DRAFT FINAL

Phase III RFI/RI Report

Rocky Flats Plant
881 Hillside Area
(Operable Unit No. 1)

Volume VIII

Appendices B2 and B3
Hydrogeologic Data

U.S. Department of Energy
Rocky Flats Plant
Golden, Colorado

REVIEWED FOR CLASSIFICATION/UCNI
By
Date 11/4/92

October 1992

ADMIN RECORD

A-OU01-000446

Appendix B

Hydrogeologic Data

Phase III
RFI/RI Report

OU1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881
1 OU1 OU1
side 881 Hill
U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881

ADMIN RECORD

REVIEWED FOR CLASSIFICATION/UCNI
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Date 11/4/93

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APPENDIX B - LIST OF ACRONYMS AND ABBREVIATIONS

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ASTM	American Society for Testing and Materials
BGS	below ground surface
cm/sec	centimeters per second
ft/min	feet per minute
GW	ground water
(I)	development by injection methods
IHSS	Individual Hazardous Subtance Site
MW	monitoring well designation
N/A	not applicable
OU1	Operable Unit No. 1
(P)	bedrock boreholes in which packer tests were performed prior to well installation
psi	pounds per square inch
PVC	polyvinyl chloride
PZ	piezometer designation
RCRA	Resource Conservation and Recovery Act
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFP	Rocky Flats Plant
SOP	Standard Operating Procedure

Appendix B2

cm/sec	centimeter per second
C	concentration of bromide in extracted fluid
°C	degree Celsius
DOE	Department of Energy
EMD	Environmental Management Department
ft	feet or foot
ft/min	feet per minute
ft^{2}/min	square feet per min
ft^{3}/min	cubic feet per minute
gpm	gallons per minute
HDPE	high density polyethylene
I.D.	inside diameter
ISA	ionic strength adjuster
ISE	ion selective electrode
kW	kilowatt
mg/l	milligrams per liter

Appendix B2

ml	milliliter
O.D.	outside diameter
OU1	Operable Unit No. 1
pH	negative logarithm of hydrogen ion concentration
PPE	personal protective equipment
psi	pounds per square inch
PVC	polyvinyl chloride
Q	discharge rate
RCRA	Resource Conversation and Recovery Act
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFP	Rocky Flats Plant
rpm	revolutions per minute
SC	specific conductance
SOP	standard operating procedures
S_w	drawdown
µmhos/cm	micromhos per centimeter

Appendix B2
Attachments

Multiple-Well Test Data

Phase III
RFI/RI Report

ATTACHMENT B2-1
FIELD ACTIVITIES CHRONOLOGY

Day	Date	Time	Activity
T-W	11/05-06/91	-	Site reconnaissance of three planned multiple-well pumping and tracer test sites (Sites 1, 2, and 3).
Th	11/07/91	-	Drill borehole 38691/monitoring well 37 in Site 1 vicinity. Bedrock encountered at 6.5 feet, total depth of 10.2 feet; borehole is dry; borehole abandoned.
		-	Drill monitoring well 37 offset/borehole 38791 located 20 feet north of Borehole 38691. Bedrock encountered at 6.5 feet, total depth of 10.2 feet; borehole is dry; borehole abandoned.
W	11/13/91	-	Drill pilot hole 1/borehole 39091 for Site 1, located 98.7 feet east of borehole 30091/borehole 54. Borehole was offset twice due to auger refusal. Bedrock encountered at 6 feet, total depth of 8 feet. Approximate depth to water of 2.6 feet; borehole abandoned (11/14/91).
Sat	11/16/91	-	Drill pilot hole 2/borehole 39391 for Site 2. Bedrock encountered at 4.5 feet, total depth of 8 feet; borehole is dry; borehole abandoned.
T	11/26/91	-	Drill pilot hole 3/borehole 39791 for Site 3. Bedrock encountered at 4.5 feet, total depth of 8 feet; borehole is dry; borehole abandoned.
W	11/27/91	-	Install single wellpoint (39891) for single-well step-drawdown and tracer evaluation tests, located 29.3 feet east (approximately downgradient) of pilot hole 1/borehole 39091. Augered to an approximate depth of 5 feet, driven to an approximate depth of 6 feet. Approximate depth to water of 2 feet.
M	12/02/91	-	Development of wellpoint 39891. Wellpoint bailed dry after removal of approximately six well casing volumes (3 gallons).
T	12/03/91	-	Continue development of single wellpoint until parameters (i.e., pH, conductivity, and temperature) stabilize. Collect water quality sample (BH01010EBU1) after development complete.
		14:59	Start step-drawdown test.

Day	Date	Time	Activity
		16:13	Stop step-drawdown test, wellpoint is pumped dry during second step of test. Test conducted for an elapsed time of 74 minutes.
F	102/06/91	10:20	Start second step-drawdown with lower pumping rates than test of 12/03/91.
		16:15	Stop pumping; test consisted of eight steps for an elapsed time of 355 minutes. Monitoring well recovery.
		16:35	Stop data logger after well recovery.
Sat	12/07/91	-	Install wellpoints for multiple-well pumping and tracer tests. Nine wellpoints installed (Wellpoints E1 to E5, and O1 to O4).
Sun	12/08/91	-	Continue installation of wellpoints. Six wellpoints installed (wellpoints O5 and I1 to I5). All wellpoints were driven to an average depth of 6 feet.
M	12/09/91	-	Development of wellpoints in multiple-well array.
		-	Field preparation for single-well tracer test evaluation for distilled water.
T	12/10/91	-	Field preparation, continued.
		16:10	Began injection stage with distilled water.
		23:02	Finished injection stage; injected 30 gallons in 412 minutes.
		23:12	Began extraction stage.
W	12/11/91	09:20	Finished extraction stage; extracted 38 gallons in 583 minutes.
Th	12/12/91	-	Field preparation for single-well tracer test for potassium bromide solution.
F	12/13/91	-	Field preparation, continued.
		08:58	Began injection stage with bromide solution.
		15:55	Finished injection stage; injected 30 gallons in 407 minutes.

Day	Date	Time	Activity
		16:02	Began extraction stage.
Sat	12/14/91	04:22	Finished extraction stage; extracted 41 gallons in 633 minutes.
		-	Development of wellpoints in multiple-well array, continued.
Sun	12/15/91	-	Development of wellpoints, continued.
M	12/16/91	-	Completed development of wellpoints; field preparation for multiple-well constant-rate pumping test.
T	12/17/91	-	Field preparation, continued.
		12:00	Start multiple-well pumping test.
		16:56	Multiple-well pumping test discontinued after six successively higher pumping rates failed to induce measurable drawdown in the wellpoints.
W	12/18/91	12:46	Start multiple-well pumping test.
		20:46	Stopped pump after an elapsed time of 480 minutes, start monitoring recovery.
Th	12/19/91	11:36	Shut off data loggers and stopped monitoring recovery after an elapsed time of 890 minutes.
M	12/30/91	-	Measured water levels in wellpoint array.
Th	01/02/92	-	Measured water levels in wellpoint array.
M	01/06/92	-	Measured water levels in wellpoint array.
M	01/13/92	-	Measured water levels in wellpoint array.
Th	01/21/92	-	Field preparation for multiple-well tracer test.
W	01/22/92	-	Field preparation, continued.
Th	01/23/92	-	Field preparation, continued.
		09:50	Began establishing gradient; adjust electrodes.
		14:40	Gradient satisfactory, system stabilized.

Day	Date	Time	Activity
		15:05	RFP wide field operations halted due to high winds.
F	01/24/92	-	Field preparation, continued.
		08:46	Began establishing gradient; adjust electrodes.
		12:20	Made final adjustments.
		13:45	RFP-wide field operations halted due to high winds.
Sat	01/25/92	-	No activities attempted due to high winds.
Sun	01/26/92	-	No activities.
M	01/27/92	-	Field preparation, continued; thaw ice in tubing.
		10:30	Began establishing gradient; adjust electrodes.
		13:56	Made final adjustments.
		15:00	Began injecting bromide tracer solution.
T	01/28/92	00:04	Test stopped.
		-	Began dismantling tracer test equipment.
W	01/29/92	-	Finished dismantling and removing tracer test equipment.
		-	All wellpoints removed; boreholes grouted and abandoned.

ATTACHMENT B2-2
SINGLE-WELL TEST EQUIPMENT

WELL INSTALLATION

The following is a list of equipment and materials used for the single wellpoint installation:

- B-57 Mobile Drill (3.25-inch-I.D. hollow stem augers, 6.25-inch drill bit)
- 1.7 inch I.D. stainless steel wellpoints (two 5-foot screen lengths, 0.010-inch slot size)
- 1.5 inch I.D. carbon steel extension rod (5-foot length)
- Bell reducer
- Weighted tape measure
- Tape measure
- Solinst electronic water level meter (sufficiently accurate to measure water levels to the nearest 0.01 foot)
- Distilled water
- Plastic sheeting/scissors
- Clipboard/black permanent pens
- Copy of site map
- Field logbook/watch
- Copy of EMD SOPs
- Appropriate field form (Form GT.2A; Hollow-Stem Auger Drilling Field Activities Report)
- Appropriate health and safety instrumentation, equipment, and personal protective equipment (PPE)

WELL DEVELOPMENT AND SAMPLING

The following is a list of equipment and materials used for development and sampling of the single wellpoint:

Development:

- Teflon bottom filling bailer (1.25-inch O.D., 3 feet long)
- Portable pH meter (Orion Model 230A) with appropriate pH buffer solutions
- Portable conductivity meter (YSI Model 33 (12/02/91) or Hach Model 44600 (12/03/91)) with appropriate conductivity standard
- Solinst electronic water level meter (sufficiently accurate to measure water levels to the nearest 0.01 foot)
- Distilled water
- Plastic sheeting/scissors
- Nylon rope
- Borosilicate beakers
- Graduated flask
- Nalgene wash bottle filled with distilled water
- Paper towels
- Card table
- 55 gallon drum(s) for temporary containment of development water
- Clipboard/black permanent pens
- Field logbook/watch
- Copy of EMD SOPs
- Appropriate field forms (Forms GW.1A and GW.2A)
- Appropriate health and safety instrumentation, equipment, and PPE

Sampling:

In addition to the above, the following equipment was used for sampling:

- 5 kW generator/extension cord/gasoline/funnel
- Geotech variable speed peristaltic pump with Masterflex No. 16 pumphead, 60 to 350 rpm, appropriate lengths of tubing (silicone and nylon) and barb valves
- Appropriate sample bottles
- Sample cooler with sufficient blue ice to cool samples to 4°C
- Appropriate sample preservatives (nitric acid, sulfuric acid)
- Chain of custody forms
- Sample labels/custody seals
- Appropriate field form (Form GW.6B)

STEP-DRAWDOWN TEST

The following is a list of equipment and materials used for the single-well step-drawdown test:

- 5 kW generator/extension cords/gasoline/funnel
- Geotech variable speed peristaltic pump, Masterflex No. 16 pumphead, 60 to 350 rpm, with a minimum capacity of 0.03 gpm, with appropriate lengths of tubing (silicone and nylon), tubing weight, and barb valves
- Variable-area flow meter, 65 mm column, 0 to 267 ml/min range (0 to 0.071 gpm) and a graduated flask
- Hermit SE 2000 data logger (8 channel)
- 5 psi pressure transducer (accuracy of $\pm$ 0.14 inch) or 10 psi pressure transducer (accuracy of $\pm$ 0.28 inch) with cable, reel, and jumper cables
- Portable IBM compatible personal computer
- Solinst electronic water level meter (sufficiently accurate to measure water levels to the nearest 0.01 foot)
- Distilled water
- Plastic sheeting/scissors
- Card table
- 55-gallon drum(s) for temporary containment of pumping test water
- Calculator/clipboard/black permanent markers
- Field logbook/watch (readable to 1-second increments)
- Copy of EMD SOPs
- Appropriate field form (Aquifer Pumping Test Data Sheet)
- Appropriate health and safety instrumentation, equipment, and PPE

TRACER EVALUATION TEST
DISTILLED WATER TRACER

The following is a list of equipment and materials used for the single well tracer evaluation tests for distilled water.

- Distilled water
- 30-gallon HDPE tank with spigot
- Geotech variable speed peristaltic pump, with Masterflex no. 16 pumphead, 60 to 350 rpm
- Appropriate lengths and sizes of tubing (vinyl, silicone, polyethylene) and appropriately sized reducing unions, union elbows, and pipe adaptors
- Variable-area flowmeter, 65 mm column, 0 to 267 ml/min range
- Stopper, solid rubber, microstopper size, fastened into polyethylene tubing
- Flow-through conductivity cell, K = 1.0/cm, 30 ml volume (YSI model 3446)
- Conductivity meter, digital (YSI model 35)
- pH, temperature electrode with Orion model 250A meter (with automatic temperature compensation)
- pH, temperature electrode with Orion model 230A meter (with automatic temperature compensation)
- Conductivity, temperature electrode with Orion model 122 meter (with automatic temperature compensation)
- Beaker, 100 ml, polypropylene

General:

- 5kW generator/extension cord/gasoline/funnel
- Tape measure
- Hermit SE 2000 data logger (8 channel) 10 psi pressure transducer (accuracy of ± 0.28 inch) with cable, reel, and jumper cables

TRACER EVALUATION TEST
DISTILLED WATER TRACER

- Card table
- Plastic sheeting/scissors
- Calculator, clipboard/black permanent pens
- Field logbook/watch
- Copy of EMD SOPs
- Appropriate health and safety instrumentation, equipment, and PPE
- Solinst electronic water level meter (sufficiently accurate to measure water levels to nearest 0.01 foot)

TRACER EVALUATION TEST
BROMIDE TRACER

The following is a list of equipment and materials used for the single-well tracer evaluation test for bromide:

- Bromide solution
- 30-gallon HDPE tank with spigot
- Mixer, 500 to 1,000 rpm, 1/20 horsepower, 30-inch shaft, 2-inch diameter three-bladed propeller
- Geotech variable speed peristaltic pump, with Masterflex no. 16 pump head, 60 to 350 rpm
- Approprate lengths and sizes of tubing (vinyl, silicone and polyethylene) and appropriately sized reducing unions, pipe adaptors, and branch tee.
- Variable-area flow meter, 65 mm column, 0 to 267 ml/min range
- Stopper, solid rubber, microstopper size, fastened into polyethylene tubing
- Stopcock valve, PVC

General:

- 5kW generator/extension cord/gasoline/funnel
- Tape measure
- Hermit SE 2000 data logger (8 channel) 10 psi pressure transducer (accuracy of ± 0.28 inch) with cable, reel, and jumper cables
- Card table
- Plastic sheeting/scissors
- Calculator, clipboard/black permanent pens
- Field logbook/watch
- Copy of EMD SOPs

TRACER EVALUATION TEST
BROMIDE TRACER

- Appropriate health and safety instrumentation, equipment, and PPE
- Solinst electronic water level meter (sufficiently accurate to measure water levels to nearest 0.01 foot)

ATTACHMENT B2-3
SINGLE-WELL
FIELD DATA SHEETS

Appendix B2
Multiple-Well Test Data

WELL INSTALLATION

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — FORM GT.2A

HOLLOW-STEM AUGER DRILLING FIELD ACTIVITIES REPORT

PROJECT NUMBER: OU1

DATE: 11/27/91

PROJECT NAME: 881 HILLSIDE

BOREHOLE IDENTIFICATION: 39891 (Temporary drive point for pump/tracer tests)

WEATHER CONDITIONS: Partly cloudy, Cool ~40°F, slight Westerly breeze ~5-10mph

RIG TYPE: B-57/MOBILE DRILL

DRILLING COMPANY/DRILLER: BOYLES BROTHERS / R. Sharp

GEOLOGIST/ENGINEER: B. Bolivia - Geologist (Form filled out by S. Conderman)

CREW MEMBERS: J. Geist - Health & Safety, B Warner - Driller's Helper

WATER LEVEL/TIME: ~2.0' after drivepoint installation

TOTAL DEPTH: 6.0', Augured to 5.0' Drove pt. to 6.0'. Bottom of screen at ~5.5' from ground surface

DECONTAMINATION: Field

ENVIRONMENTAL MATERIALS TYPES, VOLUMES, AND DRUMS USED: No drums - natural formation materials filled annulus around drivepoint - No excess cuttings to be drummed

DIAMETER OF BORING: ~6" used 3¼" ID Hollow stem augers

TYPE AND SIZE OF AUGERS AND BIT: 3¼" ID Hollow stem augers ~6" O.D.

SAMPLING TYPES, DEPTHS: NONE

SEE RESULTS PILOT HOLE 1 (39091) for pump/tracer test array

HAMMER SIZE: 140lb

DEPTH TO BEDROCK: 6.0' see results pilot Hole 1 (39091)

END-OF-DAY STATUS: Installed drivepoint for pump/tracer test evaluation

CHRONOLOGICAL RECORD OF ACTIVITIES:
Augured to 5.0' Drove point to 6.0'
Bottom of screen 5.5'
1240 Begin driving drivept. 1249 stop driving screen bent after drive 1.25'
1255 Try driving pilot hole with 2.5" ID split spoon
1305 Hit rock @ 3.0' advanced to 3.25' hit rock
1335 Try driving pilot hole with 1.75" ID core drive sampler does not work
1345 Auger pilot hole with 6.0 O.D. HSA augers
Augured to 5.0', Drove pt 6.0'

COMMENTS: Located 30 ft downgradient (East) of PH-01 (39091)

Appendix B2
Multiple-Well Test Data

WELL DEVELOPMENT AND SAMPLING

U.S. DEPARTMENT OF E RGY ROCKY FLATS PLANT

Form GW.2A
Test Evaluation

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title S. Condran / Hydrogeologist

Well ID 39891

Survey location coordinates: North _____ East _____

Date this report 12/2/91 Date well installation 11/27/91 Date well development 12/2/91 + 12/3/91

Well designation: Temporary drivepoint (1.7" I.D.) for pump/tracer tests

Ground elevation: Est: _____ Survey: _____

Screened interval: (From Ground Surface) 0.80 to 5.8 (measured during development 12/2/91) Formation: Woman Crk. Valley Fill Alluvium

Measuring point (MP): Top of well casing/other: Ground surface Well stick up: 1.0'

Water level (below MP): Start: 1.80' End: Dry

Well depth (below MP): 5.70' Water elevation (depth) (BGS) 1.80' sc 12/2/91

Method used to measure water level: Electronic water level meter (Solinst Model 101) Estimated recharge rate: Not calculated! Not used to calculate well casing volume per SOP GW.2 sec. 5.2.1.1

Volume of saturated annulus (assume 30 percent porosity):

Volume Calculation: Well casing volume = $\pi r^2 h = \pi (0.0703')^2 3.9' = 0.06147 ft^3 \times \frac{7.48 gal}{ft^3} = 0.46 gal \approx 0.5 gal$

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 5.70' After: 5.74'

Development equipment: Teflon bailer 1¼" O.D. (used for development only)

Sampling equipment: Peristatic pump 350 rpm w/silicone tubing ~~Teflon bailer 1¼" O.D. (used for sampling only)~~ sc 12/2/91

pH meter No. S/N 001752 (Orion Model 230A) Calibration: pH 10.01 @ 4.00 @ 17.1°C pH 10.01 @ 10.10 @ 17.1°C Measured pH 7 = 7.0 @ 17.1°C sc 11/29/91

Specific conductance meter No.: S/N 15662 (YSI Model 33) Calibration: Not checked with standard 12/2/91

F.T.U. meter No.: N/A per SOP GW.2 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	* S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1541	<	—	7.30	4.11	*120	0	0	Brown, silty
1552	< .25	—	7.50	3.11	112	0.5	1	"
1557	"	—	7.51	4.11	140	1.0	2	"
1600	"	—	7.59	4.11	162	1.5	3	"
1604	"	—	7.66	4.11	180	2.0	4	"
1609	"	—	7.79	4.11	208	2.25	4½	Lt. Brown, less silty
1611	"	—	7.94	4.11	212	2.50	5	"
1625	" Well bailed dry after ~ 3 gallons removed							

Comments: Will let well recharge overnight and will continue development until pH within 0.2 units and S.C. within 10% for 3 consecutive readings

* Conductivity readings appear consistently low, calibration was checked 12/3/91 AM meter read 500 umhos with 1000 umhos standard, a new conductivity meter was used on 12/3/91

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title S. Condran / Hydrogeologist

Well ID 39891

Survey location coordinates: North _____ East _____

Date this report 12/3/91 Date well installation 11/27/91 Date well development 12/2/91 & 12/3/91

Well designation: Temporary drivepoint (1.7" I.D.) for pump/tracer tests

Ground elevation: Est: _____ Survey: _____

Screened interval: from ground surface 0.8 to 5.8 ~~0.71 to 5.71~~ SC 12/3/91 (measured during development 12/2/91) Formation: Woman Crk Alluvium

Measuring point (MP): Top of well casing/other: TOWC Well stick up: 1.0' Surveyed 0.95'

Water level (below MP): Start: 2.78' End: 5.46'

Well depth (below MP): 6.70' SC 12/3/91 Water ~~elevation~~ depth (BGS) 1.78' SC 12/3/91

Method used to measure water level: Electronic water level meter (Solinst Model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 sec. 5.2.1

Volume Calculation: Well casing volume = $\pi r^2 h = \pi (0.07083')^2 (3.6'^{1/2}) = 0.061' \times 7.48 \frac{gal}{ft} = 0.46 gal \sim 0.50 g$ SC 12/3/91

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 6.70' SC 12/3/91 After: Not Measured

Development equipment: Teflon bailer 1¼" O.D.

Sampling equipment: Peristaltic pump 350 rpm w/ Silicone tubing

pH meter No. Orion Model 230A S/N 001752 Calibration: pH 4.01 = 4.00 ~ 10.11 pH 10.01 = 10.18 ~ 10.11 measured 7.00 = 7.10 @ 10°C

Specific conductance meter No.: Hach Model 44600 ~~YSI Model 33~~ ~~SN 15062~~ SN 900704633 SC 12/3/91 Calibration: 959 umhos/cm with 1000 umhos std @ 25°C @ ~10°C

F.T.U. meter No.: N/A per SOP 2.08 Calibration: N/A

Time	Pumping Rate gpm	FTU	pH	Temp. °C	← S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
1209	<25	—	8.06	6.11	* 960	0.25	SC 12/3/91 ~~0~~ 5¼	slightly cloudy
1213	↓	—	7.95	6.11	960	0.50	6 ~~5¼~~ SC 12/3/91	Lt brown, cloudy
1217	↓	—	7.92	5.11	960	0.75	6½ ~~5¾~~ SC 12/3/91	"
1220	↓	—	7.81	5.11	1000	1.00	7	"
1224	↓	—	7.77	5.11	960	1.25	7½	"
1227	↓	—	7.73	5.11	960	1.50	8	"
Removed ~ 0.50 additional gallons no parameters collected								
Total of 10 volumes removed								

Comments: Bailing additional volumes until pH within 0.2 units, S.C. within 10% and temperature within 1.0°C for 3 consecutive ~~volumes~~ readings SC 12/3/91. See development record 12/2/91

* Used a new conductivity meter on 12/3/91 due to low readings obtained 12/2/91

Collected water quality sample after wellpoint development completed see sampling form

(4011-600-0022) (GW2REV.1)(09-10-91)

Test Evaluation

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS
MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT — Revision 1.2

Project No. OU1 881 HILLSIDE

Date/time 12/2/91 / 1515

Personnel 1. S. Gundran

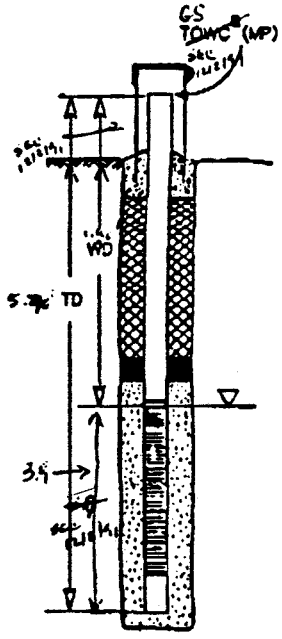
2. J. Geist

Model 101 100' LONG

EQUIPMENT: Manufacturer Solinst Model 10373 Serial No. _____

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. 39891	from ground surface WD[b] (ft)	from ground surface MTD[c] (ft)	Comments
Measurement 1	1.80	5.40	
Measurement 2	1.80	5.40	
Measurement 3	1.80	5.40	
	1.80	5.40	+ 0.30' = 5.70' SEC
	Average WD	Average MTD	Probe End[d] TD[e] Chk'd by

Well No.	WD[b]	MTD[c]	Comments
Measurement 1			
Measurement 2			
Measurement 3			
			+ ____ = ____ ____
	Average WD	Average MTD	Probe End[d] TD[e] Chk'd by

Well No.	WD[b]	MTD[c]	Comments
Measurement 1			
Measurement 2			
Measurement 3			
			+ ____ = ____ ____
	Average WD	Average MTD	Probe End[d] TD[e] Chk'd by

Footnotes:
A = TOWC = top of well casing SC 12/2/91
b = WD = depth to water from ~~MP~~ Ground Surface
c = MTD = measured total depth from ~~MP~~ Ground Surface
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from ~~MP~~ Ground Surface SC 12/2/91
GS = Ground surface

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

(4011-600-0022) (GW1-FORM.1A) (09-18-91) (4:18pm)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 Hillside

Date / TIME 12/3/91 / 1130

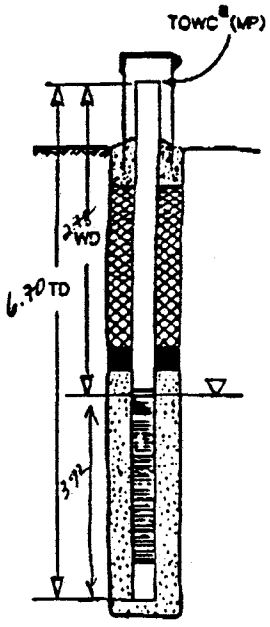
Personnel 1. S. Conlran

2. T. Sindelar

EQUIPMENT: Manufacturer Solinst Model Model 101 100' Long Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. 39891	TOWC WD[b] (Ft)	TOWC MTD[c] (Ft)	Comments
Measurement 1	2.78	6.40	
Measurement 2	2.78	6.40	
Measurement 3	2.78	6.40	
	2.78 Average WD	6.40 Average MTD	+ 0.30' = 6.70' SEC Probe End[d] TD[e] Chk'd by

Well No.	WD[b]	MTD[c]	Comments
Measurement 1			
Measurement 2			
Measurement 3			
	Average WD	Average MTD	+ ____ = ____ ____ Probe End[d] TD[e] Chk'd by

Well No.	WD[b]	MTD[c]	Comments
Measurement 1			
Measurement 2			
Measurement 3			
	Average WD	Average MTD	+ ____ = ____ ____ Probe End[d] TD[e] Chk'd by

Footnotes:
a = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

Form GW.6B

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS PLANT
GROUND WATER SAMPLE COLLECTION LOG

Page 1 of 2
Revision 1

BM 01010EBU1

Project Name: Quarterly Ground Water Sampling Sample Nos: ~~GW~~ IT (sc 12/3/91)
Project No.: 304902 . ___ . ___ . ___ Well I.D. 39891
COC/RFA/ No.: ___ Samples Collected By: S. Condran / T. Sindelar
COC/RFA No.: ___ Zone: ___
QC Review By/Date: ___ Dates Collected: 12/3/91

PURGE METHOD - TYPE USED: Peristaltic pump used for sampling w/silicone tubing

☐ PUMP ☐ PERISTALTIC ☐ OTHER ___

☒ BAILER ☒ TEFLON 1/4" O.D. ☐ OTHER ___

PURGING REQUIREMENTS & CALCULATIONS - Datum: Top of Well Casing (TOWC) PURGE DATE: 12/3/91

ID = Well Casing Inside Diameter (inches) = 1.7"
UV = Unit Casing Volume (gal/linear foot) = 0.118 gal/ft = π(.07083)² 7.48 gal/ft³
WD = Depth to Water (feet) = 2.78' (TOWC)
TD = Total Depth (feet) = Measured Total Depth (MTD)+Probe End 6.40 + 0.30 = 6.70'
IC = Initial Water Column (feet) = TD - WD = 6.70 - 2.78 = 3.92'
IV = Initial Water Volume (gallons) = UV x IC = 0.118 x 3.92' = 0.46 ~ 0.50 gal
SD = Depth to Top of Screen = 1.74 - 1/(sc 12/3/91) 11 = 0.74' (from ground surface)
Is WD less than SD - 2ft? (Y/N) N If Y, then:
AC = Adjusted Water Column(ft) = TD-SD = ___ - ___ = ___
AV = Adjusted Casing Volume(gal) = UVxAC = ___ x ___ = ___
If No, then 3 x IV = 3 x 0.50 = 1.5 gal

Checked by: ___

PURGED VOLUMES and RECHARGE

Volume Purged (GAL)	Temp (°C)	Conductance (mS/cm)	pH (SU)	DO (mg/L)	Nitrate (ppm)	Time (24-hour)	Turbidity (FTU)	Water Description (Color, Turbidity, Odor, Oil, etc.)
- SEE	WELL	DEVELOPMENT	FORM	12/3/91.				
ACCORDING	TO	TECH. MEMORANDUM	#4	A WATER	QUALITY	SAMPLE		
WAS COLLECTED	IMMEDIATELY	AFTER	COMPLETION	OF	WELL	DEVELOPMENT.		
- SAMPLE	WAS	ANALYZED	FOR	COMMON	ION	CHEMISTRY,	TOTAL	ORGANIC CARBON
AND	TOTAL	DISSOLVED	SOLIDS					

PURGE VOLUMES & RECHARGE

Actual purged volume (gallons) = ~1.5 gals (12/3/91) Purged dry? (Y/N) = N
90% of IC = 0.9 x IC(or AC) = 0.9 x 3.92 = 3.53
10 minute Water Level Recovery: Time Start: Recharge time not calculated Time Stop ___
ER = Estimated 30 minute recharge = (TD-10 minute WD) x3 = (___ - ___) x3 = ___

Depth to water prior to sampling 2.80' (TOWC) Time 1443 Date 12/3/91
Depth to water prior to sampling ___ Time ___ Date ___
Depth to water prior to sampling ___ Time ___ Date ___

Checked by: ___

1 2x to 912 [illegible]-7251

CONTRACTOR EBASCO SAMPLERS S. Condren PROJECT # OU1

SITE CONTACT/PHONE Dave Axtell (FAX 303-966-8025) LAB/LOCATION IT Corporation - Export, PA

C-O-C NUMBER EBU1-39891-02

fax 12-9-91

EG&G ROCKY FLATS PLANT CHAIN OF CUSTODY

Corrected COC

DATE/TIME	SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOIL(S) WATER (W)	FILTERED=F POT DISS=P	TURN AROUND RUSH=R	OUT OF SPEC REPORTS REQUIRED	PRESERVATIVE: COOLED TO 4 C Y/N	Zn(C2H3O2)2	NAOH	HNO3	H2SO4	Na2S2O3	Anions - as noted	ICP - CLP metals	Nitrate/nitrite	TDS
12/3/91 1517	BH01010 EBU1	4.5'	1 L plastic	1	W				X						X			
12/3/91 1504	BH01010 EBU1	"	"	1	W				X			X				X		
12/3/91 1510	BH01010 EBU1	"	"	1	W				X				X				X	
12/3/91 1527	BH01010 EBU1	"	1 L amber	1	W				X									X

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
[signature]	12-9-91	1350			

REMARKS Anions - HCO_3^-, $SO_4^=$, F^-, Cl^-, Br^- Metals must include Na, Ca, Fe, Si, Al, K, Mg, Mn

SHIPMENT METHOD FAX

LABORATORY USE ONLY	Y / N
PCKG REC'D/CUSTODY SEALS INTACT	
SAMPLE LABELS/COCs AGREE	
TEMPERATURE WITHIN SPECIFICATION ____ C	
CORRECTED COPY ATTACHED	
OTHER PROBLEMS OR DISCREPANCIES	

CONTRACTOR KBASCO SAMPLERS S. Condron PROJECT # OU1

SITE CONTACT/PHONE Dave Axtell (Fax 303-966-8025) LAB/LOCATION IT Corporation - Export, PA

C-O-C NUMBER EBU1- 39891 -02

EG&G ROCKY FLATS, CHAIN OF CUSTODY

METALS and VOAs

DATE/TIME	SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOIL(S) WATER (W)	FILTERED-F POT DISS-P	TURN AROUND RUSH -R	OUT OF SPEC REPORTS	PRESERVATIVE: COOLED TO 4 C	HCl	NAOH	HNO3	H2SO4	BOTTLE CODES: ANIONS*	ICP METALS	NITRATE	TOTAL DISSOLVED SOLIDS
12/3/91 1517	BH01010EBU1	4.5'	1l. plastic	1	W				X					X			
12/3/91 1504	BH01010EBU1	4.5'	1l plastic	1	W				X			X			X		
12/3/91 1510	BH01010EBU1	4.5'	1l plastic	1	W				X				X			X	
12/3/91 1527	BH01010EBU1	4.5'	1l amber	1	W				X								X

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
Sarah Condron	12/3/91 1545	Conrad J. Biernicki	12-03-91 1545
Conrad J. Biernicki	12-03-91 1600	Ed Cottell	12-03-91 1600
Ed Cottell	12-5-91 1700		

REMARKS * Anions - HCO_3^-, $SO_4^{=}$, F^-, Cl^-, Br^-

SHIPMENT METHOD

LABORATORY USE ONLY	Y	N
PCKG RECD/CUSTODY SEALS INTACT		
SAMPLE LABELS/COCs AGREE		
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

CONTRACTOR EBASCO SAMPLERS S. CONDRAN PROJECT # OU1

SITE CONTACT/PHONE Dave Axtell (Fax 303-966-8025) LAB/LOCATION ACCU LABS - Arvada, CO

C-O-C NUMBER EBU1- 39891 -09

G&G ROCKY FLATS, CHAIN OF CUSTODY

EG&G ROCKY FLATS, CHAIN OF CUSTODY

TOTAL ORGANIC CARBON

DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOILS WATER (W)	FILTERED-F BOT DISS-P	TURN AROUND RUSH-R	OUT OF SPEC REPORTS	COOLED TO 4C	HCl	NAOH	HNO3	H2SO4	Total Organic Carbon
12/3/91	1513	BH01010EBU1	4.5'	40ml vial	2	W				X					X

BOTTLE CODES

PRESERVATIVE

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
Sarah Condran	12/3/91	1545	Conrad J. Biernilis	12-03-91	1545
Conrad J. Biernilis	12-03-91	1600	[illegible] Axtell	12-03-91	16⁰⁰

REMARKS

LABORATORY USE ONLY	Y	N
PCKG REC'D/CUSTODY SEALS INTACT		
SAMPLE LABELS/COCs AGREE		
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

SHIPMENT METHOD

CONTRACTOR KBASCO SAMPLERS S. Condran PROJECT # OU1

SITE CONTACT/PHONE Dave Axtell (Fax 303-966-8025) LAB/LOCATION ITAS - Richland, WA

C-O-C NUMBER KBU1-39891-01

EG&G ROCKY FLATS, CHAIN OF CUSTODY

RADIATION SCREENS

DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOIL(S) WATER (W)	FILTERED=F POT DISS=P	TURN AROUND RUSH =R	OUT OF SPEC REPORTS	PRESERVATIVE HCl	PRESERVATIVE HNO3				BOTTLE CODES	GROSS ALPHA / BETA	Pu 239/240 AM241	U 233/234,235,238	Sr89/90 Cs137 (1)	Th230/232,CM244,NP237	DISS GROSS ALPHA/BETA	DISS Pu 239/240 Am 241	DISS U233/234,235,238	DISS Sr 89/90 Cs 137 (1)	DISS Th230/2 CM244 NP237	TRITIUM (H3)	RAD SCREEN
															R A	R B	R C	R D	R F	R A	R B	R C	R D	R F	R G	R H
12/3/91	1527	BH01010EBU1	4.5'	120 ml	1	C														*	*	*	*	*		X

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
Samuel G. Condran	12/3/91	1545	Conrad J. Biemiller	12-03-91	1545
Conrad J. Biemiller	12-03-91	1600	D F Axtell	12-03-91	16⁰⁰
D F Axtell	12-3-91	17⁰⁰			

REMARKS * INDICATES FILTERED SAMPLE
(1) - Cs 134 WHEN BY GAMMA

SHIPMENT METHOD

LABORATORY USE ONLY	Y	N
PCKG REC'D/CUSTODY SEALS INTACT		
SAMPLE LABELS/COCs AGREE		
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

INTERNATIONAL TECHNOLOGY CORPORATION

Sample Screening Release Form

Matrix Water

EBU1-39891-01
COC# IT-RE-00092

SDG# 1840

Batch# N/A

Client ID	IT #	Total Activity in µCi		
		Alpha	Beta	Other*
FT00175REU2	11206001	<.01	<.1	
FT00176REU2	11206002	↓	↓	
FT00177REU2	11206003	↓	↓	
BH01010EBU1	11206004	↓	↓	

Below Category I Release Limits ✓ yes _____ no
If no specifiy the samples above Category I **

Precautions: _____

Approval for Release Matt Long Date 12-4-91

(1) Sample Screening form (RD2802 Appendix A) and calculated results must accompany this form.
* Other analysis may include Tritium, etc.
** Only Category I samples can be transferred to other IT Laboratories.

Form RC-001 11/90 Rev 0

Appendix B2
Multiple-Well Test Data

STEP-DRAWDOWN TEST

AQUIFER PUMPING TEST DATA SHEET

SINGLE WELL STEP-DRAWDOWN PUMPING TEST

DATE 12\03\91 PERSON RECORDING DATA S Conoran

WELL # 39891 Pump/Tracer Test Evaluation Wellpoint

HYDROSTRATIGRAPHIC UNIT Woman Creek Valley Fill Alluvium

SCREENED INTERVAL 0.8 ft to 5.8 ft (from ground surf.)
SC 12/3/91

STATIC WATER LEVEL 2.8 (TOC) ft PUMPING WELL I.D. 1.7 in

DISTANCE TO PUMPING WELL 0 ft

TEST START TIME 14 : 59 : 00

ELAPSED TIME (Units) (min)	STEP	WATER LEVEL (Units) (ft TOC)	DIFFST. (ft)	Q (pumping well) (Units) (ml/sec)	Q (GPM)
0	1st Pumping Rate	2.80	0	100ml/25sec	0
2				↓	0.063
5		2.88	0.08	~~100ml/24.3sec~~ 100ml/24.6sec	0.065
13		3.42	0.62	100ml/23sec	0.069
				100ml/22.9sec	
17		3.72	0.92		

.
.
.

etc.

AQUIFER PUMPING TEST DATA SHEET

DATE 12\03\91 PERSON RECORDING DATA S. CONDRAN

WELL # 39891

HYDROSTRATIGRAPHIC UNIT _____

SCREENED INTERVAL _____ft to _____ft

STATIC WATER LEVEL _____ft PUMPING WELL I.D. _____in

DISTANCE TO PUMPING WELL _____ft

TEST START TIME _____:_____:_____

SEE PAGE 1

ELAPSED TIME (Units)(min)	WATER LEVEL (Units) ft (TOC)	DIFF ST. (ft)	Q (pumping well) (Units)(ml/sec)	Q (gpm)
22			100/22.7	0.066
			100/23.7	
			100/24.2	
26	3.95	1.15		
29	4.11	1.31	100/23.3	0.067
			100/23.9	
32	4.23	1.43 SC 12/3/91	100/22.6	0.069
			" / 23.2	
			" / 22.7	
etc. 37	4.46	1.66	" / 22.8	0.070
			" / 22.6	
			" / 22.8	
45	4.76	1.96	" / 24.4	0.067
			" / 23.3	
			" / 23.3	

AQUIFER PUMPING TEST DATA SHEET

Page 3 of 3

DATE 12\03\91 PERSON RECORDING DATA S. CONDRAN

WELL # 39891

HYDROSTRATIGRAPHIC UNIT _____

SCREENED INTERVAL _____ft to _____ft

STATIC WATER LEVEL _____ft PUMPING WELL I.D. _____in

DISTANCE TO PUMPING WELL _____ft

TEST START TIME _____:_____:_____

SEE PAGE 2

ELAPSED TIME (Units) (min)		WATER LEVEL (Units) ft (TOC)	DIFF ST. (ft)	Q (pumping well) (Units) (ml/sec)	Q (gpm)
50		5.09	2.29	100/23.8	0.066
				" / 24.8	
				" / 24.8 @ 12/3/91	
55		5.24	2.44	" / 25.1	0.062
				" / 26.2	
				" / 24.9	
59		5.34	2.54		
60	2nd pumping rate	5.40	2.60	" / 20	0.050
				" / 19.6	
				" / 19.7	
etc. 65	Pump is pumping air	5.90	3.10	" / 27.0	0.057
				" / 28.3	
				" / 28.3	
70		5.90	3.10	" / 28.8	0.057
				" / 27.4	
74	TEST END WELL IS DRY			" / 27.2	AVG. 0.046
	NEED TO RUN ANOTHER STEP-DRAWDOWN TEST AT LOWER PUMPING RATES				

(4011)XAQTEST(10/29/91)

Page 1 of 5

AQUIFER PUMPING TEST DATA SHEET

SINGLE WELL STEP-DRAWDOWN PUMPING TEST

DATE 12 \ 06 \ 91 PERSON RECORDING DATA S. CONDRAN

WELL # 39891 PUMP/TRACER TEST EVALUATION WELLPOINT

HYDROSTRATIGRAPHIC UNIT Woman Crk. Valley Fill Alluvium

SCREENED INTERVAL 0.8 ft to 5.8 ft (from Ground Surf.) SC 12/6/91

STATIC WATER LEVEL ~~2.5~~ 2.78 (TOC) ft SC 12/6/91 PUMPING WELL I.D. ~~390~~ 1.7 in SC 12/6/91

DISTANCE TO PUMPING WELL SAME ft

TEST START TIME 10 : 20 : 00

ELAPSED TIME ~~(Units)~~ Minutes SC 12/6/91	STEP	WATER LEVEL ~~(Units)~~ (ft) (TOC) SC 12/6/91	DIFF. (ft)	Q (pumping well) ~~(Units)~~ (ml/~~min~~ sec) SC 12/6/91 Graduated cylinder	Flowmeter (gpm)	Q (pumping well) (gal/min) Graduated cylinder
0	1 = STEP 0 on HERMIT DATALOGGER	2.78	0	0		0
1		2.80	0.02			~~0.032~~ SC 12/6/91
2 ½ SC 12/6/91		2.8~~85~~ 2 SC 12/6/91	0.02	100 ml/48 sec		0.033
3		2.885	0.025	100 ml/49.3		0.032
3.5		2.81	0.030			
4		2.81	0.030	100/49.3 SC 12/6/91		0.032
5		2.81	0.030	100/49.8	0.030	0.032
10		2.825	0.045	100/50.3		0.031
13		2.835	0.055	100/47.6		0.033
15		2.84	0.060	100/46.8		0.034
20		2.84	0.060	100/47.9	0.030	0.033
SIC 25		2.845	0.065	100/47.2	0.030	0.034
30		2.85	0.07	100/47.3	0.031	0.034
35		2.85	0.07	100/46.2	0.031	0.034
40				100/45.7	0.031	0.035
45						

Page 2

AQUIFER PUMPING TEST DATA SHEET

SINGLE WELL STEP DRAWDOWN PUMPING TEST

DATE 12 \ 6 \ 91 PERSON RECORDING DATA S. CONDRAN

WELL # 39891

HYDROSTRATIGRAPHIC UNIT Woman Creek Valley Fill Alluvium

SCREENED INTERVAL 0.7 ft to 5.7 ft

STATIC WATER LEVEL _____ ft PUMPING WELL I.D. _____ in

DISTANCE TO PUMPING WELL _____ ft

TEST START TIME ____:____:____

SEE HEADER INFO. from Page 1

ELAPSED TIME (Units) (minutes)	STEP	WATER LEVEL (Units) (ft)(TOC)	DIFF. (ft)	Q (pumping well) (Units) (ml/min) Graduated cylinder	Flow meter (gpm)	Q (pumping well) (gal/min) Graduated cylinder
50	1st STEP 0 on [illegible]	2.85	0.07	100/44.5	0.034	0.036
55		2.85	0.07	100/45.4	0.034	0.035
60		2.85	0.07	100/44.7	0.034	0.035
65		2.85	0.07	100/45.0	0.034	0.035
70		2.85	0.07	100/44.3	0.034	0.036
75		2.85	0.07	100/43.6	0.0345	0.036
80	STEP 2nd STEP 1 on [illegible]	2.85	0.07	100/35.8	0.041	0.044
82		2.855	0.075	100/35.1	0.0415	0.095
85		2.855	0.075	100/35.8	0.0415	0.044
etc. 90		2.86	0.08	100/36.0	0.0415	0.044
95		2.86	0.08	100/35.8	0.041	0.044
100		2.86	0.08	100/35.0	0.041	0.045
105		2.865	0.085	100/34.8	0.042	0.046
110		2.86	0.08	100/34.9	0.042	0.045

AQUIFER PUMPING TEST DATA SHEET

SINGLE WELL STEP DRAWDOWN PUMPING TEST

DATE 12\6\91 PERSON RECORDING DATA S. Condran

WELL # 39891

HYDROSTRATIGRAPHIC UNIT Women Creek Valley Fill Alluvium

SCREENED INTERVAL _____ft to _____ft

STATIC WATER LEVEL _____ft PUMPING WELL I.D. _____in

DISTANCE TO PUMPING WELL _____ft

TEST START TIME ____:____:____

SEE HEADER INFO. FROM PAGE 1

ELAPSED TIME (Units) (Minutes)	STEP	WATER LEVEL (Units) (ft)(toc)	DIFF. (ft)	Q (pumping well) (Units)(ml/sec) Graduated cylinder	Q Flowmeter (gpm)	Q (pumping well) (gpm) Graduated cylinder
115	2	2.87	0.09	100/34.6	0.042	0.046
120		2.87	0.09	100/34.1	0.042	0.046
125		2.87	0.09	100/32.6	0.047	0.047
130		2.875	0.095	100/33.9	0.043	0.047
135		2.87	0.09	100/33.7	0.043	0.047
143		2.87	0.09	100/34.7	0.042	0.046
145		2.87	0.09	100/34.3	0.042	0.046
150		2.87	0.09	100/34.2	0.042	0.046
155		2.87	0.09	100/34.5	0.042	0.046
160	3	2.87	0.09	100/27.9	0.053	0.057
etc. 165		2.88	0.10	100/28.0	0.053	0.057
170		2.89	0.11	100/27.7	0.053	0.057
177		2.895	0.115	100/27.6	0.053	0.057
182		2.90	0.12	100/27.6	0.053	0.057
185		2.895	0.115	100/27.6	0.053	0.057
190	4	2.90	0.12	100/27.6	0.060	0.064
191		2.905	0.125	100/ 12/6/91		12/6/91
195		2.92	0.14	100/	0.061	0.065

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AQUIFER PUMPING TEST DATA SHEET

SINGLE WELL STEP DRAWDOWN PUMPING TEST

DATE 12 \ 6 \ 91 PERSON RECORDING DATA Sarah Condran

WELL # 39891

HYDROSTRATIGRAPHIC UNIT Woman Crk. Valley Fill Alluvium

SCREENED INTERVAL 0.7 ft to 5.7 ft

STATIC WATER LEVEL _____ ft PUMPING WELL I.D. _____ in

DISTANCE TO PUMPING WELL _____ ft

SEE INFO. PAGE 1

TEST START TIME ____:____:____

ELAPSED TIME (Units) (minutes)	STEP	WATER LEVEL (Units) (ft)(Toc)	Diff. (ft)	Graduated cylinder Q (pumping well) (Units) (ml/sec)	Q flowmeter (gpm)	Graduated cylinder Q (gpm)
200	4	2.955	0.175	100/24.4	0.061	0.065
205		2.96	0.18	100/24.5	0.061	0.065
210		2.96	0.18	100/24.6	0.060	0.064
215		2.95	0.17	100/24.4	0.061	0.065
220		2.96	0.18	100/24.5	0.060	0.065
225	SC 12/6/91 5	2.95	0.17	100/24.~~4~~2 SC 12/6/91	0.061	0.085 SC 12/6/91
230	STEP 5	3.05	0.27	100/19.0	not within range	0.083
235		3.17	0.39	100/19.4	"	0.082 SC 12/6/91
240		3.20	0.42	100/19.4	"	0.082 SC 12/6/91
etc. 245		3.20	0.42	100/19.3	"	0.082
250		3.20	0.42	100/19.1	"	0.083
255		3.21	0.43	100/19.1	"	0.083
260		3.2~~3~~2 SC 12/6/91	0.4~~5~~4 SC 12/6/91	100/19.1	"	0.083
265		3.21	0.43	100/19.2	"	0.083
270		3.21	0.43	100/19.2	"	0.083
275		3.20	0.42	100/19.1	"	0.083
280	STEP 6	3.21	0.43	100/19.4	"	0.097
281		3.35	0.57			

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AQUIFER PUMPING TEST DATA SHEET

SINGLE WELL STEP DRAWDOWN PUMPING TEST

DATE 12 \ 06 \ 91 PERSON RECORDING DATA S. CONORAN

WELL # 39291 PUMP/TRACER TEST EVALUATION WELLPOINT

HYDROSTRATIGRAPHIC UNIT WOMAN CREEK VALLEY FILL ALLUVIUM

SCREENED INTERVAL 0.7 ft to 5.7 ft

STATIC WATER LEVEL _____ft PUMPING WELL I.D. _____in

DISTANCE TO PUMPING WELL _____ft

TEST START TIME _____:_____:_____

SEE HEADER INFO FROM PAGE 1

ELAPSED TIME (Units) (MINUTES)	STEP	WATER LEVEL (Units) ft (TOC)	DIFF. (ft)	Q (pumping well) (Units) (gal/sec) Graduated cylinder	Flow Meter (gpm)	Graduated Cylinder (gpm)
					OUT OF RANGE	
285	6	3.40	0.62	100/16.5	"	0.096
290		3.42	0.64	100/16.8 at 12/6/91	"	0.094
295		3.42	0.64	100/16.85	"	0.097
300		3.42	0.64	100/16.8	"	0.094
305		3.42	0.64	100/16.4	"	0.097
310	7	3.46	0.68	100/15.1	"	0.10
315		3.53	0.77	100/15.2	"	0.10
320		3.57	0.79	100/15.2	"	0.10
325		3.595	0.815	100/15.2	"	0.10
330		3.59	0.81	100/14.7	"	0.11
etc. 335		3.60	0.82	100/15.1	"	0.10
340	8	3.60	0.82	100/14.8	"	0.11
345		3.605	0.825	100/14.9	"	0.11
350		3.605	0.825	100/15.1	"	0.10
355	SHUT OFF PUMP WILL MONITOR RECOVERY	2.90				

ATTACHMENT B2-4
SINGLE-WELL
TIME-DRAWDOWN MEASUREMENTS

Table 1. Step-Drawdown Test December 3, 1991

Step	Time	Elapsed Time(min)	Step Time(min)	Drawdown (ft)	Discharge (gpm)
1	14:59	0.0000	0.0000	-0.009	
		0.0083	0.0083	0.019	
		0.0166	0.0166	0.006	
		0.0250	0.0250	0.000	
		0.0333	0.0333	0.019	
		0.0416	0.0416	0.019	
		0.0500	0.0500	0.003	
		0.0583	0.0583	-0.006	
		0.0666	0.0666	0.019	
		0.0750	0.0750	0.025	
		0.0833	0.0833	0.003	
		0.1000	0.1000	0.019	
		0.1166	0.1166	0.009	
		0.1333	0.1333	0.000	
		0.1500	0.1500	0.012	
		0.1666	0.1666	0.015	
		0.1833	0.1833	0.015	
		0.2000	0.2000	0.000	
		0.2166	0.2166	0.022	
		0.2333	0.2333	0.031	
		0.2500	0.2500	0.006	
		0.2666	0.2666	0.022	
		0.2833	0.2833	0.022	
		0.3000	0.3000	0.000	
		0.3166	0.3166	0.019	
		0.3333	0.3333	0.003	
		0.4166	0.4166	0.019	
		0.5000	0.5000	0.000	
		0.5833	0.5833	0.019	
		0.6666	0.6666	0.025	
		0.7500	0.7500	0.009	
		0.8333	0.8333	0.028	
		0.9166	0.9166	0.028	
		1.0000	1.0000	0.019	
		1.0833	1.0833	0.028	

File: 1203STP1.WQ1

Table 1. Step-Drawdown Test December 3, 1991

Step	Time	Elapsed Time(min)	Step Time(min)	Drawdown (ft)	Discharge (gpm)
		1.1666	1.1666	0.028	
		1.2500	1.2500	0.019	
		1.3333	1.3333	0.025	
		1.4166	1.4166	0.041	
		1.5000	1.5000	0.009	
		1.5833	1.5833	0.015	
		1.6666	1.6666	0.044	
		1.7500	1.7500	0.028	
		1.8333	1.8333	0.047	
		1.9166	1.9166	0.047	
		2.0	2.0	0.053	0.063
		2.5	2.5	0.047	
		3.0	3.0	0.057	
		3.5	3.5	0.057	
		4.0	4.0	0.066	
		4.5	4.5	0.069	
		5.0	5.0	0.063	0.065
		5.5	5.5	0.082	
		6.0	6.0	0.076	
		6.5	6.5	0.079	
		7.0	7.0	0.117	
		7.5	7.5	0.164	
		8.0	8.0	0.224	
		8.5	8.5	0.291	
		9.0	9.0	0.348	
		9.5	9.5	0.380	
		10.0	10.0	0.421	
		11.0	11.0	0.484	
		12.0	12.0	0.570	
		13.0	13.0	0.611	0.069
		14.0	14.0	0.687	
		15.0	15.0	0.750	
		16.0	16.0	0.813	
		17.0	17.0	0.870	
		18.0	18.0	0.921	

File: 1203STP1.WQ1

Table 1. Step-Drawdown Test December 3, 1991

Step	Time	Elapsed Time(min)	Step Time(min)	Drawdown (ft)	Discharge (gpm)
		19.0	19.0	0.965	
		20.0	20.0	0.997	
		21.0	21.0	1.057	
		22.0	22.0	1.079	0.066
		23.0	23.0	1.130	
		24.0	24.0	1.155	
		25.0	25.0	1.197	
		26.0	26.0	1.212	
		27.0	27.0	1.231	
		28.0	28.0	1.273	
		29.0	29.0	1.304	0.067
		30.0	30.0	1.333	
		31.0	31.0	1.380	
		32.0	32.0	1.415	0.069
		33.0	33.0	1.431	
		34.0	34.0	1.491	
		35.0	35.0	1.535	
		36.0	36.0	1.583	
		37.0	37.0	1.618	0.07
		38.0	38.0	1.672	
		39.0	39.0	1.725	
		40.0	40.0	1.773	
		41.0	41.0	1.811	
		42.0	42.0	1.865	
		43.0	43.0	1.915	
		44.0	44.0	1.966	
		45.0	45.0	2.014	0.067
		46.0	46.0	2.067	
		47.0	47.0	2.112	
		48.0	48.0	2.162	
		49.0	49.0	2.207	
		50.0	50.0	2.251	0.066
		51.0	51.0	2.292	
		52.0	52.0	2.340	
		53.0	53.0	2.368	

File: 1203STP1.WQ1

Table 1. Step-Drawdown Test December 3, 1991

Step	Time	Elapsed Time(min)	Step Time(min)	Drawdown (ft)	Discharge (gpm)
		54.0	54.0	2.403	
		55.0	55.0	2.435	0.062
		56.0	56.0	2.476	
		57.0	57.0	2.504	
		58.0	58.0	2.530	
		59.0	59.0	2.561	
2	15:59	60.0	60.0	2.580	0.08
		61.0	61.0	2.742	
		62.0	62.0	2.897	
		63.0	63.0	3.052	
		64.0	64.0	3.103	
		65.0	65.0	3.103	pumping
		66.0	66.0	3.106	air
		67.0	67.0	3.106	
		68.0	68.0	3.103	
		69.0	69.0	3.100	
		70.0	70.0	3.100	
		71.0	71.0	3.100	
		72.0	72.0	3.106	
		73.0	73.0	3.103	
		74.0	74.0	3.106	

File: 1203STP1.WQ1

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
1	10:20 AM	0	0	-0.007	0
		0.0083	0.0083	-0.009	
		0.0166	0.0166	-0.009	
		0.025	0.025	-0.009	
		0.0333	0.0333	-0.009	
		0.0416	0.0416	-0.009	
		0.05	0.05	-0.003	
		0.0583	0.0583	-0.011	
		0.0666	0.0666	-0.011	
		0.075	0.075	-0.009	
		0.0833	0.0833	-0.007	
		0.1	0.1	-0.006	
		0.1166	0.1166	-0.009	
		0.1333	0.1333	-0.011	
		0.15	0.15	-0.011	
		0.1666	0.1666	-0.011	
		0.1833	0.1833	-0.007	
		0.2	0.2	-0.009	
		0.2166	0.2166	-0.011	
		0.2333	0.2333	-0.014	
		0.25	0.25	-0.007	
		0.2666	0.2666	-0.012	
		0.2833	0.2833	-0.009	
		0.3	0.3	-0.009	
		0.3166	0.3166	-0.009	
		0.3333	0.3333	-0.004	
		0.4166	0.4166	-0.004	
		0.5	0.5	0.001	
		0.5833	0.5833	-0.001	
		0.6666	0.6666	-0.004	
		0.75	0.75	-0.015	
		0.8333	0.8333	-0.02	
		0.9166	0.9166	-0.015	
		1	1	-0.003	
		1.0833	1.0833	0.003	
		1.1666	1.1666	0.006	
		1.25	1.25	0.001	
		1.3333	1.3333	0.006	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		1.4166	1.4166	-0.006	
		1.5	1.5	-0.012	
		1.5833	1.5833	0.007	
		1.6666	1.6666	0.012	
		1.75	1.75	0	
		1.8333	1.8333	0.009	
		1.9166	1.9166	0.004	
		2	2	0.012	0.033
		2.5	2.5	-0.001	
		3	3	0.012	
		3.5	3.5	0.019	0.032
		4	4	0.015	
		4.5	4.5	0.009	
		5	5	0.012	0.032
		5.5	5.5	0.007	
		6	6	0.007	
		6.5	6.5	0.012	
		7	7	0.023	
		7.5	7.5	0.031	
		8	8	0.023	
		8.5	8.5	0.038	
		9	9	0.047	
		9.5	9.5	0.025	
	10:30 AM	10	10	0.039	0.032
		11	11	0.017	
		12	12	0.034	
		13	13	0.033	
		14	14	0.034	
		15	15	0.026	0.033
		16	16	0.044	
		17	17	0.026	
		18	18	0.041	
		19	19	0.042	
	10:40 AM	20	20	0.053	0.034
		21	21	0.047	
		22	22	0.052	
		23	23	0.058	
		24	24	0.058	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		25	25	0.055	0.033
		26	26	0.06	
		27	27	0.057	
		28	28	0.039	
		29	29	0.049	
	10:50 AM	30	30	0.045	0.034
		31	31	0.03	
		32	32	0.053	
		33	33	0.061	
		34	34	0.06	
		35	35	0.038	0.034
		36	36	0.061	
		37	37	0.053	
		38	38	0.05	
		39	39	0.055	
	11:00 AM	40	40	0.057	0.034
		41	41	0.036	
		42	42	0.066	
		43	43	0.052	
		44	44	0.058	
		45	45	0.052	0.035
		46	46	0.058	
		47	47	0.06	
		48	48	0.063	
		49	49	0.061	
	11:10 AM	50	50	0.06	0.036
		51	51	0.071	
		52	52	0.068	
		53	53	0.047	
		54	54	0.047	
		55	55	0.071	0.035
		56	56	0.068	
		57	57	0.058	
		58	58	0.049	
		59	59	0.045	
	11:20 AM	60	60	0.05	0.035
		61	61	0.058	
		62	62	0.064	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		63	63	0.068	
		64	64	0.05	
		65	65	0.06	0.035
		66	66	0.045	
		67	67	0.036	
		68	68	0.038	
		69	69	0.058	
	11:30 AM	70	70	0.058	0.036
		71	71	0.055	
		72	72	0.049	
		73	73	0.074	
		74	74	0.058	
		75	75	0.057	0.036
		76	76	0.064	
		77	77	0.045	
		78	78	0.064	
		79	79	0.072	
		80	80	0.063	
2	11:40 AM	80	0	0.045	0.044
		80.0083	0.0083	0.041	
		80.0166	0.0166	0.063	
		80.025	0.025	0.066	
		80.0333	0.0333	0.053	
		80.0416	0.0416	0.057	
		80.05	0.05	0.055	
		80.0583	0.0583	0.042	
		80.0666	0.0666	0.044	
		80.075	0.075	0.064	
		80.0833	0.0833	0.064	
		80.1	0.1	0.058	
		80.1166	0.1166	0.041	
		80.1333	0.1333	0.069	
		80.15	0.15	0.053	
		80.1666	0.1666	0.053	
		80.1833	0.1833	0.047	
		80.2	0.2	0.066	
		80.2166	0.2166	0.06	
		80.2333	0.2333	0.044	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		80.25	0.25	0.068	
		80.2666	0.2666	0.06	
		80.2833	0.2833	0.044	
		80.3	0.3	0.071	
		80.3166	0.3166	0.057	
		80.3333	0.3333	0.045	
		80.4166	0.4166	0.061	
		80.5	0.5	0.049	
		80.5833	0.5833	0.05	
		80.6666	0.6666	0.063	
		80.75	0.75	0.055	
		80.8333	0.8333	0.069	
		80.9166	0.9166	0.042	
		81	1	0.06	
		81.0833	1.0833	0.066	
		81.1666	1.1666	0.045	
		81.25	1.25	0.057	
		81.3333	1.3333	0.069	
		81.4166	1.4166	0.06	
		81.5	1.5	0.057	
		81.5833	1.5833	0.066	
		81.6666	1.6666	0.055	
		81.75	1.75	0.06	
		81.8333	1.8333	0.068	
		81.9166	1.9166	0.063	
		82	2	0.066	0.045
		82.5	2.5	0.076	
		83	3	0.071	
		83.5	3.5	0.079	
		84	4	0.071	
		84.5	4.5	0.063	
		85	5	0.064	0.044
		85.5	5.5	0.068	
		86	6	0.071	
		86.5	6.5	0.072	
		87	7	0.072	
		87.5	7.5	0.069	
		88	8	0.079	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		88.5	8.5	0.069	
		89	9	0.074	
		89.5	9.5	0.069	
	11:50 AM	90	10	0.053	0.044
		91	11	0.082	
		92	12	0.088	
		93	13	0.064	
		94	14	0.077	
		95	15	0.066	0.044
		96	16	0.083	
		97	17	0.074	
		98	18	0.083	
		99	19	0.063	
	12:00 PM	100	20	0.082	0.045
		101	21	0.058	
		102	22	0.069	
		103	23	0.08	
		104	24	0.076	
		105	25	0.08	0.046
		106	26	0.071	
		107	27	0.06	
		108	28	0.087	
		109	29	0.082	
	12:10 PM	110	30	0.083	0.045
		111	31	0.058	
		112	32	0.085	
		113	33	0.088	
		114	34	0.072	
		115	35	0.077	0.046
		116	36	0.079	
		117	37	0.082	
		118	38	0.082	
		119	39	0.08	
	12:20 PM	120	40	0.091	0.046
		121	41	0.08	
		122	42	0.096	
		123	43	0.076	
		124	44	0.072	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		125	45	0.082	0.047
		126	46	0.083	
		127	47	0.079	
		128	48	0.077	
		129	49	0.076	
	12:30 PM	130	50	0.079	0.047
		131	51	0.08	
		132	52	0.069	
		133	53	0.082	
		134	54	0.066	
		135	55	0.08	0.047
		136	56	0.069	
		137	57	0.083	
		138	58	0.074	
		139	59	0.076	
	12:40 PM	140	60	0.077	
		141	61	0.05	
		142	62	0.079	
		143	63	0.08	0.046
		144	64	0.087	
		145	65	0.063	0.046
		146	66	0.077	
		147	67	0.066	
		148	68	0.076	
		149	69	0.079	
	12:50 PM	150	70	0.082	0.046
		151	71	0.077	
		152	72	0.079	
		153	73	0.072	
		154	74	0.082	
		155	75	0.063	0.046
		156	76	0.068	
		157	77	0.071	
		158	78	0.068	
		159	79	0.074	
		160	80	0.087	
3	01:00 PM	160	0	0.076	0.057
		160.0083	0.0083	0.087	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		160.0166	0.0166	0.098	
		160.025	0.025	0.074	
		160.0333	0.0333	0.08	
		160.0416	0.0416	0.098	
		160.05	0.05	0.069	
		160.0583	0.0583	0.083	
		160.0666	0.0666	0.096	
		160.075	0.075	0.069	
		160.0833	0.0833	0.085	
		160.1	0.1	0.069	
		160.1166	0.1166	0.096	
		160.1333	0.1333	0.072	
		160.15	0.15	0.095	
		160.1666	0.1666	0.077	
		160.1833	0.1833	0.088	
		160.2	0.2	0.082	
		160.2166	0.2166	0.071	
		160.2333	0.2333	0.093	
		160.25	0.25	0.077	
		160.2666	0.2666	0.072	
		160.2833	0.2833	0.091	
		160.3	0.3	0.072	
		160.3166	0.3166	0.091	
		160.3333	0.3333	0.077	
		160.4166	0.4166	0.093	
		160.5	0.5	0.083	
		160.5833	0.5833	0.09	
		160.6666	0.6666	0.076	
		160.75	0.75	0.063	
		160.8333	0.8333	0.087	
		160.9166	0.9166	0.063	
		161	1	0.079	
		161.0833	1.0833	0.088	
		161.1666	1.1666	0.091	
		161.25	1.25	0.076	
		161.3333	1.3333	0.077	
		161.4166	1.4166	0.069	
		161.5	1.5	0.095	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		161.5833	1.5833	0.083	
		161.6666	1.6666	0.077	
		161.75	1.75	0.09	
		161.8333	1.8333	0.072	
		161.9166	1.9166	0.074	
		162	2	0.102	
		162.5	2.5	0.095	
		163	3	0.083	
		163.5	3.5	0.095	
		164	4	0.063	
		164.5	4.5	0.087	
		165	5	0.064	0.057
		165.5	5.5	0.087	
		166	6	0.077	
		166.5	6.5	0.095	
		167	7	0.107	
		167.5	7.5	0.102	
		168	8	0.09	
		168.5	8.5	0.095	
		169	9	0.106	
		169.5	9.5	0.09	
	01:10 PM	170	10	0.112	0.057
		171	11	0.082	
		172	12	0.077	
		173	13	0.079	
		174	14	0.104	
		175	15	0.106	
		176	16	0.096	
		177	17	0.091	0.057
		178	18	0.102	
		179	19	0.09	
	01:20 PM	180	20	0.071	
		181	21	0.088	
		182	22	0.102	0.057
		183	23	0.101	
		184	24	0.102	
		185	25	0.077	0.057
		186	26	0.087	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		187	27	0.085	
		188	28	0.102	
		189	29	0.099	
		190	30	0.117	
4	01:30 PM	190	0	0.122	0.064
		190.0083	0.0083	0.126	
		190.0166	0.0166	0.118	
		190.025	0.025	0.106	
		190.0333	0.0333	0.095	
		190.0416	0.0416	0.088	
		190.05	0.05	0.099	
		190.0583	0.0583	0.12	
		190.0666	0.0666	0.128	
		190.075	0.075	0.122	
		190.0833	0.0833	0.106	
		190.1	0.1	0.106	
		190.1166	0.1166	0.122	
		190.1333	0.1333	0.088	
		190.15	0.15	0.128	
		190.1666	0.1666	0.115	
		190.1833	0.1833	0.091	
		190.2	0.2	0.122	
		190.2166	0.2166	0.125	
		190.2333	0.2333	0.102	
		190.25	0.25	0.091	
		190.2666	0.2666	0.118	
		190.2833	0.2833	0.129	
		190.3	0.3	0.104	
		190.3166	0.3166	0.095	
		190.3333	0.3333	0.123	
		190.4166	0.4166	0.131	
		190.5	0.5	0.115	
		190.5833	0.5833	0.123	
		190.6666	0.6666	0.106	
		190.75	0.75	0.125	
		190.8333	0.8333	0.129	
		190.9166	0.9166	0.126	
		191	1	0.093	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		191.0833	1.0833	0.104	
		191.1666	1.1666	0.125	
		191.25	1.25	0.12	
		191.3333	1.3333	0.115	
		191.4166	1.4166	0.104	
		191.5	1.5	0.125	
		191.5833	1.5833	0.112	
		191.6666	1.6666	0.125	
		191.75	1.75	0.095	
		191.8333	1.8333	0.11	
		191.9166	1.9166	0.131	
		192	2	0.098	
		192.5	2.5	0.112	
		193	3	0.144	
		193.5	3.5	0.107	
		194	4	0.145	
		194.5	4.5	0.12	
		195	5	0.155	0.065
		195.5	5.5	0.141	
		196	6	0.164	
		196.5	6.5	0.156	
		197	7	0.145	
		197.5	7.5	0.166	
		198	8	0.177	
		198.5	8.5	0.171	
		199	9	0.182	
		199.5	9.5	0.18	
	01:40 PM	200	10	0.171	0.065
		201	11	0.166	
		202	12	0.161	
		203	13	0.16	
		204	14	0.158	
		205	15	0.182	0.065
		206	16	0.16	
		207	17	0.155	
		208	18	0.179	
		209	19	0.145	
	01:50 PM	210	20	0.175	0.064

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		211	21	0.172	
		212	22	0.16	
		213	23	0.18	
		214	24	0.145	
		215	25	0.171	0.065
		216	26	0.148	
		217	27	0.179	
		218	28	0.142	
		219	29	0.183	
	02:00 PM	220	30	0.148	0.065
		221	31	0.16	
		222	32	0.171	
		223	33	0.164	
		224	34	0.174	
		225	35	0.166	0.066
		226	36	0.161	
		227	37	0.183	
		228	38	0.158	
		229	39	0.16	
		230	40	0.148	
5	02:10 PM	230	0	0.139	0.083
		230.0083	0.0083	0.136	
		230.0166	0.0166	0.174	
		230.025	0.025	0.201	
		230.0333	0.0333	0.191	
		230.0416	0.0416	0.148	
		230.05	0.05	0.137	
		230.0583	0.0583	0.169	
		230.0666	0.0666	0.202	
		230.075	0.075	0.202	
		230.0833	0.0833	0.167	
		230.1	0.1	0.166	
		230.1166	0.1166	0.212	
		230.1333	0.1333	0.158	
		230.15	0.15	0.177	
		230.1666	0.1666	0.212	
		230.1833	0.1833	0.158	
		230.2	0.2	0.193	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		230.2166	0.2166	0.202	
		230.2333	0.2333	0.155	
		230.25	0.25	0.218	
		230.2666	0.2666	0.177	
		230.2833	0.2833	0.198	
		230.3	0.3	0.215	
		230.3166	0.3166	0.166	
		230.3333	0.3333	0.229	
		230.4166	0.4166	0.234	
		230.5	0.5	0.209	
		230.5833	0.5833	0.185	
		230.6666	0.6666	0.234	
		230.75	0.75	0.258	
		230.8333	0.8333	0.258	
		230.9166	0.9166	0.251	
		231	1	0.258	
		231.0833	1.0833	0.272	
		231.1666	1.1666	0.277	
		231.25	1.25	0.283	
		231.3333	1.3333	0.289	
		231.4166	1.4166	0.267	
		231.5	1.5	0.27	
		231.5833	1.5833	0.272	
		231.6666	1.6666	0.27	
		231.75	1.75	0.278	
		231.8333	1.8333	0.301	
		231.9166	1.9166	0.302	
		232	2	0.263	
		232.5	2.5	0.323	
		233	3	0.275	
		233.5	3.5	0.34	
		234	4	0.343	
		234.5	4.5	0.348	
		235	5	0.37	0.082
		235.5	5.5	0.396	
		236	6	0.405	
		236.5	6.5	0.362	
		237	7	0.38	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		237.5	7.5	0.4	
		238	8	0.386	
		238.5	8.5	0.394	
		239	9	0.369	
		239.5	9.5	0.375	
	02:20 PM	240	10	0.41	0.082
		241	11	0.407	
		242	12	0.389	
		243	13	0.404	
		244	14	0.396	
		245	15	0.415	0.082
		246	16	0.421	
		247	17	0.438	
		248	18	0.435	
		249	19	0.418	
	02:30 PM	250	20	0.408	0.083
		251	21	0.364	
		252	22	0.389	
		253	23	0.421	
		254	24	0.41	
		255	25	0.348	0.083
		256	26	0.396	
		257	27	0.369	
		258	28	0.41	
		259	29	0.373	
	02:40 PM	260	30	0.381	0.083
		261	31	0.391	
		262	32	0.405	
		263	33	0.394	
		264	34	0.412	
		265	35	0.378	0.083
		266	36	0.394	
		267	37	0.381	
		268	38	0.383	
		269	39	0.431	
	02:50 PM	270	40	0.381	0.083
		271	41	0.38	
		272	42	0.388	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		273	43	0.361	
		274	44	0.378	
		275	45	0.364	0.083
		276	46	0.392	
		277	47	0.383	
		278	48	0.388	
6	03:00 PM	280	0	0.351	0.097
		280.0083	0.0083	0.351	
		280.0166	0.0166	0.354	
		280.025	0.025	0.356	
		280.0333	0.0333	0.364	
		280.0416	0.0416	0.362	
		280.05	0.05	0.362	
		280.0583	0.0583	0.359	
		280.0666	0.0666	0.361	
		280.075	0.075	0.367	
		280.0833	0.0833	0.377	
		280.1	0.1	0.385	
		280.1166	0.1166	0.397	
		280.1333	0.1333	0.405	
		280.15	0.15	0.415	
		280.1666	0.1666	0.423	
		280.1833	0.1833	0.432	
		280.2	0.2	0.44	
		280.2166	0.2166	0.446	
		280.2333	0.2333	0.448	
		280.25	0.25	0.448	
		280.2666	0.2666	0.45	
		280.2833	0.2833	0.451	
		280.3	0.3	0.453	
		280.3166	0.3166	0.454	
		280.3333	0.3333	0.456	
		280.4166	0.4166	0.437	
		280.5	0.5	0.435	
		280.5833	0.5833	0.442	
		280.6666	0.6666	0.451	
		280.75	0.75	0.459	
		280.8333	0.8333	0.432	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		280.9166	0.9166	0.41	
		281	1	0.45	
		281.0833	1.0833	0.491	
		281.1666	1.1666	0.44	
		281.25	1.25	0.47	
		281.3333	1.3333	0.5	
		281.4166	1.4166	0.461	
		281.5	1.5	0.454	
		281.5833	1.5833	0.451	
		281.6666	1.6666	0.518	
		281.75	1.75	0.518	
		281.8333	1.8333	0.492	
		281.9166	1.9166	0.459	
		282	2	0.469	
		282.5	2.5	0.532	
		283	3	0.518	
		283.5	3.5	0.527	
		284	4	0.564	
		284.5	4.5	0.529	
		285	5	0.568	0.096
		285.5	5.5	0.541	
		286	6	0.61	
		286.5	6.5	0.551	
		287	7	0.599	
		287.5	7.5	0.614	
		288	8	0.581	
		288.5	8.5	0.587	
		289	9	0.565	
		289.5	9.5	0.619	
	03:10 PM	290	10	0.61	0.094
		291	11	0.576	
		292	12	0.578	
		293	13	0.592	
		294	14	0.591	
		295	15	0.624	0.097
		296	16	0.567	
		297	17	0.575	
		298	18	0.633	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		299	19	0.64	
	03:20 PM	300	20	0.579	0.094
		301	21	0.643	
		302	22	0.63	
		303	23	0.61	
		304	24	0.613	
		305	25	0.633	0.097
		306	26	0.616	
		307	27	0.619	
		308	28	0.632	
		309	29	0.624	
		310	30	0.635	
7	03:30 PM	310	0	0.611	0.1
		310.0083	0.0083	0.622	
		310.0166	0.0166	0.564	
		310.025	0.025	0.635	
		310.0333	0.0333	0.594	
		310.0416	0.0416	0.579	
		310.05	0.05	0.643	
		310.0583	0.0583	0.575	
		310.0666	0.0666	0.602	
		310.075	0.075	0.638	
		310.0833	0.0833	0.568	
		310.1	0.1	0.635	
		310.1166	0.1166	0.618	
		310.1333	0.1333	0.57	
		310.15	0.15	0.638	
		310.1666	0.1666	0.622	
		310.1833	0.1833	0.573	
		310.2	0.2	0.638	
		310.2166	0.2166	0.643	
		310.2333	0.2333	0.584	
		310.25	0.25	0.584	
		310.2666	0.2666	0.644	
		310.2833	0.2833	0.649	
		310.3	0.3	0.606	
		310.3166	0.3166	0.579	
		310.3333	0.3333	0.605	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		310.4166	0.4166	0.635	
		310.5	0.5	0.603	
		310.5833	0.5833	0.632	
		310.6666	0.6666	0.654	
		310.75	0.75	0.683	
		310.8333	0.8333	0.611	
		310.9166	0.9166	0.67	
		311	1	0.622	
		311.0833	1.0833	0.613	
		311.1666	1.1666	0.632	
		311.25	1.25	0.659	
		311.3333	1.3333	0.624	
		311.4166	1.4166	0.641	
		311.5	1.5	0.679	
		311.5833	1.5833	0.681	
		311.6666	1.6666	0.63	
		311.75	1.75	0.713	
		311.8333	1.8333	0.652	
		311.9166	1.9166	0.703	
		312	2	0.709	
		312.5	2.5	0.668	
		313	3	0.741	
		313.5	3.5	0.74	
		314	4	0.684	
		314.5	4.5	0.686	
		315	5	0.689	0.1
		315.5	5.5	0.713	
		316	6	0.781	
		316.5	6.5	0.714	
		317	7	0.714	
		317.5	7.5	0.79	
		318	8	0.784	
		318.5	8.5	0.8	
		319	9	0.736	
		319.5	9.5	0.738	
	03:40 PM	320	10	0.778	0.1
		321	11	0.749	
		322	12	0.733	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		323	13	0.765	
		324	14	0.787	
		325	15	0.808	0.1
		326	16	0.811	
		327	17	0.76	
		328	18	0.735	
		329	19	0.749	
	03:50 PM	330	20	0.782	0.11
		331	21	0.746	
		332	22	0.793	
		333	23	0.806	
		334	24	0.792	
		335	25	0.801	0.1
		336	26	0.803	
		337	27	0.754	
		338	28	0.757	
		339	29	0.787	
		340	30	0.768	
8	04:00 PM	340	0	0.751	0.11
		340.0083	0.0083	0.803	
		340.0166	0.0166	0.741	
		340.025	0.025	0.751	
		340.0333	0.0333	0.806	
		340.0416	0.0416	0.747	
		340.05	0.05	0.733	
		340.0583	0.0583	0.793	
		340.0666	0.0666	0.782	
		340.075	0.075	0.732	
		340.0833	0.0833	0.757	
		340.1	0.1	0.767	
		340.1166	0.1166	0.776	
		340.1333	0.1333	0.749	
		340.15	0.15	0.776	
		340.1666	0.1666	0.774	
		340.1833	0.1833	0.749	
		340.2	0.2	0.79	
		340.2166	0.2166	0.738	
		340.2333	0.2333	0.805	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		340.25	0.25	0.735	
		340.2666	0.2666	0.805	
		340.2833	0.2833	0.733	
		340.3	0.3	0.808	
		340.3166	0.3166	0.73	
		340.3333	0.3333	0.809	
		340.4166	0.4166	0.803	
		340.5	0.5	0.805	
		340.5833	0.5833	0.741	
		340.6666	0.6666	0.806	
		340.75	0.75	0.733	
		340.8333	0.8333	0.801	
		340.9166	0.9166	0.784	
		341	1	0.733	
		341.0833	1.0833	0.787	
		341.1666	1.1666	0.805	
		341.25	1.25	0.803	
		341.3333	1.3333	0.806	
		341.4166	1.4166	0.803	
		341.5	1.5	0.741	
		341.5833	1.5833	0.763	
		341.6666	1.6666	0.752	
		341.75	1.75	0.797	
		341.8333	1.8333	0.746	
		341.9166	1.9166	0.79	
		342	2	0.812	
		342.5	2.5	0.736	
		343	3	0.759	
		343.5	3.5	0.751	
		344	4	0.79	
		344.5	4.5	0.824	
		345	5	0.757	0.11
		345.5	5.5	0.819	
		346	6	0.781	
		346.5	6.5	0.76	
		347	7	0.792	
		347.5	7.5	0.76	
		348	8	0.789	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		348.5	8.5	0.828	
		349	9	0.809	
		349.5	9.5	0.77	
	04:10 PM	350	10	0.76	0.1
		351	11	0.8	
		352	12	0.771	
		353	13	0.827	
		354	14	0.797	
Recovery	04:15 PM	355	0	0.786	0
		355.0083	0.0083	0.782	
		355.0166	0.0166	0.779	
		355.025	0.025	0.773	
		355.0333	0.0333	0.768	
		355.0416	0.0416	0.762	
		355.05	0.05	0.757	
		355.0583	0.0583	0.751	
		355.0666	0.0666	0.747	
		355.075	0.075	0.743	
		355.0833	0.0833	0.736	
		355.1	0.1	0.725	
		355.1166	0.1166	0.716	
		355.1333	0.1333	0.705	
		355.15	0.15	0.695	
		355.1666	0.1666	0.684	
		355.1833	0.1833	0.673	
		355.2	0.2	0.663	
		355.2166	0.2166	0.654	
		355.2333	0.2333	0.643	
		355.25	0.25	0.633	
		355.2666	0.2666	0.624	
		355.2833	0.2833	0.613	
		355.3	0.3	0.603	
		355.3166	0.3166	0.594	
		355.3333	0.3333	0.584	
		355.4166	0.4166	0.54	
		355.5	0.5	0.492	
		355.5833	0.5833	0.45	
		355.6666	0.6666	0.407	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		355.75	0.75	0.367	
		355.8333	0.8333	0.328	
		355.9166	0.9166	0.291	
		356	1	0.256	
		356.0833	1.0833	0.221	
		356.1666	1.1666	0.232	
		356.25	1.25	0.199	
		356.3333	1.3333	0.167	
		356.4166	1.4166	0.139	
		356.5	1.5	0.104	
		356.5833	1.5833	0.095	
		356.6666	1.6666	0.088	
		356.75	1.75	0.087	
		356.8333	1.8333	0.083	
		356.9166	1.9166	0.082	
		357	2	0.08	
		357.5	2.5	0.071	
		358	3	0.061	
		358.5	3.5	0.055	
		359	4	0.05	
		359.5	4.5	0.045	
	04:20 PM	360	5	0.041	
		360.5	5.5	0.034	
		361	6	0.03	
		361.5	6.5	0.025	
		362	7	0.02	
		362.5	7.5	0.017	
		363	8	0.014	
		363.5	8.5	0.011	
		364	9	0.011	
		364.5	9.5	0.007	
		365	10	0.004	
		366	11	-0.001	
		367	12	-0.004	
		368	13	-0.009	
		369	14	-0.006	
	04:30 PM	370	15	-0.009	
		371	16	-0.012	

Table 2. Step-Drawdown Test December 6, 1991

Step	Time	Elapsed Time (min)	Step Time (min)	Drawdown (ft)	Discharge (gpm)
		372	17	-0.012	
		373	18	-0.015	
		374	19	-0.015	
	04:40 PM	375	20	-0.012	

ATTACHMENT B2-5
MULTIPLE-WELL TEST EQUIPMENT

WELL INSTALLATION

The following is a list of equipment and materials used for installation of the multiple-wellpoint array in addition the list provided in Attachment B2-2:

- 1.7-inch-I.D. stainless steel wellpoints (5-foot screen length, 0.010-inch slot size) for a total of 20
- 1.5-inch-I.D. carbon steel extension rods (5-foot length) for a total of 20
- Bell reducers
- Appropriate amount of 4-inch-O.D. solid stem augers (replaced 3.25-inch-I.D. hollow stem augers used in single wellpoint installation)

WELL DEVELOPMENT

The following is a list of equipment and materials used for development of the multiple-well array in addition to the list provided in Attachment B2-2:

- Teflon bottom filling bailer (1.25-inch-O.D., 3-foot length) for a total of 2
- pH meter (Orion Model 250A) with appropriate buffer solutions
- Conductivity meter (Orion Model 122) with appropriate conductivity standard (replaced conductivity meters used for single well development)
- Geotech variable speed peristaltic pumps with appropriate lengths of tubing (nylon and silicone) and connectors
- Surge block (consisted of 1.5-inch O.D., 3-foot length, stainless steel slug)

PUMPING TEST

The following is a list of equipment and materials used for the multiple-well pumping test in addition to the equipment used for the step-drawdown test in Attachment B2-2:

- Backup 5 kW generator
- SHURFlo Model 1424-814-78 diaphragm pump (capable of pumping rates up to 1.6 gpm)
- Hermit SE 2000 data logger (8 channel) for a total of 2
- 5 psi pressure transducers (accuracy of $\pm$ 0.14 inch) for a total of 3
- 10 psi pressure transducers (accuracy of $\pm$ 0.28 inch) for a total of 18
- Solinst electronic water level meter (sufficiently accurate to measure water levels to the nearest 0.01 foot) for a total of 2
- Polyethylene storage tanks (375-gallon and 200-gallon) for temporary storage of the pumping test water

MULTIPLE-WELL TRACER TEST
EXTRACTION WELLS E1 THROUGH E5
(five sets of the following equipment)

The following is a list of equipment and materials used for the multiple-well tracer test extraction wells in addition to the genral tracer equipment list provided in Attachment B2-2:

- Diaphragm pump, self priming, 1.85 gpm maximum
- B/W Controls liquid level control relay, high sensitivity with NEMA 1 enclosure, wired in direct operation mode, with 22 kW sensitivity resistor
- Electrode suspension wire, heavy-insulated 18 gauge copper
- Stopper, solid rubber, no. 00, fastened into polyethylene tubing
- Appropriate lengths and sizes of tubing (vinyl and polyethylene) and appropriately sized pipe adaptors, reducing bushings, and branch tee
- Stopper, solid rubber, fastened into polyethylene tubing
- Electrodes (2), shielded, wire suspension type, 303 stainless, 2-inch long, 9/16-inch diameter (B/W Controls type E-1S-shielded)
- Digital flow accumulator, nylon, 0.3 to 3.0 gpm range
- Stopcock valve, PVC
- Polyethylene Storage Tanks (200- and 375-gallon) and lined 55-gallon drums

MULTIPLE-WELL TRACER TEST
INJECTION WELLS I1 THROUGH I5
(five sets of the following equipment)

The following is a list of equipment and materials used for the multiple-well tracer test injection wells in addition to the general tracer equipment list provided in Attachment B2-2:

- Stock formation water or bromide solution, in 200-gallon tank, 375-gallon tank, or lined 55-gallon drums
- Diaphragm pump, self priming, 1.85 gpm maximum
- B/W Controls liquid level control relay, high sensitivity with NEMA 1 enclosure wired in inverse operation mode with 22 kW sensitivity resistor
- Electrode suspension wire, heavy-insulated 18 gauge copper
- Electrodes (2), shielded, wire suspension type, 303 stainless, 2-inch long, 9/16-inch diameter (B/W Controls type E-1S-shielded; no. 6013-W6)
- Appropriate lengths and sizes of tubing (vinyl and polyethylene) and appropriatelty sized pipe adaptor and reducing bushings
- Digital flow accumulator, nylon, 0.3 to 3.0 gpm range
- Stopper, solid rubber, no. 00, fastened into polyethylene tubing

MULTIPLE-WELL TRACER TEST
SUPPLEMENTAL SAMPLING; WELLS I-3 AND O-3
(two sets of the following equipment)

The following is a list of equipment and materials used for the multiple-well tracer test supplemental sampling wells in addition to the general tracer equipment list provided in Attachment B2-2:

- Peristaltic pump, Geotech with Masterflex no. 17 pumphead, 60 to 350 rpm
- Appropriate lengths and sizes of tubing (polyethylene, vinyl, and silicone) and appropriately sized connectors, pipe adaptor, and branch tee
- Stopcock valve, PVC
- Stopper, solid rubber, microstopper size, fastened into polyethylene tubing

ABANDONMENT

The following is a list of equipment and materials used for wellpoint abandonment:

- Jack with chain
- Grout plant with 1-inch hose
- Reduced pH bentonite grout
- Cement bentonite grout
- RFP water
- Black permanent pens
- Appropriate PPE
- Copy of EMD SOPs
- Appropriate field form (Form GT.5A)

ATTACHMENT B2-6
MULTIPLE-WELL FIELD DATA SHEETS

Appendix B2
Multiple-Well Test Data

WELL INSTALLATION

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GT.2A

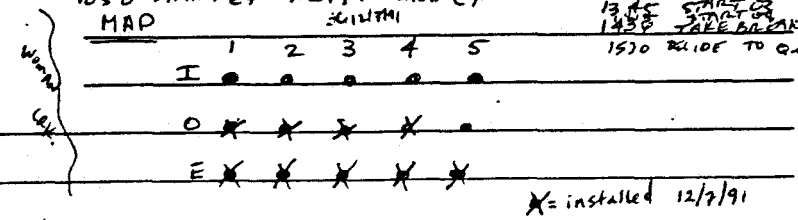
HOLLOW-STEM AUGER DRILLING
FIELD ACTIVITIES REPORT

PROJECT NUMBER	OU1
DATE	12/7/91
PROJECT NAME	881 HILLSIDE
BOREHOLE IDENTIFICATION	PUMP/TRACER TEST ARRAY
WEATHER CONDITIONS	SUNNY, WARM T≈55°F, CALM
RIG TYPE	B-57 MOBILE DRILL
DRILLING COMPANY/DRILLER	BOYLES BROTHERS / D. JARVIE
GEOLOGIST/ENGINEER	S. CONDRAN - GEOLOGIST
CREW MEMBERS	T. SAVILO - HEALTH & SAFETY, R. SHARP - DRILLER'S HELPER
WATER LEVEL/TIME	NOT MEASURED
TOTAL DEPTH (T.D. 54' = Bottom of screen)	INSTALLED E1 TO E5 and O1 to O4 (see map below) E1=6.54 E2=6.44 E3=6.54 E4=6.54 E5=6.44 O1=6.44 O2=6.44 O3=6.34 O4=6.54
DECONTAMINATION	FIELD
ENVIRONMENTAL MATERIALS TYPES, VOLUMES, AND DRUMS USED	NONE - DRIVE POINT ANNULUS FILLED WITH NATURAL FORMATION MATERIALS - NO EXCESS CUTTINGS TO BE DRUMMED
DIAMETER OF BORING	~4½ INCHES USED 4" O.D SOLID STEM AUGERS
TYPE AND SIZE OF AUGERS AND BIT	4" O.D. SOLID STEM AUGERS, 4¼" DRILL BIT
SAMPLING TYPES, DEPTHS	NONE SEE RESULTS PILOT HOLE 1 (39091) FOR PUMP/TRACER TEST ARRAY
HAMMER SIZE	140 lb
DEPTH TO BEDROCK	6.0' SEE RESULTS PILOT HOLE 1 (39091) FOR PUMP/TRACER TEST ARRAY
END-OF-DAY STATUS	INSTALLED DRIVE POINTS E1 TO E5 and O1 to O4 SEE MAP BELOW

CHRONOLOGICAL RECORD OF ACTIVITIES

0906 START DRIVING DRIVEPT. E1
0914 DRILLERS ARE ON A ROCK DESTROYED 1 DRIVEPOINT WILL CANGE TO SMALL I.D. SOLID STEM AUGER
0921 START AUGERING WITH 4" O.D. SOLID STEM AUGER AT E1
0940 FINISH E1
0950 START E2
1022 FINISHED E2
1034 START E3
1054 FINISHED E3
1050 START E4
1124 FINISHED E4
1126 START E5
1232 FINISHED E5
1240 START O1
1314 FINISHED O1
1311 START O2
1340 FINISHED O2
1346 START O3
1413 FINISHED O3
1415 START O4
1433 FINISHED O4
1435 TAKE BREAK TO MEASURE DRIVE
1530 RIDE TO QUIT FOR THE DAY

MAP



PUMP/TRACER TEST ARRAY

COMMENTS

WILL INSTALL O5 and I1 to I5 SUN. 12/8

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — FORM GT.2A

HOLLOW-STEM AUGER DRILLING
FIELD ACTIVITIES REPORT

PROJECT NUMBER	OU 1
DATE	12/8/91
PROJECT NAME	881 HILLSIDE
BOREHOLE IDENTIFICATION	Pump/TRACER TEST ARRAY (Temporary drive points for Pump/Tracer Test)
WEATHER CONDITIONS	Sunny, warm T = 55°F, calm
RIG TYPE	B-57 Mobile Drill
DRILLING COMPANY/DRILLER	Boyles Brothers / D. Jarvie
GEOLOGIST/ENGINEER	C. Bicninlus - Geologist (Form filled out by S. Condrun)
CREW MEMBERS	S. Bradfield Driller's Helper M. Billman - Health Safety, J. Blevins - Driller's Helper
WATER LEVEL/TIME	Not measured
TOTAL DEPTH (TD - .54' = Bottom of Screen)	05 = 6.35 I1 = 6.60 I2 = 6.50 I3 = 6.64 I4 = 6.72 I5 = 6.43
DECONTAMINATION	FIELD
ENVIRONMENTAL MATERIALS	
TYPES, VOLUMES, AND	NONE - DRIVEPT. ANNULUS FILLED WITH NATURAL FORMATION
DRUMS USED	MATERIALS - NO EXCESS CUTTINGS TO BE DRUMMED
DIAMETER OF BORING	~ 9½ INCHES USED 4" O.D. SOLID STEM AUGERS
TYPE AND SIZE OF AUGERS	
AND BIT	4" O.D. solid stem augers, 4½" drill bit
SAMPLING TYPES, DEPTHS	None
	See results pilot hole 1 (39091) for pump/
	tracer test array
HAMMER SIZE	140 lb.
DEPTH TO BEDROCK	6.0' See results pilot hole 1 (39091) for pump/tracer test array
END-OF-DAY STATUS	Installed drive points 05 and I1 to I5 see map below
CHRONOLOGICAL RECORD	0735 crew has installed 05
	0746 crew has installed I5
OF ACTIVITIES	0757 " I4
	0808 " I3
	0822 " I2
	0832 Have drilled to T.D. for I1 crew waiting on bell reducer
	1035 Crew has installed I1
	Tent is also set up over site 1053 crew leaves site for the day
COMMENTS	MAP 1 2 3 4 5
Will start developing well pts,	I X X X X X
12/9/91	0 X
	E . . . . .

X = installed 12/8/91

Appendix B2
Multiple-Well Test Data

WELL DEVELOPMENT

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: S. Condran / Hydrogeologist

Well ID: PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT #I1 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report: 12/9/91, 12/15/91, 12/16/91 Date well installation: 12/8/91 Date well development: 12/9/91, 12/15/91, 12/16/91

Well designation: #I1 SEE MAP BELOW

Ground elevation: Est: _____ Survey: _____

Screened interval (from ground surface): 1.1' to 6.1' (from installation) Formation: WOMAN CREEK VALLEY FILL ALLUVIUM

Measuring point (MP): Top of well casing/other: TOP OF WELL CASING (Measured during development) Well stick up: ~1.0'

Water level (below MP): Start: 2.84' (SC 12/9/91) End: Not measured 12/9/91 (SC 12/9/91) BEG 3.30 (12/15/91) 3.19 (12/14/91) END 3.33 (12/15/91) 3.34 (12/16/91)

Well depth (below MP): 7.05' Water ~~elevation~~ depth (BGS) ~1.84' (SC 12/9/91)

Method used to measure water level: Electronic water level meter (Solinst Model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 Sec. 5.2.1.1

Volume Calculation: well casing volume $= \pi r^2 h = \pi (0.07083')^2\, 4.21' = 0.06635 \times 7.48\,\text{gall}/\text{ft}^3 = 0.50$ gall

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 7.05' After: 7.05'

Development equipment: Teflon bailer 1¼" O.D. (12/9/91, 12/15/91), Peristaltic pump 350rpm (12/15/91, 12/16/91)

Sampling equipment: Not sampled

pH meter No.: Orion Model 230A S/N 001752 Calibration: pH 4.01 = 4.00 @ 13.1°C; pH 10.01 = 10.14 @ 13.1°C; pH 7.00 measured 7.11 @ 13.1°C

Specific conductance meter No.: Orion Model 122 SN 9811023 Calibration: Cond. std. = 1,000 umhos @ 25°C measured 1,040 umhos @ 14.4°C

F.T.U. meter No.: NA per GW SOP 2.08 Calibration: NA

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/9/91	1134	<.1 (12/9/91)	—	7.70	7.1	734	0	0	DK. brown, vy silty
	1156		—	7.36	6.1	695	0.25	½	"
	1159		—	7.41	5.1	601	0.50	1	"
	1204		—	7.52	6.1	602	0.75	1½	"
	1209		—	7.50	5.1	693	1.0	2	"
	1212		—	7.44	5.1	727	1.25	2½	"
	1216		—	7.45	6.1	725	1.50	3	"
	1220		—	7.45	6.1	724	1.75	3½	silt is decreasing
	1224		—	7.35	6.1	731	2.0	4	"
	1227		—	7.34	6.1	732	2.25	4½	"
	1234	↓	—	7.37	5.1	735	2.50	5	"

Comments: MAP = 1 2 3 4 5 N

12/15 Pumped/bailed silt from bottom wellpoint is producing well - no parameters collected

12/16 Pumped well a 25 minutes until water clear. Collected final round of measurements after additional development activities: pH 7.06 Temp 4.8 COND 868 lt. gray

(4011-600-0022) (GW2REV.1)(09-10-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title S. Condran / Hydrogeologist

Well ID PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT # I2 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report 12/9/91, 12/15/91, 12/16/91 Date well installation 12/8/91 Date well development 12/9/91, 12/15/91, 12/16/91

Well designation: #I2 SEE MAP BELOW

Ground elevation: Est: _____ Survey: _____

Screened interval: 0.96 to 5.96' (from ground surface) measured at time of installation; 1.0 - 6.0' (measured during development 12/9/91) Formation: Woman Creek Valley Fill Alluvium

Measuring point (MP): Top of well casing/other: TOP OF WELL CASING Well stick up: ~1.0 (measured 0.93') during develop. 3E6 3.41 (12/15/91)

Water level (below MP): Start: 2.94' End: Not measured 12/9/91 3.30' (12/16/91) END 3.44' (12/15/91) 3.45 (12/16/91)

Well depth (below MP): 6.93' Water elevation (BGS) ~2.01' depth sc 12/9/91

Method used to measure water level: Electronic water level meter (solinst Model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well; casing volume per SOP GW.2 Sec. 5.2.1.1

Volume Calculation: Well casing volume $= \pi r^2 h = \pi (0.07083')^2 3.99' = 0.06259\ ft^3 \times 7.48\ gal/ft^3 = 0.47$ gall. ≈ 0.5 gal

Quantity of water used during drilling: NONE

Depth of sediment (below MP): Before: 6.93' (12/9/91, 12/15/91) After: Not measured 12/9/91

Development equipment: Teflon bailer 1¼" O.D., Peristaltic pump 350 rpm (12/15/91, 12/16/91)

Sampling equipment: Not sampled

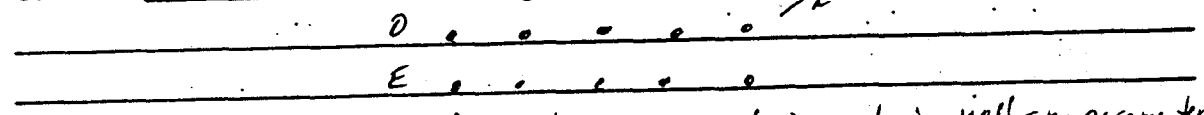
pH meter No. Orion Model 230A S/N 001752 Calibration: pH 4.01 = 4.00 @ 13.1°C pH 7.00 measured 7.1 @ 13.1°C pH 10.01 = 10.14 @ 13.1°C

Specific conductance meter No.: Orion Model 122 S/N 9811023 Calibration: Conductivity standard = 1,000 µmhos @ 25°C measured 1,040 µmhos @ 14.4°C

F.T.U. meter No.: NA per GW SOP 2.05 Calibration: NA

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umbos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/9/91 1239	~.15	—	7.43	6.1	768	0	0	DK. brown, VJ. silty
1241		—	7.54	6.1	778	0.25	½	"
1243		—	7.52	6.1	770	0.50	1	"
1245		—	7.50	6.1	768	0.75	1½	"
1248		—	7.50	6.1	813	1.0	2	"
1251		—	7.51	6.1	837	1.25	2½	"
1253		—	7.53	7.1	787	1.5	3	decreasing silt content
1255		—	7.55	6.1	836	1.75	3½	"
1301		—	7.62	6.1	855	2.0	4	"
1304		—	7.64	6.1	846	2.25	4½	"
1306	↓	—	7.69	6.1	867	2.5	5	"

Comments: MAP



12/15 Pumped / bailed silt from bottom wellpoint is producing well - no parameters collected

12/16 Pumped well ~ 25 minutes until water clear. Collected additional round of measurements. after additional development activities:

pH 7.00 Temp 5.1 Cond 1002 lt. gray

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: S. CONDRAN / HYDROGEOLOGIST

Well ID: PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT #I3 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report: 12/9/91, 12/15/91, 12/16/91 Date well installation: 12/8/91 Date well development: 12/9/91, 12/15/91, 12/16/91

Well designation: #I3 SEE MAP BELOW

Ground elevation: Est: / Survey: _____

Screened interval (Ground surface): 1.1 to 6.1' (measured at time of installation) 1.0 to 6.0' (Measured during development) Formation: NOMAN CREEK VALLEY FILL ALLUVIUM

Measuring point (MP): Top of well casing/other: TOP of well CASING Well stick up: ~1.0' (measured 1.03')

Water level (below MP): Start: 3.05' End: Not measured 12/9/91 BEG 3.52' (12/15/91) 3.41' (12/14/91) END 3.59 (12/15/91) 3.56 (12/16/91)

Well depth (below MP): 7.08' Water elevation (BGS) depth ~2.02' SC 12/9/91

Method used to measure water level: Electronic water level meter (Solinst Model 101) Estimated recharge rate: Not measured

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 Sec. 5.2.1.1

Volume Calculation: Well casing volume = $\pi r^2 h = \pi(0.07083')^2\, 4.03' = 0.06352\,ft^3 \times 7.48\,gal/ft^3 = 0.48\,gal = \sim 0.5\,gal$

Quantity of water used during drilling: NONE

Depth of sediment (below MP): Before: 7.08 After: Not measured 12/9/91

Development equipment: Teflon bailer 1¼" O.D. (12/9/91, 12/15/91), Peristaltic pump 350 rpm (12/15/91, 12/16/91)

Sampling equipment: Not sampled

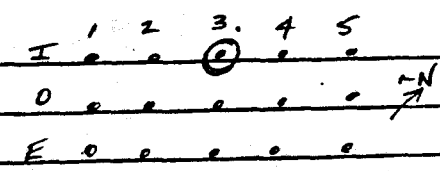
pH meter No.: Orion Model 230A S/N 001752 Calibration: pH 4.01 = 4.00 @ 13.1°C pH 10.01 = 10.14 @ 13.1°C pH 7.00 measured 7.11 @ 13.1°C

Specific conductance meter No.: Orion Model 122 S/N 9811023 Calibration: Cond. Std. = 1000 µmhos @ 25°C measured 1040 @ 14.4°C

F.T.U. meter No.: NA per SOP 2.08 Calibration: NA

	Time	[illegible]	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/9/91	1313	[illegible]	—	7.48	6.1	853	0	0	DK. brown, vy. silty
	1317		—	7.49	7.1	797	0.25	½	"
	1319		—	7.52	7.1	828	0.50	1	"
	1322		—	7.59	6.1	789	0.75	1½	"
	1325		—	7.58	7.1	850	1.0	2	"
	1329		—	7.64	6.1	904	1.25	2½	"
	1332		—	7.68	7.1	929	1.50	3	lt. brown, less silty
	1335		—	7.68	6.1	933	1.75	3½	lt. brown, less silty
	1338		—	7.64	6.1	938	2.0	4	"
	1341		—	7.71	6.1	938	2.25	4½	"

Comments: MAP



12/15 pumped/bailed silt from bottom wellpoint is a good producer - no parameters collected

12/16 pumped well ~25 minutes until water clear

Conducted additional round of measurements after additional development activities:

pH 6.99 Temp 5.3 COND 1012 lt. gray

(4011-600-0022) (G[illegible]-91)

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID WELLPOINT I3 PUMP/TRACER TEST ARRAY

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

SEE PAGE 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/9/91 1345	2.15	—	7.68	6.1	941	2.5	5	lt. brown
1347	↓	—	7.63	6.1	939	2.75	5 1/2	lt. brown
			JY 12/9/91					

Comments: _____

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Page 1 of 1

Recorder's Name and Title S. CONDRAN / HYDROGEOLOGIST

Well ID PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT #I4 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report 12/9/91, 12/15/91, 12/16/91 Date well installation 12/8/91 Date well development 12/9/91, 12/15/91, 12/16/91

Well designation: #I4 SEE MAP BELOW

Ground elevation: Est: _____ Survey: _____

Screened interval: 6.18 to 6.18' (Measured at time of installation) (From ground surface) Formation: WOMAN CREEK VALLEY FILL ALLUVIUM
Sc 12/9/91 1.1 to 6.1 (Measured during development)

Measuring point (MP): Top of well casing/other: TOP OF WELL CASING Well stick up: ~1.0' (Measured 1.0' during development)
BEG 3.56' (12/15/91) 3.46' (12/16/91) END 3.59 (12/15/91) 3.60 (12/16/91)

Water level (below MP): Start: 3.09' End: Not measured 12/9/91

Well depth (below MP): 7.15' Water elevation (BGS) ~2.06' depth Sc 12/9/91

Method used to measure water level: meter (Solinst Model 101) Electronic water level Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 Sec. 5.2.1.1

Volume Calculation: Well casing volume = $\pi r^2 h = \pi (0.07083')^2 \cdot 4.06' = 0.06399 \text{ ft}^3 \times 7.48 \text{ gal/ft}^3 = 0.48 \text{ gal} \simeq 0.5 \text{ gal}$

Quantity of water used during drilling: NONE

Depth of sediment (below MP): Before: 7.15' After: Not measured 12/9/91 (12/9/91, 12/15/91)

Development equipment: Teflon bailer 1¼" O.D., Peristaltic pump 350 rpm (12/15/91, 12/16/91)

Sampling equipment: Not sampled

pH meter No. Orion Model 123A SN 001752 Calibration: pH = 4.01 = 4.00 @ 13.1°C pH 7.00 measured 7.11 @ 13.1°C
pH = 10.01 = 10.14 "

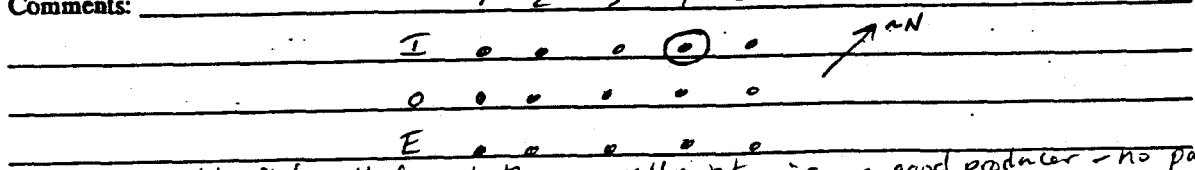
Specific conductance meter No.: Orion Model 122 SN 9811023 Calibration: Sc 12/9/91 Conductivity Standard = 1,000 umhos @ 25°C measured 1,040 umhos @ 14.4°C

F.T.U. meter No.: NA per GW SOP 2.8 Calibration: NA

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1237	<.15	—	7.96	6.1	938	0	0	Lt. brown, silty
1240		—	7.48	7.1	930	0.25	½	"
1242		—	7.52	6.1	935	0.50	1	"
1244		—	7.48	7.1	910	0.75	1½	Brown, silty
1246		—	7.43	7.1	944	1.0	2	"
1249		—	7.44	6.1	944	1.25	2½	"
1252		—	7.46	7.1	946	1.5	3	"
1254		—	7.41	7.1	955	1.75	3½	"
1256		—	7.45	7.1	957	2.0 for 12/9/91	4	"
1303		—	7.43	6.1	952	2.25	4½	Decreasing silt content
1305	↓	—	7.46	6.1	958	2.5	5	"

12/9/91

Comments:



12/15 Pumped/bailed silt from bottom wellpoint is a good producer - no parameters collected
12/16 Pumped well ~25 minutes until water was clear
Collected final round of measurements after additional develop. activities.
pH 7.00 Temp. 5.3 Sc, Cond 1016 lt. brown

(4011-600-0022) (GW2REV.1)(09-10-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Page 1 of 1.

Recorder's Name and Title S. CONDRAN

Well ID PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT # I5 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report #I5 12/9/91 (12/9/91), 12/15/91, 12/16/91 Date well installation 12/8/91 Date well development 12/9/91, 12/15/91, 12/16/91

Well designation: #I5 SEE MAP BELOW

Ground elevation: Est: _____ Survey: _____

Screened interval: (From Ground surface) 0.89 to 5.89' (From installation) 1.2 to 6.2 (Measured during development 12/9/91) Formation: Woman Crk. Valley Fill Alluvium

Measuring point (MP): Top of well casing/other: Top of Well casing Well stick up: ~1.0' (measured 1.0' during development)

Water level (below MP): Start: 3.15' End: Not measured 12/9/91 BEG 3.61 (12/15/91) 3.50' (12/14/91) END 3.64 (12/15/91) 3.65 (12/16/91)

Well depth (below MP): 7.22' Water ~~elevation~~ depth (BGS) ~2.15' SC 12/9/91

Method used to measure water level: Electronic water level meter Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 sec. 5.2.1.1

Volume Calculation: Well casing volume = $\pi r^2 h = \pi(0.07083')^2 \cdot 2.07 = 0.064 \times 7.48 \frac{gal}{ft^3} = 0.48$ gal. ≈ 0.5 gal

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 7.22' After: Not measured 12/9/91

Development equipment: Teflon bailer 1 1/4" O.D (12/9/91, 12/15/91), Peristaltic pump 350 rpm (12/15/91, 12/16/91)

Sampling equipment: Not sampled

pH meter No. Orion Model 230A S/N 001752 Calibration: pH 4.01 = 4.00 @ 13.11°C pH 10.01 = 10.14 @ 13.11°C pH 7.00 measured 7.11 @ 13.11°C

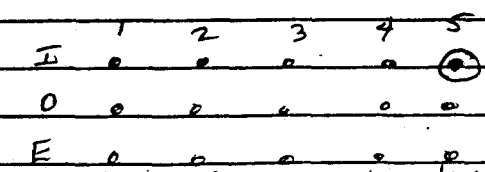
Specific conductance meter No.: Orion Model 122 SN 9811023 Calibration: conductivity std = 1,000 umhos @ 25°C measured = 1,040 umhos @ 14.4°C

F.T.U. meter No.: N/A per SOP 2.08 Calibration: N/A

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm a: °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/9/91	1134	<.15	—	7.38	8.11	953	0	0	clear
	1152		—	7.45	6.11	975	0.25	1/2	lt. brown
	1157		—	7.38	6.11	960	0.50	1	lt. brown
	1202		—	7.40	6.11	972	0.75	1 1/2	"
	1207		—	7.46	6.11	972	1.00	2	brown
	1211		—	7.42	6.11	966	1.25	2 1/2	"
	1214		—	7.47	6.11	969	1.5	3.0	"
	1218		—	7.47	6.11	968	1.75	3 1/2	"
	1221		—	7.40	6.11	968	2.0	4	"
	1223		—	7.37	6.11	968	2.25	4 1/2	"
	1225		—	7.38	6.11	969	2 1/2	5	lt. brown

Comments: — 7.0 SC 12/9/91

MAP



12/15 Pumped/bailed silt from bottom wellpoint is a good producer - no parameters collected

12/16 Pumped well ~25 minutes until water was clear

Collected final round of measurements after additional development activities:

pH 7.02 Temp 5.4 Cond. 1015 clear

(4011-600-0022) (GW2REV.1)(09-10-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title S. CONDRAN / HYDROGEOLOGIST

Well ID PUMP / TRACER TEST NEWPOINT ARRAY WELLPOINT #01 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report 12/9/91, 12/16/91 Date well installation 12/7/91 Date well development 12/9/91, 12/16/91

Well designation: #01 SEE MAP BELOW

Ground elevation: Est: _____ Survey: _____

Screened interval: (From Ground Surface) 0.90 to 5.90' (measured during installation) 1.2 to 6.2 (TD measured during development) Formation: WOMAN CREEK VALLEY FILL ALLUVIUM

Measuring point (MP): Top of well casing/other: TOP OF WELL CASING Well stick up: ~1.0' (measured 0.79' during development) SEE 3.20' (12/15/91) 3.10' (12/14/91) END 3.24 (12/15/91); 3.24 (12/16/91)

Water level (below MP): Start: 2.74' End: Not measured 12/9/91

Well depth (below MP): 6.97' Water elevation (BGS) depth ~1.95' SC 12/9/91

Method used to measure water level: Electronic water level meter (Slist Model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 Sec. 5.2.1.1

Volume Calculation: Well casing volume $= \pi r^2 h = \pi (0.07083)^2 4.23' = 0.06667 \frac{ft^3}{ft} \times 7.48 \frac{gal}{ft^3} = 0.50$ gal

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 6.97' After: Not measured 12/9/91

Development equipment: Teflon bailer 1¼" O.D. (12/9/91), Peristaltic pump 350 rpm (12/16/91)

Sampling equipment: Not sampled

pH meter No. Orion Model 230A S/N 001752 Calibration: pH 4.01 = 4.00 @ 13.1°C, pH 10.01 = 10.14 @ 13.1°C pH not measured all @ 13.1°C

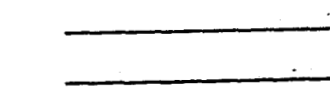
Specific conductance meter No.: Orion Model 122 SN 9811023 Calibration: Cond. std. = 1,000 mmhos @ 25°C measured 1,040 mmhos @ 14.4°C

F.T.U. meter No.: NA per SOP 2.08 Calibration: NA

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. mmhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/9/91 1315	2.15	—	7.58	6.1	792	0	0	Dk. brown, vy. silty
1318	↓	—	7.58	6.1	849	0.25	½	"
1320		—	7.59	6.1	837	0.5	1	"
1324		—	7.63	6.1	811	0.75	1½	"
1327		—	7.64	7.1	832	1.0	2	"
1330		—	7.66	6.1	884	1.25	2½	"
1333		—	7.65	7.1	906	1.5	3	Lt. brown, less silty
1337		—	7.58	6.1	939	1.75	3½	"
1340		—	7.57	6.1	943	2	4	"
1343	↓	—	7.56	6.1	952	2.25	4½	"

Comments:

MAP



12/16 Pumped well ~25 minutes until water clear

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID #01

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

SEE PAGE 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/9/91 1346	<.15	—	7.57	6.1	955	2.5	5	Lt. brown
1352	↓	—	7.57	6.1	954	2.75	5½	"
1354	↓	—	7.50	6.1	952	3.0	6	"

Comments: 12/14 Collected final round of measurements after additional development activities

pH 7.01 Temp 5.4 Cond 996 lt. gray

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — Form GW2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title S. CONDRAN / HYDROGEOLOGIST

Well ID PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT #02 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report 12/14/91 / 12/15/91, 12/16/91 Date well installation 12/7/91 Date well development 12/14/91, 12/15/91, 12/16/91

Well designation: #02 SEE MAP BELOW

Ground elevation: Est: _____ Survey: _____

Screened interval: 0.90 to 5.90' (From ground surface) (Measured during installation) Formation: Woman Crk. Valley Fill Alluvium

Measuring point (MP): Top of well casing/other: Top of well casing (1.1 to 6.1 TD measured during development) Well stick up: ≈1.0' (measured 0.85' during well development)

Water level (below MP): Start: 2.67' (12/14/91) 5.33 (12/15/91) End: Dry (12/14/91) 3.22 (12/15/91) 3.23 (12/16/91)

Well depth (below MP): 6.89' (12/14/91) Water elevation (BGS) ≈1.84' depth 12/14/91

Method used to measure water level: meter (Solinst Model 101 Electronic Water level) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing Volume per SOP GW.2 Sec. 5.2.1.

