53.7 feet. Reamed borehole to 52.7 and installed 2" monitoring well.	
60								
65								
70								
75								

WELL DIAGRAM

- Seal (1/4" Bentonite Pellets)
- Centralizer
- Screen (2" ID, 0.010 slot PVC)
- Filter Pack (Sand WB-10/20)
- Centralizer / Bottom Cap

ELEVATION: 40, 45, 50, 55, 60, 65, 70, 75

Sample Interval ☐ No Sample Taken ▽minimum ▼maximum ▼average

U.S. GEOLOGICAL SURVEY

PROJECT: Yolo. Flow COF

LOGGED BY Jay Mugel | DATE 3/20/95 | PG 1 OF 1 | WELL NO: MWD-23

LAND SURFACE ALT. 707.89 | WELL DEPTH Csg: 125.1 Hole: 125.5 | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH 113.0 (land surface) ; ALT. | TOP OF SCREEN: DEPTH 115.0 (land surface) ; ALT.

Hole drilled 3/15 - 3/20/95. well installation completed 5/12/95. Ground water encountered at 52.3 (IT log); W.L. at 54.5 after well installation (IT log).

DEPTH	CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: RQD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
								Overburden logged from only 3 samples collected several days after drilling.
5	5.0 Split Spoon 6.2							Loess (?): lt gray to tan, clayey silt.
10	10.0 Split Spoon 11.1							Terrace Fan (?) (Possible Till Ur lt gray to yellow-brown, high plastic clay, minor sand; mottled; blocky fracture
15	15.0 Split Spoon 16.0							Fill yellow-brown, silty, sandy clay, w/ few rock frags. Abund. Mn along fractures. Residuum (16.5 to 38.3), based on split spoon refusal at 16; till/residuum at 16.8 in MWS-23
20								No samples below 16.0
								Augered to 19 ft, then drilled w/ air to 38.3 ft
25								IT log indicates residuum is mostly chert; clay at 36
30								
35								← 0.7 ft clay at 36.0
	38.3		← gravel zone					Core begins @ 38.3
40					3			Top of rock at 32.3

U.S. GEOLOGICAL SURVEY

PROJECT: Webb. Army COE

LOGGED BY: J Mucel | DATE: 3/20/95 | PG 2 OF 4 | WELL NO: MWD-23

LAND SURFACE ALT. | WELL DEPTH | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH ; ALT. | TOP OF SCREEN: DEPTH ; ALT.

DEPTH	CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: RQD	FRACTURES PER FOOT	DISCONTINUITIES: COMMENT
40 – 42.9	3.5/4.6 76%		← ground core	1.8/4.6 39%	>6, 2, 1	
42.9 – 47.9 (45)	5.9/6.0 98%			2.3/6.0 38%	2, 5, 6, 3, 3, 0	
47.9 – 52.9 (50)	4.1/4.0 103%			1.8/4.0 45%	3, 1, 4, 2	
52.9 – 57.8 (55)	3.5/4.9 71%		Grinding (below) accts for 1.4 ft core loss?; ← ground?; ← ground fracts correctable	2.5/4.9 51%	1, 1, 2, 2, >6	
57.8 – 62.9 (60)	4.6/5.1 90%		don't see where core loss is.	3.0/5.1 59%	0, 1, >6, >6, 2	} couple chert beds
62.9 – 66.4 (65)	3.8/3.5 109%		deficit; surplus	1.5/3.5 43%	2, 3, 3	
66.4 – 72.9 (70)	6.2/6.5 95%		← minor grinding	3.9/6.5 60%	1, 5, 1, 0, 1, 2, 4	
72.9 – 75.2 (75)	2.3/2.3 100%			1.5/2.3 65%	2, 3	
75.2 – 80					2, 2, 0, 4, 0	

WL in MWD-23, after ... tion ∇ (≈54)

MWS-23 Filter Pack (Approx.) (≈56 to ≈68)

CORE DESCRIPTION

38.3 to 100.2 :
Weathered Z: Hinton-Keokuk
Alternating orange-brown (FeOx) & gray, fragilecse limestone w/ chert as interbeds & nodules. Chert commonly chalky (weathered).
Horiz. discontinuities (fracts & bedding planes): some show "smoothing" (weathering) dissol & precipitation of carbonate
Chert commonly fractured along variable orientations
FeOx along fracts are common
MnOx less common.
Orange-brown limestone is sometimes argillaceous.
Variable porosity: Not particular porous except some FeOx-stain limestones, esp. 49-50, 59-60 79-83, 92.5 to 94.5, & some thinner intervals. These dry quickly when water is applied.

More detailed intervals:

38.3 to 47 : Rock fabric more "disturbed" than elsewhere. Parts brecciated, (healed) w/ chert frags in orange-brown limestone matrix; numerous high angle fractures w/ calcite, orange limestone, or both; Numerous horiz to low angle fracts/partings, some showing dissol & secondary mineralization. But rock is not vuggy or very porous in most places. (This is a strongly weathered subunit).
64.5 to 79 : Fresh limestone (still part of weathered unit) w/ only minor chert. Chert is fairly fresh also, although broken. Not much FeOx staining along chert fracture surfaces.

● = chert

(hard and

U.S. GEOLOGICAL SURVEY

PROJECT: Weldon · Army COE

LOGGED BY D Mugel | DATE 3/20/95 | PG 3 OF 4 | WELL NO: MWD-23

LAND SURFACE ALT. | WELL DEPTH | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH ; ALT. | TOP OF SCREEN: DEPTH ; ALT.

DEPTH		CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: RQD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
80		2.3/7.6 90% 82.8		Dave see where core loss is	5.1/7.6 67%	1 5 2			← limonite in rims
		1.1/1.1 100% 87.9			0.8/1.1 73%	76			
85		2.3/9.0 92% 92.0		Dave see where Core loss is 0.7 deficit	6.4/9.0 71%	2 1 2 3 1 1 2 1 4			>27-22 ± <91-92 greenish gray, fine, dolomitic (Fern Glen type)
90		7.9/7.7 103% 100.6		0.2 surplus ← minor spalling	5.9/7.7 75%	4 1 1 6 1 1 2			94.5 to 100.2 · Gradational to unweathered unit, below: weak FeOx discoloration, appears to be somewhat more porous than fresh limestone. FeOx along chert fractures. ← 2° limey siltstone
95		2.0/2.0 100% 102.6			2.0/2.0 100%	1 1 1			100.2-125.1: Unweathered Burlington-Keo
100		5.3/6.6 88% 109.2		← ground 0.8 deficit	5.8/6.6 68%	1 1 1 1 1 1			100.2-115.6: "Typical" unweathered B Gray, mdg to coarse, fossiliferous limestone w/ some chert as interbeds or nodules or lenses. Gradational w/ weathered unit above from 100.2 to 107: Some faint, orange discoloration.
105		4.3/3.5 123% 113.7		0.8 surplus	3.6/3.5 103%	2 0 3	high angle fract	1 1	Chert shows some weathering along bedding surfaces (chalky) Limestone is only weakly porous Pyrite (?) along fract @ 110.
110	MWD-23 Filter Pack	2.6/2.5 104% 115.2		0.1 surplus	2.3/2.5 92%	0 1 1			
115		4.6/4.5 100% 119.7			3.0/4.5 67%	0 2 2 1 3		1	115.6-125.1 (bottom): "Fern Glen type" lithology. BK/FG contact is typically gradational; intervals of FG-type lithology commonly occur in lower BK (eg. MWD-2, MWD-6). Because only 9.5 ft of FG are present, this is logged as BK (an alternate interpretation would put contact at 115.6).
120									

U.S. GEOLOGICAL SURVEY

PROJECT: Walker.. Army COE

LOGGED BY D Muger | DATE 3/20/95 | PG 4 OF 4 | WELL NO: MWD-23

LAND SURFACE ALT. | WELL DEPTH | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH ; ALT. | TOP OF SCREEN: DEPTH ; ALT.

DEPTH		CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: ROD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
120		4.1/3.9 105%		0.2 surplus	2.5/2.9 64%	4 3 3		1	BK (Fern Glen type) lithology (115.1 - 125.1): Greyish greenish brown limey dolomite to dolomite; minor limestone; some chert
	mud-filled fract.	1234 1.2/1.5 80%		0.3 drilling water	0/1.5 0%	0 3			Numerous pin point & larger vugs; couple calc. to. P. lled or lined vugs ("geodes") Some chalky bedding surfaces (chert & dolomite).
125	125.5	125.1 Bottom of core; Bottom of Filter Pack (1T lg) = 125.5							
130									2835 gal water loss during drilling (2T log).
135									
140									
145									
150									
155									
160									

U.S. GEOLOGICAL SURVEY | PROJECT: Fern, FOE

LOGGED BY Doug Mugel | DATE 5-1-95, 6-14-95 | PG 1 OF 3 | WELL NO: MWD-25

LAND SURFACE ALT. 681.05 | WELL DEPTH MWS-25 39.6, MWD-25 104.5 | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH S-25 47.0, D-25: 102.2; ALT. | TOP OF SCREEN: DEPTH S-25 49.4, D-25 104.3; ALT.

DEPTH	CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: RQD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
5	SS = Split Spoon Sample							Loess: generally buff-tan, clayey silt to silty clay; dk root hairs. Mn oxide nodules.
	SS							
10	SS							Clay fill: Lt tan, brown, orange, mottled clay w/ accessional sand grain (minor Fe oxide nodules?).
								Residuum
15	SS							chert gravel
	19.0							Started coring at 18 ft.
20	2.4/5.0 52%	18.5 to 19.8		0%	>6			18 to 36.5: Residuum: Core from 18 to 22' is chert rubble: porous, vuggy, Fe-oxide stained chert fragments, sandy & friable locally, w/ probable clay zones (washed out) 12.0 to 19.8 and 23.0 to 26.3. No limestone.
	23.0				>6			
25	1.3/5.0 26%	23 ft to 26.3		0%	>6			
	28.0				>6			Stopped coring and advanced casing.
30	No Core: Advanced Casing							Resumed coring at 35.5
	35							chert gravel (sample)
35	35.5 4.5/7.5 60%	1 ft Core loss 36.5 to 37.0	Reported on core as void 39.0 to ground	0%	2			Top of rock interpreted to be 36.5, w/ void from 37 to 39.
40								36.5 - 103.0: Weathered Bucatunna - Kiokuk Limestone

▽ = ... △ = ... ● = ...

U.S. GEOLOGICAL SURVEY

PROJECT: Army [illegible] [illegible]

LOGGED BY: D Mugel	DATE: 5-1-95, 6-14-95	PG 2 OF 3	WELL NO: MW2-25
LAND SURFACE ALT.	WELL DEPTH		WELL BOTTOM ALT.
TOP FILTER PACK: DEPTH ; ALT.		TOP OF SCREEN: DEPTH ; ALT.	

MWS-25 Filter Pack (approx. 47–60 ft)

DEPTH	CORE RUN AND RECOVERY	CORE LOSS LOCATION	CORE LOSS COMMENT	RQD	FRACTURES PER FOOT	DISCONTINUITIES COMMENT	GRAPHIC
40					4, 6, 5		
43.0–44.5	1.2/1.5, 80%			0%	>6, >6	chert rubble	#
44.5–49.5	2.3/5.0, 46%	X	47.0 Marked [illegible] loss in core box	0.5/5.0, 10%	>6, >6	solutioned, orange-brn chert-ls bx (healed)	#D
49.5–54.5	4.8/5.0, 96%			0%	5, 3, 3, 3		
54.5–62.0	5.5/7.5, 73%	X, X	57.8–58.3 0.5 ft core loss; 60.5 1.5 ft core loss	0.9/7.5, 12%	>6, >6, 3, 2		
62.0–64.5	2.9/2.5, 116%			0.8/2.5, 32%	2, 2		
64.5–74.5	9.4/10.0, 94%		Core "loss" prob. due to too much core in run above; ← [illegible] ground	6.0/10.0, 60%	2, 0, 3, 3, 4, 4, 2, 1, 5, 5		
74.5–	9.8/10.0, 98%			3.9/10.0, 39%	1, 6, 5, 1, >6, 2	"Poker chips"	

CORE DESCRIPTION

36.5 – 103.0
Weathered Burlington Keokuk limestone:

Limestone, fine to coarsely crystalline, w/ chert interbeds or as lenses and nodules. Limestone is moderately weathered in most places but is locally slightly weathered to fresh (noted) (contact w/ unweathered unit below is gradational). Weathering is characterized by orange to orange-brown color, locally [illegible] sponge-like porosity (otherwise only weak to moderate porosity), locally argillaceous, locally vugs w/ calcite and/or quartz. MnOx and FeOx along some surfaces. Discrete core-loss zones (probably voids, some clay-filled) down to 62.0 ft.

(~51–53 ft) gray ls. (fresh)

(~62–70 ft) Fresh to slightly weathered

(~76–77 ft) slightly weathered

(~80 ft) vugs w/ calcite

U.S. GEOLOGICAL SURVEY

PROJECT: Army COE Waukon Spring

LOGGED BY D. Mugel | DATE 5-1-95 6-14-95 | PG 3 OF 3 | WELL NO: MWD-25

LAND SURFACE ALT. | WELL DEPTH | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH ; ALT. | TOP OF SCREEN: DEPTH ; ALT.

DEPTH		CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: ROD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
80						2			
						>6	broken chert	a	Weathered Burlington - Keokuk Limestone cont.
						3			
						2			
		84.5				4			
85		3.4/3.5			1.2/3.5	3			vugs w/calcite
		98%			34%	>6	broken chert limestone	1	
		88.0				0			fractured slightly weathered
90		6.5/6.5			3.9/6.5	4		1	
		100%			60%	3			
						5			
						1			
95		94.5				1			
						0			
		10.0/10.0			2.7/10.0	5			
		100%			27%	1			
100						2			This interval is gradational between weathered/unweathered "poker chips": limestone is coarsely vuggy, slightly to mod. porous, slightly weathered (cream-colored)
						>6			
						>6			
						>6			
						6			
						6			103.0 - 114.5: Unweathered units of Burlington-Keokuk Fm.
105		104.5				3			
						5			
		9.7/10.0			2.5/10.0	3			fresh gray & tan, mostly coarsely vuggy fossiliferous, stylolitic, locally glauconitic
						2			
						4			
110						6			
					25%	>6			
						>6	broken chert	1	
		97%				3			Fem Glen-type lithofacies: more orange-brown (slightly weathered) than normal brown. Pin-point pores & spongy-like porosity.
						6		1	
115		114.5		Bottom of core					
120									

MWD-25 Filter Pack

U.S. GEOLOGICAL SURVEY

PROJECT: Army COE Weldon Spring

LOGGED BY Doug Mugel | DATE 4/19/95 | PG 1 OF 2 | WELL NO: MW5-26

LAND SURFACE ALT. 672.36 | WELL DEPTH 54.5 | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH 41.5 ; ALT. | TOP OF SCREEN: DEPTH 44.0 ; ALT.

DEPTH	CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: ROD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
	SS = Split Spoon Samples							
5	SS							Brown clayey silt. Appearance of loess, but probably fill. Sample from 10.0 to 10.4
10	SS							10.4 is moist.
								10.4 to 40.6: Residuum ← clayey chert, brown
15	SS							White & orange sand-sized chert fragments
20	SS							Clayey chert, brown
25	SS							Clayey chert, tan, brown & green (Soft drilling 27-30 ft bgs)
30	SS							Red-brown, high plastic clay w/ occ. chert fragment Black MnOx streaks, blebs
35	SS							Brown high plastic clay w/ chert
	39.0	X	Core loss					Auger refusal at 39.0
40								Core loss 39.0 to 40.6

U.S. GEOLOGICAL SURVEY | PROJECT:

LOGGED BY D. Mangel | DATE 4/19/95 | PG 2 OF 2 | WELL NO: MWS-26

LAND SURFACE ALT. | WELL DEPTH | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH ; ALT. | TOP OF SCREEN: DEPTH ; ALT.

w.l. immed. after drilling

MWS-26 Filter-Pack

DEPTH	CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: RQD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
40								Calling 40.0 top of rock
	3.9/5.5 71%		R Drilled through soft zone, no recovery. Drill rods dropped	2.7/5.5 49%	3 1 2			gray, harsh, generally csg Fossil. limestone, minor chert nodule. (freshest part of entire core).
45	44.5							40.6 to 65.0 (TD): Weathered Burlington-Keokuk Fm
	46.3 46.0 42.3 2.9/5.5 53% 44.5 44.8		Core Loss Zones are Voids (Probably Mud-packer tests from 45 to -55 and 55 to 65 showed very tight rock)	1.4/5.5 25%	1			gray to orange brown, generally csg Fossil. ferm: limestone, w/ chert as nodules & brk. Chert has many hairline fractures, & is locally broken. Limestone is strongly solutioned; broken mostly along horiz partings that are somewhat rounded, showing solution pitted; Porosity is relatively poor- down to 44.5, then generally moderate to 61.0, then poor to 65.0 Voids down to 51.4. Packer tests suggest voids are clay filled (do not accept water)
50	50.0 50.1 51.4 4.0/5.0 80%			0.7/5.0 14%	2 5 >6	broken chert and limestone horiz partings broken chert		
55	55.0				>6 2 6	broken chert		
60	9.8/10.0 98%			4.9/10.0 49%	2 3 3 2 1			↑ strong orange-brown discoloration w/ some gray ↓ weak orange-brown discoloration w/ some gray.
			Core loss 64.9-65.0		1 2			
65	65.0							green clay along fracture surface

Water loss during coring: 2600 gal.
Well took >200 bags (50 lbs) of sand & gravel (25 kg) (Clay washed out from voids during air reaming)

0 breccia / = fracture

U.S. GEOLOGICAL SURVEY

PROJECT: Army COE Weldon Spr

LOGGED BY	DATE	PG	WELL NO:
D. Muegel	4-3-95	1 OF 4	MWD-107

LAND SURFACE ALT.	WELL DEPTH	WELL BOTTOM ALT.
607.19	134.0	

TOP FILTER PACK: DEPTH 121.5 (land surface) ; ALT.

TOP OF SCREEN: DEPTH 123.5 (land surface) ; ALT.

DEPTH	CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: ROD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
0								Hit groundwater at 39.3 (IT log
5	SS							0-4 : loess (from MWS-107 log)
10	SS							4-10 Excelsior Fm ?: Gray silty clay w/ occ. che and and gravel sized gra (contacts at 4' and 10 ft from MWS-107 log)
15	SS							10-39.3 Till : Orange-brown, bi yellow-brown & gray mottled, high plastic silty clay, w/ chert and limestone sand and gravel. Some mottled black mn ox.
20	SS							
25	SS							
	SS							
30	SS							
35	SS							↓ clay softer than above
	SS							Contact at 39.3 based on where ground water was encountere
40								39.3 - 46.0 ' Residuum wet, clayey chert gravel

SS = Split Spoon Sample

U.S. GEOLOGICAL SURVEY | PROJECT: Army COE Weldon Spring

LOGGED BY D. Muel | DATE 4/3/95 | PG 2 OF 4 | WELL NO: MWD-107

LAND SURFACE ALT. | WELL DEPTH | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH : ALT. | TOP OF SCREEN: DEPTH : ALT.

DEPTH	CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: RQD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
40	5S							Residuum, con't.
45	45.0							Start coring at 45.0
	1 Hole	X						1' core loss
	46.0				4			Core begins at 46.0 (top rock)
	7.9/8.0			7.2/8.0	1			46.0-79.0: Weathered Burlington-Keokuk:
50	99%			28%	76			3 Zones:
					3			46.0-68.0: Yellow-brown, limey siltstone to silty limestone, strongly mottled to brecciated with chert; some gray (fresh) limestone, esp 61-64. mottled/Brecciated rock is well healed. Moderate to good porosity, w/ some "sponge like" limey siltstone; larger pores where limey parts are somewhat friable. Couple large quartz-calcite lined vugs. Numerous hair-line quartz filled fractures, at various angles, down to ~59 ft. Although brecciated, rock is more competent, less porous, better recovery with RQD than strongly weathered subunit of Burlington-Keokuk, noted in other wells.
					5			
					3			
					1			
					5			
55	54.0				3			
	7.2/7.5			1.0/7.5	4			
	96%			13%	3			
					5			
					4			
60					4			
					3			
	@.3 2.5/2.5			1.3/2.5	3			
	100%			48%	6			
	64.0				4			
65					76			
	9.7/10.0			2.5/10.0	0			
	97%			25%	6			
					2	Core is broken into Poker Chips; Breaks do not appear natural; instead, is "spun" (some grinding).		
70					76			
					76			
					6			68.0-74.0: Gray, fossiliferous limestone; minor chert (fresh)
					76			
					5			
75	74.0				1			74.0-79.0: strongly mottled to brecciated, as above; less porous, more often than yellow brown. (In MWD-107, both colors present. 68-79 is transition to Unweathered)
	7.4/7.4			7.0/7.4	1			
	100%			95%	1			
					1			
					2			
80					2			79.0-134.0 Unweathered Burlington-Keokuk
					0			

MWD-107 Filter Pack

= rubble, ■ = chert, ▲ breccia, ∫ highangle fracture

U.S. GEOLOGICAL SURVEY

PROJECT: Army COE Weldon Spring			
LOGGED BY D. Mugel	DATE 4/3/95	PG 3 OF 4	WELL NO: MWD-107
LAND SURFACE ALT.	WELL DEPTH		WELL BOTTOM ALT.
TOP FILTER PACK: DEPTH	; ALT.	TOP OF SCREEN: DEPTH	; ALT.

DEPTH		CORE RUN AND RECOVERY	CORE LOSS LOCATION	CORE LOSS COMMENT	RQD	DISCONTINUITIES FRACTURES PER FOOT	DISCONTINUITIES COMMENT
80	MWD-107 Filter Pack					0	
		81.4 2.4/2.6 92%			2.0/2.6 77%	0, 0, 1	
85		84.0 7.1/7.1 100%			3.6/7.1 51%	0, 0, >6, >6, 2, 1, 2	"Pokerchip", spun core
90							
		91.1 2.5/2.9 86%	▬	core loss 93.4 to 93.8	1.3/2.9 52%	3, 1, 3	
95		94.0 5.0/5.0 100%			1.3/5.0 26%	2, >6, 6, 4, >6	"Pokerchip; spun core
100		99.0 1.4/1.4 100%			.8/1.4 57%	3	
		100.4 3.4/3.6 94%			0/3.6 0%	>6, >6, >6, >6	
105		104.0 6.5/6.4 102%			.7/6.4 11%	>6, >6, >6, >6, 5, 3	
110		110.4 3.3/3.6 92%			0%	>6, 3, 5, 6	broken chert
115		114.0 5.7/5.8 98%			1.2/5.8 21%	>6, 2, >6, >6, 4, >6	broken chert; some short, high angle fractures
120		119.8					

CORE DESCRIPTION

79.0 - 134.0:

Unweathered Burlington-Keokuk Fm:

Gray to tan, mostly coarse-grained fossiliferous limestone, w/ lesser finely crystalline & locally silty limestone, w/ chert interbedded or as lenses.

Strongly mottled; not as severe as in weathered unit; less silty, more gray & not as tan as 74-79. Few irreg. open fracts.

Generally non- to weakly porous. Few thin intervals of dolomite (Fern Glen type lithology). Some high angle fractures, but no FeOx staining along them. Some MnOx along horiz. fracts @ 133.5, 134.

"Pokerchip" limestone - due to drilling, as above. Not natural partings. In this interval limestone is slightly chalky to slightly friable.

dolomite (Fern Glen type lithology), "pin point" porosity

Parts silty limestone, mottled.

calcite vug fill

limey dolomite

U.S. GEOLOGICAL SURVEY

PROJECT: ArmyCOE Weldon Spring

LOGGED BY D. Mugel	**DATE** 4/3/95	**PG** 4 **OF** 4	**WELL NO:** MWD-107
LAND SURFACE ALT:	**WELL DEPTH**		**WELL BOTTOM ALT.**
TOP FILTER PACK: DEPTH	**; ALT.**	**TOP OF SCREEN: DEPTH**	**; ALT.**

DEPTH		CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: RQD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
120	MWD-107 Filter Pack	3.7/4.2 98%		don't see where core loss is.	1.6/4.2 38%	3, 4, 3, 5	Some high angle fractures		Unweathered Burlington-Keokuk cont.
125		124.0 4.9/5.0 98%			1.7/5.0 34%	0, 3, >6, 6, >6	Poker chip; broken chert		finely xline limestone; silty? mottled dolomite (Fern glen-type) w/calcite lined vug
130		129.0 4.5/5.0 90%		0.3' core loss 133.7 to 134.0	0.8/5.0 16%	3, 5, >6, 6, 6	Poker chip		
135		134.0							← MnOx in horiz fracts Bottom of core at 133.7 0.3 ft core loss at bottom. Bottom of hole at 134.0 (bottom 0.3 ft left in hole?)
140									

U.S. GEOLOGICAL SURVEY

PROJECT: Army COE Weldon Spring

LOGGED BY Don Mugel | DATE 4/11/95 | PG 1 OF 2 | WELL NO: MWS-112

LAND SURFACE ALT. 572.57 | WELL DEPTH MWS-112 : 36.3, MWD-112 : 105.8 | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH S-112: 23.7, D-112: 93.3 : ALT. | TOP OF SCREEN: DEPTH S-112: 25.7, D-112: 95.3 : ALT.

Fresh water encountered at 24.5

DEPTH	WELL	CORE RUN AND RECOVERY	CORE LOSS LOCATION	CORE LOSS COMMENT	RQD	FRACTURES PER FOOT	DISCONTINUITIES COMMENT	GRAPHIC	CORE DESCRIPTION
5		SS							Dark brown clay and chert fragments. Overburden appears to be residuum down to 18.0 ft, based on ? sampl
10		SS							Brown clay and chert fragments
15		SS							Brown clay and chert fragments
18.0		18.0							Core begins at 18.0
20		5.5/5.5 100%		minor brown clay w/ chert at bottom	0%	>6, >6, 3, 5, 6	Some chalky, rounded surfaces, some w/ Fe, Mn Ox.	#	Top of bedrock at 18.0. 18.0-23.5: Weathered Burlington Keokuk Limestone: Gray to tan, csg to fng limestone w/ chert as nodules mottled w/ limestone. Some limestone is argillaceous. Several voids in bot. 5 ft, filled w/ clay (per driller). Otherwise, core is broken along fracts & smallings & these surfaces show some solutioning (rounding, chalky) & minor Mn Fe Ox. Unit lacks Fe coloration usually characteristic of weathered unit.
23.5–28.0 (25)	MWS-112 Filter Pack	23.5, 24.0, 25.0 100%, 25.5 .4/1.5 27%, 27.0, 28.0	← ← ? ← ←	Clay-filled voids	0%, 0%	3, 3	* w/ clay *	#	
30		4.5/4.5 100%			2.7/3.5 77%	2, 3, 1, 0, 1			28.5 to 62.5: Unweathered Bu-k. Gray, csg to fng limestone w/ chert interbedded or as nodules. Slight yellow discoloration 40-42. Some Fern Glen-type dolomite, except lacking characteristic pin-point porosity. Generally weak porosity, but a few vugs and fractures, and some of these, along w/ horizontal parting surfaces, exhibit some effects of solution: rounding, chalky surfaces.
32.5–38.5 (35)	MWS-112 Filter Pack	32.5, 5.3/6.0 82%, 38.5		Some spun core (grams), some solutioned partings, but can't pin-point core loss	2.2/6.0 37%	3, >6, 4, 6, >6			
40	MWS-112 Grouted					3, 3			

rubble ● chert | high I ... ⊼ Discontinuous ...

U.S. GEOLOGICAL SURVEY

PROJECT: Army COE Weldon Spr. MO

LOGGED BY D Mugel | DATE 4/11/95 | PG 2 OF 2 | WELL NO: MWS-112

LAND SURFACE ALT. | WELL DEPTH | WELL BOTTOM ALT.

TOP FILTER PACK: DEPTH ; ALT. | TOP OF SCREEN: DEPTH ; ALT.

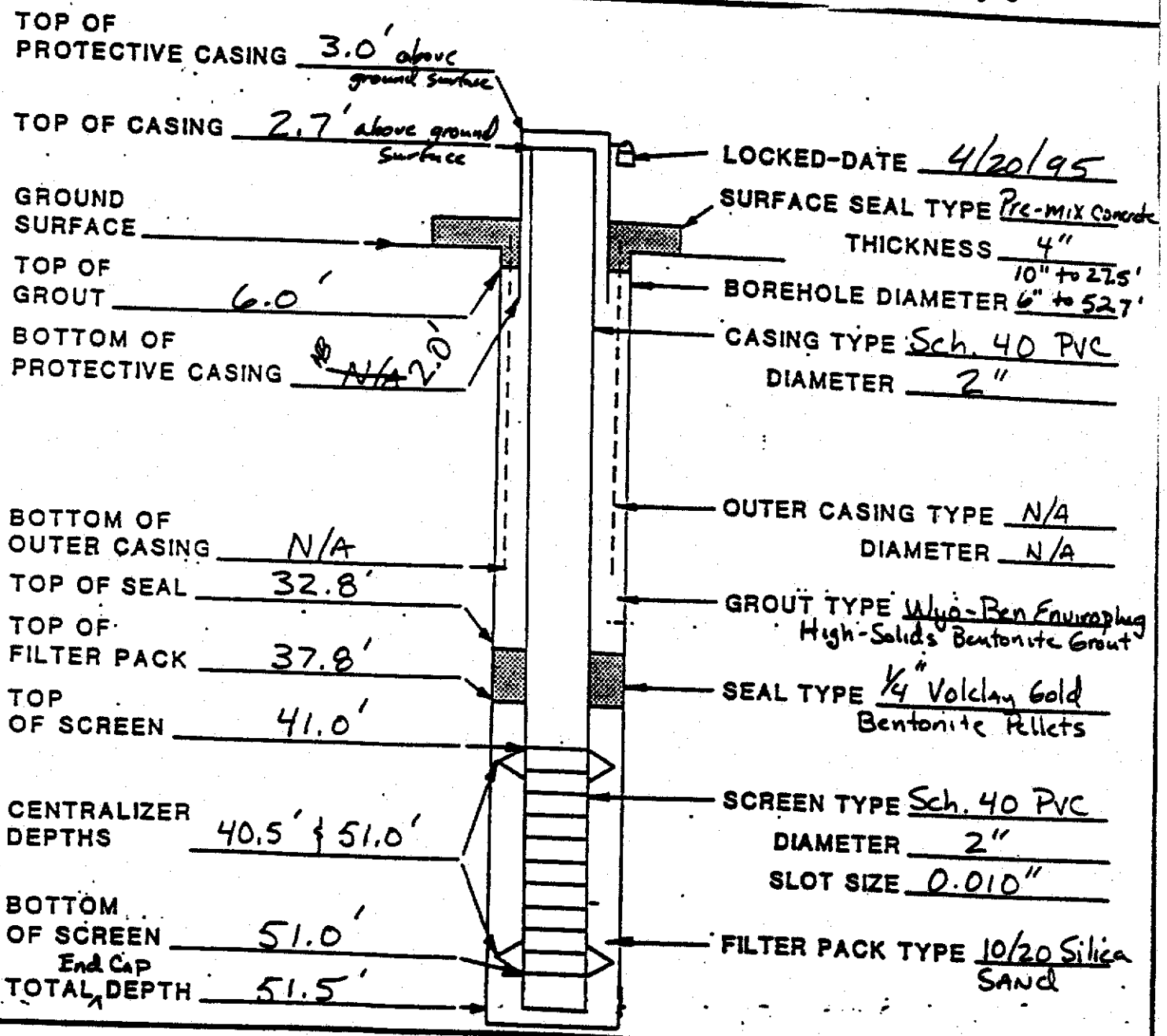
DEPTH	CORE RUN AND RECOVERY	CORE LOSS: LOCATION	CORE LOSS: COMMENT	DISCONTINUITIES: RQD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: COMMENT	GRAPHIC	CORE DESCRIPTION
40					>6	broken chert		Unweathered Burlington-Keokuk Fm, cont.
					>6			
	10.0/10.0			3.5/10.0	2	broken chert →		
					4	↳		
45	100%			35%	4			
					4			
					1			
					0	broken chert →		
	48.5				0	↳		
50					6			
	9.9/10.0			5.1/10.0	1			
					4			
	99%			51%	1			
55					6			calcite, qtz lined vug
					5	broken limestone		
					2			
					>6			
	58.5				1			
	3.7/4.0			1.8/4.0	5	broken chert		I
60	93%			45%	1			calcite, qtz lined vug
					6			
	62.5							Bottom of core at 62.5 ft
65								Drilling problems - grouted hole up to 36.3 and installed MWS-112. No core below 62.5 ft. Retrofitted USGS-7 to MWD-112: Screen: 95.3-105.3 Filter Pack: 93.3-105.8

WELDON SPRING SITE REMEDIAL ACTION PROJECT

WELL COMPLETION RECORD

WELL NUMBER MW-4025 DATE INSTALLED 4/19/95 - 4/20/95

PMC REPRESENTATIVE P. Patchin/N. Boss DRILLER Geotechnology



COMMENTS Bottom of 3" corehole at 53.7 ft. Reamed hole to 6" to 52.7 ft.

PMC REPRESENTATIVE SIGNATURE [signature] DATE 4/21/95

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES DIVISION

BOREHOLE LOG

Sheet 1 of 6
Project Number: WP-304
Hole Number: MW-4025

Project: WSSRAP Groundwater OU-RI WP-304
Location: Old Rail Bed East of Hwy 94
Coordinates: To be determined
Drilling Contractor: Geotechnology
Drill Make and Model: CME-75 10" HSA
Depth Top of Rock: 27.5 ft.
Depth Casing & Size: 10" HSA to 27.5
Hole Size: 10" to ft then
Elevation: ~648 (TBD)
Angle from Vert. and Bearing: Vertical
Depth Bottom of Hole: 53.7 ft
Water Level: 41.75' 4/17/95
Fluid & Additives: Water
Date Start: 4/10/95
Date Finish: 4/19/95
Logger: P. Patchin

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, Gradation or Plasticity, Particle Size Distribution, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy, USCS Group Symbol
	0	0	CME 1	2.3'/2.5'	Survey Meter Count < background	Reworked Fenceviews / Fill	0-.5' Topsoil w/ roots, organics, grass
	2.5	2.5					.5-5.0' Silty Clay, mottled reddish yellow 7.5YR 6/6 and light olive brn. 2.5Y 5/2, slightly moist, med plasticity (becomes more plastic at 2.5'), MnOx stringers, slightly blocky, stiff CL (Possible reworked Fenceviews) V. plastic and moist 4-5ft.
5			CME 2	5'/5'	< background		5.0-7.5' Clayey Silt / Silty Clay dry to damp strong brn (7.5YR 5/6) to light yellowish brn ( ), stiff to v. stiff, increased MnOx, abund FeOx stain, some roots, wavy bedding, ML-CL
	7.5	7.5					7.5-8.5' Clay, highly plastic, mottled grayish brn (2.5Y 5/2) with minor strong brn (7.5YR 5/6) slightly moist to moist, stiff CH ——— grading
10			CME 3	5'/5'	< background		8.5-13.2 Clayey Silt, mottled as in 5.0-7.5' dry to slightly damp, minor interbed clay, Abund live roots, abund MnOx from 11.0-13.2' ML
	12.5	12.5					
15			CME 4	5'/5'	< background		13.2-19.0 Clay plastic, mottled grayish brown 2.5Y 5/2 and strong brn (7.5YR 5/6), minor fine v. coarse angular grvl (5%), stiff to v stiff, blocky w/ some slickensides, fractured, (roots along fractures), damp, color to pred strong brn 16.5-18.5, v. plastic 13.2-14.8 with subangular chert gravel to 1.5 inch, MnOx nodules abund, FeOx nodules starting at 16.5 ft. CH
	16.0					Clayey Silt	
	17.5	17.5	CME 5	2'/2'	< background refusal		
4/10/95	19.6					Residuum?	19.0-20.0 Gravelly Clay approx 30% large subangular chert gravel, more reddish color clay (dark red 2.5YR 4/6) mottled with grysh brn (2.5Y 5/2) very abund blk MnOx veinlets, dry to slightly moist, med plasticity v. stiff CL Residuum?
20	19.5		CME 6	3'/3'	< background refusal		20.0-23.7' Clayey Gravel, ~30% high plasticity clay with pockets of silt, gravel v. angular chert to 3" with weathering inside, dry to damp, abund FeOx on chert MnOx stain last 1.5 ft primarily chert, very fractured, GC
	22.5	22.5	CME 7	4.7'/5.0'	< background	Residuum	(NEXT PAGE) Residuum
25							

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES GROUP

BOREHOLE LOG

Sheet 2 of 6

Project Number: WP-304

Hole Number: MW-4025

Project: WSSRAP GWOU-RI

Location: Old Rail Bed East of Hwy 94

ELEVATION	DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE & NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS "6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, Gradation or Plasticity, Particle Size Distribution, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy, USCS Group Symbol
	25	27.5	CME 17 CONTD			Residuum	23.7 - 24.6 Gravelly Clay, strong brn (7.5YR 5/8), slightly moist, mod. plastic w/ approx 20% gravel to 2" (angular chert), MnO2 Streaks, ML Residuum
			Sampler/Auger Refusal				24.6 - 27.0 Clayey Gravel, as in 20-23.7, 80% gravel (ang. chert to 3"). Very weathered and stained clay is as in 23.7-24.6. Orange silt pocket at 26.2-26.4, predominantly dry to slightly moist. (clay is moist). Clay lense from 26.7-27.0 as in 23.7-24.6. Last .5' is primarily wthrd chert.
	30						TRIED Sample at 27.5, Sampler & Auger Refusal
							Top of Bedrock at 27.5 ft.
							Set 3" casing to 27.5.
							ROCK CORE DESRIPTIONS START ON NEXT PAGE.

as in 23.7 - 24.6

WELDON SPRING REMEDIAL ACTION PROJECT

BOREHOLE LOG

Sheet 3 of 6
Project Number: WP-304
Hole Number: MW-4025

Project: Groundwater OU-RI Fieldwork
Location: Rail Bed east of Hwy 94

DEPTH	COMMENTS: TESTS/MONITORING INSTRUMENTATION CORING RATE AND SMOOTHNESS CORING FLUID LOSS CONTAMINATION	CORE RUN LENGTH AND RECOVERY (%)	CORE LOSS ZONE	BOX NUMBER	DISCONTINUITIES: ROD	FRACTURES PER FOOT	DESCRIPTION TIGHTNESS PLANARITY SMOOTHNESS FILLING, STAINING ORIENTATION	GRAPHIC LOG	LITHOLOGY: MINERALOGY CLASSIFICATION COLOR GRAIN SIZE ALTERATION / CEMENTATION HARDNESS WEATHERED STATE Porosity Fractures
27									Set 8" casing to 27.5'. Begin core drilling 27.5'
	25% water return	Run 1 4.5/5.0			0%	2	Spun Spun		27.5–53.7 ARGILLACEOUS LIMESTONE (65%) and Chert (35%) interbedded & brecciated together. limestone is gray(N5) to dk yellow & orange (10YR 3/4) to dk yellow & orange (10YR 6/6), very argillaceous w/ zones of higher $CaCO_3$, fine-xln, hard to med. hard, moderately to sparsely wfrd, slightly porous, w/ th. Abund FeOx in rock matrix with MnOx specks. Chert is, brecciated to nodular, (nodules to .2'), v. hard, light gray (N7) to med dk gray (N4), fossiliferous, fractured. Limestone is slightly stylolitic.
28									
4/11		Run 2			2.3		Open, rough		
4/12	2.5 min/ft	4.8'			4.8	3	Open, smooth		
	25% return.	4.8'			48%		Open, Spun		
29		100%							
						2	Tight range 5°		
							Open smooth 5°		
	25% return								
30	Alternating hard (chert) & softer zones						Open, stylolitic w/ thin clay		
	3.5 min/ft					3	Open, rough w/ FeOx clay		
	25% return								
31							Open, rough 20° w/ minor FeOx clay. Open, rough		
	Top of 1st packer test @ 32.0					3	Open, rough Stylolitic, FeOx		
									32.0–32.7 Severely wthrd & broken, Abund. FeOx stain Clay.
32	15% return					< 6	Rubble w/ FeOx stn.		
	10% return 32.8	Run 3			40		Stylolitic		
33		5.9/5.9			59		Smooth, open 10°		
	10% Return	100%			68%	2			
34							Open, Spun		

WELDON SPRING REMEDIAL ACTION PROJECT

BOREHOLE LOG

Sheet 4 of 6
Project Number: WP-304
Hole Number: MW-4025

Project: GWOU-RI Fieldwork
Location: Rail Bed East of 94

DEPTH	COMMENTS: TESTS/MONITORING INSTRUMENTATION CORING RATE AND SMOOTHNESS CORING FLUID LOSS CONTAMINATION	CORE RUN LENGTH AND RECOVERY (%)	CORE LOSS ZONE	BOX NUMBER	DISCONTINUITIES: ROD	FRACTURES PER FOOT	DESCRIPTION TIGHTNESS PLANARITY SMOOTHNESS FILLING, STAINING ORIENTATION	GRAPHIC LOG	LITHOLOGY: MINERALOGY CLASSIFICATION COLOR GRAIN SIZE ALTERATION / CEMENTATION HARDNESS WEATHERED STATE
34						4	Open, Spun		Argillaceous Limestone & Chert as above.
							Open, Smooth		
35	10% return						Spun Tight rough		
						3	Open rough		
							Open, Spun		
36	10% return						Open, rough		
						4	Open, rough, clg Tight-rough		
							Spun		
37	10% return						Tight, rough		
						2	Tight, rough		37.5 - 39.7 Very Argillaceous with abund FeOx Stain, higher porosity,
38	10% return						Open, Spun		
	38.2 - 38.7 Bit dropped Return water clay to dk brn.					2	Open, Spun clg		
	38.7	Run 4 5.0/5.0 100%			3.5'/5.0 70%				
39	10% return					2	Open, rough clg		
							Stylolite		
40	20% return						Open, Spun		
						2			
41	20% return						Open rough		

WELDON SPRING REMEDIAL ACTION PROJECT

BOREHOLE LOG

Sheet 5 of 6

Project Number: WP-304

Hole Number MW-4025

Project: WSRAP - GWOU - Fieldwork

Location:

DEPTH	COMMENTS: TESTS/MONITORING INSTRUMENTATION CORING RATE AND SMOOTHNESS CORING FLUID LOSS CONTAMINATION	CORE RUN LENGTH AND RECOVERY (%)	CORE LOSS ZONE	BOX NUMBER	DISCONTINUITIES: ROD	FRACTURES PER FOOT	DESCRIPTION TIGHTNESS PLANARITY SMOOTHNESS FILLING, STAINING ORIENTATION	GRAPHIC LOG	LITHOLOGY: MINERALOGY CLASSIFICATION COLOR GRAIN SIZE ALTERATION / CEMENTATION HARDNESS WEATHERED STATE
41		Run 4 Cont'd				0			Argillaceous Limestone & Chert, as above.
42	41.8' Lost water						Tight, smooth clay, FeOx		
	Top of packer test #2					4	Spun		
43	NO return						Open, rough clay (FeOx)		
	Bottom of first packer test.						Tight, rough clay		
	43.7 43.7						Spun		
						7/6	Rubble		— Very weathered & broken.
44	No return	Run 5			2.6		Open, rough & spun		
		4.7/4.7'			4.7		Open, smooth		
	4 min/ft	100%			55%		Open, rough clay (FeOx)		
45	No return						Open, stylolitic clay.		
							Tight, smooth		
	5 min/ft						Spun		
46	no return						Tight, rough weathered.		46.2 - 47.0' - Very weathered w/ pinpoint to .1" vugs, Abund FeOx and high porosity, high clay content (V. little HCl reaction)
							Open, rough, clay		
47	no return						Open, rough, FeOx minor clay.		
48	No return						Tight, smooth planar 15°		

WELDON SPRING REMEDIAL ACTION PROJECT

BOREHOLE LOG

Sheet 6 of 6

Project Number: WP-304

Hole Number: MW-4025

Project: WSSRAP-GW04 - Fieldwork

Location: Rail Bed E. of 94

DEPTH	COMMENTS: TESTS/MONITORING INSTRUMENTATION CORING RATE AND SMOOTHNESS CORING FLUID LOSS CONTAMINATION	CORE RUN LENGTH AND RECOVERY (%)	CORE LOSS ZONE	BOX NUMBER	DISCONTINUITIES: ROD	FRACTURES PER FOOT	DESCRIPTION TIGHTNESS PLANARITY SMOOTHNESS FILLING, STAINING ORIENTATION	GRAPHIC LOG	LITHOLOGY: MINERALOGY CLASSIFICATION COLOR GRAIN SIZE ALTERATION / CEMENTATION HARDNESS WEATHERED STATE
48							Open, rough, MnOx		Argillaceous Limestone & CHERT, AS ABOVE
	48.4								
	53.7	Run 6			2.3/5.3	2	Tight, rough		
		4.5/5.3			43%				
49	No return	85%					Tight, rough		
						3	Tight, rough, mnOx		
							Open, rough, mnOx		
50									
							Tight, rough, Alk		
						3			50.5 ft, T.D. Gradual color change to grayish yellow (5Y8/4), increase in stylolite and chert (40%), increased clay/silt content and mod. to high porosity. [WEATHERED BK LIMESTONE]
							Tight, smooth		
51							Tight, rough		
							Tight, rough		
						>	Open, rough, Stylolite		
						6	Stylolites		
		51.9					Open rough		
52								Core Loss	
		52.3				>	Open rough clay		
						6	Tight, Smooth		
		52.8					Open, Stylolites, clay		
53								Core Loss	
		53.2				>	Open, Stylolites, clay FLOW		
	Bottom of packer test #2					6	Open, rough		
53.7									53.7
54									↑ Total Coring Depth @ 53.7', 9:59 4/14/95
									Reamed borehole to 52.7' and installed 2" monitoring well. (see well diagram).

10.5

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES DIVISION

BOREHOLE LOG

Sheet 1 of 4
Project Number: WP-304
Hole Number: MW-4024B

Project: WSSRAP Groundwater OU - RI Investigation
Location: of MW-4020.
Coordinates: TBD
Drilling Contractor: Geotechnology
Drill Make and Model: CME-750 10" OD HSA
Depth Top of Rock: 23.0'
Depth Casing & Size: HSA to 23.0' / Auger
Hole Size: 10" / 6"
Elevation: ~657
Angle from Vert. and Bearing: Vertical
Depth Bottom of Hole: 59.0
Water Level: 48.75' btp 6/21/95
Fluid & Additives: WATER
Date Start: 6/12/95
Date Finish: 6/20/95
Logger: N. Boss

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE & NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SYMBOLIC LOG	SOIL DESCRIPTION: Name, Gradation or Plasticity, Particle Size Distribution, Color, Moisture Content, Relative Density or Consistency, Soil Structure, Mineralogy, USCS Group Symbol
	0	NA	NA	NA	∠ background	Topsoil	- For lithologic description see MW-4024A boring log. For packer test info see MW-4024A.
						2.0 Loamy silt.	- SYMBOLIC LOG ESTIMATED BASED UPON DRILL CUTTINGS @ SURFACE.
	5						
						7.5 Fill (Mix)	
	10						
	15				∠ background	15.5 Clay Till	
	20					20.0 Bedrock	
						23.0	Auger Refusal @ 23.0. Top of Bedrock. Description continued on rock log page 2 of 4 →

WELDON SPRING REMEDIAL ACTION PROJECT

BOREHOLE LOG

Sheet 2 of 4

Project Number: WP-304

Hole Number: MW-4024B

Project: WSSRAP GWOU - RI INVESTIGATION

Location: OF MW-4020

DEPTH	COMMENTS: TESTS/MONITORING INSTRUMENTATION CORING RATE AND SMOOTHNESS CORING FLUID LOSS CONTAMINATION	CORE RUN LENGTH AND RECOVERY (%)	CORE LOSS/ ZONE	BOX NUMBER	DISCONTINUITIES: ROD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION TIGHTNESS PLANARITY SMOOTHNESS FILLING, STAINING ORIENTATION	GRAPHIC LOG	LITHOLOGY: MINERALOGY CLASSIFICATION COLOR GRAIN SIZE ALTERATION / CEMENTATION HARDNESS WEATHERED STATE
23									AUGER REFUSAL @ 23.6' TOP OF ROCK
	BOREHOLE WAS NOT CORED, HOWEVER WAS REAMED W/ 6" MILLDOWN BIT. 1 min/ft						SEE MW-4024A FOR DETAILED DESCRIPTION	BEDFORD LIMESTONE	SEE MW-4024A FOR DETAILED DESCRIPTION.
25	1 min/ft.								- gray slurry
27	3 min/ft.								- gray slurry
29	3.5 min/ft.								- gray slurry
31	2 min/ft.								- gray slurry, ls. chips
33	1.5 min/ft.								- gray slurry, ls. chips
35	4 min/ft.								- CLAY SEAM
37									- brn-gray slurry, ls. chips

WELDON SPRING REMEDIAL ACTION PROJECT

BOREHOLE LOG

Sheet 3 of 4
Project Number: WP-3041
Hole Number: MW-4024B

Project: WSSRAP GWOU - RI INVESTIGATION
Location: OF MW-4020

DEPTH	COMMENTS: TESTS/MONITORING INSTRUMENTATION CORING RATE AND SMOOTHNESS CORING FLUID LOSS CONTAMINATION	CORE RUN LENGTH AND RECOVERY (%)	CORE LOSS ZONE	BOX NUMBER	DISCONTINUITIES: ROD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION TIGHTNESS PLANARITY SMOOTHNESS FILLING, STAINING ORIENTATION	GRAPHIC LOG	LITHOLOGY: MINERALOGY CLASSIFICATION COLOR GRAIN SIZE ALTERATION / CEMENTATION HARDNESS WEATHERED STATE
37	1.5 min/ft						SEE MW-4024A FOR DESCRIPTION	BULLNOSE CHERT GRAVEL	
39	2.5 min/ft								- brn slurry, ls. chips, chert frags.
41	3.5 min/ft								- brn slurry, ls. chips, chert frags.
43	2.5 min/ft								- brn slurry, ls. chips, chert frags.
45	2 min/ft								- gray slurry, chert frags.
47	2 min/ft								- gray slurry, chert frags
49	2 min/ft								- gray slurry, chert frags
51									- gray slurry, chert frags

WELDON SPRING REMEDIAL ACTION PROJECT

Sheet 4 of 4

Project Number: WP-304

Hole Number: MW-4024B

BOREHOLE LOG

Project: WSSRAP GWOU - RI INVESTIGATION

Location: OF MW-4020

DEPTH	COMMENTS: TESTS/MONITORING INSTRUMENTATION CORING RATE AND SMOOTHNESS CORING FLUID LOSS CONTAMINATION	CORE RUN LENGTH AND RECOVERY (%)	CORE LOSS ZONE	BOX NUMBER	DISCONTINUITIES: ROD	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION TIGHTNESS PLANARITY SMOOTHNESS FILLING, STAINING ORIENTATION	GRAPHIC LOG	LITHOLOGY: MINERALOGY CLASSIFICATION COLOR GRAIN SIZE ALTERATION	LITHOLOGY: CEMENTATION HARDNESS WEATHERED STATE
51	1.5 min/ft						SEE MW-4024A FOR DESCRIPTION	BEDROCK-UNDIFFERENTIATED		
53	1.5 min/ft								-gray slurry, chert frags	
55	1.5 min/ft								-gray slurry, chert frags	
57	1.5 min/ft								-gray slurry, chert frags	
59									BORING TERMINATED @ 59.0'	
61										

WELDON SPRING SITE REMEDIAL ACTION PROJECT
MONITORING WELL INSTALLATION DIAGRAM

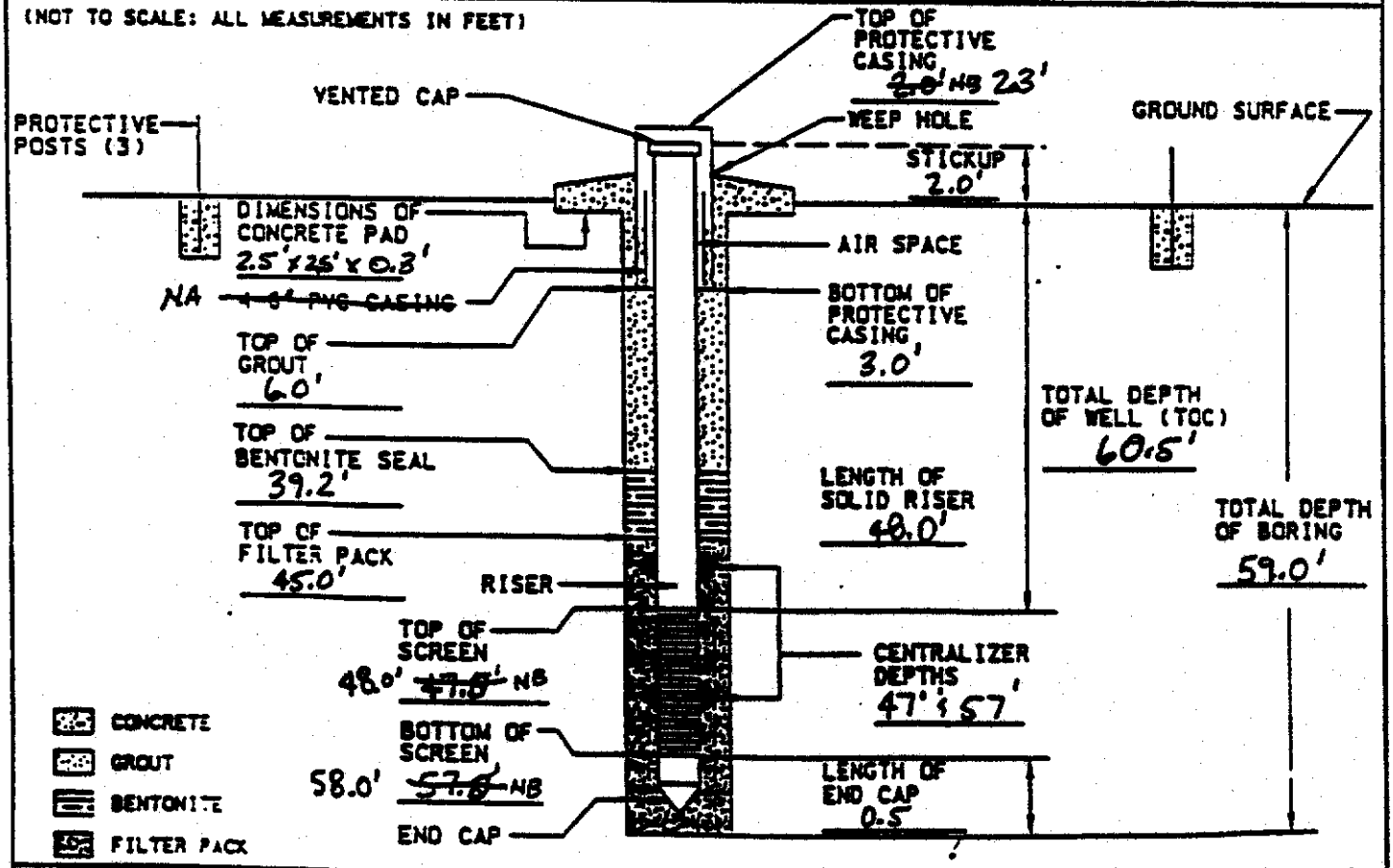
PROJECT NAME WSSRAP GWOU - RI INVESTIGATION WORK PACKAGE NO. 304
WELL NO. MW-4024B WELL LOCATION East of Hwy 94 North MDOC POND
DATE 6/21/95 - 6/23/95 TIME — COORDINATES N: _____ E: _____

GROUND SURFACE ELEVATION _____
TOP OF SCREEN ELEVATION _____
REFERENCE POINT ELEVATION _____
TYPE FILTER PACK Silica Sand GRADATION 10/20
FILTER PACK MANUFACTURER —
SCREEN MATERIAL Schedule 40 PVC
MANUFACTURER TRI-LOCK
SCREEN DIAMETER 2" SLOT SIZE 0.010"
RISER MATERIAL Schedule 40 PVC
MANUFACTURER TRI-LOCK
RISER DIAMETER 2"
DRILLING TECHNIQUE HSA to 23', Air Rotary to 59.0'
AUGER/BIT SIZE AND TYPE 6¼" ID HSA, 6" Air Hammer

BENTONITE TYPE ¼" Pellets
MANUFACTURER Volclay Gold
GROUT TYPE High Solids Bentonite Grout
MANUFACTURER Wyo-Ben Enviroplug
GROUT WEIGHT 9.4 lb/gal - 10.0 lb/gal
BOREHOLE DIAMETER 10" to 23' 6" to 59'
FIELD REPRESENTATIVE Nick Boos
DRILLING CONTRACTOR Geotechnology
AMOUNT BENTONITE USED 1-5 gal bucket (50 lb)
AMOUNT CEMENT USED ~5.5 - 50 lb bags
AMOUNT SAND USED 5-50 lb bags
STATIC WATER LEVEL (> 24 hrs. after dev.) _____
MEASURED ON (date/time) _____

REMARKS Well drilled 30' upgradient from MW-4024A, which was abandoned before completion due to drill rig oil leak into boring.

(NOT TO SCALE: ALL MEASUREMENTS IN FEET)



QA/QC
DRILLER: _____ INSPECTOR: _____
DISCREPANCIES: _____ CHECKED BY: _____ DATE: _____

A/P1/082/0495
04/03/95

SECTION 2:

MONITORING WELL DETAILS

PROJECT NAME Weldon Spring Well Installation PROJECT NO. 312430

WELL NO. MWD23 WELL LOCATION 18.4' NW of MWS23

DATE 5-11-95 / 5-12-95 TIME 1350 (5-12-95) completed grouting to 3' bgs

GROUND SURFACE ELEVATION _____

TOP OF SCREEN ELEVATION _____

REFERENCE POINT ELEVATION _____

TYPE FILTER PACK Silica Sand GRADATION _____

FILTER PACK MANUFACTURER The Morie Co.

SCREEN MATERIAL MANUFACTURER Howard Smith Screen Co. (HSSC)

SCREEN DIAMETER 2.0" ID SLOT SIZE .010

RISER MATERIAL Sch 40 PVC

MANUFACTURER Maaflex

RISER DIAMETER 2.0" ID

DRILLING TECHNIQUE (above casing) 4.25" HSA

AUGER/BIT SIZE AND TYPE _____

DRILLING TECHNIQUE (below casing) Air Rotary

AUGER/BIT SIZE AND TYPE NX core rod, diamond bit

SENTONITE TYPE pellets (3/8") MANUFACTURER Baotest

CEMENT TYPE Envirogrout, Envirogrout bentonite MANUFACTURER Wyo Ben Inc

BOREHOLE DIAMETER 6"

LAW ENVIRONMENTAL INC. IT Corporation FIELD REPRESENTATIVE Penny Backman

DRILLING CONTRACTOR United Geosciences

AMOUNT BENTONITE USED 1-bkt-seal

AMOUNT CEMENT USED 11 bags (grout) 8 bags ch

AMOUNT SAND USED 5 bags

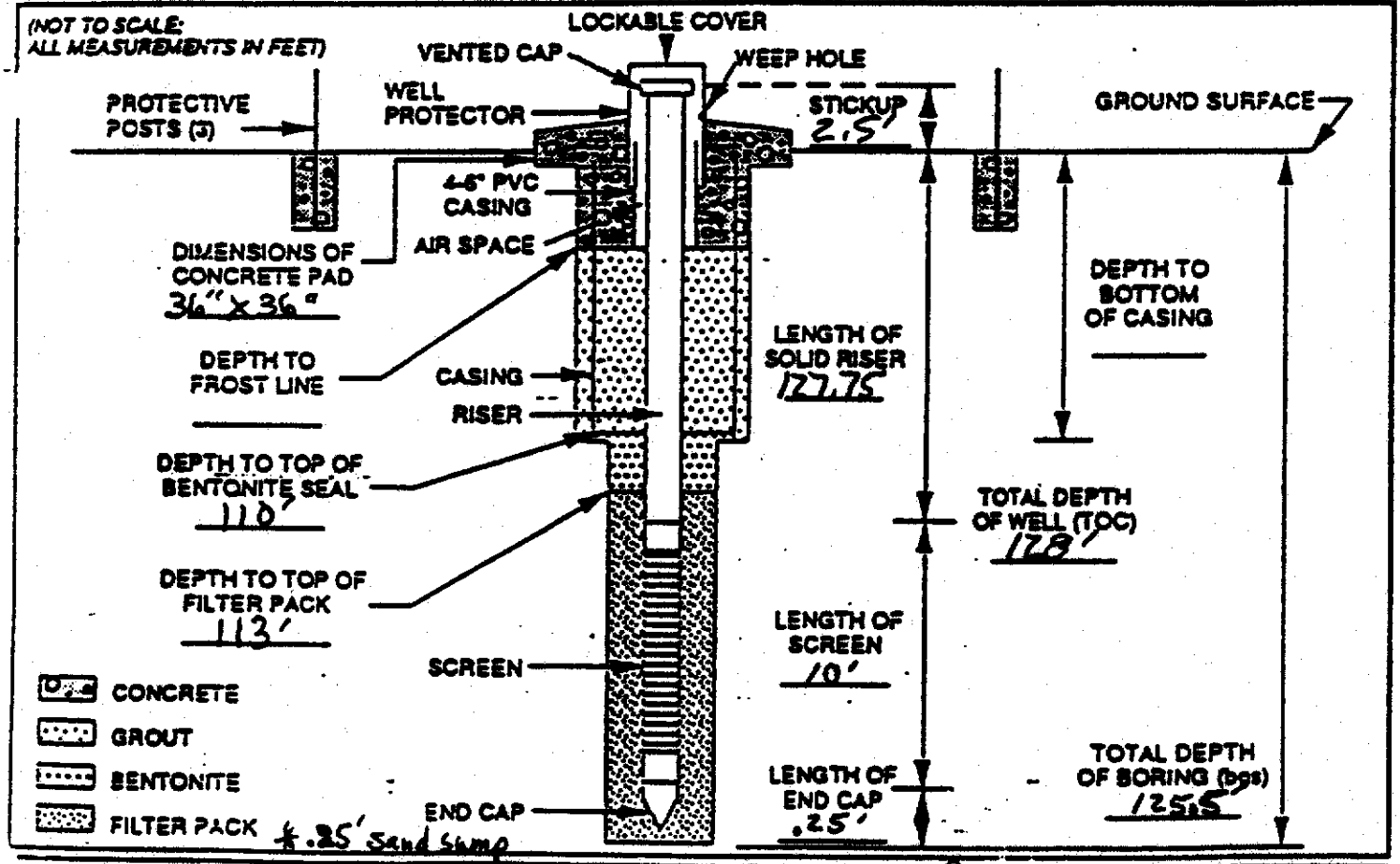
STATIC WATER LEVEL (> 24 hrs. after dev.) _____

MEASURED ON (Date/Time) _____

TYPE/SIZE OF CASING _____

REMARKS Envirogrout grout from 110'-75', 6" air hammer, tri-cone bit, bentonite chips from 75'-35', Envirogrout grout from 35'-3', Scra set @ 115'-125'

(NOT TO SCALE: ALL MEASUREMENTS IN FEET)



QA / QC

DRILLER: Chuck Coltrey/Bruce Brewington INSPECTOR: Penny S Backman

DISCREPANCIES: _____ CHECKED BY: _____ DATE: _____

PROJECT NAME Weldon Spring Well Design PROJECT NO. 312430

WELL NO. MW S25 WELL LOCATION

DATE 5-4-95 to 5-5-95 TIME 1500

GROUND SURFACE ELEVATION

TOP OF SCREEN ELEVATION

REFERENCE POINT ELEVATION

TYPE FILTER PACK silica sand GRADATION 30-50
FILTER PACK MANUFACTURER Maris Co

SCREEN MATERIAL stainless steel
MANUFACTURER HGSC

SCREEN DIAMETER 2" SLOT SIZE .010"

RISER MATERIAL Sch 40 PVC
MANUFACTURER Monoflex

RISER DIAMETER 2"

DRILLING TECHNIQUE 6.25" HSA, Air Rotary
AUGER/BIT SIZE AND TYPE 6" Air hammer NX core barrel

REMARKS Screen set from 59.35'-49.35' (including end cap)

BENTONITE TYPE 3/8" pellets ; chips
MANUFACTURER Baroid ; Wyo Ben Inc

CEMENT TYPE Enviroplug bentonite grout
MANUFACTURER Wyo-Ben Inc

BOREHOLE DIAMETER 6"

~~LAW ENVIRONMENTAL INC.~~ IT Corp
FIELD REPRESENTATIVE M. Jank

DRILLING CONTRACTOR United Geosciences

AMOUNT BENTONITE USED 4 bags (50# ea) chips
1 bkt (50# ea) pellets

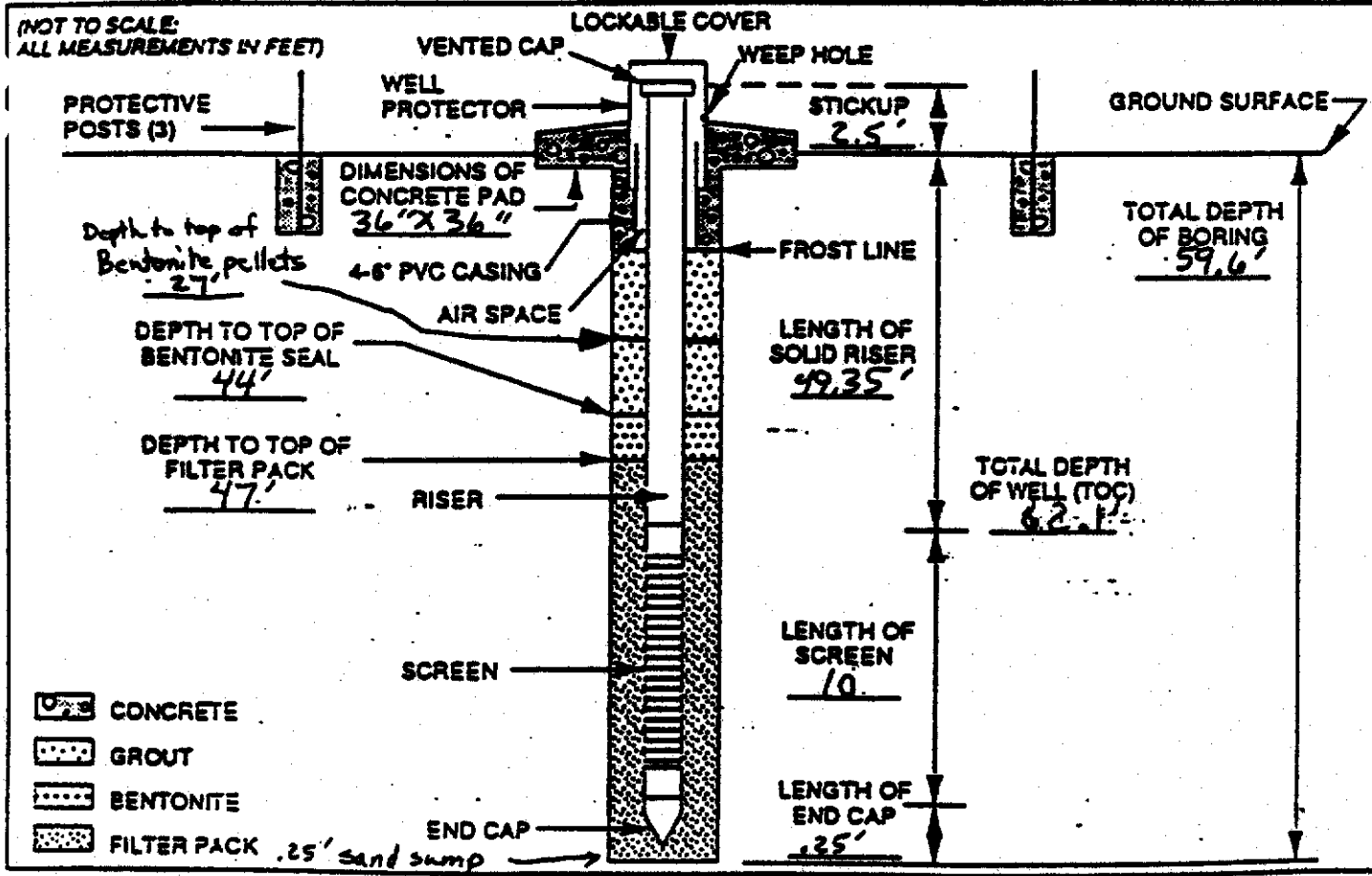
AMOUNT CEMENT USED 2.25 bags (50# ea)

AMOUNT SAND USED 3.5 bags (50# ea)

STATIC WATER LEVEL (> 24 hrs. after dev.)

MEASURED ON (Date/Time)

(NOT TO SCALE: ALL MEASUREMENTS IN FEET)



QA / QC

DRILLER: Chuck Caltry INSPECTOR: M Jank

DISCREPANCIES: CHECKED BY: DATE:

PROJECT NAME Weldon Spring Well Design PROJECT NO. 312430

WELL NO. MWD25 WELL LOCATION

DATE 5-2-95 TIME 1600

GROUND SURFACE ELEVATION

TOP OF SCREEN ELEVATION

REFERENCE POINT ELEVATION

TYPE FILTER PACK Silica Sand GRADATION 30-50

FILTER PACK MANUFACTURER Morie Co

SCREEN MATERIAL MANUFACTURER stainless steel / HSSC

SCREEN DIAMETER 2" SLOT SIZE .010"

RISER MATERIAL sch 40 PVC

MANUFACTURER Monoflex

RISER DIAMETER 2"

DRILLING TECHNIQUE (above casing) 6.25" HSA

AUGER/BIT SIZE AND TYPE

DRILLING TECHNIQUE (below casing) NX coring, Air Rotary

AUGER/BIT SIZE AND TYPE 4" Air hammer (diamond bit)

REMARKS Screen set from 114.25' - 104.25' (includes .25' end cap)
Grouted from 98.95' to 39'; bentonite chips from 39'-27'; grout from 27'-3'

BENTONITE TYPE 3/8" pellets

MANUFACTURER Baroid

CEMENT TYPE Envirogline bentonite grout

MANUFACTURER Wyo Ben Inc.

BOREHOLE DIAMETER 6"

~~SAW ENVIRONMENTAL INC.~~ IT Corp

FIELD REPRESENTATIVE M. Jank

DRILLING CONTRACTOR United Geosciences

AMOUNT BENTONITE USED 6.5 bags chips 50# each; 14 bkt pellets

AMOUNT CEMENT USED 10 bags (50# each)

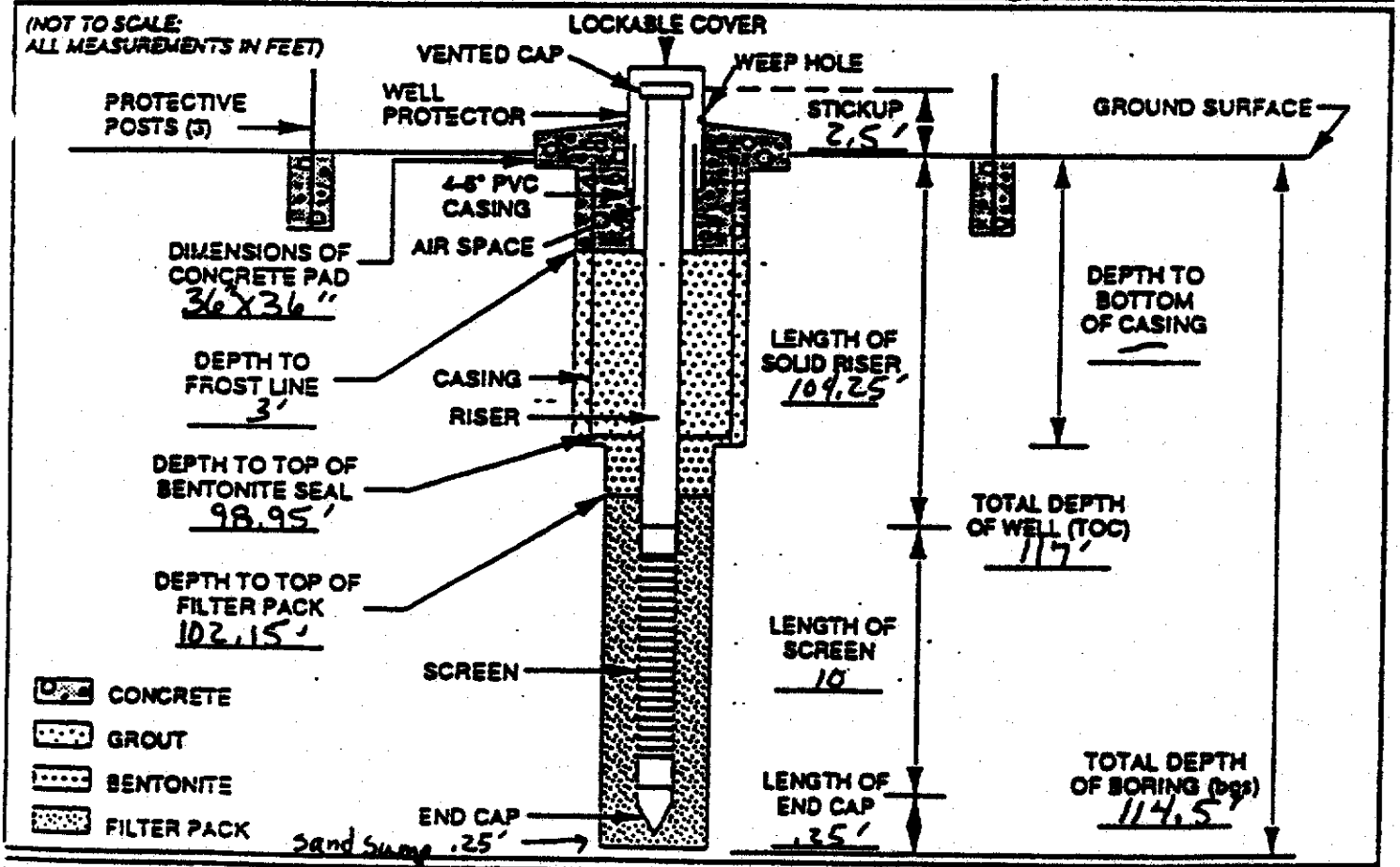
AMOUNT SAND USED 3.5 bags (50# each)

STATIC WATER LEVEL (> 24 hrs. after dev.)

MEASURED ON (Date/Time)

TYPE/SIZE OF CASING

(NOT TO SCALE; ALL MEASUREMENTS IN FEET)



QA / QC

DRILLER: Chuck Caltry INSPECTOR: M Jank

DISCREPANCIES: CHECKED BY: DATE:

PROJECT NAME Weldon Spring Well Installation PROJECT NO. _____

WELL NO. MW-26 WELL LOCATION WSTA

DATE 4-21-95 TIME 0730

GROUND SURFACE ELEVATION _____

TOP OF SCREEN ELEVATION _____

REFERENCE POINT ELEVATION _____

TYPE FILTER PACK Pea gravel / silica sand GRADATION 30-50

FILTER PACK MANUFACTURER Morie Co., Quikrete

SCREEN MATERIAL stainless steel 2"

MANUFACTURER HSSC

SCREEN DIAMETER 2" SLOT SIZE .010"

RISER MATERIAL sch 40 PVC

MANUFACTURER Monoflex

RISER DIAMETER 2"

DRILLING TECHNIQUE HSA / Air Rotary / NX core

AUGER/BIT SIZE AND TYPE 6" air hammer / diamond bit

BENTONITE TYPE 3/8" pellets

MANUFACTURER Reactest

Enviroplug Medium (chips)

CEMENT TYPE Enviroplug grout

MANUFACTURER Wyo-Ben

BOREHOLE DIAMETER 6"

LAW ENVIRONMENTAL INC. IT Corp

FIELD REPRESENTATIVE Penny S Brockman

DRILLING CONTRACTOR United Geosciences

AMOUNT BENTONITE USED 12 bags (50 lb each) for seal 1.5 buckets pellets

bentonite chips for annu

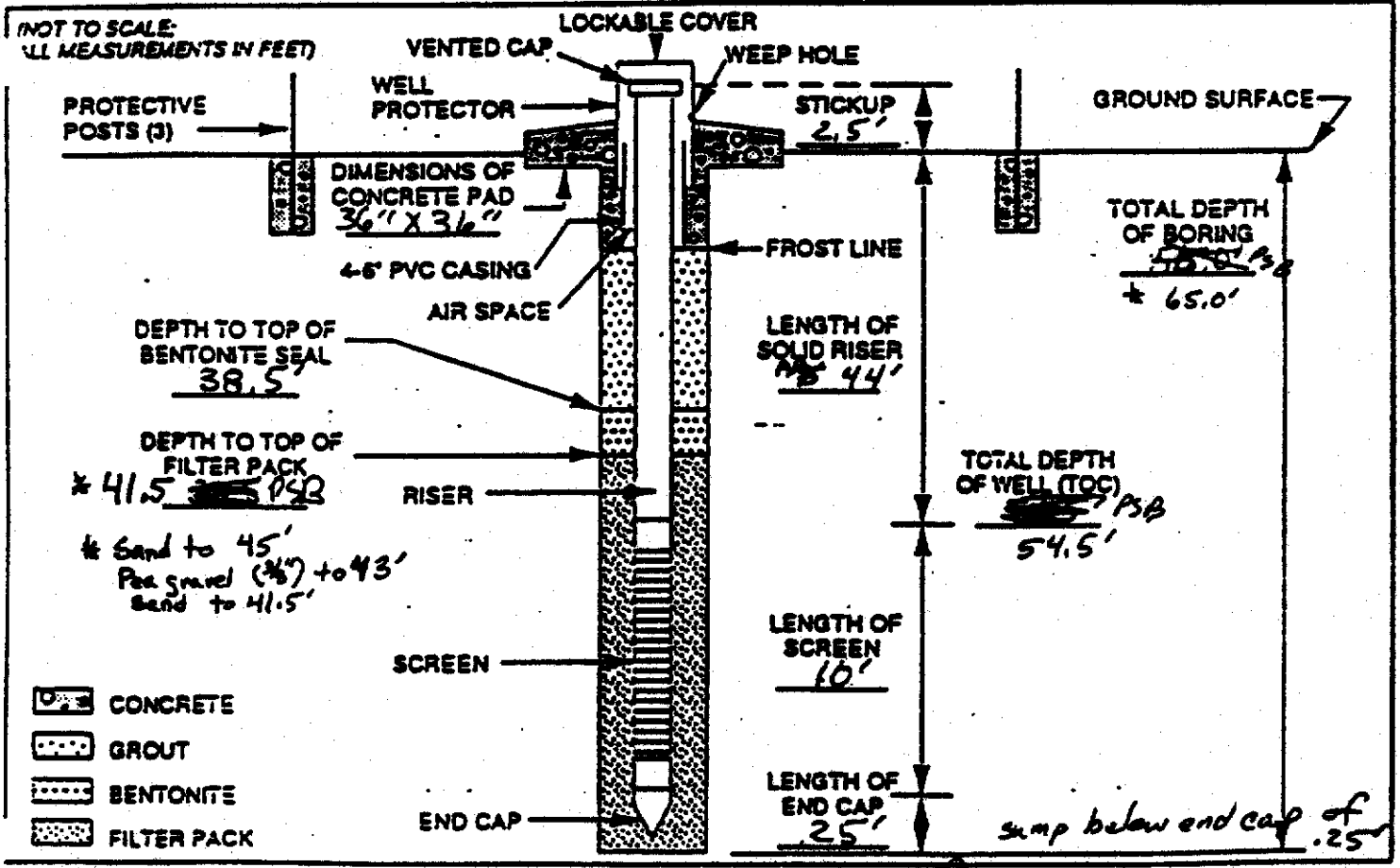
AMOUNT CEMENT USED 9 bags Enviroplug grout (50 lb e

AMOUNT SAND USED 152 bags (50 lbs) (to 45') 75 bags Pea gravel (50 lbs) to 43', + 4 bags sand (50 lbs) to 41.5'

STATIC WATER LEVEL (> 24 hrs. after dev.) _____

MEASURED ON (Date/Time) _____

REMARKS Depth of well to top of stickup 57' (screen set from 54'-44'



QA / QC | DRILLER: Chuck Caltry INSPECTOR: Penny S Brockman

DISCREPANCIES: _____ CHECKED BY: _____ DATE: _____

* Bentonite pellets from 65.0' to 54.5'

GROUT: Enviroplug chips to 30' - remainder grout made of Enviroplug grout to 9' bgs

PROJECT NAME Weldon Spring Well Installation PROJECT NO. _____

WELL NO. MWD107 WELL LOCATION East of MWS107

DATE 4-6-95/ TIME 1600

GROUND SURFACE ELEVATION _____

TOP OF SCREEN ELEVATION _____

REFERENCE POINT ELEVATION _____

TYPE FILTER PACK Silica GRADATION 30-50

FILTER PACK MANUFACTURER Morie Co.

SCREEN MATERIAL MANUFACTURER (HSSC) Howard Smith Screen Co.

SCREEN DIAMETER 2" SLOT SIZE .010"

RISER MATERIAL sch 40 PVC

MANUFACTURER Manaflex

RISER DIAMETER 2"

DRILLING TECHNIQUE (above casing) Hollow Stem Augering

AUGER/BIT SIZE AND TYPE 6.25" HSA

DRILLING TECHNIQUE (below casing) Water Rotary

AUGER/BIT SIZE AND TYPE ~~4"~~ NX core barrel-diamond bit

REMARKS Air Rotary Drilling was used to ream boring to broaden diameter to 6"

BENTONITE TYPE Peltonite (pellets)

MANUFACTURER Roctest

CEMENT TYPE Enviroplug grout (bentonite)

MANUFACTURER Enviroplug (Wyo-Ben Inc.)

BOREHOLE DIAMETER 6"

~~LAW ENVIRONMENTAL INC.~~ IT Corp.

FIELD REPRESENTATIVE Penny S Brockman

DRILLING CONTRACTOR United Geosciences

AMOUNT BENTONITE USED 15-50# bags + 5-50# bags + 2-50# bags

AMOUNT CEMENT USED _____

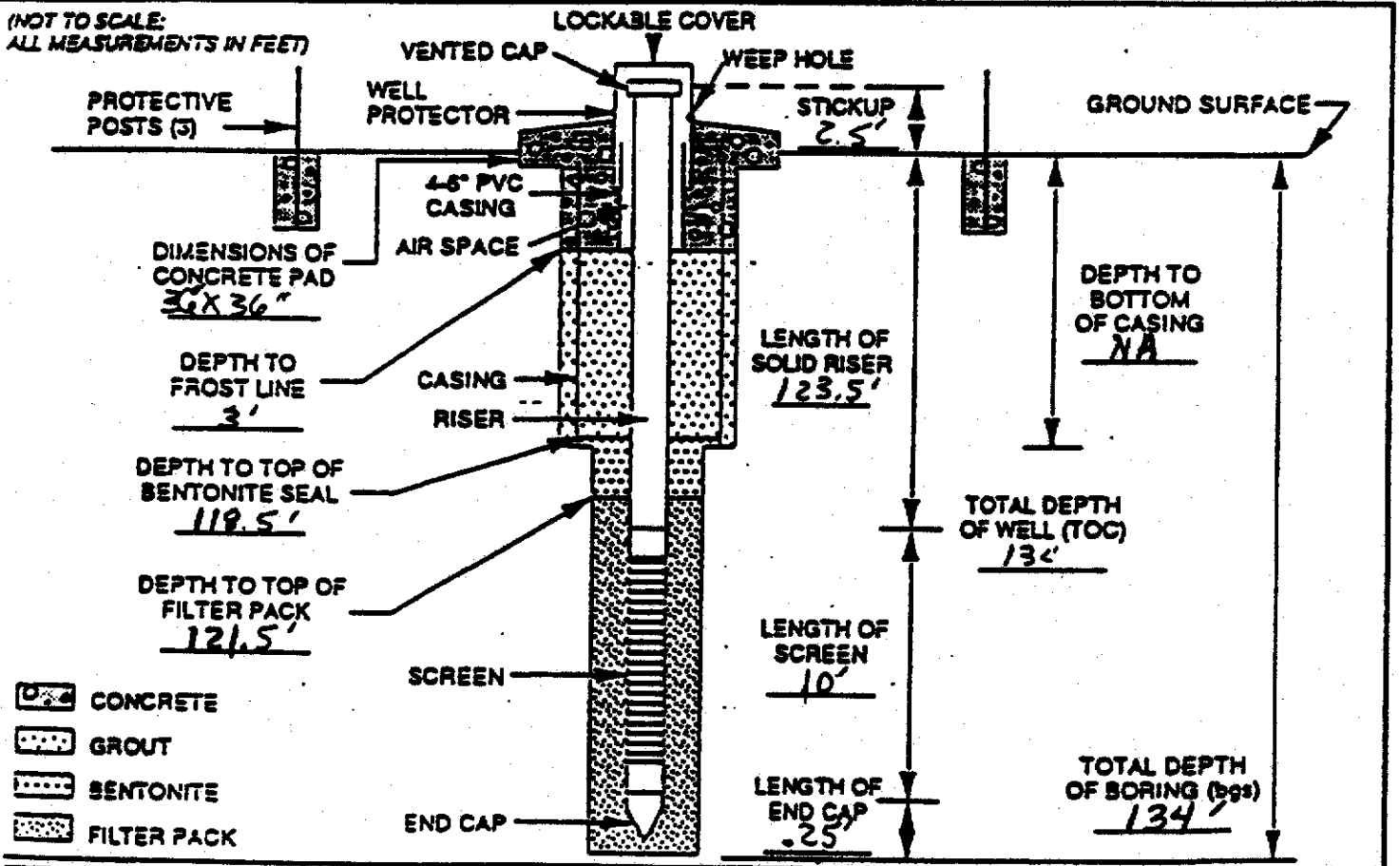
AMOUNT SAND USED 4-50lb bags

STATIC WATER LEVEL (> 24 hrs. after dev.) _____

MEASURED ON (Date/Time) _____

TYPE/SIZE OF CASING _____

(NOT TO SCALE: ALL MEASUREMENTS IN FEET)



QA/QC

DRILLER: Chuck Cattey INSPECTOR: Penny S Brockman

DISCREPANCIES: _____ CHECKED BY: _____ DATE: _____

Note: Below end cap - set .25' of filter pack for sump

PROJECT NAME Weldon Spring Well Installation PROJECT NO. _____

WELL NO. MWS 112 WELL LOCATION 15' - E of original USGS 7

DATE 4-12-95 TIME _____

GROUND SURFACE ELEVATION _____

TOP OF SCREEN ELEVATION _____

REFERENCE POINT ELEVATION _____

TYPE FILTER PACK silica GRADATION 30-50

FILTER PACK MANUFACTURER Moxie CO

SCREEN MATERIAL stainless steel

MANUFACTURER [redacted] HSSC

SCREEN DIAMETER 2" SLOT SIZE 010"

RISER MATERIAL sch 40 PVC

MANUFACTURER Menaflex

RISER DIAMETER 2"

DRILLING TECHNIQUE 3.25 HSA / Air Rotary

AUGER/BIT SIZE AND TYPE 6" Air hammer

BENTONITE TYPE [redacted] pellets (3/8")

MANUFACTURER Roctect

CEMENT TYPE Envirosplug

MANUFACTURER Wyo-Ben, Inc.

