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16. KEY

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1	1	Cog.Eng. B.A. Williams		9/21/92	H4-56	M.J. Hartman	signature of Hartman		H4-56	6	6
1	1	Cog. Mgr. R.L. Jackson/K.R. Fecht		9/21/92	H4-56	EDMC (2)			H4-22	6	6
1	1	QA T.L. Bennington		9/21/92	H4-16	Central files			L8-04	6	6
		Safety N/A									
4	4	Env. L.C. Swanson	LC Swanson	9/21/92	H4-56						

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Signature of EDT Originator — Date 21 Sep 92	Authorized Representative for Receiving Organization — Date	Cognizant/Project Engineer's Manager — Date 9/21/92	Ltr. No. N/A [] Approved [] Approved w/comments [] Disapproved w/comments

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WHC-SD-EN-DP-043, Rev. 0

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Date Release Required
October 9, 1992

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Part 1

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4. Rev No.

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APPROVED FOR PUBLIC RELEASE

10/9/92 N. Dolis

6. Author

Name: M.J. Hartman

Mary J Hartman 21 Sept 92

Signature

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7. Abstract

Wells 199-D5-13, 199-D8-4, 199-D8-5, and 199-D8-6 were drilled in 1991 as RCRA groundwater monitoring wells for the 100-D Ponds facility, in the 100-D Area of the Hanford Site. The data package includes information on drilling, construction, well development, and aquifer testing. Data interpretation is limited to aquifer testing and depths of the Hanford/Ringold contact.

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9. Impact Level 3Q

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CONTENTS

1.0 INTRODUCTION 1

2.0 WELL 199-D5-13 4
- 2.1 DRILLING 4
- 2.2 WELL COMPLETION 4
- 2.3 WELL DEVELOPMENT AND PUMP INSTALLATION 5
- 2.4 AQUIFER TESTING 5

3.0 WELL 199-D8-4 5
- 3.1 DRILLING 5
- 3.2 WELL COMPLETION 6
- 3.3 WELL DEVELOPMENT AND PUMP INSTALLATION 6
- 3.4 AQUIFER TESTING 6

4.0 WELL 199-D8-5 7
- 4.1 DRILLING 7
- 4.2 WELL COMPLETION 7
- 4.3 WELL DEVELOPMENT AND PUMP INSTALLATION 8
- 4.4 AQUIFER TESTING 8

5.0 WELL 199-D8-6 8
- 5.1 DRILLING 8
- 5.2 WELL COMPLETION 9
- 5.3 WELL DEVELOPMENT AND PUMP INSTALLATION 9
- 5.4 AQUIFER TESTING 10

6.0 REFERENCES 10

APPENDICES:

- A - DRILLING AND CONSTRUCTION DATA A-1
- B - SEDIMENT SAMPLE DATA B-1
- C - WELL DEVELOPMENT AND PUMP INSTALLATION C-1
- D - AQUIFER TESTS D-1

FIGURE:

1 Location of Wells 199-D5-13, 199-D8-4, 199-D8-5, and 199-D8-6 2

TABLE:

1 Survey Data for RCRA Groundwater Monitoring Wells Installed in the 100-D Area in 1991 3

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1.0 INTRODUCTION

Four new groundwater monitoring wells were installed around the 100-D Ponds, a Resource Conservation and Recovery Act of 1976 (RCRA) facility, in 1991, in support of Tri-Party Agreement milestone M-24-14 (Ecology et al. 1989). Well 199-D5-13 will serve as an upgradient monitoring well; wells 199-D8-4, 199-D8-5, and 199-D8-6 are downgradient wells. The locations of these wells are illustrated in Figure 1. Coordinates and elevations are listed in Table 1. For convenience, well numbers are often shortened by dropping the "199-" prefix.

The groundwater monitoring plan for the 100-D Ponds (Hartman 1991) describes the hydrogeology of the 100-D Area and provides justification for the new wells and their locations. The wells were constructed to the specifications described by Westinghouse Hanford Company (WHC) (1990).

This document is a compilation of data and information on drilling, construction, and development of the new wells. Copies of forms, notes, and diagrams completed in the field comprise the bulk of this document. Few interpretations are included. Lithologic contacts were picked by V. L. King based on the geologist's logs and lithologic samples. Aquifer test data were interpreted to estimate aquifer properties. For each well, the following documents are included in appendices.

- <u>Appendix A:</u>
  - well summary sheet
  - well construction report
  - borehole log
  - geophysical log(s)
- <u>Appendix B:</u>
  - grain size data for screened interval
  - $CaCO_3$ and moisture data
- <u>Appendix C:</u>
  - well development record
  - pump installation record
- <u>Appendix D:</u>
  - drawdown and recovery data
  - slug test data
  - aquifer test analysis.

Other records, such as chain-of-custody forms, decontamination records, daily field records, and training records are on file with WHC.

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Figure 1. Location of Wells 199-D5-13, 199-D8-4, 199-D8-5, and 199-D8-6.