Volume Calculation: Well casing volume = $\pi r^2 h = \pi (0.07083')^2 4.22' = 0.0066 ft^3 \times 7.48 \frac{gal}{ft^3} = 0.50$ gal

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 6.89' (12/14/91) (12/14/91, 12/15/91) After: Not measured

Development equipment: Teflon bailer 1¼" O.D & Peristaltic Pump 350 rpm (12/16/91)

Sampling equipment: Not Sampled

pH meter No. SN 002249 (Orion Model 250A) Calibration: pH 4.01 = 4.00 @ 10.7°C, 10.01 = 9.70 @ 10.7°C, pH 7.00 measures 9.0 @ 11.4°C (12/16/91)

Specific conductance meter No.: SN 9811023 (Orion Model 122) Calibration: Cond. std. = 1,000 umhos @ 25°C measured 1047 @ 9.6°C

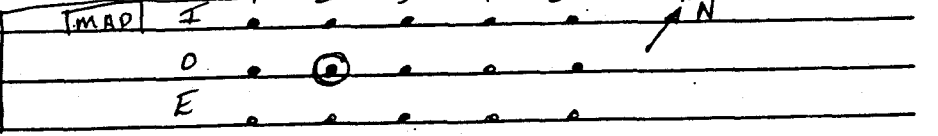
F.T.U. meter No.: NA per GW SOP 2.6 Calibration: NA

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/14 1110	≈.15	—	7.54	5.7	867	0.50	1	Brown
1115		—	7.94	5.3	777	0.75	1½	"
1120		—	7.22	5.5	777	1.125	2¼	"
1122		—	7.95	6.1	722	125	2½	"
1124		—	8.13	6.0	714	1.5	3	"
1127	↓	—	7.65	6.3	715	1.75	3½	"
12/15 1321	≈.2 gpm	—	7.42	6.9	944	2.75	5½	Milky
1325		—	7.36	6.9	954	3.25	6½	"
1328	↓	—	7.35	6.3	962	3.75	7½	"

Comments: 12/14 1057 Wellpoint bailed dry ≈ 2 volumes - no parameters collected
12/15 Wellpoint did not recovery enough from 12/14 continue bailing
Wellpoint bailed dry

12/15 Added decanted development water to wellpoint then bailed out repeatedly #02 began to produce.
12/16 pumped ≈ 25 minutes until water appeared clear also collected final round of measurements:
pH 7.01 Temp 5.5 Cond 958 lt. gray

MAP



U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Page 1 of 2

Recorder's Name and Title: S. CONDRAN / HYDROGEOLOGIST

Well ID: PUMP / TRACER TEST WELLPOINT ARRAY WELLPOINT #03 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____
12/15/91 (No parameters collected)

Date this report: 12/14/91 12/16/91 Date well installation: 12/7/91 Date well development: 12/14/91, 12/15/91, 12/16/91

Well designation: #03 SEE MAP BELOW

Ground elevation: Est: _____ Survey: _____
(from Ground Surface)

Screened interval: 0.80 to 5.80' (measured during installation, develop 12/9/91) Formation: Woman Crk. Valley Fill Alluvium SC 12/30/91
1.0 to 6.0 (TD measured during development) Water level measurements 12/30/91

Measuring point (MP): Top of well casing/other: Top of Well Casing Well stick up: ~1.0' (measured 0.96' during develop)

Water level (below MP): Start: 3.34' (12/14/91) 6.42 (12/15/91) End: Dry (12/14/91) ~~6.42~~ 6.64 (12/15/91) SC 12/16/91 6.22 (12/16/91)

Well depth (below MP): 6.77' (12/9/91) 6.94 (12/30/91) Water ~~elevation~~ depth (BGS) SC 12/14/91 ~2.38'

Method used to measure water level: Electronic water level meter (Solinst Model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 sec. 5.2.1.1

Volume Calculation: Well casing volume $= \pi r^2 h = \pi (0.07083')^2 3.43' = 0.05406 ft^3 \times 7.48 \frac{gal}{ft^3} = 0.40$ gal

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 6.77' (12/9/91) After: Not measured (12/16/91)

Development equipment: Teflon bailer 1¼" O.D. (12/14/91, 12/15/91), Peristaltic pump 350 rpm, surge block (12/16/91)

Sampling equipment: Not sampled

pH meter No.: Orion Model 250A S/N 002249 Calibration: pH 4.01 = 4.00 @ 10.7°C, 10.01 = 9.70 @ 10.7°C; pH 7.00 measures 7.05 @ 11.4°C

Specific conductance meter No.: Orion Model 122 SN 9811023 Calibration: Cond std. = 1000 µmhos @ 25°C, measures 1047 µmhos @ 9.6°C

12/16/91

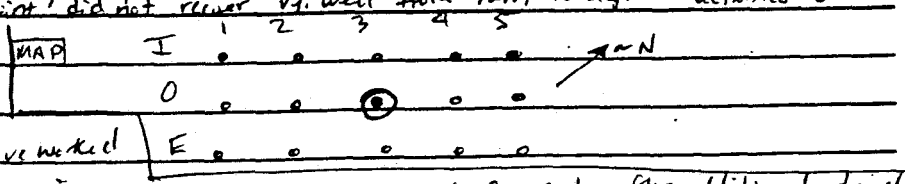
F.T.U. meter No.: NA per GW SOP 2.08 Calibration: NA

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm a: °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/14	1144	<.15	—	7.83	5.6	741	0.40	1	Brown
	1147	↓	—	8.36	5.9	704	0.80	2	"
	1231	↓	—	WELL IS DRY					lt. brown
12/16/91	0945		—	7.62	6.9	667	~~0.120~~ 0.10 SC 12/14/91	2¼	lt. gray/brn., cloudy
			—	WELL IS DRY		AFTER REMOVAL ~1/10 GALLON			WILL LET RECHARGE
			—						
	1512	<.10	—	7.18	6.1	988	0.30	2¾	lt. gray, cloudy
	1514	↓	—	7.16	5.8	988	0.50	3¼	"
	1518	↓	—	7.23	5.7	988	0.70	3¾	"
	1523	↓	—	7.14	5.8	987	0.90	4¼	"

12/14 1057 Wellpoint bailed dry < 2 volumes - no parameters collected

Comments: 12/15 End of day wellpoint H_2O is not clearing up
Wellpoint did not recover vs. well from 12/14 development activities - bailed dry 12/15

12/15 Added decanted development H_2O bailed out repeatedly, wellpoint still not producing



12/16 1210 Use surge block on 03
1255 Surge method appears to have worked well is producing

12/16 pumped ~25 minutes until water was clear - collected final round of msmts. after additional development activities

pH 7.02 Temp 5.6 COND 986 lt. brown

(4011-600-0022) (GW2REV.1)(09-10-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID Wellpoint 03

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. Orion model 250A S/N 002249 Calibration: pH 4.01 = 4.00 @ 10.7°C pH 10.01 = 9.70 @ 10.7°C pH 7.00 measures 7.08 @ 11.4°C

Specific conductance meter No.: Orion Model 123 S/N 9811023 Calibration: Conductivity std. of 1000 µmhos @ 25°C measures 1047 µmhos @ 9.6°C

F.T.U. meter No.: _____ Calibration: _____

SEE PAGE 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. µmhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/14 1527	2.10	—	7.16	5.9	987	1.10	4 3/4	lt gray, cloudy
1529	↓	—	7.09	5.7	986	1.30	5 1/4	lt gray, cloudy
1533		—	7.12	5.6	985	1.50	5 3/4	"
1535		—	7.02	5.6	985	1.70	6 1/4	"
1537		—	7.03	5.6	985	1.90	6 3/4	"
1541	↓	—	7.01	5.7	990	2.10	7 1/4	"

Comments: _____

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title S. CONDRAN / HYDROGEOLOGIST

Well ID Well Point 04 PUMP TRACER TEST WELL POINT ARRAY (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report 12/14/91, 12/16/91 Date well installation 12/7/91 Date well development 12/14/91, 12/16/91

Well designation: #04 SEE MAP BELOW NEXT PAGE (sc 12/14/91)

Ground elevation: Est: _____ Survey: _____

Screened interval: (from ground surface) 1.0 to 6.0' (measured during installation + development) Formation: Woman Creek Valley Fill Alluvium

Measuring point (MP): Top of well casing/other: Top of well casing Well stick up: ~1.0' (measured 1.0' during development)

Water level (below MP): Start: 5.28' End: not measured 12/14/91 BEG 3.36 (12/15/91) END 3.38 (12/15/91) 3.40 (12/16/91)

Well depth (below MP): 6.96' (12/9/91) Water elevation (BGS) ~2.28 (depth sc 12/14/91)

Method used to measure water level: meter (Solinst Model 101) (Electronic water level) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 sec. 5.2.1.1.

Volume Calculation: Well casing volume = $\pi r^2 h = \pi (0.1070 ft)^2 3.68' = 0.0580 ft^3 \times 7.48 gal/ft^3 = 0.43 gal \approx 0.5 gal$

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 6.96' (12/9/91) After: Not measured 12/14/91

Development equipment: Teflon bailer 1¼" O.D. (12/14/91), peristaltic pump 350 rpm (12/16/91)

Sampling equipment: Not Sampled

pH meter No. Orion Model 250A SN 802249 Calibration: pH = 4.00 @ 10.7°C, 10.01 = 9.70 @ 10.7°C, pH 7.00 measures 7.08 @ 11.8°C (12/16/91)

Specific conductance meter No.: Orion Model 122 SN 9811023 Calibration: Cond. std = 1000 micromhos @ 25°C, measures 1047 micromhos @ 9.6°C (12/16/91)

F.T.U. meter No.: NA per GW SOP 2.04 Calibration: NA

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/14				7.5				
1231		—	7.76	5.8 (estimated)	968	0	0	DK brown, silty
1233	.125	—	7.97	5.8	953	0.25	½	"
1234	.25	—	7.73	5.8	950	0.50	1	"
1235	.25	—	8.09	5.7	956	0.75	1½	"
1237	.125	—	7.92	5.5	957	1.0	2	"
1238	.25	—	7.86	5.6	956	1.25	2½	"
1239	.25	—	7.90	5.4	955	1.50	3	decreasing silt from here
1240	.25	—	7.84	5.5	954	1.75	3½	"
1241	.25	—	7.89	5.4	956	2.0	4	"
1243	.125	—	7.95	5.7	957	2.25	4½	"
1243	.5	—	7.81	5.5	960	2.50	5	"
1244	.25	—	7.83	5.6	958	2.75	5½	"
1245		—	7.85	5.6	963	3.0	6	"
1246		—	7.85	5.8	958	3.25	6½	"
1246	.5	—	7.54	5.9	941	3.50	7	"
1247	.25	—	7.49	5.6	967	3.75	7½	"
1247	.5	—	7.61	5.7	962	4	8	Lt. brown
1249	.125	—	7.50	5.7	965	4.25	8½	"
1250	.25	—	7.51	5.8	967	4.5	9	"
1251		—	7.18	5.7	964	4.75	9½	"

Comments: ↓

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID 04 continued

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

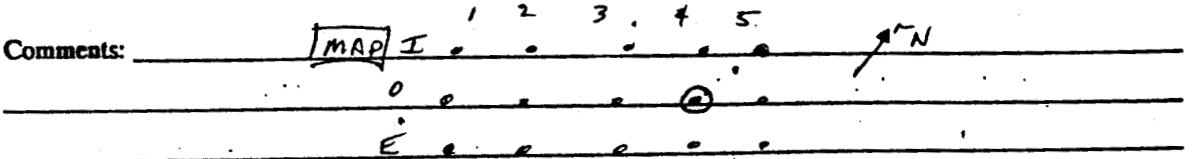
F.T.U. meter No.: _____ Calibration: _____

SEE Page 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
1252	.25	—	7.20	5.7	968	5	10	Brown, silty
1254	.125	—	7.19	5.7	968	5.25	10½	"
1255	.25	—	7.16	5.7	968	5.5	11	"
1265	.5	—	7.24	5.7	968	5.75	11½	"
1256	.25	—	7.29	5.8	967	6	12	"
1257	.25	—	7.32	5.7	965	6.25	12½	at 12/13/93 Lt brown less silty
1259	.125	—	7.14	5.6	967	6.5	13	"
1300	.25	—	7.16	5.7	967	6.75	13½	"
1301	.25	—	7.15	5.7	968	7	14	"

12/14

Comments: MAP



12/16 Pumped well ~ 25 minutes until water was clear
- Also collected final round of parameters after additional development activities:
pH 7.02 Temp 6.0 Cond .973 clear

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Page 1 of 1

Recorder's Name and Title S. CONDRAN / HYDROGEOLOGIST

Well ID PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT #05 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report 12/9/91, 12/16/91 Date well installation 12/8/91 Date well development 12/9/91, 12/16/91

Well designation: WELLPOINT #05 SEE MAP BELOW

Ground elevation: Est: _____ Survey: _____

Screened interval: (From Ground Surface) 0.81 to 5.81' (measured during installation) Formation: WOMAN CRK. VALLEY FILL ALLUVIUM

Measuring point (MP): Top of well casing/other: Top of well casing 1.0 to 6.0 (measured during development) Well stick up: ~1.0' (measured 0.92' during develop.)

Water level (below MP): Start: 2.90' End: Not measured BEG 3.38 (12/15/91) 3.26 (12/14/91) END 3.40' (12/15/91) 3.41' (12/16/91)

Well depth (below MP): 6.89' Water ~~elevation~~ depth (BGS) ~1.98' SEE 12/9/91

Method used to measure water level: Electronic water level meter (Solinst model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 Sec. 5.2.1.1.

Volume Calculation: Well casing volume = $\pi r^2 h = \pi (0.07083')^2 \cdot 3.99' = 0.06289\,ft^3 \times 7.48\,\frac{ft^3}{gal} = 0.47\,gal$ ~0.5 gal

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 6.89' After: Not measured

Development equipment: Teflon bailer 1'4" O.D. (12/9/91), Peristaltic pump 350 rpm (12/16/91)

Sampling equipment: Not sampled

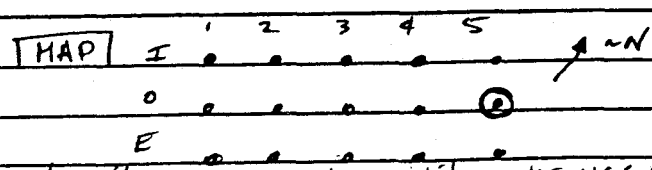
pH meter No. Orion model 230A S/N 001752 Calibration: pH 4.01 = 4.00 @ 13.1°C pH 10.01 = 10.14 " pH 7.00 measured till @ 13.1°C

Specific conductance meter No.: Orion Model 122 SN 9811023 Calibration: Cond. std. = 1000 mmhos @ 25°C measured 1040 mmhos @ 14.4°C

F.T.U. meter No.: NA per GW SOP 2.08 Calibration: NA

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm a: °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/9/91 SC 12/9/91 1356	.125	—	7.47	6.1	899	0	0	Dk. brown silty
1358	.125	—	7.48	6.1	918	0.25	1/2	"
1402	.063	—	7.47	6.1	960	0.5	1	"
1404	.125	—	7.48	6.1	950	0.75	1 1/2	"
1406	.125	—	7.46	6.1	956	1.0	2	"
1407	.25	—	7.47	7.1	959	1.25	2 1/2	lt. brn. less silty
1409	.125	—	7.53	6.1	964	1.5	3	"
1410	.25	—	7.46	6.1	957	1.75	3 1/2	"
1412	.125	—	7.47	6.1	960	2.0	4	"
1416	.063	—	7.52	6.1	959	2.25	4 1/2	"
1417	.25	—	7.46	6.1	960	2.5	5	lt. brown

Comments:



12/16 pumped well ~25 minutes until water was clear
Also collected final round of parameters after additional development activities:

pH 7.03 Temp 5.5 Cond 964 clear

(4011-600-0022) (GW2REV.1)(09-10-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: S. CONDRAN / HYDROGEOLOGIST

Well ID: PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT # E1 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report: 12/9/91, 12/14/91, 12/15/91 and 12/16/91 Date well installation: 12/7/91 Date well development: 12/9/91, 12/14, 12/15, 12/6/91

Well designation: # E1 SEE MAP BELOW

Ground elevation: Est: _____ Survey: WOMAN CRK. VALLEY FILL ALLUVIUM

Screened interval: (From ground surface) 1.0 to 6.0' (measured during installation) 0.9 to 5.9 (TD measured during development) Formation: ↓

Measuring point (MP): Top of well casing/other: TOP OF WELL CASING Well stick up: ~1.0' (measured 1.10' during dev.)

Water level (below MP): Start: 2.68' (12/9/91) End: Not measured 12/9/91

Well depth (below MP): 7.03' ~~[illegible]~~ SC 12/9/91 Water ~~elevation~~ depth (BGS) ~1.58' (12/9/91) SC 12/9/91

Method used to measure water level: Electronic water level meter (Solinst model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 sec. 5.2.1.1

Volume Calculation: Well casing volume $= \pi r^2 h = \pi (0.07083')^2 \cdot 4.35' = 0.06856\ ft^3 \times \frac{7.48\ gal}{1\ ft^3} = 0.51\ gal$

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 7.03' (12/9/91) After: Not measured 12/9/91

Development equipment: Teflon bailer 1¼" O.D (12/9/91, 12/14/91) 12/16/91, Peristaltic pump (12/15/91) 350 rpm 12/16/91, Surge block (12/16

Sampling equipment: Not sampled

pH meter No. Orion Model 230A SN 001752 (12/9/91) Calibration: pH 4.01 = 4.00 @ 13.1°C pH 10.01 = 10.14 @ 13.1°C pH 7.00 measured 7.11 @ 13.1°C

Specific conductance meter No.: Orion model 122 SN 9811023 (12/9/91) Calibration: Cond. Std. = 1,000 µmhos @ 25°C measured 1,040 µmhos @ 14.4°C

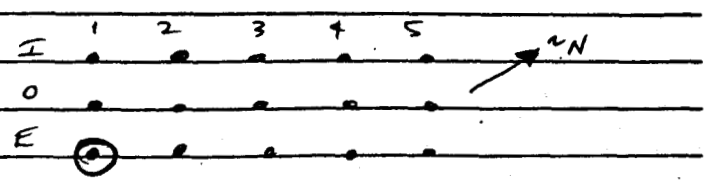
F.T.U. meter No.: NA per SOP 2.08 Calibration: NA

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/9/91	1401	.125	—	7.59	6.1	788	0	0	Dk. brn, vy, silty
	1403	↓	—	7.58	6.1	777	0.25	½	"
	1405	↓	—	7.61	6.1	768	0.50	1	"
	1407	↓	—	7.61	6.1	760	0.75	1½	"
	1408	.25	—	7.60	7.1	784	1.0	2	"
	1410	.125	—	7.60	7.1	757	1.25	2½	"
	1411	.25	—	7.60	7.1	820	1.5	3	"
	1413	.125	—	7.65	7.1	825	1.75	3½	"
	1415	.125	—	7.66	7.1	838	2	4	"
	1423	.031	—	7.79	6.1	898	2.25	4½	Brown

Comments:

1413 well appears to be going dry

MAP



WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID E1

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

SEE Page 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/9/91 1429	.042	—	7.86	7.1	952	~~2.5~~ 2.75	~~5~~ 5½	Brown
1448	.08	—	7.74	6.1	969	3	6	"
1617		—	7.12	5.1	963	3.25	6½	Lt. gray/brown, cloudy
1622		—	7.30	5.1	977	3.5	7	"
1625	↓	—	7.53	5.1	982			"

Comments: 1413 Well point is going dry - slow to recharge

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID E1

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 12/14/91 / 12/15/91 12/16/91 12/9/91

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: 3.14' (12/14) 3.24 (12/15) End: Not measured (12/14) 3.26 (12/15)

Well depth (below MP): 7.04' (12/14) Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: 7.04 (12/14) After: Not measured

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

See Page 1 for additional info

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/14	1348	0.125	—	7.21	6.4	966	3.75	7½	lt. gray, cloudy
	1350	0.125	—	7.67	5.9	969	4.0	8	"
	1351	0.25	—	7.43	5.8	973	4.25	8½	"
	1352	0.25	—	7.52	5.9	973	4.5	9	"
	1353	0.25	—	7.50	6.1	973	4.75	9½	"
12/15	0940		—	6.94	8.3	981	5.5	11	"
	9:52		—	7.05	7.2	969	5.75	11½	"
pumping ≈ 200ml/min	9:59	Dry	—	~~6.76~~	~~5.9~~	~~973~~ SC for TJS 12/16/91	6.0	12	"
	10:27		—	6.76	5.9	973	6.25	12½	"
	10:33		—	6.96	6.3	975	6.5	13	"
	10:44		—	7.13	5.9	973			Clear
	10:52		—	7.15	6.9	975	6.75	13½	Clear

Comments: SC 12/16/91 SC 12/16/91

No development activities 12/10-13 so as not to affect single well tracer test

(4011-600-0022) (GW2REV.1)(09-10-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID 67

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 12/16/91

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: ____

Water level (below MP): Start: 3.28 (12/16/91) End: Not measured

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. Orion model 250A (12/16) S/N 002249 Calibration: pH 4.01 = 4.00 @ 10.7°C; pH 10.01 = 9.70 @ 10.7°C; pH 7.00 = 7.08 @ 11.4°C

Specific conductance meter No.: Orion model 122 S/N 9811023 Calibration: Conductivity std. 1000 µmhos @ 25°C measures 1047 µmhos @ 9.6°C

F.T.U. meter No.: _____ Calibration: _____

SEE Page 1 for additional info.

ONLY 12/16/91 NEED TO ADD W/ 12/9, 12/14 + 12/15 FOR CUMULATIVE TOTAL

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/16/91								
1513	.083	—	7.11	6.5	977	1/4	1/4	lt. gray, cloudy
1516	↓	—	7.22	6.0	979	1/2	1	"
1519	↓	—	7.24	6.0	981	3/4	1 1/2	"
1524	.05	—	7.17	5.9	979	1	2	"
1528	.06	—	7.13	5.9	977	1 1/4	2 1/2	"
1531	.083	—	7.07	5.8	974	1 1/2	3	lt. gray, slightly cloudy
1534	↓	—	7.19	5.7	973	2 1/4	3 1/2	"
1536	.125	—	7.04	5.7	972	2 1/2	4	"
						So 12/16/91		

Comments: 12/16 Used surge block to develop well
12/16 pumped well ~25 minutes until water was clear
Also collected final round of parameters after additional develop. activities:
pH 7.06 Temp. 5.4 cond. 973 lt. gray

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — Form GW2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title S. Conran / Hydrogeologist

Well ID PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT # E2 (SEE MAP BELOW)

Survey location coordinates: North _____ East _____

Date this report 12/14/91, 12/15/91, 12/16/91 Date well installation 12/7/91 Date well development 12/14/91, 12/15/91, 12/16/91

Well designation: # E2

Ground elevation: Est: _____ Survey: _____

Screened interval: 0.90 to 5.90' (From ground surface) (Measured during installation + development 12/9/91) Formation: Woman Creek Valley Fill Alluvium

Measuring point (MP): Top of well casing/other: Top of Well casing Well stick up: ~1.0' (0.98' measured during develop.)

Water level (below MP): Start: 2.91' (12/14) 4.73 (12/15) End: Not measured 12/14 5.84 (12/15)

Well depth (below MP): 6.92' (12/14/91) (12/9/91) Water elevation (BGS) depth 1.93' as 12/14/91

Method used to measure water level: Electronic water level meter (Solinst Model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 sec. 5.2.1.1

Volume Calculation: Well casing volume = $\pi r^2 h = \pi (0.07083')^2 4.01' = 0.06320 ft^3 \times \frac{7.48 gal}{ft^3} = 0.47 gal$ ≈ 0.5 gal

Quantity of water used during drilling: NONE

Depth of sediment (below MP): Before: 6.92' (12/14/91) (12/9/91) After: Not measured 12/14

Development equipment: Teflon bailer 1¼" O.D. (12/14/91, 12/15/91), Surge block (12/16/91), 350 rpm peristaltic pump (12/15/91, 12/16/91)

Sampling equipment: Not sampled

pH meter No. Orion Model 250A SN 0022 49 Calibration: pH 4.01 = 4.00 @ 10.7°C, pH 10.01 = 9.70 @ 10.7°C, measure pH 7.00 = 7.08 @ 11.4°C

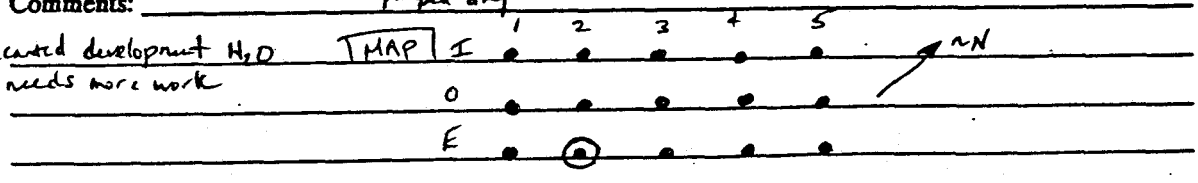
Specific conductance meter No.: Orion Model 122 SN 9811023 Calibration: Cond. std. = 1000 umhos @ 25°C, measured 1047 umhos @ 9.6°C

F.T.U. meter No.: NA per GW SOP 2.08 Calibration: NA

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/14	1432		—	7.12	5.5	812	0	0	DK. brown, vy. silty
	1433	.25	—	7.14	5.7	808	0.25	½	"
	1434	.25	—	7.11	6.0	810	0.5	1	"
	1437	.083	—	7.62	6.0	799	0.75	1½	"
12/15	1055	200 ml/min	—	Start pumping @ 200 ml/min					
	1058		—	DRY					
	1358		—	7.30	7.5	847	1.0	2	lt. brown
12/14	0909		—	6.60	6.0	947	1.25	2½	clear, slightly cloudy
	0911	.125	—	6.66	5.4	932	1.5	3	lt. brown, cloudy
	0914	.083	—	6.69	5.5	928	1.75	3½	"

Comments: 12/15 End of day wellpoint H_2O still not clearing up. Beg. of day wellpoint pumped dry did not recover well from 12/14 development activities

12/15 Added decanted development H_2O to bailed out - needs more work



WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID E2

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: 3.08 (12/16/91) End: Not measured (12/16/91)

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

SEE PAGE 1 for additional info.

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/16 0915	.25	—	6.72	5.5	925	2	4	Brown, cloudy
		—	DRY					"
0942		—	7.25	6.3	945	2.25	4 1/2	"
		—	WELL	BAILED	DRY AGAIN	WILL LET	RECHARGE	"
1016		—	7.18	7.9	945	2.5	5	"
1036	≤.01	—	7.40	7.8	948	2.75	5 1/2	"
1054		—	7.08	8.6	951	3	6	Lt Brown, cloudy
1117		—	7.29	7.6	941	3.25	6 1/2	"
1200		—	7.58	7.6	931	3.5	7	Lt. gray, cloudy
1233	√	—	8.02	7.7	952	3.75	7 1/2	"

Comments: 12/16 Used surge block to develop well
12/16 pumped well ~ 25 minutes until water was clear

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID E2

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development _____

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

SEE Page 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/14 1235	.125	—	7.55	7.7	948	4.0	8	Lt. gray, cloudy
1237	↓	—	7.52	8.0	940	4.25	8½	"
1239	↓	—	7.55	8.1	944	4.5	9	"
1511	.125	—	7.21	6.4	948	4.75	9½	"
1519	↓	—	7.24	5.8	959	5	10	"
1524	↓	—	7.17	5.7	959	5.25	10½	"
1527	↓	—	7.16	5.7	960	5.5	11	Lt. brown, cloudy
1530	↓	—	7.09	5.6	960	5.75	11½	"
1533	↓	—	7.15	5.6	960	6.0	12	"
1535	↓	—	7.08	5.5	959	6.25	12½	"

Comments: 12/16 collected additional round of msmts. after additional develop. activities:
pH 7.18 Temp 5.5 Cond. 960 lt. brown

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Page 1 of 1

Recorder's Name and Title: S. CONDRAN / HYDROGEOLOGIST

Well ID: # E3 PUMP/TRACER TEST WELLPOINT ARRAY (SEE MAP ~~NEXT PAGE~~ BELOW) SC 12/14/91

Survey location coordinates: North _____ East _____

Date this report: 12/14/91, 12/16/91 Date well installation: 12/7/91 Date well development: 12/14/91, 12/16/91

Well designation: # E3

Ground elevation: Est: _____ Survey: _____

Screened interval: (From Ground surface) 1.0 to 6.0' (Measured during installation) 1.1 to 6.1 (Measured during development 12/9) Formation: Woman Creek Valley Fill Alluvium

Measuring point (MP): Top of well casing/other: Top of Well Casing Well stick up: ~1.0' (measured ~ 0.9' during develop.)

Water level (below MP): Start: 3.10' (12/14) End: Not measured 12/14 BEG 3.22 (12/15) END 3.23 (12/15) 3.25 (12/16)

Well depth (below MP): ~~7.02'~~ 6.96' (12/14/91) 6.97' (12/9/91) SC 12/14/91 Water ~~elevation~~ depth (BGS) ~2.19' SC 12/14/91

Method used to measure water level: Electronic water level meter (Solinst Model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW 2 Sec. 5.2.1.1

Volume Calculation: Well casing volume = $\pi r^2 h = \pi(0.07083')^2$ ~~3.92~~ 3.87 SC 12/14/91 = 0.0610 ft³ SC 12/14/91, 7.48 gal/ft³ = 0.46 gal 1c · 50 gal

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: ~~7.02'~~ 6.96' (12/14/91) 6.97' (12/9/91) SC 12/14/91 After: Not measured 12/14

Development equipment: Teflon bailer (12/14/91), 1¼" O.D., Peristaltic pump (12/16/91)

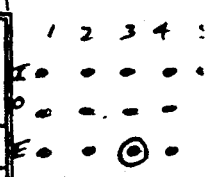
Sampling equipment: Not sampled

pH meter No.: Orion Model 250A S/N 002249 Calibration: pH 4.01 = 4.00 @ 10.7°C; 10.01 = 9.70 @ 10.7°C; pH 7.00 measures 7.08 @ 11.4°C 12/16/91

Specific conductance meter No.: Orion Model 122 SN 9811023 Calibration: cond. std = 1000 mmhos @ 25°C; measures 1047 @ 9.6°C

F.T.U. meter No.: NA per GW SOP 2.08 Calibration: NA

MAP



Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Casing Vols.	Physical Description of Water
1320		—	7.43	6.1	898	0	0	Dk. brn, vy. silty
1321	<.25	—	7.45	6.3	820	0.25	½	"
1322		—	7.41	6.5	832	0.50	1	"
1323		—	7.34	6.4	808	0.75	1½	"
1325		—	7.37	6.4	805	1.0	2	"
1327		—	7.47	6.6	829	1.25	2½	"
1330		—	7.41	6.6	899	1.50	3	"
1415		—	7.67	6.1	960	1.75	3½	Lt. Dk. brn, cloudy
1416		—	~~7.72~~ 7.68	6.0	967	2	4	SC 12/14/91 "
1419		—	7.72 SC 12/14/91	5.9	965	2.25	4½	Brn, cloudy
1420		—	7.42	6.1	968	2.5	5	"
1423		—	7.35	6.0	964	2.75	5½	"
1424		—	7.35	6.3	964	3	6	"
1425		—	7.31	5.8	964	3.25	6½	"
~~1426~~		—	~~7.20~~	~~5.9~~	~~961~~	~~3.5~~	7	"
1427		—	7.31	5.8	963	3.75	7½	"
1428		—	7.37	5.8	962	4	8	"

Comments:

Comments: 12/16 Pumped well ~25 minutes until water was clear. Collected additional round of msmts after additional develop. activities: pH 7.0 Temp 5.6 COND 956 lt gray

(0011-600-0022) (GW2REV.1)(09-10-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title: S. CONDRAN / HYDROGEOLOGIST

Well ID: # E4 PUMP/TRACER TEST WELLPOINT ARRAY (SEE MAP ~~BELOW~~ NEXT PAGE) SC 12/14/91

Survey location coordinates: North _____ East _____

Date this report: 12/14/91, 12/16/91 (12/15/91 (no parameters collected)) Date well installation: 12/7/91 Date well development: 12/14/91, 12/16/91, 12/15/91

Well designation: # E4 SEE MAP ~~BELOW~~ NEXT PAGE SC 12/14/91

Ground elevation: Est: _____ Survey: _____

Screened interval: (From Ground Surface) 1.0 to 6.0' (Measured during installation) + development 12/8/91 Formation: Women Crk. Valley Fill Alluvium

Measuring point (MP): Top of well casing/other: Top of well casing Well stick up: ~1.0' (Measured 0.96' during develop.)

Water level (below MP): Start: 3.50' (12/16/91) 3.28' (12/14/91) End: Not measured (12/16/91) (12/14/91) BEG 3.83 (12/15/91) END 6.56 (12/15/91) 3.50 (12/16/91) SC 12/16/91

Well depth (below MP): 6.70 (12/14/91) 7.02 (12/9/91) Water ~~elevation~~ depth (BGS) 2.32' SC 12/18/91

Method used to measure water level: Electronic water level meter (Solinst Model 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well volume per SOP GW.2 Sec. 5.2.1.1

Volume Calculation: Well casing volume = $\pi r^2 h$ = $\pi(0.07083')^2 \times 3.74'$ = 0.05845 ft³ × 7.48 gal/ft³ = 0.44 gal. ~0.5 gal which is easily measured

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 6.70 (12/14/91) 7.02 (12/9/91) After: Not measured

Development equipment: Teflon bailer 1¼" O.D. (12/14/91, 12/15/91, 12/16/91), Peristaltic pump (12/16/91), surge block (12/16/91)

Sampling equipment: Not Sampled

pH meter No.: Orion model 250A S/N 002249 Calibration: pH 4.01 = 4.00 @ 10.7°C, 10.01 = 9.70 @ 10.7°C; pH 7.00 measures 7.08 @ 11.4°C 12/16/91

Specific conductance meter No.: Orion model 122 S/N 9811023 Calibration: Cond. std = 1000 µmhos @ 25°C, measures 1047 µmhos @ 9.6°C

F.T.U. meter No.: NA per SOP GW 2.08 Calibration: NA

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm at °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/14/91	1303		—	7.02	6.0	873	0	0	DK. Brn., vy. silty
	1305	.125	—	7.35	6.2	888	0.25	1/2	"
	1306	.25	—	7.32	6.4	792	0.50	1	"
	1307	.25	—	7.40	6.2	780	0.75	1½	"
	1308	.25	—	7.40	6.6	779	1.0	2	"
	1314	<.05	—	7.51	6.8	755	1.25	2½	"
	1342	↓	—	7.54	7.2	748	1.5	3	"
	1450	↓	—	7.18	7.1	767	1.75	3½	"
12/16/91	0918		—	6.87	5.5	913	2.0	4	lt brown, cloudy
	0920	.125	—	6.92	5.6	913	2.25	4½	"
	0922	.125	—	6.97	5.6	907	2.5	5	"
	0923	.2	—	6.96	5.8	911	2.75	5½	"
	0939	Remove ~ 1/10 gallon wellpoint bailed dry and let recharge							
	1507		—	7.32	7.4	960	3	6	lt brown, cloudy
	1514	.036	—	7.39	5.8	967	3.25	6½	"
	1517	.083	—	7.24	5.7	965	3.5	7	"
	1522	.05	—	7.13	5.9	964	3.75	7½	"
	1526	.06	—	7.22	5.8	962	4.0	8	

Comments: 12/15 End of day wellpoint H_2O still not clearing up needs additional work. 12/15 Beg. of day wellpoint did not recover from 12/14 development activities. bailed dry 12/15

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title _____

Well ID _____

Survey location coordinates: North _____ East _____

Date this report _____ Date well installation _____ Date well development 12/14/91 12/16/91

Well designation: E4

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: _____ End: _____

Well depth (below MP): _____ Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: _____ After: _____

Development equipment: _____

Sampling equipment: _____

pH meter No. _____ Calibration: _____

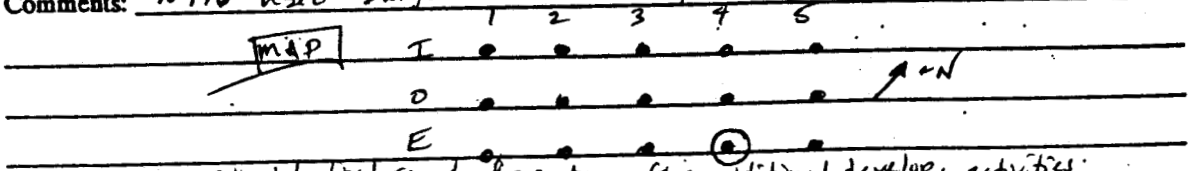
Specific conductance meter No.: _____ Calibration: _____

F.T.U. meter No.: _____ Calibration: _____

SEE PAGE 1

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/16/91 1529	.083	—	7.12	5.6	962	4.25	8½	lt. brn, cloudy
1534	.050	—	7.09	5.7	960	4.5	9	"
1537	.083	—	7.04	5.5	959	4.75	9½	"
1540	.063	—	7.0~	5.6	960	5	10	"
1542	.125	—	7.02	5.6	958	5.25	10½	"
1542	.5	—	7.03	5.5	956	5.5	11	"

Comments: 12/16 Pumped well ~25 minutes total, water was clear
12/16 Used surge block to develop well



12/16 Collected final round of insmts. after additional develop. activities:
pH 7.02, Temp. 5.6 COND 956 lt. brown

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

Recorder's Name and Title S. CONDRAN / Hydrogeologist

Well ID PUMP/TRACER TEST WELLPOINT ARRAY WELLPOINT #E5 (SEE MAP BELOW)

Survey location coordinates: North ____ East ____ (12/15/91 (no parameters collected))

Date this report 12/9/91, 12/14/91, 12/16/91 Date well installation 12/7/91 Date well development 12/9/91, 12/14/91, 12/15/91, 12/16/91

Well designation: #E5 SEE MAP BELOW

Ground elevation: Est: ____ Survey: ____

Screened interval: 0.90 to 5.90' (Measured during installation) (From ground surface) Formation: WOMAN CR. VALLEY FILL ALLUVIUM

Measuring point (MP): Top of well casing/other: TOP OF WELL CASING (1.1 to 6.1 (measured during development 12/14/91)) Well stick up: ~1.0' (Measured 0.86' during develop.)

Water level (below MP): Start: 3.69' (12/9/91) End: Not measured (12/9/91) (6.83 (12/14/91))

Well depth (below MP): 6.83' (12/9/91) (6.62 sc 12/14/91) Water elevation (BGS) ~2.83' (depth sc 12/9/91)

Method used to measure water level: Electronic water level meter (Solinst 101) Estimated recharge rate: Not estimated

Volume of saturated annulus (assume 30 percent porosity): Not used to calculate well casing volume per SOP GW.2 Sec. 5.2.1.1

Volume Calculation: well casing volume = $\pi r^2 h = \pi (0.0708 ft)^2 3.20' = 0.05044 ft^3 \times 7.48 gal/ft^3 = 0.38 gal$ ≈ 0.40 gal

Quantity of water used during drilling: None

Depth of sediment (below MP): Before: 6.83' (12/9/91) (6.62 sc 12/9/91) After: Not measured (12/9/91)

Development equipment: Teflon bailer 1¼" O.D., Peristaltic pump (12/16/91), Surge block (12/16/91) (12/7/91, 12/14/91 / 12/15/91, 12/16/91)

Sampling equipment: Not sampled

pH meter No. Orion Model 230A SN 001752 Calibration: pH 4.01 = 4.00 @ 12.1°C, pH 10.01 = 10.14 @ 13.1°C pH 7.00 measured 7.11 @ 12.1°C } 12/9

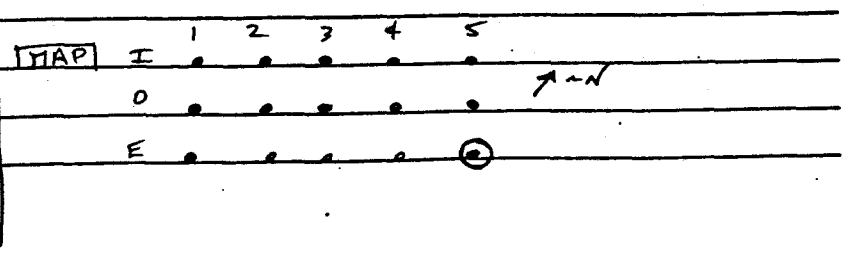
Specific conductance meter No.: Orion Model 122 S/N 981023 Calibration: Cond. std. = 1,900 µmhos @ 25°C measured 1,940 µmhos @ 14.4°C }

F.T.U. meter No.: Na per GW SOP 2.04 Calibration: NA

Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. µmhos/cm @ °C	Cum. Vol. of H_2O Removed		Physical Description of Water
						Gallons	Casing Vols.	
12/9 1422		—	8.38	6.1	807	0	0	Lt. brown, silty
1425	~.25	—	7.84	7.1	755	0.25	¼	Dk. brown, silty
1427		—	7.74	7.1	675	0.5	1	"
1428	~.25	—	7.75	7.1	673	0.75	1½	"
1431		—	7.86	7.1	696	1.0	2	"
1433	↓	—	7.87	7.1	775	1.25	2½	"

Comments:

13 Wellpoint is going dry - very slow to recharge



U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

Form GW.2A

WELL DEVELOPMENT AND SAMPLING FORM

E
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ditional
info

Recorder's Name and Title _____

Well ID ES

Survey location coordinates: North _____ East _____ 12/09/91

Date this report _____ Date well installation _____ Date well development 12/14/91 / 12/16/91

Well designation: _____

Ground elevation: Est: _____ Survey: _____

Screened interval: _____ Formation: _____

Measuring point (MP): Top of well casing/other: _____ Well stick up: _____

Water level (below MP): Start: 5.96 (12/14) 3.32 (12/16/91) End: Not measured (12/14) BEG 6.78 (12/15) END 6.24 (12/15/91)

Well depth (below MP): 6.83 (12/14/91) 6.78' (12/15/91) Water elevation (BGS) _____

Method used to measure water level: _____ Estimated recharge rate: _____

Volume of saturated annulus (assume 30 percent porosity): _____

Volume Calculation: _____

Quantity of water used during drilling: _____

Depth of sediment (below MP): Before: 6.83 (12/14) 6.78 (12/15) After: Not measured 12/14

Development equipment: _____

Sampling equipment: _____

pH meter No. Orion Model 250A S/N 002249 Calibration: pH 4.01 = 4.00 @ 10.7°C pH 10.01 = 9.70 @ 10.7°C pH 7.00 = 7.08 @ 11.4°C 12/16/91

Specific conductance meter No.: Orion Model 122 S/N 981023 Calibration: Conductivity Std = 1000 umhos @ 25°C Reads 1047 @ 9.6°C

F.T.U. meter No.: _____ Calibration: _____

	Time	Pumping Rate gpm	FTU	pH	Temp. °C	S.C. umhos/cm @ °C	Cum. Vol. of H_2O Removed: Gallons	Cum. Vol. of H_2O Removed: Casing Vols.	Physical Description of Water
12/14/91	1356			7.52	7.3	693	1.5	3	dk. brown, silty
	1359			7.55	7.3	630	1.75	3½	"
12/16/91	0923			7.08	5.5	923	2	4	~~[illegible]~~
	0925			7.14	5.6	918	2.25	4½	"
	0930			7.12	5.8	919	2.5	5	"
	0935			7.24	6.2	916	2.75	5½	"
	Bailed dry 12/16 after removing ~3/4 gallon								
	1509			7.20	6.8	947	3	6	lt. gray, cloudy
	1513			7.15	6.0	951	3.25	6½	"
	1517			7.23	5.8	949	3.5	7	"
	1522			7.12	5.9	948	3.75	7½	"
	1525			7.20	5.8	947	4	8	
	1528			7.13	5.6	945	4.25	8½	
	1531			7.08	5.6	945	4.5	9	lt brown, cloudy

Comments:

1256 12/16 Use surge block on ES appears to have worked well is producing
- pumped well a 25 minutes until water was clear
- Also collected additional round of msmts. after addit. develop. activities.
H7 02 Temp 5.5 Cond 945 lt. gray

No development activities 12/10 - 13/91 so as not to affect single well tracer tests

12/15 End of day wellpoint H_2O not clearing up needs additional work
Beg of day wellpoint did not recover well from 12/14 development activities - bailed dry 12/15
12/15 Added decanted development H_2O to ES then bailed out - wellpoint not responding needs additional work

(4011-600-0022) (GW2REV.1)(09-10-91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

Page 1 of 5

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/9/91

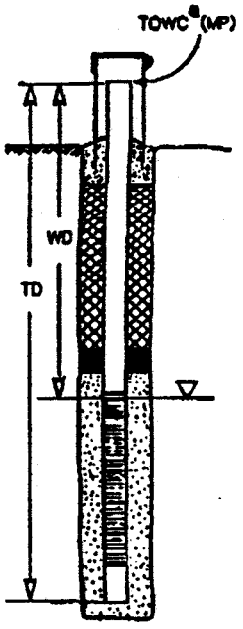
Personnel 1. S. CONORAN

2. C. BIENIULIS

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. I1	TOWC WD[b] (ft)	TOWC MTD[c] (ft)	Comments
Measurement 1	2.84	~~7.09~~ 6.75	
Measurement 2	2.84	7.05 6.75	
Measurement 3	2.84	7.05 6.75	
	2.84 Average WD	7.05 6.75 (SC 12/4/91) Average MTD	+ 0.30 Probe End[d] = 7.05 TD[e] SEC Chk'd by

Well No. I2	WD[b]	MTD[c]	Comments
Measurement 1	2.94	6.63	
Measurement 2	2.94	6.63	
Measurement 3	2.94	6.63	
	2.94 Average WD	6.63 Average MTD	+ .3 Probe End[d] = 6.93 TD[e] SEC Chk'd by

Well No. I3	WD[b]	MTD[c]	Comments
Measurement 1	3.05	6.78	
Measurement 2	3.05	6.78	
Measurement 3	3.05	6.78	
	3.05 Average WD	6.78 Average MTD	+ .3 Probe End[d] = 7.08 TD[e] SEC Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/9/91

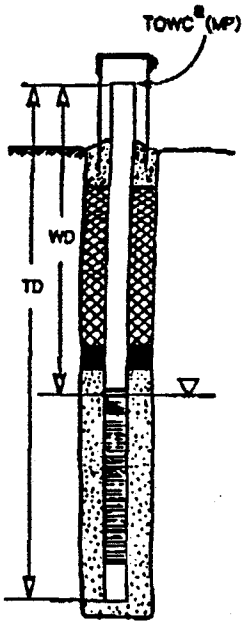
Personnel 1. S. CONDRON

2. C. BIENIULIS

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. I1	TOWC WD[b] (ft)	TOWC MTD[c] ft	Comments
Measurement 1	3.09	6.85	
Measurement 2	3.09	6.85	
Measurement 3	3.09	6.85	
	3.09 Average WD	6.85 Average MTD	+ 0.3 Probe End[d] = 7.15 TD[e] SEC Chk'd by

Well No. I5	WD[b]	MTD[c]	Comments
Measurement 1	3.15	6.92	
Measurement 2	3.15	6.92	
Measurement 3	3.15	6.92	
	3.15 Average WD	6.92 Average MTD	+ 0.3 Probe End[d] = 7.22 TD[e] SEC Chk'd by

Well No. 01	WD[b]	MTD[c]	Comments
Measurement 1	2.74	6.67	
Measurement 2	2.74	6.67	
Measurement 3	2.74	6.67	
	2.74 Average WD	6.67 Average MTD	+ 0.3 Probe End[d] = 6.97 TD[e] SEC Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

Page 3 of 5

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 EAST HILLSIDE

Date 12/9/91

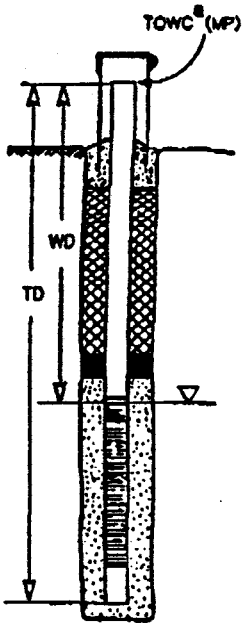
Personnel 1. S. CONDRAN

2. C. BIENIULIS

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/9/91 Date Due 3/2/92

QC REVIEW: Name _____ Date _____



Well No. 02	TOWC WD[b] (ft)	TOWC MTD[c] (ft)	Comments
Measurement 1	2.40	6.59	
Measurement 2	2.40	6.59	
Measurement 3	2.40	6.59	
	2.40 Average WD	6.59 Average MTD	+ 0.3 Probe End[d] = 6.89 TD[e] SEC Chk'd by

Well No. 03	WD[b]	MTD[c]	Comments
Measurement 1	2.88	6.47	
Measurement 2	2.88	6.47	
Measurement 3	2.88	6.47	
	2.88 Average WD	6.47 Average MTD SC 12/9/91	+ 0.3 Probe End[d] = 6.77 TD[e] SEC Chk'd by

Well No. 04	WD[b]	MTD[c]	Comments
Measurement 1	2.89	6.66	
Measurement 2	2.89	6.66	
Measurement 3	2.89	6.66	
	2.89 Average WD	6.66 Average MTD	+ 0.3 Probe End[d] = 6.96 TD[e] SEC Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/9/91

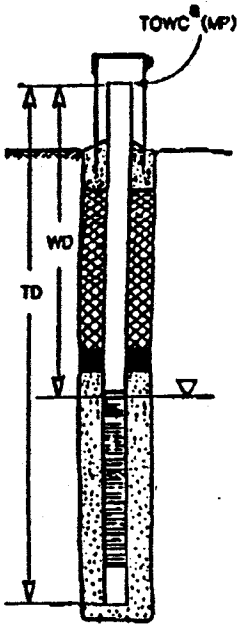
Personnel 1. J. CONDRAY

2. C. BIENIULIS

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. 05	TOWC WD[b] (ft)	TOWC MTD[c] (ft)	Comments
Measurement 1	2.90	6.59	
Measurement 2	2.90	6.59	
Measurement 3	2.90	6.59	
	2.90 Average WD	6.59 Average MTD	+ 0.3 Probe End[d] = 6.89 TD[e] SLC Chk'd by

Well No. E1	WD[b]	MTD[c]	Comments
Measurement 1	2.68	6.73	
Measurement 2	2.68	6.73	
Measurement 3	2.68	6.73	
	2.68 Average WD	6.73 Average MTD	+ 0.3 Probe End[d] = 7.03 TD[e] SLC Chk'd by

Well No. E2	WD[b]	MTD[c]	Comments
Measurement 1	2.58	6.62 6.92	
Measurement 2	2.58	6.62 6.92	
Measurement 3	2.58	6.62 6.92	
	2.58 Average WD	SLC 12/9/91 6.92 Average MTD	+ 0.3 Probe End[d] = 8.92 SLC 12/9/91 TD[e] SLC Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
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- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

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GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. 041 881 HILLSIDE

Date 12/9/91

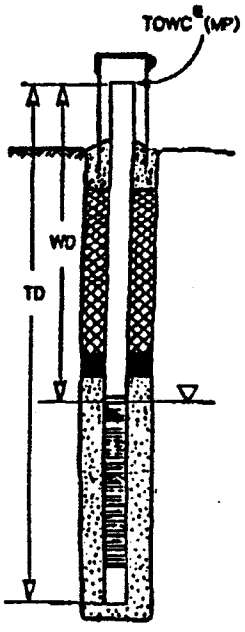
Personnel 1. S. COWDEAN

2. C. BIENIULIS

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. E3	TOWC WD[b] (ft)	TOWC MTD[c] (ft)	Comments
Measurement 1	3.75	6.67	
Measurement 2	3.75	6.67	
Measurement 3	3.75	6.67	
	3.75 Average WD	6.67 Average MTD	+ 0.3 Probe End[d] = 6.97 TD[e] SEC Chk'd by

Well No. E4	WD[b]	MTD[c]	Comments
Measurement 1	3.96	6.72	
Measurement 2	3.96	6.72	
Measurement 3	3.96	6.72	
	3.96 Average WD	6.72 Average MTD	+ 0.3 Probe End[d] = 7.02 TD[e] SEC Chk'd by

Well No. E5	WD[b]	MTD[c]	Comments
Measurement 1	3.69	6.32	
Measurement 2	3.69	6.32	
Measurement 3	3.69	6.32	
	3.69 Average WD	6.32 Average MTD	+ 0.3 Probe End[d] = 6.67 TD[e] SEC Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
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U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

Page 1 of 5

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT

Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/14/91

Personnel 1. T. SINDELAR

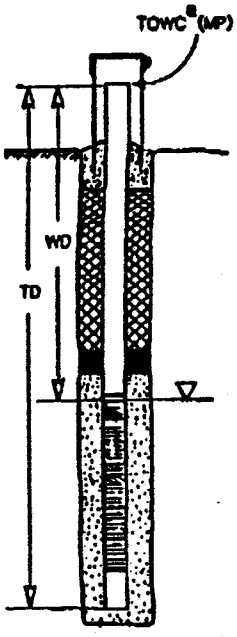
2. J. GEIST

Form filled out by S. Cadran

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. I1	TOWC WD[b] (ft)	TOWC MTD[c] (ft)	Comments
Measurement 1	3.19	Not measured	
Measurement 2	3.19		
Measurement 3	3.19		
	3.19 Average WD	Average MTD	+ ____ = ____ SEC Probe End[d] TD[e] Chk'd by

Well No. I2	WD[b]	MTD[c]	Comments
Measurement 1	3.30	Not measured	
Measurement 2	3.30		
Measurement 3	3.30		
	3.30 Average WD	Average MTD	+ ____ = ____ SEC Probe End[d] TD[e] Chk'd by

Well No. I3	WD[b]	MTD[c]	Comments
Measurement 1	3.41	Not measured	
Measurement 2	3.41		
Measurement 3	3.41		
	3.41 Average WD	Average MTD	+ ____ = ____ SEC Probe End[d] TD[e] Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
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Notes:
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U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/14/91

Personnel 1. T. SINCLAIR

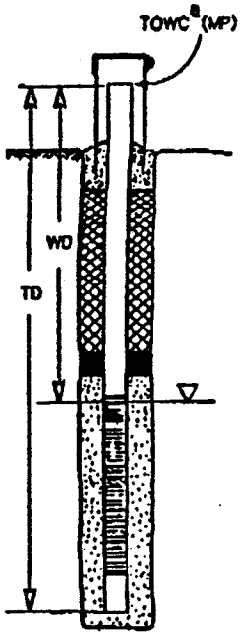
2. J. GEIST

Form filled out by S. Candran

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. I4	TOWC WD[b] (ft)	TOWC MTD[c] (ft)	Comments
Measurement 1	3.46	Not measured	
Measurement 2	3.46		
Measurement 3	3.46		
	3.46 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] SEC Chk'd by

Well No. I5	WD[b]	MTD[c]	Comments
Measurement 1	3.50	Not measured	
Measurement 2	3.50		
Measurement 3	3.50		
	3.50 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] SEC Chk'd by

Well No. 01	WD[b]	MTD[c]	Comments
Measurement 1	3.10	not measured	
Measurement 2	3.10		
Measurement 3	3.10		
	3.10 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] SEC Chk'd by

Footnotes:
a = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
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GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/14/91

Personnel 1. T. SINCLAIR

2. J. GEIST

Form filled out by S. Condran

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

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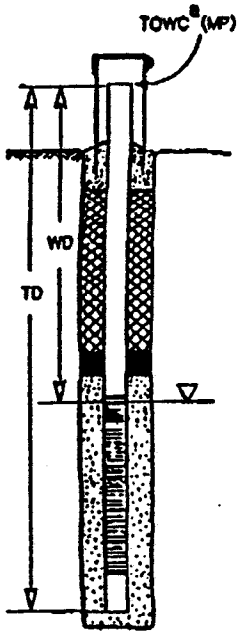

Well No. 02	TOWC WD[b] (ft)	TOWC MTD[c] (ft)	Comments
Measurement 1	DRY	Not measured	
Measurement 2			
Measurement 3			
	Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] SEC Chk'd by

Well No. 03	WD[b]	MTD[c]	Comments
Measurement 1	DRY	Not measured	
Measurement 2			
Measurement 3			
	Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] SEC Chk'd by

Well No. 04	WD[b]	MTD[c]	Comments
Measurement 1	3.28	Not measured	
Measurement 2	3.28		
Measurement 3	3.28		
	3.28 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] SEC Chk'd by

Footnotes:
a = TOWC = top of well casing
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U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/14/91

Personnel 1. T. SINDELAR

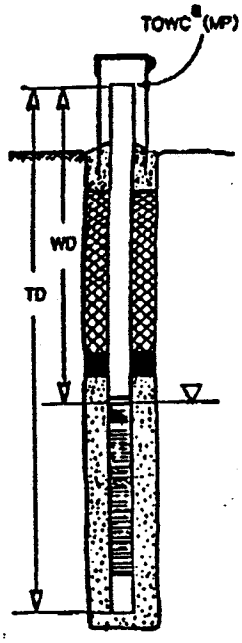
2. J. GEIST

Form filled out by S. Condran

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. 05	TOWC WD[b] (ft)	TOWC MTD[c] (ft)	Comments
Measurement 1	3.26	not measured	
Measurement 2	3.26		
Measurement 3	3.26		
	3.26 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] SEC Chk'd by

Well No. E1	WD[b]	MTD[c]	Comments
Measurement 1	3.14	7.04	
Measurement 2	3.14	7.04	
Measurement 3	3.14	7.04	
	3.14 Average WD	7.04 Average MTD	+ ____ = ____ Probe End[d] TD[e] SEC Chk'd by

Well No. E2	WD[b]	MTD[c]	Comments
Measurement 1	2.91	6.92	
Measurement 2	2.91	6.92	
Measurement 3	2.91	6.92	
	2.91 Average WD	6.92 Average MTD	+ ____ = ____ Probe End[d] TD[e] SEC Chk'd by

Footnotes:
a = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
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U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

Page 5 of 5

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/14/91

Personnel 1. T. SINCLAIR

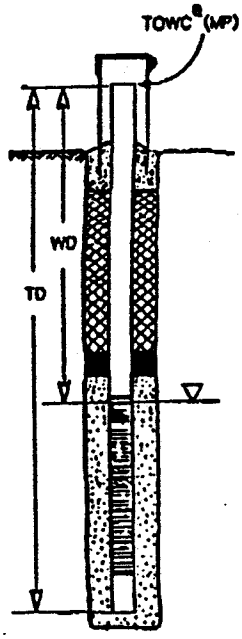
2. J. GEIST

Form filled out by S. Condran

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. E3	TOWC WD[b] (ft)	TOWC MTD[c] (ft)	Comments
Measurement 1	3.10	6.96	
Measurement 2	3.10	6.96	
Measurement 3	3.10	6.96	
	3.10 Average WD	6.96 Average MTD	+ _____ = _____ SEC Probe End[d] TD[e] Chk'd by

Well No. E4	WD[b]	MTD[c]	Comments
Measurement 1	3.28	6.70	
Measurement 2	3.28	6.70	
Measurement 3	3.28	6.70	
	3.28 Average WD	6.70 Average MTD	+ _____ = _____ SEC Probe End[d] TD[e] Chk'd by

Well No. E5	WD[b]	MTD[c]	Comments
Measurement 1	5.96	6.83	
Measurement 2	5.96	6.83	
Measurement 3	5.96	6.83	
	5.96 Average WD	6.83 Average MTD	+ _____ = _____ SEC Probe End[d] TD[e] Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
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U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

Page 1 of 5

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT

Revision 1.2

Project No. OU1 EAST HILLSIDE

Date 12/15/91

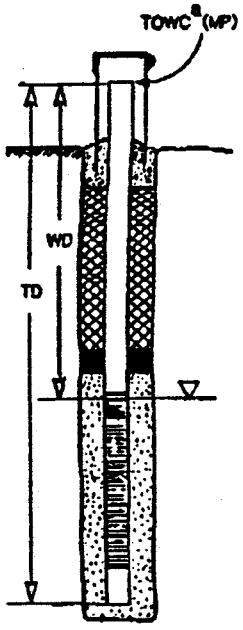
Personnel 1. T. SINDELAR

2. T. SAVKO / C. BIENIULIS (form filled out by S. London)

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. I1	TOWC BEG/END WD[b] (ft)	MTD[c]	Comments
Measurement 1	3.30 / 3.33	Not measured	
Measurement 2	3.30 / 3.33		
Measurement 3	3.30 / 3.33		
	3.30 / 3.33 Average WD	Average MTD	+ _____ = _____ Probe End[d] TD[e] _____ Chk'd by

Well No. I2	WD[b]	MTD[c]	Comments
Measurement 1	3.41 / 3.44	Not measured	
Measurement 2	3.41 / 3.44		
Measurement 3	3.41 / 3.44		
	3.41 / 3.44 Average WD	Average MTD	+ _____ = _____ Probe End[d] TD[e] _____ Chk'd by

Well No. I3	WD[b]	MTD[c]	Comments
Measurement 1	3.52 / 3.59	Not measured	
Measurement 2	3.52 / 3.59		
Measurement 3	3.52 / 3.59		
	3.52 / 3.59 Average WD	Average MTD	+ _____ = _____ Probe End[d] TD[e] _____ Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
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U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT

Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/15/91

Personnel 1. T. SINDELAR

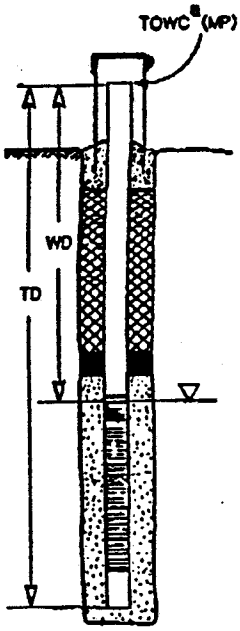
2. T. SAVKO / C. BIENIULUS

(form filled out by S. Conlon)

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. I4	TOWC BEG/END WD[b] (ft)	MTD[c]	Comments
Measurement 1	3.56 / 3.59	Not measured	
Measurement 2	3.56 / 3.59		
Measurement 3	3.56 / 3.59		
	3.56 / 3.59 Average WD	Average MTD	+ _____ = _____ _____ Probe End[d] TD[e] Chk'd by

Well No. I5	WD[b]	MTD[c]	Comments
Measurement 1	3.61 / 3.64	Not measured	
Measurement 2	3.61 / 3.64		
Measurement 3	3.61 / 3.64		
	3.61 / 3.64 Average WD	Average MTD	+ _____ = _____ _____ Probe End[d] TD[e] Chk'd by

Well No. 01	WD[b]	MTD[c]	Comments
Measurement 1	3.20 / 3.24	Not measured	
Measurement 2	3.20 / 3.24		
Measurement 3	3.20 / 3.24		
	3.20 / 3.24 Average WD	Average MTD	+ _____ = _____ _____ Probe End[d] TD[e] Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/15/91

Personnel 1. T. SINDELAR

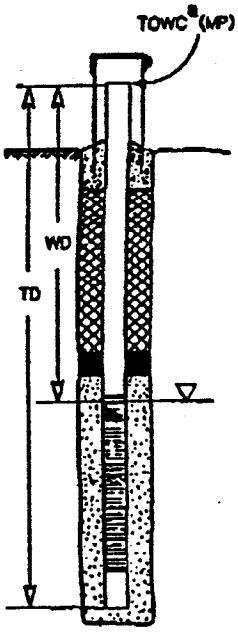
2. T. SAVKO / C. BIENIULIS

(form filled out by S. Lenton)

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 9/3/92

QC REVIEW: Name _____ Date _____



Well No. 02	TOWC BEG/END WD[b] (ft)	MTD[c]	Comments
Measurement 1	5.33/3.22	Not measured	
Measurement 2	5.33/3.22		
Measurement 3	5.33/3.22		
	5.33/3.22 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] ____ Chk'd by

Well No. 03	WD[b]	MTD[c]	Comments
Measurement 1	6.42/6.64	Not measured	
Measurement 2	6.42/6.64		
Measurement 3	6.42/6.64		
	6.42/6.64 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] ____ Chk'd by

Well No. 04	WD[b]	MTD[c]	Comments
Measurement 1	3.36/3.38	Not measured	
Measurement 2	3.36/3.38		
Measurement 3	3.36/3.38		
	3.36/3.38 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] ____ Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 EB/HILLSIDE

Date 12/15/91

Personnel 1. T. SINDELAR

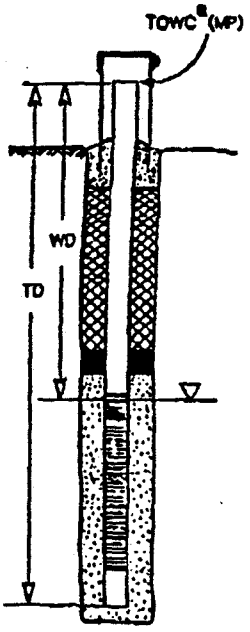
2. T. SAVKO / C. BIENIULLUS

(form filled out by S. Condon)

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. 05	TOWC BEG/END WD[b](ft)	MTD[c]	Comments
Measurement 1	3.38 / 3.40	Not measured	
Measurement 2	3.38 / 3.40		
Measurement 3	3.38 / 3.40		
	3.38 / 3.40		+ ____ = ____ ____
	Average WD	Average MTD	Probe End[d] TD[e] Chk'd by

Well No. E1	WD[b]	MTD[c]	Comments
Measurement 1	3.24 / 3.26	Not measured	
Measurement 2	3.24 / 3.26		
Measurement 3	3.24 / 3.26		
	3.24 / 3.26		+ ____ = ____ ____
	Average WD	Average MTD	Probe End[d] TD[e] Chk'd by

Well No. E2	WD[b]	MTD[c]	Comments
Measurement 1	4.73 / 5.84	Not measured	
Measurement 2	4.73 / 5.84		
Measurement 3	4.73 / 5.84		
	4.73 / 5.84		+ ____ = ____ ____
	Average WD	Average MTD	Probe End[d] TD[e] Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

Page 5 of 5

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 EAST HILLSIDE

Date 12/15/91

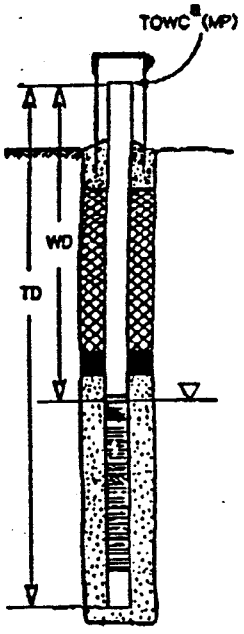
Personnel 1. T. SINDELAR

2. T. SAVKO / C. BIENIULUS (form filled out by S. London)

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. E3	TOWC BEG/END WD[b] (ft)	MTD[c]	Comments
Measurement 1	3.22/3.23	Not measured	
Measurement 2	3.22/3.23		
Measurement 3	3.22/3.23		
	3.22/3.23 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] Chk'd by

Well No. E4	WD[b]	MTD[c]	Comments
Measurement 1	3.83/6.56	Not measured	
Measurement 2	3.83/6.56		
Measurement 3	3.83/6.56		
	3.83/6.56 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] Chk'd by

Well No. E5	WD[b]	MTD[c]	Comments
Measurement 1	6.78/6.24	Not measured	
Measurement 2	6.78/6.24		
Measurement 3	6.78/6.24		
	6.78/6.24 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/16/91

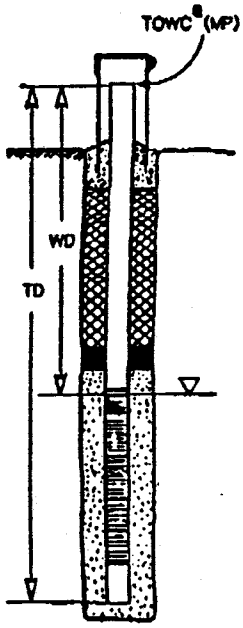
Personnel 1. S. CONDRON

2. T. SINDELAR

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. I1	TOWC WD[b] (ft)	MTD[c]	Comments
Measurement 1	3.34	Not measured	
Measurement 2	3.34		
Measurement 3	3.34		
	3.34 (sc 12/16/91) Average WD	Average MTD	+ _____ = _____ Probe End[d] TD[e] _____ Chk'd by

Well No. I2	WD[b]	MTD[c]	Comments
Measurement 1	3.45	Not measured	
Measurement 2	3.45		
Measurement 3	3.45		
	3.45 Average WD	Average MTD	+ _____ = _____ Probe End[d] TD[e] _____ Chk'd by

Well No. I3	WD[b]	MTD[c]	Comments
Measurement 1	3.56	Not measured	
Measurement 2	3.56		
Measurement 3	3.56		
	3.56 Average WD	Average MTD	+ _____ = _____ Probe End[d] TD[e] _____ Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/16/91

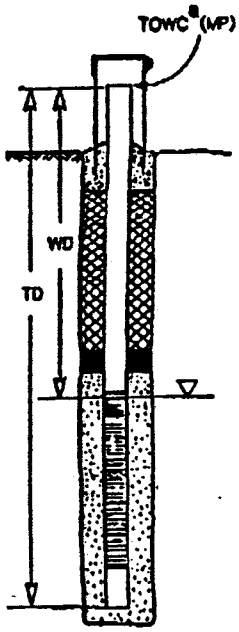
Personnel 1. S. CONDON

2. T. SINDELAR

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. I4	TOWC WD[b] (ft)	MTD[c]	Comments
Measurement 1	3.60	Not measured	
Measurement 2	3.60		
Measurement 3	3.60		
	3.60 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] ____ Chk'd by

Well No. I5	WD[b]	MTD[c]	Comments
Measurement 1	3.65	Not measured	
Measurement 2	3.65		
Measurement 3	3.65		
	3.65 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] ____ Chk'd by

Well No. O1	WD[b]	MTD[c]	Comments
Measurement 1	3.24	Not measured	
Measurement 2	3.24		
Measurement 3	3.24		
	3.24 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] ____ Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/16/91

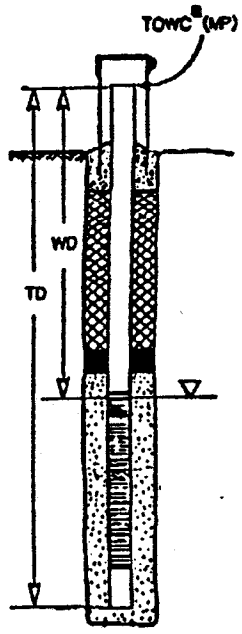
Personnel 1. S. CONDRON

2. T. SINDELAR

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. 02	TOWC WD[b] (ft)	MTD[c]	Comments
Measurement 1	3.23	Not measured	
Measurement 2	3.23		
Measurement 3	3.23		
	3.23 Average WD	Average MTD	+ ____ = ____ ____ Probe End[d] TD[e] Chk'd by

Well No. 03	WD[b]	MTD[c]	Comments
Measurement 1	6.22	Not measured	
Measurement 2	6.22		
Measurement 3	6.22		
	6.22 Average WD	Average MTD	+ ____ = ____ ____ Probe End[d] TD[e] Chk'd by

Well No. 04	WD[b]	MTD[c]	Comments
Measurement 1	3.40	Not measured	
Measurement 2	3.40		
Measurement 3	3.40		
	3.40 Average WD	Average MTD	+ ____ = ____ ____ Probe End[d] TD[e] Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/16/91

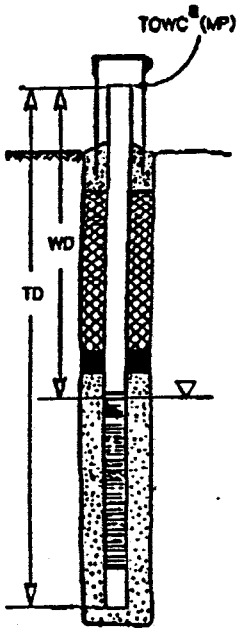
Personnel 1. S. CONDRON

2. T. SINDELAR

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. 05	TOWC WD[b] (ft)	MTD[c]	Comments
Measurement 1	3.41	Not measured	
Measurement 2	3.41		
Measurement 3	3.41		
	3.41 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] Chk'd by

Well No. E1	WD[b]	MTD[c]	Comments
Measurement 1	3.28	Not measured	
Measurement 2	3.28		
Measurement 3	3.28		
	3.28 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] Chk'd by

Well No. E2	WD[b]	MTD[c]	Comments
Measurement 1	3.08	Not measured	
Measurement 2	3.08		
Measurement 3	3.08		
	3.08 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] Chk'd by

Footnotes:
a = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT

FORM GW.1A

GROUNDWATER LEVELS MEASUREMENTS/CALCULATIONS

ROCKY FLATS PROJECT Revision 1.2

Project No. OU1 881 HILLSIDE

Date 12/16/91

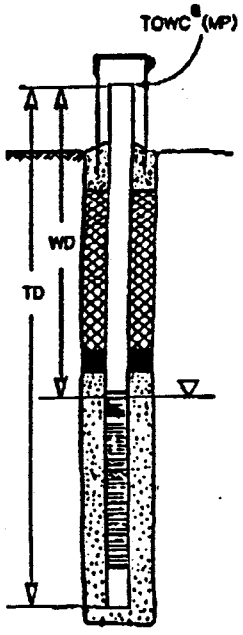
Personnel 1. S. CONDRON

2. T. SINDELAR

EQUIPMENT: Manufacturer SOLINST Model 101 Serial No. 10373

CALIBRATION: Date Passed 12/3/91 Date Due 3/3/92

QC REVIEW: Name _____ Date _____



Well No. E3	TOWC WD[b] (ft)	MTD[c]	Comments
Measurement 1	3.25	Not measured	
Measurement 2	3.25		
Measurement 3	3.25		
	3.25 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] ____ Chk'd by

Well No. E4	WD[b]	MTD[c]	Comments
Measurement 1	3.50	Not measured	
Measurement 2	3.50		
Measurement 3	3.50		
	3.50 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] ____ Chk'd by

Well No. E5	WD[b]	MTD[c]	Comments
Measurement 1	3.32	Not measured	
Measurement 2	3.32		
Measurement 3	3.32		
	3.32 Average WD	Average MTD	+ ____ = ____ Probe End[d] TD[e] ____ Chk'd by

Footnotes:
A = TOWC = top of well casing
b = WD = depth to water from MP
c = MTD = measured total depth from MP
d = Probe End = length beyond measuring point on probe
e = TD = total depth of well from MP

Notes:
- All measurements are relative to Mark Point (MP) = north side of TOWC
- QC review by supervisor is a check of reasonableness.
- Measurements 1 and 2 must be within .01 ft of a 3rd measurement must be taken

Appendix B2
Multiple-Well Test Data

PUMPING TEST

~~Well Number:~~ Pump/Tracer Test Array
SC 12/18/91

Date: 12/18/91 Pumping Rates

All readings are depth to water from top of casing

Time After Pumping Started Min : Sec	Reading ~~Flow Rate~~ (feet) SC 12/18/91	~~Time~~ SC 12/18/91	Reading (feet)
7:35		8 sec/Bucket. 1.6 GPM	
7:43		1.6	
13:45		8:14/5 gal 1.55 GPM	
30:10		1.6	
30:50 SC 12/18/91		1.6	
34:55		1.6	
50:00		8:15/5 gal 1.59 SC 12/18/91	
Hrs:Min:Sec 1:10:00		1.6	
1:27:00		1.6	
2:24:00		8:30/5 gal 1.5/1.43 SC 12/18/91	
3:15:00		1.5	
6:00:00		Constant 1.5 1.5	
7:59:00 ~~8:00~~ SC 12/18/91		1.5	

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S CONORAN

WELL # I1

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground Surface) 1.2 ft to 6.2 ft

STATIC WATER LEVEL (TOC.) 3.37 ft PUMPING WELL I.D. 1.7 in

DISTANCE TO PUMPING WELL 5.15 ft (survey 1/2/92)

TEST START TIME 12 : 46 : 25

Note: Pump started 2'40 into test

Recovery: ~~Started~~ started 5:12/18/91 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)

SEE ATTACHED SHEET(S)

.

.

.

etc.

Project: OU1 200 HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: I 1

Date: 12/18/91

Static Water Level: 3.37' (TOC)

Stickup: 0.81 (measured) 0.82' (survey)

All readings are depth to water from top of casing

Time (ELAPSED) MIN	SEC	Reading (feet)	Time (ELAPSED) HR	MIN	SEC	Reading (feet)
~1	00 SL					
~~1 47~~ (1 min)		3.36	01	35	30	3.50
4 30 min		3.38	02	10	35	3.52
7	50	3.39	02	40	12	3.54
11	00	3.41	03	12	15	3.56
13	31	3.41	03	40	03	3.56
16	20	3.42	4:15			3.60
19	00	3.42	4:59			3.60
25	56	3.43	5:36			3.63
33	07	3.43	6:07			3.64
45	04	3.44	6:40			3.68
52	10	3.46	7:12			3.66
1: 01	48	3.46	7:44			3.69
~~01: 15~~ 16 : 13 SL 12/18/91		~~3.22~~ 3.48 SL 12/18/91	8:03			3.66
11 25 : 20		3.50	8:05			3.65

HR MIN SEC

Well Number: I 1

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:10:05	3.63		
8:17:25	3.62		
8:26:01	3.61		
8:34:04	3.60		
8:46:50	3.60		
9:08:50	3.57		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S. CONORAN

WELL # I2

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground Surface) 1.0 ft to 6.0 ft

STATIC WATER LEVEL (TOC) 3.46' ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 3.05 ft (survey 1/2/92)

TEST START TIME 12:46:25

Note: Pump started 2:40 sec into test
Recovery started 8:00:01 elapsed time into test

SEE ATTACHED SHEET (S)

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)

.
.
.
etc.

Project: OU1 831 HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: I2

Date: 12/18/91

Static Water Level: 3.46' (TOC)

Stickup: 0.93 (measured) 0.92 (survey)

All readings are depth to water from top of casing

Time MIN	SEC	Reading (feet)	Time (ELAPSED) HR	MIN	SEC	Reading (feet)
3.06	SC 12/18/91	3.48	01	37	10	3.60
6	20	3.50	02	11	40	3.64
9	38	3.50	02	41	25	3.64
12	24	3.52	03	13	20	3.67
15	08	3.53	03	41	15	3.69
17	43	3.53	4:15			3.70
20	39	3.53	4:59			3.71
27	54	3.54	5:36			3.74
34	11	3.54	6:06			3.74
44:30		3.60	6:40			3.74
53	40	3.57	7:11			3.77
1:03	25	3:58	7:49			3.78
01:19	16	3.60				
01:27:01		3.60				

Well Number: I2

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:03:15	3.78		
8:06:34	3.75		
8:11:05	3.74		
8:18:25	3.73		
8:26:40	3.71		
8:34:00	3.70		
8:46:30	3.70		
9:09:25	3.67		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S. CONORAN

WELL # I3

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.0 ft to 6.0 ft

STATIC WATER LEVEL (TOC) 3.575 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 2.42 ft (survey 1/2/92)

TEST START TIME 12 : 46 : 25

Note : Pump started 2 min 40 sec after start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)
.		
.		
.		
etc.		

SEE ATTACHED SHEET (s)

Project: OU1 821 HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: I3

Date: 12/18/91

Static Water Level: 3.575' (TOC)

Stickup: 1.03 (measured) 1.05 (survey)

All readings are depth to water from top of casing

Time MIN	SEC	Reading (feet)	Time (ELAPSED) HR	MIN	SEC	Reading (feet)
3.	30 SC 12/18/91	3.60	01	37	30	3.73
6	37	3.63	02	11	59	3.77
10	00	3.62	02	41	40	3.78
12	42	3.64	03	13	30	3.80
15	24	3.65	03	41		3.82
18	04	3.66	4:	13		3.85
20	54	3.66	4:	57		3.85
28	11	3.66	5:	33		3.87
34	28	3.67	6.	00		3.90
44:	10	3.71	6:	37		3.89
53	57	3.70	7:	08		3.91
1:	03: 21	3.75	7:	45		3.91
1:	13: 28	3.75				
1:	27: 30	3.73				

Well Number: I3

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:01:05	3.98		
8:04	3.70		
8:08:29	3.84		
8:16:20	3.82		
8:24:25	3.80		
8:30:26	3.80		
8:42:05	3.79		
9:07:14	3.77		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S CONORAN

WELL # I4

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.1 ft to 6.1 ft

STATIC WATER LEVEL (TOC) 3.61 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 3.24 ft (survey 1/2/92)

TEST START TIME 12 : 46 : 25

Note: Pump started 2 min 40 sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)
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etc.		

SEE ATTACHED SHEET(S)

Project: OU1 881 HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: I4

Date: 12/18/91

Static Water Level: 3.61' (TOC)

Stickup: 1.02 (measured) 1.06 (survey)

All readings are depth to water from top of casing

Time hr/min/sec	Reading (feet)	Time hr/min/sec	Reading (feet)
4:42	3.70	1:01:10	3.76
6:30	3.70	1:15:30	3.76
9:30	3.70	1:25:10	3.78
11:20	3.70	1:35:25	3.80
13:20	3.705	2:10:33	3.85
15:27	3.705	2:40	3.85
17:30	3.705	3:12	3.90
19:22	3.71	3:40	3.86
21:26	3.71	4:11	3.88
~~25:30~~	~~3.75~~ SL 12/18/91	4:13	3.90
28:00	3.72	4:57	3.88
35:40	3.74	5:33	3.90
41:50	3.755	6:01	3.92
53:55	3.75	6:37	3.94

Well Number: I4

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
7:08	3.94		
7:46	3.95		
8:01:20	3.94		
8:04:05	3.90		
8:08:09	3.88		
8:16:30	3.86		
8:24:40	3.84		
8:30:50	3.845		
8:42:38	3.83		
9:07:30	3.82		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S. CONORAN

WELL # I5

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.2 ft to 6.2 ft

STATIC WATER LEVEL (TOC.) 3.66 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 5.38 ft (survey 1/2/92)

TEST START TIME 12 : 46 : 25

Note: Pump started 2 min 40 sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)

SEE ATTACHED SHEET(S)

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etc.

Project: OU1 881 HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: I5

Date: 12/18/91

Static Water Level: 3.66' (TOC)

Stickup: 1.01 (measured) 1.03 (survey)

All readings are depth to water from top of casing

Time hr/min/s	Reading (feet)	Time hr/min/s	Reading (feet)
34 sec	3.70'	1:01:25	3.82
~~1m 35 sec~~	~~3.46~~ SC 12/18/91	1:15:45	3.84
5:00	3.75	1:25:30	3.83
6:59	3.75	1:35:40	3.845
8:52	3.745	2:10 SC 12/18/91	3.89
11:30	3.755	2:40	3.87
13:45	3.755	3:13	3.90
15:55	3.77	3:40	3.94
17:44	3.77	4:12	3.945
19:40	3.80	4:55	395
26 11	3.80	5:33	3.96
36:05	3.795	6:01	3.98
42 00	3.80	~~6:37~~ 6:37 SC 12/18/91	3.98
54:08	3.80	7:08	4.02

Well Number: I5

Date: 12/15/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
7:46	4.02		
8:01:35	4.00		
8:04:05	3.98		
8:09:21	3.93		
8:16:55	3.92		
8:25:04	3.90		
8:31:25	3.90		
8:43:00	3.89		
9:07:45	3.86		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S. CONDRAN

WELL # 01

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.2 ft to 6.2 ft

STATIC WATER LEVEL (TOC) 3.25 ft PUMPING WELL I.D. 4.7 in

DISTANCE TO PUMPING WELL 4.51 ft (survey 1/2/92)

TEST START TIME 12 : 46 : 25

Note: Pump started 2 min 40 sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)

SEE ATTACHED SHEETS

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etc.

Project: OU1 881 HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: 01

Date: 12/18/91

Static Water Level: 3.25' (TOC)

Stickup: 0.77 (measured) 0.80' (survey)

All readings are depth to water from top of casing

Time MIN SEC	Reading (feet)	Time (ELAPSED) HR MIN SEC	Reading (feet)
1.23	3.26	01 35 50	3.41
4 min 55 sec	3.28	02 10 50	3.43
7 [illegible]	3.29	02 40 30	3.45
11 [illegible]	3.32	03 12 27	3.45
13 50	3.32	03 40 15	3.48
16 36	3.32	4:16	3.50
19 23	3.32	5:00	3.51
26 40	3.34	5:37	3.54
33 13	3.35	6:07	3.56
45 25	3.36	6:41	3.55
52 32	3.36	7:12	3.56
1 02 13	3.38	7:50	3.56
11 16 [illegible]	3.40	8:03	3.575
01 25 36	3.42	8:05	3.55

Well Number: 01

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:09:30	3.535		
8:16:53	3.52		
8:25:15	3.51		
8:33:20	3.49		
8:47:00	3.48		
9:08:10	3.47		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S CONORAN

WELL # 02

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.1 ft to 6.1 ft

STATIC WATER LEVEL (TOC) 3.24 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 2.25 ft (survey 1/2/92)

TEST START TIME 12 : 46 : 25

Note: Pump started 2 min 40 sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)

SEE ATTACHED SHEET(S)

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etc.

Project: ONI 99, HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: 02

Date: 12/18/91

Static Water Level: 3.24' (TOC)

Stickup: 0.81 (measured) 0.80 (survey)

All readings are depth to water from top of casing

Time MIN	SEC	Reading (feet)	Time (ELAPSED) HR	MIN	SEC	Reading (feet)
2.35 ~~MIN~~ SEC 12/18/91		3.26	01	30	50	3.40
6	00	3.28	02	11	30	3.43
9	10	3.29	02	41	10	3.45
12	07	3.30	03	13	10	3.48
14	45	3.31	03	40	59	3.49
17	27	3.32	4:15			3.50
20	20	3.33	4:59			3.50
27	35	3.32	5:35			3.52
33	56	3.34	6:05			3.54
44	55	3.375	6:39			3.55
53	19	3.36	7:11			3.56
1:03	04	3.37	7:49			3.58
01	17 34	3.38	8:02:55			3.54
01	26 48	3.40	8:06:10			3.50

Well Number: 02

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:11:45	3.51		
8:19:00	3.51		
8:27:13	3.495		
8:33:50	3.48		
8:46:00	3.50		
9:09:46	3.46		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S CONORAN

WELL # 03

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.0 ft to 6.0 ft

STATIC WATER LEVEL (TOC) 3.40 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 0 ft

TEST START TIME 12 : 46 : 25

Note: Pump started 2min 40sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)

SEE ATTACHED SHEET(S)

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etc.

Project: OKI 881 HILLSIDE REAL TIME ; t=0 12/18/91 12:46 25

Hydrogeologist: S. CONDRAN

Well Number: 03

Date: 12/18/91

Static Water Level: 3.40' (TOC)

Stickup: 0.95 (Measured) 0.97 (survey)

All readings are depth to water from top of casing

Time MIN SEC	Reading (feet)	Time	Reading (feet)
2:40	Pump Starts	1:27.20	3.90'
4.00 ~~[illegible]~~ SC 12/18/91	3.75	1:37:54	3.905'
7 17	3.75	02 12 25	3.91
10 30	3.77	02 41 59	3.94
13 00	3.78	03 13 50	3.96
15 53	3.79	03 41 45	3.98
18 26	3.79	4:13	4.00
21 11	3.80	4:58	4.01
28 33	3.82	5:32	~~4.00~~ 4.04 SC 12/18/91
34 47	3.82	6:00	4.035
44:02	3.85	6:34	4.06
54 15	3.85	7:07	4.08
1 03 40	3.86	7:45	4.10
1:17:43	3.90		

Well Number: 03

Date: 12/18/91

All readings are depth to water from top of casing

8:00:01 Recovery

Time	Reading (feet)	Time	Reading (feet)
8:00:40	3.78		
8:03:55	3.70		
8:06:30	3.70		
8:12:06	3.65		
8:13:00	3.65		
8:~~14:00~~ 15:40 accuracy	3.655		
8:18:59	3.655		
8:24:07	3.64		
8:27:03	3.64		
8:29:54	3.64		
8:34:33	3.62		
8:41:33	3.625		
8:47:50	3.620		
8:53:35	3.62		
8:59:30	3.~~60~~ 605 so 12/18/91		
9:07:00	3.60		
9:09:56	3.60		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S. CONORAN

WELL # 04

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.0 ft to 6.0 ft

STATIC WATER LEVEL (TOC) 3.405 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 2.53 ft (survey 1/2/92)

TEST START TIME 12:46:25

Note: Pump started 2min 40 sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)
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.		
etc.		

SEE ATTACHED SHEET(S)

Well Number: 09

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:02:30	3.74		
8:05:30	3.70		
8:10:53	3.68		
8:18:05	3.66		
8:26:10	3.65		
8:32:30	3.66		
8:45:07	3.64		
9:08:19	3.61		
	✓		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S CONORAN

WELL # 05

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.0 ft to 6.0 ft

STATIC WATER LEVEL (TOC) 3.42 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 4.99 ft (survey 1/2/92)

TEST START TIME 12 :46 :25

Note: Pump started 2min 40sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)

SEE ATTACHED (SHEETS)

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etc.

Project: OMI EEI HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: 04

Date: 12/18/91

Static Water Level: 3.405' (TOC)

Stickup: 1.0 (measured) 1.0 (survey)

All readings are depth to water from top of casing

Time Min/Sec	Reading (feet)	Time	Reading (feet)
4:20	3.50	1:17.30	3.60
6:20	3.50	1:27.00	3.60
8:10	3.50	1:37.30	3.60
11:05	3.50	2:12:30	3.65
13:07	3.51	2:42	3.65
15:05	3.535	3:14	3.66
17:18	3.55	3:42	3.66
19:04	3.505	4:13	3.70
21:13	3.54	4:57	3.70
27:40	3.525	5:35	3.72
35:50	3.52	6:04	3.74
43:40	3.55	6:39	3.76
55:15	3.60	7:09	3.75
1:03:00	3.56	7:48	3.76

Project: AMI EEI HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: 05

Date: 12/18/91

Static Water Level: 3.42' (TOC)

Stickup: 0.91 (measured) 0.90 (survey)

All readings are depth to water from top of casing

Time min/s	Reading (feet)	Time hrs/min/s	Reading (feet)
1 min 35 sec	3.46'	1:01:40	3.60
5:25	3.54	1:16:07	3.60
7:15	3.50	1:25:45	3.68
9:20	3.51	1:36:02	3.62
11:56	3.52	2:11	3.63
14:02	3.57	2:41	3.66
16:10	3.55	3:13	3.66
18:00	3.57	3:41	3.70
20:04	3.55	4:12	3.705
26:31	3.55	4:56	3.71
36:24	3.55	5:34	3.73
42:30	3.56	6:02	3.74
54:20	3.575	6:38	3.76
		7:09	3.77

Well Number: 05
DC 12/18/91

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
7:46	3.78		
9:01:50	3.76		
8:04:30	3.72		
8:09:50	3.70		
8.12:10	3.68		
8:25:17	3.67		
8:32	3.66		
8:43:34	3.65		
9.28:05	3.63		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S. CONORAN

WELL # E1

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground Surface) 0.9 ft to 5.9 ft

STATIC WATER LEVEL (TOC) 3.30 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 5.33 ft (Survey 1/2/92)

TEST START TIME 12 : 46 : 25

Note: Pump started 2 min 40 sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)

SEE ATTACHED SHEET(S)

etc.

Project: ORI DEI HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: E1

Date: 12/18/91

Static Water Level: 3.30' (TOC)

Stickup: 1.10 (measured) 1.10 (survey)

All readings are depth to water from top of casing

Time MIN SEC	Reading (feet)	Time (ELAPSED) HR MIN SEC	Reading (feet)
1.45 min	3.30	01 36 09	3.45
5 17	3.33	02 10 59	3.46
7 30	3.34	02 40 40	3.49
11 33	3.35	03 12 40	3.50
14 05	3.36	03 40 30	3.52
16 50	3.37	4:16	3.55
19 40	3.37	5:00	3.55
26 52	3.37	5:37	3.60
33 26	3.38	6:08	3.60
45: 30	3.41	6:41	3.58
52 46	3.41	7:12	3.605
1 02 27	3.41	7:50	3.62
11 16 57	3.44	8:02	3.61
01 25 57	3.47	8:04	3.60

Well Number: E1

Date: 12/19/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:08:45	3.58		
8:16:21	3.56		
8:24:46	3.55		
8:32:48	3.54		
8:47:10	3.51		
9:07:32	3.50		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S. CONORAN

WELL # E2

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground Surface) 0.9 ft to 5.9 ft

STATIC WATER LEVEL (TOC) 3.09 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 3.47 ft (Survey 1/2/92)

TEST START TIME 12 : 46 : 25

Note: Pump started 2min 40sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)
		SEE ATTACHED SHEET(S)
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etc.		

Project: OU1 SOUTH HILLSIDE

Hydrogeologist: S. CONORAN

Well Number: E2

Date: 12/18/91

Static Water Level: 3.07' (TOC)

Stickup: 0.96 (measured) 1.00 (Survey)

All readings are depth to water from top of casing

Time (ELAPSED) MIN SEC	Reading (feet)	Time (ELAPSED) HR MIN SEC	Reading (feet)
2.1(min	3.10	01 36 34	3.27
5 40 Sec 12/19/91	3.14	02 11 14	3.29
8 52	3.15	02 40 58	3.30
11 50	3.16	03 12 55	3.33
14 24	3.16	03 40 50	3.34
17 10	3.18	4:15	3.37
19 57	3.18	4:59	3.36
27 10	3.19	5:35	3.38
33 40	3.20	6:04	3.40
45: 20	3.24	~~6:04~~	~~3.34~~ Sec 12/19/91
53 03	3.22	6:39	3.42
1 02 49	3.23	7:10	3.42
01 17 19	3.26	7:49	3.44
01 26 25	3.26	8:02:55	3.38

Well Number: E2

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:06:00	3.36		
8:11:28	3.36		
8:18:40	3.34		
8:26:40	3.33		
8:35:30	3.34		
8:46:00	3.34		
9:09:25	3.29		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S. CONORAN

WELL # E3

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.1 ft to 6.1 ft

STATIC WATER LEVEL (TOC) 3.26 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 3.44 ft (survey 1/2/92)

TEST START TIME 12 : 46 : 25

Note: Pump started 2 min 40 sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)
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etc.		

SEE ATTACHED SHEET (S)

Project: OU1 921 HILLSIDE

Hydrogeologist: S. CONDRAN

Well Number: E3

Date: 12/18/91

Static Water Level: 3.26' (TOC)

Stickup: 0.90 (measured) 0.90 (survey)

All readings are depth to water from top of casing

Time M:S	Reading (feet)	Time	Reading (feet)
10:30	3.37	2:12	3.50
12:42	3.40	2:42	3.50 SEE 12/18/91
14:50	3.37	3:14	3.53
16:50	3.40	3.42	3.54
18:45	3.40	4:14	3.55
20:56	3.40	4:58	3.56
27:25	3.40	5:35	3.60
35:07	3.39	6:04	3.60
43:10	3.425	6:39	3.60
54 38	3.40	7:10	3.62
1:02:30	3.45	7:48	3.64
1:17:05	3.45	8:02:30	3.58
1:26:30	3.46	8:05:45	3.56
1:37:13	3.5+		

Well Number: E3

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:11:12	3.52		
8:18:25	3.51		
8:26:24	3.50		
8:33:13	3.50		
8:45:44	3.51		
9:09:06	3.46		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S. CONORAN

WELL # E4

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground surface) 1.0 ft to 6.0 ft

STATIC WATER LEVEL (TIC) 3.465 ft PUMPING WELL I.D. 4.7 in

DISTANCE TO PUMPING WELL 3.84 ft (survey 11/2/92)

TEST START TIME 12 : 46 : 25

Note: Pump started 2 min 40 sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)
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etc.		

SEE ATTACHED SHEET(S)

Project: OU1 903 HILLSIDE

Hydrogeologist: S. CONNOLLY

Well Number: E4

Date: 12/18/91

Static Water Level: 3.465' (TOC)

Stickup: 0.95 (measured) 0.99 (survey)

All readings are depth to water from top of casing

Time mm/ss	Reading (feet)	Time hr/min/s	Reading (feet)
3 min 30 sec	3.55'	1'02:10	3.63
6.00	3.55	1 16:45	3.65
7:53	3.55	1;26.20	3.645
10:05	3.55	1'36:55	3.66
12:25	3.57	2:12	3.68
14:30	3.58	2:42	3.70
16 40	3.60	3:14	3.705
18:30	3.58	3:41	3.725
20:40	3.60	4:12	3.75
27:05	3.60	4:57	3.76
35. 24	3.58	5:34	3.80
43:10	3.605	6:03	3.78
55 34	3.62	6:38	3.80
sc 12/18/91	cc 12/18/91	7:09	3.81

Well Number: E4

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
7:45	3.83		
8:02:15	3.78		
8:05	3.79		
8:10:35	3.75		
8:17:50	3.72		
8:25:55	3.71		
8:32:38	3.72		
8:44:38	3.70		
SCC 12/18/91 8:08:57	3.67		

AQUIFER PUMPING TEST DATA SHEET

DATE 12\18\91 PERSON RECORDING DATA S CONORAN

WELL # E5

HYDROSTRATIGRAPHIC UNIT WOMAN CRK VALLEY FILL ALLUVIUM

SCREENED INTERVAL (Ground Surface) 1.1 ft to 6.1 ft

STATIC WATER LEVEL (TOC) 3.35 ft PUMPING WELL I.D. 17 in

DISTANCE TO PUMPING WELL 5.51 ft (Survey 1/2/92)

TEST START TIME 12 :46 :25

Note: Pump started 2 min to sec after test start time
Recovery started 8:00:01 elapsed time into test

ELAPSED TIME (Units)	WATER LEVEL (Units)	Q (pumping well) (Units)

SEE ATTACHED SHEET(S)

.
.
.

etc.

Project: OU1 EEI HILLSIDE

Hydrogeologist: S. CONRAD

Well Number: ES

Date: 12/18/91

Static Water Level: 3.35' (TOC)

Stickup: 0.85 (measured) 0.75 (survey)

All readings are depth to water from top of casing

Time mm:ss	Reading (feet)	Time	Reading (feet)
2 min Mark	3.40'	1:02:00	3.50
5:47	3.44 SOC 12/18/91	1:16:26	3.50
7:34	3.45	1:26:05	3.52
9:49	3.43	1:36:40	3.56
12:12	3.45	2:11:30	3.57
14:18	3.45	2:41	3.57
16:27	3.485	3:13	3.60
18:15	3.445	3:41	3.605
20:23	3.50	4:12	3.62
26:47	3.45	4:56	3.63
36:46	3.46	5:34	3.64
42:50	3.48	6:03	3.66
54:35	3.50	6:38	3.68
		7:09	3.68
		7:47	3.72

Well Number: E5

Date: 12/18/91

All readings are depth to water from top of casing

Time	Reading (feet)	Time	Reading (feet)
8:02:02	3.66		
9:04:30	3.64		
8:10:18	3.62		
8:17:25	3.60		
8:25:39	3.60		
8:32:20	3.59		
8:44:05	3.56		
9:08:35	3.55		

Appendix B2
Multiple-Well Test Data

TRACER TEST

CONTRACTOR [illegible]BASCO SAMPLERS S. CONDRAN, [illegible]PAPINGUTH PROJECT # OU1 881 H[illegible]PE

SITE CONTACT/PHONE DAVE AXTELL / 988-7702 LAB/LOCATION

C-O-C NUMBER EBU1-TTEST-01 ~~104X0~~ 1-27-92

EG&G ROCKY FLATS, CHAIN OF CUSTODY

BOTTLE CODES

PRESERVATIVE

DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOIL(S) WATER (W)	FILTERED=F POT DISS=P	TURN AROUND RUSH =R	OUT OF SPEC REPORTS	COOLED TO 4 C	HCl	NAOH	HNO3	H2SO4	BROMIDE
1/27/92	1531	TTE100001EBU1	E1	120ml plas.		W									X
	1532	TTI300001EBU1	I3												X
	1532	TT0300001EBU1	O3												X
	1533	TTE200001EBU1	E2												X
	1534	TTE300001EBU1	E3												X
	1534	TTE400001EBU1	E4												X
	1535	TTE500001EBU1	E5												X
	1553	TTF100002EBU1	C1												X
	1554	TTI300002EBU1	I3												X
	1554	TT0300002EBU1	O3												X
	1556	TTE200002EBU1	E2												X
	1556	TTE300002EBU1	E3												X
	1557	TTE400002EBU1	E4												X
	1558	TTE500002EBU1	E5												X
	1558	TTTR00001EBU1	TRACER												X
	1627	TTE100003EBU1	E1												X

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
[signature]	1-29-92	1630			

REMARKS

LABORATORY USE ONLY	Y	N
PCKG REC'D/CUSTODY SEALS INTACT		
SAMPLE LABELS/COCs AGREE		
TEMPERATURE WITHIN SPECIFICATION ____ C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

SHIPMENT METHOD

CONTRACTOR EBASCO SAMPLERS S. CONDRAN, H. [illegible] PROJECT # [illegible]

LAB/LOCATION

SITE CONTACT/PHONE DAVE AXTELL / 488-2202

C-O-C NUMBER EBU1-TTEST-02 ~~10401~~

SC 1-27-92

EG&G ROCKY FLATS, CHAIN OF CUSTODY

SC 1/28/92

DATE/TIME		SAMPLE NUMBER	LOCATION	CONTAINER TYPE	NUMBER OF CONTAINERS	MEDIA SOIL(S) WATER (W)	FILTERED=F POT DISS=P	TURN AROUND RUSH =R	OUT OF SPEC REPORTS	COOLED TO 4 C	HCl	NAOH	HNO3	H2SO4	BROMIDE
1/27/92	1648	TTE200003EBU1	E2	120ml plas											X
	1649	TTE300003EBU1	E3												X
	1945	TTE100004EBU1	E1												X
	1946	TTO300003EBU1	O3												X
	1947	TTI300003EBU1	I3												X
	1948	TTE200004EBU1	E2												X
	1950	TTE300004EBU1	E3												X
	1958	TTE400003EBU1	E4												X
	1959	TTE500003EBU1	E5												X
	NA	TTST00001EBU1	STD												X
	NA	TTST00002EBU1	STD												X
	NA	TTST00003EBU1	STD												

BOTTLE CODES

PRESERVATIVE

RELINQUISHED BY	DATE/TIME		RECEIVED BY	DATE/TIME	
[illegible]	1-29-92	1630			

LABORATORY USE ONLY	Y	N
PCKG REC'D/CUSTODY SEALS INTACT		
SAMPLE LABELS/COCs AGREE		
TEMPERATURE WITHIN SPECIFICATION ____C		
CORRECTED COPY ATTACHED		
PROBLEMS OR DISCREPANCIES		

REMARKS

SHIPMENT METHOD

DAMES & MOORE

REMOVABLE CONTAMINATION REPORT FORM

SWIPE ID	SYSTEM/EFF (CPM/DPM)	BACKGROUND (CPM)	GROSS CNTS	TIME (MIN)	DPM/100 cm^2
200X	0.36	2	0	2	<5
E5 1558	0.36	2	0	2	<5
I3 1532	0.36	2	0	2	<5
20X	0.36	2	0	2	<5
E2 1533	0.36	2	0	2	<5
E5 1535	0.36	2	0	2	<5
I3 1554	0.36	2	0	2	<5
03 1532	0.36	2	0	2	<5
E1 1531	0.36	2	1	2	<5
E3 1534	0.36	2	0	2	<5
E4 1557	0.36	2	0	2	<5
03 1554	0.36	2	0	2	<5
03 1946	0.36	2	0	2	<5
E1 1945	0.36	2	0	2	<5
E2 1948	0.36	2	0	2	<5
I3 1947	0.36	2	0	2	<5
200X	0.36	2	1	2	<5
E5 1959	0.36	2	0	2	<5
E4 1958	0.36	2	0	2	<5
E4 1534	0.36	2	0	2	<5
TRACER 1558	0.36	2	0	2	<5

ANALYZED BY: DAVID S BRADFIELD David S Bradfield 29 JAN 92

SMEARS TAKEN FROM TEST SITE 1

DAMES & MOORE

REMOVABLE CONTAMINATION REPORT FORM

SWIPE ID	SYSTEM/EFF (CPM/DPM)	BACKGROUND (CPM)	GROSS CNTS	TIME (MIN)	DPM/100 cm^2
E1 1553	0.36	2	0	2	< 5
E2 1648	0.36	2	0	2	< 5
E3 1950	0.36	2	0	2	< 5
E1 1627	0.36	2	0	2	< 5
E2 1556	0.36	2	0	2	< 5
E3 249	0.36	2	0	2	< 5
E3 1556	0.36	2	0	2	< 5

SBB

ANALYZED BY: DAVID G BRADFIELD 29JAN92

SMEARS TAKEN FROM TEST SITE 1

IT ANALYTICAL SERVICES
2800 GEORGE WASHINGTON WAY, RICHLAND, WA
RADIOCHEMICAL ANALYSIS REPORT
ROF Account(s) listed
Results reported on 920203

SAMPLE TYPE	CUST#	ISOTOPE		RESULT	COUNTING ERROR	OVERALL ERROR	ANALYSIS SIZE	PERCENT MOIST	SAMPLE DATE	SAMPLE TIME	ON DATE	U TIME	C	GROUP	ITAS#
as Reported => 920203															
WATER	TTI300001	BETA_B	311	2.04E-04 UCI/L	1.04E-04	1.76E-04(2S)	1.00E-02 L		920127	1532	920127	1532	I	103	20201801
WATER	TTI300001	ALPHA_B	312 *	4.02E-05 UCI/L	6.37E-05	6.86E-05(2S)	1.00E-02 L		920127	1532	920127	1532	I	103	20201801
WATER	TTE100004	BETA_B	311	1.25E-04 UCI/L	9.04E-05	1.28E-04(2S)	1.00E-02 L		920127	1945	920127	1945	I	103	20201802
WATER	TTE100004	ALPHA_B	312 *	7.71E-05 UCI/L	8.20E-05	9.06E-05(2S)	1.00E-02 L		920127	1945	920127	1945	I	103	20201802

4 Records listed

* Denotes a result less than the overall error: (xS) specifies the level of error: 1 sigma or 2 sigma

SENT BY:ITAS RICHLAND ; 2- 3-92 3:36PM ; 3755590→ ;# 3

IT TECHNOLOGY CORPORATION

Sample Screening Release Form

Matrix: Water COC#: _____

SDG#: 114 EBU-TTEST-02

Batch#: 20201801-02 EBU1-TTEST-01

Client ID	IT #	Total Activity in uci		
		Alpha	Beta	Other*
ITE300001EBU1	20201801	<.01	<.1	~~<247~~ <239 ✓
ITE100004EBU1	20201802	↓	↓	

Below Category I Release Limits: ✓ yes _____ no

If "no," specify the samples above Category I **: _____

Precautions: _____

Approval for Release [signature] Date 2-3-92

(1) Sample Screening Form (RD2802 Appendix A) and calculated results must accompany this form.

* Other analysis may include Tritium, etc.

** Only Category I samples can be transferred to other IT Laboratories.

Form RC-001 12/91 Rev 1

Appendix B2
Multiple-Well Test Data

WELL ABANDONMENT

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT FORM GT.5A

BOREHOLE ABANDONMENT
FIELD ACTIVITIES REPORT

PROJECT NUMBER: OU1 DATE: 1-29-92

PROJECT NAME: 881 Hillside

BOREHOLE IDENTIFICATION: 39891 (Drive Point Hole)

COORDINATES: _____ North _____ East

WEATHER CONDITIONS: partly cloudy, pleasant, 50° F

RIG TYPE: _____

DRILLING COMPANY/DRILLER: Boyles Bros / D. Schroer

GEOLOGIST/ENGINEER: C. Bieniulis

CREW MEMBERS: _____

WATER LEVEL/TIME: _____

TOTAL DEPTH/DIAMETER: 6.0' / ~6" Diam.

ENVIRONMENTAL MATERIALS TYPES, VOLUMES, AND DRUMS USED: _____

TREMIE AND PUMPING EQUIPMENT: 1" hose w/ grout plant

GROUT VOLUME PLACED: 1.0 ft^3

TYPE/LENGTH/DIAMETER OF CASING REMOVED: Drive Point: 5' ss screen (1.7" ID)
2' ss blank (1.5" ID) (1' stick-up)

TYPE/LENGTH/DIAMETER OF CASING LEFT IN PLACE: NA

END-OF-DAY STATUS: Grouted 3.0'-6.0' Cement 0.0'-3.0'

CHRONOLOGICAL RECORD OF ACTIVITIES:
1000 pulled out drive pt. from 39891
1200 borehole grouted from 3.0'-6.0'
and cemented from 0.0'-3.0'

COMMENTS: MW 10.2 ppg

(4011-REV-0025)(GTSREV.1)(09/10/91)

U.S. DEPARTMENT OF ENERGY ROCKY FLATS PLANT — FORM GT.5A

BOREHOLE ABANDONMENT FIELD ACTIVITIES REPORT

PROJECT NUMBER: OU1 DATE: 1-29-92

PROJECT NAME: 881 Hillside

BOREHOLE IDENTIFICATION: Site #1 15 Well Point Grid (I 1 to E 5)

COORDINATES: North _____ East _____

WEATHER CONDITIONS: partly cloudy, pleasant, 50°F

RIG TYPE: _____

DRILLING COMPANY/DRILLER: Boyles Bros. / D. Schroer

GEOLOGIST/ENGINEER: C. Bieniulis

CREW MEMBERS: _____

WATER LEVEL/TIME: _____

TOTAL DEPTH/DIAMETER: 6.0 / ~ 4.5" Diam.