BOREHOLE DIAMETER 6"

LAW ENVIRONMENTAL INC. FIELD REPRESENTATIVE Penny S Brackman

DRILLING CONTRACTOR United Geosciences

AMOUNT BENTONITE USED 8 bucket (50# ea)

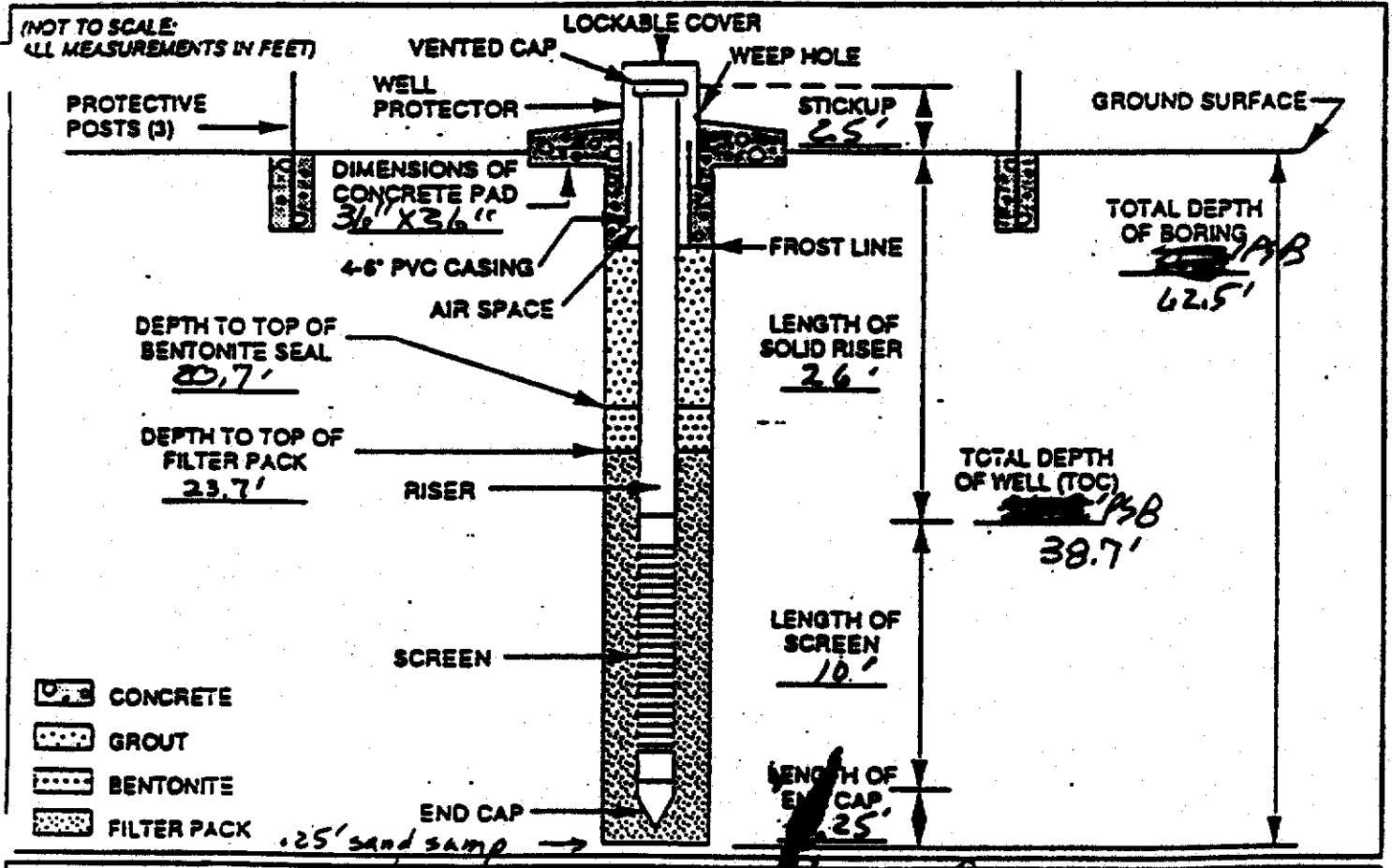
AMOUNT CEMENT USED 6 bags Envirosplug

AMOUNT SAND USED [redacted] 3.8-50# bags

STATIC WATER LEVEL (> 24 hrs. after dev.) _____

MEASURED ON (Date/Time) _____

REMARKS 2 bkts → grouted up to 36.3' for bottom of well; screen interval 25.7'-35.7'



QA / QC

DRILLER: Chuck Coffey INSPECTOR: Penny S Brackman

DISCREPANCIES: _____ CHECKED BY: _____ DATE: _____

PROJECT NAME Weldon Spring Well Installation PROJECT NO. _____

WELL NO. MW D 112 WELL LOCATION original location of USGS 7

DATE 4-12-95 TIME _____

GROUND SURFACE ELEVATION _____

TOP OF SCREEN ELEVATION _____

REFERENCE POINT ELEVATION _____

TYPE FILTER PACK silica GRADATION 30-50

FILTER PACK MANUFACTURER Morie Co

SCREEN MATERIAL MANUFACTURER HSSC

SCREEN DIAMETER 2" SLOT SIZE .010"

RISER MATERIAL Sch 40 PVC

MANUFACTURER Monoflex

RISER DIAMETER 2"

DRILLING TECHNIQUE (~~above casing~~) 3.25 HSA / Air Rotary

AUGER/BIT SIZE AND TYPE 6" Air Hammer / NX rock

DRILLING TECHNIQUE (~~below casing~~) _____

AUGER/BIT SIZE AND TYPE _____

BENTONITE TYPE pellets (3/8")

MANUFACTURER Reactest

CEMENT TYPE Enviroplug

MANUFACTURER Wyo Ben

BOREHOLE DIAMETER 6"

LAW ENVIRONMENTAL INC. FIELD REPRESENTATIVE Penny S Brackman

DRILLING CONTRACTOR United Geosciences

AMOUNT BENTONITE USED 1 bkt pellets

AMOUNT CEMENT USED 10 bags Enviroplug

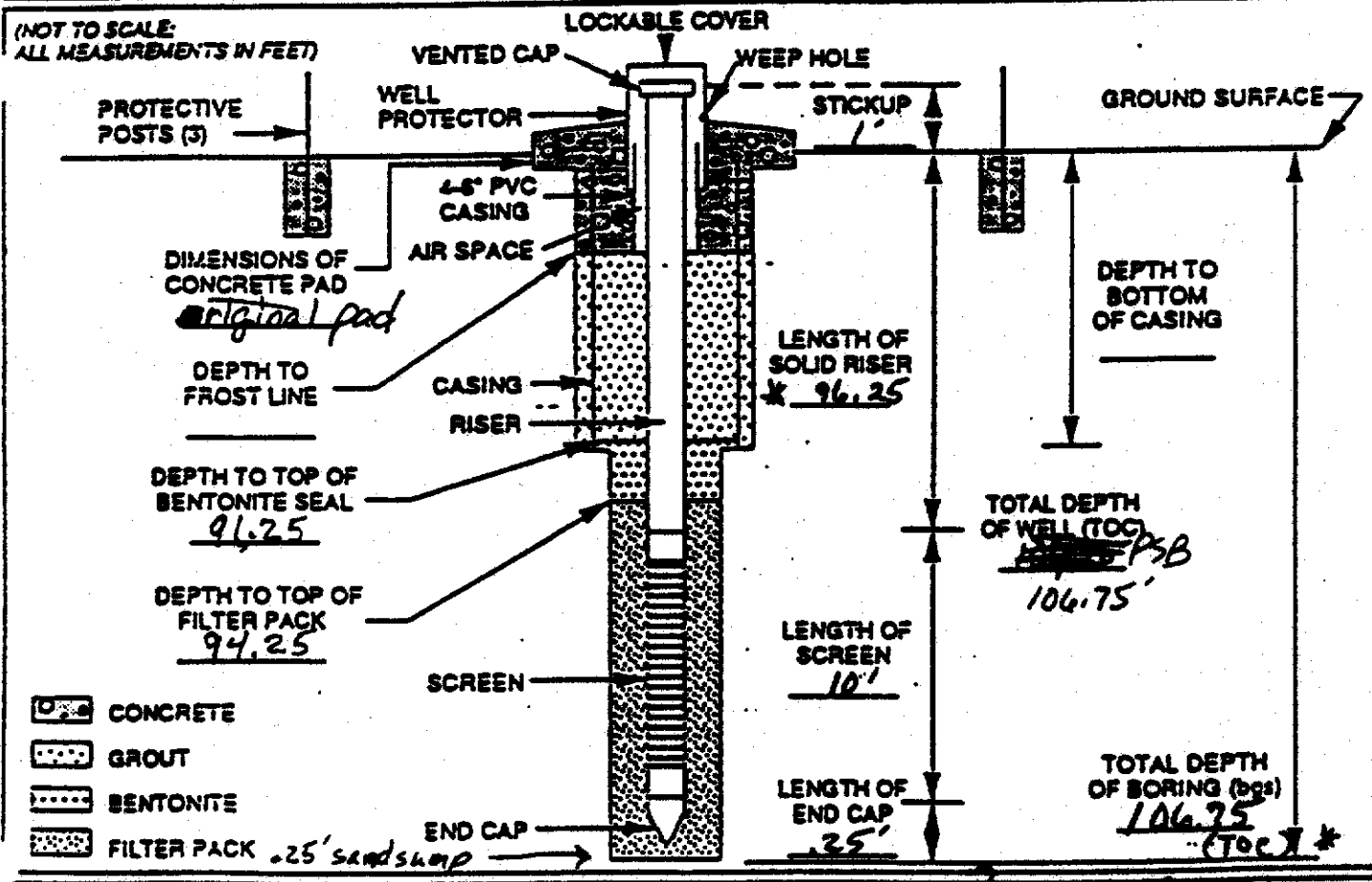
AMOUNT SAND USED 4.2 bags (50#ea)

STATIC WATER LEVEL (> 24 hrs. after dev.) _____

MEASURED ON (Date/Time) _____

TYPE/SIZE OF CASING _____

REMARKS USGS 7 retrofitted to deep well (2" dia) MW D112 Scrn interval 106.25-96.25



QA / QC | DRILLER: Chuck Caltry INSPECTOR: Penny J Brackman

DISCREPANCIES: _____ CHECKED BY: _____ DATE: _____

* TOP OF EXISTING CASING FOR USGS 7

SECTION 3:

PACKER TEST RESULTS

MORRISON-KNUDSEN ENGINEERS, INC. · **PRESSURE TEST RESULTS (FIELD)** TEST # 1

Project: USSRAP Groundwater Ou-RI	Job Number: 3840	Test Section: 27.0 to 37.6	Bore Hole: MW-402
Test Equipment Identification: Tam International Packer w/ 3/4" pipe; Sensus Water Meter; Moino Centrifugal Pump	BORE HOLE Orientation: Vertical	Size: 3 inch	Test By: P. Patchin Date: 4/27/95
Packers: On Casing / Single/Double / Hydraulic/Inflatable — 2 ft rubber	Groundwater Depth: 48.2 Ft.	Gauge Height Above Ground: 1.9 Ft.	Gravity Head: 34.2 Ft.

TEST 1-1 Inflow pressure (Hp) 5 psi x 2.31 = 11.55 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1190 .0	1211. 4	1230 .5	1250 .9	1272 .8	1294 .7	1316 .3	1338 .2	1359 .9	1380 .9		21.21 GPM / CFM
Take Per Min.		21.4	19.1	20.4	21.9	21.9	21.6	21.9	21.7	21.0		CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

33.45 ~~45.75~~ FT. = 34.2 FT. + 11.55 FT. − 12.3 FT.

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln \frac{L\ (ft)}{r\ (ft)} = \frac{21.21}{\cancel{45.75}\ 33.45 \times 10.6} \times .011 \ln \frac{10.6}{.125} = K, CM/SEC$$

(.059819) (.045824) ~~2.14 x 10⁻³~~ → 2.9 X 10⁻³

TEST 1-2 Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1420 .0	1445 .2	469 .5	493 .4	516 .9	540 .7	564 .7	587 .9				23.98 GPM / CFM
Take Per Min.		25.2	24.3	23.9	23.5	23.8	23.6	23.6				

41.7 H_T ~~57.3~~ FT. = H_G 34.2 FT. + H_p 23.1 FT. − H_L 15.6 FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{23.98}{\cancel{57.3}\ 41.7 \times 10.6} \times .011 \ln \frac{10.6}{.125} = K, CM/SEC$$

(.059181) (.054250) ~~1.92 x 10⁻³~~ → 2.7 X 10⁻³

TEST 1-3 Inflow pressure (Hp) 15 psi x 2.31 = 34.65 feet (.047643)

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1610 .0	1637 .1	663 .2	689 .4	Hose Full of	1730 .0	756 .3	782 .5	8[illegible]	[illegible] water		26.23 GPM / CFM
Take Per Min.		27.1	25.9	26.2	—	—	26.3	26.2	25.7			

↑ New start

50.35 H_T ~~67.65~~ FT. = H_G 34.2 FT. − H_p 34.65 FT. − H_L 18.5 FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{26.23}{\cancel{67.65}\ 50.35 \times 10.6} \times .011 \ln \frac{10.6}{.125} = K, CM/SEC$$

(.052103) (.045643) ~~1.76 x 10⁻³~~ → 2.4 X 10⁻³

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Test # 3

Project: WSSRAD Groundwater Ou - RI	Job Number: 3840 WP-304	Test Section: 48.5 to 59.0	Bore Hole: MW1 Det 4
Test Equipment Identification: See Page 1	BORE HOLE Orientation: vertical	Size: 3 in.	Test By: P. Patchin / B. Cato-Johnson Date: 4/28/95
Packers: On Casing — Single/Double — Hydraulic/Inflatable — 2 ft rubber	Groundwater Depth: 48.2 Ft.	Gauge Height Above Ground: 1.9 Ft.	Gravity Head: 50.1 Ft.

TEST # 3-4 Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft	3224 .0	3224 .0	3224 .9	3225 .1	3226 .0	3226 .3	3226 .3	3227 .4	3228 .0	3228 .5	3229 .1	.51 GPM
Take Per Min.		0.0	0.3	0.8	0.3	0.3	0.3	0.6	0.6	0.5	0.6	CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

73.2 FT. = 50.1 FT. + 23.1 FT. − negligible* FT.

14.15

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln \frac{L\ (ft)}{r\ (ft)} = \frac{.51}{73.2 \times 10.5} \times .011 \ln \frac{10.5}{.125} = 3.2 \times 10^{-}$$

(.000663) (.048739)

TEST 2 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\quad}{\quad} \times \quad = \quad$$ K, CM/SEC

TEST 3 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\quad}{\quad} \times \quad = \quad$$ K, CM/SEC

* Negligible = < 1 ft of total head = 0.

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST # 3

Project	Job Number	Test Section	Bore Hole
WSSRAP Groundwater OU-RI	3840 WP-304	48.5 to 59.0	MW-4024

Test Equipment Identification	BORE HOLE Orientation	BORE HOLE Size	Test By / Date
TAM International Packer w/ 3/4" pipe, Sensus water meter, Moino Centrifugal Pump	Vertical	3"	P. Patchin / B. Cato-Johnson 4/28/95

Packers	Groundwater Depth	Gauge Height Above Ground	Gravity Head
On Casing — 2 ft rubber; Single/Double; Hydraulic/Inflatable	48.2 FL	1.9 FL	50.1 ✓ FL

3100

TEST # 3-1

Inflow pressure (Hp) 10 psi x 2.31 = 23.1 ✓ feet

TIME, MIN.	0	-1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	3168 .0	3168 .7	169 .8	170 .3	171 .0	172 .2	173 .2	173 .6	174 .6	175 .3	176 .1	.81 ✓ GPM
Take Per Min.		.7	1.1	.5	.7	1.2	1.0	.4	1.0	.7	.8	CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (H_p) − Head Losses (H_L)

73.2 ✓ FT. = 50.1 FT. + 23.1 FT. − negligible* FT.

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln \frac{L\ (ft)}{r\ (ft)} = \frac{.81}{73.2 \times 10.5} \times .011 \ln \frac{10.5}{.125} = 5.1 \times 10^{-5}$$

(.001053) (.048731)

TEST # 3-2

Inflow pressure (Hp) 20 psi x 2.31 = 46.2 ✓ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	3190 .0	3192 .2	193 .7	195 .3	196 .5	197 .9	198 .7	200 .2	201 .3			~~1.30~~ GPM 1.41 CFM
Take Per Min.		2.2	1.5	1.6	1.2	1.3	1.1	1.3	1.1			

outlier

H_T 96.3 FT. = H_G 50.1 FT. + H_p 46.2 FT. − H_L negligible* FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\text{~~1.3~~ } 1.41}{96.3 \times 10.5} \times .011 \ln \frac{10.5}{.125} = \text{~~}6.2 \times 10^{-5}\text{~~ } 6.8 \times 10^{-5}$$

(.001394) ~~(.001285)~~

TEST 3-3

Inflow pressure (Hp) 30 psi x 2.31 = 69.3 ✓ feet (.048739)

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	3217. .0	3220. .2	3222. .9	3225. .1	3227. .0	3229. .3	3230. .1	3232. .5	3233. .9	3235. .4	3236. .1	~~1.75~~ ✓ GPM 1.99 CFM
Take Per Min.		3.2	2.7	2.2	2.1	1.3	1.9	1.6	1.6	1.5	1.3	

H_T 119.4 FT. = H_G 50.1 FT. + H_p 69.3 FT. − H_L negligible* FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\text{~~1.75~~ } 1.99}{119.4 \times 10.5} \times .011 \ln \frac{10.5}{.125} = \text{~~}7.2 \times 10^{-5}\text{~~ } 7.7 \times 10^{-5}$$

(.001567) ~~(.001395)~~ (.048739)

* Negligible = < 1 ft head loss

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Test 22

Project	Job Number	Test Section	Bore Hole
WSSRAP Groundwater OU-RI	3840 WP-304	37.0 to 49.0	MW-4024

Test Equipment Identification	BORE HOLE Orientation	BORE HOLE Size	Test By / Date
See first Page	Vertical	3"	P. Patchan 4/28/95

Packers (On Casing / Single/Double / Hydraulic/Inflatable)	Groundwater Depth	Gauge Height Above Ground	Gravity Head
	48.2 FT.	1.9 FT.	44.9 F

TEST # 2-4 Inflow pressure (Hp) 10 psi x 2.31 = 23.1 ✓ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	2910 .0	930 .4	950 .0	969 .1	988 .0	3006 .7	3025 .2	3043 .5	061 .9	080 .0	098 .0	18.8 GPM
												CFM
Take Per Min.	20.4	19.6	19.1	18.9	18.7	18.5	17.3	18.4	18.1	18.0		CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~66.0~~ 56.2 FT. = 44.9 FT. + 23.1 FT. − 11.8 FT

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{18.8}{\cancel{66.0} \times 12} \times \frac{.011 \ln \frac{12}{.125}}{(1.027876)\ (.023039)} = \text{K, CM/SEC} \quad \cancel{1.16 \times 10^{-3}}\ 1.4 \times 10^{-3}$$

TEST 2 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet (.050207)

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
												CFM
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\quad \times \quad} \times \quad = \text{K, CM/SEC}$$

TEST 3 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
												CFM
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\quad \times \quad} \times \quad = \text{K, CM/SEC}$$

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST E-2

Project: WSSRAP Groundwater OU-RI	Job Number: 3840 WP-304	Test Section: 37.0 to 49.0	Bore Hole: MW-4024
Test Equipment Identification: TAM International Packer w/ 3½" Pipe; Sensus water meter; Moino Centrifugal Pump.	BORE HOLE Orientation: Vertical	Size: 3 inch	Test By: P. Patchin Date: 4/27-4/28/95
Packers: On Casing, (Single)/Double, Hydraulic/Inflatable	Groundwater Depth: 48.2 Ft.	Gauge Height Above Ground: 1.9 Ft.	Gravity Head: 44.9 ~ F

2116

TEST # 2-1

Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	2190.0	2207.1	223.6	240.5	256.6	272.8	288.6	304.3	319.9			16.24 GPM
Take Per Min.		17.1	16.5	16.9	16.1	16.2	15.8	15.7	15.6			CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~68.0~~ (59.1) FT. = 44.9 FT. + 23.1 FT. − 8.9 FT

$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{16.24}{\sim\!68.0\sim \times 12.0} \times \frac{.011 Ln \frac{12}{.125}}{} = K, CM/SEC$

(59.1) (.022899) (~~.019402~~) (.050207)

$\frac{9.99 \times 10^{-4}}{1.2 \times 10^{-3}}$

TEST 2-2

Inflow pressure (Hp) 20 psi x 2.31 = 46.2 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	340.0	360.4	380.4	400.2	420.1	439.6	458.5	477.7	496.8			19.6 GPM
Take Per Min.		20.4	20.0	19.8	19.9	19.5	18.9	19.2	19.1			CFM

H_T ~~71.1~~ (71.7) FT. = H_G 44.9 FT. + Hp 46.2 FT. − H_L 12.8 FT.

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{19.6}{\sim\!71.1\sim \times 12} \times \frac{.011 Ln \frac{12}{.125}}{} = K, CM/SEC$

(.022780) (~~.019724~~) (71.7) (.050207)

$\frac{9.00 \times 10^{-4}}{1.1 \times 10^{-3}}$

4/27/95

4/28/95

TEST # 2-3

Inflow pressure (Hp) 25 psi x 2.31 = 57.75 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	2660.0	2685.6	711.3	737.0	762.9	788.1	814.6	840.0				25.71 GPM
Take Per Min.		25.6	25.7	25.7	25.9	26.0	25.7	25.4				CFM

H_T ~~102.6~~ (81.25) FT. = H_G 44.9 FT. + Hp 57.75 FT. − H_L 21.4 FT.

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{25.71}{\sim\!102.6\sim \times 12} \times \frac{.011 Ln \frac{12}{.125}}{} = K, CM/SEC$

(81.25) (.026369) (~~.025677~~) (.050207)

$\frac{1.3 \times 10^{-3}}{}$

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST # 1 cs

Project: WSSRAP Groundwater OU-RI	Job Number: 3840	Test Section: 27.0 to 37.6	Bore Hole: MW-4024
Test Equipment Identification: See Page 1	BORE HOLE Orientation: Vertical Size: 3"	Test By: P. Patchin Date: 4/27/95	
Packers On Casing — 2 ft rubber (Single/Double, Hydraulic/Inflatable)	Groundwater Depth: 48.2 Ft.	Gauge Height Above Ground: 1.9 Ft.	Gravity Head: 34.2 Ft

TEST # 1-4 Inflow pressure (H_P) 5 psi × 2.31 = 11.55 ✓ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1910 .0	930 .0	948 .8	987 .5	986 .5	2005 .5	2024 .2	2043 .6	2063 .0	2082 .0	2001 .1	19.11 GPM
Take Per Min.	20.0	18.8	18.7	19.0	19.0	18.7	19.4	19.4	19.0	19.1		CFM

CFM × 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (H_P) − Head Losses (H_L)

35.65 → ~~45.75~~ FT. = 34.2 FT. + 11.55 FT. − 10.1 FT

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{19.11}{\text{~~45.75~~} \times 10.6} \times .011 \ln \frac{10.6}{.125} = \text{K, CM/SEC}$$

(.050570) (.039406) 35.65 (.048543) ~~1.42 × 10⁻~~ 2.5 × 10

TEST 2 Inflow pressure (H_P) _____ psi × 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + H_P _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\times} \times \quad = \text{K, CM/SEC}$$

TEST 3 Inflow pressure (H_P) _____ psi × 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + H_P _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\times} \times \quad = \text{K, CM/SEC}$$

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST # 1.

Project: WSSRAF 6.N OU-RI Fieldwork	Job Number: WP-304	Test Section: 32.0' to 43.7'	Bore Hole: MW-402
Test Equipment Identification: TAM International Packer, Sensus Water Meter, Main Centrifical Pump	BORE HOLE Orientation: Vertical	Size: 3" (.25')	Test By: P. Patchin Date: 4/13/95
Packers: On Casing — Single/Double — Hydraulic/Inflatable — 2' rubber	Groundwater Depth: 41.8 Ft.	Gauge Height Above Ground: 4.3 Ft.	Gravity Head: 42.2 F

~~TEST 1~~ Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

248.5 / 10.8

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	102.0	119.6	136.4	151.8	166.2	178.9	191.4	203.7	215.6	227.1	237.7	12.50 GP / 12.77 CF
Take Per Min.		19.6	17.0	15.2	14.4	12.7	12.5	12.3	11.9	11.5	10.6	CFM x 7.48 = GP

Do not include these tests. Pressure gauge malfunction.

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) - Head Losses (H_L)

averaged these three values

65.3 FT. = 42.2 FT. + 23.1 FT. - F

$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{12.5}{65.3 \times 11.7} \times 0.011 \ln \frac{11.7 ft}{.125} = 8.17 \times 10^{-}$ K, CM/SEC

(.0636)

~~TEST 2~~ Inflow pressure (Hp) 20 psi x 2.31 = 46.2 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	390.6	56.2	70.7	84.9	98.9	411.6	24.8	36.9	47.4	57.7	67.8	13.30 GP / 12.75 CF
Take Per Min.		16.5	14.5	14.2	13.5	13.2	13.2	12.1	10.5	10.3	10.1	

Average these values.

H_T 88.4 FT. = H_G 42.2 FT. + Hp 46.2 FT. - H_L F

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{13.3}{88.4 \times 11.7} \times .011 \ln \frac{11.7}{.125} = 6.42 \times 10^{-4}$ K, CM/SEC

(.012959)

(.0429)

New pressure gauge

TEST 3 1-1 Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	550.0	561.3	70.9	78.7	86.2	93.7	600.7	607.7	614.3	620.2	625.6	7.33 GPM / 7.42 CFM
Take Per Min.		11.3	9.6	8.1	7.3	7.5	7.2	6.5	6.6	5.9	5.9	

Average these values. FDP 5/1/95

H_T ~~65.3~~ 63.4 FT. = H_G 42.2 FT. + Hp 23.1 FT. - H_L 1.9 FT

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{7.42}{63.4 \times 11.7} \times .011 \ln \frac{11.7}{.125} = 5.0 \times 10^{-4}$ K, CM/SEC

~~(.0376)~~ (.010203)

PAGE

MORRISON-KNUDSEN ENGINEERS, INC. · **PRESSURE TEST RESULTS (FIELD)** 3-2 Test #

Project: WSSRAP GWOU – RI Fieldwork	Job Number: WP-304	Test Section: 32.0 to 43.7	Bore Hole: MW...

Test Equipment Identification	BORE HOLE Orientation:	BORE HOLE Size:	Test By: / Date:
Tam Int'l Packer Sensus Water Meter Moino Centrifugal Pump	vertical	3" (.25')	Test By: F. Fetchin Date: 4/13/95

Packers: On Casing / (Single) Double / Hydraulic/(Inflatable) — 2' rubber	Groundwater Depth: 41.8 Ft.	Gauge Height Above Ground: 4.3 Ft.	Gravity Head: 42.2

TEST 1-2 Inflow pressure (H_P) 20 psi × 2.31 = 46.2 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	680.0	692.9	704.6	715.2	725.1	734.4	743.3	752.1	759.7	767.0	774.6	~~7.50~~ (9.46
Take Per Min.		12.9	11.7	10.6	9.9	9.3	8.9	8.8	7.6	7.3	7.6	CFM × 7.48 – ~~Averaged~~

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (H_P) – Head Losses (H_L)

~~88.4~~ 85.5 FT.	=	42.2 FT.	+	46.2 FT.	–	2.9

$$K = \frac{Q\,(gpm)}{H_T\,(ft) \times L\,(ft)} \times .011 \ln \frac{L\,(ft)}{r\,(ft)} =$$ $\frac{9.46\ \text{(~~7.50~~)}}{\text{~~88.4~~ (85.5)} \times 11.7}$ × $.011 \ln \frac{11.7'}{.125'}$ = K, CM/SEC ~~3.62 × 10~~ 4.7 × 10

(~~.00725~~) (.009457) (.0499293)

TEST 1-3 Inflow pressure (H_P) 10 psi × 2.31 = 23.1 feet

Held back pressure

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	810.0	815.3	819.8	824.3	828.7	833.1	837.5	841.9	846.3			~~4.46~~ (4.56
Take Per Min.		5.3	4.5	4.5	4.4	4.4	4.6	4.4	4.4			~~Average~~

H_T	65.3 FT.	= H_G	42.2 FT.	+ H_P	23.1 FT.	– H_L	negligible*

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} =$$ $\frac{\text{~~4.46~~ } 4.56}{69.2 \times 11.7}$ × $.011 \ln \frac{11.7'}{.125'}$ = K, CM/SEC ~~2.92 × 10~~ ~~2.75~~ 2.8

15:05 (~~.00577~~) (.005632) (.0499293)

(NO TEST)

TEST 3 Inflow pressure (H_P) ____ psi × 2.31 = ____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	880.0	[illegible]	[illegible]	937.0	960.6	982.1						G / C
Take Per Min.		[illegible]	19.7	20.7	21.6	21.5						

H_T	FT.	= H_G	FT.	+ H_P	FT.	– H_L	F

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} =$$ ——— × ——— × ——— = K, CM/SEC

[illegible]

* [illegible] = < [illegible] head loss

MORRISON-KNUDSEN ENGINEERS, INC. · **PRESSURE TEST RESULTS (FIELD)** — TEST #2

Project: WSSRAP GWOU monitoring wells	Job Number: WP-304	Test Section: 43.0 to 53.7	Bore Hole: MW-4025
Test Equipment Identification: TAM International Packer	BORE HOLE Orientation: vertical	Size: 3" (.25')	Test By: P. Patchin; Date: 4/14/95
Packers: On Casing ~~Single~~/Double ← 2ft rubber; Hydraulic/Inflatable	Groundwater Depth: 41.8 Ft.	Gauge Height Above Ground: 1.6 Ft.	Gravity Head: 113.4 Ft.

TEST # 2-1 Inflow pressure (Hp) 10 psi x 2.31 = 23.1 ✓ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1002 .0	1002 .7	1003 .1	3 .6	1004 .1	004 .5	005 .0	005 .5	5 .9			~~.48~~ .49 GPM; .47 CFM
Take Per Min.		.7	.4	.5	.5	.4	.5	.5	.4			CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

66.5 ✓ FT. = 43.4 FT. + 23.1 FT. − negligible* FT.

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln \frac{L\ (ft)}{r\ (ft)} = \frac{\text{~~.48~~ .49}}{66.5 \times 10.7} \times .011 \ln \frac{10.7}{.125} = \text{K, CM/SEC } \text{~~3.30×10^{-5}~~ } 3.4 \times 10^{-5}$$

(.0074 = .16)

TEST # 2-2 Inflow pressure (Hp) 20 psi x 2.31 = 46.2 ✓ feet (.048=46.2)

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1012 .0	1014 .0	015 .8	017 .7	019 .4	021 .2	022 .9	024 .6				1.80 ✓ GPM; CFM
Take Per Min.		2.0	1.8	1.9	1.7	1.8	1.7	1.7				

H_T 89.6 ✓ FT. = H_G 43.4 FT. + Hp 46.2 FT. − H_L negligible* FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{1.80}{89.6 \times 10.7} \times .011 \ln \frac{10.7}{.125} = \text{K, CM/SEC } 9.2 \times 10^{-5} \checkmark$$

(.0019 ??)

TEST # 2-3 Inflow pressure (Hp) 30 psi x 2.31 = 69.3 ✓ feet (.043=99.3)

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1031 .0	1033 .7	1036 .3	1038 .0	41. 0	43. 3	45.6	47.8				2.30 GPM; (2.4) CFM
Take Per Min.		2.7	2.6	2.3	2.4	2.5	2.3	2.2				

Outliers → Middle → Average all but outliers

H_T 112.7 ✓ FT. = H_G 43.4 FT. + Hp 69.3 FT. − H_L negligible* FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\text{~~2.30~~ 2.4}}{112.7 \times 10.7} \times .011 \ln \frac{10.7}{.125} = \text{K, CM/SEC } \text{~~9.34×10^{-5}~~ } 9.7 \times 10^{-5}$$

(.0021??)

*negligible = < 1 ft head loss

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Test # 2

Project:	Job Number:	Test Section:	Bore Hole:
WSRAP GWOU	WP-304	43.0 to 53.7	MW-402

Test Equipment Identification	BORE HOLE Orientation:	BORE HOLE Size:	Test By:
TAM International Packer	vertical	3" (.25')	P. Patchin
			Date: 4/14/95

Packers	Groundwater Depth:	Gauge Height Above Ground:	Gravity Head:
On Casing ~~Single~~/Double 2' rubber Hydraulic/Inflatable	41.8 Ft	1.6 Ft	43.4

TEST # 2-4 Inflow pressure (Hp) 10 psi x 2.31 = 23.1 ✓ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1049	1049.7	1050 .4	051 .2	52 .0	52 .8						.76 ✓ GP
Take Per Min.		.7	.7	.8	.8	.8						CF

CFM x 7.48 = GP

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (H_P) − Head Losses (H_L)

66.5 ✓ FT. = 43.4 FT. + 23.1 FT. + negligible * FT

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln \frac{L\ (ft)}{r\ (ft)} = \frac{.76}{66.5 \times 10.7} \times .011 \ln \frac{10.7}{.125} = 5.2 \times 10^{-3}$$

(.001068) (.048946)

K, CM/SEC ✓

TEST 2 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GP
Take Per Min.												CF

H_T _____ FT. = H_G _____ FT. + H_P _____ FT. − H_L _____ FT

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\quad}{\quad \times \quad} \times \quad =$$

K, CM/SEC

TEST 3 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GP
Take Per Min.												CF

H_T _____ FT. = H_G _____ FT. − H_P _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\quad}{\quad \times \quad} \times \quad =$$

K, CM/SEC

* need static = < 1 ft head loss

TEST 1

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Page 1 of 2

Project:	Job Number:	Test Section: (Angle Depth)	Bore Hole:
GWOM-RI Fieldwork	WP-385	47.2 to 57.8	AH-200

Test Equipment Identification	BORE HOLE Orientation:	BORE HOLE Size:	Test By:
Bimbar II Inflatable Packer Niagra #0575144 Water-Meter Moino Centrifugal Pump	60° from Horizontal	3.0"	P. Patchin

Packers	Groundwater Depth:	Gauge Height Above Ground:	Gravity Head:
On Casing Single/Double Hydraulic/Inflatable	~~71.7~~ (Angle) 70.7 → 61.2 ~~64.7~~ (Vertical) Ft.	7.5 Ft.	52.5+2.5=5 ~~67.2~~ 55.0 Ft. (vert. inc.)

6/20/95 measurement after weekend sit

TEST 1 Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1410 .0	420 .4	430 .7	440 .7	450 .8	460 .8	470 .8					10.13 GPM / CFM
Take Per Min.		10.4	10.3	10.0	10.1	10.0	10.0					CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

62.5 ~~49.2~~ FT. = ~~67.2~~ 55.0 FT. + 23.1 FT. − 15.6 FT.

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \times \frac{L\ (ft)}{r\ (ft)} = \frac{10.13}{62.5 \times 10.6} \times \frac{10.6}{.125} = K,\ CM/SEC = 7.5 \times 10^{-}$$

(.015291)

TEST 1-2 Inflow pressure (Hp) 20 psi x 2.31 = 46.2 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1510 .0	1522 .3	534 .0	545 .9	557 .5	569 .0	580 .8	592 .8				11.93 GPM / CFM
Take Per Min.		12.3	11.7	11.9	11.6	11.5	11.8	12.0				

H_T ~~113.4~~ 80.3 FT. = H_G ~~67.2~~ 55.0 FT. + H_p 46.2 FT. − H_L 20.9 FT.

$$K = \frac{Q}{H_T \times L} \times .011 \times \frac{L}{r} = \frac{11.93}{113.4 \times 10.6} \times \frac{10.6}{.125} = K,\ CM/SEC = 6.8 \times 10^{-4}$$

(.013598) 80.325

TEST 1-3 Inflow pressure (Hp) 25 psi x 2.31 = 57.8 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1620 .0	632 .8	645 .7	658 .5	671 .0	683 .6	696 .0					12.6 GPM / CFM
Take Per Min.		12.8	12.9	12.8	12.5	12.6	12.4					

88.8 H_T ~~115.75~~ FT. = H_G ~~67.2~~ 55.0 FT. + H_p 57.8 FT. − H_L 24.0 FT.

$$K = \frac{Q}{H_T \times L} \times .011 \times \frac{L}{r} = \frac{12.6}{115.75 \times 10.6} \times \frac{10.6}{.125} = K,\ CM/SEC = 6.6 \times 10^{-}$$

(.012247) (.013449) 88.8 (.048943)

MORRISON-KNUDSEN ENGINEERS, INC. — **PRESSURE TEST RESULTS (FIELD)**

TEST 2

Project: WSSRAP GWOU - RI	Job Number: WP-385	Test Section: 47.2 to 57.8	Bore Hole: AH-200
Test Equipment Identification: Bimbar II Inflatable Packer; Nagra #0875144 Water meter; Moino Centrifugal Pump.	BORE HOLE Orientation: 60° from Horiz. Size: 3"	Test By: P. Patchin; Date: 6/20/95	
Packers: On Casing / (Single/Double) / Hydraulic/(Inflatable) — 70.7 → 74.7 (angle); 61.2 → 64.7 (vert.) ft.	Groundwater Depth:	Gauge Height Above Ground: 2.5' Ft.	Gravity Head: ~~67.2~~ 55.0 Ft (vert.h)

TEST 1-4 Inflow pressure (Hp) 10 psi × 2.31 = 23.1 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1720	728	737	746	755	764	573					8.8 GPM
	.0	.9	.7	.7	.6	.5	.8					CFM
Take Per Min.		8.9	8.8	9.0	8.9	8.9	8.8					.57 CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~78.3~~ (66.1) FT. = ~~67.2~~ (55.0) FT. + 23.1 FT. − 12.0 L FT.

$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{8.8}{\text{~~78.3~~ (66.1)} \times 10.6} \times .011 \ln \frac{10.6}{.125} = K,\ CM/SEC$

~~1.012559~~ ~~7.012602~~ (1.048843)

~~5.1 x 10⁻⁴~~ 6.1 x 10⁻⁴

TEST 2 Inflow pressure (Hp) _____ psi × 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
												CFM
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\quad \times \quad} \times \quad = K,\ CM/SEC$

TEST 3 Inflow pressure (Hp) _____ psi × 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
												CFM
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\quad \times \quad} \times \quad = K,\ CM/SEC$

TEST 2

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Project: WSSRAP Gwou RI Fieldwork	Job Number: WP-385	Test Section: (Angle Depth) 57.9 to 67.7	Bore Hole: AH-2003
Test Equipment Identification: -Bimban II Inflatable Packer -Niagra #0875 1144 water meter -Moino Centrifugal Pump	BORE HOLE Orientation: 60° from horizontal; Size: 3.0"	Test By: P. Patchin; Date: 6/20/95	
Packers: On Casing; Single/Double; Hydraulic/Inflatable	Groundwater Depth: ~~70.7~~ ~~74.5 (Angle)~~ 61.2 ~~64.5 Depth~~ FL	Gauge Height Above Ground: 2.5 FL	Gravity Head: 54.4 + 2.5 = 56.9 FL

TEST # 2-1 Inflow pressure (H_p) 20 psi x 2.31 = ~~46.2~~ feet — Possible Packer leakage

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1865 .0	85 .2	85 .4	85 .6	5 .78	86 .0	86 .15	86 .37	6 .60			0.20 GPM
Take Per Min.		.2	.2	.2	.18	.22	.15	.22	.23			CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (H_p) − Head Losses (H_L)

~~111.5~~ (103.1) FT. = ~~65.3~~ (56.9) FT. + 46.2 FT. + negligible* FT.

$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{0.20}{\sim\!\sim 111.5 \sim\!\sim \times 9.8\ (103.1)} \times .011 \ln \frac{9.8}{.125} = K, CM/SEC\ 9.5 \times 10^{-6}$ (.000197) (.047980)

TEST 2-2 Inflow pressure (H_p) 30 psi x 2.31 = ~~69.3~~ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	1895 .5	95 .7	95 .9	95 .1	96 .29	6 .5	6 .78	6 .86	7 .03	7 .25	7 .44	0.18 GPM
Take Per Min.		.2	.2	.2	.19	.21	.18	.08	.17	.22	.19	CFM

H_T ~~134.6~~ (126.2) FT. = H_G ~~65.3~~ (56.9) FT. + H_p 69.3 FT. − H_L negligible* FT.

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{0.18}{\sim\!\sim 134.6 \sim\!\sim \times 9.8\ (126.2)} \times .011 \ln \frac{9.8}{.125} = K, CM/SEC\ 7.0 \times 10^{-6}$ (.000146) (.047980)

Pressure Mode

TEST # 2-3 Inflow pressure (H_p) 40 psi x 2.31 = ~~92.4~~ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	908 .2	8 .42	08 .70	8 .92	9 .15	9 .38	9 .61	9 .83				0.23 GPM
Take Per Min.		.22	.28	.22	.23	.23	.23	.22				CFM

H_T ~~151.4~~ (149.3) FT. = H_G ~~65.3~~ (56.9) FT. + H_p 92.4 FT. − H_L negligible* FT.

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{0.23}{\sim\!\sim 151.4 \sim\!\sim \times 9.8\ (149.3)} \times .011 \ln \frac{9.8}{.125} = K, CM/SEC\ 7.6 \times 10^{-6}$ (.000158) (.047980)

*negligible = < 1 ft head loss

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Page 1 of 2

Project	Job Number	Test Section: (Angle Depth)	Bore Hole:
WSSRAP GW OU RI	WP-385	57.9 to 67.7	AH 200

Test Equipment Identification	BORE HOLE Orientation	BORE HOLE Size	Test By / Date
See previous sheet	60° from Horiz.	3.0 inch	Test By: P. Perkins Date: 6/20/95

Packers (On Casing; Single/Double; Hydraulic/Inflatable)	Groundwater Depth	Gauge Height Above Ground	Gravity Head
	70.7 (angle) ~~74.5~~ 61.2 (vert). FL	2.5 FL	~~65.3~~ 56.9 (vert. head) =

TEST # 2-4 Inflow pressure (Hp) 20 psi x 2.31 = ~~46.2~~ feet ← almost no take @

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	910 .3	10 .43	10 .56	10 .70	10 .87	11 .00	11 .12	11 .27	11 .40			0.14 GPM / CFM
Take Per Min.		.13	.13	.14	.17	.13	.12	.15	.13			CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~44.5~~ (103.1) FT. = ~~65.3~~ 56.9 FT. + 46.2 FT. ± negligible* FT

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{0.14}{\sim\!44.5 \times 9.8} \times .011 \ln. \frac{9.8}{.125} = 6.6 \times 10^{-}$$

(.000138) (103.1) (.047980)

TEST 2 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM / CFM
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\times} \times \quad = \text{K, CM/SEC}$$

TEST 3 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM / CFM
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\times} \times \quad = \text{K, CM/SEC}$$

*negligible = < 1 ft head loss

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Project: WSSRAP 6WOU-RE Fieldwork	Job Number: WP-385	Test Section: (Angle Depth) 67.0 to 77.7	Bore Hole: AH 2003
Test Equipment Identification: -Rinehart 11 T. Inflatable Packer -Niagra #C875/1144 water meter -Mono Centrifugal Pump	BORE HOLE Orientation: 60° from Horiz. Size: 3 inch	Test By: P. Patchin Date: 6/21/95	
Packers On Casing Single/Double Hydraulic/Inflatable	Groundwater Depth: Angle Depth ~~74.5~~ Ft. (70.7' (61.2' vert. depth)	Gauge Height Above Ground: 2.5 Ft.	Gravity Head: ~~74.85~~ 64.82 Ft (vert.)

TEST# 3-1 Inflow pressure (Hp) 20 psi x 2.31 = 46.2 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading	1917	917	17	17	18	18	18	18	19			.27 GPM
Gallons or Cu. Ft.	~0	.28	.52	.83	.12	.39	.68	.94	.22			CFM
Take Per Min.		.20	.24	.31	.29	.27	.29	.26	.28			CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~121.05~~ 111.02 FT. = ~~74.85~~ 64.82 FT. + 46.2 FT. − negligible* FT.

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \text{ in.} \frac{L\ (ft)}{r\ (ft)} = \frac{0.27}{\text{~~121.05~~ 111.02} \times 10.7} \times .011 \text{ in} \frac{10.7}{.125} = K, CM/SEC = 1.1 \times 10^{-5}$$

(.000227) (.048947)

TEST# 3-2 Inflow pressure (Hp) 40 psi x 2.31 = 92.4 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading	1926.	6	7	7	8	8	9	9	1930			.55 GPM
Gallons or Cu. Ft.	0	.55	.11	.69	.22	.70	.25	.76	.30			CFM
Take Per Min.		.55	.56	.58	.53	.57	.55	.51	.54			

H_T ~~101.25~~ 157.22 FT. = H_G ~~74.85~~ 64.82 FT. + Hp 92.4 FT. − H_L negligible* FT.

$$K = \frac{Q}{H_T \times L} \times .011 \text{ in.} \frac{L}{r} = \frac{0.55}{\text{~~101.25~~ 157.22} \times 10.7} \times .011 \text{ in} \frac{10.7}{.125} = K, CM/SEC = 1.6 \times 10^{-5}$$

(.000327) (.048947)

TEST 3-3 Inflow pressure (Hp) 50 psi x 2.31 = 115.5 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading	1933	33	34	34	35	36	6	7	8			0.62 GPM
Gallons or Cu. Ft.	.0	.27	.31	.93	.52	.15	.77	.38	.00			CFM
Take Per Min.		.6	.64	.62	.59	.63	.62	.61	.62			

H_T ~~190.35~~ 180.32 FT. = H_G ~~74.85~~ 64.82 FT. + Hp 115.5 FT. − H_L negligible* FT.

$$K = \frac{Q}{H_T \times L} \times .011 \text{ in.} \frac{L}{r} = \frac{0.62}{\text{~~190.35~~} \times 10.7} \times .011 \text{ in} \frac{10.7}{.125} = K, CM/SEC = 1.6 \times 10^{-5}$$

(.000321) (180.32) (.048947)

*negligible = < 1 ft head loss

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST #3

Pg 2 of 2

Project: WSSRAP Gwoun-RI	Job Number: WP-385	Test Section: 67.0 to 77.7	Bore Hole: MH-200
Test Equipment Identification: See Previous Page	BORE HOLE Orientation: 60° from Horiz. Size: 3 inches	Test By: P. Ratchin Date: 6/21/95	
Packers: On Casing, ~~Single~~/Double, Hydraulic/~~Inflatable~~	Groundwater Depth: ~~74.5~~ Ft.	Gauge Height Above Ground: 2.5' Ft.	Gravity Head: ~~74.85~~ 64.82 → vert. hea

70.7 (61.2' vert. depth)

TEST # 3-4 Inflow pressure (Hp) 20 psi x 2.31 = ~~46.2~~ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLO
Meter Reading Gallons or Cu. Ft	1938 .70	39 .04	39 .38	39 .69	40 .03	40 .38	40 .71	41 .07	41 .38			0.34 G / C
Take Per Min.		.34	.34	.31	.34	.35	.36	.32	.35			CFM x 7.48 = G

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~421.05~~ 111.02 FT. = ~~74.85~~ 64.82 FT. + 46.2 FT. − negligible*

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{0.34}{~~121.05~~\ 111.02 \times 10.7} \times .011 \ln \frac{10.7}{.125} = K,\ CM/SEC\ 1.4 \times 10^{-}$$

(.000286) (.048947)

TEST 2 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft												GI / CI
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ F

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\quad \times \quad} \times \quad = K,\ CM/SEC$$

TEST 3 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft												GP / CF
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\quad \times \quad} \times \quad = K,\ CM/SEC$$

*negligible = < 1 ft. head loss

TEST 4

MORRISON-KNUDSEN ENGINEERS, INC. · **PRESSURE TEST RESULTS (FIELD)** Pg 1 of 2

Project: WSSRAP	Job Number: WP-385	Test Section: 77.0 to 87.7'	Bore Hole: Apr 2003
Test Equipment Identification: -Bimba 11 Inflatable Packer -Niagra #0875 1144 water meter -Mono Centrifugal Pump	BORE HOLE Orientation: 30° from vertical Size: 3 inch	Test By: P. Patching Date: 6/22/95	
Packers: On Casing, Single/Double, Hydraulic/Inflatable	Groundwater Depth: Angle Depth 70.7 ~~74.5~~ Ft. → 61.2 vert. depth	Gauge Height Above Ground: 2.5 Ft.	Gravity Head: ~~69.8~~ 63.7 F

TEST # 4-1 Inflow pressure (Hp) 25 psi x 2.31 = 57.8 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	2160 .0	168 .1	~~[illegible]~~ 76 .1	84 .1	92 .1	200 ~~00~~ .1	208 .1					8.01 GPM
Take Per Min.		8.1	8.0	8.0	8.0	8.0	8.0					CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~124.8~~ 106.9 FT. = ~~67.0~~ 63.7 FT. + 57.8 FT. − 14.6 FT.

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{8.01}{\sim\!\sim\!124.8\sim\!\sim \times 10.7} \times .011 \ln \frac{10.7}{.125} = K,\ CM/SEC$$

(~~.005498~~) (.007002) (~~80.9~~ 106.9) (.048946) ~~2.93 x 10⁻⁴~~ 3.4 x 10⁻⁴

TEST # 4-2 Inflow pressure (Hp) 35 psi x 2.31 = 80.9 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	2240 .0	249 .7	259 .3	268 .9	278 .7	288 .4	298 .1					9.68 GPM
Take Per Min.		9.7	9.6	9.6	9.8	9.7	9.7					CFM

H_T ~~149.9~~ 123.7 FT. = H_G ~~67.0~~ 63.7 FT. + Hp 80.9 FT. − H_L 20.9 FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{9.68}{\sim\!\sim\!149.9\sim\!\sim \times 10.7} \times .011 \ln \frac{10.7}{.125} = K,\ CM/SEC$$

(~~.005410~~) (.007313) (~~149.9~~ 123.7) (.048946) ~~2.99 x 10⁻⁴~~ 3.6 x 10⁻⁴

TEST # 4-3 Inflow pressure (Hp) 50 psi x 2.31 = 115.5 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	2380 .0	391 .8	403 .4	414 .9	426 .3	437 .8	449 .3					11.55 GPM
Take Per Min.		11.8	11.6	11.5	11.4	11.5	11.5					CFM

H_T ~~182.5~~ 149.9 FT. = H_G ~~67.0~~ 63.7 FT. + Hp 115.5 FT. − H_L 29.3 FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{11.55}{\sim\!\sim\!182.5\sim\!\sim \times 10.7} \times .011 \ln \frac{10.7}{.125} = K,\ CM/SEC$$

(~~.004514~~) (.007201) (~~149.9~~) (.043946) ~~2.99 x 10⁻⁴~~ 3.5 x 10⁻⁴

MORRISON-KNUDSEN ENGINEERS, INC. **PRESSURE TEST RESULTS (FIELD)** Page 2 of 2

Project: WSSRAP GWOU RI	Job Number: WP-385	Test Section: 77.0' to 87.7'	Bore Hole: AH 2003
Test Equipment Identification: See Previous Page	BORE HOLE Orientation: 60° from Horiz.	Size: 3 inch	Test By: P. Patchin Date: 6/22/95
Packers On Casing Single/Double Hydraulic/Inflatable	Groundwater Depth: 70.7 → ~~74.5~~ (Angle) 61.2 → ~~64.5~~ (vertical) FL	Gauge Height Above Ground: 2.5 FL	Gravity Head: 63.7 ~~67.0~~ F

TEST # 4-4 Inflow pressure (Hp) 25 psi x 2.31 = 57.8 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	2470 .0	79 .1	88 .1	97 .1	506 .1	515 .1	524 .2					9.03 GPM CFM
Take Per Min.		9.1	9.0	9.0	9.0	9.0	9.1					CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~124.8~~ (103.3) FT. = ~~67.0~~ (63.7) FT. + 57.8 FT. − 18.2 F

$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{9.03}{\sim\sim 124.8 \sim\sim \times 10.7} \times .011 \ln \frac{10.7}{.125} =$ K, CM/SEC ~~3.70 x 10⁻⁴~~ 4.0 x 10⁻⁴

~~(.006762)~~ (.008169) (103.3) (.048946)

TEST # 4-5 Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	537 .0	544 .3	551 .6	559 .2	566 .2	573 .5						7.3 GPM CFM
Take Per Min.		7.3	7.3	7.6	7.0	7.3						

H_T ~~90.1~~ (74.5) FT. = H_G ~~67.0~~ (63.7) FT. + Hp 23.1 FT. − H_L 12.3 FT

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{7.3}{\sim\sim 90.1 \sim\sim \times 10.7} \times .011 \ln \frac{10.7}{.125} =$ K, CM/SEC ~~3.79 x 10⁻⁴~~ 4.5 x 10⁻⁴

~~(.007572)~~ (.009158) (74.5) (.048946)

TEST 3 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM CFM
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\quad \times \quad} \times \quad =$ K, CM/SEC

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST 1 Pg 1 of 2

Project:	Job Number:	Test Section: (angle depth	Bore Hole:
GWOM-RI Characterization	WP-385	34.5' to 44.0'	AH 2004

Test Equipment Identification	BORE HOLE		Test By:
Bimbar 11 Inflatable Packer Niagra #08751144 Water Meter MOINO Centrifugal Pump	Orientation: 30° VERT	Size: 2" ϕ	R Cato Johnston Date: 6/28/95

Packers:	Groundwater Depth:	Gauge Height Above Ground:	Gravity Head:
~~On Casing~~ ~~Single~~/Double Hydraulic/Inflatable	25' (VERT) Ft.	2.5' Ft.	27.5' Ft

TEST 1-1

Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

Leaking packer ?

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	4392 .5	4403 .2	4414 .0	4424 .9	4436 .0	4446 .8	4457 .2	4467 .9	4478 .2	4488 .8	4499 .0	10.6 GPM
Take Per Min.		10.7	10.8	10.9	11.1	10.8	10.4	10.7	10.3	10.6	10.2	CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~50.6~~ 37.3 FT. = 27.5' FT. + 23.1 FT. − 13.3 FT.

Will not Test 1-1 because of leaking Packer. POP 8/14/95 (.083894)

$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \text{ in.} \frac{L\ (ft)}{r\ (ft)} = \frac{10.6}{\sim\!\!50.6 \times 9.5} \times .011 \ln \frac{9.5}{.125}$ = K, CM/SEC ~~1.05 (10⁻³)~~ ~~2.99 x 10⁻⁴~~

(13.3) (.047638)

TEST 1-2

Inflow pressure (Hp) 20 psi x 2.31 = 46.2 feet

NO TEST

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	4574 .0	4581 .1	4588 .2	4595 .4	4603 .3	4611 .0	4618 .2	4625 .4	4632 .6			7.3 GPM
Take Per Min.		7.1	7.1	7.4	7.7	7.7	7.2	7.2	7.2			CFM

H_T ~~75.7~~ 67.1 FT. = H_G 27.5 FT. + H_P 46.2 FT. − H_L 6.6 FT.

$K = \frac{Q}{H_T \times L} \times .011 \text{ in.} \frac{L}{r} = \frac{7.3}{75.1 \times 9.5} \times .011 \ln \frac{9.5}{.125}$ = K, CM/SEC ~~4.07 (10⁻⁴)~~ ~~5.5 x 10⁻⁴~~

(.011452) (67.1) (.047638)

TEST 1-3

Inflow pressure (Hp) 25 psi x 2.31 = 57.75 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	4661 .4	4669 .9	4678 .0	4686 .4	4694 .4	4702 .8	4710 .9	4718 .9	4727 .2	4736 .2	4743 .1	8.2 GPM
Take Per Min.		8.3	8.1	8.4	8.2	8.2	8.1	8.0	8.3	8.0	8.1	CFM

H_T ~~85.25~~ 77.05 FT. = H_G 27.5 FT. + H_P 57.75 FT. − H_L 8.2 FT.

$K = \frac{Q}{H_T \times L} \times .011 \text{ in.} \frac{L}{r} = \frac{8.2}{\sim\!\!85.25 \times 9.5} \times .011 \ln \frac{9.5}{.125}$ = K, CM/SEC ~~4.82 (10⁻⁴)~~ ~~5.3 x 10⁻⁴~~

(.011202) (77.05) (.047638)

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Project: WSSRAP GWOU RI Characterization	Job Number: WP-385	Test Section: 34.5 to 44.0	Bore Hole: AH-2004
Test Equipment Identification: See previous page	BORE HOLE Orientation: 30° from vert.	Size: 3" dia	Test By: R. Cato-Johnston Date: 6/28/95
Packers: On Casing, Single/Double, Hydraulic/Inflatable	Groundwater Depth: 25' (vert) Ft.	Gauge Height Above Ground: 2.5 Ft.	Gravity Head: 27.5 F

TEST 1-4 Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	4765.9	4771.4	4777.4	4783.2	4789.0	4794.9	4800.4					5.8 GPM
Take Per Min.		5.7	5.8	5.8	5.8	5.9	5.7					CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~50.1~~ 46.3 FT. = 27.5 FT. + 23.1 FT. − 4.3 FT.

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \text{ in.} \frac{L\ (ft)}{r\ (ft)} = \frac{5.3}{(.013186)\ 46.3 \text{ ~~50.1~~} \times 9.5} \times \frac{.011 \text{ in} \frac{9.5}{.125}}{(.047638)} = K,\ CM/SEC\ \ 6.3 \times 10^{-4}$$

TEST 2 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \text{ in.} \frac{L}{r} = \frac{\quad}{\times} \times \quad = K,\ CM/SEC$$

TEST 3 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \text{ in.} \frac{L}{r} = \frac{\quad}{\times} \times \quad = K,\ CM/SEC$$

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST 2

Project: WSSRAD GWOU RI Characterization	Job Number: WP-385	Test Section: 44.0 to 54.0	Bore Hole: AH-2004
Test Equipment Identification: Bimbar 11 Inflatable Packer; Niagra #08751144 Water Meter; Moino Centrifugal Pump	BORE HOLE Orientation: 30° FROM V	Size: 3"	Test By: R. Cato-Johnston; Date: 6/28/95
Packers: On Casing; Single/Double; Hydraulic/Inflatable	Groundwater Depth: 25 FL	Gauge Height Above Ground: 2.5' FL	Gravity Head: 27.5

TEST # 2-1

Inflow pressure (Hp) 10 psi x 2.31 = 23.1 feet

20

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	4823.2	4830.8	4838.4	4846.2	4853.7	4861.2	4868.5	4875.7				7.5 GPM
Take Per Min.		7.6	7.6	7.8	7.5	7.5	7.3	7.2				CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

~~50.4~~ 42.3 FT. = 27.5 FT. + 23.1 FT. − 8.3 FT.

$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \times \frac{L\ (ft)}{r\ (ft)}$ (.017731) (423)

$= \frac{7.5}{\cancel{50.4}\ 42.3 \times 10.0} \times .011 \times \frac{10}{.125} =$ K, CM/SEC 8.6×10^{-4} ~~1.1×10^{-3}~~

TEST 2-2

Inflow pressure (Hp) 20 psi x 2.31 = 46.2 feet .048202

50

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	4898.8	4908.2	4917.6	4926.8	4936.1	4945.2	4954.5	4963.7	4973.0			9.3 GPM
Take Per Min.		9.4	9.4	9.2	9.3	9.1	9.3	9.2	9.3			CFM

H_T ~~73.7~~ 61.3 FT. = H_G 27.5 FT. + Hp 46.2 FT. − H_L 12.4 FT.

$K = \frac{Q}{H_T \times L} \times .011 \times \frac{L}{r}$ (.015171) (61.3)

$= \frac{9.3}{\cancel{73.7}\ 61.3 \times 10.0} \times .011 \times \frac{10}{.125} =$ K, CM/SEC ~~1.0×10^{-3}~~ 7.3×10^{-4} (.048202)

TEST # 2-3

Inflow pressure (Hp) 30 psi x 2.31 = 69.3 feet

55

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	4995.0	5005.6	5016.4	5027.1	5037.8	5048.7	5059.3					10.7 GPM
Take Per Min.		10.6	10.8	10.7	10.6	10.9	10.6					CFM

H_T ~~76.2~~ 80.7 FT. = H_G 27.5 FT. + Hp 69.3 FT. − H_L 16.1 FT.

$K = \frac{Q}{H_T \times L} \times .011 \times \frac{L}{r}$ (.013258)

$= \frac{10.7}{\cancel{76.8}\ 80.7 \times 10.0} \times .011 \times \frac{10}{.125} =$ K, CM/SEC ~~5.3×10^{-4}~~ 6.4×10^{-4}

80.7 (.048202)

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD) (cont) Pg. 2 of 3

Project: WSSRAP GWOU RI Characterization	Job Number: WP-385	Test Section: 44 to 54	Bore Hole: AH 2004
Test Equipment Identification: See Previous Page	BORE HOLE Orientation: 30° from Vert.	Size: 3"	Test By: R. Cato-Johnston Date: 6/28/95
Packers: On-Casing, Single/Double, Hydraulic/Inflatable	Groundwater Depth: 25 Ft.	Gauge Height Above Ground: 2.5' Ft.	Gravity Head: 27.5 Ft.

TEST # 2-4 Inflow pressure (H_P) 10 psi x 2.31 = 23.1 feet

20

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	5070 .0	5076 .9	5084 .0	5091 .0	5098 .2	5105 .0	5112 .0	5119 .7	5125 .4	5132 .3	5139 .2	6.9 GPM
Take Per Min.		6.9	7.1	7.0	7.2	6.8	7.0	6.7	6.7	6.9	6.9	CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (H_P) − Head Losses (H_L)

~~50.6~~ 43.5 FT. = 27.5 FT. + 23.1 FT. − 7.1 FT.

$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{6.9}{~~50.6~~ \times 10.0} \times .011 \ln. \frac{10}{.1125} =$ K, CM/SEC ~~9.5 x 10⁻⁴~~ 9.7 x 10⁻⁴

(1.015862) (43.5) (.04[8202])

TEST 2 Inflow pressure (H_P) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + H_P _____ FT. − H_L _____ FT.

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\times} \times \quad =$ K, CM/SEC

TEST 3 Inflow pressure (H_P) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + H_P _____ FT. − H_L _____ FT.

$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\times} \times \quad =$ K, CM/SEC

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST 3 Pg. 1 of 2

Project: WSSRAP GWOU-RI CHARACTERIZATION	Job Number: WP-385	Test Section: 54.0 to 62.0	Bore Hole: AH-200
Test Equipment Identification: Bimbar 11 Inflatable Packer; Niagra #08751144 Water Meter; Moino Centrifugal Pump	BORE HOLE Orientation: 30° VERT	Size: 3"	Test By: R CARLSON-JESTER; Date: 6/29/95
Packers: On-Casing, Single/Double, Hydraulic/Inflatable	Groundwater Depth: 25.0 VERT Ft.	Gauge Height Above Ground: 2.5 Ft.	Gravity Head: 27.5 Ft.

TEST # 3-1 Inflow pressure (Hp) 20 psi x 2.31 = 46.2 feet

5

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	5151 .15	5151 .15	5151 .15	5151 .15	5151 .15							0 GPM
Take Per Min.	0	0	0	0								CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

73.7 FT. = 27.5 FT. + 46.2 FT. − FT.

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln \frac{L\ (ft)}{r\ (ft)} = \frac{0}{73.7 \times 8.0} \times .011 \ln \frac{8.0}{.125} = \text{K, CM/SEC } 0$$

TEST # 3-2 Inflow pressure (Hp) 30 psi x 2.31 = 69.3 feet

50

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	5151 .20	5151 .20	5151 .20	5151 .20	5151 .20							0 GPM
Take Per Min.	0	0	0	0								CFM

H_T 96.8 FT. = H_G 27.5 FT. + Hp 69.3 FT. − H_L ? FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{0}{96.8 \times 8.0} \times .011 \ln \frac{8.0}{.125} = \text{K, CM/SEC } 0$$

TEST 3-3 Inflow pressure (Hp) 40 psi x 2.31 = 92.4 feet

25

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	5151 .80	5153 .40	5153 .40	5153 .40	5153 .40	5153 .40						0 GPM
Take Per Min.	1.6	0	0	0	0							CFM

Leaking packers

H_T 119.9 FT. = H_G 27.5 FT. + Hp 92.4 FT. − H_L ? FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{0}{119.9 \times 8.0} \times .011 \ln \frac{8.0}{.125} = \text{K, CM/SEC } 0$$

Turned up pressure on packer

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST 3 (CONT) Pg 2 of

Project	Job Number:	Test Section:	Bore Hole:
WSSRAP GWOU RI Fieldwork	WP-385	54.0 to 62.0	AH 2004

Test Equipment Identification	BORE HOLE Orientation:	Size:	Test By: R. Cato-Johnston
See Previous Page	30° from Vert.	3"	Date: 6/29/95

Packers: On Casing / Single/Double / Hydraulic/Inflatable	Groundwater Depth:	Gauge Height Above Ground:	Gravity Head:
	25.0 (vertical) Ft.	2.5 Ft.	27.5 Ft.

TEST 3-4 Inflow pressure (Hp) 20 psi x 2.31 = 46.2 feet

30

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	5753 .40	5753 .40	5753 .40	5753 .40	5753 .40							0 GPM
Take Per Min.	0	0	0	0								CFM

CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

13.7 FT. = 27.5 FT. + 46.2 FT. − ? FT.

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{0}{13.7 \times 8.0} \times .011 \ln \frac{8.0}{1125} = K, CM/SEC\ 0$$

TEST 2 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\times} \times \quad = K, CM/SEC$$

TEST 3 Inflow pressure (Hp) _____ psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM
Take Per Min.												CFM

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{\times} \times \quad = K, CM/SEC$$

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

TEST # 1

Project: WSSRAP GWOU RI	Job Number: 3840 WP-385	Test Section: 43.0' to 53.9'	Bore Hole: AH-2005
Test Equipment Identification: -Bimbar 11 Inflatable Packer (360PS) -Niagra #0857144 Water Meter -Mono Centrifugal pump.	BORE HOLE Orientation: 30° from vertical	Size: 3 inches	Test By: P. Patchin Date: 7/7/95
Packers: On Casing; Single/Double; Hydraulic/Inflatable	Groundwater Depth: ~ 20.2 (vertical) FL	Gauge Height Above Ground: 2.5 FL	Gravity Head: ~ 22.7 F

TEST 1 Inflow pressure (Hp) 15 psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6489 .60	.60	.60	.60	.60	.60	.60					0 GPM / CFM
Take Per Min.		0	0	0	0	0	0					CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

FT.	=	FT.	+	FT.	−	F

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln \frac{L\ (ft)}{r\ (ft)} = \frac{\quad}{\times} \times \quad = \text{K, CM/SEC}$$

TEST 2 Inflow pressure (Hp) 20 psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6989 .63	.63	.63	.69	.69	.69	.69	.71	.71			0 GPM / CFM
Take Per Min.		0	0	.06	0	0	0	.02	0			

Likely Packer Leakage

H_T FT. = H_G FT. + H_P FT. − H_L FT

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\quad}{\times} \times \quad = \text{K, CM/SEC}$$

TEST 3 Inflow pressure (Hp) 30 psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6989 .82	.82	.82	.82	.82	.82	.82	.82	.82			0 GPM / CFM
Take Per Min.		0	0	0	0	0	0	0	0			

H_T FT. = H_G FT. + H_P FT. − H_L FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\quad}{\times} \times \quad = \text{K, CM/SEC}$$

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Test #:

Project:	Job Number:	Test Section:	Bore Hole:
WSSKAP GWOU - RI Invest.	EWP-385	53.0 to 63.5	AH-200

Test Equipment Identification	BORE HOLE		Test By:
Bimba w/ 11 Inflatable Packer Niagra #09511 44 Water Meter MOINO Centrifugal Pump	Orientation: 30° from vertical	Size: 3 inches	P. Patchin
			Date: 7/10/95

Packers	Groundwater Depth:	Gauge Height Above Ground:	Gravity Head:
On Casing Single/Double Hydraulic/Inflatable	~24.4 (est) FL	2.5 Ft.	26.9 F

TEST 1

Inflow pressure (Hp) 20 psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6981 .33	.33	.33	.33	.33	.33						0 GPM / CFM
Take Per Min.	0	0	0	0	0							CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

FT.	=	FT.	+	FT.	−	F

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln. \frac{L\ (ft)}{r\ (ft)} = \frac{\quad}{x} \times \quad = \text{K, CM/SEC}$$

TEST 2

Inflow pressure (Hp) 30 psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6982 .20	.45	.67	.92	3 .18	.27	.27	.27	.27	.27	.27	0 GPM / CFM
Take Per Min.	.25	.22	.25	.26	.09	0	0	0	0	0		

Probable packer leakage

H_T FT. = H_G FT. + Hp FT. − H_L FT

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{x} \times \quad = \text{K, CM/SEC}$$

TEST 3

Inflow pressure (Hp) 40 psi x 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6983 .28	.28	.28	.28	.28	.24	↓ Packer moved 3 feet					0 GPM / CFM
Take Per Min.	0	0	0	0	0							

H_T FT. = H_G FT. + Hp FT. − H_L FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln. \frac{L}{r} = \frac{\quad}{x} \times \quad = \text{K, CM/SEC}$$

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Test #3

Project: WSSRAP GWOU-RI Investigation	Job Number: WP-385	Test Section: 63.0 to 72.3 '	Bore Hole: RIF-2005
Test Equipment Identification: Bimbur 1L Inflatable Packer; Niagra #08571144 Water Meter; Mono Centrifugal Pump	BORE HOLE Orientation: 60° from Horiz. Size: 3.0"	Test By: P. Patchin Date: 7/11/95	
Packers: On Casing; Single/Double; Hydraulic/Inflatable	Groundwater Depth: ~24.4 FL (7/11/95)	Gauge Height Above Ground: 2.5 ' FL	Gravity Head: 26.9 F

TEST # 3-1 Inflow pressure (Hp) 20 psi x 2.31 = 46.2 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6989 .50	.58	.66	.73	.84	.93	90 .02	.11	.20	.31	.41	.09 GPM / CFM
Take Per Min.		.08	.08	.07	.11	.09	.09	.09	.09	.11	.10	CFM x 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

73.1 FT. = 26.9 FT. + 46.2 FT. − negligible* FT

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln \frac{L\ (ft)}{r\ (ft)} = \frac{.09}{73.1 \times 9.3} \times .011 \ln \frac{9.3}{.125} = 6.3 \times 10^{-4}\ \text{K, CM/SEC}$$

(.000132) (.047404)

TEST # 3-2 Inflow pressure (Hp) 30 psi x 2.31 = 69.3 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6991 .40	.62	.88	2 .00	.17	.38	.55	.75	.95	3 .13	.32	.19 GPM / CFM
Take Per Min.		.22	.26	.12	.17	.21	.17	.20	.20	.18	.19	

H_T 96.2 FT. = H_G 26.9 FT. + Hp 69.3 FT. − H_L negligible* FT

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{.19}{96.2 \times 9.3} \times .011 \ln \frac{9.3}{.125} = 1.0 \times 10^{-5}\ \text{K, CM/SEC}$$

(.000212) (.047404)

TEST 3-3 Inflow pressure (Hp) 40 psi x 2.31 = 92.4 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6994 .00	.25	.51	.77	95 .03	.29	.55					.26 GPM / CFM
Take Per Min.		.25	.26	.26	.26	.26	.26					

H_T 119.3 FT. = H_G 26.9 FT. + Hp 92.4 FT. − H_L negligible* FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{.26}{119.3 \times 9.3} \times .011 \ln \frac{9.3}{.125} = 1.1 \times 10^{-5}\ \text{K, CM/SEC}$$

.00234 (.047404)

*negligible = < 1 ft total head loss

MORRISON-KNUDSEN ENGINEERS, INC.

PRESSURE TEST RESULTS (FIELD)

Kg 201

TEST #

Project: WSSRAP Gwou RI Investigation	Job Number: WP-385	Test Section: 63.0 to 72.3	Bore Hole: AH-2005
Test Equipment Identification: See Previous Page	BORE HOLE Orientation: 30° from Vert.	Size: 3"	Test By: P. Patchin
			Date: 7/11/95
Packers: On Casing, Single/Double, Hydraulic/Inflatable	Groundwater Depth: ~24.4 Ft.	Gauge Height Above Ground: 2.5 Ft.	Gravity Head: 26.9 F

TEST # 3-4 Inflow pressure (Hp) 20 psi × 2.31 = 46.2 feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.	6995 .90	.99	.08	.17	.27	.37	.47	.58				.10 GPM / CFM
Take Per Min.		.09	.09	.09	.10	.10	.10	.11				CFM × 7.48 = GPM

Total Head (H_T) = Gravity Head (H_G) + Pressure Head (Hp) − Head Losses (H_L)

73.1 ✓FT. = 26.9 FT. + 46.2 FT. = negligible* F

$$K = \frac{Q\ (gpm)}{H_T\ (ft) \times L\ (ft)} \times .011 \ln \frac{L\ (ft)}{r\ (ft)} = \frac{.10}{73.1 \times 9.3} \times .011 \ln \frac{9.3}{.125} = 7.0 \times 10^{-} \checkmark$$

(.000147) ✓ (.047404)

TEST 2 Inflow pressure (Hp) _____ psi × 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM / CFM
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\quad}{\times} \times \quad = \text{K, CM/SEC}$$

TEST 3 Inflow pressure (Hp) _____ psi × 2.31 = _____ feet

TIME, MIN.	0	1	2	3	4	5	6	7	8	9	10	Q AVERAGE FLOW
Meter Reading Gallons or Cu. Ft.												GPM / CFM
Take Per Min.												

H_T _____ FT. = H_G _____ FT. + Hp _____ FT. − H_L _____ FT.

$$K = \frac{Q}{H_T \times L} \times .011 \ln \frac{L}{r} = \frac{\quad}{\times} \times \quad = \text{K, CM/SEC}$$

* negligible = < 1 ft total head loss

Packer Test Data - MW-D23

Top	Bottom	SWL (ft)	r (ft)	P (psi)	P (ft)	t (i)	t (f)	gal (i)	gal (f)	t total	gal total	Q (gpm)	Q (cfs)	A/r	Ce	hL (ft)	H (ft)	K (ft/s)	K (cm/s)	
38.3	52.9	54.60	0.125	10	23.07	930	935	3921.90	3921.90	5	0.10	0.020	0.000045	116.8	107	0	79.57	2.20E-08	6.70E-07	(1)
38.3	52.9	54.60	0.125	20	46.14	937	942	3922.50	3922.60	5	0.10	0.020	0.000045	116.8	107	0	102.64	1.67E-08	5.09E-07	
38.3	52.9	54.60	0.125	30	69.21	943	948	3923.00	3923.30	5	0.30	0.060	0.000134	116.8	107	0	125.71	4.04E-08	1.23E-06	1.05x10
38.3	52.9	54.60	0.125	10	23.07	949	953	3923.20	3923.70	4	0.50	0.125	0.000279	116.8	107	0	79.57	1.37E-07	4.19E-06	
50	125	52.30	0.125	10	23.07	1153	1158	4706.60	4788.50	5	81.90	16.380	0.036497	600	590	0	77.37	6.35E-06	1.94E-04	
50	125	52.30	0.125	20	46.14	1159	1164	4816.10	4916.50	5	100.40	20.080	0.044742	600	590	0	100.44	6.00E-06	1.83E-04	
50	125	52.30	0.125	30	69.21	1205	1210	4921.80	5019.30	5	97.50	19.500	0.043449	600	590	0	123.51	4.74E-06	1.44E-04	1.79x10
50	125	52.30	0.125	10	23.07	1210	1215	5033.50	5116.20	5	82.70	16.540	0.036854	600	590	0	77.37	6.42E-06	1.96E-04	
60	125	52.30	0.125	10	23.07	1105	1110	4376.30	4415.40	5	39.10	7.820	0.017424	520	500	0	77.37	3.57E-06	1.09E-04	
60	125	52.30	0.125	20	46.14	1111	1116	4435.00	4486.50	5	51.50	10.300	0.022950	520	500	0	100.44	3.63E-06	1.11E-04	
60	125	52.30	0.125	30	69.21	1122	1127	4554.50	4619.50	5	65.00	13.000	0.028966	520	500	0	123.51	3.72E-06	1.13E-04	1.11x10
60	125	52.30	0.125	10	23.07	1128	1133	4636.80	4676.40	5	39.60	7.920	0.017647	520	500	0	77.37	3.62E-06	1.10E-04	
70	125	52.30	0.125	10	23.07	933	938	3973.90	4016.10	5	44.20	8.840	0.019697	440	420	0	77.37	4.80E-06	1.46E-04	
70	125	52.30	0.125	20	46.14	940	945	4021.10	4057.20	5	36.10	7.220	0.016087	440	420	0	100.44	3.02E-06	9.21E-05	
70	125	52.30	0.125	30	69.21	948	953	4087.20	4143.80	5	56.60	11.320	0.025223	440	420	0	123.51	3.85E-06	1.17E-04	1.42x10
70	125	52.30	0.125	10	23.07	957	962	4194.50	4256.70	5	64.20	12.840	0.028610	440	420	0	77.37	6.98E-06	2.13E-04	
85	125	52.30	0.125	10	23.07	840	845	3952.00	3952.70	5	0.70	0.140	0.000312	320	330	0	77.37	9.68E-08	2.94E-06	
85	125	52.30	0.125	20	46.14	846	851	3954.10	3956.60	5	2.50	0.500	0.001114	320	330	0	100.44	2.66E-07	8.10E-06	(4)
85	125	52.30	0.125	30	69.21	852	857	3957.70	3961.70	5	4.00	0.800	0.001783	320	330	0	123.51	3.46E-07	1.05E-05	
85	125	52.30	0.125	40	92.28	857	862	3962.70	3969.70	5	7.00	1.400	0.003119	320	330	0	146.58	5.10E-07	1.55E-05	0.52x10
85	125	52.30	0.125	10	23.07	902	907	3969.20	3970.50	5	1.30	0.260	0.000579	320	330	0	77.37	1.79E-07	5.47E-06	
105	125	52.30	0.125	10	23.07	1425	1430	3924.80	3925.80	5	1.00	0.200	0.000446	160	200	0	77.37	2.26E-07	6.88E-06	
105	125	52.30	0.125	20	46.14	1432	1437	3926.90	3928.70	5	1.80	0.360	0.000802	160	200	0	100.44	3.13E-07	9.55E-06	(5)
105	125	52.30	0.125	30	69.21	1441	1446	3931.00	3933.20	5	2.20	0.440	0.000980	160	200	0	123.51	3.11E-07	9.49E-06	
105	125	52.30	0.125	40	92.28	1449	1454	3934.60	3936.80	5	2.20	0.440	0.000980	160	200	0	146.58	2.62E-07	7.99E-06	6.92x10
105	125	52.30	0.125	10	23.07	1455	1460	3937.00	3937.10	5	0.10	0.020	0.000045	160	200	0	77.37	2.26E-08	6.88E-07	

Top	Bottom	SWL (ft)	r (ft)	P (psi)	P (ft)	t (i)	t (f)	gal (i)	gal (f)	t total	gal total	Q (gpm)	Q (cfs)	A/r	Ce	hL (ft)	H (ft)	K (ft/s)		
70	85	52.3	0.125	10	23.07							8.7	0.019385	120	150	0	77.37	1.30E-05	3.97E-04	
70	85	52.3	0.125	20	46.14							6.72	0.014973	120	150	0	100.44	7.74E-06	2.36E-04	(3)
70	85	52.3	0.125	30	69.21							10.52	0.023440	120	150	0	123.51	9.86E-06	3.01E-04	
70	85	52.3	0.125	40	92.28							11.44	0.025490	120	150	0	146.58	9.03E-06	2.75E-04	3.27x10
70	85	52.3	0.125	10	23.07							9.34	0.020811	120	150	0	77.37	1.40E-05	4.26E-04	
60	70	52.3	0.125	20	46.14							3.08	0.006863	80	105	0	100.44	5.01E-06	1.53E-04	
60	70	52.3	0.125	30	69.21							1.68	0.003743	80	105	0	123.51	2.22E-06	6.78E-05	(2) 1.10x10

Packer Test Data - MW-D25

Top	Bottom	SWL (ft)	r (ft)	P (psi)	P (ft)	t (i)	t (f)	gal (i)	gal (f)	t total	gal total	Q (gpm)	Q (cfs)	A/r	Cs	hL (ft)	H (ft)	K (ft/s)	K (cm/s)
18	28	47.59	0.125	10	23.07	900	905	5373.70	5381.80	5	8.10	1.620	0.003610	80	105	0.07	53.20	2.28E-06	6.96E-05
18	28	47.59	0.125	20	46.14	905	910	5384.00	5391.50	5	7.50	1.500	0.003342	80	105	0.07	76.27	1.51E-06	4.61E-05
18	28	47.59	0.125	30	69.21	910	915	5393.40	5398.90	5	5.50	1.100	0.002451	80	105	0.03	99.38	8.63E-07	2.63E-05
18	28	47.59	0.125	10	23.07	915	920	5410.20	5412.80	5	2.60	0.520	0.001159	80	105	0	53.27	7.32E-07	2.23E-05
44.5	54.5	47.59	0.125	10	23.07	1018	1023	5788.00	5836.00	5	48.00	9.600	0.021390	80	105	3.49	69.37	2.26E-05	6.90E-04
44.5	54.5	47.59	0.125	20	46.14	1023	1028	5836.00	5891.00	5	55.00	11.000	0.024510	80	105	4.62	91.31	1.97E-05	6.00E-04
44.5	54.5	47.59	0.125	30	69.21	1028	1033	5906.00	5960.00	5	54.00	10.800	0.024064	80	105	4.62	114.38	1.54E-05	4.71E-04
44.5	54.5	47.59	0.125	10	23.07	1033	1038	5965.00	6028.00	5	63.00	12.600	0.028075	80	105	5.95	66.91	3.08E-05	9.39E-04
54.5	64.5	47.59	0.125	10	23.07	1222	1227	6020.6	6020.72	5	0.12	0.024	0.000053	80	105	0	72.86	5.39E-08	1.64E-06
54.5	64.5	47.59	0.125	20	46.14	1227	1232	6021.1	6021.2	5	0.10	0.020	0.000045	80	105	0	95.93	3.41E-08	1.04E-06
54.5	64.5	47.59	0.125	30	69.21	1232	1237	6021.4	6021.6	5	0.20	0.040	0.000089	80	105	0	119.00	5.50E-08	1.68E-06
54.5	64.5	47.59	0.125	10	23.07	1237	1242	6021.1	6021.11	5	0.01	0.002	0.000004	80	105	0	72.86	4.49E-09	1.37E-07
64.5	74.5	47.59	0.125	10	23.07	1419	1424	6021.5	6022.3	5	0.80	0.160	0.000357	80	105	0	72.86	3.59E-07	1.09E-05
64.5	74.5	47.59	0.125	20	46.14	1424	1429	6022.8	6023.7	5	0.90	0.180	0.000401	80	105	0	95.93	3.07E-07	9.35E-06
64.5	74.5	47.59	0.125	30	69.21	1429	1434	6024.2	6026	5	1.80	0.360	0.000802	80	105	0	119.00	4.95E-07	1.51E-05
64.5	74.5	47.59	0.125	10	23.07	1434	1439	6025.6	6025.9	5	0.30	0.060	0.000134	80	105	0	72.86	1.35E-07	4.10E-06
74.5	84.5	47.59	0.125	10	23.07	1628	1633	6026.5	6026.8	5	0.30	0.060	0.000134	80	105	0	72.86	1.35E-07	4.10E-06
74.5	84.5	47.59	0.125	20	46.14	1633	1638	6027.15	6027.5	5	0.35	0.070	0.000156	80	105	0	95.93	1.19E-07	3.64E-06
74.5	84.5	47.59	0.125	30	69.21	1638	1643	6027.8	6028.2	5	0.40	0.080	0.000178	80	105	0	119.00	1.10E-07	3.35E-06
74.5	84.5	47.59	0.125	10	23.07	1643	1648	6028	6028.1	5	0.10	0.020	0.000045	80	105	0	72.86	4.49E-08	1.37E-06
84.5	94.5	47.59	0.125	10	23.07	1140	1145	6036.15	6036.40	5	0.25	0.050	0.000111	80	105	0	72.86	1.12E-07	3.42E-06
84.5	94.5	47.59	0.125	20	46.14	1145	1150	6036.80	6036.85	5	0.05	0.010	0.000022	80	105	0	95.93	1.70E-08	5.20E-07
84.5	94.5	47.59	0.125	30	69.21	1150	1155	6037.20	6037.20	5	0.00	0.000	0.000000	80	105	0	119.00	0.00E+00	0.00E+00
84.5	94.5	47.59	0.125	10	23.07	1155	1160	6036.50	6036.60	5	0.10	0.020	0.000045	80	105	0	72.86	4.49E-08	1.37E-06
94.5	114.5	47.59	0.125	10	23.07	1527	1532	6037.80	6037.80	5	0.00	0.000	0.000000	160	200	0	72.86	0.00E+00	0.00E+00
94.5	114.5	47.59	0.125	20	46.14	1532	1537	6038.40	6038.80	5	0.40	0.080	0.000178	160	200	0	95.93	7.29E-08	2.22E-06
94.5	114.5	47.59	0.125	30	69.21	1537	1542	6039.05	6039.60	5	0.55	0.110	0.000245	160	200	0	119.00	8.08E-08	2.46E-06
94.5	114.5	47.59	0.125	40	92.28	1542	1547	6039.90	6047.50	5	7.60	1.520	0.003387	160	200	0.25	141.82	9.37E-07	2.85E-05
94.5	114.5	47.59	0.125	10	23.07	1547	1552	6047.00	6047.00	5	0.00	0.000	0.000000	160	200	0	72.86	0.00E+00	0.00E+00

Packer Test Data - MW-S26

Top	Bottom	SWL (ft)	r (ft)	P (psi)	P (ft)	t (i)	t (f)	gal (i)	gal (f)	t total	gal total	Q (gpm)	Q (cfs)	A/r	Cs	hL (ft)	H (ft)	K (ft/s)	K (cm/s)
39	44.5	42.80	0.125	10	23.07	1149	1154	5422.80	5495.50	5	72.70	14.540	0.032398	44	70	6.8	62.97	2.95E-05	8.99E-04
39	44.5	42.80	0.125	20	46.14	1154	1159	5517.40	5599.20	5	81.80	16.360	0.036453	44	70	8.64	84.20	2.44E-05	7.45E-04
39	44.5	42.80	0.125	30	69.21	1200	1205	5614.50	5712.40	5	97.90	19.580	0.043627	44	70	11.95	103.96	2.35E-05	7.16E-04
39	44.5	42.80	0.125	10	23.07	1205	1210	5736.50	5747.20	5	10.70	2.140	0.004768	44	70	0.26	69.51	3.91E-06	1.19E-04
44.5	55	42.80	0.125	10	23.07	1420	1425	5747.40	5747.40	5	0.00	0.000	0.000000	84	106	0	68.07	0.00E+00	0.00E+00
44.5	55	42.80	0.125	20	46.14	1426	1431	5747.40	5747.40	5	0.00	0.000	0.000000	84	106	0	91.14	0.00E+00	0.00E+00
44.5	55	42.80	0.125	30	69.21	1432	1437	5747.30	5747.30	5	0.00	0.000	0.000000	84	106	0	114.21	0.00E+00	0.00E+00
44.5	55	42.80	0.125	10	23.07	1438	1443	5747.30	5747.30	5	0.00	0.000	0.000000	84	106	0	68.07	0.00E+00	0.00E+00
55	65	42.80	0.125	10	23.07	934	939	5747.80	5747.90	5	0.10	0.020	0.000045	80	105	0	68.07	4.80E-08	1.46E-06
55	65	42.80	0.125	20	46.14	939	944	5747.90	5747.90	5	0.00	0.000	0.000000	80	105	0	91.14	0.00E+00	0.00E+00
55	65	42.80	0.125	30	69.21	944	949	5747.90	5747.90	5	0.00	0.000	0.000000	80	105	0	114.21	0.00E+00	0.00E+00
55	65	42.80	0.125	40	92.28	949	954	5747.90	5747.90	5	0.00	0.000	0.000000	80	105	0	137.28	0.00E+00	0.00E+00
55	65	42.80	0.125	10	23.07	954	959	5747.90	5747.90	5	0.00	0.000	0.000000	80	105	0	68.07	0.00E+00	0.00E+00

Packer Test Data - MW-D107

Top	Bottom	SWL (ft)	r (ft)	P (psi)	P (ft)	t (i)	t (f)	gal (i)	gal (f)	t total	gal total	Q (gpm)	Q (cfs)	A/r	Cs	h (ft)	H (ft)	K (ft/s)	K (cm/s)
44	54	18.70	0.125	10	23.07	1425	1430	5126.30	5143.30	5	18.00	3.600	0.008021	80	105	0.51	43.38	1.36E-05	4.14E-04
44	54	18.70	0.125	20	46.14	1434	1439	5157.20	5221.40	5	64.20	12.840	0.028610	80	105	6.01	60.97	3.44E-05	1.05E-03
44	54	18.70	0.125	30	69.21	1440	1445	5221.40	5295.20	5	73.80	14.760	0.032888	80	105	7.75	82.36	2.93E-05	8.93E-04
44	54	18.70	0.125	10	23.07	1445	1450	5308.20	5332.20	5	24.00	4.800	0.010695	80	105	0.97	43.00	1.83E-05	5.58E-04
54	64	18.70	0.125	10	23.07	1350	1355	5126.30	5126.30	5	0.00	0.000	0.000000	80	105	0	43.97	0.00E+00	0.00E+00
54	64	18.70	0.125	20	46.14	1355	1360	5126.30	5126.30	5	0.00	0.000	0.000000	80	105	0	67.04	0.00E+00	0.00E+00
54	64	18.70	0.125	30	69.21	1401	1406	5126.30	5126.30	5	0.00	0.000	0.000000	80	105	0	90.11	0.00E+00	0.00E+00
54	64	18.70	0.125	10	23.07	1406	1411	5126.30	5126.30	5	0.00	0.000	0.000000	80	105	0	43.97	0.00E+00	0.00E+00
64	74	18.70	0.125	10	23.07	1324	1329	5126.30	5126.30	5	0.00	0.000	0.000000	80	105	0	43.97	0.00E+00	0.00E+00
64	74	18.70	0.125	20	46.14	1330	1335	5126.30	5126.30	5	0.00	0.000	0.000000	80	105	0	67.04	0.00E+00	0.00E+00
64	74	18.70	0.125	30	69.21	1335	1340	5126.30	5126.30	5	0.00	0.000	0.000000	80	105	0	90.11	0.00E+00	0.00E+00
64	74	18.70	0.125	10	23.07	1340	1345	5126.30	5126.30	5	0.00	0.000	0.000000	80	105	0	43.97	0.00E+00	0.00E+00
74	84	18.70	0.125	10	23.07	1250	1255	5124.00	5124.10	5	0.10	0.020	0.000046	80	105	0	43.97	7.44E-08	2.27E-06
74	84	18.70	0.125	20	46.14	1255	1260	5124.50	5124.50	5	0.00	0.000	0.000000	80	105	0	67.04	0.00E+00	0.00E+00
74	84	18.70	0.125	30	69.21	1300	1305	5124.70	5125.00	5	0.30	0.060	0.000134	80	105	0	90.11	1.09E-07	3.32E-06
74	84	18.70	0.125	40	92.28	1305	1310	5125.20	5125.20	5	0.00	0.000	0.000000	80	105	0	113.18	0.00E+00	0.00E+00
74	84	18.70	0.125	10	23.07	1310	1315	5125.20	5125.20	5	0.00	0.000	0.000000	80	105	0	43.97	0.00E+00	0.00E+00
84	94	18.70	0.125	10	23.07	1201	1206	5122.80	5122.80	5	0.00	0.000	0.000000	80	105	0	43.97	0.00E+00	0.00E+00
84	94	18.70	0.125	20	46.14	1207	1212	5123.10	5123.30	5	0.20	0.040	0.000089	80	105	0	67.04	9.76E-08	2.97E-06
84	94	18.70	0.125	30	69.21	1215	1220	5123.50	5123.60	5	0.10	0.020	0.000045	80	105	0	90.11	3.63E-08	1.11E-06
84	94	18.70	0.125	40	92.28	1220	1225	5123.70	5123.80	5	0.10	0.020	0.000045	80	105	0	113.18	2.88E-08	8.81E-07
84	94	18.70	0.125	10	23.07	1225	1230	5123.30	5123.30	5	0.00	0.000	0.000000	80	105	0	43.97	0.00E+00	0.00E+00
94	114	18.70	0.125	10	23.07	955	960	5334.5	5334.9	5	0.40	0.080	0.000178	160	200	0	43.97	1.59E-07	4.85E-06
94	114	18.70	0.125	20	46.14	1001	1006	5335.4	5335.9	5	0.50	0.100	0.000223	160	200	0	67.04	1.30E-07	3.97E-06
94	114	18.70	0.125	30	69.21	1007	1012	5336.4	5337.1	5	0.70	0.140	0.000312	160	200	0	90.11	1.36E-07	4.14E-06
94	114	18.70	0.125	40	92.28	1014	1019	5337.5	5338.5	5	1.00	0.200	0.000446	160	200	0	113.18	1.54E-07	4.71E-06
94	114	18.70	0.125	10	23.07	1020	1025	5338.2	5338.3	5	0.10	0.020	0.000045	160	200	0	43.97	3.97E-08	1.21E-06
114	134	18.70	0.125	10	23.07	1340	1345	5343.5	5344.2	5	0.70	0.140	0.000312	160	200	0	43.97	2.78E-07	8.48E-06
114	134	18.70	0.125	20	46.14	1345	1350	5344.5	5345.5	5	1.00	0.200	0.000446	160	200	0	67.04	2.61E-07	7.95E-06
114	134	18.70	0.125	30	69.21	1350	1355	5345.7	5347.4	5	1.70	0.340	0.000758	160	200	0	90.11	3.30E-07	1.00E-05
114	134	18.70	0.125	40	92.28	1355	1360	5347.6	5349.8	5	2.20	0.440	0.000980	160	200	0	113.18	3.40E-07	1.04E-05
114	134	18.70	0.125	10	23.07	1400	1405	5349.96	5350.20	5	0.24	0.048	0.000107	160	200	0	43.97	9.54E-08	2.91E-06