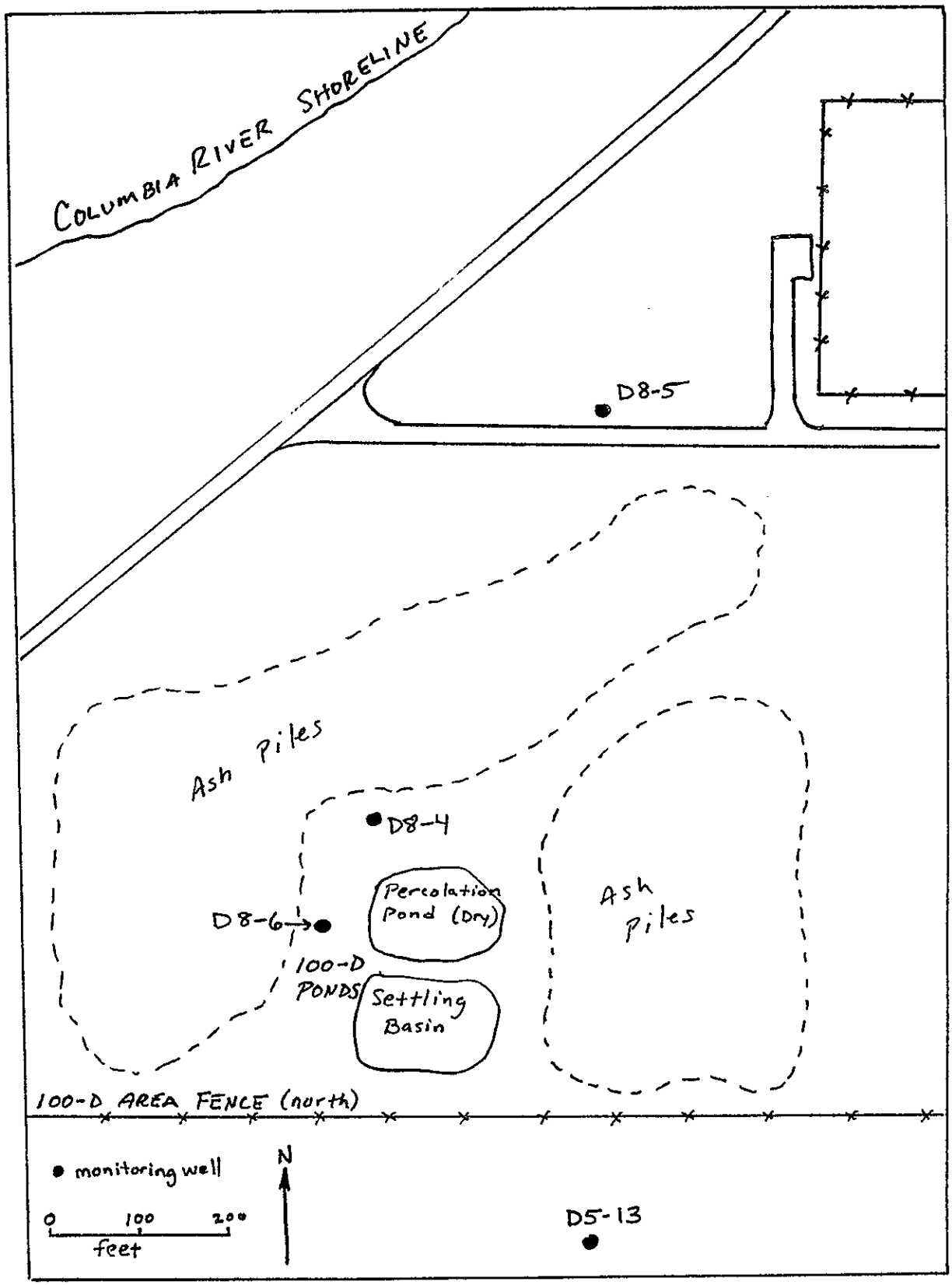

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Table 1. Survey Data for RCRA Groundwater Monitoring Wells Installed in the 100-D Area in 1991.

Well	Datum or coordinate system[a]	Coordinates center of casing	Elevations (feet) Brass Marker in Concrete	Top Hydrostar Plate North Side	Top Outer Casing North Side
D5-13	100-D	93,433.0 N 53,540.2 W	467.40	470.90	470.88
	Lambert or NGVD'29	151,955.39 N 573,535.72 E	468.00	471.50	471.49
D8-4	100-D	93,876.7 N 53,829.9 W	465.99	468.14 *	468.13
	Lambert or NGVD'29	152,090.41 N 573,447.39 E	466.59	468.74	468.73
D8-5	100-D	94,379.1 N 53,532.4 W	449.42	451.90	451.90
	Lambert or NGVD'29	152,243.73 N 573,537.39 E	450.02	452.50	452.49
D8-6	100-D	93,780.4 N 53,870.1 W	473.19	N/A	475.90
	Lambert or NGVD'29	152,061.02 N 573,434.93 E	473.79	N/A	476.50

[a]Lambert WCS83S coordinates in meters. 100-D coordinates in feet (they are equivalent to "Hanford Coordinates").

NGVD'29 elevations are feet above the National Geodetic Vertical Datum of 1929; 100-D elevations in feet above mean sea level.
N/A = not available.

* corrected from typographical error in survey report

100-D elevations and coordinates are most comparable to survey data for other wells currently in the groundwater database.

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2.0 WELL 199-D5-13

2.1 DRILLING

Well D5-13 was drilled with a cable-tool rig. Drilling began on October 15, 1991, and was completed November 1, 1991, at a total depth of 100 ft below land surface (bls). Temporary, carbon steel casing was used during drilling: 12-in-diameter casing from surface to 19 ft bls; 10-in-diameter casing from surface to total depth. Approximately 320 gal of water were added during drilling. Drilling information is compiled in Appendix A.

Sediments were primarily sand to sandy gravel with traces of flyash at 25 to 30 ft (see borehole log in Appendix A). Samples were collected approximately every 5 ft of depth for calcium carbonate analysis, radiological screening, and lithologic archiving. The contact between the Hanford and Ringold formations was encountered at approximately 50 ft. Moisture samples were collected above the water table, where no water was added during drilling (10 samples). A sample for grain size analysis was collected from the interval to be screened. Physical data for sediments are contained in Appendix B.

A gross gamma log was run on November 1, 1991, from 3.6 to 95.8 ft bls, through the temporary casing. A copy of the gross gamma log is in Appendix A.

The borehole and soils were monitored regularly for organic vapors and radioactive contaminants. There was no detectible contamination.

2.2 WELL COMPLETION

Permanent casing and screen were installed in well D5-13 between November 22 and 26, 1991. Static water level at that time was 86.7 ft bls. A 10-slot, 4-in-diameter stainless steel screen was set from 97.3 to 76.3 ft bls. Permanent casing is 4-in-diameter stainless steel with centralizers, from 76.3 ft bls to above land surface. The sand pack is 20- to 40-mesh silica sand (97.1 to 71.9 ft bls). The annular seal comprises bentonite pellets (71.9 to 67.1 ft bls), bentonite crumbles (67.1 to 18.0 ft bls), and cement grout (18.0 to 2.0 ft bls). The remaining annulus was filled with concrete when a 4- by 4-ft by 6-in. concrete pad was installed at the wellhead. A 6-in. protective casing with a locking cap was also installed at the wellhead. Four protective steel posts were set in concrete around the well. A brass marker stamped with the well number was set into the concrete. The centerline of the well was surveyed to Lambert and 100-D coordinates. Elevation was surveyed to NGVD'29 and 100-D data. Elevations were established for the top of the Hydrostar (trade name of Instrumentation Northwest) plate, top of outer casing (north side), and the brass marker set in the concrete pad. Documentation of well completion is compiled in Appendix A.