ENVIRONMENTAL MATERIALS TYPES, VOLUMES, AND DRUMS USED: _____

TREMIE AND PUMPING EQUIPMENT: 1" hose w/ grout plant

GROUT VOLUME PLACED: 1.0 ft^3

TYPE/LENGTH/DIAMETER OF CASING REMOVED: Well Points: 5' SS screen (1.7" ID)
2' SS blank (1.5" ID) (1' stick-up)

TYPE/LENGTH/DIAMETER OF CASING LEFT IN PLACE: NA

END-OF-DAY STATUS: Grouted 3.0'-6.0' Cement 0.0'-3.0'

CHRONOLOGICAL RECORD OF ACTIVITIES: 1000 well points removed from grid
1200 boreholes grouted from 3.0'-6.0'
and cemented from 0.0'-3.0'

COMMENTS: MW 10.2 ppg

(4011-REV-0025)(GT5REV.1)(09/10/91)

ATTACHMENT B2-7
MULTIPLE-WELL PUMPING TEST
TIME-DRAWDOWN DATA
AND GRAPHICAL SOLUTIONS

Table 1. Multiple-Well Pumping Test Time-Drawdown Data

Uncorrected Time (minutes)	Corrected Time (minutes)	Well I1 (ft)	Well I2 (ft)	Well I3 (ft)	Well I4 (ft)	Well I5 (ft)	Well O1 (ft)	Well O2 (ft)	Well O3 (ft)	Well O4 (ft)	Well O5 (ft)	Well E1 (ft)	Well E2 (ft)	Well E3 (ft)	Well E4 (ft)	Well E5 (ft)
0	-2.66667	0	-0.003	0	-0.003	-0.001	0	0	0.003	-0.003	0	0	0.003	0	0.003	-0.003
0.0083	-2.65837	-0.001	-0.003	0	0	-0.001	0	0	0	0	-0.003	0.003	0	0	0.003	-0.003
0.0166	-2.65007	0	-0.003	0	0	-0.001	0.003	0	0	0	-0.003	0	0	0	0.003	-0.003
0.025	-2.64167	0	0	0	0	-0.001	0	-0.003	0	0	-0.009	0.003	0	0	0	-0.001
0.0333	-2.63337	0	-0.003	0	0	-0.001	0.003	-0.003	0	0	-0.003	0	0.003	0	0	-0.001
0.0416	-2.62507	0	0	0	0	0	0.003	0	0	0	-0.006	0	0	0	0	-0.003
0.05	-2.61667	0.001	0	0	-0.003	-0.001	0.003	0	-0.003	0	-0.009	0.003	0	0	0	-0.001
0.0583	-2.60837	0	-0.003	0	0	0	0.003	-0.003	0	0	-0.003	0.003	0	0	0	-0.001
0.0666	-2.60007	0.001	0	0	0	0	0.003	-0.003	-0.003	0	-0.003	0.003	0.003	0	0.003	-0.001
0.075	-2.59167	0.001	0	0	-0.003	-0.001	0.003	0	0	0	-0.006	0	0	0	0	-0.001
0.0833	-2.58337	0	-0.003	0	0	-0.001	0.003	0	0	0	-0.009	0.003	0	0	0	-0.001
0.1	-2.56667	0.001	0	0	0	-0.001	0.003	0	0	0	-0.006	0.003	0.003	0	0	-0.003
0.1166	-2.55007	0	-0.003	0	0	-0.001	0.003	0	0.003	0	-0.003	0.003	0	0	0	-0.003
0.1333	-2.53337	0	-0.003	0	0	-0.001	0.003	0	0.012	0	-0.006	0.003	0.003	0	0	-0.001
0.15	-2.51667	0.001	-0.003	0	0	0	0.003	0	0.009	0	-0.006	0.003	0	0	0	-0.001
0.1666	-2.50007	0	-0.003	0	0	0.001	0.003	0	0.003	0	0	0.003	0	0.003	0.003	-0.001
0.1833	-2.48337	0	0	0	0	0.001	0.003	0	0	0	-0.006	0.003	0	0	0.003	-0.001
0.2	-2.46667	0.001	0	0	0	0.003	0.003	0	0	-0.003	-0.015	0	0.003	0	0	-0.001
0.2166	-2.45007	0	0	0	0	-0.001	0.003	0	-0.003	0	-0.009	0.003	0.003	0	0	-0.001
0.2333	-2.43337	0	0	0	0	-0.001	0.003	0	-0.003	0	-0.006	0.003	0.003	0	0.003	-0.001
0.25	-2.41667	0	0	0	0	-0.001	0.003	0	-0.003	0	-0.003	0	0.003	0	0	-0.001
0.2666	-2.40007	0.001	0	0	0	-0.001	0.003	0	-0.003	0	-0.003	0.003	0.003	0	0.003	-0.003
0.2833	-2.38337	0.001	0	0	0	-0.001	0.003	0	-0.003	-0.003	-0.009	0.003	0	0	0	-0.001
0.3	-2.36667	0.003	0	0	0	-0.003	0.003	0	-0.003	-0.003	-0.009	0.003	0.003	0	0	-0.001
0.3166	-2.35007	0.001	0	0	0	-0.001	0.003	0	-0.003	-0.003	-0.006	0	0	0	0	-0.001
0.3333	-2.33337	0.001	0	0	0	0.001	0.003	0	-0.003	0	-0.009	0.003	0.003	0	0	-0.003
0.4166	-2.25007	0.006	-0.003	0	0	0.001	0	0	-0.003	-0.003	-0.012	0.003	0	-0.003	0	-0.003
0.5	-2.16667	-0.023	0	0	0	-0.003	0	-0.003	-0.003	0	-0.015	0	0	0	0	-0.003
0.5833	-2.08337	0.027	0	0	0	0	0	-0.003	-0.003	0	-0.019	0.003	0.003	-0.003	0	-0.003
0.6666	-2.00007	0.007	0	0	0	0.007	0.003	0	-0.003	0	-0.003	0.003	0.003	0	0	-0.003
0.75	-1.91667	-0.007	0	0	0	-0.001	0	0	-0.003	0	-0.022	0.003	0	0	0	-0.003
0.8333	-1.83337	0.011	0	0	0	0	0	0	-0.003	-0.003	-0.034	0.003	0.003	0	-0.003	-0.003
0.9166	-1.75007	0.003	0	0	0	0.004	0.003	0	-0.003	0	-0.009	0.003	0.003	0	0	-0.003
1	-1.66667	0	-0.003	0	0	-0.001	0	-0.003	-0.003	-0.003	-0.003	0	0.003	0	0	-0.001
1.0833	-1.58337	0	-0.003	0	-0.003	-0.001	0.003	0	0	-0.003	-0.009	0.003	0.003	0	0	-0.003
1.1666	-1.50007	0	0	0	0	-0.001	0.003	0	0	0	-0.003	0	0.003	0	0.003	-0.003
1.25	-1.41667	0	-0.003	0	0	-0.001	-0.003	0	-0.003	-0.003	-0.006	0.003	0.003	0	0	-0.003
1.3333	-1.33337	0	-0.003	0	0	-0.001	0.009	0	0	0	0	0	0.003	0	0.003	-0.003
1.4166	-1.25007	-0.001	-0.003	0	0	-0.001	0.006	0	0.003	0	-0.006	0.003	0.006	0	0.003	-0.001
1.5	-1.16667	0	0	0	0	0	0.003	0	0.006	0	0	-0.015	0.003	0	0.003	-0.001
1.5833	-1.08337	0	-0.003	0	0	-0.001	0.003	0	-0.003	0	-0.003	0	0.003	0	0.003	-0.001

Table 1. Multiple-Well Pumping Test Time-Drawdown Data

Uncorrected Time (minutes)	Corrected Time (minutes)	Well I1 (ft)	Well I2 (ft)	Well I3 (ft)	Well I4 (ft)	Well I5 (ft)	Well O1 (ft)	Well O2 (ft)	Well O3 (ft)	Well O4 (ft)	Well O5 (ft)	Well E1 (ft)	Well E2 (ft)	Well E3 (ft)	Well E4 (ft)	Well E5 (ft)
1.6666	-1.00007	0	0	0	0	-0.001	0	0	-0.003	0	-0.009	0.003	0.003	0	0	-0.004
1.75	-0.91667	0	-0.003	0	0	-0.001	0	0	-0.003	0	-0.006	0.003	0.003	0	0.003	-0.003
1.8333	-0.83337	0	-0.003	0	0	-0.001	0	0	-0.003	0.003	-0.006	0	0.009	0	0.003	-0.003
1.9166	-0.75007	-0.001	-0.003	0	0	-0.001	0	0	0.003	0	-0.006	0	-0.006	0	0	-0.011
2	-0.66667	0	-0.003	0	0	-0.001	0	0	-0.006	0	-0.012	0.003	0.012	0	0	0.006
2.5	-0.16667	0	-0.003	0	0	-0.003	0	0.009	-0.006	-0.003	-0.015	0	0.006	0	0	-0.004
3	0.33333	0.007	-0.003	0.022	0.015	0.022	0.012	0.021	0.327	0.022	0.012	0.019	0.029	0.034	0.015	0.012
3.5	0.83333	0.014	0.015	0.038	0.028	0.031	0.019	0.025	0.336	0.031	0	0.022	0.041	0.044	0.031	0.022
4	1.33333	0.015	0.015	0.038	0.034	0.036	0.022	0.031	0.343	0.022	-0.015	0.025	0.045	0.05	0.037	0.027
4.5	1.83333	0.03	0.019	0.041	0.025	0.041	0.025	0.034	0.336	0.041	0.041	0.028	0.048	0.05	0.044	0.033
5	2.33333	0.02	0.022	0.044	0.041	0.041	0.031	0.034	0.336	0.047	0.006	0.031	0.054	0.057	0.044	0.035
5.5	2.83333	0.022	0.025	0.047	0.044	0.047	0.028	0.037	0.349	0.047	0.028	0.031	0.051	0.057	0.05	0.038
6	3.33333	0.025	0.028	0.05	0.047	0.05	0.031	0.043	0.349	0.05	0.022	0.034	0.061	0.06	0.056	0.04
6.5	3.83333	0.027	0.031	0.038	0.038	0.052	0.035	0.04	0.343	0.053	0.034	0.034	0.064	0.063	0.053	0.042
7	4.33333	0.028	0.031	0.053	0.053	0.056	0.035	0.043	0.333	0.053	0.025	0.038	0.067	0.063	0.053	0.045
7.5	4.83333	0.03	0.031	0.053	0.053	0.055	0.038	0.043	0.355	0.056	0.015	0.041	0.067	0.066	0.053	0.04
8	5.33333	0.031	0.034	0.053	0.057	0.058	0.028	0.046	0.352	0.056	0.025	0.041	0.07	0.066	0.056	0.048
8.5	5.83333	0.031	0.034	0.057	0.047	0.058	0.041	0.046	0.349	0.06	0.019	0.041	0.074	0.069	0.056	0.05
9	6.33333	0.033	0.038	0.057	0.06	0.061	0.041	0.05	0.355	0.066	0.015	0.044	0.08	0.069	0.06	0.051
9.5	6.83333	0.035	0.028	0.06	0.06	0.061	0.044	0.05	0.349	0.066	0.031	0.044	0.08	0.073	0.063	0.053
10	7.33333	0.036	0.041	0.066	0.063	0.063	0.044	0.053	0.352	0.069	0.028	0.047	0.083	0.073	0.063	0.054
12	9.33333	0.041	0.047	0.069	0.069	0.069	0.05	0.05	0.368	0.075	0.044	0.053	0.096	0.082	0.072	0.061
14	11.33333	0.046	0.053	0.076	0.076	0.074	0.057	0.059	0.368	0.082	0.044	0.057	0.106	0.085	0.075	0.066
16	13.33333	0.051	0.057	0.079	0.082	0.079	0.06	0.065	0.377	0.085	0.053	0.063	0.116	0.092	0.079	0.069
18	15.33333	0.054	0.063	0.085	0.085	0.082	0.063	0.066	0.368	0.094	0.044	0.063	0.122	0.095	0.085	0.071
20	17.33333	0.057	0.063	0.085	0.088	0.083	0.066	0.075	0.374	0.098	0.047	0.069	0.135	0.101	0.088	0.075
22	19.33333	0.058	0.066	0.088	0.088	0.086	0.07	0.075	0.393	0.101	0.047	0.073	0.141	0.101	0.091	0.079
24	21.33333	0.062	0.069	0.088	0.091	0.091	0.073	0.078	0.38	0.104	0.057	0.073	0.148	0.104	0.094	0.082
26	23.33333	0.051	0.072	0.095	0.095	0.093	0.076	0.081	0.399	0.107	0.066	0.079	0.158	0.107	0.098	0.085
28	25.33333	0.068	0.076	0.098	0.088	0.096	0.079	0.084	0.39	0.11	0.069	0.079	0.164	0.107	0.098	0.087
30	27.33333	0.068	0.072	0.098	0.098	0.099	0.079	0.084	0.399	0.11	0.041	0.082	0.17	0.111	0.098	0.087
32	29.33333	0.071	0.076	0.101	0.101	0.102	0.082	0.087	0.405	0.11	0.044	0.085	0.174	0.114	0.104	0.092
34	31.33333	0.074	0.082	0.104	0.104	0.105	0.085	0.093	0.405	0.11	0.06	0.088	0.177	0.117	0.107	0.093
36	33.33333	0.078	0.085	0.107	0.107	0.109	0.089	0.093	0.409	0.116	0.044	0.088	0.183	0.12	0.11	0.098
38	35.33333	0.081	0.085	0.111	0.117	0.11	0.092	0.096	0.396	0.116	0.044	0.092	0.19	0.123	0.11	0.1
40	37.33333	0.081	0.085	0.111	0.117	0.11	0.092	0.096	0.39	0.116	0.066	0.095	0.193	0.123	0.113	0.101
42	39.33333	0.082	0.091	0.114	0.129	0.115	0.095	0.1	0.418	0.116	0.069	0.095	0.196	0.126	0.117	0.101
44	41.33333	0.086	0.091	0.117	0.123	0.115	0.098	0.103	0.409	0.113	0.066	0.098	0.196	0.13	0.113	0.103
46	43.33333	0.087	0.091	0.117	0.104	0.117	0.098	0.103	0.421	0.11	0.057	0.101	0.196	0.13	0.12	0.105
48	45.33333	0.089	0.091	0.12	0.126	0.12	0.098	0.103	0.431	0.11	0.092	0.104	0.196	0.13	0.123	0.106
50	47.33333	0.09	0.098	0.123	0.129	0.121	0.101	0.106	0.409	0.107	0.079	0.104	0.196	0.133	0.126	0.109

Table 1. Multiple-Well Pumping Test Time-Drawdown Data

Uncorrected Time (minutes)	Corrected Time (minutes)	Well I1 (ft)	Well I2 (ft)	Well I3 (ft)	Well I4 (ft)	Well I5 (ft)	Well O1 (ft)	Well O2 (ft)	Well O3 (ft)	Well O4 (ft)	Well O5 (ft)	Well E1 (ft)	Well E2 (ft)	Well E3 (ft)	Well E4 (ft)	Well E5 (ft)
52	49.33333	0.094	0.098	0.123	0.139	0.124	0.105	0.109	0.431	0.107	0.095	0.104	0.196	0.139	0.126	0.111
54	51.33333	0.095	0.101	0.13	0.133	0.126	0.106	0.112	0.431	0.107	0.085	0.107	0.193	0.142	0.126	0.113
56	53.33333	0.097	0.101	0.13	0.129	0.129	0.108	0.115	0.434	0.107	0.092	0.111	0.193	0.142	0.129	0.114
58	55.33333	0.098	0.104	0.13	0.133	0.131	0.111	0.115	0.443	0.107	0.073	0.114	0.193	0.146	0.132	0.117
60	57.33333	0.102	0.107	0.133	0.136	0.132	0.114	0.118	0.434	0.104	0.101	0.114	0.193	0.146	0.136	0.119
62	59.33333	0.103	0.111	0.136	0.139	0.136	0.124	0.121	0.437	0.107	0.104	0.117	0.193	0.149	0.139	0.124
64	61.33333	0.105	0.111	0.139	0.139	0.139	0.117	0.121	0.453	0.113	0.098	0.12	0.196	0.149	0.142	0.126
66	63.33333	0.106	0.111	0.139	0.142	0.139	0.117	0.125	0.453	0.113	0.095	0.12	0.199	0.152	0.142	0.127
68	65.33333	0.108	0.114	0.142	0.142	0.14	0.12	0.125	0.446	0.116	0.101	0.12	0.199	0.149	0.145	0.127
70	67.33333	0.11	0.114	0.142	0.142	0.142	0.12	0.125	0.443	0.116	0.104	0.123	0.199	0.152	0.142	0.127
72	69.33333	0.113	0.117	0.142	0.145	0.143	0.124	0.128	0.453	0.116	0.104	0.123	0.199	0.155	0.142	0.13
74	71.33333	0.113	0.117	0.145	0.148	0.147	0.127	0.131	0.468	0.116	0.114	0.126	0.199	0.158	0.148	0.132
76	73.33333	0.129	0.117	0.149	0.152	0.148	0.13	0.131	0.468	0.116	0.111	0.13	0.196	0.155	0.148	0.134
78	75.33333	0.116	0.111	0.152	0.152	0.15	0.133	0.134	0.459	0.116	0.107	0.13	0.199	0.158	0.151	0.135
80	77.33333	0.117	0.123	0.152	0.155	0.151	0.133	0.137	0.459	0.116	0.107	0.13	0.199	0.165	0.155	0.137
82	79.33333	0.121	0.123	0.155	0.155	0.155	0.133	0.137	0.475	0.12	0.088	0.133	0.199	0.161	0.155	0.138
84	81.33333	0.121	0.126	0.152	0.158	0.156	0.136	0.137	0.462	0.12	0.12	0.133	0.196	0.161	0.155	0.14
86	83.33333	0.124	0.126	0.155	0.158	0.158	0.136	0.14	0.472	0.123	0.111	0.136	0.199	0.168	0.161	0.14
88	85.33333	0.125	0.13	0.158	0.161	0.159	0.14	0.143	0.484	0.126	0.101	0.139	0.199	0.171	0.164	0.145
90	87.33333	0.127	0.133	0.158	0.164	0.161	0.143	0.143	0.465	0.126	0.13	0.139	0.203	0.171	0.164	0.147
92	89.33333	0.129	0.133	0.161	0.164	0.162	0.143	0.146	0.478	0.129	0.117	0.142	0.203	0.174	0.167	0.148
94	91.33333	0.13	0.136	0.164	0.164	0.166	0.146	0.146	0.472	0.132	0.13	0.142	0.203	0.174	0.167	0.15
96	93.33333	0.132	0.136	0.164	0.167	0.167	0.146	0.15	0.481	0.135	0.123	0.142	0.203	0.174	0.167	0.151
98	95.33333	0.133	0.139	0.166	0.171	0.169	0.149	0.15	0.484	0.139	0.146	0.146	0.206	0.168	0.17	0.155
100	97.33333	0.135	0.139	0.168	0.171	0.17	0.149	0.153	0.49	0.139	0.126	0.146	0.209	0.177	0.174	0.156
110	107.33333	0.141	0.145	0.174	0.177	0.175	0.156	0.156	0.494	0.154	0.142	0.155	0.222	0.184	0.18	0.163
120	117.33333	0.149	0.152	0.184	0.186	0.183	0.165	0.165	0.5	0.161	0.139	0.161	0.235	0.193	0.189	0.171
130	127.33333	0.156	0.158	0.19	0.193	0.189	0.171	0.171	0.503	0.167	0.139	0.171	0.241	0.199	0.196	0.177
140	137.33333	0.162	0.168	0.193	0.199	0.196	0.175	0.178	0.503	0.17	0.158	0.174	0.251	0.209	0.202	0.19
150	147.33333	0.169	0.174	0.203	0.205	0.202	0.184	0.184	0.512	0.17	0.152	0.184	0.251	0.215	0.208	0.197
160	157.33333	0.173	0.18	0.209	0.215	0.21	0.191	0.19	0.525	0.17	0.171	0.187	0.245	0.219	0.212	0.202
170	167.33333	0.18	0.187	0.215	0.224	0.215	0.197	0.196	0.522	0.17	0.155	0.193	0.235	0.225	0.218	0.206
180	177.33333	0.186	0.19	0.218	0.228	0.219	0.203	0.203	0.541	0.173	0.18	0.199	0.222	0.234	0.224	0.211
190	187.33333	0.191	0.196	0.228	0.234	0.226	0.206	0.209	0.544	0.18	0.168	0.206	0.209	0.234	0.23	0.216
200	197.33333	0.196	0.199	0.231	0.237	0.232	0.213	0.212	0.557	0.186	0.209	0.209	0.19	0.244	0.237	0.221
210	207.33333	0.2	0.206	0.234	0.24	0.237	0.216	0.215	0.563	0.189	0.206	0.215	0.183	0.244	0.243	0.227
220	217.33333	0.202	0.209	0.237	0.25	0.241	0.219	0.221	0.56	0.196	0.193	0.222	0.174	0.253	0.246	0.234
230	227.33333	0.212	0.215	0.247	0.253	0.246	0.226	0.228	0.579	0.199	0.199	0.225	0.17	0.25	0.253	0.239
240	237.33333	0.216	0.222	0.253	0.256	0.251	0.232	0.231	0.579	0.202	0.199	0.231	0.161	0.263	0.259	0.242
250	247.33333	0.221	0.225	0.256	0.263	0.257	0.235	0.237	0.579	0.208	0.187	0.234	0.151	0.269	0.262	0.247
260	257.33333	0.226	0.228	0.26	0.266	0.262	0.241	0.24	0.585	0.221	0.228	0.238	0.154	0.272	0.268	0.253

Table 1. Multiple-Well Pumping Test Time-Drawdown Data

Uncorrected Time (minutes)	Corrected Time (minutes)	Well I1 (ft)	Well I2 (ft)	Well I3 (ft)	Well I4 (ft)	Well I5 (ft)	Well O1 (ft)	Well O2 (ft)	Well O3 (ft)	Well O4 (ft)	Well O5 (ft)	Well E1 (ft)	Well E2 (ft)	Well E3 (ft)	Well E4 (ft)	Well E5 (ft)
270	267.33333	0.231	0.231	0.263	0.269	0.265	0.245	0.246	0.579	0.224	0.231	0.244	0.148	0.279	0.272	0.258
280	277.33333	0.235	0.237	0.269	0.275	0.27	0.251	0.253	0.607	0.23	0.238	0.247	0.148	0.282	0.278	0.263
290	287.33333	0.239	0.241	0.272	0.278	0.275	0.254	0.256	0.613	0.23	0.247	0.253	0.145	0.288	0.281	0.266
300	297.33333	0.243	0.244	0.279	0.285	0.279	0.261	0.259	0.607	0.23	0.234	0.257	0.138	0.298	0.284	0.271
310	307.33333	0.247	0.247	0.279	0.285	0.283	0.257	0.262	0.626	0.233	0.247	0.26	0.132	0.295	0.291	0.274
320	317.33333	0.251	0.253	0.288	0.291	0.287	0.267	0.268	0.616	0.224	0.247	0.263	0.109	0.301	0.294	0.277
330	327.33333	0.256	0.256	0.291	0.294	0.292	0.27	0.275	0.623	0.233	0.238	0.269	0.099	0.301	0.3	0.284
340	337.33333	0.259	0.26	0.295	0.297	0.295	0.273	0.275	0.623	0.243	0.266	0.272	0.09	0.304	0.303	0.289
350	347.33333	0.263	0.263	0.301	0.304	0.298	0.276	0.281	0.648	0.24	0.25	0.276	0.067	0.311	0.306	0.29
360	357.33333	0.267	0.266	0.301	0.307	0.305	0.28	0.284	0.626	0.246	0.276	0.282	0.051	0.32	0.313	0.295
370	367.33333	0.272	0.272	0.307	0.31	0.308	0.286	0.287	0.642	0.249	0.266	0.285	0.041	0.32	0.316	0.3
380	377.33333	0.275	0.275	0.31	0.316	0.311	0.289	0.293	0.651	0.262	0.295	0.288	0.035	0.323	0.319	0.303
390	387.33333	0.279	0.279	0.314	0.316	0.316	0.292	0.293	0.642	0.268	0.266	0.292	0.025	0.33	0.325	0.307
400	397.33333	0.282	0.282	0.317	0.329	0.319	0.296	0.303	0.648	0.275	0.279	0.295	0.006	0.33	0.325	0.307
410	407.33333	0.285	0.282	0.32	0.332	0.321	0.296	0.3	0.67	0.275	0.292	0.298	-0.006	0.336	0.332	0.313
420	417.33333	0.288	0.288	0.323	0.339	0.325	0.302	0.306	0.679	0.275	0.282	0.301	-0.019	0.342	0.335	0.315
430	427.33333	0.291	0.291	0.326	0.342	0.328	0.305	0.309	0.682	0.281	0.295	0.304	-0.022	0.339	0.335	0.318
440	437.33333	0.296	0.294	0.329	0.345	0.333	0.312	0.312	0.664	0.297	0.295	0.307	-0.016	0.349	0.341	0.324
450	447.33333	0.298	0.298	0.333	0.345	0.335	0.312	0.315	0.696	0.294	0.288	0.311	-0.019	0.349	0.344	0.324
460	457.33333	0.301	0.301	0.336	0.348	0.34	0.315	0.318	0.682	0.297	0.298	0.314	-0.022	0.355	0.351	0.328
470	467.33333	0.304	0.304	0.339	0.354	0.343	0.321	0.321	0.686	0.306	0.307	0.317	-0.022	0.358	0.357	0.334
480	477.33333	0.307	0.307	0.342	0.354	0.344	0.321	0.325	0.601	0.313	0.304	0.32	-0.019	0.361	0.354	0.336

Table 2. Multiple-Well Pumping Test Recovery Data

Uncorrected Time (minutes)	Corrected Time (minutes)	Well I1 (ft)	Well I2 (ft)	Well I3 (ft)	Well I4 (ft)	Well I5 (ft)	Well O1 (ft)	Well O2 (ft)	Well O3 (ft)	Well O4 (ft)	Well O5 (ft)	Well E1 (ft)	Well E2 (ft)	Well E3 (ft)	Well E4 (ft)	Well E5 (ft)
	0	0.307	0.307	0.342	0.354	0.344	0.321	0.325	0.601							
0	0.05	0.302	0.304	0.333	0.354	0.338	0.318	0.309	0.336	0.313	0.339	0.314	-0.029	0.355	0.357	0.336
0.0083	0.0583	0.302	0.304	0.333	0.354	0.336	0.315	0.309	0.336	0.316	0.339	0.314	-0.029	0.358	0.354	0.336
0.0166	0.0666	0.302	0.304	0.333	0.354	0.336	0.315	0.309	0.333	0.313	0.342	0.314	-0.029	0.355	0.354	0.336
0.025	0.075	0.302	0.301	0.333	0.354	0.336	0.315	0.309	0.336	0.313	0.339	0.314	-0.029	0.355	0.354	0.336
0.0333	0.0833	0.302	0.304	0.333	0.354	0.336	0.315	0.306	0.333	0.313	0.339	0.311	-0.032	0.352	0.354	0.334
0.0416	0.0916	0.302	0.301	0.329	0.354	0.335	0.315	0.306	0.336	0.313	0.339	0.314	-0.032	0.352	0.354	0.334
0.05	0.1	0.301	0.304	0.329	0.354	0.336	0.315	0.306	0.333	0.309	0.339	0.311	-0.032	0.352	0.354	0.334
0.0583	0.1083	0.301	0.301	0.329	0.351	0.335	0.315	0.306	0.33	0.313	0.339	0.311	-0.032	0.349	0.351	0.334
0.0666	0.1166	0.301	0.301	0.329	0.351	0.335	0.315	0.306	0.33	0.309	0.336	0.311	-0.035	0.349	0.351	0.334
0.075	0.125	0.301	0.301	0.329	0.354	0.333	0.315	0.306	0.333	0.309	0.336	0.311	-0.035	0.346	0.351	0.334
0.0833	0.1333	0.301	0.301	0.326	0.354	0.333	0.312	0.306	0.333	0.309	0.336	0.311	-0.035	0.346	0.351	0.334
0.1	0.15	0.301	0.301	0.326	0.351	0.333	0.312	0.303	0.33	0.309	0.336	0.307	-0.038	0.346	0.351	0.332
0.1166	0.1666	0.299	0.301	0.326	0.351	0.332	0.312	0.303	0.33	0.309	0.336	0.307	-0.038	0.342	0.348	0.331
0.1333	0.1833	0.299	0.301	0.326	0.351	0.332	0.312	0.303	0.327	0.306	0.333	0.307	-0.038	0.339	0.348	0.331
0.15	0.2	0.299	0.301	0.323	0.351	0.33	0.312	0.303	0.327	0.306	0.333	0.307	-0.038	0.339	0.348	0.329
0.1666	0.2166	0.299	0.298	0.323	0.351	0.33	0.308	0.303	0.327	0.306	0.333	0.307	-0.041	0.336	0.348	0.329
0.1833	0.2333	0.299	0.301	0.323	0.351	0.328	0.308	0.3	0.324	0.306	0.33	0.304	-0.041	0.336	0.344	0.329
0.2	0.25	0.299	0.298	0.323	0.351	0.328	0.308	0.3	0.324	0.303	0.33	0.304	-0.045	0.333	0.344	0.326
0.2166	0.2666	0.298	0.298	0.32	0.351	0.328	0.308	0.3	0.327	0.303	0.33	0.304	-0.048	0.333	0.344	0.326
0.2333	0.2833	0.298	0.298	0.32	0.351	0.327	0.308	0.3	0.327	0.303	0.33	0.304	-0.045	0.33	0.344	0.326
0.25	0.3	0.298	0.298	0.32	0.351	0.327	0.308	0.3	0.327	0.303	0.33	0.304	-0.048	0.33	0.341	0.326
0.2666	0.3166	0.298	0.298	0.32	0.351	0.325	0.308	0.3	0.321	0.303	0.326	0.304	-0.048	0.33	0.341	0.326
0.2833	0.3333	0.298	0.298	0.32	0.351	0.325	0.308	0.3	0.324	0.297	0.326	0.304	-0.048	0.326	0.341	0.324
0.3	0.35	0.296	0.298	0.317	0.348	0.324	0.308	0.3	0.321	0.3	0.326	0.301	-0.048	0.326	0.341	0.324
0.3166	0.3666	0.296	0.298	0.317	0.348	0.324	0.308	0.296	0.321	0.3	0.326	0.301	-0.051	0.326	0.338	0.323
0.3333	0.3833	0.296	0.298	0.317	0.351	0.324	0.305	0.296	0.324	0.297	0.326	0.304	-0.051	0.326	0.338	0.323
0.4166	0.4666	0.294	0.294	0.314	0.348	0.319	0.305	0.296	0.306	0.29	0.323	0.298	-0.051	0.32	0.335	0.318
0.5	0.55	0.293	0.291	0.31	0.348	0.317	0.302	0.293	0.314	0.29	0.317	0.298	-0.054	0.317	0.335	0.316
0.5833	0.6333	0.293	0.291	0.31	0.345	0.316	0.302	0.293	0.317	0.29	0.317	0.295	-0.058	0.317	0.332	0.315
0.6666	0.7166	0.291	0.291	0.307	0.342	0.313	0.299	0.293	0.327	0.284	0.314	0.295	-0.058	0.314	0.329	0.311
0.75	0.8	0.29	0.288	0.307	0.342	0.313	0.299	0.29	0.311	0.284	0.311	0.295	-0.058	0.311	0.329	0.31
0.8333	0.8833	0.29	0.288	0.304	0.342	0.31	0.299	0.29	0.308	0.281	0.311	0.295	-0.061	0.311	0.325	0.308
0.9166	0.9666	0.29	0.288	0.307	0.339	0.308	0.299	0.29	0.311	0.281	0.307	0.295	-0.061	0.307	0.322	0.307
1	1.05	0.288	0.285	0.304	0.335	0.306	0.296	0.29	0.311	0.278	0.307	0.292	-0.064	0.307	0.322	0.305
1.0833	1.1333	0.288	0.285	0.301	0.332	0.305	0.296	0.287	0.308	0.275	0.304	0.292	-0.064	0.304	0.322	0.303
1.1666	1.2166	0.287	0.285	0.301	0.339	0.303	0.296	0.287	0.305	0.275	0.301	0.288	-0.064	0.304	0.319	0.302
1.25	1.3	0.287	0.285	0.301	0.332	0.332	0.296	0.287	0.305	0.275	0.304	0.292	-0.064	0.304	0.319	0.302
1.3333	1.3833	0.287	0.282	0.298	0.332	0.302	0.292	0.287	0.305	0.275	0.301	0.288	-0.067	0.301	0.316	0.3
1.4166	1.4666	0.285	0.282	0.298	0.332	0.311	0.292	0.284	0.302	0.271	0.298	0.292	-0.067	0.301	0.316	0.298

Table 2. Multiple-Well Pumping Test Recovery Data

Uncorrected Time (minutes)	Corrected Time (minutes)	Well I1 (ft)	Well I2 (ft)	Well I3 (ft)	Well I4 (ft)	Well I5 (ft)	Well O1 (ft)	Well O2 (ft)	Well O3 (ft)	Well O4 (ft)	Well O5 (ft)	Well E1 (ft)	Well E2 (ft)	Well E3 (ft)	Well E4 (ft)	Well E5 (ft)
1.5	1.55	0.285	0.282	0.298	0.329	0.302	0.292	0.284	0.302	0.271	0.298	0.288	-0.067	0.301	0.316	0.298
1.5833	1.6333	0.283	0.282	0.295	0.326	0.298	0.292	0.284	0.302	0.271	0.301	0.288	-0.067	0.298	0.316	0.297
1.6666	1.7166	0.283	0.279	0.295	0.326	0.298	0.292	0.284	0.302	0.268	0.295	0.288	-0.067	0.298	0.313	0.297
1.75	1.8	0.283	0.279	0.291	0.326	0.297	0.292	0.284	0.302	0.271	0.295	0.285	-0.07	0.298	0.313	0.297
1.8333	1.8833	0.282	0.279	0.291	0.323	0.297	0.289	0.281	0.302	0.268	0.295	0.278	-0.07	0.298	0.313	0.294
1.9166	1.9666	0.282	0.279	0.291	0.323	0.297	0.289	0.281	0.298	0.268	0.295	0.285	-0.07	0.295	0.31	0.294
2	2.05	0.28	0.279	0.291	0.323	0.295	0.292	0.281	0.298	0.265	0.295	0.288	-0.07	0.295	0.31	0.298
2.5	2.55	0.279	0.275	0.288	0.316	0.291	0.289	0.278	0.295	0.262	0.292	0.282	-0.074	0.292	0.303	0.289
3	3.05	0.272	0.269	0.285	0.31	0.287	0.283	0.278	0.292	0.259	0.285	0.279	-0.074	0.288	0.303	0.286
3.5	3.55	0.274	0.272	0.282	0.307	0.286	0.28	0.275	0.292	0.259	0.285	0.276	-0.077	0.285	0.3	0.282
4	4.05	0.272	0.266	0.282	0.307	0.283	0.276	0.271	0.286	0.256	0.282	0.276	-0.08	0.282	0.297	0.281
4.5	4.55	0.269	0.263	0.279	0.301	0.279	0.276	0.268	0.286	0.252	0.282	0.272	-0.083	0.279	0.294	0.277
5	5.05	0.269	0.263	0.276	0.297	0.278	0.28	0.268	0.283	0.252	0.276	0.272	-0.083	0.276	0.291	0.276
5.5	5.55	0.264	0.263	0.276	0.297	0.276	0.273	0.265	0.283	0.249	0.276	0.269	-0.087	0.276	0.291	0.274
6	6.05	0.266	0.26	0.272	0.294	0.275	0.27	0.253	0.28	0.249	0.273	0.266	-0.08	0.276	0.287	0.271
6.5	6.55	0.264	0.263	0.272	0.291	0.272	0.27	0.262	0.276	0.246	0.273	0.266	-0.09	0.272	0.287	0.269
7	7.05	0.263	0.26	0.269	0.291	0.27	0.267	0.262	0.273	0.243	0.269	0.266	-0.09	0.272	0.284	0.266
7.5	7.55	0.261	0.256	0.269	0.288	0.268	0.264	0.259	0.276	0.246	0.273	0.263	-0.09	0.269	0.284	0.266
8	8.05	0.259	0.253	0.269	0.285	0.268	0.264	0.259	0.273	0.243	0.269	0.26	-0.093	0.266	0.281	0.265
8.5	8.55	0.259	0.253	0.253	0.285	0.265	0.264	0.259	0.27	0.24	0.266	0.266	-0.093	0.266	0.281	0.263
9	9.05	0.256	0.253	0.266	0.285	0.265	0.251	0.256	0.27	0.24	0.266	0.26	-0.093	0.266	0.281	0.263
9.5	9.55	0.258	0.25	0.263	0.282	0.264	0.264	0.256	0.27	0.24	0.266	0.26	-0.096	0.263	0.278	0.26
10	10.05	0.256	0.25	0.263	0.282	0.264	0.261	0.256	0.27	0.24	0.266	0.26	-0.096	0.263	0.278	0.252
12	12.05	0.251	0.247	0.26	0.275	0.257	0.257	0.25	0.264	0.233	0.263	0.257	-0.096	0.26	0.275	0.256
14	14.05	0.247	0.241	0.256	0.272	0.254	0.251	0.246	0.261	0.23	0.257	0.25	-0.103	0.253	0.268	0.252
16	16.05	0.245	0.237	0.237	0.266	0.249	0.248	0.243	0.254	0.23	0.253	0.257	-0.103	0.253	0.265	0.25
18	18.05	0.242	0.234	0.25	0.266	0.246	0.248	0.24	0.254	0.23	0.25	0.247	-0.106	0.247	0.262	0.247
20	20.05	0.239	0.234	0.247	0.263	0.243	0.245	0.237	0.251	0.221	0.247	0.241	-0.106	0.247	0.259	0.242
22	22.05	0.235	0.228	0.241	0.256	0.24	0.238	0.234	0.245	0.221	0.244	0.241	-0.106	0.244	0.256	0.239
24	24.05	0.232	0.228	0.241	0.256	0.238	0.238	0.231	0.245	0.221	0.241	0.238	-0.109	0.238	0.253	0.235
26	26.05	0.231	0.225	0.237	0.253	0.235	0.235	0.228	0.239	0.215	0.238	0.234	-0.112	0.238	0.249	0.232
28	28.05	0.228	0.222	0.234	0.247	0.232	0.232	0.225	0.242	0.211	0.238	0.231	-0.112	0.234	0.246	0.229
30	30.05	0.226	0.222	0.234	0.247	0.229	0.232	0.225	0.236	0.208	0.231	0.228	-0.119	0.231	0.243	0.227
32	32.05	0.224	0.218	0.231	0.243	0.227	0.229	0.221	0.232	0.205	0.228	0.228	-0.122	0.228	0.243	0.224
34	34.05	0.221	0.218	0.228	0.24	0.226	0.226	0.218	0.232	0.202	0.225	0.225	-0.125	0.228	0.24	0.223
36	36.05	0.22	0.212	0.225	0.237	0.223	0.222	0.215	0.229	0.202	0.225	0.225	-0.125	0.225	0.237	0.221
38	38.05	0.216	0.212	0.225	0.237	0.221	0.222	0.215	0.226	0.202	0.222	0.222	-0.125	0.225	0.234	0.219
40	40.05	0.215	0.209	0.222	0.234	0.218	0.219	0.212	0.226	0.199	0.222	0.219	-0.125	0.222	0.234	0.218
42	42.05	0.213	0.206	0.222	0.231	0.216	0.216	0.209	0.229	0.199	0.222	0.219	-0.125	0.219	0.23	0.214
44	44.05	0.212	0.206	0.215	0.228	0.215	0.216	0.209	0.223	0.199	0.212	0.215	-0.122	0.219	0.23	0.213

Table 2. Multiple-Well Pumping Test Recovery Data

Uncorrected Time (minutes)	Corrected Time (minutes)	Well I1 (ft)	Well I2 (ft)	Well I3 (ft)	Well I4 (ft)	Well I5 (ft)	Well O1 (ft)	Well O2 (ft)	Well O3 (ft)	Well O4 (ft)	Well O5 (ft)	Well E1 (ft)	Well E2 (ft)	Well E3 (ft)	Well E4 (ft)	Well E5 (ft)
46	46.05	0.21	0.209	0.215	0.228	0.215	0.216	0.209	0.226	0.196	0.209	0.215	-0.122	0.215	0.227	0.211
48	48.05	0.208	0.202	0.215	0.228	0.211	0.213	0.206	0.223	0.192	0.206	0.209	-0.125	0.212	0.224	0.21
50	50.05	0.208	0.209	0.218	0.228	0.21	0.213	0.206	0.22	0.196	0.206	0.212	-0.125	0.209	0.221	0.208
52	52.05	0.204	0.196	0.209	0.218	0.207	0.206	0.2	0.214	0.192	0.203	0.209	-0.125	0.209	0.218	0.205
54	54.05	0.205	0.202	0.212	0.221	0.207	0.21	0.203	0.217	0.192	0.203	0.206	-0.125	0.206	0.218	0.205
56	56.05	0.202	0.196	0.206	0.218	0.204	0.203	0.2	0.21	0.189	0.199	0.206	-0.125	0.206	0.218	0.203
58	58.05	0.2	0.193	0.203	0.215	0.202	0.2	0.196	0.207	0.189	0.196	0.206	-0.125	0.203	0.215	0.202
60	60.05	0.199	0.193	0.203	0.212	0.2	0.2	0.193	0.21	0.189	0.196	0.203	-0.122	0.203	0.215	0.2
62	62.05	0.197	0.193	0.203	0.212	0.2	0.2	0.193	0.21	0.189	0.199	0.203	-0.122	0.203	0.212	0.198
64	64.05	0.196	0.19	0.199	0.209	0.199	0.203	0.193	0.21	0.186	0.193	0.196	-0.125	0.199	0.208	0.195
66	66.05	0.194	0.187	0.199	0.209	0.196	0.197	0.19	0.207	0.189	0.196	0.199	-0.119	0.199	0.208	0.195
68	68.05	0.194	0.187	0.196	0.209	0.196	0.2	0.19	0.207	0.186	0.193	0.196	-0.119	0.199	0.208	0.195
70	70.05	0.192	0.19	0.196	0.209	0.194	0.197	0.19	0.207	0.186	0.193	0.196	-0.116	0.196	0.205	0.193
72	72.05	0.191	0.187	0.196	0.205	0.192	0.194	0.187	0.201	0.186	0.19	0.196	-0.116	0.193	0.205	0.192
74	74.05	0.189	0.187	0.193	0.202	0.191	0.194	0.187	0.198	0.183	0.187	0.193	-0.116	0.193	0.202	0.189
76	76.05	0.189	0.183	0.193	0.202	0.189	0.191	0.184	0.198	0.183	0.187	0.193	-0.112	0.19	0.202	0.189
78	78.05	0.186	0.183	0.193	0.199	0.188	0.191	0.184	0.198	0.186	0.187	0.193	-0.109	0.193	0.202	0.187
80	80.05	0.186	0.183	0.19	0.199	0.186	0.187	0.184	0.195	0.183	0.187	0.19	-0.109	0.19	0.202	0.185
82	82.05	0.184	0.18	0.19	0.199	0.186	0.187	0.181	0.195	0.183	0.184	0.19	-0.106	0.19	0.199	0.185
84	84.05	0.183	0.18	0.19	0.196	0.185	0.187	0.181	0.191	0.183	0.184	0.19	-0.103	0.19	0.199	0.184
86	86.05	0.181	0.177	0.187	0.196	0.181	0.184	0.181	0.191	0.18	0.18	0.187	-0.103	0.187	0.196	0.181
88	88.05	0.18	0.174	0.187	0.193	0.181	0.184	0.178	0.191	0.177	0.18	0.187	-0.103	0.187	0.196	0.179
90	90.05	0.18	0.177	0.187	0.193	0.181	0.181	0.178	0.188	0.173	0.177	0.187	-0.103	0.184	0.196	0.179
92	92.05	0.178	0.174	0.184	0.193	0.18	0.181	0.175	0.188	0.173	0.177	0.184	-0.099	0.184	0.193	0.179
94	94.05	0.178	0.171	0.184	0.19	0.178	0.181	0.175	0.188	0.17	0.177	0.18	-0.099	0.18	0.193	0.176
96	96.05	0.175	0.171	0.18	0.19	0.177	0.181	0.175	0.185	0.17	0.174	0.18	-0.099	0.18	0.189	0.174
98	98.05	0.173	0.171	0.177	0.186	0.175	0.178	0.171	0.185	0.164	0.171	0.177	-0.106	0.18	0.186	0.172
100	100.05	0.173	0.168	0.177	0.186	0.173	0.178	0.171	0.182	0.158	0.171	0.177	-0.109	0.177	0.186	0.171
110	110.05	0.167	0.161	0.174	0.18	0.169	0.171	0.165	0.176	0.135	0.165	0.174	-0.141	0.171	0.18	0.163
120	120.05	0.162	0.155	0.168	0.174	0.162	0.165	0.162	0.169	0.11	0.158	0.168	-0.19	0.165	0.174	0.155
130	130.05	0.159	0.152	0.164	0.171	0.159	0.162	0.156	0.166	0.098	0.152	0.161	-0.235	0.161	0.17	0.151
140	140.05	0.156	0.149	0.161	0.167	0.155	0.159	0.153	0.163	0.098	0.149	0.158	-0.267	0.158	0.167	0.147
150	150.05	0.151	0.142	0.155	0.161	0.15	0.152	0.15	0.16	0.094	0.146	0.155	-0.296	0.152	0.164	0.143
160	160.05	0.146	0.139	0.152	0.158	0.145	0.149	0.146	0.154	0.088	0.139	0.149	-0.332	0.149	0.158	0.138
170	170.05	0.145	0.136	0.149	0.155	0.142	0.146	0.14	0.151	0.085	0.136	0.146	-0.358	0.146	0.155	0.135
180	180.05	0.141	0.133	0.145	0.152	0.139	0.143	0.137	0.147	0.082	0.133	0.142	-0.383	0.142	0.151	0.132
190	190.05	0.138	0.13	0.142	0.148	0.136	0.14	0.134	0.144	0.085	0.13	0.139	-0.406	0.139	0.148	0.13
200	200.05	0.135	0.123	0.139	0.145	0.131	0.136	0.131	0.141	0.079	0.126	0.136	-0.429	0.136	0.145	0.126
210	210.05	0.132	0.123	0.136	0.142	0.129	0.133	0.131	0.138	0.079	0.123	0.136	-0.448	0.133	0.142	0.122
220	220.05	0.129	0.12	0.133	0.139	0.126	0.133	0.128	0.136	0.079	0.12	0.133	-0.464	0.13	0.139	0.121

Table 2. Multiple-Well Pumping Test Recovery Data

Uncorrected Time (minutes)	Corrected Time (minutes)	Well I1 (ft)	Well I2 (ft)	Well I3 (ft)	Well I4 (ft)	Well I5 (ft)	Well O1 (ft)	Well O2 (ft)	Well O3 (ft)	Well O4 (ft)	Well O5 (ft)	Well E1 (ft)	Well E2 (ft)	Well E3 (ft)	Well E4 (ft)	Well E5 (ft)
230	230.05	0.127	0.117	0.13	0.136	0.124	0.13	0.125	0.135	0.075	0.117	0.13	-0.487	0.126	0.139	0.117
240	240.05	0.124	0.114	0.126	0.133	0.121	0.127	0.121	0.132	0.072	0.117	0.126	-0.503	0.123	0.136	0.116
250	250.05	0.122	0.114	0.126	0.133	0.12	0.124	0.118	0.129	0.072	0.114	0.126	-0.516	0.123	0.132	0.114
260	260.05	0.121	0.111	0.123	0.129	0.117	0.124	0.118	0.129	0.072	0.111	0.123	-0.529	0.12	0.132	0.113
270	270.05	0.119	0.107	0.12	0.126	0.115	0.12	0.115	0.125	0.066	0.111	0.12	-0.545	0.117	0.129	0.111
280	280.05	0.116	0.107	0.12	0.123	0.112	0.117	0.112	0.122	0.069	0.104	0.12	-0.554	0.117	0.126	0.108
290	290.05	0.116	0.104	0.117	0.123	0.11	0.117	0.112	0.122	0.066	0.104	0.117	-0.567	0.114	0.126	0.106
300	300.05	0.113	0.101	0.114	0.12	0.109	0.114	0.109	0.119	0.066	0.101	0.114	-0.577	0.114	0.123	0.105
310	310.05	0.111	0.101	0.114	0.12	0.109	0.114	0.109	0.119	0.066	0.101	0.114	-0.59	0.111	0.123	0.105
320	320.05	0.11	0.101	0.114	0.117	0.105	0.111	0.106	0.116	0.066	0.101	0.114	-0.593	0.111	0.12	0.101
330	330.05	0.108	0.098	0.111	0.114	0.102	0.108	0.106	0.116	0.063	0.098	0.111	-0.606	0.107	0.12	0.1
340	340.05	0.108	0.098	0.111	0.114	0.104	0.108	0.103	0.116	0.06	0.095	0.111	-0.625	0.107	0.12	0.098
350	350.05	0.105	0.095	0.107	0.114	0.099	0.108	0.103	0.113	0.047	0.092	0.111	-0.651	0.104	0.113	0.095
360	360.05	0.105	0.091	0.107	0.11	0.099	0.105	0.103	0.11	0.044	0.092	0.107	-0.667	0.104	0.113	0.095
370	370.05	0.102	0.091	0.104	0.107	0.096	0.105	0.1	0.11	0.041	0.088	0.104	-0.693	0.101	0.11	0.092
380	380.05	0.102	0.088	0.104	0.107	0.096	0.101	0.1	0.11	0.041	0.088	0.104	-0.709	0.098	0.11	0.09
390	390.05	0.098	0.085	0.101	0.107	0.094	0.101	0.098	0.107	0.034	0.085	0.101	-0.735	0.098	0.107	0.087
400	400.05	0.098	0.085	0.101	0.104	0.091	0.098	0.098	0.103	0.031	0.082	0.101	-0.764	0.098	0.107	0.087
410	410.05	0.098	0.085	0.101	0.104	0.093	0.098	0.093	0.107	0.031	0.082	0.101	-0.787	0.095	0.107	0.087
420	420.05	0.097	0.082	0.101	0.101	0.09	0.098	0.093	0.103	0.025	0.079	0.101	-0.816	0.095	0.107	0.084
430	430.05	0.097	0.082	0.098	0.101	0.09	0.098	0.093	0.103	0.031	0.082	0.098	-0.829	0.095	0.107	0.085
440	440.05	0.095	0.082	0.098	0.101	0.088	0.095	0.09	0.103	0.031	0.079	0.098	-0.841	0.092	0.104	0.084
450	450.05	0.094	0.079	0.095	0.101	0.086	0.095	0.09	0.1	0.025	0.079	0.098	-0.867	0.092	0.104	0.082
460	460.05	0.094	0.079	0.095	0.098	0.086	0.095	0.09	0.1	0.028	0.079	0.095	-0.877	0.092	0.104	0.082
470	470.05	0.094	0.079	0.095	0.098	0.086	0.095	0.09	0.097	0.028	0.079	0.095	-0.89	0.092	0.104	0.082
480	480.05	0.092	0.079	0.095	0.098	0.085	0.092	0.087	0.097	0.037	0.076	0.095	-0.89	0.088	0.101	0.08
490	490.05	0.092	0.079	0.092	0.098	0.085	0.092	0.087	0.097	0.034	0.076	0.095	-0.896	0.088	0.101	0.082
500	500.05	0.092	0.079	0.095	0.098	0.085	0.092	0.087	0.097	0.041	0.079	0.095	-0.896	0.088	0.101	0.082
510	510.05	0.09	0.076	0.092	0.095	0.083	0.092	0.087	0.097	0.034	0.076	0.092	-0.903	0.088	0.101	0.08
520	520.05	0.09	0.076	0.092	0.095	0.083	0.089	0.087	0.097	0.031	0.076	0.092	-0.916	0.088	0.101	0.079
530	530.05	0.09	0.076	0.092	0.095	0.083	0.089	0.087	0.094	0.031	0.076	0.092	-0.922	0.088	0.098	0.079
540	540.05	0.089	0.076	0.088	0.095	0.083	0.092	0.087	0.097	0.025	0.076	0.088	-0.935	0.088	0.098	0.079
550	550.05	0.09	0.076	0.092	0.095	0.083	0.089	0.087	0.094	0.034	0.076	0.092	-0.932	0.088	0.098	0.08
560	560.05	0.09	0.076	0.092	0.095	0.082	0.089	0.087	0.097	0.041	0.079	0.092	-0.922	0.088	0.101	0.08
570	570.05	0.09	0.079	0.092	0.095	0.085	0.089	0.087	0.097	0.05	0.079	0.088	-0.909	0.088	0.101	0.082
580	580.05	0.089	0.076	0.092	0.091	0.083	0.089	0.087	0.097	0.056	0.079	0.088	-0.89	0.088	0.098	0.08
590	590.05	0.087	0.076	0.088	0.091	0.082	0.089	0.084	0.094	0.044	0.076	0.088	-0.89	0.088	0.098	0.079
600	600.05	0.087	0.076	0.088	0.091	0.082	0.085	0.084	0.094	0.041	0.076	0.085	-0.887	0.085	0.094	0.079
610	610.05	0.087	0.076	0.088	0.091	0.08	0.089	0.084	0.094	0.031	0.076	0.085	-0.896	0.085	0.098	0.077
620	620.05	0.087	0.076	0.088	0.091	0.082	0.089	0.084	0.094	0.028	0.076	0.088	-0.903	0.085	0.098	0.077

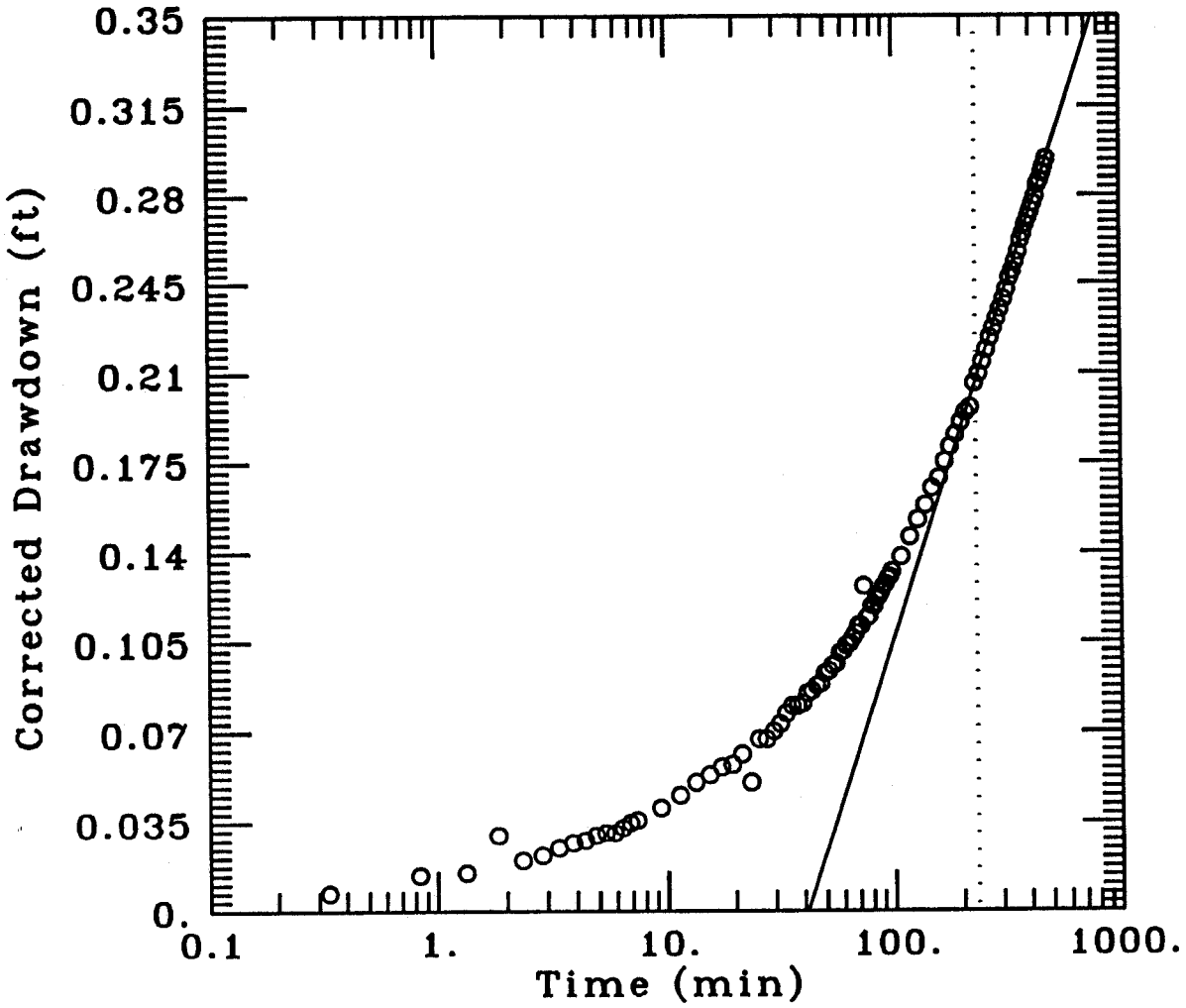
Table 2. Multiple-Well Pumping Test Recovery Data

Uncorrected Time (minutes)	Corrected Time (minutes)	Well I1 (ft)	Well I2 (ft)	Well I3 (ft)	Well I4 (ft)	Well I5 (ft)	Well O1 (ft)	Well O2 (ft)	Well O3 (ft)	Well O4 (ft)	Well O5 (ft)	Well E1 (ft)	Well E2 (ft)	Well E3 (ft)	Well E4 (ft)	Well E5 (ft)
630	630.05	0.089	0.076	0.088	0.091	0.082	0.089	0.084	0.094	0.037	0.076	0.088	-0.903	0.088	0.098	0.079
640	640.05	0.087	0.076	0.088	0.091	0.08	0.085	0.084	0.094	0.037	0.076	0.085	-0.899	0.085	0.094	0.077
650	650.05	0.087	0.076	0.088	0.091	0.082	0.089	0.084	0.097	0.041	0.079	0.088	-0.896	0.085	0.098	0.079
660	660.05	0.087	0.076	0.088	0.091	0.082	0.085	0.084	0.094	0.044	0.076	0.088	-0.887	0.085	0.098	0.079
670	670.05	0.087	0.076	0.088	0.091	0.08	0.085	0.084	0.094	0.034	0.076	0.088	-0.89	0.085	0.094	0.077
680	680.05	0.087	0.076	0.088	0.091	0.08	0.089	0.084	0.094	0.034	0.076	0.088	-0.89	0.085	0.094	0.077
690	690.05	0.089	0.076	0.088	0.091	0.082	0.085	0.084	0.097	0.034	0.076	0.088	-0.887	0.088	0.098	0.079
700	700.05	0.087	0.076	0.088	0.091	0.082	0.085	0.084	0.094	0.037	0.076	0.085	-0.887	0.088	0.098	0.079
710	710.05	0.087	0.076	0.092	0.091	0.082	0.089	0.084	0.094	0.037	0.076	0.088	-0.887	0.088	0.098	0.079
720	720.05	0.089	0.079	0.088	0.095	0.083	0.089	0.084	0.097	0.047	0.079	0.088	-0.867	0.088	0.098	0.082
730	730.05	0.089	0.079	0.088	0.095	0.085	0.089	0.084	0.097	0.053	0.076	0.088	-0.848	0.088	0.098	0.082
740	740.05	0.089	0.079	0.088	0.095	0.083	0.089	0.084	0.097	0.056	0.076	0.088	-0.829	0.088	0.098	0.082
750	750.05	0.089	0.079	0.088	0.095	0.085	0.089	0.084	0.097	0.06	0.082	0.088	-0.806	0.088	0.098	0.082
760	760.05	0.089	0.079	0.085	0.095	0.085	0.089	0.084	0.097	0.069	0.082	0.088	-0.777	0.088	0.098	0.084
770	770.05	0.09	0.079	0.088	0.095	0.086	0.089	0.084	0.1	0.079	0.082	0.088	-0.722	0.092	0.101	0.087
780	780.05	0.09	0.082	0.088	0.095	0.088	0.092	0.087	0.1	0.091	0.082	0.092	-0.658	0.092	0.101	0.09
790	790.05	0.09	0.082	0.088	0.095	0.088	0.089	0.084	0.103	0.104	0.088	0.092	-0.59	0.092	0.101	0.092
800	800.05	0.092	0.085	0.088	0.098	0.088	0.092	0.087	0.103	0.11	0.088	0.092	-0.545	0.095	0.101	0.092
810	810.05	0.09	0.085	0.092	0.098	0.088	0.092	0.087	0.103	0.116	0.088	0.092	-0.503	0.095	0.101	0.092
820	820.05	0.09	0.085	0.088	0.098	0.088	0.089	0.087	0.103	0.113	0.085	0.092	-0.467	0.095	0.101	0.09
830	830.05	0.09	0.085	0.088	0.098	0.088	0.092	0.087	0.103	0.096	0.085	0.092	-0.448	0.092	0.098	0.088
840	840.05	0.09	0.085	0.088	0.098	0.088	0.092	0.087	0.103	0.091	0.088	0.092	-0.429	0.092	0.098	0.088
850	850.05	0.09	0.082	0.092	0.095	0.088	0.092	0.087	0.103	0.082	0.085	0.092	-0.419	0.092	0.098	0.087
860	860.05	0.092	0.088	0.092	0.098	0.091	0.092	0.087	0.107	0.101	0.092	0.095	-0.387	0.095	0.101	0.09
870	870.05	0.09	0.085	0.088	0.098	0.09	0.092	0.087	0.107	0.12	0.088	0.095	-0.345	0.095	0.101	0.09
880	880.05	0.092	0.088	0.092	0.098	0.091	0.092	0.087	0.107	0.126	0.092	0.095	-0.299	0.095	0.101	0.092
890	890.05	0.09	0.088	0.088	0.098	0.091	0.092	0.084	0.107	0.126	0.092	0.095	-0.254	0.095	0.101	0.092

COOPER-JACOB METHOD

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I1



DATA SET:
I1PT.IN
03/12/92

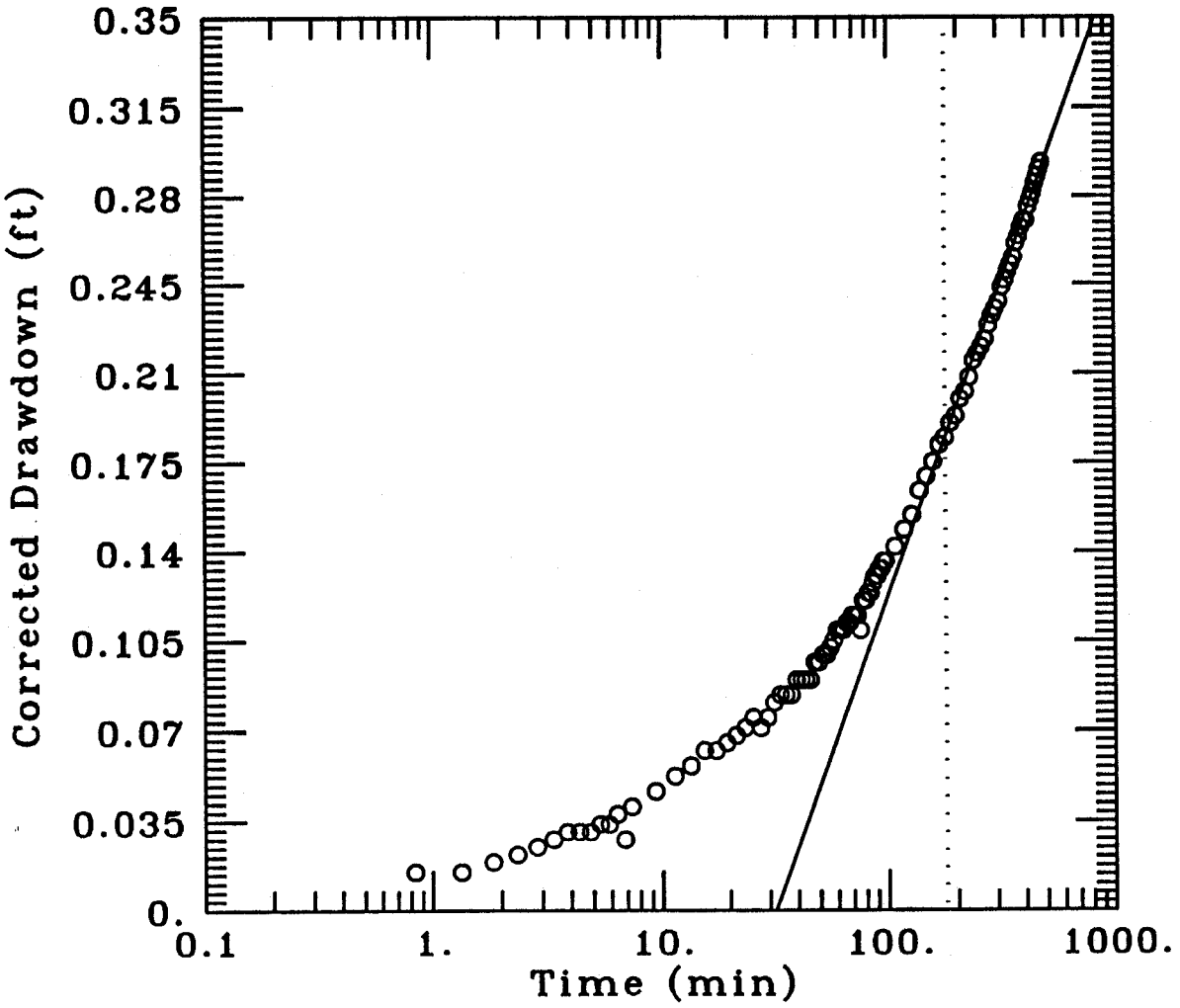
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
I1

ESTIMATED PARAMETERS:
T = 0.1338 ft^2/min
S = 0.465

TEST DATA:
Q = 0.2019 ft^3/min
r = 5.15 ft
b = 3.68 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I2



DATA SET:
i2pt.in
03/18/92

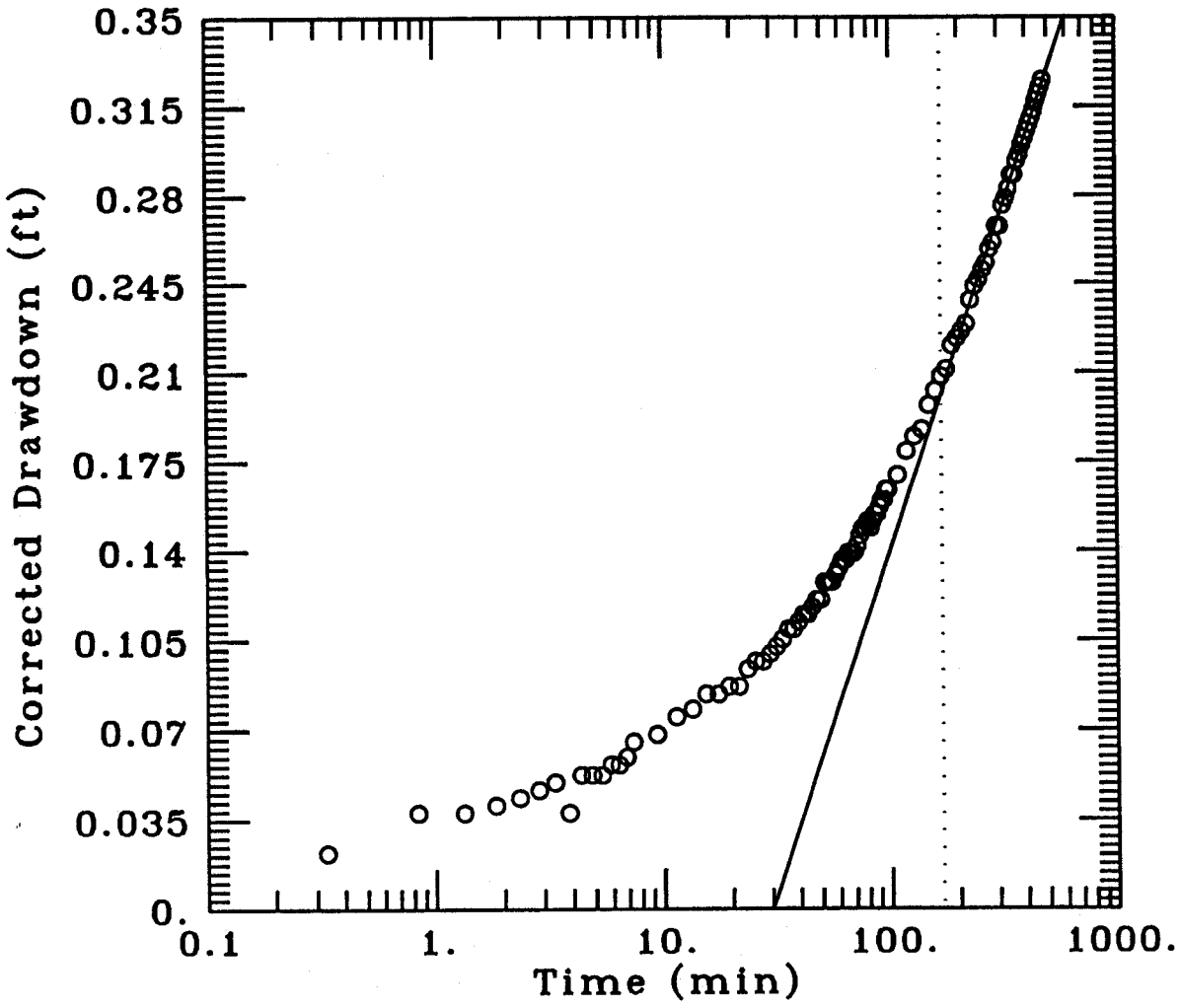
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
I2

ESTIMATED PARAMETERS:
T = 0.1497 ft^2/min
S = 1.145

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.05 ft
b = 3.47 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I3



DATA SET:
I3PT.IN
03/12/92

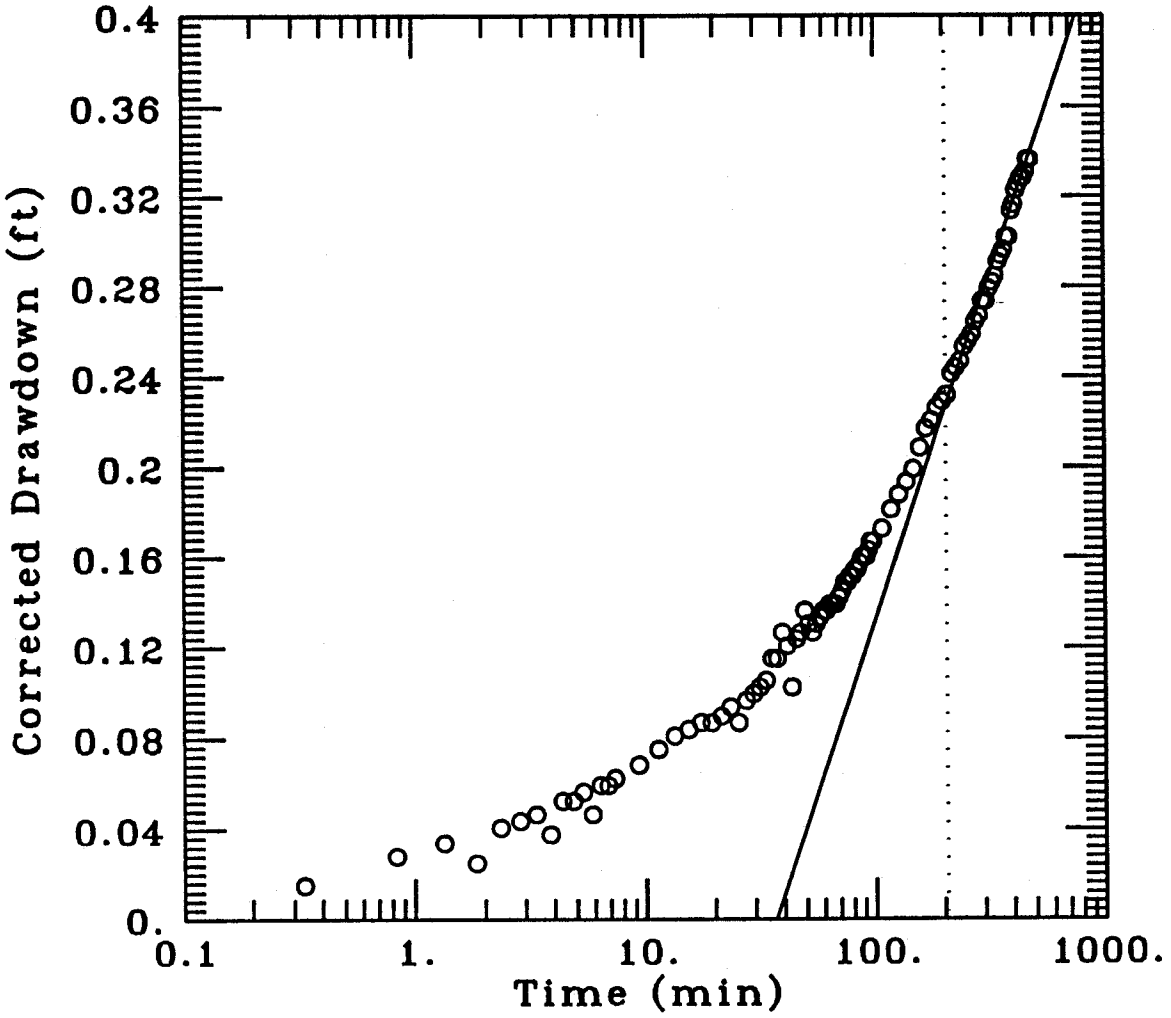
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
I3

ESTIMATED PARAMETERS:
T = 0.1372 ft^2/min
S = 1.574

TEST DATA:
Q = 0.2018 ft^3/min
r = 2.42 ft
b = 3.51 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I4



DATA SET:
I4PT.IN
03/18/92

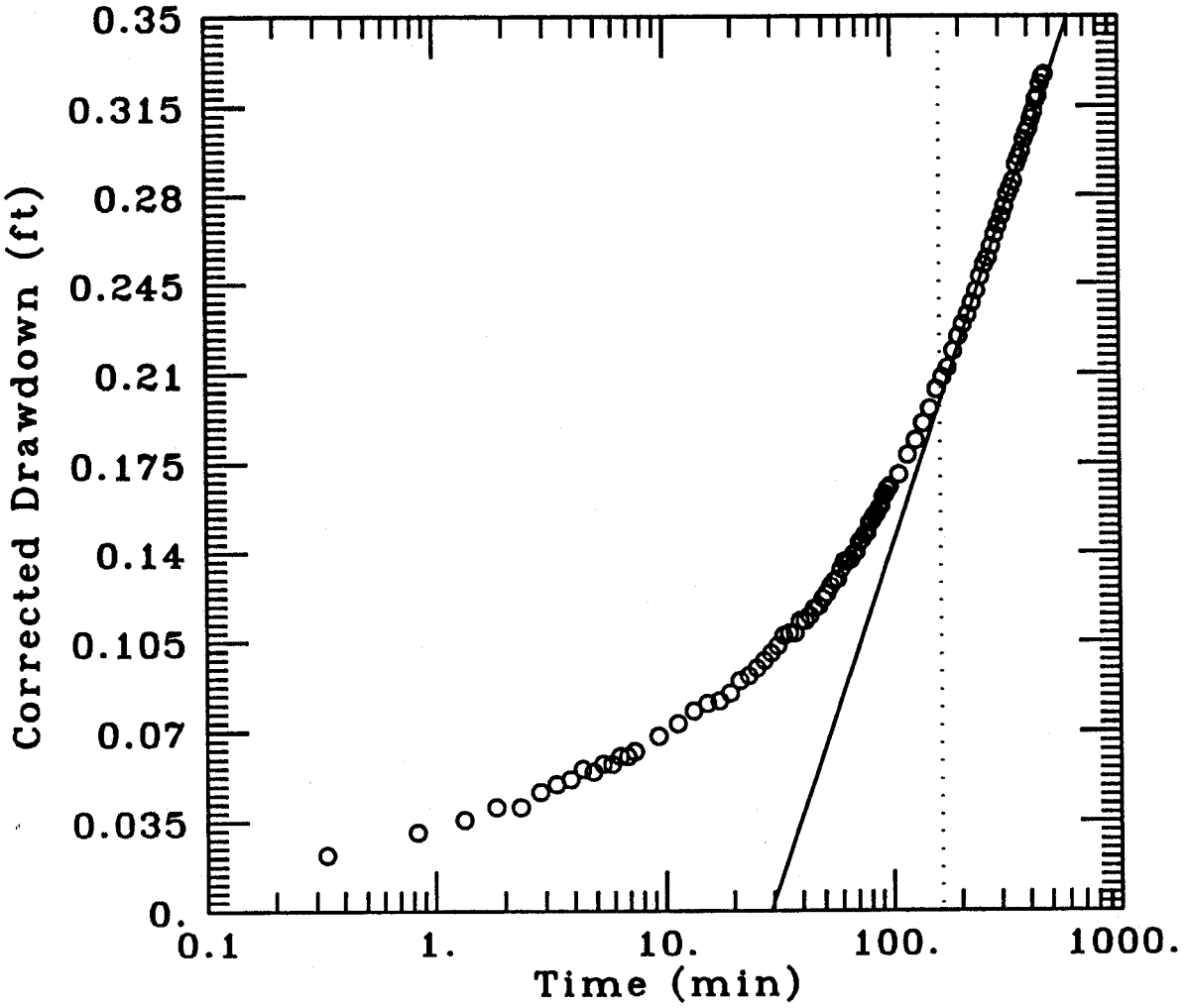
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
I4

ESTIMATED PARAMETERS:
T = 0.1217 ft^2/min
S = 0.9527

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.24 ft
b = 3.54 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I5



DATA SET:
I5PT.IN
03/12/92

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Cooper-Jacob

TEST DATE:
12/18/91

TEST WELL:
03

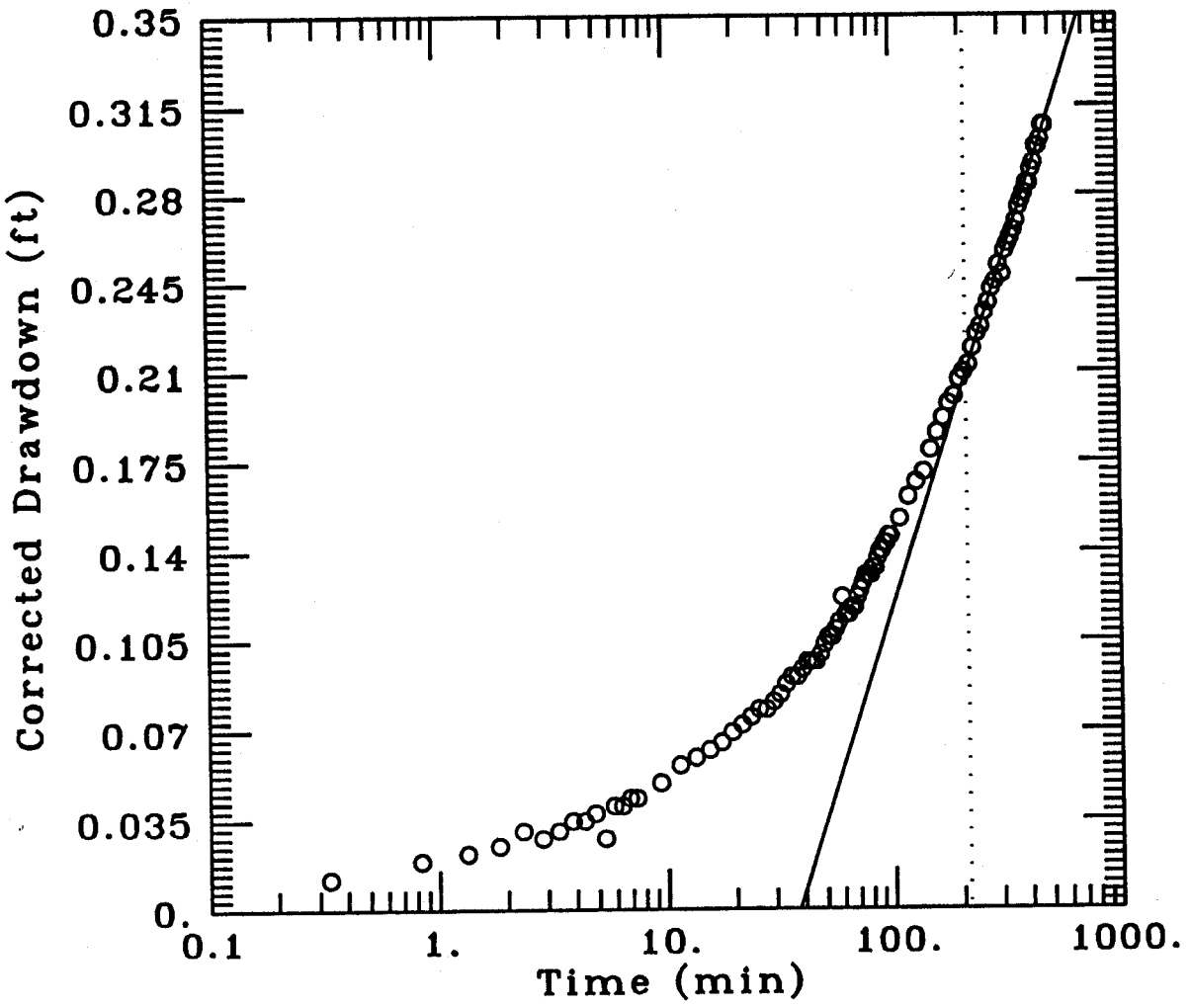
OBS. WELL:
I5

ESTIMATED PARAMETERS:
T = 0.1391 ft^2/min
S = 0.3137

TEST DATA:
Q = 0.2019 ft^3/min
r = 5.38 ft
b = 3.56 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL 01



DATA SET:
01PT.IN
03/18/92

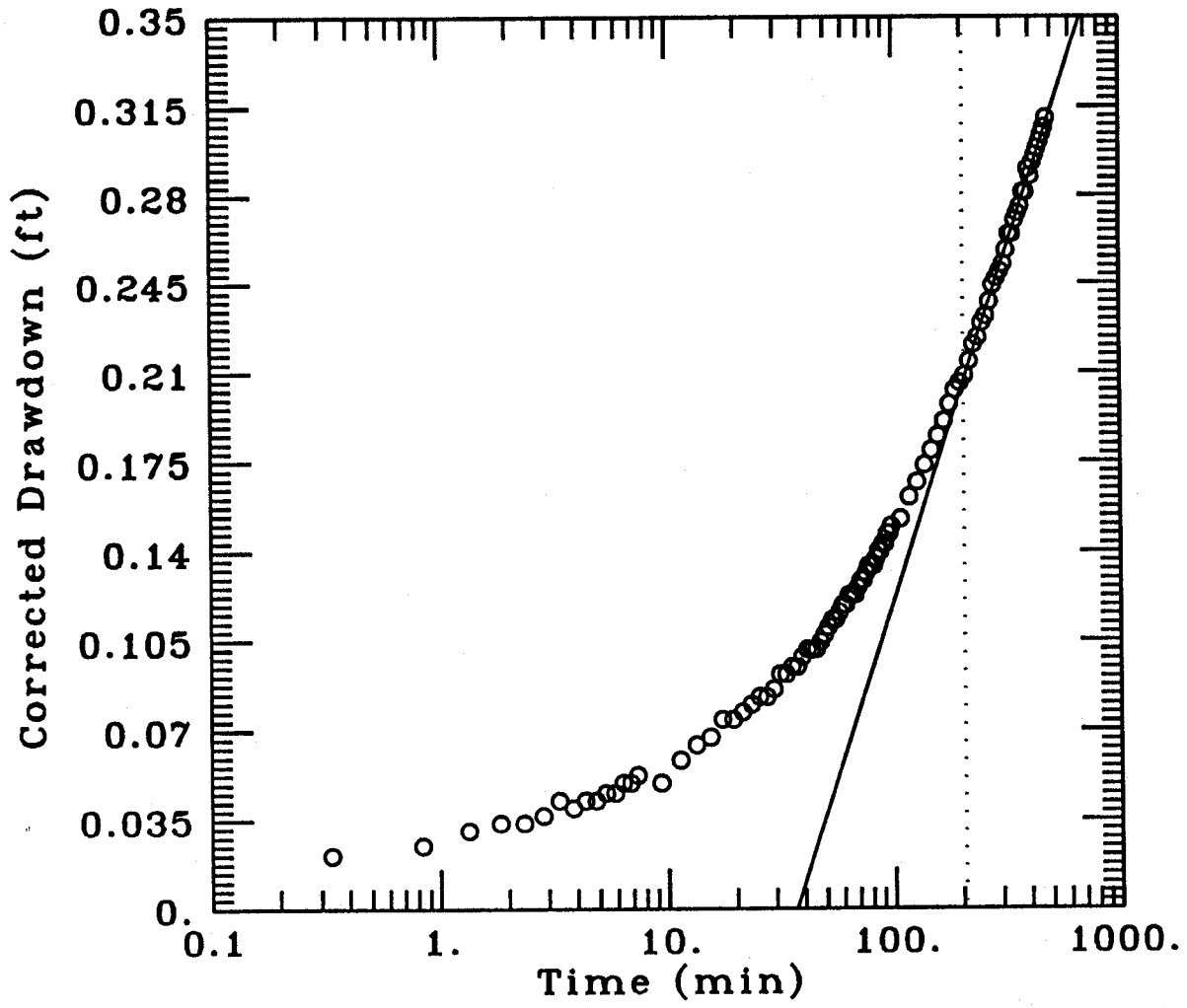
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
01

ESTIMATED PARAMETERS:
T = 0.1325 ft^2/min
S = 0.5508

TEST DATA:
Q = 0.2019 ft^3/min
r = 4.51 ft
b = 3.72 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL 02



DATA SET:
02PT.IN
03/18/92

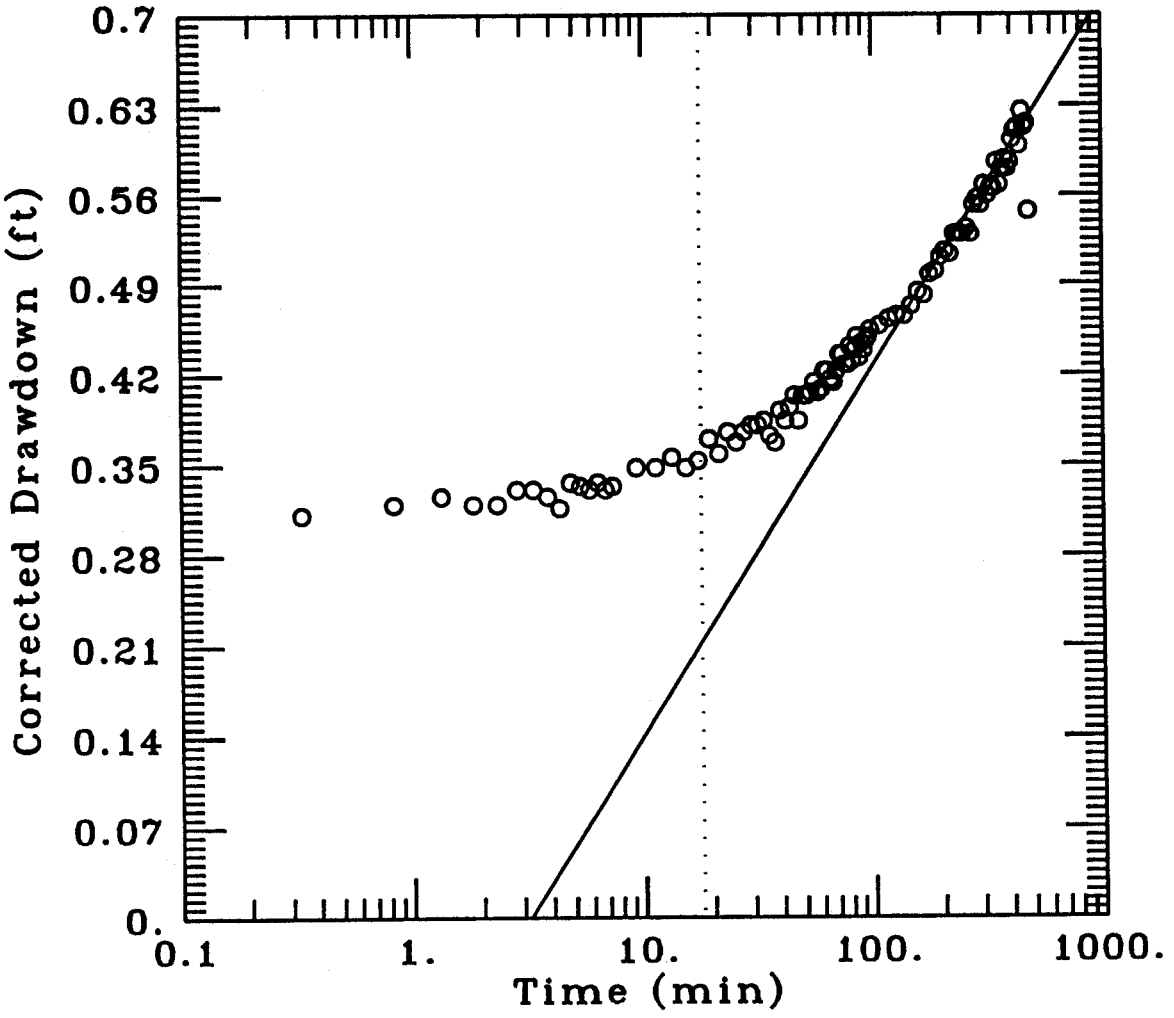
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
02

ESTIMATED PARAMETERS:
T = 0.1338 ft^2/min
S = 2.172

TEST DATA:
Q = 0.2019 ft^3/min
r = 2.25 ft
b = 3.65 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL 03



DATA SET:
03PT.IN
03/18/92

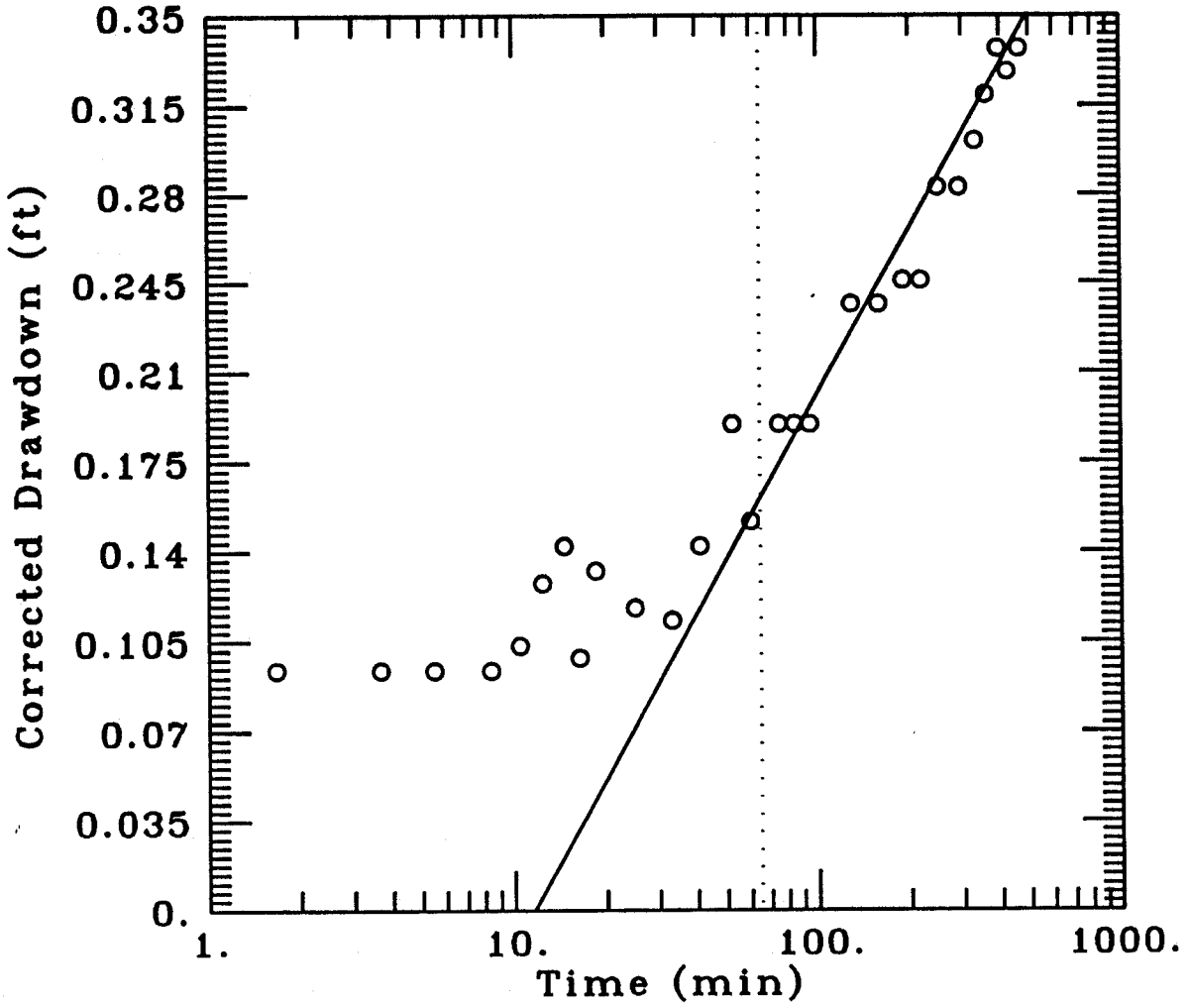
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
03

ESTIMATED PARAMETERS:
T = 0.1298 ft^2/min
S = 184.1

TEST DATA:
Q = 0.2019 ft^3/min
r = 0.07083 ft
b = 3.37 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL 04



DATA SET:
04PMAQ.IN
05/30/92

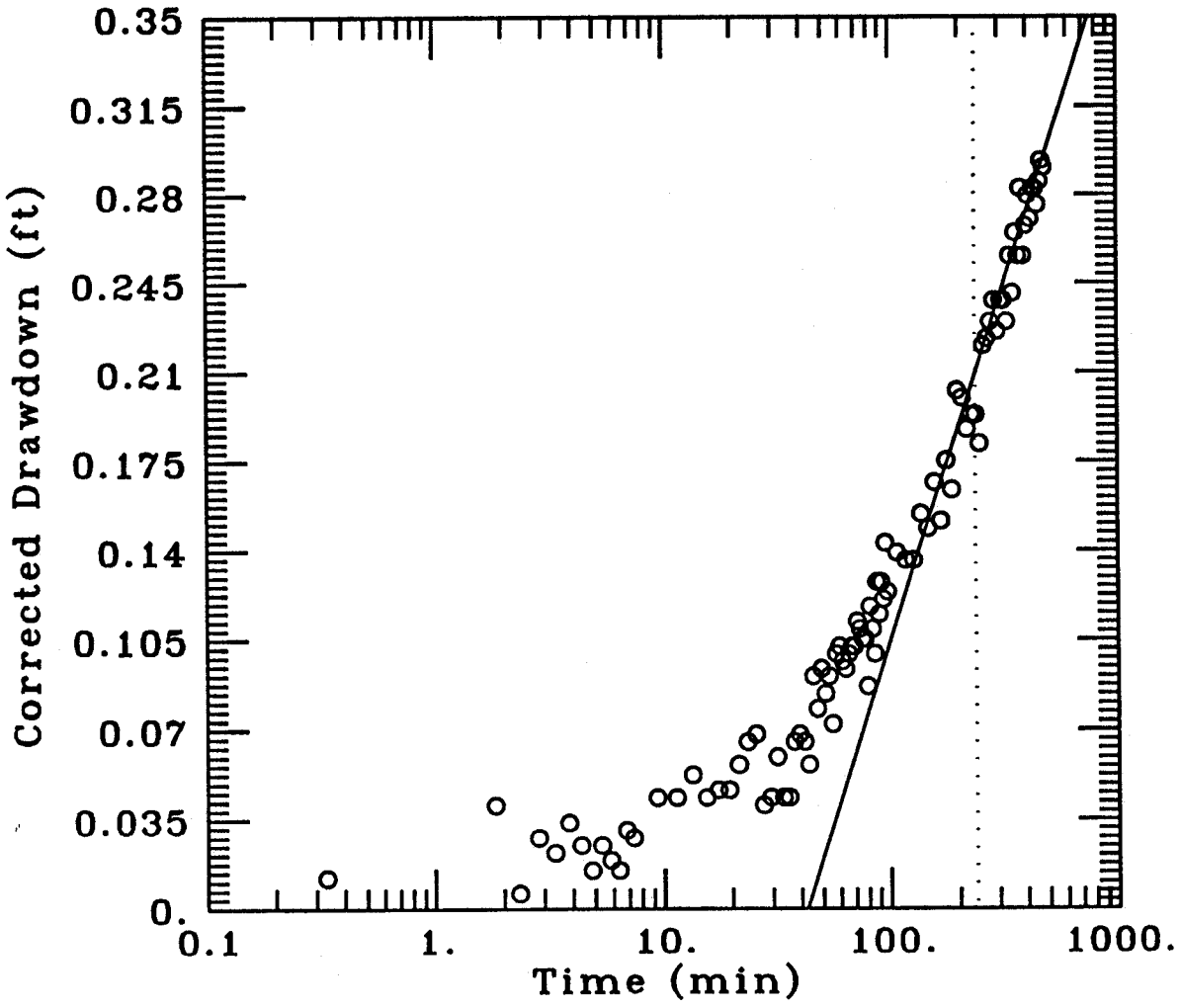
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
04

ESTIMATED PARAMETERS:
T = 0.1723 ft^2/min
S = 0.6971

TEST DATA:
Q = 0.2019 ft^3/min
r = 2.53 ft
b = 3.56 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL 05



DATA SET:
05PT.IN
03/11/92

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Cooper-Jacob

TEST DATE:
12/18/91

TEST WELL:
03

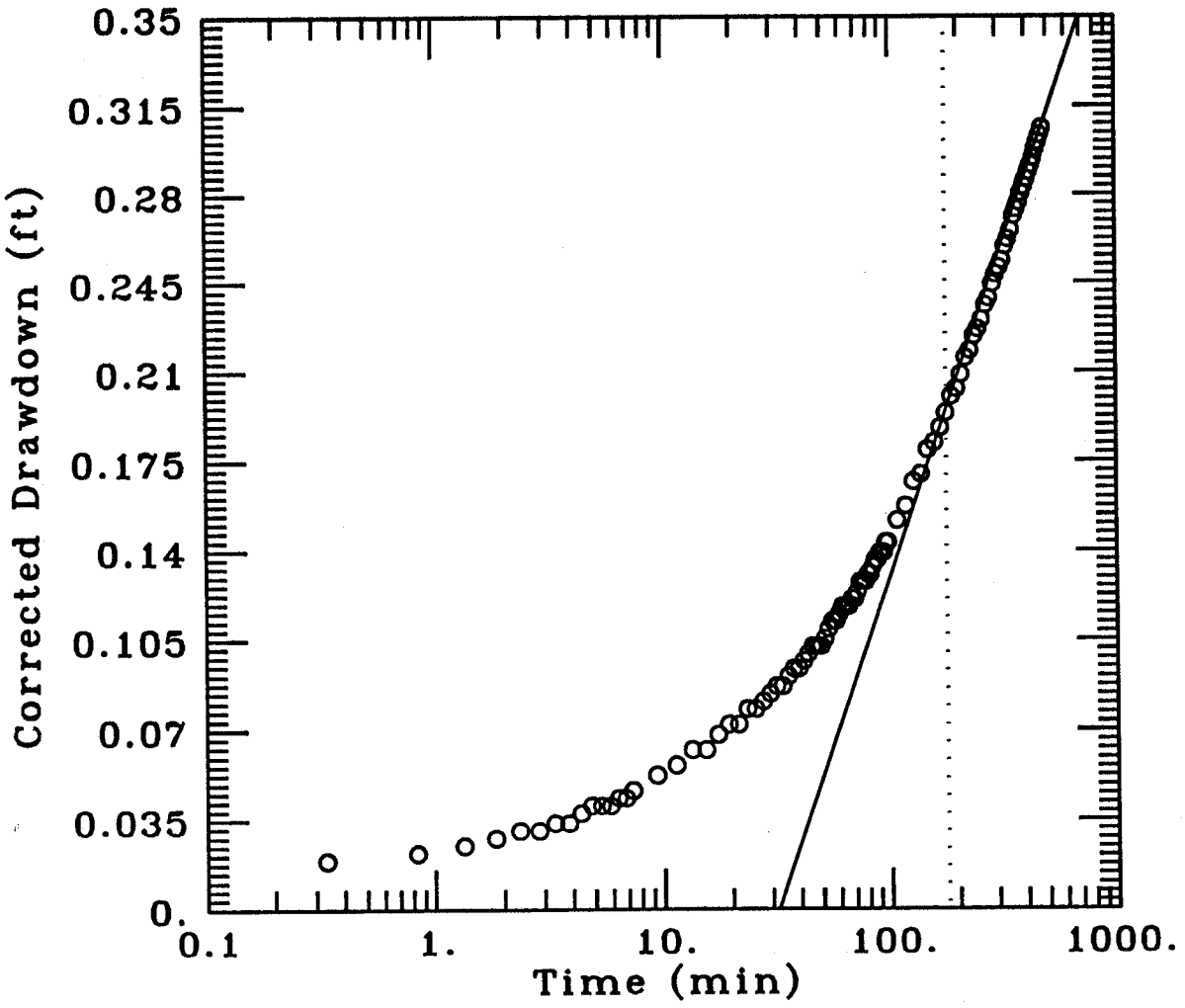
OBS. WELL:
05

ESTIMATED PARAMETERS:
T = 0.1321 ft^2/min
S = 0.5036

TEST DATA:
Q = 0.2019 ft^3/min
r = 4.99 ft
b = 3.47 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL E1



DATA SET:
E1PT.IN
03/18/92

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Cooper-Jacob

TEST DATE:
12/18/91

TEST WELL:
03

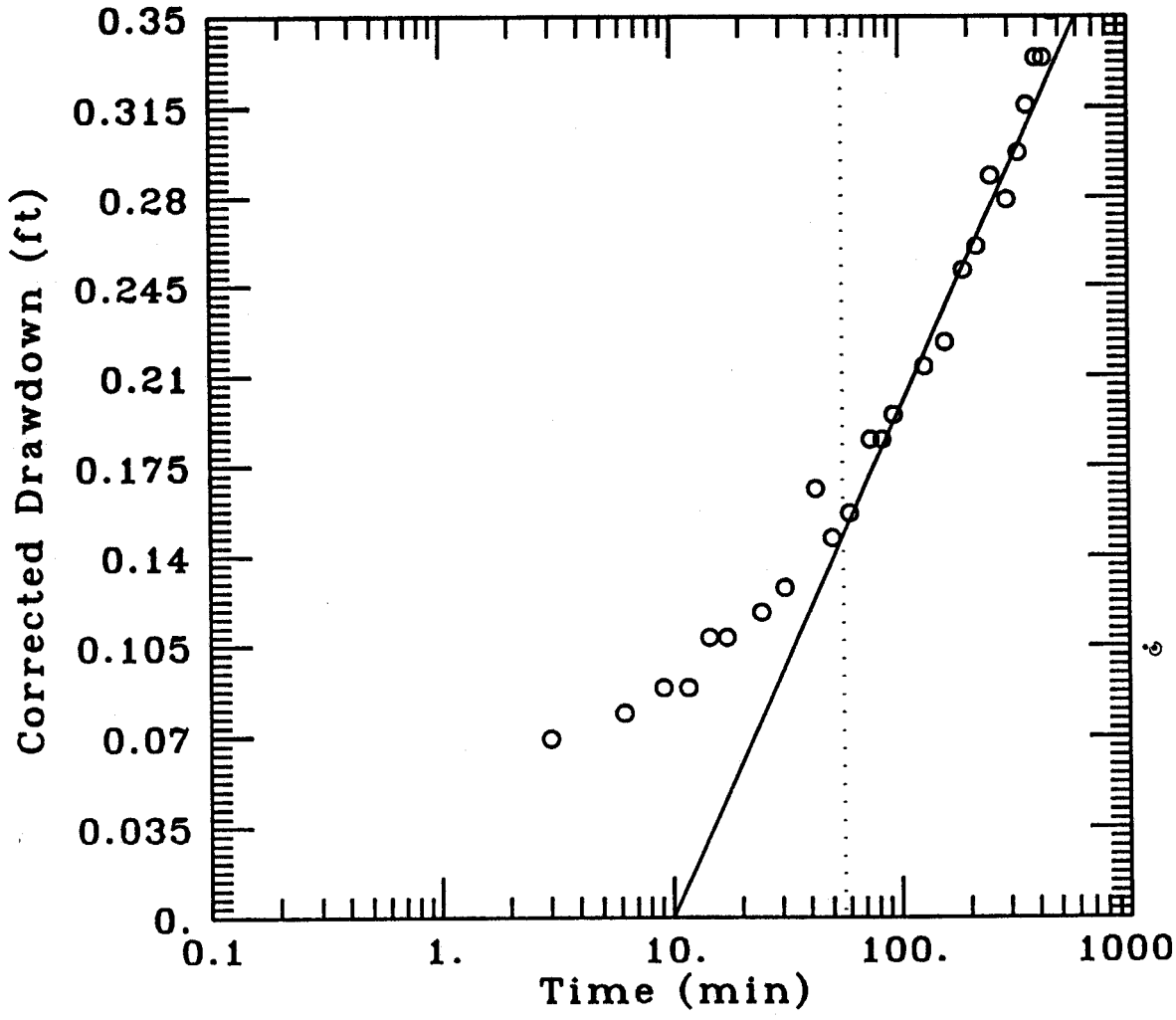
OBS. WELL:
E1

ESTIMATED PARAMETERS:
T = 0.1418 ft^2/min
S = 0.355

TEST DATA:
Q = 0.2019 ft^3/min
r = 5.33 ft
b = 3.73 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL E2



DATA SET:
E2PMAQ.IN
05/30/92

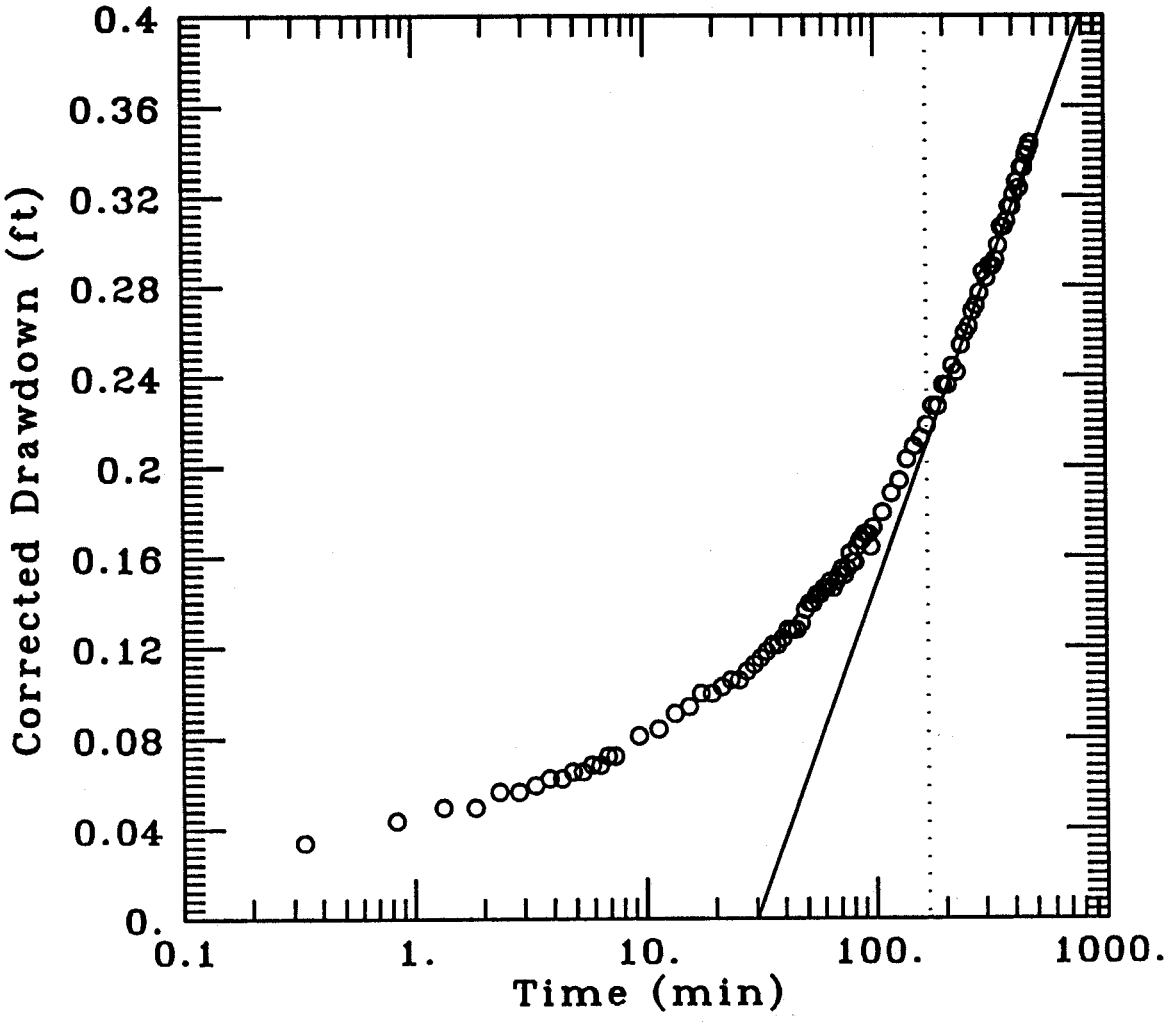
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
E2

ESTIMATED PARAMETERS:
T = 0.1873 ft^2/min
S = 0.3498

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.47 ft
b = 3.83 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL E3



DATA SET:
E3PT.IN
03/18/92

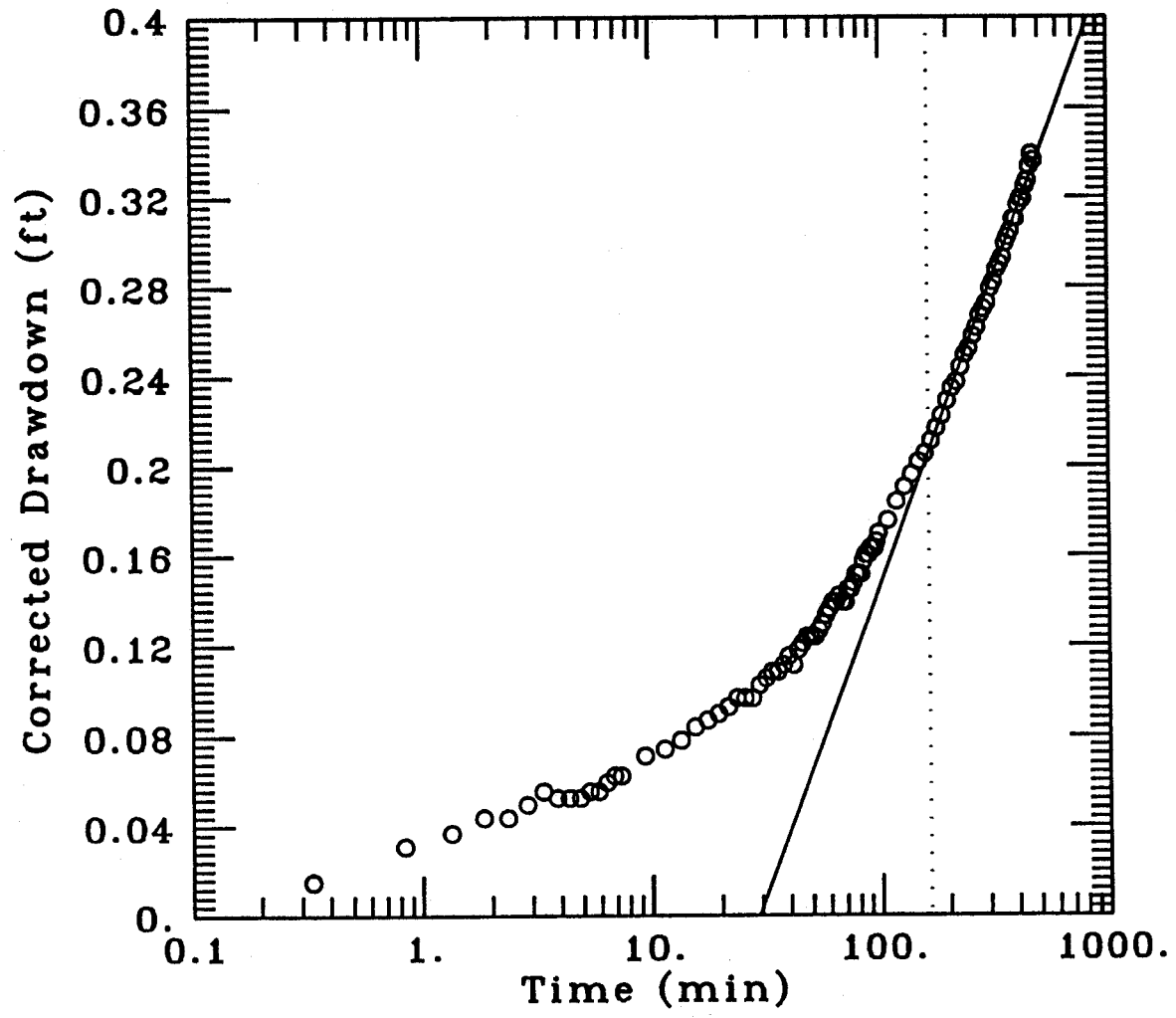
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
E3

ESTIMATED PARAMETERS:
T = 0.1315 ft^2/min
S = 0.7463

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.44 ft
b = 3.71 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL E4



DATA SET:
E4PT.IN
03/18/92

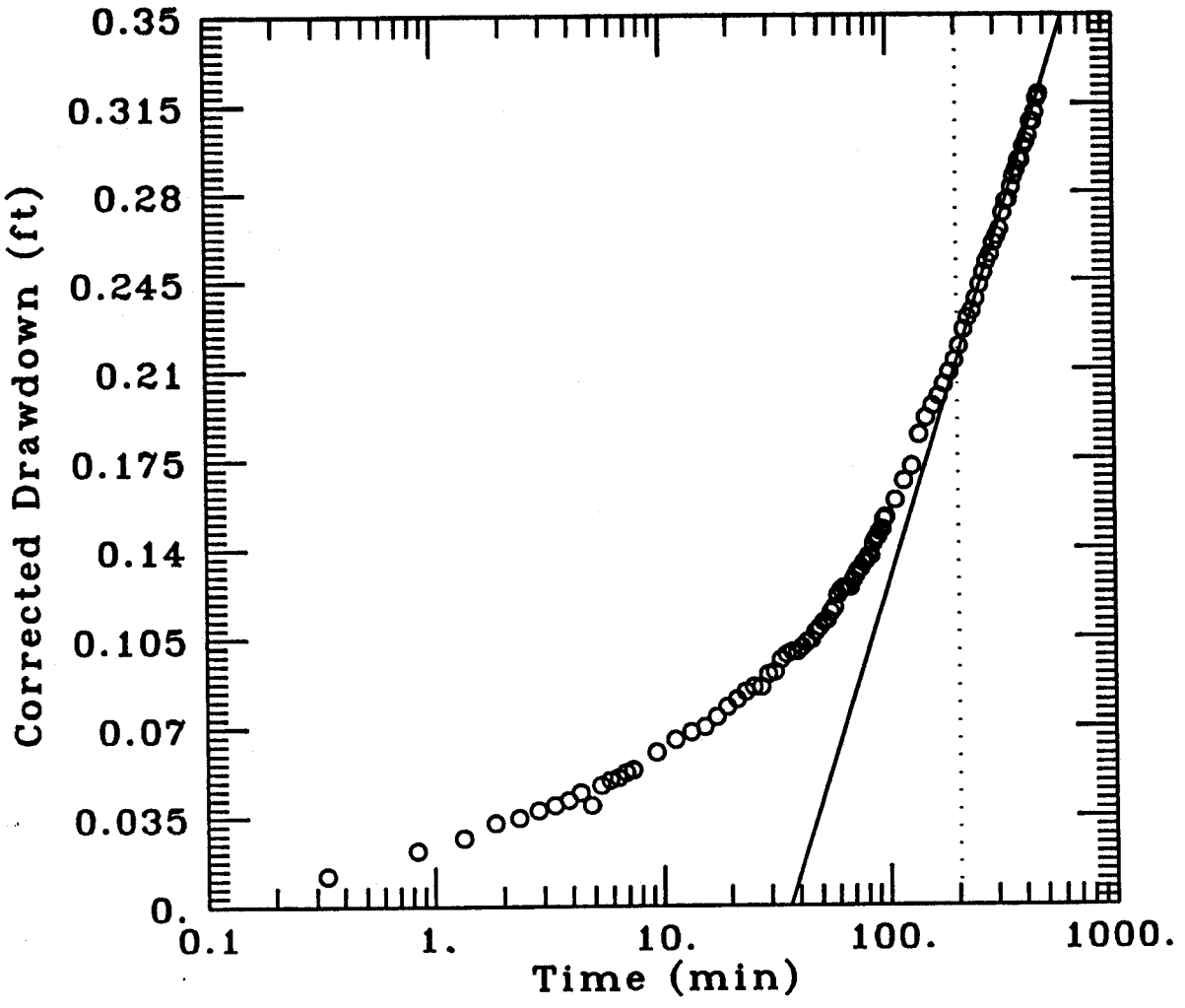
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Cooper-Jacob
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
E4

ESTIMATED PARAMETERS:
T = 0.1345 ft^2/min
S = 0.5952

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.84 ft
b = 3.56 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL E5



DATA SET:
E5PT.IN
03/18/92

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Cooper-Jacob

TEST DATE:
12/18/91

TEST WELL:
03

OBS. WELL:
E5

ESTIMATED PARAMETERS:
T = 0.1292 ft^2/min
S = 0.345

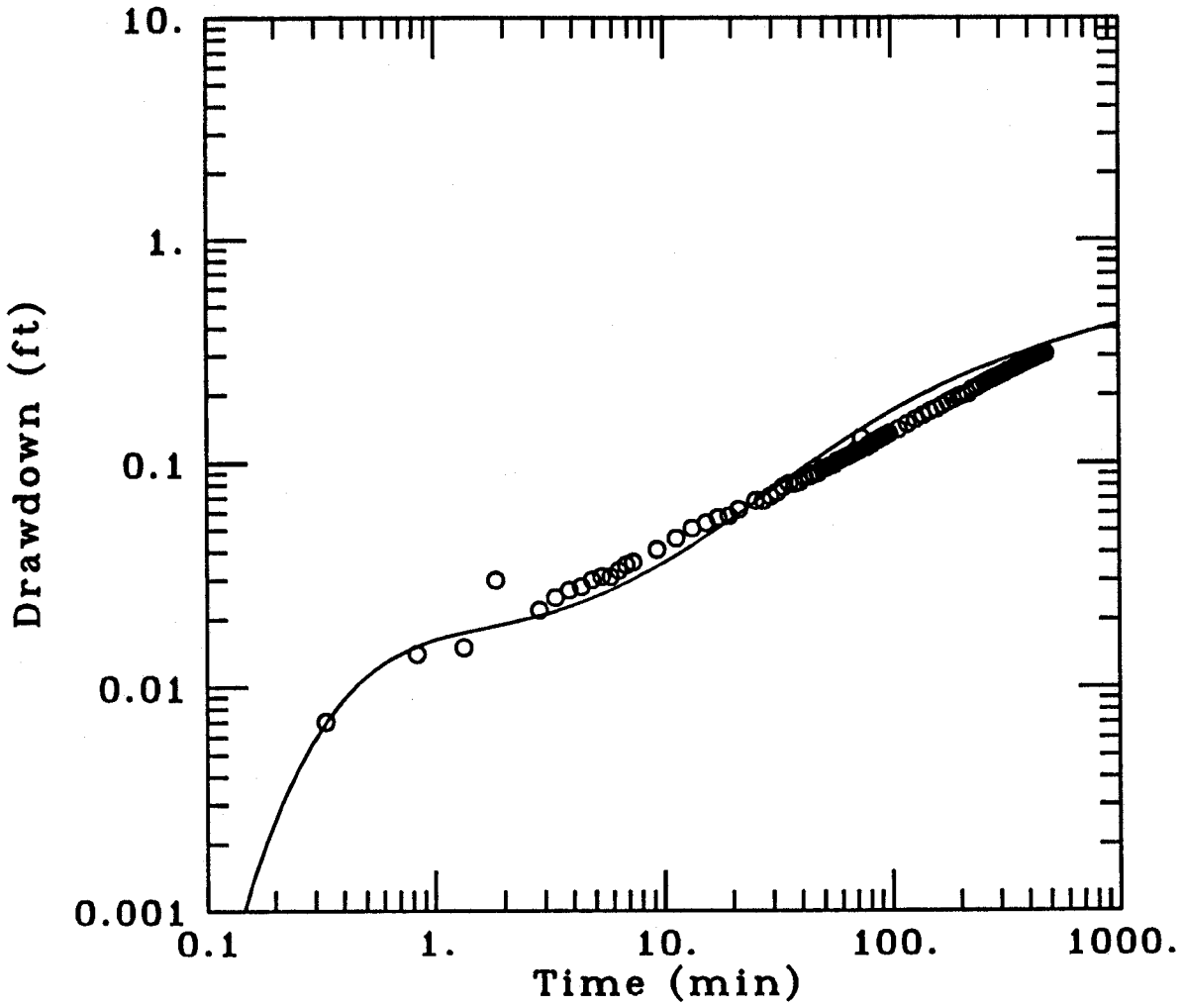
TEST DATA:
Q = 0.2019 ft^3/min
r = 5.51 ft
b = 3.27 ft

Appendix B2
Multiple-Well Test Data

NEUMAN METHOD

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I1



DATA SET:
I1PT.IN
03/17/92

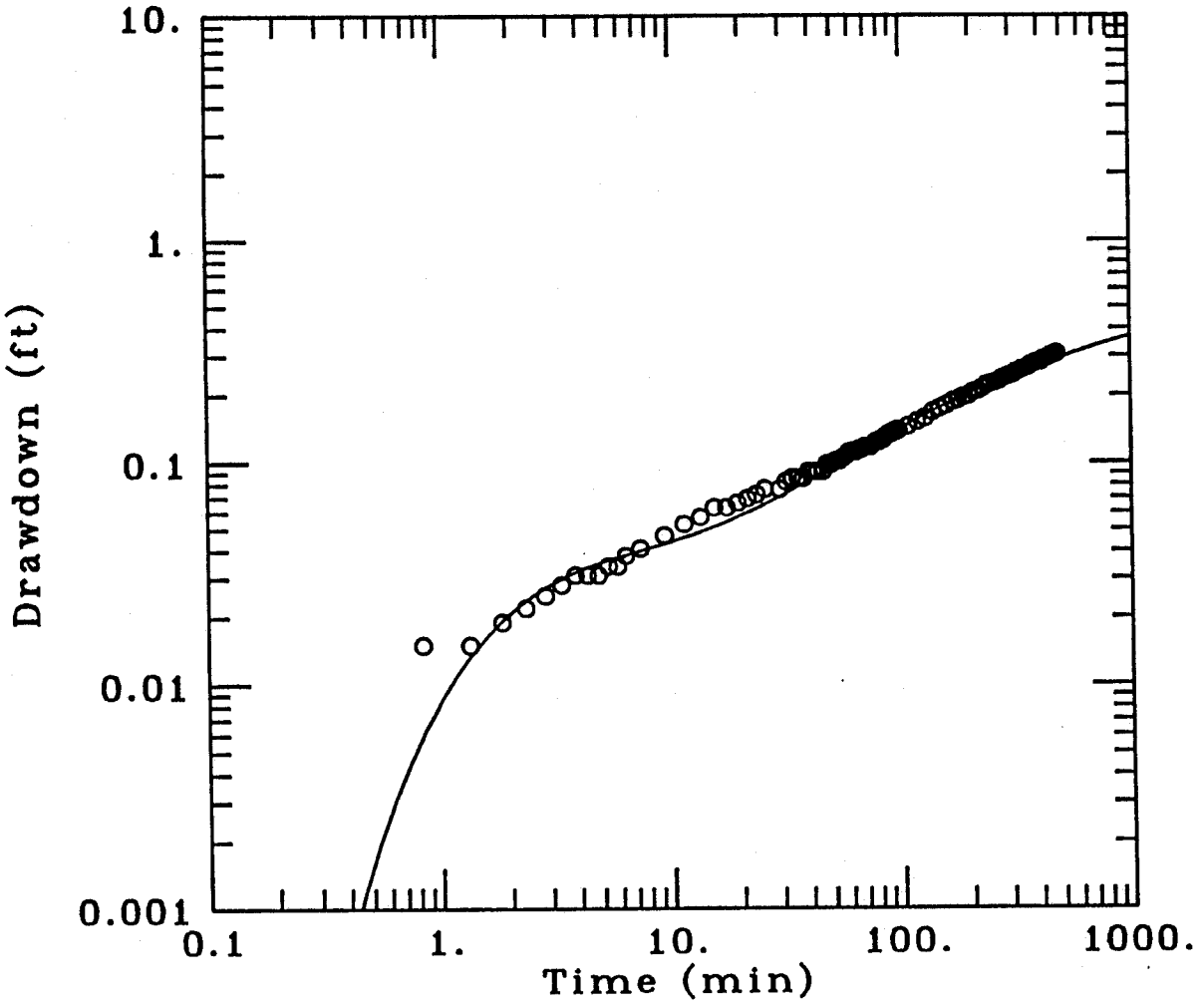
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
I1

ESTIMATED PARAMETERS:
T = 0.1398 ft^2/min
S = 0.008818
Sy = 0.3075
β = 2.