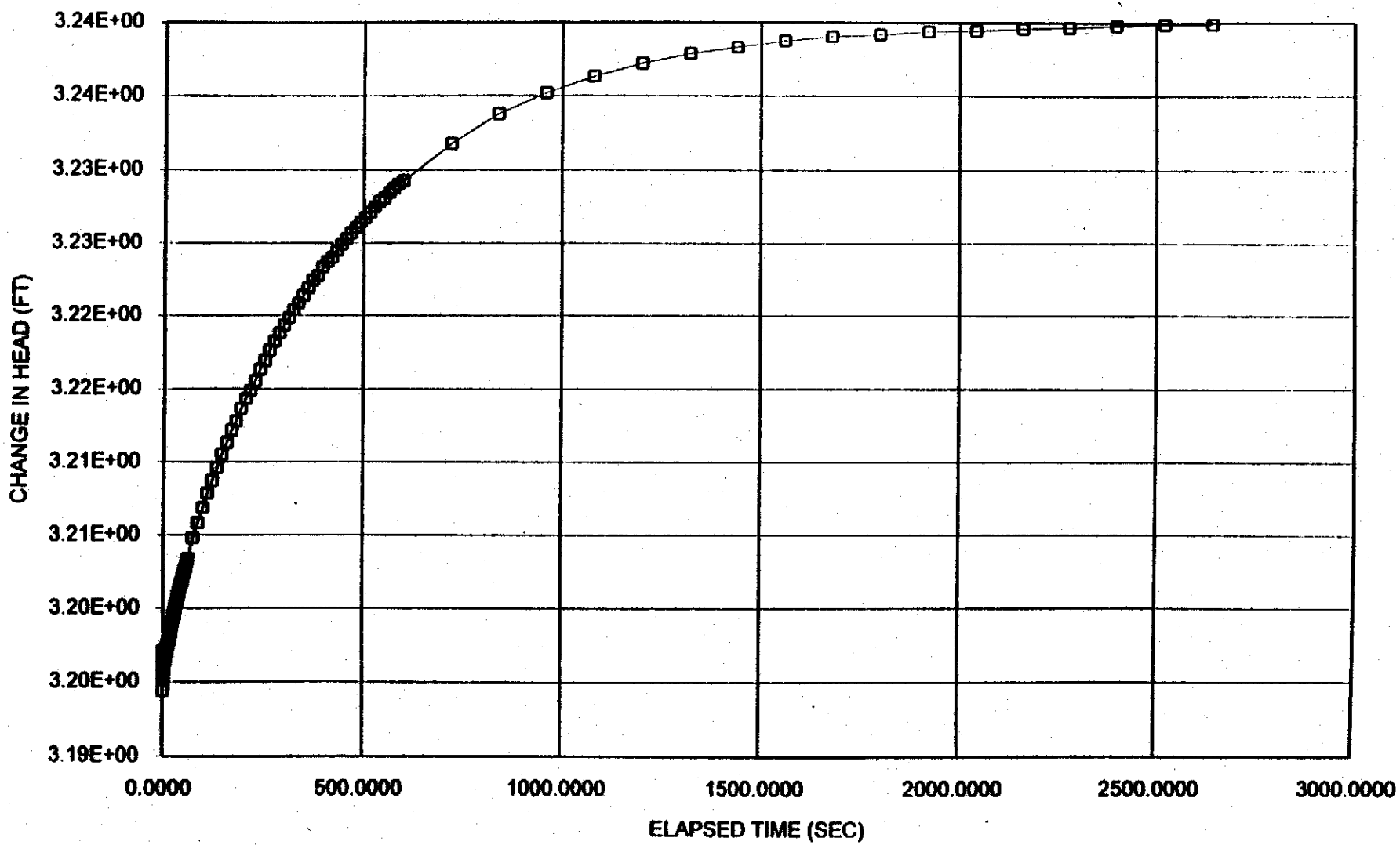
Packer Test Data - MW-D112

Top	Bottom	SWL (ft)	r (ft)	P (psi)	P (ft)	t (i)	t (f)	gal (i)	gal (f)	t total	gal total	Q (gpm)	Q (cfs)	A/r	Ce	hL (ft)	H (ft)	K (ft/s)	K (cm/s)
28.5	38.5	26.60	0.125	10	23.07	1255	1260	5351.00	5351.10	5	0.10	0.020	0.000045	80	105	0	51.87	6.31E-08	1.92E-06
28.5	38.5	26.60	0.125	20	46.14	1300	1305	5351.20	5351.50	5	0.30	0.060	0.000134	80	105	0	74.94	1.31E-07	3.99E-06
28.5	38.5	26.60	0.125	30	69.21	1305	1310	5351.60	5351.90	5	0.30	0.060	0.000134	80	105	0	98.01	1.00E-07	3.05E-06
28.5	38.5	26.60	0.125	10	23.07	1310	1315	5351.50	5351.50	5	0.00	0.000	0.000000	80	105	0	51.87	0.00E+00	0.00E+00
38.5	48.5	26.60	0.125	10	23.07	1410	1415	5352.90	5353.10	5	0.20	0.040	0.000089	80	105	0	51.87	1.26E-07	3.84E-06
38.5	48.5	26.60	0.125	20	46.14	1415	1420	5353.80	5354.20	5	0.40	0.080	0.000178	80	105	0	74.94	1.75E-07	5.32E-06
38.5	48.5	26.60	0.125	30	69.21	1420	1425	5354.50	5355.30	5	0.80	0.160	0.000357	80	105	0	98.01	2.67E-07	8.14E-06
38.5	48.5	26.60	0.125	10	23.07	1425	1430	5355.00	5355.00	5	0.00	0.000	0.000000	80	105	0	51.87	0.00E+00	0.00E+00
48.5	58.5	26.60	0.125	10	23.07	1515	1520	5355.80	5355.80	5	0.00	0.000	0.000000	80	105	0	51.87	0.00E+00	0.00E+00
48.5	58.5	26.60	0.125	20	46.14	1520	1525	5356.10	5356.20	5	0.10	0.020	0.000045	80	105	0	74.94	4.36E-08	1.33E-06
48.5	58.5	26.60	0.125	30	69.21	1525	1530	5356.40	5356.70	5	0.30	0.060	0.000134	80	105	0	98.01	1.00E-07	3.05E-06
48.5	58.5	26.60	0.125	10	23.07	1535	1540	5356.40	5356.40	5	0.00	0.000	0.000000	80	105	0	51.87	0.00E+00	0.00E+00

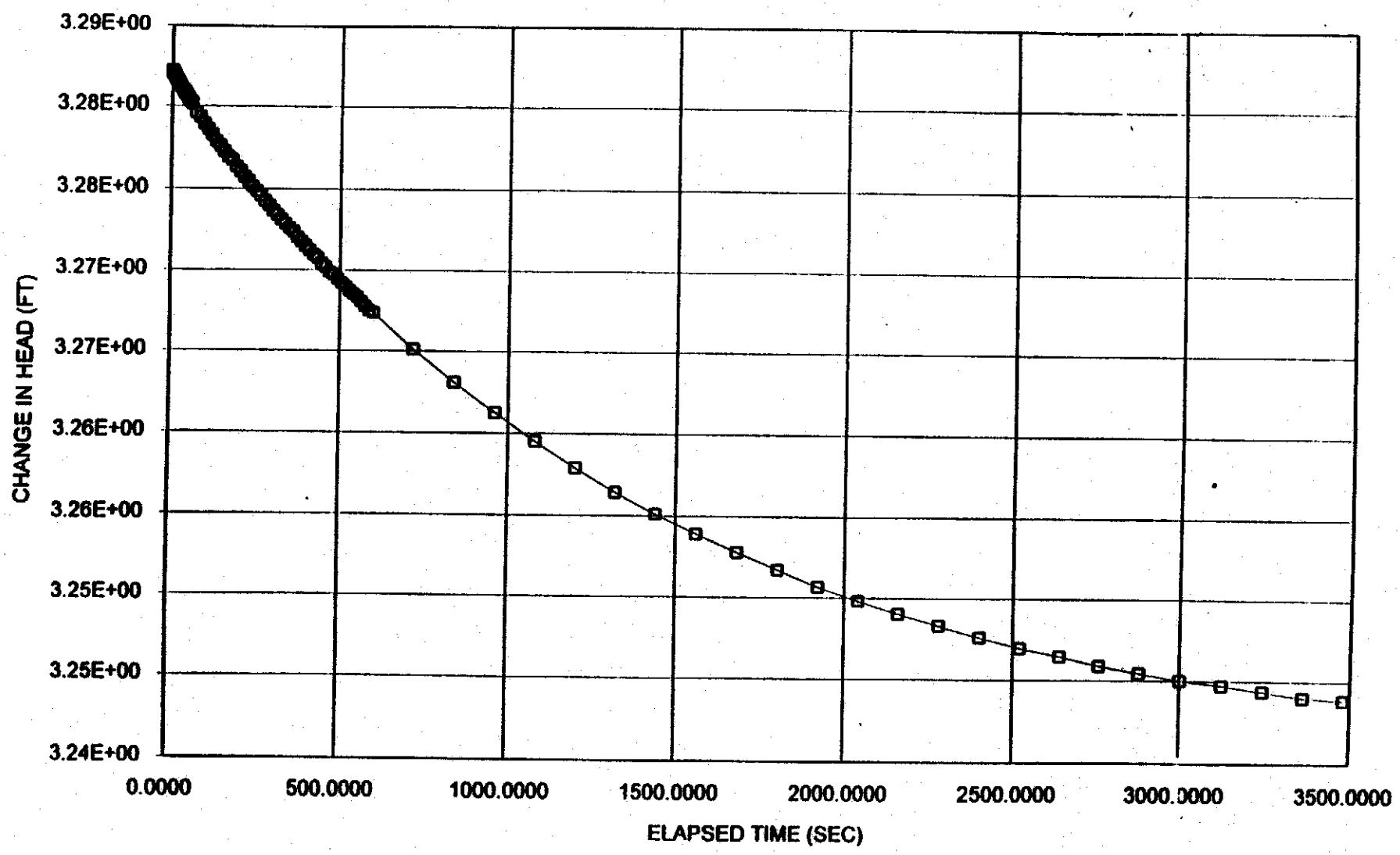
SECTION 4:

SLUG TEST RESULTS

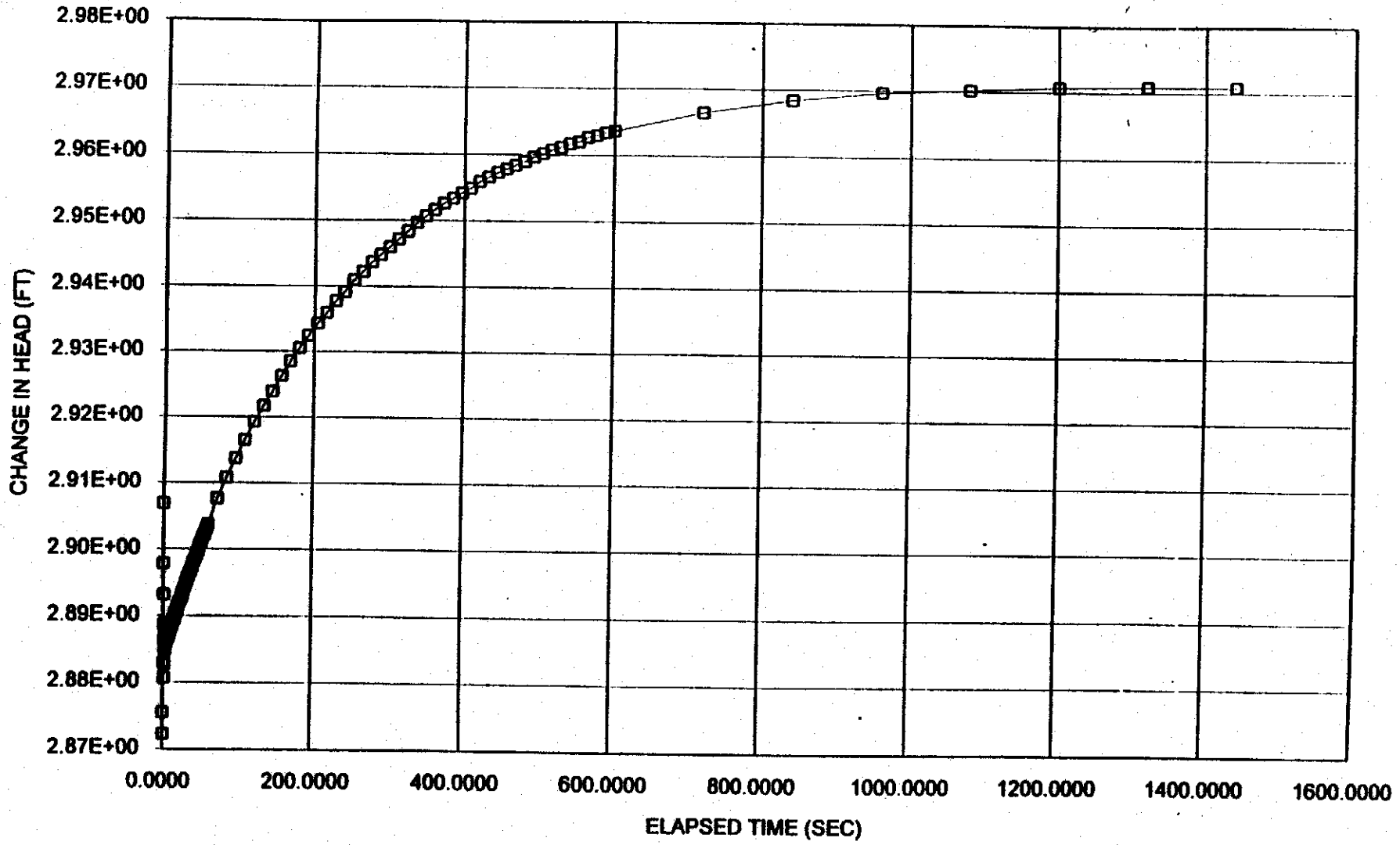
HYDRAULIC CONDUCTIVITY - MWS21 (FALLING HEAD)
TEST DATE-3/9/95



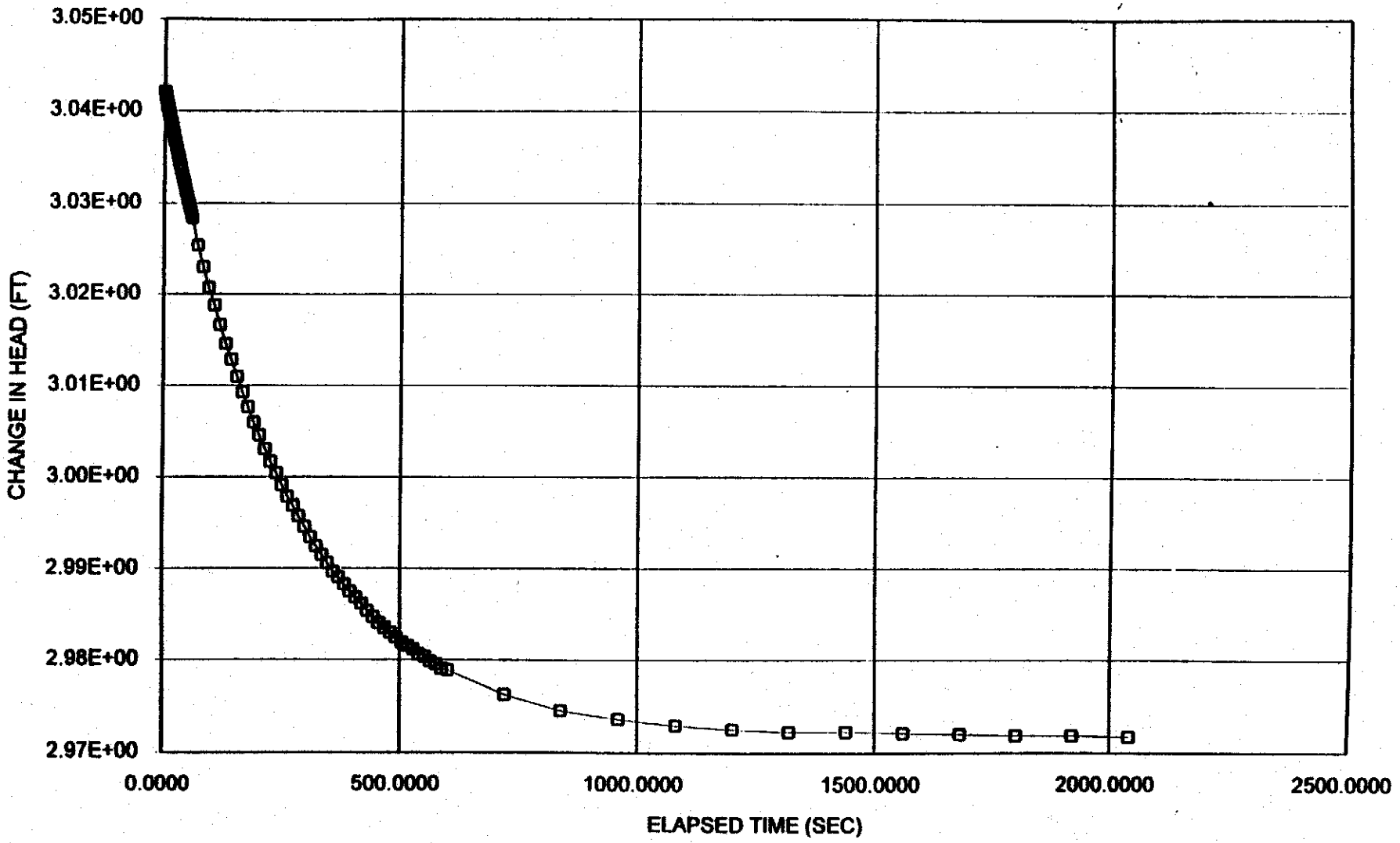
HYDRAULIC CONDUCTIVITY - MWS21 (RISING HEAD)
TEST DATE 3/9/95



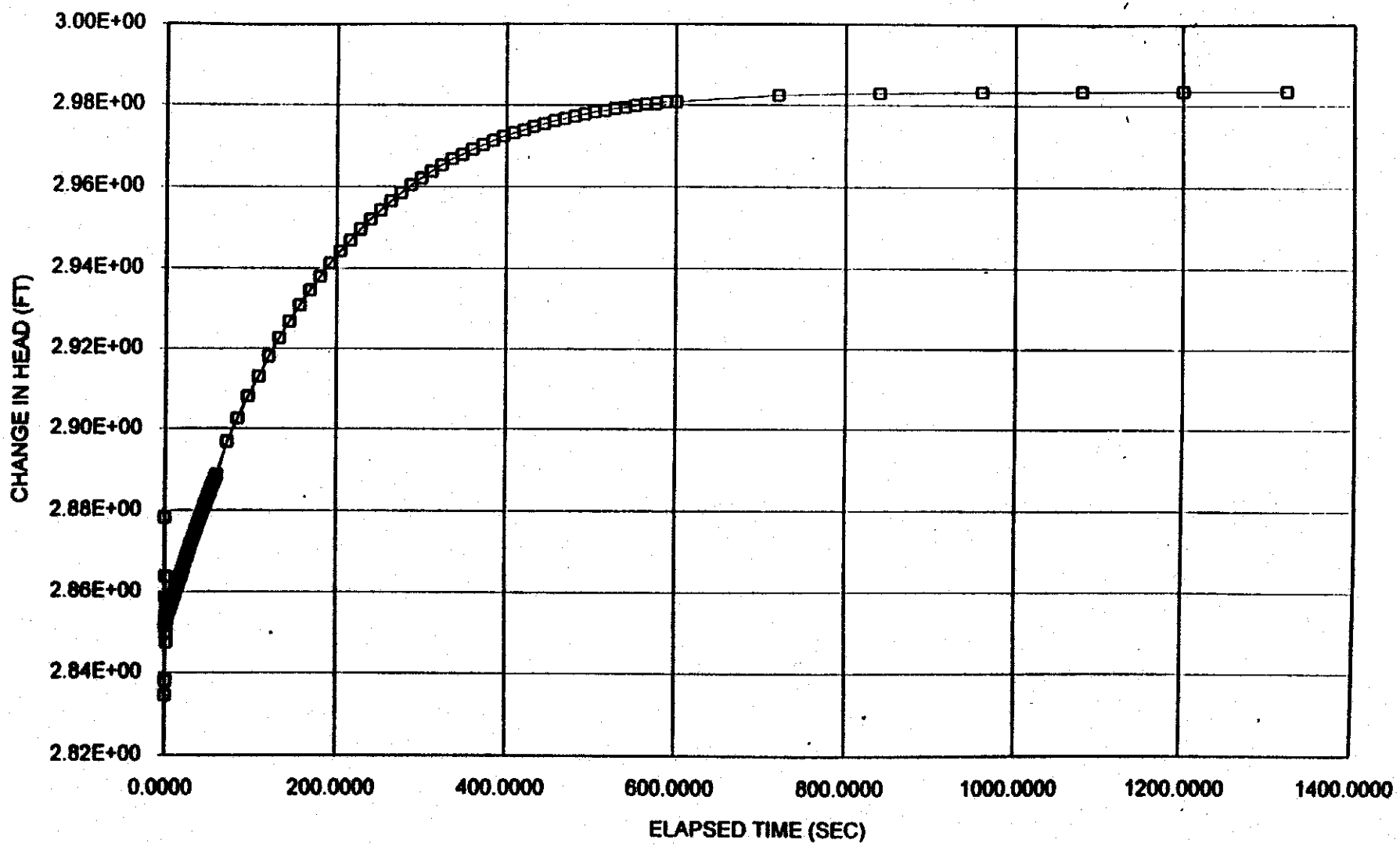
HYDRAULIC CONDUCTIVITY - MW/22 FALLING HEAD
TEST DATE-3/10/95



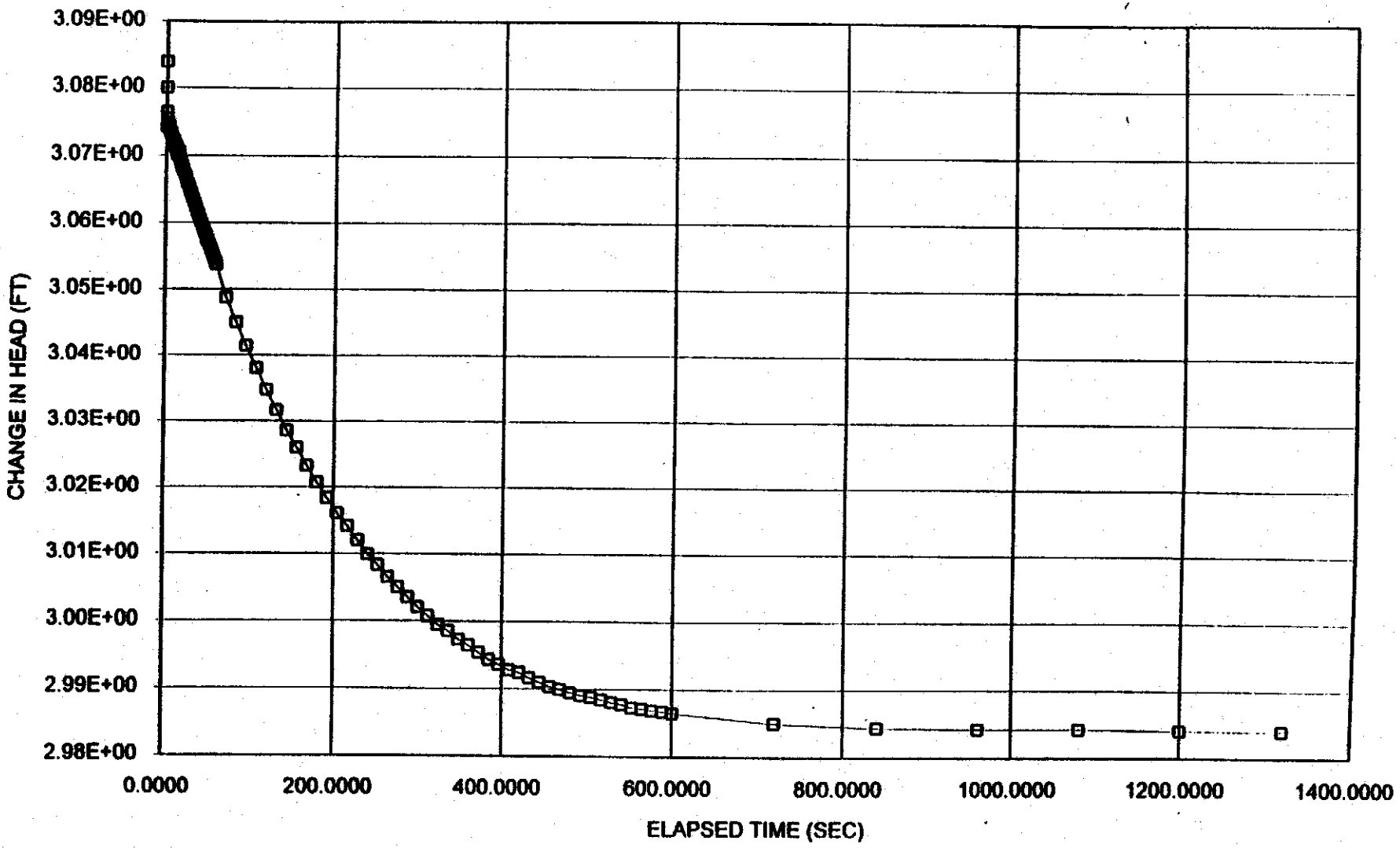
HYDRAULIC CONDUCTIVITY - MWV22 (RISING HEAD)
TEST DATE 3/10/95



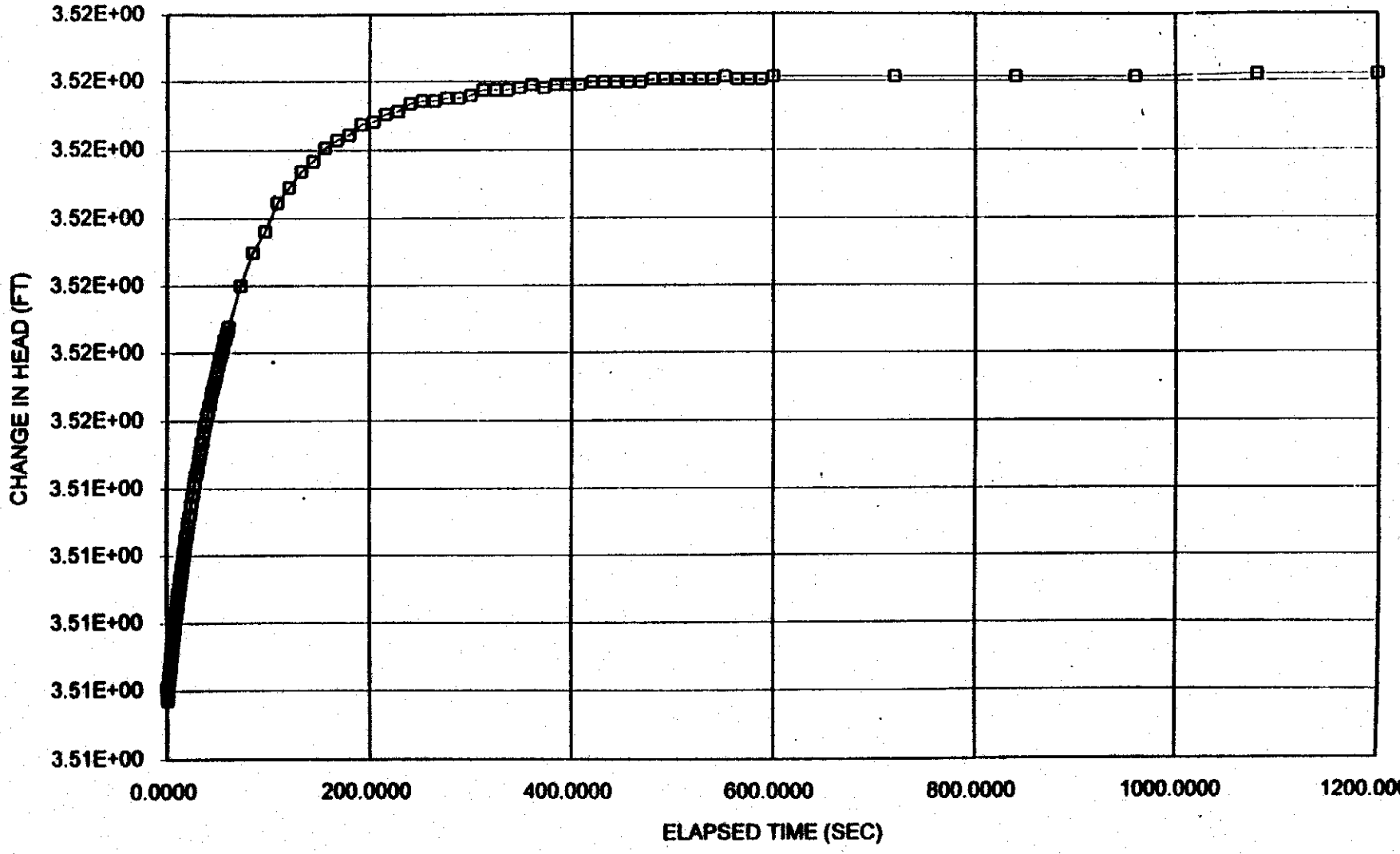
HYDRAULIC CONDUCTIVITY - MWS22 (FALLING HEAD)
TEST DATE 3/9/95



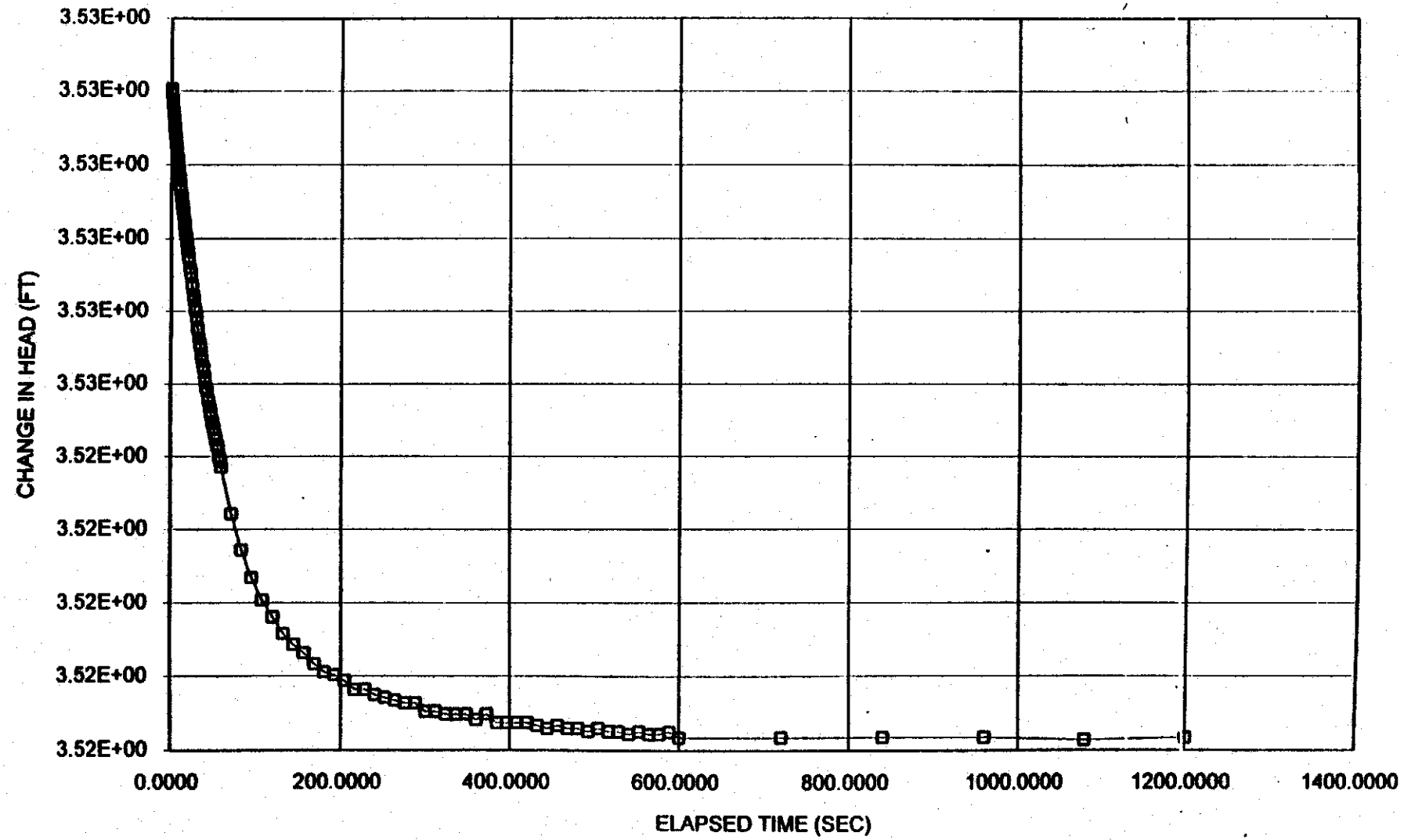
HYDRAULIC CONDUCTIVITY - MWS22 (RISING HEAD)
TEST DATE-3/10/95



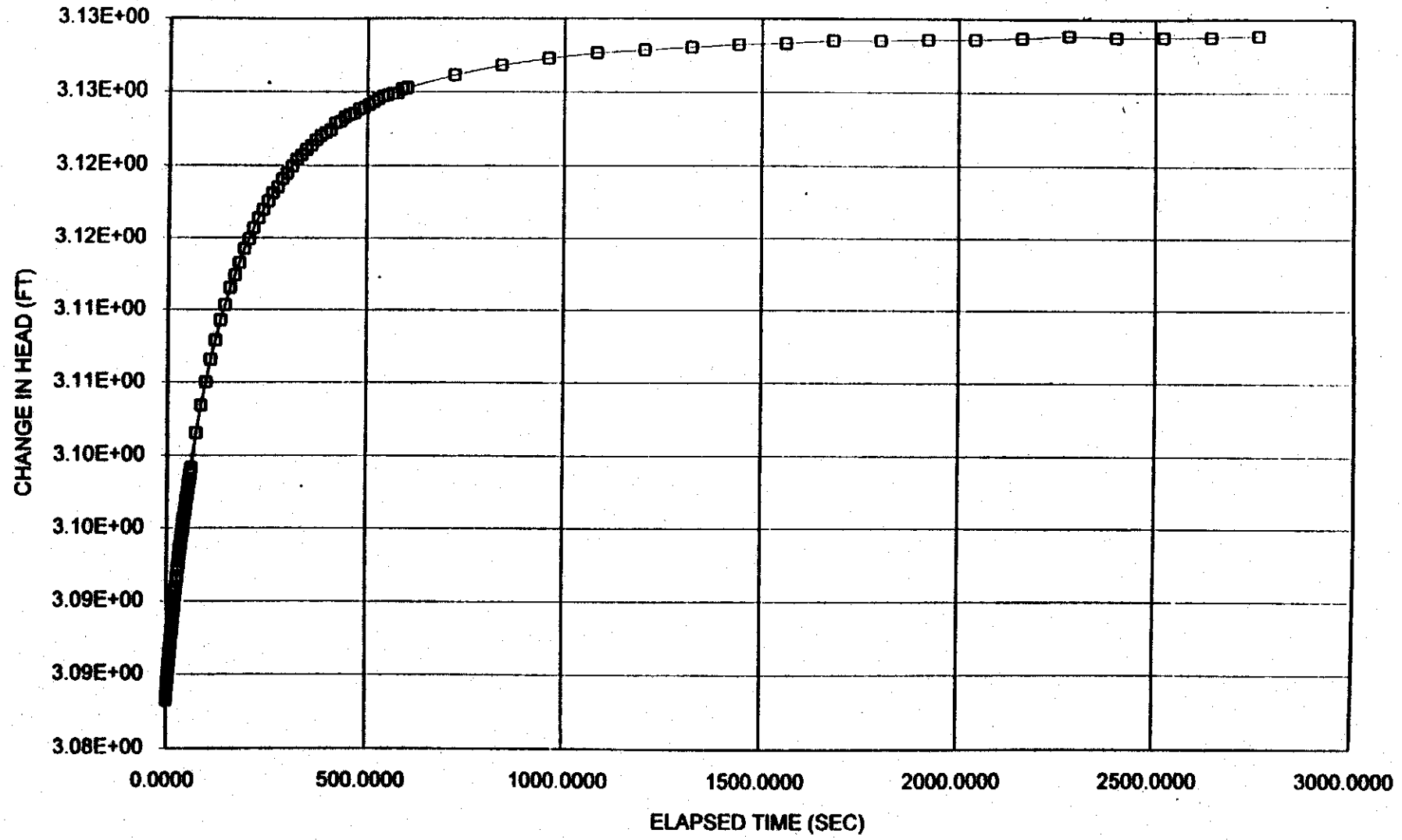
HYDRAULIC CONDUCTIVITY - MWS23 (FALLING HEAD)
TEST DATE-3/9/95



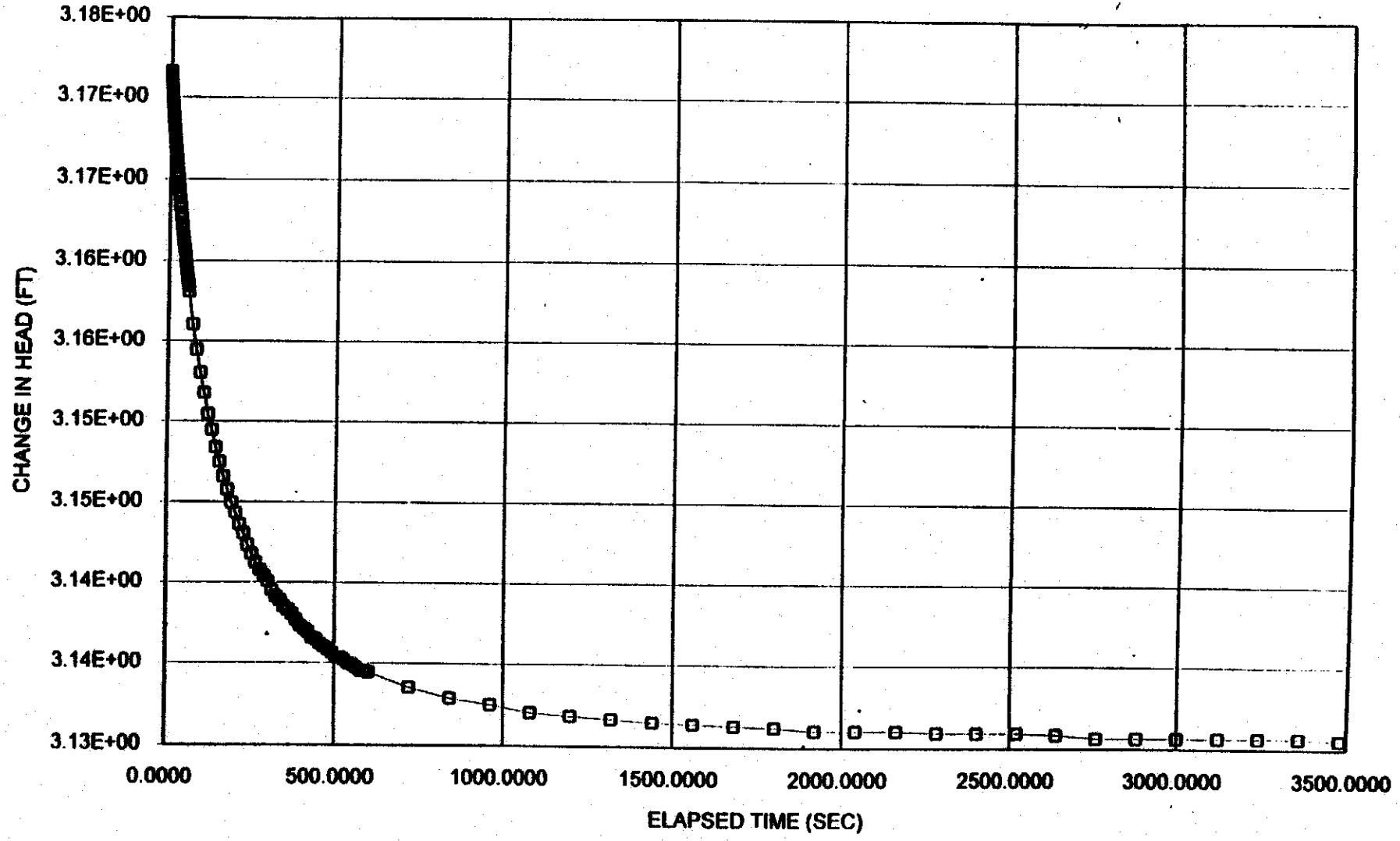
HYDRAULIC CONDUCTIVITY - MWS23 (RISING HEAD)
TEST DATE -3/8/95



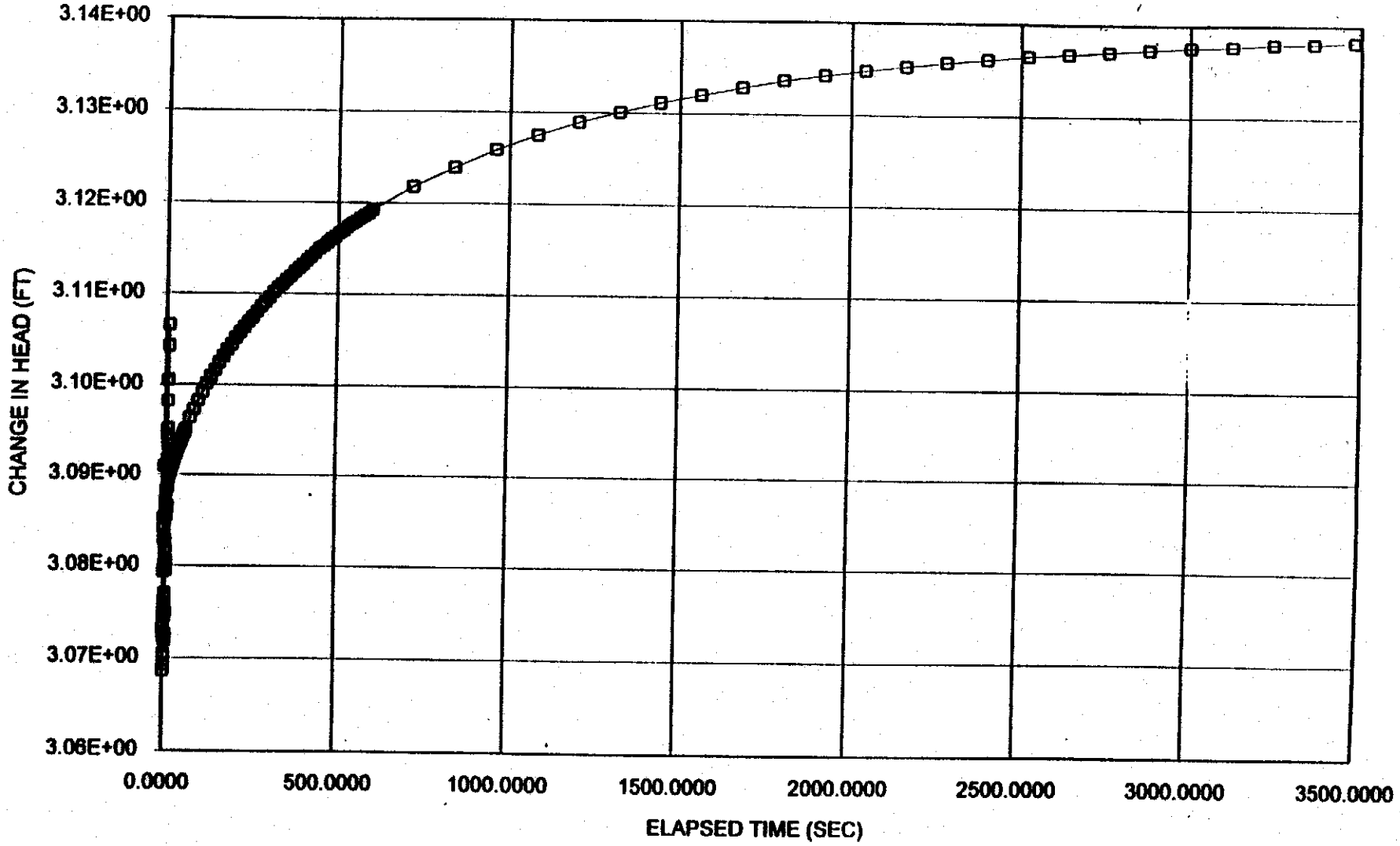
HYDRAULIC CONDUCTIVITY - MW24R (FALLING HEAD)
TEST DATE 3/9/95



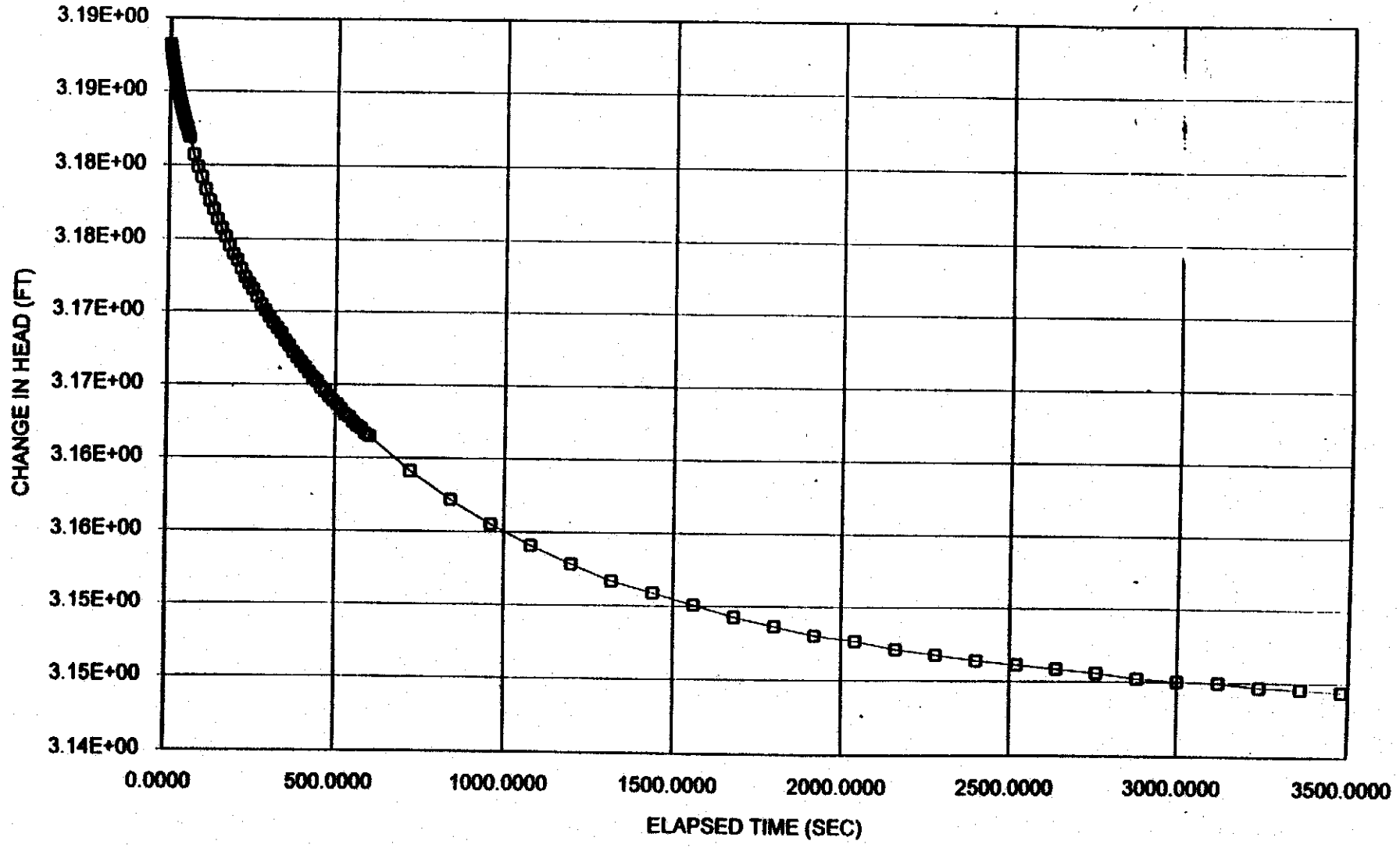
HYDRAULIC CONDUCTIVITY - MW24R (RISING HEAD)
TEST DATE-3/9/95



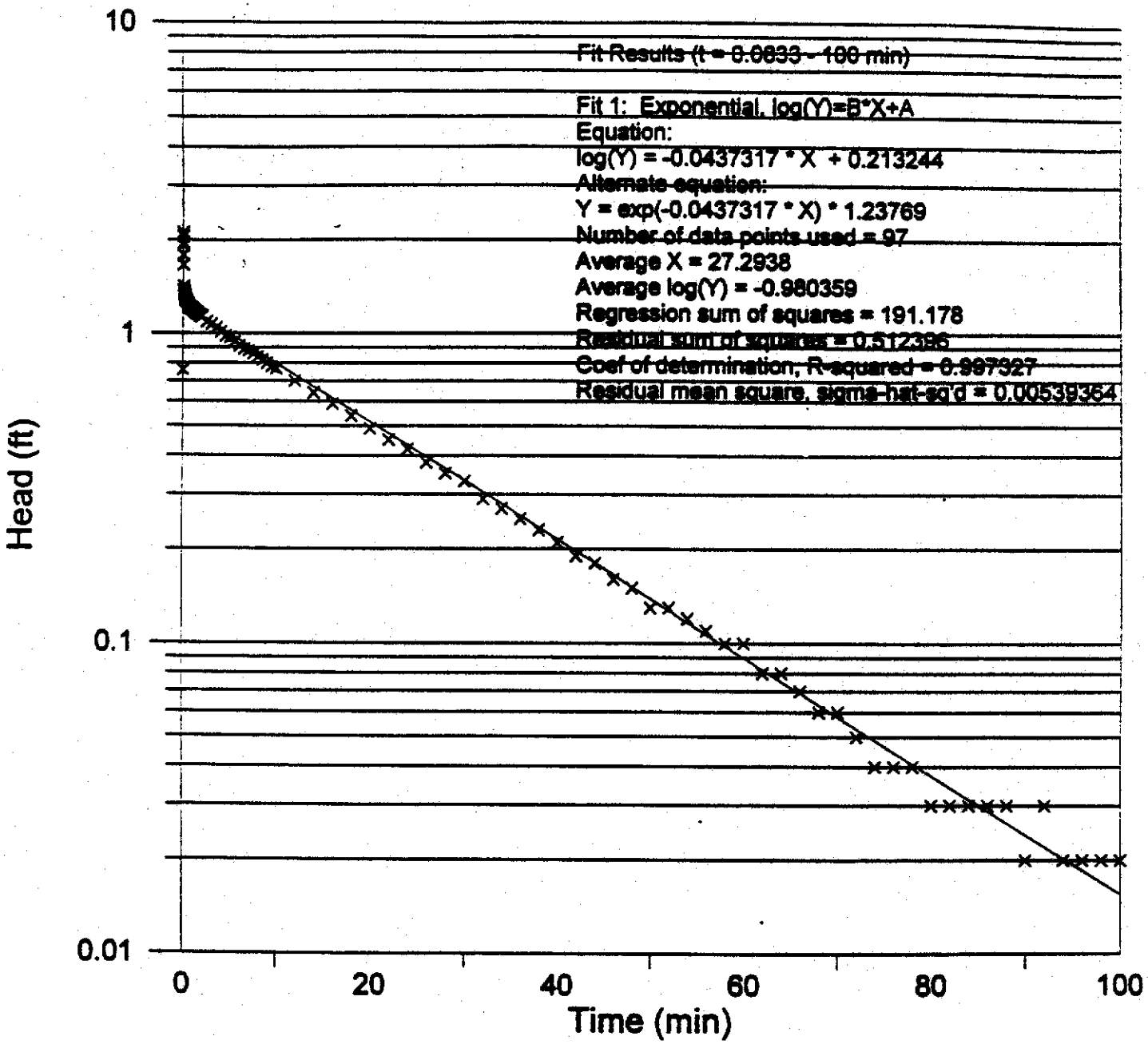
HYDRAULIC CONDUCTIVITY - MWS24 (FALLING HEAD)
TEST DATE-3/14/95



HYDRAULIC CONDUCTIVITY - MWS24 (RISING HEAD)
TEST DATE-3/14/95



MW-2001 - Test 4 - falling



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\,in$ well radius $r_w = 0.354\,ft$

$L = 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

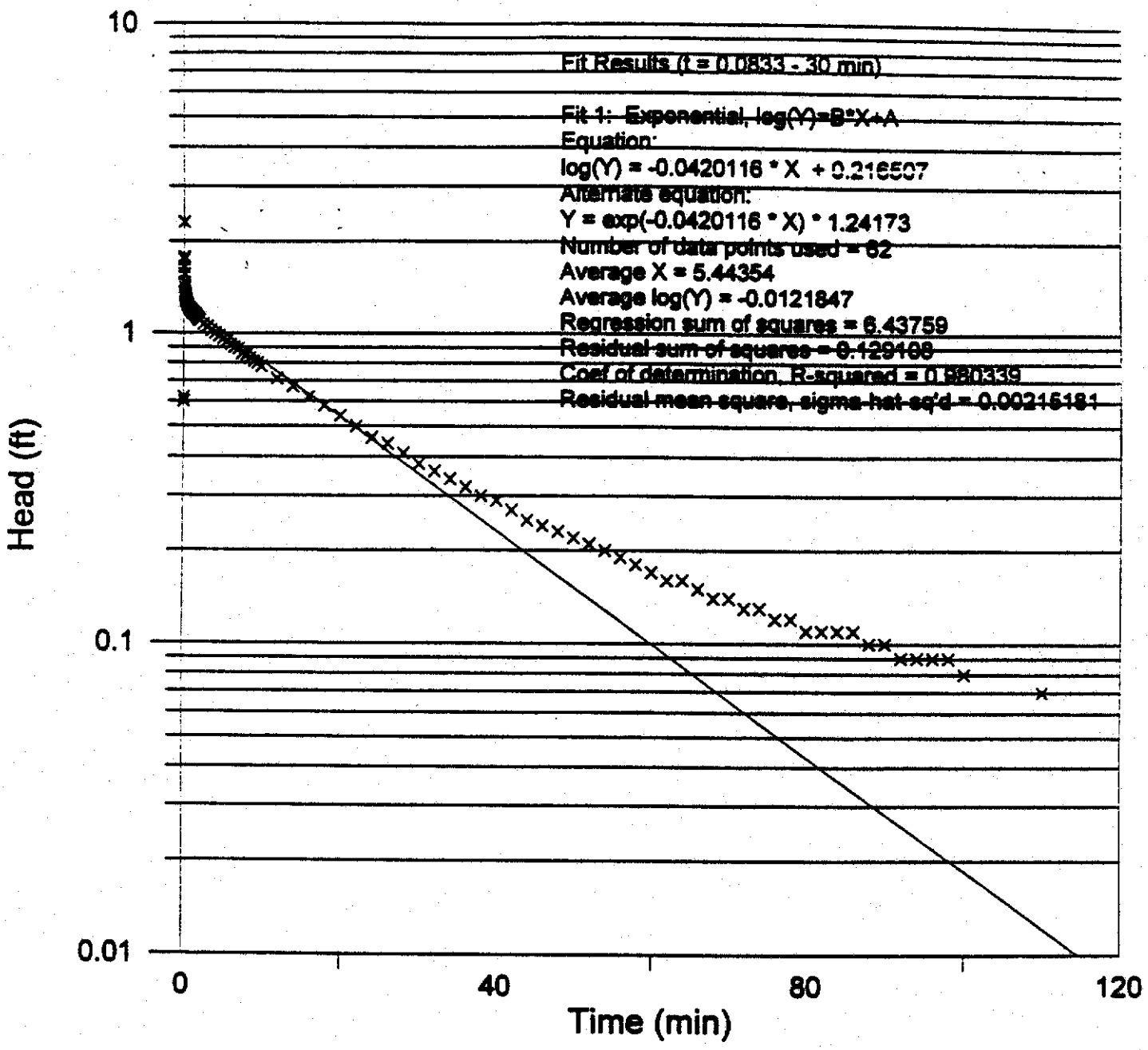
$H0 = 1.57\,ft$ $H := ((613.44 - 24.22) - 553.7)\cdot ft$ $H = 35.52\,ft$ $D := ((613.44 - 24.22) - 547.7)\cdot ft$

$D = 41.52\,ft$ $S := .0437317\,min^{-1}$ slope $A = 2.390$ $B = 0.388$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K = \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 5\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 3\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2001 - Test 5 - rising



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w = \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L = 10\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

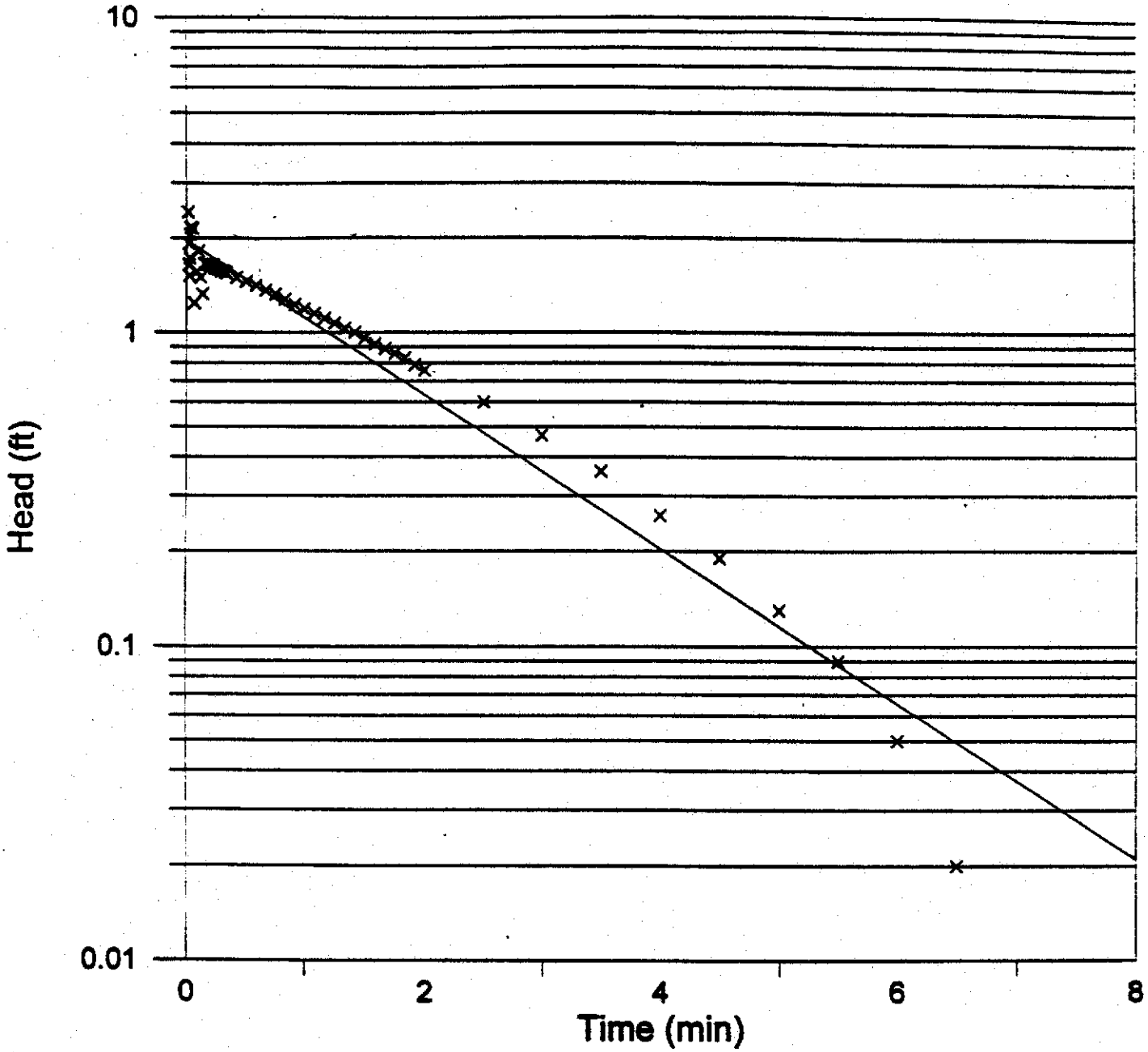
$H0 = 1.57\,ft$ $H := ((613.44 - 24.22) - 553.7)\cdot ft$ $H = 35.52\,ft$ $D := ((613.44 - 24.22) - 547.7)\cdot ft$

$D = 41.52\,ft$ $S = .0420116\,min^{-1}$ slope $A = 2.390$ $B = 0.388$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K = \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 5\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 3\cdot 10^{-5}\cdot\frac{cm}{sec}$

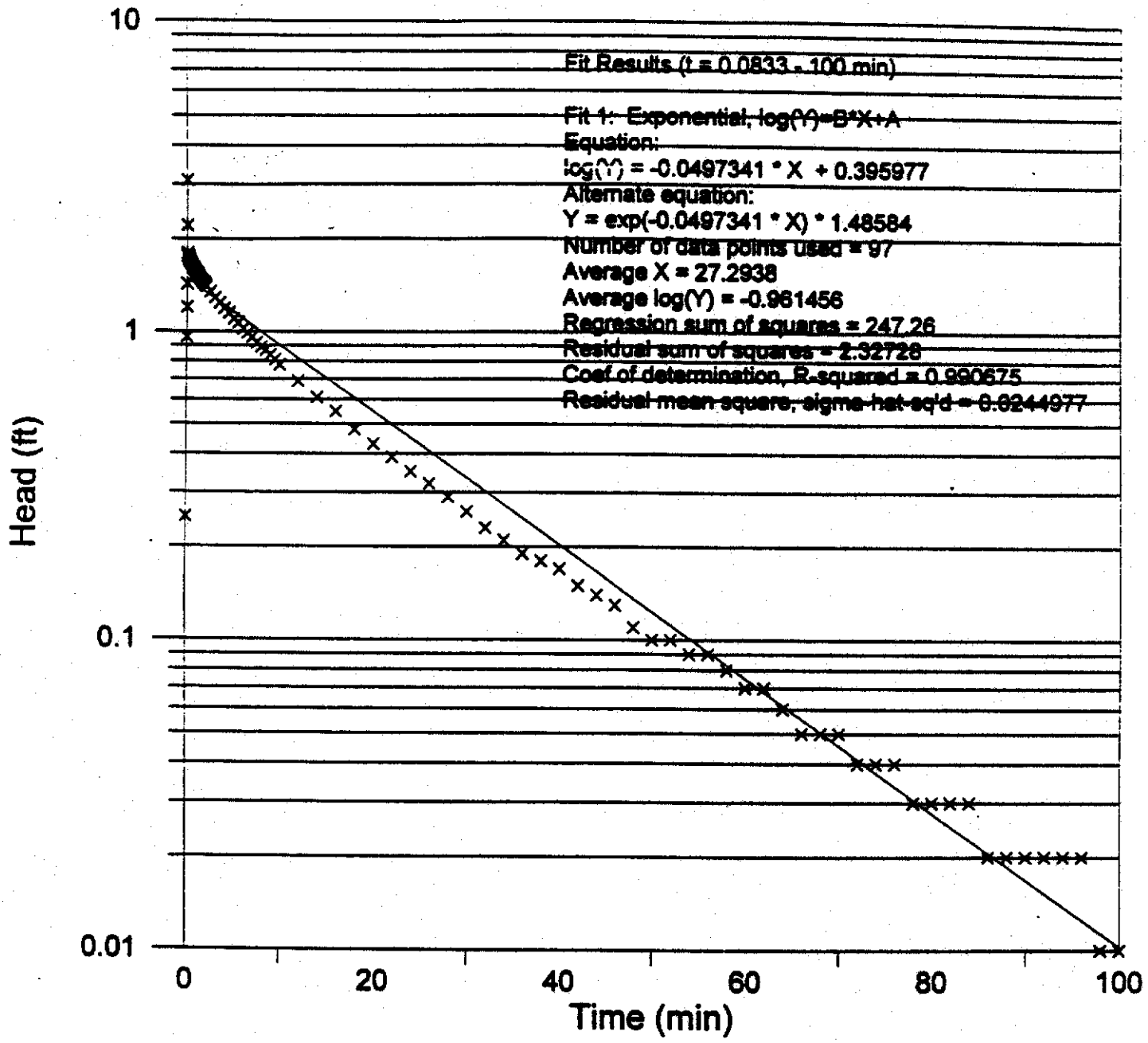
MW-2003 - Test 2 - falling



Fit Results

Fit 1: Exponential, log(Y)=B*X+A
Equation:
log(Y) = -0.566877 * X + 0.677764
Alternate equation:
Y = exp(-0.566877 * X) * 1.96947
Number of data points used = 54
Average X = 1.26443
Average log(Y) = -0.0390114
Regression sum of squares = 46.7676
Residual sum of squares = 2.0419
Coef of determination, R-squared = 0.958166
Residual mean square, sigma-hat-sq'd = 0.0392673

MW-2003 - Test 3 - rising



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w = \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L = 10\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2}\cdot l$ displacement

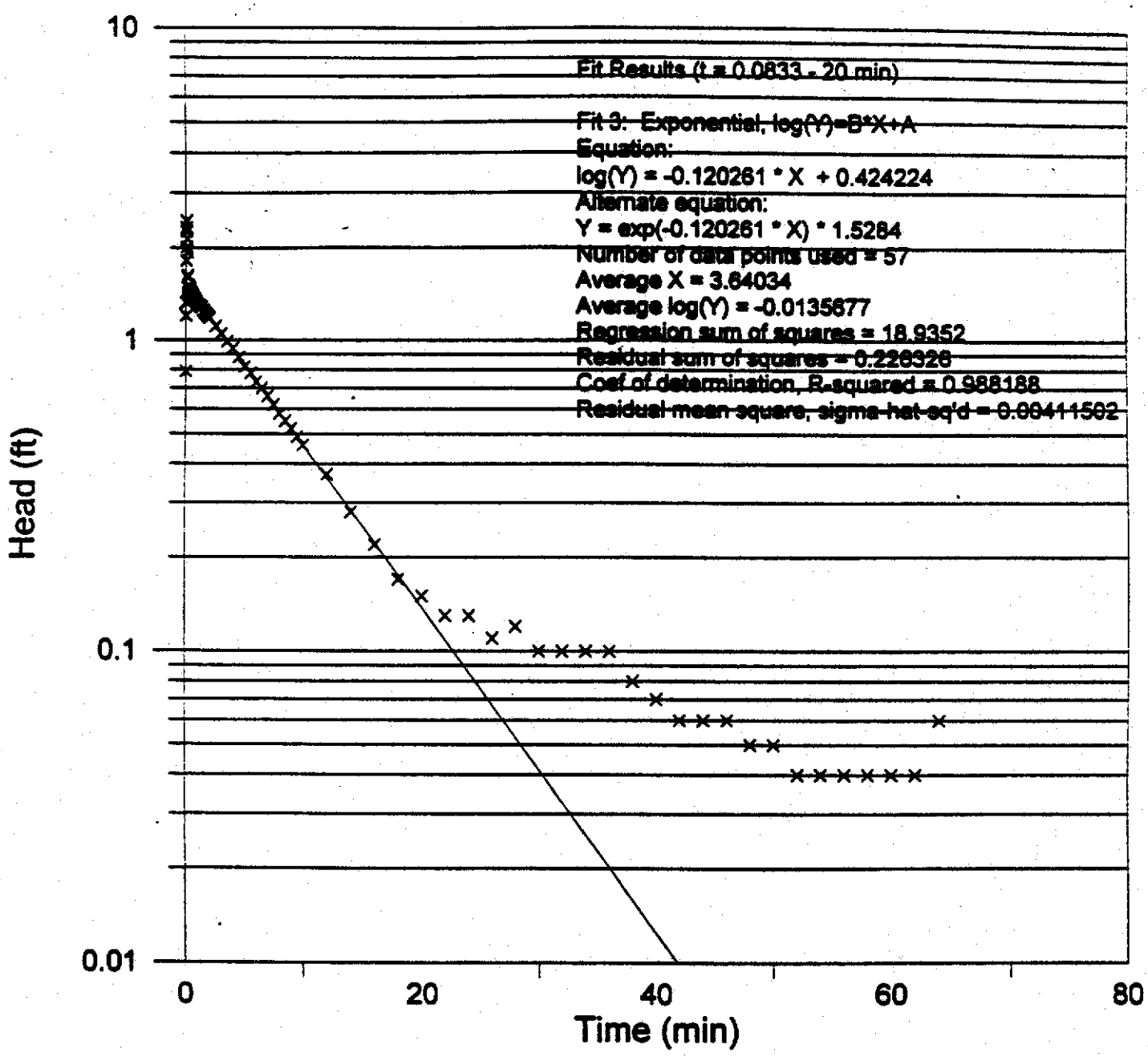
$H0 = 1.57\,ft$ $H = ((638.78 - 40.12) - 579.1)\cdot ft$ $H = 19.56\,ft$ $D = ((638.78 - 40.12) - 573.1)\cdot ft$

$D = 25.56\,ft$ $S = .0497341\,min^{-1}$ slope $A = 2.390$ $B = 0.388$ geometry coefficients

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K = \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 5\cdot10^{-5}\cdot\frac{ft}{min}$ $K = 3\cdot10^{-5}\cdot\frac{cm}{sec}$

MW-2007 - Test 2 - falling



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w = \frac{8.5}{2}\,in$ well radius $r_w = 0.354\,ft$

$L = 10\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2} \cdot l$ displacement

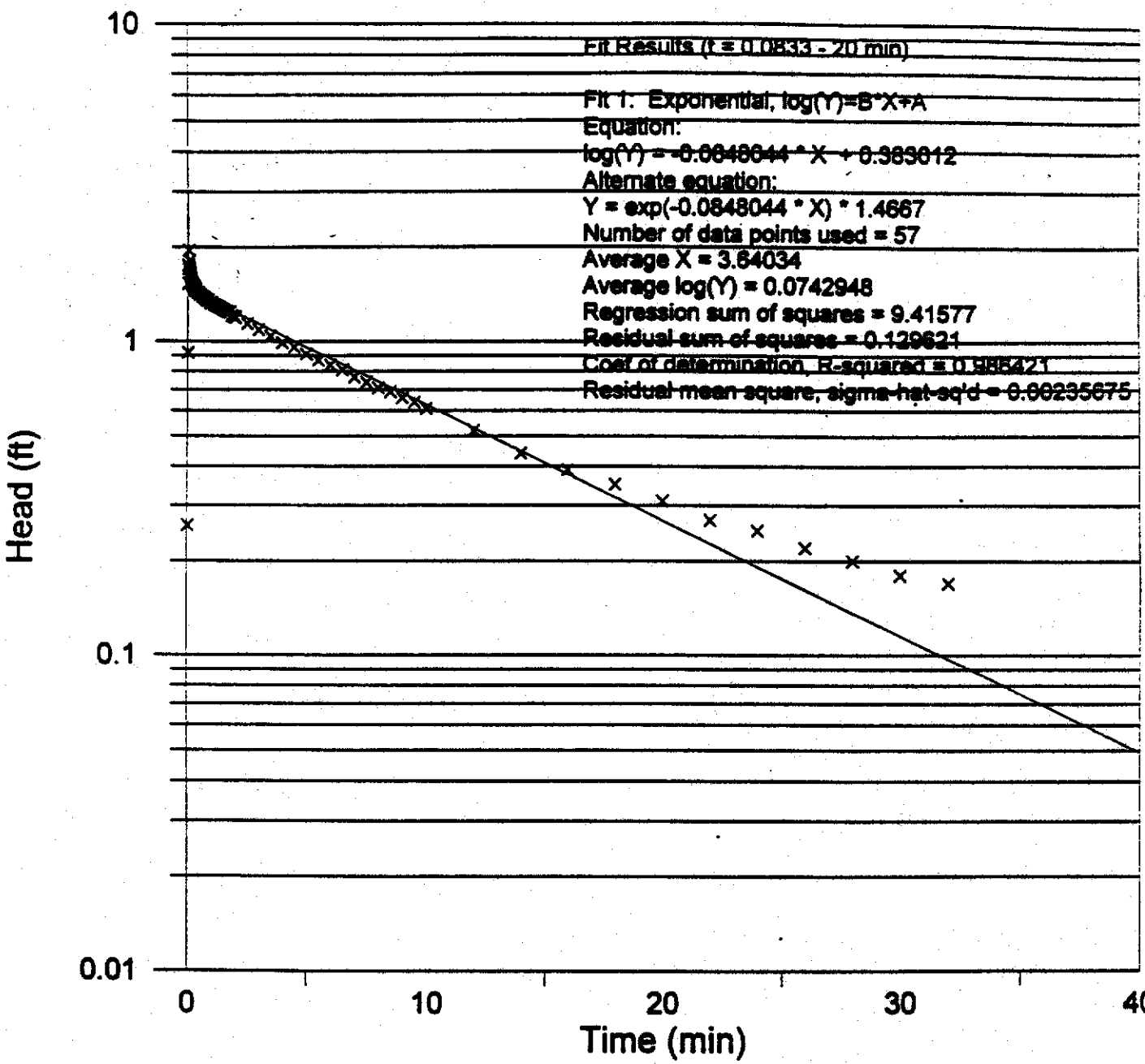
$H0 = 1.57\,ft$ $H = ((653.60 - 60.69) - 558.9)\,ft$ $H = 34.01\,ft$ $D = ((653.60 - 60.69) - 552.9)\,ft$

$D = 40.01\,ft$ $S = .12026\,min^{-1}$ slope $A = 2.390$ $B = 0.388$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B \cdot \ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K = \frac{r_c^2 \cdot \ln Rerw}{2 \cdot L} \cdot S$ $K = 1 \cdot 10^{-4} \cdot \frac{ft}{min}$ $K = 7 \cdot 10^{-5} \cdot \frac{cm}{sec}$

MW-2007 - Test 3 - rising



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w = \frac{8.5}{2}\,in$ well radius $r_w = 0.354\,ft$

$L = 10\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2} \cdot l$ displacement

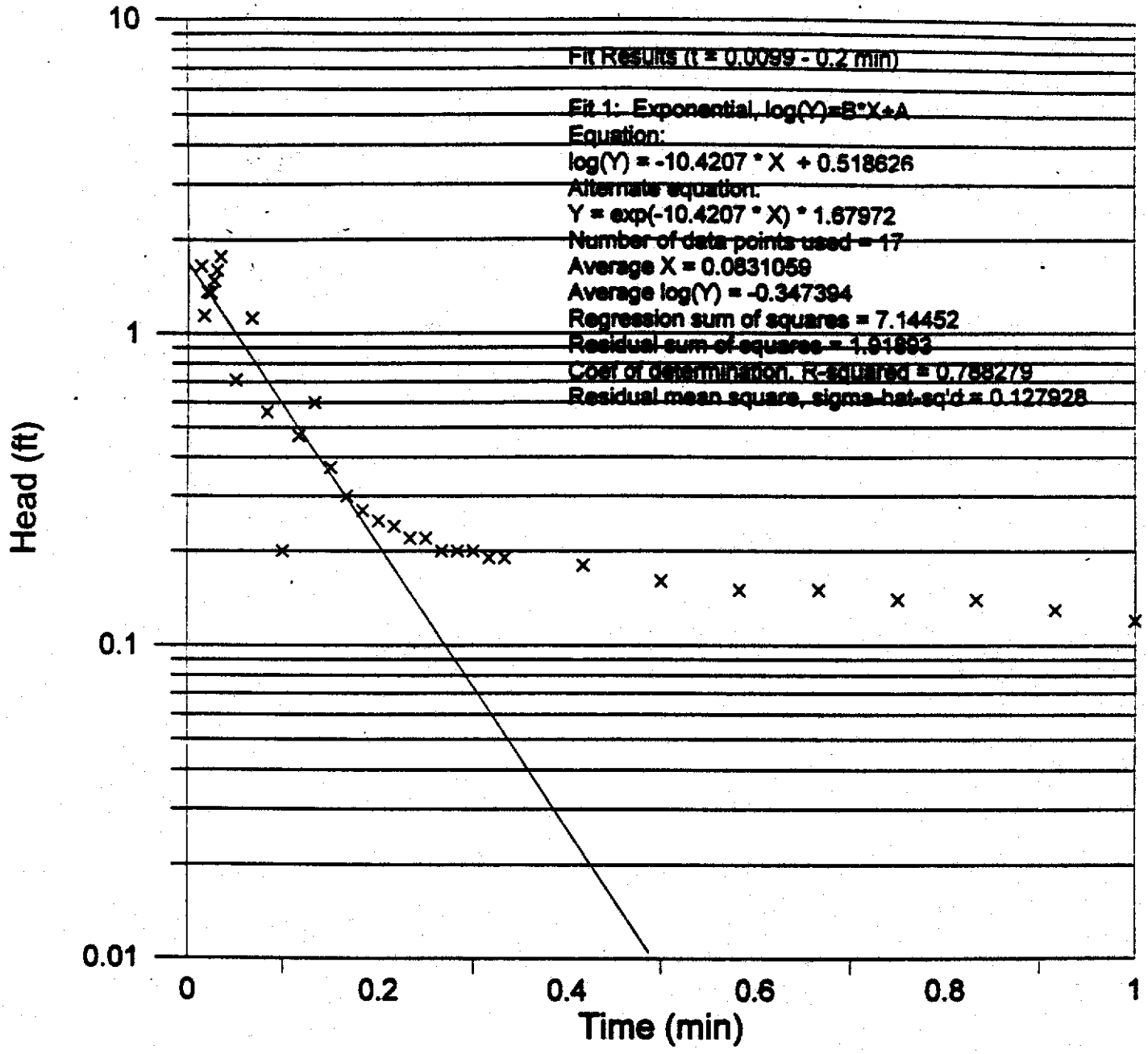
$H0 = 1.57\,ft$ $H = ((653.60 - 60.69) - 558.9)\,ft$ $H = 34.01\,ft$ $D = ((653.60 - 60.69) - 552.9)\,ft$

$D = 40.01\,ft$ $S = .0848044\,min^{-1}$ slope $A = 2.390$ $B = 0.388$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B \cdot \ln\left(\frac{D - H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K = \frac{r_c^2 \cdot \ln Rerw}{2 \cdot L} \cdot S$ $K = 1 \cdot 10^{-4} \cdot \frac{ft}{min}$ $K = 5 \cdot 10^{-5} \cdot \frac{cm}{sec}$

MW-2010 - Test 0 - falling



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L := 10\cdot ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

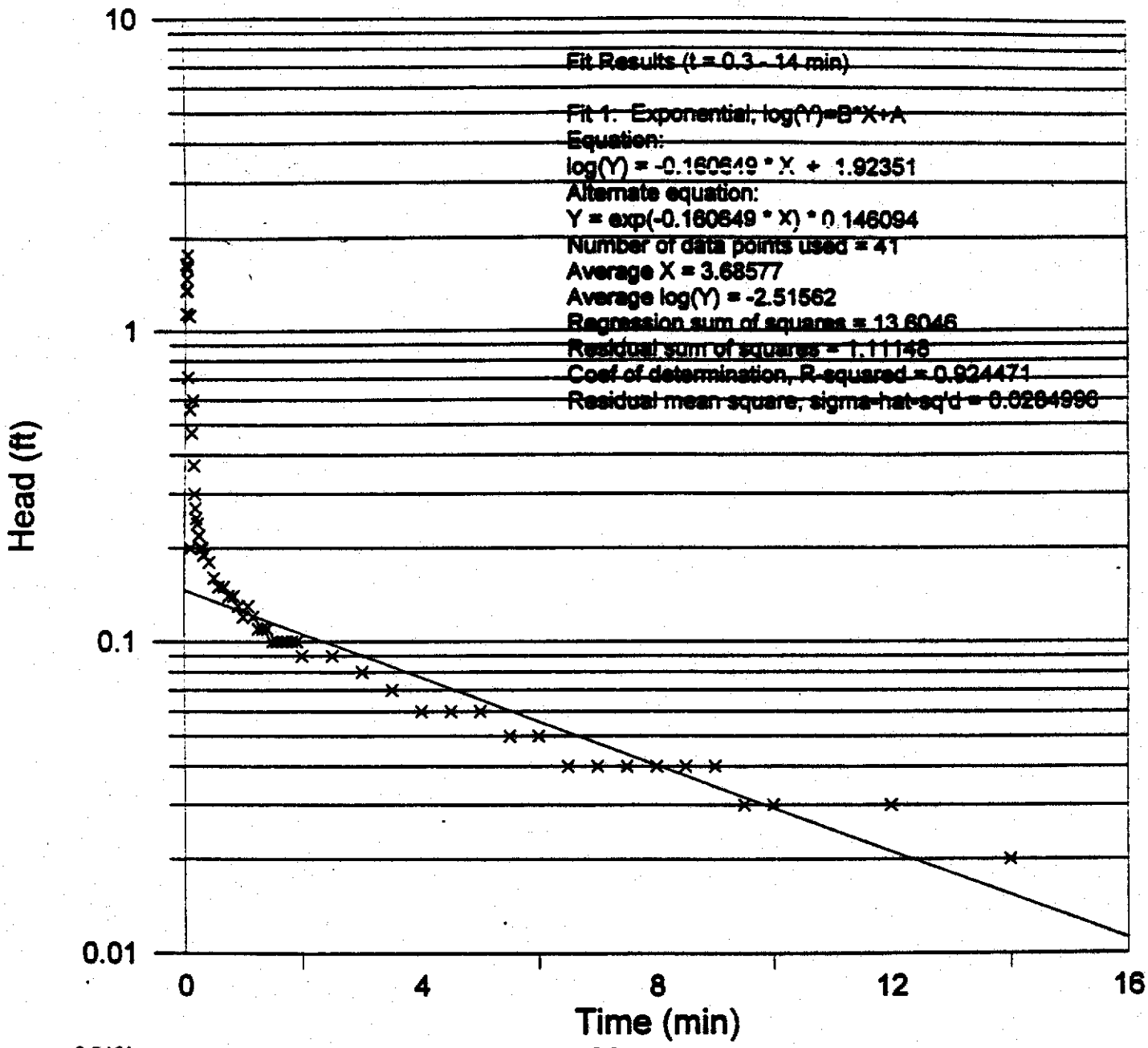
$H0 = 1.57\,ft$ $H := ((644.67 - 43.37) - 584.9)\cdot ft$ $H = 16.4\,ft$ $D := ((644.67 - 43.37) - 578.9)\cdot ft$

$D = 22.4\,ft$ $S = 10.4207\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 1\cdot 10^{-2}\cdot\frac{ft}{min}$ $K = 6\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2010 - Test 0 - falling



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w = \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$ $L = 10\,ft$ screened interval

$r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2}\cdot l$ displacement $H0 = 1.57\,ft$ $n = 0.30$ $r_{cc} = \left[(1-n)\cdot r_c^2 + n\cdot r_v\right.$

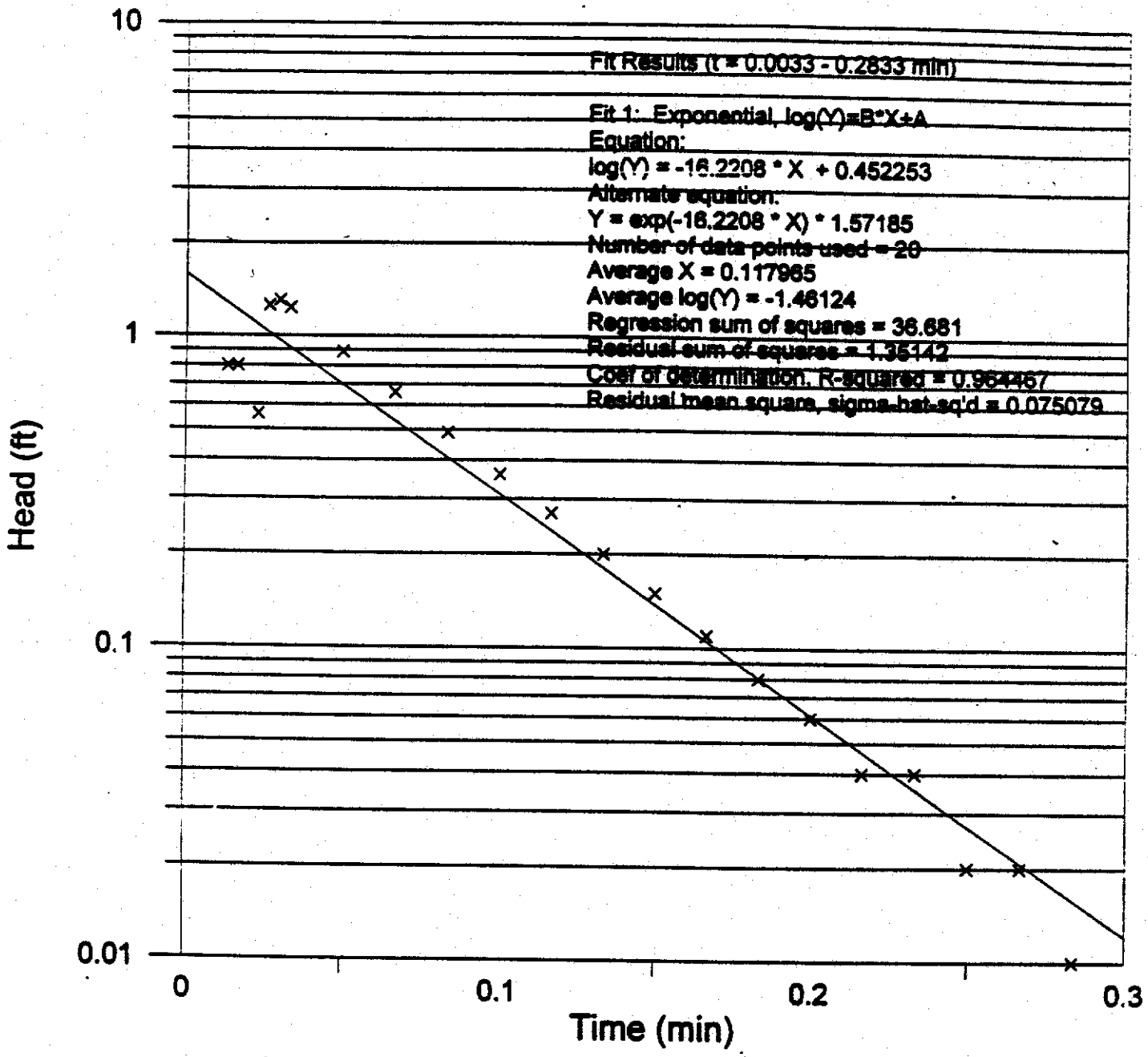
$r_{cc} = 0.209\,ft$ $\frac{r_{cc}^2}{r_c^2} = 5.001$ $H0c = \frac{r_s^2}{r_{cc}^2}\cdot l$ $H0c = 0.313\,ft$ corrected displacement $H = ((644.67 - 43.37) - 584.9)\cdot$

$H = 16.4\,ft$ $D = ((644.67 - 43.37) - 578.9)\cdot ft$ $D = 22.4\,ft$ $S = .160649\,min^{-1}$ slope $A = 2.390$ $B = 0.388$ geometry coeffi

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K = \frac{r_{cc}^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 9\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 4\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2010 - Test 1 - rising



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L = 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