The only additives during well drilling and completion were water and "well guard," a nonpetroleum-based lubricant used on drilling tools and casing threads.

2.3 WELL DEVELOPMENT AND PUMP INSTALLATION

Well D5-13 was developed December 6, 1991. A temporary submersible pump was used to remove 688 gal water from the well. The sampling pump was also used to develop the well further; 816 gal were removed. Final turbidity was 3.6 nephelometric turbidity units. Drawdown and recovery data were measured with a transducer in the pumping well during development with the submersible pump. A well development log is included in Appendix C. Water level data from development and recovery are included in Appendix D.

A dedicated Hydrostar sampling pump was installed in well D5-13 on December 6, 1991. Sampling pump intake is at 92.4 ft below top of casing. A pump installation form is included in Appendix C.

2.4 AQUIFER TESTING

Water level data were collected during development, as described in Section 2.3. A slug injection and withdrawal test was also conducted in well D5-13 on December 6, 1991 after development. Hydraulic conductivity was estimated as 130 ft/d, based on slug withdrawal. Aquifer test data and their interpretation are included in Appendix D.

3.0 WELL 199-D8-4

3.1 DRILLING

Well D8-4 was drilled with a sonic rig. Drilling began on October 31, 1991, and reached total depth November 8, 1991. During the first attempt at completion, there was difficulty pulling the temporary casing. The bottom 10 ft of the borehole had to be redrilled. Drilling was completed November 12, 1991, at a total depth of 103.7 ft bls. Temporary, carbon steel casing was used during drilling: 8-in-diameter casing from surface to 28 ft bls; 7-in-diameter casing from surface to total depth. Approximately 107 gal of water were added during drilling. Drilling information is compiled in Appendix A.

Sediments were primarily sand to gravelly sand with layers of silt. Flyash was observed to 20 ft bls. The screened interval is sandy gravel. The contact between the Hanford and Ringold formations was encountered at approximately 50 ft. The borehole was advanced beyond its planned completion depth to tag a clay unit at 103 ft (see borehole log in Appendix A). Samples were collected approximately every 5 ft of depth for calcium carbonate analysis, moisture analysis, radiological screening, and lithologic archiving. A grain size sample was not collected. Physical data for sediments are contained in Appendix B.

A gross gamma log was run on November 8, 1991, from 0 to 101.8 ft bls, through the temporary casing. A copy of the gross gamma log is in Appendix A.

The borehole and soils were monitored regularly for organic vapors and radioactive contaminants. There was no detectible contamination.

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3.2 WELL COMPLETION

Permanent casing and screen were installed in well D8-4 between November 12 and 14, 1991. Static water level at that time was 84.7 ft bls. A 10-slot, 3-in-diameter stainless steel screen was set from 94 to 74 ft bls. Permanent casing is 3-in-diameter stainless steel from 74 ft bls to above land surface. Casing centralizers were unnecessary because the sonic rig centralizes the permanent casing while pulling back the temporary casing. The sand pack is 10- to 20-mesh silica sand (103.2 to 71.4 ft bls). The annular seal comprises bentonite pellets (71.4 to 65.1 ft bls), bentonite crumbles (65.1 to 24.7 ft bls), and cement grout (24.7 to 3.0 ft bls). The remaining annulus was filled with concrete when a 4- by 4-ft by 6-in. concrete pad was installed at the wellhead. A 6-in. protective casing with a locking cap was also installed at the wellhead. Four protective steel posts were set in concrete around the well. A brass marker stamped with the well number was set into the concrete. The centerline of the well was surveyed to Lambert and 100-D coordinates. Elevation was surveyed to NGVD'29 and 100-D data. Elevations were established for the top of the Hydrostar (trade name of Instrumentation Northwest, Redmond, Washington) plate, top of outer casing (north side), and the brass marker set in the concrete pad. Documentation of well completion is compiled in Appendix A.

The only additives during well drilling and completion were water and nonpetroleum-based lubricant used on drilling tools and casing threads.

3.3 WELL DEVELOPMENT AND PUMP INSTALLATION

A Hydrostar sampling pump was installed in well D8-4 on December 4, 1991. Sampling pump intake is at 94.5 ft below top of casing. A pump installation form is included in Appendix C.

Well D8-4 was developed December 4, 1991. The sampling pump was used to remove 3,200 gal water from the well (the 3-in-diameter casing was too small to accept the temporary submersible pump normally used for development). Final turbidity was 4.7 nephelometric turbidity units. Drawdown and recovery data were measured with a transducer in the pumping well during development. A well development log is included in Appendix C. Water level data from development and recovery are included in Appendix D.

3.4 AQUIFER TESTING

Water level data were collected during development, as described in Section 3.3, but could not be interpreted to determine aquifer properties. No slug tests were conducted in well D8-4 because available equipment did not fit down the 3-in. casing. Drawdown data are included in Appendix D.

4.0 WELL 199-D8-5

4.1 DRILLING

Well D8-5 was drilled with a sonic rig. Drilling began on October 11, 1991, and was completed October 28, 1991, at a total depth of 87.2 ft bls. Temporary, carbon steel casing was used during drilling: 7-in-diameter casing from surface to total depth. During drilling, the temporary casing broke off, leaving part of the casing and a core barrel in the hole. All of this material was retrieved and the hole was redrilled. Approximately 2 gal of water were added during drilling. Drilling information is compiled in Appendix A.

Sediments ranged from gravelly sandy silt to gravel. The screened interval is sandy silty gravel and sand. The contact between the Hanford and Ringold formations was encountered at approximately 44 ft. The bottom of the borehole encountered a clay unit at 80 to 83 ft bls (see borehole log in Appendix A). Samples were collected approximately every 5 ft of depth for calcium carbonate analysis, moisture analysis, radiological screening, and lithologic archiving. Grain size samples were not collected. Physical data for sediments are contained in Appendix B.

A gross gamma log was run on October 28, 1991 from 0 to 87.2 ft bls, through the temporary casing. A copy of the gross gamma log is in Appendix A.

The borehole and soils were monitored regularly for organic vapors and radioactive contaminants. There was no detectible contamination.