TEST DATA:
Q = 0.2019 ft^3/min
r = 5.15 ft
b = 3.68 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST-Well I2



DATA SET:
i2pt.in
03/17/92

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Neuman

TEST DATE:
12/18/91

TEST WELL:
03

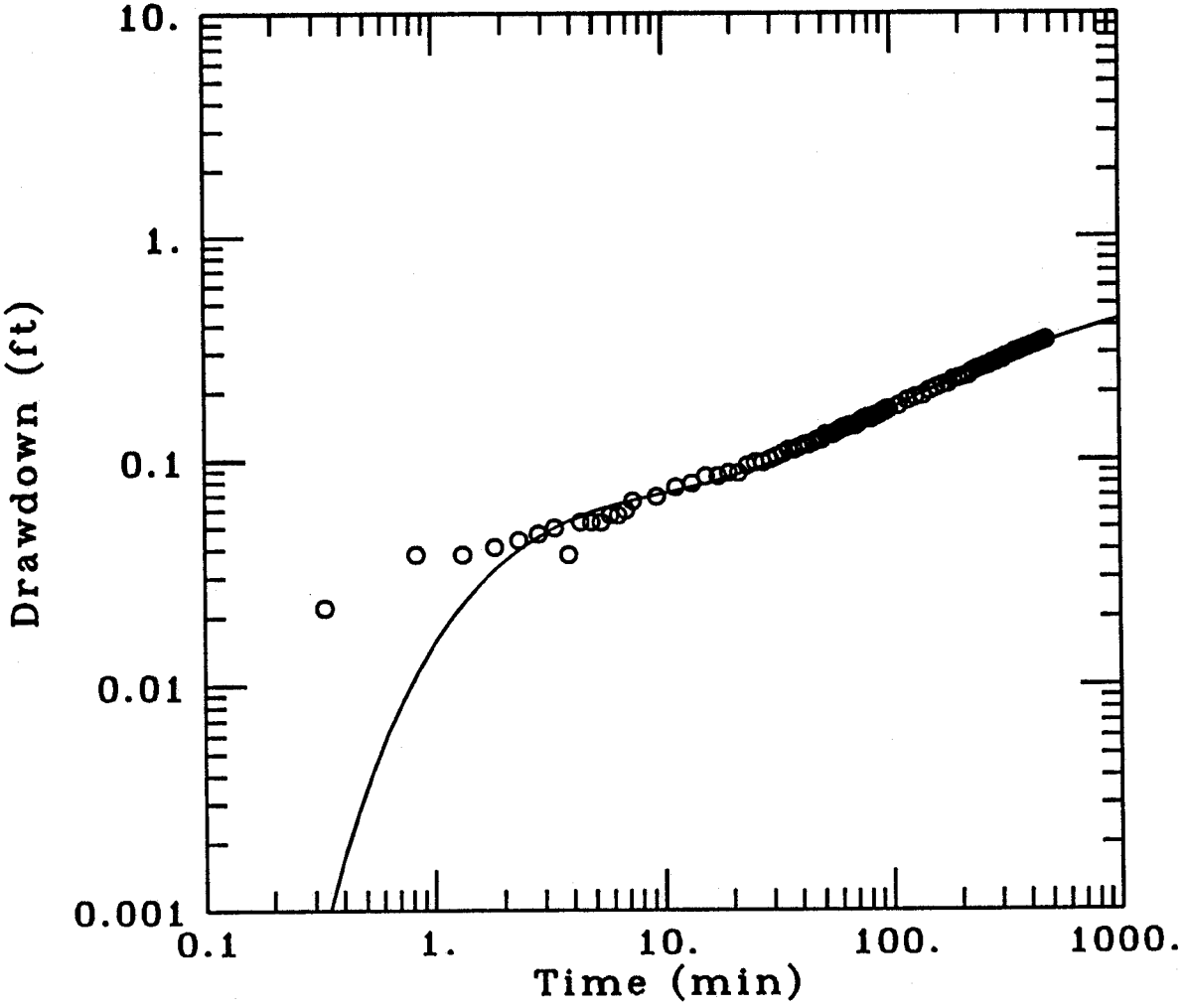
OBS. WELL:
I1

ESTIMATED PARAMETERS:
T = 0.1494 ft^2/min
S = 0.08489
Sy = 1.139
β = 1.

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.028 ft
b = 3.47 ft

	Client: EQ&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I3



DATA SET:
i3pt.in
03/20/92

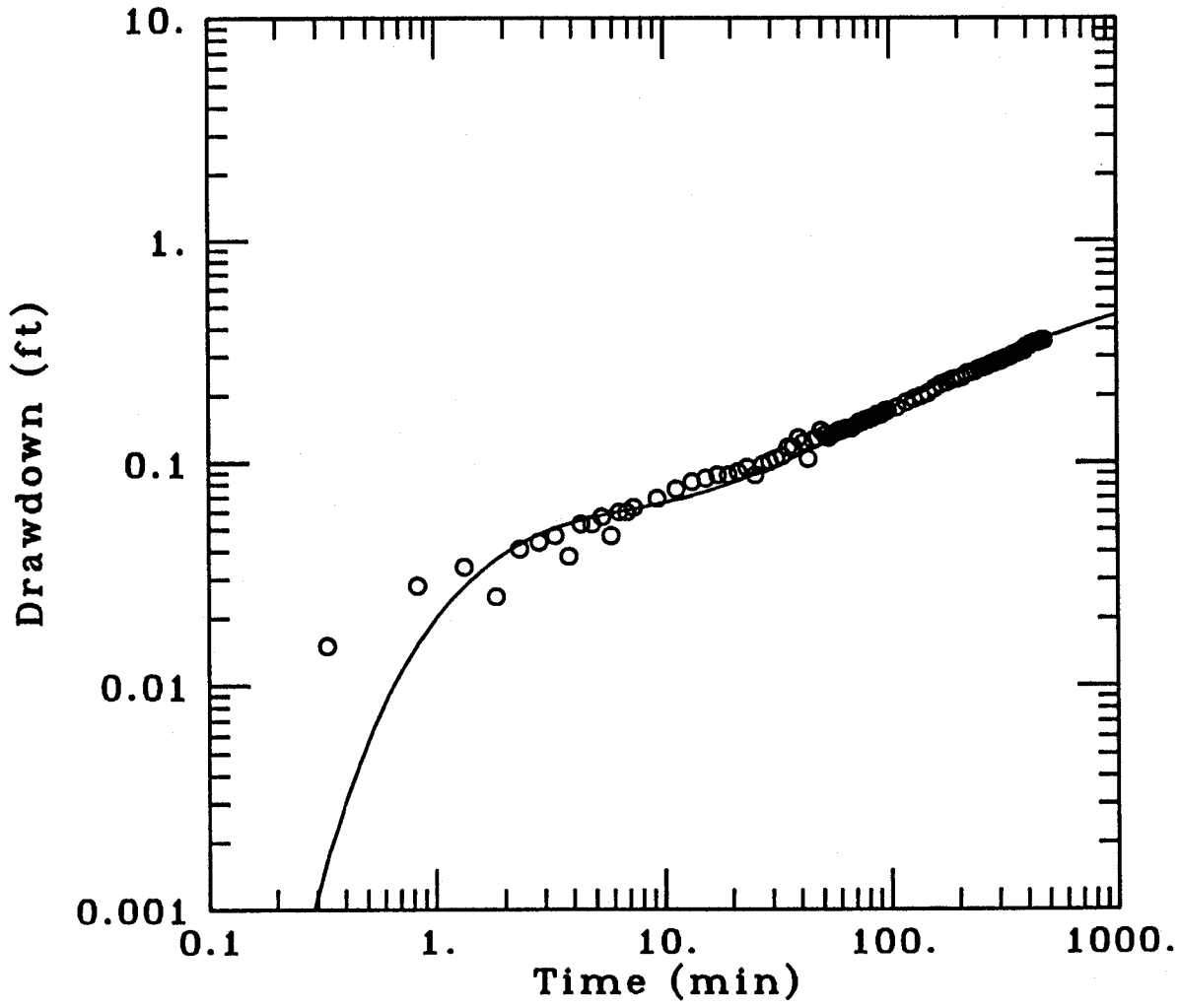
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
I3

ESTIMATED PARAMETERS:
T = 0.1292 ft^2/min
S = 0.09685
Sy = 1.58
β = 0.6

TEST DATA:
Q = 0.2019 ft^3/min
r = 2.42 ft
b = 3.51 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I4



DATA SET:
i4pt.in
03/18/92

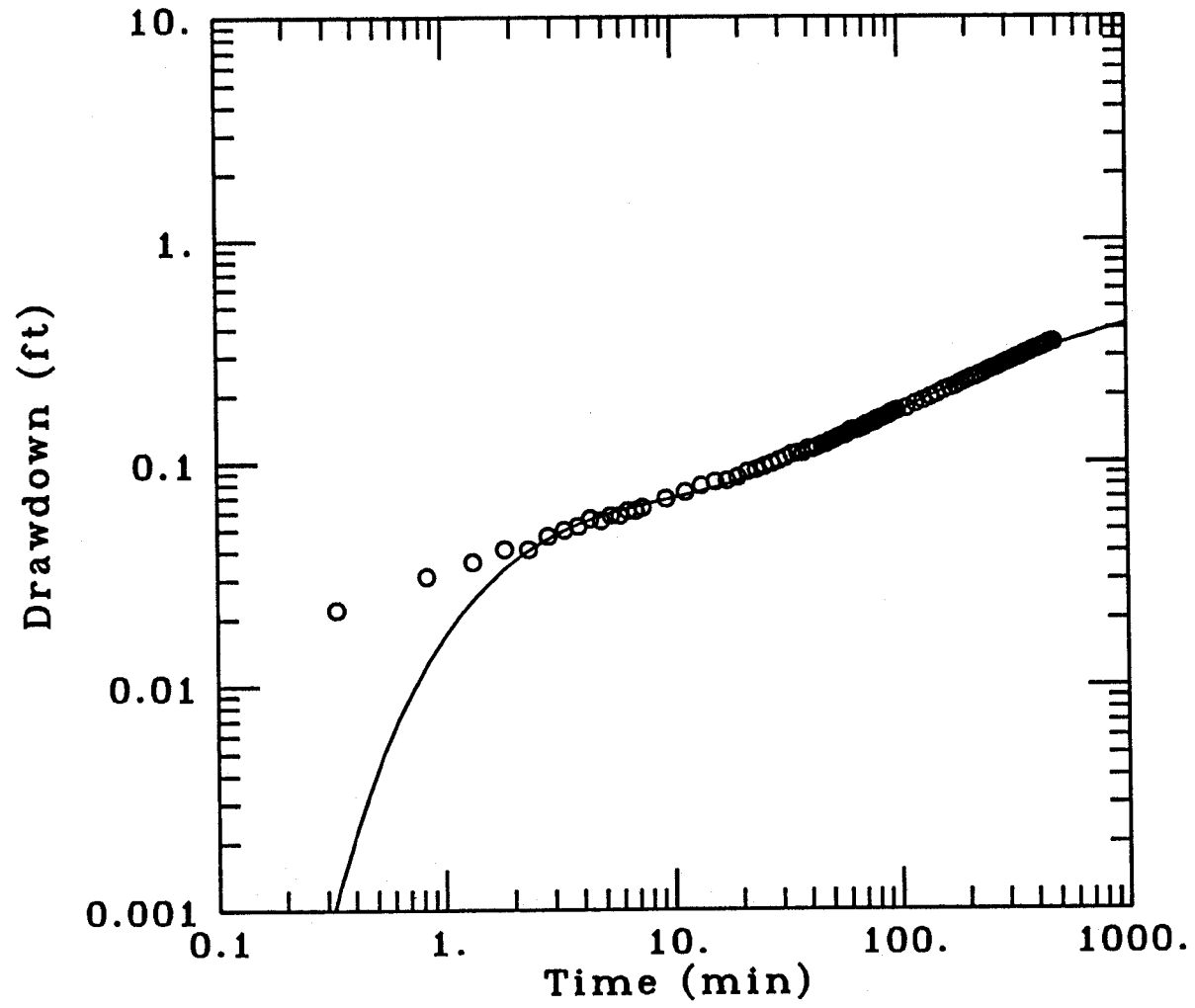
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
I4

ESTIMATED PARAMETERS:
T = 0.1145 ft^2/min
S = 0.04099
Sy = 0.902
β = 0.8

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.24 ft
b = 3.54 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I5



DATA SET:
i5pt.in
03/20/92

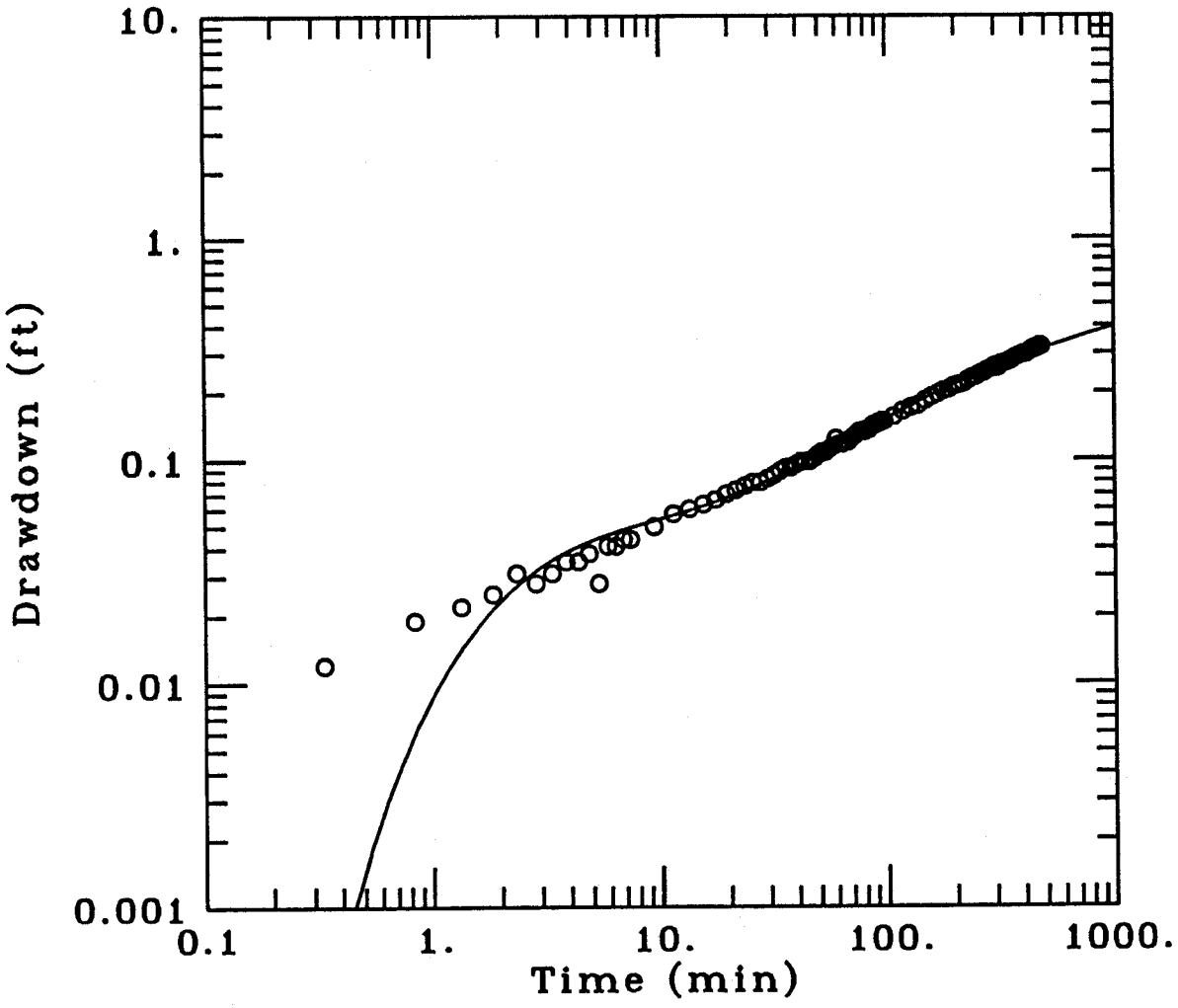
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
I5

ESTIMATED PARAMETERS:
T = 0.1353 ft^2/min
S = 0.01883
Sy = 0.3036
β = 0.6

TEST DATA:
Q = 0.2019 ft^3/min
r = 5.38 ft
b = 3.56 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL 01



DATA SET:
o1pt.in
03/18/92

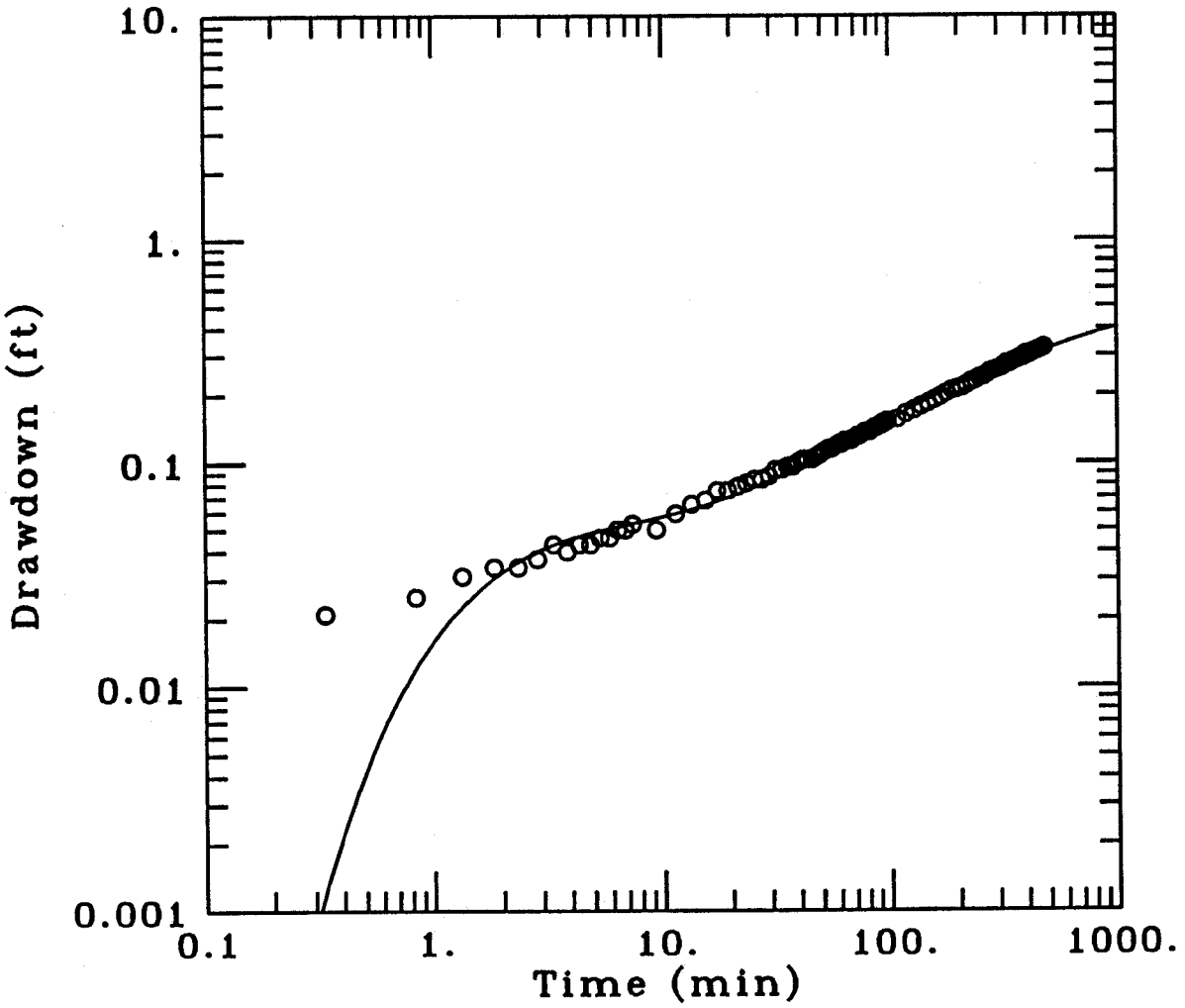
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
01

ESTIMATED PARAMETERS:
T = 0.1382 ft^2/min
S = 0.0379
Sy = 0.4883
β = 0.8

TEST DATA:
Q = 0.2019 ft^3/min
r = 4.51 ft
b = 3.72 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL 02



DATA SET:
o2pt.in
03/19/92

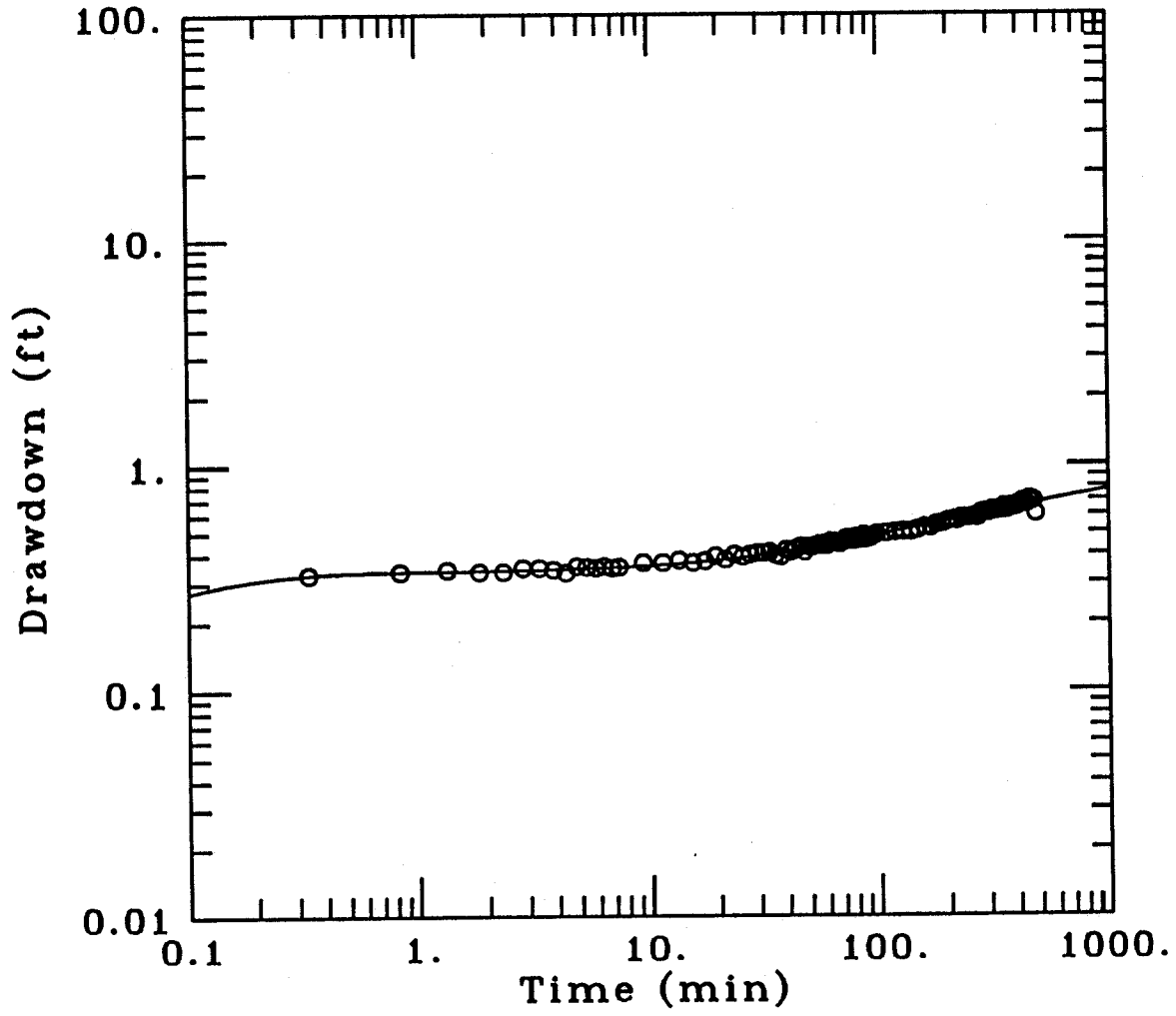
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
02

ESTIMATED PARAMETERS:
T = 0.1344 ft^2/min
S = 0.104
Sy = 2.017
β = 0.8

TEST DATA:
Q = 0.2019 ft^3/min
r = 2.25 ft
b = 3.65 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST, WELL 03



DATA SET:
o3pt.in
05/31/92

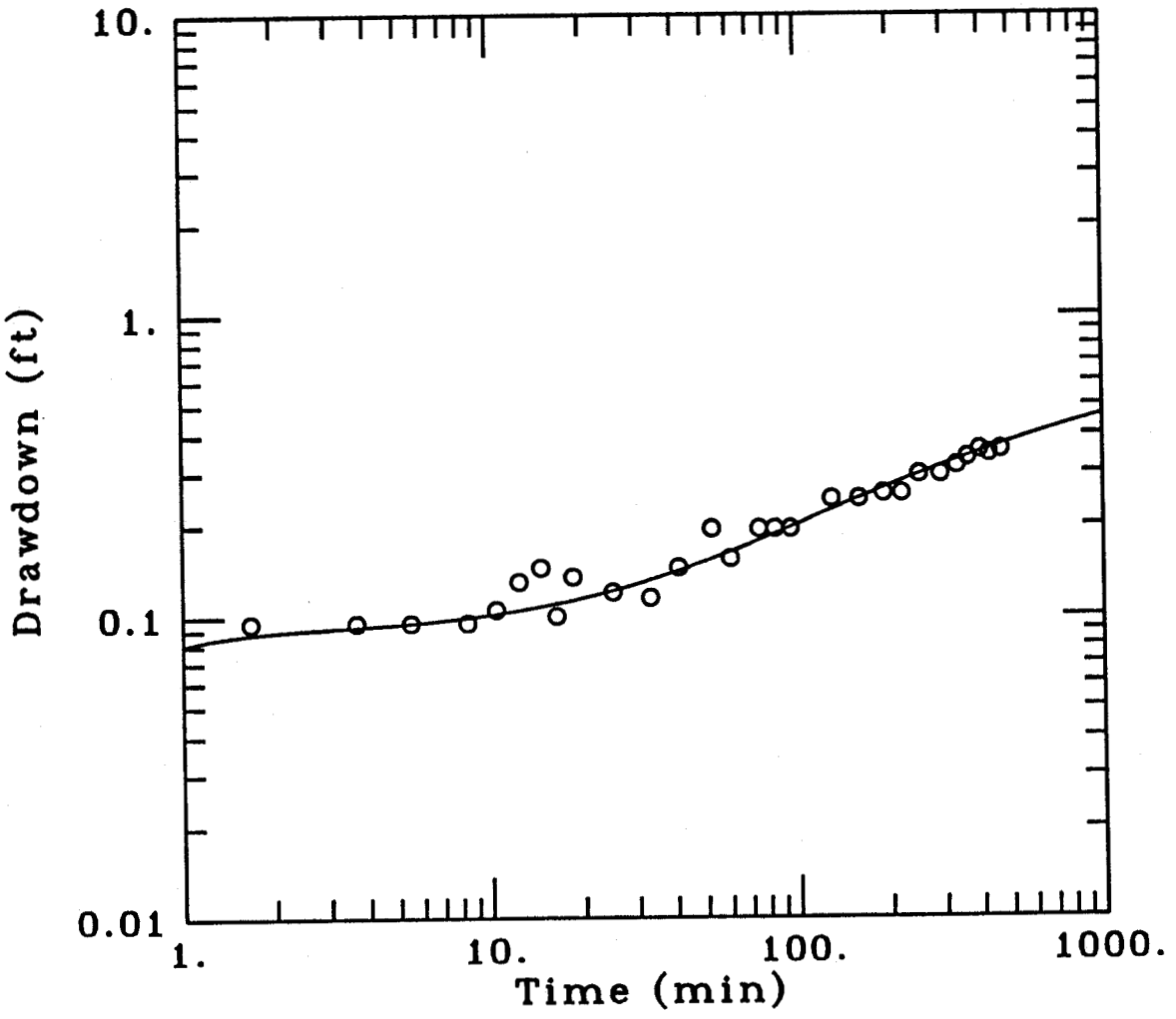
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
03

ESTIMATED PARAMETERS:
T = 0.1191 ft^2/min
S = 0.3757
Sy = 175.2
β = 0.03

TEST DATA:
Q = 0.2019 ft^3/min
r = 0.07083 ft
b = 3.37 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL 04



DATA SET:
o4pmaq.in
05/31/92

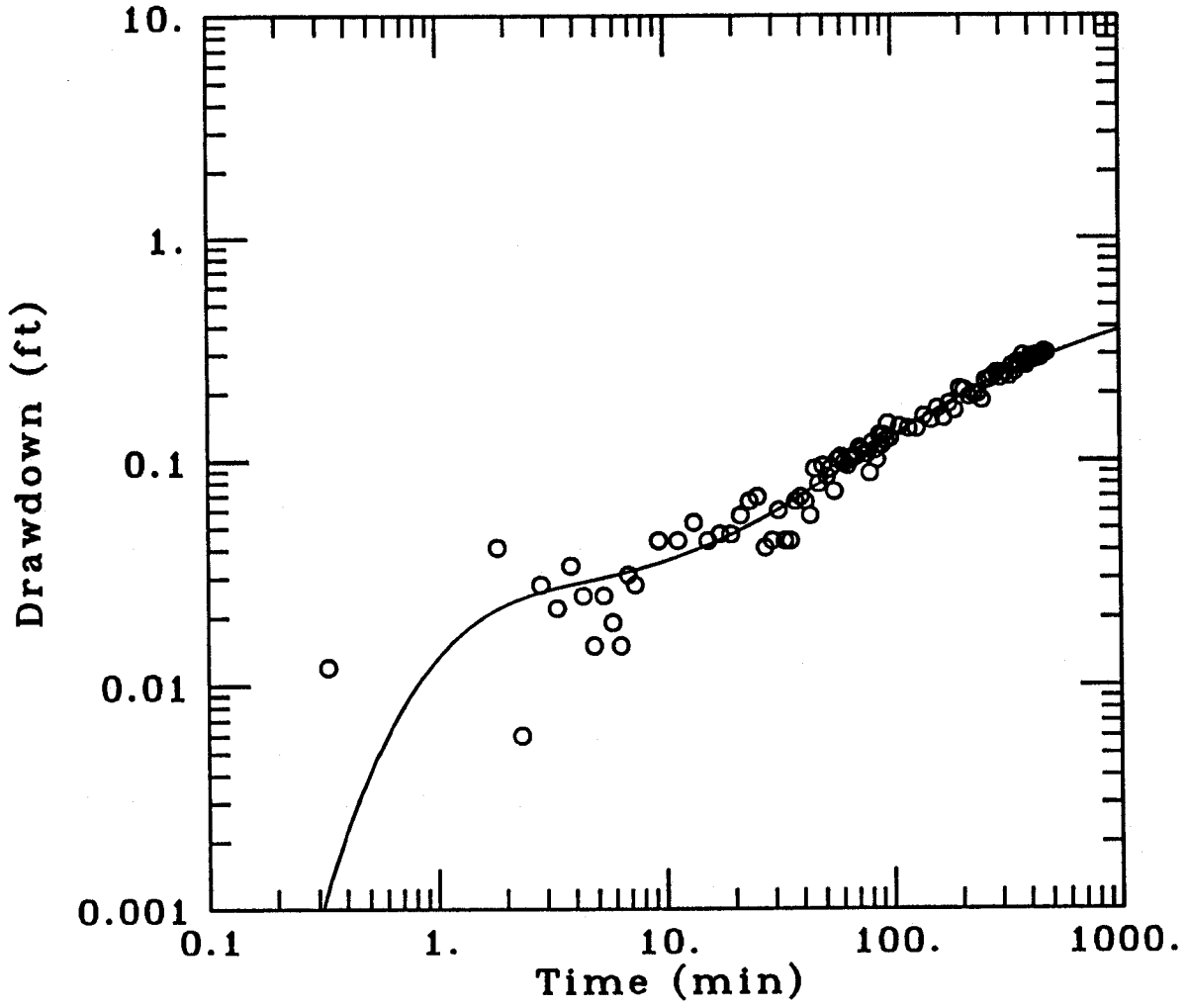
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
04

ESTIMATED PARAMETERS:
T = 0.1273 ft^2/min
S = 0.01238
Sy = 1.162
β = 0.4

TEST DATA:
Q = 0.2019 ft^3/min
r = 2.53 ft
b = 3.56 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL 05



DATA SET:
05PT.IN
03/19/92

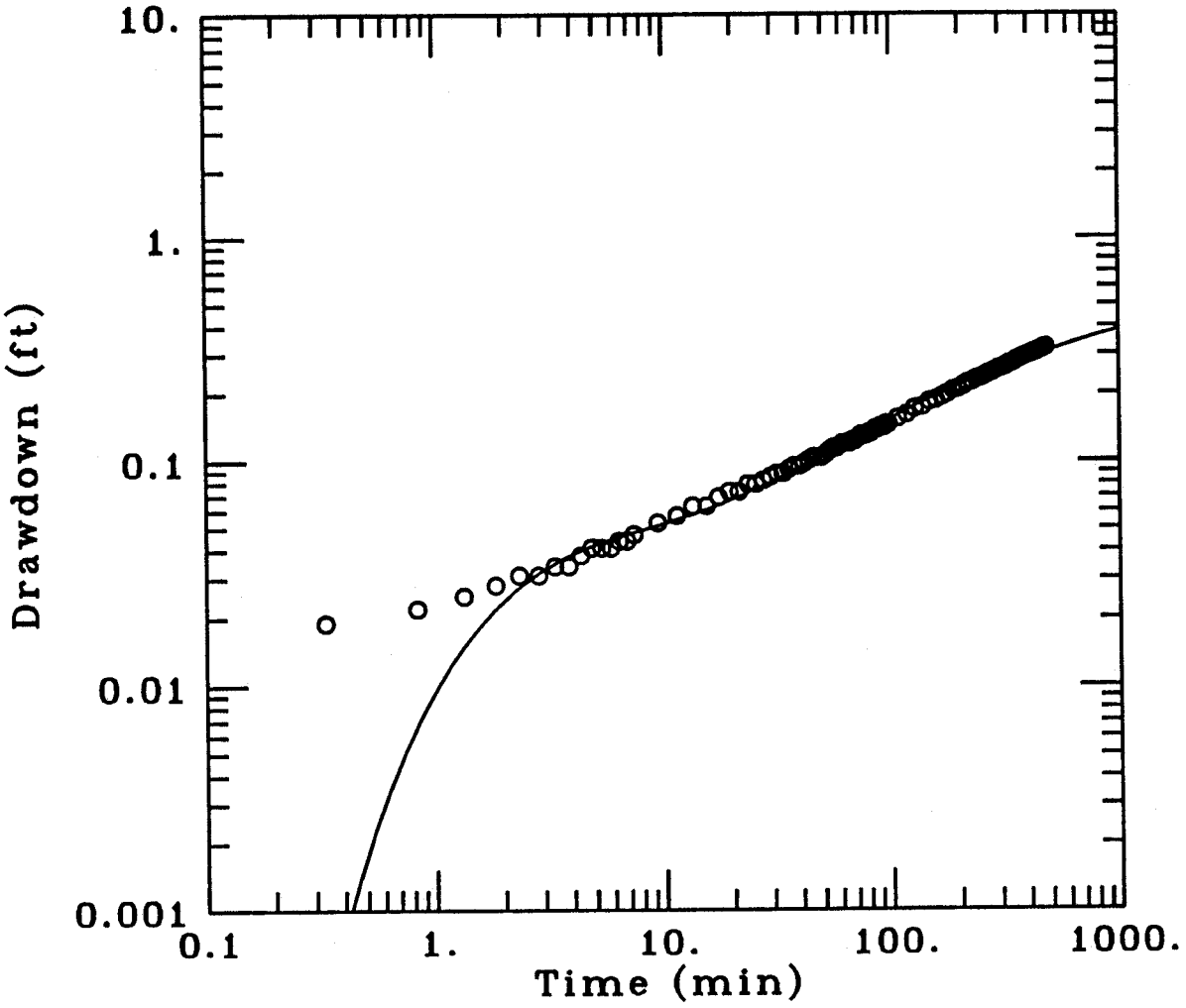
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
05

ESTIMATED PARAMETERS:
T = 0.1264 ft^2/min
S = 0.01929
Sy = 0.5547
β = 1.5

TEST DATA:
Q = 0.2019 ft^3/min
r = 4.99 ft
b = 3.47 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL E1



DATA SET:
E1PT.IN
03/19/92

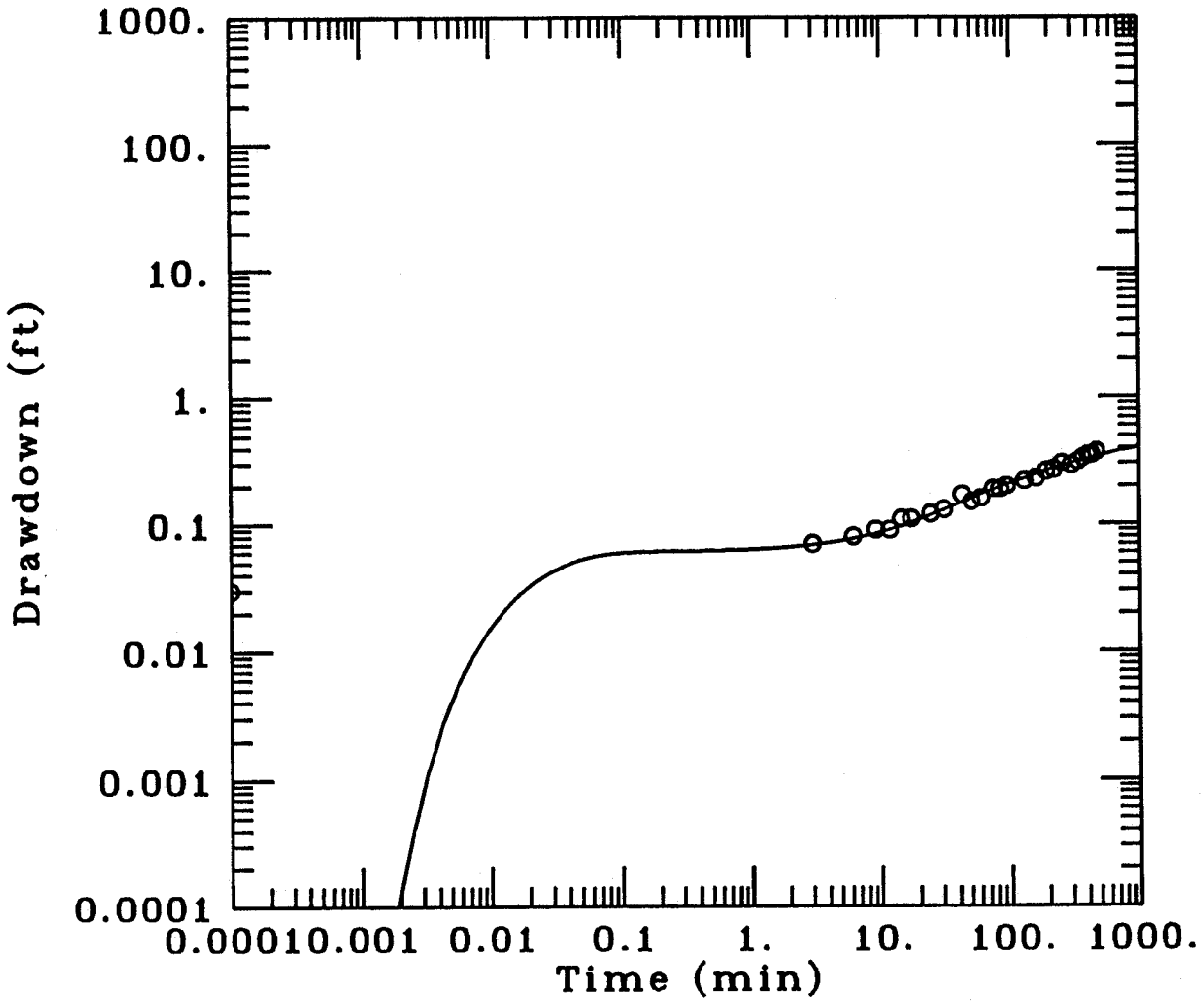
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
E1

ESTIMATED PARAMETERS:
T = 0.1476 ft^2/min
S = 0.02665
Sy = 0.3241
β = 0.8

TEST DATA:
Q = 0.2019 ft^3/min
r = 5.33 ft
b = 3.73 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL E2



DATA SET:
e2pmaq.in
05/31/92

AQUIFER TYPE:
Unconfined

SOLUTION METHOD:
Neuman

TEST DATE:
12/18/91

TEST WELL:
03

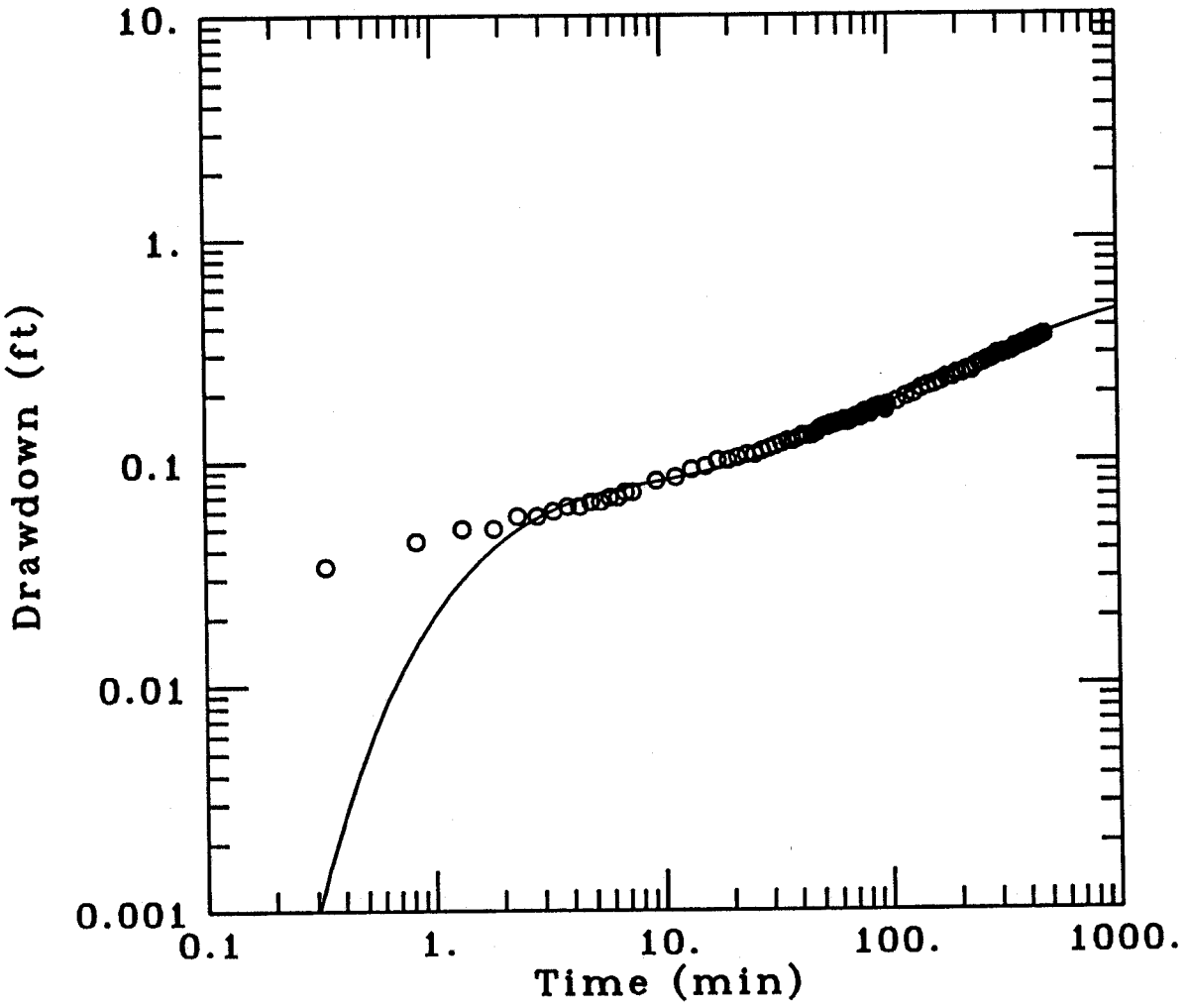
OBS. WELL:
E2

ESTIMATED PARAMETERS:
T = 0.1837 ft^2/min
S = 0.0005597
Sy = 0.3363
β = 0.4

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.47 ft
b = 3.83 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL E3



DATA SET:
E3PT.IN
03/19/92

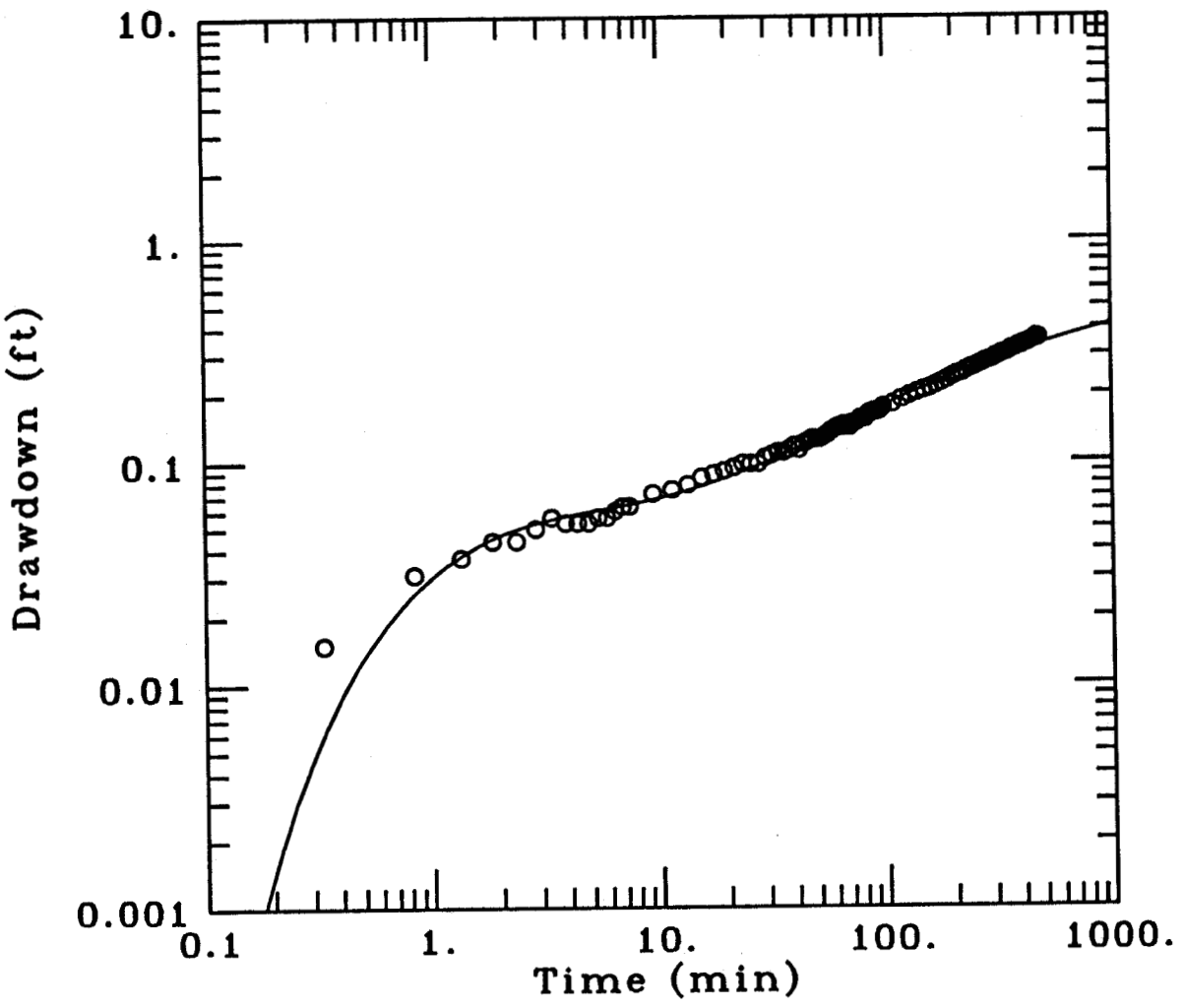
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
E3

ESTIMATED PARAMETERS:
T = 0.1103 ft^2/min
S = 0.03755
Sy = 0.8121
β = 0.6

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.44 ft
b = 3.71 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL E4



DATA SET:
E4PT.IN
03/19/92

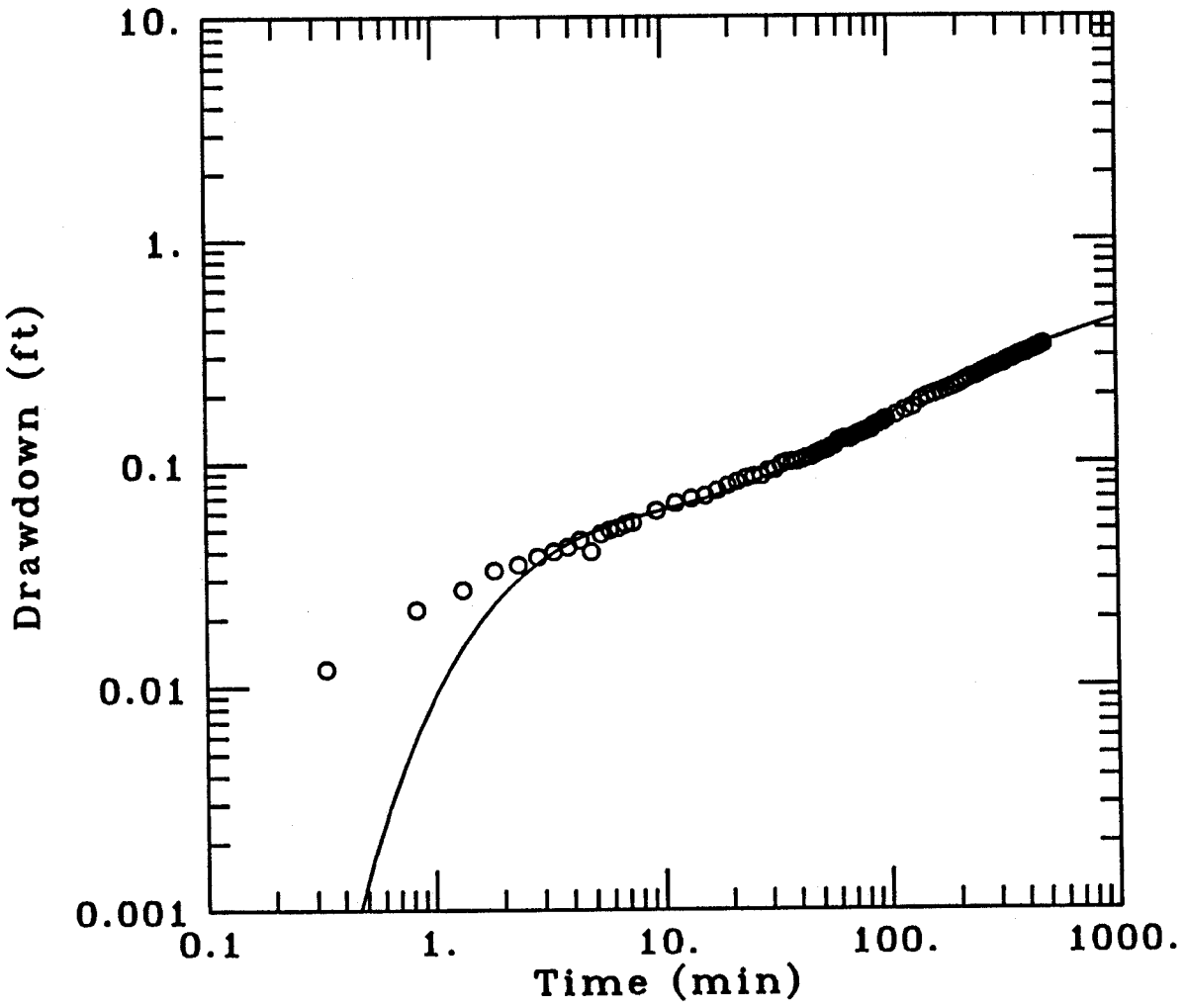
AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
E4

ESTIMATED PARAMETERS:
T = 0.1491 ft^2/min
S = 0.0222
Sy = 0.4998
β = 0.6

TEST DATA:
Q = 0.2019 ft^3/min
r = 3.84 ft
b = 3.56 ft

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL E5



DATA SET:
E5PT.IN
03/19/92

AQUIFER TYPE:
Unconfined
SOLUTION METHOD:
Neuman
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
E5

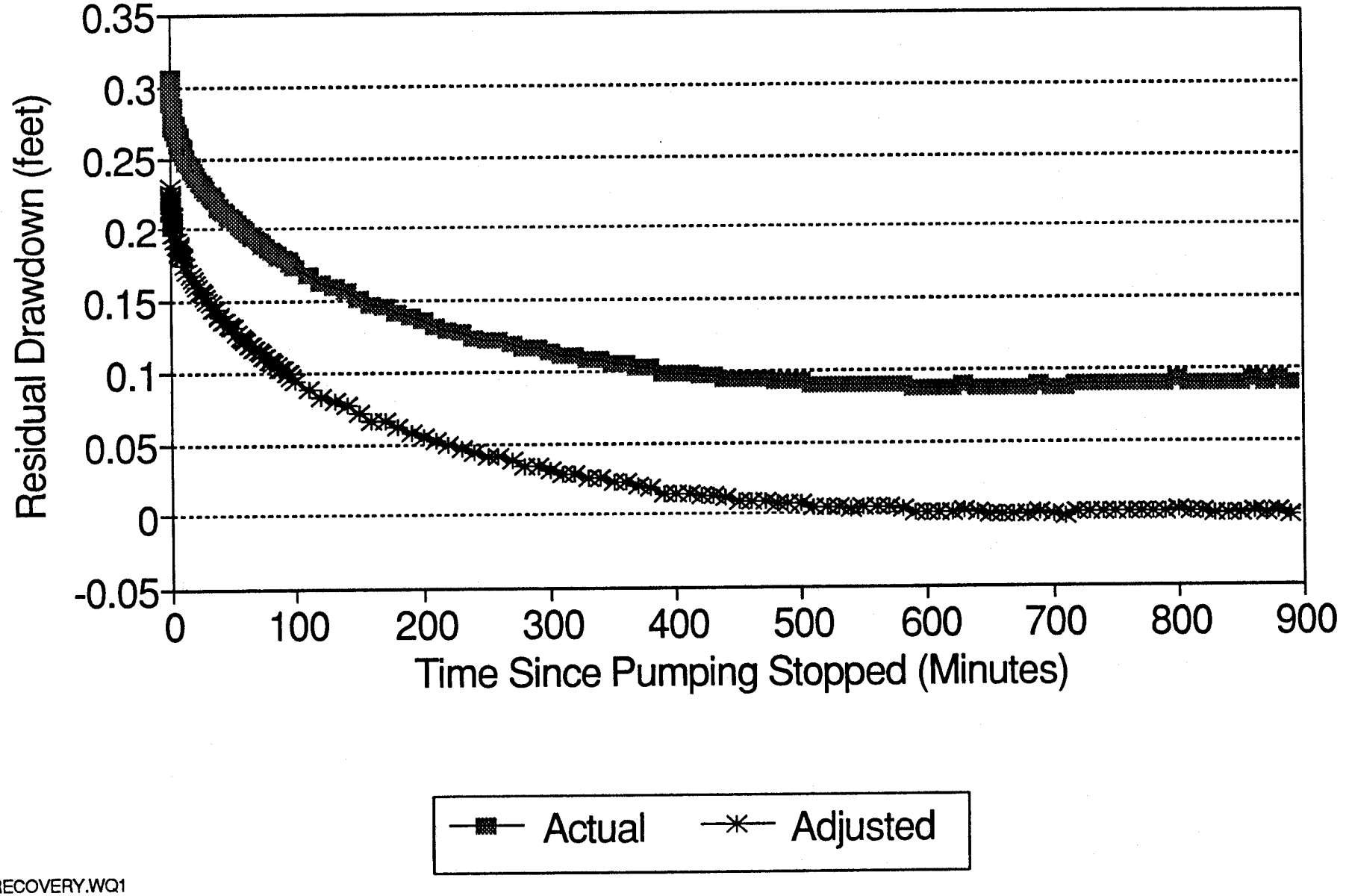
ESTIMATED PARAMETERS:
T = 0.1171 ft^2/min
S = 0.02308
Sy = 0.3394
β = 0.8

TEST DATA:
Q = 0.2019 ft^3/min
r = 5.51 ft
b = 3.27 ft

THEIS RECOVERY METHOD

Recovery Data - Well I1

Aquifer Pumping Test - 12/18-19/91



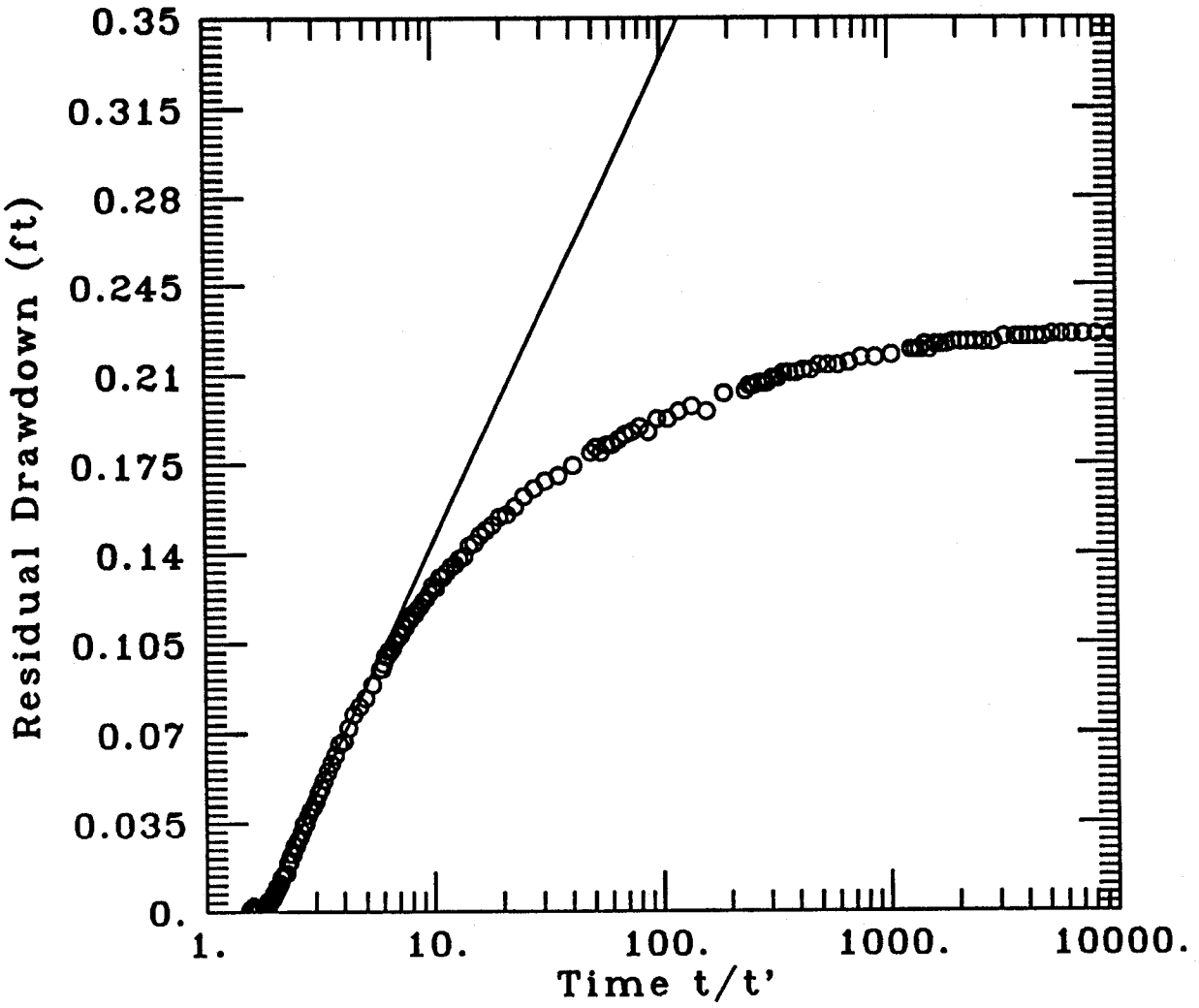
RECOVERY.WQ1

Client: EG&G ROCKY FLATS

Project No.: OPERABLE UNIT 1

Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL I1, ADJ



DATA SET:
I1_ADJ.IN
05/30/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

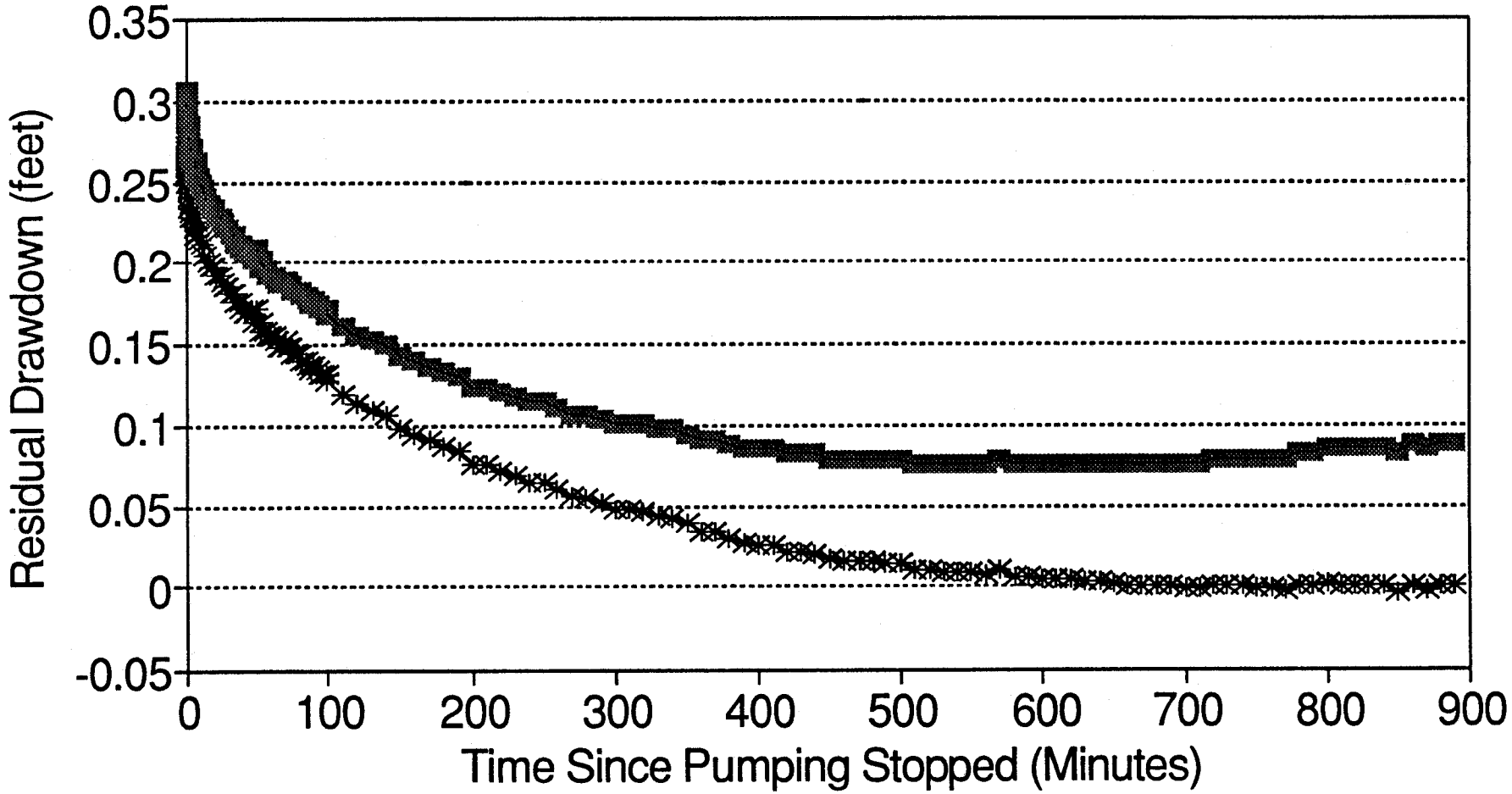
OBS. WELL:
I1

ESTIMATED PARAMETERS:
T = 0.1951 ft^2/min
S' = 1.717

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well I2

Aquifer Pumping Test - 12/18-19/91



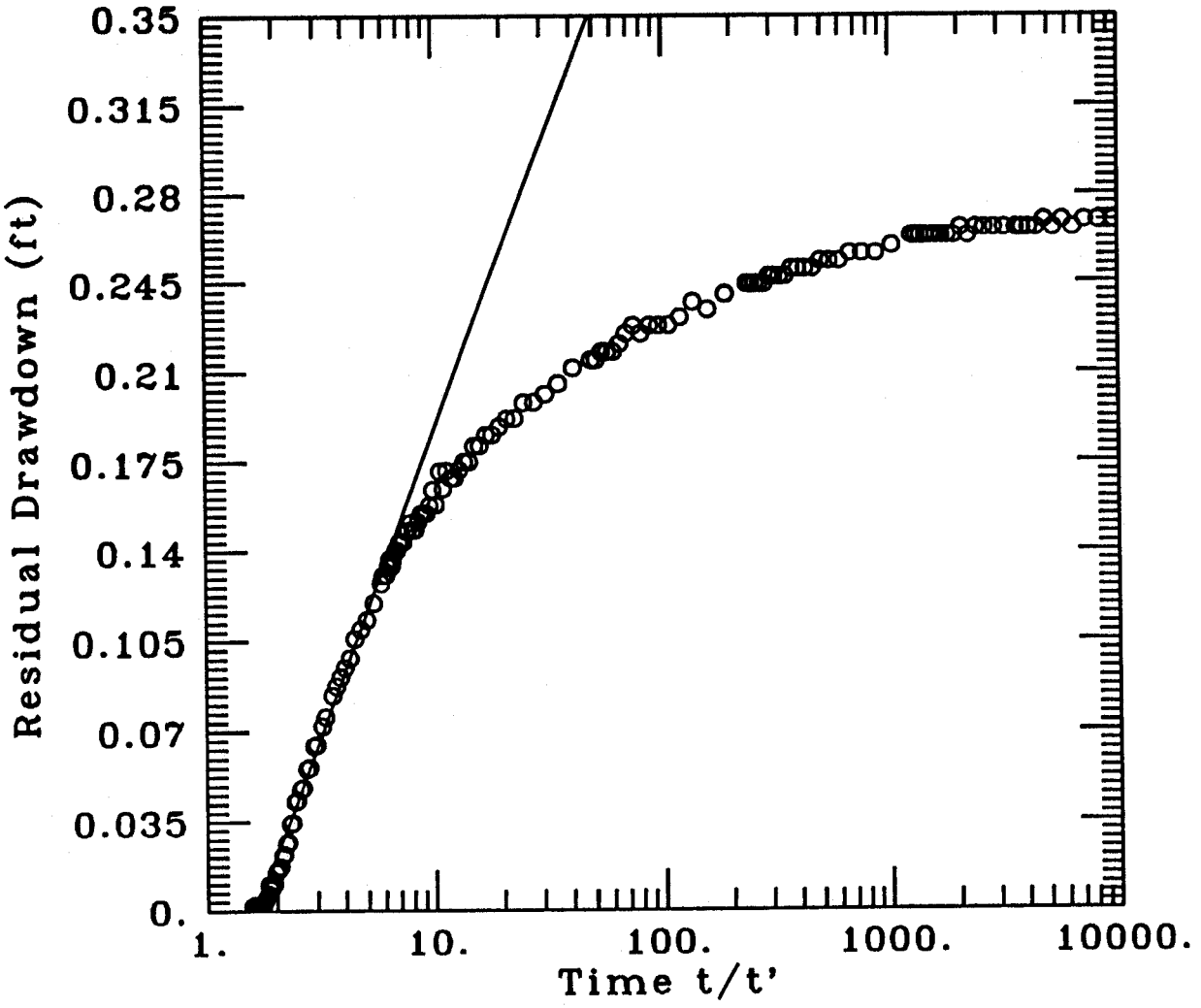
RECOVERY.WQ1

Client: EG&G ROCKY FLATS

Project No.: OPERABLE UNIT 1

Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL I2, ADJ



DATA SET:
i2_adj.in
05/28/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

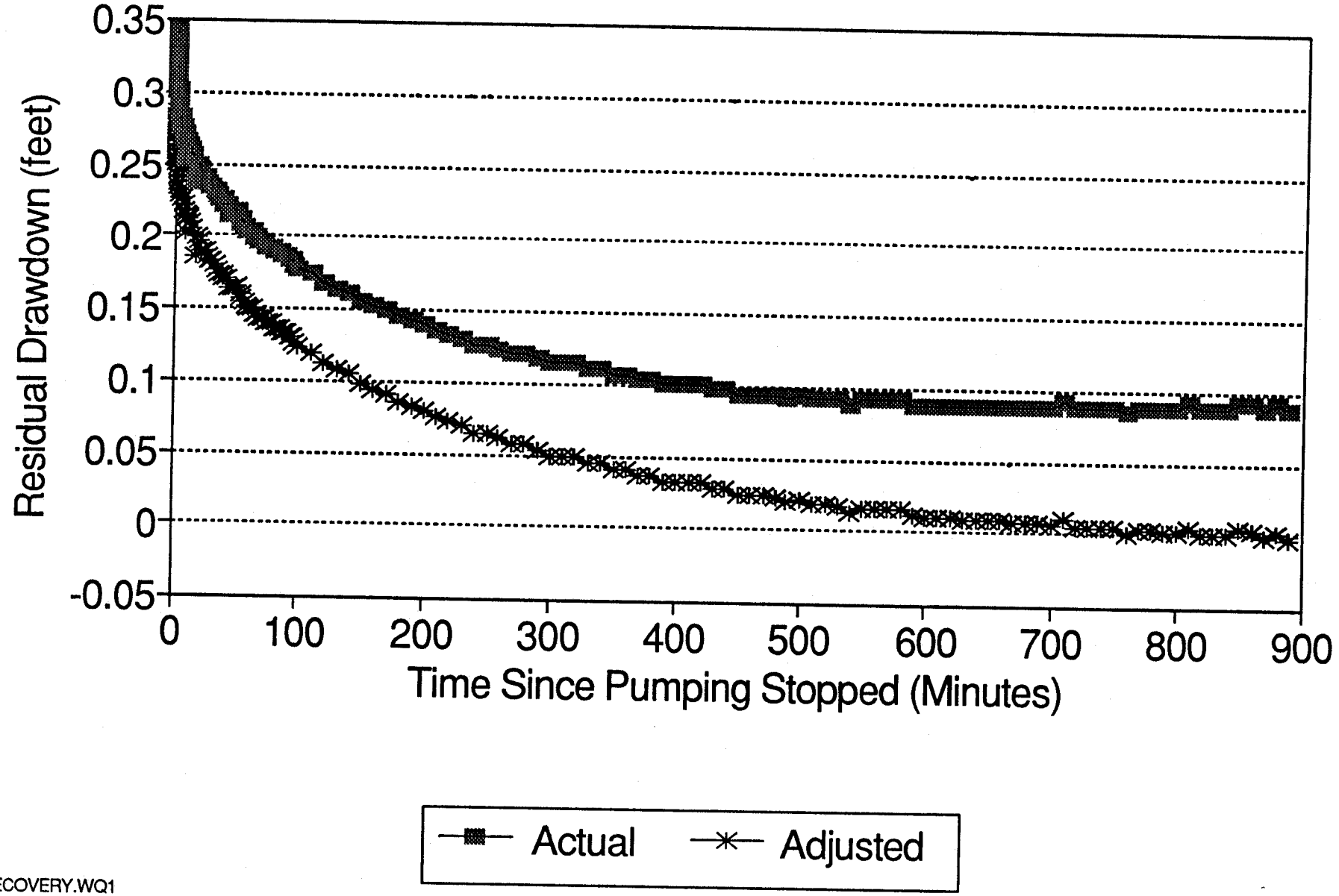
OBS. WELL:
I2

ESTIMATED PARAMETERS:
T = 0.156 ft^2/min
S' = 1.621

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well I3

Aquifer Pumping Test - 12/18-19/91



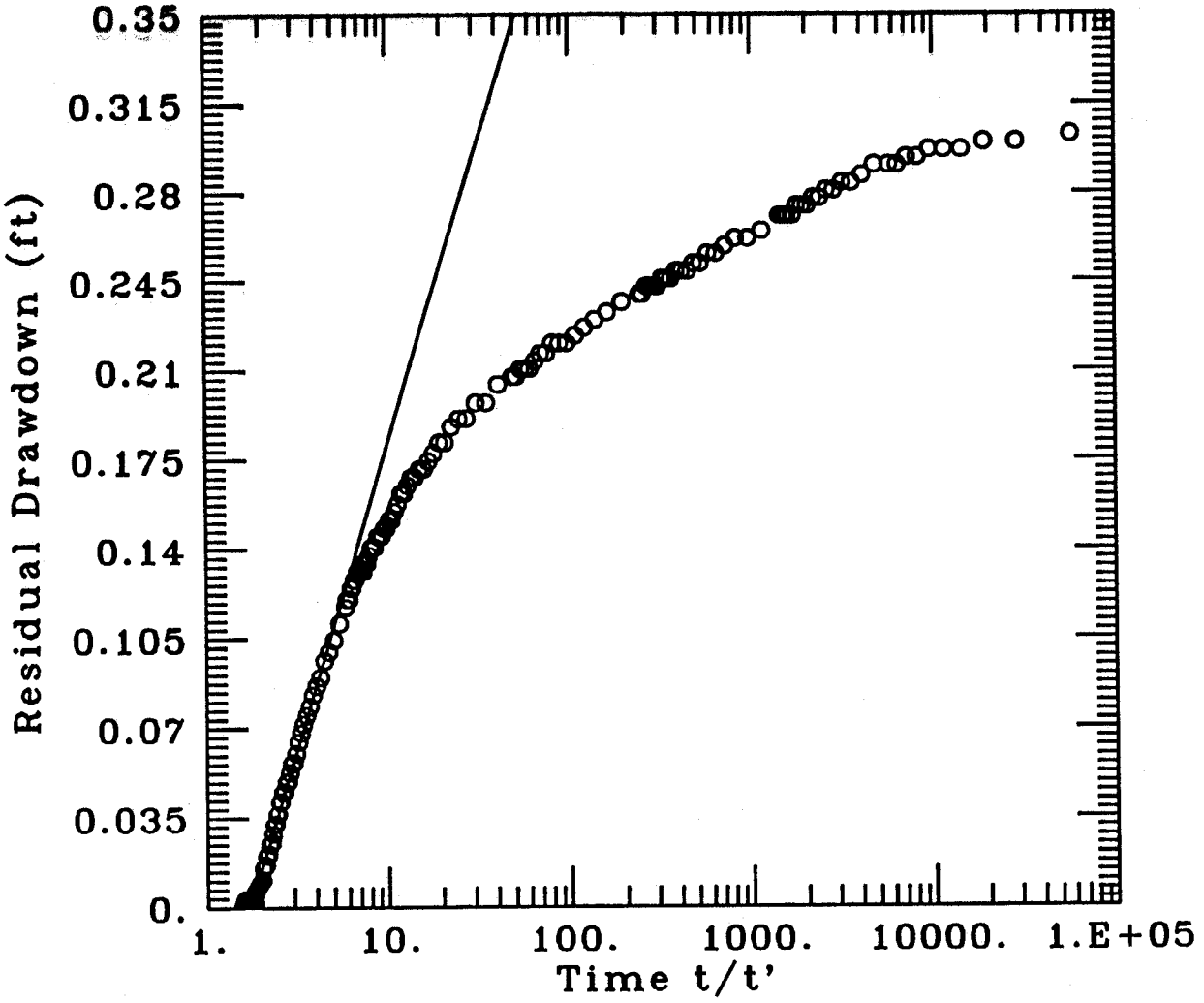
RECOVERY.WQ1

Client: EG&G ROCKY FLATS

Project No.: OPERABLE UNIT 1

Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL I3, ADJ



DATA SET:
i3_adj.in
05/31/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

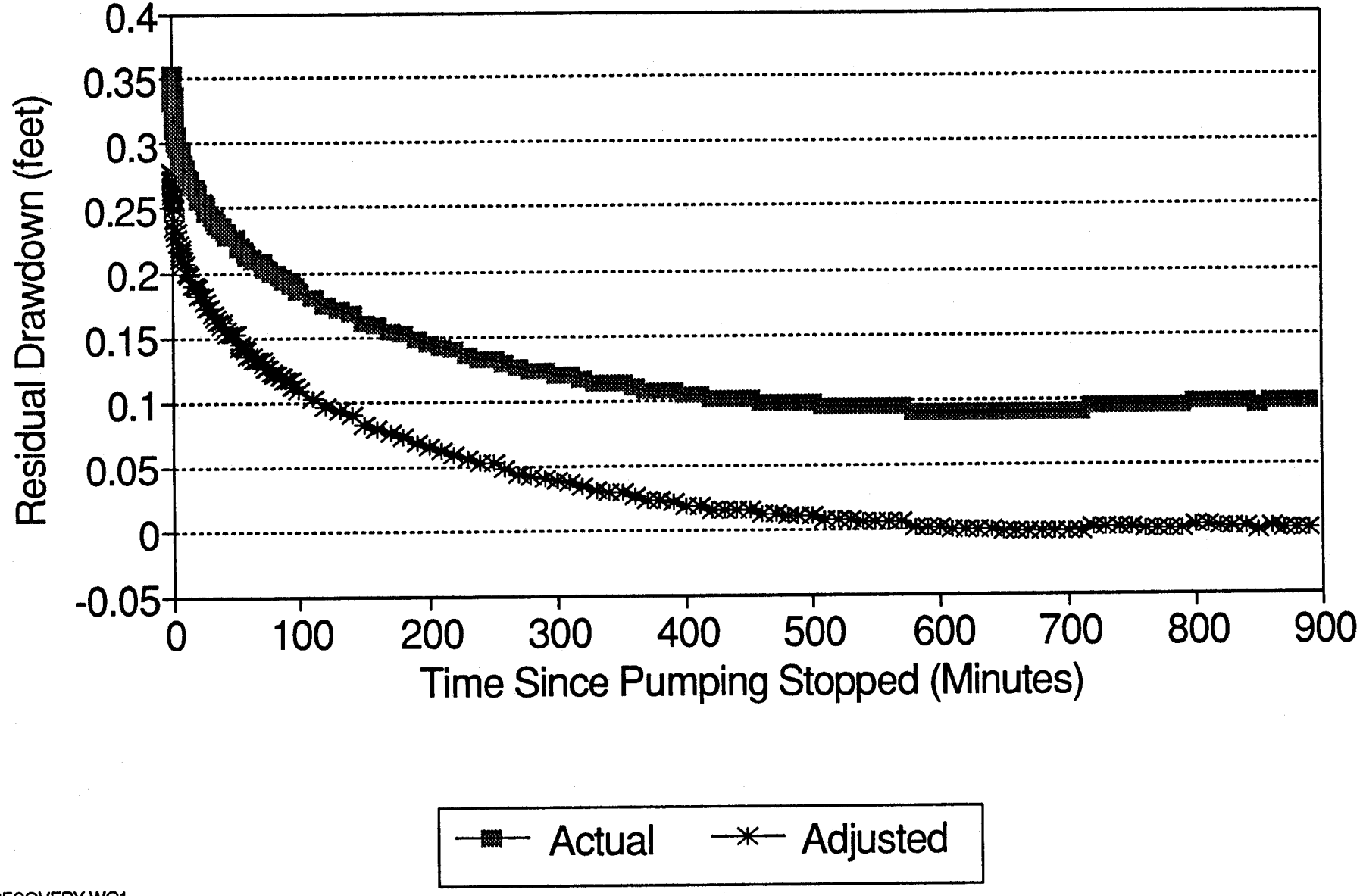
OBS. WELL:
I3

ESTIMATED PARAMETERS:
T = 0.1564 ft^2/min
S' = 1.721

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well I4

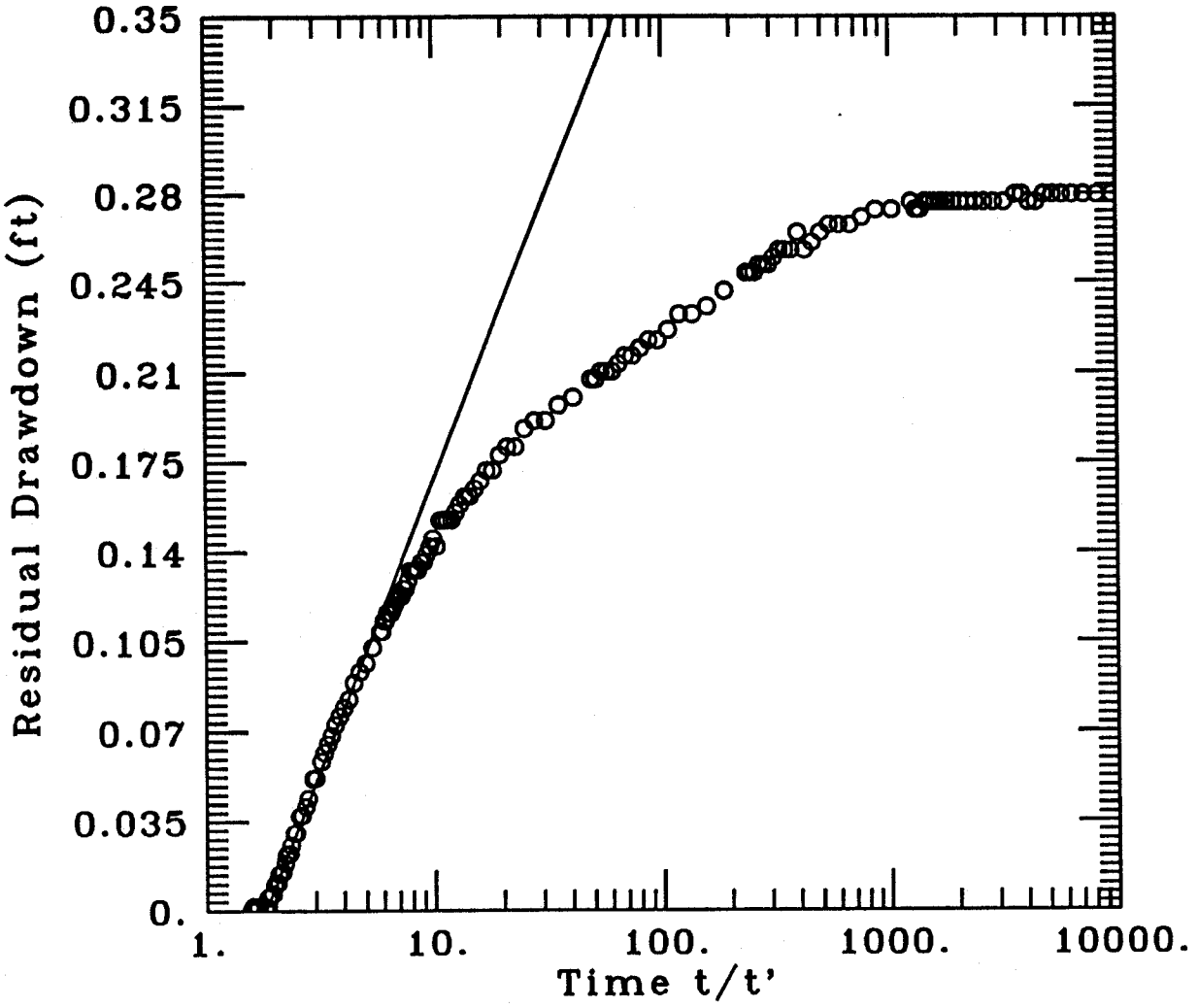
Aquifer Pumping Test - 12/18-19/91



RECOVERY.WQ1

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL I4, ADJ



DATA SET:
I4_ADJ.IN
05/30/92

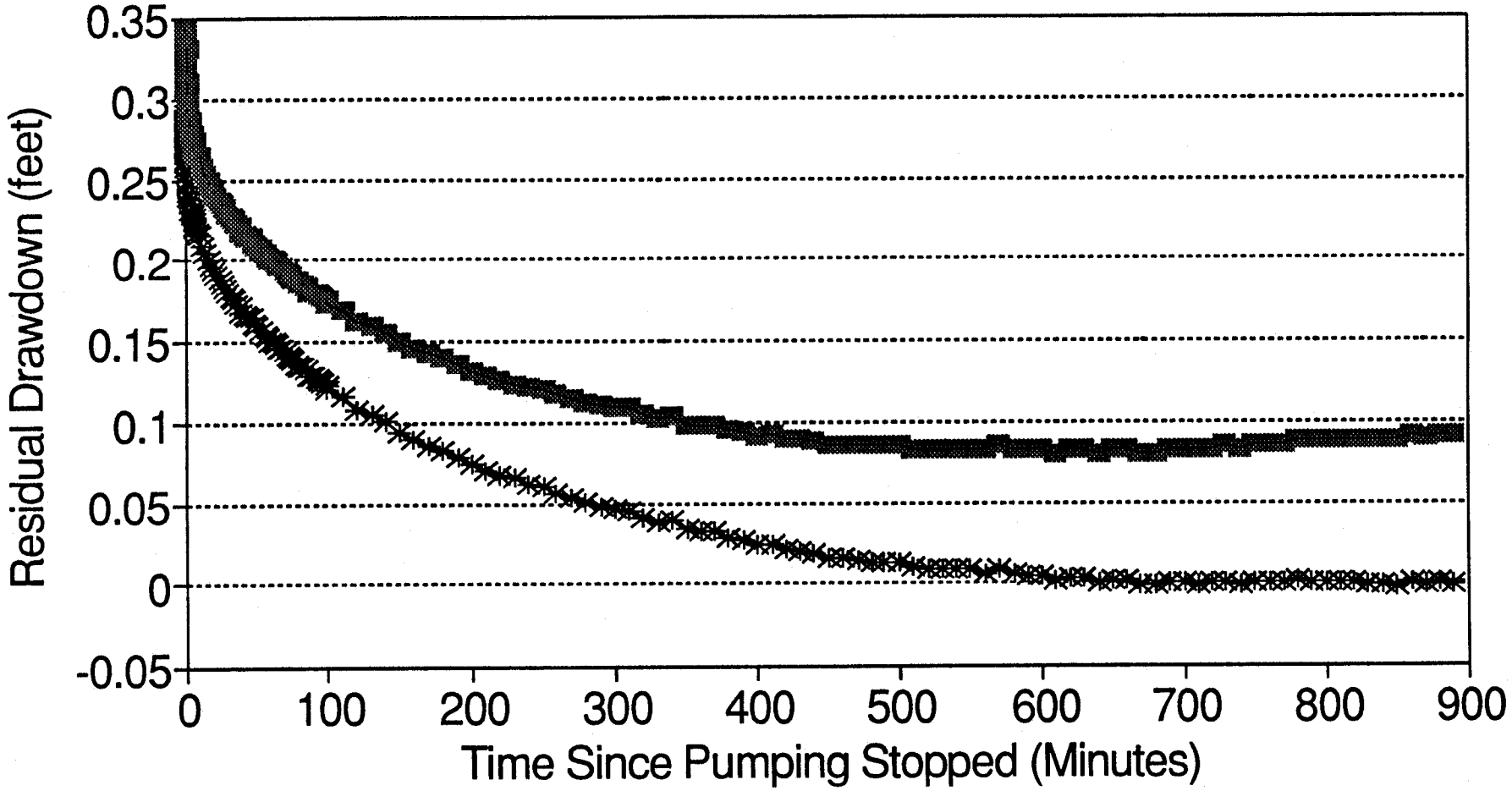
AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
I4