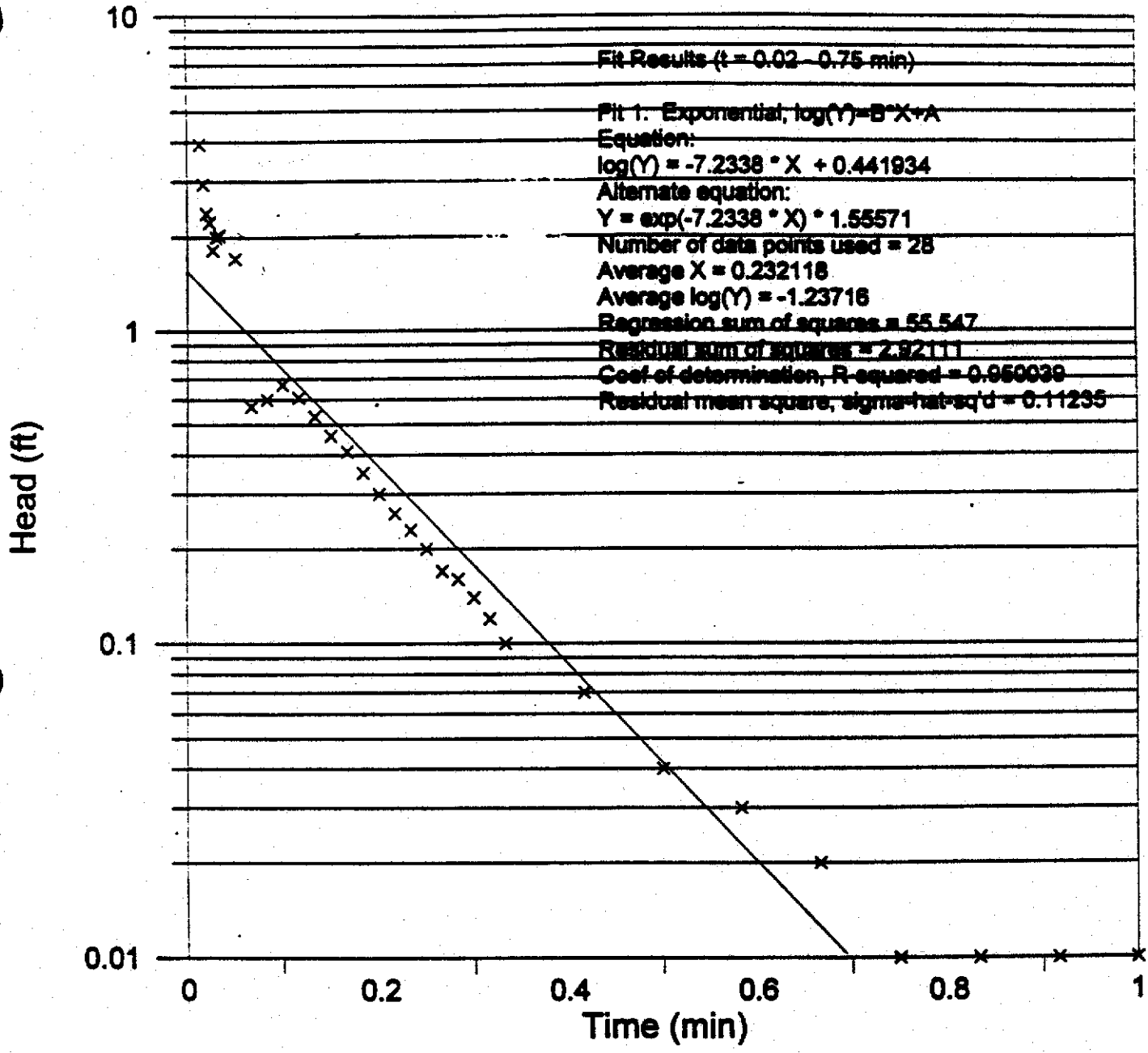
$H0 = 1.57\,ft$ $H = ((644.67 - 43.37) - 584.9)\cdot ft$ $H = 16.4\,ft$ $D = ((644.67 - 43.37) - 578.9)\cdot ft$

$D = 22.4\,ft$ $S = 16.2208\,min^{-1}$ slope $A = 2.390$ $B = 0.388$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 2\cdot 10^{-2}\cdot\frac{ft}{min}$ $K = 9\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2011 - Test 4 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\,in$ well radius $r_w = 0.354\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

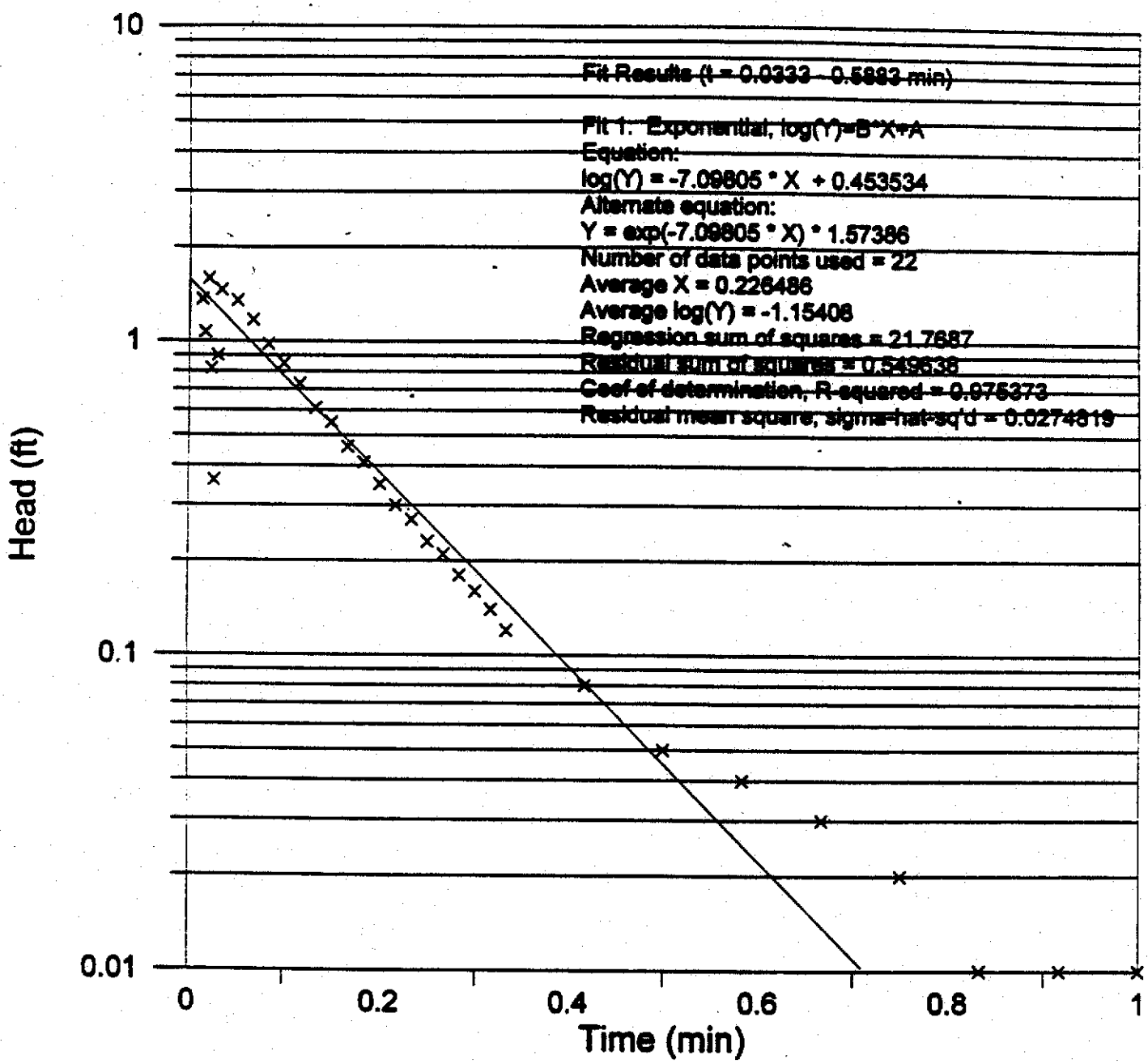
$H0 = 1.57\,ft$ $H := ((655.28 - 54.18) - 580.4)\,ft$ $H = 20.7\,ft$ $D := ((655.28 - 54.18) - 574.2)\,ft$

$D = 26.9\,ft$ $S := 7.2338\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B \cdot \ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$ partially penetrating case

$K := \frac{r_c^2 \cdot \ln Rerw}{2 \cdot L} \cdot S$ $K = 8 \cdot 10^{-3} \cdot \frac{ft}{min}$ $K = 4 \cdot 10^{-3} \cdot \frac{cm}{sec}$

MW-2011 - Test 5 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L := 10\cdot ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\cdot ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

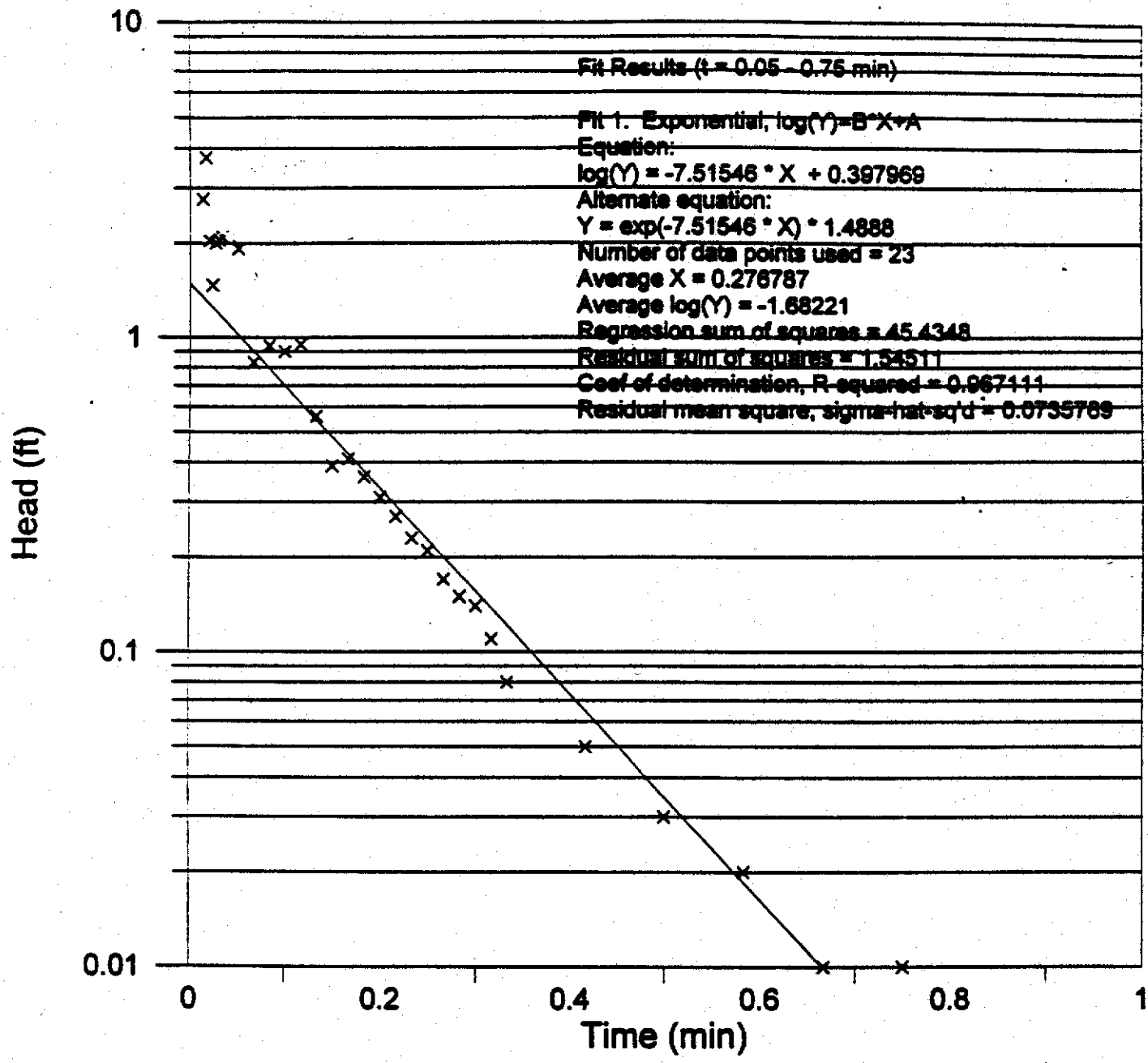
$H0 = 1.57\,ft$ $H := ((655.28 - 54.18) - 580.4)\cdot ft$ $H = 20.7\,ft$ $D := ((655.28 - 54.18) - 574.2)\cdot ft$

$D = 26.9\,ft$ $S := 7.09805\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ partially penetrating case

$K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 8\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 4\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2011 - Test 6 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

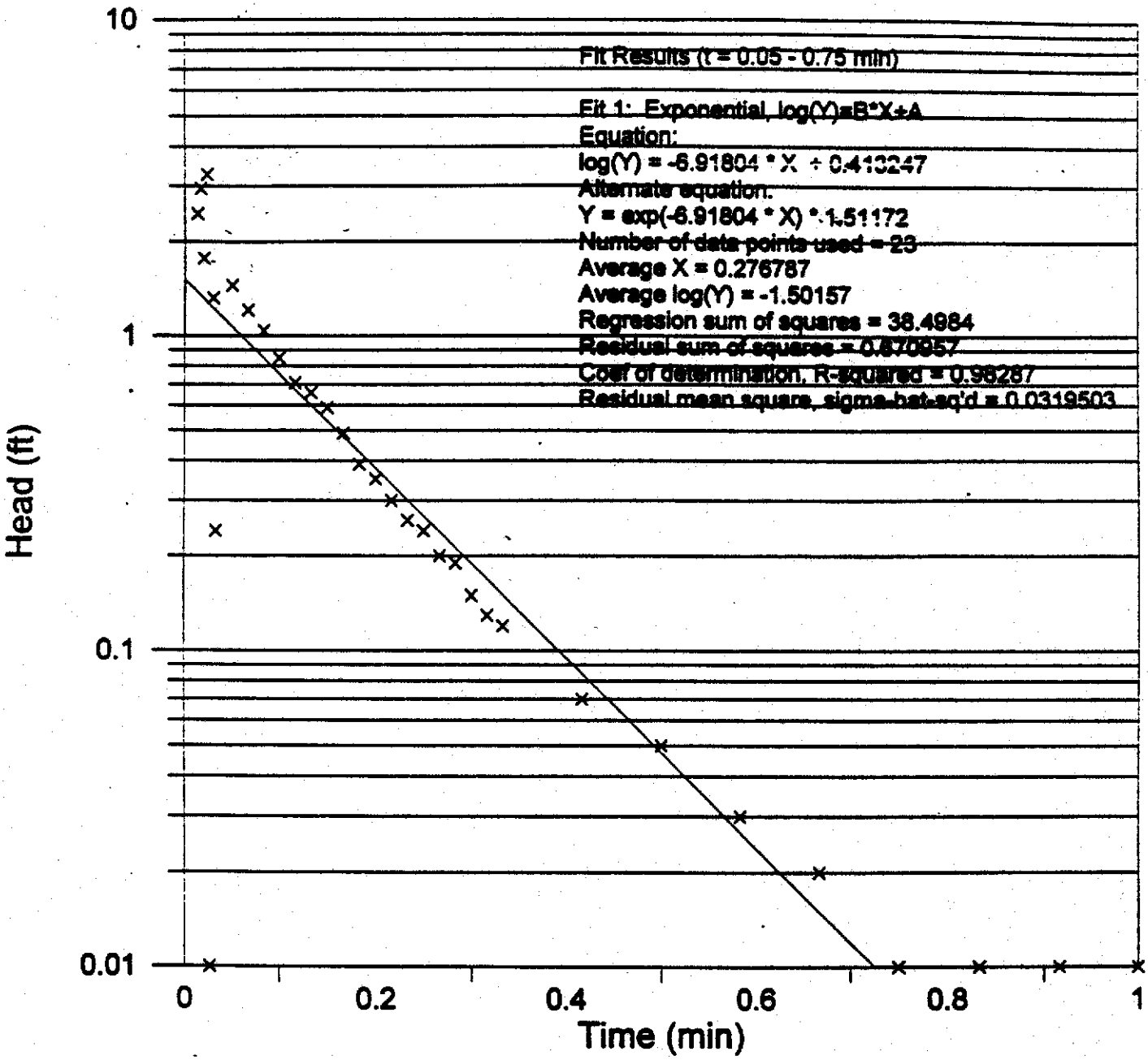
$H0 = 1.57\,ft$ $H := ((655.28 - 54.18) - 580.4)\cdot ft$ $H = 20.7\,ft$ $D := ((655.28 - 54.18) - 574.2)\cdot ft$

$D = 26.9\,ft$ $S := 7.51546\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 8\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 4\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2011 - Test 7 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

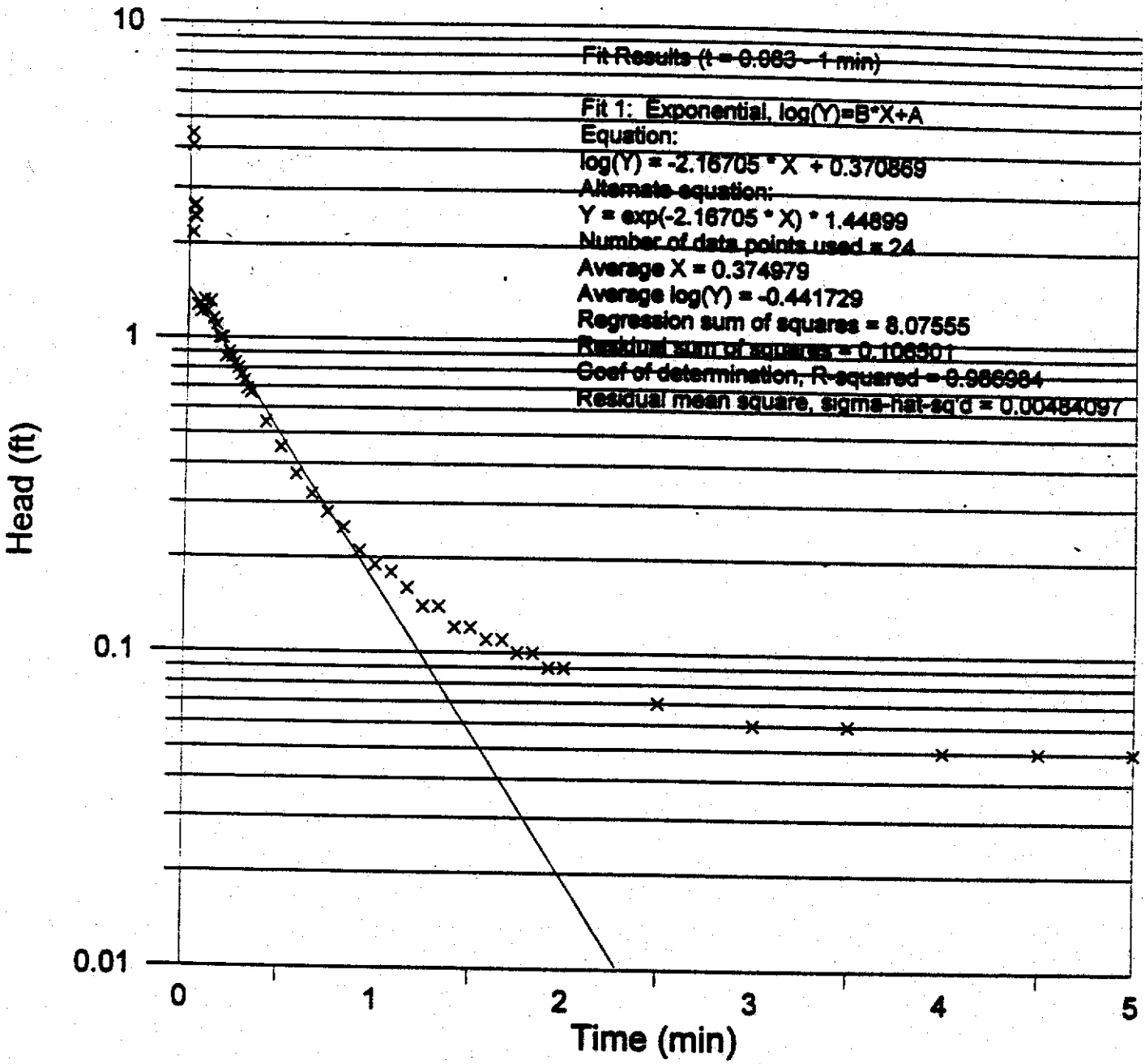
$H0 = 1.57\,ft$ $H := ((655.28 - 54.18) - 580.4)\cdot ft$ $H = 20.7\,ft$ $D := ((655.28 - 54.18) - 574.2)\cdot ft$

$D = 26.9\,ft$ $S := 6.91804\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ partially penetrating case

$K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 8\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 4\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2012 - Test 0 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

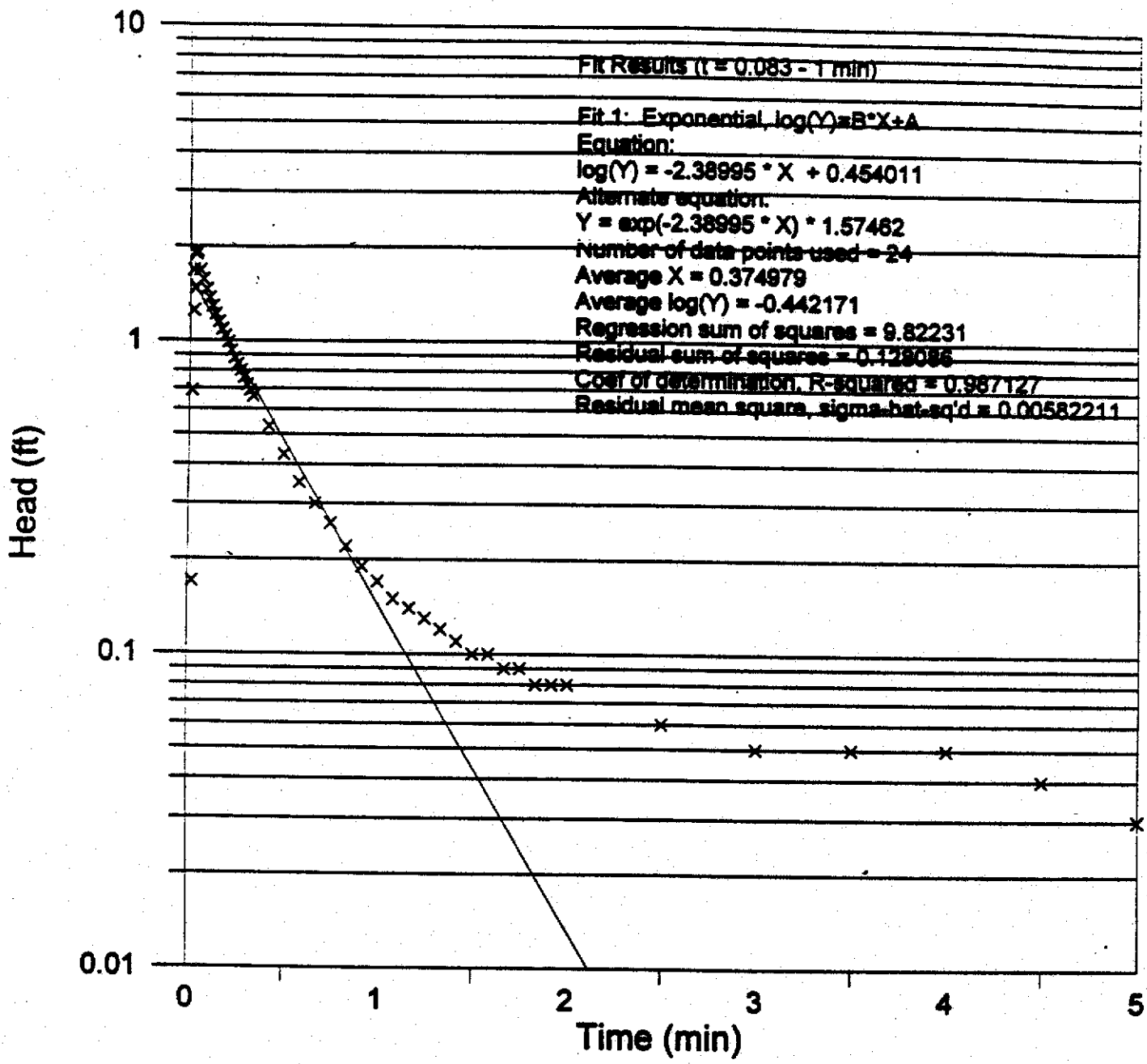
$H0 = 1.57\,ft$ $H := ((636.61 - 27.09) - 576.8)\cdot ft$ $H = 32.72\,ft$ $D := ((636.61 - 27.09) - 565.3)\cdot ft$

$D = 44.22\,ft$ $S := 2.16705\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 3\cdot10^{-3}\cdot\frac{ft}{min}$ $K = 1\cdot10^{-3}\cdot\frac{cm}{sec}$

MW-2012 - Test 1 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\,in$ well radius $r_w = 0.354\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

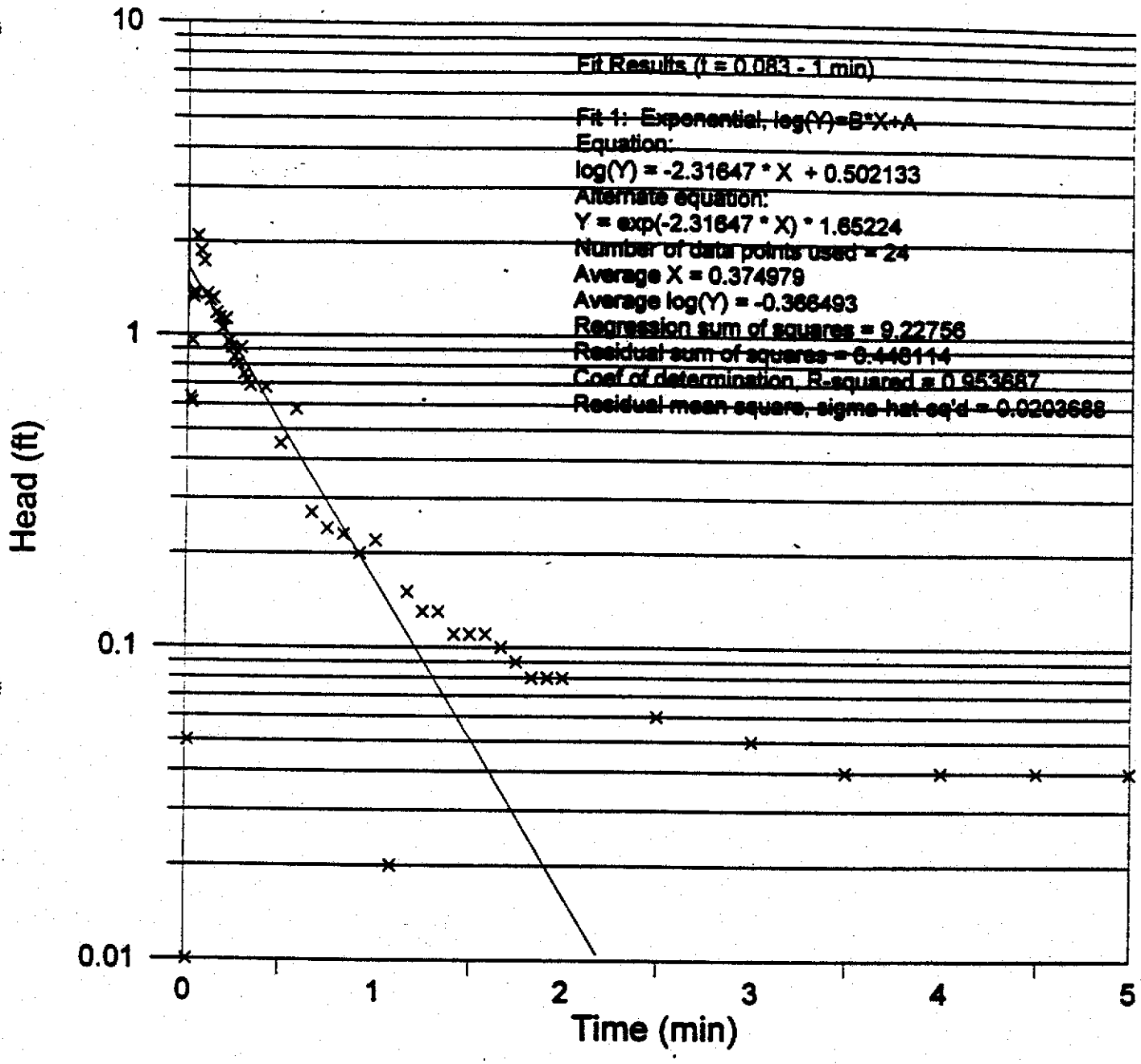
$H0 = 1.57\,ft$ $H := ((636.61 - 27.09) - 576.8)\cdot ft$ $H = 32.72\,ft$ $D := ((636.61 - 27.09) - 565.3)\cdot ft$

$D = 44.22\,ft$ $S := 2.38995\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2 \cdot \ln Rerw}{2\cdot L} \cdot S$ $K = 3\cdot 10^{-3}\cdot \frac{ft}{min}$ $K = 1\cdot 10^{-3}\cdot \frac{cm}{sec}$

MW-2012 - Test 2 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

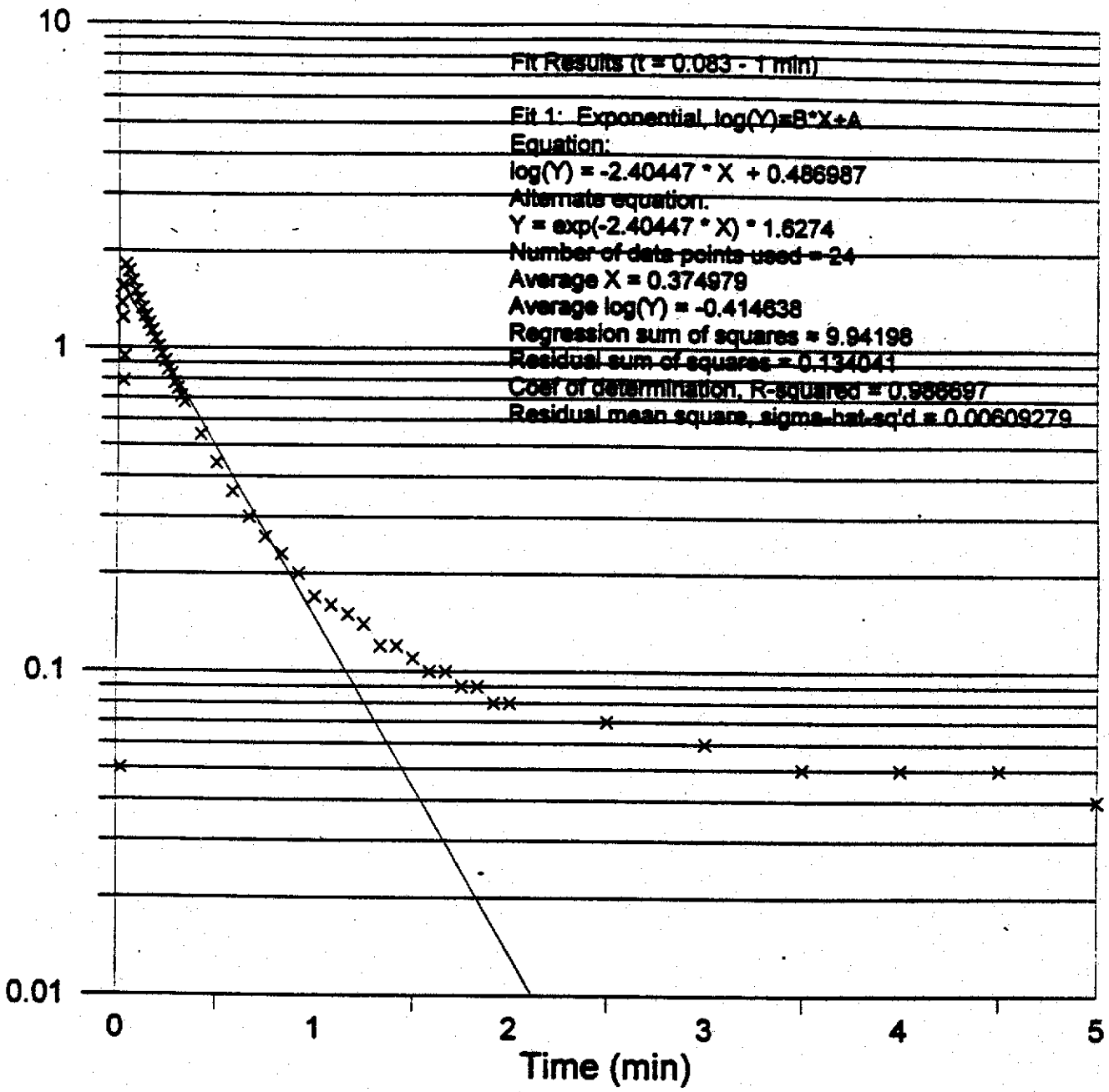
$H0 = 1.57\,ft$ $H := ((636.61 - 27.09) - 576.8)\cdot ft$ $H = 32.72\,ft$ $D := ((636.61 - 27.09) - 565.3)\cdot ft$

$D = 44.22\,ft$ $S := 2.31647\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 3\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 1\cdot 10^{-2}\cdot\frac{cm}{sec}$

MW-2012 - Test 3 - rising



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L := 10\cdot ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

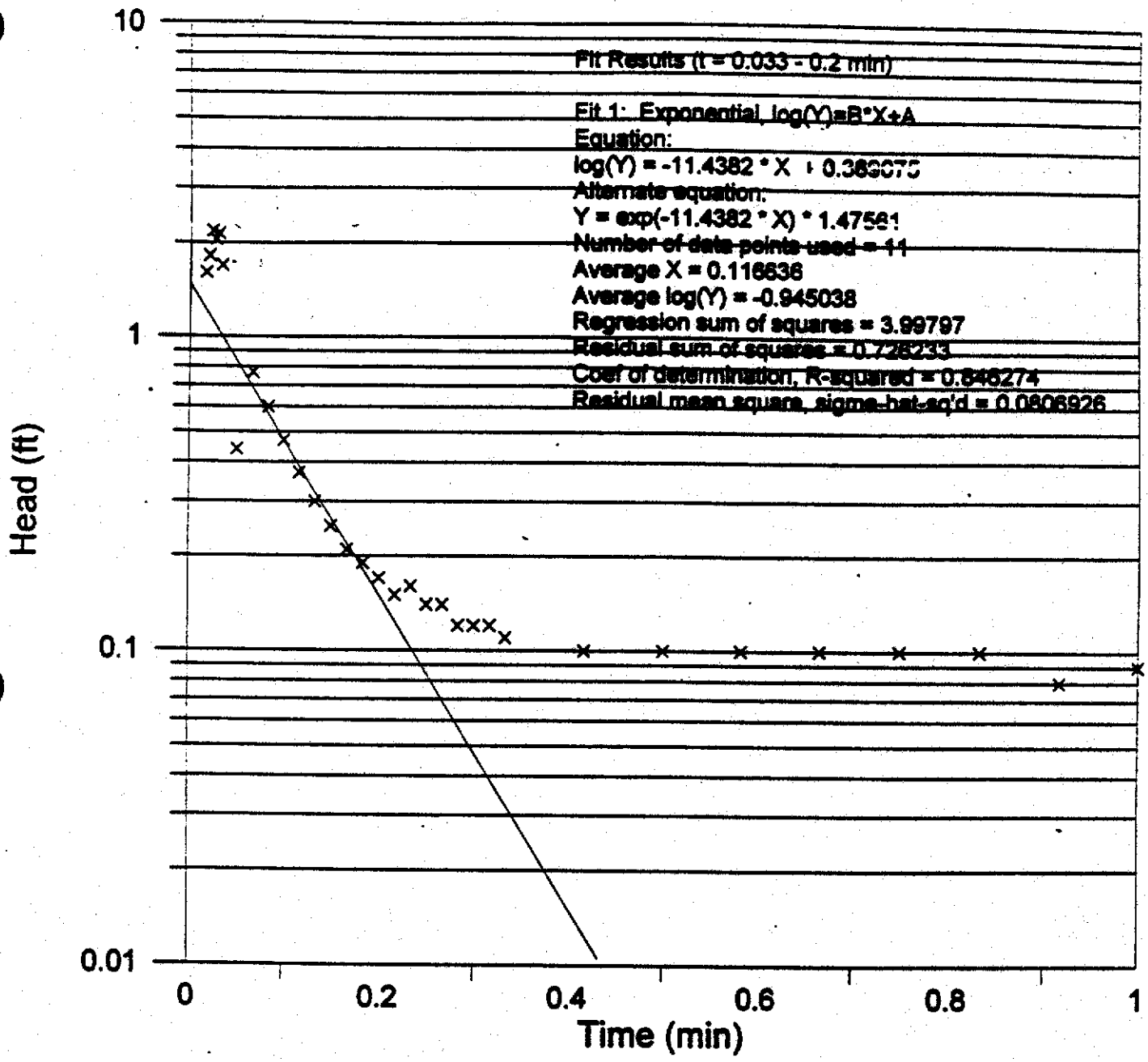
$H0 = 1.57\,ft$ $H := ((636.61 - 27.09) - 576.8)\cdot ft$ $H = 32.72\,ft$ $D := ((636.61 - 27.09) - 565.3)\cdot ft$

$D = 44.22\,ft$ $S := 2.40447\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K = \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 3\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 1\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2014 - Test 0 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

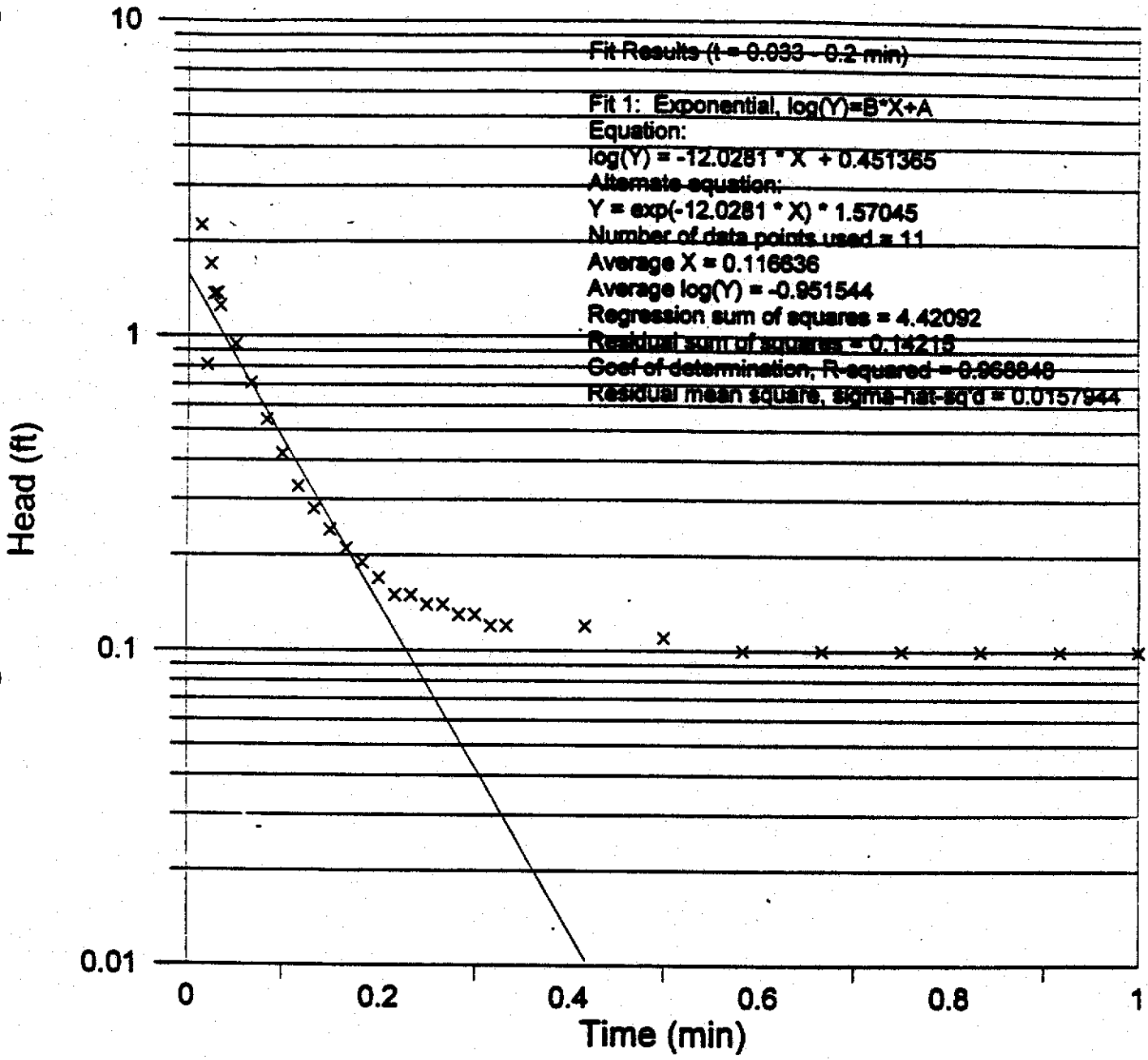
$H0 = 1.57\,ft$ $H := ((649.37 - 44.50) - 589.6)\cdot ft$ $H = 15.27\,ft$ $D := ((649.37 - 44.50) - 583.6)\cdot ft$

$D = 21.27\,ft$ $S := 11.4382\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$ partially penetrating case

$K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 1\cdot 10^{-2}\cdot\frac{ft}{min}$ $K = 6\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2014 - Test 1 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L = 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 1.57\,ft$ $H := ((649.37 - 44.50) - 589.6)\cdot ft$ $H = 15.27\,ft$ $D := ((649.37 - 44.50) - 583.6)\cdot ft$

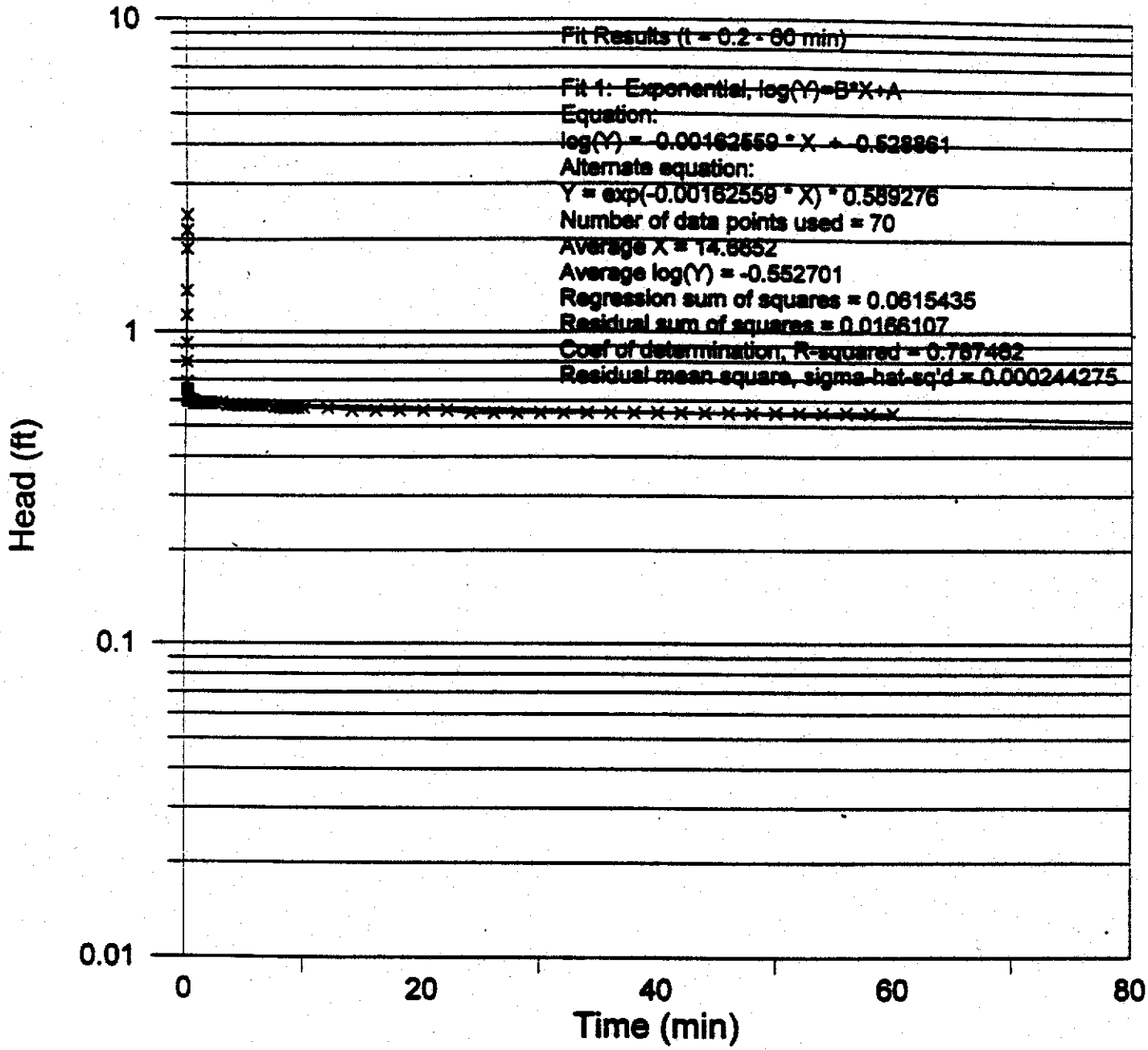
$D = 21.27\,ft$ $S := 12.0281\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case

$K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 1\cdot 10^{-2}\cdot\frac{ft}{min}$ $K = 6\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2017 - Test 0 - falling



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$ $L := 10\cdot ft$ screened interval

$r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\cdot ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement $H0 = 1.57\,ft$ $n := 0.30$ $r_{cc} := \left[(1-n)\cdot r_c^2 + n\cdot r_v\right.$

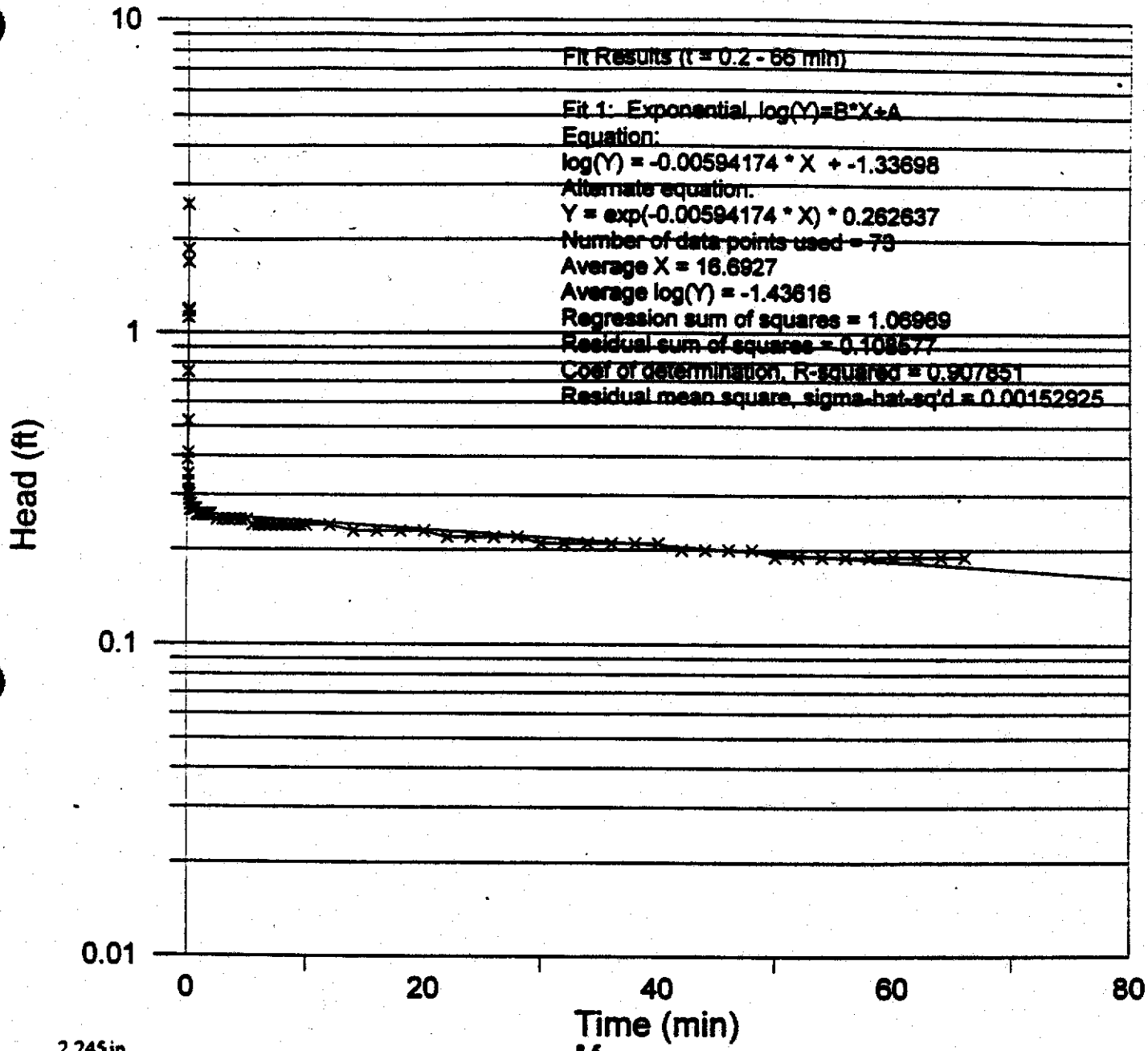
$r_{cc} = 0.209\,ft$ $\frac{r_{cc}^2}{r_c^2} = 5.001$ $H0c := \frac{r_s^2}{r_{cc}^2}\cdot l$ $H0c = 0.313\,ft$ corrected displacement $H := ((659.84 - 53.64) - 594.9)\cdot f$

$H = 11.3\,ft$ $D := ((659.84 - 53.64) - 588.9)\cdot ft$ $D = 17.3\,ft$ $S := .00162559\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coeffic

$$\ln Rerw = \left| \frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right|^{-1}$$

partially penetrating case $K := \frac{r_{cc}^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 8\cdot 10^{-6}\cdot\frac{ft}{min}$ $K = 4\cdot 10^{-6}\cdot\frac{cm}{sec}$

MW-2017 - Test 1 - rising



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w = \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$ $L = 10\,ft$ screened interval

$r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2}\cdot l$ displacement $H0 = 1.57\,ft$ $n = 0.30$ $r_{cc} = \left[(1-n)\cdot r_c^2 + n\cdot r_w^2\right]^{(}$

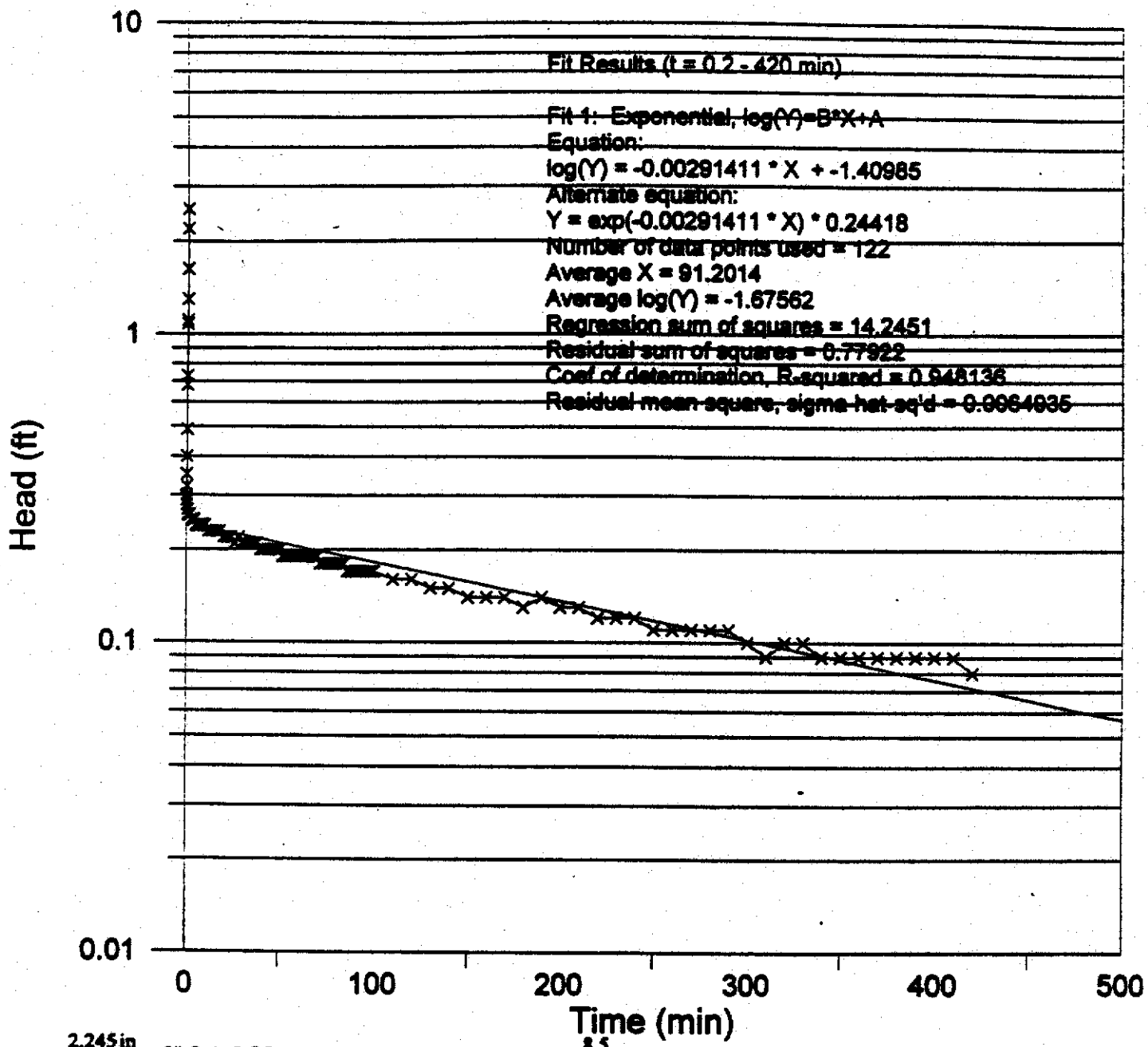
$r_{cc} = 0.209\,ft$ $\frac{r_{cc}^2}{r_c^2} = 5.001$ $H0c = \frac{r_s^2}{r_{cc}^2}\cdot l$ $H0c = 0.313\,ft$ corrected displacement $H = ((659.84 - 53.64) - 594.9)\cdot ft$

$l = 11.3\,ft$ $D = ((659.84 - 53.64) - 588.9)\cdot ft$ $D = 17.3\,ft$ $S = .00594174\,min^{-1}$ slope $A = 2.390$ $B = 0.388$ geometry coefficier

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K = \frac{r_{cc}^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 3\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 1\cdot 10^{-5}\cdot\frac{cm}{sec}$

MW-2017 - Test 2 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$ $L := 10\,ft$ screened interval

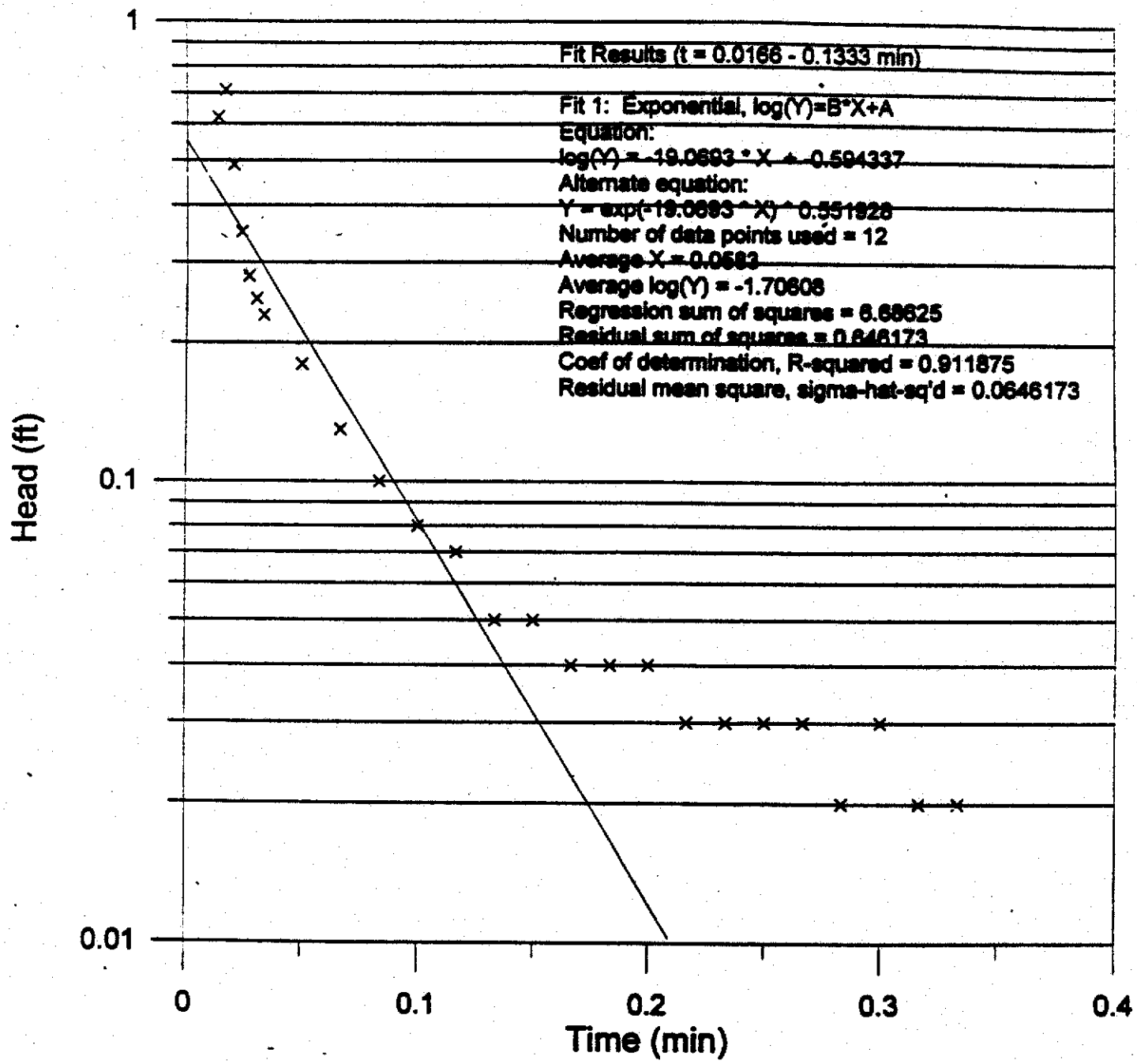
$r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement $H0 = 1.57\,ft$ $n := 0.30$ $r_{cc} := \left[(1-n)\cdot r_c^2 + n\cdot r_\right.$

$r_{cc} = 0.209\,ft$ $\frac{r_{cc}^2}{r_c^2} = 5.001$ $H0c := \frac{r_s^2}{r_{cc}^2}\cdot l$ $H0c = 0.313\,ft$ corrected displacement $H := ((659.84 - 53.64) - 594.9)\cdot$

$H = 11.3\,ft$ $D := ((659.84 - 53.64) - 588.9)\cdot ft$ $D = 17.3\,ft$ $S := .0029141\,min^{-1}$ slope $A := 2.390$ $B := 0.388$ geometry coeffi

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ partially penetrating case $K := \frac{r_{cc}^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 1\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 7\cdot 10^{-6}\cdot\frac{cm}{sec}$

MW-2032 - Test 0 - rising



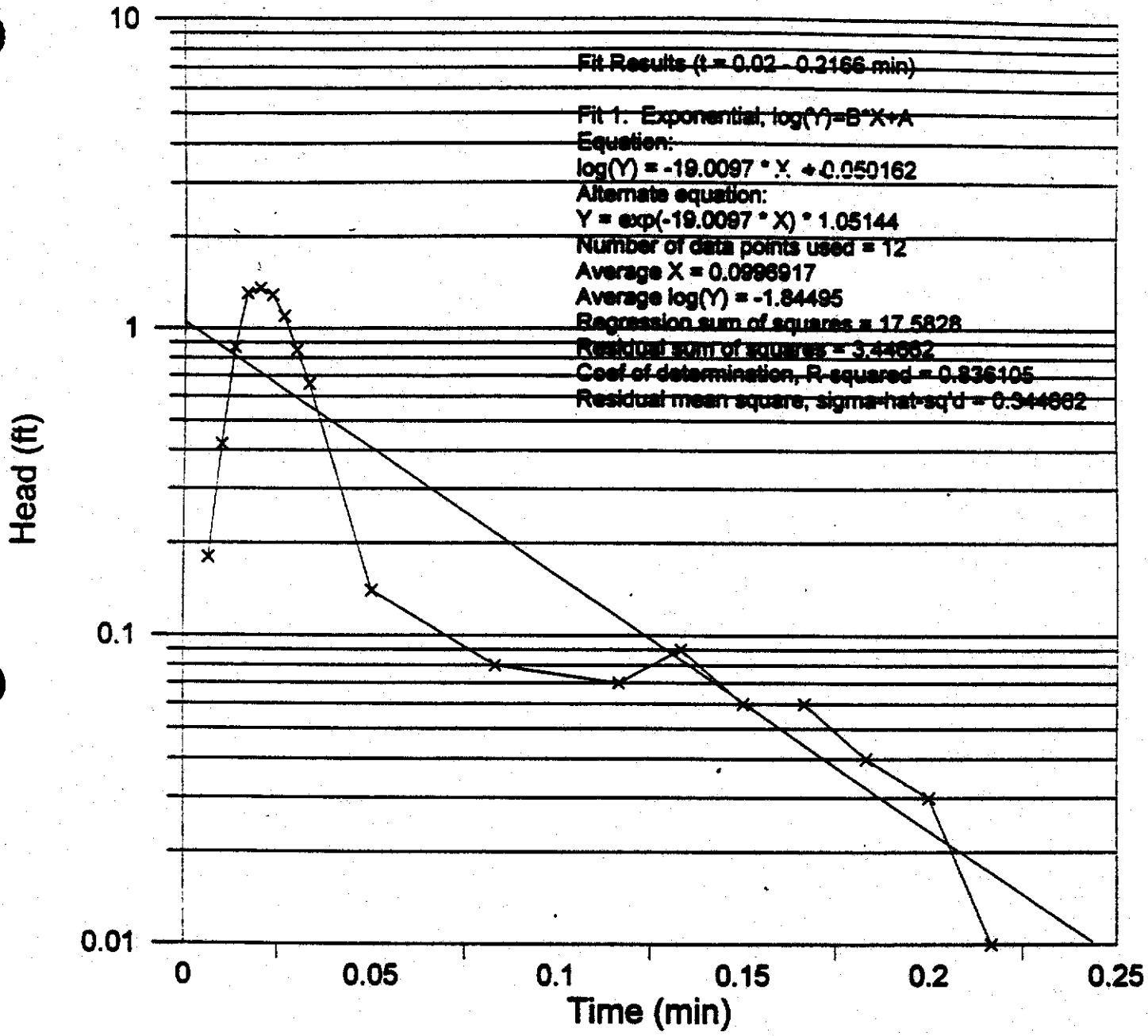
$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

$L := 6.05\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

$H0 = 0.889\,ft$ $H := ((637.48 - 54.23) - 577.2)\cdot ft$ $H = 6.05\,ft$ $S := 19.0693\,min^{-1}$ slope $C := 2.598$ geometry coefficient

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K := \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S$ $K = 7 \cdot 10^{-2} \cdot \frac{ft}{min}$ $K = 4 \cdot 10^{-2} \cdot \frac{cm}{sec}$

MW-2032 - Test 1 - falling h20



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

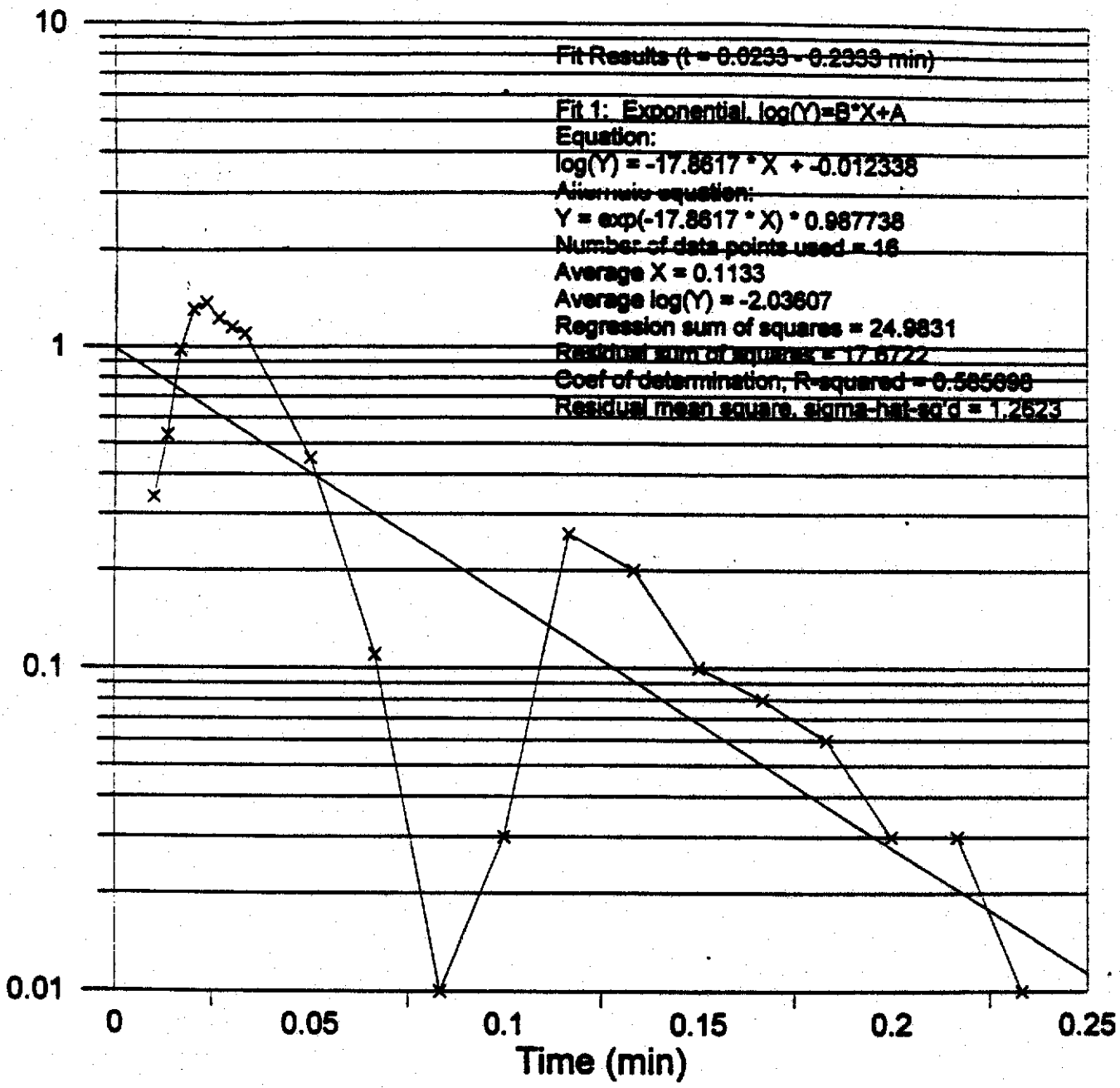
$L := 6.05\,ft$ screened interval $r_s := \frac{1.3\,in}{2}$ bailer radius $r_s = 0.65\,in$ $l := 3.2\,ft$ bailer length

$v_s := \pi \cdot r_s^2 \cdot l + 1 \cdot liter$ bailer volume $r_s := \sqrt{\frac{v_s}{\pi \cdot l}}$ $r_s = 0.964\,in$ equiv. radius $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

$H0 = 1.339\,ft$ $H := ((637.48 - 54.23) - 577.2) \cdot ft$ $H = 6.05\,ft$ $S := 19.0097\,min^{-1}$ slope $C := 2.598$ geometry coefficien

$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)} \right]^{-1}$ fully penetrating case $K := \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S$ $K = 7 \cdot 10^{-2} \cdot \frac{ft}{min}$ $K = 4 \cdot 10^{-2} \cdot \frac{cm}{sec}$

MW-2032 - Test 2 - falling h20



$r_c := \frac{2.98 \cdot in}{2}$ NQ Corehole $r_c = 0.124 \cdot ft$ $r_w := \frac{2.98 \cdot in}{2}$ well radius $r_w = 0.124 \cdot ft$

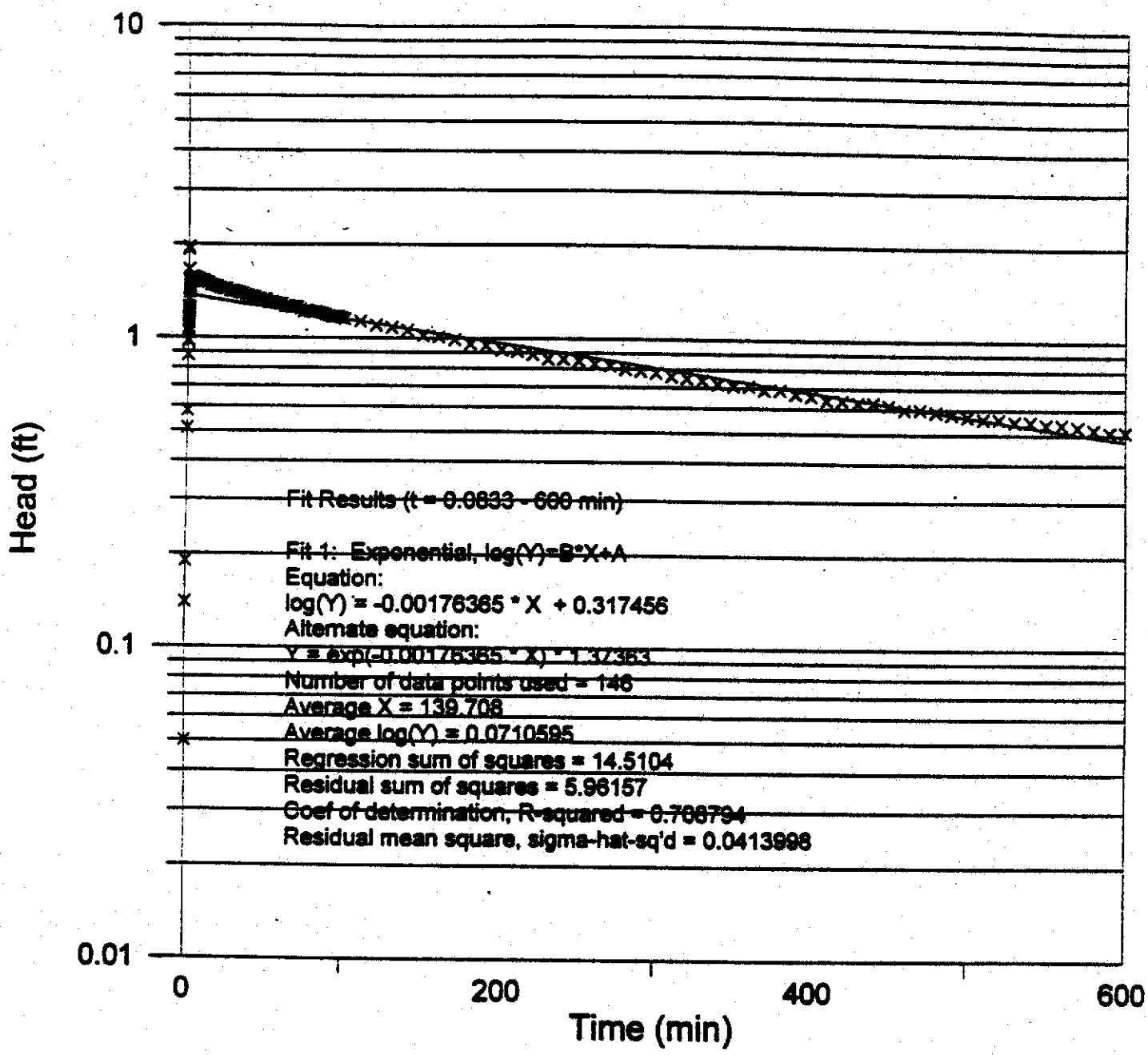
$L := 6.05 \cdot ft$ screened interval $r_s := \frac{1.3 \cdot in}{2}$ bailer radius $r_s = 0.65 \cdot in$ $l := 3.2 \cdot ft$ bailer length

$v_s := \pi \cdot r_s^2 \cdot l + 1 \cdot liter$ bailer volume $r_s := \sqrt{\frac{v_s}{\pi \cdot l}}$ $r_s = 0.964 \cdot in$ equiv. radius $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

$H0 = 1.338 \cdot ft$ $H = ((637.48 - 54.23) - 577.2) \cdot ft$ $H = 6.05 \cdot ft$ $S := 17.8617 min^{-1}$ slope $C := 2.598$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$ fully penetrating case $K := \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S$ $K = 7 \cdot 10^{-2} \cdot \frac{ft}{min}$ $K = 3 \cdot 10^{-2} \cdot \frac{cm}{sec}$

MW-2034 - Test 6 - falling H20



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

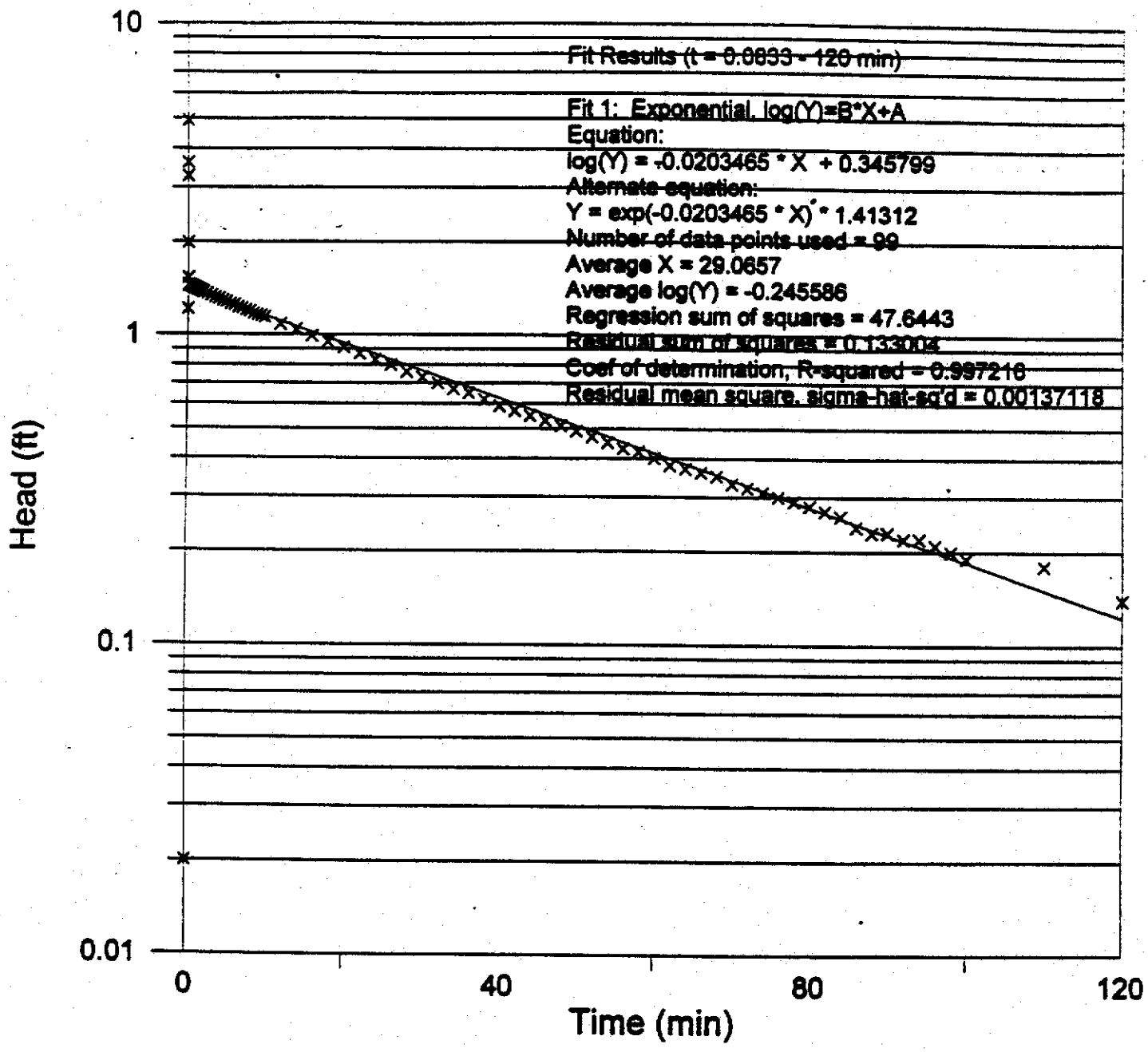
$L := 9\,ft$ screened interval $r_s := \frac{1.3\,in}{2}$ bailer radius $r_s = 0.65\,in$ $l := 3.2\,ft$ bailer length

$v_s := \pi \cdot r_s^2 \cdot l = 1\,liter$ bailer volume $r_s := \sqrt{\frac{v_s}{\pi \cdot l}}$ $r_s = 0.964\,in$ equiv. radius $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

$H0 = 1.338\,ft$ $H := ((660.83 - 53.63) - 598.2)\,ft$ $H = 9\,ft$ $S := .00176305\,min^{-1}$ slope $C := 3.425$ geometry coefficient

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$ fully penetrating case $K := \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S$ $K = 5 \cdot 10^{-6} \cdot \frac{ft}{min}$ $K = 3 \cdot 10^{-6} \cdot \frac{cm}{sec}$

MW-2035 - Test 2 - falling



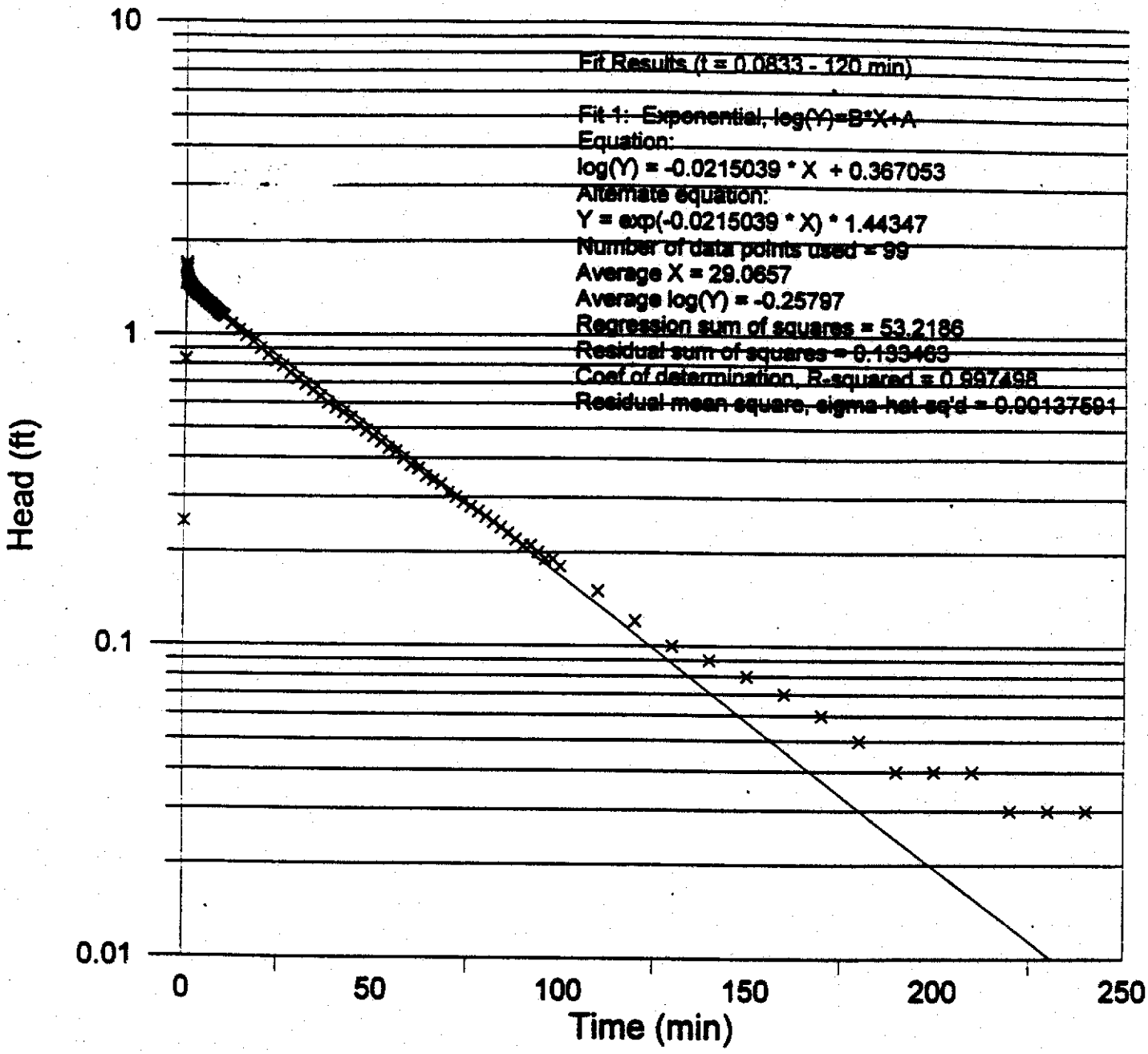
$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L = 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 1.566\,ft$ $H := ((668.40 - 53.38) - 589.5)\cdot ft$ $H = 25.52\,ft$ $S = .0203465\,min^{-1}$ slope $C = 2.985$ geometry coefficie

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 3\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 2\cdot 10^{-5}\cdot\frac{cm}{sec}$

MW-2035 - Test 3 - rising



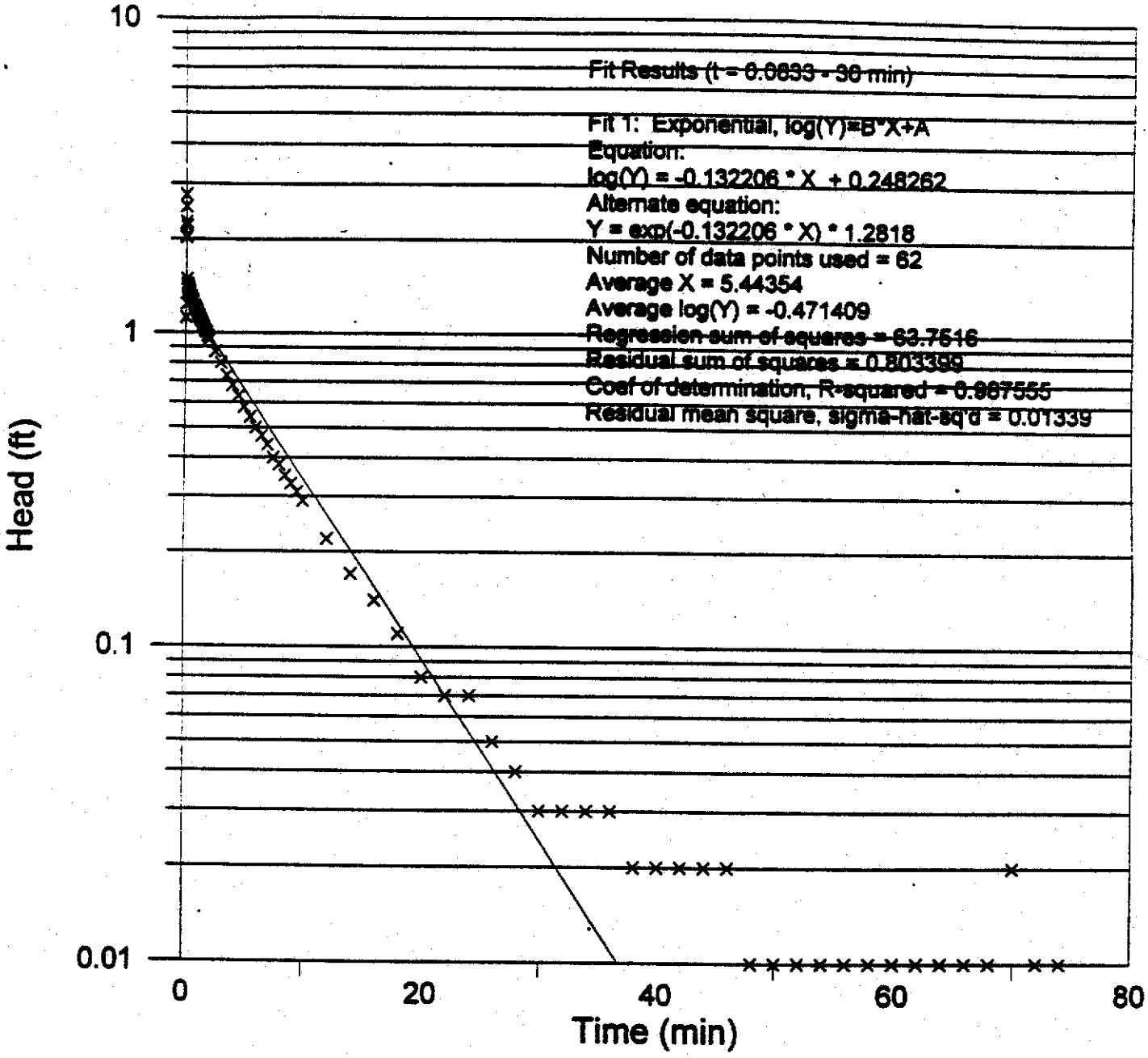
$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 1.566\,ft$ $H := ((668.40 - 53.38) - 589.5)\cdot ft$ $H = 25.52\,ft$ $S := .0215039\,min^{-1}$ slope $C := 2.985$ geometry coefficient

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K := \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 4\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 2\cdot 10^{-5}\cdot\frac{cm}{sec}$

MW-2036 - Test 4 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\cdot ft$ screened interval $r_s := \frac{1.25\cdot in}{2}$ slug radius $l := 5.05\cdot ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

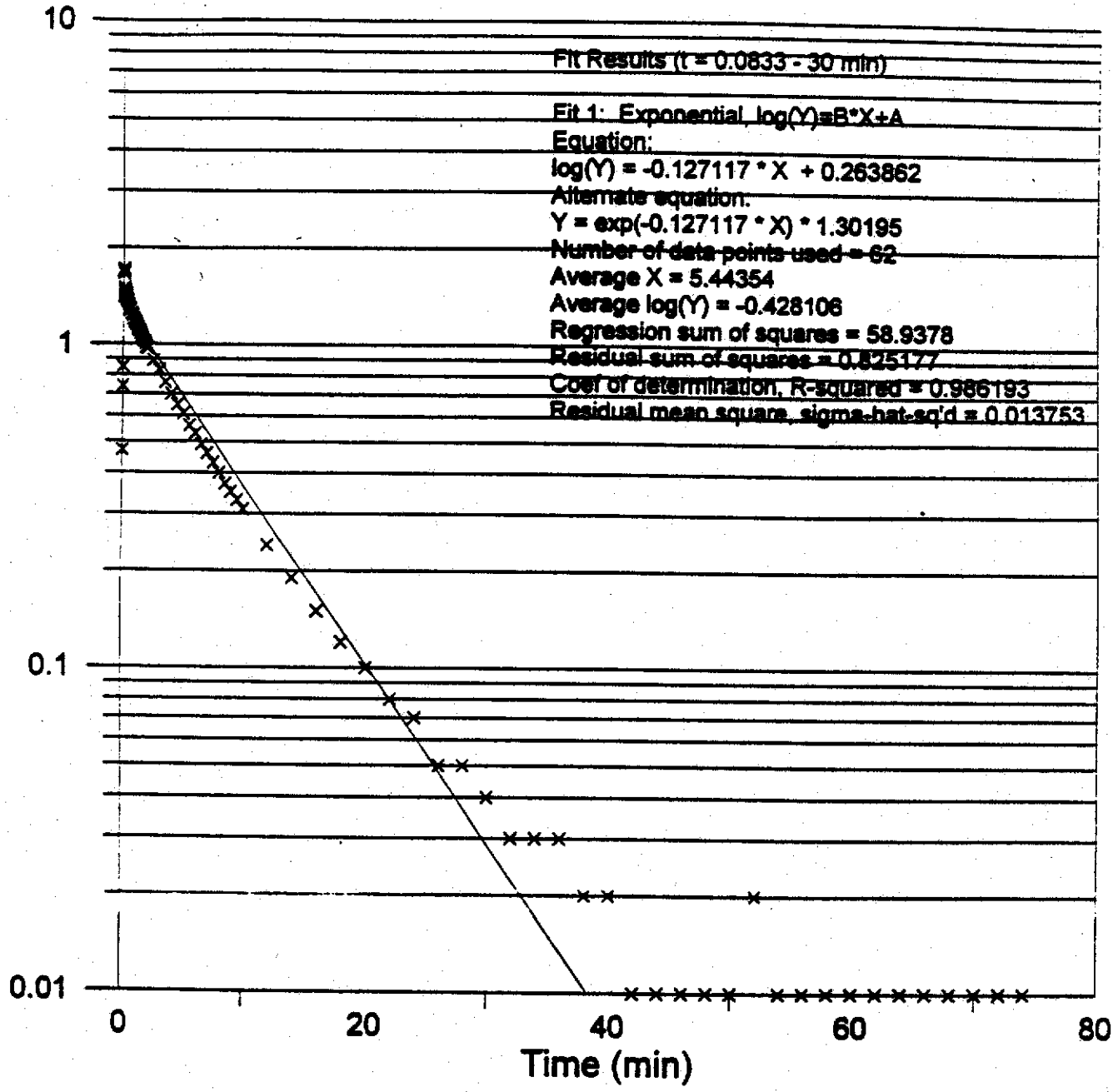
$H0 = 1.57\,ft$ $H := ((658.01 - 43.89) - 589.0)\cdot ft$ $H = 25.12\,ft$ $D := ((658.01 - 43.89) - 583.5)\cdot ft$