4.2 WELL COMPLETION

Permanent casing and screen were installed in well D8-4 on October 29, 1991. Static water level at that time was 70 ft bls. A 10-slot, 3-in-diameter stainless steel screen was set from 83 to 63 ft bls. Permanent casing is 3-in-diameter stainless steel from 63 ft bls to above land surface. Casing centralizers were unnecessary because the sonic rig centralizes the permanent casing while pulling back the temporary casing. The sand pack is 10- to 20-mesh silica sand (87.2 to 58 ft bls). The annular seal comprises bentonite pellets (58 to 54.4 ft bls), bentonite crumbles (54.4 to 18.8 ft bls), and cement grout (18.8 to 2 ft bls). The remaining annulus was filled with concrete when a 4- by 4-ft by 6-in. concrete pad was installed at the wellhead. A 7-in. protective casing with a locking cap was also installed at the wellhead. Four protective steel posts were set in concrete around the well. A brass marker stamped with the well number was set into the concrete. The centerline of the well was surveyed to Lambert and 100-D coordinates. Elevation was surveyed to NGVD'29 and 100-D data. Elevations were established for the top of the Hydrostar plate, top of outer casing (north side), and the brass marker set in the concrete pad. Documentation of well completion is compiled in Appendix A.

The only additives during well drilling and completion were water and nonpetroleum-based lubricant used on drilling tools and casing threads.

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4.3 WELL DEVELOPMENT AND PUMP INSTALLATION

A Hydrostar sampling pump was installed in well D8-5 on 5 December 1991. Its intake is at 82.6 ft below top of casing. A pump installation form is included in Appendix C.

Well D8-5 was developed 5 December 1991. The sampling pump was used to remove 160 gal water from the well (the 3-in diameter casing was too small to accept the temporary submersible pump normally used for development). Final turbidity was 3.1 nephelometric turbidity units. Drawdown and recovery data were measured with a transducer in the pumping well during development. A well development log is included in Appendix C. Water level data from development and recovery are included in Appendix D.

4.4 AQUIFER TESTING

A slug injection and withdrawal test was conducted in well D8-5 on 5 December 1991 before development. Hydraulic conductivity was estimated to be 1.1 ft/d, based on slug withdrawal. Water level data were also collected during development, as described in section 4.3, but they could not be analyzed to determine aquifer properties. Aquifer test data and their interpretation are included in Appendix D.

5.0 WELL 199-D8-6

5.1 DRILLING

Well D8-6 was drilled with a cable-tool rig. Drilling began on October 31, 1991, and was completed December 18, 1991, at 110 ft bls. Temporary, carbon steel casing was used during drilling: 12-in-diameter casing from surface to 20 ft bls; 10-in-diameter casing from surface to total depth. Approximately 253 gal of water were added during drilling. Drilling information is compiled in Appendix A.

Sediments were primarily gravelly sand to sand and flyash in the upper 65 ft of the borehole, and sand and gravel at depth. The screened interval is sand and gravel with abundant silt (see borehole log in Appendix A). The contact between the Hanford and Ringold formations was encountered at approximately 70 ft. Samples were collected approximately every 5 ft of depth for calcium carbonate analysis, moisture analysis, radiological screening, and lithologic archiving. A sample for grain size analysis was collected from the interval to be screened. Physical data for sediments are contained in Appendix B.

A gross gamma log was run on November 22, 1991. from 3.1 to 109.6 ft bls, through the temporary casing. A copy of the gross gamma log is in Appendix A.

The borehole and soils were monitored regularly for organic vapors and radioactive contaminants. There was no detectible contamination.

5.2 WELL COMPLETION

During the first attempt at completion of well D8-6, the 10-in. temporary casing was stuck in the hole and the well screen was bent. The screen and stainless steel casing were removed. The borehole was redrilled in the same hole, and the 10-in. temporary casing was eventually freed and a new screen was installed with the permanent casing. The 10-in. casing shoe was not retreived, and remains in the ground at a depth of approximately 70 ft. The shoe was located with a downhole magnetic log (Appendix A). This irregularity was documented on a nonconformance report, and a request for variance was submitted to the Washington Department of Ecology. Since the casing shoe is in the bentonite seal, it should have no effect on groundwater samples.

Static water level at the time of completion was 90.4 ft bls. A 20-slot, 4-in-diameter stainless steel screen was set from 107.82 to 87.5 ft bls. Permanent casing is 4-in-diameter stainless steel with centralizers, from 87.5 ft bls to above land surface. The primary sand pack is 10- to 20-mesh silica sand (108.2 to 83.4 ft bls). A secondary 20 to 40 sand pack was installed between 83.4 and 79.8 ft bls. The annular seal comprises bentonite crumbles (79.8 to 77.9 ft bls), bentonite slurry (77.9 to 24.0 ft bls), more bentonite crumbles (24.0 to 18.9 ft bls), and cement grout (18.9 to 0 ft bls).

A 4- by 4-ft by 6-in. concrete pad was installed at the wellhead. A 6-in-diameter protective casing with a locking cap was installed around the 4-in. casing. Four protective steel posts were set in concrete around the well. A brass marker stamped with the well number was set into the concrete. The centerline of the well was surveyed to Lambert and 100-D coordinates. Elevation was surveyed to NGVD'29 and 100-D data. Elevations were established for the top of outer casing (north side), and the brass marker set in the concrete pad. Documentation of well completion is compiled in Appendix A.

The only additives during well drilling and completion were water and "jet lube," a nonpetroleum-based lubricant used on drilling tools and casing threads.

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5.3 WELL DEVELOPMENT AND PUMP INSTALLATION

Well D8-6 was developed December 21, 1991. A temporary submersible pump was used to remove 1,018 gal water from the well. Final turbidity was 4.9 nephelometric turbidity units. Drawdown and recovery data were measured with a transducer in the pumping well during development. A well development log is included in Appendix C. Water level data from development and recovery are included in Appendix D.

A dedicated Hydrostar sampling pump was installed in well D8-6 on December 23, 1991. The pump was initially installed on the 4-in. casing because the protective casing, pad, and posts, had not yet been installed. The pump intake was at 102.4 ft below the top of the 4-in. casing. After the 6-in. casing was installed, the pump was raised to the top of the 6-in. protective casing. Thus the pump intake is at 102.4 ft below the top of the 6-in. casing. A form describing the initial pump installation is included in

Appendix C. Well head diagrams for before and after the protective casing was installed are also included in Appendix C.