ESTIMATED PARAMETERS:
T = 0.1625 ft^2/min
S' = 1.81

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well I5

Aquifer Pumping Test - 12/18-19/91



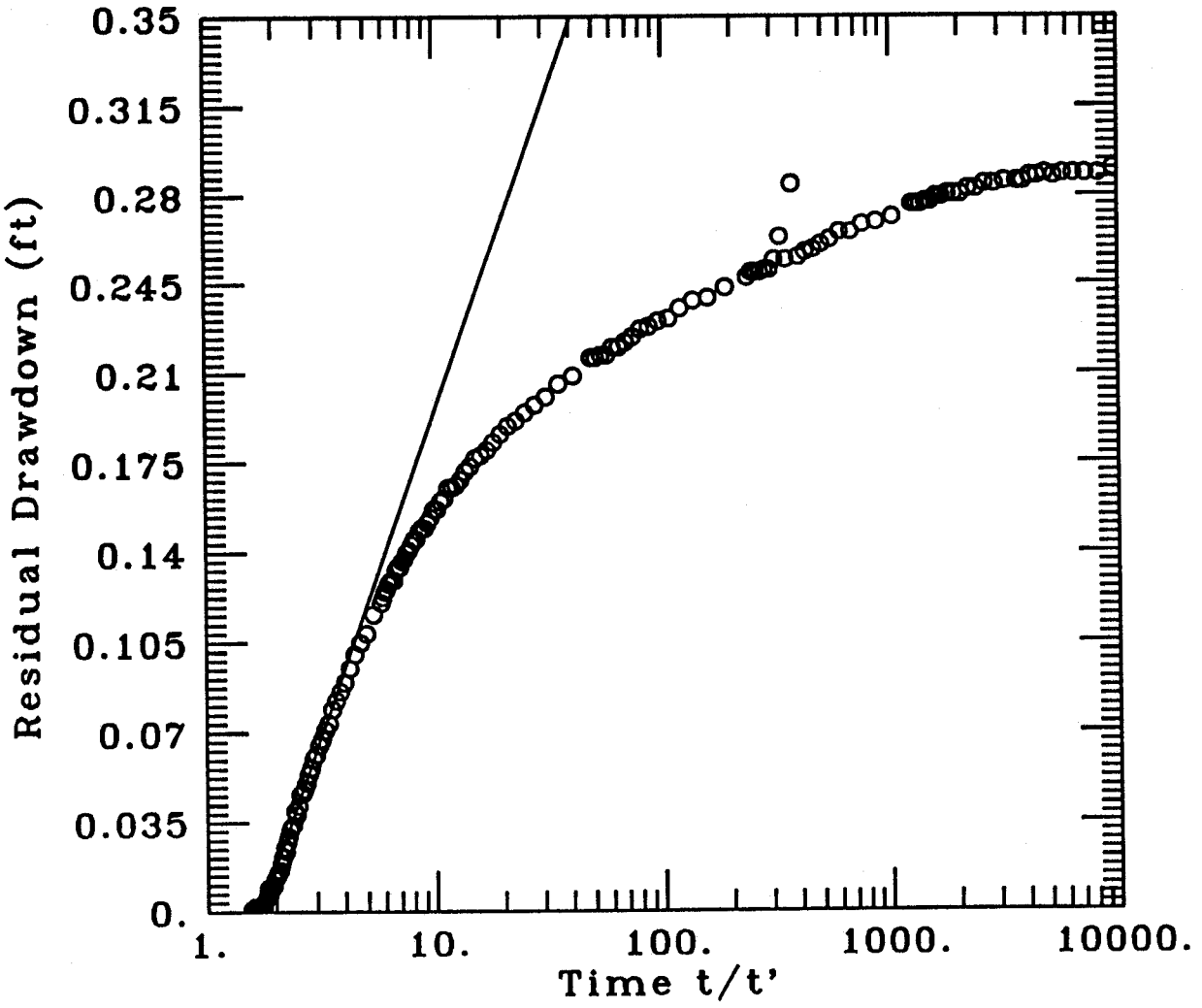
RECOVERY.WQ1

Client: EG&G ROCKY FLATS

Project No.: OPERABLE UNIT 1

Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL I5, ADJ



DATA SET:
i5_adj.in
05/30/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

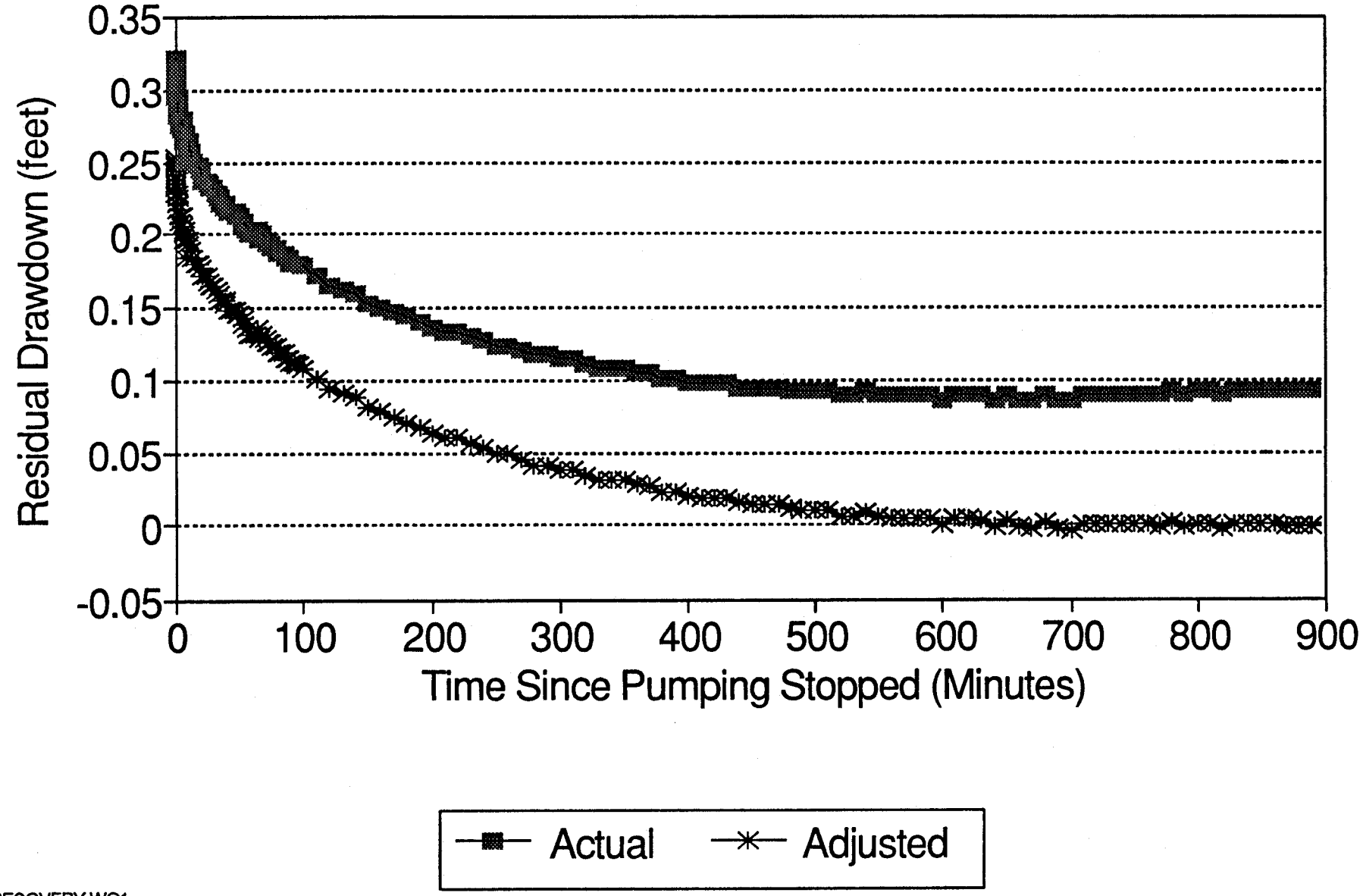
OBS. WELL:
I5

ESTIMATED PARAMETERS:
T = 0.146 ft^2/min
S' = 1.692

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well O1

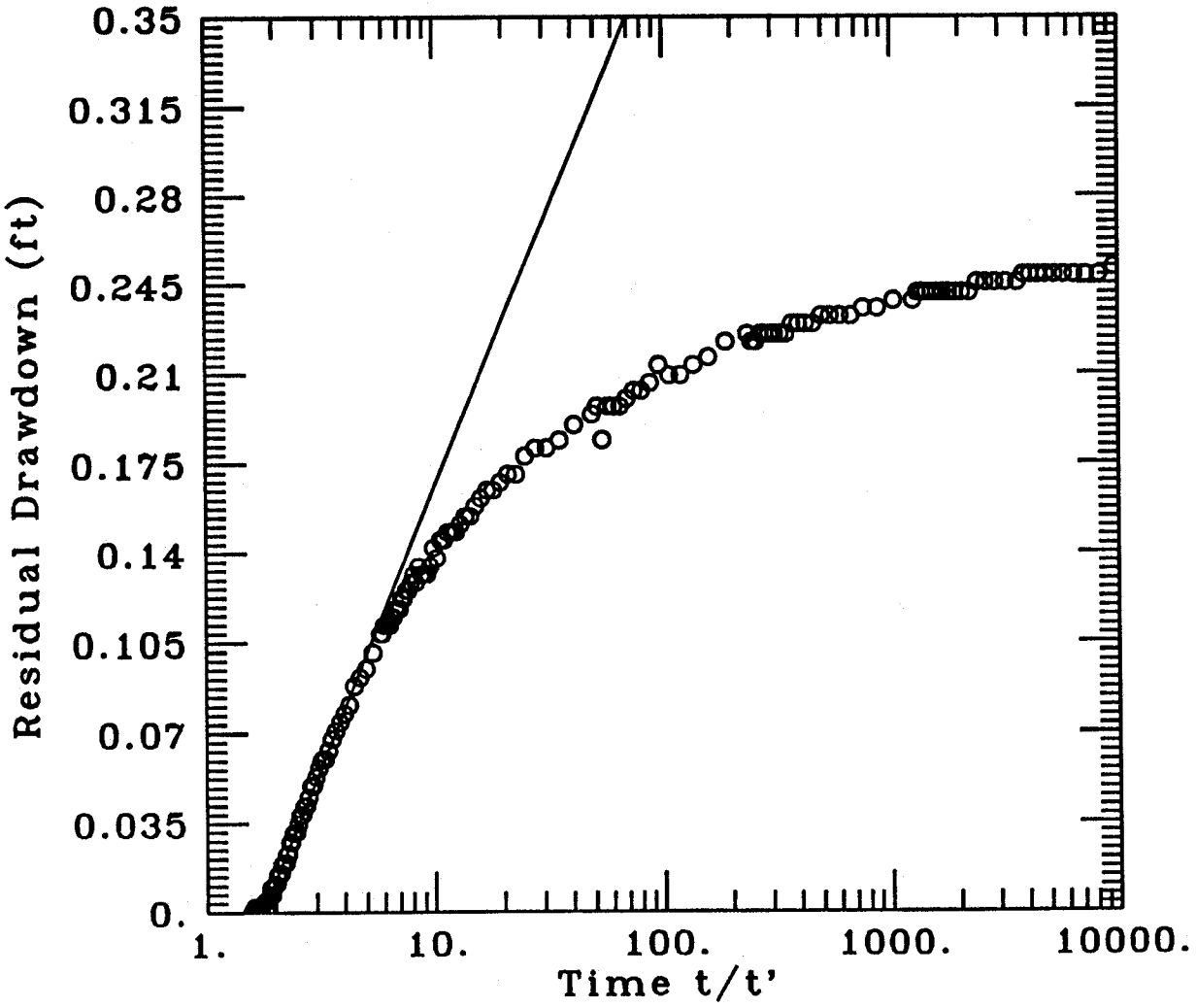
Aquifer Pumping Test - 12/18-19/91



RECOVERY.WQ1

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL 01, ADJ



DATA SET:
o1_adj.in
05/30/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

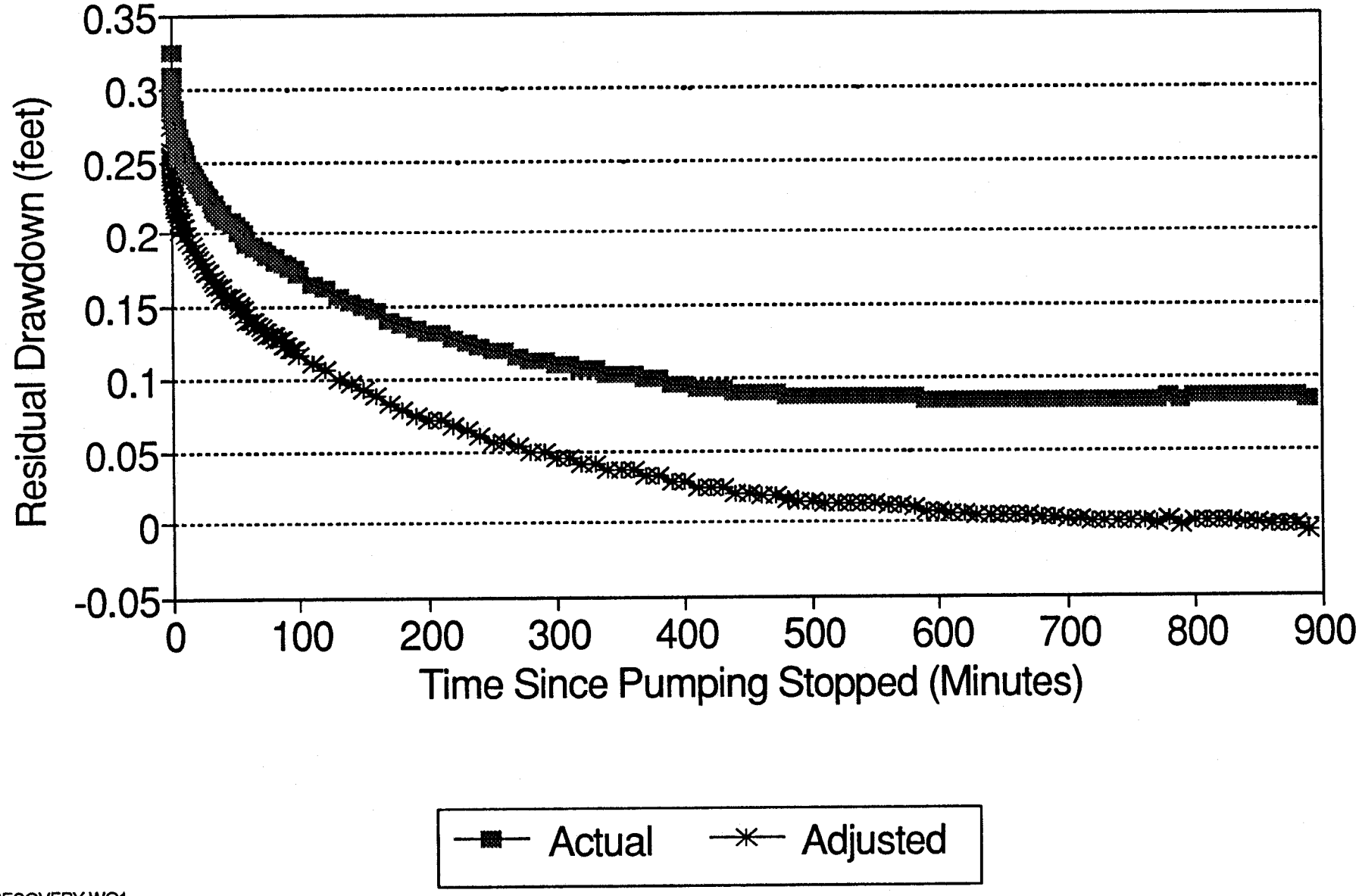
OBS. WELL:
01

ESTIMATED PARAMETERS:
T = 0.1694 ft^2/min
S' = 1.736

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480

Recovery Data - Well O2

Aquifer Pumping Test - 12/18-19/91



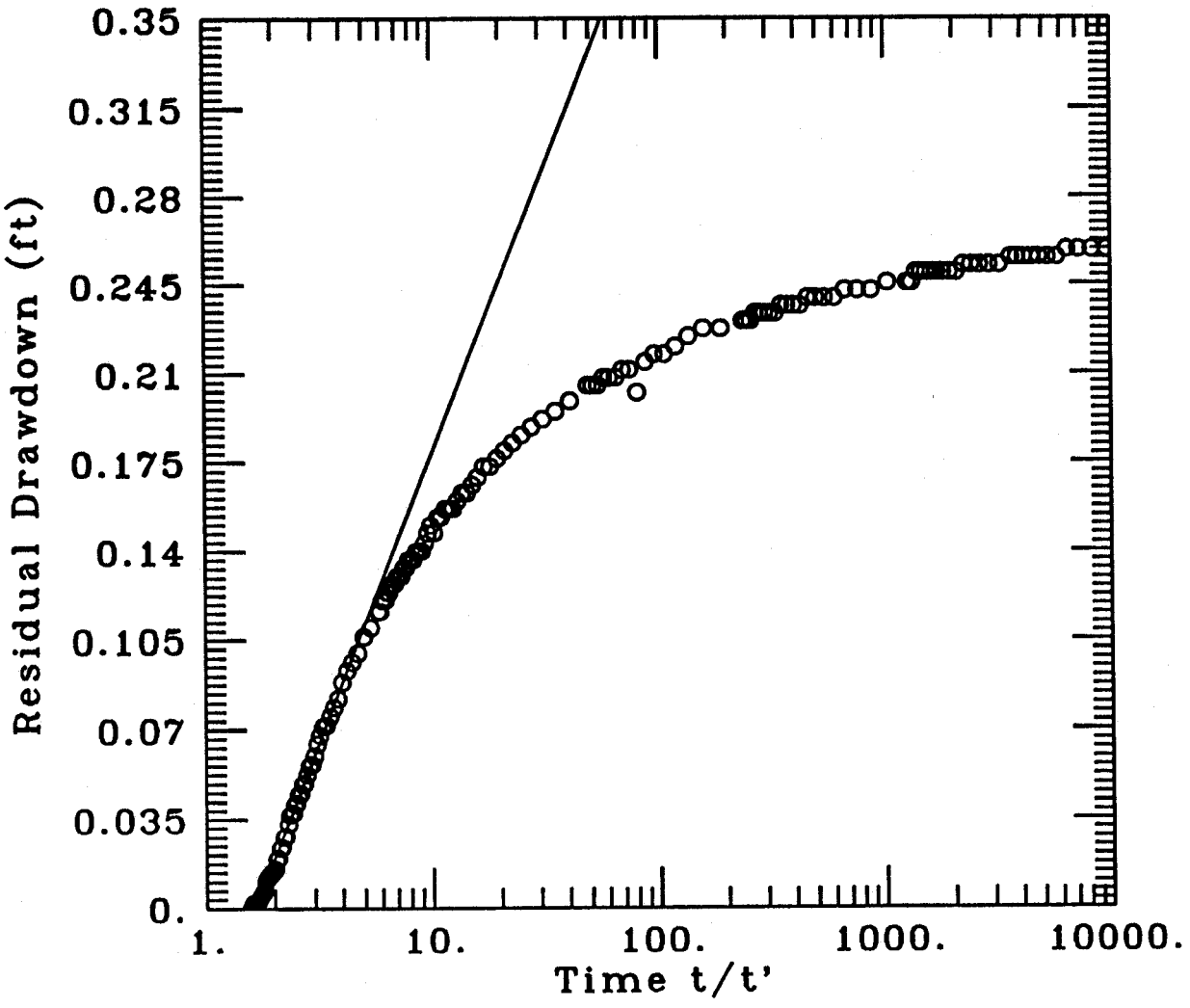
RECOVERY.WQ1

Client: EG&G ROCKY FLATS

Project No.: OPERABLE UNIT 1

Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL 02, ADJ



DATA SET:
o2_adj.in
05/31/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

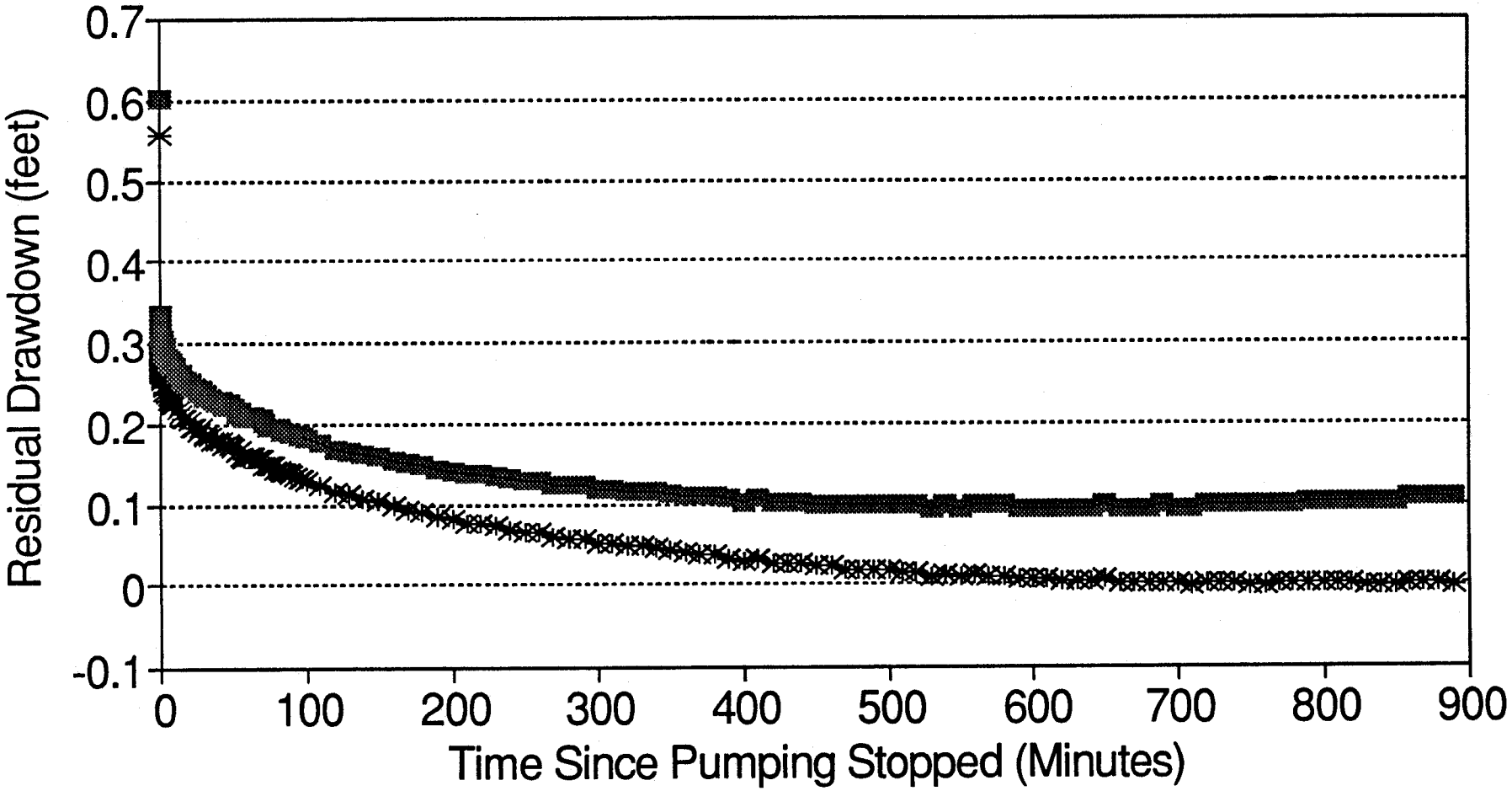
OBS. WELL:
02

ESTIMATED PARAMETERS:
T = 0.1633 ft^2/min
S' = 1.627

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well O3

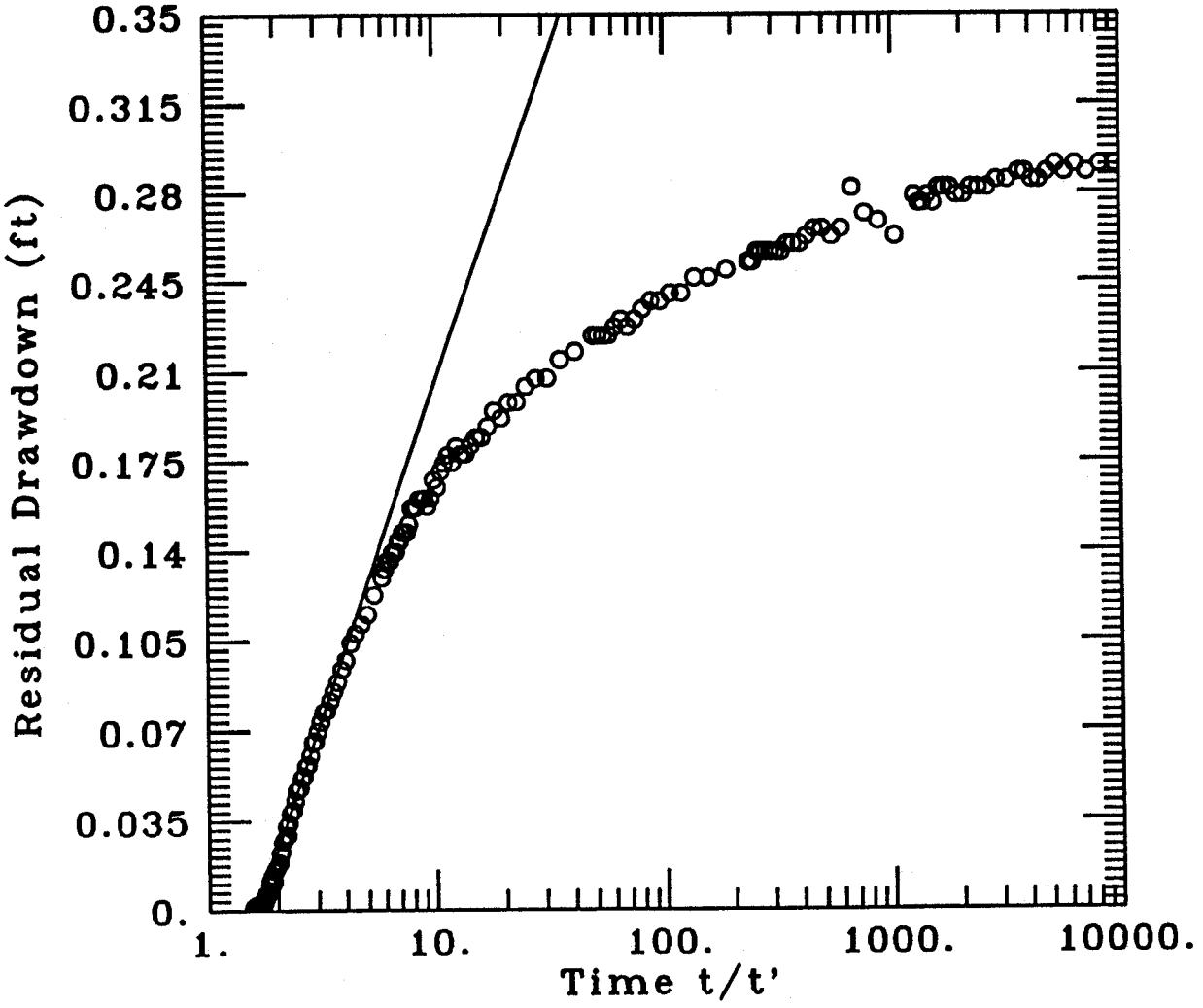
Aquifer Pumping Test - 12/18-19/91



RECOVERY.WQ1

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL 03, ADJ



DATA SET:
o3_adj.in
05/30/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

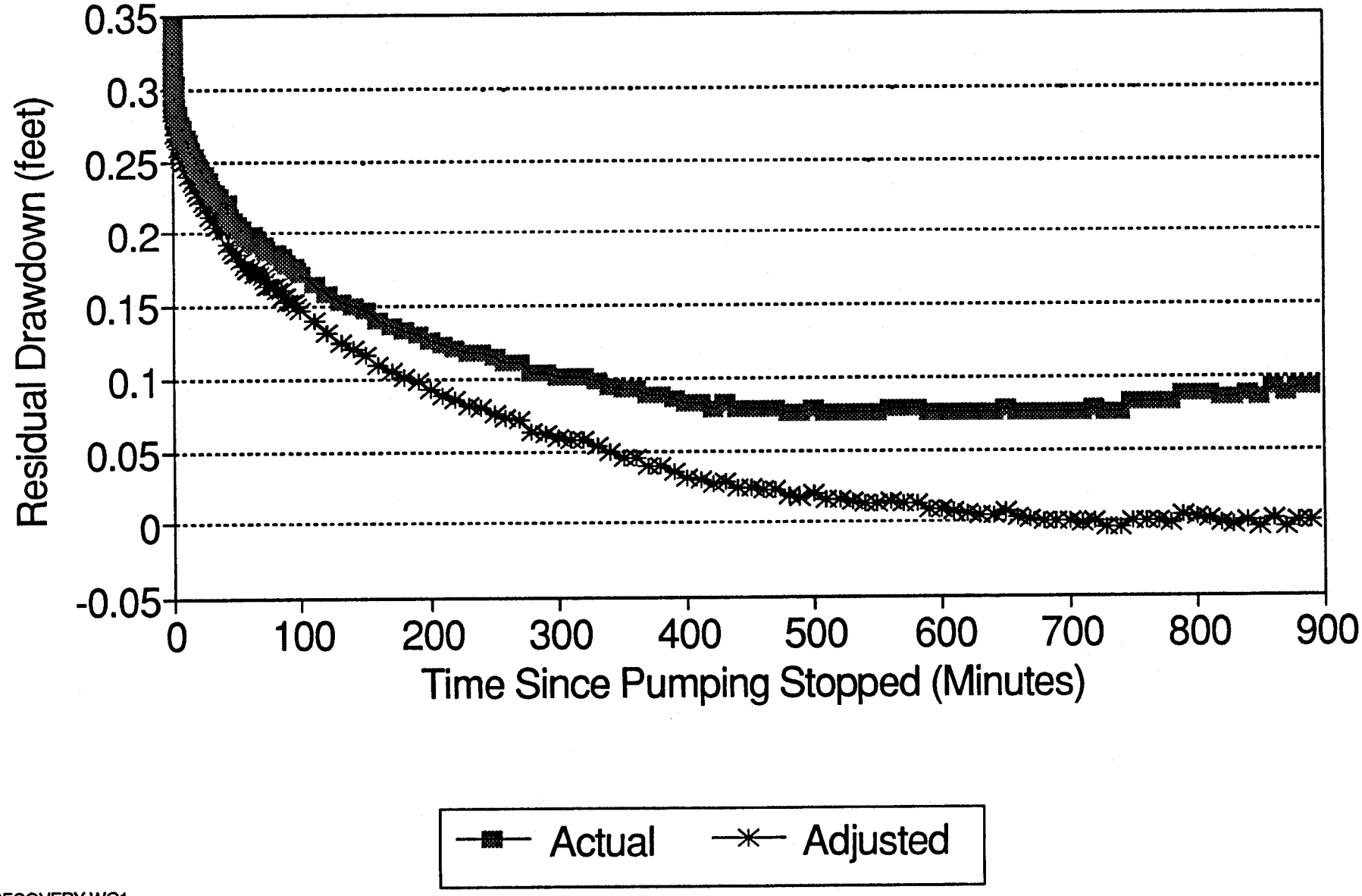
OBS. WELL:
03

ESTIMATED PARAMETERS:
T = 0.1425 ft^2/min
S' = 1.609

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well O5

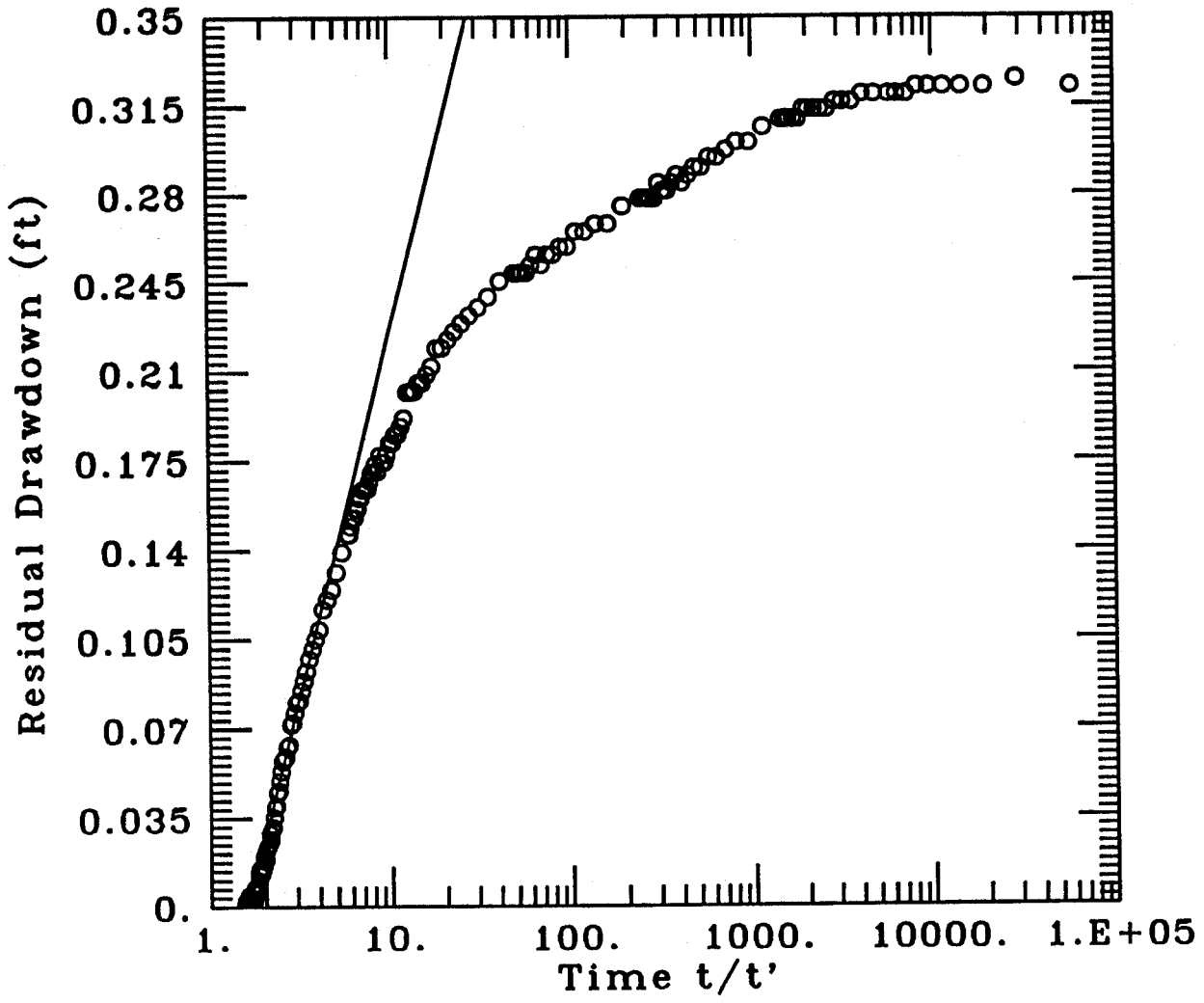
Aquifer Pumping Test - 12/18-19/91



RECOVERY.WQ1

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL 05, ADJ



DATA SET:
o5_adj.in
05/30/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

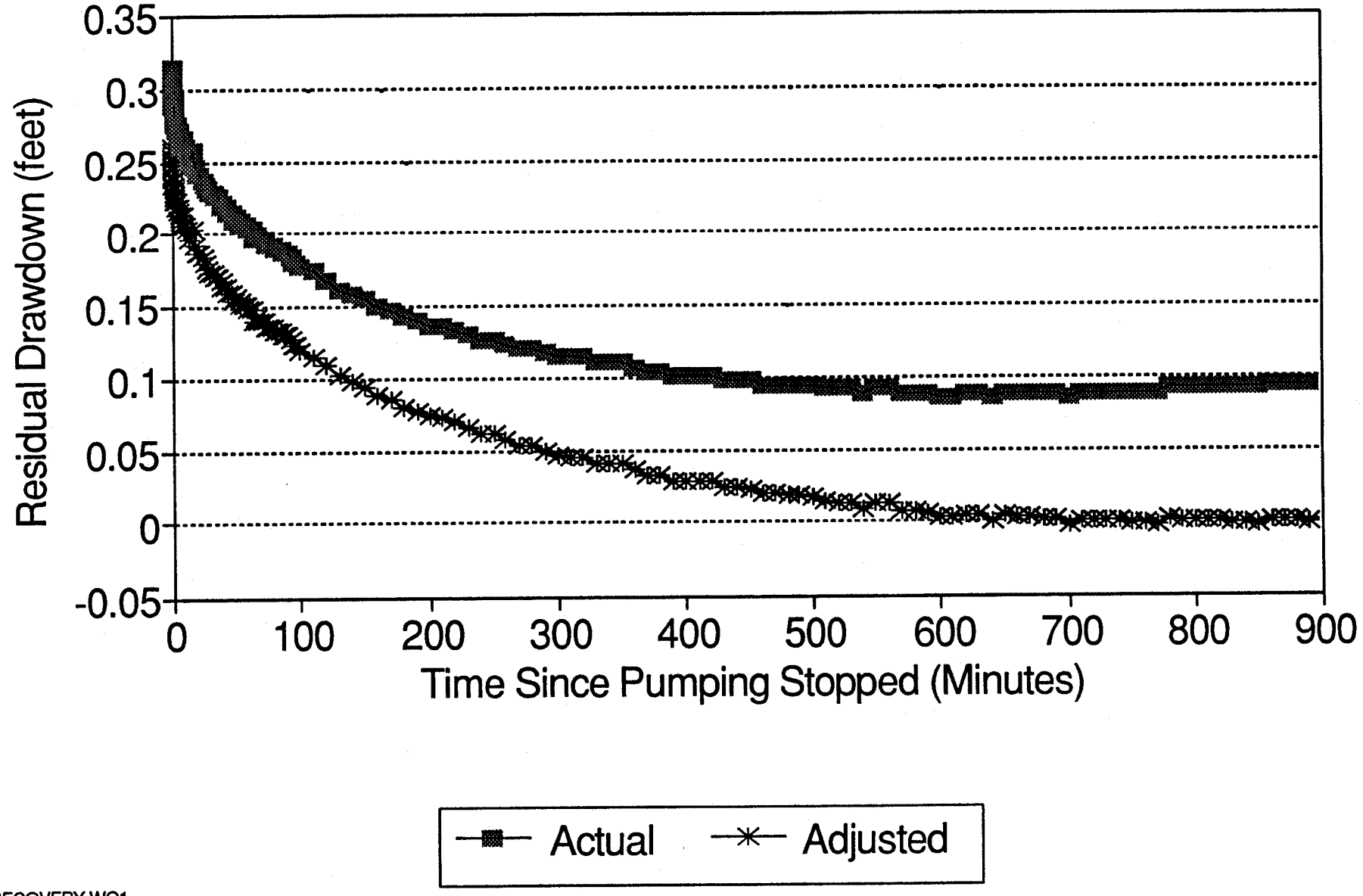
OBS. WELL:
05

ESTIMATED PARAMETERS:
T = 0.1298 ft^2/min
S' = 1.599

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well E1

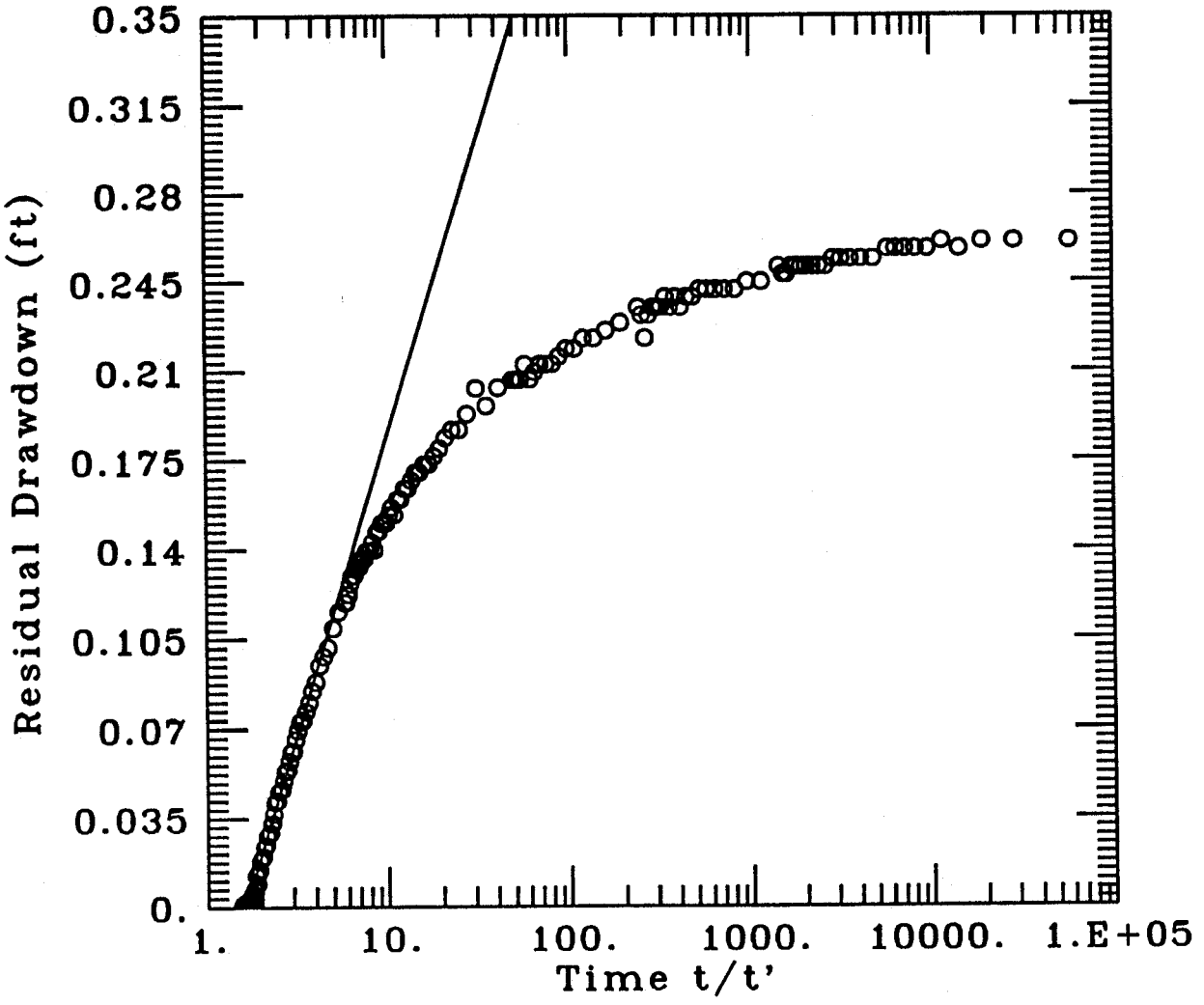
Aquifer Pumping Test - 12/18-19/91



RECOVERY.WQ1

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL E1, ADJ



DATA SET:
e1_adj.in
05/30/92

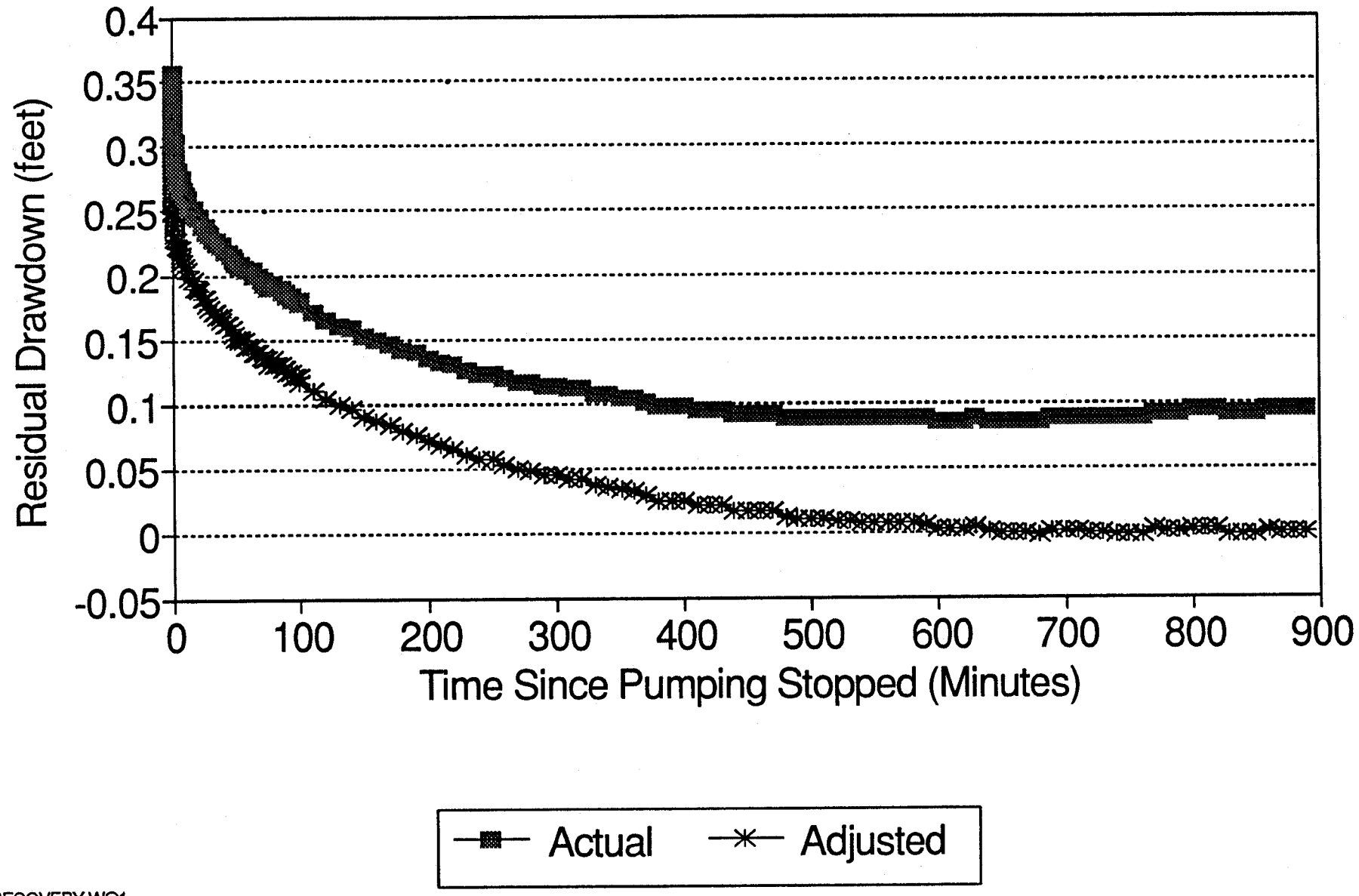
AQUIFER TYPE:
Confined
SOLUTION METHOD:
Theis Recovery
TEST DATE:
12/18/91
TEST WELL:
03
OBS. WELL:
E1

ESTIMATED PARAMETERS:
T = 0.1581 ft^2/min
S' = 1.62

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well E3

Aquifer Pumping Test - 12/18-19/91



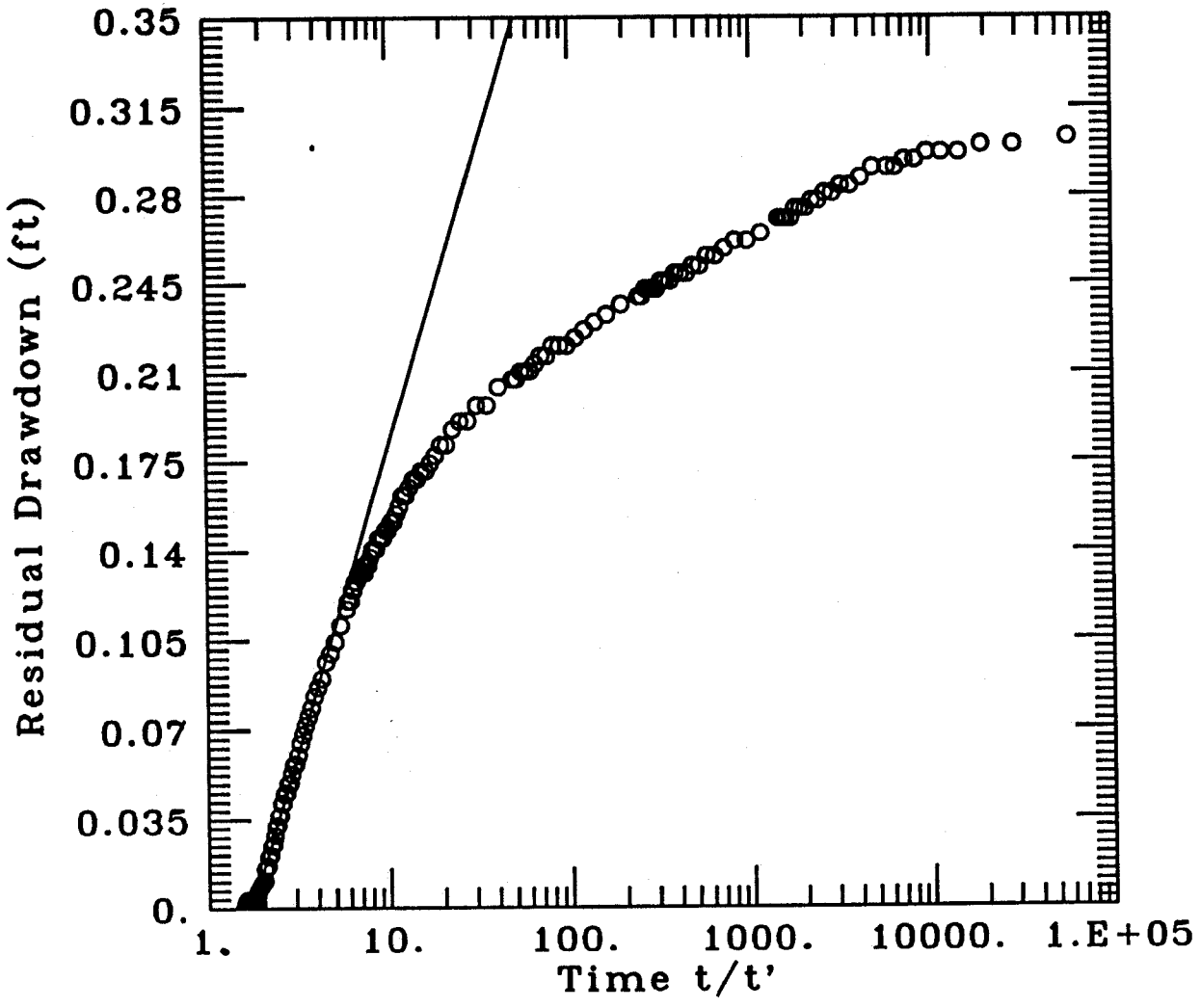
RECOVERY.WQ1

Client: EG&G ROCKY FLATS

Project No.: OPERABLE UNIT 1

Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST - WELL E3, ADJ



DATA SET:
e3_adj.in
05/30/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

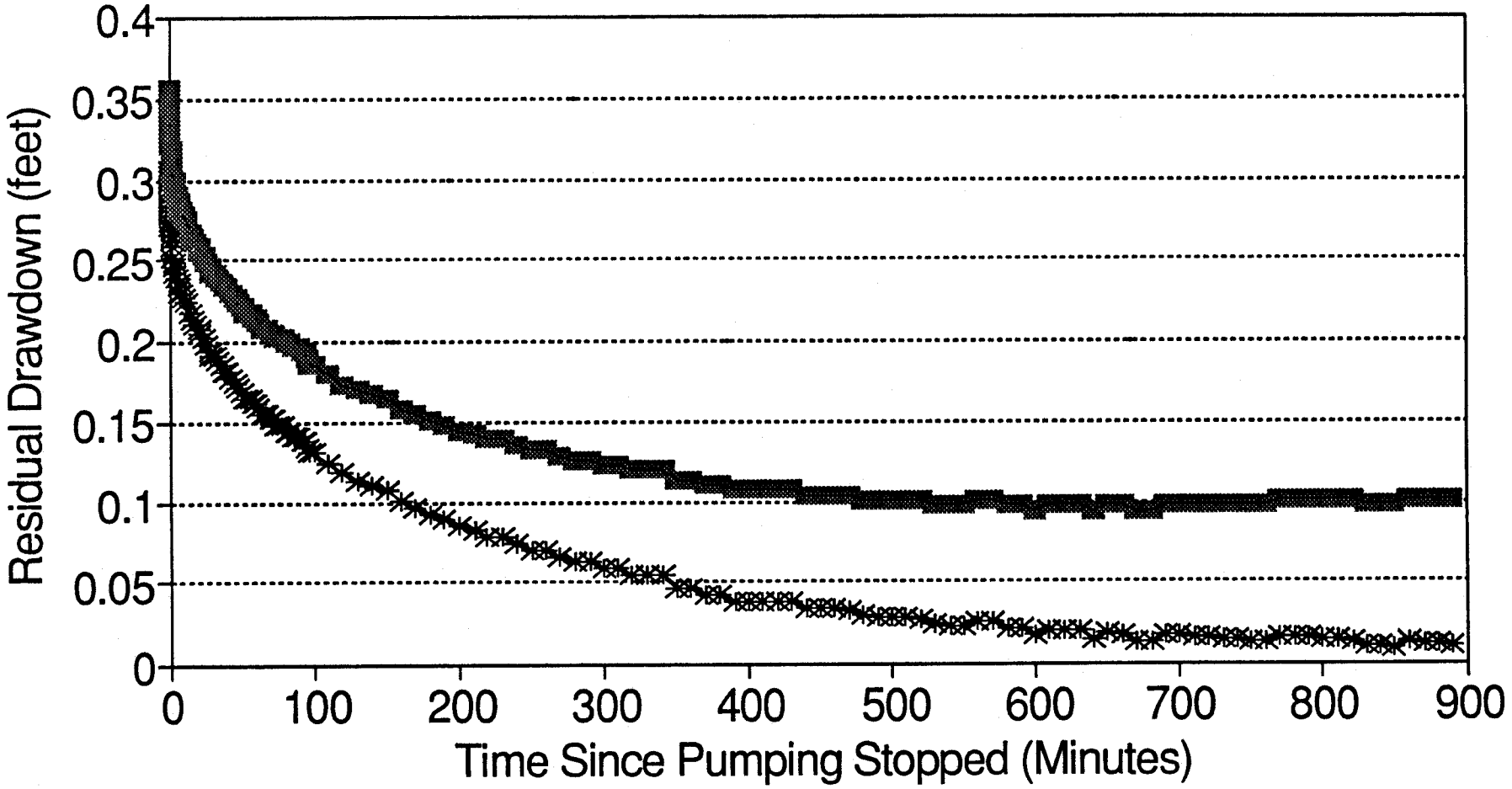
OBS. WELL:
E3

ESTIMATED PARAMETERS:
T = 0.1556 ft^2/min
S' = 1.719

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well E4

Aquifer Pumping Test - 12/18-19/91



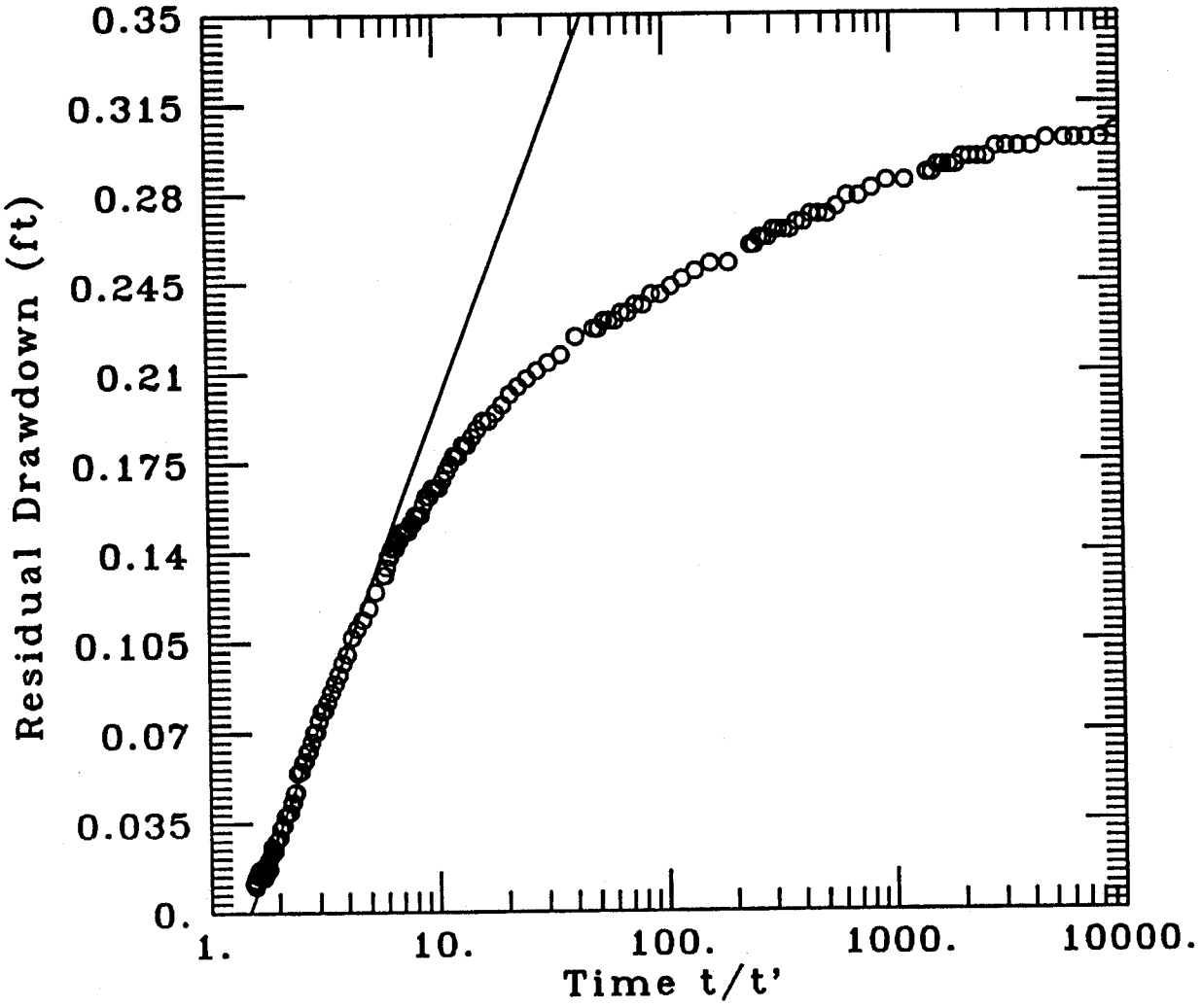
RECOVERY.WQ1

Client: EG&G ROCKY FLATS

Project No.: OPERABLE UNIT 1

Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL E4, ADJ



DATA SET:
e4_adj.in
05/31/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

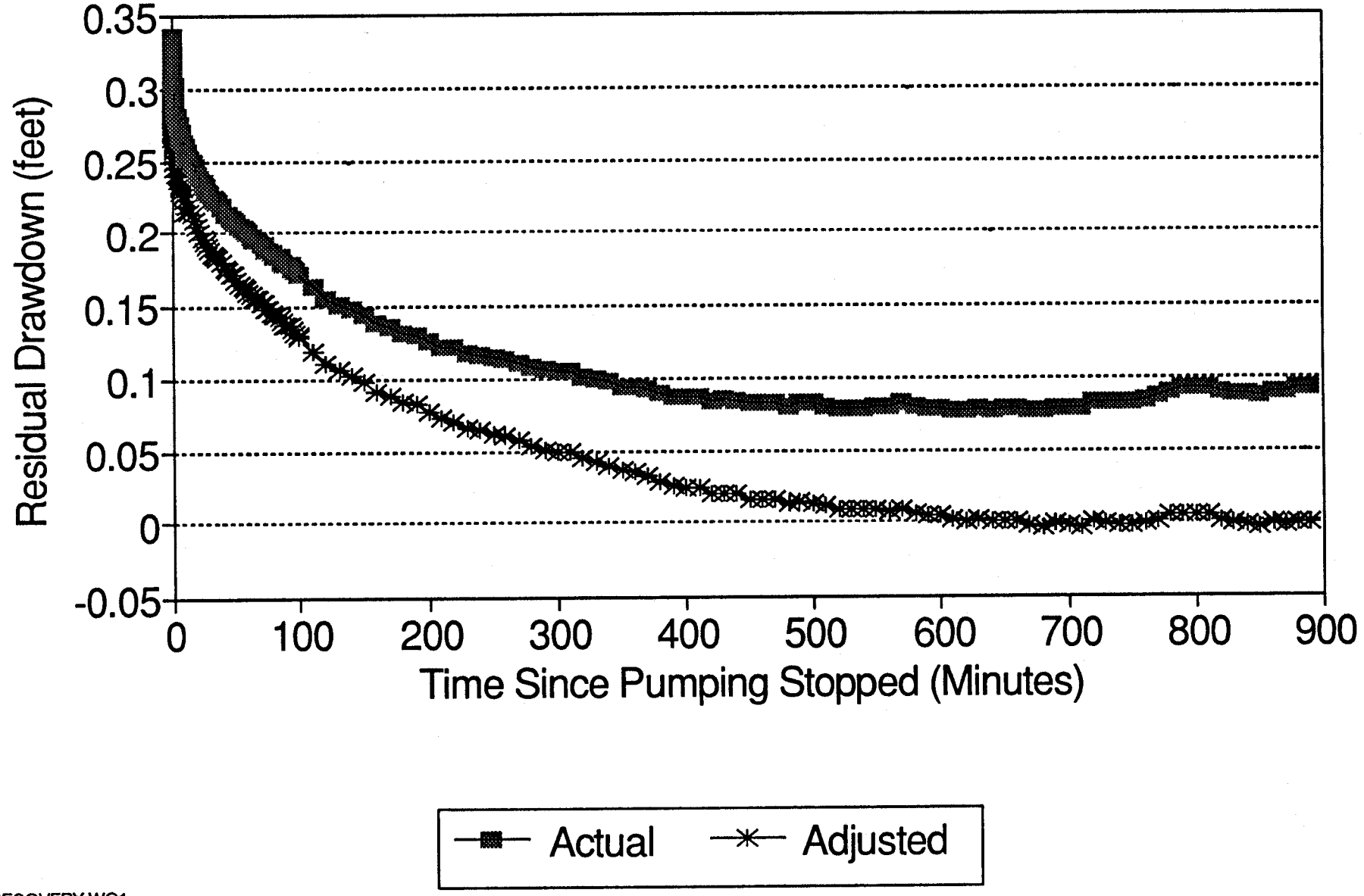
OBS. WELL:
E4

ESTIMATED PARAMETERS:
T = 0.1565 ft^2/min
S' = 1.473

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

Recovery Data - Well E5

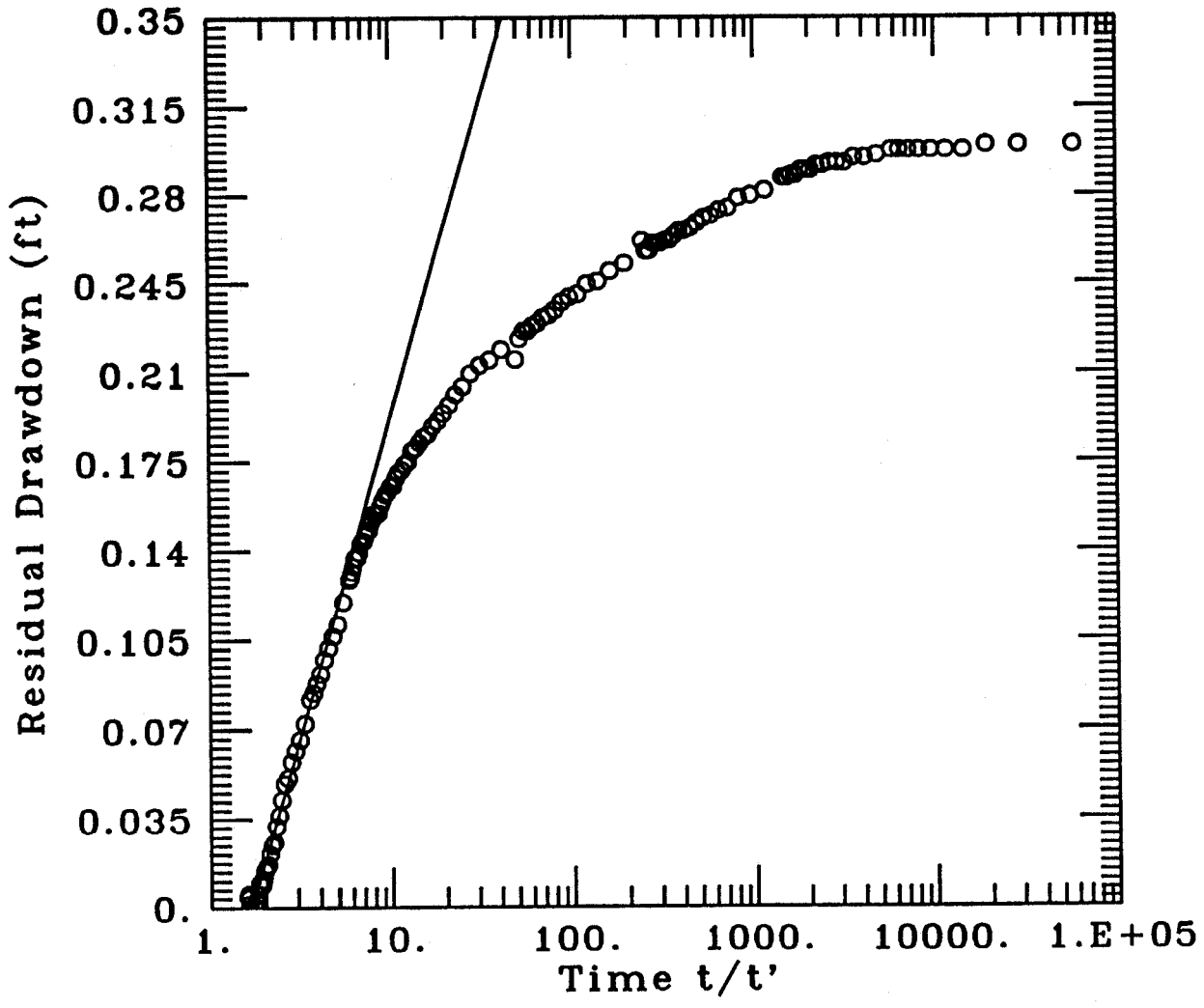
Aquifer Pumping Test - 12/18-19/91



RECOVERY.WQ1

	Client: EG&G ROCKY FLATS
Project No.: OPERABLE UNIT 1	Location: WOMAN CREEK

881 HILLSIDE AQUIFER TEST – WELL E5, ADJ



DATA SET:
e5_adj.in
05/30/92

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

TEST DATE:
12/18/91

TEST WELL:
03

OBS. WELL:
E5

ESTIMATED PARAMETERS:
T = 0.1482 ft^2/min
S' = 1.673

TEST DATA:
Q = 0.2019 ft^3/min
t pumping = 480. min

ATTACHMENT B2-8
BROMIDE ANALYTICAL METHODS

BROMIDE ANALYTICAL METHODS

Bromide concentrations were measured in the field, immediately after samples were collected, using an Orion model 94-35 bromide ISE; an Orion model SA210 meter was used to measure millivolt potential. The reference electrode was filled before each day's use with a 4M KCl, AgCl saturated filling solution. Electrodes were rinsed with distilled water and blotted dry before each measurement was made. In the field, the reference electrode was stored in filling solution when not in use. For periods of inactivity exceeding 2 days the electrode was drained and rinsed with distilled water.

Samples were collected in 50 ml beakers for the bromide tracer evaluation test and in 100 ml beakers for the multiple-well tracer test. Orion-brand ionic strength adjusting solution (ISA), consisting of 5M $NaNO_3$, was added to each sample. For the 50 ml samples, 1 ml of ISA was added with a 1 ml Grade A pipette. For the 100 ml samples, 2 ml of ISA was added using a Brinkmann Macro-Transferpettor automatic pipette.

Bromide calibration standards were prepared by serial dilutions of Orion 0.1M NaBr standard. Glassware used for the dilutions consisted of 5 ml, 10 ml, and 20 ml Grade A pipettes and a 1,000 ml Grade A volumetric flask. Instead of using three standards, as suggested in Technical Memorandum 4, eight standards were used to provide greater control. The eight standards were made as follows:

Dilution Factor	Pipette: Volumetric Flask	Final Concentration
10X	100 ml (7990.4 mg/l) : 1000 ml	800 mg/l
20X	50 ml (7990.4 mg/l) : 1000 ml	400 mg/l
50X	20 ml (7990.4 mg/l) : 1000 ml	160 mg/l
100X	10 ml (7990.4 mg/l) : 1000 ml	80.0 mg/l
200X	5 ml (7990.4 mg/l) : 1000 ml	40.0 mg/l
1000X	10 ml (800 mg/l) : 1000 ml	8.0 mg/l
2000X	10 ml (400 mg/l) : 1000 ml	4.0 mg/l
5000X	10 ml (160 mg/l) : 1000 ml	1.6 mg/l

Standards were prepared prior to beginning the single-well bromide tracer evaluation test and again before beginning the multiple-well tracer test. Standards were stored in 1,000 ml Nalgene HDPE bottles. For the multiple-well tracer test, the bottles were sealed in a plastic bag and placed in the discharge water tank to achieve the correct temperature.

Bromide calibration curves were made for several temperatures to evaluate the extent that temperature affects electrode response. Select results are presented in Attachment B2-8, Table 1 and Figure 1. For each calibration curve, a least-squares linear regression was performed on log-transformed data.

Temperature differences between the temperature at which time calibration curve was made and the temperature at which the samples were measured probably constitutes the greatest error in the bromide measurements, although the error would be systematic. Based on the curves made at 2.1°C and at 9.0°C (Attachment B2-8, Figure 1), a 1°C temperature shift produced an error of about 8 percent at a +100 millivolt ISE response (about 1.6 mg/l bromide) and an error of about 3 percent at a -40 millivolt ISE response (about 560 mg/l bromide). A second cause of error results from meter sensitivity. Bromide ISE response was recorded to the nearest millivolt, which yielded an accuracy of about 2 percent for any given bromide concentration. The effect of the limited sensitivity of the meter can be observed in the time-concentration curves in Figure B2-13, in which the discrete number of recorded concentration values produce a "stepped profile." Combining the error factors results in an average estimated error of about ±5 percent for a measured bromide concentration.

As an independent check on the accuracy of the bromide measurements made in the field, samples were collected periodically during the multiple-well tracer test and were submitted to an Environmental Protection Agency-approved analytical laboratory for analysis. Split samples of select calibration standards were also submitted. The analytical laboratory analyzed for bromide using a colorimetric method (Standard Method 4500-Br^-B, Phenol Red Colorimetric Method). The results of these analyses are presented in Attachment B2-8, Table 2. All field and laboratory

measurements were comparable to within one order of magnitude. The percentage difference between laboratory and field measurements ranged from less than 1 percent to 45 percent. The average percent difference was 20 percent. Concentration variations are likely due to the different analytical techniques used in the field and the laboratory.

Table 1. Bromide ISE Calibration Data, Electrode Potential in Millivolts for Calibration Standards

T(°C)	Date	Time	5000X (1.6 mg/l)	2000X (4.0 mg/l)	1000X (8.0 mg/l)	200X (40.0 mg/l)	100X (80.0 mg/l)	50X (160 mg/l)	20X (400 mg/l)	10X (800 mg/l)
2.1 ± 0.1	01/27/92	21:07	90	73	58	21	1	-14	-34	-51
3.8 ± 0.2	01/27/92	21:25	92	76	59	21	4	-13	-33	-49
4.6 ± 0.2	01/27/92	21:43	92	76	61	23	4	-11	-33	-50
7.7 ± 1.4	01/27/92	13:13	107	83	61	24	7	-8	-29	-48
9.0	12/14/91	04:10	104	84	68	29	10	-7	-29	-51

Least-Squares Linear Regression Coefficients
for Log-Transformed Data

T(°C)	m	b	r^2
2.1 ± 0.1	-0.01880	1.9535	0.9987
3.8 ± 0.2	-0.01873	1.9825	0.9991
4.6 ± 0.2*	-0.01863	1.9923	0.9984
7.7 ± 1.4	-0.01768	2.0503	0.9985
9.0**	-0.01768	2.0864	0.9972

Notes:

Bromide concentration in mg/l may be determined as follows:

$$[Br^-] = 10^{(mX + b)}$$

where: m is slope
X is measured concentration in millivolts
b is the y intercept

*used for multiple-well tracer test
**used for single-well tracer evaluation test

Table 2 Comparison of Laboratory and Field Bromide Concentrations

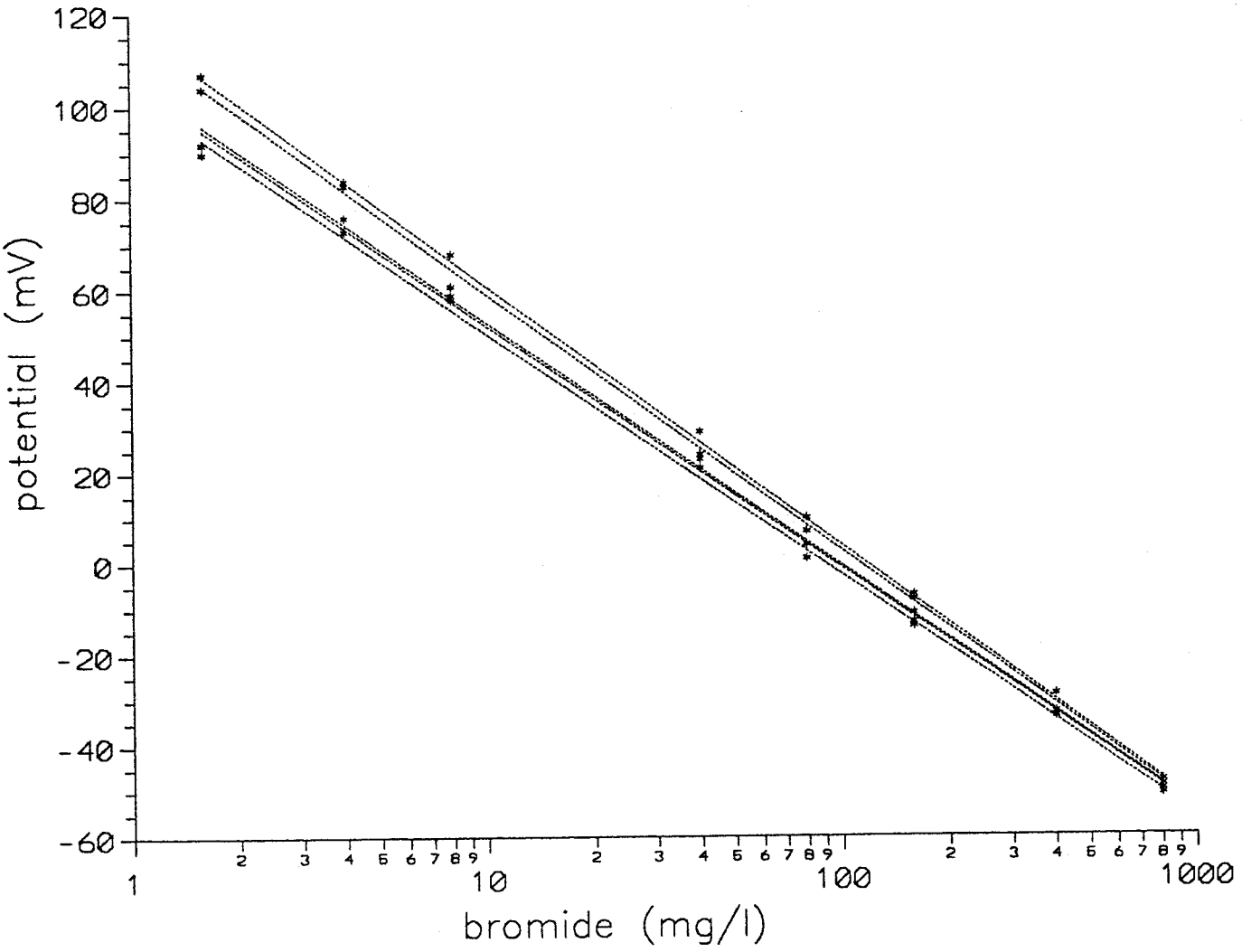
Well	Elapsed Time Lab/Field (min)	Concentration (mg/l) Laboratory	Field
I3	32/33	320	388
	54/57	490	405
	298/294	290	547
O3	32/33	190	158
	54/55	330	253
	286/297	360	481
E1	31/32	14	18
	53/54	57	56
	87/88	92	98
	285/290	160	213
E2	33/34	16	23
	56/57	78	86
	*108/109	140	179
	108/109	140	179
	288/291	180	287
E3	+*-11/--	1.3	--
	-11/--	1.5	--
	34/35	180	133
	56/58	290	287
	290/292	390	441
E4	34/35	230	232
	57/59	340	313
	298/293	300	388
E5	35/36	140	253
	58/59	340	287
	299/294	170	287
Tracer Solution	58/68	480	423
20X Standard	-	420	400
200X Standard	-	40	40
2000X Standard	-	4.1	4.0

Bromide ISE used to determine field concentration

Colorimetric method (Method 4500-Br-B. Phenol Red Colorimetric Method) used to determine laboratory concentration

* Labotory duplicate

+ Sample collected prior to injection of tracer



Curve	Date	Time	T(°C)
Uppermost	12/14/91	04:10	9.0°
	01/27/92	13:13	7.7±1.4°
Middle	01/27/92	21:43	4.6±0.2°
	01/27/92	21:25	3.8±0.2°
Lowermost	01/27/92	21:07	2.1±0.1°

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant Golden, Colorado

881 HILLSIDE AREA
OPERABLE UNIT NO. 1
PHASE III RFI/RI REPORT

Effect of Temperature on
Bromide Calibration Curves
Attachment B2-8, Figure 1

JUNE 1992

ATTACHMENT B2-9
SINGLE-WELL TRACER EVALUATION TESTS - TEST PARAMETERS AND RESULTS

Table 1 Single-Well Tracer Evaluation Tests - Summary of Test Parameters

	Distilled Water Test	Bromide Test
Water column height, static	3.84 ft *	3.67 ft **
Injection volume	30 gal	30 gal
Injection time, total	412 min.	417 min.
Down time	0 min.	10 min.
Injection time, net	412 min.	407 min.
Injection rate (volume/net time)	0.073 gpm	0.074 gpm
Water column height, final	3.97 ft	3.80 ft
Δ water level (final relative to static)	+ 3.4%	+ 3.5%
Switchover time	10 min.	7 min.
Extraction volume	38 gal	41 gal
Extraction time, total	608 min.	740 min.
Down time	25 min.	45 min.
Extraction time, net	583 min.	695 min.
Extraction rate (volume/net time)	0.065 gpm	0.059 gpm
Water column height, final	3.47 ft	3.29 ft
Δ water level (final relative to static)	- 9.6%	- 10.4%

Notes:

* at 10:12 on 12/11/91.
** at 08:55 on 12/13/91.

Table 2 Single-Well Tracer Evaluation Tests - Distilled-Water Tracer Results

Time (min)	Flow SC (µmhos/cm)	Temperature (°C)	Corr. SC (µmhos/cm)	C/C_f	Discharge SC** (µmhos/cm)	C/C_f**
0	10.9	7.8*	17	0.018		
4	19.8	7.8	31	0.032	28	0.030
6	30.8	7.7	48	0.050	53	0.056
8	46.9	7.7	74	0.077	60	0.063
11	108	7.5	171	0.178	146	0.154
13	129	7.3	205	0.214		
15	161	7.2	257	0.268	246	0.259
18	189	7.2	302	0.314	290	0.305
19	202	7.1	324	0.337	306	0.322
21	219	7.1	351	0.366	335	0.353
23	240	7.0	386	0.402	364	0.383
25	261	7.0	420	0.437	403	0.424
27	274	6.9	442	0.460	426	0.448
28	279	6.9*	450	0.469		
30	293	6.9	473	0.492		
33	311	6.8	503	0.524	492	0.518
36	328	6.8*	531	0.553		
38	337	6.8	545	0.568	534	0.562
43	361	6.7	586	0.611	576	0.606
48	373	6.8	604	0.629	599	0.631
53	392	6.6	639	0.665	630	0.663
58	402	6.5	657	0.685	647	0.681
68	417	6.4	684	0.713	680	0.716
78	433	6.4	711	0.740	707	0.744
89	448	6.3	738	0.768	739	0.778
98	455	6.3	749	0.780	745	0.784
108	465	6.2	768	0.800	769	0.809

Time (min)	Flow SC (µmhos/cm)	Temperature (°C)	Corr. SC (µmhos/cm)	C/C_f	Discharge SC** (µmhos/cm)	C/C_f**
118	471	6.2	778	0.811	782	0.823
128	478	6.1	793	0.826	796	0.838
138	485	6.1	804	0.838	805	0.847
158	495	5.9	827	0.861	826	0.869
168	509	5.9	850	0.885	835	0.879
178	512	5.8	858	0.894	841	0.885
188	517	5.8	866	0.902		
193	520	5.8	871	0.908	857	0.902
203	520	5.7	874	0.911	860	0.905
213	522	5.8	875	0.911	869	0.915
223	525	5.6	886	0.923	871	0.917
233	527	5.6	889	0.926	875	0.921
243	530	5.6	894	0.932	880	0.926
253	533	5.6	899	0.937	885	0.932
263	534	5.6	901	0.939	888	0.935
273	535	5.5	906	0.944	892	0.939
283	538	5.5	911	0.949	896	0.943
293	539	5.5	913	0.951	899	0.946
303	540	5.5	914	0.953	902	0.949
313	542	5.4	921	0.960	906	0.954
323	542	5.4	921	0.960	908	0.956
333	542	5.4	921	0.960	912	0.960
343	544	5.4	925	0.963	919	0.967
363	543	5.4	923	0.961	920	0.968
378	544	5.5	921	0.960	922	0.971
393	542	5.5	918	0.956	928	0.977
408	549	5.5	930	0.968	929	0.978

Time (min)	Flow SC (µmhos/cm)	Temperature (°C)	Corr. SC (µmhos/cm)	C/C_f	Discharge SC** (µmhos/cm)	C/C_f**
423	547	5.4	930	0.968	930	0.979
438	546	5.9	912	0.950	934	0.983
453	549	5.6	926	0.965	936	0.985
468	552	5.6	931	0.970	939	0.988
488	559	5.5	947	0.986	942	0.992
503	562	5.5	952	0.991	942	0.992
518	561	5.5	950	0.990	943	0.993
533	562	5.5	952	0.991	949	0.999
548	565	5.5	957	0.997	947	0.997
563	566	5.6	955	0.995	949	0.999
578	568	5.6	958	0.998	947	0.997
583	568	5.6	958	0.998	950	1.000

Notes:

Time - elapsed time in minutes (excluding down time).

Flow SC - specific conductivity measured with flow-through cell in µmhos/cm.

Temperature - temperature in °C measured at the discharge line (asterisk indicates an estimated value).

Corr. SC - specific conductivity measured with flow-through cell corrected to 25°C using a temperature coefficient of 2.1%/°C (see text).

C/C_f - corrected SC (above) normalized to the corrected specific conductivity measured from the formation water with the flow-through cell (960 µmhos/cm).

Discharge SC - specific conductivity measured with a temperature-compensating probe-type electrode at the discharge line.

C/C_f - discharge SC (above) normalized to the specific conductivity measured from the formation water with the probe-type electrode (950 µmhos/cm).

** Included for verification purposes only.

Table 3 Single-Well Tracer Evaluation Tests - Bromide Tracer Results

Time (min)	Bromide (mV)	Bromide (mg/l)	C/C_o
1	-36	486	0.972
2	-36	486	0.972
4	-36	486	0.972
6	-36	486	0.972
8	-35	467	0.934
10	-34	448	0.896
12	-33	430	0.861
14	-34	448	0.896
17	-31	397	0.793
20	-30	381	0.762
22	-29.5	373	0.746
24	-29	366	0.731
26	-29	366	0.731
28	-28	351	0.702
33	-30	381	0.762
38	-24	298	0.597
43	-24	298	0.597
48	-22	275	0.550
53	-21	264	0.528
58	-20.5	259	0.517
63	-20	253	0.507
73	-17	224	0.449
78	-16.5	220	0.440
83	-16	215	0.431
88	-15	207	0.414
92	-14	199	0.397
97	-13	191	0.381
107	-12	183	0.366

Time (min)	Bromide (mV)	Bromide (mg/l)	C/C_o
117	-10	169	0.337
127	-8.5	159	0.317
137	-6	143	0.287
147	-5	138	0.275
157	-5	138	0.275
167	-3	127	0.254
177	-1	117	0.234
187	0	112	0.225
197	1	108	0.216
207	1	108	0.216
217	0	112	0.225
227	3	99	0.199
237	3	99	0.199
247	6	88	0.176
257	7	84	0.169
267	7	84	0.169
277	8	81	0.162
287	9	78	0.156
291	10	75	0.149
306	12	69	0.138
321	13	66	0.132
332	15	61	0.122
342	18	54	0.108
362	20	50	0.099
382	20	50	0.099
402	22	46	0.092
422	23	44	0.088
442	24	42	0.085

Time (min)	Bromide (mV)	Bromide (mg/l)	C/C_o
462	25	41	0.081
482	25	41	0.081
502	26	39	0.078
522	28	36	0.072
542	31	32	0.064
562	32	31	0.061
582	33	29	0.059
598	33	29	0.059
618	32	31	0.061
633	34	28	0.056
653	35	27	0.054
673	36	26	0.052
693	37	25	0.050

Notes:

Time - elapsed time in minutes (excluding down time).

Bromide (mV) - concentration of bromide measured with bromide ion selective electrode in millivolts.

Bromide (mg/l) - concentration in mV converted to mg/l using calibration curve made at 7.7°C (01/27/92; 13:13).

C/C_o - bromide (mg/l) normalized to the concentration in the tracer fluid (500 mg/l).

ATTACHMENT B2-10
MULTIPLE-WELL TRACER TEST -
TEST PARAMETERS AND RESULTS

Table 1 Corrected Flow Accumulator Readings (gallons)

Well	I1	I2	I3	I4	I5	E1	E2	E3	E4	E5
Serial No.	10646	11304	12403	12405	12406	7311	11303	11306	12404	12407
Corr. Factor	1.000931	1.005774	0.998367	1.003508	0.995816	1.00254	1.000931	1.008703	1.004802	0.97924
Time	I1	I2	I3	I4	I5	E1	E2	E3	E4	E5
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	1.70	0.30	0.60	0.08	6.74	6.37	1.26	0.92	3.82	1.69
16	4.35	0.68	1.49	0.08	18.38	14.07	2.94	2.15	10.63	4.70
26	6.84	1.00	2.32	0.08	29.00	21.98	4.57	3.34	16.94	7.45
48	12.21	1.77	4.15	0.08	50.28	38.56	7.79	5.74	29.92	13.67
66	16.40	2.33	5.64	0.08	67.03	51.81	10.24	7.59	40.39	17.87
81	20.01	2.89	6.95	0.08	80.55	62.98	12.37	9.24	48.98	21.65
111	27.20	3.98	9.40	0.08	106.73	85.19	16.58	12.34	65.68	29.20
125	30.56	4.49	10.56	0.45	118.92	95.78	18.63	13.91	74.07	32.92
150	36.43	5.40	12.36	0.88	139.59	113.20	21.85	16.33	87.11	38.81
175	42.71	6.27	14.28	1.09	158.59	132.33	25.26	18.90	100.66	44.76
207	50.06	7.37	16.62	1.15	181.70	154.27	29.17	21.91	116.79	51.92
240	56.64	8.36	19.09	1.16	201.80	176.26	33.00	24.89	132.69	59.07

Table 1 Corrected Flow Accumulator Readings (gallons)

Time	I1	I2	I3	I4	I5	E1	E2	E3	E4	E5
266	62.01	9.20	21.18	1.19	217.59	193.63	35.86	27.14	145.09	64.20
310	70.57	10.61	24.25	2.11	241.99	221.72	40.56	30.93	164.64	73.25
332	75.00	11.29	25.82	2.53	255.15	236.30	42.86	32.84	174.75	77.91
354	79.37	12.02	27.40	2.83	268.35	250.02	45.11	34.67	184.29	82.26
399	87.64	13.43	30.43	2.99	293.86	277.87	50.04	38.76	203.58	91.01
438	94.72	14.63	33.12	2.99	315.85	302.48	53.44	41.59	220.58	
470	100.35	15.65	35.38	2.99	333.42	321.56	56.43	44.13	233.86	104.75
503	106.10		37.65	3.42	349.82	341.68	59.50	46.71	247.43	111.02
540	113.45	17.76	40.02	3.62	368.37	365.94	63.03	49.77	263.20	118.11
TOTALS					543					860

Table 2 Corrected Flow Accumulator Readings Converted to Pumping Rates (gpm)

Time	Well I1	I2	I3	I4	I5	E1	E2	E3	E4	E5
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	0.284	0.050	0.100	0.013	1.124	1.061	0.210	0.153	0.636	0.282
16	0.265	0.038	0.089	0.000	1.164	0.770	0.168	0.123	0.681	0.301
26	0.248	0.031	0.083	0.000	1.062	0.791	0.163	0.119	0.631	0.275
48	0.244	0.035	0.083	0.000	0.967	0.754	0.146	0.109	0.590	0.283
66	0.232	0.031	0.083	0.000	0.931	0.736	0.136	0.103	0.582	0.233
81	0.241	0.037	0.087	0.000	0.902	0.745	0.142	0.110	0.573	0.252
111	0.240	0.037	0.082	0.000	0.873	0.740	0.140	0.103	0.557	0.252
125	0.240	0.036	0.083	0.027	0.871	0.757	0.147	0.112	0.599	0.266
150	0.235	0.037	0.072	0.017	0.827	0.697	0.129	0.097	0.521	0.235
175	0.251	0.035	0.077	0.008	0.760	0.765	0.137	0.103	0.542	0.238
207	0.230	0.035	0.073	0.002	0.722	0.686	0.122	0.094	0.504	0.224
240	0.200	0.030	0.075	0.000	0.609	0.666	0.116	0.090	0.482	0.217
266	0.206	0.032	0.080	0.001	0.607	0.668	0.110	0.087	0.477	0.197
310	0.194	0.032	0.070	0.021	0.555	0.638	0.107	0.086	0.444	0.206

Table 2 Corrected Flow Accumulator Readings Converted to Pumping Rates (gpm)

Time	Well I1	I2	I3	I4	I5	E1	E2	E3	E4	E5
332	0.202	0.031	0.071	0.019	0.598	0.663	0.105	0.087	0.459	0.212
354	0.199	0.033	0.072	0.014	0.600	0.624	0.102	0.083	0.434	0.198
399	0.184	0.031	0.067	0.004	0.567	0.619	0.109	0.091	0.429	0.195
438	0.181	0.031	0.069	0.000	0.564	0.631	0.087	0.072	0.436	
470	0.176	0.032	0.071	0.000	0.549	0.597	0.094	0.079	0.415	0.194
503	0.174		0.069	0.013	0.497	0.609	0.093	0.078	0.411	0.190
540	0.199	0.030	0.064	0.005	0.501	0.656	0.095	0.083	0.426	0.192

Table 3 Relative Water Column Heights (ft)

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
initial	3.871	3.972	4.091	4.115	4.182	3.793	3.656	3.928	3.911	3.950	3.808	3.566	3.743	3.969	3.860
0	0.270	0.280	0.238	0.241	0.184	-0.035	-0.041	-0.025	0.060	0.022	-0.121	-0.156	-0.123	-0.174	-0.117
2	0.294	0.273	0.241	0.282	0.169	-0.038	-0.044	-0.028	0.056	0.019	-0.146	-0.118	-0.196	-0.174	-0.131
4	0.294	0.254	0.248	0.231	0.207	-0.054	-0.044	-0.028	0.060	0.019	-0.134	-0.159	-0.161	-0.171	-0.113
6	0.296	0.242	0.228	0.234	0.191	-0.041	-0.044	-0.032	0.056	0.016	-0.162	-0.114	-0.187	-0.148	-0.133
8	0.270	0.226	0.248	0.237	0.174	-0.038	-0.041	-0.025	0.053	0.013	-0.159	-0.159	-0.142	-0.155	-0.162
10	0.291	0.292	0.248	0.234	0.152	-0.038	-0.041	-0.025	0.056	0.016	-0.143	-0.140	-0.193	-0.133	-0.167
12	0.246	0.289	0.292	0.237	0.204	-0.038	-0.044	-0.050	0.056	0.013	-0.156	-0.114	-0.136	-0.133	-0.130
14	0.262	0.276	0.292	0.244	0.166	-0.054	-0.047	-0.028	0.056	0.009	-0.150	-0.105	-0.200	-0.145	-0.134
16	0.280	0.264	0.248	0.237	0.165	-0.041	-0.047	-0.032	0.050	0.009	-0.131	-0.127	-0.168	-0.183	-0.136
18	0.259	0.257	0.289	0.275	0.160	-0.041	-0.047	-0.035	0.050	0.009	-0.175	-0.181	-0.136	-0.161	-0.155
20	0.300	0.248	0.238	0.231	0.177	-0.041	-0.047	-0.035	0.047	0.006	-0.159	-0.165	-0.123	-0.161	-0.118
22	0.256	0.232	0.254	0.269	0.171	-0.041	-0.047	-0.035	0.047	0.009	-0.140	-0.165	-0.177	-0.171	-0.154
24	0.257	0.280	0.248	0.234	0.187	-0.041	-0.047	-0.025	0.047	0.006	-0.121	-0.146	-0.158	-0.161	-0.125
26	0.260	0.283	0.209	0.231	0.160	-0.041	-0.047	-0.038	0.047	0.006	-0.121	-0.146	-0.127	-0.123	-0.162
28	0.267	0.267	0.295	0.234	0.198	-0.045	-0.050	-0.025	0.047	0.003	-0.165	-0.114	-0.196	-0.152	-0.151
30	0.283	0.254	0.301	0.234	0.193	-0.054	-0.047	-0.041	0.044	0.006	-0.165	-0.121	-0.168	-0.171	-0.134
32	0.304	0.242	0.248	0.231	0.198	-0.045	-0.050	-0.044	0.044	0.006	-0.162	-0.143	-0.155	-0.155	-0.122
34	0.267	0.232	0.289	0.234	0.155	-0.045	-0.047	-0.038	0.044	0.003	-0.172	-0.108	-0.155	-0.126	-0.118
36	0.245	0.283	0.298	0.234	0.146	-0.045	-0.050	-0.041	0.047	0.003	-0.159	-0.127	-0.155	-0.167	-0.151
38	0.265	0.273	0.254	0.231	0.165	-0.045	-0.050	-0.044	0.047	0.003	-0.156	-0.137	-0.158	-0.139	-0.120
40	0.272	0.254	0.295	0.250	0.136	-0.045	-0.050	-0.032	0.044	0.003	-0.150	-0.127	-0.158	-0.161	-0.131
42	0.302	0.248	0.273	0.272	0.215	-0.048	-0.047	-0.041	0.047	0.003	-0.137	-0.111	-0.187	-0.145	-0.172
44	0.281	0.232	0.225	0.234	0.169	-0.045	-0.050	-0.038	0.047	0.003	-0.140	-0.130	-0.187	-0.152	-0.160
46	0.294	0.286	0.305	0.275	0.155	-0.045	-0.050	-0.025	0.050	0.000	-0.159	-0.114	-0.120	-0.126	-0.136
48	0.296	0.270	0.244	0.272	0.214	-0.045	-0.050	-0.041	0.050	0.000	-0.159	-0.156	-0.133	-0.126	-0.160
50	0.246	0.254	0.254	0.263	0.150	-0.045	-0.050	-0.044	0.050	0.000	-0.156	-0.130	-0.158	-0.155	-0.138
52	0.278	0.242	0.248	0.266	0.176	-0.041	-0.050	-0.041	0.050	0.000	-0.127	-0.114	-0.184	-0.142	-0.115
54	0.296	0.302	0.282	0.231	0.161	-0.045	-0.050	-0.044	0.047	-0.006	-0.134	-0.162	-0.177	-0.180	-0.146

Table 3 Relative Water Column Heights (ft)

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
56	0.246	0.273	0.260	0.256	0.214	-0.048	-0.053	-0.047	0.041	-0.010	-0.169	-0.153	-0.133	-0.155	-0.162
58	0.267	0.242	0.257	0.222	0.207	-0.048	-0.050	-0.032	0.031	-0.016	-0.156	-0.137	-0.161	-0.139	-0.147
60	0.296	0.245	0.235	0.237	0.142	-0.045	-0.050	-0.035	0.018	-0.016	-0.159	-0.124	-0.196	-0.158	-0.139
62	0.254	0.229	0.263	0.253	0.139	-0.051	-0.053	-0.038	0.012	-0.016	-0.153	-0.127	-0.130	-0.174	-0.139
64	0.272	0.283	0.238	0.285	0.163	-0.048	-0.053	-0.025	0.006	-0.019	-0.150	-0.130	-0.168	-0.167	-0.139
66	0.283	0.267	0.244	0.256	0.144	-0.057	-0.053	-0.041	0.000	-0.019	-0.121	-0.124	-0.180	-0.148	-0.146
68	0.276	0.248	0.279	0.279	0.191	-0.048	-0.053	-0.041	-0.007	-0.016	-0.153	-0.137	-0.158	-0.161	-0.126
70	0.270	0.232	0.248	0.225	0.182	-0.048	-0.053	-0.041	-0.010	-0.019	-0.131	-0.134	-0.190	-0.167	-0.123
72	0.264	0.283	0.222	0.279	0.142	-0.061	-0.053	-0.035	-0.016	-0.019	-0.156	-0.146	-0.149	-0.139	-0.149
74	0.259	0.267	0.260	0.231	0.160	-0.048	-0.050	-0.044	-0.019	-0.019	-0.146	-0.159	-0.117	-0.180	-0.173
76	0.254	0.245	0.228	0.250	0.157	-0.048	-0.050	-0.035	-0.023	-0.022	-0.146	-0.114	-0.155	-0.167	-0.151
78	0.251	0.229	0.222	0.275	0.150	-0.051	-0.053	-0.032	-0.026	-0.022	-0.134	-0.130	-0.123	-0.145	-0.167
80	0.256	0.280	0.317	0.285	0.138	-0.048	-0.053	-0.035	-0.029	-0.022	-0.156	-0.156	-0.165	-0.180	-0.168
82	0.264	0.248	0.267	0.241	0.222	-0.048	-0.053	-0.035	-0.029	-0.022	-0.162	-0.114	-0.127	-0.171	-0.144
84	0.296	0.245	0.241	0.241	0.176	-0.045	-0.050	-0.035	-0.032	-0.022	-0.156	-0.140	-0.180	-0.171	-0.126
86	0.264	0.270	0.228	0.247	0.165	-0.048	-0.053	-0.035	-0.035	-0.022	-0.146	-0.108	-0.142	-0.171	-0.152
88	0.264	0.267	0.235	0.256	0.165	-0.054	-0.053	-0.044	-0.038	-0.026	-0.150	-0.124	-0.120	-0.164	-0.172
90	0.276	0.245	0.286	0.260	0.184	-0.061	-0.053	-0.041	-0.042	-0.026	-0.153	-0.162	-0.184	-0.161	-0.172
92	0.302	0.229	0.257	0.285	0.149	-0.048	-0.053	-0.032	-0.042	-0.026	-0.131	-0.130	-0.168	-0.171	-0.136
94	0.248	0.276	0.222	0.269	0.166	-0.048	-0.053	-0.041	-0.048	-0.029	-0.140	-0.108	-0.149	-0.174	-0.131
96	0.278	0.261	0.279	0.256	0.163	-0.048	-0.056	-0.035	-0.048	-0.029	-0.153	-0.146	-0.127	-0.174	-0.143
98	0.296	0.242	0.257	0.272	0.250	-0.048	-0.053	-0.041	-0.048	-0.029	-0.127	-0.124	-0.158	-0.126	-0.172
100	0.260	0.226	0.241	0.244	0.144	-0.051	-0.056	-0.050	-0.051	-0.029	-0.153	-0.111	-0.193	-0.177	-0.146
102	0.291	0.283	0.292	0.231	0.163	-0.051	-0.056	-0.047	-0.051	-0.029	-0.159	-0.162	-0.180	-0.158	-0.139
104	0.264	0.264	0.251	0.285	0.182	-0.048	-0.053	-0.047	-0.048	-0.029	-0.146	-0.146	-0.177	-0.139	-0.162
106	0.260	0.248	0.241	0.282	0.215	-0.048	-0.056	-0.041	-0.045	-0.029	-0.124	-0.140	-0.177	-0.136	-0.128
108	0.276	0.229	0.235	0.263	0.144	-0.051	-0.053	-0.044	-0.042	-0.029	-0.137	-0.137	-0.174	-0.129	-0.159
110	0.248	0.292	0.228	0.260	0.204	-0.045	-0.050	-0.044	-0.038	-0.029	-0.140	-0.134	-0.171	-0.126	-0.125
112	0.246	0.273	0.289	0.260	0.182	-0.048	-0.053	-0.038	-0.032	-0.026	-0.153	-0.121	-0.165	-0.145	-0.144
114	0.305	0.257	0.232	0.241	0.130	-0.048	-0.053	-0.044	-0.029	-0.026	-0.165	-0.124	-0.171	-0.161	-0.196

Table 3 Relative Water Column Heights (ft)

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
116	0.280	0.232	0.276	0.250	0.136	-0.051	-0.056	-0.041	-0.029	-0.029	-0.134	-0.121	-0.168	-0.174	-0.139
118	0.245	0.289	0.241	0.250	0.179	-0.048	-0.053	-0.041	-0.029	-0.026	-0.153	-0.121	-0.174	-0.174	-0.176
120	0.249	0.273	0.267	0.247	0.180	-0.051	-0.056	-0.041	-0.029	-0.029	-0.127	-0.121	-0.165	-0.171	-0.147
122	0.251	0.261	0.295	0.244	0.147	-0.051	-0.053	-0.044	-0.023	-0.029	-0.124	-0.114	-0.165	-0.164	-0.141
124	0.251	0.242	0.292	0.237	0.188	-0.051	-0.056	-0.044	-0.023	-0.029	-0.137	-0.124	-0.174	-0.167	-0.151
126	0.260	0.296	0.254	0.228	0.131	-0.057	-0.056	-0.041	-0.019	-0.029	-0.153	-0.124	-0.184	-0.174	-0.164
128	0.280	0.289	0.279	0.310	0.163	-0.048	-0.053	-0.035	-0.016	-0.026	-0.159	-0.124	-0.180	-0.142	-0.144
130	0.281	0.264	0.267	0.275	0.149	-0.048	-0.053	-0.041	-0.013	-0.026	-0.159	-0.130	-0.184	-0.117	-0.123
132	0.304	0.248	0.260	0.250	0.180	-0.045	-0.056	-0.041	-0.010	-0.026	-0.140	-0.121	-0.161	-0.161	-0.159
134	0.291	0.296	0.251	0.301	0.209	-0.048	-0.056	-0.041	-0.007	-0.029	-0.153	-0.121	-0.152	-0.161	-0.139
136	0.276	0.273	0.225	0.260	0.171	-0.048	-0.056	-0.041	0.000	-0.022	-0.153	-0.121	-0.133	-0.180	-0.155
138	0.259	0.248	0.279	0.234	0.201	-0.048	-0.053	-0.044	0.009	-0.019	-0.156	-0.127	-0.120	-0.174	-0.152
140	0.248	0.232	0.241	0.269	0.249	-0.048	-0.056	-0.044	0.018	-0.013	-0.153	-0.127	-0.117	-0.148	-0.139
142	0.288	0.280	0.286	0.237	0.191	-0.048	-0.056	-0.044	0.025	-0.016	-0.156	-0.130	-0.187	-0.174	-0.146
144	0.289	0.264	0.273	0.253	0.142	-0.048	-0.056	-0.066	0.031	-0.016	-0.112	-0.140	-0.193	-0.142	-0.155
146	0.284	0.245	0.244	0.272	0.141	-0.048	-0.056	-0.041	0.041	-0.013	-0.156	-0.149	-0.190	-0.117	-0.157
148	0.272	0.226	0.270	0.279	0.179	-0.051	-0.056	-0.041	0.044	-0.016	-0.137	-0.165	-0.196	-0.145	-0.167
150	0.253	0.280	0.286	0.279	0.166	-0.051	-0.056	-0.044	0.050	-0.016	-0.121	-0.114	-0.180	-0.177	-0.125
152	0.294	0.267	0.228	0.272	0.174	-0.045	-0.053	-0.041	0.050	-0.016	-0.153	-0.134	-0.114	-0.158	-0.155
154	0.299	0.248	0.222	0.250	0.187	-0.048	-0.056	-0.041	0.060	-0.013	-0.165	-0.102	-0.123	-0.152	-0.139
156	0.245	0.235	0.295	0.234	0.231	-0.051	-0.056	-0.044	0.060	-0.016	-0.143	-0.118	-0.123	-0.183	-0.147
158	0.278	0.289	0.263	0.253	0.201	-0.048	-0.056	-0.044	0.066	-0.016	-0.140	-0.153	-0.139	-0.174	-0.125
160	0.246	0.280	0.232	0.237	0.147	-0.048	-0.056	-0.044	0.066	-0.019	-0.112	-0.114	-0.155	-0.171	-0.167
162	0.291	0.264	0.267	0.247	0.174	-0.051	-0.059	-0.044	0.069	-0.016	-0.146	-0.140	-0.168	-0.148	-0.155
164	0.264	0.245	0.276	0.285	0.149	-0.051	-0.056	-0.044	0.072	-0.016	-0.150	-0.111	-0.190	-0.142	-0.141
166	0.241	0.232	0.241	0.228	0.153	-0.051	-0.056	-0.044	0.079	-0.019	-0.146	-0.134	-0.120	-0.152	-0.123
168	0.286	0.283	0.260	0.241	0.177	-0.051	-0.059	-0.047	0.079	-0.013	-0.150	-0.114	-0.130	-0.164	-0.151
170	0.254	0.270	0.279	0.241	0.176	-0.032	-0.059	-0.044	0.082	-0.016	-0.124	-0.143	-0.133	-0.177	-0.151
172	0.246	0.267	0.228	0.247	0.160	-0.048	-0.053	-0.028	0.082	-0.019	-0.131	-0.121	-0.152	-0.152	-0.133
174	0.276	0.245	0.267	0.241	0.220	-0.051	-0.059	-0.044	0.082	-0.016	-0.162	-0.114	-0.187	-0.145	-0.117

Table 3 Relative Water Column Heights (ft)

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
176	0.265	0.232	0.238	0.241	0.185	-0.054	-0.059	-0.047	0.082	-0.019	-0.121	-0.162	-0.117	-0.174	-0.138
178	0.243	0.286	0.248	0.266	0.196	-0.051	-0.059	-0.047	0.082	-0.019	-0.153	-0.137	-0.133	-0.161	-0.136
180	0.292	0.267	0.248	0.237	0.242	-0.054	-0.059	-0.047	0.082	-0.016	-0.140	-0.124	-0.161	-0.129	-0.149
182	0.289	0.248	0.238	0.241	0.242	-0.051	-0.059	-0.047	0.082	-0.016	-0.159	-0.118	-0.190	-0.177	-0.128
184	0.270	0.229	0.232	0.244	0.172	-0.051	-0.059	-0.047	0.082	-0.016	-0.153	-0.111	-0.130	-0.155	-0.141
186	0.256	0.280	0.282	0.241	0.163	-0.051	-0.059	-0.047	0.082	-0.016	-0.134	-0.153	-0.161	-0.142	-0.155
188	0.275	0.261	0.263	0.234	0.155	-0.045	-0.059	-0.047	0.085	-0.019	-0.118	-0.156	-0.114	-0.152	-0.133
190	0.288	0.251	0.251	0.244	0.149	-0.051	-0.056	-0.047	0.088	-0.013	-0.159	-0.156	-0.149	-0.174	-0.118
192	0.300	0.232	0.279	0.231	0.199	-0.051	-0.056	-0.047	0.082	-0.016	-0.153	-0.156	-0.165	-0.120	-0.120
194	0.260	0.283	0.241	0.241	0.218	-0.051	-0.059	-0.047	0.082	-0.019	-0.159	-0.168	-0.193	-0.167	-0.146
196	0.297	0.270	0.270	0.234	0.133	-0.054	-0.059	-0.047	0.079	-0.016	-0.146	-0.181	-0.139	-0.158	-0.155
198	0.260	0.257	0.282	0.282	0.144	-0.051	-0.059	-0.047	0.082	-0.016	-0.162	-0.108	-0.177	-0.139	-0.159
200	0.253	0.248	0.251	0.244	0.176	-0.051	-0.059	-0.050	0.082	-0.016	-0.175	-0.118	-0.130	-0.123	-0.117
202	0.292	0.242	0.270	0.269	0.172	-0.051	-0.059	-0.047	0.082	-0.016	-0.146	-0.130	-0.168	-0.126	-0.143
204	0.302	0.232	0.260	0.279	0.153	-0.054	-0.059	-0.050	0.079	-0.019	-0.153	-0.146	-0.123	-0.164	-0.136
206	0.275	0.289	0.232	0.282	0.147	-0.054	-0.059	-0.050	0.079	-0.019	-0.153	-0.111	-0.174	-0.133	-0.115
208	0.248	0.286	0.289	0.260	0.177	-0.054	-0.056	-0.050	0.075	-0.022	-0.108	-0.134	-0.136	-0.164	-0.146
210	0.278	0.289	0.260	0.234	0.161	-0.054	-0.056	-0.050	0.072	-0.022	-0.124	-0.108	-0.114	-0.133	-0.110
212	0.262	0.286	0.241	0.237	0.166	-0.054	-0.056	-0.054	0.072	-0.022	-0.143	-0.134	-0.155	-0.133	-0.155
214	0.246	0.229	0.241	0.288	0.160	-0.054	-0.056	-0.050	0.069	-0.022	-0.169	-0.114	-0.123	-0.161	-0.136
216	0.284	0.235	0.248	0.348	0.142	-0.054	-0.056	-0.050	0.072	-0.026	-0.146	-0.159	-0.190	-0.123	-0.122
218	0.294	0.242	0.263	0.393	0.166	-0.054	-0.056	-0.054	0.072	-0.026	-0.150	-0.140	-0.158	-0.171	-0.122
220	0.253	0.248	0.276	0.425	0.155	-0.054	-0.056	-0.054	0.066	-0.029	-0.169	-0.127	-0.139	-0.186	-0.152
222	0.299	0.257	0.251	0.425	0.147	-0.054	-0.059	-0.054	0.060	-0.026	-0.143	-0.118	-0.127	-0.161	-0.172
224	0.270	0.270	0.279	0.415	0.204	-0.061	-0.056	-0.054	0.063	-0.026	-0.140	-0.111	-0.114	-0.145	-0.165
226	0.256	0.264	0.241	0.402	0.209	-0.054	-0.056	-0.054	0.063	-0.026	-0.169	-0.108	-0.168	-0.139	-0.120
228	0.296	0.273	0.228	0.393	0.153	-0.057	-0.059	-0.050	0.060	-0.029	-0.175	-0.108	-0.165	-0.174	-0.151
230	0.300	0.267	0.248	0.383	0.171	-0.057	-0.056	-0.054	0.056	-0.029	-0.165	-0.114	-0.190	-0.145	-0.125
232	0.280	0.280	0.270	0.377	0.223	-0.057	-0.056	-0.054	0.056	-0.026	-0.146	-0.137	-0.123	-0.117	-0.151
234	0.275	0.286	0.286	0.367	0.176	-0.057	-0.056	-0.054	0.056	-0.029	-0.156	-0.149	-0.117	-0.180	-0.168

Table 3 Relative Water Column Heights (ft)

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
236	0.278	0.289	0.241	0.358	0.169	-0.057	-0.059	-0.054	0.053	-0.026	-0.156	-0.168	-0.127	-0.129	-0.149
238	0.286	0.235	0.260	0.371	0.149	-0.061	-0.059	-0.057	0.050	-0.032	-0.146	-0.162	-0.161	-0.174	-0.160
240	0.300	0.251	0.273	0.361	0.158	-0.057	-0.059	-0.054	0.050	-0.029	-0.143	-0.108	-0.120	-0.183	-0.133
242	0.268	0.267	0.292	0.355	0.128	-0.054	-0.056	-0.054	0.047	-0.032	-0.115	-0.121	-0.184	-0.190	-0.152
244	0.254	0.273	0.289	0.342	0.184	-0.057	-0.059	-0.057	0.047	-0.029	-0.159	-0.108	-0.117	-0.148	-0.139
246	0.265	0.283	0.286	0.339	0.203	-0.064	-0.059	-0.057	0.041	-0.032	-0.156	-0.124	-0.184	-0.123	-0.147
248	0.272	0.292	0.282	0.333	0.190	-0.064	-0.059	-0.057	0.037	-0.032	-0.153	-0.149	-0.171	-0.148	-0.165
250	0.273	0.238	0.286	0.323	0.155	-0.057	-0.059	-0.057	0.037	-0.032	-0.162	-0.114	-0.152	-0.177	-0.149
252	0.284	0.245	0.276	0.275	0.187	-0.057	-0.059	-0.060	0.034	-0.035	-0.153	-0.146	-0.136	-0.129	-0.123
254	0.294	0.257	0.267	0.263	0.152	-0.057	-0.059	-0.060	0.031	-0.032	-0.134	-0.114	-0.127	-0.167	-0.136
256	0.300	0.267	0.254	0.256	0.185	-0.057	-0.059	-0.060	0.028	-0.032	-0.169	-0.137	-0.127	-0.180	-0.149
258	0.243	0.273	0.241	0.247	0.152	-0.057	-0.059	-0.060	0.028	-0.032	-0.131	-0.108	-0.120	-0.177	-0.160
260	0.256	0.283	0.286	0.237	0.161	-0.064	-0.059	-0.060	0.025	-0.035	-0.131	-0.140	-0.171	-0.183	-0.146
262	0.267	0.292	0.263	0.231	0.165	-0.057	-0.059	-0.060	0.022	-0.035	-0.146	-0.114	-0.177	-0.148	-0.122
264	0.280	0.242	0.222	0.250	0.161	-0.057	-0.059	-0.060	0.025	-0.032	-0.124	-0.165	-0.165	-0.177	-0.167
266	0.291	0.254	0.263	0.231	0.184	-0.061	-0.062	-0.060	0.022	-0.035	-0.131	-0.137	-0.123	-0.161	-0.152
268	0.253	0.280	0.257	0.279	0.158	-0.054	-0.056	-0.057	0.018	-0.035	-0.137	-0.121	-0.133	-0.136	-0.134
270	0.246	0.286	0.295	0.241	0.157	-0.061	-0.059	-0.060	0.022	-0.032	-0.118	-0.114	-0.158	-0.148	-0.144
272	0.273	0.235	0.263	0.269	0.172	-0.061	-0.059	-0.057	0.018	-0.035	-0.153	-0.149	-0.168	-0.180	-0.175
274	0.296	0.251	0.232	0.237	0.182	-0.061	-0.059	-0.060	0.018	-0.035	-0.153	-0.130	-0.177	-0.148	-0.164
276	0.246	0.264	0.273	0.269	0.160	-0.061	-0.062	-0.060	0.022	-0.035	-0.153	-0.124	-0.177	-0.136	-0.147
278	0.268	0.286	0.241	0.237	0.182	-0.057	-0.062	-0.060	0.018	-0.038	-0.143	-0.121	-0.130	-0.152	-0.144
280	0.292	0.232	0.254	0.266	0.174	-0.061	-0.062	-0.060	0.015	-0.035	-0.159	-0.149	-0.187	-0.155	-0.167
282	0.267	0.248	0.270	0.241	0.157	-0.061	-0.062	-0.060	0.018	-0.035	-0.121	-0.111	-0.136	-0.161	-0.128
284	0.297	0.267	0.286	0.266	0.179	-0.061	-0.062	-0.063	0.018	-0.035	-0.115	-0.134	-0.117	-0.158	-0.155
286	0.256	0.286	0.289	0.234	0.166	-0.061	-0.062	-0.060	0.018	-0.038	-0.127	-0.137	-0.158	-0.183	-0.126
288	0.276	0.232	0.286	0.256	0.171	-0.061	-0.062	-0.060	0.015	-0.035	-0.137	-0.127	-0.139	-0.183	-0.159
290	0.251	0.248	0.260	0.234	0.149	-0.064	-0.062	-0.060	0.015	-0.038	-0.165	-0.146	-0.190	-0.193	-0.122
292	0.270	0.267	0.298	0.266	0.171	-0.067	-0.062	-0.060	0.015	-0.038	-0.162	-0.162	-0.130	-0.180	-0.143
294	0.299	0.289	0.251	0.241	0.169	-0.061	-0.062	-0.060	0.015	-0.035	-0.162	-0.108	-0.158	-0.164	-0.165

Table 3 Relative Water Column Heights (ft)

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
296	0.248	0.235	0.270	0.279	0.172	-0.067	-0.062	-0.066	0.015	-0.035	-0.127	-0.114	-0.120	-0.126	-0.122
298	0.265	0.251	0.235	0.253	0.155	-0.061	-0.062	-0.060	0.018	-0.035	-0.143	-0.124	-0.155	-0.129	-0.141
300	0.294	0.267	0.235	0.301	0.161	-0.061	-0.062	-0.060	0.015	-0.035	-0.146	-0.127	-0.184	-0.161	-0.170
302	0.249	0.286	0.298	0.260	0.218	-0.064	-0.062	-0.060	0.015	-0.035	-0.150	-0.134	-0.127	-0.196	-0.123
304	0.280	0.235	0.282	0.241	0.182	-0.061	-0.062	-0.060	0.015	-0.035	-0.127	-0.140	-0.158	-0.145	-0.143
306	0.280	0.257	0.254	0.272	0.179	-0.061	-0.062	-0.060	0.018	-0.035	-0.169	-0.153	-0.184	-0.136	-0.164
308	0.264	0.273	0.298	0.241	0.165	-0.061	-0.062	-0.060	0.018	-0.038	-0.124	-0.162	-0.155	-0.164	-0.130
310	0.294	0.292	0.263	0.269	0.198	-0.064	-0.062	-0.063	0.018	-0.038	-0.165	-0.114	-0.117	-0.180	-0.162
312	0.264	0.257	0.238	0.237	0.174	-0.057	-0.059	-0.057	0.015	-0.038	-0.153	-0.124	-0.158	-0.158	-0.131
314	0.268	0.267	0.248	0.253	0.179	-0.061	-0.062	-0.063	0.018	-0.035	-0.127	-0.146	-0.130	-0.180	-0.120
316	0.272	0.286	0.270	0.288	0.188	-0.064	-0.062	-0.063	0.012	-0.038	-0.159	-0.168	-0.149	-0.180	-0.141
318	0.297	0.238	0.286	0.247	0.182	-0.061	-0.062	-0.060	0.015	-0.038	-0.169	-0.114	-0.165	-0.136	-0.122
320	0.289	0.257	0.292	0.269	0.171	-0.061	-0.062	-0.060	0.015	-0.038	-0.124	-0.134	-0.139	-0.180	-0.155
322	0.248	0.273	0.292	0.298	0.168	-0.064	-0.062	-0.060	0.012	-0.038	-0.137	-0.172	-0.184	-0.136	-0.130
324	0.254	0.296	0.292	0.237	0.172	-0.061	-0.066	-0.063	0.012	-0.038	-0.153	-0.127	-0.130	-0.158	-0.191
326	0.254	0.242	0.292	0.244	0.174	-0.064	-0.066	-0.060	0.012	-0.038	-0.169	-0.172	-0.161	-0.136	-0.160
328	0.260	0.264	0.286	0.250	0.188	-0.064	-0.066	-0.063	0.006	-0.038	-0.169	-0.127	-0.133	-0.174	-0.149
330	0.259	0.289	0.270	0.256	0.180	-0.064	-0.066	-0.063	0.003	-0.038	-0.162	-0.159	-0.184	-0.193	-0.147
332	0.254	0.242	0.257	0.256	0.187	-0.064	-0.066	-0.063	0.003	-0.038	-0.156	-0.121	-0.139	-0.174	-0.141
334	0.259	0.264	0.244	0.256	0.182	-0.061	-0.059	-0.060	0.003	-0.038	-0.131	-0.146	-0.168	-0.139	-0.133
336	0.299	0.283	0.289	0.253	0.233	-0.061	-0.066	-0.063	0.003	-0.038	-0.162	-0.121	-0.149	-0.177	-0.136
338	0.299	0.242	0.270	0.250	0.161	-0.061	-0.059	-0.060	0.000	-0.038	-0.112	-0.149	-0.171	-0.133	-0.168
340	0.260	0.261	0.232	0.234	0.185	-0.064	-0.066	-0.063	0.000	-0.038	-0.159	-0.118	-0.127	-0.171	-0.152
342	0.292	0.283	0.273	0.269	0.174	-0.064	-0.062	-0.063	0.000	-0.038	-0.153	-0.149	-0.174	-0.180	-0.134
344	0.270	0.232	0.238	0.244	0.174	-0.064	-0.062	-0.063	0.000	-0.038	-0.156	-0.130	-0.174	-0.177	-0.134
346	0.260	0.257	0.267	0.275	0.168	-0.064	-0.066	-0.063	0.000	-0.041	-0.172	-0.118	-0.161	-0.161	-0.138
348	0.253	0.276	0.241	0.247	0.161	-0.067	-0.062	-0.063	-0.004	-0.038	-0.143	-0.149	-0.146	-0.139	-0.138
350	0.251	0.238	0.254	0.275	0.158	-0.064	-0.066	-0.063	-0.007	-0.041	-0.162	-0.127	-0.130	-0.167	-0.136
352	0.241	0.261	0.273	0.234	0.158	-0.064	-0.066	-0.063	-0.010	-0.041	-0.178	-0.111	-0.190	-0.129	-0.130
354	0.280	0.286	0.228	0.244	0.155	-0.064	-0.066	-0.063	-0.010	-0.041	-0.159	-0.143	-0.155	-0.186	-0.120

Table 3 Relative Water Column Heights (ft)

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
356	0.294	0.242	0.241	0.241	0.155	-0.064	-0.066	-0.063	-0.007	-0.038	-0.127	-0.118	-0.130	-0.177	-0.159
358	0.265	0.264	0.254	0.250	0.157	-0.064	-0.066	-0.060	-0.004	-0.035	-0.124	-0.108	-0.184	-0.126	-0.126
360	0.251	0.292	0.254	0.260	0.168	-0.064	-0.066	-0.063	-0.004	-0.038	-0.137	-0.137	-0.136	-0.186	-0.181
362	0.241	0.248	0.260	0.247	0.166	-0.064	-0.066	-0.063	-0.007	-0.041	-0.150	-0.118	-0.117	-0.167	-0.125
364	0.245	0.264	0.292	0.279	0.184	-0.064	-0.066	-0.063	-0.007	-0.041	-0.146	-0.111	-0.196	-0.186	-0.146
366	0.254	0.286	0.248	0.237	0.199	-0.064	-0.066	-0.063	-0.007	-0.038	-0.150	-0.146	-0.180	-0.177	-0.167
368	0.264	0.242	0.276	0.241	0.171	-0.064	-0.066	-0.063	-0.010	-0.041	-0.175	-0.156	-0.168	-0.133	-0.122
370	0.276	0.264	0.228	0.234	0.168	-0.064	-0.066	-0.063	-0.010	-0.041	-0.159	-0.140	-0.136	-0.155	-0.143
372	0.283	0.289	0.238	0.237	0.155	-0.064	-0.066	-0.063	-0.010	-0.041	-0.118	-0.134	-0.177	-0.174	-0.162
374	0.291	0.238	0.248	0.244	0.160	-0.064	-0.066	-0.063	-0.010	-0.041	-0.150	-0.134	-0.165	-0.193	-0.172
376	0.299	0.270	0.241	0.234	0.163	-0.064	-0.066	-0.063	-0.010	-0.041	-0.153	-0.127	-0.142	-0.152	-0.157
378	0.291	0.289	0.301	0.241	0.161	-0.064	-0.066	-0.063	-0.010	-0.041	-0.156	-0.130	-0.130	-0.174	-0.138
380	0.272	0.242	0.276	0.282	0.161	-0.064	-0.062	-0.063	-0.013	-0.041	-0.131	-0.130	-0.120	-0.152	-0.154
382	0.245	0.264	0.251	0.234	0.176	-0.064	-0.066	-0.063	-0.013	-0.041	-0.140	-0.134	-0.168	-0.174	-0.172
384	0.253	0.289	0.292	0.237	0.176	-0.070	-0.066	-0.063	-0.013	-0.041	-0.131	-0.134	-0.171	-0.161	-0.134
386	0.257	0.242	0.241	0.237	0.155	-0.064	-0.066	-0.063	-0.013	-0.041	-0.159	-0.137	-0.152	-0.167	-0.131
388	0.259	0.267	0.267	0.231	0.163	-0.064	-0.066	-0.063	-0.013	-0.041	-0.131	-0.140	-0.130	-0.171	-0.147
390	0.267	0.289	0.289	0.231	0.166	-0.064	-0.066	-0.063	-0.013	-0.041	-0.156	-0.159	-0.117	-0.158	-0.159
392	0.278	0.242	0.286	0.244	0.236	-0.064	-0.066	-0.066	-0.013	-0.041	-0.137	-0.111	-0.127	-0.133	-0.162
394	0.291	0.261	0.228	0.234	0.161	-0.067	-0.066	-0.066	-0.013	-0.041	-0.162	-0.121	-0.123	-0.183	-0.133
396	0.291	0.283	0.238	0.241	0.193	-0.064	-0.066	-0.066	-0.013	-0.041	-0.118	-0.124	-0.161	-0.167	-0.149
398	0.256	0.238	0.238	0.231	0.150	-0.067	-0.066	-0.066	-0.016	-0.041	-0.150	-0.130	-0.161	-0.152	-0.165
400	0.272	0.257	0.235	0.234	0.172	-0.067	-0.066	-0.066	-0.016	-0.045	-0.137	-0.165	-0.193	-0.145	-0.130
402	0.292	0.283	0.248	0.237	0.153	-0.064	-0.062	-0.063	-0.019	-0.041	-0.165	-0.134	-0.130	-0.171	-0.123
404	0.278	0.235	0.238	0.234	0.201	-0.064	-0.066	-0.066	-0.023	-0.045	-0.162	-0.165	-0.127	-0.190	-0.143
406	0.251	0.257	0.248	0.272	0.076	-0.067	-0.066	-0.066	-0.023	-0.045	-0.143	-0.121	-0.130	-0.158	-0.186
408	0.265	0.280	0.282	0.237	0.152	-0.064	-0.066	-0.066	-0.023	-0.041	-0.162	-0.153	-0.130	-0.158	-0.139
410	0.288	0.289	0.267	0.231	0.161	-0.067	-0.066	-0.066	-0.023	-0.041	-0.162	-0.118	-0.139	-0.161	-0.165
412	0.292	0.251	0.244	0.237	0.160	-0.067	-0.066	-0.066	-0.029	-0.045	-0.143	-0.140	-0.142	-0.180	-0.133
414	0.260	0.273	0.279	0.237	0.298	-0.067	-0.066	-0.066	-0.029	-0.045	-0.153	-0.111	-0.155	-0.152	-0.168

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
416	0.292	0.299	0.257	0.266	0.182	-0.067	-0.066	-0.063	-0.029	-0.045	-0.140	-0.127	-0.152	-0.183	-0.134
418	0.248	0.251	0.292	0.260	0.150	-0.067	-0.066	-0.066	-0.029	-0.045	-0.156	-0.149	-0.168	-0.180	-0.170
420	0.275	0.273	0.251	0.234	0.185	-0.067	-0.066	-0.069	-0.032	-0.045	-0.140	-0.111	-0.152	-0.136	-0.130
422	0.253	0.292	0.276	0.237	0.147	-0.067	-0.066	-0.066	-0.032	-0.048	-0.137	-0.130	-0.155	-0.139	-0.151
424	0.265	0.242	0.235	0.244	-0.023	-0.067	-0.066	-0.066	-0.035	-0.045	-0.121	-0.156	-0.168	-0.199	-0.125
426	0.294	0.264	0.260	0.231	0.150	-0.067	-0.069	-0.069	-0.035	-0.045	-0.159	-0.118	-0.168	-0.161	-0.159
428	0.249	0.283	0.235	0.234	0.155	-0.067	-0.069	-0.069	-0.035	-0.048	-0.150	-0.124	-0.184	-0.158	-0.128
430	0.278	0.238	0.295	0.231	0.241	-0.067	-0.066	-0.066	-0.038	-0.045	-0.140	-0.134	-0.187	-0.136	-0.162
432	0.246	0.261	0.263	0.282	0.150	-0.067	-0.066	-0.069	-0.038	-0.045	-0.165	-0.146	-0.190	-0.142	-0.133
434	0.278	0.286	0.235	0.231	0.193	-0.067	-0.066	-0.069	-0.038	-0.045	-0.165	-0.159	-0.174	-0.142	-0.155
436	0.246	0.238	0.267	0.234	0.171	-0.045	-0.066	-0.069	-0.038	-0.045	-0.156	-0.121	-0.127	-0.174	-0.146
438	0.286	0.261	0.228	0.234	0.160	-0.067	-0.069	-0.069	-0.042	-0.045	-0.159	-0.108	-0.136	-0.158	-0.147
440	0.257	0.283	0.257	0.234	0.157	-0.067	-0.069	-0.069	-0.042	-0.045	-0.165	-0.137	-0.155	-0.158	-0.146
442	0.245	0.242	0.289	0.269	0.182	-0.064	-0.062	-0.066	-0.042	-0.041	-0.121	-0.118	-0.193	-0.145	-0.162
444	0.268	0.264	0.228	0.231	0.166	-0.067	-0.066	-0.069	-0.048	-0.045	-0.159	-0.134	-0.177	-0.148	-0.123
446	0.243	0.289	0.232	0.272	0.188	-0.067	-0.066	-0.069	-0.048	-0.048	-0.162	-0.162	-0.123	-0.183	-0.165
448	0.281	0.245	0.235	0.228	0.153	-0.070	-0.069	-0.069	-0.048	-0.048	-0.140	-0.127	-0.142	-0.145	-0.147
450	0.262	0.276	0.241	0.231	0.222	-0.067	-0.066	-0.069	-0.051	-0.048	-0.159	-0.153	-0.171	-0.158	-0.130
452	0.265	0.238	0.238	0.234	0.166	-0.070	-0.069	-0.069	-0.051	-0.045	-0.162	-0.118	-0.117	-0.180	-0.149
454	0.299	0.270	0.282	0.231	0.152	-0.073	-0.066	-0.069	-0.051	-0.048	-0.134	-0.146	-0.133	-0.167	-0.173
456	0.280	0.289	0.279	0.253	0.188	-0.067	-0.069	-0.069	-0.051	-0.048	-0.159	-0.114	-0.158	-0.158	-0.170
458	0.268	0.242	0.263	0.272	0.172	-0.070	-0.066	-0.069	-0.051	-0.045	-0.146	-0.143	-0.168	-0.161	-0.168
460	0.251	0.273	0.248	0.234	0.212	-0.067	-0.069	-0.069	-0.051	-0.048	-0.124	-0.114	-0.139	-0.155	-0.168
462	0.257	0.296	0.289	0.247	0.237	-0.067	-0.069	-0.069	-0.051	-0.048	-0.162	-0.149	-0.161	-0.199	-0.164
464	0.299	0.261	0.257	0.244	0.193	-0.067	-0.069	-0.069	-0.051	-0.048	-0.162	-0.121	-0.180	-0.129	-0.131
466	0.281	0.286	0.232	0.234	0.146	-0.067	-0.069	-0.069	-0.048	-0.048	-0.150	-0.156	-0.117	-0.142	-0.144
468	0.273	0.245	0.263	0.231	0.155	-0.067	-0.069	-0.069	-0.048	-0.048	-0.150	-0.143	-0.139	-0.158	-0.159
470	0.275	0.273	0.248	0.237	0.161	-0.067	-0.069	-0.069	-0.048	-0.048	-0.172	-0.124	-0.174	-0.202	-0.165
472	0.270	0.292	0.238	0.234	0.169	-0.070	-0.069	-0.073	-0.048	-0.048	-0.134	-0.134	-0.127	-0.145	-0.136
474	0.284	0.267	0.276	0.253	0.182	-0.064	-0.066	-0.066	-0.054	-0.048	-0.153	-0.137	-0.142	-0.193	-0.151

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
476	0.273	0.292	0.241	0.279	0.165	-0.067	-0.066	-0.069	-0.051	-0.048	-0.115	-0.121	-0.155	-0.177	-0.125
478	0.272	0.254	0.270	0.231	0.184	-0.067	-0.066	-0.073	-0.051	-0.048	-0.124	-0.162	-0.190	-0.186	-0.134
480	0.280	0.283	0.232	0.228	0.153	-0.067	-0.066	-0.069	-0.051	-0.048	-0.169	-0.140	-0.136	-0.152	-0.154
482	0.283	0.235	0.248	0.237	0.179	-0.067	-0.066	-0.069	-0.048	-0.048	-0.162	-0.121	-0.184	-0.196	-0.191
484	0.284	0.264	0.254	0.237	0.269	-0.070	-0.069	-0.073	-0.051	-0.048	-0.137	-0.108	-0.130	-0.171	-0.131
486	0.300	0.292	0.257	0.234	0.174	-0.067	-0.069	-0.069	-0.048	-0.048	-0.118	-0.146	-0.161	-0.133	-0.151
488	0.286	0.257	0.263	0.250	0.225	-0.067	-0.069	-0.069	-0.048	-0.048	-0.165	-0.127	-0.130	-0.190	-0.173
490	0.246	0.286	0.216	0.231	0.152	-0.070	-0.069	-0.073	-0.048	-0.048	-0.162	-0.118	-0.152	-0.193	-0.136
492	0.257	0.248	0.263	0.237	0.172	-0.067	-0.069	-0.066	-0.048	-0.051	-0.140	-0.108	-0.117	-0.180	-0.149
494	0.270	0.276	0.238	0.231	0.149	-0.070	-0.069	-0.069	-0.048	-0.051	-0.162	-0.165	-0.149	-0.161	-0.172
496	0.297	0.242	0.257	0.237	0.177	-0.067	-0.069	-0.073	-0.051	-0.054	-0.140	-0.162	-0.120	-0.174	-0.151
498	0.256	0.270	0.241	0.234	0.168	-0.070	-0.069	-0.073	-0.051	-0.051	-0.165	-0.111	-0.177	-0.161	-0.141
500	0.294	0.235	0.286	0.234	0.163	-0.070	-0.069	-0.073	-0.051	-0.051	-0.153	-0.118	-0.149	-0.190	-0.151
502	0.253	0.261	0.263	0.234	0.152	-0.070	-0.069	-0.076	-0.051	-0.054	-0.124	-0.143	-0.136	-0.142	-0.172
504	0.292	0.242	0.235	0.237	0.169	-0.070	-0.069	-0.076	-0.051	-0.054	-0.124	-0.114	-0.130	-0.180	-0.134
506	0.262	0.296	0.286	0.241	0.179	-0.067	-0.066	-0.069	-0.051	-0.057	-0.131	-0.137	-0.184	-0.196	-0.162
508	0.260	0.283	0.235	0.282	0.195	-0.070	-0.069	-0.076	-0.051	-0.057	-0.165	-0.124	-0.136	-0.180	-0.133
510	0.268	0.267	0.257	0.228	0.199	-0.070	-0.069	-0.076	-0.051	-0.054	-0.121	-0.124	-0.180	-0.145	-0.176
512	0.280	0.254	0.286	0.231	0.149	-0.070	-0.069	-0.076	-0.051	-0.057	-0.165	-0.108	-0.161	-0.139	-0.151
514	0.276	0.245	0.232	0.231	0.155	-0.070	-0.069	-0.076	-0.051	-0.057	-0.134	-0.162	-0.155	-0.142	-0.146
516	0.251	0.283	0.238	0.234	0.157	-0.070	-0.069	-0.076	-0.051	-0.054	-0.153	-0.140	-0.155	-0.171	-0.139
518	0.260	0.286	0.248	0.263	0.152	-0.073	-0.072	-0.076	-0.051	-0.054	-0.165	-0.121	-0.146	-0.171	-0.128
520	0.275	0.267	0.254	0.234	0.215	-0.070	-0.072	-0.076	-0.051	-0.057	-0.134	-0.149	-0.133	-0.199	-0.170
522	0.297	0.251	0.254	0.275	0.177	-0.070	-0.072	-0.076	-0.051	-0.057	-0.131	-0.149	-0.133	-0.136	-0.175
524	0.246	0.292	0.251	0.272	0.153	-0.070	-0.072	-0.076	-0.051	-0.057	-0.156	-0.143	-0.133	-0.136	-0.181
526	0.268	0.273	0.244	0.234	0.166	-0.070	-0.069	-0.076	-0.051	-0.057	-0.165	-0.137	-0.146	-0.139	-0.160
528	0.284	0.257	0.238	0.231	0.155	-0.073	-0.069	-0.076	-0.051	-0.060	-0.172	-0.130	-0.161	-0.148	-0.167
530	0.275	0.238	0.286	0.228	0.161	-0.073	-0.072	-0.076	-0.051	-0.057	-0.150	-0.114	-0.155	-0.148	-0.168
532	0.267	0.276	0.270	0.231	0.158	-0.073	-0.072	-0.079	-0.048	-0.057	-0.137	-0.114	-0.146	-0.174	-0.159
534	0.260	0.251	0.251	0.231	0.161	-0.073	-0.072	-0.079	-0.051	-0.057	-0.121	-0.114	-0.158	-0.186	-0.162

Table 3 Relative Water Column Heights (ft)

Time	Well I1	I2	I3	I4	I5	O1	O2	O3	O4	O5	E1	E2	E3	E4	E5
536	0.253	0.289	0.282	0.231	0.169	-0.073	-0.072	-0.079	-0.051	-0.057	-0.162	-0.118	-0.190	-0.199	-0.168
538	0.249	0.264	0.257	0.275	0.177	-0.070	-0.072	-0.076	-0.051	-0.057	-0.169	-0.118	-0.190	-0.148	-0.176
540	0.272	0.254	0.267	0.298	0.165	-0.073	-0.072	-0.076	-0.051	-0.057	-0.153	-0.118	-0.123	-0.190	-0.160
mean	0.271	0.263	0.259	0.258	0.172	-0.058	-0.060	-0.055	0.005	-0.031	-0.147	-0.132	-0.154	-0.160	-0.147
stddev	0.018	0.020	0.022	0.036	0.028	0.009	0.007	0.014	0.044	0.017	0.016	0.018	0.024	0.020	0.017

Table 4 Summary of Relative Water Column Heights (measurements in feet)

Injection Wells	I1	I2	I3	I4	I5
(Static)	3.871	3.972	4.091	4.115	4.182
Relative mean	+0.271	+0.263	+0.259	+0.258	+0.172
Standard deviation	±0.018	±0.020	±0.023	±0.036	±0.028
Estimated relative high	+0.30	+0.29	+0.29	+0.28	+0.22
Estimated relative low	+0.25	+0.23	+0.24	+0.23	+0.15
Estimated variation	0.05	0.06	0.05	0.05	0.07
Observation Wells	**O1**	**O2**	**O3**	**O4**	**O5**
(Static)	3.793	3.656	3.928	3.911	3.950
Relative mean	-0.058	-0.060	-0.055	+0.005	-0.031
Standard deviation	±0.009	±0.007	±0.014	±0.044	±0.017
Extraction Wells	**E1**	**E2**	**E3**	**E4**	**E5**
(Static)	3.808	3.566	3.743	3.969	3.860
Relative mean	-0.147	-0.132	-0.154	-0.160	-0.147
Standard deviation	±0.016	±0.018	±0.024	±0.020	±0.017
Estimated relative high	-0.12	-0.11	-0.12	-0.13	-0.13
Estimated relative low	-0.16	-0.16	-0.18	-0.18	-0.17
Estimated variation	0.04	0.05	0.06	0.05	0.04
Gradient	**I1-E1**	**I2-E2**	**I3-E3**	**I4-E4**	**I5-E5**
Mean Δh	0.419	0.395	0.413	0.417	0.320
ΔL	4.78	5.04	5.85	5.05	4.75
Mean gradient ($\Delta h/\Delta L$)	0.0877	0.0783	0.0705	0.0826	0.0672