$D = 30.62\,ft$ $S := .132206\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$ partially penetrating case

$K = \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 2\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 1\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2036 - Test 5 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

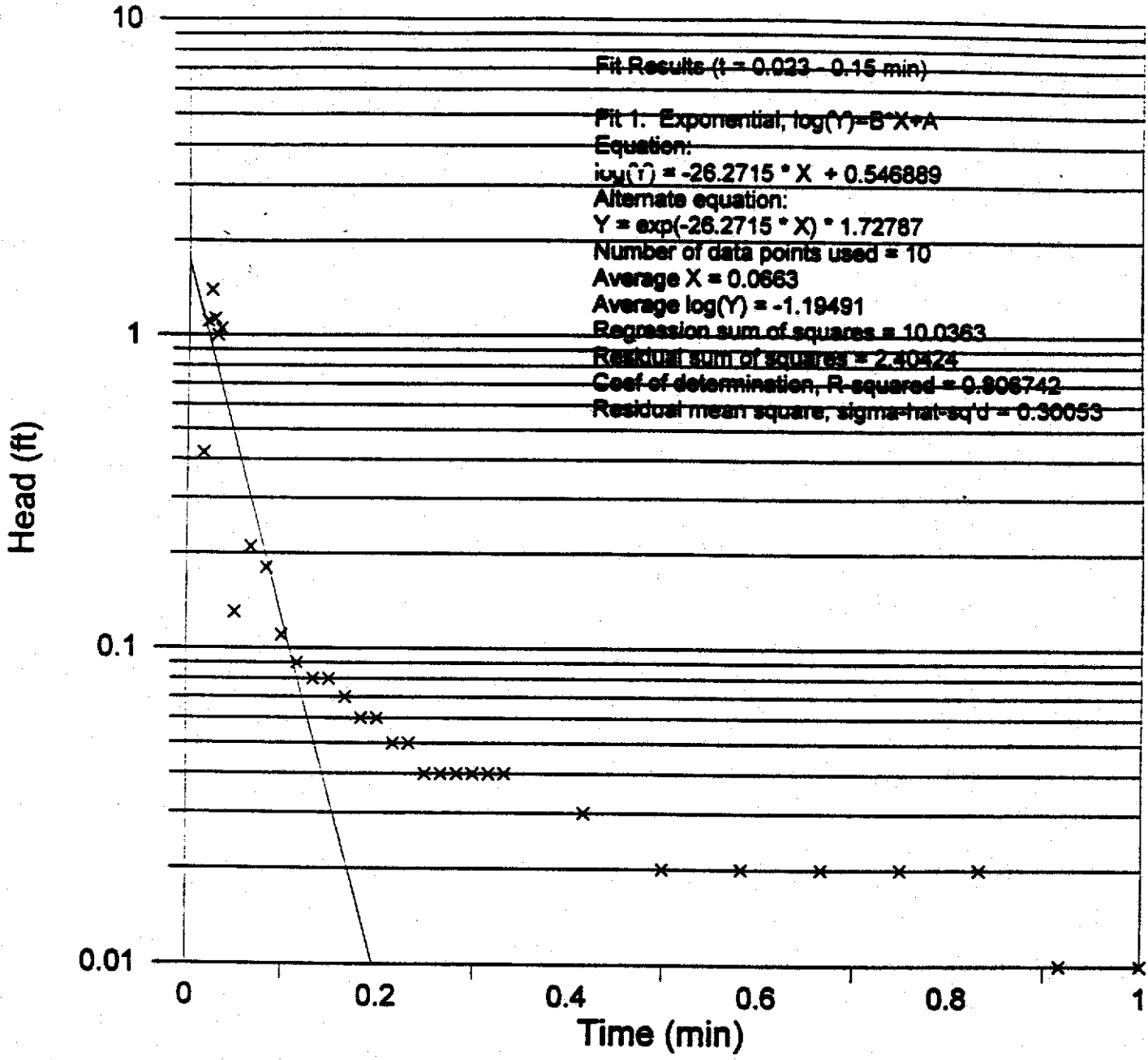
$H0 = 1.57\,ft$ $H := ((658.01 - 43.89) - 589.0)\cdot ft$ $H = 25.12\,ft$ $D := ((658.01 - 43.89) - 583.5)\cdot ft$

$D = 30.62\,ft$ $S := .127117\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K = \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 2\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 9\cdot 10^{-5}\cdot\frac{cm}{sec}$

MW-2037 - Test 6 - falling



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w = \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L = 10\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2}\cdot l$ displacement

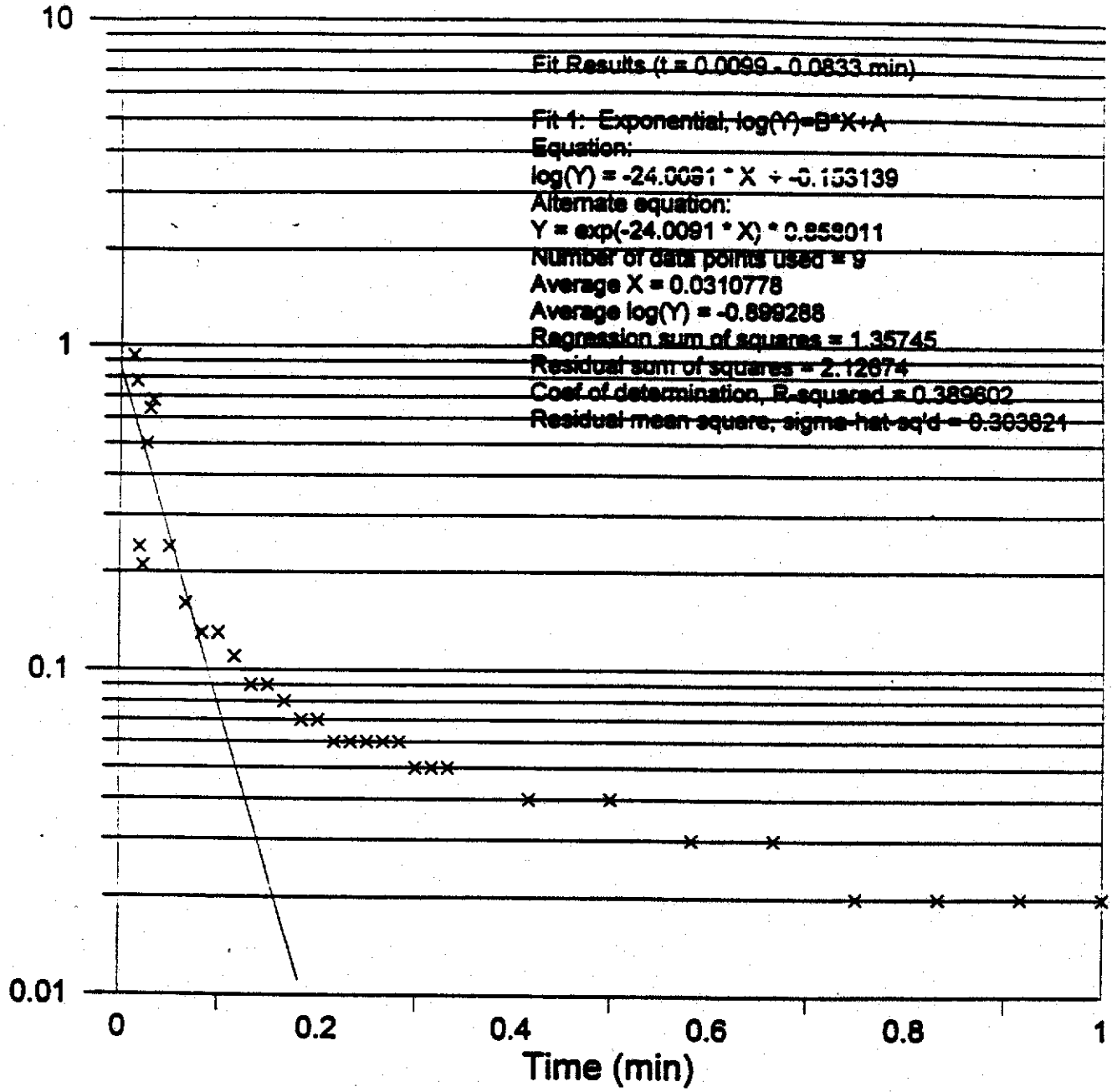
$H0 = 1.57\,ft$ $H = ((659.08 - 44.89) - 596.7)\cdot ft$ $H = 17.49\,ft$ $D = ((659.08 - 44.89) - 593.2)\cdot ft$

$D = 20.99\,ft$ $S = 26.2715\,min^{-1}$ slope $A = 3.374$ $B = 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K = \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 4\cdot 10^{-2}\cdot\frac{ft}{min}$ $K = 2\cdot 10^{-2}\cdot\frac{cm}{sec}$

MW-2037 - Test 7 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

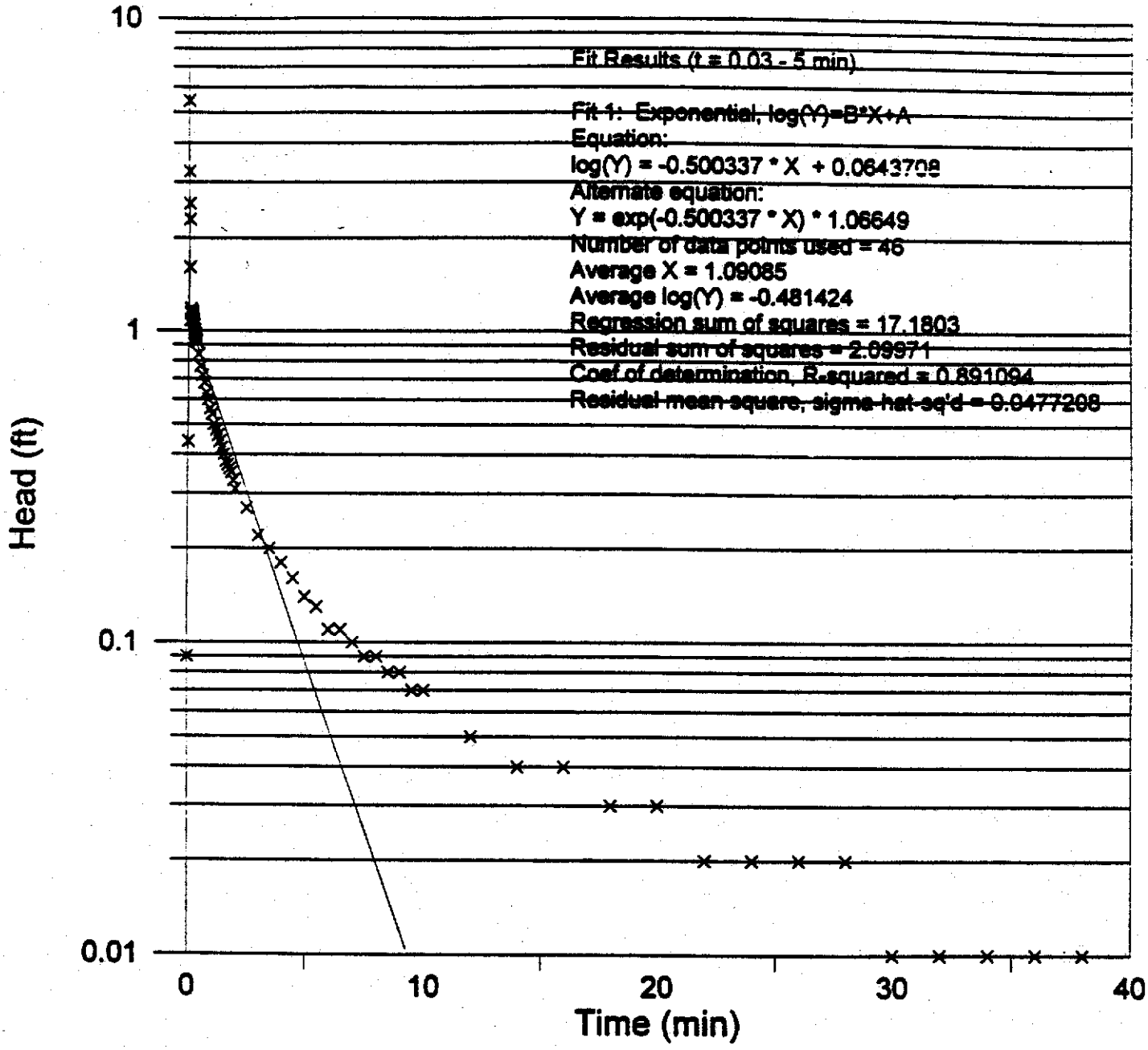
$H0 = 1.57\,ft$ $H := ((659.08 - 44.89) - 596.7)\cdot ft$ $H = 17.49\,ft$ $D := ((659.08 - 44.89) - 593.2)\cdot ft$

$D = 20.99\,ft$ $S := 24.0091\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K = \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 3\cdot 10^{-2}\cdot\frac{ft}{min}$ $K = 2\cdot 10^{-2}\cdot\frac{cm}{sec}$

MW-2038 - Test 4 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\cdot ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

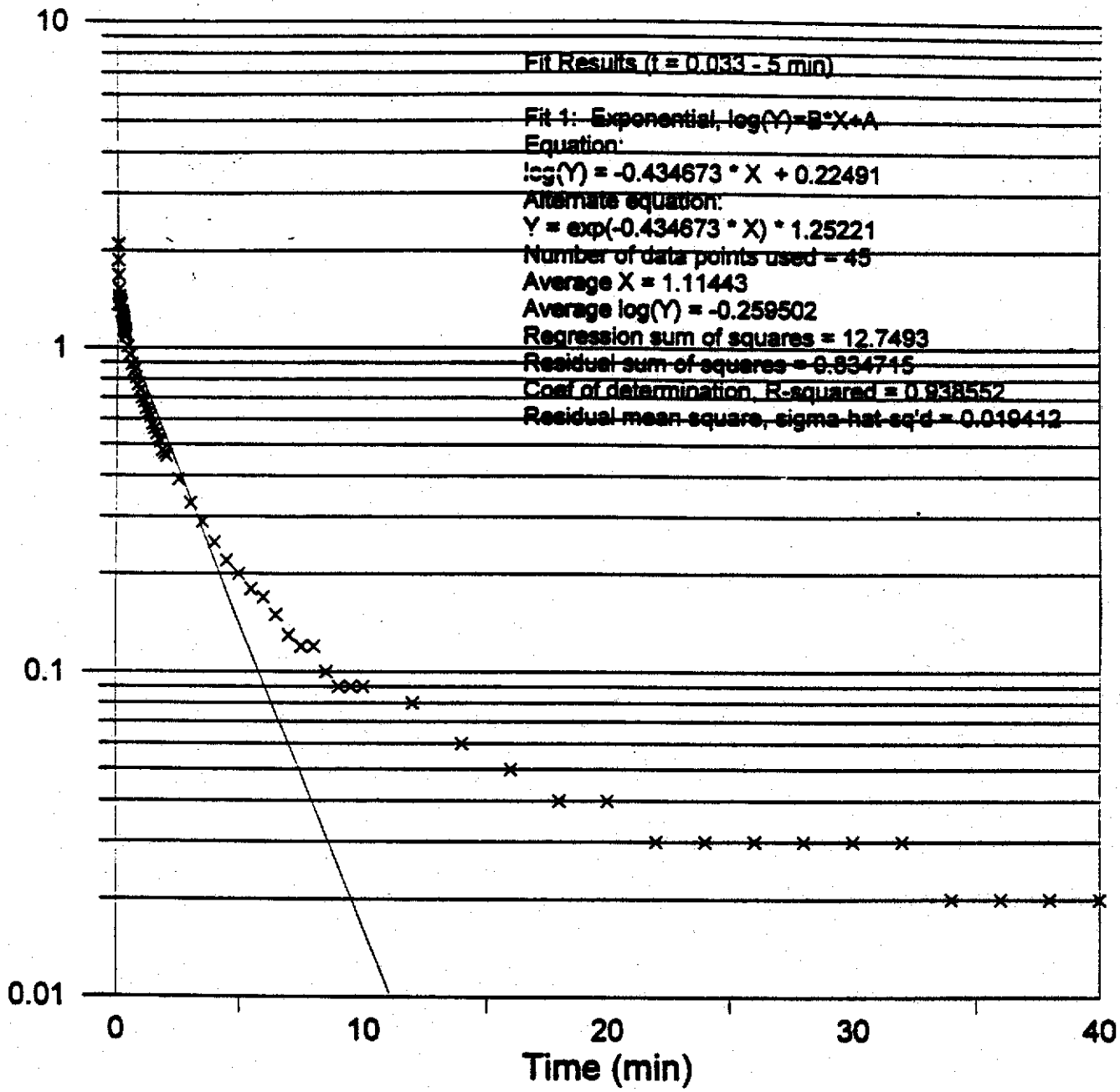
$H0 = 1.57\,ft$ $H := ((667.19 - 53.83) - 597.0)\cdot ft$ $H = 16.36\,ft$ $D := ((667.19 - 53.83) - 593.5)\cdot ft$

$D = 19.86\,ft$ $S := .500337\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 7\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 3\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2038 - Test 5 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\cdot ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

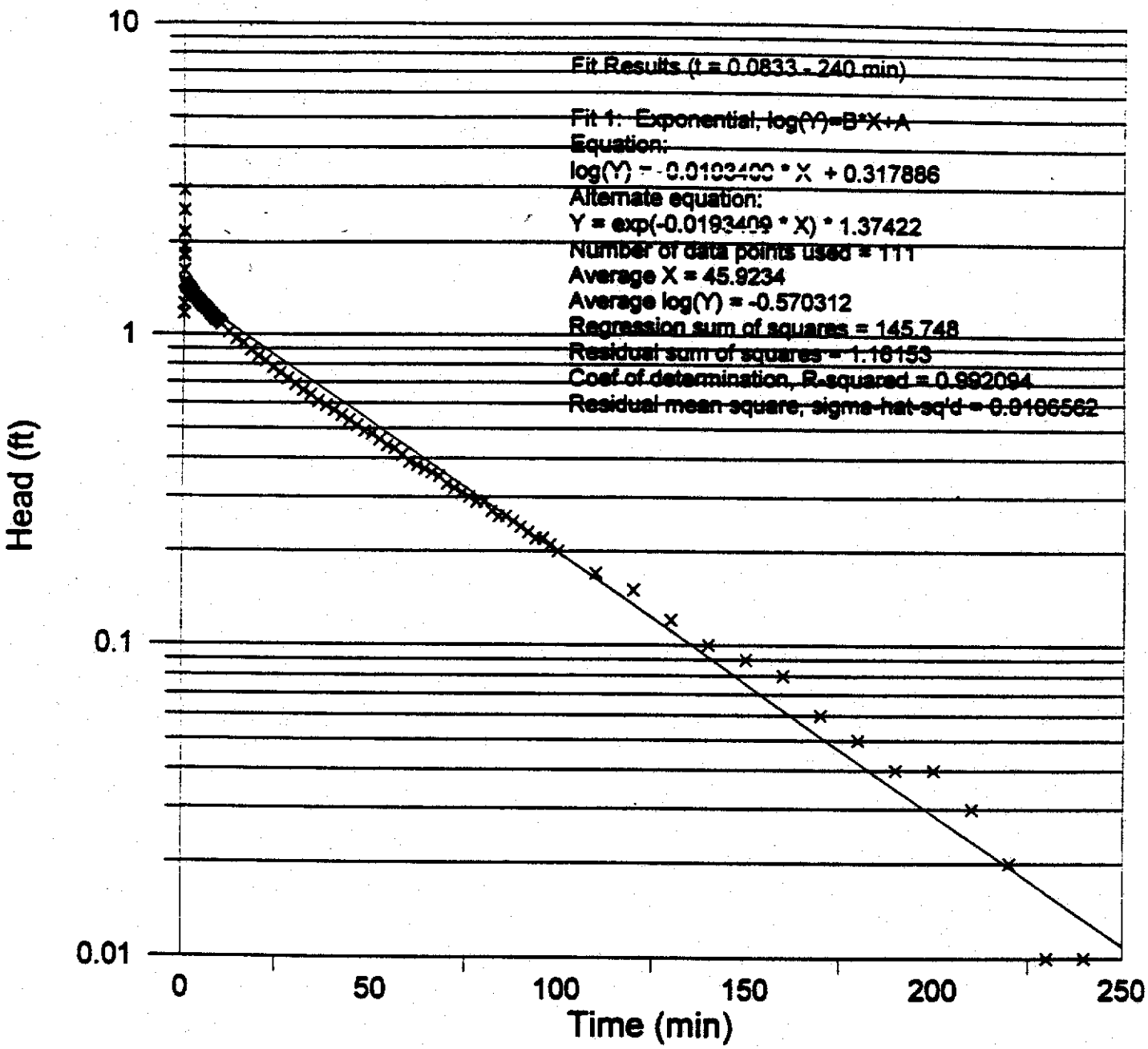
$H0 = 1.57\,ft$ $H := ((667.19 - 53.83) - 597.0)\cdot ft$ $H = 16.36\,ft$ $D := ((667.19 - 53.83) - 593.5)\cdot ft$

$D = 19.86\,ft$ $S := .434673\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 6\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 3\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2039 - Test 0 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L = 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

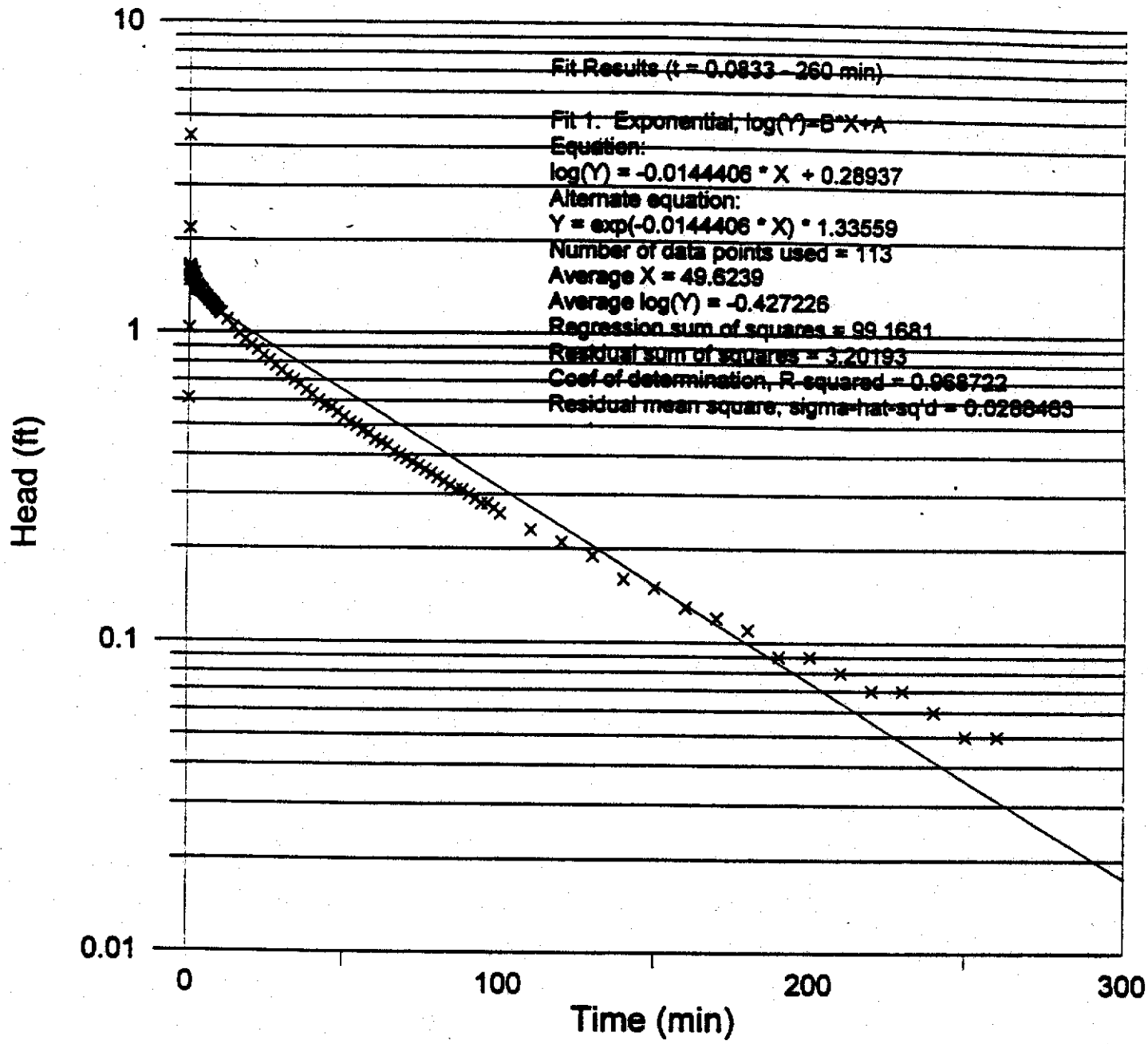
$H0 = 1.57\,ft$ $H := ((665.25 - 50.77) - 596.7)\cdot ft$ $H = 17.78\,ft$ $D := ((665.25 - 50.77) - 594.4)\cdot ft$

$D = 20.08\,ft$ $S := .0193409\,min^{-1}$ slope $A = 3.374$ $B = 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 3\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 1\cdot 10^{-5}\cdot\frac{cm}{sec}$

MW-2039 - Test 1 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 1.57\,ft$ $H := ((665.25 - 50.77) - 596.7)\cdot ft$ $H = 17.78\,ft$ $D := ((665.25 - 50.77) - 594.4)\cdot ft$

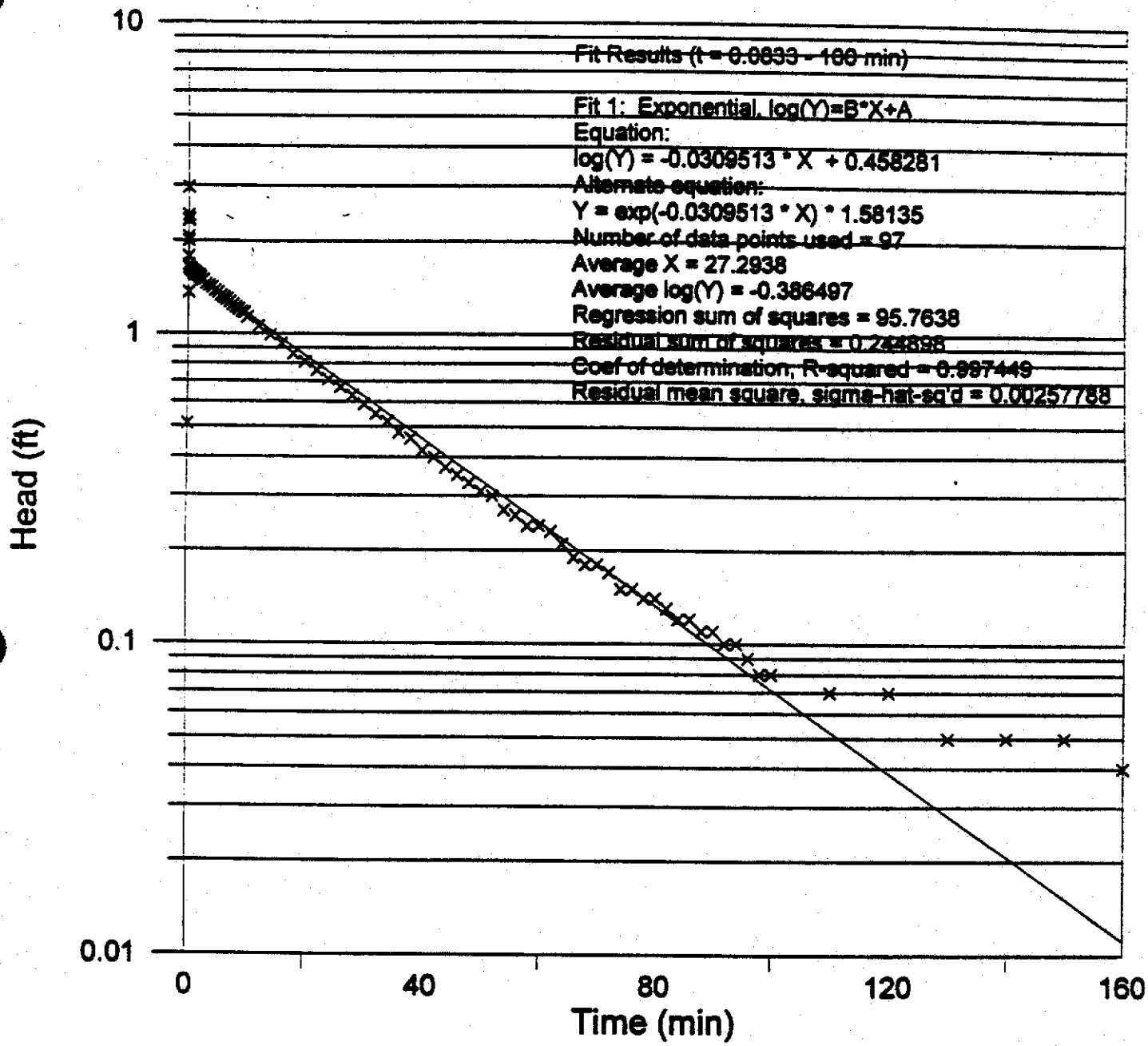
$D = 20.08\,ft$ $S := .0144406\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case

$K := \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 2\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 1\cdot 10^{-5}\cdot\frac{cm}{sec}$

MW-2040 - Test 0 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L = 10\cdot ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

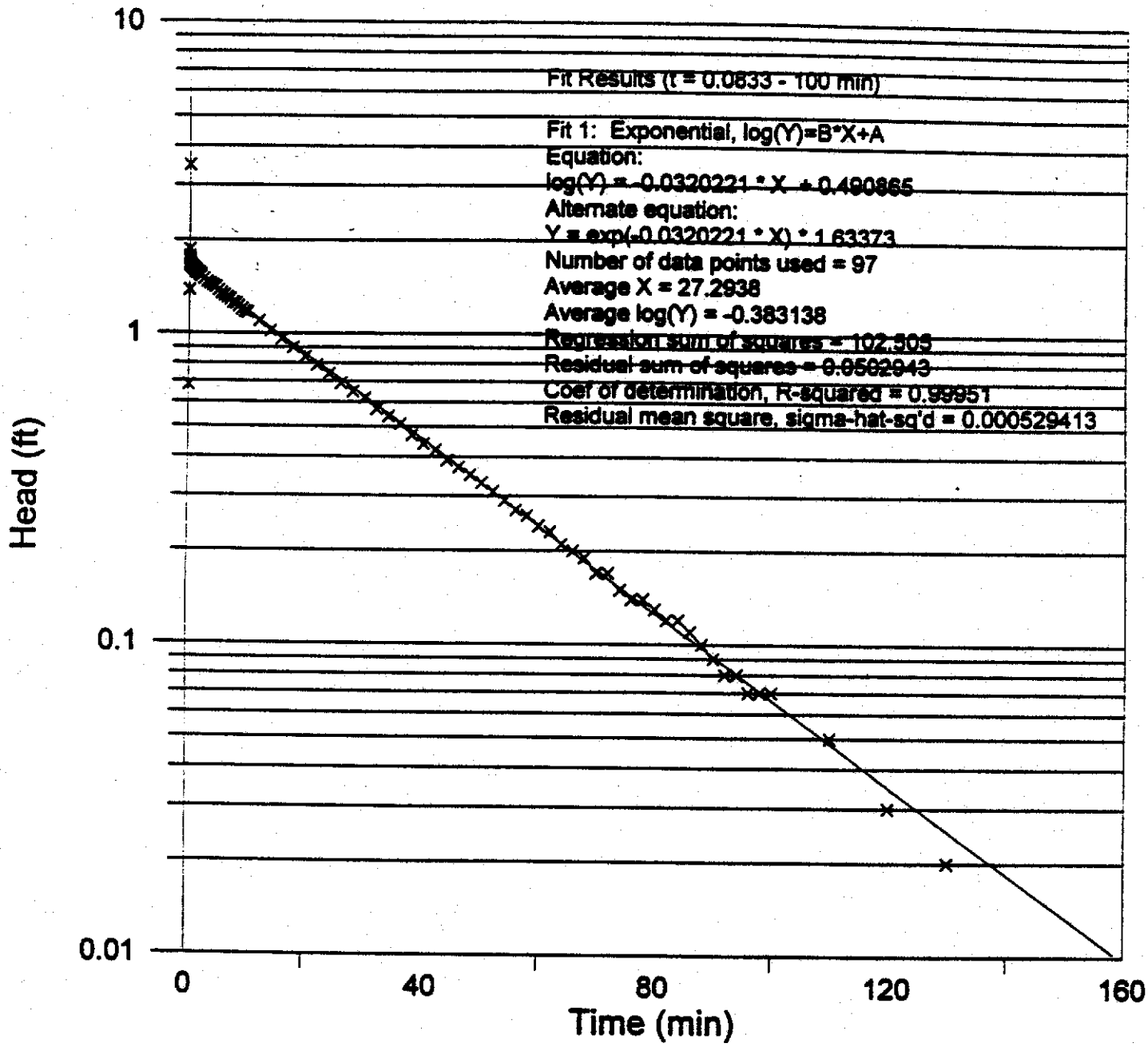
$H0 = 1.57\,ft$ $H := ((662.39 - 49.03) - 590.4)\cdot ft$ $H = 22.96\,ft$ $D := ((662.39 - 49.03) - 588.4)\cdot ft$

$D = 24.96\,ft$ $S := .0309513\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 4\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 2\cdot 10^{-5}\cdot\frac{cm}{sec}$

MW-2040 - Test 1 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

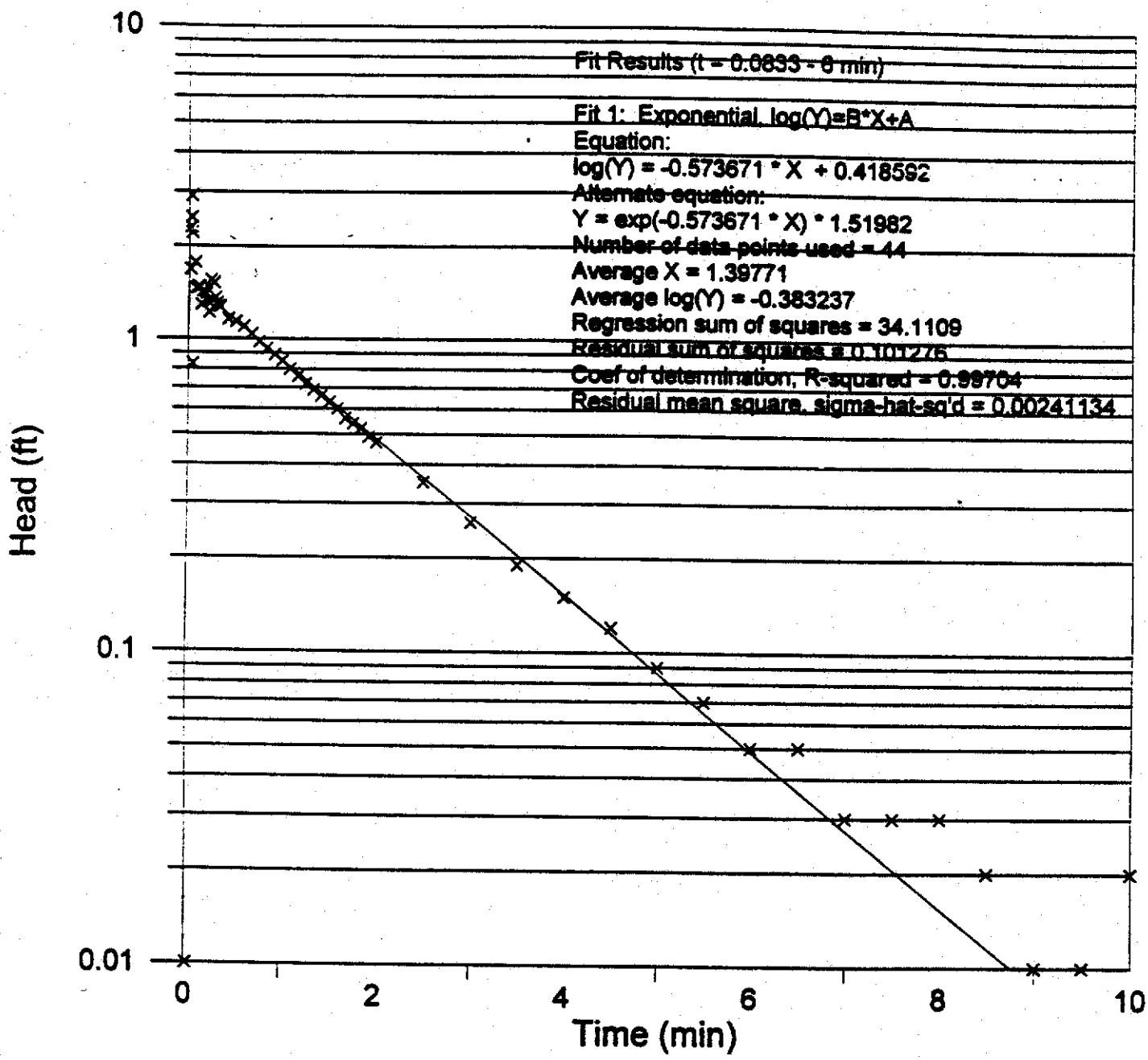
$H0 = 1.57\,ft$ $H := ((662.39 - 49.03) - 590.4)\cdot ft$ $H = 22.96\,ft$ $D := ((662.39 - 49.03) - 588.4)\cdot ft$

$D = 24.96\,ft$ $S := .0320221\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 5\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 2\cdot 10^{-5}\cdot\frac{cm}{sec}$

MW-2041 - Test 0 - falling



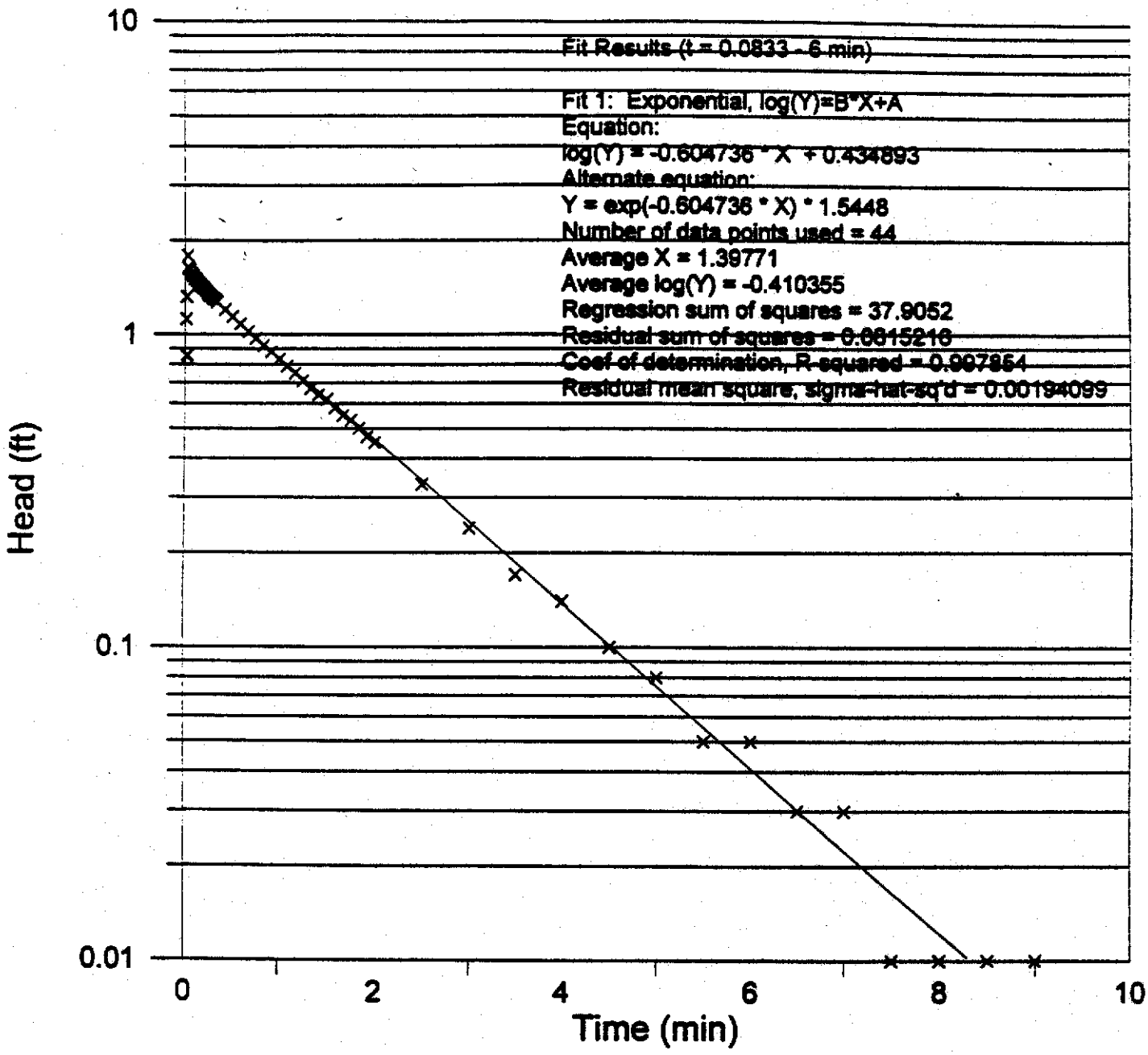
$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w = \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L = 10\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 1.566\,ft$ $H = ((661.50 - 47.92) - 587.6)\cdot ft$ $H = 25.98\,ft$ $S = .573671\,min^{-1}$ slope $C = 2.985$ geometry coefficient

$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$ fully penetrating case $K = \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 9\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 5\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2041 - Test 1 - rising



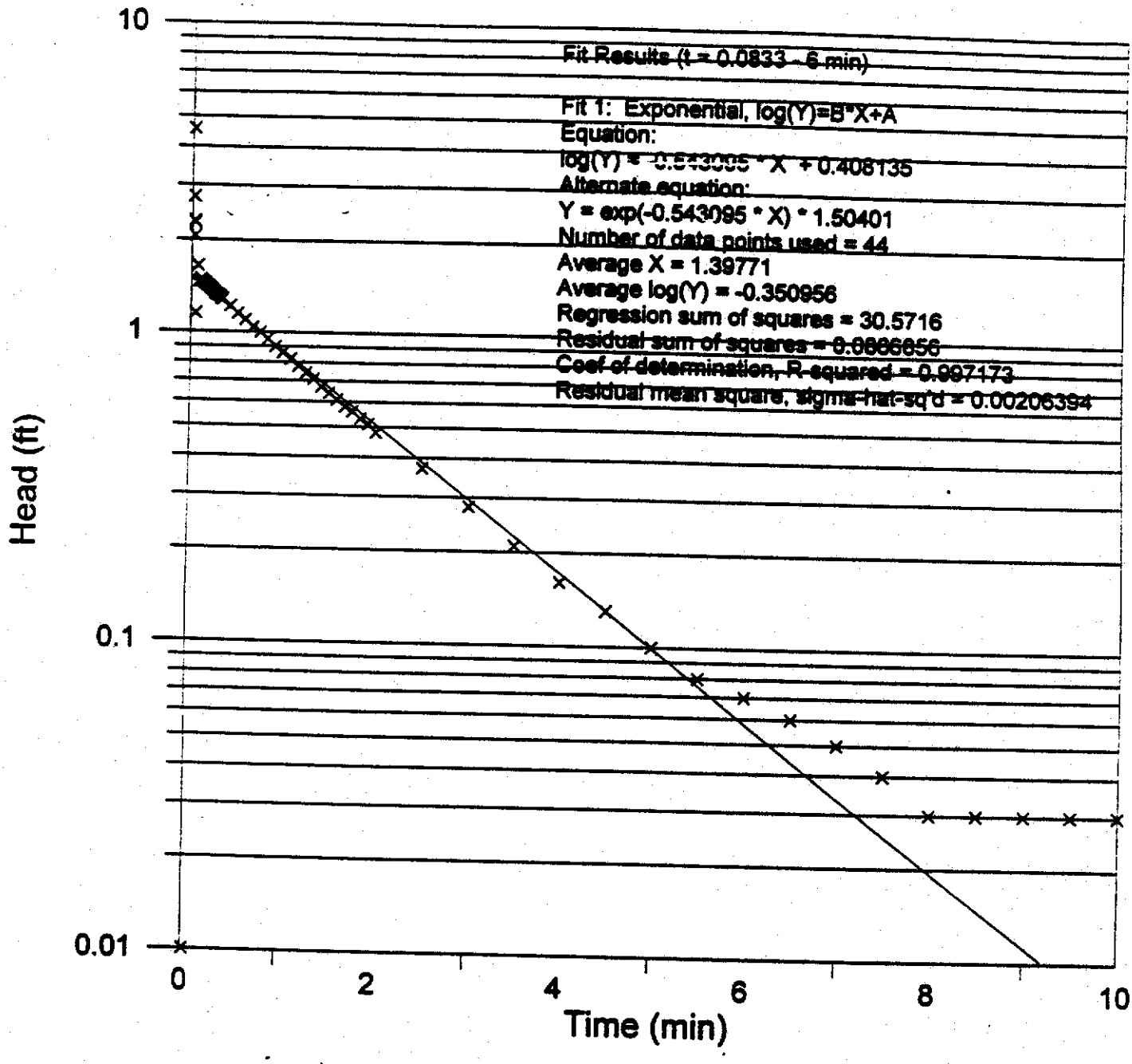
$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L = 10\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 1.566\,ft$ $H := ((661.50 - 47.92) - 587.6)\cdot ft$ $H = 25.98\,ft$ $S = .604736\,min^{-1}$ slope $C = 2.985$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K = \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 1\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 5\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2041 - Test 2 - falling



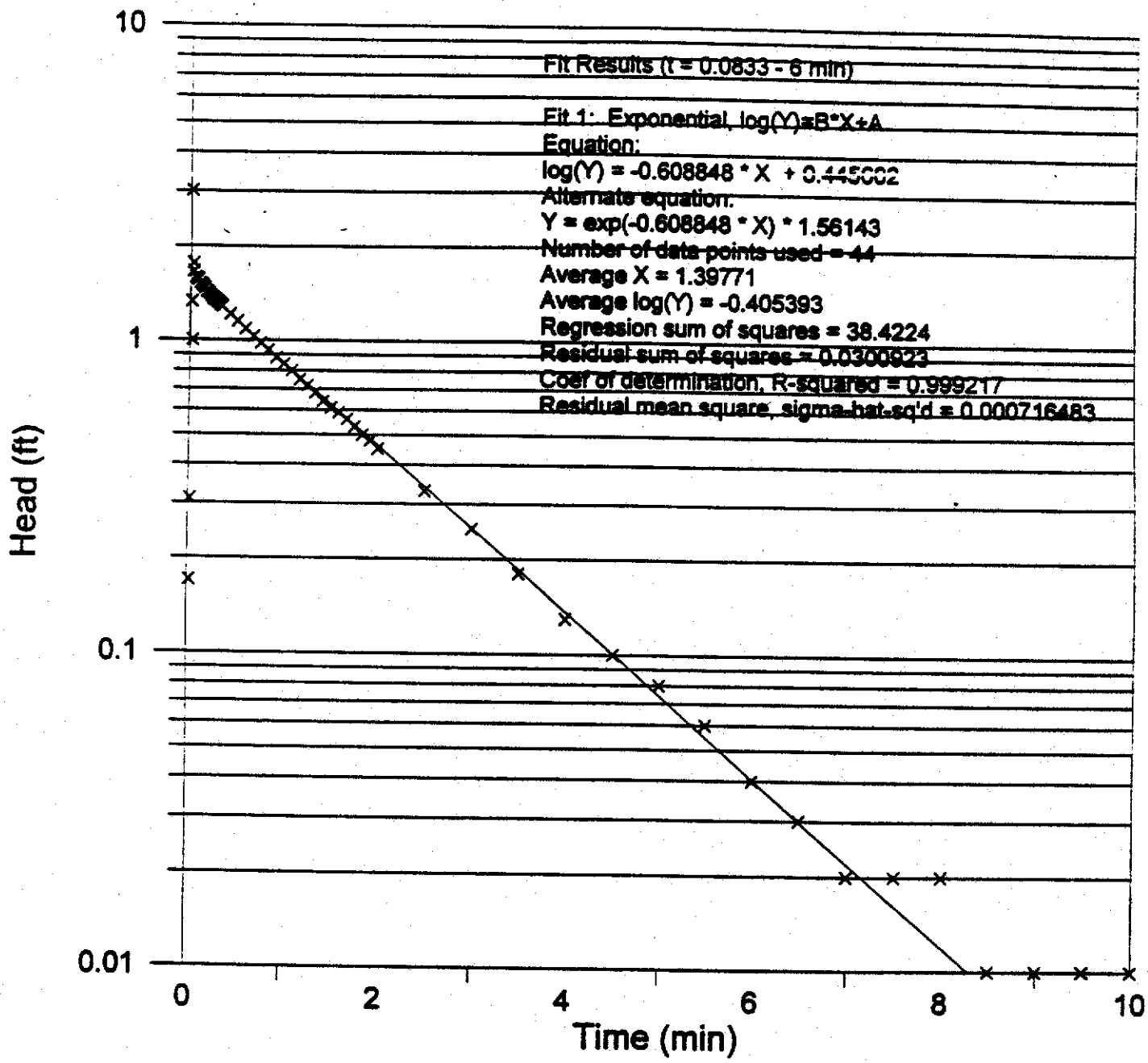
$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L = 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 1.566\,ft$ $H = ((661.50 - 47.92) - 587.6)\cdot ft$ $H = 25.98\,ft$ $S = .543095\,min^{-1}$ slope $C = 2.985$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K = \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 9\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 5\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2041 - Test 3 - rising



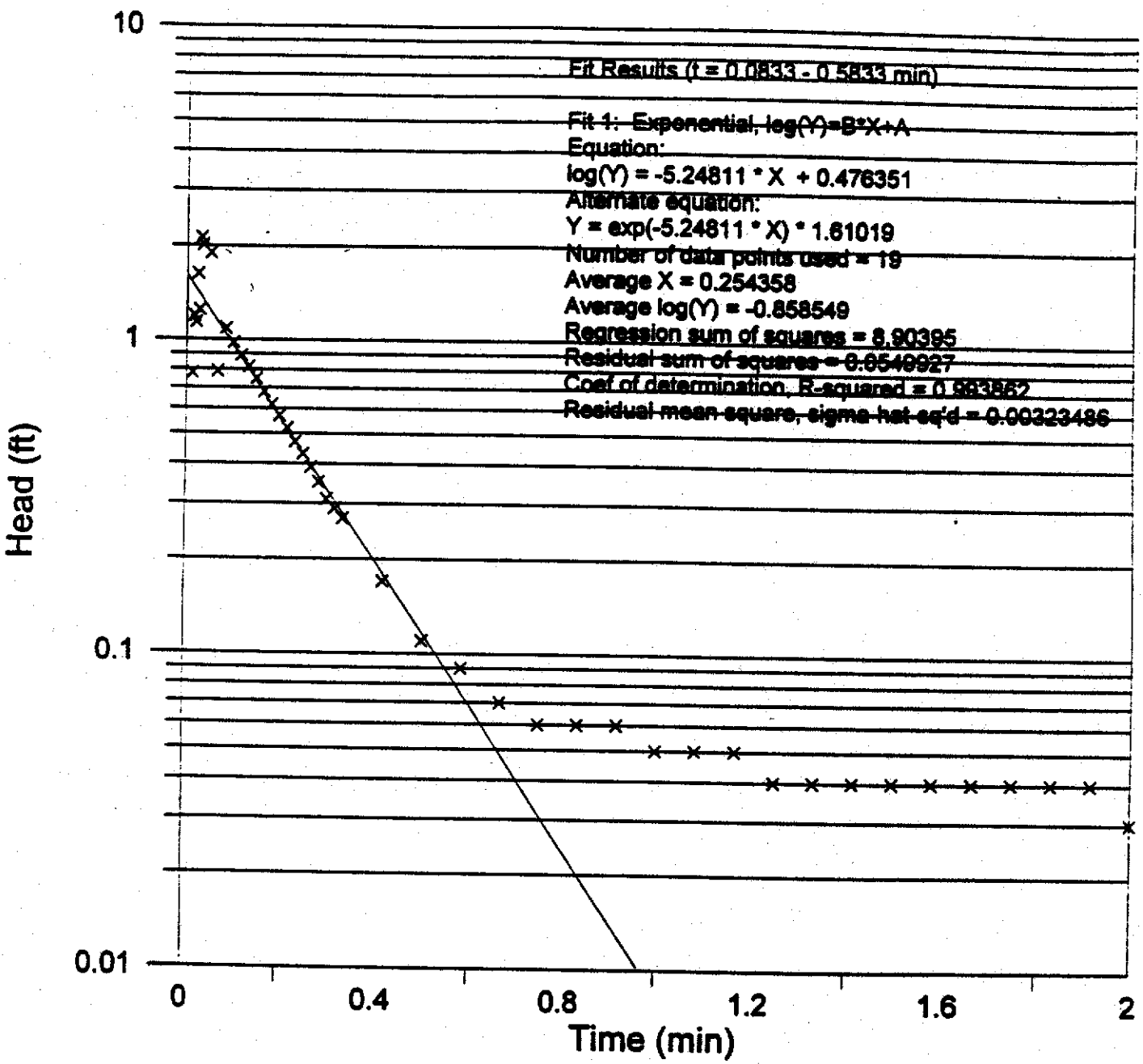
$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 1.566\,ft$ $H := ((661.50 - 47.92) - 587.6)\cdot ft$ $H = 25.98\,ft$ $S := .608848\,min^{-1}$ slope $C := 2.985$ geometry coefficient

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K := \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 1\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 5\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2042 - Test 0 - falling



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\cdot ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

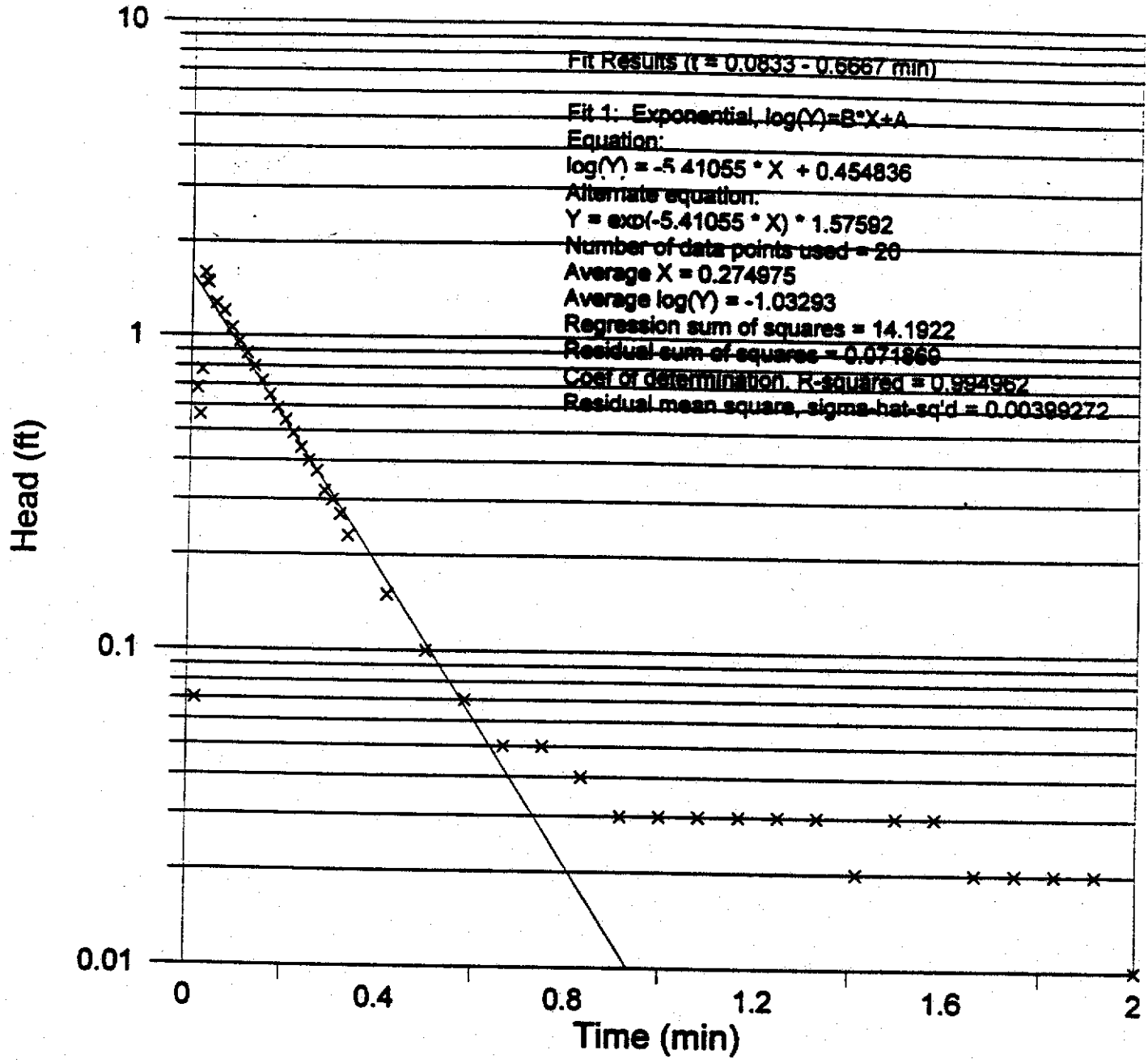
$H0 = 1.57\,ft$ $H := ((662.68 - 48.19) - 590.7)\cdot ft$ $H = 23.79\,ft$ $D := ((662.68 - 48.19) - 585.2)\cdot ft$

$D = 29.29\,ft$ $S := 5.24811\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 7\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 4\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2042 - Test 1 - rising



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\,in$ well radius $r_w = 0.167\,ft$

$L = 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

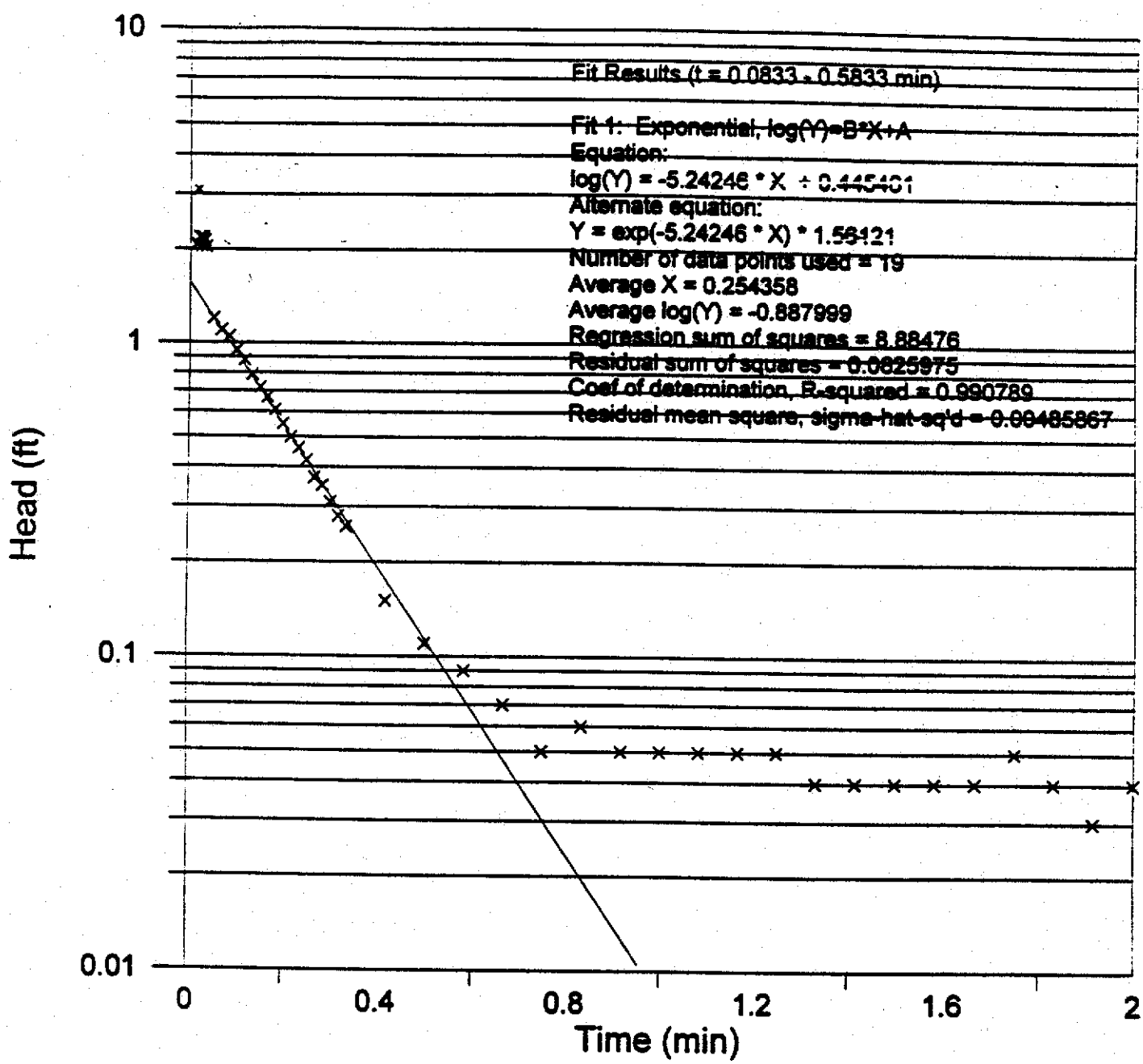
$H0 = 1.57\,ft$ $H = ((662.68 - 48.19) - 590.7)\,ft$ $H = 23.79\,ft$ $D := ((662.68 - 48.19) - 585.2)\,ft$

$D = 29.29\,ft$ $S = 5.41055\,min^{-1}$ slope $A = 3.374$ $B = 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B \cdot \ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2 \cdot \ln Rerw}{2 \cdot L} \cdot S$ $K = 8 \cdot 10^{-3} \cdot \frac{ft}{min}$ $K = 4 \cdot 10^{-3} \cdot \frac{cm}{sec}$

MW-2042 - Test 2 - falling



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

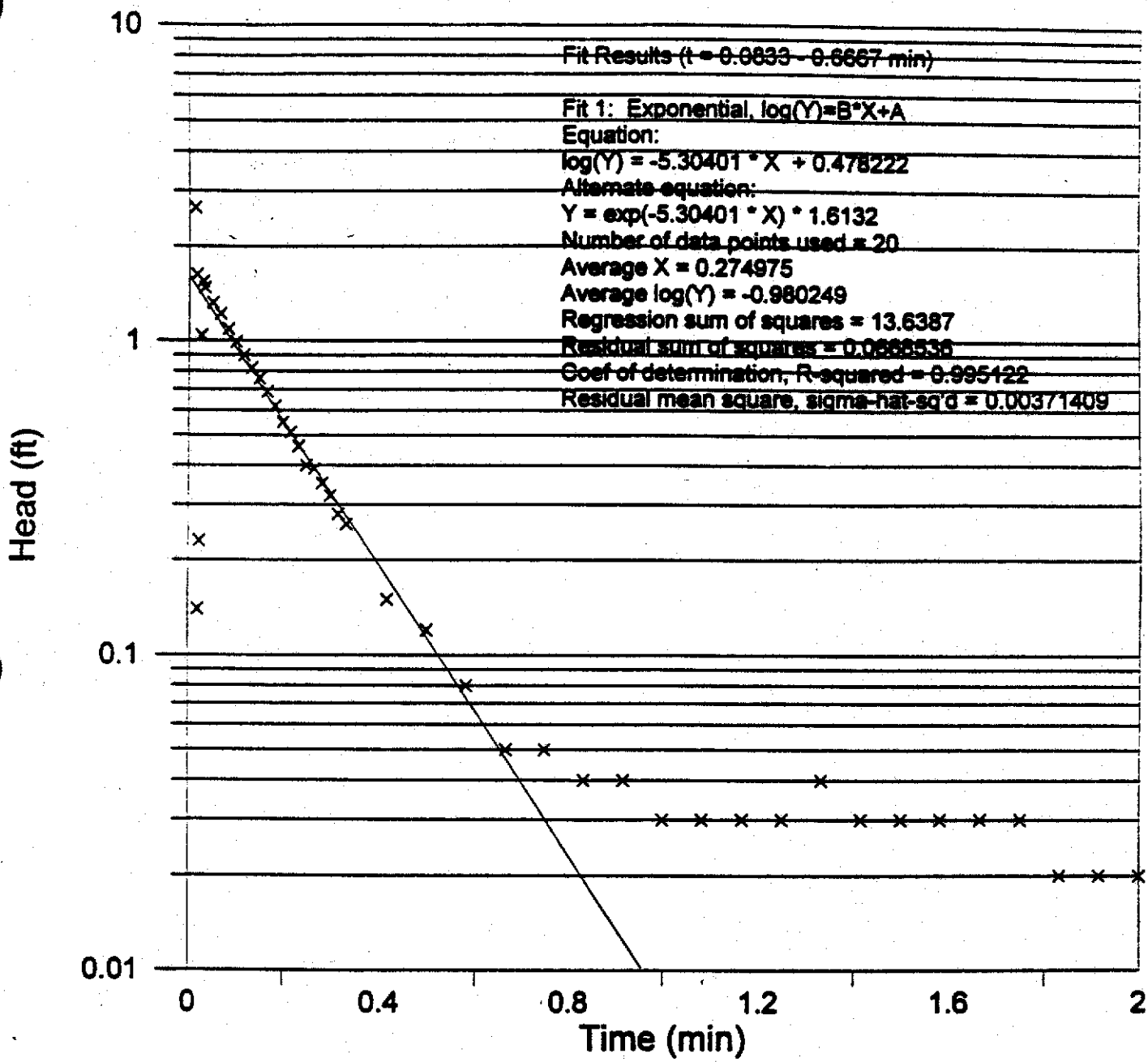
$H0 = 1.57\,ft$ $H := ((662.68 - 48.19) - 590.7)\cdot ft$ $H = 23.79\,ft$ $D := ((662.68 - 48.19) - 585.2)\cdot ft$

$D = 29.29\,ft$ $S := 5.24246\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 7\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 4\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2042 - Test 3 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

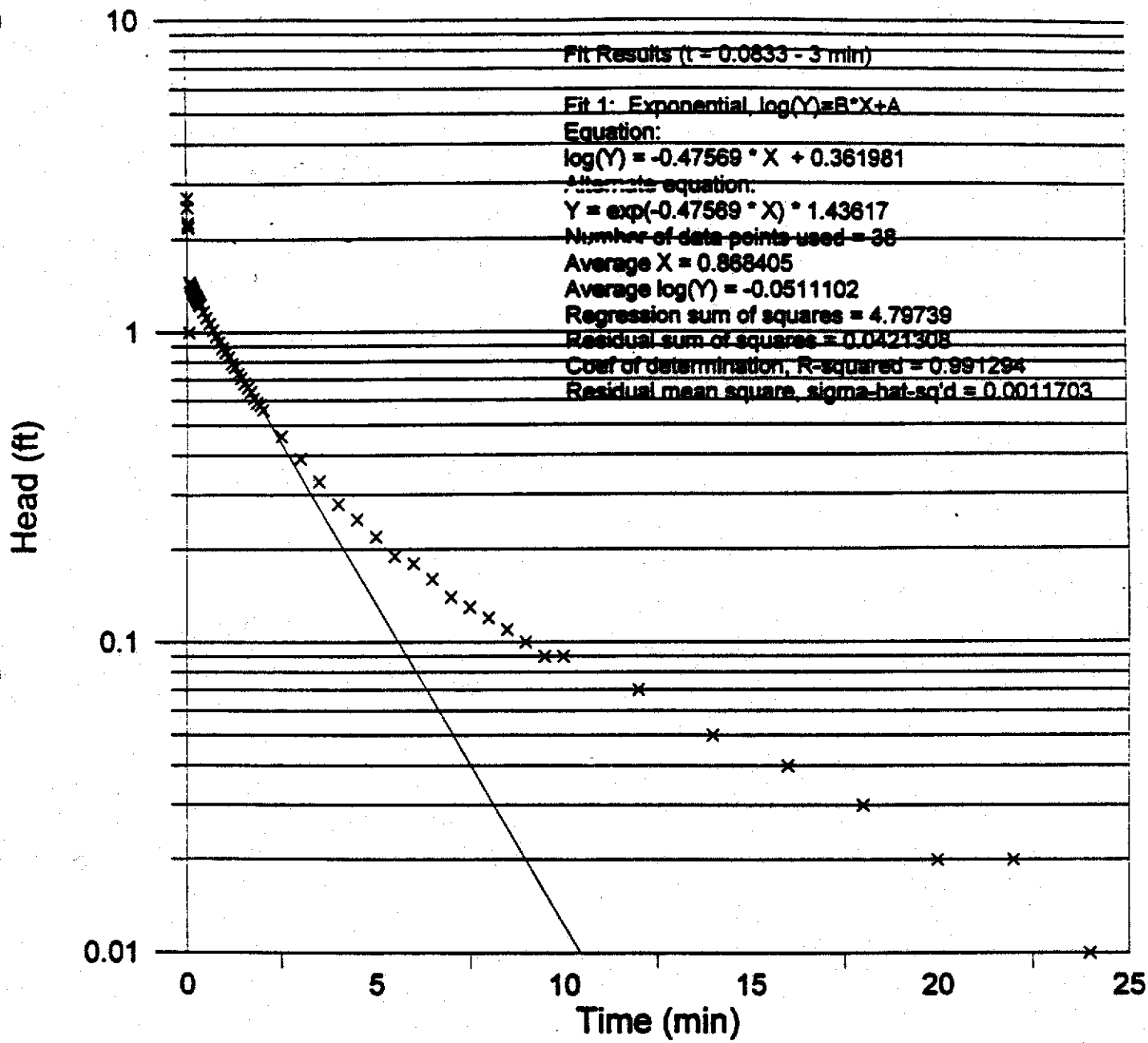
$H0 = 1.57\,ft$ $H := ((662.68 - 48.19) - 590.7)\cdot ft$ $H = 23.79\,ft$ $D := ((662.68 - 48.19) - 585.2)\cdot ft$

$D = 29.29\,ft$ $S := 5.30401\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 8\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 4\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2043 - Test 0 - falling



$r_c = \frac{2.245\,in}{2}$ - 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

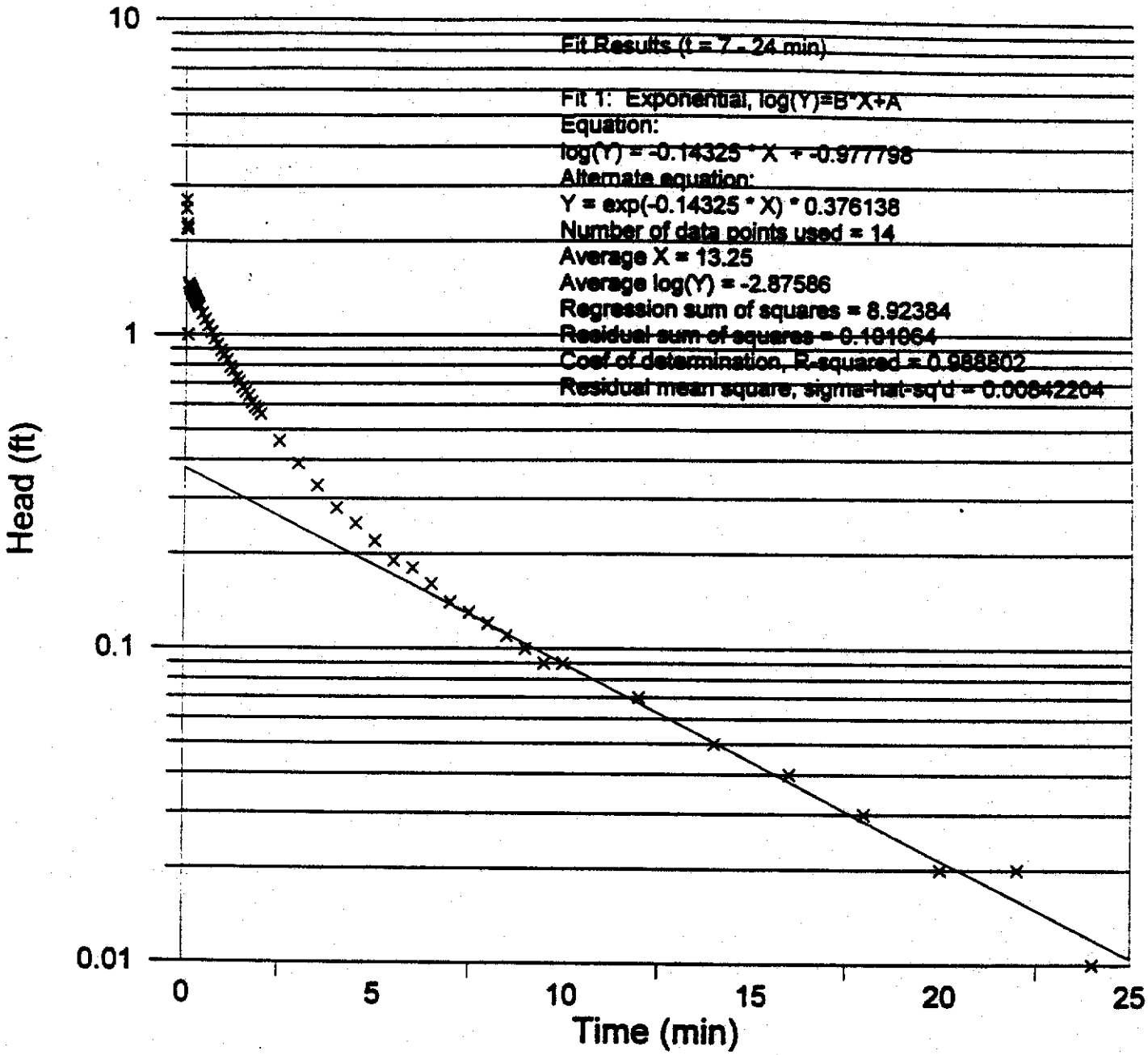
$H0 = 1.57\,ft$ $H := ((662.30 - 48.01) - 590.6)\cdot ft$ $H = 23.69\,ft$ $D := ((662.30 - 48.01) - 587.6)\cdot ft$

$D = 26.69\,ft$ $S := 0.47569\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 7\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 3\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2043 - Test 0 - falling



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\,in$ well radius $r_w = 0.167\,ft$

$L = 10\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

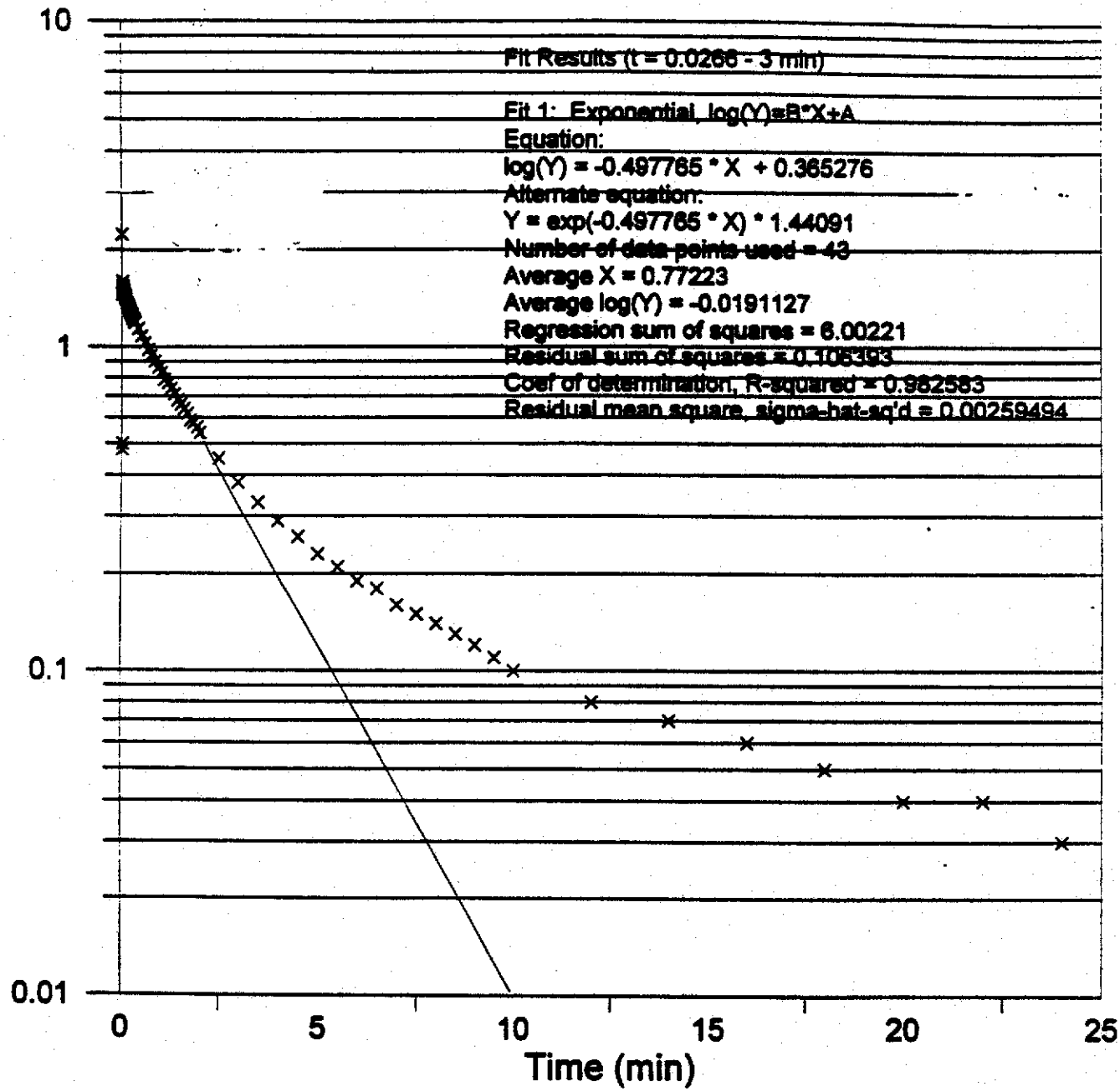
$H0 = 1.57\,ft$ $H := ((662.30 - 48.01) - 590.6)\cdot ft$ $H = 23.69\,ft$ $D := ((662.30 - 48.01) - 587.6)\cdot ft$

$D = 26.69\,ft$ $S = 0.14325\,min^{-1}$ slope $A = 3.374$ $B = 0.539$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2 \cdot \ln Rerw}{2\cdot L} \cdot S$ $K = 2\cdot 10^{-4} \cdot \frac{ft}{min}$ $K = 1\cdot 10^{-4} \cdot \frac{cm}{sec}$

MW-2043 - Test 1 - rising



$r_c := \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\cdot ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

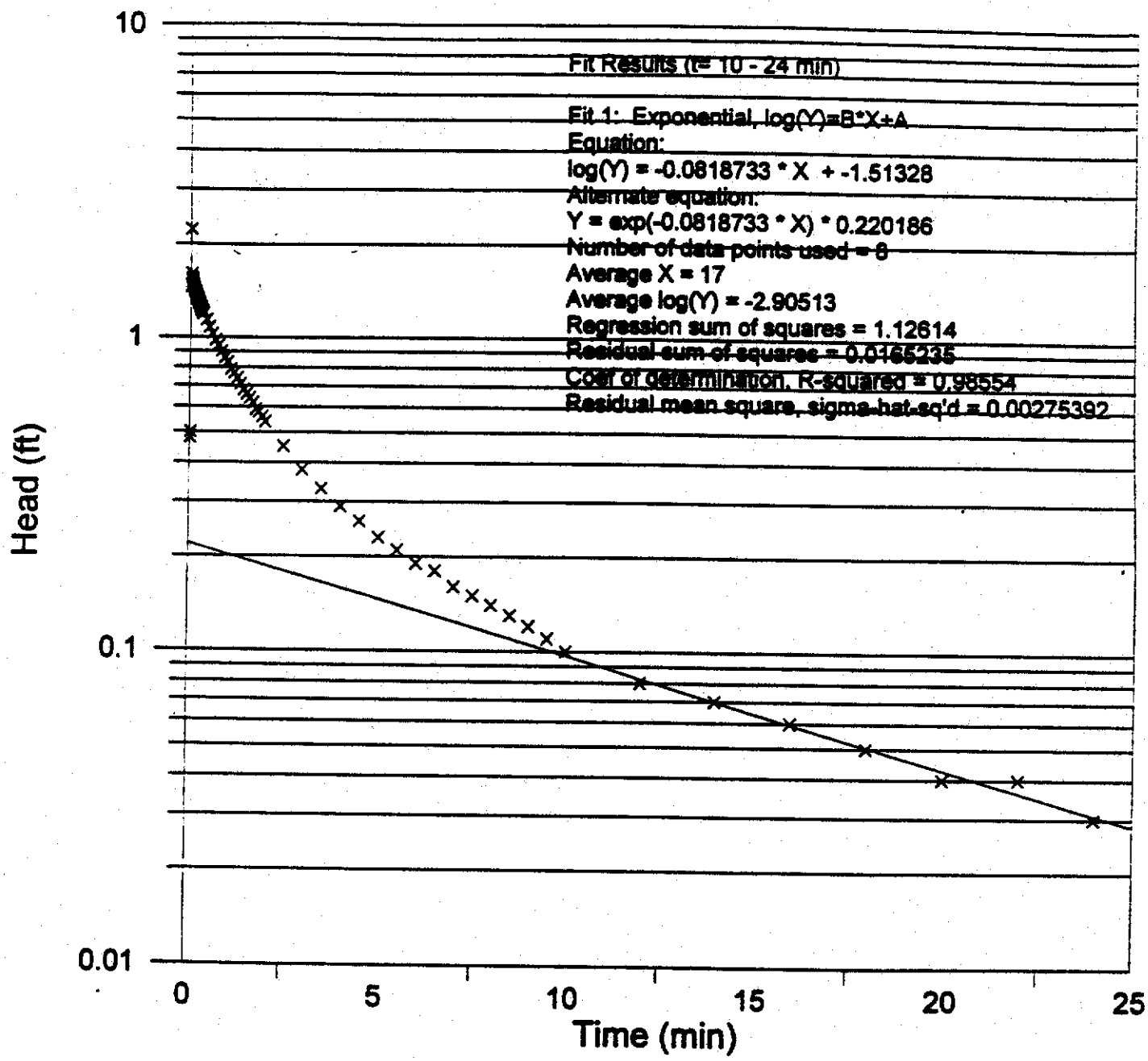
$H0 = 1.57\,ft$ $H := ((662.30 - 48.01) - 590.6)\cdot ft$ $H = 23.69\,ft$ $D := ((662.30 - 48.01) - 587.6)\cdot ft$

$D = 26.69\,ft$ $S := 0.497765\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 7\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 4\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-2043 - Test 1 - rising



$r_c = \frac{2.245\,in}{2}$ 2" Sch 5 SS (p. 977) $r_c = 0.094\,ft$ $r_w := \frac{4.0}{2}\cdot in$ well radius $r_w = 0.167\,ft$

$L := 10\cdot ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

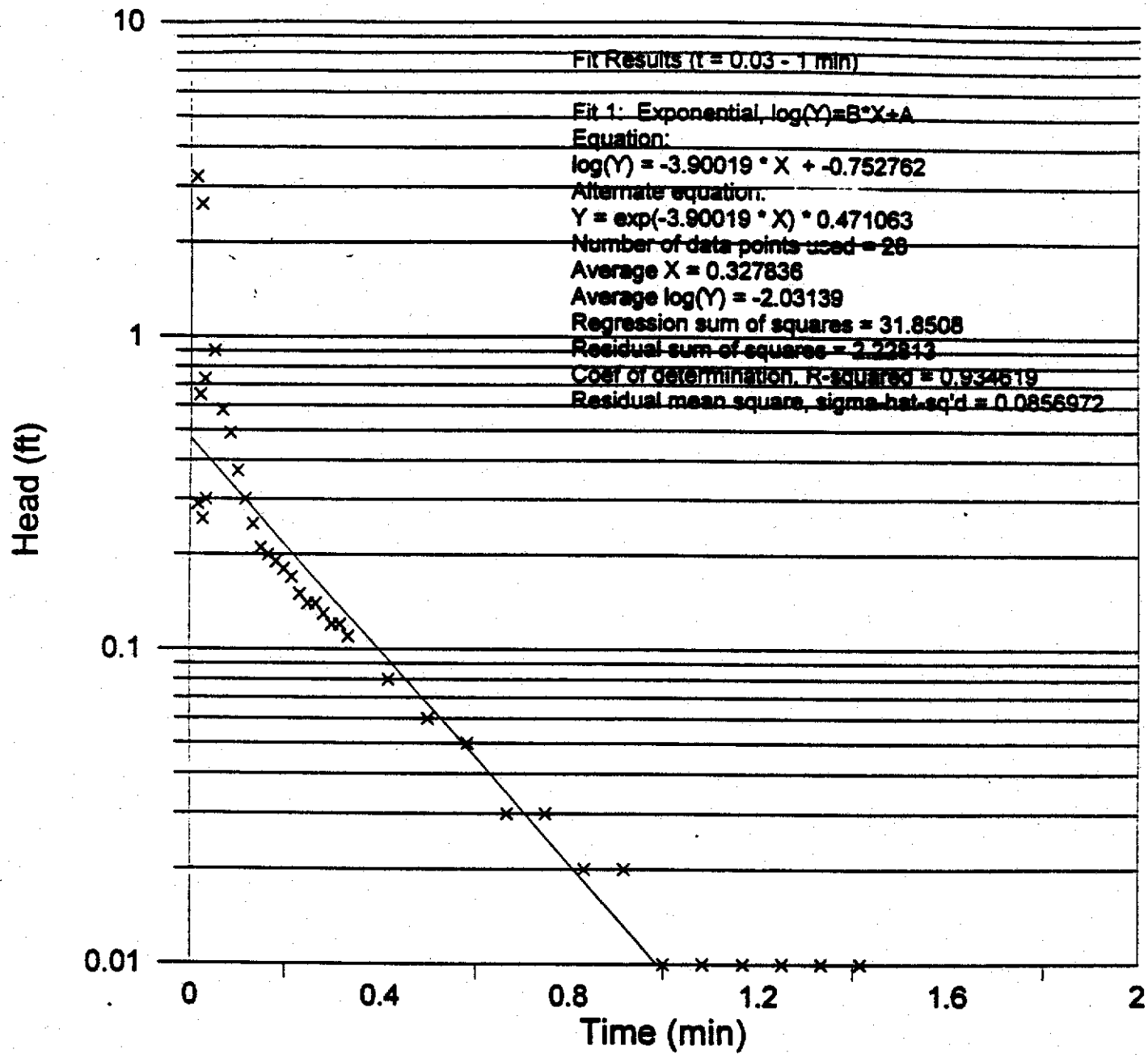
$H0 = 1.57\,ft$ $H := ((662.30 - 48.01) - 590.6)\cdot ft$ $H = 23.69\,ft$ $D := ((662.30 - 48.01) - 587.6)\cdot ft$

$D = 26.69\,ft$ $S := 0.0818733\,min^{-1}$ slope $A := 3.374$ $B := 0.539$ geometry coefficients

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 1\cdot 10^{-4}\cdot\frac{ft}{min}$ $K = 6\cdot 10^{-5}\cdot\frac{cm}{sec}$

MW-2044 - Test 1 - rising



$r_c = \frac{2.067\,in}{2}$ 2" Sch 40 PVC (p. 987) $r_c = 0.086\,ft$ $r_w = \frac{6.0}{2}\cdot in$ well radius $r_w = 0.25\,ft$ $L := 20\,ft$ screened interval