5.4 AQUIFER TESTING

Water level data were collected during development, as described in Section 5.3. These data could not be interpreted to determine aquifer properties. A slug injection and withdrawal test was also conducted in well D8-6 on December 23, 1991, after development. Hydraulic conductivity was estimated at 23 to 29 ft/d, based on slug withdraswal data. Aquifer test data and their interpretation are included in Appendix D.

6.0 REFERENCES

Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order*, U.S. Environmental Protection Agency, U.S. Department of Energy, and Washington Department of Ecology, Olympai, Washington.

Hartman, M.J., 1991, *Groundwater Monitoring Plan for the 100-D Ponds*, WHC-SD-EN-AP-048, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990, *Generic Specifications-Groundwater Monitoring Wells*, WHC-S-014, Rev. 6, Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A:

DRILLING AND CONSTRUCTION DATA

This appendix includes the following records for each well: well summary sheet; well construction report; borehole log; well construction schedule. Geophysical logs are provided at the end of the report.

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WELL 199-D5-13

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3 of 4

WELL SUMMARY SHEET

Boring or Well No. 199-D5-13

Sheet 1 of 1

Location North Fence Line 100D

Project W-017 / 100D

Elevation 467.40' BRASS CAP

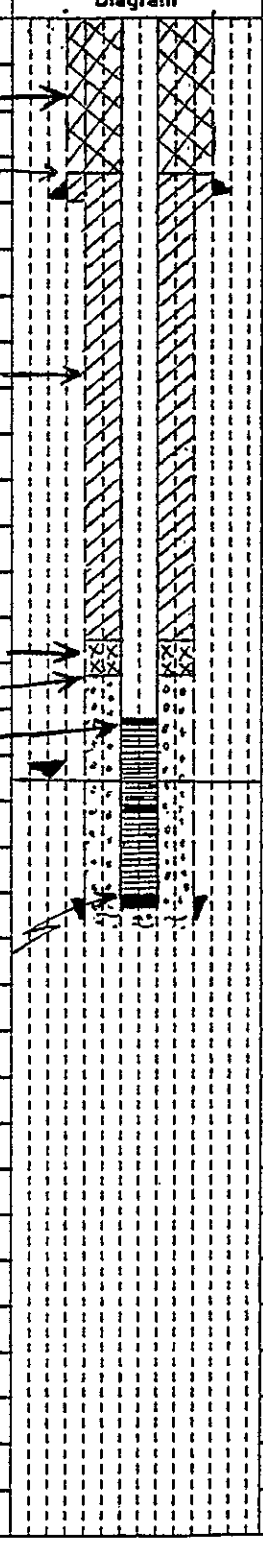
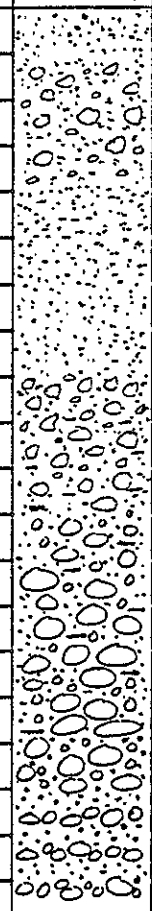
Drilling Contractor Kaiser Engineers

Driller Moe Wraspir

Drilling Method and Equipment B.E. Cable Tool

Prepared By Susan J. Havens / SJ Havens (Sign/Print Name) Date 10/24/91

Reviewed By Edward C. LaFave / Edward C. LaFave (Sign/Print Name) Date 1/2/92

CONSTRUCTION DATA: Description	CONSTRUCTION DATA: Diagram	Depth in Feet	GEOLOGIC/HYDROLOGIC DATA: Graphic Log	GEOLOGIC/HYDROLOGIC DATA: Lithologic Description
				0-5' Sand
CEMENT GROUT 2.0'-18.0'		10		5' Gravelly SAND
12" temporary casing set at 18.79'		20		17' SAND (Black)
		30		
Bentonite Crumbles 18.0'-67.1'		40		43' Sandy GRAVEL
		50		50' Slightly Silty, SANDY, GRAVEL
		60		
Bentonite Pellets 67.1'-71.9'		70		70' SILTY SANDY GRAVEL
Top of SAND 71.9' bLS				
Top of Screen 76.3' bLS		80		80' SANDY GRAVEL
SWL ~ 82.9' bLS 11-26-91				85' INTERBEDDED SAND AND GRAVEL
SCREEN (10 SLOT) 76.3'-97.0		90		
10" TEMPORARY CASING SET AT 97.60'		100		
Bottom of Screen 97.0' bLS				
Bottom of Well 97.3' bLS				

A-6000-384 (04/90)

WELL CONSTRUCTION REPORT

SIGNATURE

Specification No. WHC-S-014 Rev No. 6 **

SJH 10/24/91

ECNs 151204 164223 127739 150136 164223

Project 100D ponds monitor

Location 100D north fence

Drilling Company KEH

Driller R M Brock / M. Wrasper / J Cooper

Other (Companies) ESI

Geologist(s) E Freeman R Hibbard

Susan J. Havens Ken Lane

Myra Vaag

J.A. Coates

Well No. 199-D5-13 Temp. Well No. N/A

Coordinates N: 151 955 39 E: 573 535.72

Casing Elev. 471.49 Ground Elev 463.00 BRASS CAP

Drilling Method

Verification Method Visual observation

Criteria WHC-S-014 5.2 5.3 7.5 EE 6.7 SEC 6.2

			Initials	Date
Rotary	Air N/A	Mud N/A	N/A	N/A
Cable Tool	D 0-80	H 80-100 320	KDC	11/1/91
Drilling Fluid	Raw water	46 GAL.	KDC	11/10/91
Other	NA			

Geophysical Logging

Sondes	Interval	Date
Gross Gamma Log	95.8 - 3.6	11/1/91

Completion Data

Drilled Depth 100.0

Completed Depth 97.7'

Date Started 10-15-91

Date Completed 11-26-91

Static Water Level/Date 82.9' bls 11-26-91

Aquifer Testing

Type Instantaneous Slug Test

Flow Meter I.D. No. -NA-

Cal Due Date -NA-

Length of Test 1 hr

Volume Pumped -NA-

Drawdown -NA-

Date of Test 12-6-91

Completion Results

Cleaning

Verification Method Visual inspection / papers

Criteria WHC-S-014 7.6 4.2.2

	Initials	Date *
Drilling Tools/Rig	SJH	10/21/91
Temporary Materials	MV	10/21/91
Permanent Materials	SS Screen & casing	K.L 11-26-91