Table 5 Bromide Tracer Results (mg/l)

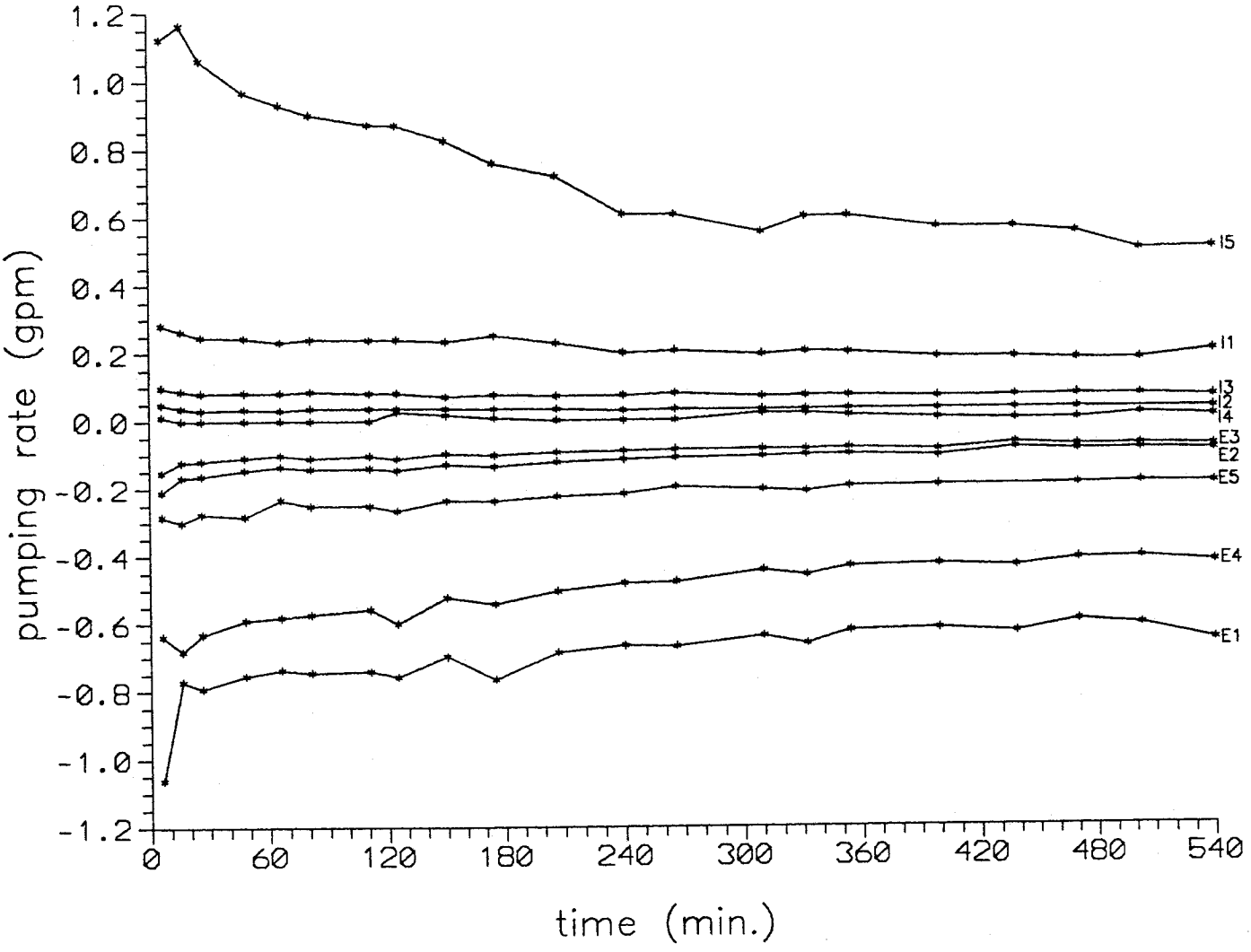
Time	E1	Time	E2	Time	E3	Time	Well E4	Time	E5	Time	I3	Time	O3	Time	Tracer
5	1	4	1	4	1	3	1	3	1	23	313	23	94	37	405
7	1	13	2	12	3	12	151	11	76	28	388	28	138	68	423
11	1	16	2	15	11	14	213	14	127	33	388	33	158	150	502
14	2	20	2	21	49	19	232	16	145	38	405	37	204	235	571
18	2	25	8	25	94	26	253	18	158	42	388	41	232	302	596
22	3	29	9	30	117	30	287	26	187	45	372	49	242	442	596
27	16	34	23	35	133	35	232	31	222	50	388	55	253		
32	18	38	31	39	187	39	287	36	253	57	405	56	275		
36	56	43	43	47	242	43	300	40	275	64	423	60	300		
41	73	46	47	51	264	43	313	42	264	68	423	63	313		
44	42	50	54	54	253	48	300	44	253	72	423	67	327		
49	45	53	70	58	287	50	313	48	264	77	441	71	327		
54	56	57	86	61	287	51	313	51	264	85	423	72	341		
56	67	61	94	65	300	55	313	52	275	91	423	76	356		
60	67	64	83	70	313	59	313	55	275	101	441	84	341		
63	70	69	90	74	313	62	313	59	287	122	460	90	341		
67	86	71	112	79	341	65	327	62	300	143	524	99	388		
70	79	73	117	86	341	70	327	66	300	164	481	102	405		
71	83	77	117	92	341	74	341	71	300	173	481	123	388		
75	86	82	127	100	372	79	327	75	287	202	441	144	423		

Table 5 Bromide Tracer Results (mg/l)

Time	E1	Time	E2	Time	E3	Time	Well E4	Time	E5	Time	I3	Time	O3	Time	Tracer
82	86	85	138	120	388	86	327	80	300	226	502	155	423		
84	86	88	145	140	405	93	327	87	300	265	571	172	441		
88	98	91	145	152	423	99	341	94	300	294	547	200	423		
89	103	95	164	171	423	111	356	99	300	325	547	227	405		
94	107	97	158	203	405	119	341	110	313	364	547	244	460		
97	107	101	172	223	405	139	341	118	313	427	502	297	481		
103	117	105	172	259	441	151	356	138	313	466	547	326	547		
106	117	109	179	292	441	167	341	150	300	493	596	365	502		
109	117	116	179	322	460	204	372	175	300			427	481		
114	117	118	187	361	460	223	356	205	327			466	502		
121	127	120	195	424	460	258	327	222	300			494	481		
129	138	131	204	462	460	293	388	258	287			543	524		
132	138	134	213	490	481	322	405	294	287						
138	138	142	213	542	524	360	341	323	287						
141	145	153	232			423	423	360	264						
145	151	167	242			461	388	422	287						
156	164	201	232			489	372	430	275						
171	164	225	232			540	372	488	275						
200	172	260	253					539	253						
228	172	291	287												
262	195	321	275												
290	213	362	287												

Table 5 Bromide Tracer Results (mg/l)

Time	E1	Time	E2	Time	E3	Time	Well E4	Time	E5	Time	I3	Time	O3	Time	Tracer
320	204	426	300												
363	195	443	300												
428	204	491	327												
464	213	541	341												
492	232														
540	264														

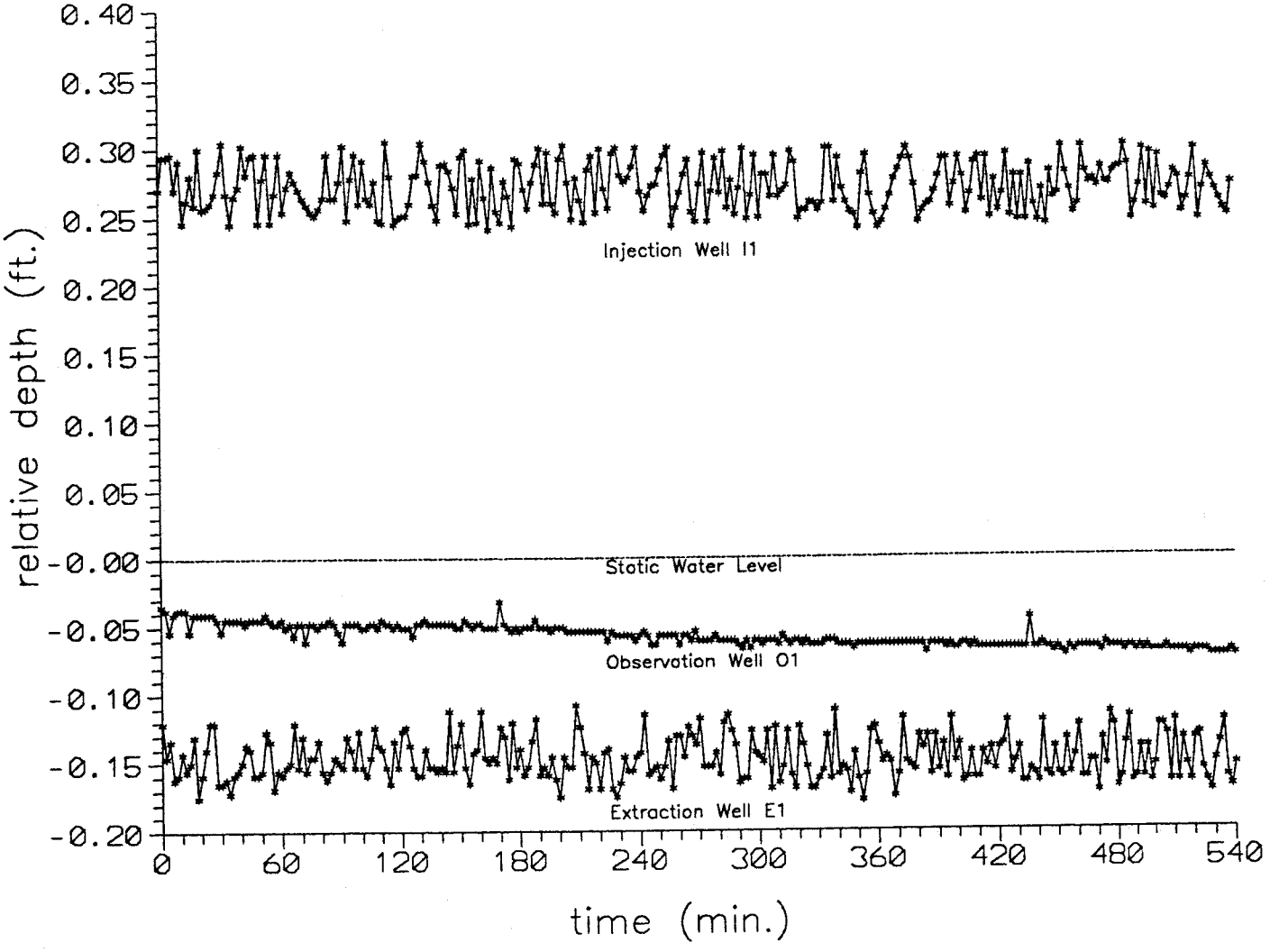


U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant Golden, Colorado

881 HILLSIDE AREA
OPERABLE UNIT NO. 1
PHASE III RFI/RI REPORT

Multiple-Well Tracer Test-
Injection and Extraction Rates
Attachment B2-10, Figure 1

JUNE 1992



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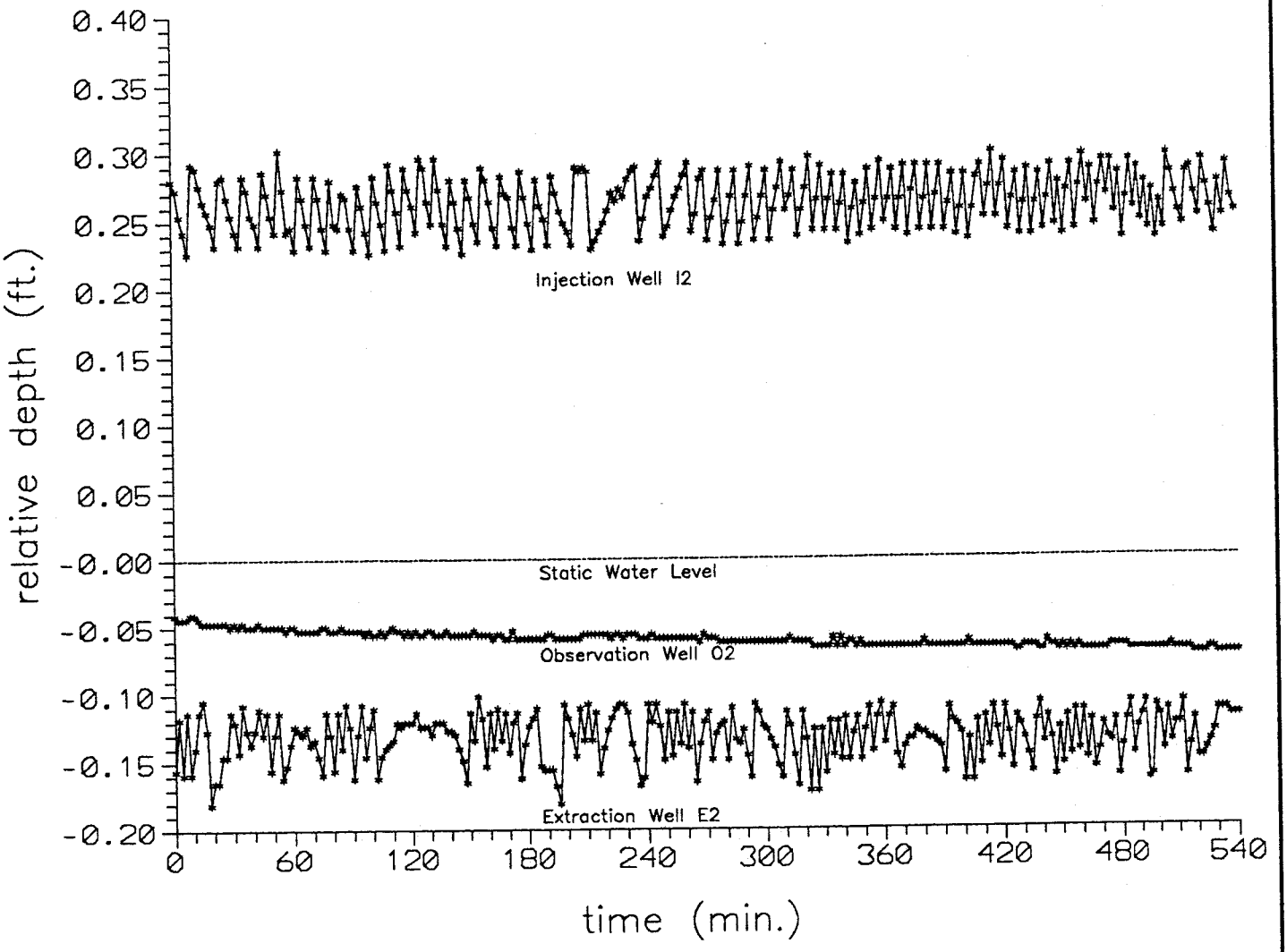
881 HILLSIDE AREA
OPERABLE UNIT NO. 1
PHASE III RFI/RI REPORT

Multiple-Well Tracer Test-
Gradient for Wells I1, O1, E1
Attachment B2-10, Figure 2

JUNE 1992



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881 HILLSIDE AREA
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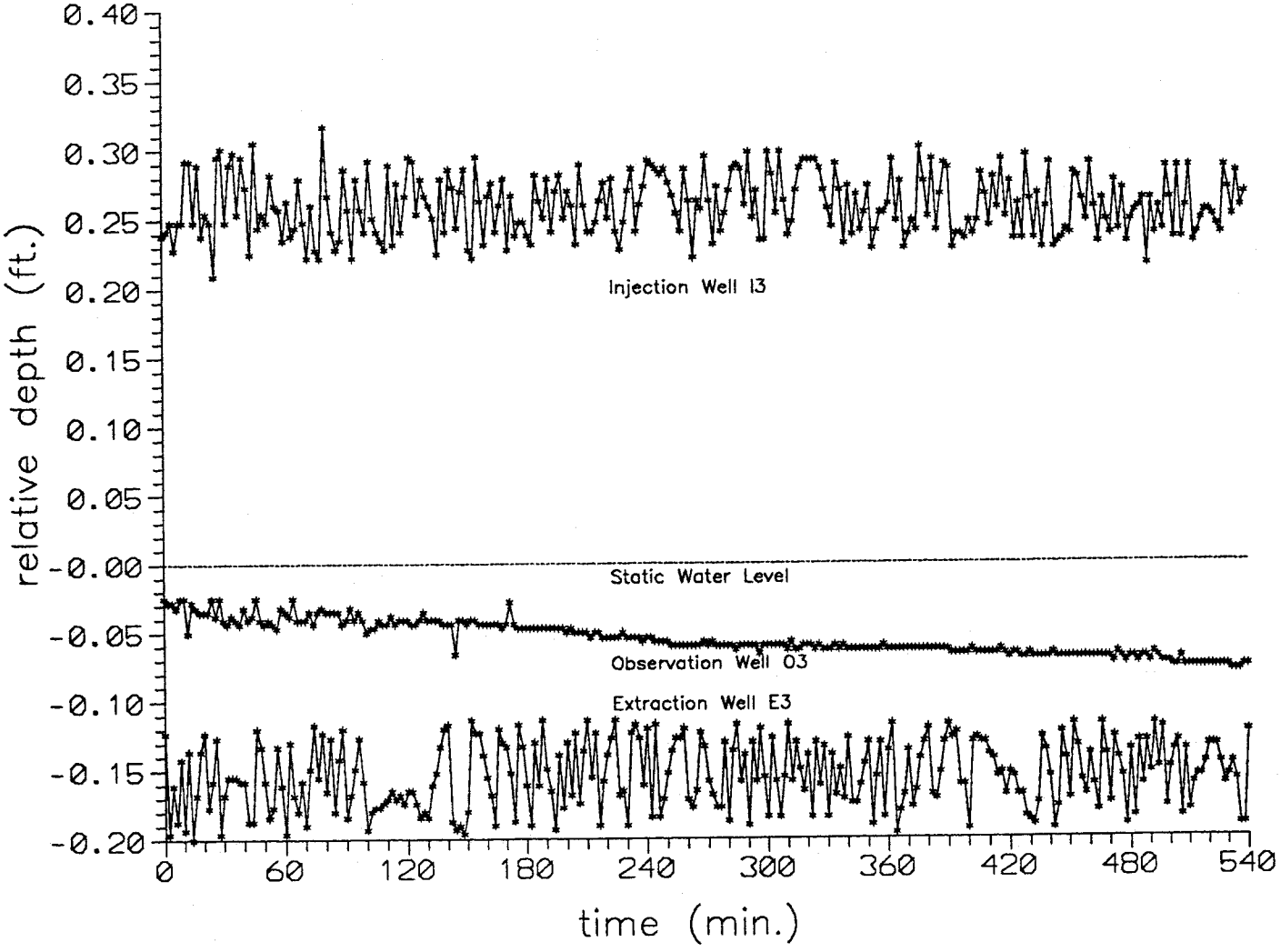
PHASE III RFI/RI REPORT

Multiple-Well Tracer Test-
Gradient for Wells I2, C2, E2
Attachment B2-10, Figure 3

JUNE 1992



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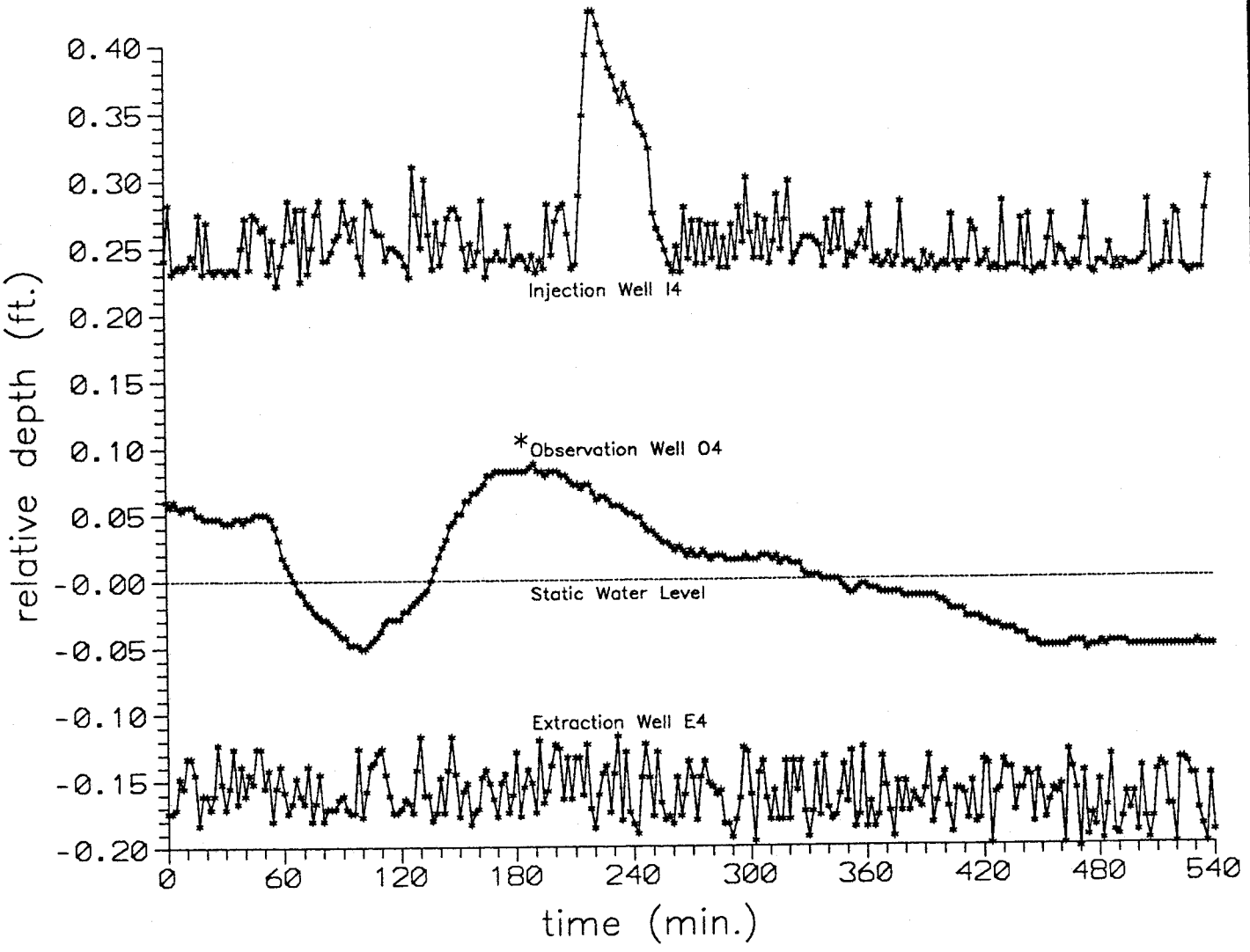
PHASE III RFI/RI REPORT

Multiple-Well Tracer Test-
Gradient for Wells I3, 03, E3
Attachment B2-10, Figure 4

JUNE 1992



*Pressure transducer for Well O4 appears to have malfunctioned.

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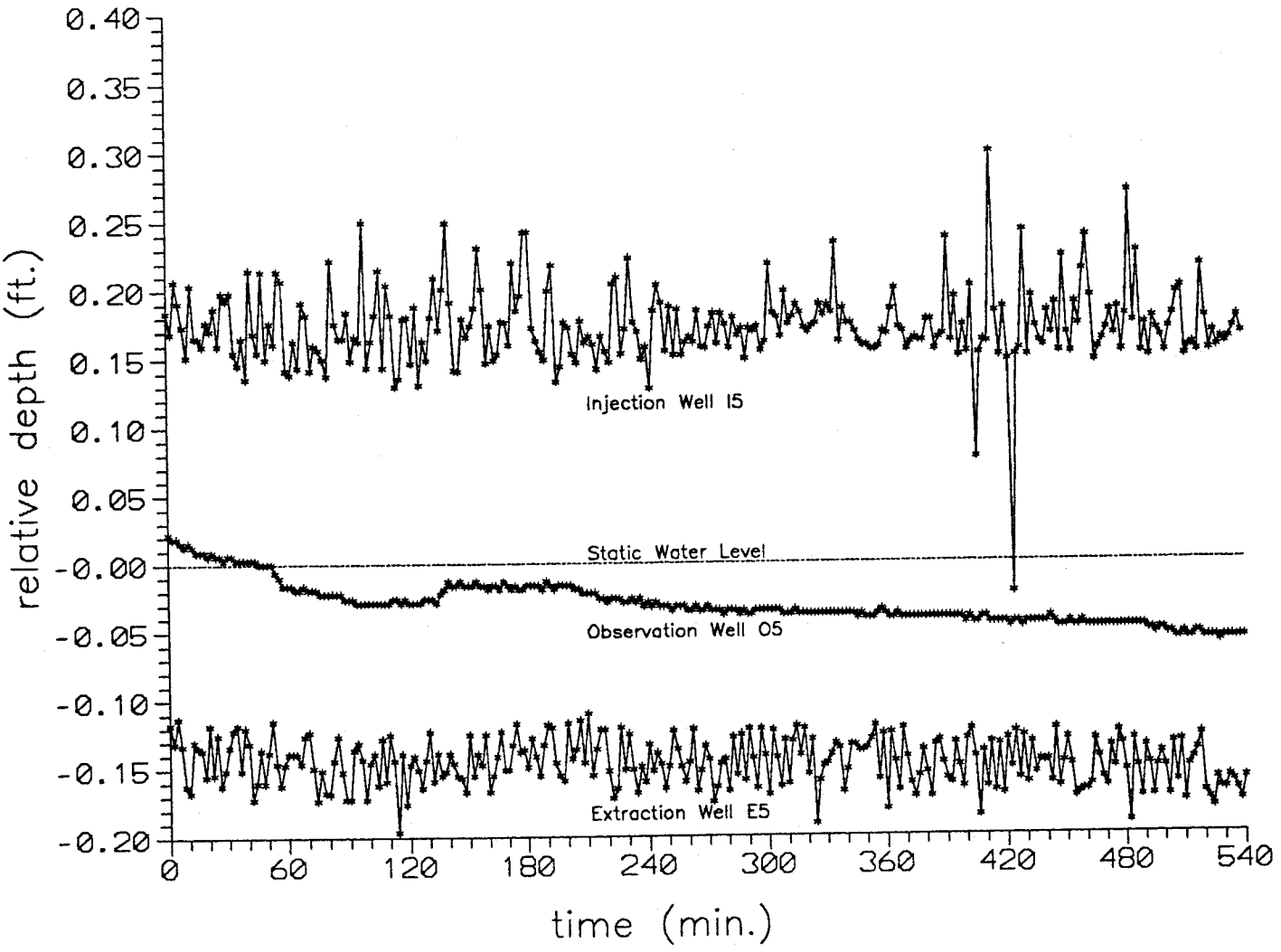
PHASE III RFI/RI REPORT

Multiple-Well Tracer Test-
Gradient for Wells I4, O4, E4
Attachment B2-10, Figure 5

JUNE 1992



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OPERABLE UNIT NO. 1
PHASE III RFI/RI REPORT

Multiple-Well Tracer Test-
Gradient for Wells I5, O5, E5
Attachment B2-10, Figure 6

JUNE 1992

ATTACHMENT B2-11
SURVEYED WELL LOCATIONS

Surveyed Well Locations

Well Number	Northings (ft)	Eastings (ft)
	SINGLE-WELL	
39891	747694.502	2085490.0741
	MULTIPLE-WELL ARRAY	
I1	747688.1713	2085472.3106
I2	747690.8963	2085472.4142
I3	747693.1271	2085472.5959
I4	747695.3232	2085473.2138
I5	747697.8299	2085473.7358
O1	747688.0972	2085474.5671
O2	747690.3744	2085475.3225
O3	747692.5909	2085474.9550
O4	747694.7528	2085476.2696
O5	747697.5084	2085475.7735
E1	747687.6940	2085477.0626
E2	747690.1336	2085477.4005
E3	747692.2385	2085478.3770
E4	747694.6276	2085478.2111
E5	747696.8983	2085478.3975

B3 GROUND WATER ELEVATION DATA

Ground water elevations were calculated from data for wells sampled within OU1 from first quarter 1989 through second and third quarters 1992. July 1992 is the most recent quarter for which data for wells in OU1 have been input to the Rocky Flats Environmental Database System (RFEDS) as of September 1992. Water level data are currently collected on a monthly basis under the routine monitoring program at RFP. Data initially were reported as measurements of depth to ground water from the elevation at the top of the well casing. To determine the ground water elevation, the measured depth to ground water was subtracted from the surveyed well casing elevation. Appendix A3 provides surveyed well casing elevations for newly installed wells.

Attachment B3-1 presents tables showing well number, sample date, ground water elevation, and depth to ground water for Phase I and II monitoring wells. The depth to ground water is presented as a positive number representing the depth to ground water from the top of the well casing. If a well was dry at the time of measuring, the depth to groundwater is presented as "Dry Well." Often, the depth to ground water is represented as "NA." In these cases, the depth to ground water was not measured because there was an obstruction at the well location that prevented the samplers from taking a depth to ground water measurement.

Attachment B3-2 presents ground water hydrographs for monitoring wells installed during the Phase I, II, and III remedial investigations at OU1. Ground water elevations are plotted versus time by month. Occasionally, water levels were collected more than once a month. Where multiple water levels exist for a month, an average water level and corresponding elevation are calculated. The hydrographs presented provide data useful in assessing and interpreting seasonal water table fluctuations. Additionally, hydrographs are useful in solving groundwater mass balance problems concerning major cation/anion chemistry and the presence of nonaqueous phase liquids in a saturated porous media.

Appendix B3
Attachments

Ground Water
Elevation Data

Phase III
RFI/RI Report

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
0187				
	01/15/89	5982.7	5994.08	11.40
	02/14/89	5982.7	5994.08	11.40
	03/27/89	5983.4	5994.08	10.70
	04/27/89	5983.5	5994.08	10.60
	05/19/89	5984.2	5994.08	9.90
	06/06/89	5984.4	5994.08	9.68
	06/29/89	5982.9	5994.08	11.20
	07/14/89	5984.7	5994.08	9.39
	08/17/89	5984.3	5994.08	9.82
	08/25/89	5981.8	5994.08	12.24
	09/13/89	5983.0	5994.08	11.10
	10/27/89	5984.9	5994.08	9.16
	01/16/90	5984.3	5994.08	9.80
	02/02/90	5983.0	5994.08	11.04
	04/13/90	5985.1	5994.08	8.98
	05/02/90	5985.2	5994.08	8.91
	07/12/90	5984.9	5994.08	9.16
	07/26/90	5985.1	5994.08	8.95
	10/01/90	5986.6	5994.08	7.47
	10/15/90	5985.5	5994.08	8.54
	01/03/91	5983.2	5994.08	10.93
	04/01/91	5982.0	5994.08	12.13
	05/14/91	5982.0	5994.08	12.09
	07/02/91	5983.2	5994.08	10.93
	08/15/91	5986.0	5994.08	8.04
	10/03/91	5987.3	5994.08	6.82
	11/05/91	N/A	5994.08	N/A
	12/04/91	5986.6	5994.08	7.44
	01/03/92	5986.1	5994.08	7.99
	02/19/92	5984.2	5994.08	9.92
	04/03/92	5986.2	5994.08	7.92
	05/11/92	5984.5	5994.08	9.60
	07/06/92	5982.8	5994.08	11.28
0287				
	01/15/89	5927.5	5932.53	5.00
	02/13/89	5928.0	5932.53	4.50
	03/24/89	5928.4	5932.53	4.10
	04/27/89	5928.3	5932.53	4.20
	05/19/89	5928.0	5932.53	4.50
	05/26/89	5927.6	5932.53	4.96
	06/29/89	5927.7	5932.53	4.80
	07/25/89	5926.7	5932.53	5.80
	07/28/89	5926.9	5932.53	5.64

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
0287				
	08/25/89	5927.3	5932.53	5.25
	09/13/89	5927.2	5932.53	5.29
	10/25/89	5927.6	5932.53	4.97
	01/18/90	5927.7	5932.53	4.82
	02/02/90	5927.8	5932.53	4.68
	04/12/90	5929.6	5932.53	2.91
	04/30/90	5928.9	5932.53	3.59
	07/12/90	5927.9	5932.53	4.65
	07/17/90	5927.8	5932.53	4.70
	08/09/90	5927.5	5932.53	5.02
	09/12/90	5927.1	5932.53	5.41
	10/01/90	5927.4	5932.53	5.10
	10/18/90	5927.2	5932.53	5.31
	11/07/90	5927.7	5932.53	4.81
	12/07/90	5927.8	5932.53	4.69
	01/02/91	5927.7	5932.53	4.79
	03/07/91	5928.1	5932.53	4.46
	04/01/91	5928.1	5932.53	4.46
	05/07/91	5928.7	5932.53	3.82
	05/13/91	5928.2	5932.53	4.33
	06/05/91	5929.2	5932.53	3.33
	07/02/91	5927.9	5932.53	4.67
	08/06/91	5928.0	5932.53	4.53
	09/03/91	5927.4	5932.53	5.15
	09/06/91	5927.5	5932.53	5.05
	10/04/91	5927.4	5932.53	5.16
	11/05/91	5927.9	5932.53	4.62
	11/14/91	5928.3	5932.53	4.22
0387				
	01/15/89	5887.8	5932.30	44.50
	02/13/89	5882.2	5932.30	50.10
	03/24/89	5887.6	5932.30	44.70
	04/27/89	5887.9	5932.30	44.40
	05/19/89	5885.4	5932.30	46.90
	06/29/89	5894.5	5932.30	37.80
	07/28/89	5884.8	5932.30	47.52
	08/25/89	5834.6	5932.30	97.68
	04/12/90	5886.7	5932.30	45.61
	05/01/90	5887.3	5932.30	44.99
	07/12/90	5886.9	5932.30	45.41
	09/12/90	5887.6	5932.30	44.72
	10/01/90	5879.2	5932.30	53.12
	10/29/90	5886.2	5932.30	46.10

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
0387				
	01/02/91	5874.8	5932.30	57.51
	03/14/91	5887.4	5932.30	44.89
	04/01/91	5878.2	5932.30	54.07
	05/14/91	5886.9	5932.30	45.42
	07/05/91	5886.3	5932.30	46.02
	08/22/91	5887.4	5932.30	44.90
	10/04/91	5885.6	5932.30	46.72
	11/12/91	5887.1	5932.30	45.22
0487				
	01/15/89	5898.9	5911.58	12.70
	02/13/89	5898.7	5911.58	12.90
	03/24/89	5900.2	5911.58	11.40
	04/27/89	5900.6	5911.58	11.00
	05/19/89	5901.1	5911.58	10.50
	06/09/89	5902.0	5911.58	9.55
	06/29/89	5901.8	5911.58	9.80
	07/14/89	5900.7	5911.58	10.91
	07/26/89	5900.3	5911.58	11.25
	08/18/89	5900.0	5911.58	11.57
	09/13/89	5899.8	5911.58	11.82
	10/16/89	5899.2	5911.58	12.38
	01/16/90	5899.2	5911.58	12.35
	01/31/90	5899.2	5911.58	12.36
	04/12/90	5905.8	5911.58	5.80
	06/07/90	5904.2	5911.58	7.39
	07/11/90	5902.1	5911.58	9.47
	08/08/90	5901.6	5911.58	9.96
	08/29/90	5900.8	5911.58	10.74
	09/12/90	5900.4	5911.58	11.20
	10/01/90	5899.9	5911.58	11.66
	10/29/90	5899.4	5911.58	12.22
	11/07/90	5899.3	5911.58	12.28
	12/06/90	5899.1	5911.58	12.51
	01/02/91	5898.8	5911.58	12.79
	03/18/91	5898.5	5911.58	13.04
	04/01/91	5898.6	5911.58	13.01
	05/07/91	5899.8	5911.58	11.78
	05/09/91	5899.8	5911.58	11.75
	06/05/91	5901.1	5911.58	10.48
	07/02/91	5900.5	5911.58	11.04
	08/06/91	5899.1	5911.58	12.52
	08/20/91	5898.9	5911.58	12.70
	09/03/91	5898.4	5911.58	13.18

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
0487				
	10/02/91	5897.6	5911.58	14.03
	11/05/91	5896.6	5911.58	14.97
	01/03/92	5897.2	5911.58	14.39
	02/03/92	5897.2	5911.58	14.35
	02/11/92	5897.3	5911.58	14.29
	03/05/92	5897.6	5911.58	13.94
	04/06/92	5901.8	5911.58	9.77
	05/06/92	5901.8	5911.58	9.77
	05/11/92	5901.8	5911.58	9.82
	06/01/92	5901.7	5911.58	9.93
	07/01/92	5899.7	5911.58	11.87
0587				
	04/13/90	5883.6	5930.16	46.53
	05/31/90	N/A	5930.16	N/A
	07/12/90	5883.9	5930.16	46.29
	08/07/90	5883.9	5930.16	46.24
	10/01/90	5883.9	5930.16	46.22
	10/12/90	5883.9	5930.16	46.24
	01/03/91	5883.7	5930.16	46.45
	03/07/91	5883.7	5930.16	46.47
	04/01/91	5913.7	5930.16	16.50
	05/13/91	5883.5	5930.16	46.62
	07/05/91	5883.6	5930.16	46.60
	08/15/91	5883.6	5930.16	46.58
	12/04/91	5883.7	5930.16	46.46
	01/03/92	5883.5	5930.16	46.62
	02/14/92	5883.6	5930.16	46.61
	04/01/92	5886.5	5930.16	43.62
	05/29/92	5885.7	5930.16	44.43
	07/02/92	5887.3	5930.16	42.84
0687				
	01/15/89	5900.5	5906.32	5.80
	02/13/89	5901.1	5906.32	5.20
	03/24/89	5901.5	5906.32	4.80
	04/25/89	5901.8	5906.32	4.50
	05/19/89	5901.6	5906.32	4.70
	06/10/89	5903.4	5906.32	2.90
	07/14/89	5900.0	5906.32	6.28
	07/26/89	5900.0	5906.32	6.30
	08/18/89	5901.2	5906.32	5.16
	09/13/89	5901.0	5906.32	5.30

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
0687				
	10/19/89	5900.9	5906.32	5.44
	01/16/90	5902.0	5906.32	4.28
	01/31/90	5902.2	5906.32	4.11
	04/12/90	5904.4	5906.32	1.88
	05/03/90	5904.4	5906.32	1.90
	07/11/90	5901.9	5906.32	4.46
	07/20/90	5901.4	5906.32	4.92
	10/01/90	5900.9	5906.32	5.42
	10/08/90	5900.7	5906.32	5.64
	01/02/91	5901.2	5906.32	5.10
	03/18/91	5901.3	5906.32	5.00
	04/01/91	5901.1	5906.32	5.19
	05/14/91	5901.6	5906.32	4.74
	07/02/91	5901.1	5906.32	5.26
	08/19/91	5900.6	5906.32	5.76
	10/02/91	5899.4	5906.32	6.96
0887				
	01/15/89	5875.5	5921.55	46.10
	02/13/89	5870.1	5921.55	51.50
	03/24/89	5875.2	5921.55	46.40
	04/27/89	5875.6	5921.55	46.00
	05/19/89	5872.8	5921.55	48.80
	06/29/89	5864.8	5921.55	56.80
	07/28/89	5873.6	5921.55	47.95
	08/25/89	5831.3	5921.55	90.25
	04/12/90	5874.2	5921.55	47.35
	05/02/90	5874.9	5921.55	46.61
	07/11/90	5874.7	5921.55	46.84
	09/11/90	5875.4	5921.55	46.17
	10/01/90	5869.8	5921.55	51.77
	11/08/90	5874.4	5921.55	47.12
	11/09/90	5874.4	5921.55	47.12
	01/02/91	5873.9	5921.55	47.69
	03/14/91	5875.3	5921.55	46.24
	04/01/91	5896.7	5921.55	24.85
	05/09/91	5874.5	5921.55	47.06
	07/02/91	5874.0	5921.55	47.51
	09/19/91	5875.3	5921.55	46.30
	10/02/91	5865.2	5921.55	56.38
	11/13/91	5874.2	5921.55	47.37
	02/05/92	5911.6	5921.55	9.92

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
0974				
	01/15/89	5916.4	5926.25	9.90
	02/14/89	5916.4	5926.25	9.90
	03/27/89	5917.0	5926.25	9.30
	04/27/89	5918.3	5926.25	8.00
	05/15/89	5917.3	5926.25	9.00
	05/18/89	5916.8	5926.25	9.50
	06/29/89	5917.7	5926.25	8.60
	08/22/89	5910.3	5926.25	15.96
	08/25/89	5915.3	5926.25	10.92
	10/26/89	5917.0	5926.25	9.30
	01/18/90	5919.6	5926.25	6.69
	02/05/90	5916.5	5926.25	9.78
	04/13/90	5920.9	5926.25	5.33
	05/31/90	5920.3	5926.25	5.91
	07/12/90	5919.3	5926.25	6.99
	08/09/90	5919.0	5926.25	7.24
	10/01/90	5918.1	5926.25	8.15
	10/15/90	5918.0	5926.25	8.28
	01/03/91	5917.3	5926.25	8.93
	04/01/91	5917.1	5926.25	9.18
	05/13/91	5917.3	5926.25	8.93
	07/05/91	5917.3	5926.25	8.94
	08/14/91	5917.1	5926.25	9.20
	10/03/91	5916.7	5926.25	9.60
	12/09/91	5916.5	5926.25	9.74
	01/03/92	5916.4	5926.25	9.81
	02/13/92	5916.6	5926.25	9.67
	04/01/92	5918.5	5926.25	7.74
	05/05/92	5917.7	5926.25	8.57
1074				
	01/15/89	5915.2	5925.91	10.70
	02/14/89	5915.8	5925.91	10.10
	03/27/89	5916.2	5925.91	9.70
	04/27/89	5916.6	5925.91	9.30
	05/18/89	5916.7	5925.91	9.20
	06/09/89	5919.3	5925.91	6.60
	06/29/89	5916.8	5925.91	9.10
	07/14/89	5916.2	5925.91	9.71
	08/23/89	5918.0	5925.91	7.90
	08/25/89	5915.8	5925.91	10.08
	10/26/89	5918.0	5925.91	7.88
	01/18/90	5918.2	5925.91	7.67
	02/05/90	5918.1	5925.91	7.86

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
1074				
	04/13/90	5922.4	5925.91	3.55
	05/31/90	5920.9	5925.91	4.99
	07/12/90	5919.8	5925.91	6.11
	08/08/90	5919.3	5925.91	6.64
	10/01/90	5918.2	5925.91	7.73
	10/18/90	5918.0	5925.91	7.96
	01/03/91	5917.5	5925.91	8.42
	04/01/91	5917.6	5925.91	8.28
	05/15/91	5918.7	5925.91	7.19
	07/05/91	5918.4	5925.91	7.52
	08/21/91	5917.4	5925.91	8.53
	10/03/91	5916.6	5925.91	9.31
	12/09/91	5916.6	5925.91	9.33
	01/03/92	5916.6	5925.91	9.31
	02/13/92	5917.1	5925.91	8.80
	04/01/92	5921.4	5925.91	4.52
	05/05/92	5919.8	5925.91	6.08
30991				
	01/09/91	Dry Well	5851.82	Dry Well
	11/04/91	Dry Well	5851.82	Dry Well
	12/02/91	Dry Well	5851.82	Dry Well
	02/03/92	N/A	5851.82	N/A
	03/03/92	5838.5	5851.82	13.34
	04/03/92	5843.0	5851.82	8.85
	05/01/92	5841.4	5851.82	10.42
	05/13/92	5841.7	5851.82	10.16
	07/01/92	5841.5	5851.82	10.29
31491				
	11/04/91	Dry Well	5905.03	Dry Well
	12/09/91	Dry Well	5905.03	Dry Well
	02/03/92	N/A	5905.03	N/A
	03/03/92	N/A	5905.03	N/A
	03/03/92	N/A	5905.03	N/A
	04/06/92	5889.0	5905.03	16.05
	05/01/92	5887.1	5905.03	17.89
	05/12/92	5885.0	5905.03	20.07
	07/01/92	5884.7	5905.03	20.30
31791				
	11/04/91	Dry Well	5879.80	Dry Well

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
31791				
	12/02/91	5863.7	5879.80	16.11
	01/09/92	5863.9	5879.80	15.91
	02/03/92	5870.4	5879.80	9.39
	02/13/92	5870.7	5879.80	9.06
	03/03/92	5870.7	5879.80	9.08
	04/03/92	5873.6	5879.80	6.20
	05/01/92	5871.0	5879.80	8.77
	05/07/92	5870.6	5879.80	9.20
	07/01/92	5869.8	5879.80	10.05
31891				
	11/04/91	5901.1	5919.52	18.40
	11/11/91	5901.2	5919.52	18.36
	12/02/91	5901.6	5919.52	17.92
	01/09/92	5901.1	5919.52	18.39
	02/04/92	5901.1	5919.52	18.38
	02/10/92	5901.0	5919.52	18.48
	03/03/92	5901.1	5919.52	18.46
	04/06/92	5903.4	5919.52	16.14
	05/01/92	5902.8	5919.52	16.73
	06/05/92	5902.9	5919.52	16.66
	07/01/92	5902.6	5919.52	16.96
32591				
	11/04/91	Dry Well	5917.41	Dry Well
	12/02/91	5897.2	5917.41	20.20
	01/09/92	5898.5	5917.41	18.90
	02/03/92	5898.4	5917.41	19.03
	03/03/92	5898.6	5917.41	18.82
	04/06/92	5899.3	5917.41	18.11
	05/01/92	5898.8	5917.41	18.58
	05/11/92	5899.0	5917.41	18.37
	07/01/92	5897.4	5917.41	20.02
33491				
	11/04/91	Dry Well	5928.59	Dry Well
	12/02/91	Dry Well	5928.59	Dry Well
	01/07/92	N/A	5928.59	N/A
	02/03/92	N/A	5928.59	N/A
	03/03/92	N/A	5928.59	N/A
	03/05/92	5917.3	5928.59	11.32
	04/03/92	5917.8	5928.59	10.76

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
33491				
	05/01/92	5918.2	5928.59	10.42
	06/03/92	5918.4	5928.59	10.15
	07/02/92	5917.7	5928.59	10.92
33691				
	11/04/91	Dry Well	5929.24	Dry Well
	12/02/91	5916.3	5929.24	12.92
	01/07/92	N/A	5929.24	N/A
	02/03/92	5916.5	5929.24	12.75
	03/05/92	5917.0	5929.24	12.24
	04/03/92	5918.3	5929.24	10.93
	05/01/92	5918.7	5929.24	10.56
	06/03/92	5918.9	5929.24	10.35
	07/02/92	N/A	5929.24	N/A
33891				
	11/04/91	Dry Well	5929.94	Dry Well
	12/02/91	Dry Well	5929.94	Dry Well
	01/07/92	N/A	5929.94	N/A
	02/03/92	N/A	5929.94	N/A
	03/05/92	N/A	5929.94	N/A
	04/08/92	5918.6	5929.94	11.38
	05/01/92	5919.3	5929.94	10.63
	06/03/92	5919.8	5929.94	10.18
	07/02/92	5919.2	5929.94	10.76
34591				
	11/04/91	Dry Well	5954.63	Dry Well
	01/07/92	N/A	5954.63	N/A
	02/03/92	5941.3	5954.63	13.32
	03/03/92	5941.7	5954.63	12.95
	04/03/92	5941.8	5954.63	12.80
	05/01/92	5941.9	5954.63	12.69
	06/02/92	5940.9	5954.63	13.69
	07/06/92	N/A	5954.63	N/A
34791				
	11/04/91	5946.5	5953.91	7.43
	12/16/91	5948.3	5953.91	5.65
	01/07/92	5948.6	5953.91	5.27
	02/10/92	5948.7	5953.91	5.25

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
34791				
	03/03/92	5948.2	5953.91	5.76
	04/03/92	5952.0	5953.91	1.92
	05/01/92	5950.3	5953.91	3.60
	05/20/92	5949.3	5953.91	4.61
	07/06/92	5949.0	5953.91	4.93
35391				
	11/04/91	5952.0	5963.03	11.02
	12/16/91	5951.9	5963.03	11.13
	01/07/92	5950.7	5963.03	12.35
	02/25/92	5952.3	5963.03	10.77
	03/03/92	5950.3	5963.03	12.74
	04/06/92	5951.9	5963.03	11.09
	05/01/92	5952.4	5963.03	10.64
	06/22/92	5952.6	5963.03	10.43
	07/01/92	5950.6	5963.03	12.42
35691				
	11/04/91	5927.0	5941.36	14.41
	11/11/91	5926.6	5941.36	14.78
	12/10/91	5929.3	5941.36	12.10
	01/09/92	5929.3	5941.36	12.05
	02/04/92	5929.4	5941.36	11.98
	02/17/92	5923.6	5941.36	17.75
	03/24/92	5925.0	5941.36	16.31
	03/24/92	5925.0	5941.36	16.31
	04/06/92	5925.3	5941.36	16.03
	05/01/92	5925.3	5941.36	16.01
	05/13/92	5925.1	5941.36	16.24
	07/01/92	5924.9	5941.36	16.45
35991				
	11/04/91	Dry Well	5976.45	Dry Well
	12/02/91	Dry Well	5976.45	Dry Well
	01/07/92	5957.4	5976.45	19.08
	02/03/92	5957.5	5976.45	18.92
	03/03/92	5957.9	5976.45	18.57
	04/08/92	5958.4	5976.45	18.03
	05/01/92	5958.7	5976.45	17.77
	06/01/92	5958.9	5976.45	17.54
	07/06/92	N/A	5976.45	N/A

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
36191				
	11/04/91	5949.5	5965.17	15.64
	11/12/91	5950.0	5965.17	15.17
	12/03/91	Dry Well	5965.17	Dry Well
	01/07/92	5953.3	5965.17	11.83
	02/11/92	5957.8	5965.17	7.40
	03/03/92	5950.8	5965.17	14.42
	04/03/92	5959.5	5965.17	5.72
	05/01/92	5960.6	5965.17	4.61
	06/10/92	5960.0	5965.17	5.20
	07/06/92	5951.3	5965.17	13.87
36391				
	11/04/91	Dry Well	5967.01	Dry Well
	12/09/91	5934.9	5967.01	32.08
	01/07/92	5935.3	5967.01	31.68
	02/03/92	5937.3	5967.01	29.70
	03/05/92	5938.0	5967.01	29.06
	04/03/92	5944.5	5967.01	22.54
	05/01/92	5941.8	5967.01	25.19
	06/05/92	5944.9	5967.01	22.09
	07/06/92	5944.0	5967.01	23.04
36691				
	12/02/91	Dry Well	5951.52	Dry Well
	01/07/92	5923.6	5951.52	27.95
	02/03/92	5924.1	5951.52	27.40
	02/27/92	5925.6	5951.52	25.90
	03/05/92	5923.9	5951.52	27.58
	04/03/92	5924.8	5951.52	26.68
	05/01/92	5926.3	5951.52	25.25
	07/06/92	5926.6	5951.52	24.96
36991				
	11/04/91	Dry Well	5972.31	Dry Well
	12/02/91	Dry Well	5972.31	Dry Well
	01/07/92	N/A	5972.31	N/A
	02/06/92	N/A	5972.31	N/A
	03/02/92	N/A	5972.31	N/A
	07/09/92	N/A	5972.31	N/A

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
37191				
	11/04/91	5938.0	5948.29	10.31
	11/12/91	5937.9	5948.29	10.35
	12/02/91	5938.4	5948.29	9.94
	01/07/92	5938.3	5948.29	10.02
	02/04/92	5938.1	5948.29	10.17
	02/10/92	5938.1	5948.29	10.18
	03/05/92	5938.5	5948.29	9.82
	04/03/92	5942.7	5948.29	5.61
	05/01/92	5941.7	5948.29	6.64
	06/24/92	5940.2	5948.29	8.08
	07/02/92	5940.0	5948.29	8.30
37591				
	11/04/91	5979.6	5993.45	13.85
	12/09/91	5984.1	5993.45	9.32
	12/16/91	5981.1	5993.45	12.38
	01/07/92	5983.0	5993.45	10.41
	02/04/92	5984.5	5993.45	8.91
	02/25/92	5983.8	5993.45	9.63
	03/03/92	5981.4	5993.45	12.07
	04/03/92	5987.7	5993.45	5.73
	05/01/92	5986.5	5993.45	6.96
	06/10/92	5986.4	5993.45	7.08
	07/06/92	5985.8	5993.45	7.64
37691				
	11/04/91	Dry Well	5985.24	Dry Well
	12/09/91	5967.1	5985.24	18.14
	01/07/92	N/A	5985.24	N/A
	02/03/92	N/A	5985.24	N/A
	03/03/92	N/A	5985.24	N/A
	04/03/92	5972.0	5985.24	13.28
	05/01/92	5968.2	5985.24	17.00
	06/22/92	5968.3	5985.24	16.90
	07/06/92	5967.6	5985.24	17.63
37791				
	12/18/91	5982.1	6004.18	22.12
	01/07/92	5982.6	6004.18	21.63
	01/20/92	5983.4	6004.18	20.78
	01/20/92	5983.4	6004.18	20.78
	03/02/92	5983.8	6004.18	20.36

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
37791				
	04/06/92	5984.6	6004.18	19.54
	04/21/92	5984.8	6004.18	19.39
	07/01/92	5985.1	6004.18	19.07
	07/29/92	5985.1	6004.18	19.07
37891				
	12/02/91	5884.5	5926.29	41.82
	12/14/91	5882.2	5926.29	44.12
	01/07/92	5883.6	5926.29	42.71
	02/26/92	5883.2	5926.29	43.14
	03/05/92	5882.5	5926.29	43.80
	04/03/92	5887.4	5926.29	38.94
	05/01/92	5889.0	5926.29	37.26
	06/03/92	5888.1	5926.29	38.22
	07/02/92	5887.5	5926.29	38.81
37991				
	12/09/91	5884.0	5933.55	49.57
	12/14/91	5883.8	5933.55	49.75
	01/07/92	5884.1	5933.55	49.42
	02/26/92	5883.8	5933.55	49.80
	03/05/92	5883.9	5933.55	49.66
	04/03/92	5885.8	5933.55	47.76
	05/01/92	5888.4	5933.55	45.14
	06/03/92	5887.8	5933.55	45.75
	06/08/92	5887.8	5933.55	45.75
	07/02/92	5887.4	5933.55	46.12
38191				
	12/02/91	5916.1	5926.40	10.30
	01/07/92	5916.1	5926.40	10.29
	03/05/92	5916.6	5926.40	9.83
	04/03/92	5918.7	5926.40	7.68
	05/01/92	5918.2	5926.40	8.20
	07/06/92	5917.2	5926.40	9.22
38291				
	11/04/91	Dry Well	5926.71	Dry Well
	12/02/91	Dry Well	5926.71	Dry Well
	01/07/92	N/A	5926.71	N/A
	03/05/92	N/A	5926.71	N/A

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
38291				
	04/03/92	N/A	5926.71	N/A
	05/01/92	N/A	5926.71	N/A
	06/01/92	N/A	5926.71	N/A
	07/02/92	N/A	5926.71	N/A
38591				
	12/09/91	5858.2	5866.62	8.43
	12/17/91	5858.1	5866.62	8.48
	01/09/92	5858.1	5866.62	8.55
	02/10/92	5858.2	5866.62	8.38
	03/03/92	5858.3	5866.62	8.35
	04/03/92	5858.9	5866.62	7.74
	05/01/92	5858.3	5866.62	8.30
	05/08/92	5858.1	5866.62	8.48
	05/08/92	5858.1	5866.62	8.48
	07/01/92	5857.7	5866.62	8.89
38891				
	12/09/91	Dry Well	5893.24	Dry Well
	01/09/92	N/A	5893.24	N/A
	02/03/92	N/A	5893.24	N/A
	03/03/92	N/A	5893.24	N/A
	04/06/92	N/A	5893.24	N/A
	05/01/92	N/A	5893.24	N/A
	06/01/92	N/A	5893.24	N/A
	07/08/92	N/A	5893.24	N/A
38991				
	01/09/92	5866.6	5895.49	28.91
	03/03/92	5875.6	5895.49	19.88
	04/03/92	5884.0	5895.49	11.47
	04/06/92	5886.0	5895.49	9.53
	05/01/92	5883.9	5895.49	11.60
	07/08/92	5881.8	5895.49	13.70
39191				
	12/17/91	5884.0	5918.32	34.30
	01/09/92	5880.4	5918.32	37.92
	02/25/92	5880.3	5918.32	37.98
	03/03/92	5881.5	5918.32	36.85
	04/06/92	5889.0	5918.32	29.28

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
39191				
	05/01/92	5888.4	5918.32	29.94
	05/13/92	5886.2	5918.32	32.08
	07/01/92	5884.6	5918.32	33.74
39291				
	12/09/91	5878.0	5910.21	32.17
	01/09/92	5878.0	5910.21	32.24
	03/03/92	5881.3	5910.21	28.90
	04/06/92	5890.8	5910.21	19.40
	05/01/92	5888.3	5910.21	21.90
	07/08/92	5885.9	5910.21	24.31
39691				
	01/07/92	5998.3	6008.37	10.10
	02/03/92	5998.2	6008.37	10.18
	03/03/92	5998.1	6008.37	10.30
	04/03/92	6000.1	6008.37	8.25
	05/01/92	5999.0	6008.37	9.34
	05/11/92	5998.7	6008.37	9.65
	07/06/92	5997.8	6008.37	10.59
4387				
	01/15/89	5916.9	5926.41	9.50
	02/14/89	5916.9	5926.41	9.50
	03/27/89	5916.6	5926.41	9.80
	04/27/89	5917.2	5926.41	9.20
	05/18/89	5917.2	5926.41	9.20
	06/10/89	5917.4	5926.41	9.05
	06/29/89	5917.0	5926.41	9.40
	07/14/89	5916.8	5926.41	9.56
	08/18/89	5917.0	5926.41	9.45
	08/25/89	5915.3	5926.41	11.13
	09/12/89	5916.5	5926.41	9.95
	10/26/89	5916.9	5926.41	9.55
	01/16/90	5916.7	5926.41	9.76
	02/01/90	5916.6	5926.41	9.79
	04/13/90	5920.5	5926.41	5.96
	06/07/90	5920.2	5926.41	6.17
	07/12/90	5919.3	5926.41	7.09
	08/09/90	5919.0	5926.41	7.43
	09/11/90	5918.4	5926.41	8.04
	09/12/90	5915.8	5926.41	10.63

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
4387				
	10/01/90	5918.0	5926.41	8.42
	11/07/90	5917.8	5926.41	8.62
	11/13/90	5917.8	5926.41	8.66
	12/06/90	5917.5	5926.41	8.93
	01/03/91	5917.3	5926.41	9.09
	03/18/91	5917.1	5926.41	9.33
	04/01/91	5916.6	5926.41	9.78
	05/07/91	5917.3	5926.41	9.15
	05/13/91	5917.3	5926.41	9.16
	06/11/91	5917.5	5926.41	8.89
	07/05/91	5917.3	5926.41	9.14
	08/06/91	5916.9	5926.41	9.53
	08/14/91	5916.9	5926.41	9.48
	09/05/91	5916.7	5926.41	9.72
	10/03/91	5916.5	5926.41	9.87
	11/05/91	5916.4	5926.41	10.05
	12/02/91	5916.5	5926.41	9.92
	12/10/91	5916.5	5926.41	9.96
	01/03/92	5916.3	5926.41	10.08
	02/13/92	5916.5	5926.41	9.89
	03/05/92	5916.2	5926.41	10.18
	04/01/92	5918.5	5926.41	7.90
	05/05/92	5917.5	5926.41	8.92
	06/01/92	5917.7	5926.41	8.67
	06/23/92	5917.1	5926.41	9.27
	07/02/92	5917.2	5926.41	9.20
4587				
	01/15/89	5859.5	5950.91	91.40
	02/14/89	5859.8	5950.91	91.10
	03/27/89	5859.5	5950.91	91.40
	04/27/89	5859.4	5950.91	91.50
	05/19/89	5859.2	5950.91	91.70
	06/29/89	5859.4	5950.91	91.50
	07/14/89	5859.3	5950.91	91.62
	08/25/89	5859.4	5950.91	91.48
	01/15/90	5861.0	5950.91	89.96
	04/17/90	5859.5	5950.91	91.41
	06/12/90	5860.0	5950.91	90.95
	07/12/90	5859.8	5950.91	91.08
	09/10/90	5860.0	5950.91	90.87
	10/01/90	5860.1	5950.91	90.81
	10/25/90	5859.9	5950.91	90.98
	01/03/91	5859.8	5950.91	91.14

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
4587				
	03/07/91	5859.8	5950.91	91.07
	04/01/91	5859.8	5950.91	91.06
	05/14/91	5859.8	5950.91	91.09
	07/05/91	5859.6	5950.91	91.28
	08/16/91	5859.6	5950.91	91.34
	10/03/91	5859.8	5950.91	91.16
	12/11/91	5859.7	5950.91	91.22
	01/03/92	5859.7	5950.91	91.18
	02/22/92	5859.7	5950.91	91.26
	04/03/92	5859.8	5950.91	91.15
	06/23/92	5860.1	5950.91	90.80
	07/02/92	5945.3	5950.91	5.65
4787				
	01/15/89	N/A	5884.64	N/A
	02/13/89	N/A	5884.64	N/A
	03/24/89	N/A	5884.64	N/A
	04/27/89	N/A	5884.64	N/A
	05/19/89	5875.8	5884.64	8.80
	06/10/89	5877.3	5884.64	7.30
	06/29/89	N/A	5884.64	N/A
	07/14/89	N/A	5884.64	N/A
	07/26/89	N/A	5884.64	N/A
	08/25/89	N/A	5884.64	N/A
	09/13/89	5876.4	5884.64	8.20
	10/20/89	N/A	5884.64	N/A
	01/16/90	5878.4	5884.64	6.21
	02/15/90	5875.9	5884.64	8.72
	04/12/90	5876.4	5884.64	8.21
	05/03/90	5876.6	5884.64	8.07
	07/11/90	Dry Well	5884.64	Dry Well
	08/08/90	5875.1	5884.64	9.51
	09/11/90	Dry Well	5884.64	Dry Well
	09/12/90	Dry Well	5884.64	Dry Well
	10/01/90	Dry Well	5884.64	Dry Well
	10/25/90	Dry Well	5884.64	Dry Well
	11/07/90	Dry Well	5884.64	Dry Well
	12/10/90	Dry Well	5884.64	Dry Well
	01/02/91	Dry Well	5884.64	Dry Well
	01/02/91	Dry Well	5884.64	Dry Well
	04/01/91	Dry Well	5884.64	Dry Well
	05/07/91	Dry Well	5884.64	Dry Well
	06/05/91	5877.3	5884.64	7.38
	07/02/91	5875.8	5884.64	8.85

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
4787				
	08/06/91	Dry Well	5884.64	Dry Well
	08/19/91	Dry Well	5884.64	Dry Well
	09/03/91	Dry Well	5884.64	Dry Well
	10/02/91	5874.8	5884.64	9.81
	10/02/91	Dry Well	5884.64	Dry Well
	11/05/91	5875.0	5884.64	9.64
	12/10/91	5876.5	5884.64	8.18
	01/10/92	5875.2	5884.64	9.45
	02/05/92	N/A	5884.64	N/A
	02/11/92	N/A	5884.64	N/A
	03/05/92	5875.0	5884.64	9.61
	04/06/92	N/A	5884.64	N/A
	05/05/92	5879.2	5884.64	5.43
	06/10/92	5878.0	5884.64	6.64
	07/01/92	5877.3	5884.64	7.36
4887				
	01/15/89	5899.5	5911.41	11.90
	02/13/89	5899.4	5911.41	12.00
	03/24/89	5900.5	5911.41	10.90
	04/27/89	5900.6	5911.41	10.80
	05/19/89	5903.9	5911.41	7.50
	06/09/89	5904.5	5911.41	6.90
	06/29/89	5903.0	5911.41	8.40
	07/14/89	5901.5	5911.41	9.89
	07/25/89	5901.5	5911.41	9.90
	08/25/89	N/A	5911.41	N/A
	09/13/89	N/A	5911.41	N/A
	10/20/89	N/A	5911.41	N/A
	01/16/90	N/A	5911.41	N/A
	04/12/90	5906.1	5911.41	5.32
	05/03/90	5905.0	5911.41	6.41
	07/11/90	5901.3	5911.41	10.09
	07/24/90	5900.0	5911.41	11.40
	10/01/90	5899.7	5911.41	11.68
	10/08/90	5899.7	5911.41	11.72
	01/02/91	5899.8	5911.41	11.64
	03/14/91	5899.4	5911.41	12.02
	04/01/91	Dry Well	5911.41	Dry Well
	07/02/91	5902.4	5911.41	9.00
	08/20/91	5900.0	5911.41	11.45
	10/02/91	5899.0	5911.41	12.40
	10/02/91	Dry Well	5911.41	Dry Well
	01/10/92	N/A	5911.41	N/A

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
4887				
	04/06/92	5906.3	5911.41	5.08
	05/06/92	5906.2	5911.41	5.18
	05/11/92	5906.1	5911.41	5.30
	07/01/92	5905.6	5911.41	5.80
4987				
	01/15/89	N/A	5914.27	N/A
	02/13/89	N/A	5914.27	N/A
	03/24/89	N/A	5914.27	N/A
	04/27/89	N/A	5914.27	N/A
	05/19/89	N/A	5914.27	N/A
	06/10/89	N/A	5914.27	N/A
	06/29/89	N/A	5914.27	N/A
	07/14/89	N/A	5914.27	N/A
	07/26/89	N/A	5914.27	N/A
	08/18/89	N/A	5914.27	N/A
	09/13/89	N/A	5914.27	N/A
	10/17/89	N/A	5914.27	N/A
	01/16/90	N/A	5914.27	N/A
	04/12/90	5911.6	5914.27	2.70
	05/03/90	5910.2	5914.27	4.10
	07/11/90	Dry Well	5914.27	Dry Well
	07/23/90	Dry Well	5914.27	Dry Well
	10/01/90	Dry Well	5914.27	Dry Well
	10/25/90	Dry Well	5914.27	Dry Well
	01/02/91	Dry Well	5914.27	Dry Well
	01/02/91	Dry Well	5914.27	Dry Well
	04/01/91	Dry Well	5914.27	Dry Well
	07/02/91	Dry Well	5914.27	Dry Well
	10/02/91	5907.5	5914.27	6.82
	10/02/91	Dry Well	5914.27	Dry Well
	01/03/92	N/A	5914.27	N/A
	04/06/92	5909.4	5914.27	4.86
	05/11/92	5908.5	5914.27	5.78
	07/01/92	5908.0	5914.27	6.25
	07/29/92	N/A	5914.27	N/A
5087				
	01/15/89	N/A	5934.78	N/A
	02/13/89	N/A	5934.78	N/A
	03/24/89	N/A	5934.78	N/A
	04/25/89	N/A	5934.78	N/A
	05/19/89	N/A	5934.78	N/A

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
5087				
	06/09/89	N/A	5934.78	N/A
	06/29/89	N/A	5934.78	N/A
	07/14/89	N/A	5934.78	N/A
	07/25/89	N/A	5934.78	N/A
	08/18/89	N/A	5934.78	N/A
	09/13/89	N/A	5934.78	N/A
	10/17/89	N/A	5934.78	N/A
	01/16/90	N/A	5934.78	N/A
	04/12/90	Dry Well	5934.78	Dry Well
	05/02/90	Dry Well	5934.78	Dry Well
	07/11/90	Dry Well	5934.78	Dry Well
	07/31/90	Dry Well	5934.78	Dry Well
	10/01/90	Dry Well	5934.78	Dry Well
	10/09/90	Dry Well	5934.78	Dry Well
	01/02/91	Dry Well	5934.78	Dry Well
	01/02/91	Dry Well	5934.78	Dry Well
	04/01/91	Dry Well	5934.78	Dry Well
	07/05/91	Dry Well	5934.78	Dry Well
	10/02/91	5918.7	5934.78	16.04
	10/02/91	Dry Well	5934.78	Dry Well
	01/03/92	N/A	5934.78	N/A
	04/03/92	N/A	5934.78	N/A
	07/01/92	N/A	5934.78	N/A
5187				
	01/15/89	5949.7	5965.22	15.50
	02/14/89	5949.7	5965.22	15.50
	03/27/89	5949.7	5965.22	15.50
	04/27/89	5949.7	5965.22	15.50
	05/26/89	5949.8	5965.22	15.40
	06/12/89	5949.8	5965.22	15.45
	06/29/89	5949.8	5965.22	15.40
	07/21/89	5949.9	5965.22	15.35
	08/14/89	5949.9	5965.22	15.35
	08/25/89	5955.4	5965.22	9.83
	09/14/89	N/A	5965.22	N/A
	10/27/89	5949.8	5965.22	15.40
	01/18/90	5949.6	5965.22	15.60
	03/23/90	N/A	5965.22	N/A
	04/26/90	5949.8	5965.22	15.44
	05/22/90	5949.8	5965.22	15.41
	07/11/90	5949.8	5965.22	15.41
	08/22/90	5949.8	5965.22	15.42
	10/03/90	5949.8	5965.22	15.42

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
5187				
	12/13/90	Dry Well	5965.22	Dry Well
	01/04/91	5949.7	5965.22	15.56
	06/12/91	5949.8	5965.22	15.43
	07/03/91	5949.8	5965.22	15.44
	08/08/91	5949.8	5965.22	15.38
	09/03/91	5949.8	5965.22	15.43
	10/02/91	5951.7	5965.22	13.49
	10/17/91	5952.9	5965.22	12.36
	01/07/92	5949.7	5965.22	15.51
	01/20/92	5949.7	5965.22	15.53
	01/20/92	5949.7	5965.22	15.53
	04/06/92	5949.8	5965.22	15.47
	07/01/92	5949.7	5965.22	15.49
	07/29/92	5949.7	5965.22	15.51
5287				
	02/14/89	5959.7	5969.57	9.90
	03/27/89	5959.9	5969.57	9.70
	04/27/89	5959.9	5969.57	9.70
	05/26/89	5960.1	5969.57	9.50
	06/12/89	5960.1	5969.57	9.50
	06/29/89	5960.9	5969.57	8.70
	07/21/89	5959.7	5969.57	9.86
	08/14/89	5960.0	5969.57	9.55
	08/25/89	5960.1	5969.57	9.48
	09/14/89	5960.2	5969.57	9.36
	10/26/89	5959.7	5969.57	9.90
	01/18/90	5959.7	5969.57	9.90
	01/29/90	5959.8	5969.57	9.73
	04/26/90	5960.2	5969.57	9.42
	06/21/90	5959.9	5969.57	9.66
	07/11/90	5959.9	5969.57	9.70
	08/24/90	5959.6	5969.57	9.94
	10/03/90	5959.6	5969.57	9.94
	12/11/90	5959.8	5969.57	9.72
	01/04/91	5959.9	5969.57	9.70
	03/26/91	5959.2	5969.57	10.41
	06/07/91	5960.0	5969.57	9.57
	07/03/91	5959.6	5969.57	9.98
	08/08/91	5959.8	5969.57	9.76
	10/02/91	5959.3	5969.57	10.24
	10/11/91	5959.2	5969.57	10.37
	01/07/92	5959.9	5969.57	9.67
	01/17/92	5960.0	5969.57	9.52

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
5287				
	04/06/92	5960.1	5969.57	9.47
	04/22/92	5960.0	5969.57	9.59
	07/01/92	5959.6	5969.57	9.97
	07/24/92	5959.4	5969.57	10.13
5387				
	01/15/89	5951.8	5961.81	10.00
	02/14/89	5951.8	5961.81	10.00
	03/24/89	5952.3	5961.81	9.50
	04/27/89	5952.6	5961.81	9.20
	05/19/89	5953.1	5961.81	8.70
	06/08/89	5953.7	5961.81	8.10
	06/29/89	5952.1	5961.81	9.70
	07/25/89	5952.4	5961.81	9.45
	07/28/89	5952.3	5961.81	9.52
	08/25/89	5951.7	5961.81	10.10
	09/13/89	5951.9	5961.81	9.95
	10/25/89	5952.5	5961.81	9.33
	01/18/90	5953.9	5961.81	7.93
	01/26/90	5954.0	5961.81	7.85
	04/12/90	5958.6	5961.81	3.24
	05/03/90	5957.3	5961.81	4.55
	07/12/90	5954.0	5961.81	7.79
	07/31/90	5953.5	5961.81	8.28
	10/01/90	5951.1	5961.81	10.72
	10/23/90	5951.0	5961.81	10.82
	01/02/91	5952.6	5961.81	9.21
	04/01/91	5953.7	5961.81	8.07
	05/13/91	5955.0	5961.81	6.78
	07/05/91	5954.6	5961.81	7.22
	08/21/91	5952.3	5961.81	9.54
	10/02/91	5951.1	5961.81	10.73
	11/14/91	5950.8	5961.81	11.01
	01/03/92	5956.8	5961.81	4.99
	04/06/92	5957.2	5961.81	4.61
	04/29/92	5955.7	5961.81	6.12
	07/01/92	5954.5	5961.81	7.35
5487				
	01/15/89	5952.8	5957.62	4.80
	01/30/89	5952.9	5957.62	4.75
	02/13/89	5952.6	5957.62	5.00
	03/24/89	5954.0	5957.62	3.60

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
5487				
	04/27/89	5954.3	5957.62	3.30
	05/19/89	5954.3	5957.62	3.30
	06/08/89	5954.4	5957.62	3.20
	06/29/89	5952.2	5957.62	5.40
	07/26/89	5952.4	5957.62	5.20
	07/28/89	5953.3	5957.62	4.32
	08/25/89	5954.3	5957.62	3.35
	09/13/89	5955.2	5957.62	2.45
	10/25/89	5952.2	5957.62	5.40
	01/18/90	5952.5	5957.62	5.08
	01/30/90	5952.9	5957.62	4.75
	04/12/90	5955.5	5957.62	2.10
	05/03/90	5954.9	5957.62	2.75
	07/12/90	5954.4	5957.62	3.18
	07/19/90	5953.5	5957.62	4.08
	08/09/90	5953.0	5957.62	4.60
	09/12/90	5953.1	5957.62	4.57
	10/01/90	5953.0	5957.62	4.65
	10/23/90	5952.1	5957.62	5.54
	11/07/90	5952.2	5957.62	5.38
	12/06/90	5952.8	5957.62	4.80
	01/02/91	5952.4	5957.62	5.24
	04/01/91	5952.8	5957.62	4.77
	05/07/91	5954.7	5957.62	2.95
	05/13/91	5953.7	5957.62	3.91
	06/05/91	5954.0	5957.62	3.58
	07/05/91	5952.6	5957.62	4.99
	08/06/91	5954.0	5957.62	3.63
	08/21/91	5953.3	5957.62	4.35
	09/03/91	5951.3	5957.62	6.35
	10/02/91	5952.8	5957.62	4.79
	11/05/91	5952.7	5957.62	4.92
	11/14/91	5954.0	5957.62	3.63
	12/07/91	5954.9	5957.62	2.74
	01/03/92	5954.3	5957.62	3.29
	02/05/92	N/A	5957.62	N/A
	03/05/92	5954.9	5957.62	2.72
	04/06/92	5954.4	5957.62	3.20
	04/29/92	5953.3	5957.62	4.28
	05/05/92	5951.7	5957.62	5.92
	06/01/92	5955.0	5957.62	2.58
	07/01/92	5953.5	5957.62	4.10

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
5587				
	01/15/89	5850.9	5860.09	9.20
	02/14/89	5850.9	5860.09	9.20
	03/24/89	N/A	5860.09	N/A
	04/27/89	5850.8	5860.09	9.30
	05/19/89	N/A	5860.09	N/A
	06/01/89	5850.8	5860.09	9.30
	06/29/89	N/A	5860.09	N/A
	07/10/89	5850.7	5860.09	9.35
	07/28/89	N/A	5860.09	N/A
	08/25/89	N/A	5860.09	N/A
	09/14/89	N/A	5860.09	N/A
	10/16/89	N/A	5860.09	N/A
	01/16/90	N/A	5860.09	N/A
	04/12/90	5853.6	5860.09	6.51
	05/04/90	5853.2	5860.09	6.87
	07/10/90	5852.3	5860.09	7.80
	07/19/90	5854.2	5860.09	5.94
	08/07/90	5851.3	5860.09	8.80
	09/12/90	5851.4	5860.09	8.70
	10/01/90	5851.4	5860.09	8.70
	10/29/90	5851.3	5860.09	8.80
	11/07/90	5850.7	5860.09	9.36
	12/06/90	Dry Well	5860.09	Dry Well
	01/02/91	5850.8	5860.09	9.34
	03/18/91	5850.8	5860.09	9.32
	04/01/91	Dry Well	5860.09	Dry Well
	05/07/91	5850.7	5860.09	9.37
	06/05/91	5850.8	5860.09	9.30
	07/02/91	5851.1	5860.09	9.01
	08/06/91	5851.2	5860.09	8.93
	08/19/91	5851.2	5860.09	8.94
	09/03/91	Dry Well	5860.09	Dry Well
	10/02/91	5850.7	5860.09	9.36
	11/05/91	5850.7	5860.09	9.42
	11/14/91	5850.7	5860.09	9.42
	12/02/91	5850.6	5860.09	9.47
	01/03/92	N/A	5860.09	N/A
	02/03/92	N/A	5860.09	N/A
	03/05/92	5850.6	5860.09	9.46
	04/01/92	5853.7	5860.09	6.40
	05/01/92	5853.0	5860.09	7.10
	05/07/92	5853.0	5860.09	7.12
	06/01/92	5851.8	5860.09	8.34
	07/01/92	5851.9	5860.09	8.18

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
5886				
	01/15/89	N/A	5897.65	N/A
	02/14/89	N/A	5897.65	N/A
	03/24/89	5891.8	5897.65	5.90
	04/27/89	N/A	5897.65	N/A
	05/19/89	N/A	5897.65	N/A
	06/29/89	N/A	5897.65	N/A
	07/28/89	N/A	5897.65	N/A
	08/25/89	N/A	5897.65	N/A
	09/15/89	5891.8	5897.65	5.90
	11/28/89	N/A	5897.65	N/A
	01/16/90	N/A	5897.65	N/A
	04/12/90	Dry Well	5897.65	Dry Well
	05/25/90	Dry Well	5897.65	Dry Well
	07/10/90	Dry Well	5897.65	Dry Well
	07/30/90	Dry Well	5897.65	Dry Well
	10/04/90	Dry Well	5897.65	Dry Well
	10/05/90	Dry Well	5897.65	Dry Well
	01/03/91	Dry Well	5897.65	Dry Well
	01/03/91	Dry Well	5897.65	Dry Well
	04/02/91	Dry Well	5897.65	Dry Well
	07/02/91	Dry Well	5897.65	Dry Well
	10/03/91	5891.1	5897.65	6.52
	10/03/91	Dry Well	5897.65	Dry Well
	01/03/92	5891.6	5897.65	6.05
	02/19/92	5891.7	5897.65	5.95
	04/03/92	5891.8	5897.65	5.88
	05/08/92	N/A	5897.65	N/A
	05/08/92	N/A	5897.65	N/A
	07/01/92	5891.3	5897.65	6.37
5986				
	01/15/89	5896.5	5922.80	26.30
	02/13/89	5896.1	5922.80	26.70
	03/24/89	5896.6	5922.80	26.20
	05/19/89	5897.4	5922.80	25.40
	04/12/90	5897.9	5922.80	24.92
	05/01/90	5898.1	5922.80	24.67
	07/11/90	5897.1	5922.80	25.74
	07/18/90	5897.0	5922.80	25.85
	08/08/90	5896.7	5922.80	26.06
	09/12/90	5896.4	5922.80	26.45
	10/01/90	5896.1	5922.80	26.66
	10/04/90	5896.0	5922.80	26.76
	11/07/90	5895.9	5922.80	26.90

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
5986				
	12/06/90	5896.0	5922.80	26.78
	01/02/91	5896.1	5922.80	26.68
	03/14/91	5896.2	5922.80	26.60
	04/01/91	5896.3	5922.80	26.50
	05/07/91	5896.9	5922.80	25.90
	05/09/91	5897.0	5922.80	25.82
	06/05/91	5897.5	5922.80	25.30
	07/02/91	5897.2	5922.80	25.65
	08/06/91	5896.4	5922.80	26.38
	08/21/91	5896.4	5922.80	26.39
	09/03/91	5896.4	5922.80	26.36
	10/02/91	5896.2	5922.80	26.62
	11/05/91	5896.0	5922.80	26.83
	11/14/91	5895.9	5922.80	26.92
	12/07/91	5896.3	5922.80	26.55
5986R				
	06/06/89	5896.0	5921.54	25.52
	07/25/89	5897.1	5921.54	24.45
	07/28/89	5895.3	5921.54	26.25
	08/25/89	5895.0	5921.54	26.50
	09/13/89	5895.1	5921.54	26.46
	10/17/89	5895.0	5921.54	26.58
	01/18/90	5895.0	5921.54	26.51
	03/20/90	5895.5	5921.54	26.00
6286				
	01/15/89	5875.9	5903.18	27.30
	02/27/89	5875.8	5903.18	27.40
	03/24/89	5875.5	5903.18	27.70
	04/25/89	5875.3	5903.18	27.90
	05/19/89	5875.3	5903.18	27.90
	06/10/89	5875.3	5903.18	27.90
	06/29/89	5875.3	5903.18	27.90
	07/14/89	5875.5	5903.18	27.73
	07/27/89	5875.6	5903.18	27.61
	08/18/89	5875.6	5903.18	27.58
	09/13/89	5875.7	5903.18	27.45
	10/19/89	5875.8	5903.18	27.34
	01/16/90	5876.2	5903.18	27.02
	02/16/90	5875.9	5903.18	27.30
	04/16/90	5876.3	5903.18	26.93
	06/13/90	5877.6	5903.18	25.58

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
6286				
	07/12/90	5877.4	5903.18	25.75
	09/18/90	5877.5	5903.18	25.65
	10/03/90	5877.4	5903.18	25.77
	11/20/90	5877.1	5903.18	26.06
	01/07/91	5876.5	5903.18	26.73
	01/09/91	5876.5	5903.18	26.72
	04/05/91	5875.5	5903.18	27.69
	05/13/91	5875.3	5903.18	27.85
	07/03/91	5875.6	5903.18	27.57
	08/22/91	5876.0	5903.18	27.22
	10/03/91	5876.2	5903.18	26.99
	11/22/91	5875.9	5903.18	27.31
	01/06/92	5875.8	5903.18	27.38
	02/11/92	5875.5	5903.18	27.71
	04/03/92	5875.7	5903.18	27.50
	06/10/92	5877.0	5903.18	26.17
	07/08/92	5877.0	5903.18	26.15
6386				
	01/15/89	N/A	5902.01	N/A
	02/13/89	N/A	5902.01	N/A
	03/24/89	N/A	5902.01	N/A
	04/25/89	N/A	5902.01	N/A
	05/19/89	N/A	5902.01	N/A
	06/10/89	N/A	5902.01	N/A
	06/29/89	N/A	5902.01	N/A
	07/14/89	N/A	5902.01	N/A
	07/26/89	N/A	5902.01	N/A
	08/18/89	5886.3	5902.01	15.73
	09/13/89	N/A	5902.01	N/A
	10/18/89	N/A	5902.01	N/A
	01/16/90	N/A	5902.01	N/A
	04/16/90	5893.4	5902.01	8.60
	06/13/90	5891.4	5902.01	10.60
	07/12/90	5886.6	5902.01	15.39
	08/09/90	5886.5	5902.01	15.50
	09/12/90	5886.3	5902.01	15.67
	09/19/90	5885.3	5902.01	16.72
	10/03/90	5885.3	5902.01	16.67
	11/08/90	Dry Well	5902.01	Dry Well
	11/27/90	Dry Well	5902.01	Dry Well
	12/04/90	Dry Well	5902.01	Dry Well
	01/07/91	Dry Well	5902.01	Dry Well
	01/07/91	Dry Well	5902.01	Dry Well

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
6386				
	04/05/91	Dry Well	5902.01	Dry Well
	05/03/91	Dry Well	5902.01	Dry Well
	06/11/91	5888.6	5902.01	13.43
	07/03/91	5888.3	5902.01	13.68
	08/08/91	5887.4	5902.01	14.57
	08/22/91	5887.8	5902.01	14.22
	09/06/91	5885.7	5902.01	16.32
	10/03/91	5885.6	5902.01	16.43
	11/05/91	5885.4	5902.01	16.59
	11/22/91	5885.4	5902.01	16.64
	12/07/91	5885.2	5902.01	16.77
	01/06/92	N/A	5902.01	N/A
	02/03/92	N/A	5902.01	N/A
	03/05/92	N/A	5902.01	N/A
	04/03/92	5888.4	5902.01	13.57
	05/05/92	5888.1	5902.01	13.92
	06/02/92	5887.8	5902.01	14.22
	06/10/92	5887.7	5902.01	14.31
	07/02/92	5885.7	5902.01	16.32
6486				
	01/15/89	5830.6	5841.05	10.50
	02/14/89	5830.8	5841.05	10.30
	03/24/89	5834.3	5841.05	6.80
	04/27/89	5833.8	5841.05	7.30
	05/19/89	5833.4	5841.05	7.70
	05/26/89	5833.5	5841.05	7.60
	07/10/89	5832.6	5841.05	8.50
	09/14/89	5830.4	5841.05	10.70
	10/16/89	N/A	5841.05	N/A
	01/16/90	5830.0	5841.05	11.01
	02/08/90	5830.1	5841.05	10.91
	04/12/90	5834.2	5841.05	6.81
	05/25/90	5833.4	5841.05	7.66
	07/10/90	5830.1	5841.05	10.94
	07/31/90	Dry Well	5841.05	Dry Well
	10/01/90	5829.9	5841.05	11.12
	10/05/90	Dry Well	5841.05	Dry Well
	01/02/91	Dry Well	5841.05	Dry Well
	01/02/91	Dry Well	5841.05	Dry Well
	04/01/91	Dry Well	5841.05	Dry Well
	07/02/91	5833.0	5841.05	8.06
	08/22/91	5831.1	5841.05	9.95
	10/03/91	5829.9	5841.05	11.14

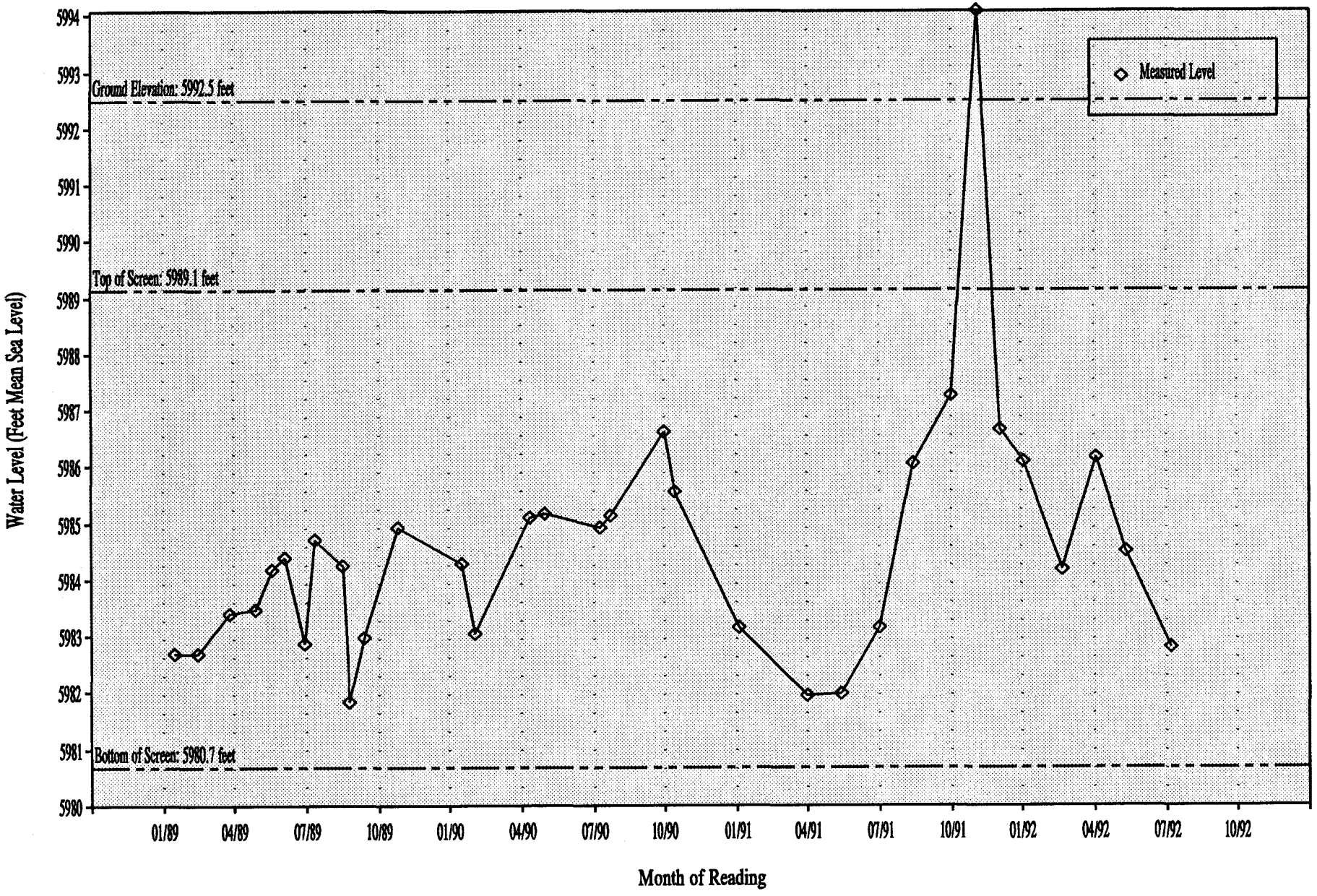
Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
6486				
	12/05/91	5832.6	5841.05	8.44
	01/03/92	5832.6	5841.05	8.44
	02/13/92	5833.8	5841.05	7.28
	04/08/92	5834.2	5841.05	6.90
	04/30/92	5833.7	5841.05	7.35
	07/01/92	5830.8	5841.05	10.23
6886				
	01/15/89	N/A	5890.49	N/A
	02/14/89	N/A	5890.49	N/A
	03/24/89	5887.4	5890.49	3.10
	04/27/89	5887.4	5890.49	3.10
	05/19/89	5887.1	5890.49	3.40
	06/29/89	5886.7	5890.49	3.80
	07/28/89	N/A	5890.49	N/A
	08/25/89	5886.8	5890.49	3.68
	09/15/89	5887.2	5890.49	3.25
	11/21/89	5887.2	5890.49	3.31
	01/16/90	5887.4	5890.49	3.13
	02/13/90	5887.3	5890.49	3.22
	04/12/90	5887.3	5890.49	3.17
	05/23/90	5887.1	5890.49	3.35
	07/10/90	5887.0	5890.49	3.46
	08/01/90	5887.0	5890.49	3.45
	10/02/90	5886.8	5890.49	3.67
	11/02/90	5886.8	5890.49	3.72
	01/02/91	5886.7	5890.49	3.78
	03/18/91	5887.2	5890.49	3.34
	04/02/91	5887.1	5890.49	3.38
	05/14/91	5887.1	5890.49	3.42
	07/02/91	5887.0	5890.49	3.50
	09/06/91	5886.3	5890.49	4.18
	10/03/91	5886.7	5890.49	3.82
	11/25/91	5886.8	5890.49	3.70
	01/03/92	5886.8	5890.49	3.71
	02/25/92	5887.1	5890.49	3.42
	04/01/92	5887.4	5890.49	3.05
	05/15/92	5886.9	5890.49	3.61
	07/01/92	5886.5	5890.49	4.00
6986				
	01/15/89	5916.2	5922.52	6.30
	02/13/89	5917.1	5922.52	5.40

Location	Sample Date	Ground Water Elevation (Feet Mean Sea Level)	Top of Casing Elevation (Feet)	Depth to Ground Water (Feet)
6986				
	03/24/89	5918.4	5922.52	4.10
	04/27/89	5918.8	5922.52	3.70
	05/19/89	5918.6	5922.52	3.90
	05/30/89	5918.0	5922.52	4.55
	06/29/89	5918.5	5922.52	4.00
	07/28/89	5917.2	5922.52	5.35
	08/10/89	5918.3	5922.52	4.20
	08/25/89	5918.9	5922.52	3.58
	09/13/89	5919.8	5922.52	2.75
	10/17/89	5917.5	5922.52	5.02
	01/18/90	5918.2	5922.52	4.32
	02/12/90	5918.4	5922.52	4.10
	04/12/90	5921.3	5922.52	1.20
	04/30/90	5921.0	5922.52	1.54
	07/11/90	5919.7	5922.52	2.87
	07/17/90	5919.5	5922.52	3.00
	10/01/90	5917.6	5922.52	4.93
	10/23/90	5917.4	5922.52	5.13
	01/02/91	5917.4	5922.52	5.09
	03/06/91	5918.1	5922.52	4.44
	04/01/91	5917.9	5922.52	4.66
	05/13/91	5919.4	5922.52	3.08
	07/02/91	5918.8	5922.52	3.76
	08/20/91	5919.3	5922.52	3.26
	10/02/91	5917.4	5922.52	5.11
	11/13/91	5918.1	5922.52	4.43
	01/03/92	5918.7	5922.52	3.85

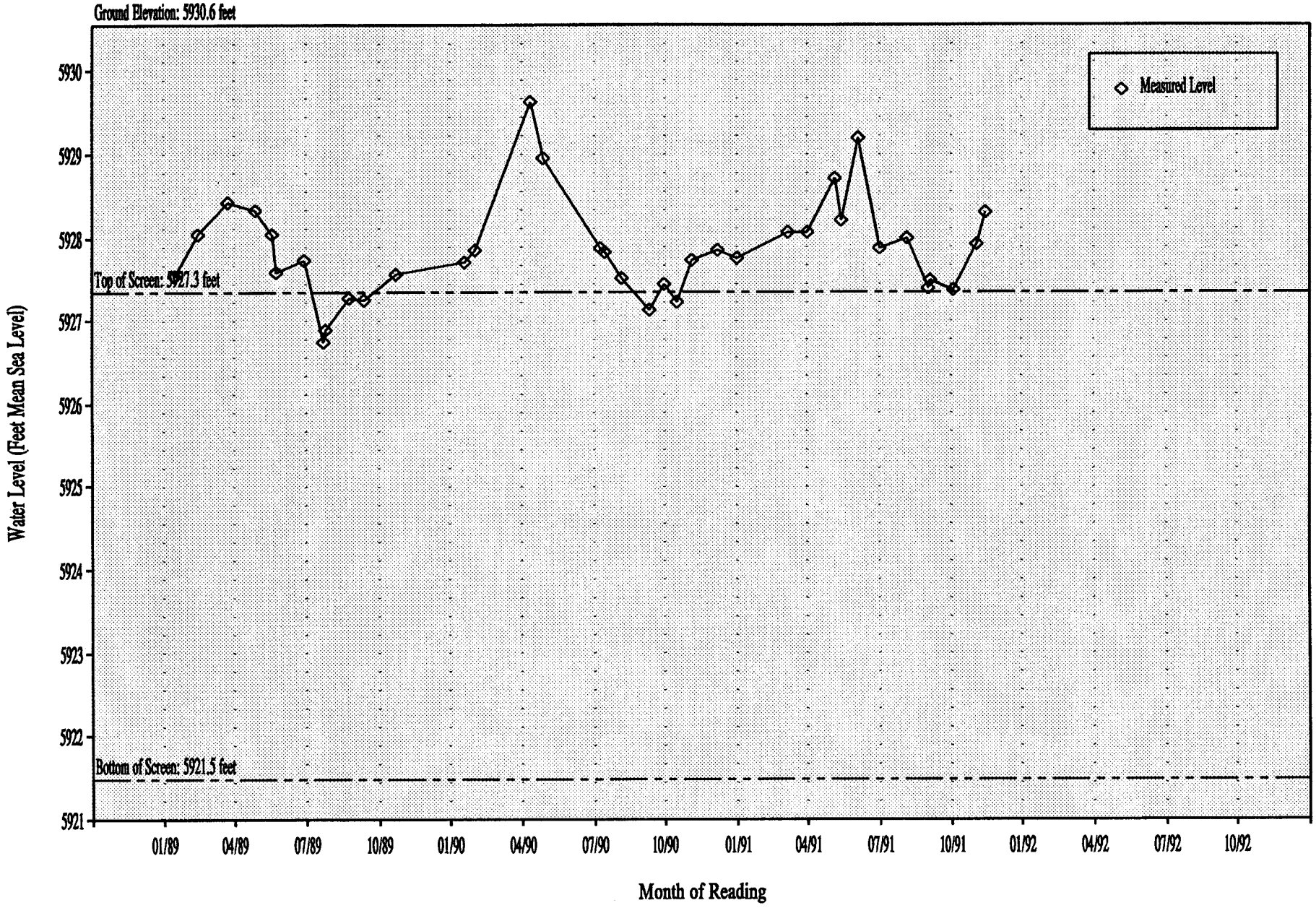
Date: 10/08/92

End of Report

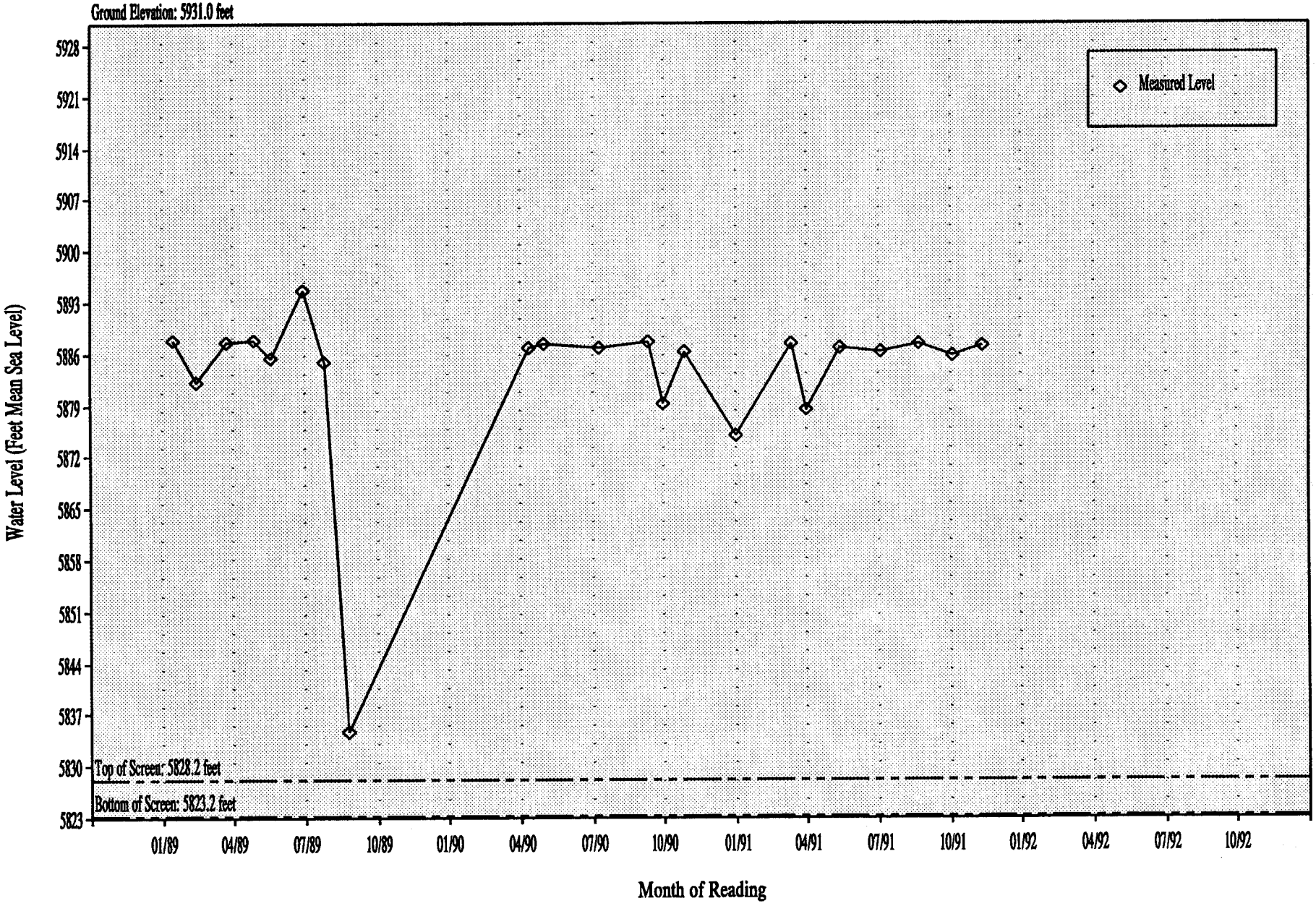
Monthly Water Level - Well 0187



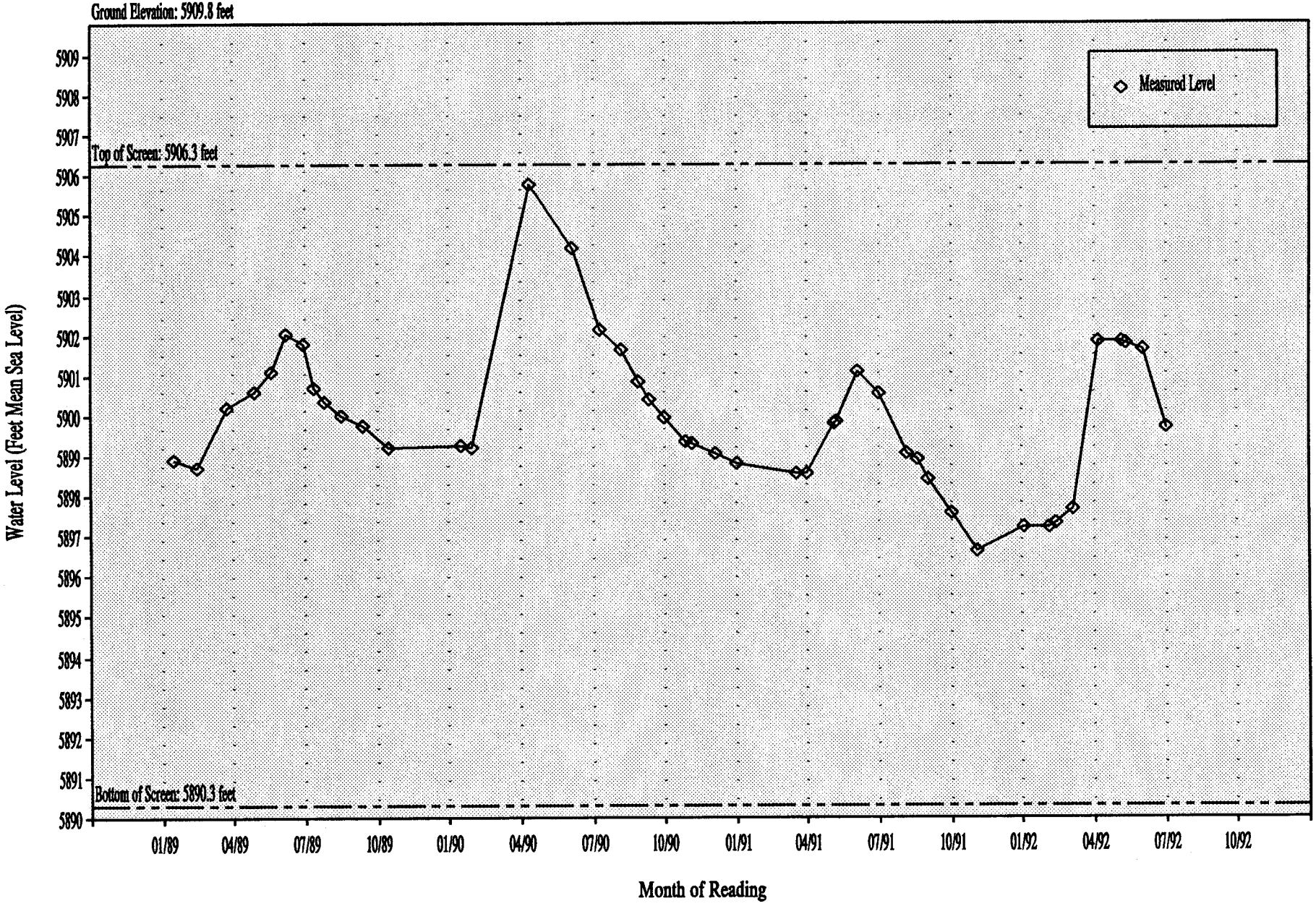
Monthly Water Level - Well 0287



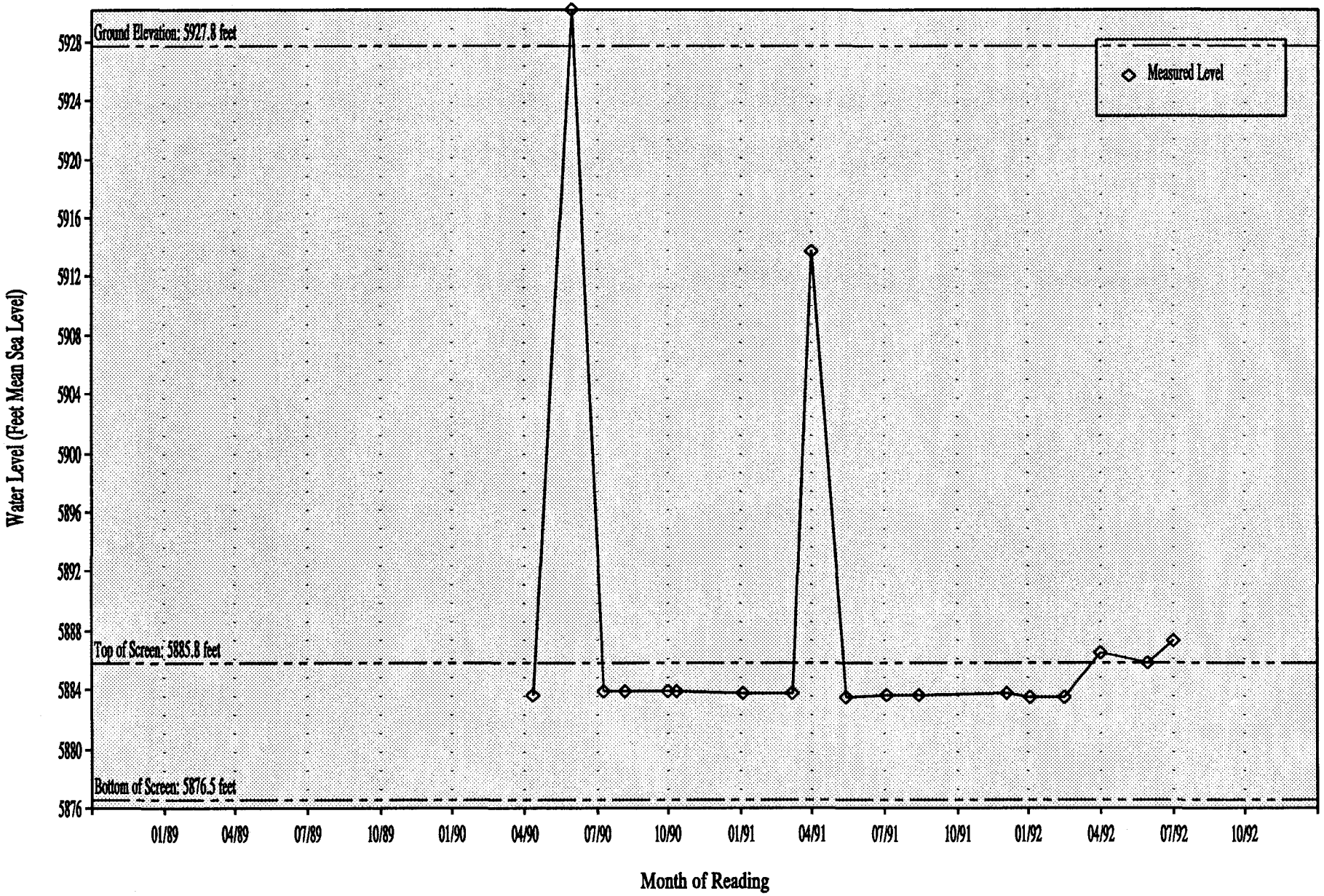
Monthly Water Level - Well 0387



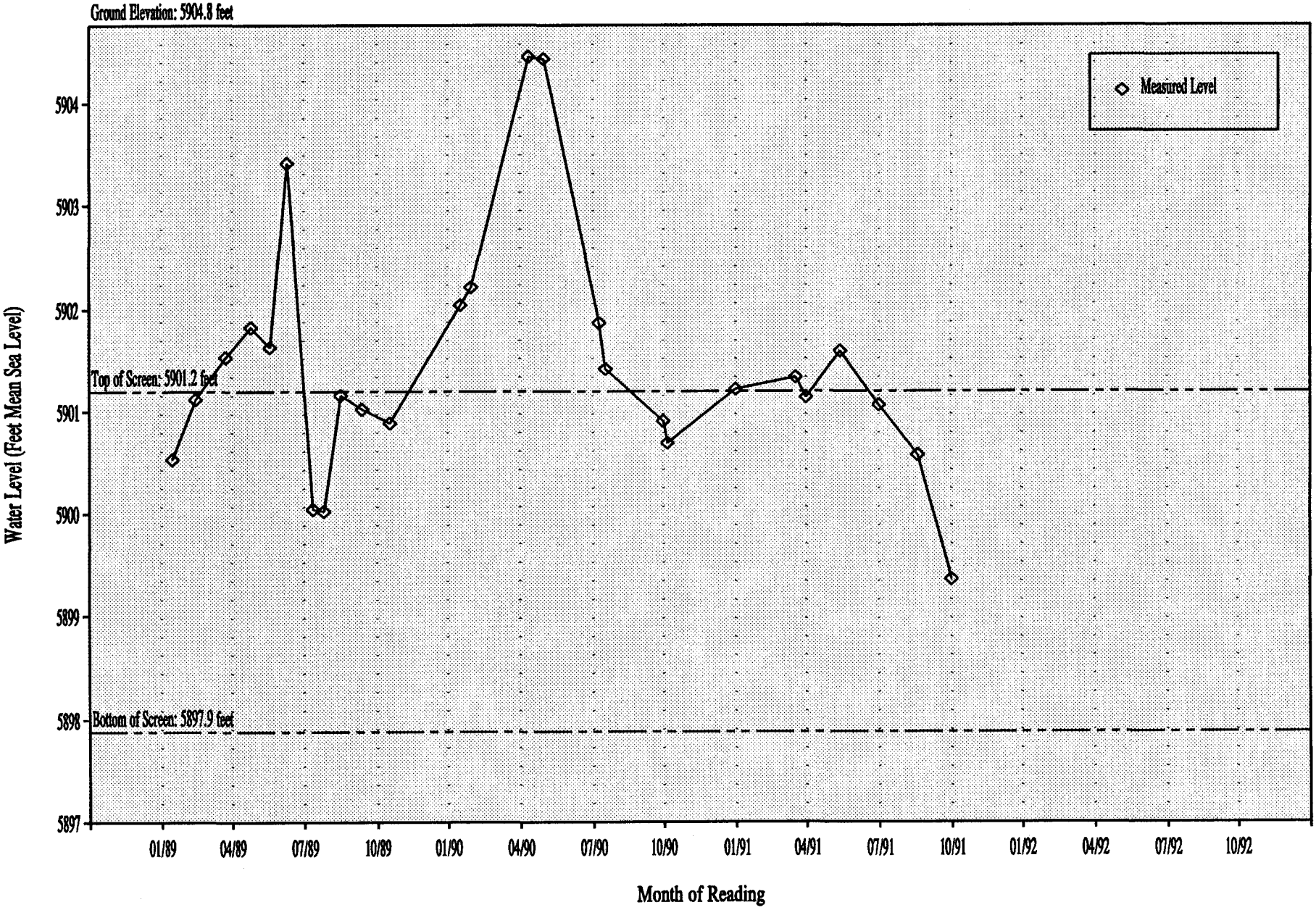
Monthly Water Level - Well 0487



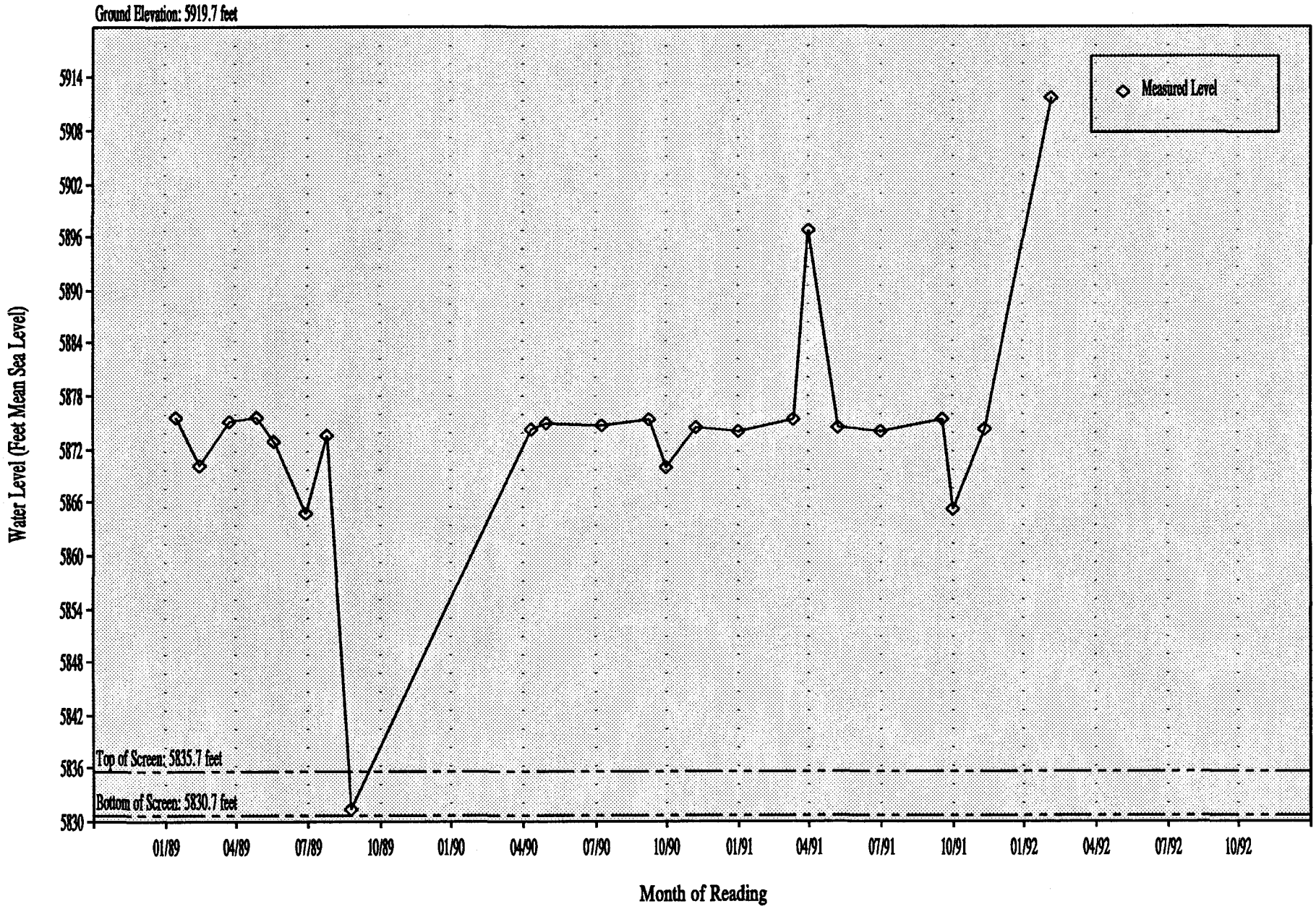
Monthly Water Level - Well 0587



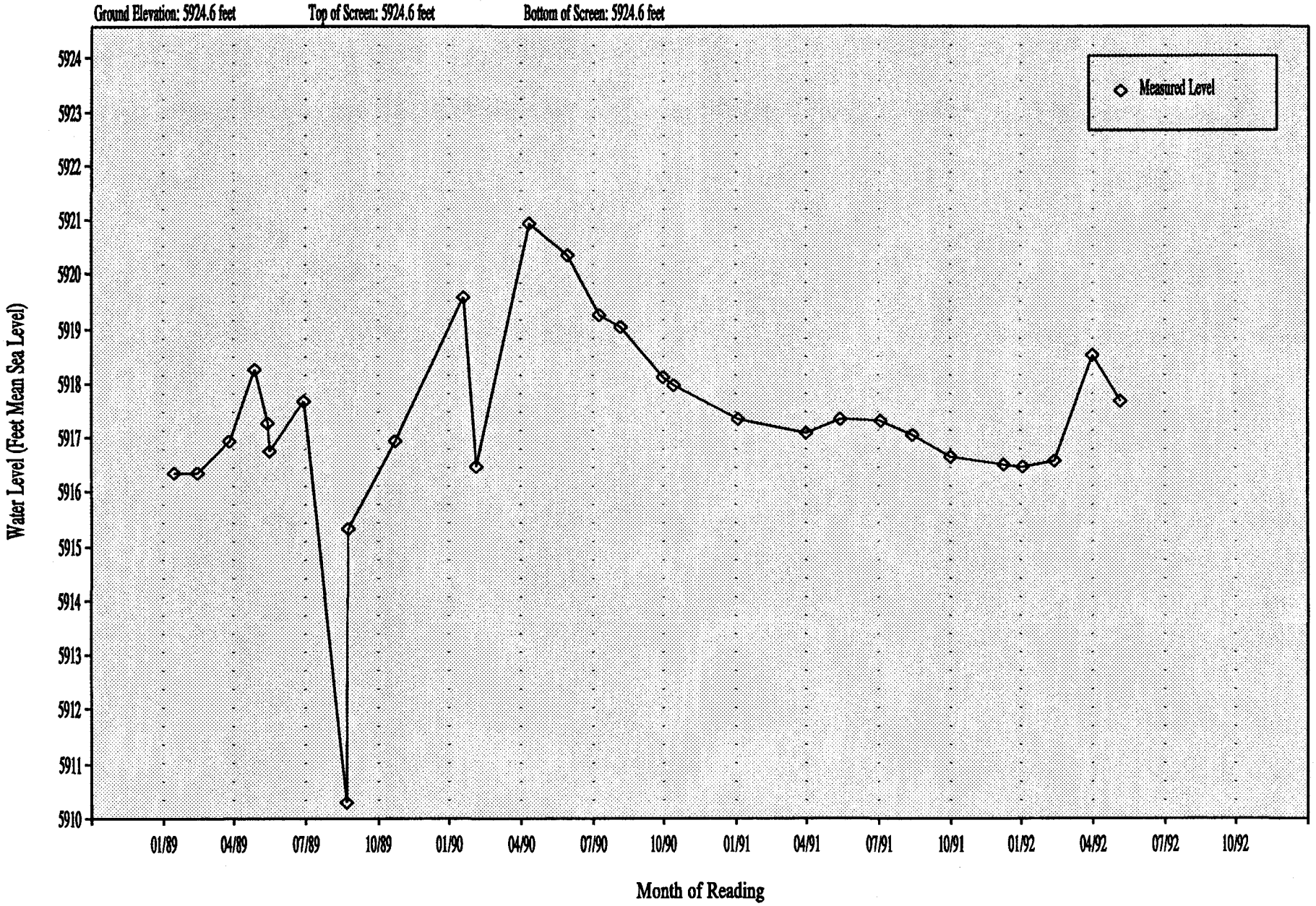
Monthly Water Level - Well 0687



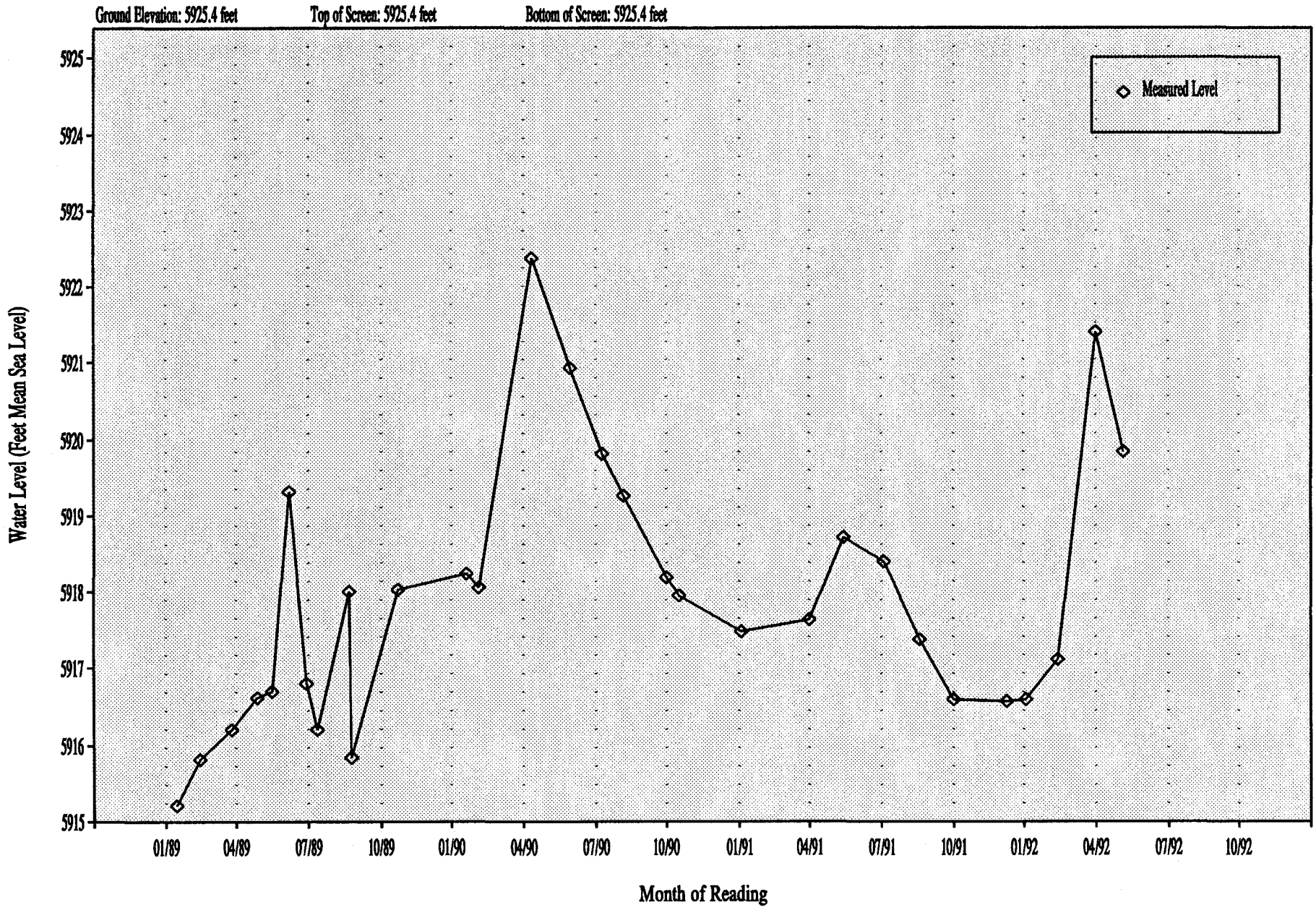
Monthly Water Level - Well 0887



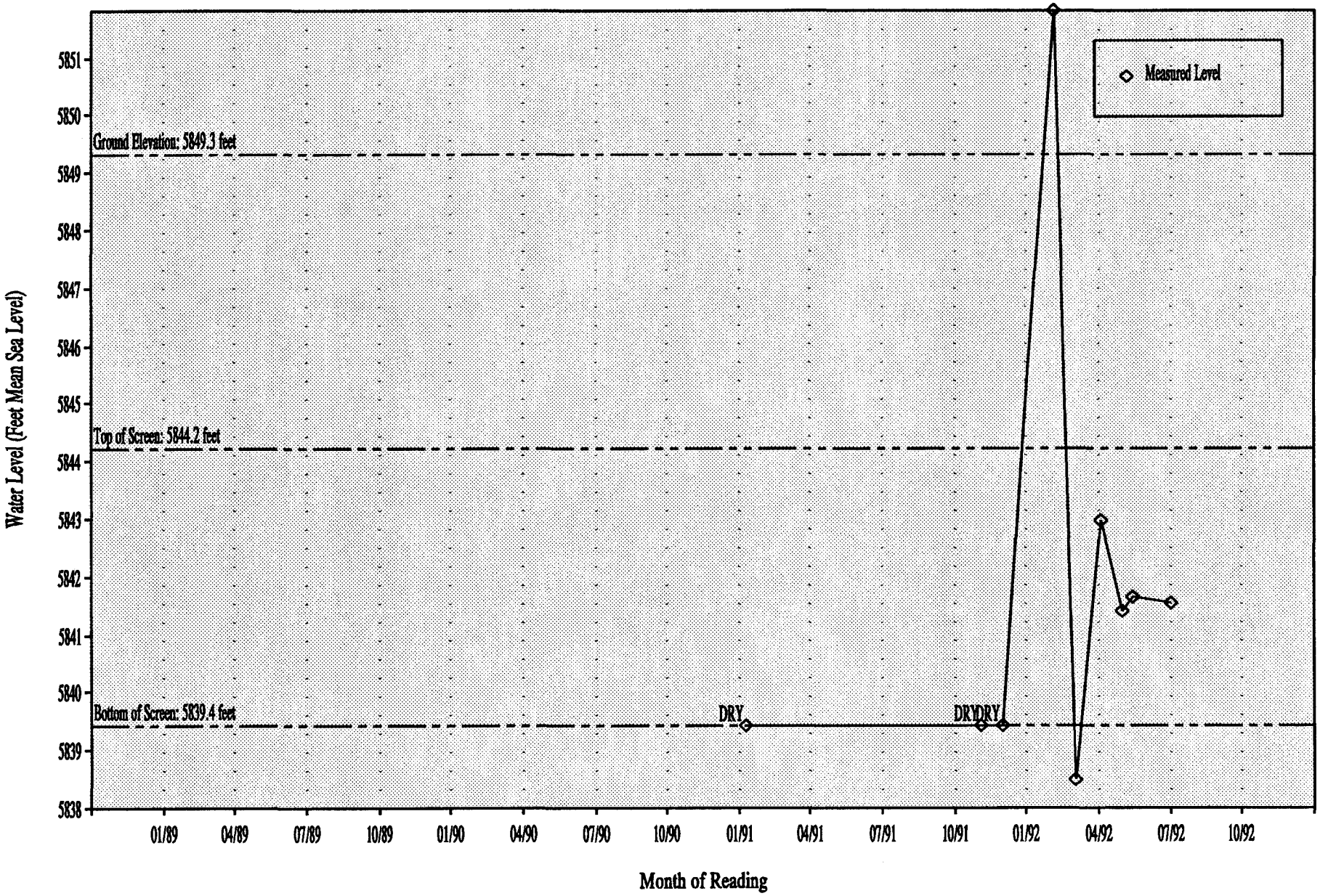
Monthly Water Level - Well 0974



Monthly Water Level - Well 1074



Monthly Water Level - Well 30991



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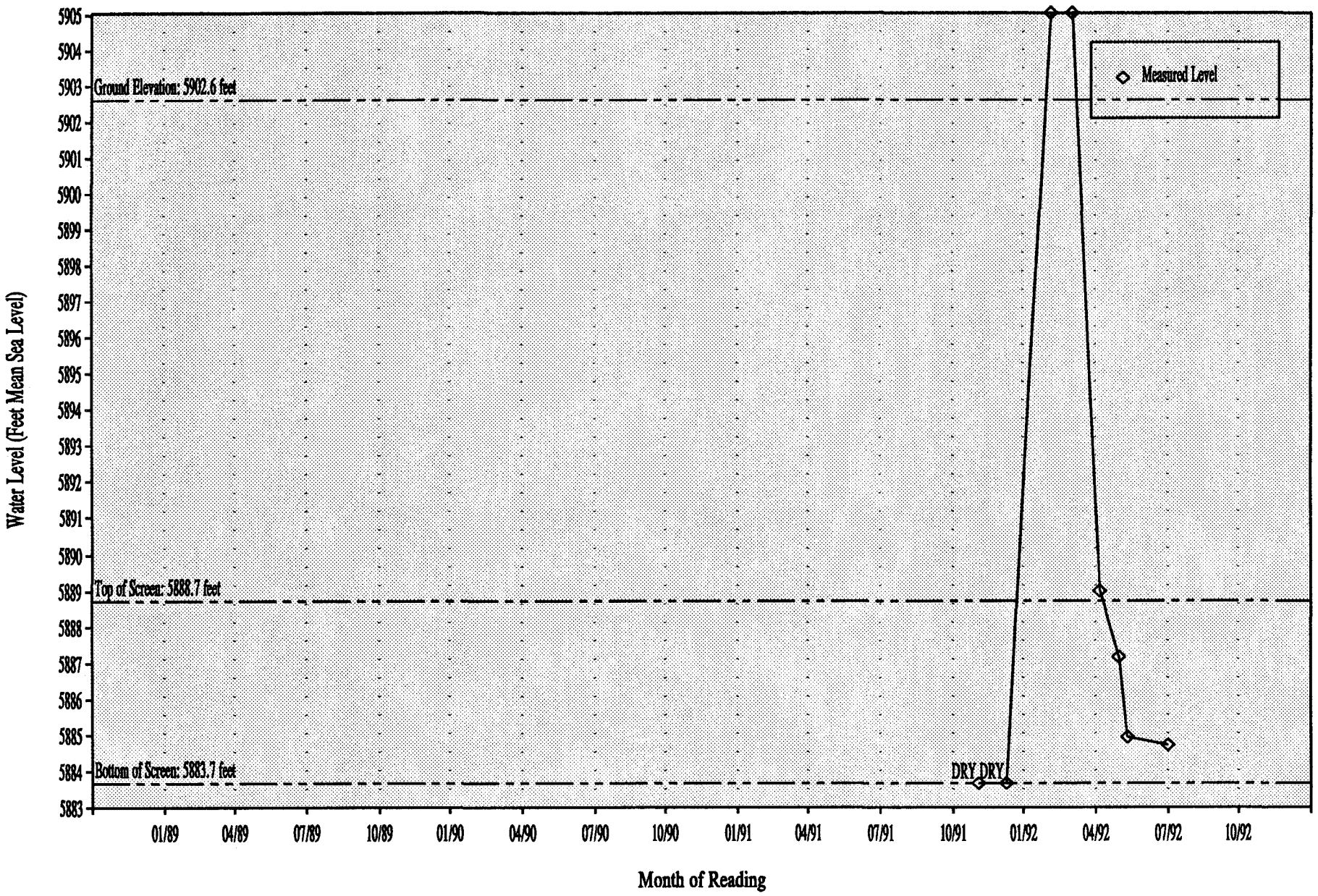