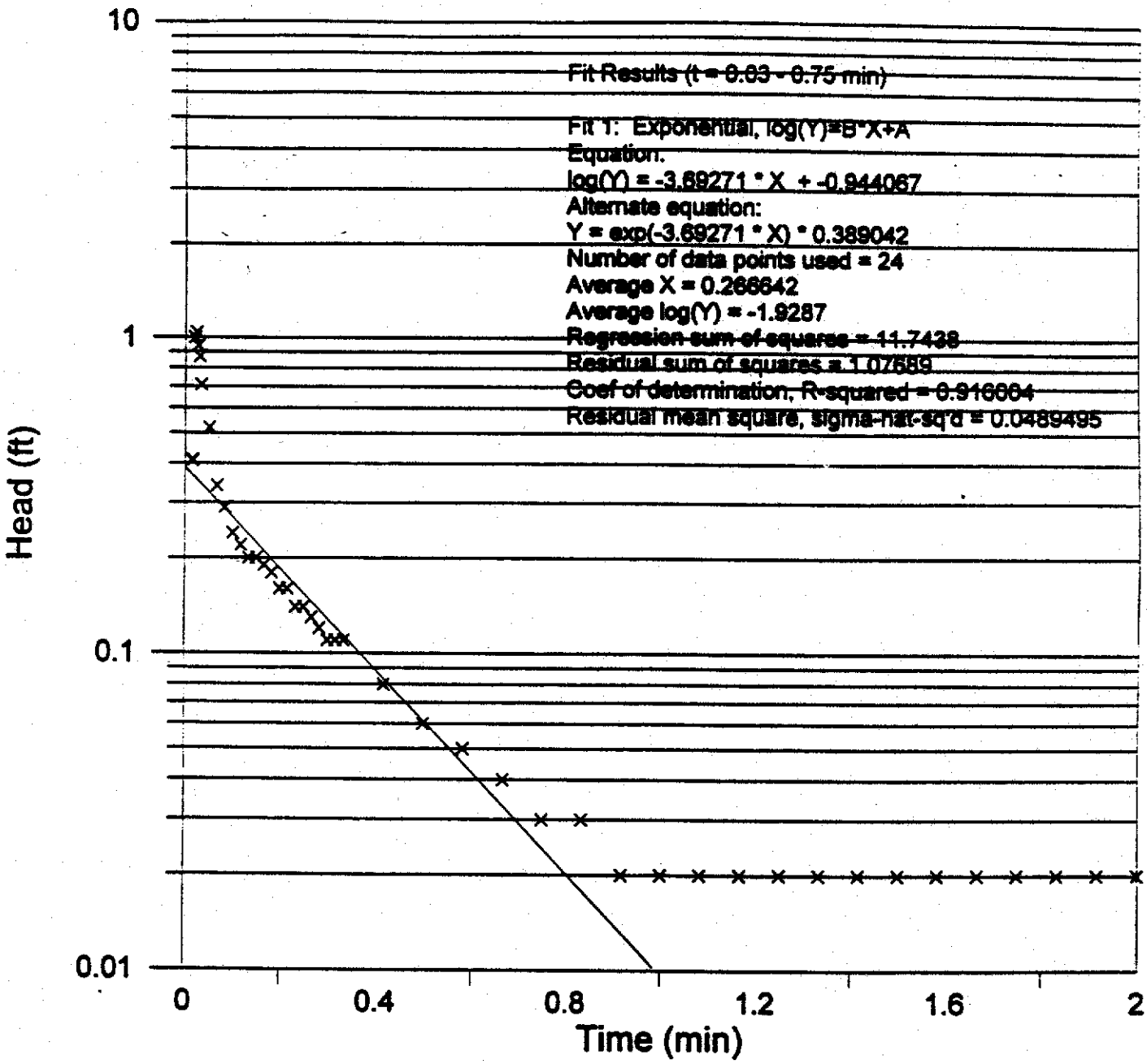
$r_s = \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2}\cdot l$ displacement $H0 = 1.85\,ft$ $n := 0.35$ $r_{cc} := \left[(1-n)\cdot r_c^2 + n\cdot r_w^2\right.$

$r_{cc} = 0.163\,ft$ $\frac{r_{cc}^2}{r_c^2} = 3.599$ $H0c = \frac{r_s^2}{r_{cc}^2}\cdot l$ $H0c = 0.513\,ft$ corrected displacement $H := ((657.11 - 43.00) - 591.1)\cdot$

$H = 23.0\,ft$ $D := ((657.11 - 43.00) - 591.1)\cdot ft$ $D = 23.0\,ft$ $S = 3.90019\,min^{-1}$ slope $C := 3.677$ geometry coefficient

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K = \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 3\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 1\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2044 - Test 4 - rising



$r_c = \frac{2.067\,in}{2}$ 2" Sch 40 PVC (p. 987) $r_c = 0.086\,ft$ $r_w := \frac{6.0}{2}\cdot in$ well radius $r_w = 0.25\,ft$ $L = 20\,ft$ screened interval

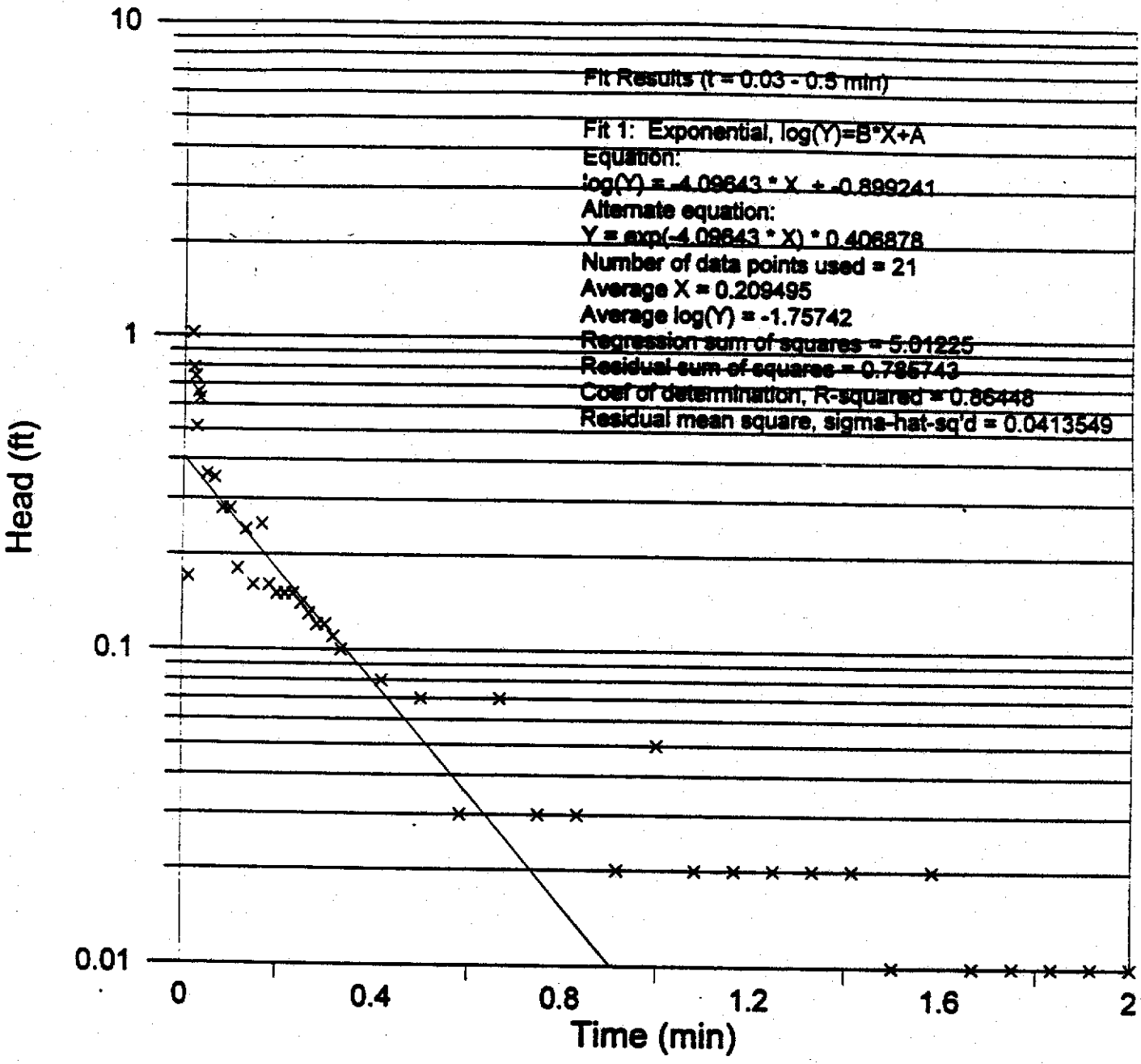
$r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement $H0 = 1.85\,ft$ $n := 0.35$ $r_{cc} := \left[(1-n)\cdot r_c^2 + n\cdot r_w^2\right]^{.5}$

$r_{cc} = 0.163\,ft$ $\frac{r_{cc}^2}{r_c^2} = 3.599$ $H0c := \frac{r_s^2}{r_{cc}^2}\cdot l$ $H0c = 0.513\,ft$ corrected displacement $H := ((657.11 - 43.00) - 591.1)\cdot ft$

$H = 23.01\,ft$ $D := ((657.11 - 43.00) - 591.1)\cdot ft$ $D = 23.01\,ft$ $S = 3.69271\,min^{-1}$ slope $C = 3.677$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K = \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 2\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 1\cdot 10^{-3}\cdot\frac{cm}{sec}$

MW-2044 - Test 6 - rising



$r_c = \frac{2.067\,in}{2}$ 2" Sch 40 PVC (p. 987) $r_c = 0.086\,ft$ $r_w = \frac{6.0}{2}\,in$ well radius $r_w = 0.25\,ft$ $L = 20\,ft$ screened interval

$r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2}\cdot l$ displacement $H0 = 1.85\,ft$ $n = 0.35$ $r_{cc} = \left[(1-n)\cdot r_c^2 + n\cdot r_w^2\right]^{0.5}$

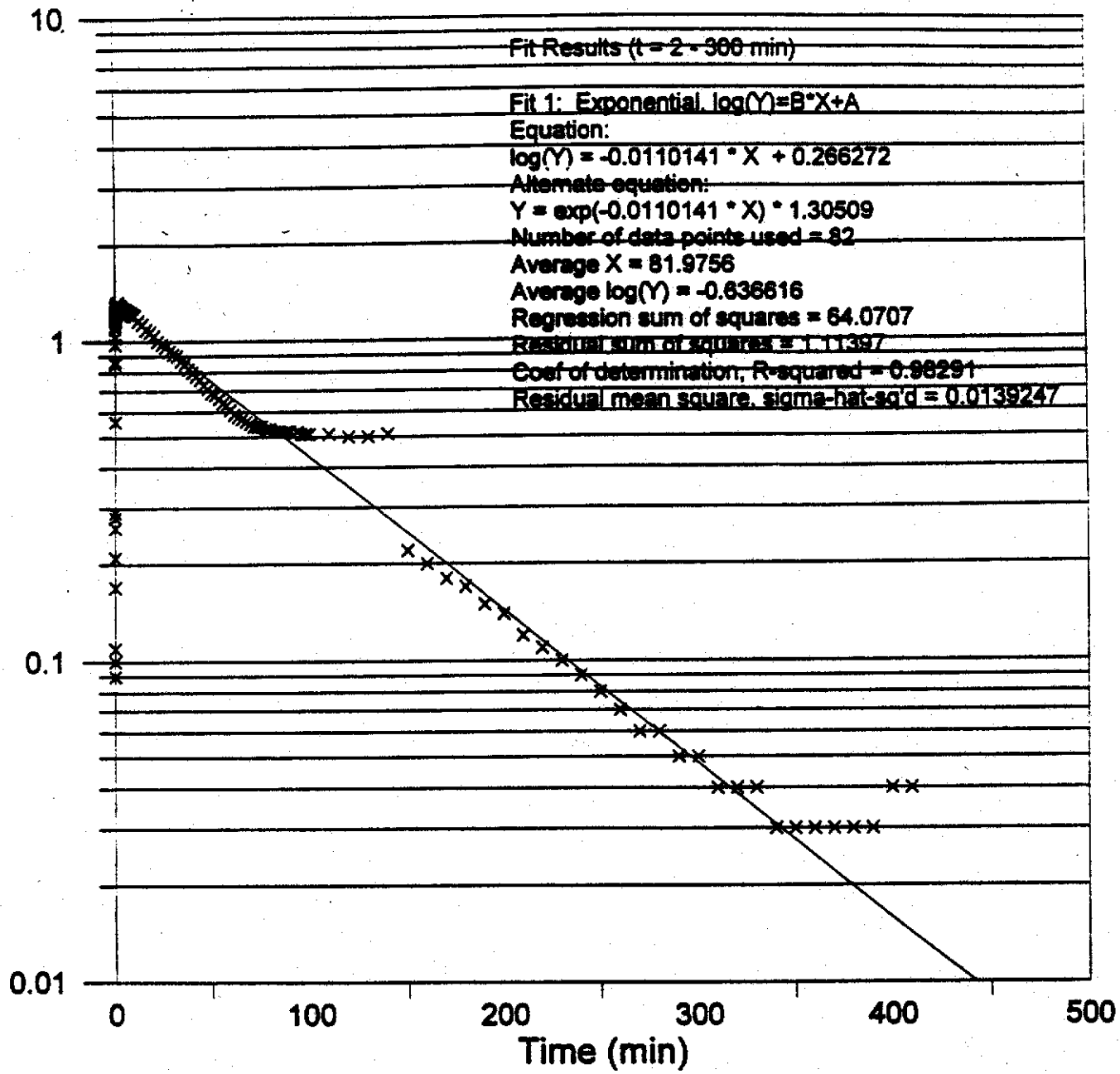
$r_{cc} = 0.163\,ft$ $\frac{r_{cc}^2}{r_c^2} = 3.599$ $H0c = \frac{r_s^2}{r_{cc}^2}\cdot l$ $H0c = 0.513\,ft$ corrected displacement $H = ((657.11 - 43.00) - 591.1)\cdot ft$

$H = 23.01\,ft$ $D = ((657.11 - 43.00) - 591.1)\cdot ft$ $D = 23.01\,ft$ $S = 4.09643\,min^{-1}$ slope $C = 3.677$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case

$$K = \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S \qquad K = 3\cdot 10^{-3}\cdot\frac{ft}{min} \qquad K = 1\cdot 10^{-3}\cdot\frac{cm}{sec}$$

MW-3023 - Test 3 - falling H20



$r_c = \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w = \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

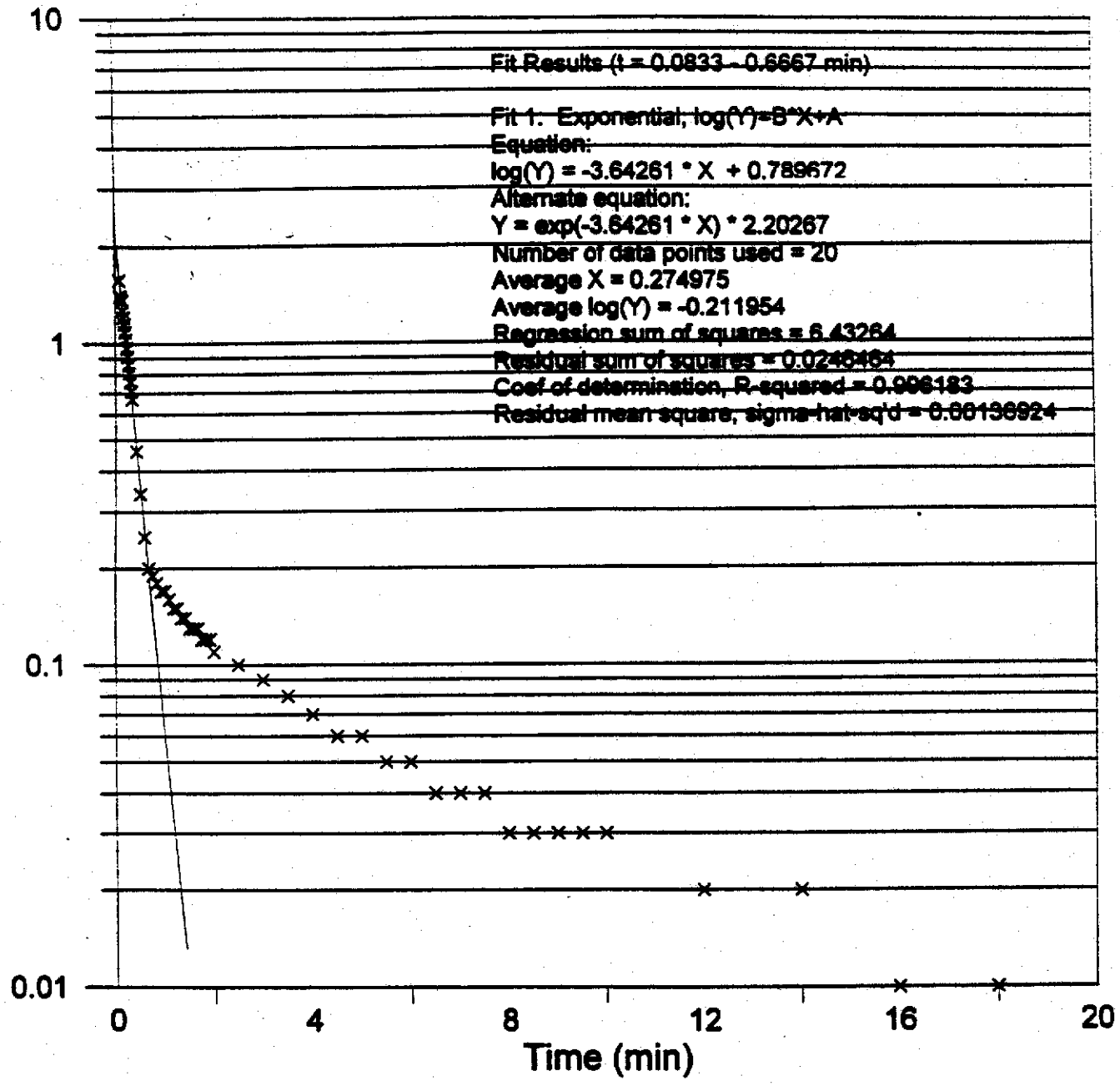
$L = 4.86\,ft$ screened interval $r_s = \frac{1.3\,in}{2}$ bailer radius $r_s = 0.65\,in$ $l = 3.2\,ft$ bailer length

$v_s = \pi \cdot r_s^2 \cdot l + 1 \cdot liter$ bailer volume $r_s = \sqrt{\frac{v_s}{\pi \cdot l}}$ $r_s = 0.964\,in$ equiv. radius $H0 = \frac{r_s^2}{r_c^2} \cdot l$ displacement

$H0 = 1.339\,ft$ $H = 4.86\,ft$ $S = 0.0110141\,min^{-1}$ slope $C = 2.270$ geometry coefficient

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$ fully penetrating case $K = \frac{r_c^2 \cdot \ln Rerw}{2 \cdot L} \cdot S$ $K = 5 \cdot 10^{-5} \cdot \frac{ft}{min}$ $K = 2 \cdot 10^{-5} \cdot \frac{cm}{sec}$

MW-3024 - Test 1 - falling



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

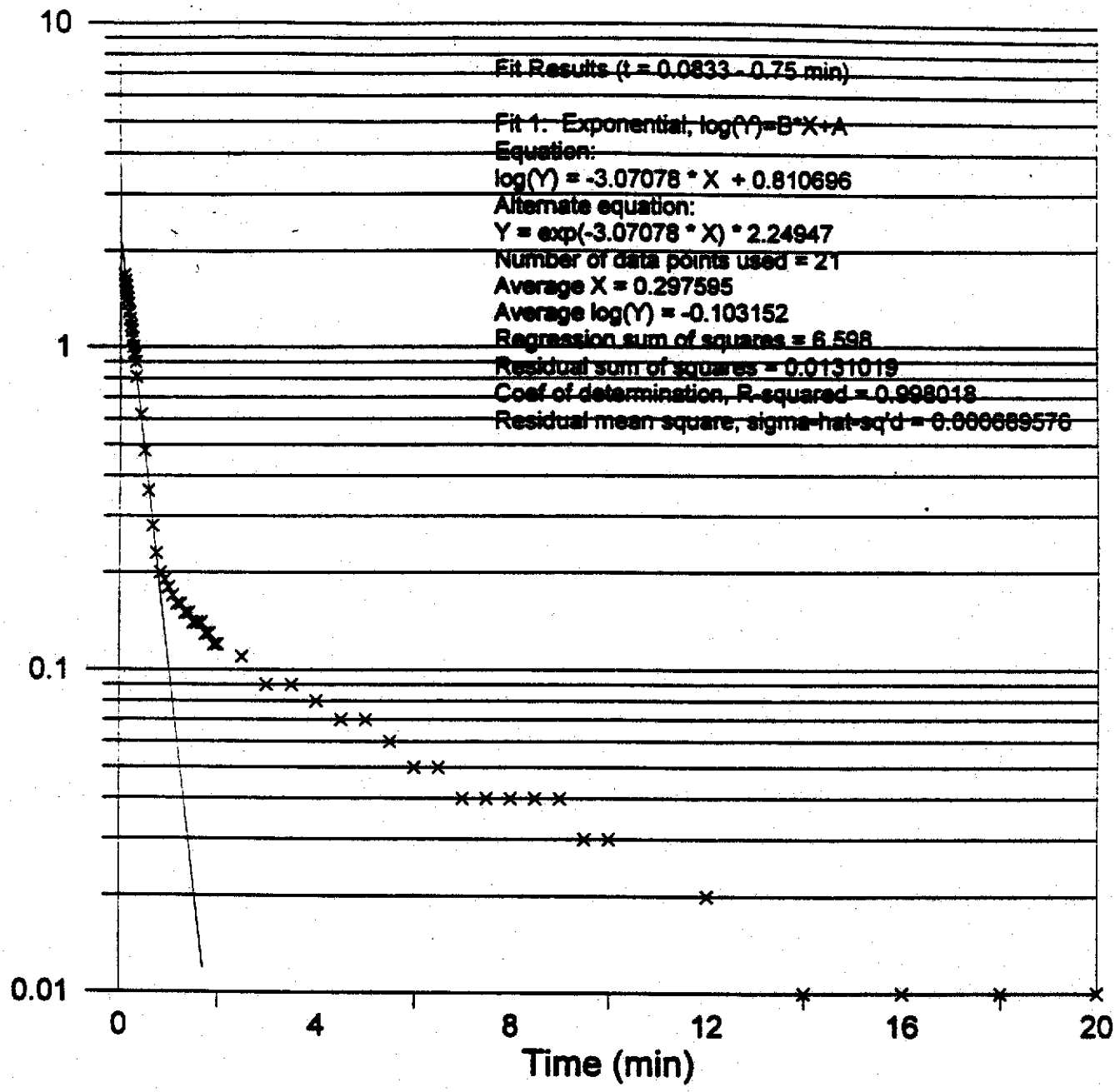
$L := 20\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

$H0 = 0.89\,ft$ $H := ((647.90 - 35.36) - 547.9)\cdot ft$ $H = 64.64\,ft$ $D := ((647.90 - 35.36) - 543.9)\cdot ft$

$D = 68.64\,ft$ $S := 3.64261\,min^{-1}$ slope $A := 5.574$ $B := 0.991$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$ partially penetrating case $K := \frac{r_c^2 \cdot \ln Rerw}{2\cdot L} \cdot S$ $K = 6\cdot 10^{-3} \cdot \frac{ft}{min}$ $K = 3\cdot 10^{-3} \cdot \frac{cm}{sec}$

MW-3024 - Test 2 - rising



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

$L = 20\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

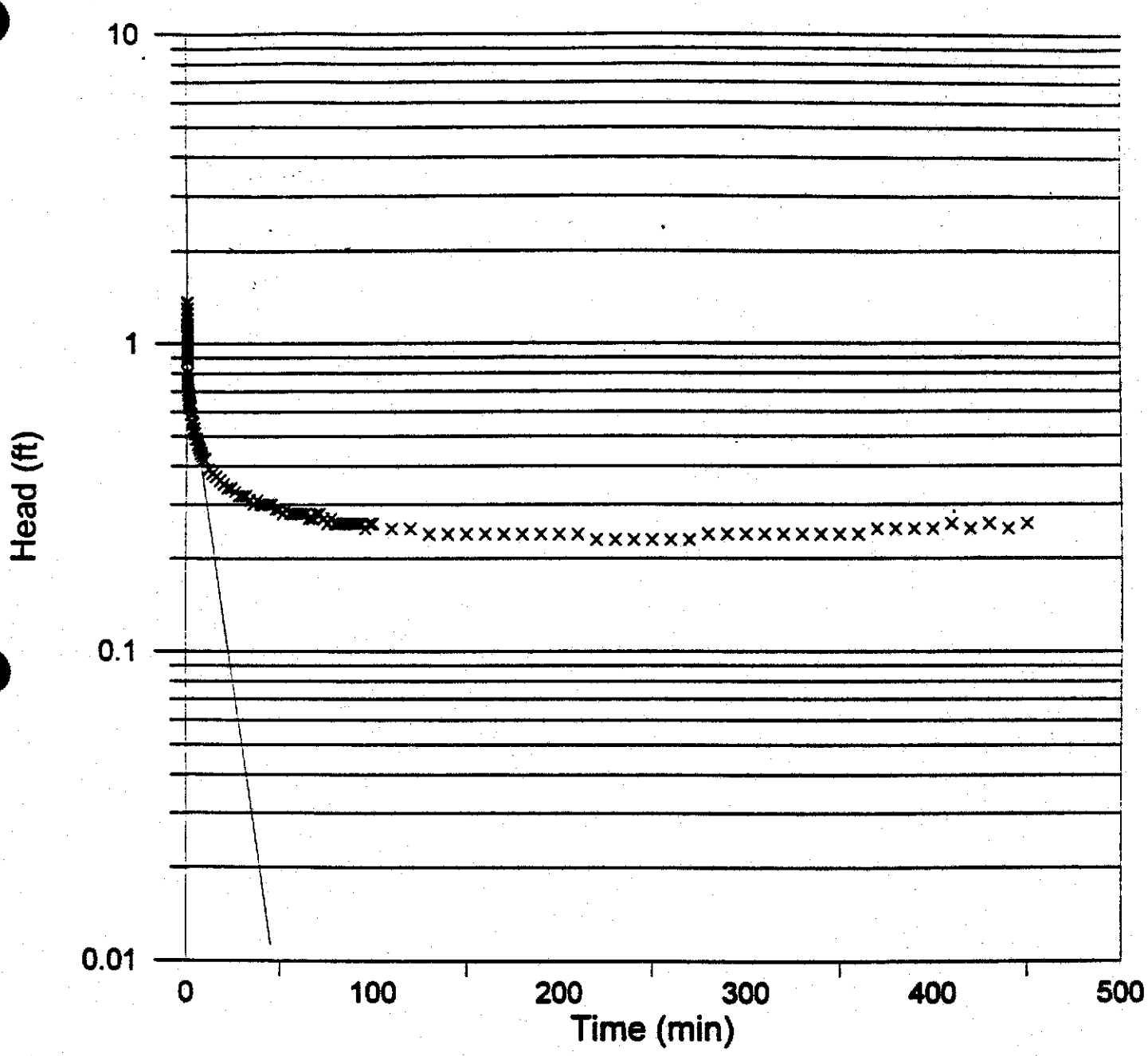
$H0 = 0.89\,ft$ $H := ((647.90 - 35.36) - 547.9)\cdot ft$ $H = 64.64\,ft$ $D := ((647.90 - 35.36) - 543.9)\cdot ft$

$D = 68.64\,ft$ $S := 3.07078\,min^{-1}$ slope $A = 5.574$ $B = 0.991$ geometry coefficients

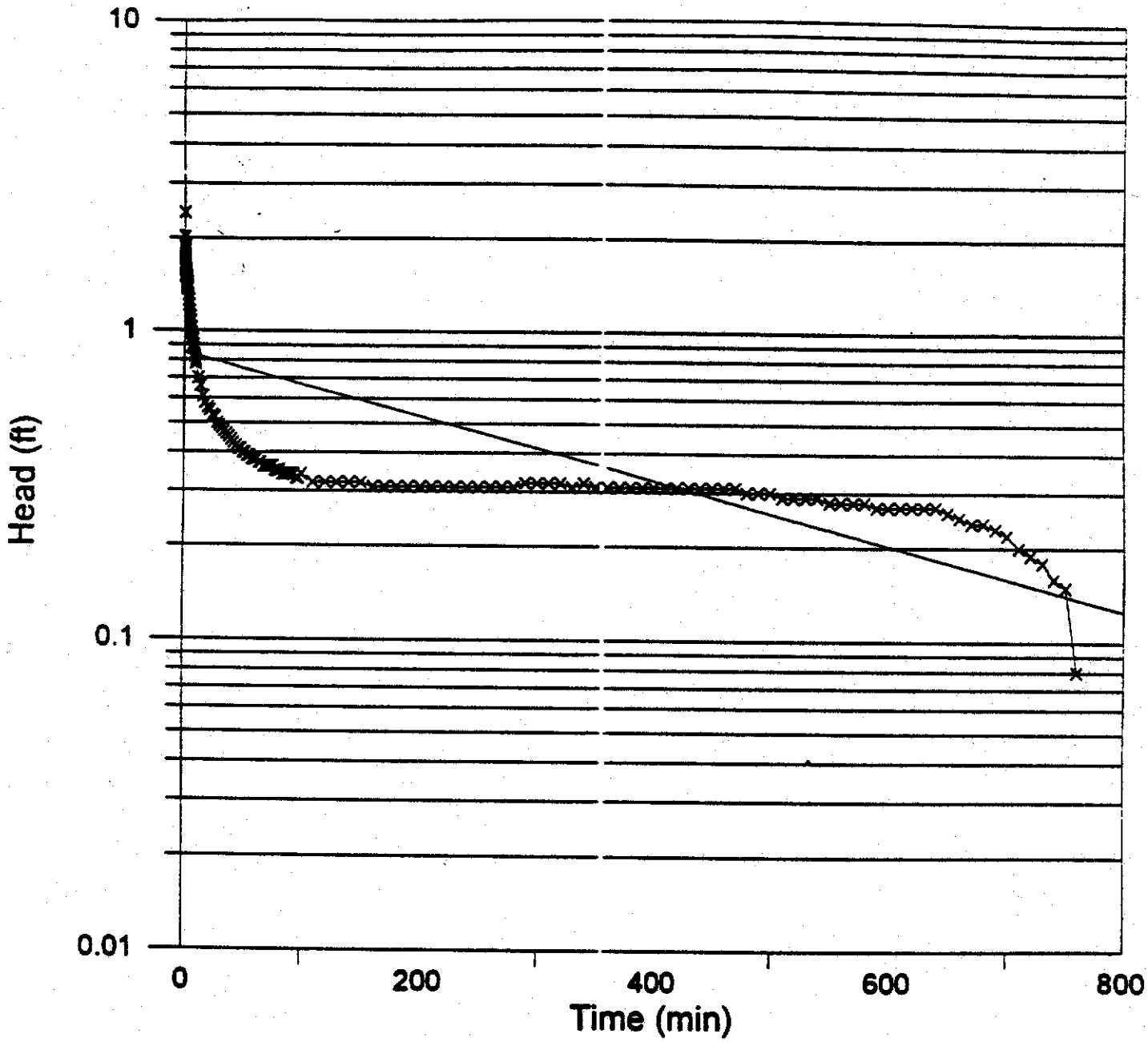
$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot \ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2 \cdot \ln Rerw}{2\cdot L} \cdot S$ $K = 5\cdot 10^{-3} \cdot \frac{ft}{min}$ $K = 3\cdot 10^{-3} \cdot \frac{cm}{sec}$

MW-3025 - Test 0 - falling



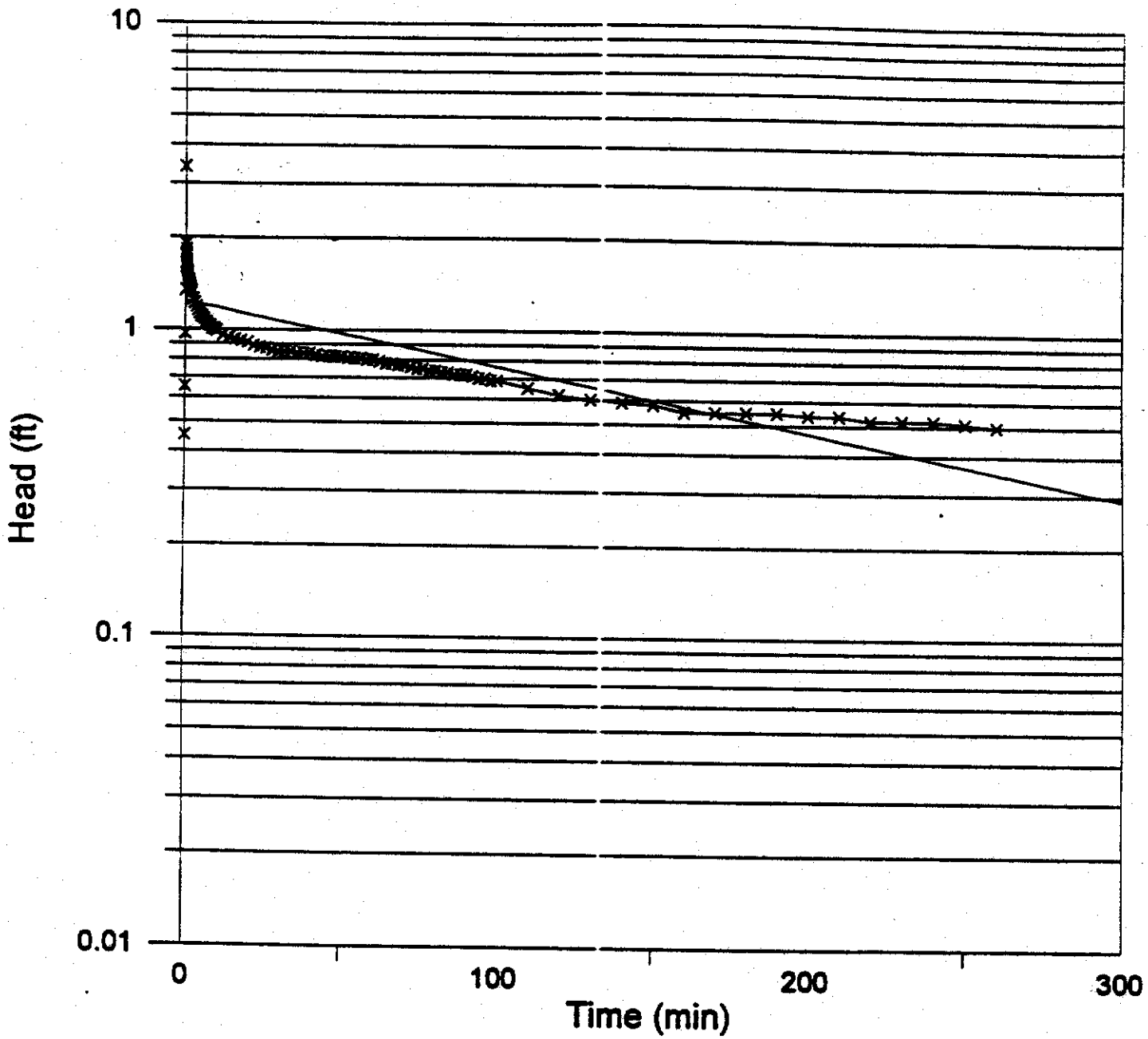
MW-3026 - Test 0 - falling



Fit Results

Fit 1: Exponential, log(Y)=B*X+A
Equation:
log(Y) = -2.04305 * X + -1.7404
Alternate equation:
Y = exp(-2.04305 * X) * 0.175451
Number of data points used = 39
Average X = 0.436644
Average log(Y) = -2.63248
Regression sum of squares = 32.5632
Residual sum of squares = 18.1001
Coef of determination, R-squared = 0.642737
Residual mean square, sigma-hat-sq'd = 0.489193

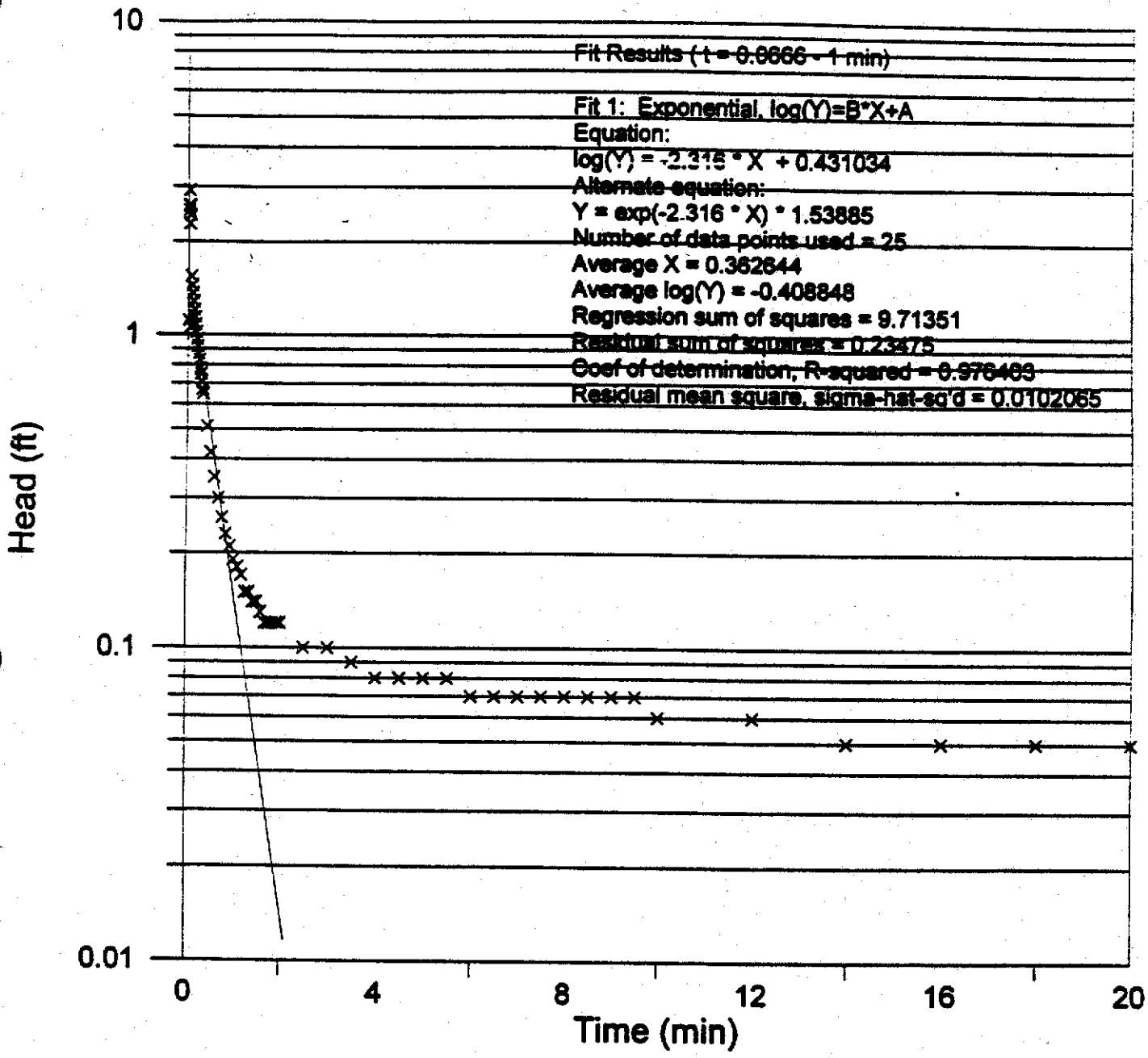
MW-3026 - Test 1 - rising



Fit Results

Fit 1: Exponential, log(Y)=B*X+A
Equation:
log(Y) = -0.0048511 * X + 0.21559
Alternate equation:
Y = exp(-0.0048511 * X) * 1.24059
Number of data points used = 121
Average X = 46.3451
Average log(Y) = -0.0092348
Regression sum of squares = 11.6238
Residual sum of squares = 6.86615
Coef of determination, R-squared = 0.628655
Residual mean square, sigma-hat-sq'd = 0.0576987

MW-3027 - Test 4 - falling



$r_c := \frac{2.067\,in}{2}$ 2" Sch 40 PVC (p. 987) $r_c = 0.086\,ft$ $r_w := \frac{8.25}{2}\cdot in$ well radius $r_w = 0.344\,ft$

$L := 15\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

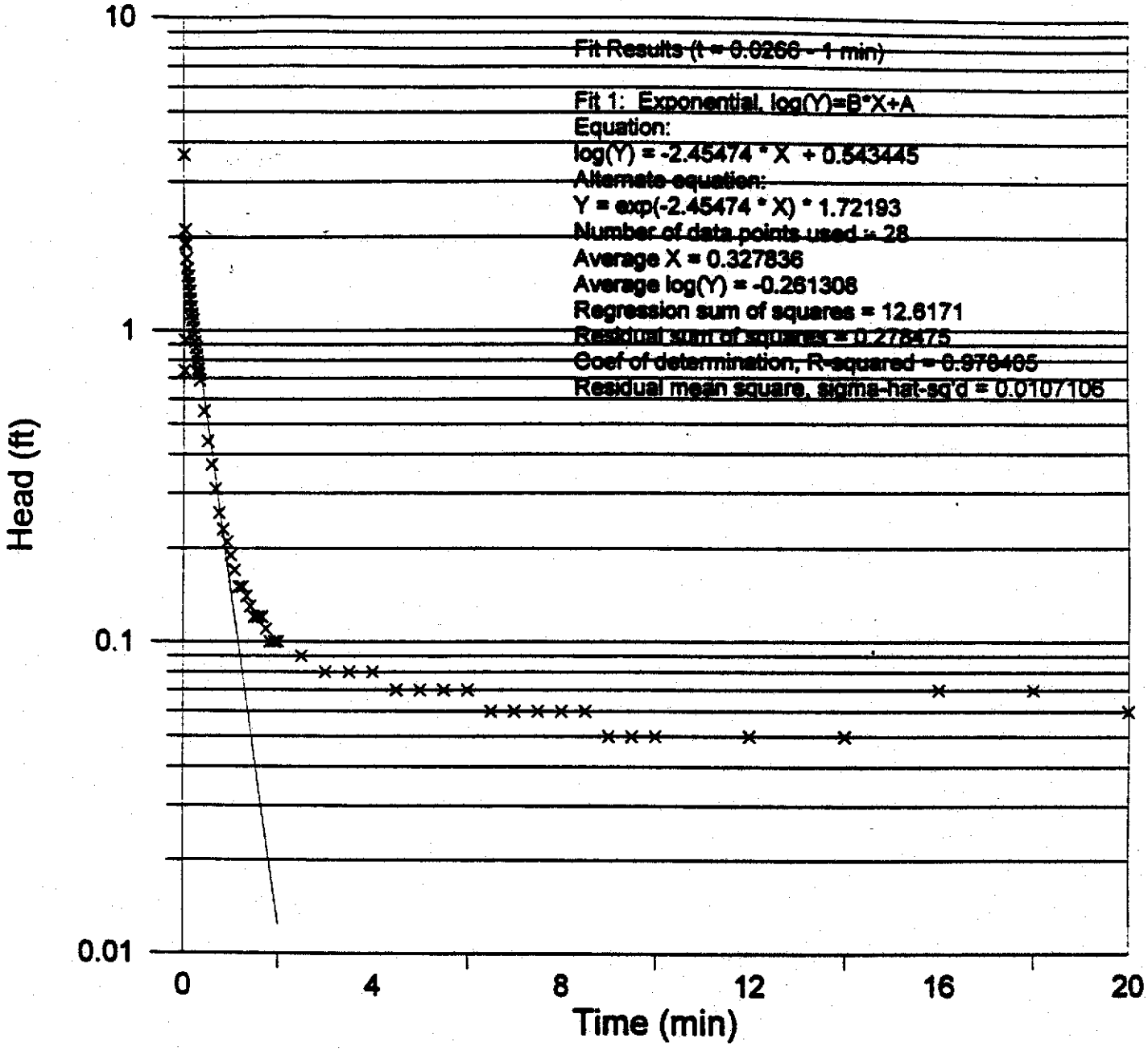
$H0 = 1.85\,ft$ $H := ((647.36 - 33.50) - 592.36)\cdot ft$ $H = 21.9\,ft$ $D := ((647.36 - 33.50) - 590.36)\cdot ft$

$D = 23.9\,ft$ $S := 2.316\,min^{-1}$ slope $A := 2.874$ $B := 0.465$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K = \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 2\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 3\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-3027 - Test 5 - rising



$r_c := \frac{2.067\,in}{2}$ 2" Sch 40 PVC (p. 987) $r_c = 0.086\,ft$ $r_w := \frac{8.25}{2}\,in$ well radius $r_w = 0.344\,ft$

$L := 15\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement

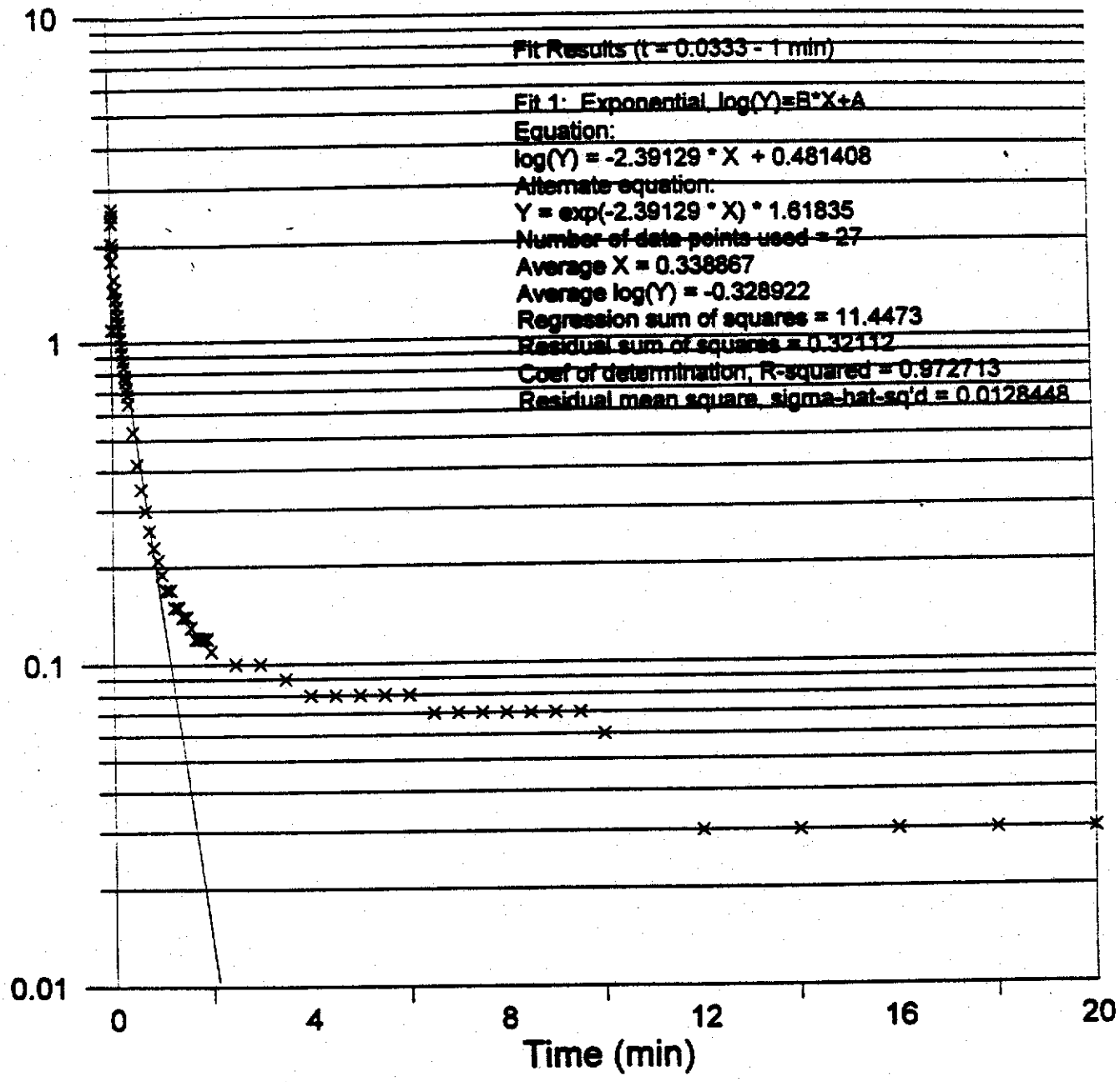
$H0 = 1.85\,ft$ $H := ((647.36 - 33.50) - 592.36)\cdot ft$ $H = 21.5\,ft$ $D := ((647.36 - 33.50) - 590.36)\cdot ft$

$D = 23.5\,ft$ $S := 2.45474\,min^{-1}$ slope $A := 2.874$ $B := 0.465$ geometry coefficients

$$\ln Rerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K := \frac{r_c^2 \cdot \ln Rerw}{2\cdot L} \cdot S$ $K = 2\cdot 10^{-3} \cdot \frac{ft}{min}$ $K = 9\cdot 10^{-4} \cdot \frac{cm}{sec}$

MW-3027 - Test 6 - falling



$r_c = \frac{2.067\,in}{2}$ 2" Sch 40 PVC (p. 987) $r_c = 0.086\,ft$ $r_w := \frac{8.25}{2}\cdot in$ well radius $r_w = 0.344\,ft$

$L = 15\,ft$ screened interval $r_s := \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

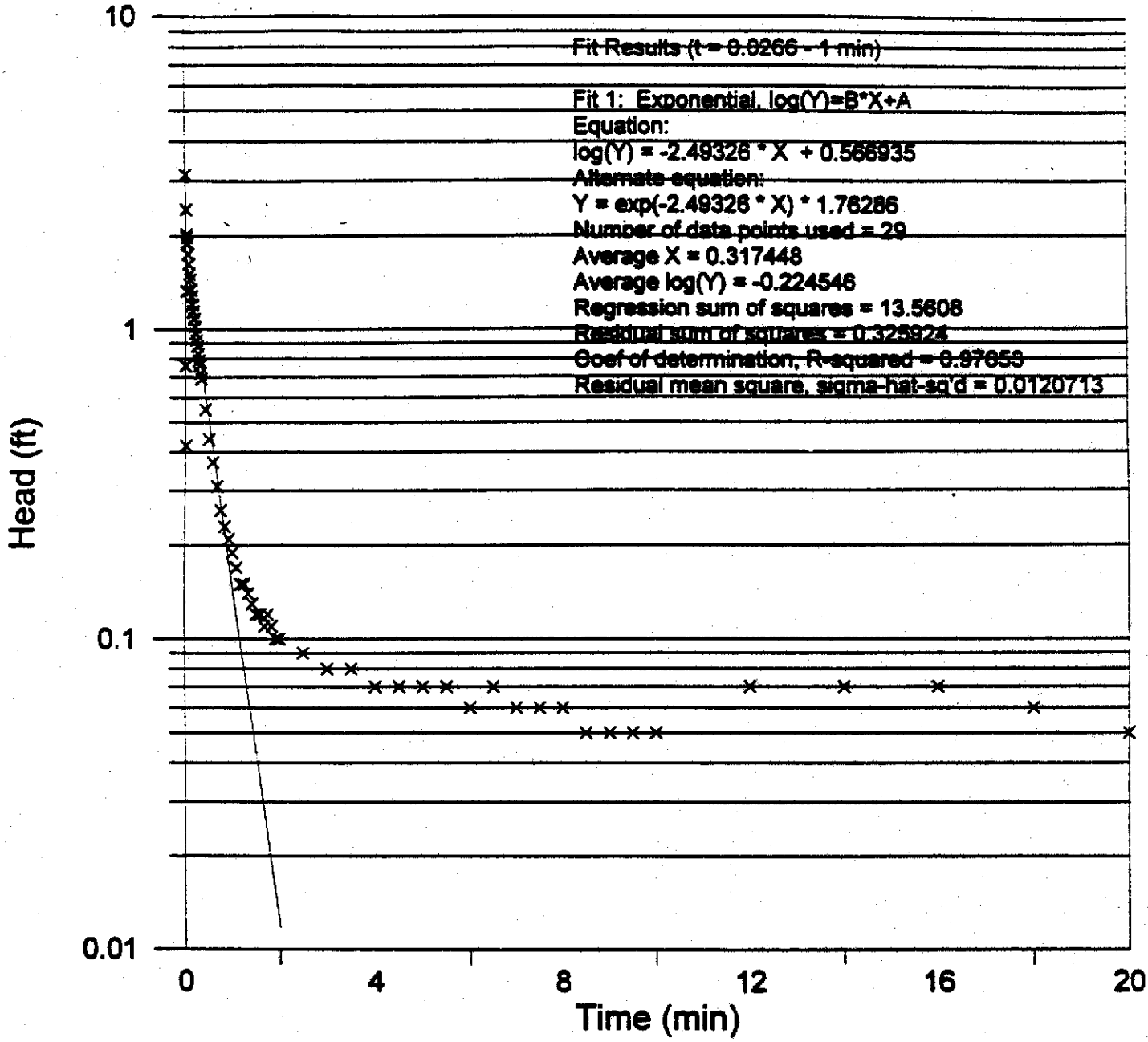
$H0 = 1.85\,ft$ $H := ((647.36 - 33.50) - 592.36)\cdot ft$ $H = 21.9\,ft$ $D := ((647.36 - 33.50) - 590.36)\cdot ft$

$D = 23.9\,ft$ $S := 2.39129\,min^{-1}$ slope $A := 2.874$ $B := 0.465$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B\cdot\ln\left(\frac{D-H}{r_w}\right)}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$

partially penetrating case $K := \frac{r_c^2\cdot \ln Rerw}{2\cdot L}\cdot S$ $K = 2\cdot 10^{-3}\cdot\frac{ft}{min}$ $K = 9\cdot 10^{-4}\cdot\frac{cm}{sec}$

MW-3027 - Test 7 - rising



$r_c = \frac{2.067\,in}{2}$ 2" Sch 40 PVC (p. 987) $r_c = 0.086\,ft$ $r_w = \frac{8.25}{2}\,in$ well radius $r_w = 0.344\,ft$

$L = 15\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2} \cdot l$ displacement

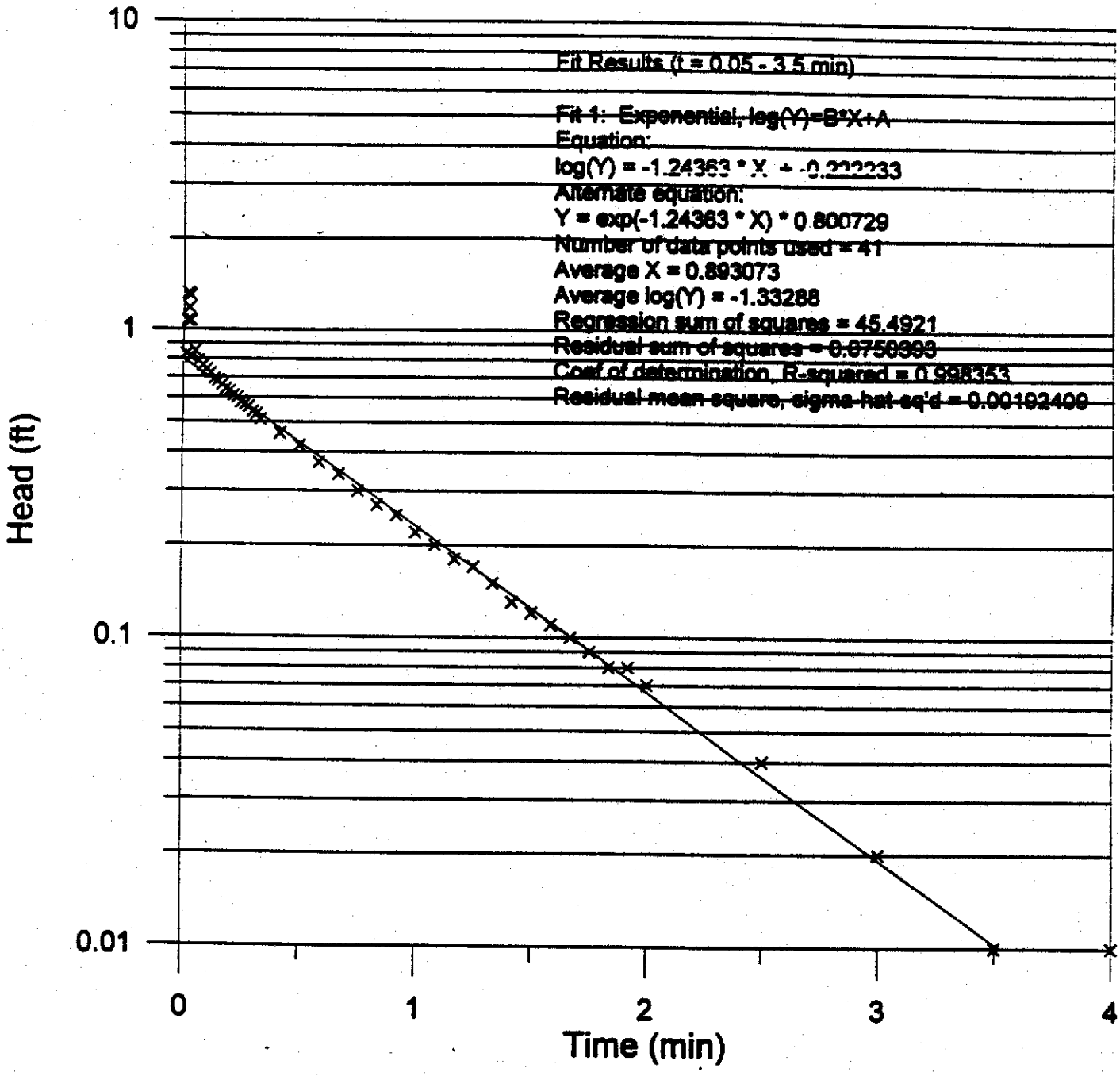
$H0 = 1.85\,ft$ $H = ((647.36 - 33.50) - 592.36)\,ft$ $H = 21.5\,ft$ $D = ((647.36 - 33.50) - 590.36)\,ft$

$D = 23.5\,ft$ $S = 2.49326\,min^{-1}$ slope $A = 2.874$ $B = 0.465$ geometry coefficients

$$\ln Rerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{A + B \cdot \ln\left(\frac{D - H}{r_w}\right)}{\left(\frac{L}{r_w}\right)} \right]^{-1}$$

partially penetrating case $K = \frac{r_c^2 \cdot \ln Rerw}{2 \cdot L} \cdot S$ $K = 2 \cdot 10^{-3} \cdot \frac{ft}{min}$ $K = 9 \cdot 10^{-4} \cdot \frac{cm}{sec}$

MW-4002 - Test 0 - falling



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

$r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement $H0 = 0.89\,ft$

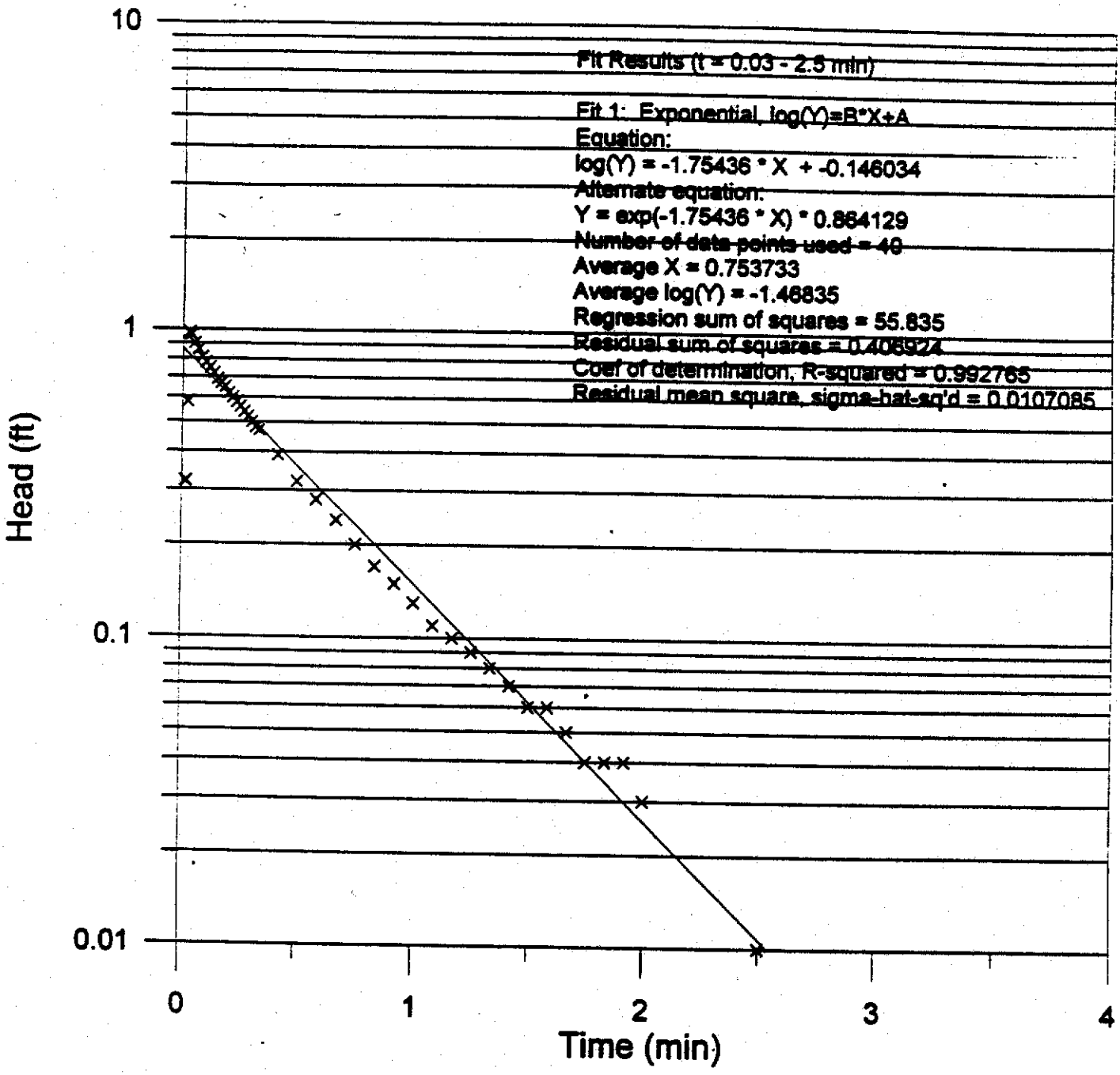
$H := ((635.20 - 66.17) - 550.60)\cdot ft$ $H = 18.43\,ft$ $D := H$ saturated thickness $D = 18.43\,ft$

$L := H$ screened interval $L = 18.43\,ft$ $S := 1.24363\,min^{-1}$ slope $C := 5.717$ geometry coefficient

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case

$$K := \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S \qquad K = 2 \cdot 10^{-3} \cdot \frac{ft}{min} \qquad K = 1 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

MW-4002 - Test 1 - rising



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

$r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement $H0 = 0.89\,ft$

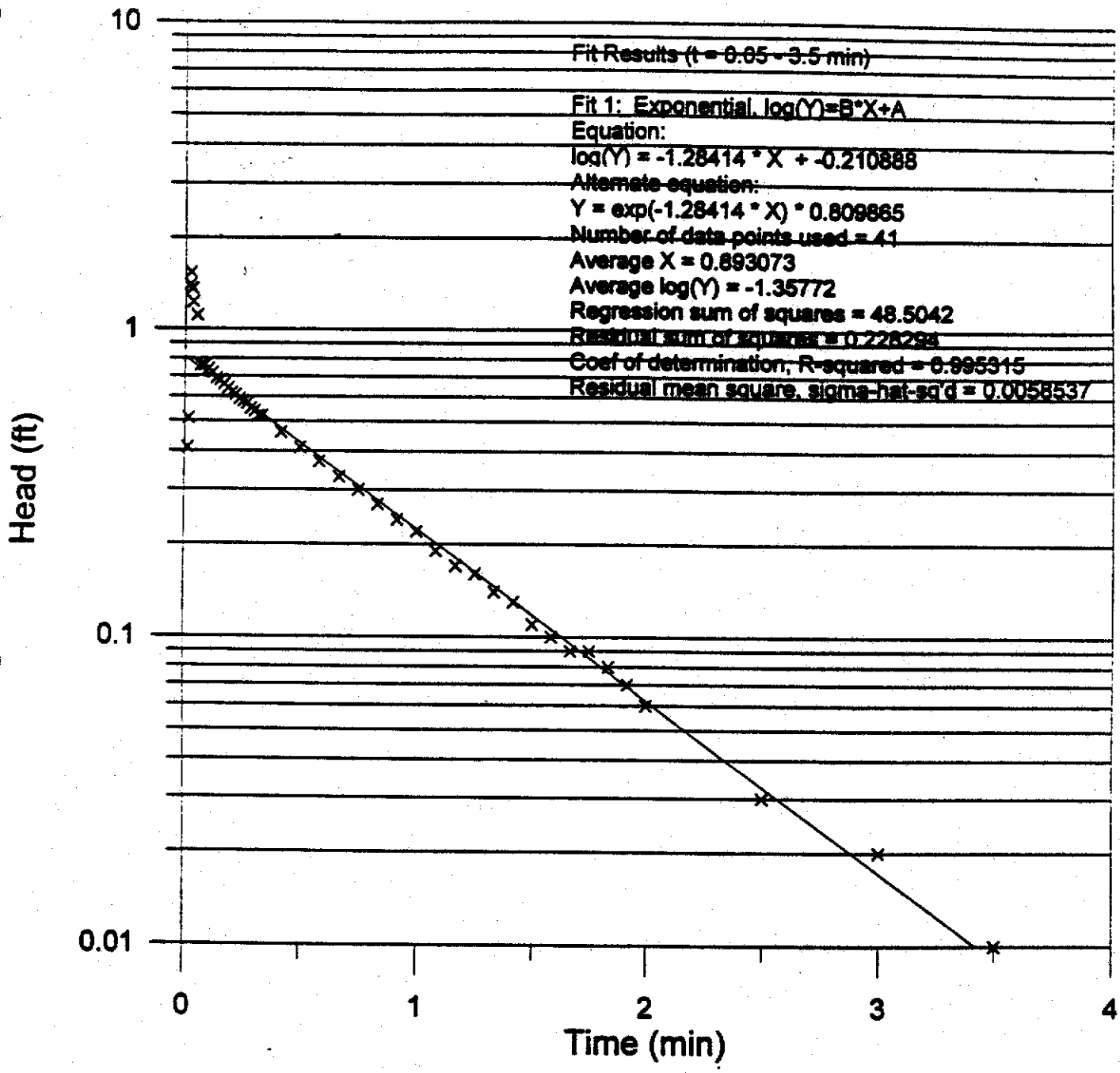
$H := ((635.20 - 66.17) - 550.60)\cdot ft$ $H = 18.43\,ft$ $D := H$ saturated thickness $D = 18.43\,ft$

$L := H$ screened interval $L = 18.43\,ft$ $S := 1.75436\,min^{-1}$ slope $C = 5.717$ geometry coefficient

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case

$K := \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S$ $K = 3 \cdot 10^{-3} \cdot \frac{ft}{min}$ $K = 1 \cdot 10^{-3} \cdot \frac{cm}{sec}$

MW-4002 - Test 2 - falling



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

$r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement $H0 = 0.89\,ft$

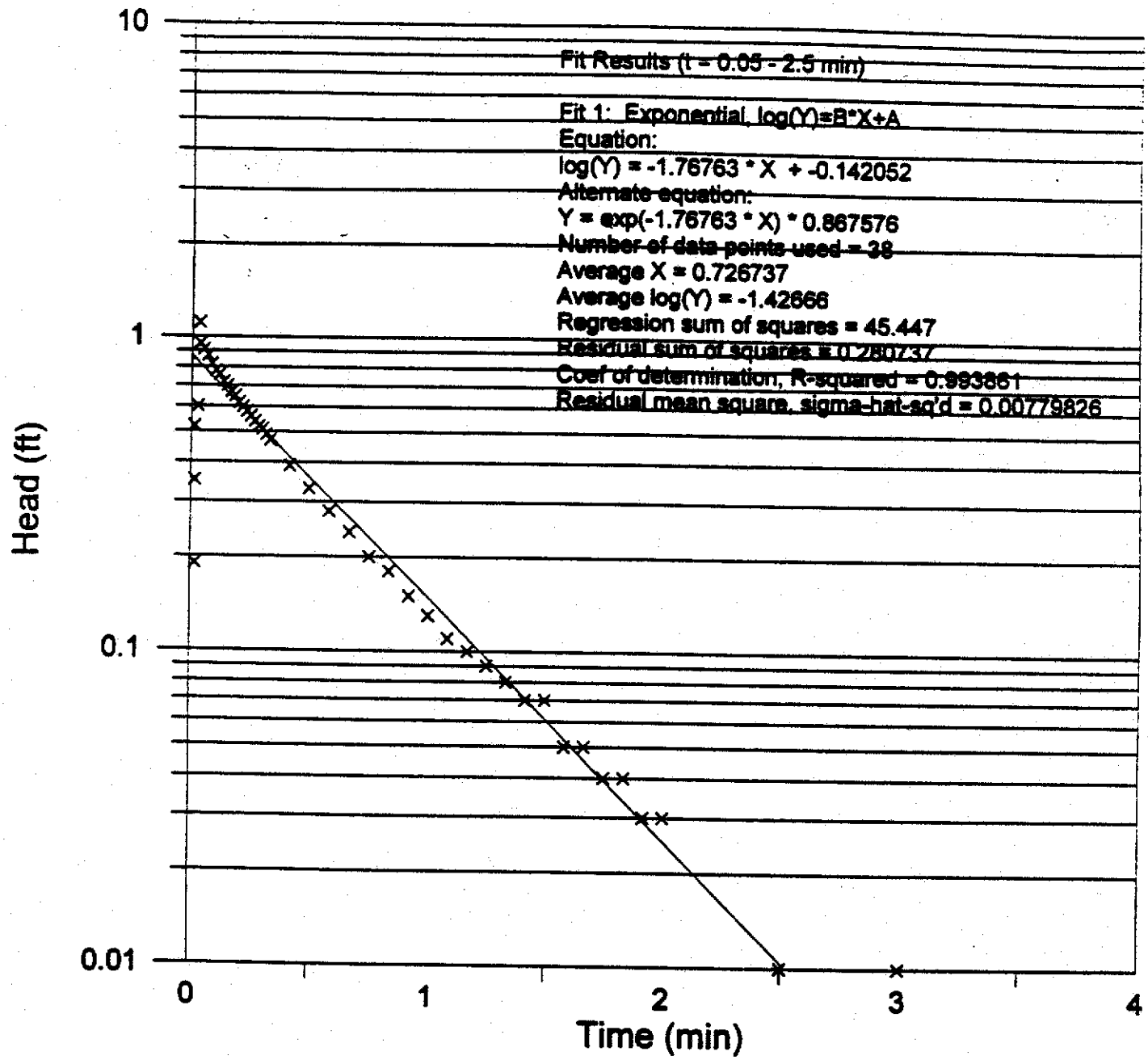
$H = ((635.20 - 66.17) - 550.60)\,ft$ $H = 18.43\,ft$ $D = H$ saturated thickness $D = 18.43\,ft$

$L = H$ screened interval $L = 18.43\,ft$ $S := 1.28414\,min^{-1}$ slope $C := 5.717$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case

$$K = \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S \qquad K = 2 \cdot 10^{-3} \cdot \frac{ft}{min} \qquad K = 1 \cdot 10^{-3} \cdot \frac{cm}{sec}$$

MW-4002 - Test 3 - rising



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

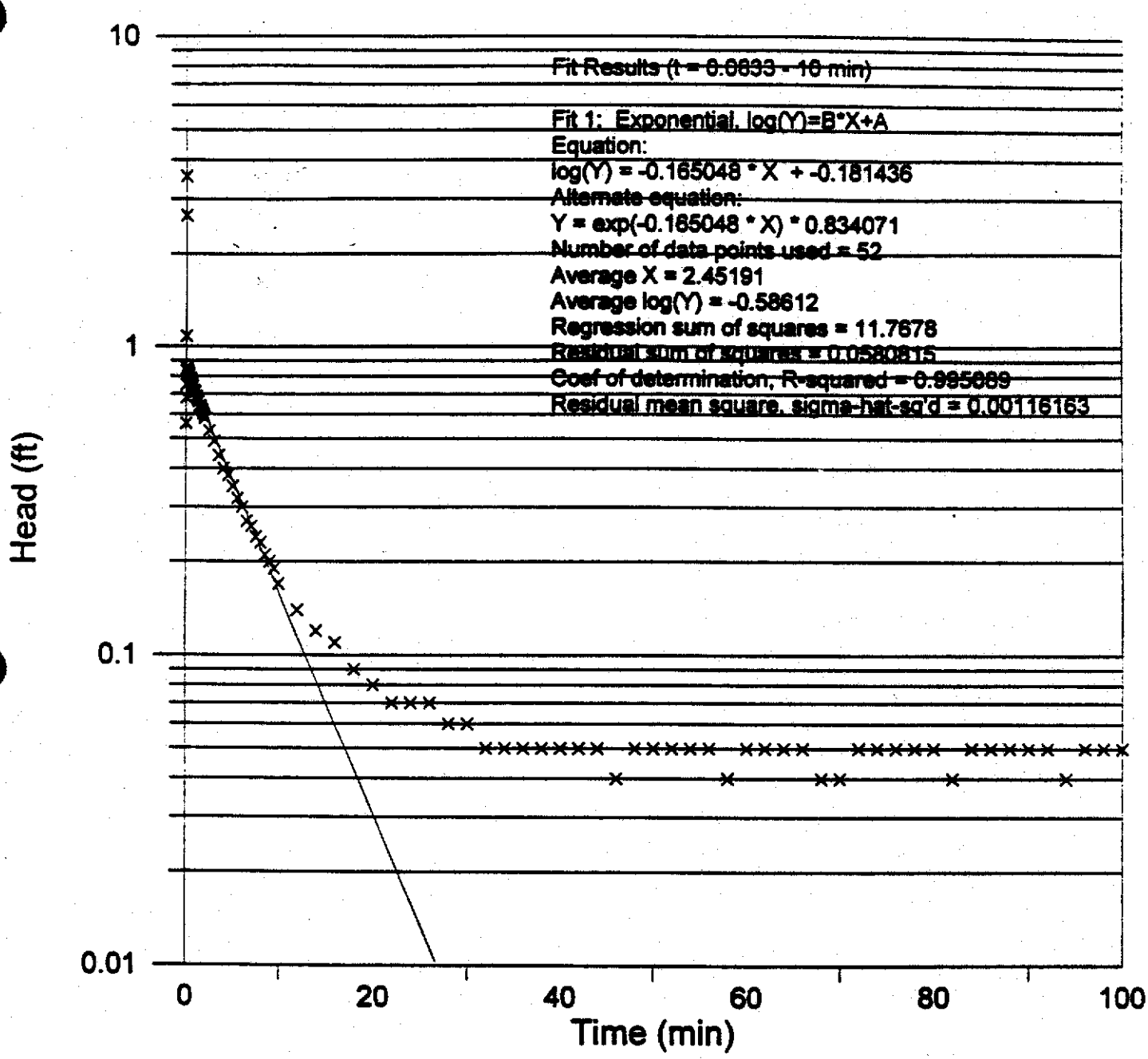
$r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement $H0 = 0.89\,ft$

$H := ((635.20 - 66.17) - 550.60) \cdot ft$ $H = 18.43\,ft$ $D := H$ saturated thickness $D = 18.43\,ft$

$L := H$ screened interval $L = 18.43\,ft$ $S := 1.76763\,min^{-1}$ slope $C := 5.717$ geometry coefficient

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K := \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S$ $K = 3 \cdot 10^{-3} \cdot \frac{ft}{min}$ $K = 1 \cdot 10^{-3} \cdot \frac{cm}{sec}$

MW-4003 - Test 2 - falling



$r_c = \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w = \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

$r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2} \cdot l$ displacement $H0 = 0.89\,ft$

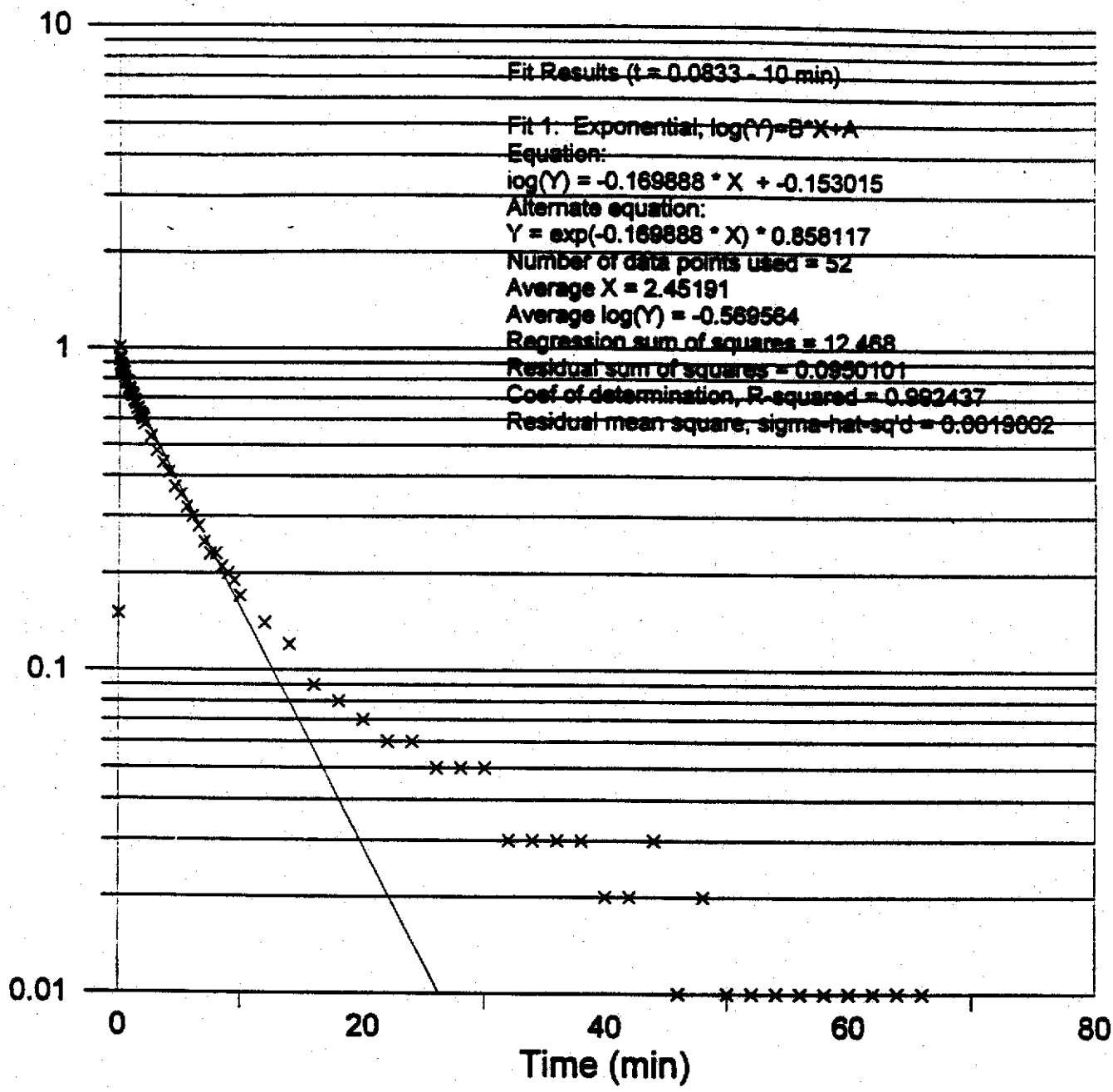
$H = ((671.60 - 55.87) - 563.50)\,ft$ $H = 52.23\,ft$ $D = H$ saturated thickness $D = 52.23\,ft$

$L = H$ screened interval $L = 52.23\,ft$ $S = 0.165048\,min^{-1}$ slope $C = 9.969$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case

$K = \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S$ $K = 1 \cdot 10^{-4} \cdot \frac{ft}{min}$ $K = 6 \cdot 10^{-5} \cdot \frac{cm}{sec}$

MW-4003 - Test 3 - rising



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

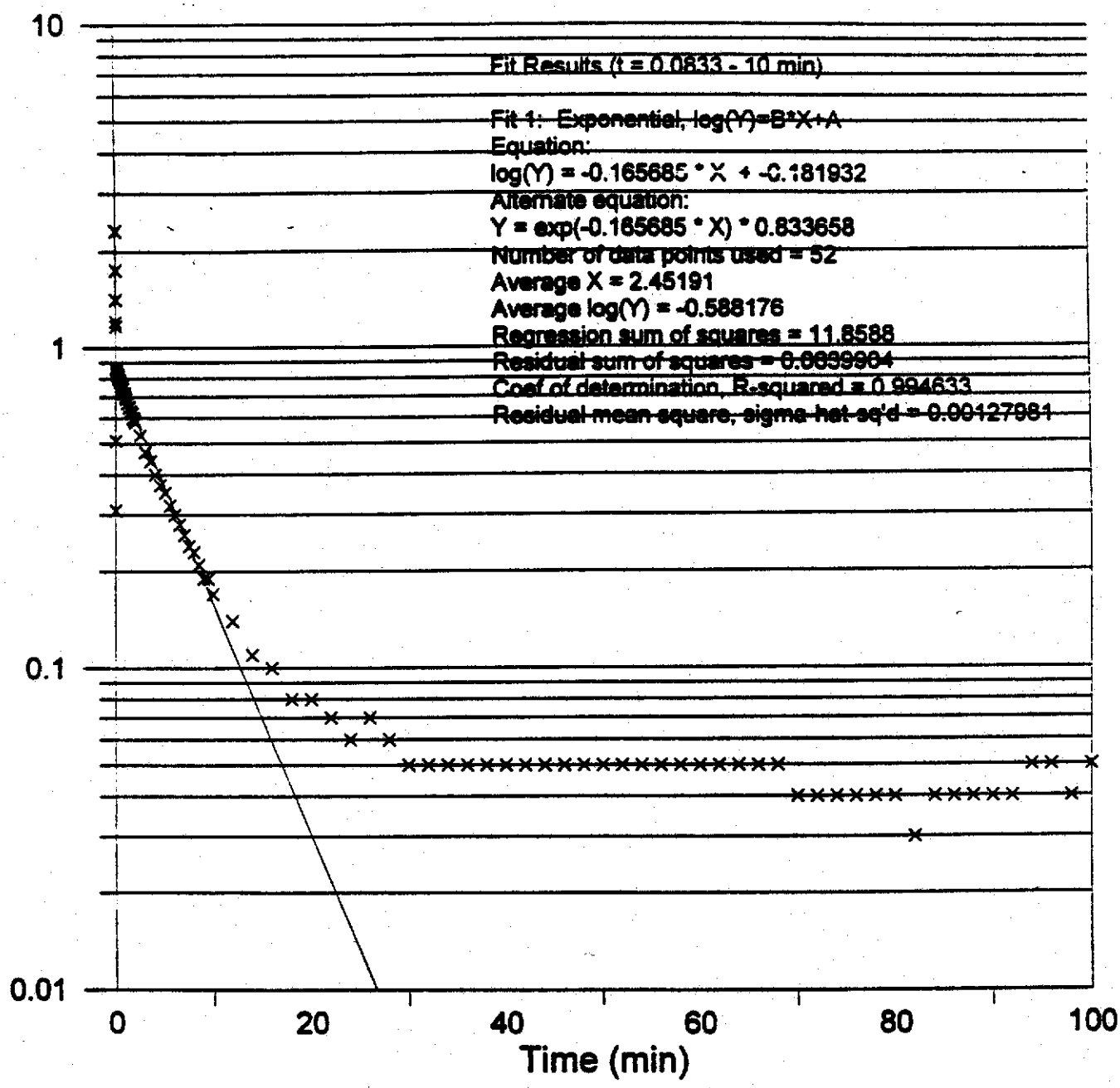
$r_s := \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement $H0 = 0.89\,ft$

$H = ((671.60 - 55.87) - 563.50)\,ft$ $H = 52.23\,ft$ $D := H$ saturated thickness $D = 52.23\,ft$

$L := H$ screened interval $L = 52.23\,ft$ $S := 0.169888\,min^{-1}$ slope $C = 9.969$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K = \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S$ $K = 1 \cdot 10^{-4} \cdot \frac{ft}{min}$ $K = 6 \cdot 10^{-5} \cdot \frac{cm}{sec}$

MW-4003 - Test 4 - falling



$r_c := \frac{2.98\,in}{2}$ NQ Corehole $r_c = 0.124\,ft$ $r_w := \frac{2.98\,in}{2}$ well radius $r_w = 0.124\,ft$

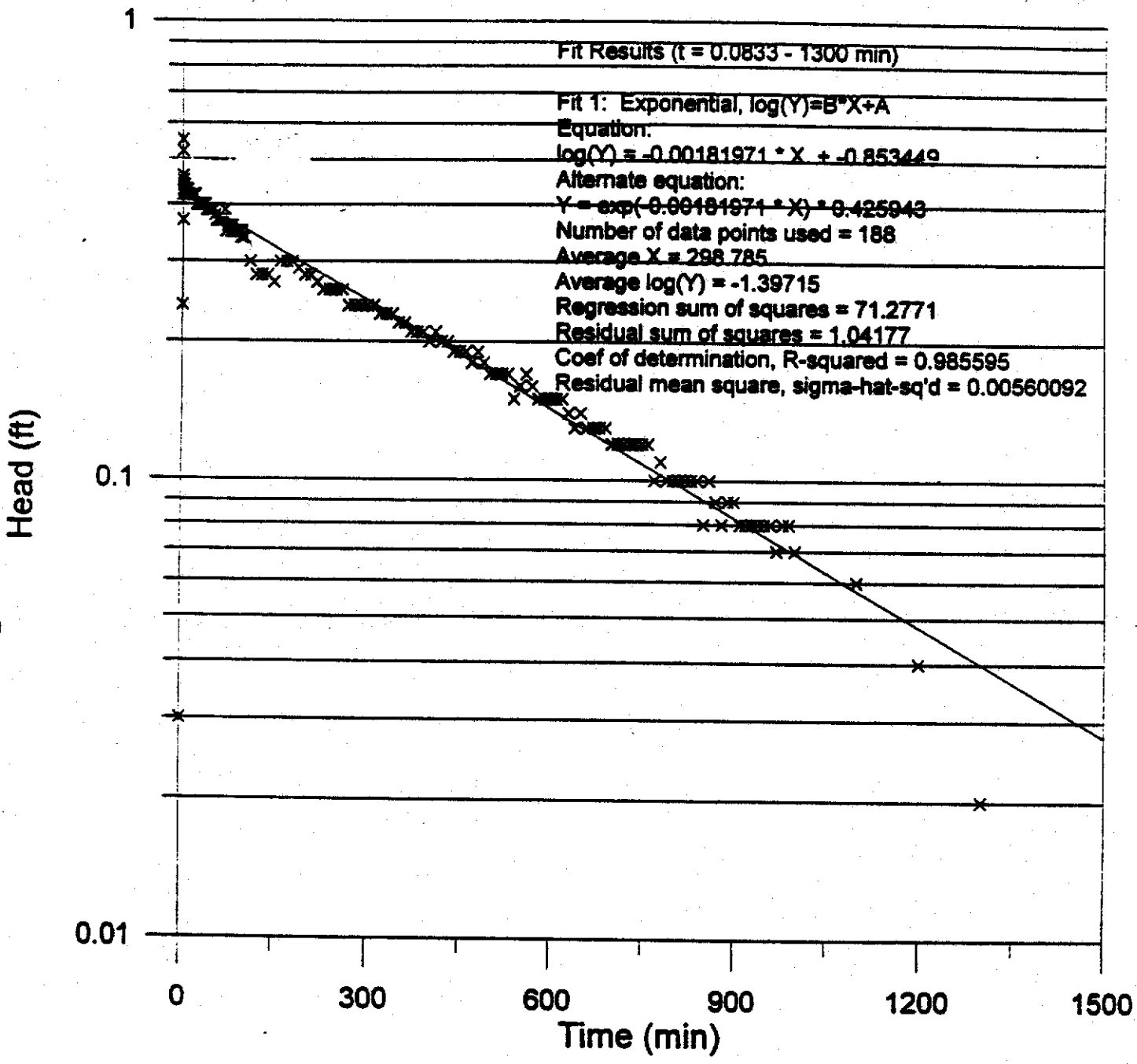
$r_s := \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2} \cdot l$ displacement $H0 = 0.89\,ft$

$H = ((671.60 - 55.87) - 563.50)\,ft$ $H = 52.23\,ft$ $D = H$ saturated thickness $D = 52.23\,ft$

$L = H$ screened interval $L = 52.23\,ft$ $S := 0.165685\,min^{-1}$ slope $C := 9.969$ geometry coefficient

$$lnRerw := \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K = \frac{r_c^2 \cdot lnRerw}{2 \cdot L} \cdot S$ $K = 1 \cdot 10^{-4} \cdot \frac{ft}{min}$ $K = 6 \cdot 10^{-5} \cdot \frac{cm}{sec}$

MW-4007 - Test 0 - falling



$r_c = \frac{4.334\,in}{2}$ 4" Sch 5 SS (p. 977) $r_c = 0.181\,ft$ $r_w = \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

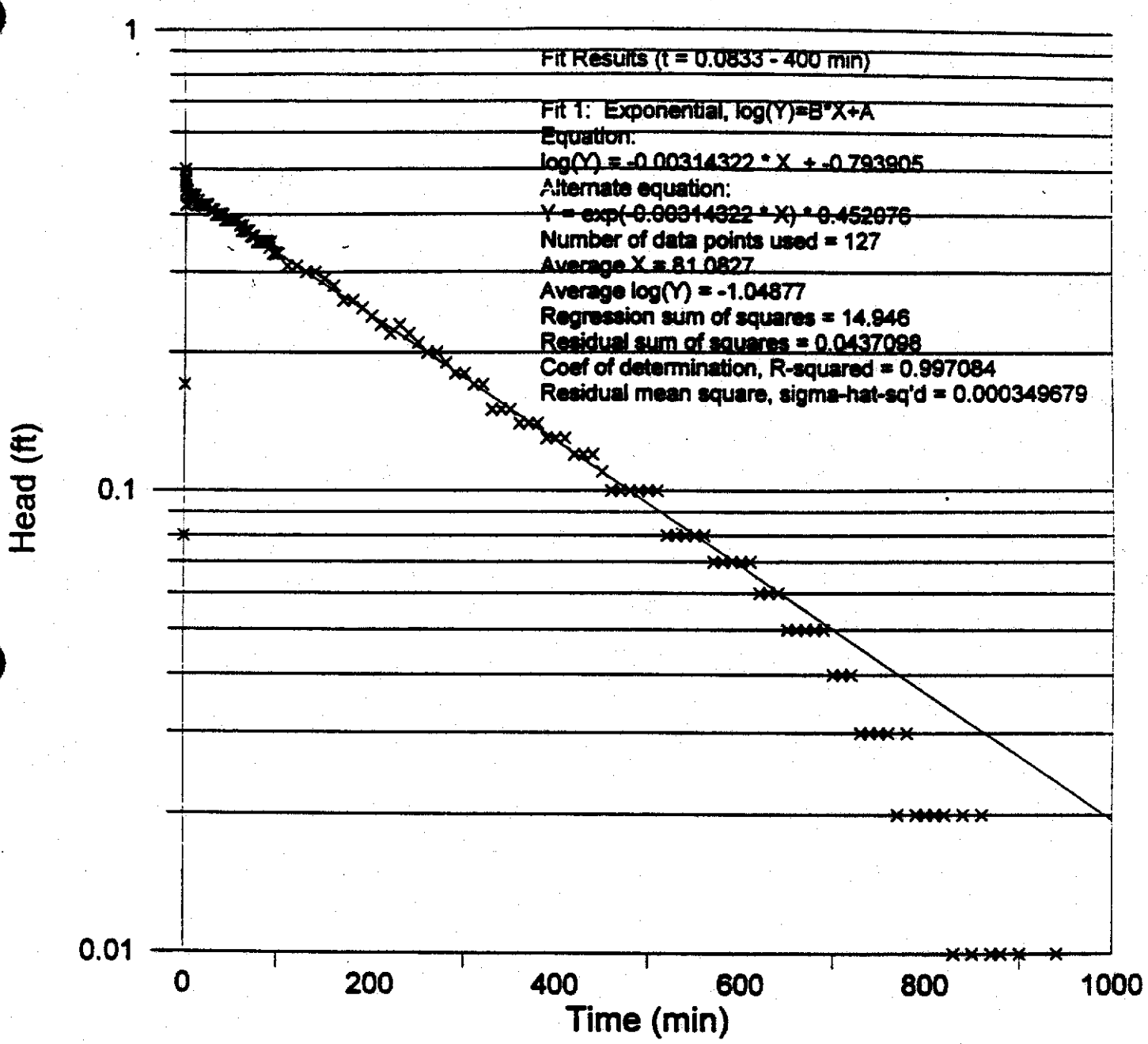
$L = 10\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l = 5.05\,ft$ slug length $H0 = \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 0.42\,ft$ $H = ((624.13 - 26.83) - 531.5)\cdot ft$ $H = 65.8\,ft$ $S = .0018197\,1\,min^{-1}$ slope $C = 1.914$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case

$$K = \frac{r_c^2 \cdot lnRerw}{2 \cdot L}\cdot S \qquad K = 1\cdot 10^{-5}\cdot\frac{ft}{min} \qquad K = 5\cdot 10^{-6}\cdot\frac{cm}{sec}$$

MW-4007 - Test 1 - rising



$r_c = \frac{4.334\,in}{2}$ 4" Sch 5 SS (p. 977) $r_c = 0.181\,ft$ $r_w := \frac{8.5}{2}\cdot in$ well radius $r_w = 0.354\,ft$

$L = 10\,ft$ screened interval $r_s = \frac{1.25\,in}{2}$ slug radius $l := 5.05\,ft$ slug length $H0 := \frac{r_s^2}{r_c^2}\cdot l$ displacement

$H0 = 0.42\,ft$ $H := ((624.13 - 26.83) - 531.5)\cdot ft$ $H = 65.8\,ft$ $S = .00314322\,min^{-1}$ slope $C = 1.914$ geometry coefficient

$$lnRerw = \left[\frac{1.1}{\ln\left(\frac{H}{r_w}\right)} + \frac{C}{\left(\frac{L}{r_w}\right)}\right]^{-1}$$ fully penetrating case $K = \frac{r_c^2\cdot lnRerw}{2\cdot L}\cdot S$ $K = 2\cdot 10^{-5}\cdot\frac{ft}{min}$ $K = 9\cdot 10^{-6}\cdot\frac{cm}{sec}$

SECTION 5:

TRACER TEST RESULTS

INJECTION POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Injection Point No. 53444
Date Received 53445
Checked by _____ Date _____
Plotted by _____ Date _____

Registrant's Name Rebecca Cato-Johnston Registrant's Phone Number (314) 441-8086
Registrant's Company, Agency or Organization Name and Address
Jacobs Engineering Group
Weldon Spring Site Remedial Action Project 7295 Highway 94 South
St. Charles State MO Zip Code 63304

THE INFORMATION BELOW PERTAINS TO THE INJECTION POINT

Injection Point Description AH-2003 Angled boring located on Chemical Plant Site
Septic Tank ☐Well ☐Lake/Pond ☐Sinkhole ☐Sewer ☐Lagoon ☐Stream ☒Other: Borehole
Please enclose a copy of a map with injection point indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section.
Legal Location SW¼ , NW¼ , NE¼ , Sec. 31 , T. 46N , R. 3E Quad Name Weldon Spring
(Additional Location Information) Weldon Spring Chemical Plant
County St. Charles Latitude/Longitude --- Elevation 630' (approx)
Property Owner's Name U.S. Department of Energy Property Owner's Phone Number (314) 441-8086
Property Owner's Address 7295 Highway 94 South St. Charles, MO 63304
Access Description Controlled area of Chemical Plant

Purpose for Trace Determination of hydrogeologic connection between this portion of chemical plant area and springs located in the Burgermeister Spring Branch

Injection Date 6/23/95 (Proposed ~~or Actual~~) Injection Time NA
Tracer Injected To be determined by MDNR-DGLS based on baseline analysis (Proposed or Actual) RWT
Tracer Amount 1 gal. (Proposed or Actual) Number of Monitoring Points (Attach Map) 3
Flow Conditions at Injection Water slug will be introduced into boring after injection of dye

Remarks

I hereby certify that the above information is accurate and complete to the best of my knowledge.
Registrant's Signature Rebecca Cato-Johnston Date 6/6/95
Registration #

INJECTION POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Injection Point No. 53444
Date Received
Checked by
Date
Plotted by
Date 4 45

gistrant's Name Rebecca Cato-Johnston Registrant's Phone Number (314) 441-8086

Registrant's Company, Agency or Organization Name and Address Jacobs Engineering Group

Weldon Spring Site Remedial Action Project 7295 Highway 94 South

City St. Charles State MO Zip Code 63304

THE INFORMATION BELOW PERTAINS TO THE INJECTION POINT

Injection Point Description AH-2005 Angled boring located on Chemical Plant site

☐Septic Tank ☐Well ☐Lake/Pond ☐Sinkhole ☐Sewer ☐Lagoon ☐Stream ☒Other: Borehole

Please enclose a copy of a map with injection point indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section.