Material Storage/Packing

Verification Method Visual observation

Criteria WHC-S-014 4.2.2 7.3

	Initials	Date
Mtl. Handling/Storage	K.L.	11-26-91
Material Packing	K.L	11-26-91

Screen

Type	Length	Slot Size
T-304	2 (10' sections) 20.74' TOTAL	NOT STAMPED

ON SCREEN, NOT RECORDED ON AI (GREEN) TAGS

Depth(s) MEASURED IN FIELD WITH Feeler GAUGES TO BE APPROXIMATELY 0.010 - 0.011 INCHES

76.3 - 97.0 // 97.3 w/ END CAP

Verification Method Verify w/ steel tape

Criteria WHC-S-014: 4.2.3, 4.2.5, 4.2.1, 12.2.1

Initials K.L Date 11-26-91

Lubricants/Additives * SEE COMMENTS

Verification Method Visual observation

Criteria WHC-S-014: 7.2

	Identify	Initials	Date
Additives	raw water	SJH	10/18/91
Lubricants	Jet lube by Well Guard	SJH	10/21/91

Straightness Test

Verification Method Visual observation

Criteria WHC-S-014: 8.2

Initials E.E.F. Date 11/1/91

A-5

A-6000-436 (09/90)

WELL CONSTRUCTION REPORT
(continuation sheet)

199-D5-43

Casing (permanent)

Type	Size	Placement
T-304 STAINLESS 10 SLOT	4"	97.3 - 76.3
T-304 STAINLESS BLANK	4"	76.3 - 37.7 BGL
		-
		-

Verification Method: Verify w/ steel tape

Criteria: WHC-5-014: 4.2.1, 4.2.4, 4.2.5, 12.21

Initials: K.L. Date: 11-26-91

Well Protection

Verification Method: Visual Observation

Criteria: WHC-5-014: 4.2, 4.6

	Initials	Date
Protective Posts	KDR	2/12/92
Protective Casing	KDR	2/12/92
Site Restored	KDR	2/12/92
Cap, Hasp and Lock	KDR	2/12/92
Surface Pad	KDR	2/12/92

Annular Seal/Filter Pack

Verification Method: Verify w/ steel tape Criteria: WHC-5-014: 4.2.6, 4.2.7, 4.2.8, 4.2.9 5.3.1 5.3.2

Type	Interval	Volume	Initials	Date
SAND 20-40	97.1 - 71.9	2000 lb 20 SACKS	K.L.	11-26-91
Bentonite Pellets	71.9 - 67.1	200 lb 4 buckets	K.L.	11-26-91
Bentonite Crumbles	67.1 - 18.0	2200 lb 44 bags	K.L.	11-26-91
Cement Grout	18.0 - 2.0	1974 lb 21 SACKS	K.L.	11-26-91

Well Survey/Labeling

Verification Method: Review of Survey Report

Criteria: WHC-5-014: 3.4

	Initials	Date
Measurement Point/Surveyed	KDR	2/12/92
Protective Casing/Brass Cap Surveyed	KDR	2/12/92
Well Number Stenciled	KDR	2/12/92
Brass Cap Labeled	KDR	2/12/92

Pump Installation

Verification Method: Visual Observation

Criteria: WHC-5-014: 4.2.2, 4.2.11

	Initials	Date
Pump Decon/Prep	JAC	12-6-91
Installed	JAC	12-6-91
Pump Tested	JAC	12-6-91

Other (initial if performed)

NA Well Abandonment NA Downhole TV Inspection (Rw) Complete As-Built Diagram, Driller's/Geologist's Logs

12-6-91 JAC Well Development

Comments/Remarks: * Core Barrel delivered to site 10/18/91 inspected by STH for Cleanliness 1½ GAL RAW H2O 10/15/91; 5 GAL RAW H2O 10/18/91; 1 GAL RAW H2O 10/22/91; 9 GAL RAW H2O 10/22/91; 31 GAL RAW H2O 10/23/91; 2 GAL RAW H2O 10/24/91; 6 GAL RAW H2O 10/28/91; 37 GAL RAW H2O 10/29/91; WELL GUARD 10/29/91; 25 GAL RAW H2O 10/30/91; WELL GUARD 10/30/91;

** Rev 6 of WHC-5-014 in effect on 10-2-91, ECN'S 150132, 127439, 164223

Screen delivered to well site without accompanying documentation of slot size. Slot size verified in field with feeler gauge

Reviewed By (Sign/Print Name): Kent D Reynolds / Kent D Reynolds Date: 2/12/92

A-6000-436 (09/90)

BOREHOLE LOG

VALIDATED KDR 2/12/92 SIGNATURE/DATE

Boring or Well No. 199 D5 13

Sheet 1 of 5

Location 100 D Ponds

Project 100 D Ponds

Elevation ~~[illegible]~~ 468.00 Brass Cap

Drilling Contractor KEH

Driller R Brock

Drilling Method and Equipment Cable tool

Prepared By Eugene Freeman (Sign/Print Name) Date 10-15-91

Reviewed By R. D. M. [illegible] (Sign/Print Name) Date 10/22/91

S. J. Haverty / Susan J. Havens

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
0				Sand	
5	(2) mason jars	DB		Gravelly Sand 2.5Y 5/3 light olive brown, moist 80% sand 20% gravel Gravels = 70% Felsic 30% mafic – 10% sl, 50% VCP, 30% CP to mp 20% FP to VFP, subrounded Sand = 50% Felsic 50% mafic – 10% vcs, 20% c.s, 35% ms, 35% fs to vfs, subrounded to subangular poorly sorted	driller added 1.5 gal of water
10	1 rad 21th 1 CaCO3/ moist	DB		10' Gravelly SAND (25% gravel, 75% Sand) 20% vcp, 4% c to mp 1% f to vfp, 10% vcs, 30% cs, 20% ms, 15% fs color wet (10YR 4/1) dark gray, dry (10YR 7/1) lt gray, sample silty moist, poorly sorted, rd to subrd, 75% mafic, 25% felsic strong rx to 10% HCl	10/17/91 0830 SJH
15	1 rad 21th 1 CaCO3	DB		15' Gravelly SAND (25% gravel, 75% Sand) 15% sc, 5% vcp, 4% c to mp, 1% f to vfp, 31% vc to cs, 35% ms, 10% f to vfs, color wet (~~10YR 2/1~~) (2.5Y 2/0) black color dry (2.5Y 5/0) gray sample wet*, poorly sorted, subang to rd, 80% basalt 20% feldspars and quartz, weak rx to 10% HCl 17' SAND	10/22/91 0910 SJH * wet from 190 l water added during drilling
20					