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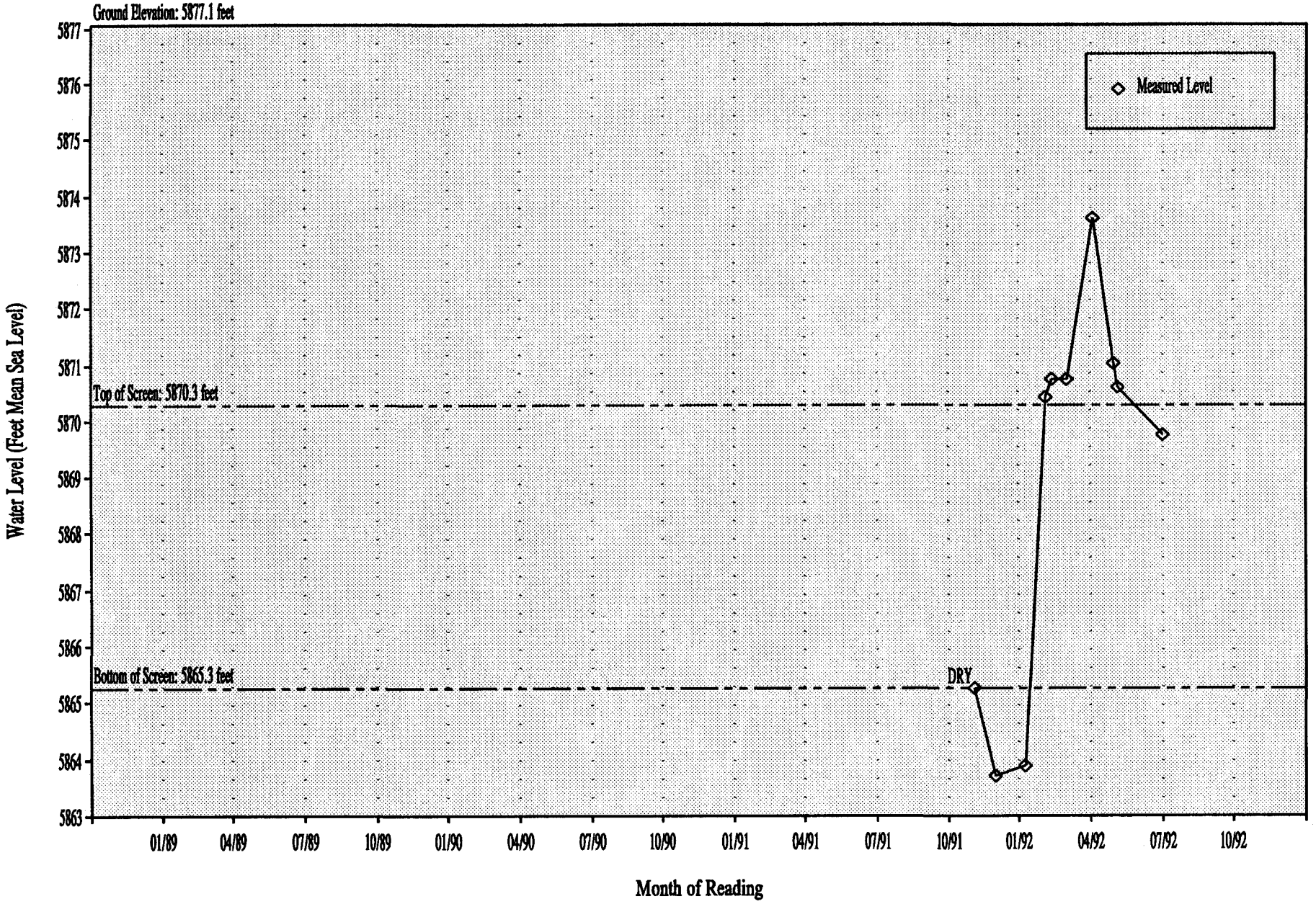

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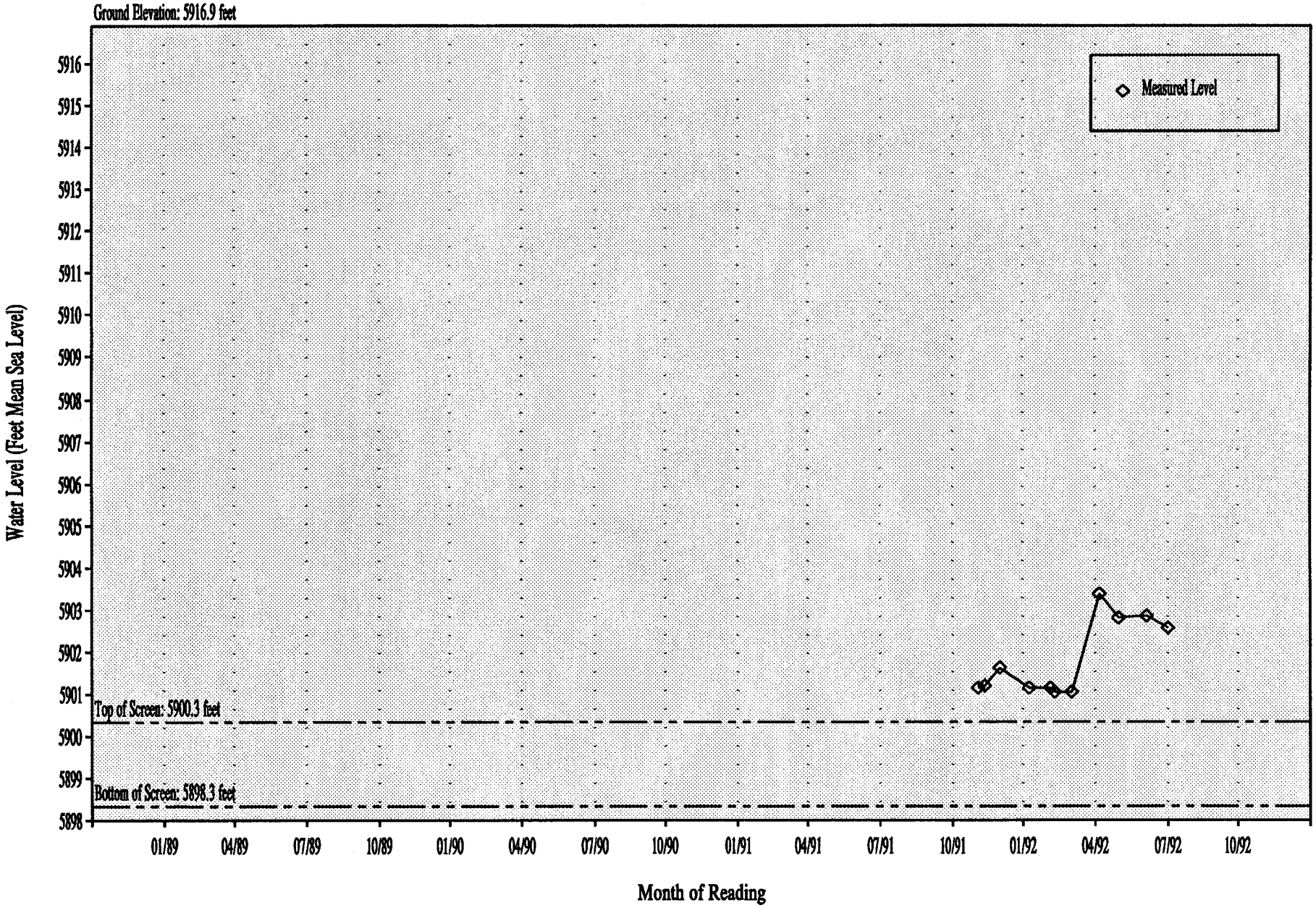

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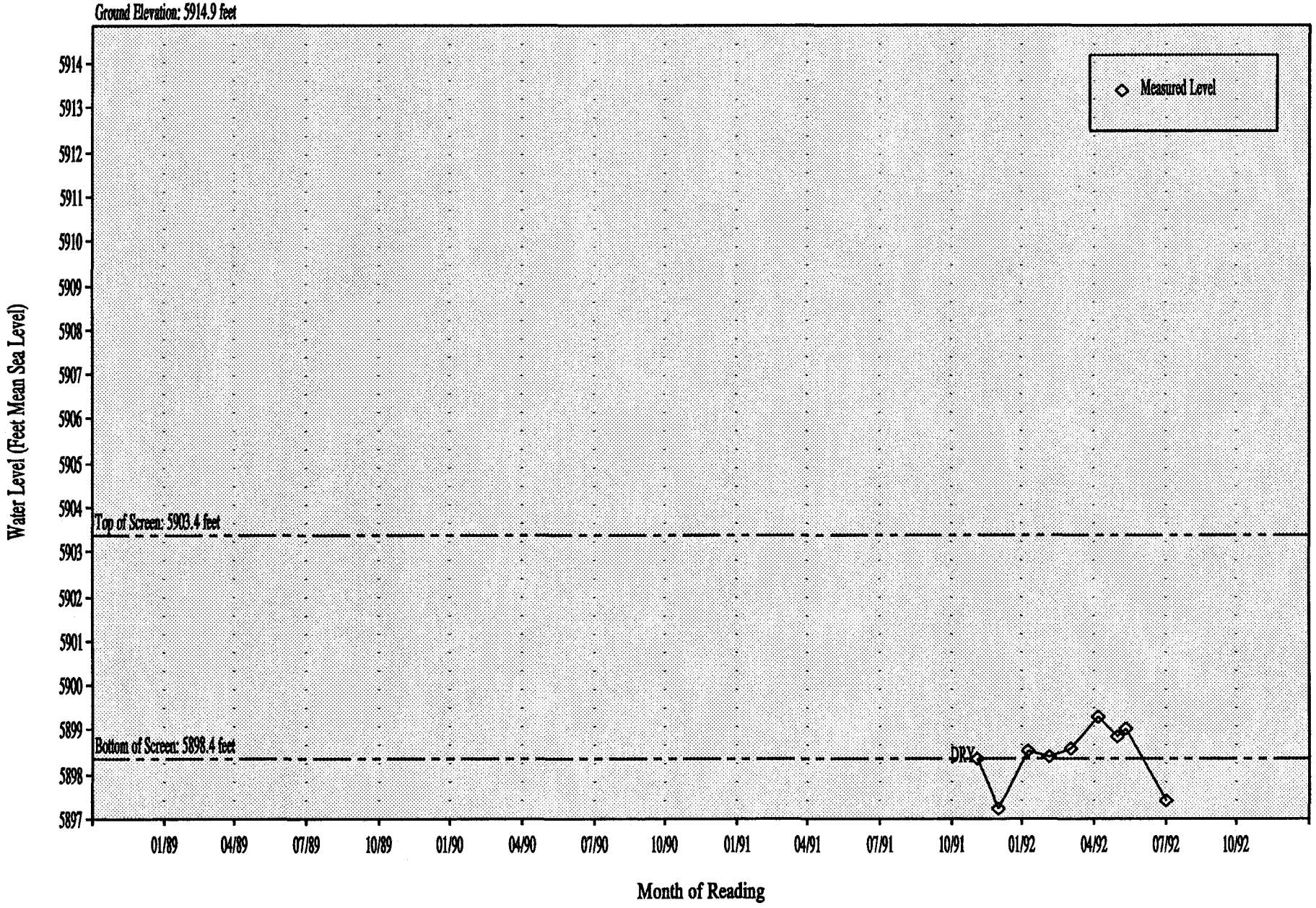

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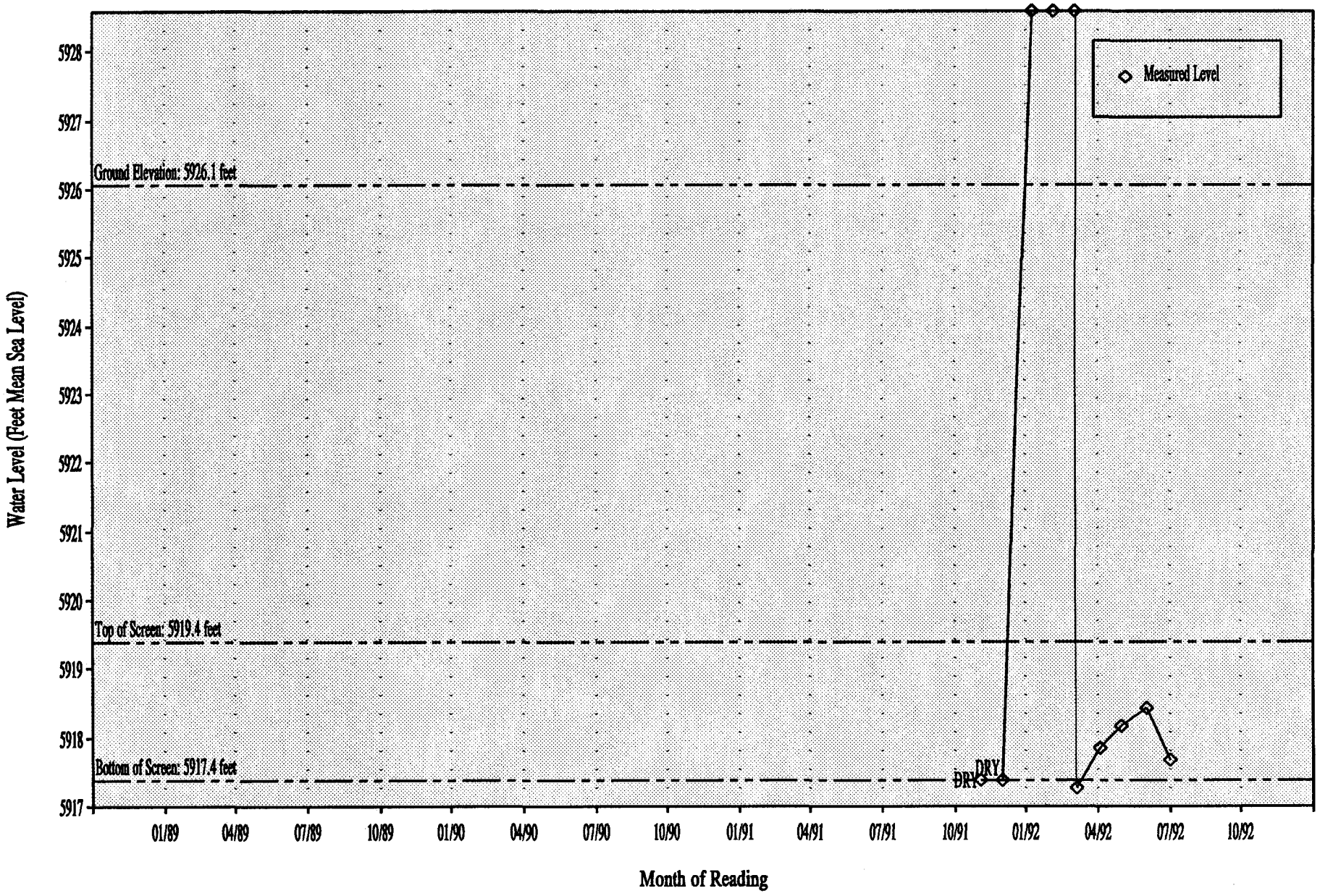

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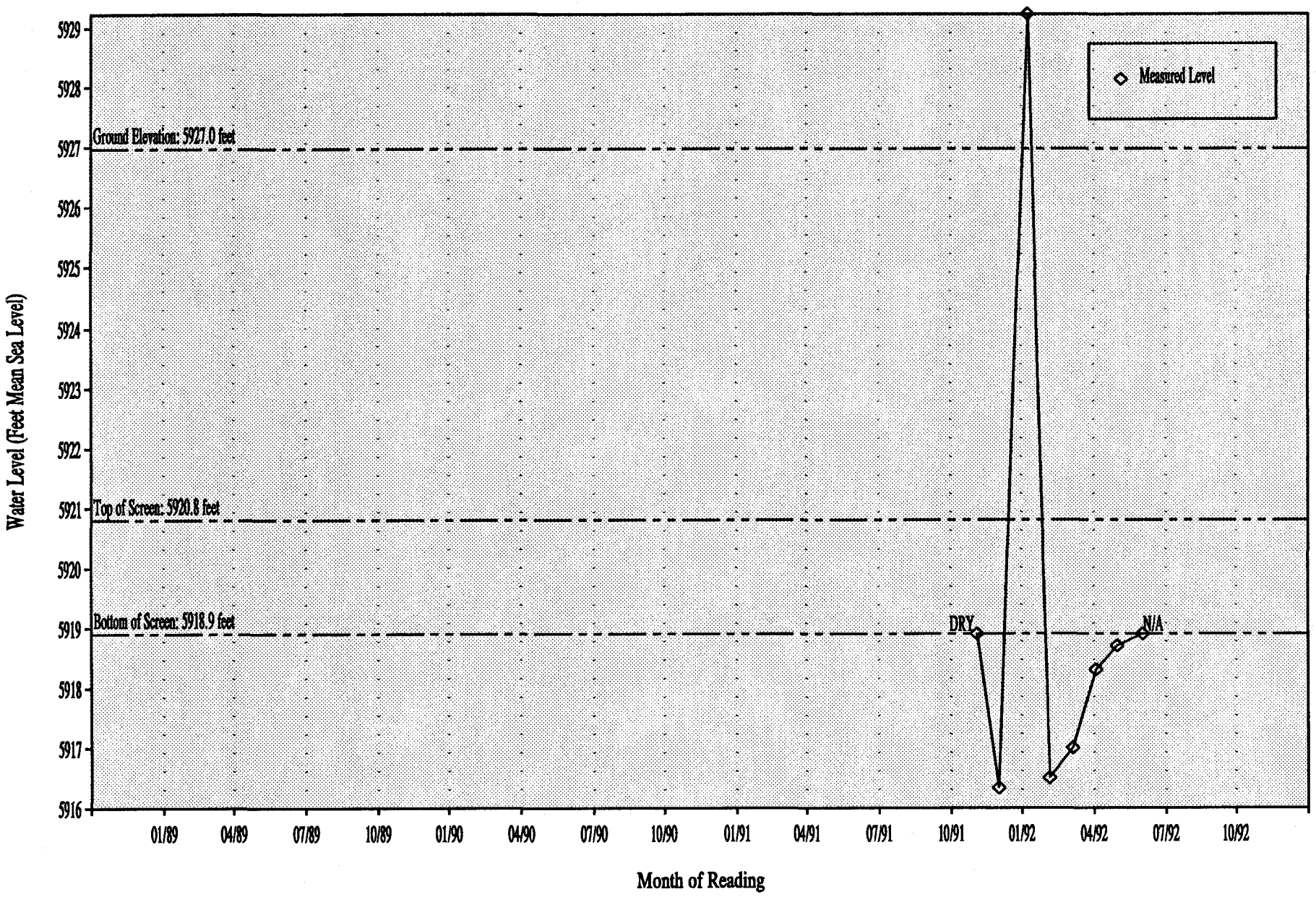

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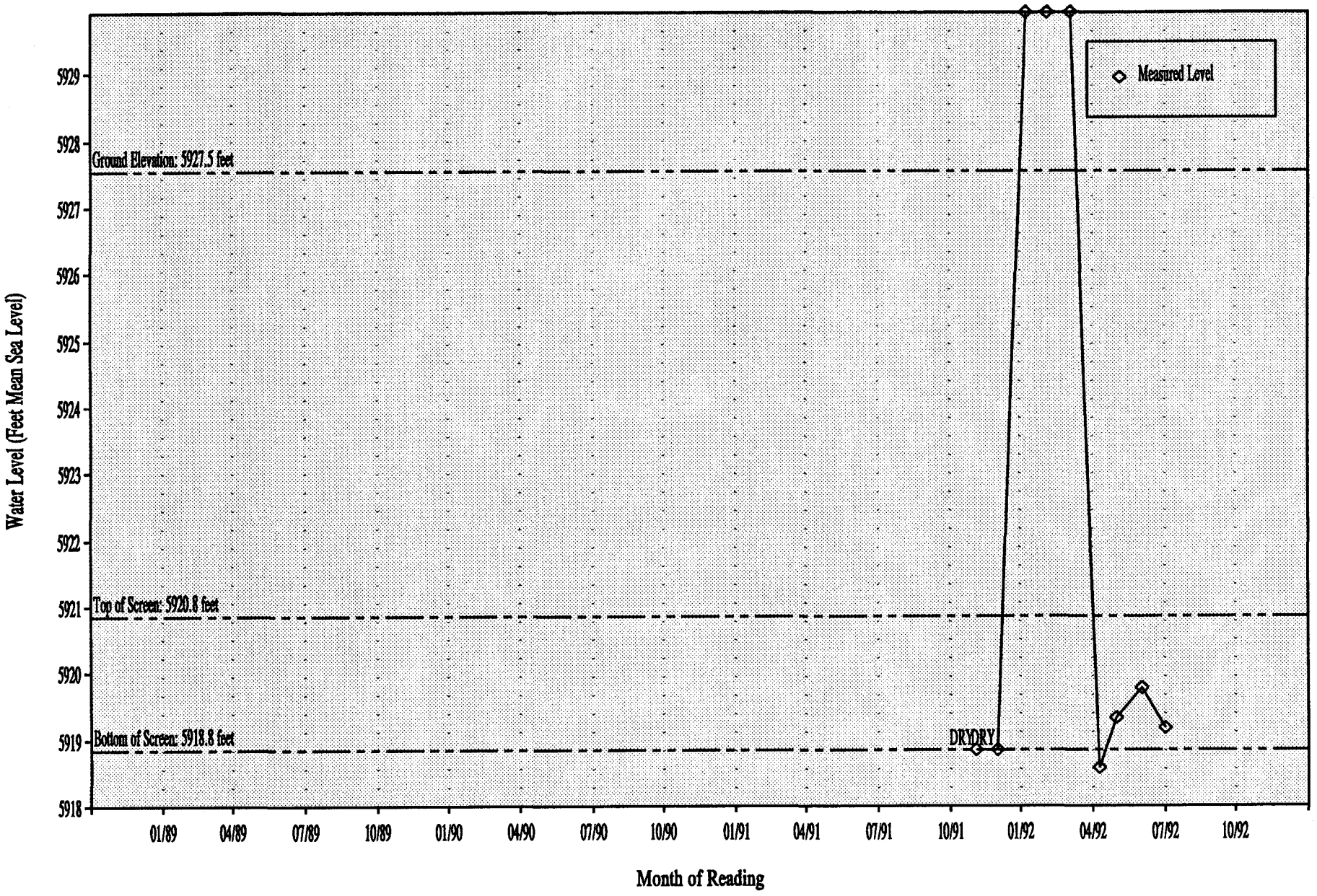

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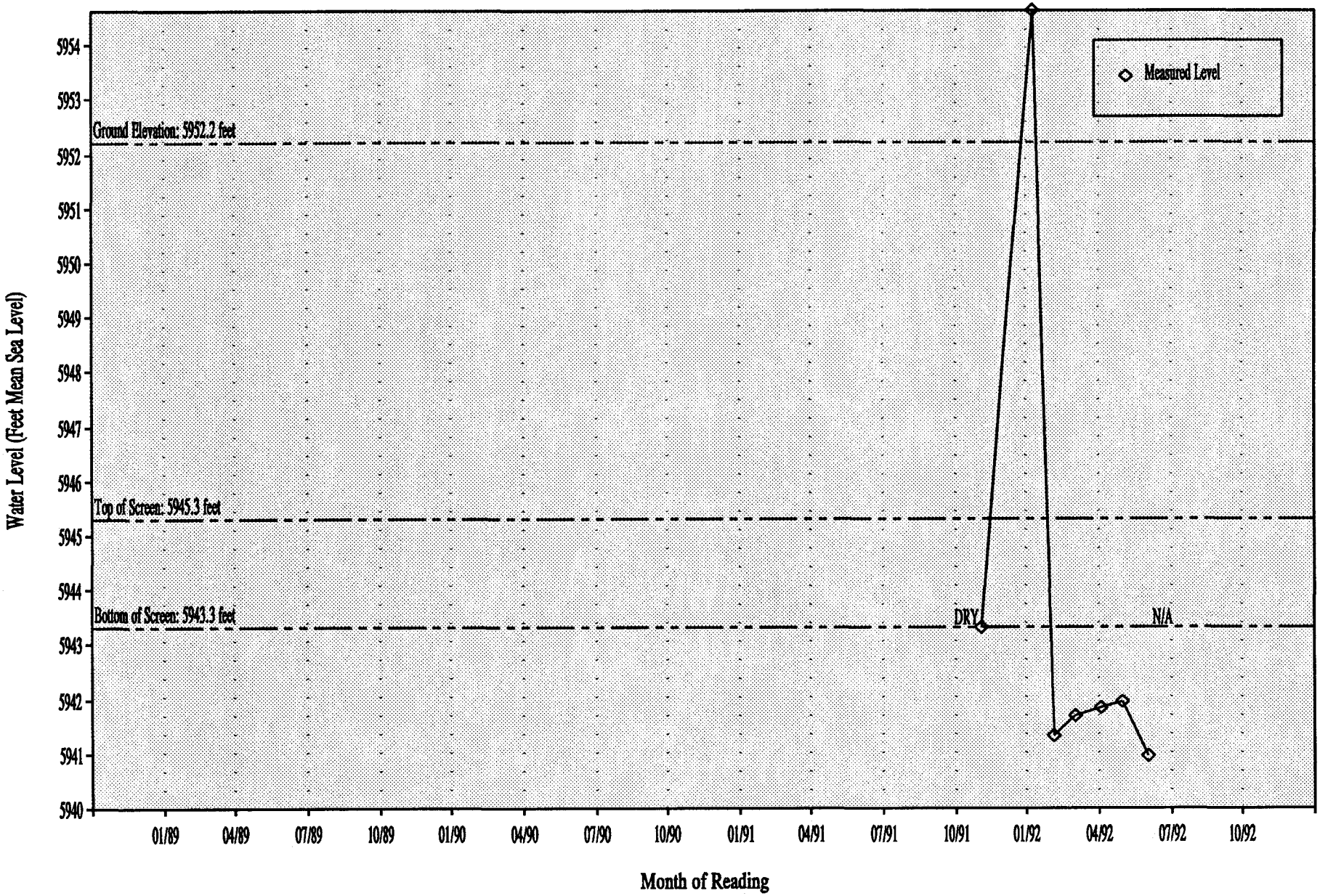

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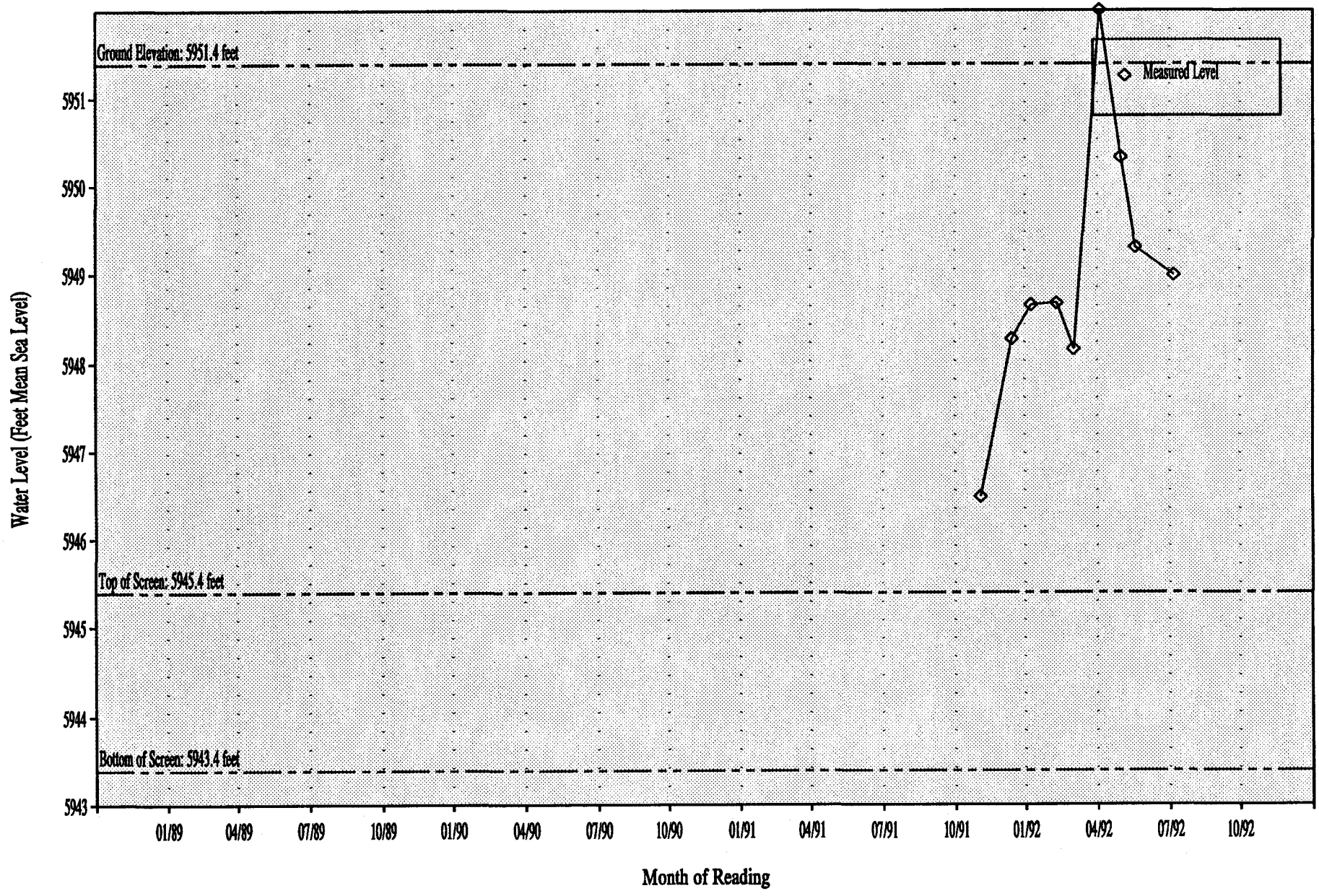

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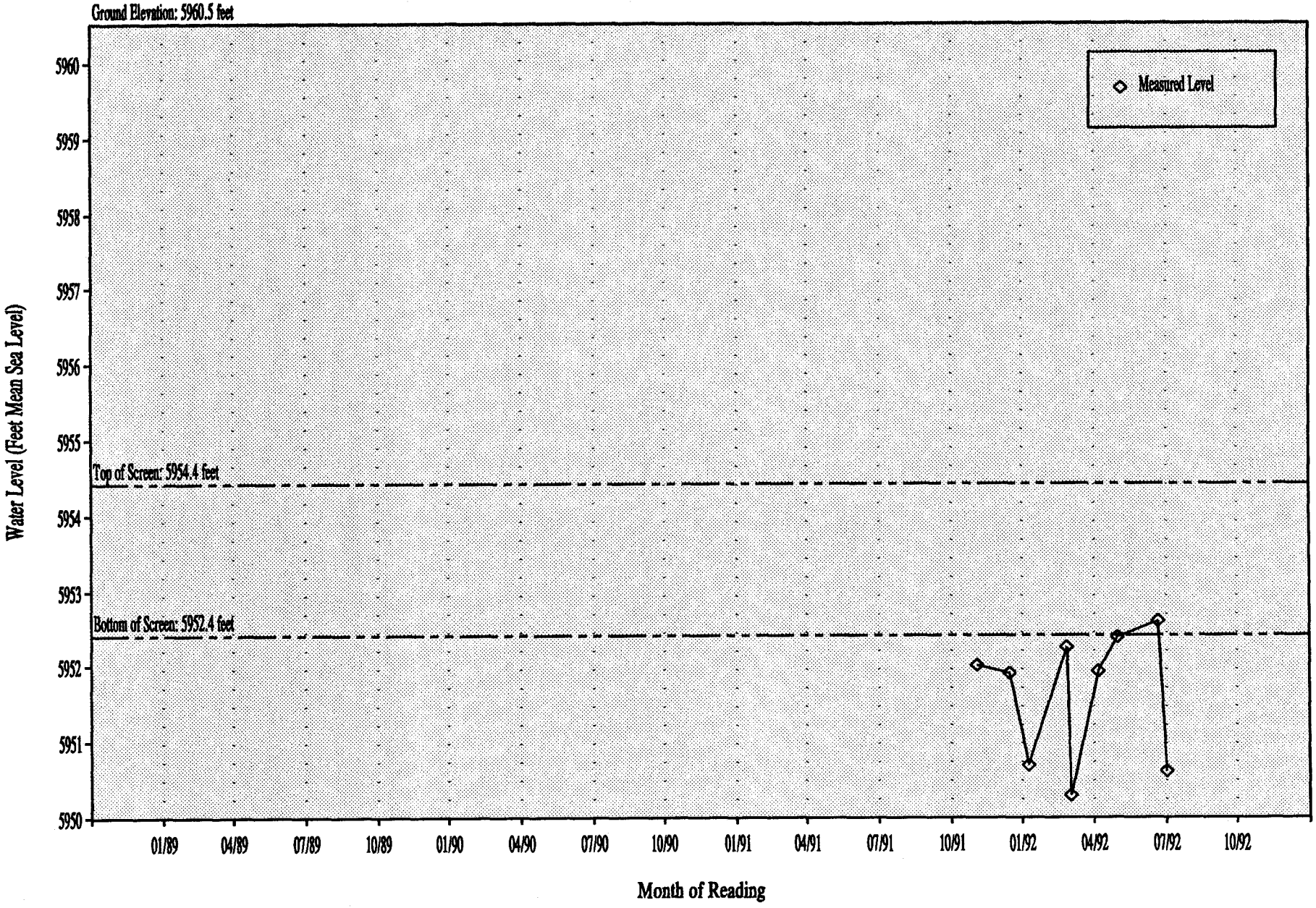

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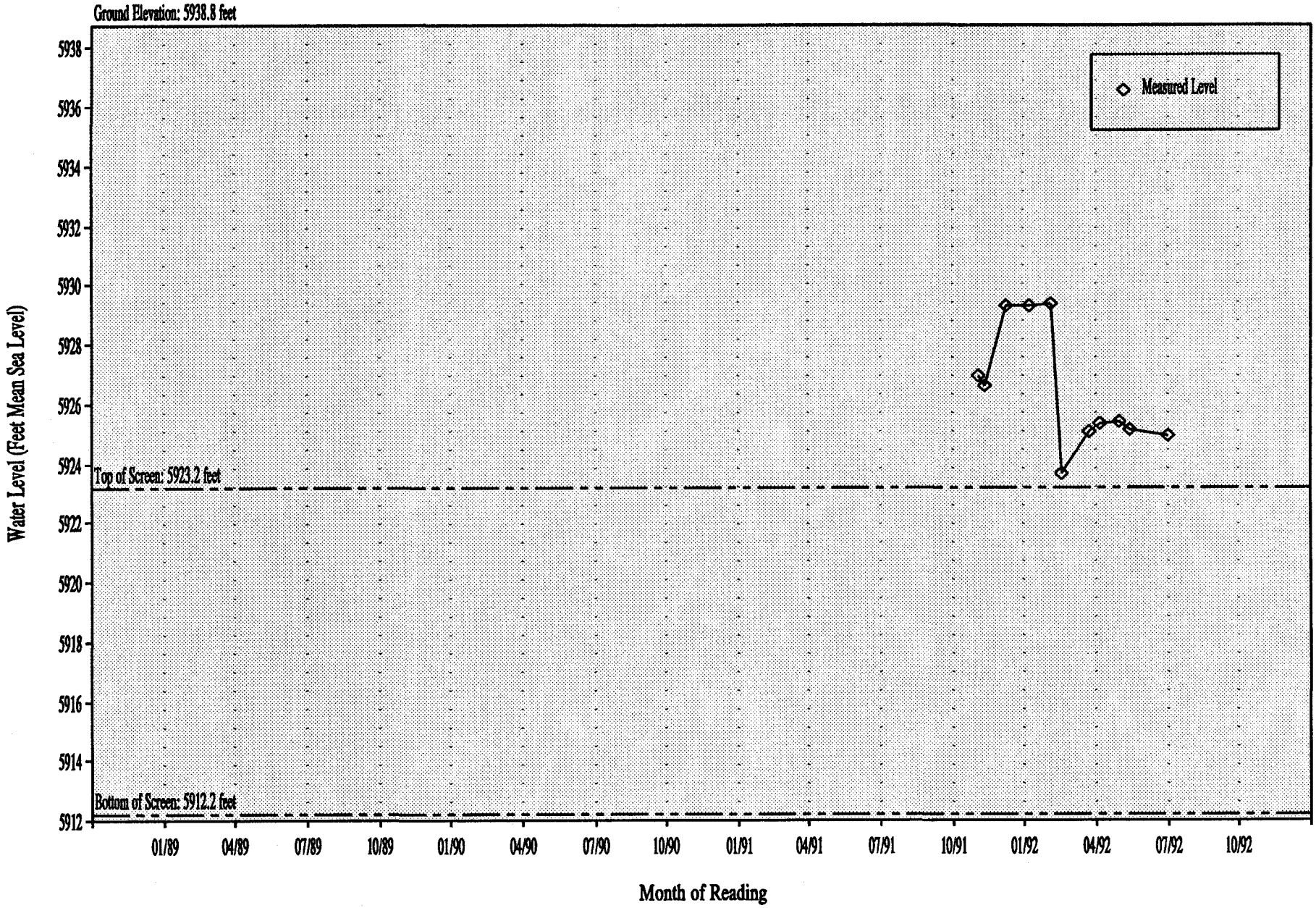

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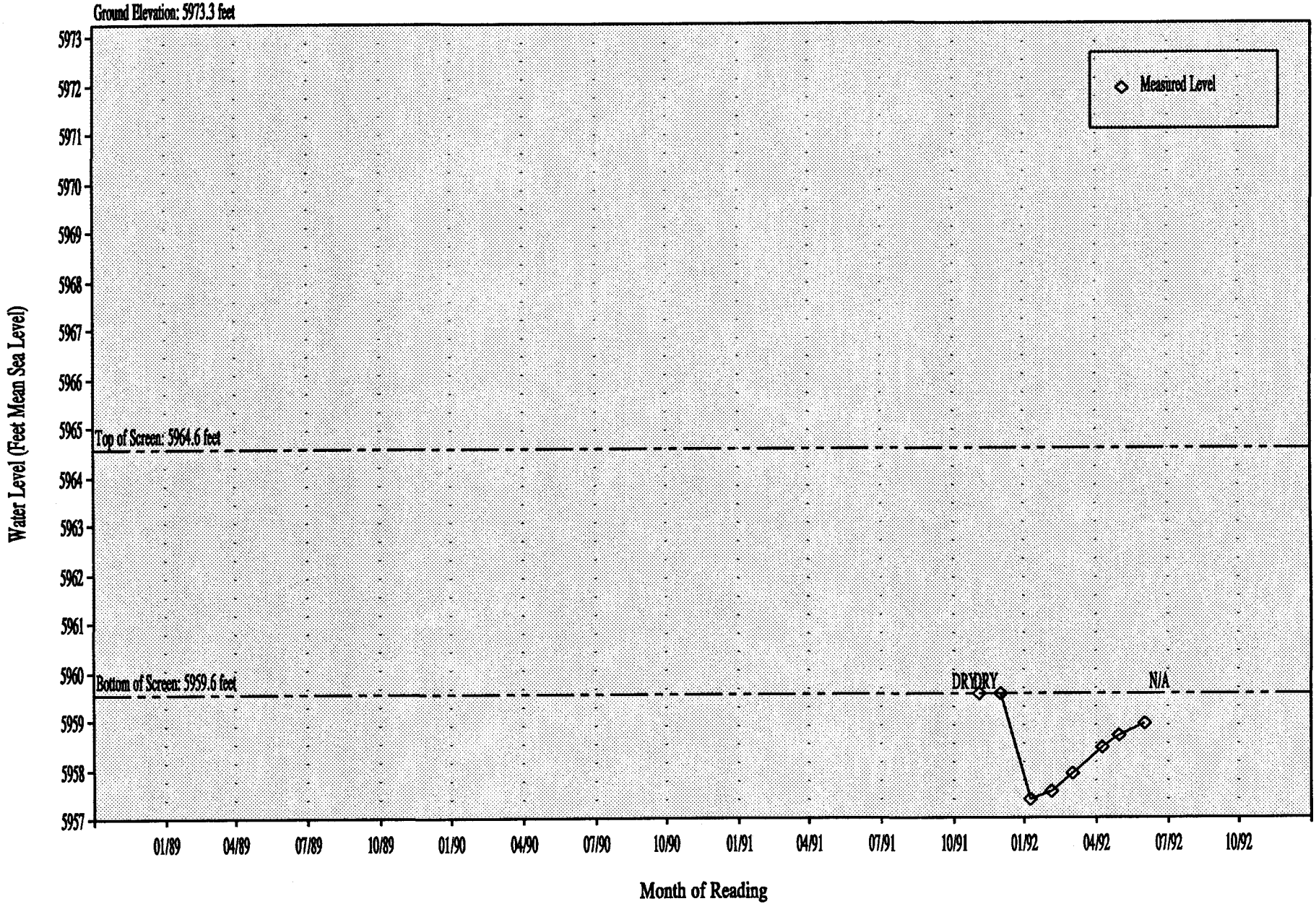

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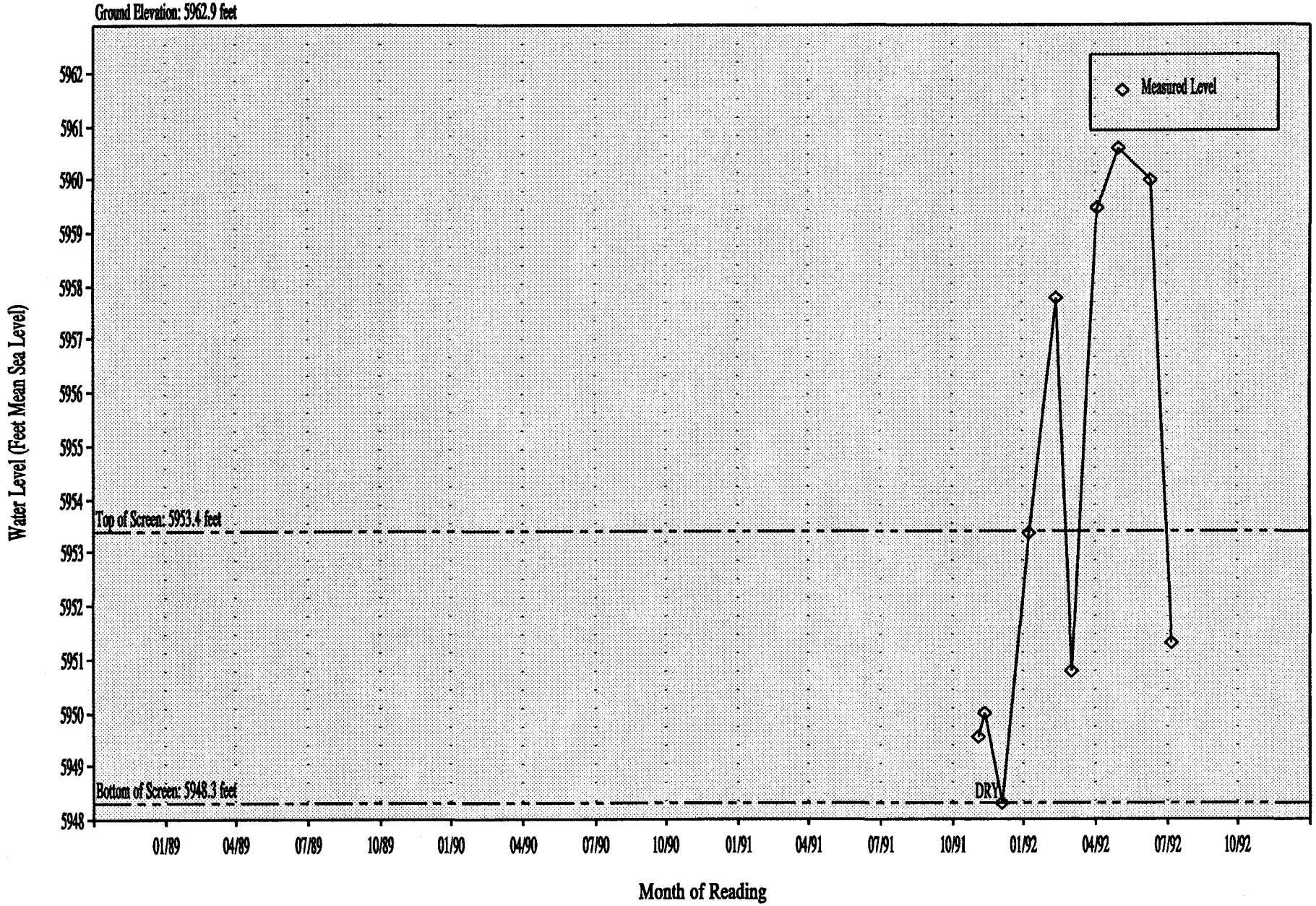

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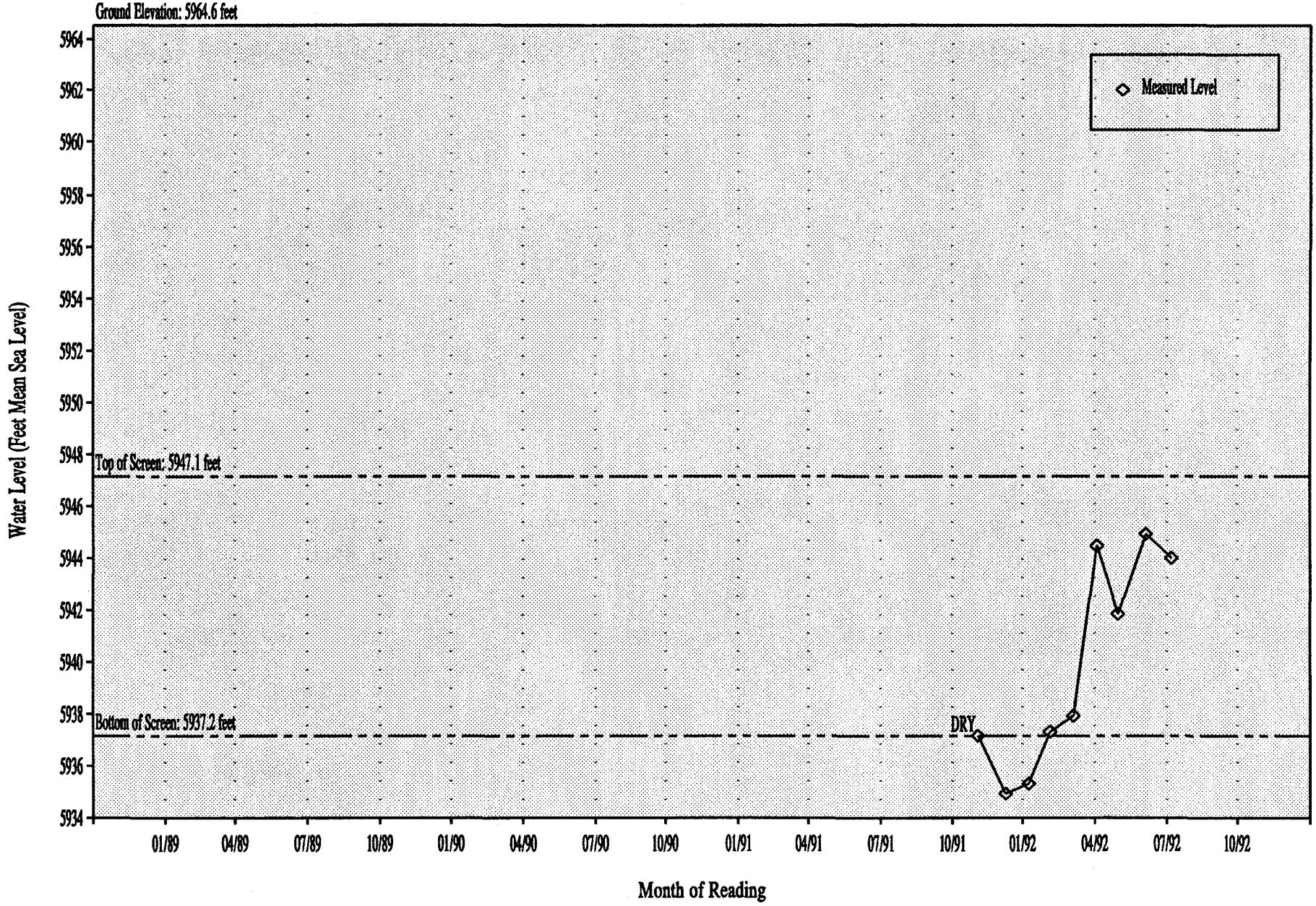

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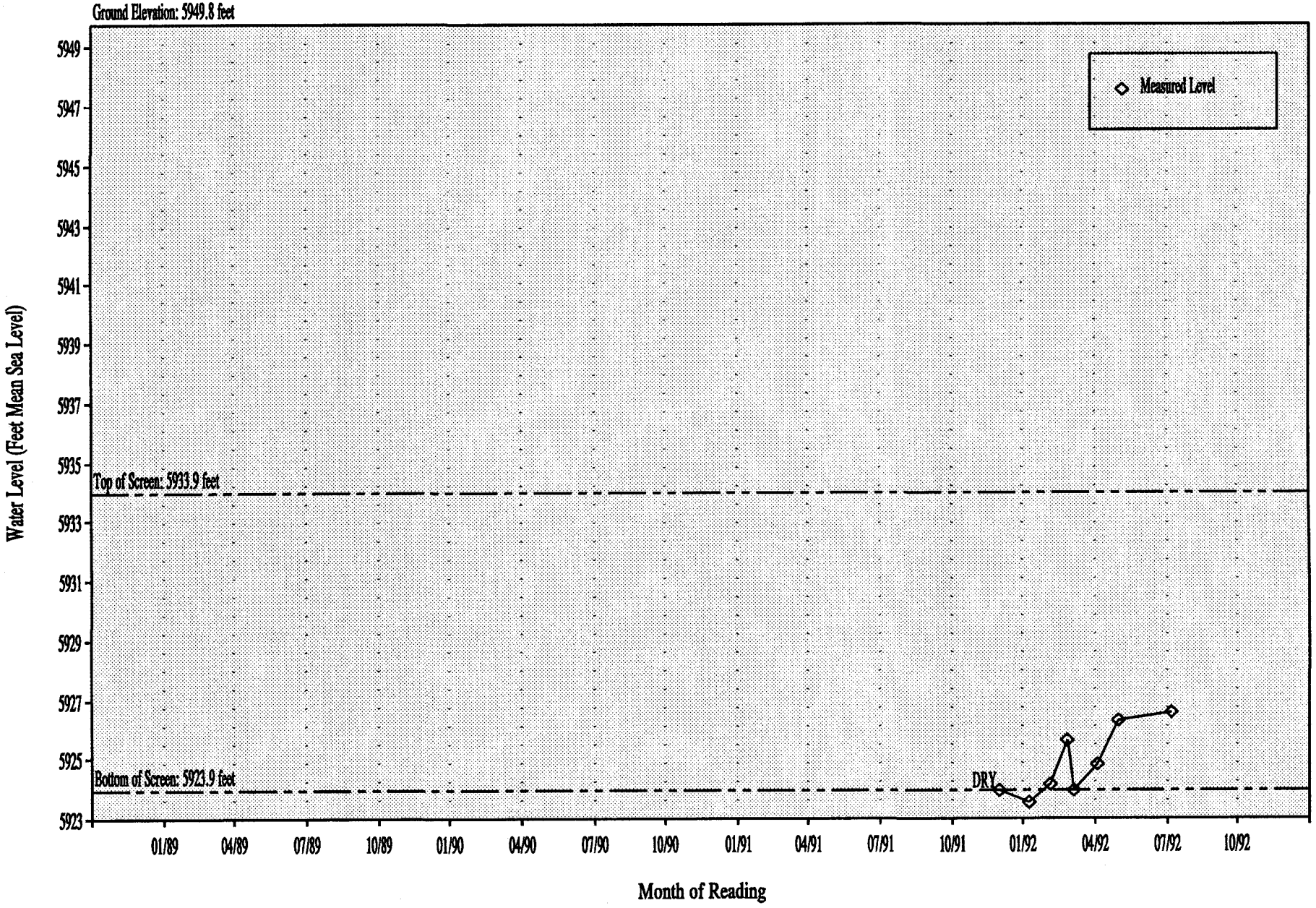

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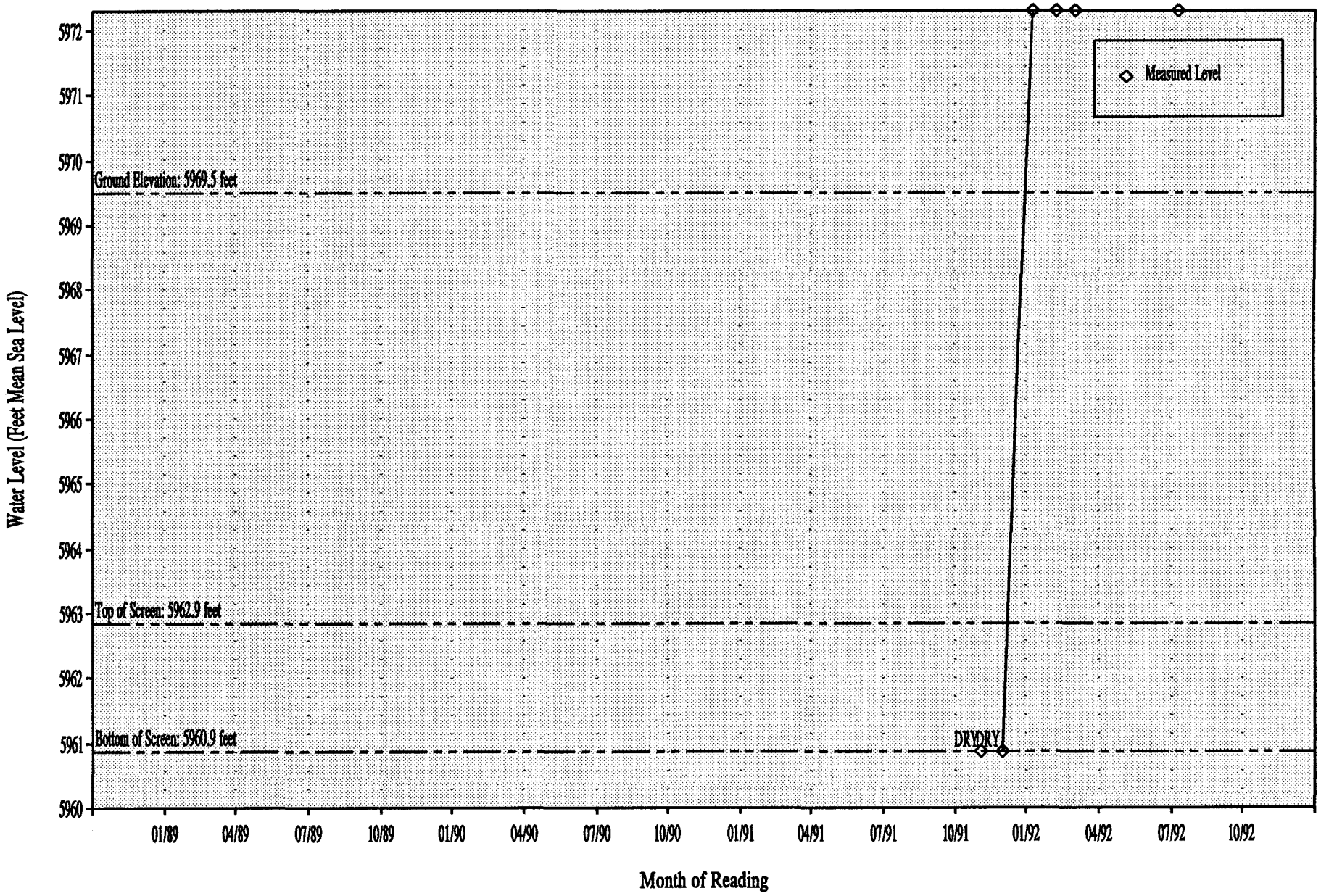

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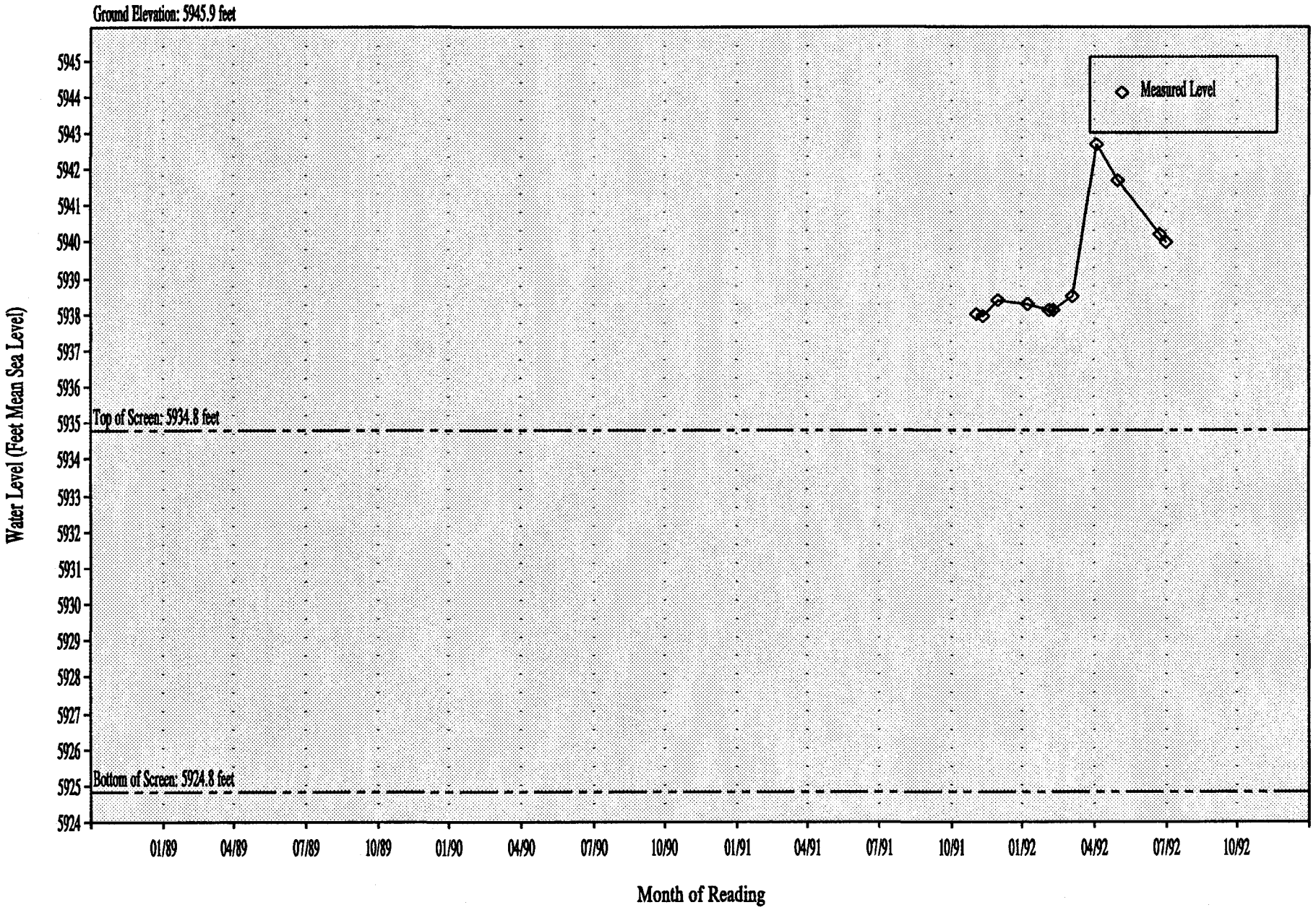

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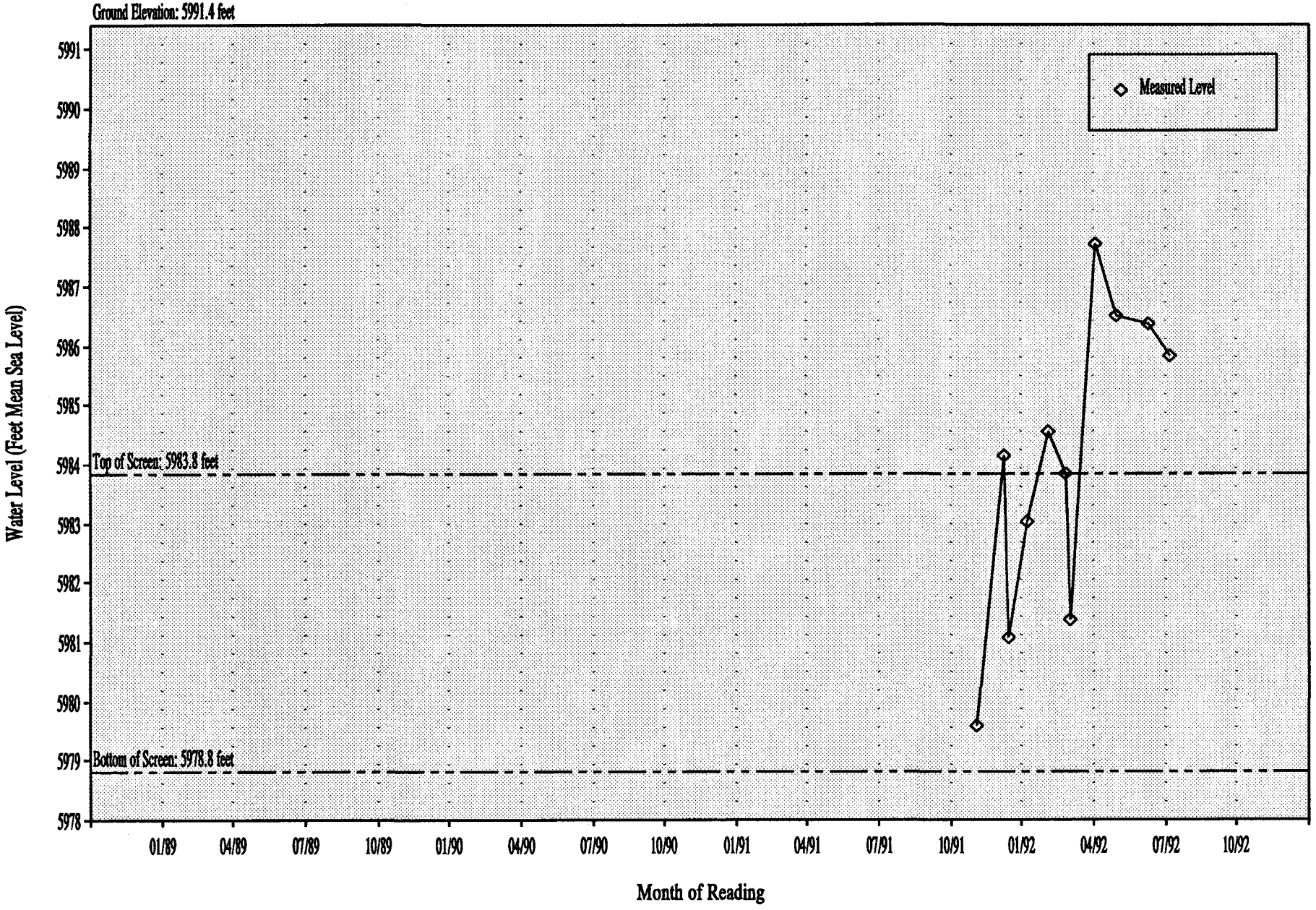

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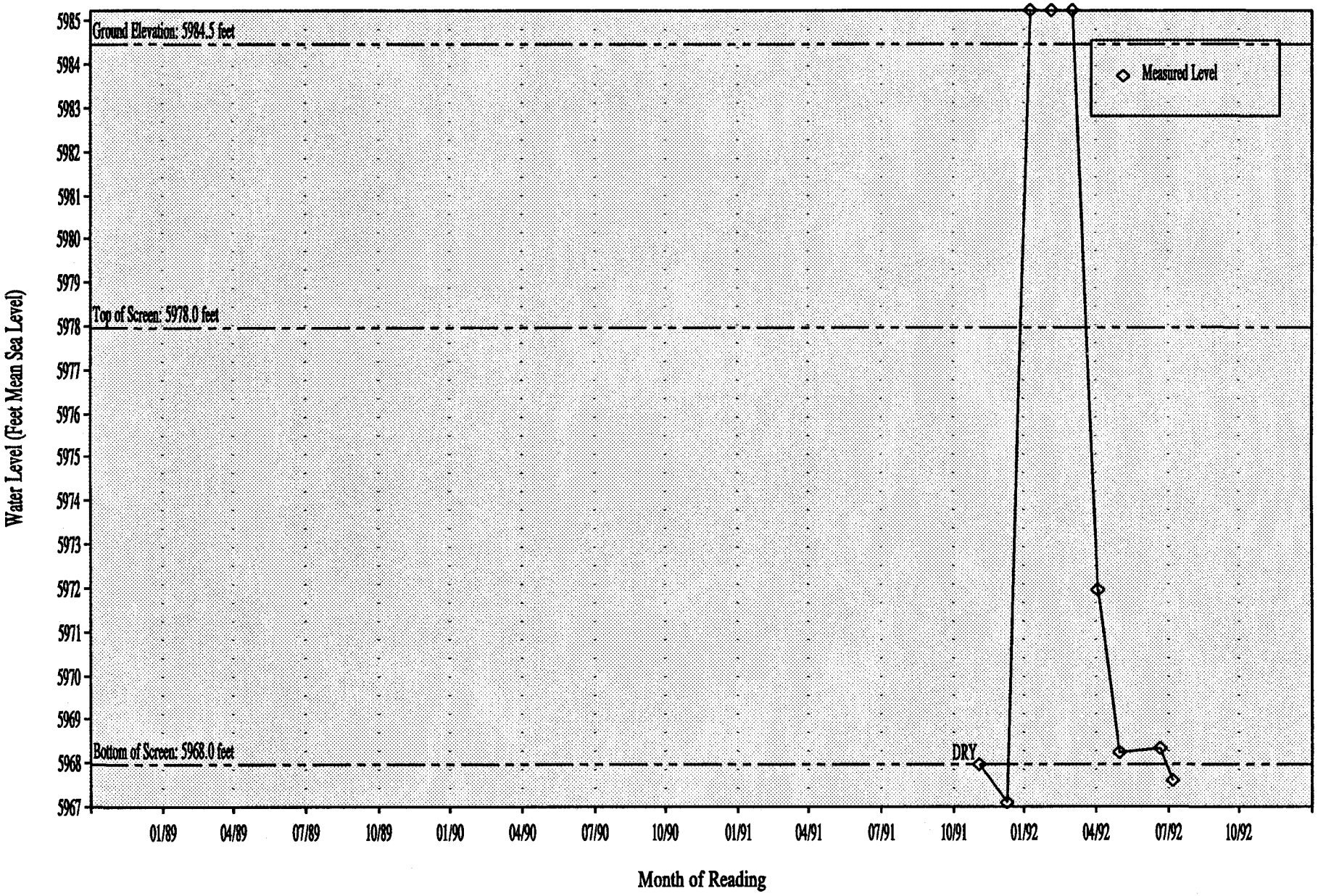

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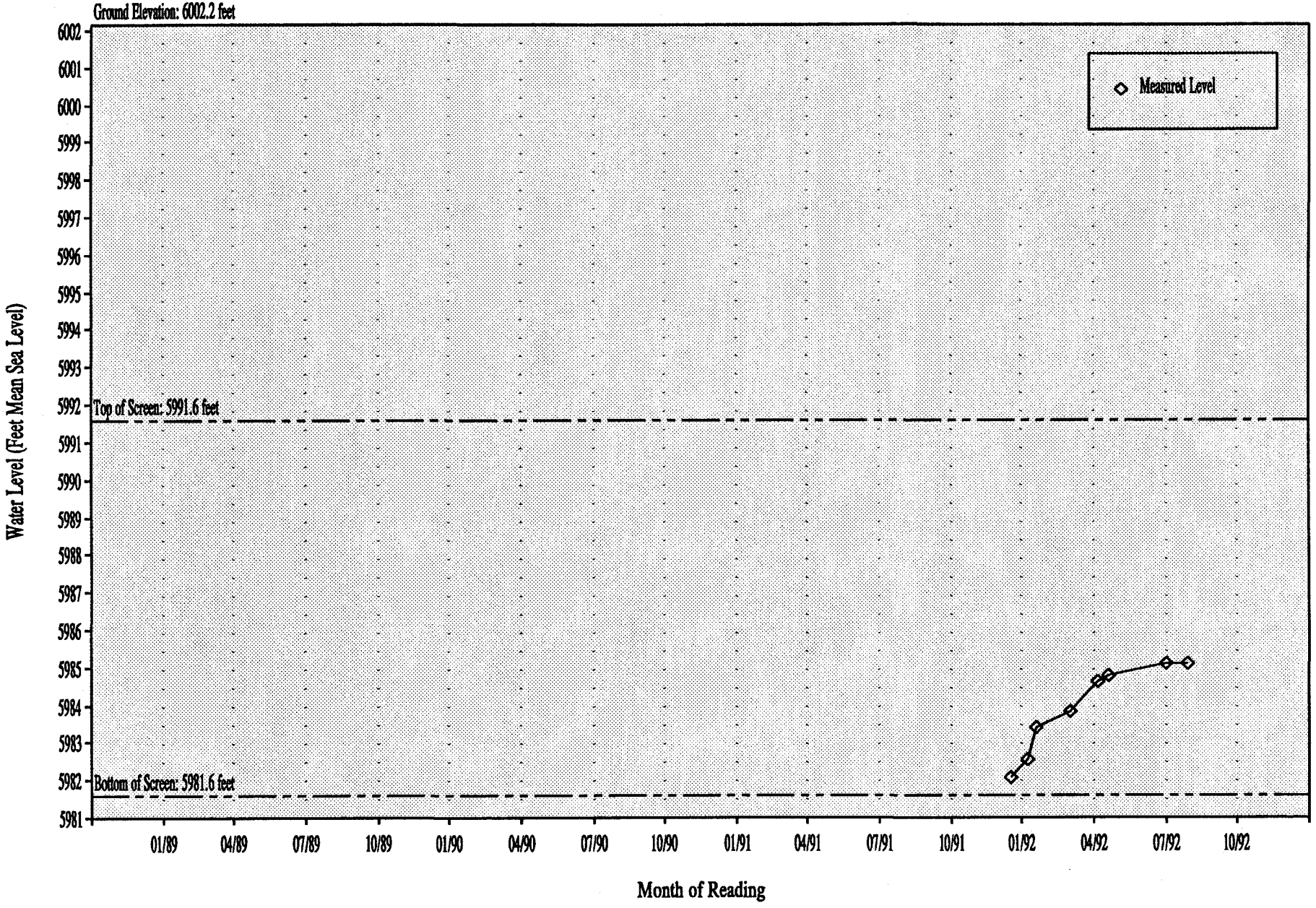

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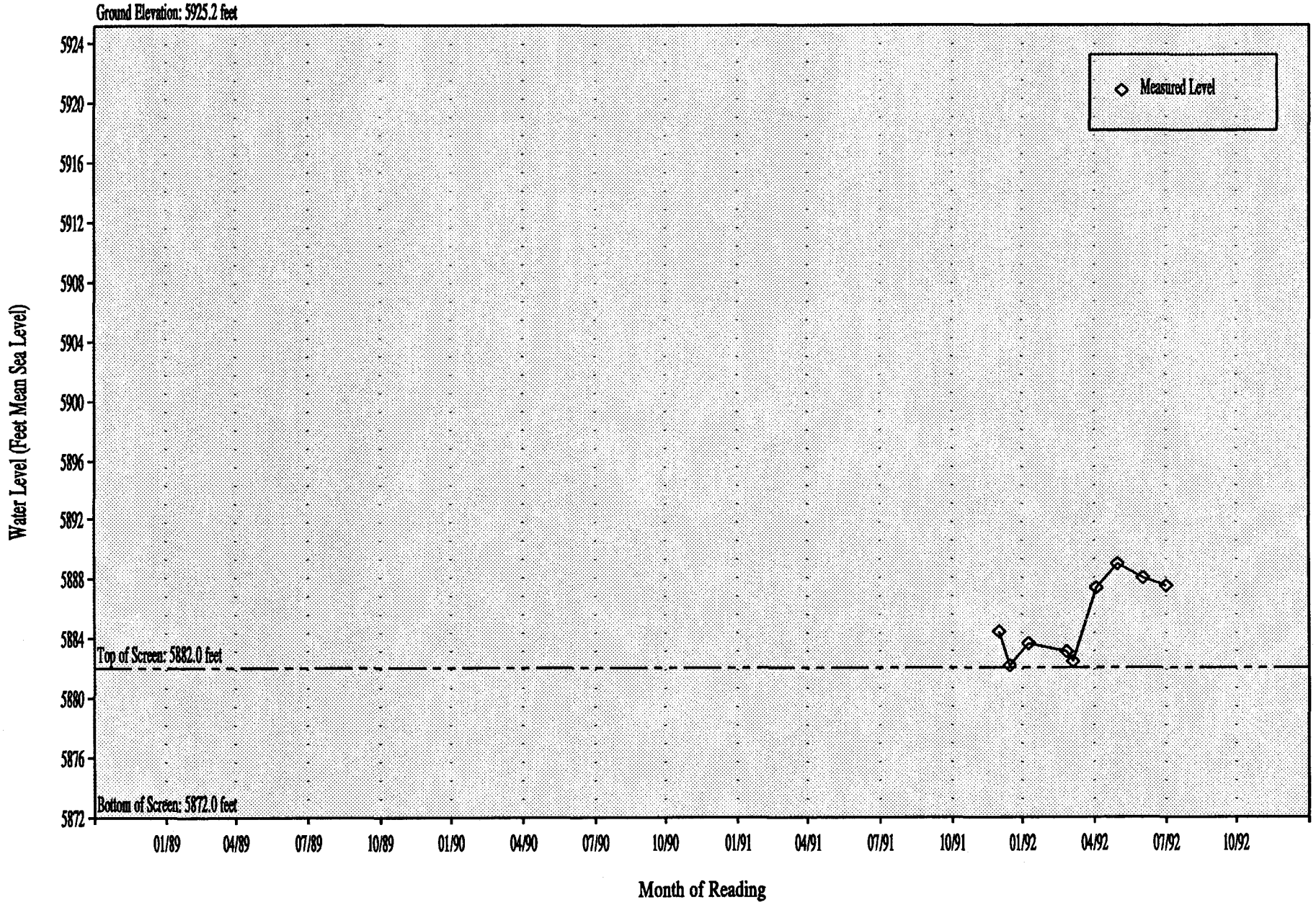

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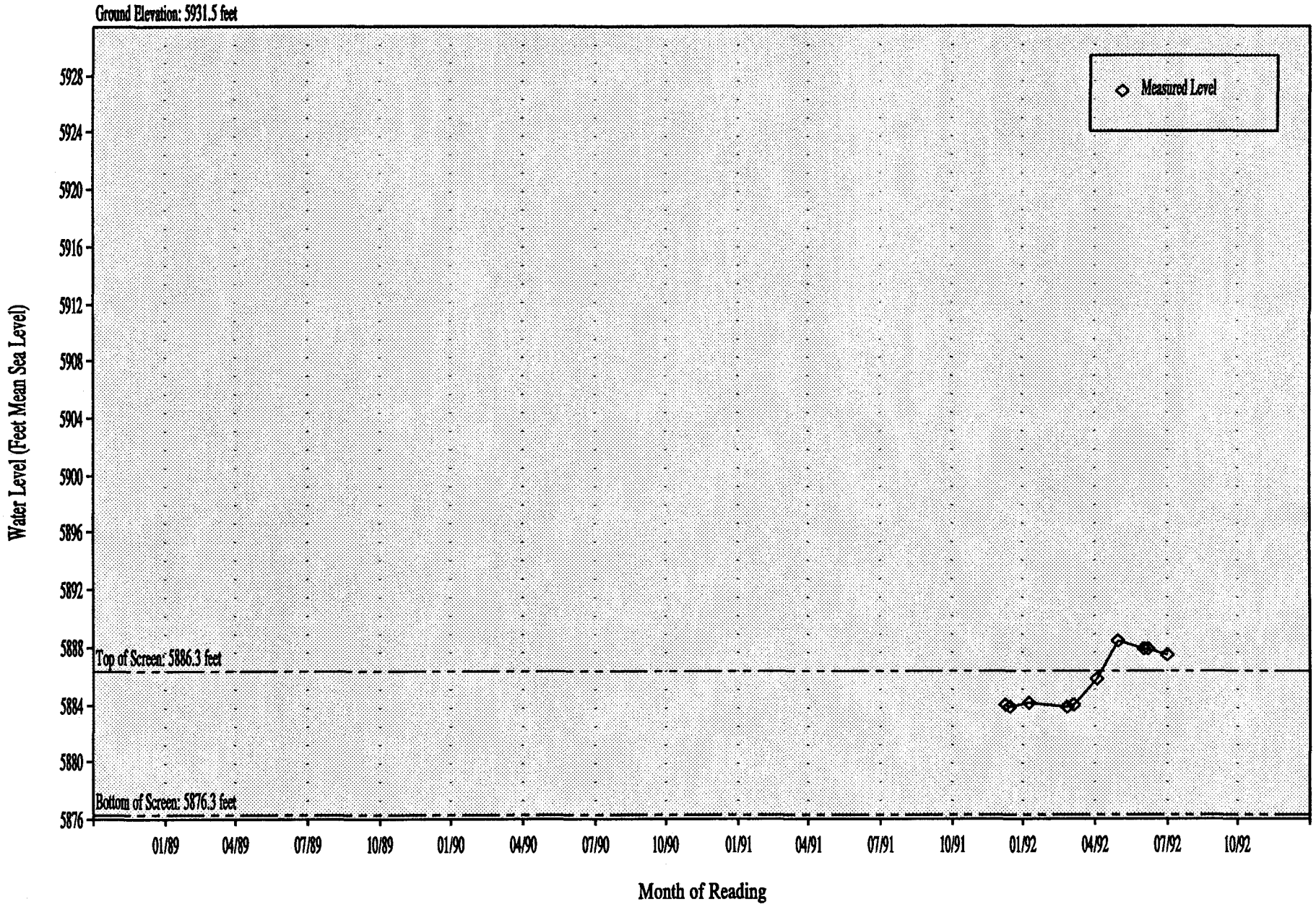

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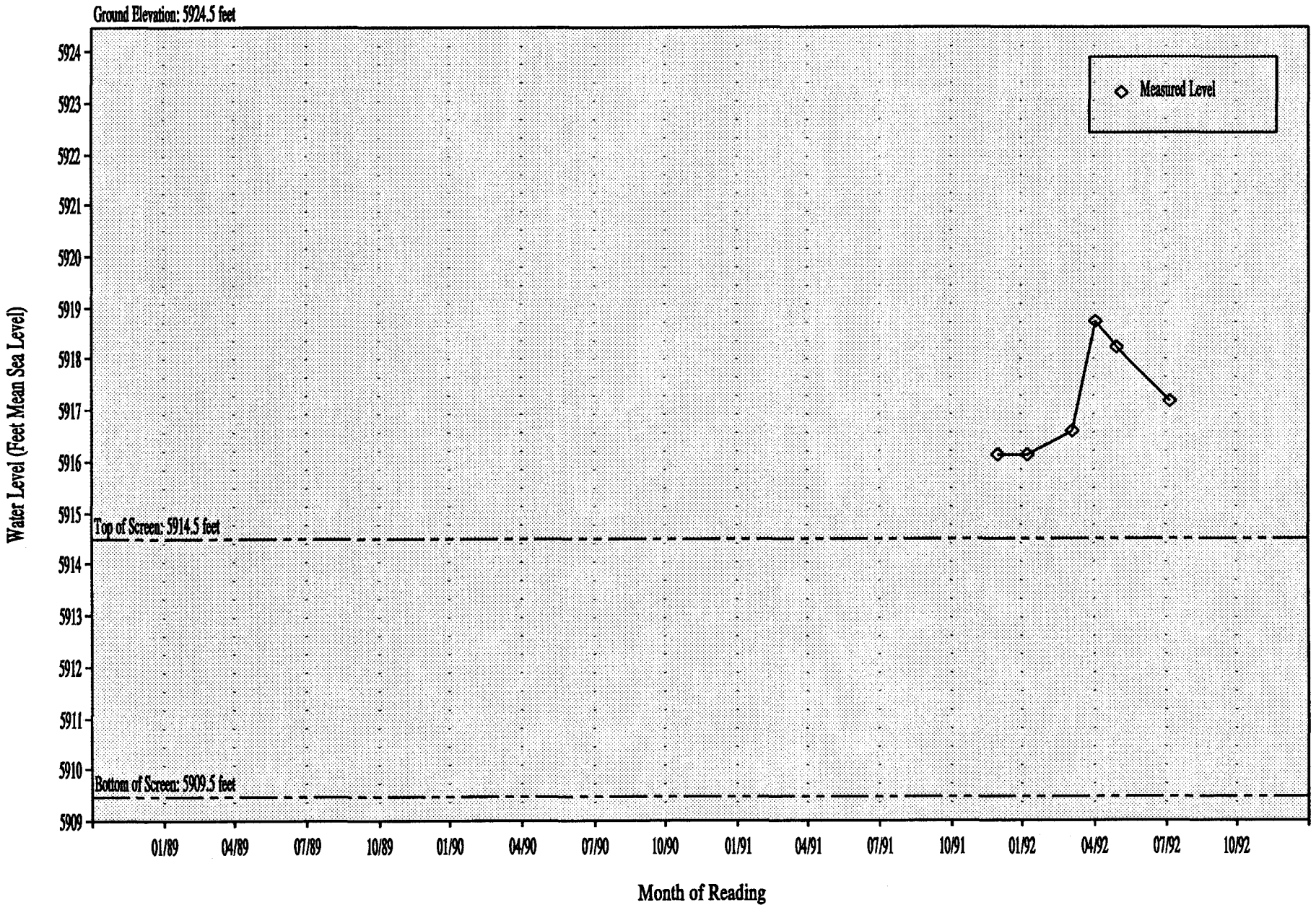

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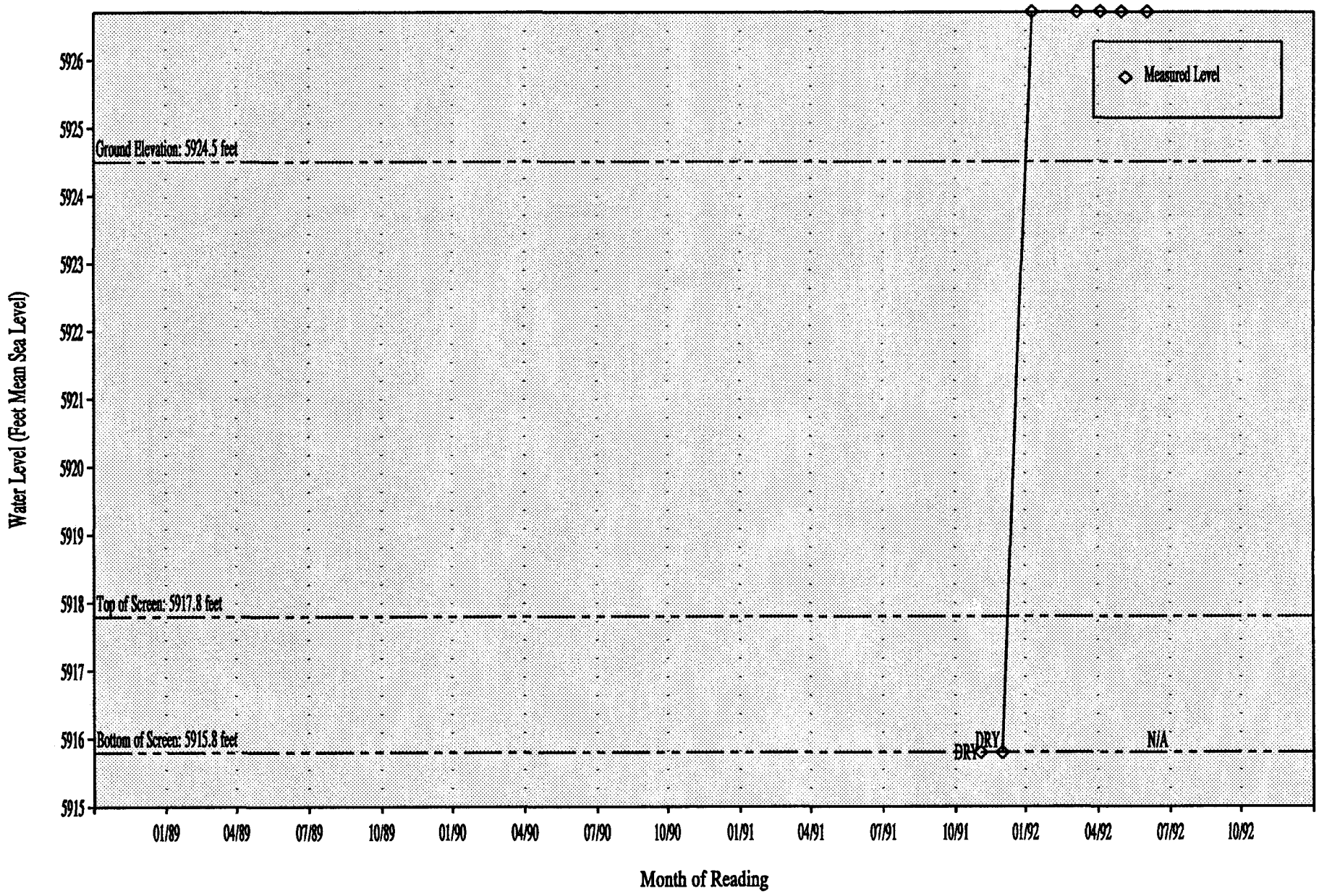

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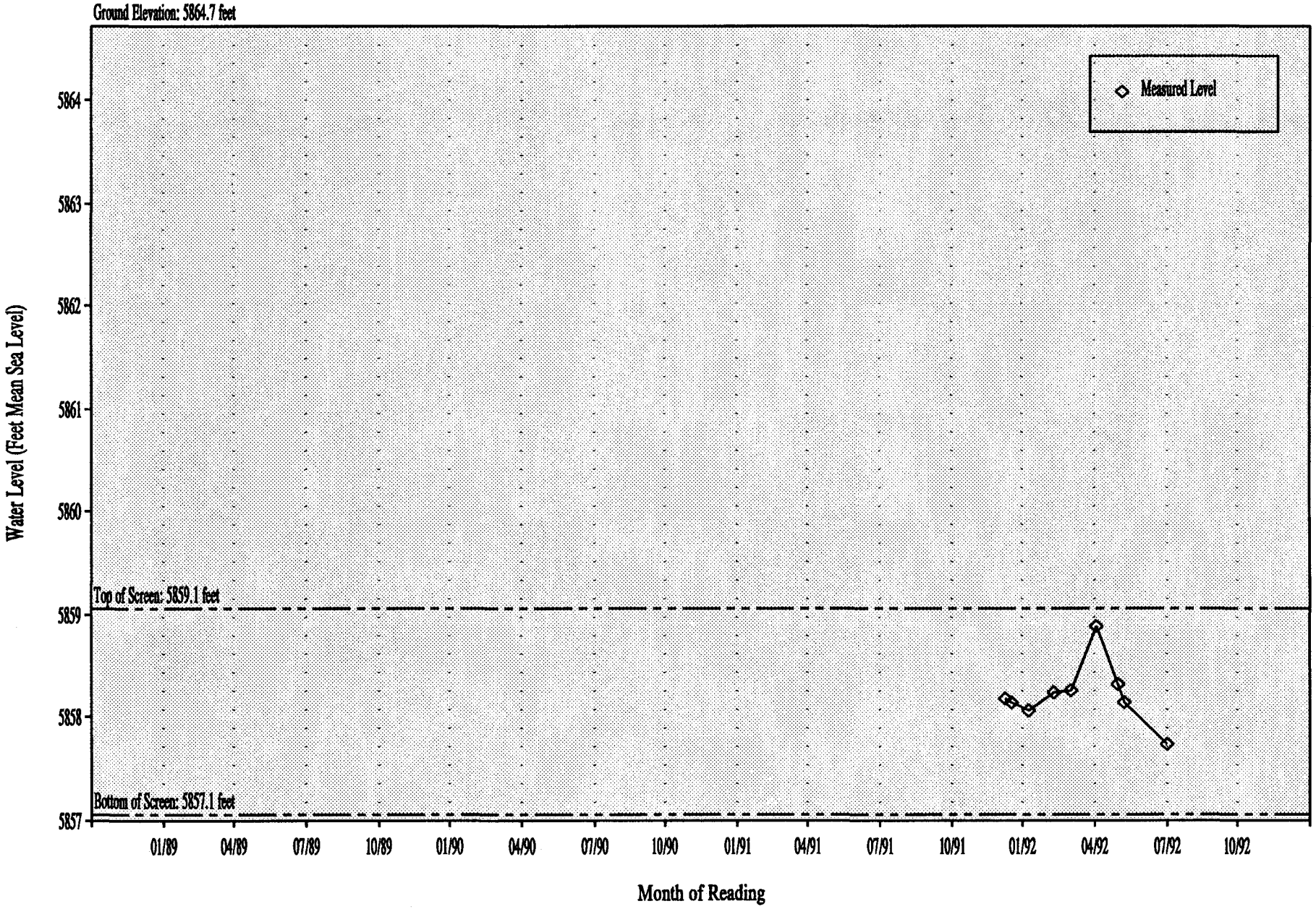

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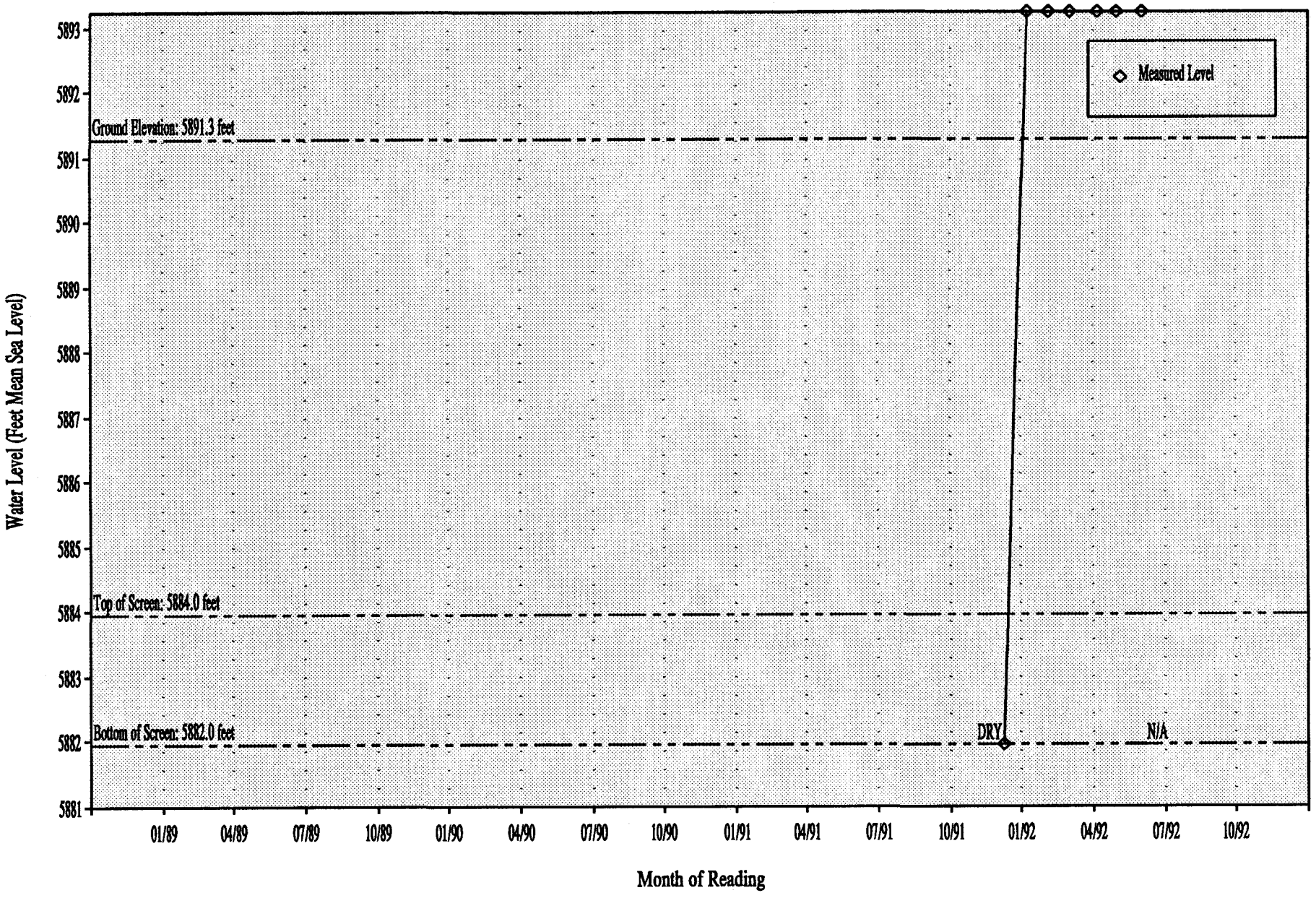

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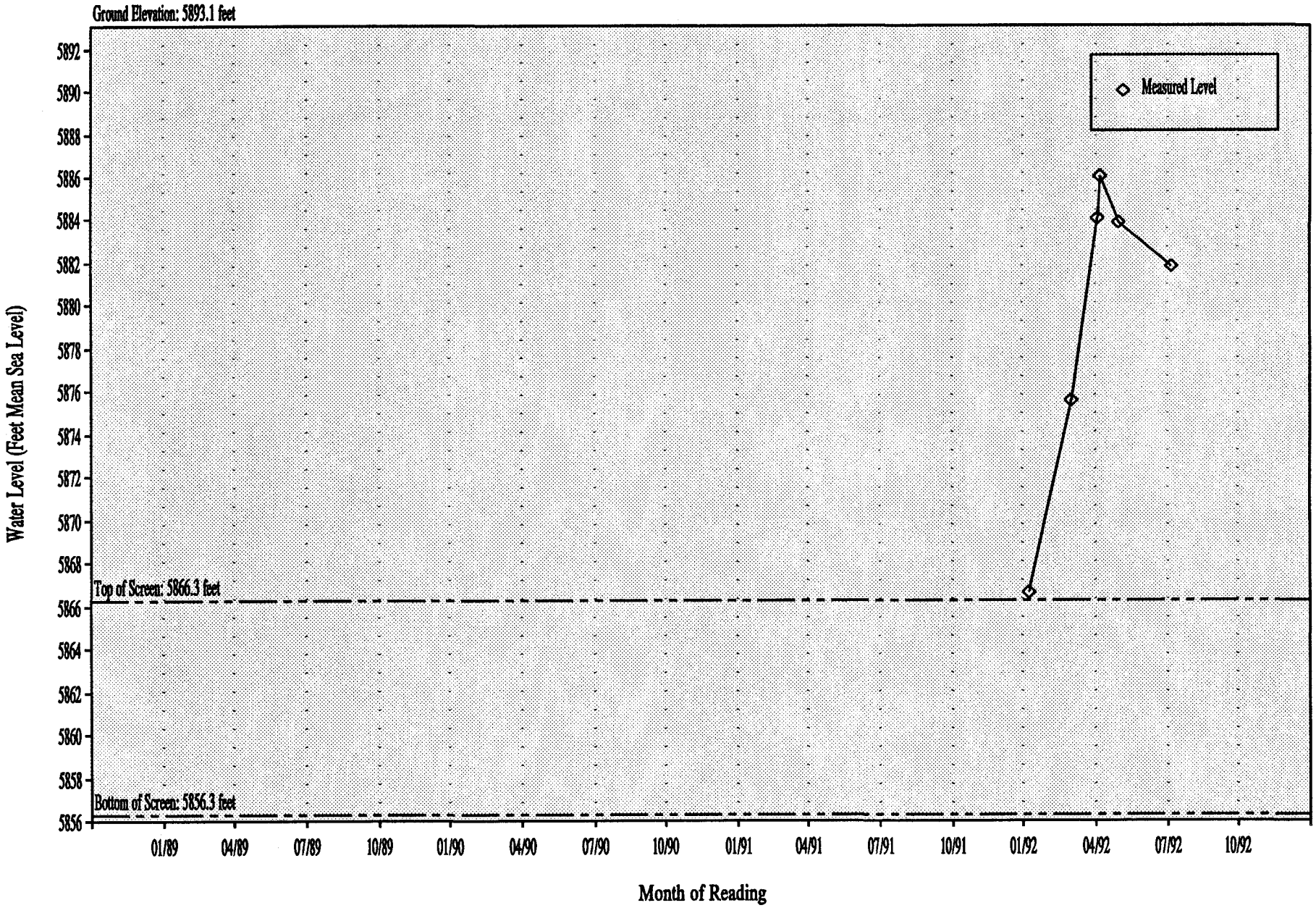

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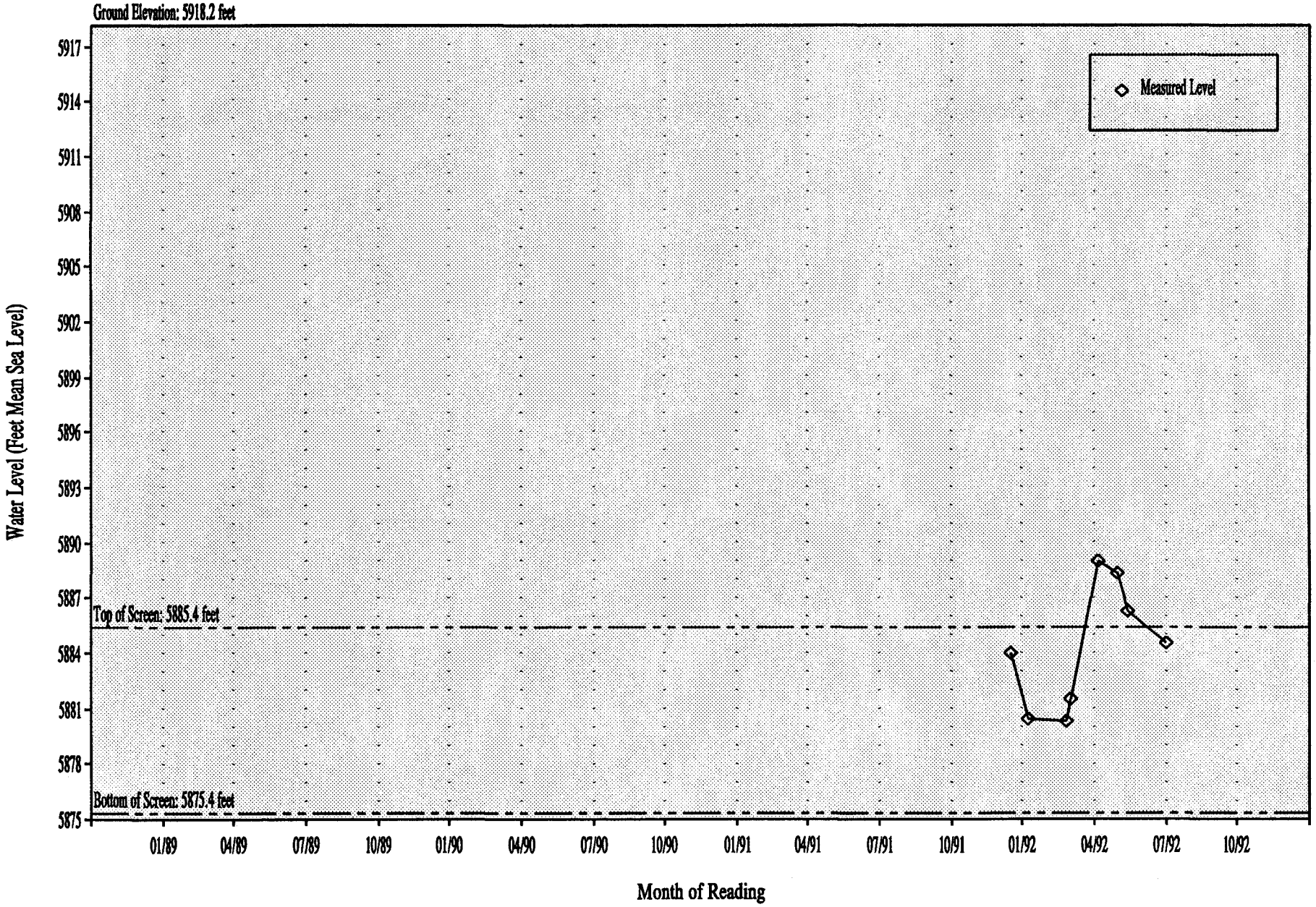