Legal Location NW¼ , NE¼ , SW¼ , Sec. 36 , T. 46N , R 3E Quad Name Weldon Spring

(Additional Location Information) Weldon Spring Chemical Plant

County St. Charles Latitude/Longitude --- Elevation 615' (approx.)

Property Owner's Name U.S. Department of Energy Property Owner's Phone Number (314) 441-8086

Property Owner's Address 7295 Highway 94 South St. Charles, MO 63304.

Access Description Controlled area of Chemical Plant

pose for Trace Determination of hydrogeologic connection between this portion of chemical plant area and springs located in Burgermeister Spring Branch.

Circle One

Injection Date 7/21/95 (Proposed ~~Actual~~) * Injection Time NA

Tracer Injected To be determined by (Proposed or Actual)

Tracer Amount MDNR-DGLS based on baseline analysis (Proposed or Actual) Number of Monitoring Points (Attach Map) 3

Flow Conditions at Injection Water slug wil be introduced into boring after injection of dye.

Remarks * No injection at this borehole. Injection into MW-2032 instead — see other inj pt. form.

~~6/16/95~~
7-12-95

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature Rebecca Cato-Johnston Date 6/16/95

Registration #

INJECTION POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Injection Point No. -54920 -5492
Date Received
Checked by _____ Date _____
Plotted by _____ Date _____

Registrant's Name Rebecca Cato-Johnston Registrant's Phone Number (314) 441-8086
Registrant's Company, Agency or Organization Name and Address Jacobs Engineering Group
Weldon Spring Site Remedial Action Project 7295 Highway 94 South
City St. Charles State MO Zip Code 63304

THE INFORMATION BELOW PERTAINS TO THE INJECTION POINT

Injection Point Description MW-2032 Monitoring well screened in the upper portion of the weathered Burlington-Keokuk Limestone
☐Septic Tank ☒Well ☐Lake/Pond ☐Sinkhole ☐Sewer ☐Lagoon ☐Stream ☐Other:
Please enclose a copy of a map with injection point indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section.
Legal Location SW¼ . SW¼ . NE¼ . Sec. 31 . T. 46N . R. 3E Quad Name Weldon Spring
(Additional Location Information) Weldon Spring Chemical Plant
County St. Charles Latitude/Longitude --- Elevation 636'
Property Owner's Name U.S. Department of Energy Property Owner's Phone Number (314) 441-8086
Property Owner's Address 7295 Highway 94 South St. Charles, MO 63304
Access Description Controlled area of the Chemical Plant

Purpose for Trace Determinatin of hydrogeologic connection between this portion of the chemical plant and springs located in Burgermeister Spring Branch

Circle One

Injection Date 7/12/95 (Proposed ~~Actual~~) Injection Time NA
Tracer Injected To be determined by (Proposed or Actual) FL DR
Tracer Amount MDNR-DGLS based on baseline analysis (Proposed or Actual) Number of Monitoring Points (Attach Map) 3
2 gal.
Flow Conditions at Injection Water slug will be introduced into boring after injection of dye.

Remarks

I hereby certify that the above information is accurate and complete to the best of my knowledge.
Registrant's Signature Rebecca Cato-Johnston Date 1/11/95
Registration #

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources, Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314) 368-2133 FAX: (314) 368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP-6301 (Burgermeister Spring)
☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) SP-6301
Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section.
Legal Location SW¼, NW¼, NW¼, Sec. 30, T. 46N, R. 3E, Quad Name Weldon Spring
(Additional Location Information) Busch Wildlife Area
County St. Charles Latitude/Longitude 38°43'02"N, 90°44'17"W, Elevation 530' (approx)
Access Description Located approximately 1000 feet upstream (southwest) from Lake 34.
Background Flow Conditions Not determined

Property Owner:
August A. Busch Cons. Area
Name: Mr. Roy Grimes
Wildlife District Supervisor
Address: 2360 Highway D
St. Charles, MO 63304
Phone Number: (314) 441-4554

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sampler Placement Date	Sampler Placement Time	Sample(r) Recovery Date	Sample(r) Recovery Time	Collected by (Initials)	Analyzed by (Initials)	Fluorescein Quantity Water	Fluorescein Quantity Carbon	Rhodamine WT Quantity Water	Rhodamine WT Quantity Carbon	Eosine Quantity Water	Eosine Quantity Carbon	Tinopal CBS-X Quantity Water	Tinopal CBS-X Quantity Cotton	Tinopal CBS-X Quantity Eluted	** Remarks/Flow Conditions, or Other Tracers
* Analysis Method Used →																

* S = Spectrofluorometer, F = Fluorometer, V = Visual, O = Other _____
** D = Dry, P = Pool, L = Low Flow, H = High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.
Registrant's Signature Rebecca Cato-Johnston Date 4/4/95
Registrant's Name (please type or print) Rebecca Cato-Johnston Registration # _____

5T 34 4A

MONITORING POINT
WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6301 Weldon Spring

☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Collected by BC. Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
1			6-6		P	S	X	X											
1			6-6		P	S			X										
1			6-6		C	S				X									
2			6-7		P	S	X	X											
2			6-7		P	S			X										
2			6-7		C	S				X				?					Small Peak at 410
3			6-9		P	S	X	X											
3			6-9		P	S			X				?						Peak 395 ?
3			6-9		C	S				X									
4			6-26		P	S	X	X											
4			6-26		P	S			X				?						Peak 392 13.32
4			6-26		C	S				X									
5			6-28		P	S	X	X											
5			6-28		P	S			X				?						Peak 391 8.76
5			6-28		C	S				X									
6			6-30		P	S	X	X											
6			6-30		P	S			X				?						Peak 392 12.72
6			6-30		C	S				X									

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other PYR, O_2=Other TE

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
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FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6301 Weldon Spring
☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____
Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 sectic
Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____
(Additional Location Information) _____
County _____ Latitude/Longitude _____ Elevation _____
Property Owner's Name _____ Property Owner's Phone Number _____
Property Owner's Address _____
Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
7			7-3		P	S	X	X											
7A			7-3		C	VS			X				X		Vi	Sun			Scan 2 Peak 403 1.6
8			7-5		P	S	X	X											
8			7-5		C	VS			X				X		Visun				Scan 2 Peak 403 4.6
9			7-7		P	S	X	X											
9			7-7		C	VS			X				X		Vi	Sun			Scan 2 Peak 403 3.4
10			7-10		P	S	X	X											
10			7-10		C	VS			X				X		Visun				Scan 2 Peak 403 2.4
11			7-12		P	S	X	X											
11			7-12		C	VS			X				X		Visun				Scan 2 Peak 403 2.7
12			7-14		P	S	X	X											
12			7-14		C	VS			X				X		Visun				Scan 2 Peak 403 3.2
13			7-17		P	S	X	X											
13			7-17		C	VS			X				X		Visun				Scan 2 Peak 403 1.3
14			7-19		P	S	X	X											
14			7-19		C	S			X				X		Visual				Scan 2 Peak 403 1.7
15			7-21		P	S	X	X			X								Peak 517 .27
15			7-21		C	S			X				X		Visun				Scan 2 Peak 403 1.74

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein AC 517, R=Rhodamine, O_1=Other: TE 4403, O_2=Other _____

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.
Registrant's Signature _____ Date _____
Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6301 Weldon Spring

☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
16			7-24		P	S	X	X			X								Peak 517 -.62
16			7-24		C	S			X				X			Visual			Scan 2 Peak 403 2.56
17			7-26		P	S	X	X			X								Peak 518 4.68
17			7-26		C	S			X				X				Visual		Scan 2 Peak 403 5.77
18			7-28		P	S	X	X			X								Peak 519 3.35
18			7-28		C	S			X				X				Visual		Scan 2 Peak 403 1.65
19			7-31		P	S	X	X			X								Peak 518 2.42
19			7-31		C	S			X				X				Visual		Scan 2 Peak 403 2.32
20			8-2		P	S	X	X			X								Peak 519 6.96
20			8-2		P	S				X				X					Peak 402 11.57
20			8-2		C	S			X				X				Visual		Peak 403 57.04
21			8-4		P	S	X	X			X								Peak 519 2.87
21			8-4		P	S				X				X					Peak 398 ?
21			8-4		C	S			X				X				Visual		Peak 403 80.62
22			8-3		P	S	X	X			X								Peak 518 13.13
22			8-3		P	S				X				X					Peak 403 ?
22			8-7		C	S			X				X				Visual		Peak 403 89.73
23			8-9		P	S	X	X			X	X			X				Peak 516 >1
23			8-9		C	S			X				X				Visual		Peak 403 81.93

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other TE, O_2=Other PYR

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT
WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP6301 (Weldon Spring trace) Burgermeister Spring

☐ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 sectic

Legal Location _____, _____, _____, Sec. _____ T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
24			8-11		P	S	X	X			X				2.9				FL=517
24			8-11		C	S			X				X				287		TE=403 (visual)
25			8-18		P	S	X	X			X				15.5				FL=518
25			8-18		C	S			X				X				524		TE=404 (visual)
26			8-25		P	S	X	X			X				21.0				FL=518
26			8-25		C	S			X				X				364		TE=403 (visual)
27			9-1		P	S	X	X			X				15.5				FL-520
27			9-1		C	S			X				X		1		312		TE 402 Scan Visual 2
28			9-8		P	S	X	X			X				3.1				FL-519
28			9-8		C	S			X				X				360		TE 404 Visual
29			9-15		P	S	X	X			X				2.6				FL-519
29			9-15		C	S			X				X				408		TE 403 Visu
30			9-22		P	S	X	X			X				4.5				FL-520
30			9-22		C	S			X				X				30.7		TE 403 Visu
31			9-28		P	S	X	X			X				5.0				FL-520
31			9-28		C	S			X				X				97.5		TE 403 Vis

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other TE, O_2=Other _____

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources, Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314) 368-2133 FAX: (314) 368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP-6303
☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) SP-6303
Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section.
Legal Location NE¼, SE¼, NE¼, Sec. 25, T. 46N, R. 2E, Quad Name Defiance
(Additional Location Information) Busch Wildlife Area
County St. Charles Latitude/Longitude 38°42'59"N, 90°44'28"W Elevation 540' (approx)
Access Description Located approximately 2000 ft upstream (southwest) from Lake 34.
Background Flow Conditions Not determined

Property Owner:
August A. Busch Cons. Area
Name: Mr. Roy Grimes
Wildlife District Supervisor
Address: 2360 Highway D
St. Charles, MO 63304
Phone Number: (314) 441-4554

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sampler Placement Date	Sampler Placement Time	Sample(r) Recovery Date	Sample(r) Recovery Time	Collected by (Initials)	Analyzed by (Initials)	Fluorescein Quantity Water	Fluorescein Quantity Carbon	Rhodamine WT Quantity Water	Rhodamine WT Quantity Carbon	Eosine Quantity Water	Eosine Quantity Carbon	Tinopal CBS-X Quantity Water	Tinopal CBS-X Quantity Cotton	Tinopal CBS-X Quantity Eluted	** Remarks/Flow Conditions, or Other Tracers
* Analysis Method Used →																

* S = Spectrofluorometer
F = Fluorometer
V = Visual
O = Other _____

** D = Dry
P = Pool
L = Low Flow
H = High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.
Registrant's Signature Rebecca Cato-Johnston Date 4/6/95
Registrant's Name (please type or print) Rebecca Cato-Johnston Registration # _____

53444

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6303 Weldon Spring

☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 sect

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
1			6-6		P	S	X	X											
1			6-6		P	S			X										
1			6-6		C	S				X									
2			6-7		P	S	X	X											
2			6-7		P	S			X			X	?						Peak 379 - 430 12.8
2			6-7		C	S				X									
3			6-9		P	S	X	X											
3			6-9		P	S			X				?						Peak 396
3			6-9		C	S				X									
4			6-26		P	S	X	X											
4			6-26		P	S			X				?						Peak 394 9.07
4			6-26		C	S				X									
5			6-28		P	S	X	X											
5			6-28		P	S			X				?						Peak 393 7.1
5			6-28		C	S				X									
6			6-30		P	S	X	X											
6			6-30		P	S			X				?						Peak 388 4.9
6			6-30		C	S				X									

* P=Carbon Packet, C=Coston, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other Pyr, O_2=Other TB

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT
WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
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FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6303 Weldon Springs

☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section.

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name Weldon Springs

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Sample(r) Placement Time	Sample(r) Recovery Date	Sample(r) Recovery Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
7			7-3		P	S	X	X											
7			7-3		C	S			X										
8			7-5		P	S	X	X											
8			7-5		C	S			X										
9			7-7		P	S	X	X			?								? Peak 512
9			7-7		C	S			X										
10			7-10		P	S	X	X											
10			7-10		C	S			X										
11			7-12		P	S	X	X											
11			7-12		C	S			X										
12			7-14		P	S	X	X			?								? Peak 505
12			7-14		C	S			X										
13			7-17		P	S	X	X			?								? Peak 512
13			7-17		C	S			X		?								
14			7-19		P	S	X	X			?								? Peak 512
14			7-19		C	S			X										
15			7-21		P	S	X	X											
15			7-21		C	S			X										

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other TE, O_2=Other _____

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

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Monitoring Point No. _____
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Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6303 Welden Springs

☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 sectio

Legal Location _____, _____, _____, Sec. _____ T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
16			7-24		P	S	X	X											
16			7-24		C	S			X										
17			7-26		P	S	X	X											
17			7-26		C	S			X										
18			7-28		P	S	X	X			?								Peak ? 904
18			7-28		C	S			X										
19			7-31		P	S	X	X											
19			7-31		C	S			X										
20			8-2		P	S	X	X											
20			8-2		P	S				X				?					Peak-370 ?
20			8-2		C	S			X										
21			8-4		P	S	X	X											
21			8-4		P	S				X				?					Peak 398 ?
21			8-4		C	S			X										
22			8-7		P	S	X	X											
22			8-7		P	S				X				?					Peak 312 ?
22			8-7		C	S			X										
23			8-9		P	S	X	X											
23			8-9		C	S			X										

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other TE, O_2=Other _____

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6303 Weldon Springs

☐ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Sample(r) Placement Time	Sample(r) Recovery Date	Sample(r) Recovery Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
24			8-11		P	S	X	X											
24			8-11		C	S			X										
25			8-18		P	S	X	X											
25			8-18		C	S			X										
26			8-25		P	S	X	X											
26			8-25		C	S			X										
27			9-1		P	S	X	X											
27			9-1		C	S			X										
28			9-8		P	S	X	X			?								FL-512 ?
28			9-8		C	S			X										
29			9-15		P	S	X	X											
29			9-15		C	S			X										
30			9-22		P	S	X	X											
30			9-22		C	S			X										
31			9-28		P	S	X	X											
31			9-28		C	S			X										

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other TE, O_2=Other _____

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources, Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314) 368-2133 FAX: (314) 368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP-6306 TWIN ISLAND LAKES SPRING
☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) SP-6306
Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section.
Legal Location NE¼, NE¼, SW¼, Sec. 19, T. 46N, R. 3E, Quad Name Weldon Spring
(Additional Location Information) _____
County St. Charles Latitude/Longitude 38°43'45" N, 90°43'52" Elevation 490' (approx)
Access Description Access from Highway 40 (westbound) approximately 1000 ft east of the entrance to the Twin Island Lakes campgrounds
Background Flow Conditions Not determined

Property Owner:
Name: Ms. Bonnie Gerdes
Address: 7375 Twin Island Lake
St. Charles, MO 63304
Phone Number: (314) 939-5034

Describe Background Data and Monitoring Data Below (Attach Documentation If Available)

Sample(r) No.	Sampler Placement Date	Sampler Placement Time	Sample(r) Recovery Date	Sample(r) Recovery Time	Collected by (Initials)	Analyzed by (Initials)	Fluorescein Quantity Water	Fluorescein Quantity Carbon	Rhodamine WT Quantity Water	Rhodamine WT Quantity Carbon	Eosine Quantity Water	Eosine Quantity Carbon	Uranine CBS-X Quantity Water	Uranine CBS-X Quantity Cotton	Uranine CBS-X Quantity Eluted	** Remarks/Flow Conditions, or Other Tracers
* Analysis Method Used →																

* S = Spectrofluorometer, F = Fluorometer, V = Visual, O = Other _____
** D = Dry, P = Pool, L = Low Flow, H = High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.
Registrant's Signature Rebecca Cato-Johnston Date 6/6/95
Registrant's Name (please type or print) Rebecca Cato-Johnston Registration # _____

C3445
C3445

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6306 Weldon Spring

☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

* 1st Week Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Bug Missing

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
2			6-7		P	S	X	X											
2			6-7		P	S			X			●	X						Peak 390 17.71
2			6-7		C	S				X									
3			6-9		P	S	X	X											
3			6-9		P	S		●	X				X						Peak 387 7.77
3			6-9		C	S				X									
4			6-26		P	S	X	X											
4			6-26		P	S			X				?						Peak 375 7.87
4			6-26		C	S				X									
5			6-28		P	S	X	X											
5			6-28		P	S			X				?						Peak 383 6.91
5			6-28		C	S				X									
6			6-30		P	S	X	X											
6			6-30		P	S			X				?						Peak 372 16.62
6			6-30		C	S				X									

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other Pyr, O_2=Other TE

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

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P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6306 Weldon Springs

☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 sectio

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
7			7-3		P	S	X	X											
7			7-3		C	S			X										
8			7-5		P	S	X	X											
8			7-5		C	S			X										
9			7-7		P	S	X	X											
9			7-7		C	S			X										
10			7-10		P	S	X	X											
10			7-10		C	S			X										
11			7-12		P	S	X	X											
11			7-12		C	S			X										
12			7-14		P	S	X	X											
12			7-14		C	S			X										
13			7-17		P	S	X	X											
13			7-17		C	S			X										
14			7-19		P	S	X	X											
14			7-19		C	S			X										
15			7-21		P	S	X	X											
15			7-21		C	S			X										

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other Tinopal TF, O_2=Other _____

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6306 Weldon Springs

☒ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 sectic

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____

(Additional Location information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
16			7-24		P	S	X	X											
16			7-24		C	S			X										
17			7-24		P	S	X	X											
17			7-24		C	S			X										
18			7-28		P	S	X	X											
18			7-28		C	S			X										
19			7-31		P	S	X	X											
19			7-31		C	S			X										
20			8-2		P	S	X	X											
20			8-2		C	S			X										
21			8-4		P	S	X	X											
21			8-4		C	S			X										
22			8-7		P	S	X	X											
23			8-7		C	S			X										
23			8-9		P	S	X	X											
23			8-9		C	S			X										

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other: TE, O_2=Other _____

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description SP 6306 Twin Islands Lake Spring

☐ Spring ☐ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description _____

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Sample(r) Placement Time	Sample(r) Recovery Date	Sample(r) Recovery Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
24			8-11		P	S	X	X											
24			8-11		C	S			X										
25			8-18		P	S	X	X											
25			8-18		C	S			X										
26			8-25		P	S	X	X											
26			8-25		C	S			X										
27			9-1		P	S	X	X											
27			9-1		C	S			X										
28			9-8		P	S	X	X			X				0.1				FL-515
28			9-8		C	S			X										
29			9-15		P		B	U	G		M	I	S	S	I	N	G		
30			9-22		C	S	X	X											
30			9-22		P	S			X										
31			9-28		C		B	U	G		M	I	S	S	I	N	G		

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other TE, O_2=Other _____

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

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P.O. Box 250, Rolla, MO 65401 (314)368-2133 FAX: (314)368-2111

FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description MW 4013

☐ Spring ☒ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 sectio

Legal Location _____, _____, _____, Sec. _____ T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description Monitoring Well

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Sample(r) Placement Time	Sample(r) Recovery Date	Sample(r) Recovery Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
18			7-28				X	X											
18			7-28						X										
19			7-31																
19			7-31																
32			10-4		P	S	X	X											
32			10-4		C	S			X										

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other: TE, O_2=Other _____

**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

Registrant's Name (please type or print) _____ Registration # _____

MONITORING POINT

WATER TRACING INFORMATION SHEET

Missouri Department of Natural Resources Division of Geology and Land Survey
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FOR OFFICE USE ONLY
Monitoring Point No. _____
Date Received _____
Checked by _____ Date _____
Plotted by _____ Date _____

THE INFORMATION BELOW PERTAINS TO THE MONITORING POINT

Monitoring Point Description MW ~~4~~ 3 4014

☐ Spring ☒ Well ☐ Stream ☐ Other: _____ Monitoring Point Number (Optional) _____

Please enclose a copy of a map with all monitoring points indicated. Describe legal location to nearest 1/4, 1/4, 1/4 section.

Legal Location _____, _____, _____, Sec. _____, T. _____, R. _____, Quad Name _____

(Additional Location Information) _____

County _____ Latitude/Longitude _____ Elevation _____

Property Owner's Name _____ Property Owner's Phone Number _____

Property Owner's Address _____

Access Description Monitoring Well

Background Flow Conditions _____

Describe Background Data and Monitoring Data Below (Attach Documentation if Available)

Sample(r) No.	Sample(r) Placement Date	Time	Sample(r) Recovery Date	Time	Samp. Meth. *	Analy. Meth. **	Tracer(s) Analyzed (Check All That Apply) *** F	R	O_1	O_2	Tracer(s) Recovered (Check All That Apply) *** F	R	O_1	O_2	Amount Recovered Units _____ *** F	R	O_1	O_2	Remarks / Flow Conditions ****
18			7-28				X	X											
18			7-28						X										
19			7-31																
19			7-31																
32			10-4		P	S	X	X											
32			10-4		C	S			X										

* P=Carbon Packet, C=Cotton, W=Water, O=Other _____

** S=Spectrofluorometer, F=Fluorometer, V=Visual, O=Other _____

*** F=Fluorescein, R=Rhodamine, O_1=Other: TE, O_2=Other _____

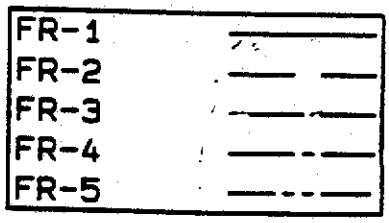
**** D=Dry, P=Pool, L=Low Flow, H=High Flow

I hereby certify that the above information is accurate and complete to the best of my knowledge.

Registrant's Signature _____ Date _____

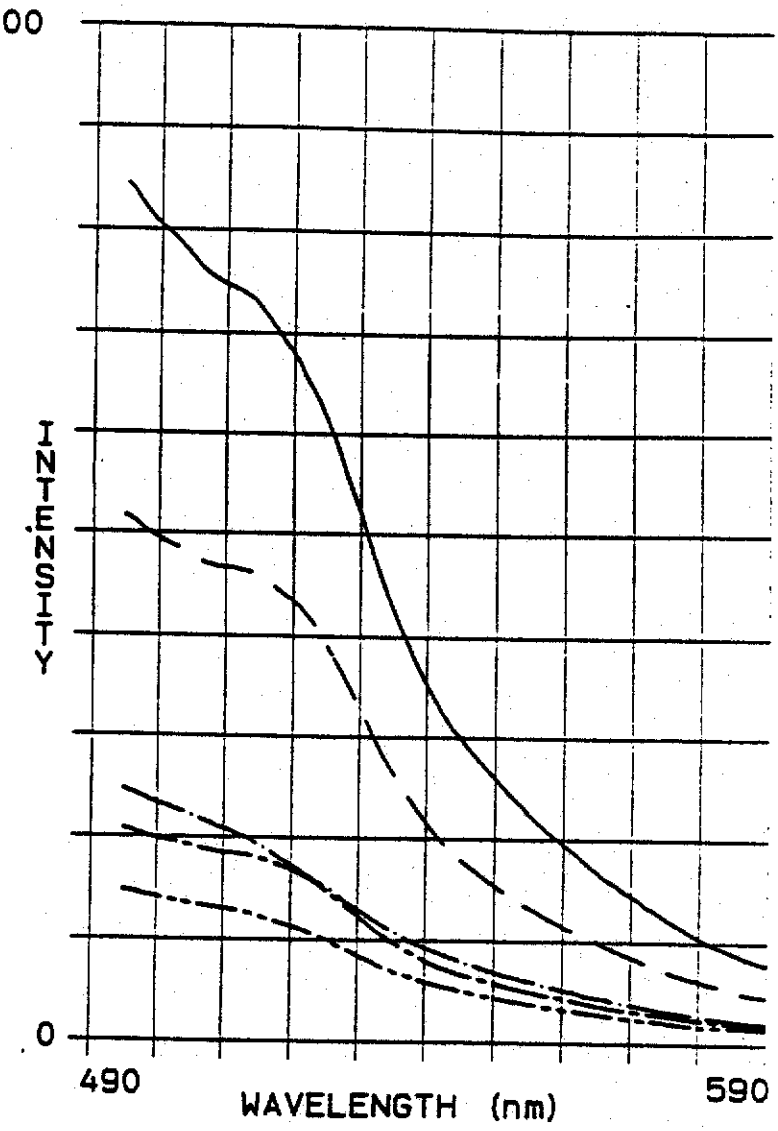
Registrant's Name (please type or print) _____ Registration # _____

LOCATION: SP6301



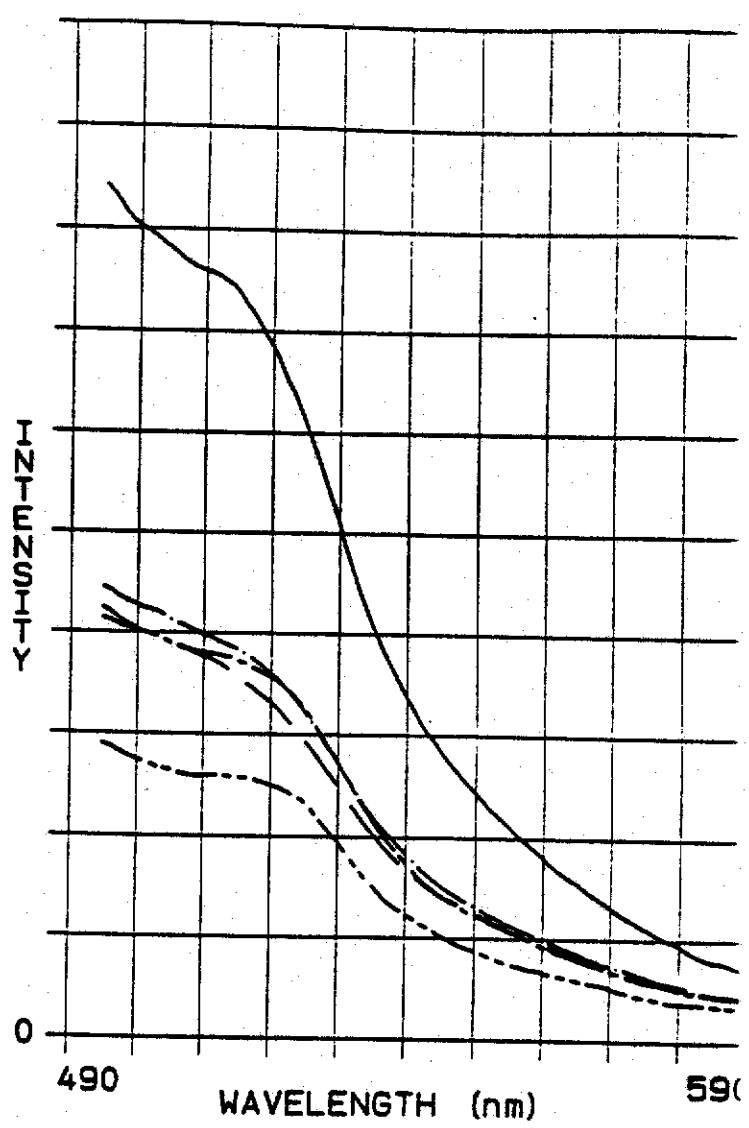
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-1	06/06/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
FR-2	06/07/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
FR-3	06/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRING							
FR-4	06/26/95	BC	DD	0	0	0	0
REMARKS:							
5	06/28/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6301



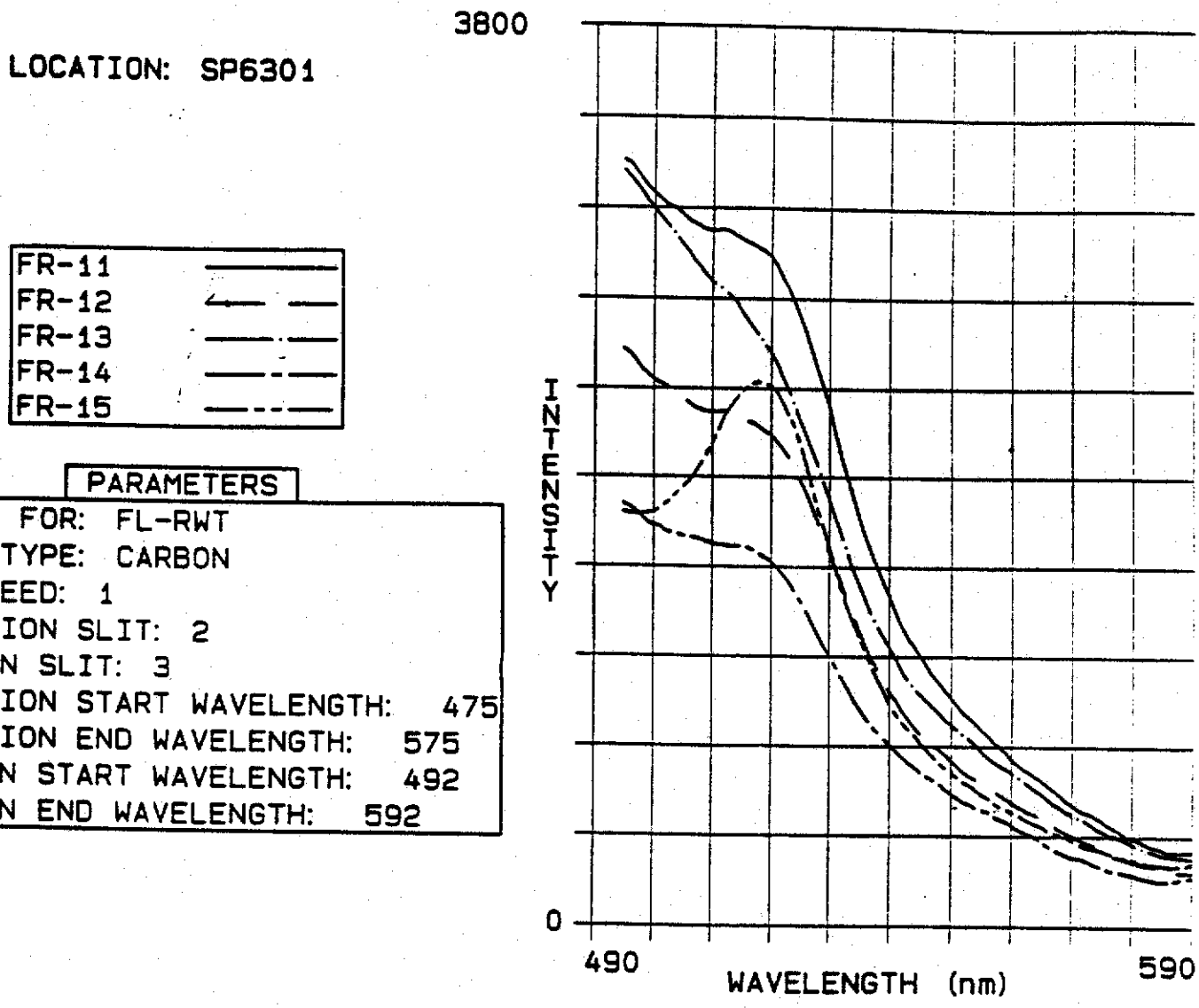
FR-6
FR-7
FR-8
FR-9
FR-10

PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-6	06/30/95	BC	DD	0	0	0	0
REMARKS:							
FR-7	07/03/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-8	07/05/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-9	07/07/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-10	07/10/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							

LOCATION: SP6301

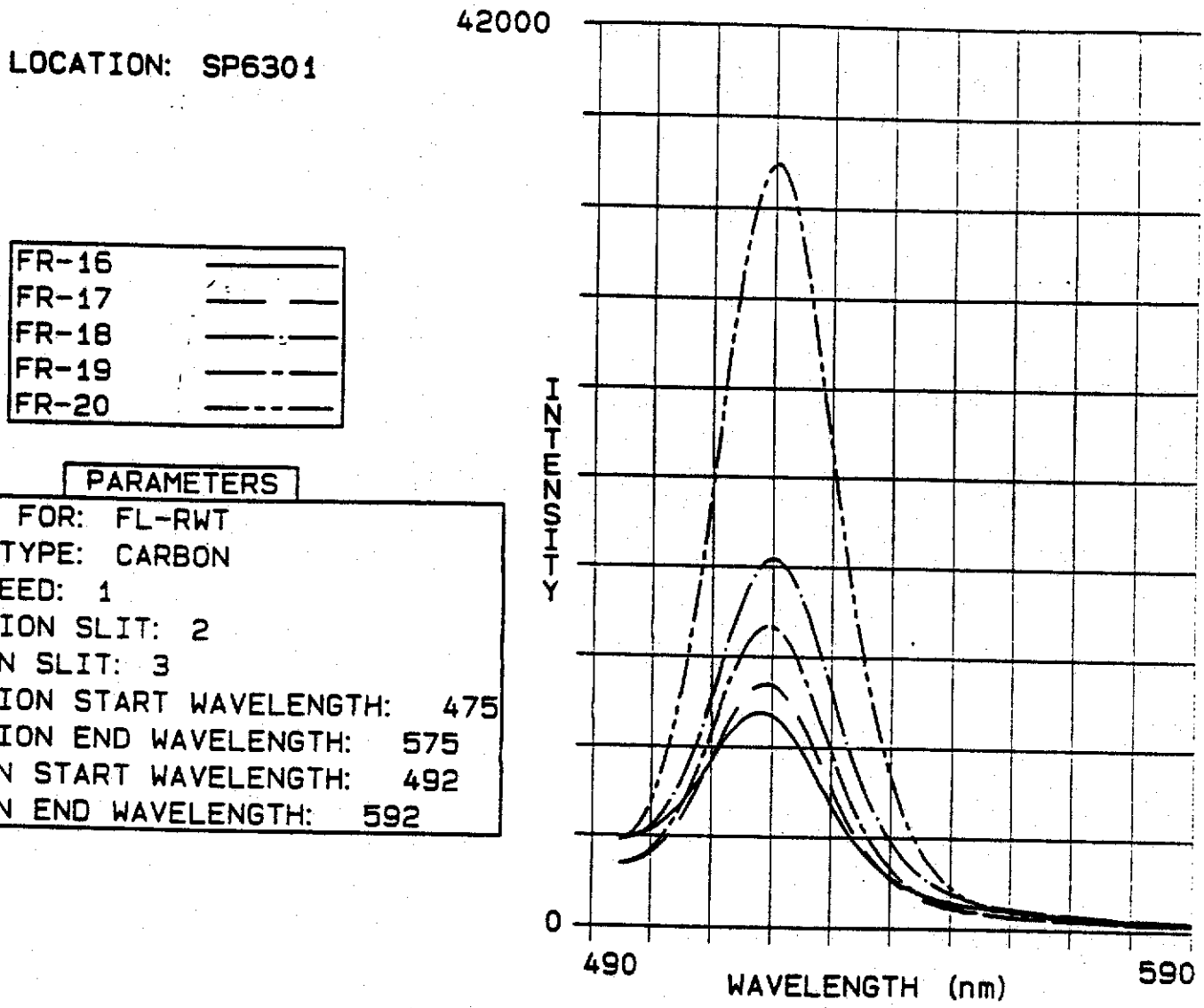


PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-11	07/12/95	BC	DD	0	0	0	0
REMARKS:							
FR-12	07/14/95	BC	DD	0	0	0	0
REMARKS:							
FR-13	07/17/95	BC	DD	0	0	0	0
REMARKS:							
FR-14	07/19/95	BC	DD	0	0	0	0
REMARKS:							
-15	07/21/95	BC	DD	517	2309	0	0
REMARKS: WELDON SPRING							

LOCATION: SP6301

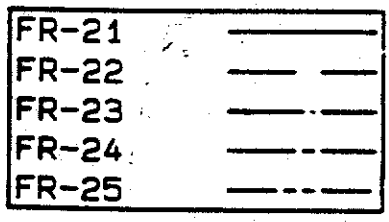


PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

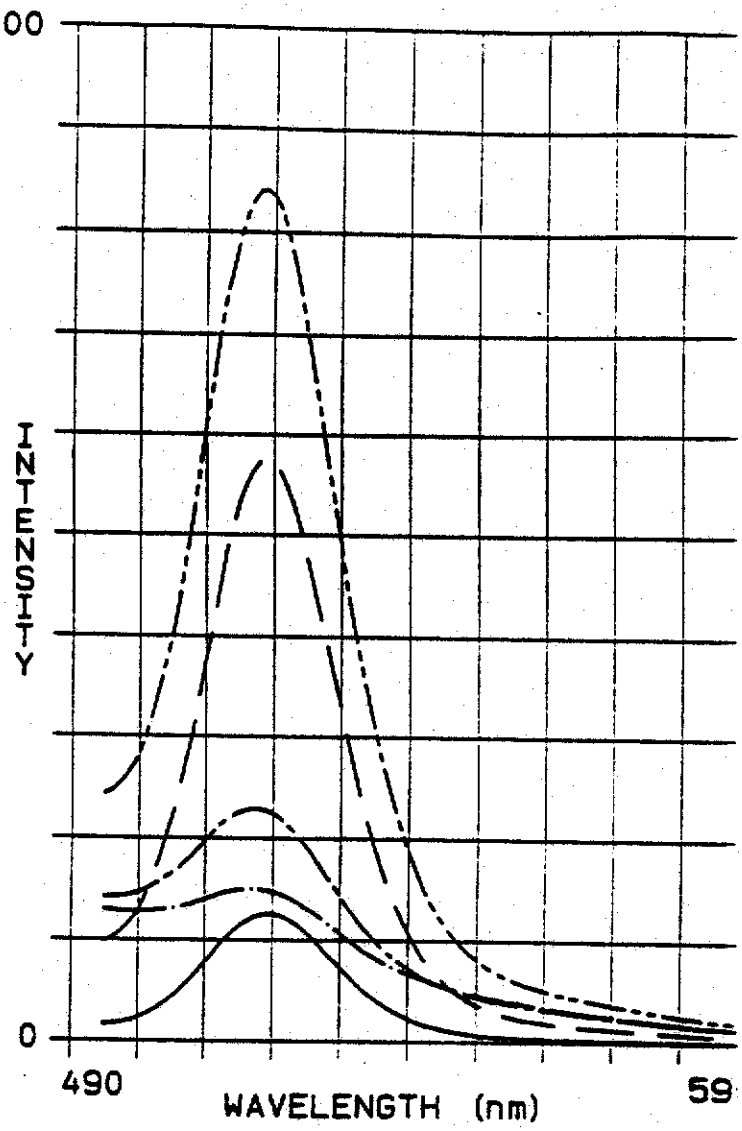
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-16	07/24/95	BC	DD	517	10002	0	0
REMARKS: WELDON SPRINGS							
FR-17	07/26/95	BC	DD	518	11336	0	0
REMARKS: WELDON SPRINGS							
FR-18	07/28/95	BC	DD	519	17177	0	0
REMARKS:							
FR-19	07/31/95	BC	DD	518	14000	0	0
REMARKS:							
20	08/02/95	BC	DD	519	35664	0	0
REMARKS: WELDON SPRING							

LOCATION: SP6301



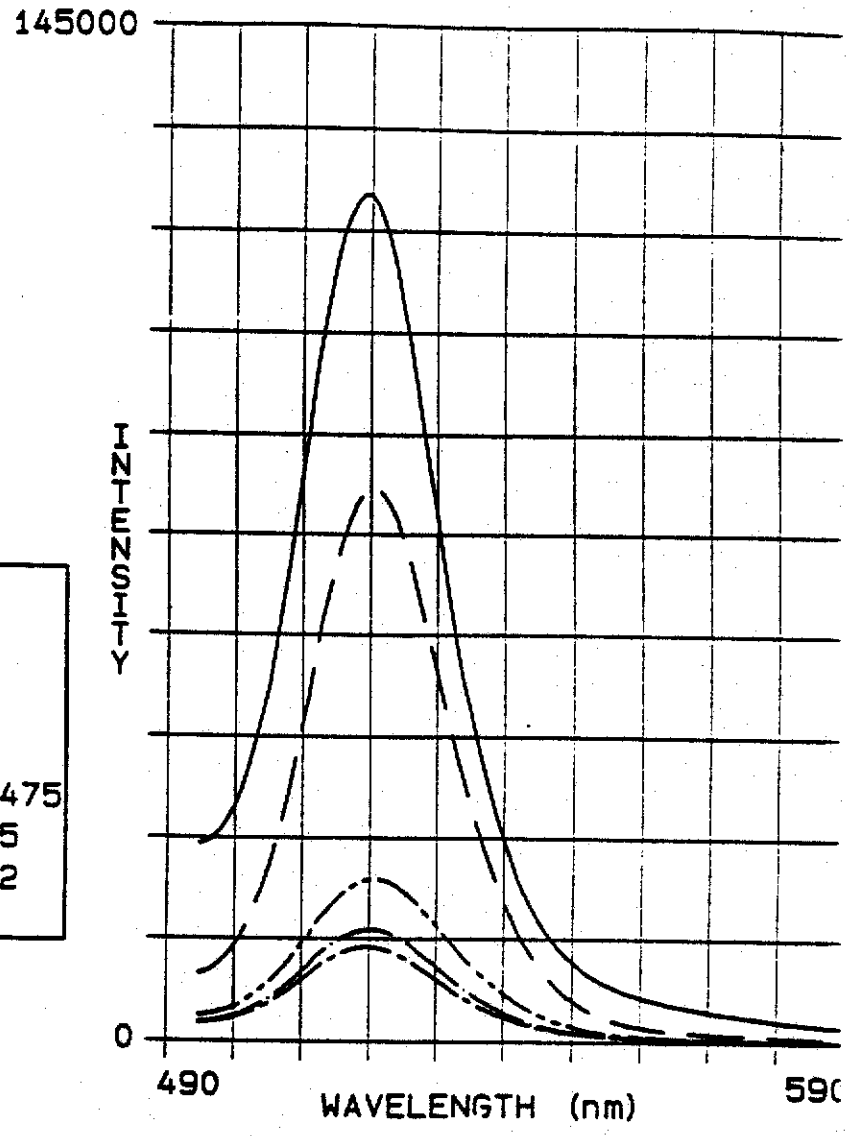
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-21	08/04/95	BC	DD	519	14718	0	0
REMARKS: WELDON SPRINGS							
FR-22	08/07/95	BC	DD	518	67257	0	0
REMARKS: WELDON SPRINGS							
FR-23	08/09/95	BC	DD	516	17560	0	0
REMARKS: WELDON SPRINGS							
FR-24	08/11/95	BC	GJY	517	26769	0	0
REMARKS:							
FR-25	08/18/95	BC	GJY	518	98329	0	0
REMARKS:							

LOCATION: SP6301



PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

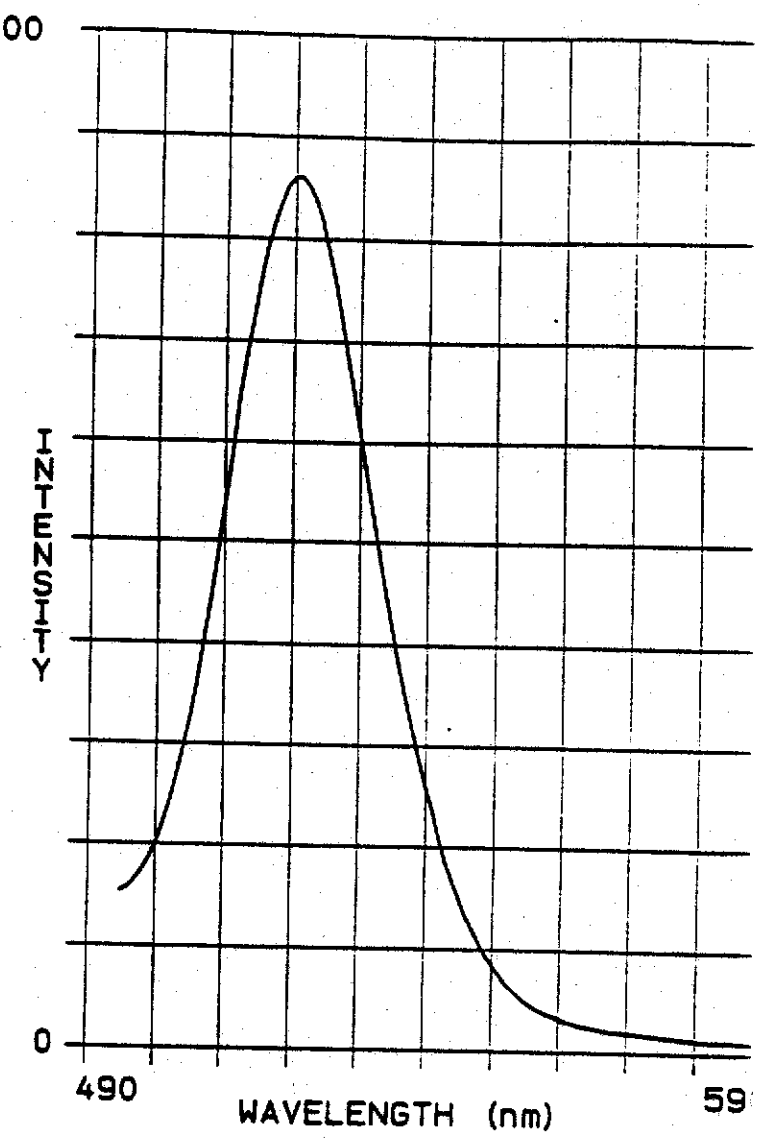
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-26	08/25/95	BC	GJY	518	121149	0	0
REMARKS:							
FR-27	09/01/95	BC	DD	520	79119	0	0
REMARKS:							
FR-28	09/08/95	BC	DD	519	15851	0	0
REMARKS:							
FR-29	09/15/95	BC	DD	519	13350	0	0
REMARKS:							
FR-30	09/22/95	BC	DD	520	23119	0	0
REMARKS:							

LOCATION: SP6301

FR-31

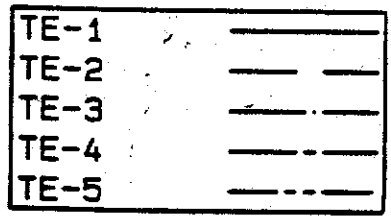
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



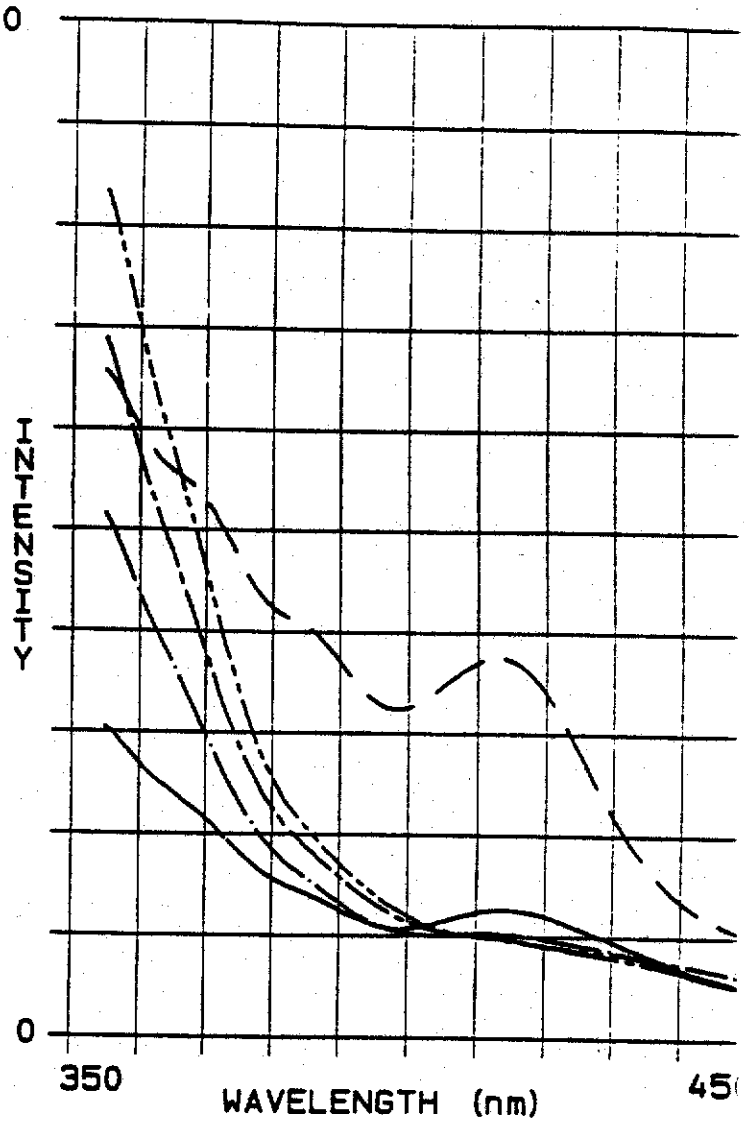
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-31	09/28/95	BC	DD	520	25814	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: SP6301



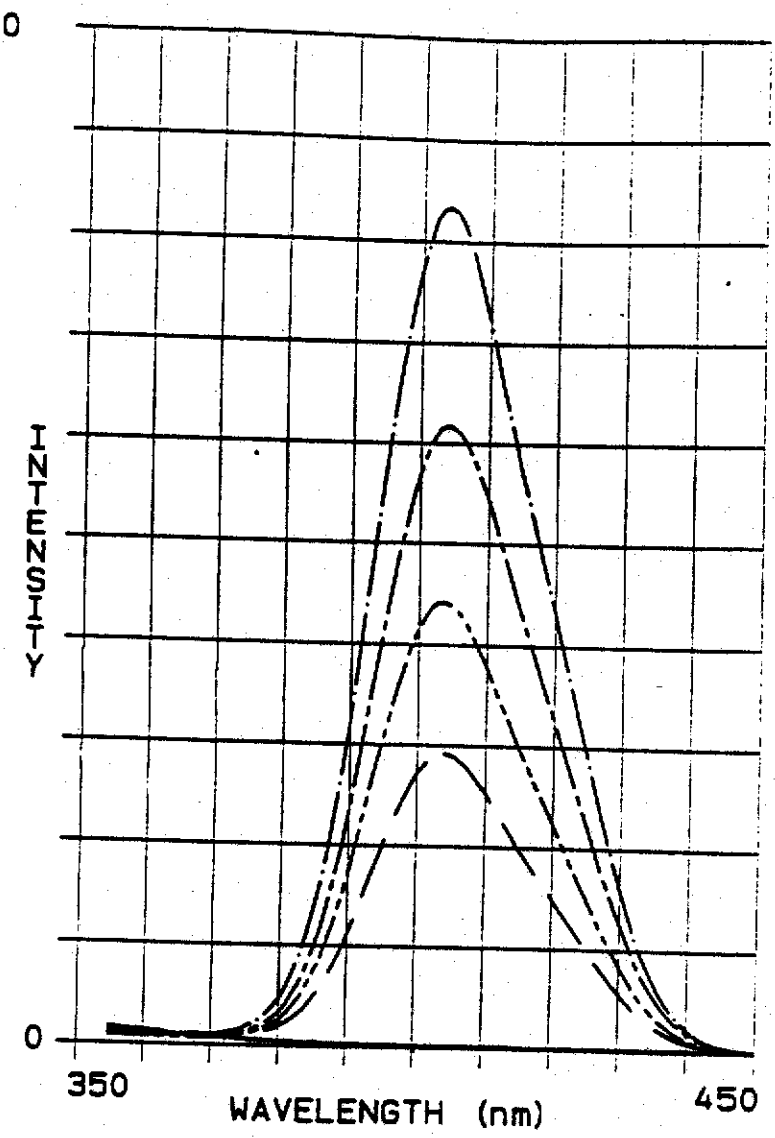
PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-1	06/06/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
TE-2	06/07/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
TE-3	06/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRING							
TE-4	06/26/95	BC	DD	0	0	0	0
REMARKS:							
TE-5	06/28/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6301



TE-6
TE-7A
TE-8
TE-9
TE-10

PARAMETERS

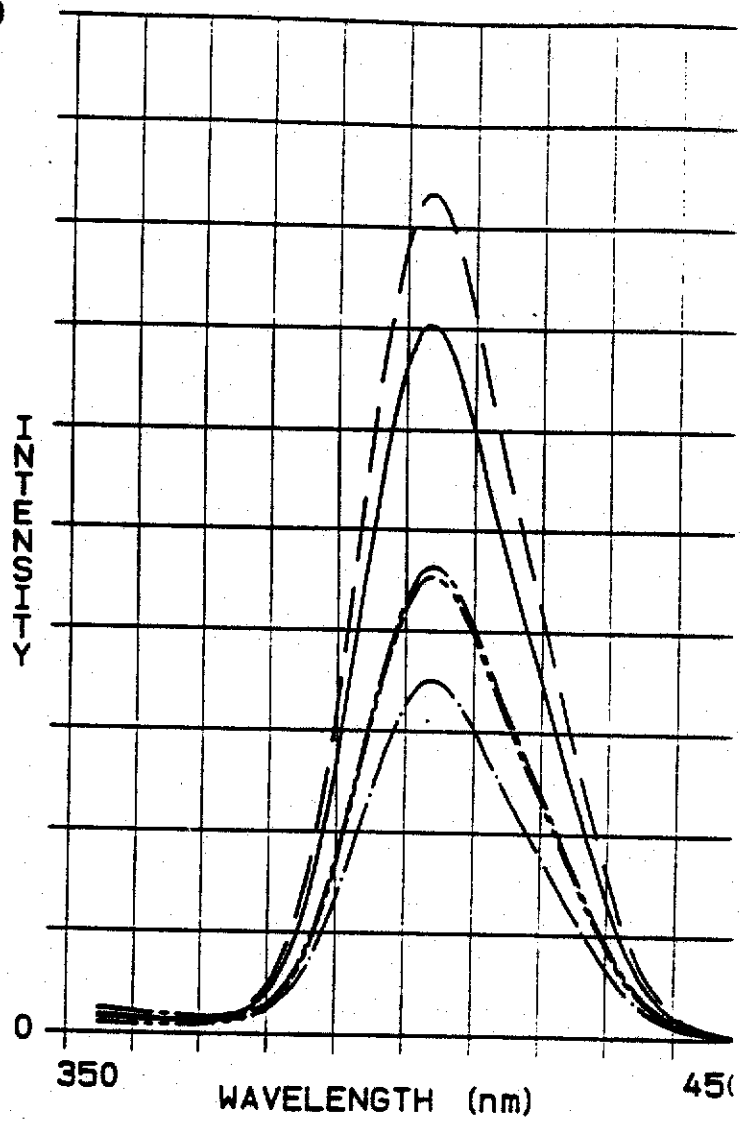
SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-6	06/30/95	BC	DD	0	0	0	0
REMARKS:							
TE-7A	07/03/95	BC	DD	403	836100	0	0
REMARKS:							
TE-8	07/05/95	BC	DD	403	2385900	0	0
REMARKS:							
TE-9	07/07/95	BC	DD	403	1768300	0	0
REMARKS:							
10	07/10/95	BC	DD	402	1264000	0	0
REMARKS:							

1967000

LOCATION: SP6301

TE-11
TE-12
TE-13
TE-14
TE-15



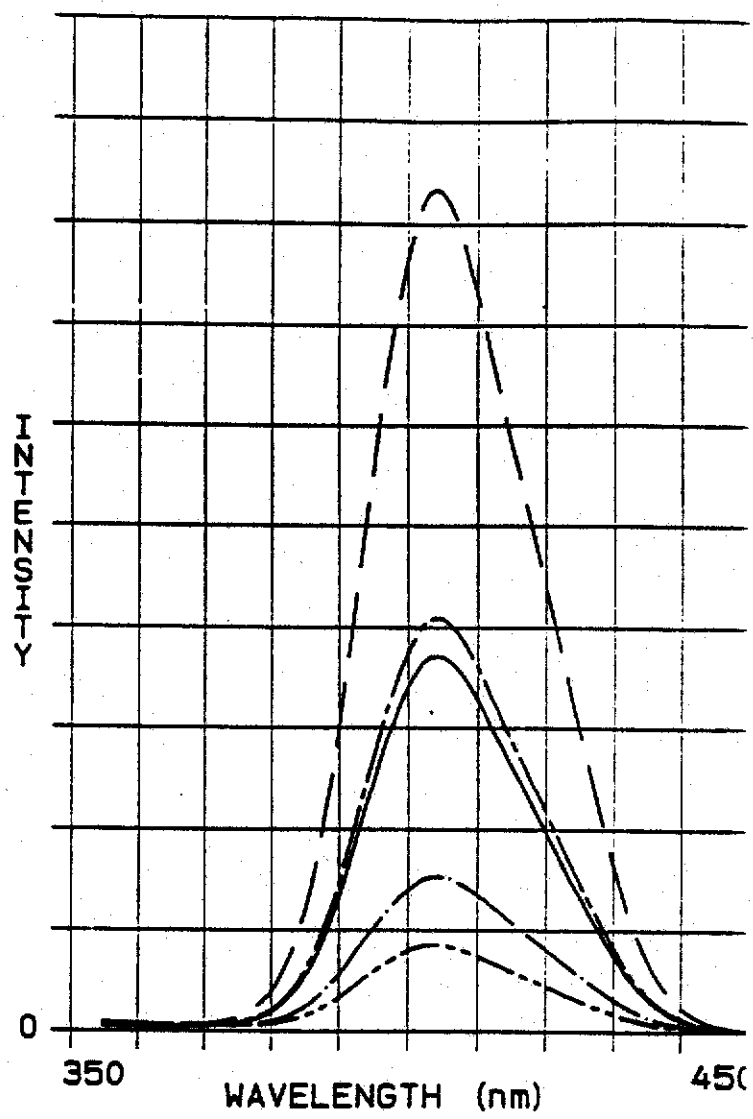
PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-11	07/12/95	BC	DD	402	1383700	0	0
REMARKS:							
TE-12	07/14/95	BC	DD	402	1639200	0	0
REMARKS:							
TE-13	07/17/95	BC	DD	403	689200	0	0
REMARKS:							
TE-14	07/19/95	BC	DD	403	910900	0	0
REMARKS:							
TE-15	07/21/95	BC	DD	403	891400	0	0
REMARKS: WELDON SPRINGS							

3529000

LOCATION: SP6301



TE-16
TE-17
TE-18
TE-19
TE-20

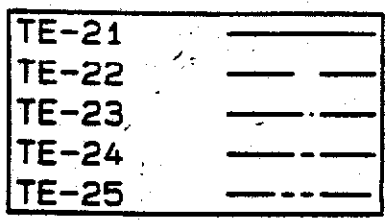
PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-16	07/24/95	BC	DD	403	1310700	0	0
REMARKS: WELDON SPRINGS							
TE-17	07/26/95	BC	DD	403	2941000	0	0
REMARKS: WELDON SPRINGS							
TE-18	07/28/95	BC	DD	403	541200	0	0
REMARKS:							
TE-19	07/31/95	BC	DD	403	1445100	0	0
REMARKS:							
TE-20	08/02/95	BC	DD	403	302294	0	0
REMARKS:							

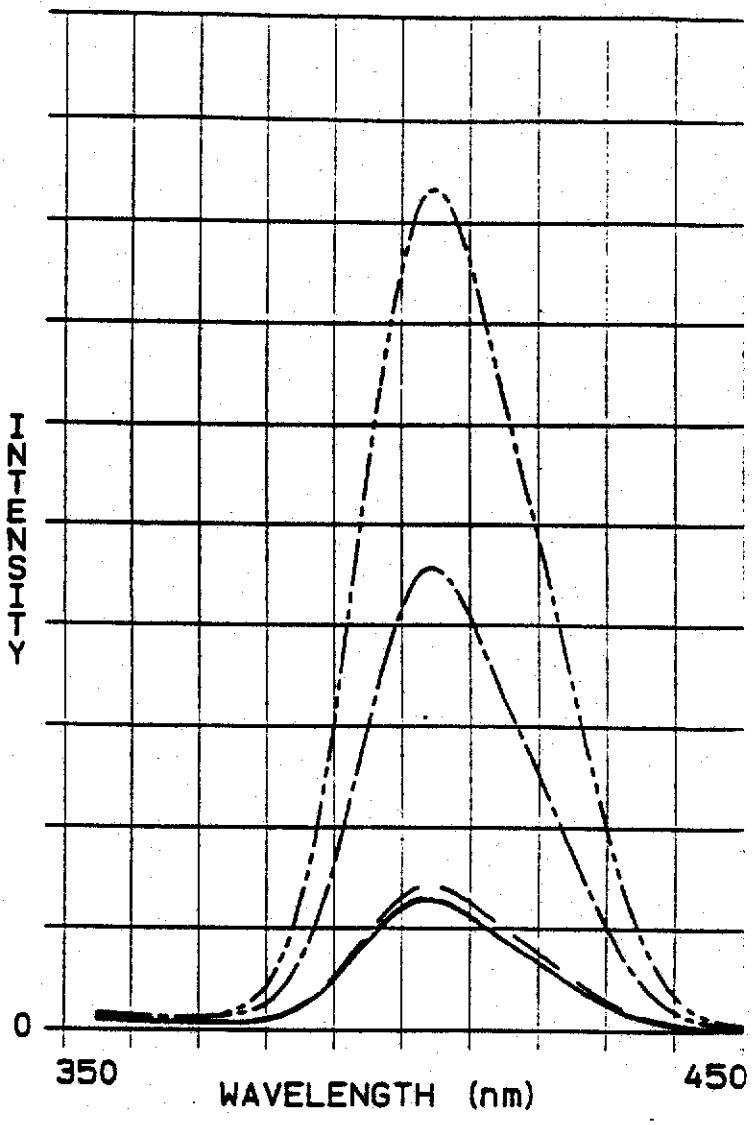
3221000

LOCATION: SP6301



PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

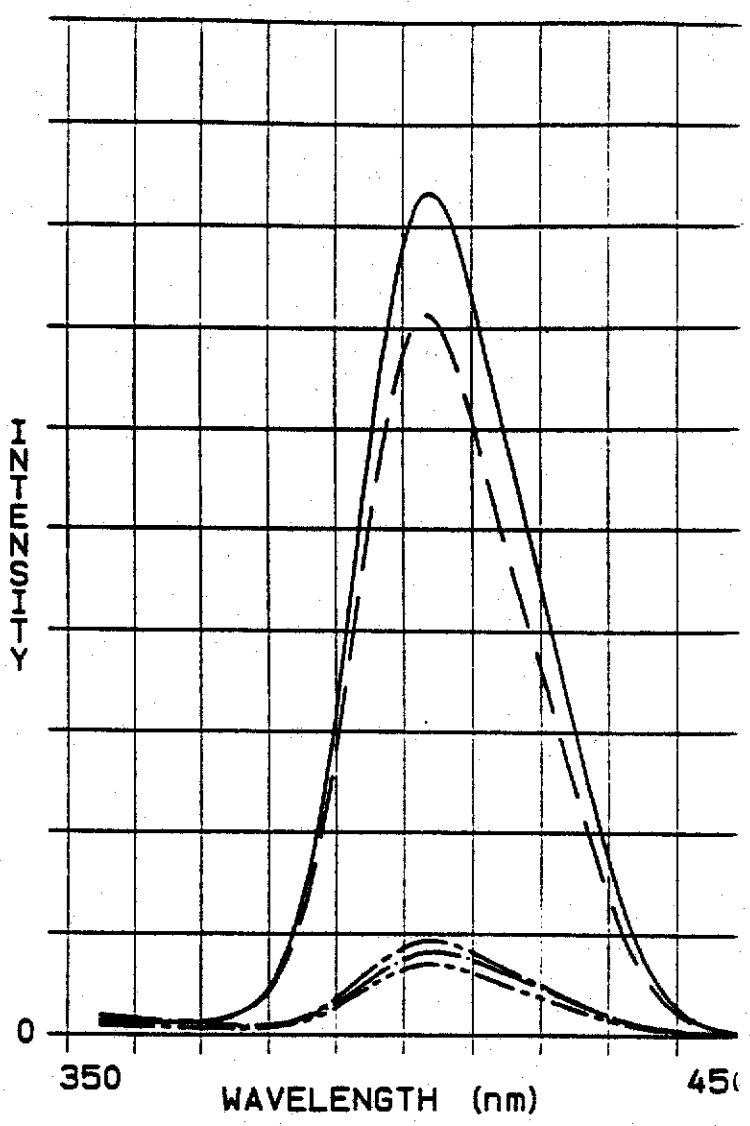


SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-21	08/04/95	BC	DD	403	412785	0	0
REMARKS: WELDON SPRINGS							
TE-22	08/07/95	BC	DD	403	459433	0	0
REMARKS: WELDON SPRINGS							
TE-23	08/09/95	BC	DD	403	419518	0	0
REMARKS: WELDON SPRINGS							
TE-24	08/11/95	BC	GJY	403	1470600	0	0
REMARKS:							
TE-25	08/18/95	BC	GJY	404	2684500	0	0
REMARKS:							

2237000

LOCATION: SP6301

TE-26	———
TE-27	— —
TE-28	—·—
TE-29	—··
TE-30	—··

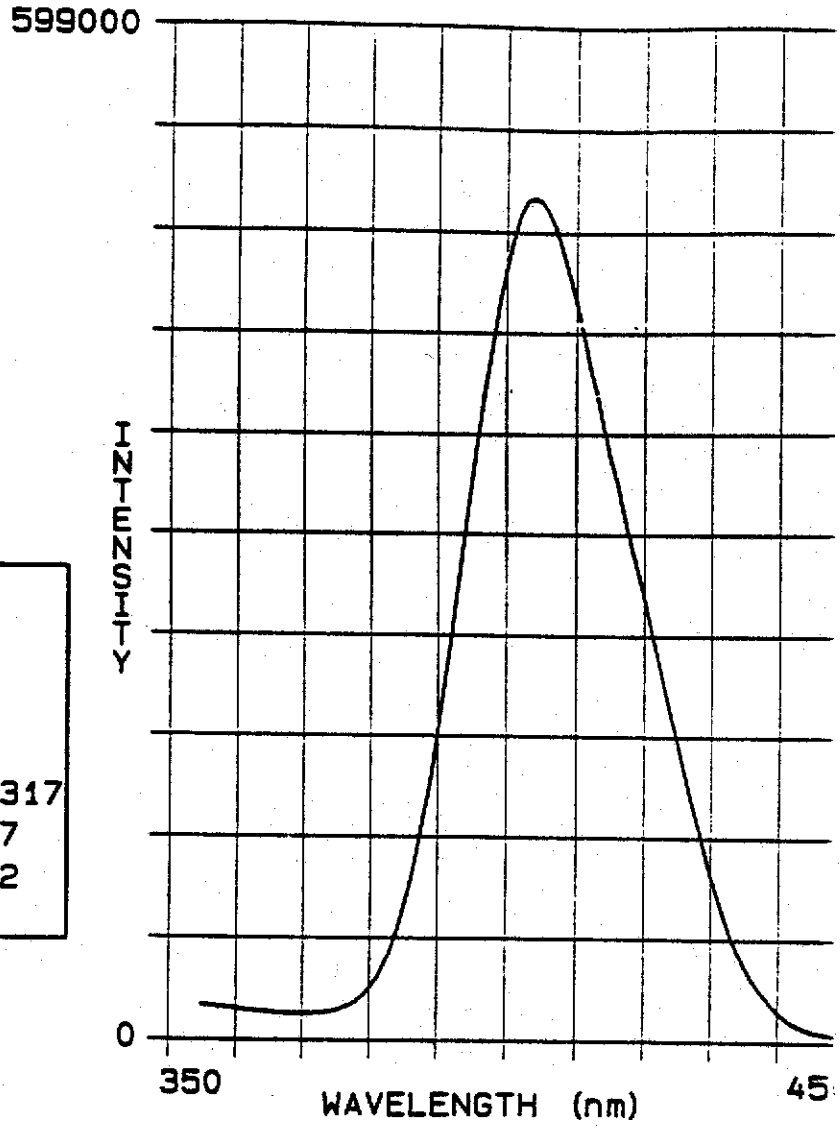


PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-26	08/25/95	BC	GJY	403	1864300	0	0
REMARKS:							
TE-27	09/01/95	BC	DD	402	1598100	0	0
REMARKS:							
TE-28	09/08/95	BC	DD	404	184400	0	0
REMARKS:							
TE-29	09/15/95	BC	DD	403	208900	0	0
REMARKS:							
TE-30	09/22/95	BC	DD	403	157018	0	0
REMARKS:							

LOCATION: SP6301



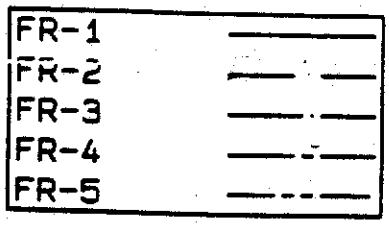
TE-31

PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

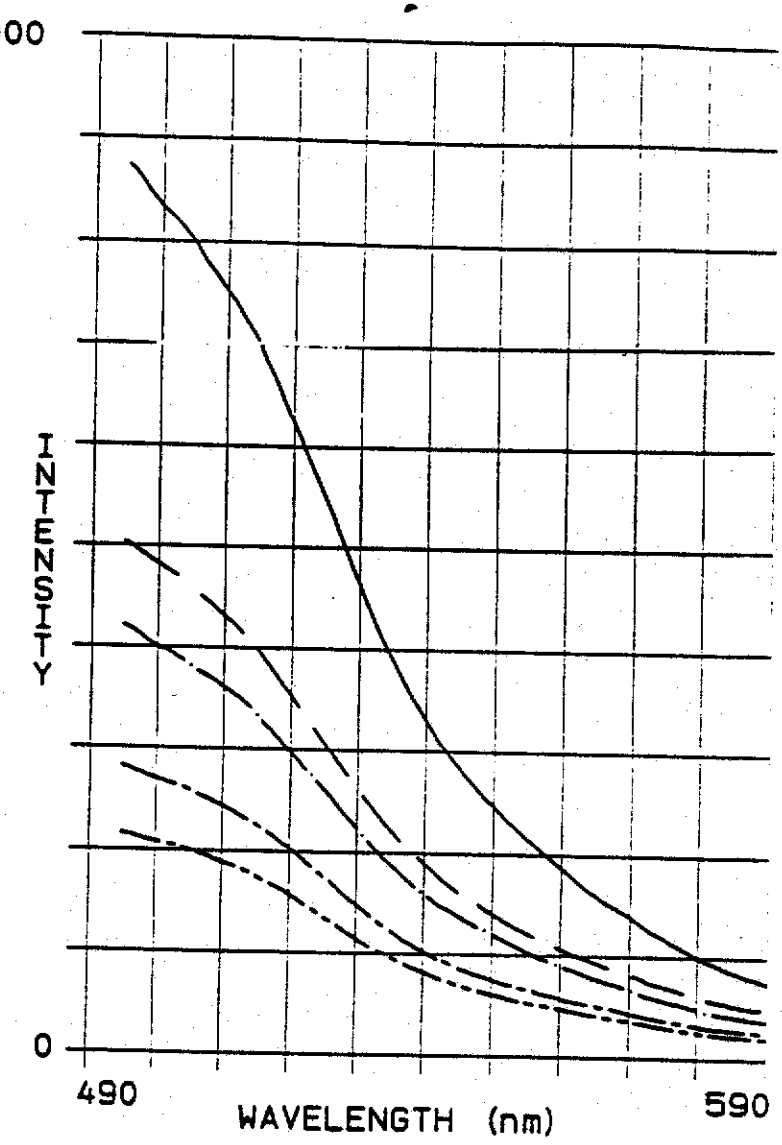
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-31	09/28/95	BC	DD	403	499446	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: SP6303



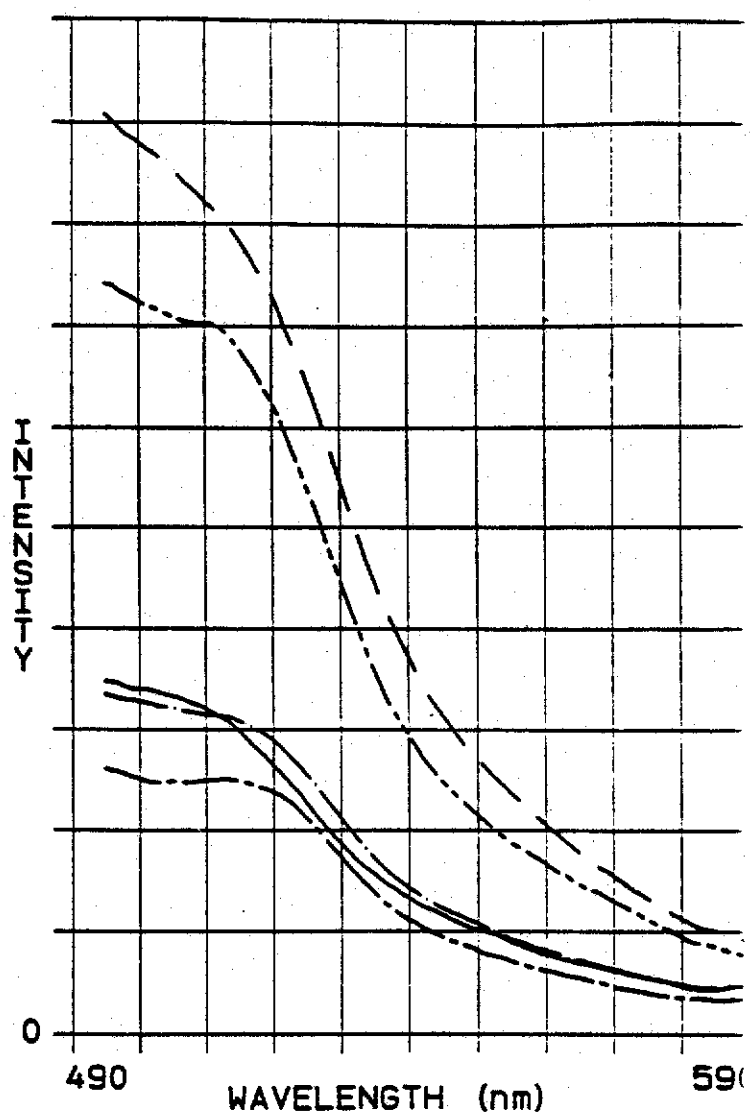
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-1	06/06/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
FR-2	06/07/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
FR-3	06/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRING							
FR-4	06/26/95	BC	DD	0	0	0	0
REMARKS:							
FR-5	06/28/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6303



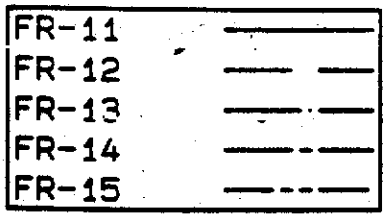
FR-6
FR-7
FR-8
FR-9
FR-10

PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

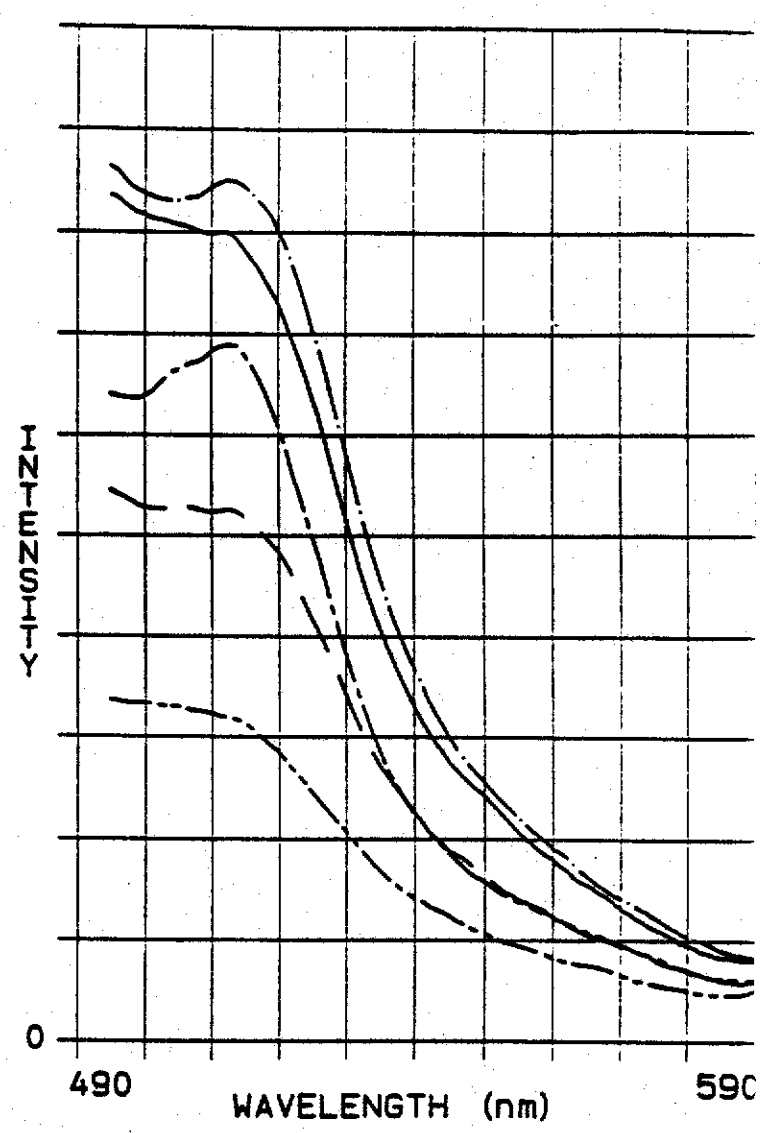
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-6	06/30/95	BC	DD	0	0	0	0
REMARKS:							
FR-7	07/03/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-8	07/05/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-9	07/07/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-10	07/10/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							

LOCATION: SP6303



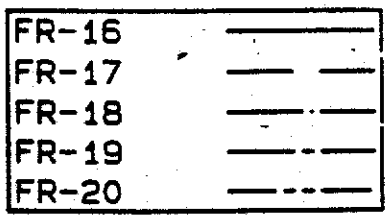
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



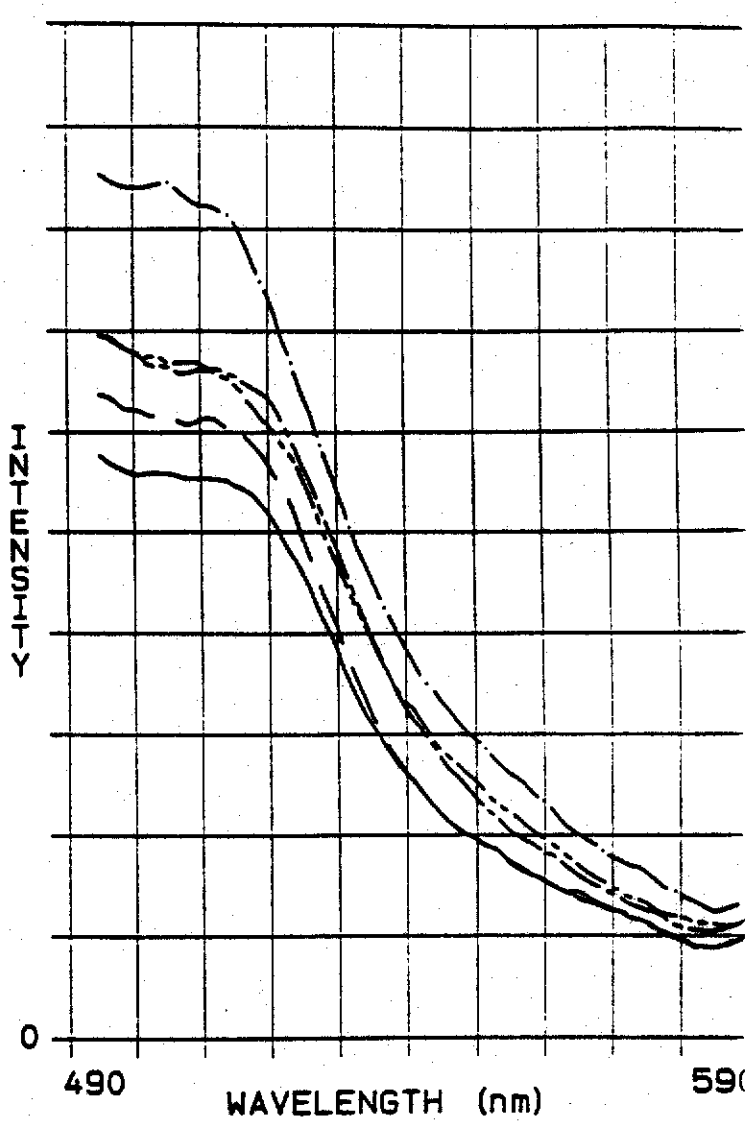
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-11	07/12/95	BC	DD	0	0	0	0
REMARKS:							
FR-12	07/14/95	BC	DD	0	0	0	0
REMARKS:							
FR-13	07/17/95	BC	DD	0	0	0	0
REMARKS:							
FR-14	07/19/95	BC	DD	0	0	0	0
REMARKS:							
FR-15	07/21/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							

LOCATION: SP6303



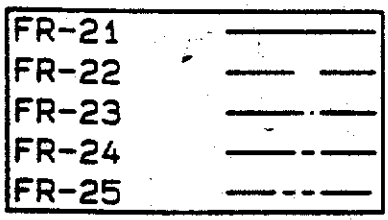
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



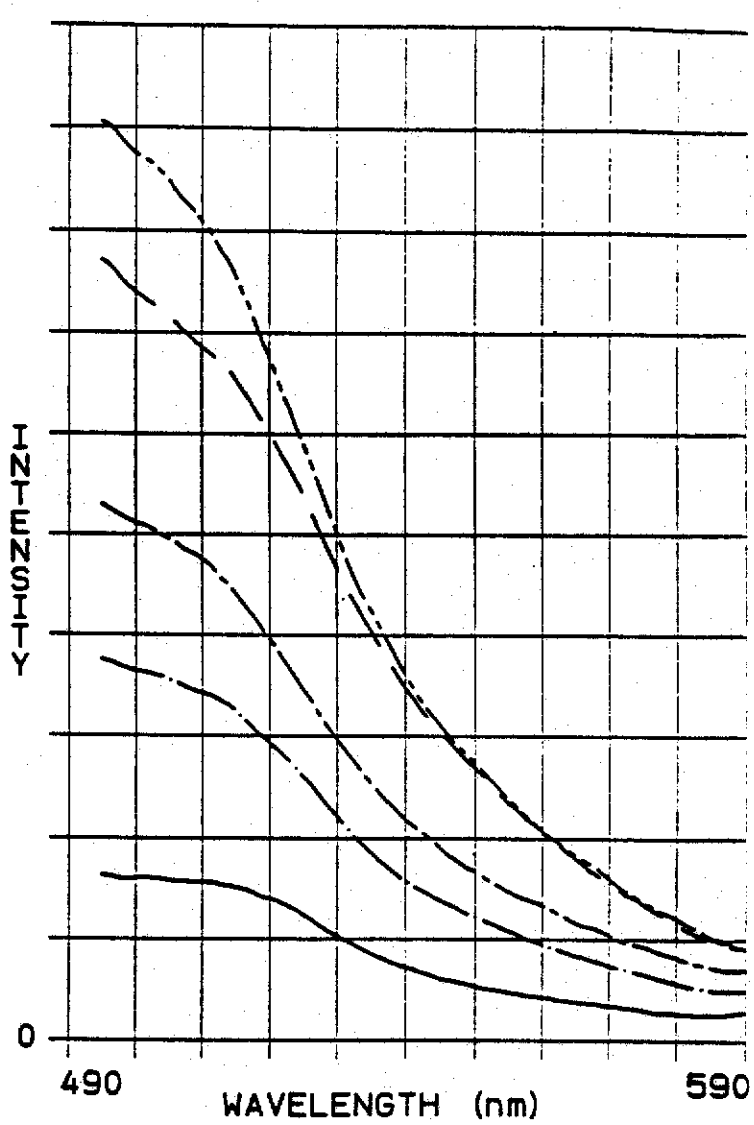
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-16	07/24/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-17	07/26/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-18	07/28/95	BC	DD	0	0	0	0
REMARKS:							
FR-19	07/31/95	BC	DD	0	0	0	0
REMARKS:							
FR-20	08/02/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							