BOREHOLE LOG

Boring or Well No 199-D5-13

Sheet 2 of 5

Location 100 D

Project W-017/100D

Elevation 468.00 Brass Cap

Drilling Contractor Kaiser

Driller Moe Wraspir

Drilling Method and Equipment B.E. Cable Tool

Prepared By Susan J. Havens/SJ Havens (Sign/Print Name) Date 10/22/91

Reviewed By R. A. Miller (Sign/Print Name) Date 10/23/91

Depth (20')	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
	1 Rad 21.4th 1 CaCO3/ moist	DB		SAND ~~40% ms~~ SJH 10/22/91 10% cs, 60% ms, 15% fs, 5% vfs to trace silt, color wet (2.5 Y 3/0) black, color dry (2.5 Y 4/0) dark gray, sample dry, mod sorted, ang to subang, 80% basalt 20% feldspars & qtz, weak rx to 10% HCl	10/22/91 1130 SJH
25'	1 Rad 21.4th 1 CaCO3/ moist	DB		25' SAND as described in 20' sample. trace flyash	10/22/91 1201 SJH
30'	1 Rad 21.4th 1 CaCO3/ moist	DB		30' SAND 20% cs, 65% ms, 15% fs trace fly ash color wet (2.5 Y 3/0) black, color dry (2.5 Y 4/0) dark gray sample moist*, mod sorted, ang to sub ang, 80% basalt, 20% feldspars & quartz, no rx w/ 10% HCl	10/23/91 0825 SJH * 5 gals water added 10/22/91 1545
35'	1 Rad 21.4th 1 CaCO3/ moist	DB		35' SAND (trace pebbles) 5% fp, 20% cs, 65% ms, 10% fs - same as described in 30' sample except slightly moist	10/23/91 1030 SJH
40'					

A-6000-382 (04/90)

BOREHOLE LOG

Boring or Well No. 199-D5-13

Sheet 3 of 5

Location 100D North Fence Line

Project W-017 / 100D

Elevation 468.00 Blues Cup

Drilling Contractor Kaiser Engineers

Driller Mac Wrasper

Drilling Method and Equipment B.E. Cable Tool

Prepared By Susan J Havens / SJ Havens (Sign/Print Name) Date 10/23/91

Reviewed By R D Miller (Sign/Print Name) Date 10/25/91

Depth (40')	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
	1 Rad 2 Lith 1 Calls/moist	DB		40' SAND (trace pebbles & fly ash) 2% fp, 23% cs, 65% ms, 10% fs as described in 30' sample	10/23/91 1120 SJH
45'				43' Sandy GRAVEL	
	1 Rad 2 Lith 1 Calls/moist	DB		45' Sandy GRAVEL (50% sand, 50% GRAVEL) 15% lg, 10% sc, 10% vcp to cp, 5% mp, 10% f to vfp, 30% vcs to cs, 15% ms, 5% fs to silt, color wet (2.5Y 3/0) black, color dry (2.5Y 4/0) dark gray, dry sample, poorly sorted, subrd to ang, 75% basalt, 25% felsite & qtz, no rx w/ 10% HCL	10/23/91 1435 SJH
50'					
	1 Rad 2 Lith 1 Calls/moist	DB		50' Slightly silty, sandy GRAVEL (55% Gravel, 40% sand, 5% silt) 10% lg, 20% sc, 10% vcp to cp, 5% mp, 10% f to vfp, 5% vcs to cs, 30% ms, 5% f to vfs, 5% silt, color wet (10YR 5/2) grayish brown, color dry (10YR 7/2) light gray, sample slightly moist* poorly sorted, rd to subrd (gravel) ang to subang (sand) 40% basalt, 60% felsite & quartz no rx w/ 10% HCL 53' Silt increasing	10/24/91 0930 SJH * raining
55'					
	1 Rad 2 Lith 1 Calls/moist	DB		55' Slightly Silty, Sandy GRAVEL (55% Gravel, 35% sand, 10% silt) 20% sc, 20% vcp to cp, 5% mp, 10% f to vfp 5% cs, 10% ms, 20% f to vfs, 10% silt color wet (2.5Y 5/2) grayish brown, dry (2.5Y 7/2) light gray, sample dry, poorly sorted, rd to subrd (gravel) ang to subang (sand) 40% basalt 60% feldspar & quartz, no rx w/ 10% HCL	10/24/91 1015 SJH
60'					

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BOREHOLE LOG

Boring or Well No. 199-D5-13

Sheet 4 of 5

Location 100D North Fence Line

Project W-017/100D

Elevation 468.00 Brass Cap

Drilling Contractor Kaiser Engineers

Driller Mike Wraspir

Drilling Method and Equipment B.E. Cable Tool

Prepared By Susan J. Havens/SJ Havens (Sign/Print Name) MK/KAG

Date 10/24/91

Reviewed By Edward C. Rafuse (Sign/Print Name)