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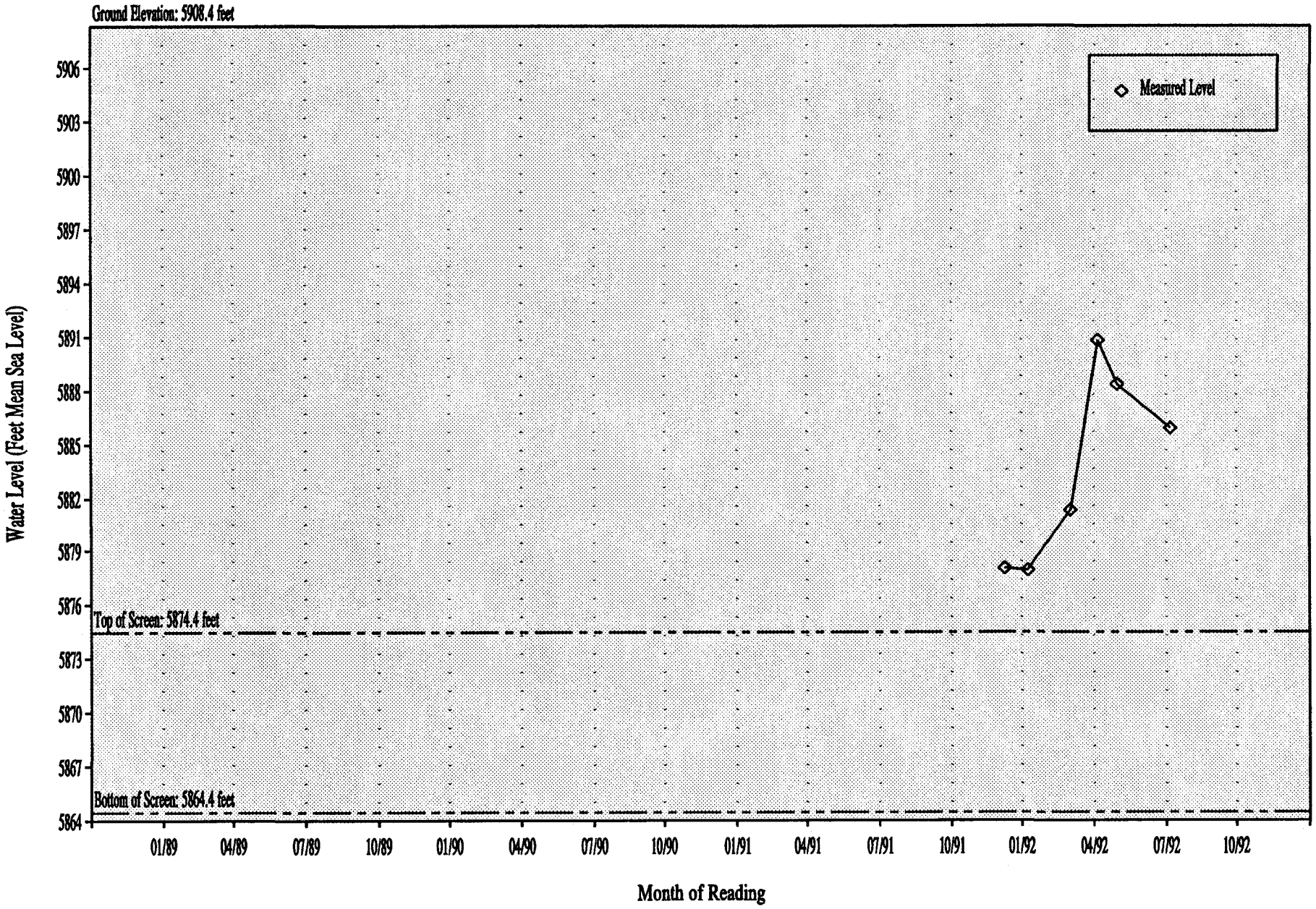

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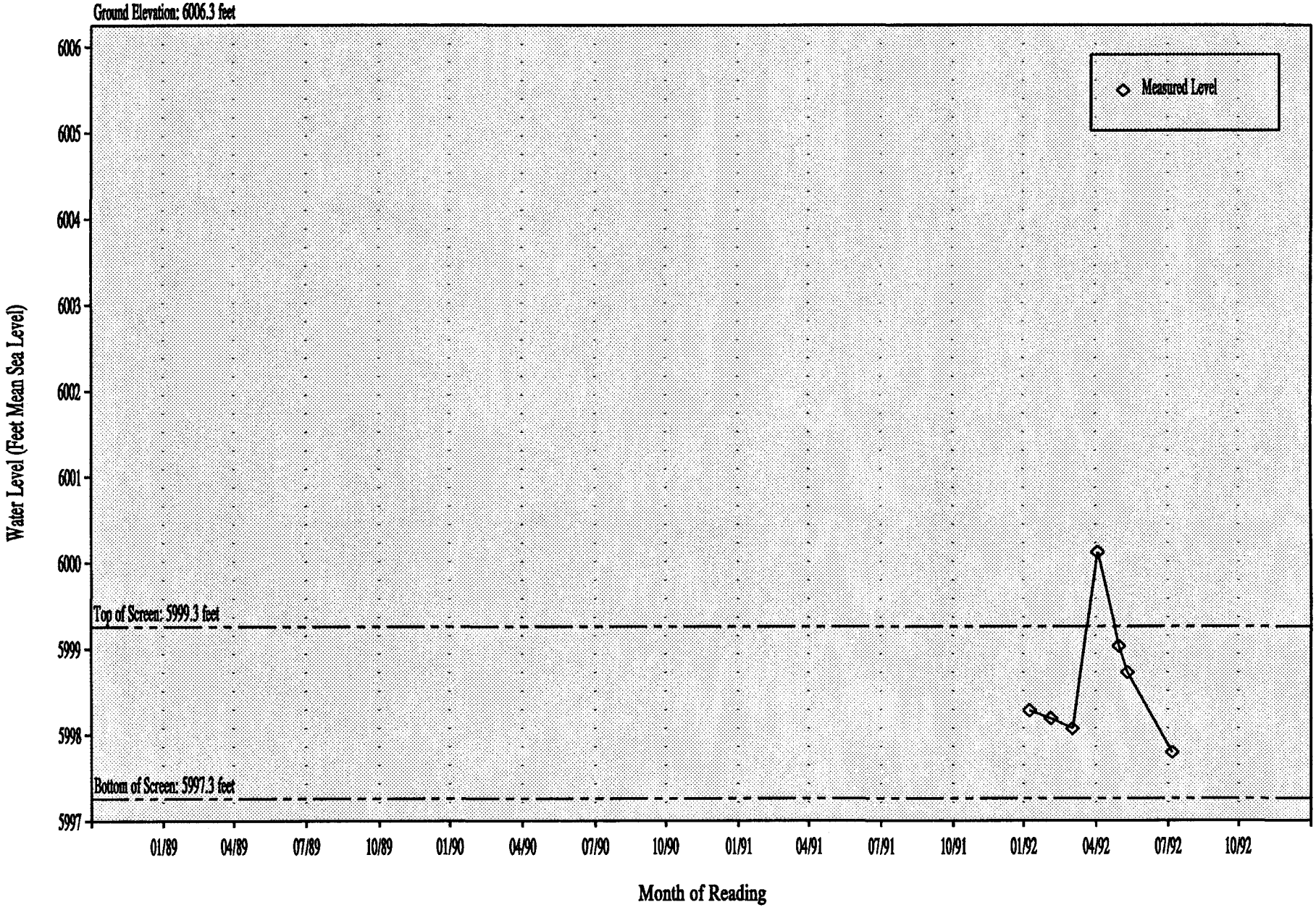

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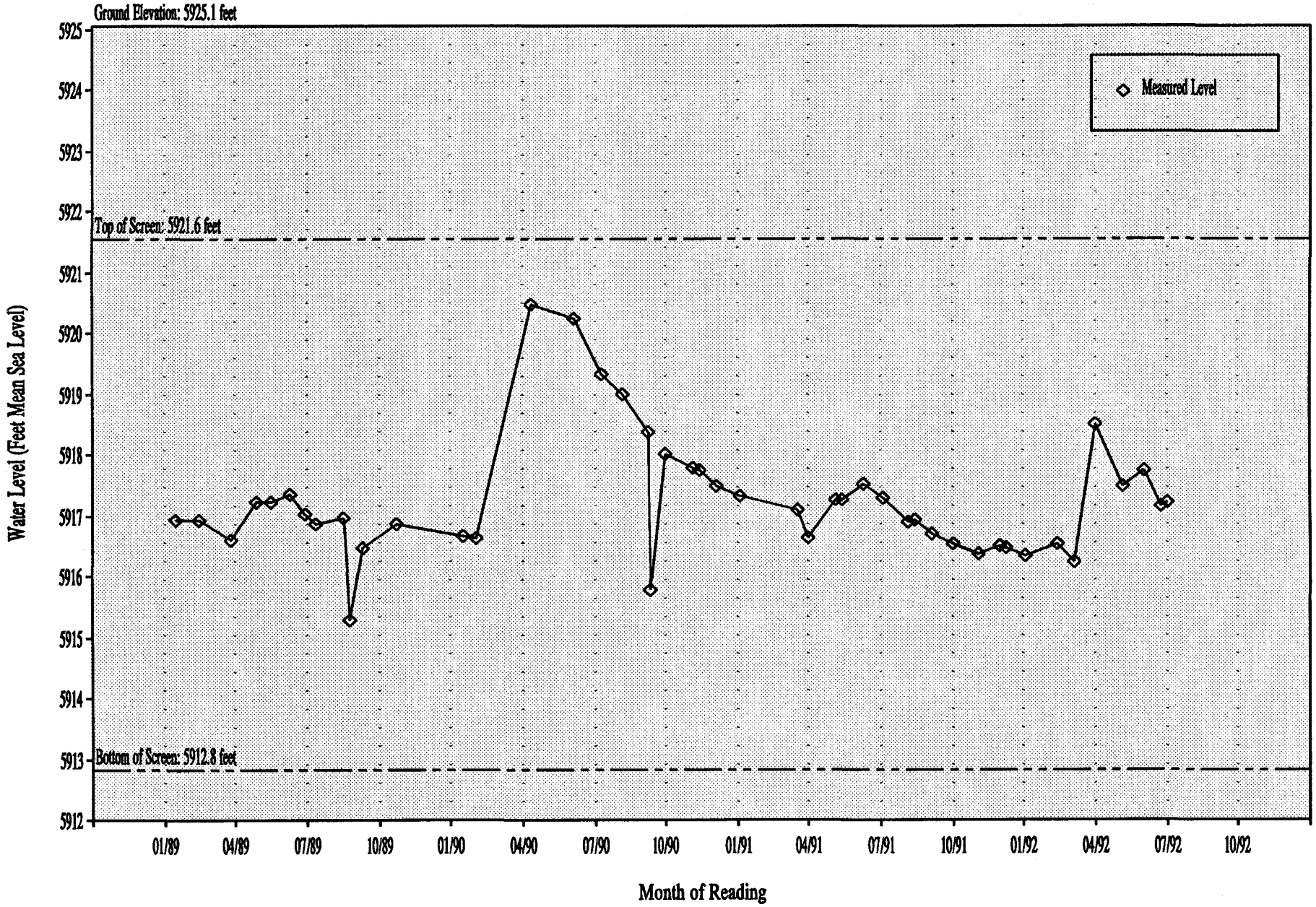

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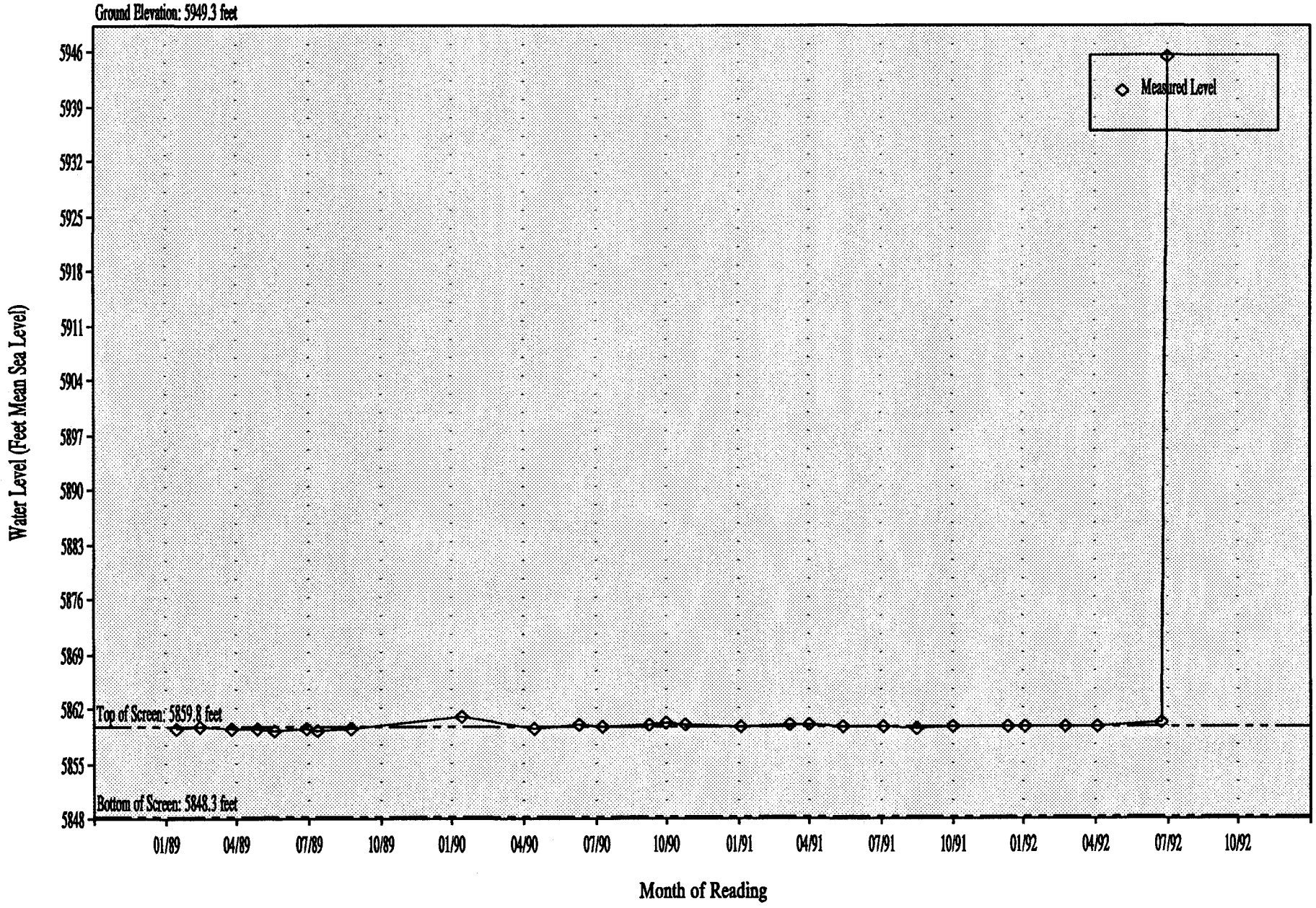

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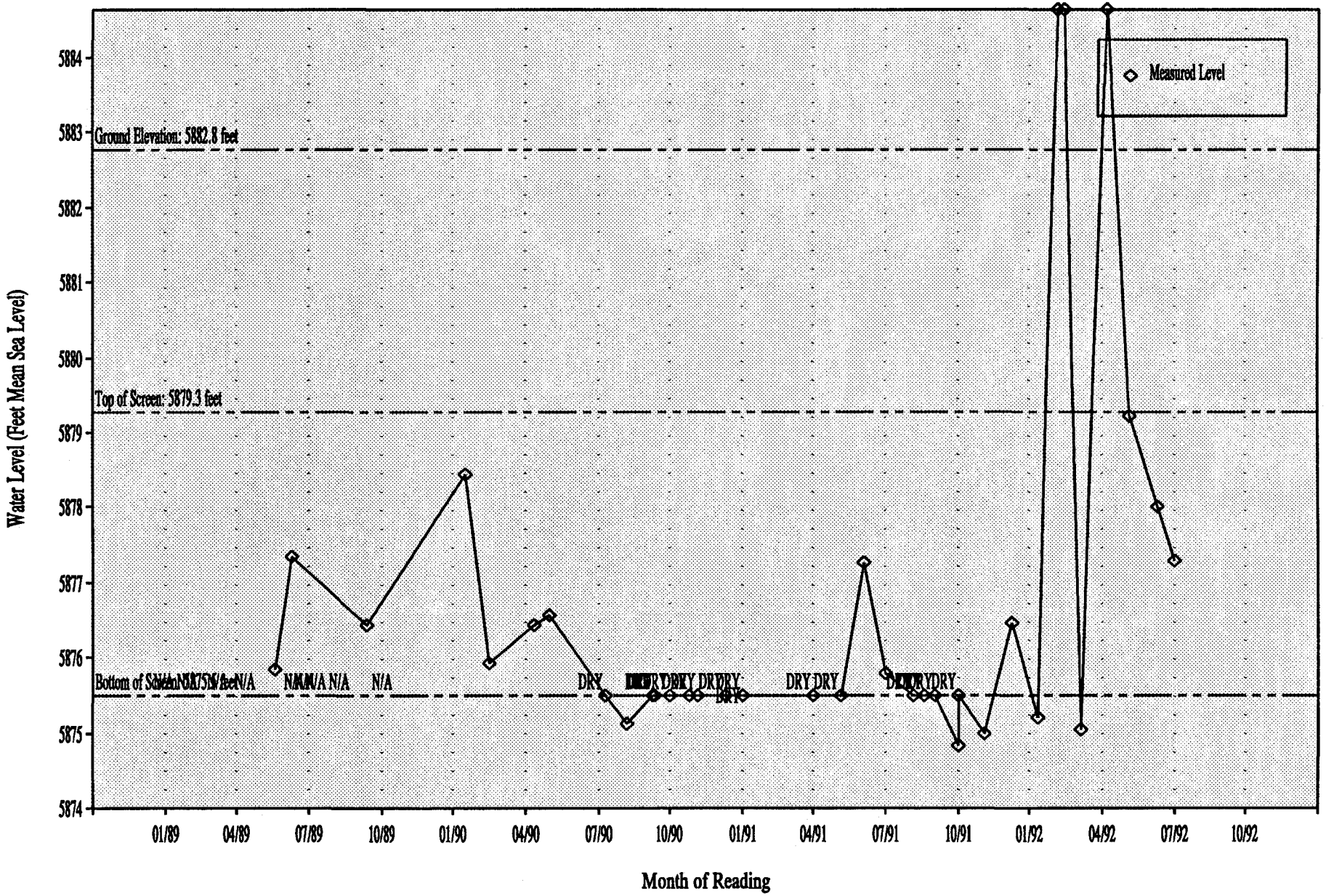

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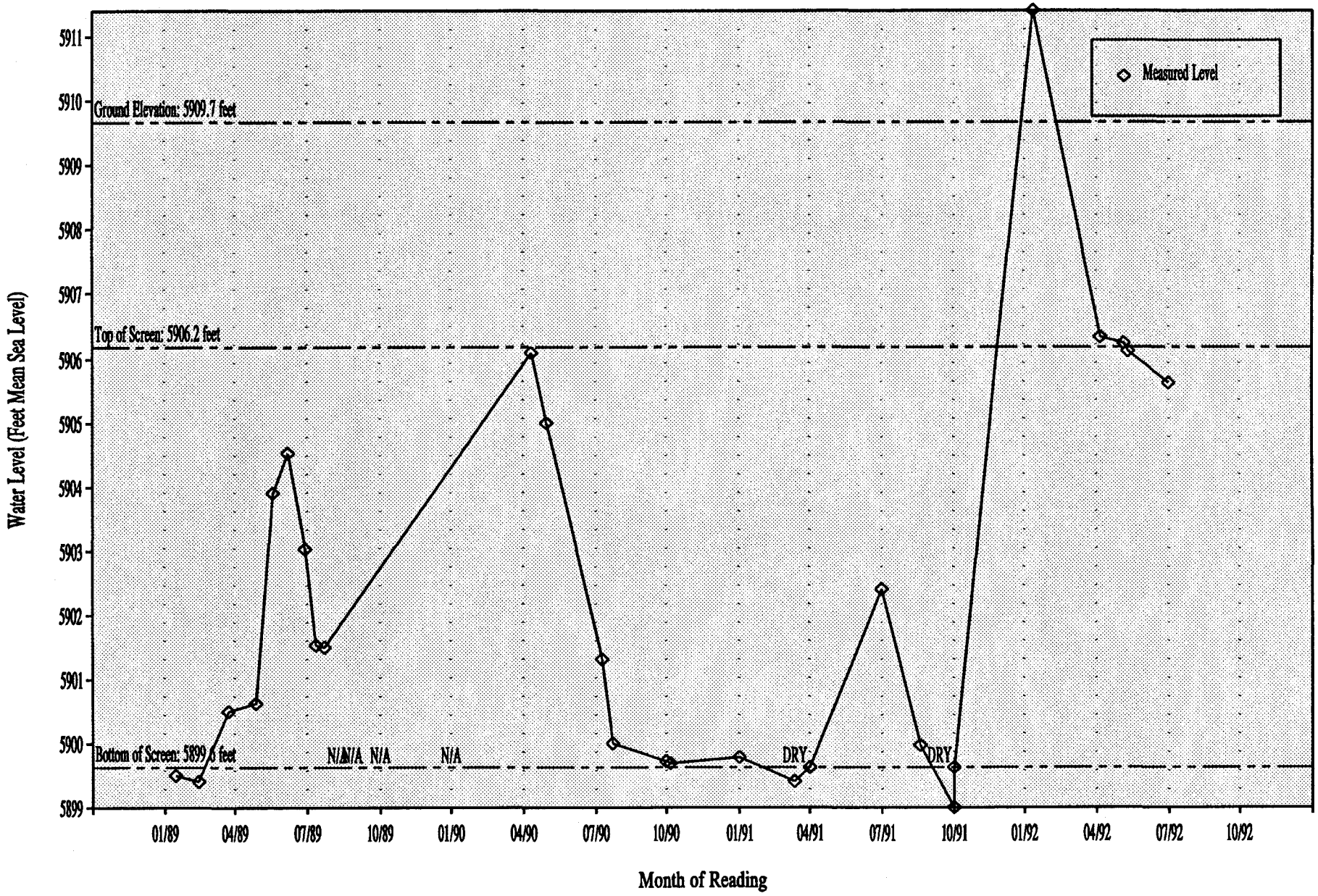

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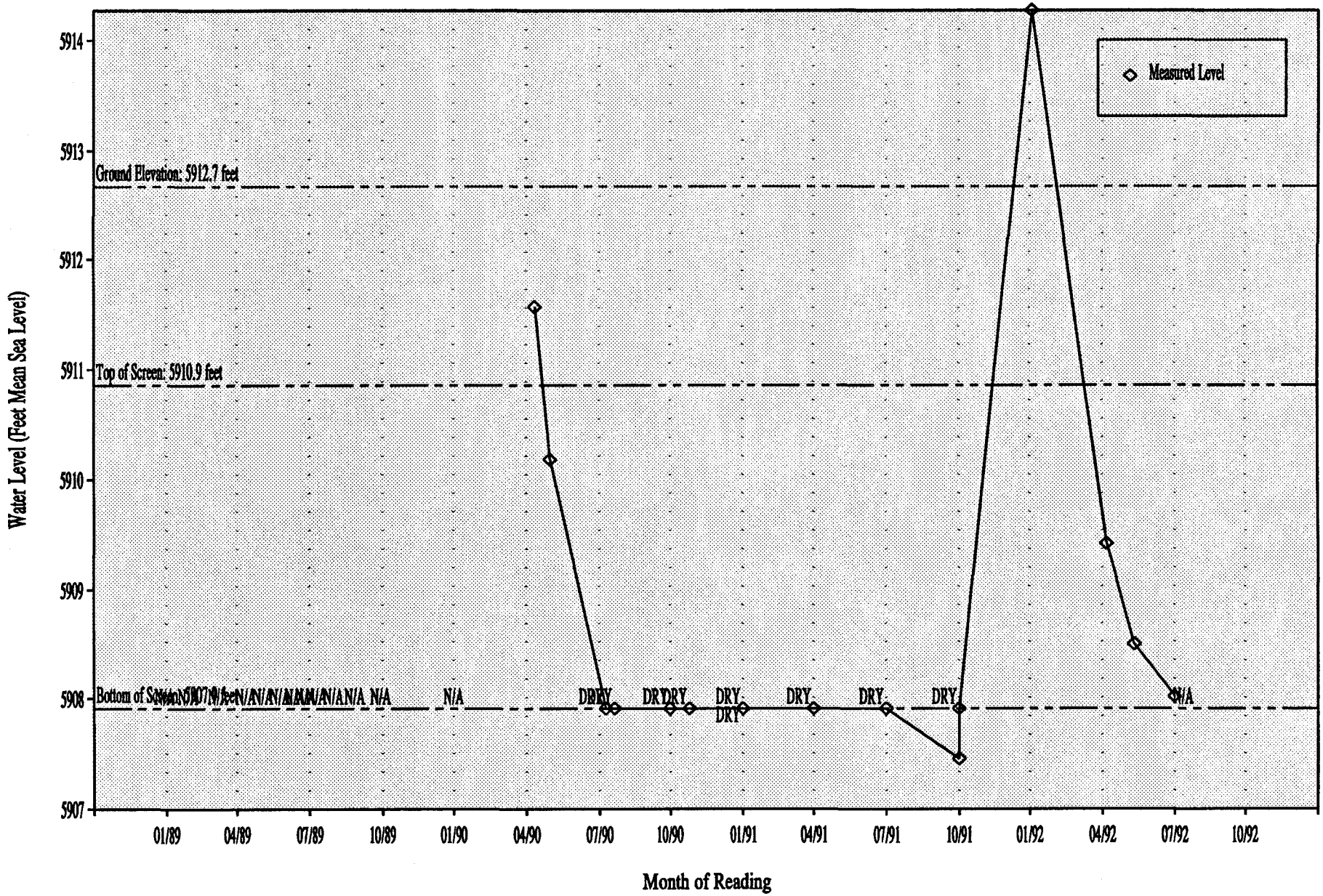

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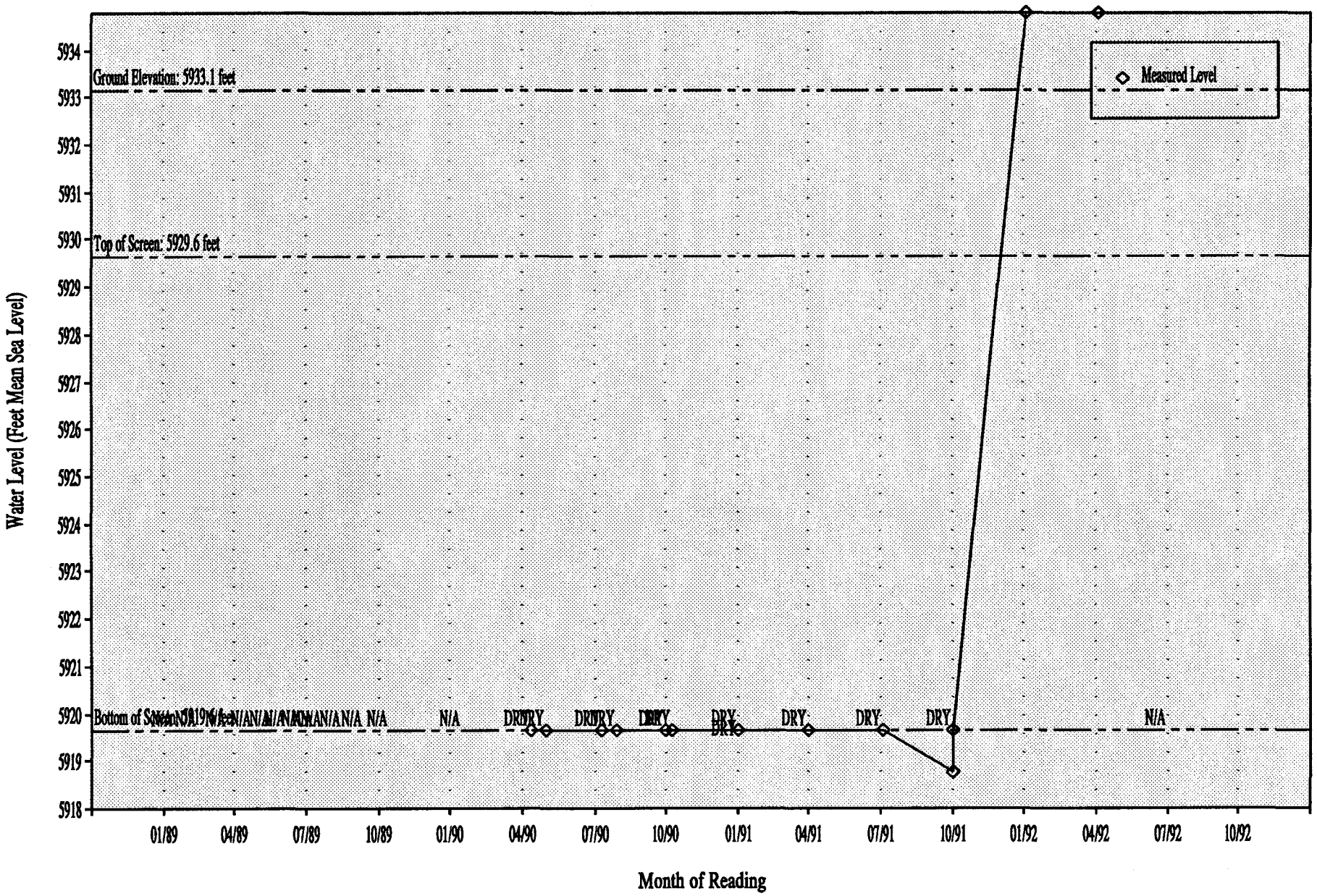

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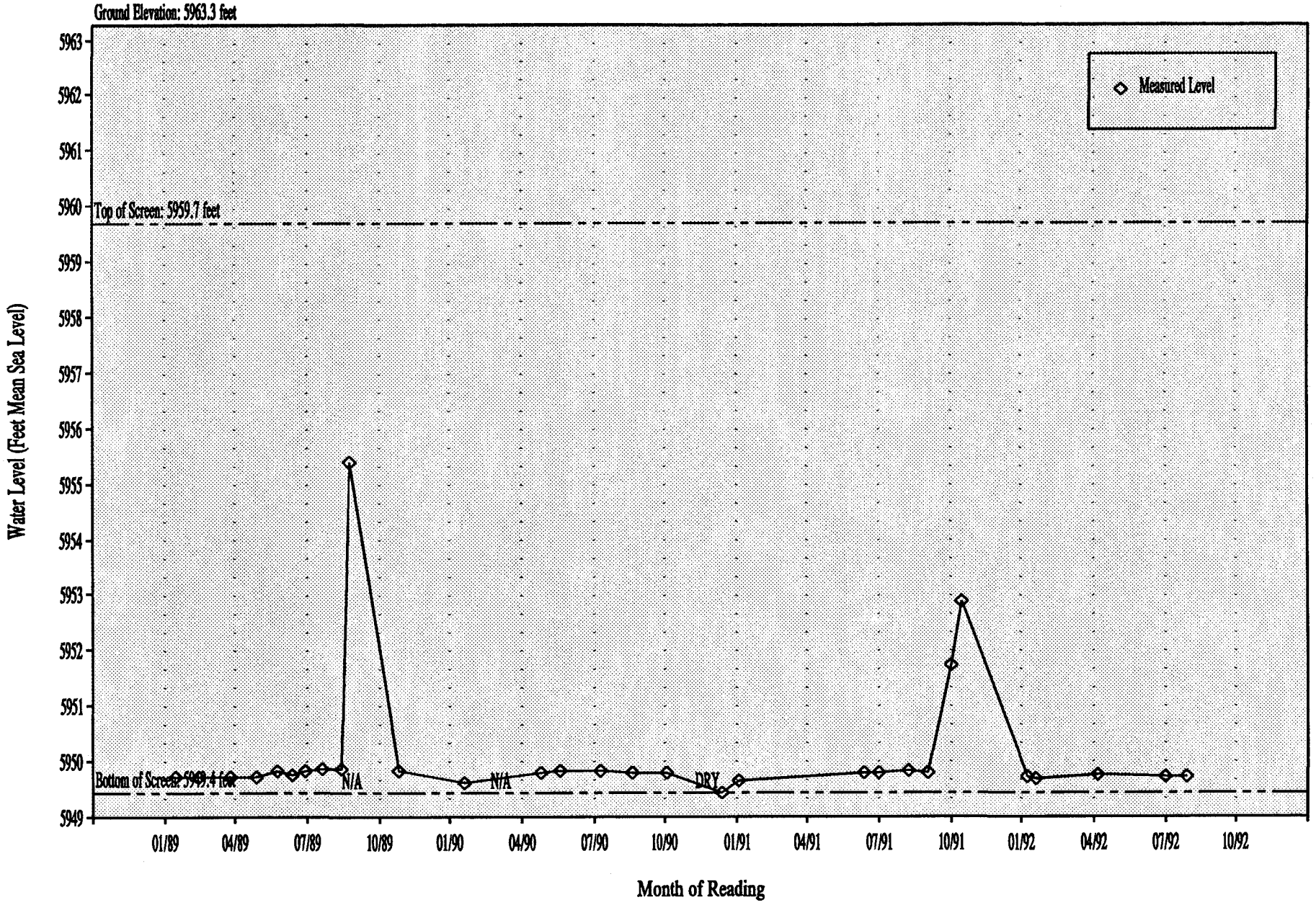

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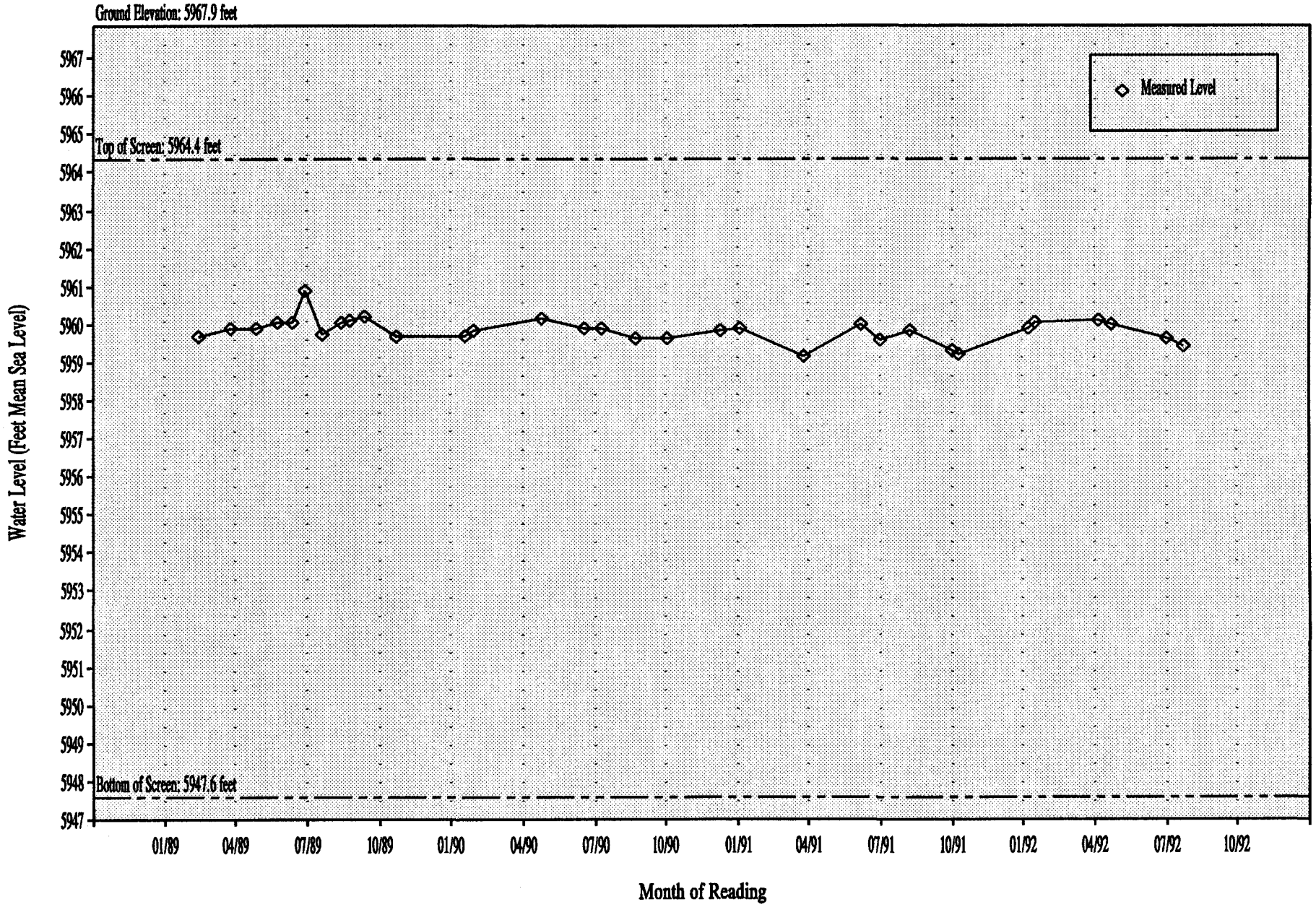

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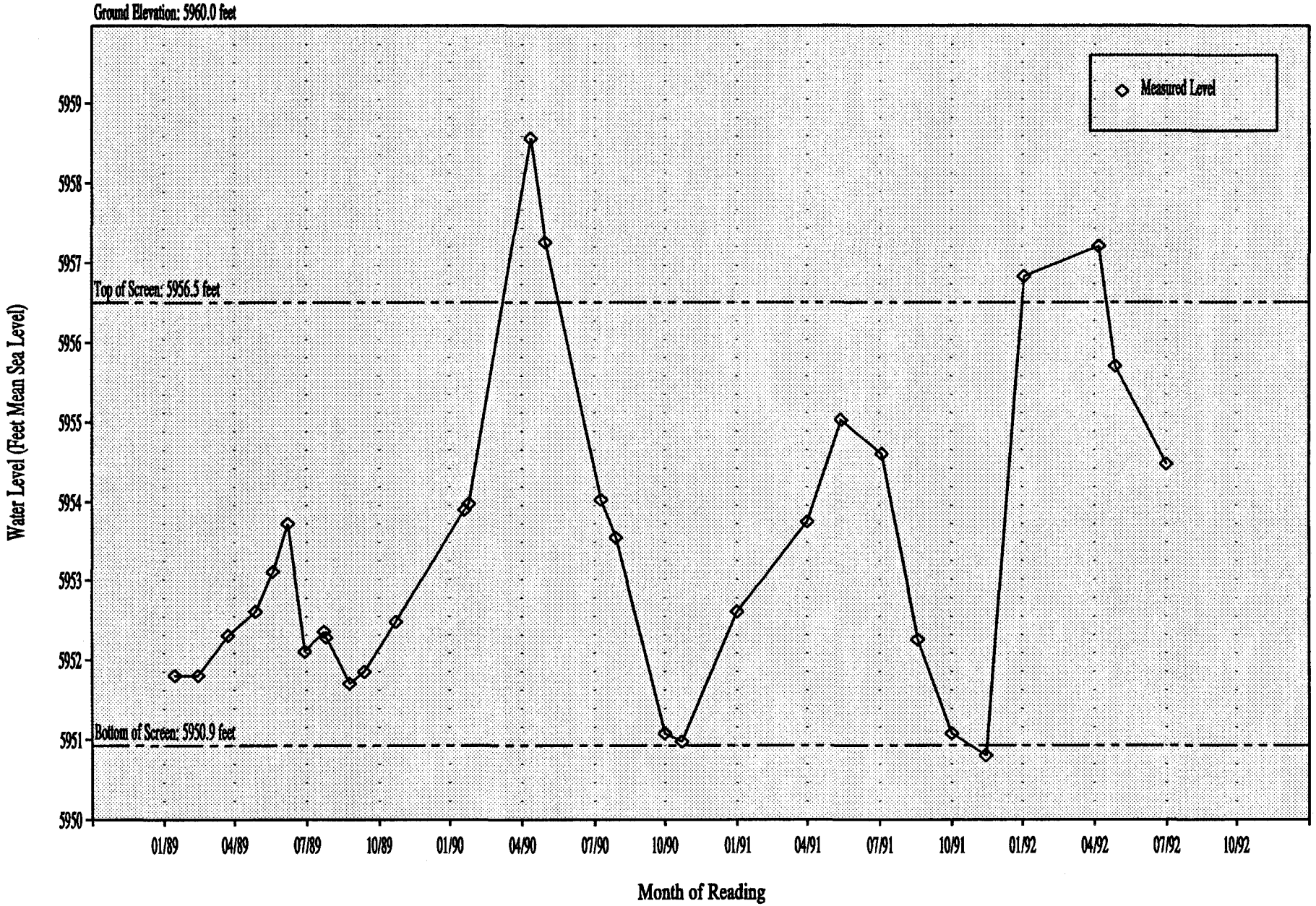

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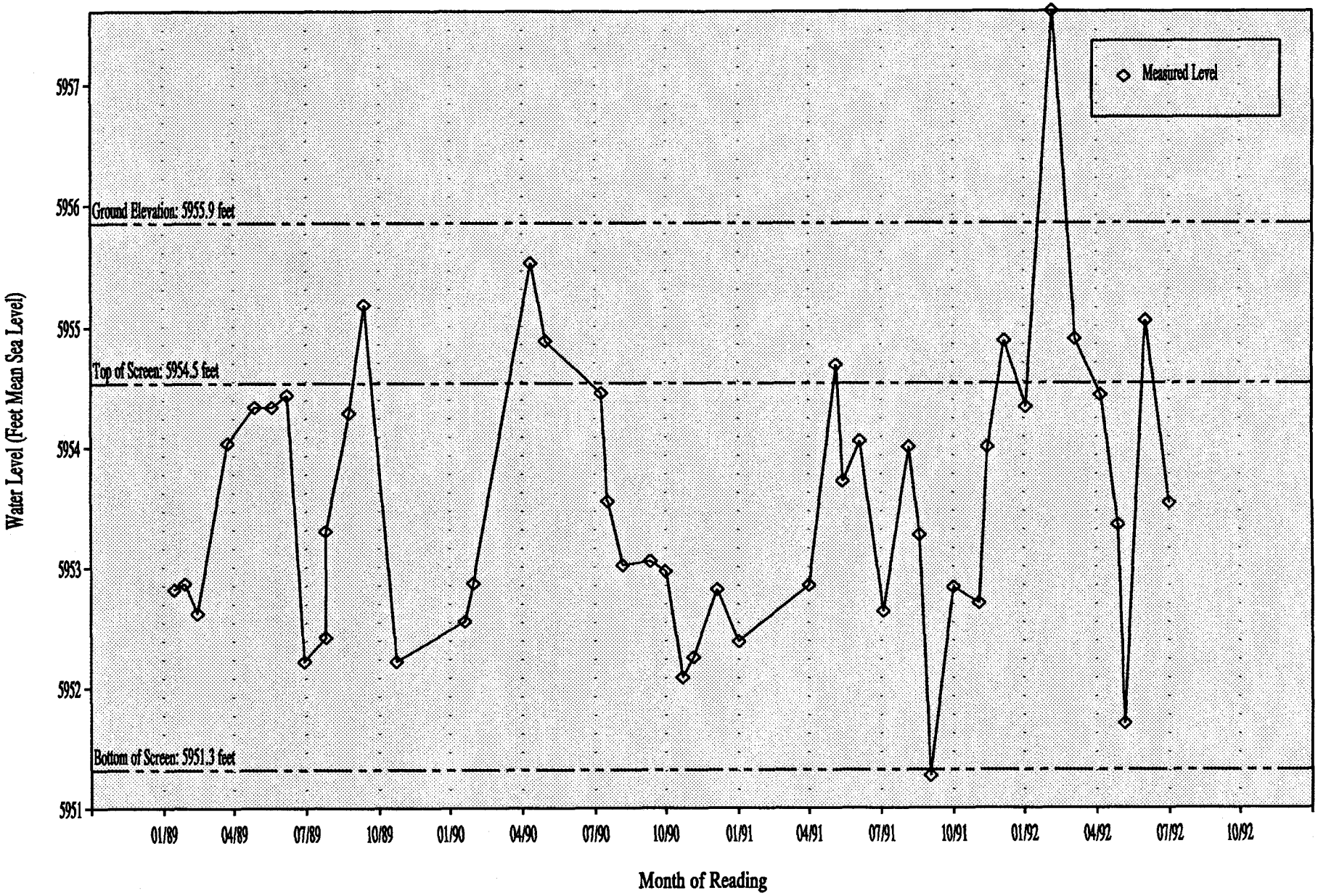

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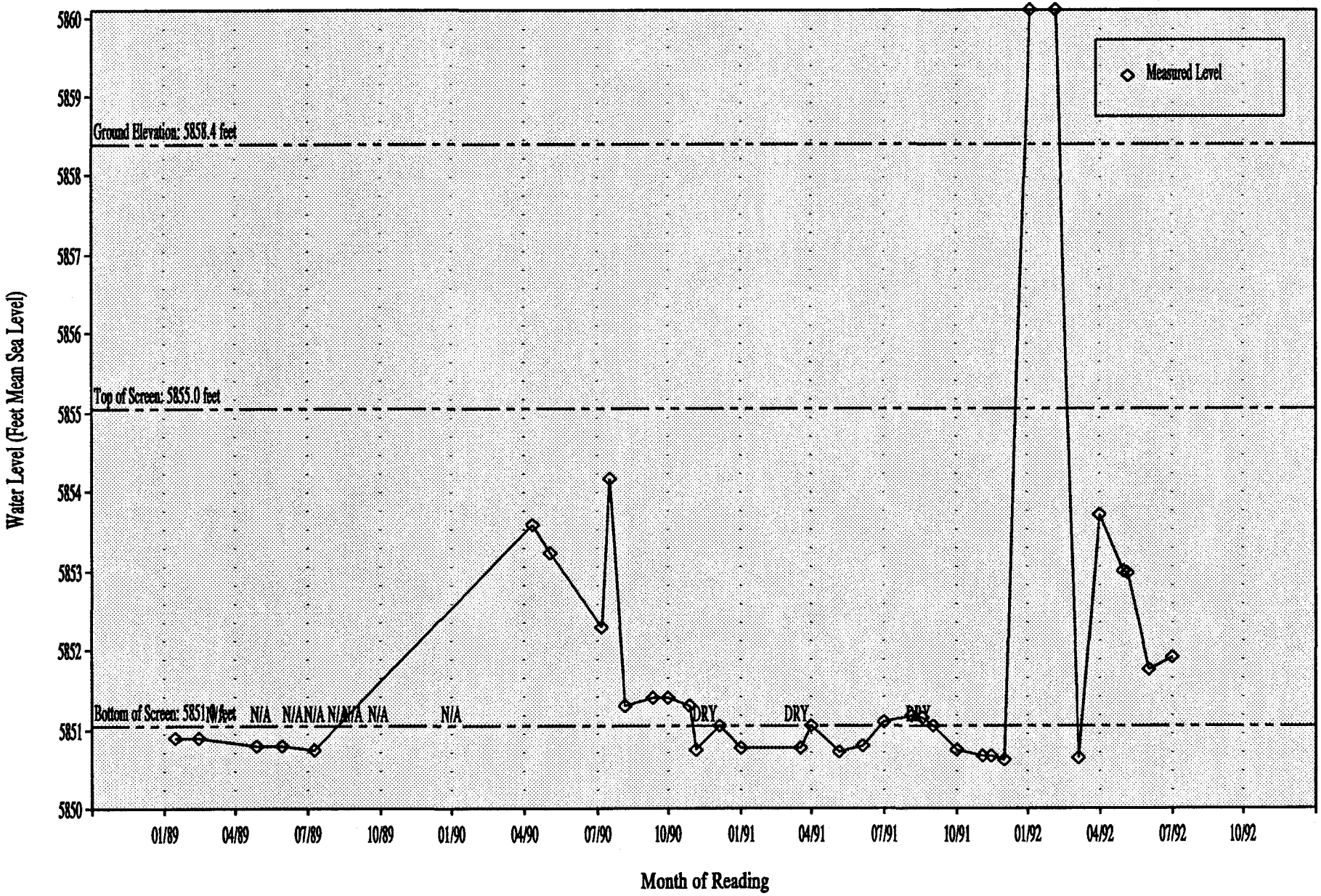

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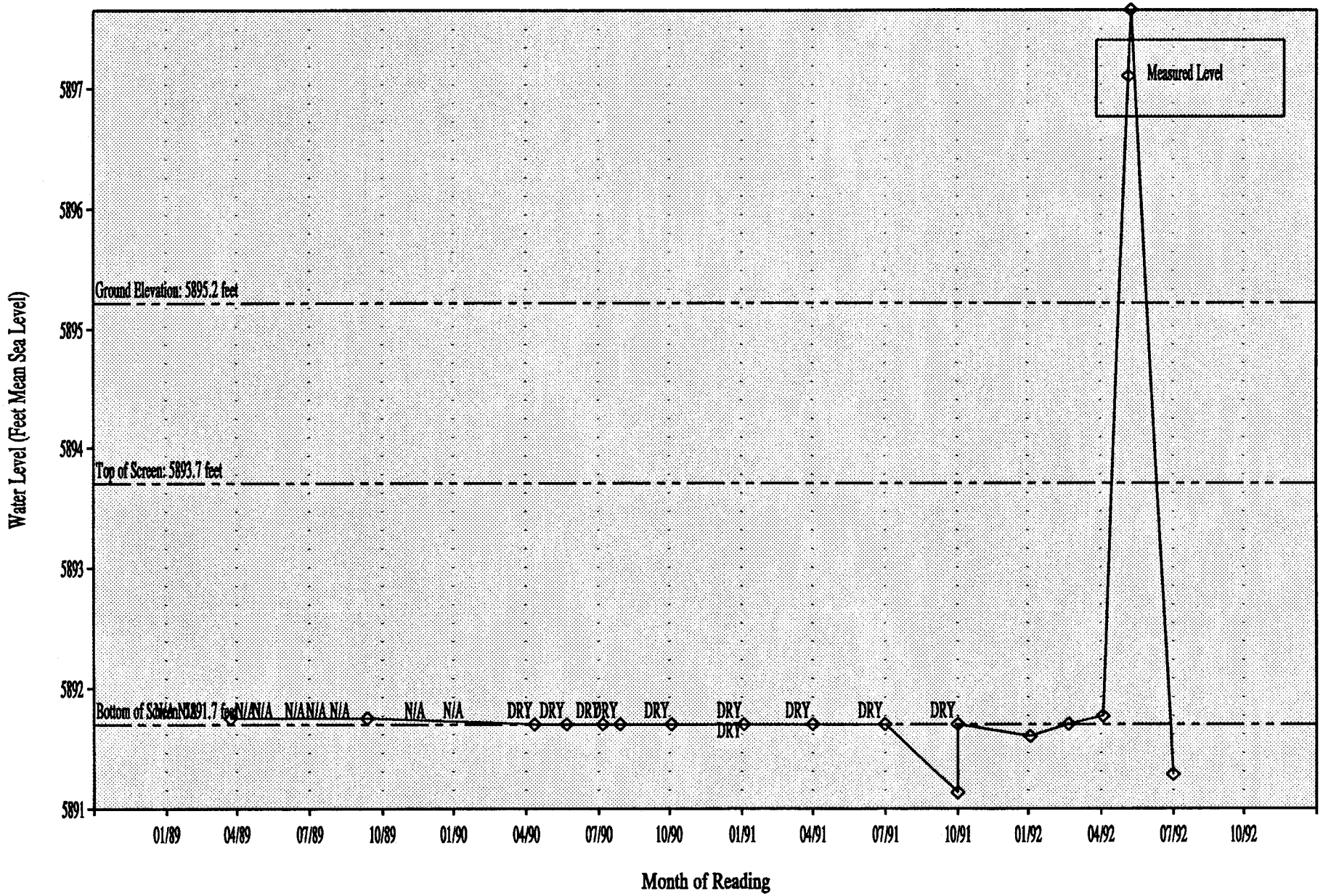

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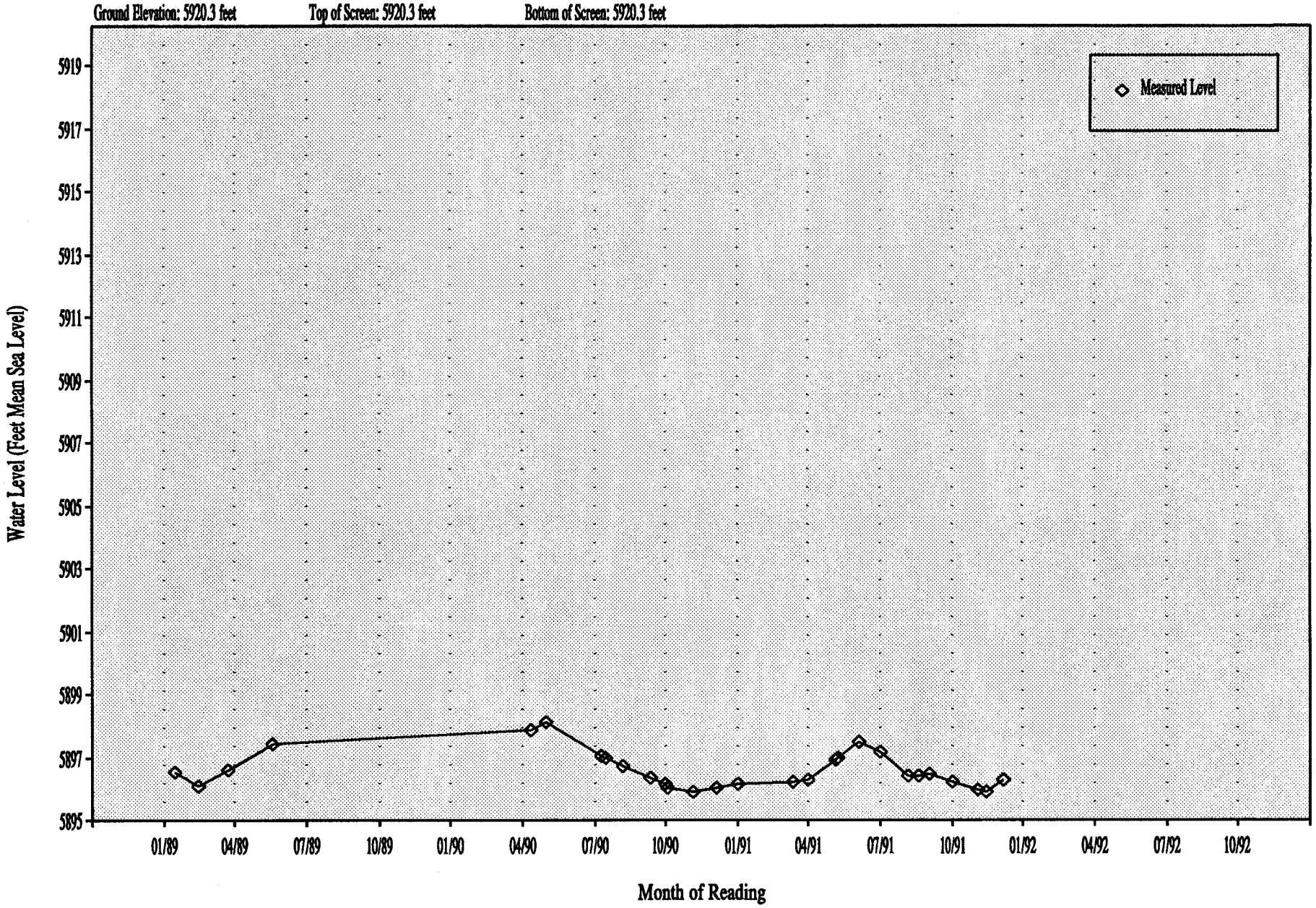

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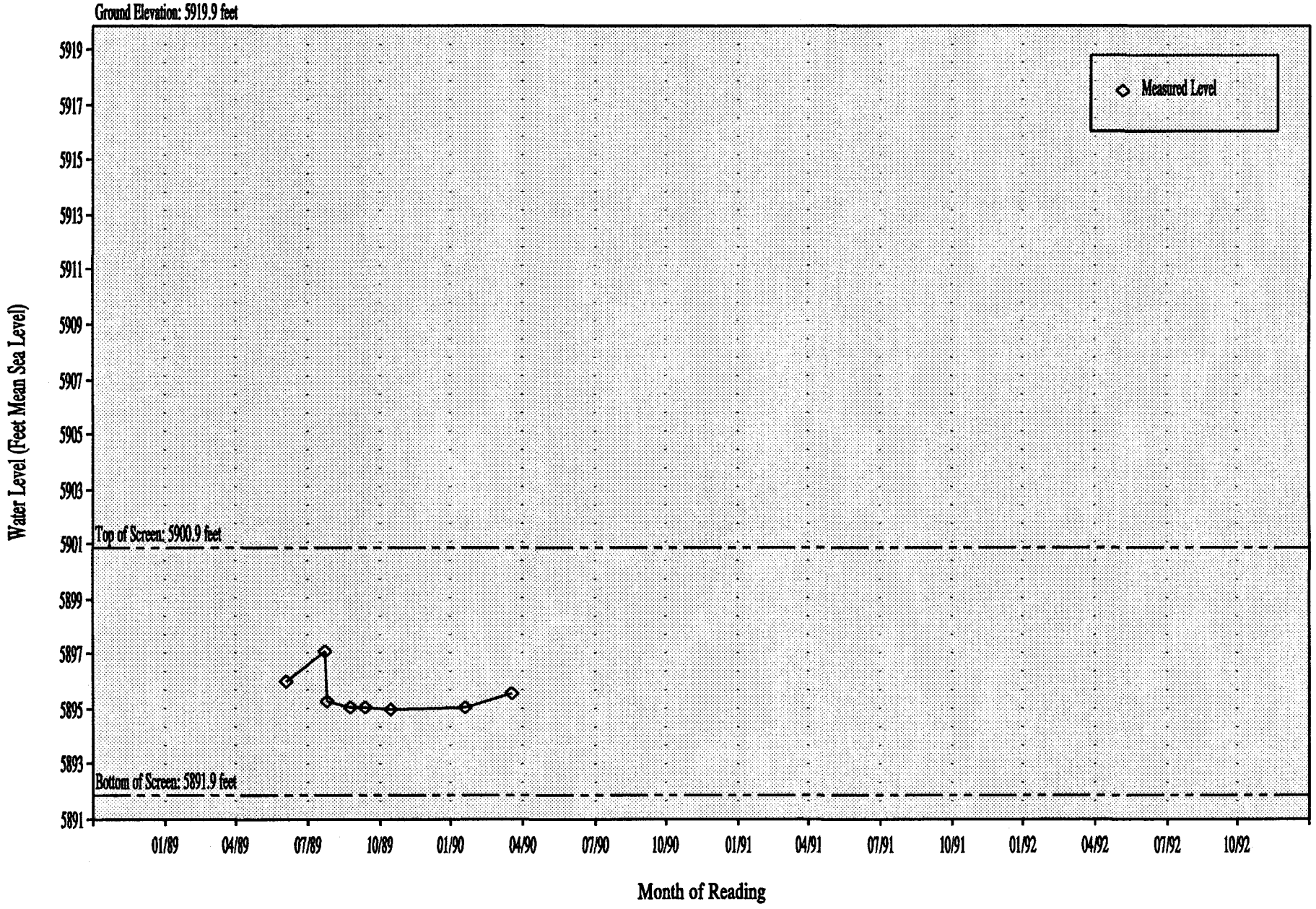

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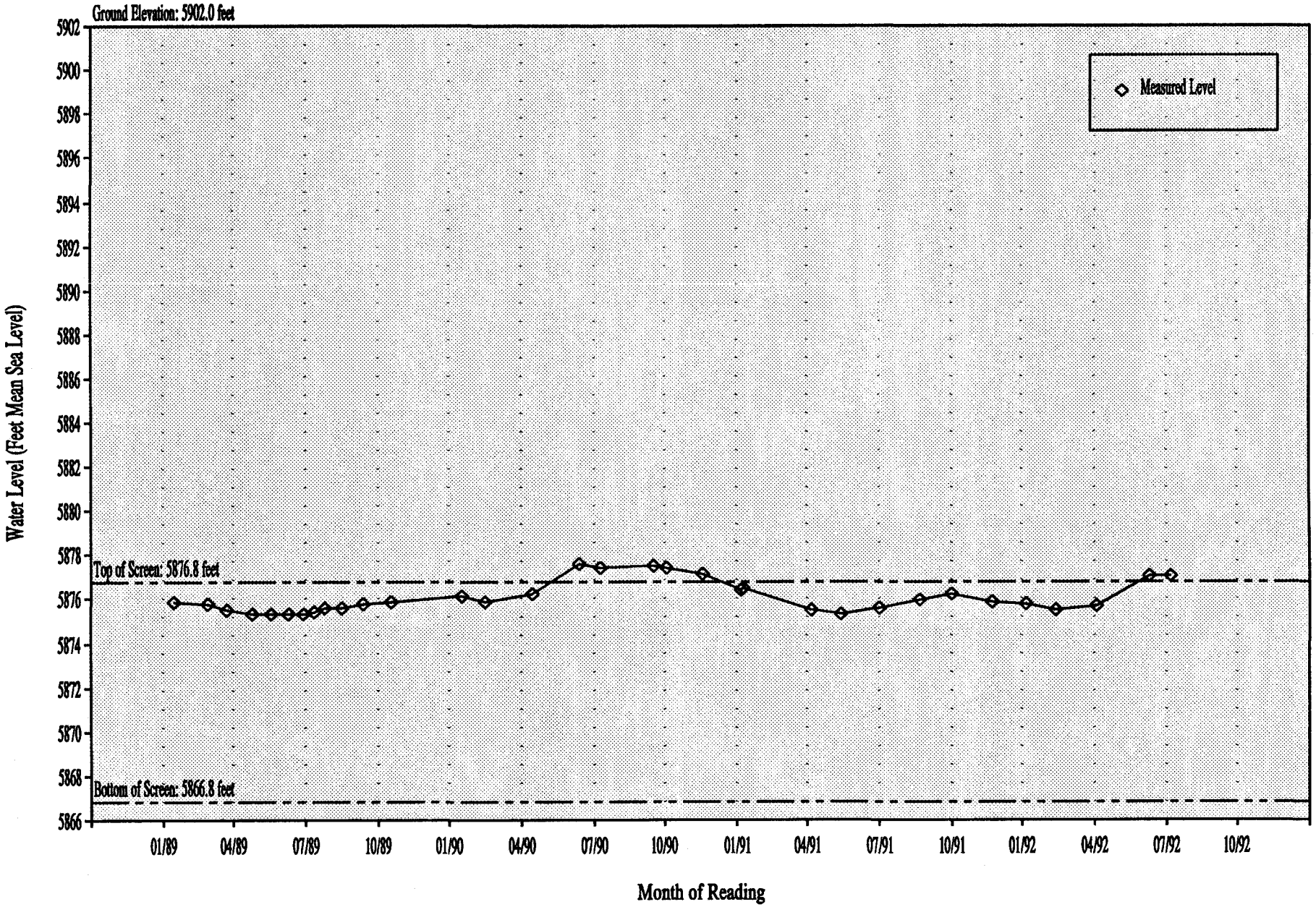

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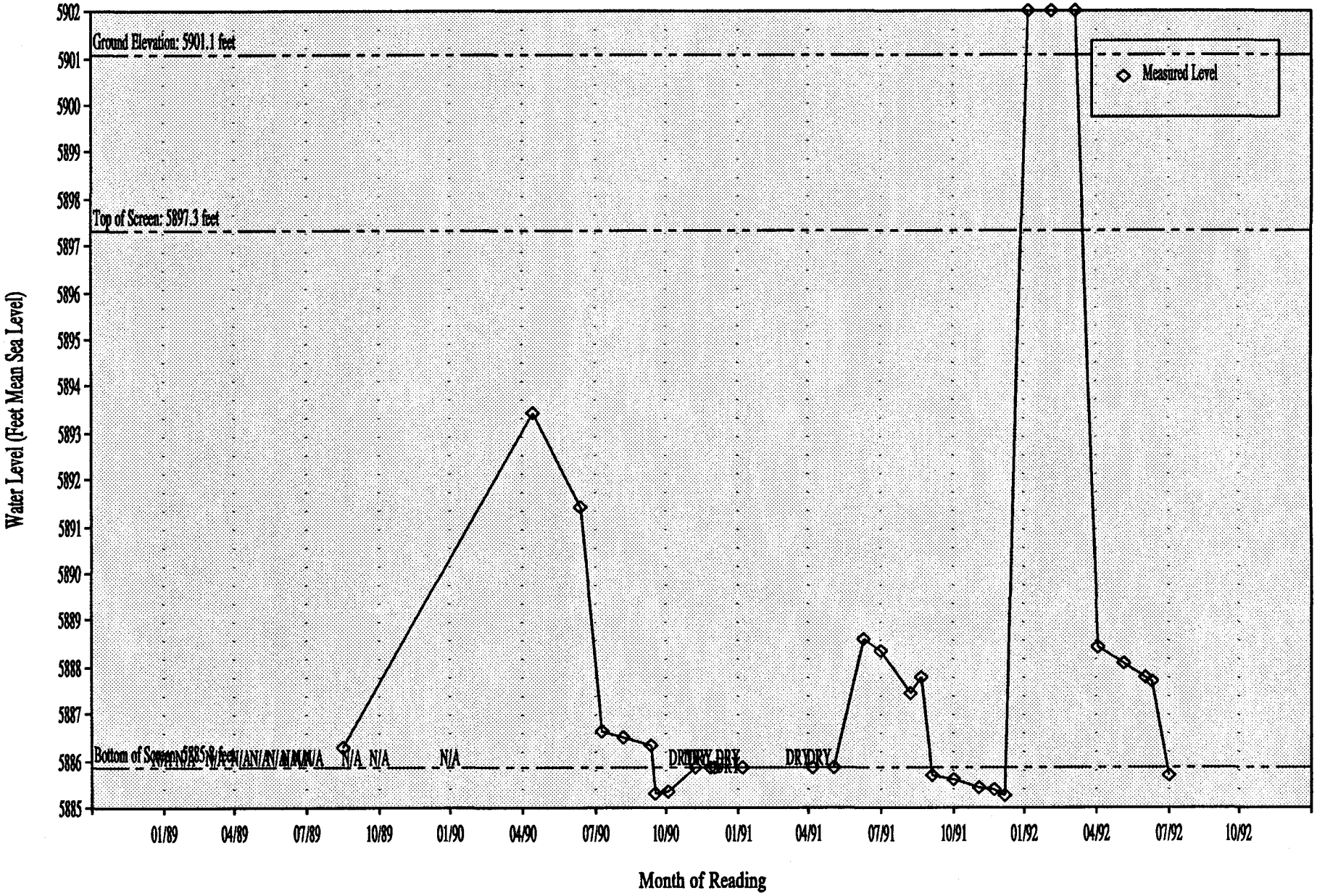

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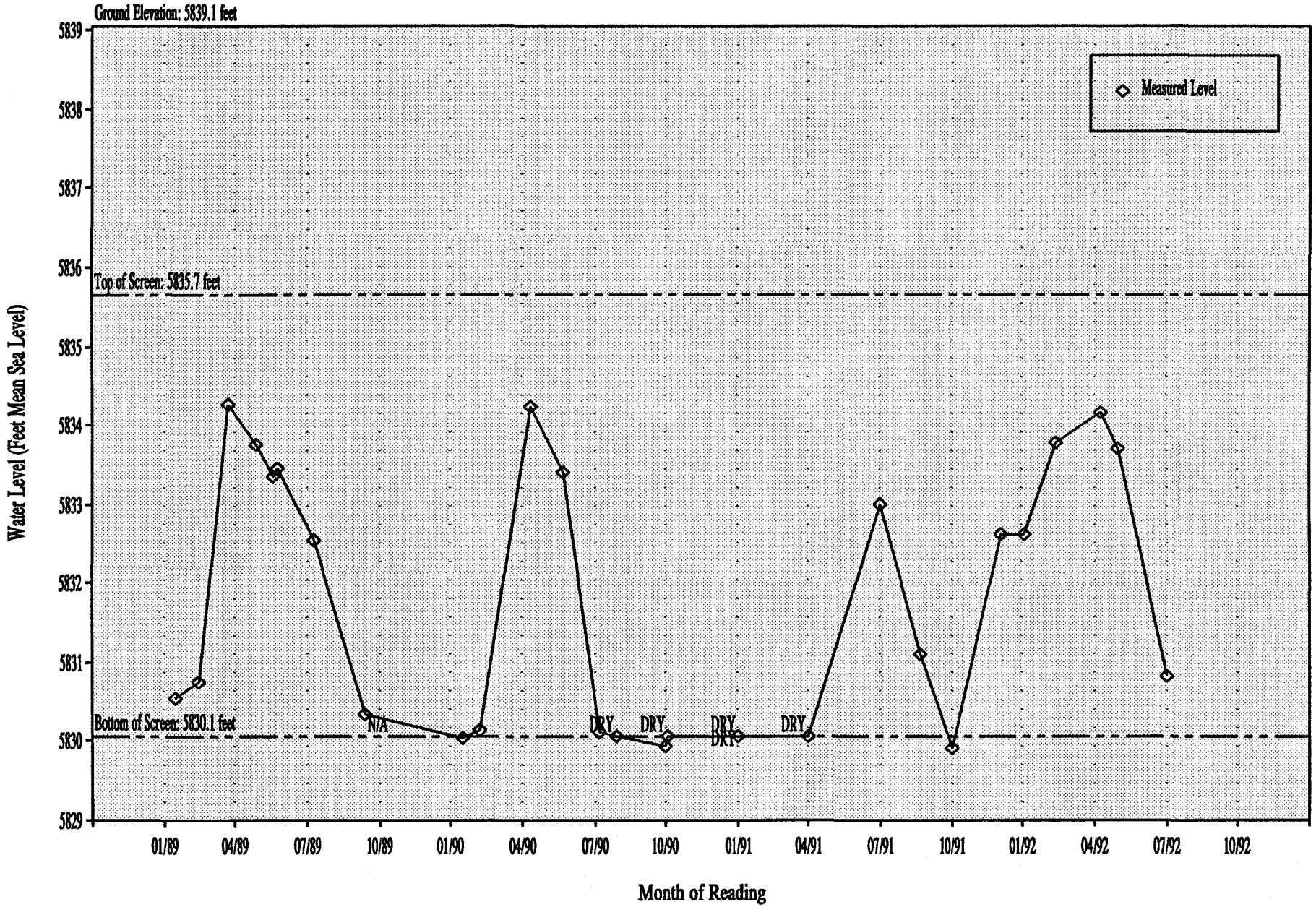

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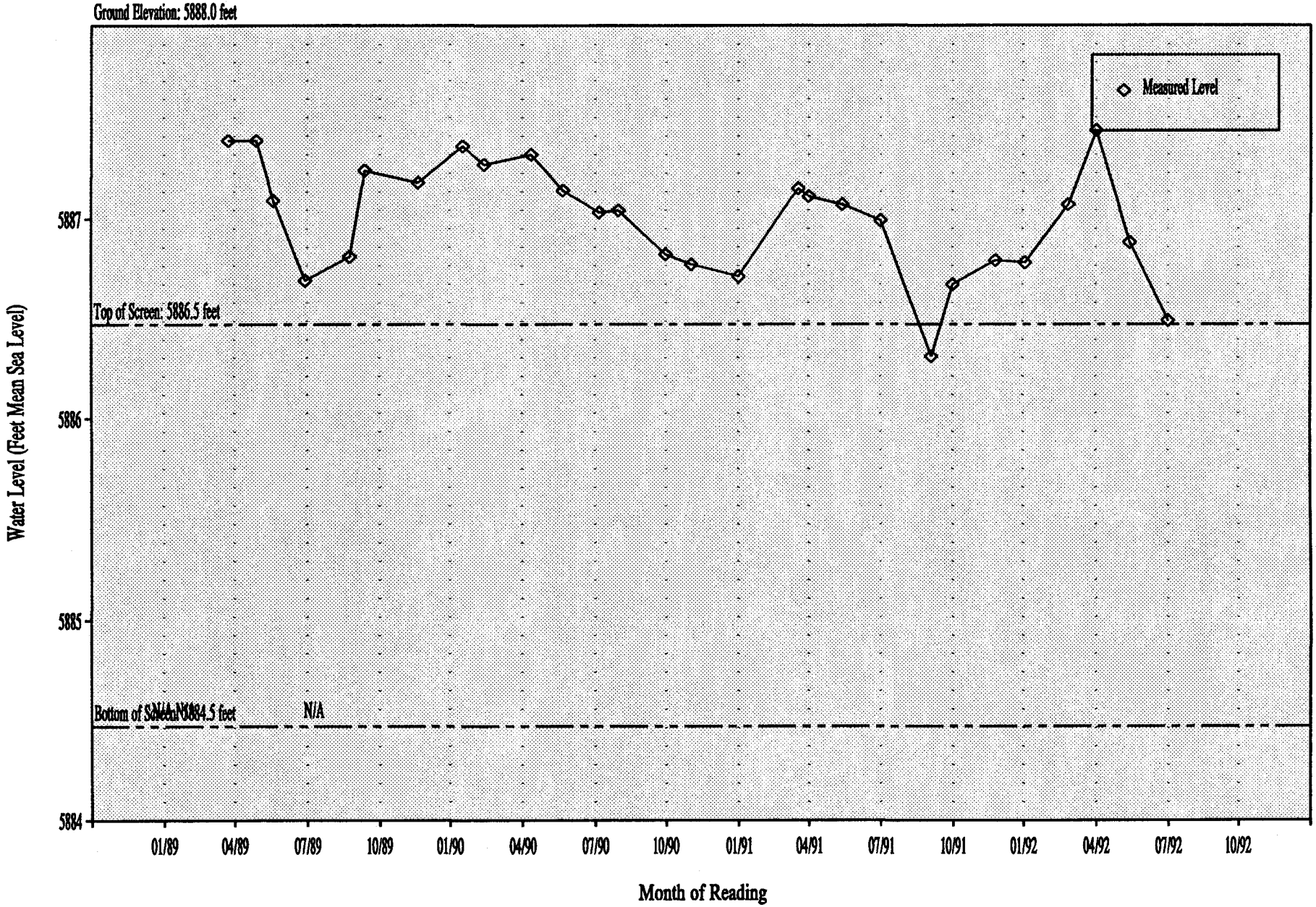

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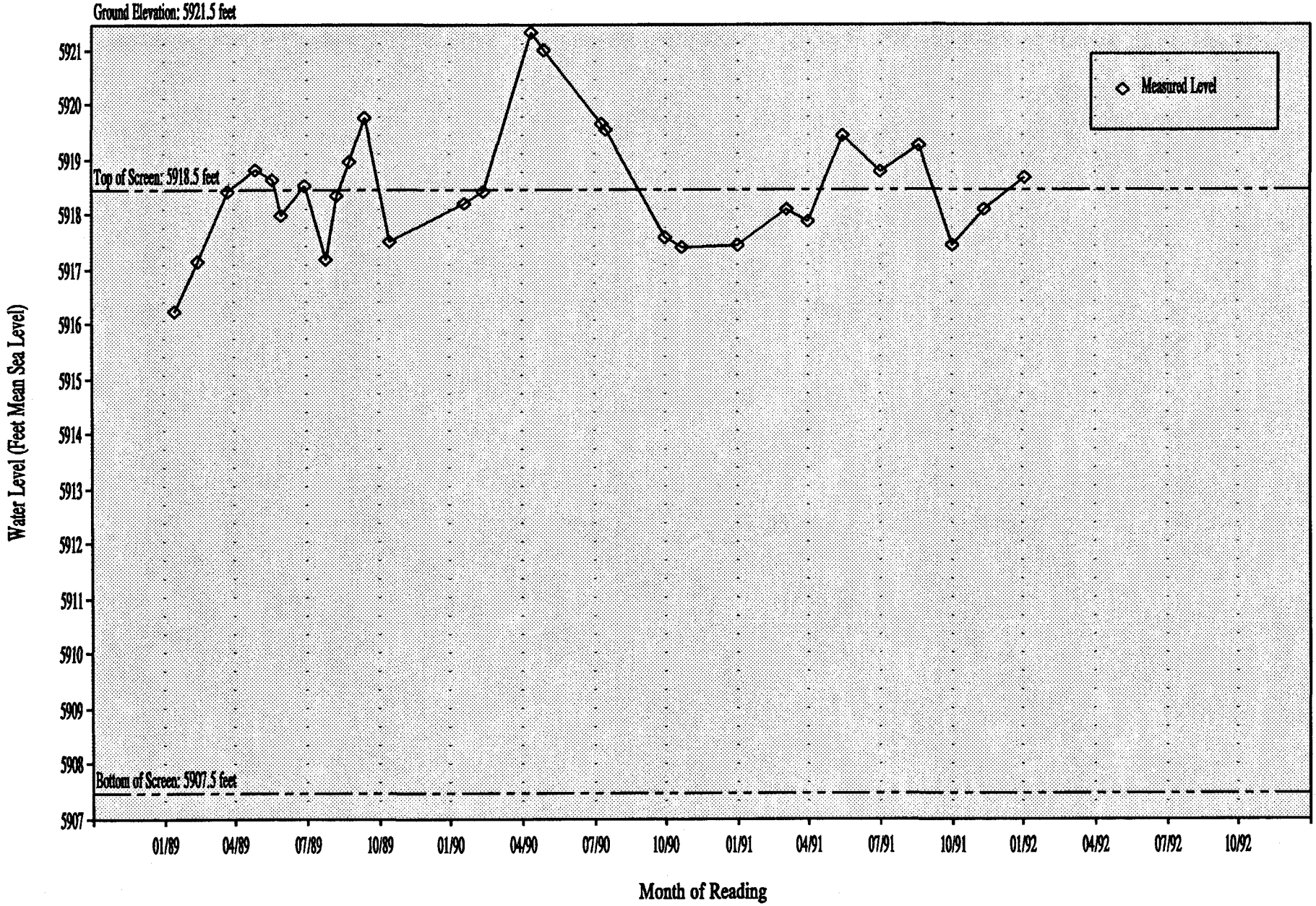

Preliminary Assessment Memorandum
Hydrogeology and Ground Water Contamination at the Western Terminus of the French Drain

Rocky Flats Plant
881 Hillside Area
(Operable Unit No. 1)

U.S. Department of Energy
Rocky Flats Plant
Golden, Colorado

September 1992

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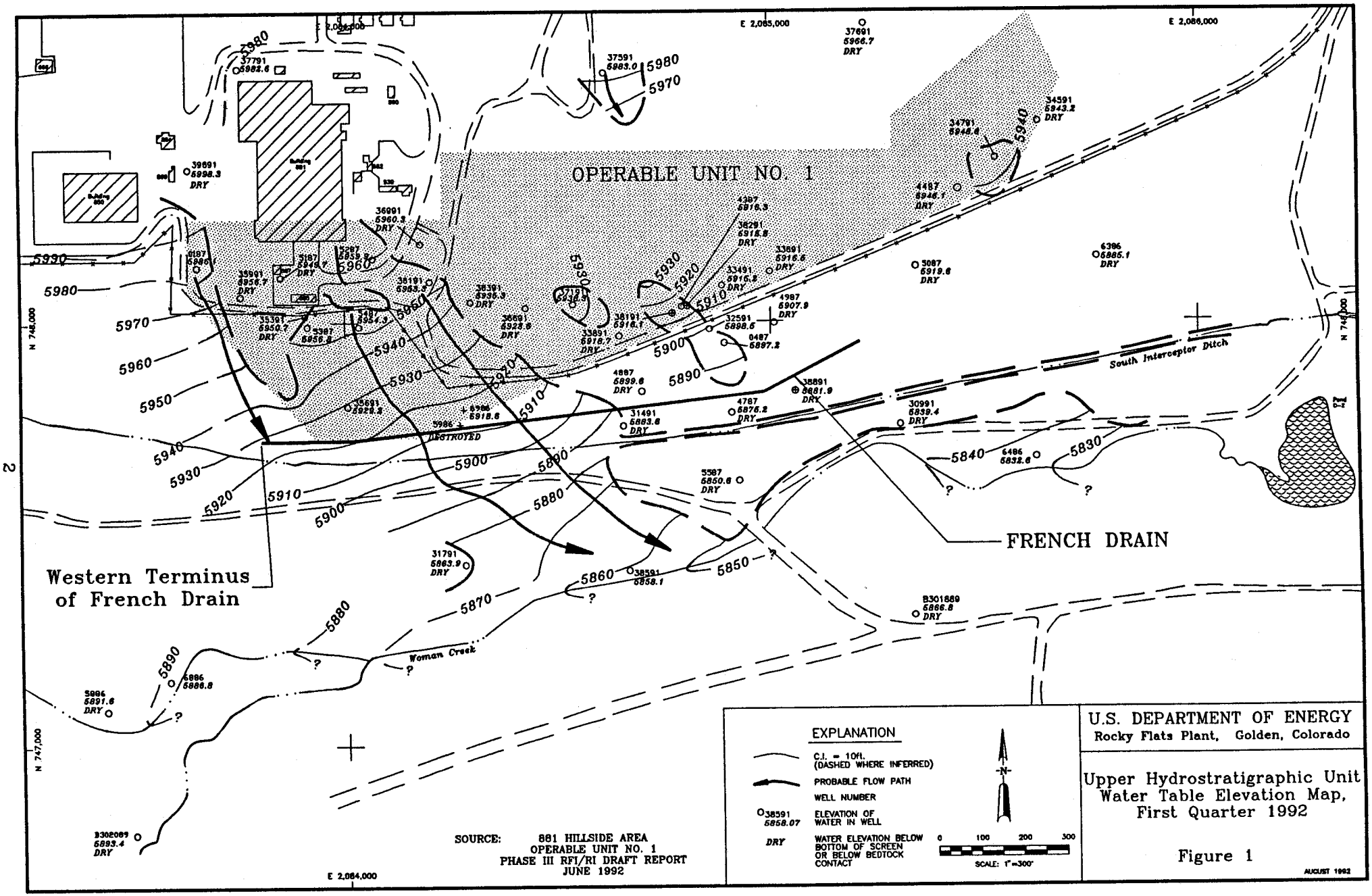
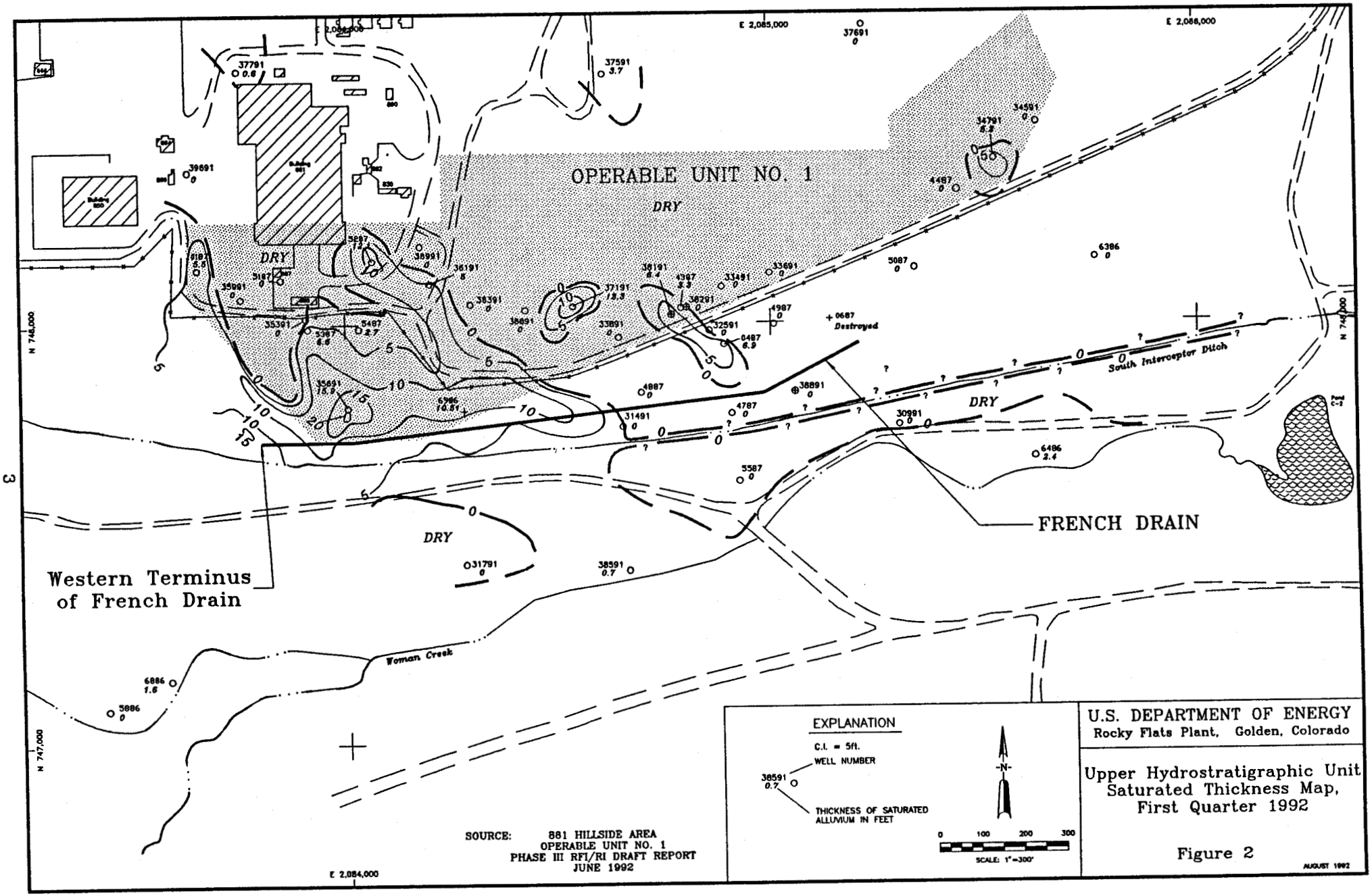
1.0 INTRODUCTION

This memorandum presents the most recent evaluation of hydrogeologic conditions and potential ground water contamination near the western terminus of the french drain located south of Building 881. The conditions depicted in this memorandum were assessed using data from the recent Phase III RCRA (Resource Conservation and Recovery Act) Facility Investigation/Remedial Investigation (RFI/RI) and the Interim Measure/Interim Remedial Action (IM/IRA) french drain monitoring program for Operable Unit No. 1 (OU1). The intent of this evaluation is to illustrate that any potentially contaminated ground water in the upper hydrostratigraphic unit (HSU) in the western portion of OU1 will be intercepted by the french drain and that potentially contaminated ground water originating from sources further west of OU1 can be evaluated under the IM/IRA french drain monitoring program and the routine ground water monitoring program. If contaminated ground water is detected in the colluvium during these monitoring programs, the possibility of adding additional monitoring wells or piezometers may be evaluated.

2.0 HYDROGEOLOGY

In the vicinity of the western terminus of the french drain, the upper HSU is comprised of colluvium and fill material. In general, the upper HSU in this area is apparently uniformly saturated, as illustrated by the water table map (Figure 1), which shows the configuration of the upper HSU water table during January 1992 prior to completion of the french drain. Figure 2 presents the saturated thickness of the upper HSU. Based on the water table contours and the saturated thicknesses presented for this period, ground water in the upper HSU in this area flows to the south and east, predominantly constrained by channel-like features occurring within the low-permeability bedrock surface. The westernmost flow path (Figure 1) intersects the french drain in the vicinity of the drain's western terminus. This indicates that any potentially contaminated ground water in the westernmost portion of OU1 would be intercepted by the french drain even before the effects of drawdown increase the capture zone.


OPERABLE UNIT NO. 1
Western Terminus of French Drain
FRENCH DRAIN
South Interceptor Ditch
Woman Creek
DESTROYED
E 2,085,000
E 2,086,000
E 2,084,000
N 748,000
N 747,000
EXPLANATION
C.I. = 10ft. (DASHED WHERE INFERRED)
PROBABLE FLOW PATH
WELL NUMBER
ELEVATION OF WATER IN WELL
DRY
WATER ELEVATION BELOW BOTTOM OF SCREEN OR BELOW BEDTOCK CONTACT
0 100 200 300
SCALE: 1"=300'
N
SOURCE: 881 HILLSIDE AREA OPERABLE UNIT NO. 1 PHASE III RFI/RI DRAFT REPORT JUNE 1992
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado
Upper Hydrostratigraphic Unit Water Table Elevation Map, First Quarter 1992
Figure 1
AUGUST 1992

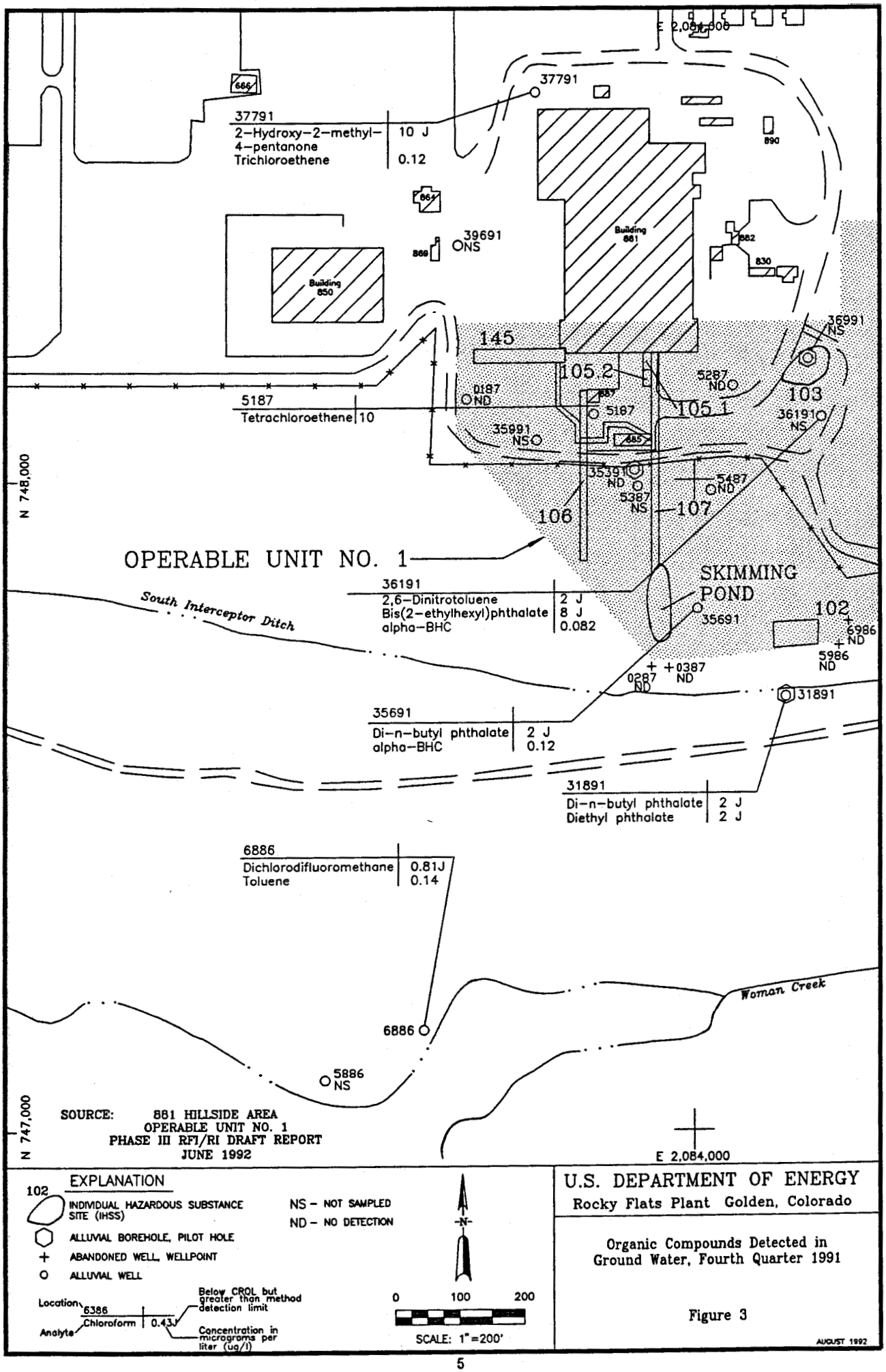

OPERABLE UNIT NO. 1
DRY
DRY
DRY
DRY
Western Terminus of French Drain
FRENCH DRAIN
South Interceptor Ditch
Woman Creek
Destroyed
E 2,085,000
E 2,086,000
E 2,084,000
N 746,000
N 747,000
EXPLANATION
C.I. = 5ft.
WELL NUMBER
38591
0.7
THICKNESS OF SATURATED ALLUVIUM IN FEET
-N-
0 100 200 300
SCALE: 1"=300'
SOURCE: 881 HILLSIDE AREA OPERABLE UNIT NO. 1 PHASE III RFI/RI DRAFT REPORT JUNE 1992
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado
Upper Hydrostratigraphic Unit Saturated Thickness Map, First Quarter 1992
Figure 2
AUGUST 1992

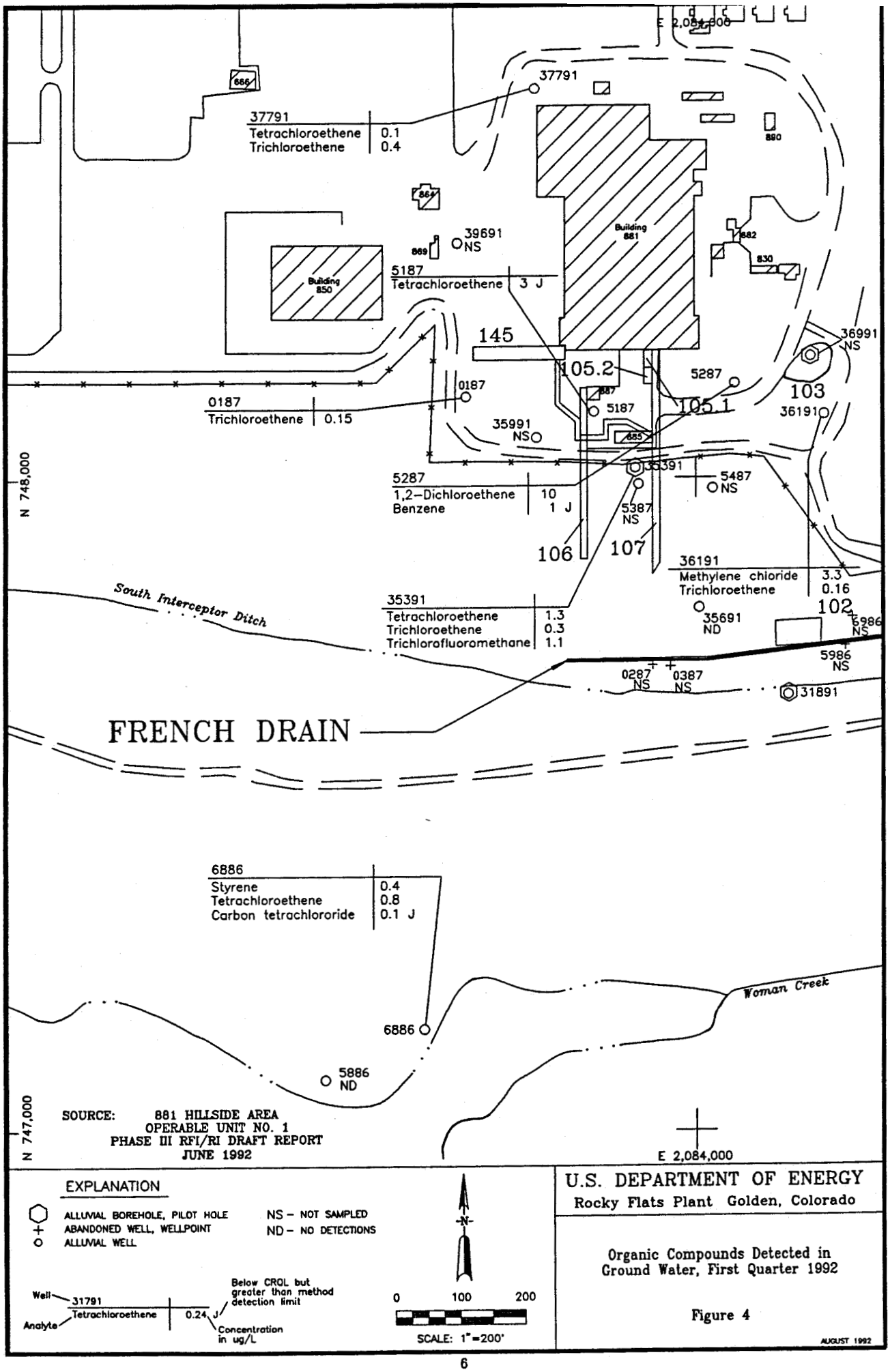
3

Appendix A of the IM/IRA French Drain Performance Monitoring Plan (DOE 1992) presents ground water modeling results that illustrate the impact of drawdown in the upper HSU due to operation of the french drain. Qualitative evaluation of the modeling results indicate that water table contours will bend around the terminus of the french drain, in response to changes in hydraulic gradient caused by the constant head discharge boundary represented by the french drain, directing ground water flow paths originating west of the french drain toward the french drain. Time series modeling results, also presented in Appendix A, show that as the french drain continues to operate, the localized drawdown around the western terminus of the french drain will increase and cause the lateral extent of the capture zone to increase. Therefore, as operational time increases, colluvial ground water residing further and further west of the western terminus will be drawn toward the french drain and ultimately captured.

3.0 ORGANIC CONTAMINANTS IN UPPER HSU GROUND WATER IN WESTERN OU1

Figures 3 and 4 illustrate the analytical results of ground water sampling conducted during the OU1 Phase III RFI/RI and subsequent sampling in the vicinity of the western terminus of the french drain. These results indicate that organic contaminants occur at very low concentrations upgradient of the western terminus at wells 0187, 5187, 35391, and 37791. These detections do not exceed contaminant specific Maximum Contaminant Levels and were not repeated in subsequent sampling events. Also, the distribution and concentrations of organics detected do not indicate a continual source of contamination, nor do they indicate the presence of a plume of contaminated ground water. As the ground water upgradient of the french drain migrates down the hillside, degradation and dilution of organic compounds is expected to occur primarily due to low average horizontal ground water flow velocities (calculated at only 30 to 60 feet per year) and from fresh water recharge events (precipitation). Ground water flow directions and predicted drawdown in the upper HSU indicate that the french drain will ultimately intercept ground water from these wells as it migrates down the hillside.


E 2,084,000
37791
2-Hydroxy-2-methyl-4-pentanone 10 J
Trichloroethene 0.12
39691 NS
Building 850
Building 881
890
882
830
36991 NS
145
105.2
5287 ND
0187 ND
5187
Tetrachloroethene 10
105.1
103
36191 NS
35991 NS
35391 ND
5387 NS
5487 ND
106
107
N 748,000
OPERABLE UNIT NO. 1
SKIMMING POND
South Interceptor Ditch
36191
2,6-Dinitrotoluene 2 J
Bis(2-ethylhexyl)phthalate 8 J
alpha-BHC 0.082
35691
102
6986 ND
5986 ND
0387 ND
0287 ND
31891
35691
Di-n-butyl phthalate 2 J
alpha-BHC 0.12
31891
Di-n-butyl phthalate 2 J
Diethyl phthalate 2 J
6886
Dichlorodifluoromethane 0.81J
Toluene 0.14
Woman Creek
6886
5886 NS
N 747,000
SOURCE: 881 HILLSIDE AREA
OPERABLE UNIT NO. 1
PHASE III RFI/RI DRAFT REPORT
JUNE 1992
E 2,084,000
EXPLANATION
102 INDIVIDUAL HAZARDOUS SUBSTANCE SITE (IHSS)
ALLUVIAL BOREHOLE, PILOT HOLE
ABANDONED WELL, WELLPOINT
ALLUVIAL WELL
NS - NOT SAMPLED
ND - NO DETECTION
Location 6386
Analyte Chloroform 0.43J
Below CROL but greater than method detection limit
Concentration in micrograms per liter (ug/l)
N
0 100 200
SCALE: 1"=200'
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant Golden, Colorado
Organic Compounds Detected in Ground Water, Fourth Quarter 1991
Figure 3
AUGUST 1992



37791
Tetrachloroethene 0.1
Trichloroethene 0.4
39691 NS
5187
Tetrachloroethene 3 J
Building 850
Building 881
145
105.2
105.1
103
0187
Trichloroethene 0.15
5287
1,2-Dichloroethene 10
Benzene 1 J
35391
5387 NS
5487 NS
36991 NS
36191
106
107
36191
Methylene chloride 3.3
Trichloroethene 0.16
102
35691 ND
6986 NS
5986 NS
0287 NS
0387 NS
31891
35391
Tetrachloroethene 1.3
Trichloroethene 0.3
Trichlorofluoromethane 1.1
South Interceptor Ditch
FRENCH DRAIN
6886
Styrene 0.4
Tetrachloroethene 0.8
Carbon tetrachlororide 0.1 J
6886
5886 ND
Woman Creek
N 748,000
N 747,000
E 2,084,000
SOURCE: 881 HILLSIDE AREA
OPERABLE UNIT NO. 1
PHASE III RFI/RI DRAFT REPORT
JUNE 1992
EXPLANATION
ALLUVIAL BOREHOLE, PILOT HOLE
ABANDONED WELL, WELLPOINT
ALLUVIAL WELL
NS - NOT SAMPLED
ND - NO DETECTIONS
Well
Analyte
31791
Tetrachloroethene 0.24 J
Below CRQL but greater than method detection limit
Concentration in ug/L
N
0 100 200
SCALE: 1"=200'
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant Golden, Colorado
Organic Compounds Detected in Ground Water, First Quarter 1992
Figure 4
AUGUST 1992

4.0 CURRENT INFORMATION ON THE HYDROGEOLOGICAL IMPACTS OF FRENCH DRAIN OPERATION

Water levels have been reported for the OU1 Phase III RFI/RI monitoring wells and piezometers since the french drain was completed in February 1992 (Table 1). Water levels have dropped approximately 4 feet upgradient of the french drain at monitoring well 35691 since the french drain became operational, even during the wetter spring and summer months. Water levels further upgradient of the french drain (monitoring wells 0187, 5387, and 5487) have not decreased as dramatically. The localized lowering of the water table near monitoring well 35691 can be attributed to the loss of ground water recharge to this area from the Building 881 footing drain system. Water from the Building 881 footing drain system was historically discharged to the skimming pond located south of Building 881. Upon completion of the french drain, this discharge was piped directly into the french drain and is no longer a source of recharge to the upper HSU. Figure 5 illustrates the lowered water table in the western portion of OU1 during the high water table conditions of spring. The lowered water table confirms, in part, the drawdown effect of the completed french drain system.

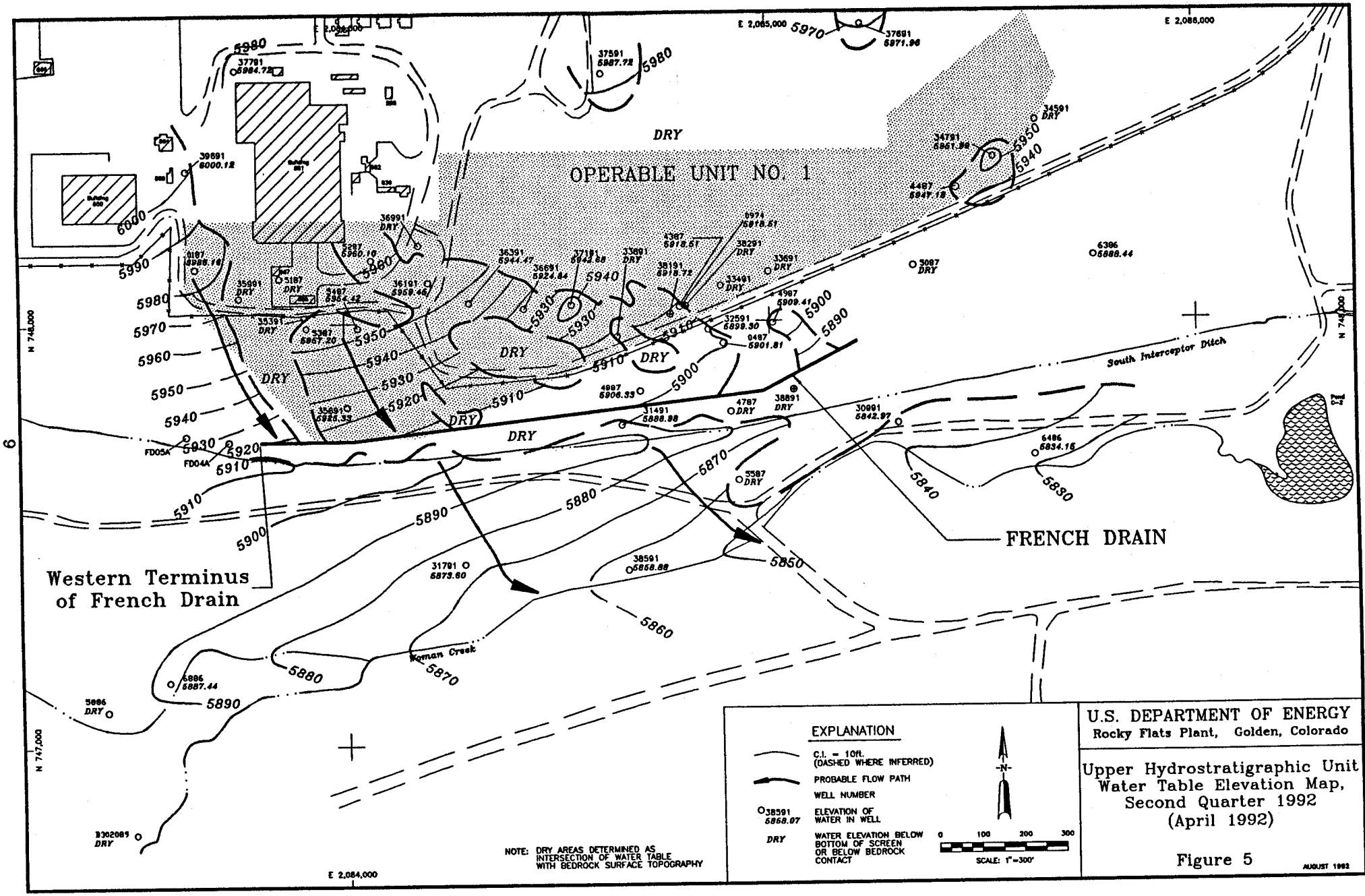
Field observations of the western terminus area made September 18, 1992 indicate that the water table in the colluvium south of Building 850, west of the western terminus area, is near the surface. This was evident based on high water levels in the south interceptor ditch west of the french drain and based on the presence of seeps along the break in slope above the south interceptor ditch in this area. Recharge to this area occurs from surface water run off observed in ditches eminating from culverts and discharge pipes near the rim of the valley and under flow of groundwater from the Rocky Flats Alluvium.

The high water table south of Building 850 confirms that a significant groundwater gradient exists toward the western terminus where groundwater elevations and water levels in the south interceptor ditch are lower.

Table 1 Monthly Water Level Measurements for Monitoring Wells in the Western Portion of OU1

Location	JAN '92	FEB '92	MAR '92	APR '92	MAY '92	JUNE '92	JULY '92
6986	5918.67	Well destroyed during french drain construction			—	—	—
0187	5986.09	5984.16	—	5986.16	5984.48	—	5982.80
5187	Dry	—	—	Dry	—	—	Dry
5287	5959.98*	—	—	5960.04*	—	—	5959.52*
5387	5956.82	—	—	5956.45*	—	—	5954.46
5487	5954.33	Dry	5954.90	5953.88*	Dry	5955.04	5953.52
31791	Dry	5870.58*	5870.72	5873.60	5870.82*	—	5869.75
35391	Dry	Dry	Dry	Dry	Dry	Dry	Dry
35691	5929.31	5926.50*	5925.05	5925.33	5925.24*	—	5924.91
35991	Dry	Dry	Dry	Dry	Dry	Dry	Dry
36191	5953.34	5957.77	5950.75	5959.45	5960.56	5959.97	5951.30
36991	Dry	Dry	Dry	—	—	—	Dry
37791	5982.98*	—	5983.82	5984.72*	—	—	5985.11
39691	Dry	Dry	Dry	6000.12	Dry	—	Dry

* Average of 2 measurements collected
— No data available
Dry Water level below bottom of screen or bedrock contact



U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

Upper Hydrostratigraphic Unit Water Table Elevation Map, Second Quarter 1992 (April 1992)

Figure 5

AUGUST 1992

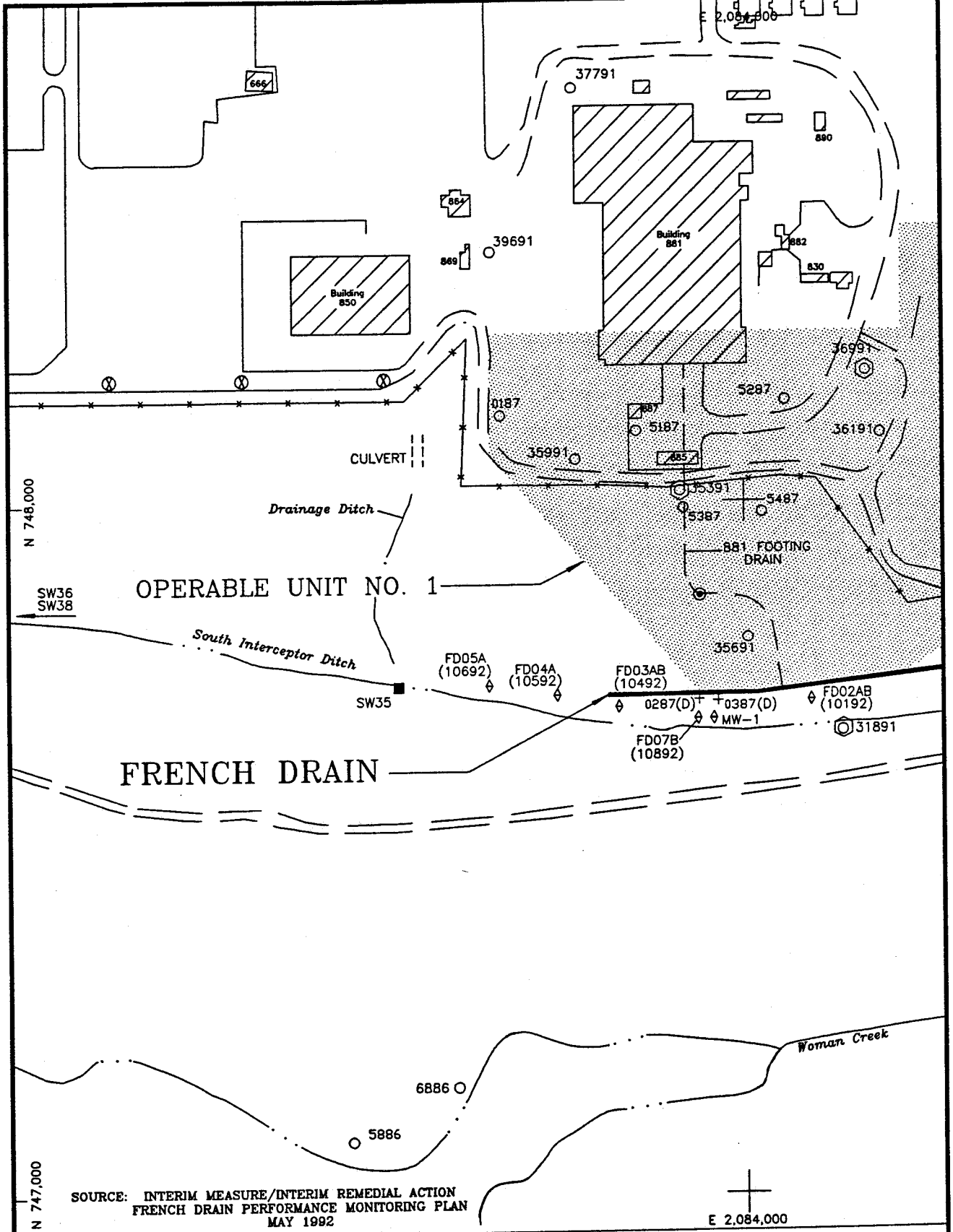
5.0 IM/IRA FRENCH DRAIN MONITORING PROGRAM AND ROUTINE GROUND WATER SAMPLING PROGRAM

To confirm the pre-operational interpretation of ground water flow path directions and effectiveness of the french drain during its operation, additional monitoring wells were installed during August 1992 under the IM/IRA french drain monitoring program. Figure 6 shows the locations of six wells in the vicinity of the western terminus. The capture zone around the western terminus of the french drain will be evaluated using water levels from these monitoring wells located south and west of the french drain.

The newly installed IM/IRA french drain monitoring program wells will be sampled quarterly. Field parameters such as pH, specific conductivity, and temperature will be measured. Samples collected will be analyzed for Contract Laboratory Program (CLP) Target Compound List organics including volatiles, semivolatiles, and pesticides/polychlorinated biphenyls, and CLP Target Analyte List metals, radionuclides, and other inorganics. Samples of surface water runoff from the west parking lot at Building 850 will be collected quarterly and analyzed for the same suite of analytes called for by the IM/IRA french drain monitoring program. Surface water samples from the South Interceptor Ditch will be collected and analyzed as part of the routine ground water sampling program (Figure 5).

Wells sampled during the OU1 Phase III RFI/RI will continue to be sampled each quarter under the routine ground water monitoring program.

The water level data collected under the OU1 Phase III RFI/RI, the IM/IRA french drain monitoring program and the routine ground water monitoring program at and near the OU1 site will continue to be evaluated to determine the hydrological conditions upgradient and around the western terminus of the french drain. Any potential ground water contamination detected at monitoring wells FD05A and FD04A will also be evaluated. Potential source areas will be identified by comparing the types and concentrations of analytes detected. If potential source areas cannot be determined using the existing array of wells and sampling locations, it may be



SOURCE: INTERIM MEASURE/INTERIM REMEDIAL ACTION FRENCH DRAIN PERFORMANCE MONITORING PLAN MAY 1992

EXPLANATION

- ALLUVIAL BOREHOLE, PILOT HOLE
- ABANDONED WELL, WELLPOINT
- ALLUVIAL WELL
- (D) DESTROYED WELL
- SUMP SAMPLE LOCATION
- PARKING LOT SAMPLING LOCATIONS
- SURFACE WATER STATION
- FRENCH DRAIN MONITORING WELLS (NUMBERS IN PARENTHESES INDICATE WELL NUMBER FOR INSTALLED WELL)

N

0 100 200

SCALE: 1"=200'

U.S. DEPARTMENT OF ENERGY

Rocky Flats Plant Golden, Colorado

Sampling Locations for Interim Measure/Interim Remedial Action French Drain Monitoring Program and the Routine Ground Water Monitoring Program

Figure 6

AUGUST 1992

recommended that additional monitoring wells or piezometers be installed upgradient or west of monitoring wells FD05A and FD04A. These wells or piezometers could be installed under the existing IM/IRA french drain monitoring Program if necessary.

6.0 SUMMARY

Based on the data presented, no cohesive or distinct plumes of contaminated ground water exist downgradient of the western portion of OU1. Likewise, it is unlikely that potentially contaminated ground water originating within the western boundaries of OU1 could bypass the western terminus of the french drain. Additional monitoring wells have been installed west of the western terminus as part of the IM/IRA french drain monitoring program to evaluate the effectiveness of the french drain. Quarterly sampling of ground water and surface water will be performed under the IM/IRA program as well as the routine ground water monitoring program. Analytical results from these programs will be evaluated to determine the presence or absence of other potential ground water contamination sources west of OU1. Based on the results of these sampling programs, additional monitoring wells or piezometers may be installed under the IM/IRA french drain monitoring program.

7.0 REFERENCES

DOE. 1992. Final Interim Measure/Interim Remedial Action French Drain Performance Monitoring Plan, Rocky Flats Plant, 881 Hillside Area (Operable Unit No. 1), May 1992.