LOCATION: SP6303



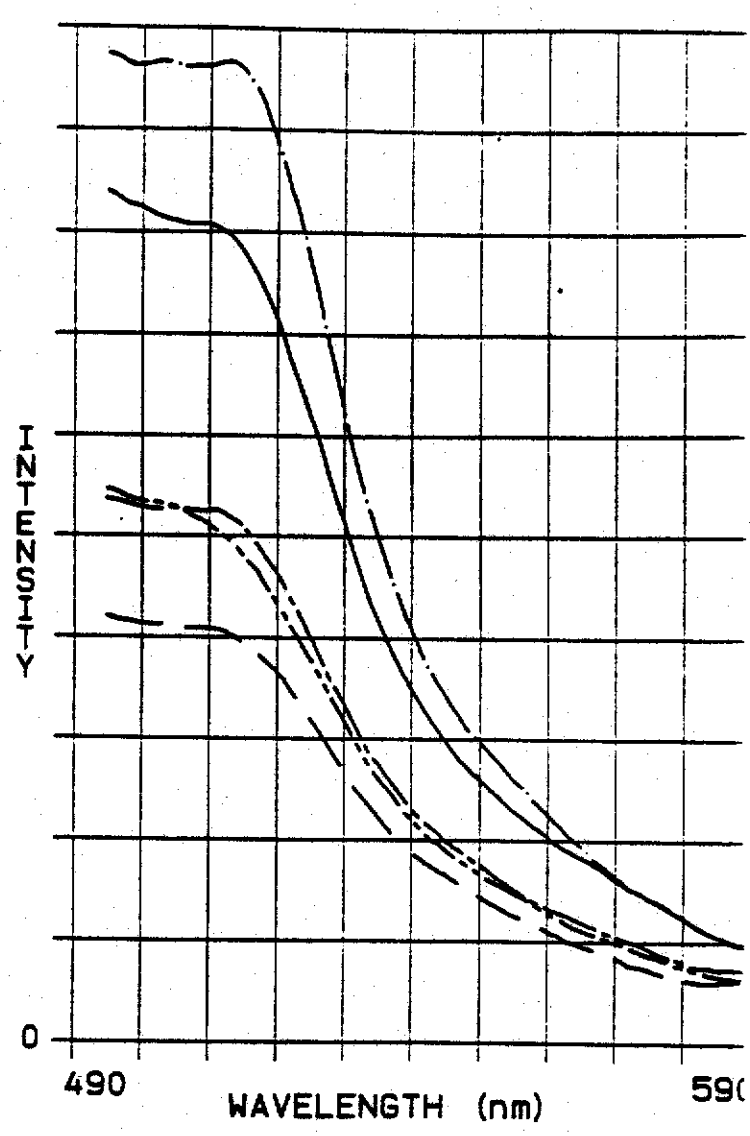
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-21	08/04/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-22	08/07/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-23	08/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-24	08/11/95	BC	GJY	0	0	0	0
REMARKS:							
FR-25	08/18/95	BC	GJY	0	0	0	0
REMARKS:							

LOCATION: SP6303



FR-26
FR-27
FR-28
FR-29
FR-30

PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

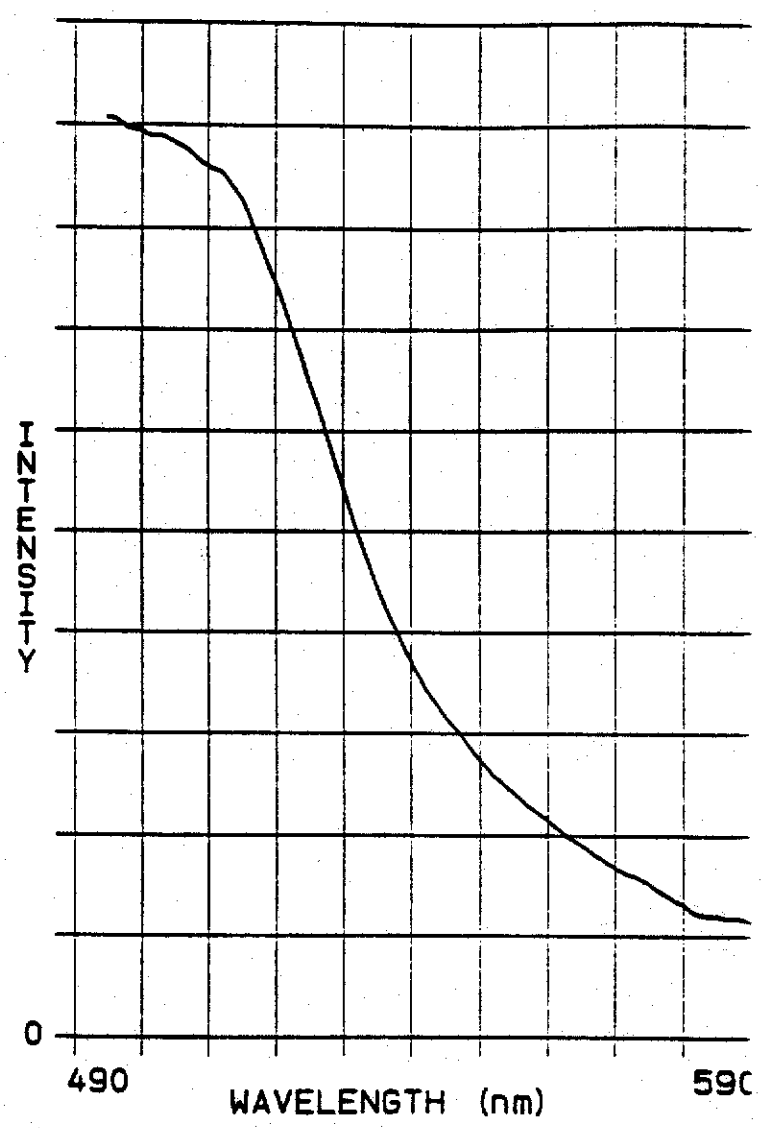
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-26	08/25/95	BC	GJY	0	0	0	0
REMARKS:							
FR-27	09/01/95	BC	DD	0	0	0	0
REMARKS:							
FR-28	09/08/95	BC	DD	0	0	0	0
REMARKS:							
FR-29	09/15/95	BC	DD	0	0	0	0
REMARKS:							
FR-30	09/22/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6303

FR-31

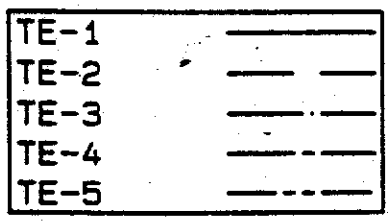
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



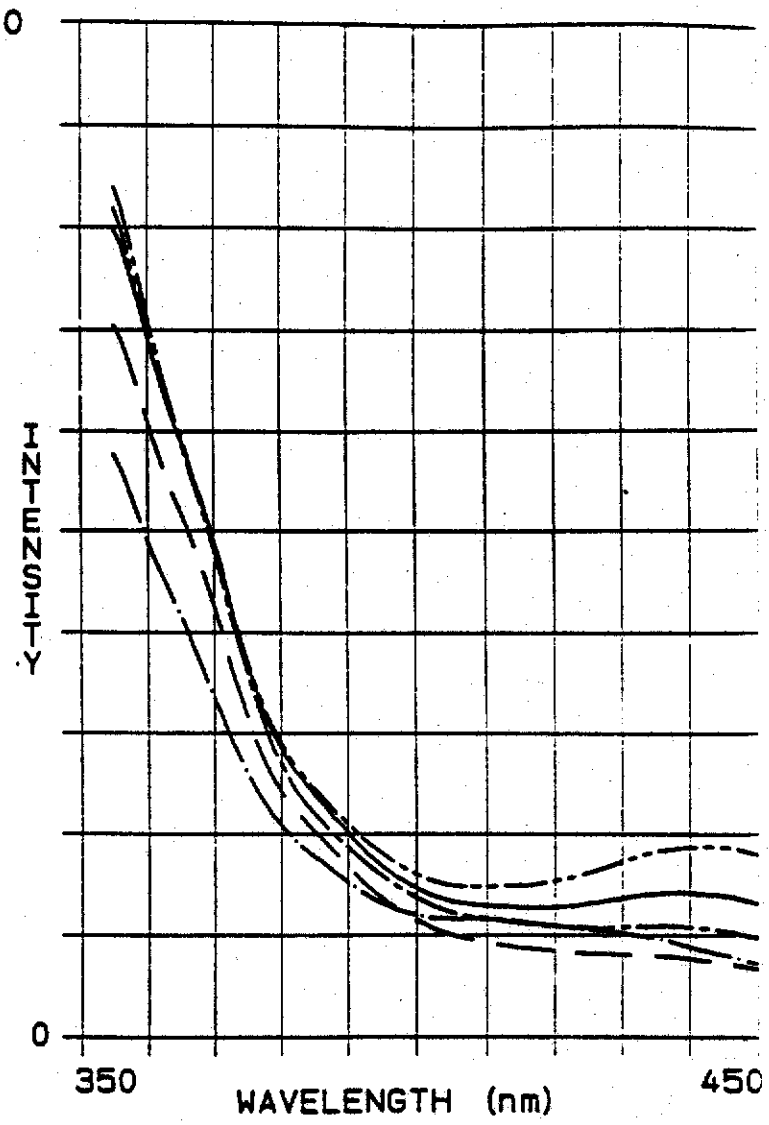
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-31	09/28/95	BC	DD	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: SP6303



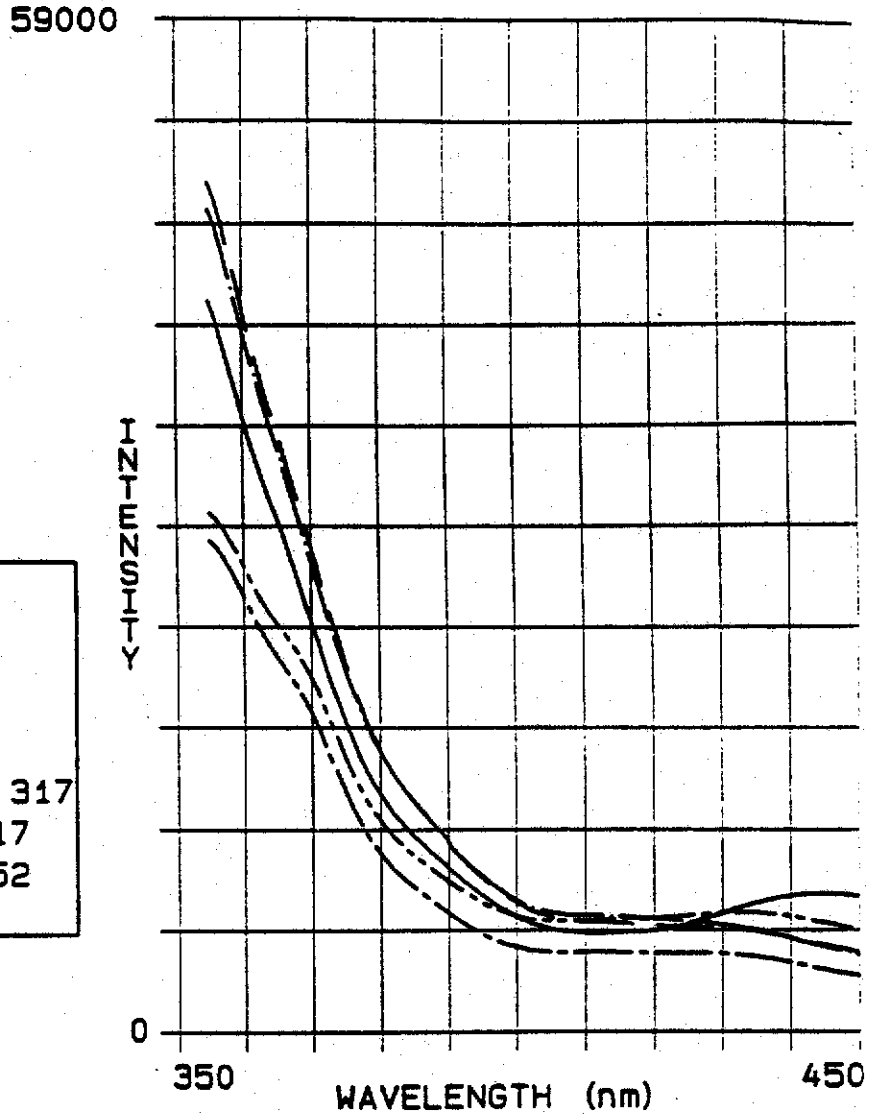
PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-1	06/06/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
TE-2	06/07/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
TE-3	06/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRING							
TE-4	06/26/95	BC	DD	0	0	0	0
REMARKS:							
TE-5	06/28/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6303



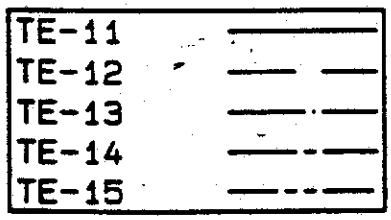
TE-6
TE-7
TE-8
TE-9
TE-10

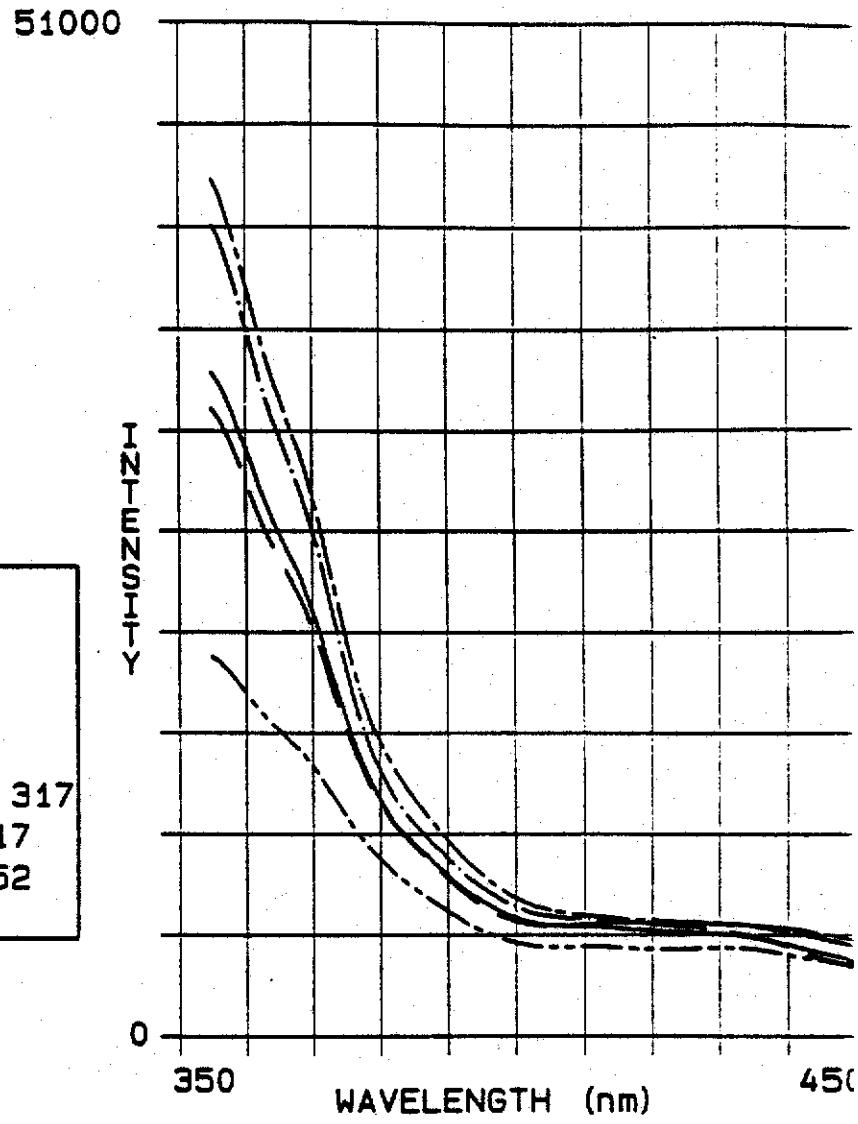
PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-6	06/30/95	BC	DD	0	0	0	0
REMARKS:							
TE-7	07/03/95	BC	DD	0	0	0	0
REMARKS:							
TE-8	07/05/95	BC	DD	0	0	0	0
REMARKS:							
TE-9	07/07/95	BC	DD	0	0	0	0
REMARKS:							
TE-10	07/10/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6303



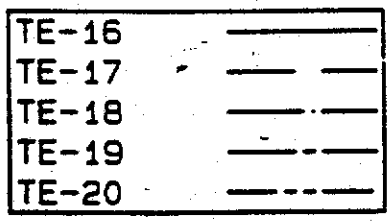


PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

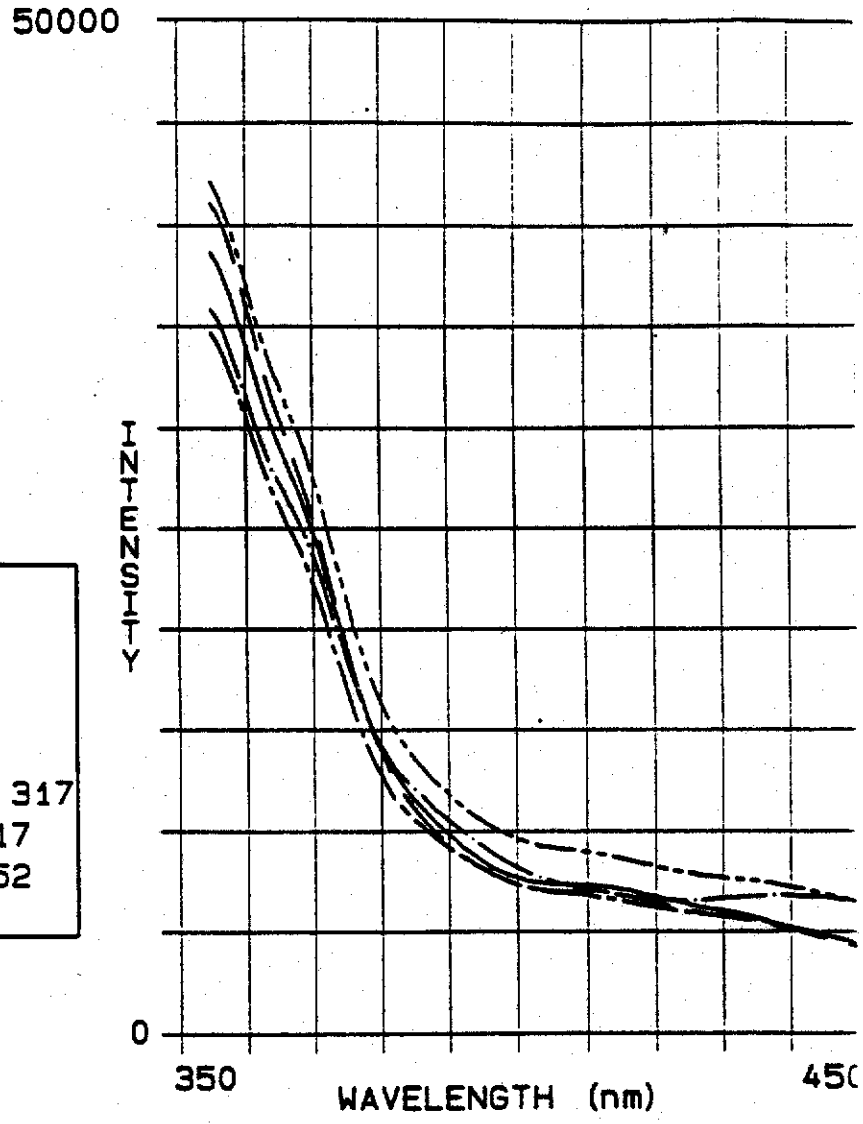
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-11	07/12/95	BC	DD	0	0	0	0
REMARKS:							
TE-12	07/14/95	BC	DD	0	0	0	0
REMARKS:							
TE-13	07/17/95	BC	DD	0	0	0	0
REMARKS:							
TE-14	07/19/95	BC	DD	0	0	0	0
REMARKS:							
TE-15	07/21/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRING							

LOCATION: SP6303



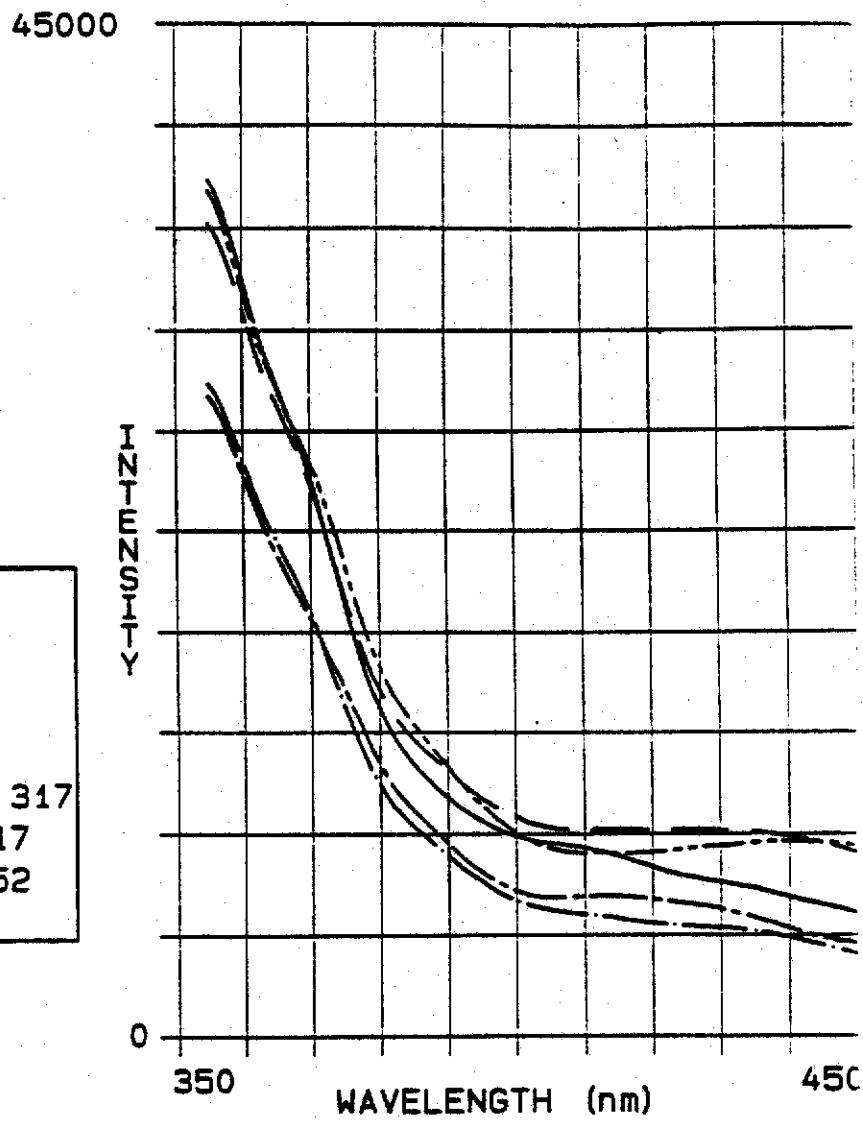
PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-16	07/24/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
TE-17	07/26/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
TE-18	07/28/95	BC	DD	0	0	0	0
REMARKS:							
TE-19	07/31/95	BC	DD	0	0	0	0
REMARKS:							
TE-20	08/02/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							

LOCATION: SP6303



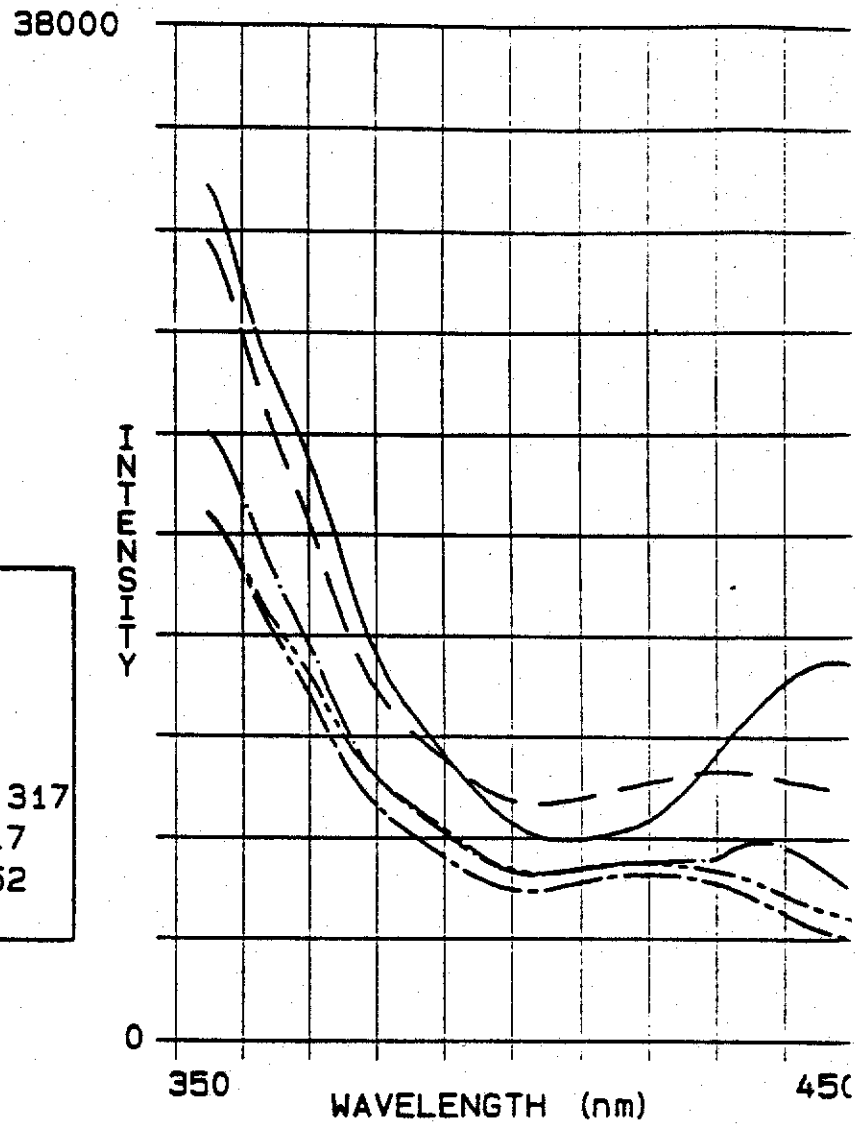
TE-21
TE-22
TE-23
TE-24
TE-25

PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-21	08/04/95	BC	DD	0	0	0	0
REMARKS:							
TE-22	08/07/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
TE-23	08/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
TE-24	08/11/95	BC	GJY	0	0	0	0
REMARKS:							
TE-25	08/18/95	BC	GJY	0	0	0	0
REMARKS:							

LOCATION: SP6303



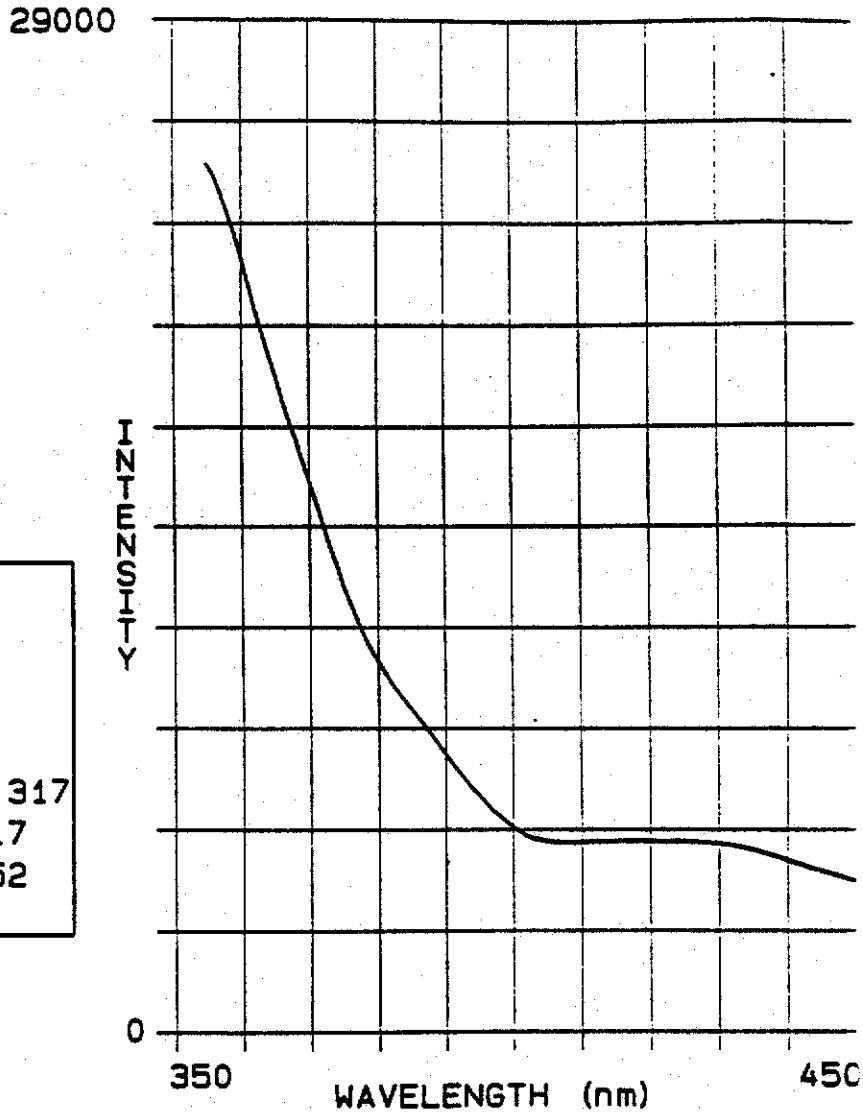
TE-26
TE-27
TE-28
TE-29
TE-30

PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-26	08/25/95	BC	GJY	0	0	0	0
REMARKS:							
TE-27	09/01/95	BC	DD	0	0	0	0
REMARKS:							
TE-28	09/08/95	BC	DD	0	0	0	0
REMARKS:							
TE-29	09/15/95	BC	DD	0	0	0	0
REMARKS:							
TE-30	09/22/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6303



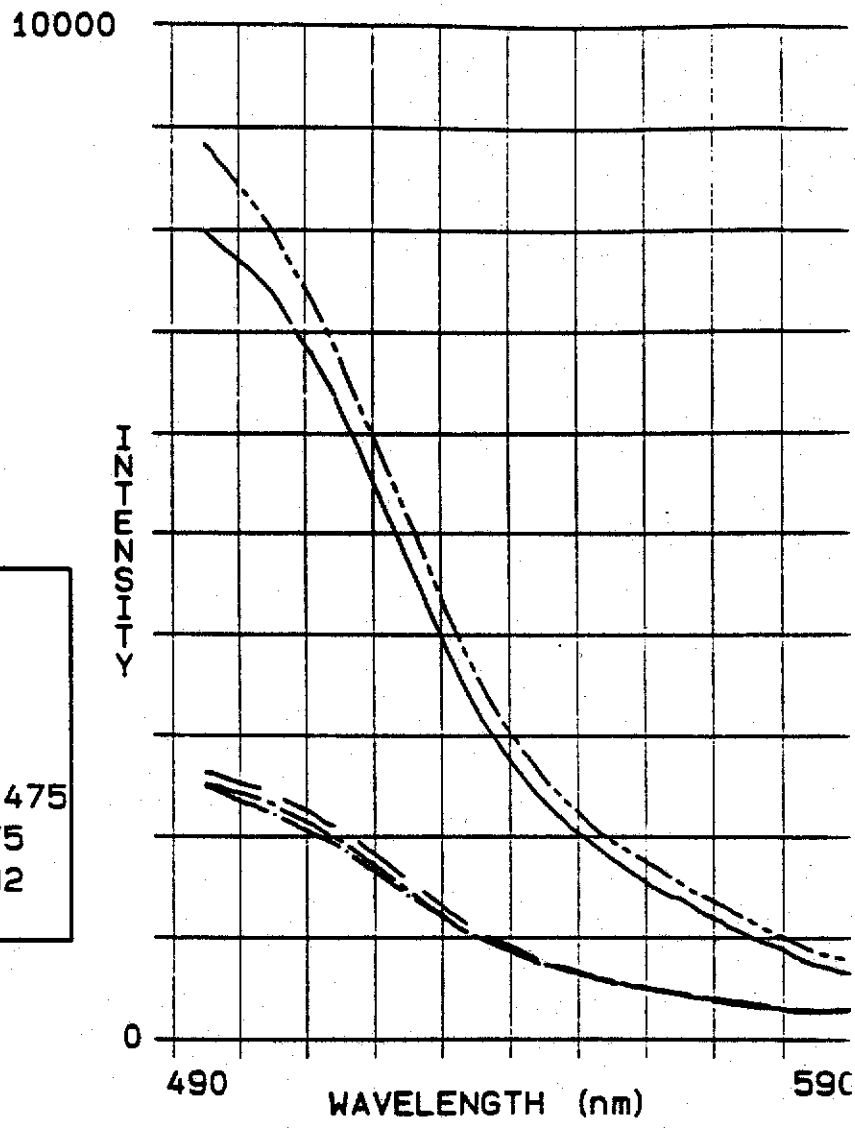
TE-31 ——

PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-31	09/28/95	BC	DD	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: SP6306



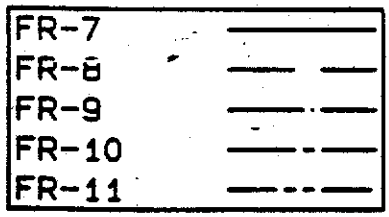
FR-2
FR-3
FR-4
FR-5
FR-6

PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

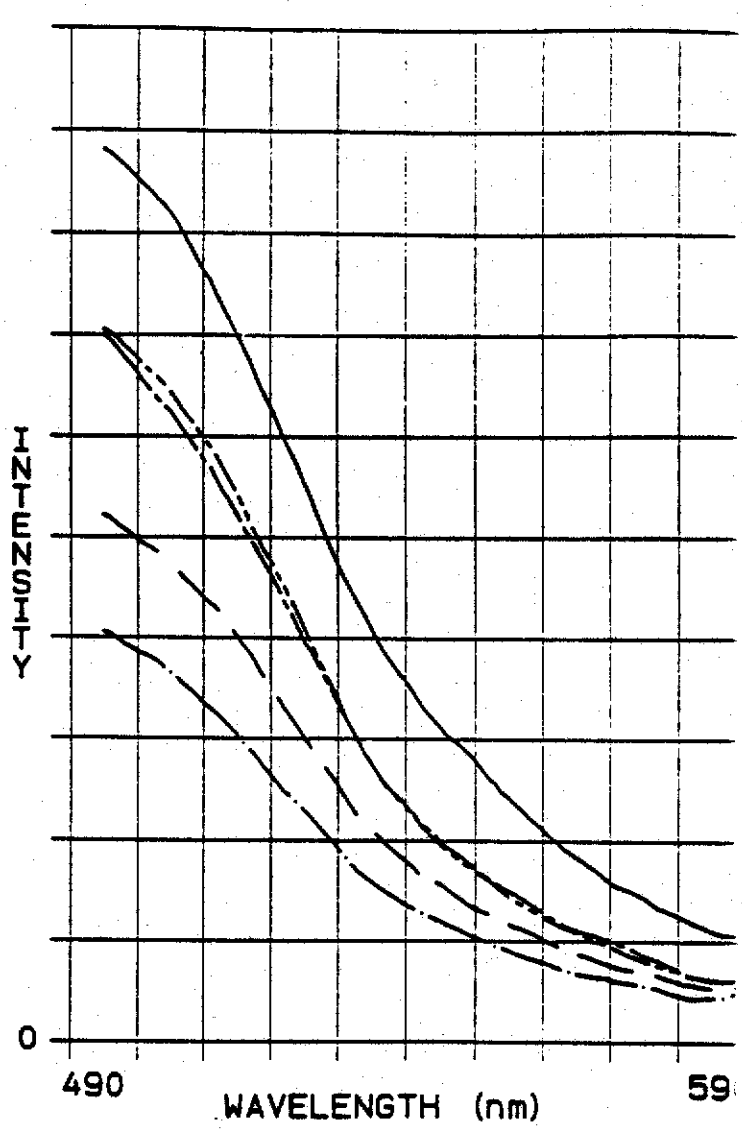
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-2	06/07/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
FR-3	06/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRING							
FR-4	06/26/95	BC	DD	0	0	0	0
REMARKS:							
FR-5	06/28/95	BC	DD	0	0	0	0
REMARKS:							
FR-6	06/30/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6306



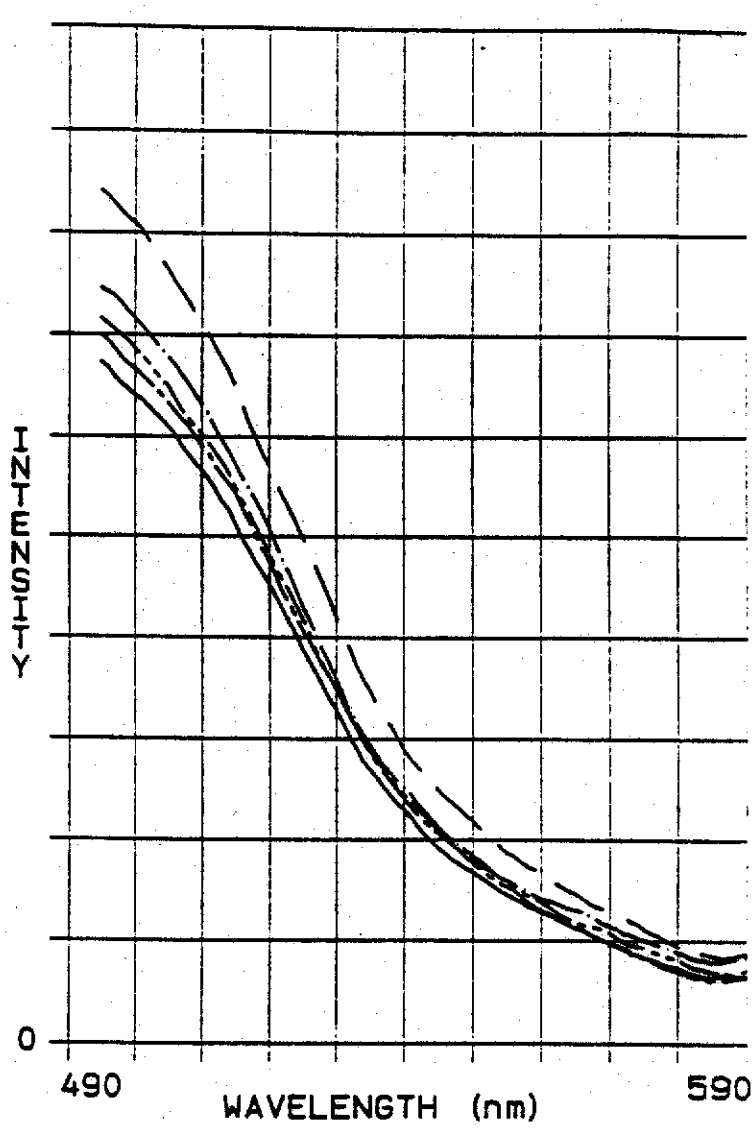
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-7	07/03/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-8	07/05/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-9	07/07/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-10	07/10/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-11	07/12/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6306



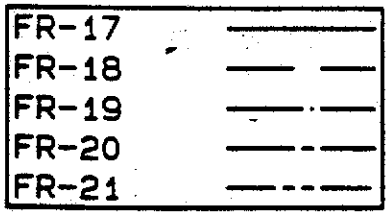
FR-12
FR-13
FR-14
FR-15
FR-16

PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

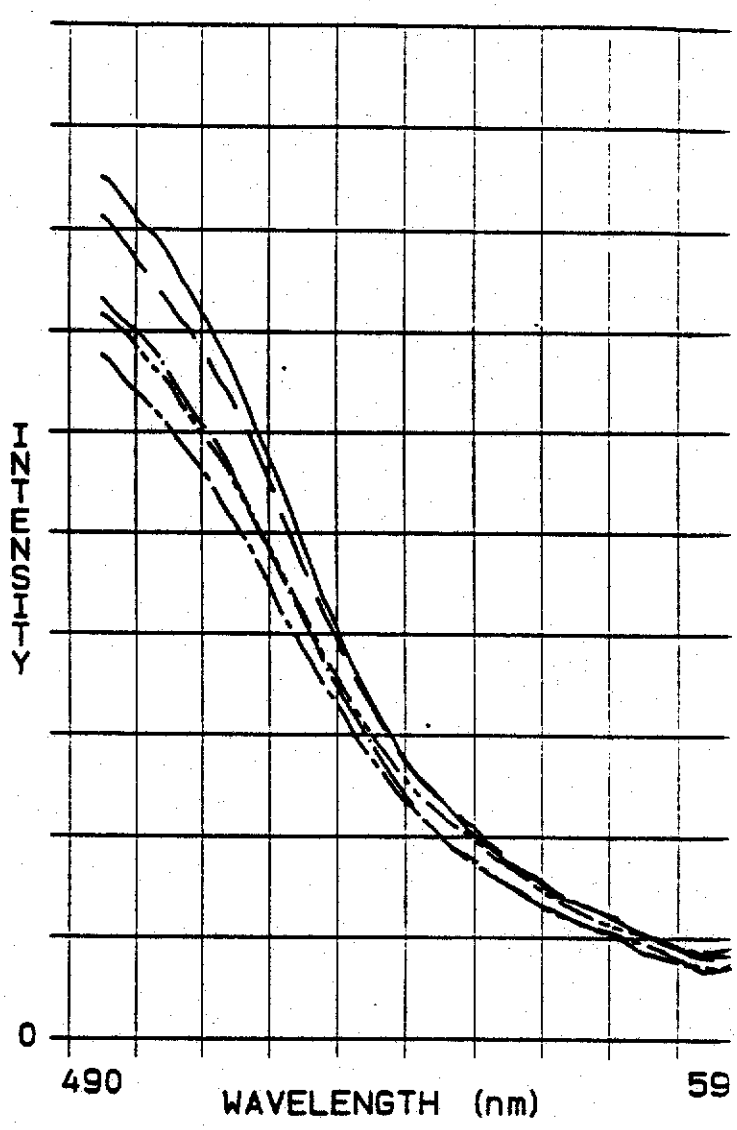
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-12	07/14/95	BC	DD	0	0	0	0
REMARKS:							
FR-13	07/17/95	BC	DD	0	0	0	0
REMARKS:							
FR-14	07/19/95	BC	DD	0	0	0	0
REMARKS:							
FR-15	07/21/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
-16	07/24/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							

LOCATION: SP6306



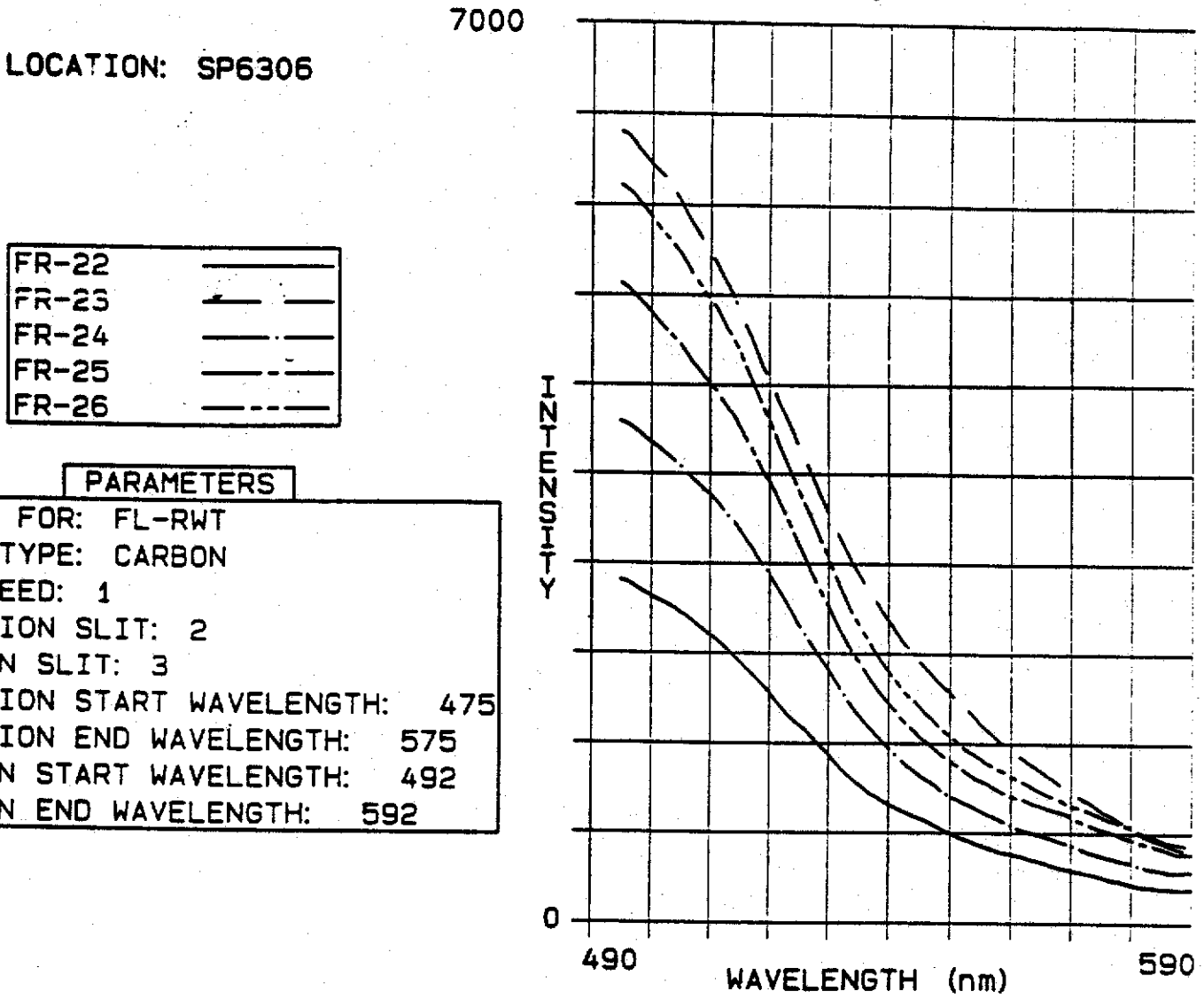
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-17	07/26/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-18	07/28/95	BC	DD	0	0	0	0
REMARKS:							
FR-19	07/31/95	BC	DD	0	0	0	0
REMARKS:							
FR-20	08/02/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-21	08/04/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							

LOCATION: SP6306

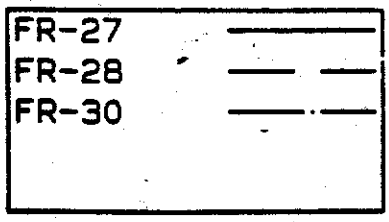


PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

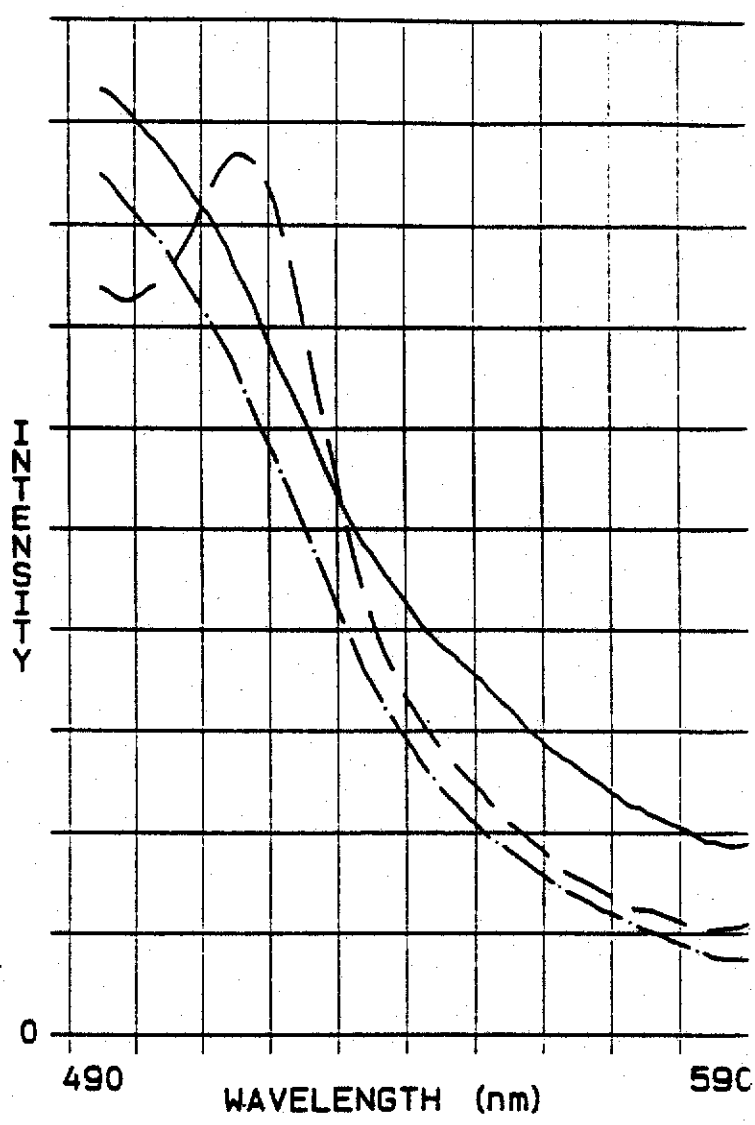
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-22	08/07/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-23	08/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
FR-24	08/11/95	BC	GJY	0	0	0	0
REMARKS:							
FR-25	08/18/95	BC	GJY	0	0	0	0
REMARKS:							
FR-26	08/25/95	BC	GJY	0	0	0	0
REMARKS:							

LOCATION: SP6306



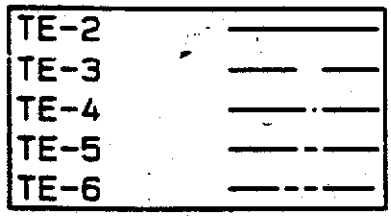
PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592



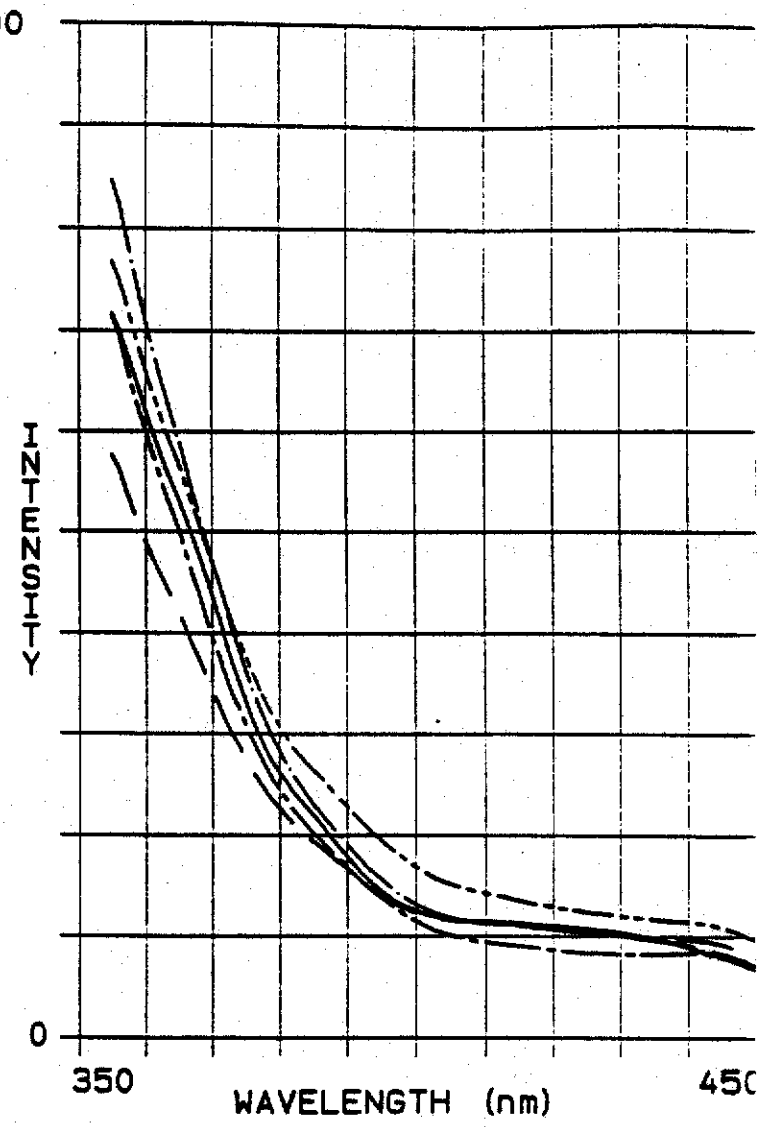
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-27	09/01/95	BC	DD	0	0	0	0
REMARKS:							
FR-28	09/08/95	BC	DD	514	3475	0	0
REMARKS:							
FR-30	09/22/95	BC	DD	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: SP6306



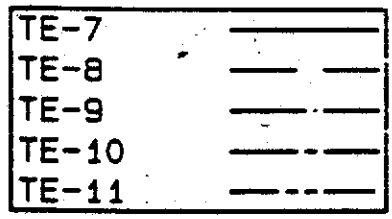
PARAMETERS

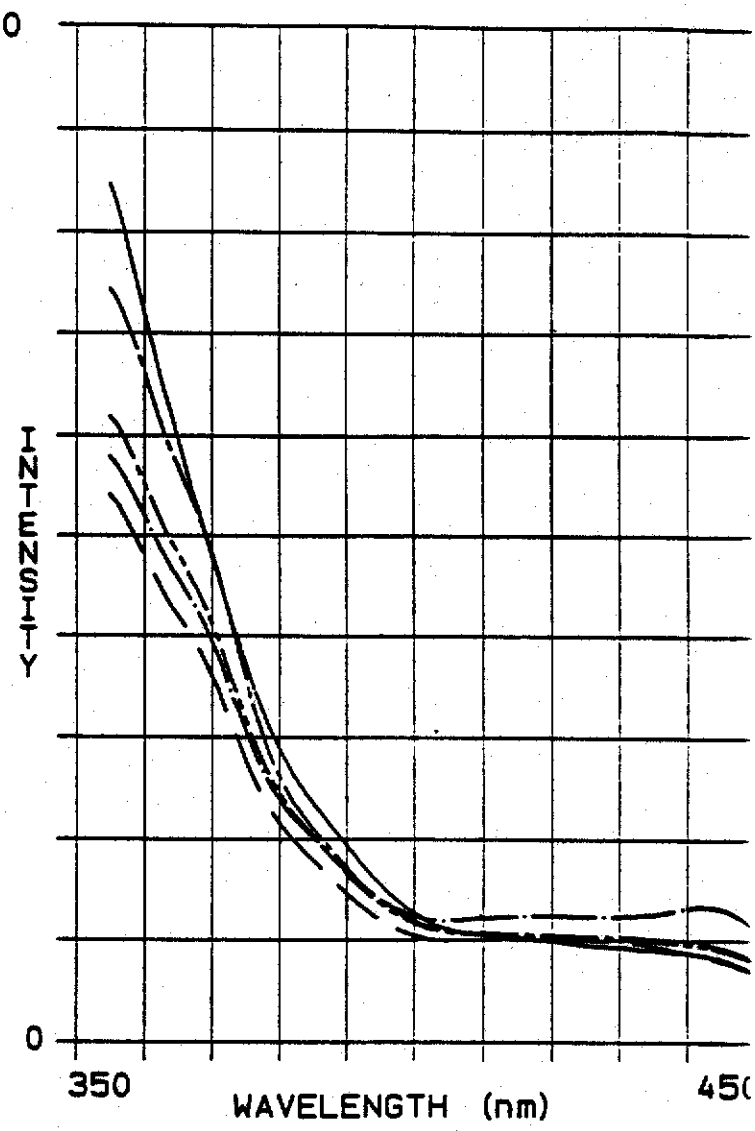
SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-2	06/07/95	RC	DD	0	0	0	0
REMARKS: WELDON SPRING							
TE-3	06/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRING							
TE-4	06/26/95	BC	DD	0	0	0	0
REMARKS:							
TE-5	06/28/95	BC	DD	0	0	0	0
REMARKS:							
TE-6	06/30/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6306



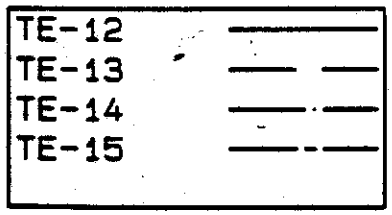


PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

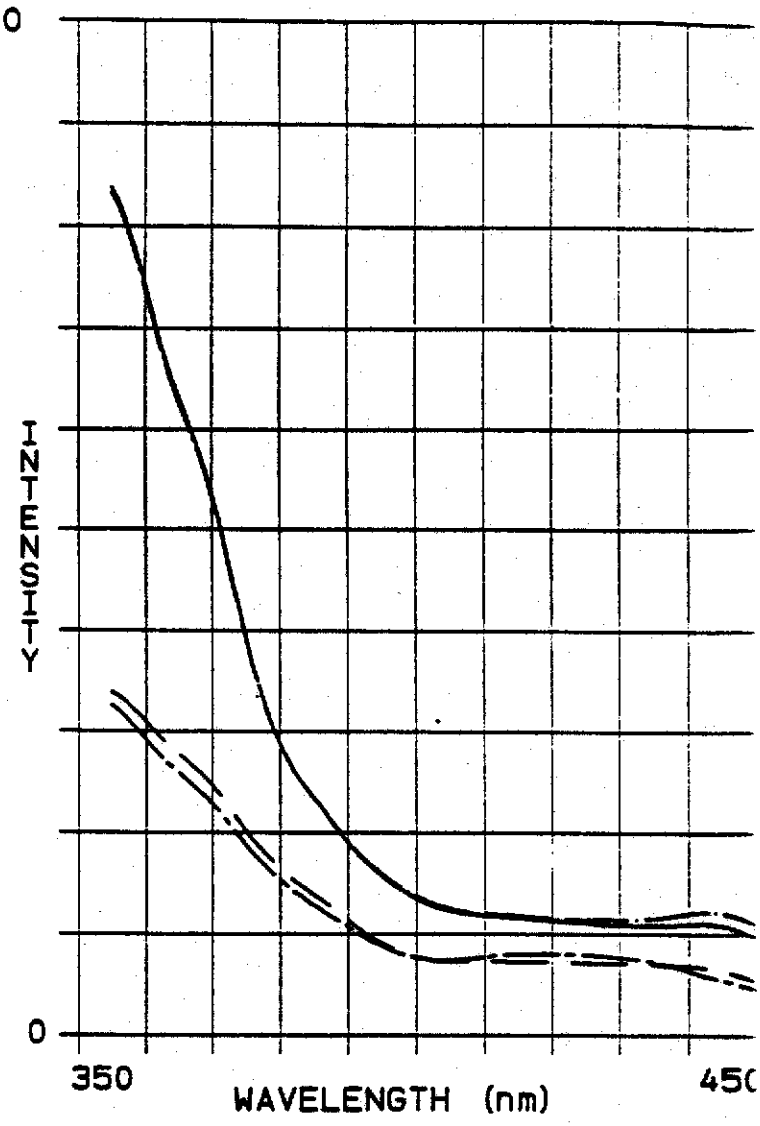
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-7	07/03/95	BC	DD	0	0	0	0
REMARKS:							
TE-8	07/05/95	BC	DD	0	0	0	0
REMARKS:							
TE-9	07/07/95	BC	DD	0	0	0	0
REMARKS:							
TE-10	07/10/95	BC	DD	0	0	0	0
REMARKS:							
TE-11	07/12/95	BC	DD	0	0	0	0
REMARKS:							

LOCATION: SP6306



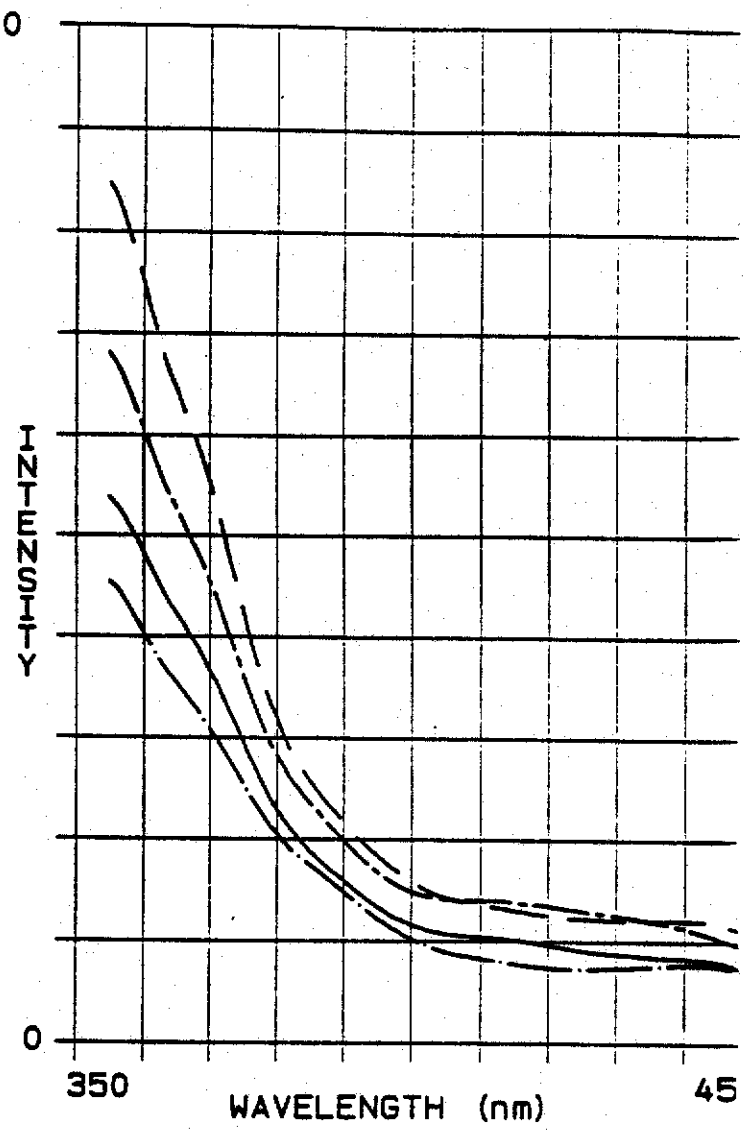
PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-12	07/14/95	BC	DD	0	0	0	0
REMARKS:							
TE-13	07/17/95	BC	DD	0	0	0	0
REMARKS:							
TE-14	07/19/95	BC	DD	0	0	0	0
REMARKS:							
TE-15	07/21/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
				0	0	0	0
REMARKS:							

LOCATION: SP6306



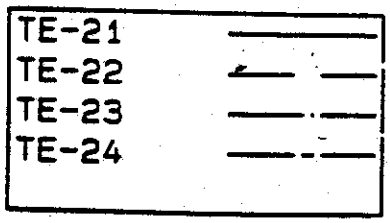
TE-17
TE-18
TE-19
TE-20

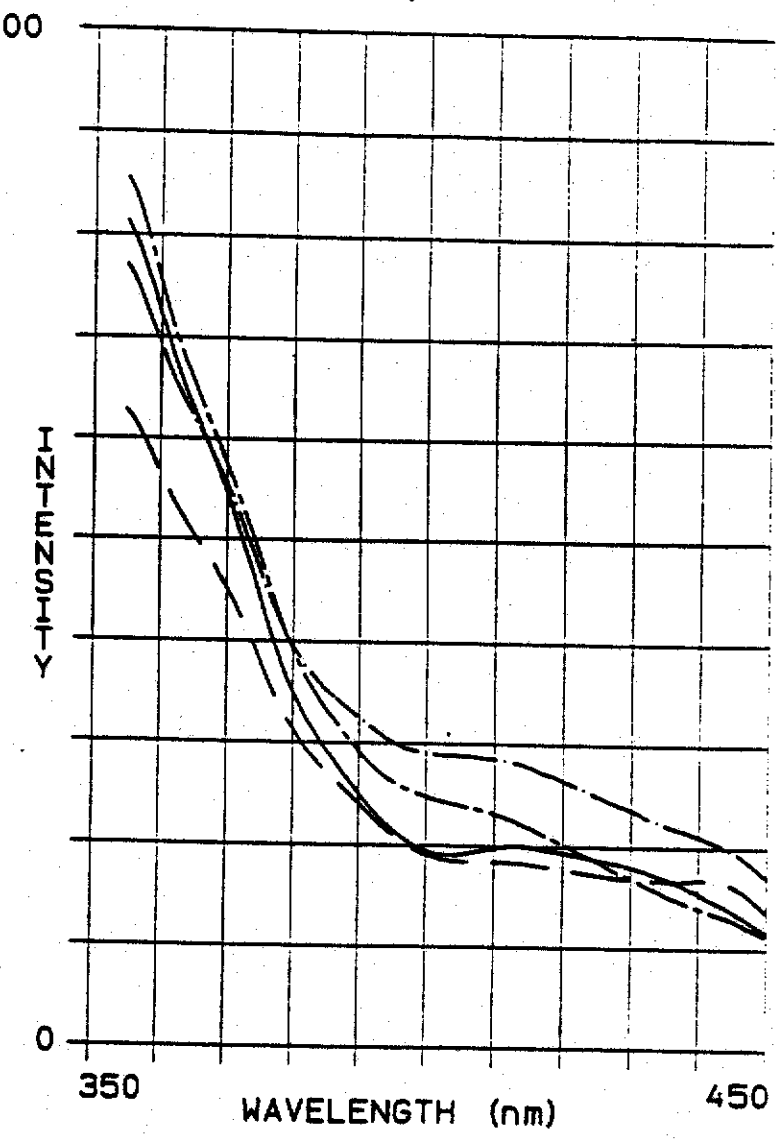
PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-17	07/26/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
TE-18	07/28/95	BC	DD	0	0	0	0
REMARKS:							
TE-19	07/31/95	BC	DD	0	0	0	0
REMARKS:							
TE-20	08/02/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
				0	0	0	0
REMARKS:							

LOCATION: SP6306



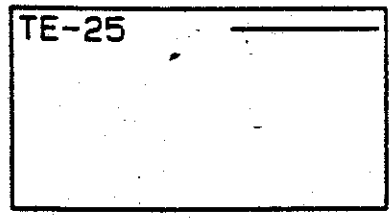


PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

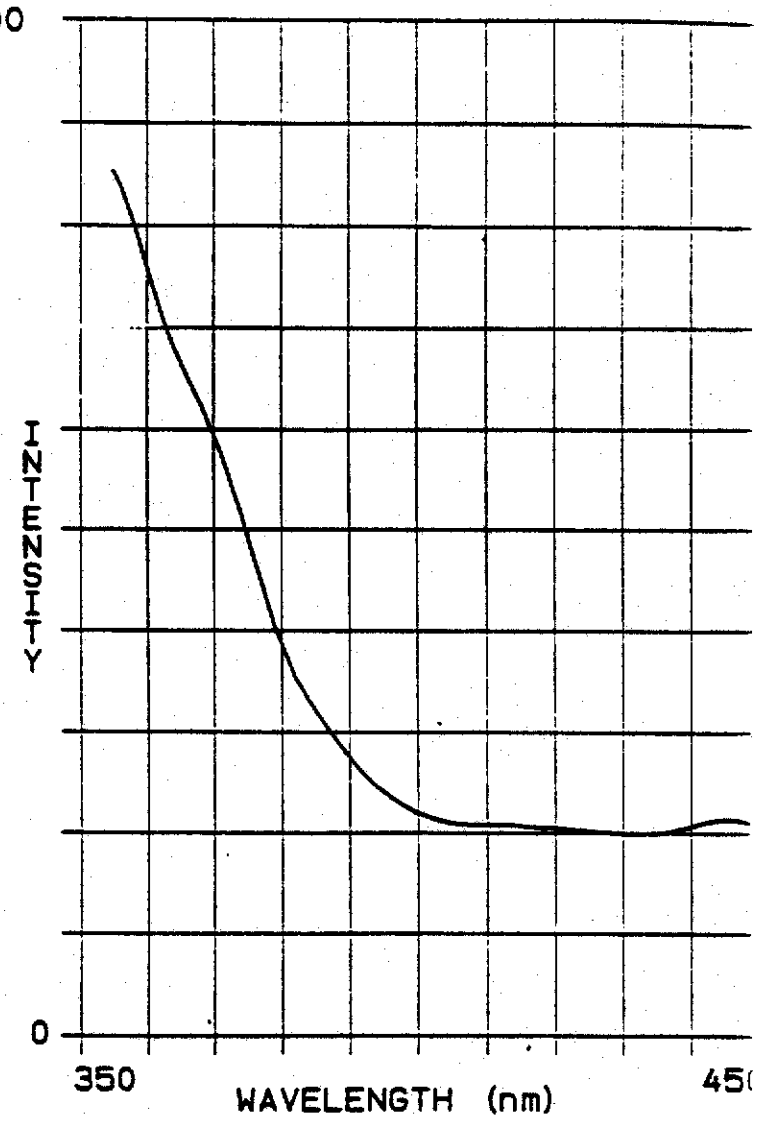
SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-21	08/04/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
TE-22	08/07/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
TE-23	08/09/95	BC	DD	0	0	0	0
REMARKS: WELDON SPRINGS							
TE-24	08/11/95	BC	GJY	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: SP6306



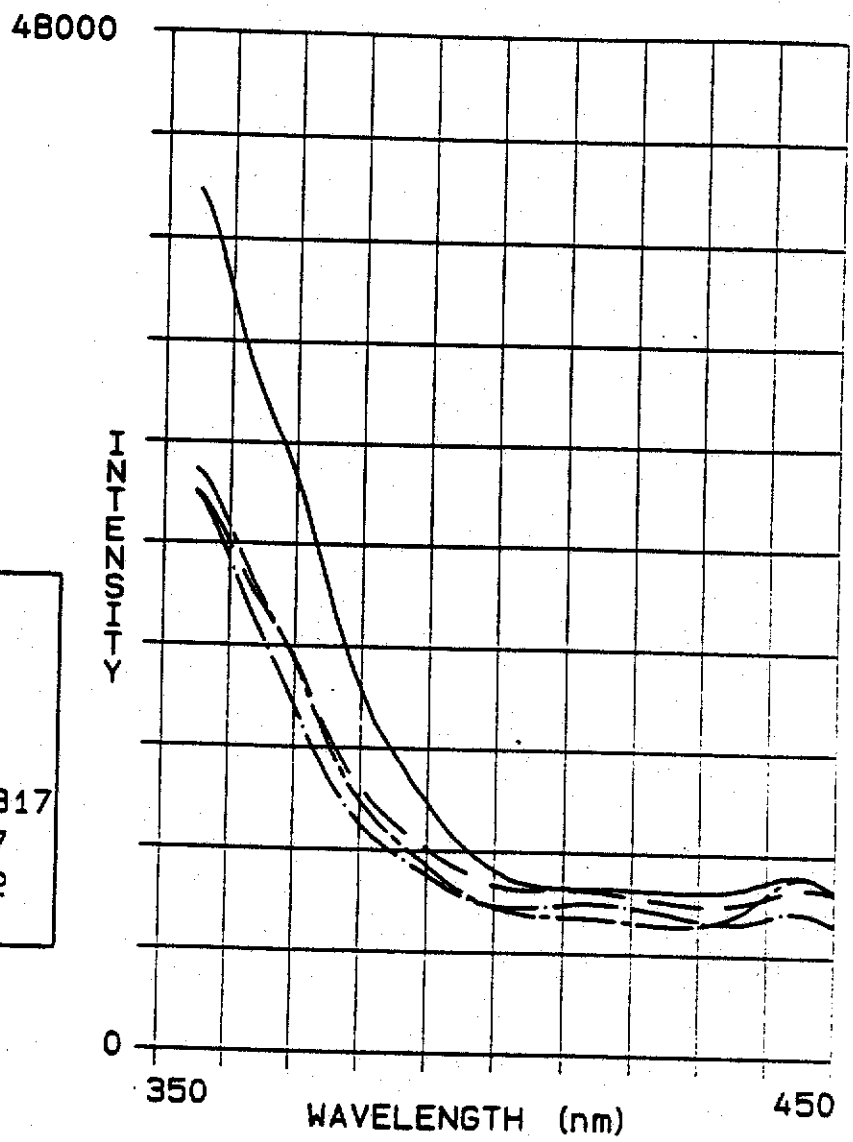
PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452



SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-25	08/18/95	BC	GJY	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: SP6306



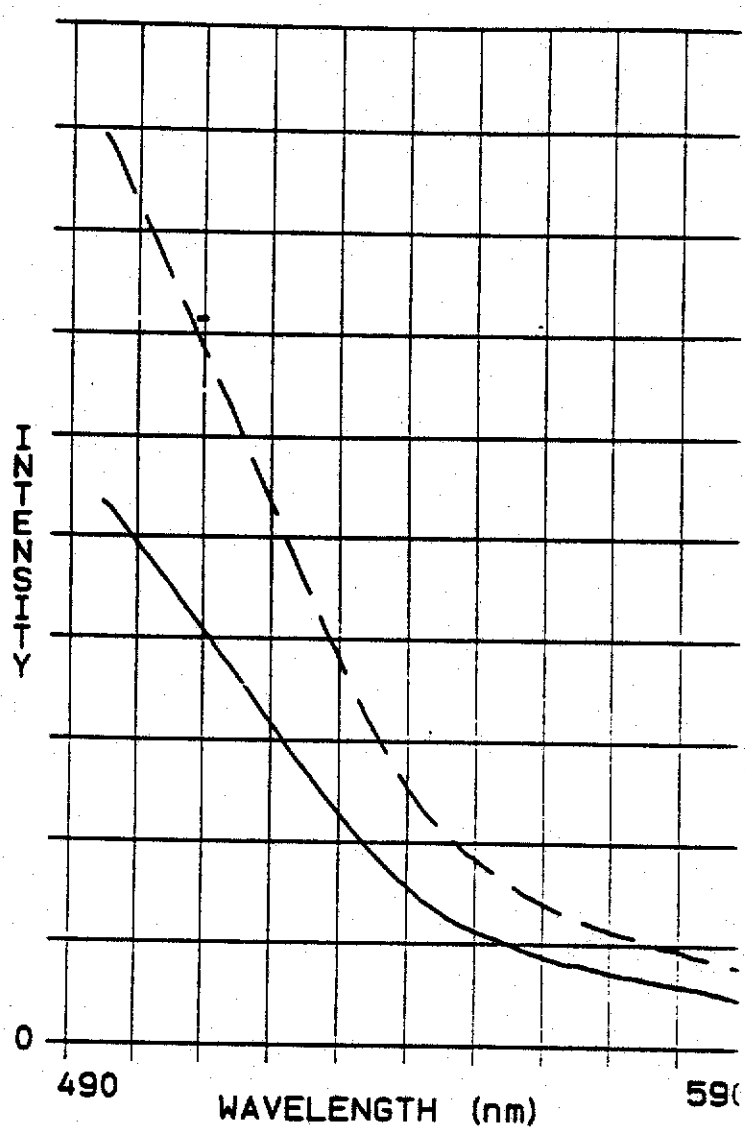
TE-26	———
TE-27	— —
TE-28	—·—
TE-30	—··—

PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-26	08/25/95	BC	GJY	0	0	0	0
REMARKS:							
TE-27	09/01/95	BC	DD	0	0	0	0
REMARKS:							
TE-28	09/08/95	BC	DD	0	0	0	0
REMARKS:							
TE-30	09/22/95	BC	DD	0	0	0	0
REMARKS:							
				0	0	0	0
ARKS:							

LOCATION: MW4013

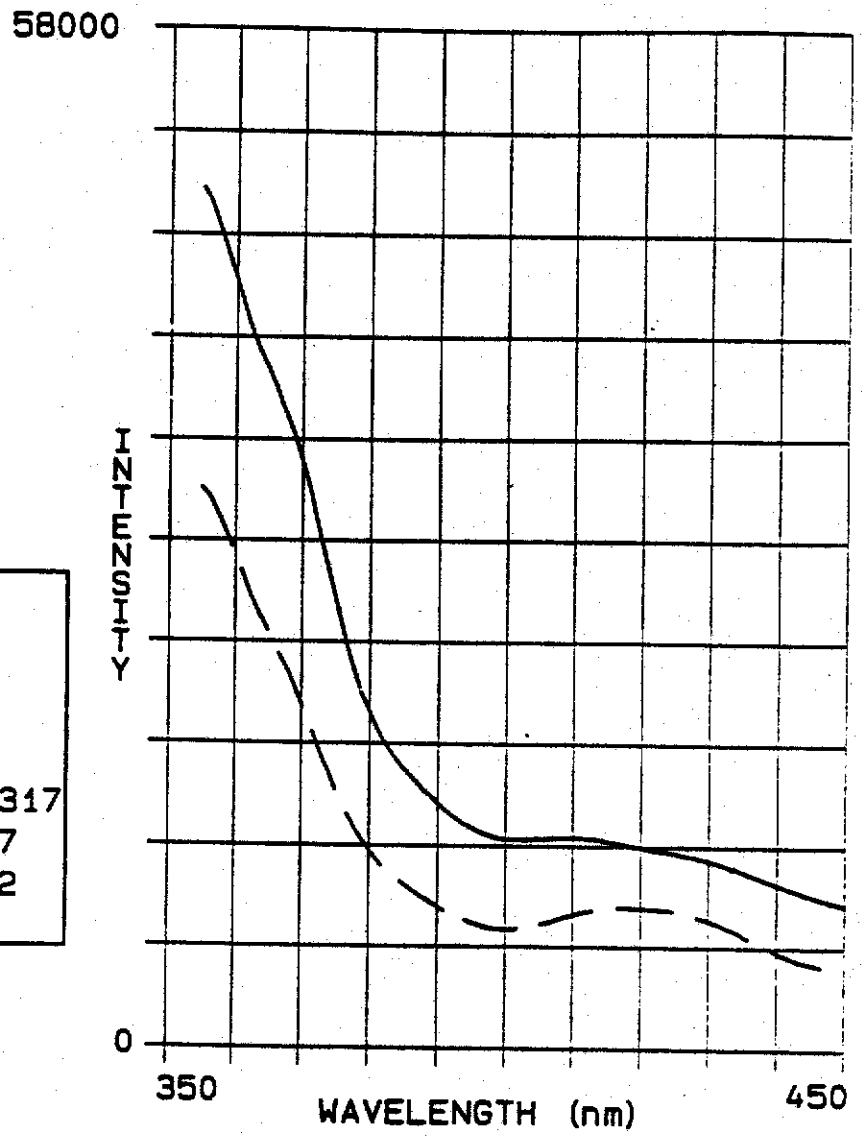


PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-18	07/28/95	BC	DD	0	0	0	0
REMARKS: MONITORING WELL							
FR-32	10/04/95	BC	DD	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: MW4013



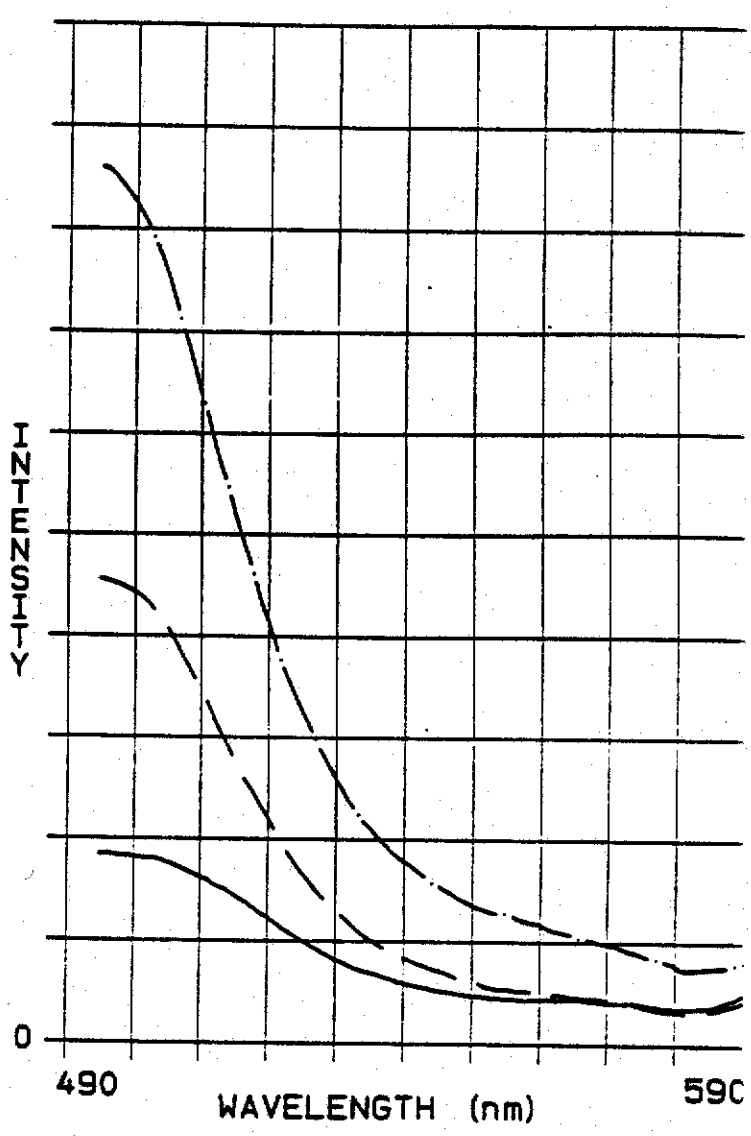
TE-18 ——
TE-32 — —

PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-18	07/28/95	BC	DD	0	0	0	0
REMARKS:							
TE-32	10/04/95	BC	DD	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: MW4014



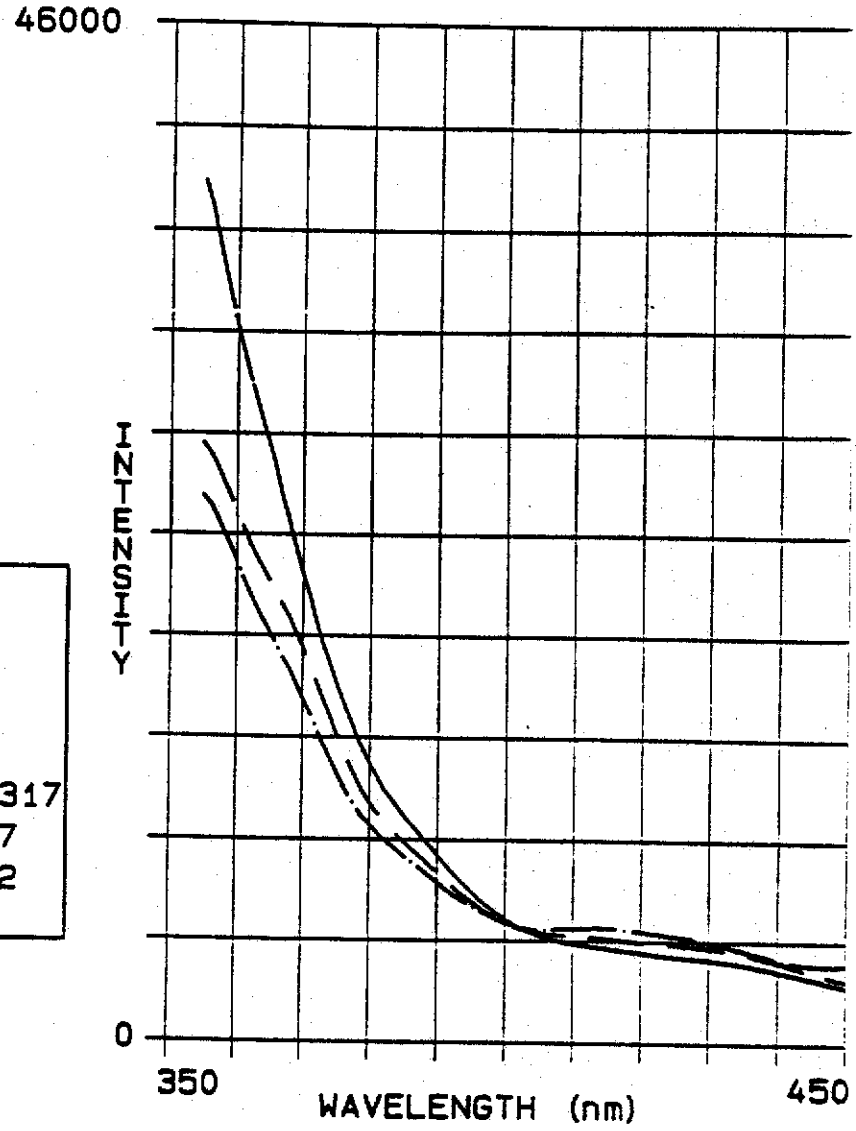
FR-4 ——————
FR-18 — — —
FR-32 ——·——

PARAMETERS

SCANNED FOR: FL-RWT
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 475
EXCITATION END WAVELENGTH: 575
EMISSION START WAVELENGTH: 492
EMISSION END WAVELENGTH: 592

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
FR-4	06/23/95	BC	DD	0	0	564	177
REMARKS: MONITORING WELL							
FR-18	07/28/95	BC	DD	0	0	0	0
REMARKS: MONITORING WELL							
FR-32	10/04/95	BC	DD	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: MW4014



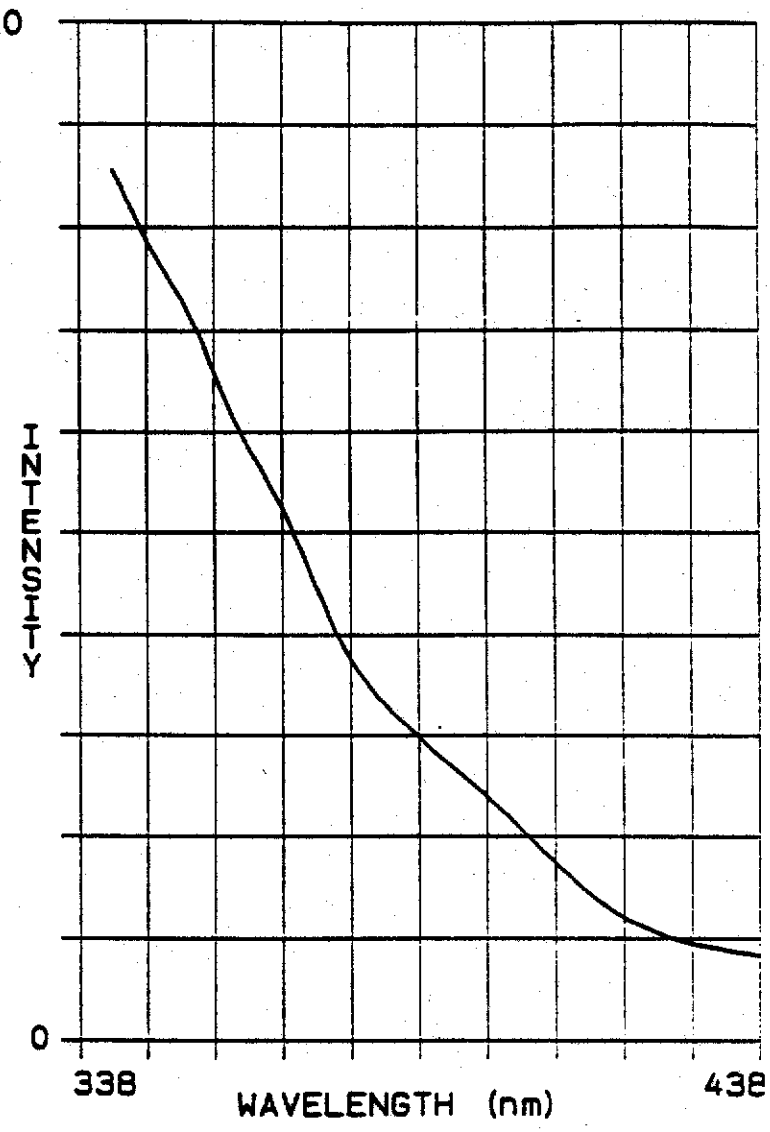
TE-4
TE-18
TE-32

PARAMETERS

SCANNED FOR: TE
SAMPLE TYPE: NH4OH
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 317
EXCITATION END WAVELENGTH: 417
EMISSION START WAVELENGTH: 352
EMISSION END WAVELENGTH: 452

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
TE-4	06/23/95	BC	DD	0	0	0	0
REMARKS:							
TE-18	07/28/95	BC	DD	0	0	0	0
REMARKS:							
TE-32	10/04/95	BC	DD	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							

LOCATION: MW4014



PYR-4 ——

PARAMETERS

SCANNED FOR: PYR
SAMPLE TYPE: CARBON
SCAN SPEED: 1
EXCITATION SLIT: 2
EMISSION SLIT: 3
EXCITATION START WAVELENGTH: 305
EXCITATION END WAVELENGTH: 405
EMISSION START WAVELENGTH: 340
EMISSION END WAVELENGTH: 440

SAMPLE	DATE COLLECTED	COLLECTED BY	TESTED BY	1st PEAK	INTENSITY	2nd PEAK	INTENSITY
PYR-4	06/23/95	BC	DD	0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							
				0	0	0	0
REMARKS:							