Date 10/30/91

Depth (60)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
	1Rad 2Lith 1CaCO3	DB		Slightly Silty, Sandy, GRAVEL (40% Gravel, 50% Sand, 10% Silt) 20% vcp to cp, 10% mp, 10% f to vfp, 10% ms 40% f to vfs, 10% silt color wet (2.5Y 5/2) grayish brown, color dry (2.5Y 7/2) light gray, sample damp*, poorly sorted, ang to subrd, 40% matic, 60% feldspar, quartz, mod rx w/ 10% HCL, consolidated*	10/24/91 1345 SJH * hard drilling material consolidated in DB
65'	1Rad 2Lith 1CaCO3/ moist	DB		65' Slightly Silty, Sandy GRAVEL (40% GRAVEL, 45% Sand, 15% Silt) 10% cp + cp, 10% mp, 20% f to vfp, 5% vc to cs, 10% ms, 30% f to vfs, 15% silt color wet (2.5Y 5/2) grayish brown, color dry (2.5 7/2) light gray sample dry, poor sorted, ang to subrd, 40% matic, 60% feldspar qtz, mod rx w/ 10% HCL	10/24/91 1530 SJH * hard drilling material consolidated in DB
70'	1 RAD 2 LITH 1 CaCO3/ MOIST	DB		70' SILTY SANDY GRAVEL (40% GRAVEL, 50% SAND, 10% SILT) 10% SC, 20% VCP, 50% CP, 5% MP, 10% MS, 20% FS, 20% VFS, 10% SILT; COLOR WET (10YR 5/2) GRAYISH BROWN, COLOR DRY (10YR 7/2) LIGHT GRAY; SAMPLE DRY; POORLY SORTED; SUBANGULAR TO WELL ROUNDED; 30% MATIC, 60% FELSIC; STRONG REACTION TO 10% HCL	10/28/91 0815 MKV HARD DRILLING GRAVEL APPEARS CEMENTED/ CONSOLIDATED IN CORE BARREL
75'	1 RAD 2 LITH 1 CaCO3	DB		75' SILTY SANDY GRAVEL AS ABOVE GRAVEL CONTENT INCREASES TO 55%, SAND AND SILT CONTENT DECREASE	10/28/91 1200 MKV HARD DRILLING CHANGED TO HARD TOOL

BOREHOLE LOG

Boring or Well No. 199-D5-13

Sheet 5 of 5

Location 100 D North Fence Line

Project W-017 / 100 D

Elevation 468.00 Brass Cap

Drilling Contractor Kaiser Engineers

Driller Alle Wraspir

Drilling Method and Equipment B.E. Cable Tool

Prepared By Myra K Vaag / Myra K Vaag (Sign/Print Name) Date

Reviewed By Edward C. Rafer / Edward C. Rafer (Sign/Print Name) Date 11/26/91

Depth (80)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
	1 RAD 2 LITH 1 CaCO3	HT		80' SANDY GRAVEL AS ABOVE (55% GRAVEL, 40% SAND, 5% SILT) SIZE DISTRIBUTION UNKNOWN - HARD TOOL SPL; COLOR WET (10YR 5/2) GRAYISH BROWN, COLOR DRY (10YR 7/2) LIGHT GRAY; SAMPLE WET BUT RAW H2O ADDED TO BOREHOLE; 30% MAFIC 60% FELSIC; STRONG REACTION TO 10% HCl	10/29/91 1455 MKV SAMPLE CONSISTS OF ANGULAR FRAGMENTS OF GRAVEL AND FINE-GRAINED SAND - HARD TOOLING
85'	1 RAD 2 LITH 1 CaCO3	HT		85' SANDY GRAVEL AS ABOVE POSSIBLY INTERBEDDED SANDS AND GRAVELS	10/30/91 1630 MKV DRILLING ALTERNATES FROM HARD TO EASY - MAY BE INTERBEDDED SANDS & GRAVELS
				88' SANDY GRAVEL	10/30/91 1310 MKV CORE BARREL SAMPLE TAKEN FOR SIEVE ANALYSIS
90'	1 RAD 2 LITH 1 CaCO3/ MOIST	DB		90' SANDY GRAVEL (60% GRAVEL, 40% SAND) 5% LC, 35% SC, 20% CP-VCP, 30% CS, 10% MS; COLOR WET (10YR 4/2) DARK GRAYISH BROWN, COLOR DRY (10YR 6/2) LIGHT BROWNISH GRAY; SAMPLE WET; POORLY SORTED; SUBANGULAR TO WELL ROUNDED; 30% MAFIC, 60% FELSIC; WEAK REACTION TO 10% HCl; CONTAINS PATCHES OF WHITE CLAY THAT RESEMBLE CALICHE BUT DO NOT FIZZ	10/30/91 1310 MKV
95'	1 RAD 2 LITH 1 CaCO3	HT		95' SANDY GRAVEL AS ABOVE	10/31/91 1240 MKV
				TD: 100.'	
	1 RAD 2 LITH	HT		98' SANDY GRAVEL AS ABOVE	10/31/91 1400 MKV

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100-D FACILITY

WELL 199-D5-13

DRILLING

START DATE	FINISH DATE	TOTAL DAYS	CURRENT DEPTH	FINAL DEPTH	DEPTH TO WATER	WATER ADDED(GAL)
10-15-91	11-1-91	14	N/A	100.0'	10-30-91 77.4' 10-31-91 93.4'	320 GALLONS

DOWN HOLE COMPLETION

START DATE	FINISH DATE	TOTAL DAYS	DEPTH TO WATER	DEPTH TO BOTTOM	DEPTH OF SCREEN	WATER ADDED/ REMOVED (GAL)
11-22-91	11-26-91	3	11-22-91 82.6 11-25-91 82.9	~~96.9'~~ 97.5 PWA 2/14/92	76.3'-97.0'* *97.3' w/END CAP	90 GALLONS ADDED TO PREVENT HEAVING 30 GALLONS REMOVED TO DEVELOP FILTER PACK

DEVELOPMENT AND ASSOCIATED ACTIVITIES

TV CAMERA DATE	AQUIFER TEST DATE	DEVELOPMENT DATE	HYDROSTAR PLACEMENT DATE	WATER REMOVED(GAL)
N/A	12-6-91	12-6-91	12-6-91	1500 GALLONS

COMMENTS:

9310230186

VALIDATED
KDR 2/12/92
SIGNATURE/DATE

189

WELL CHECK LIST

Well Number: 199 05-13 Location: 100D (91)

Date: 1/24/92

	Yes	No
Hasp on protective casing	✓	
Lock	✓	
Proper cap fit	✓	
Well ID number on brass cap	✓	
Protective post painted	✓	
Well ID number stenciled on post	✓	
Well ID number stenciled on protective casing	✓	
Survey mark on casing	✓	
Stock tank		✓
Site neat	✓	

Comments:

Signature: Edward C. Rafferty Date: 1/24/92

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WELL 199-D8-4

9313021.0122

3 of 4

WELL SUMMARY SHEET

Boring or Well No. 199D8-4

Sheet 1 of 1

Location 100D

Project W017 / 100D

Elevation 465.99' BRASS CAP

Drilling Contractor Harrison Western

Driller D. Bigham: Operator / K. Deffart: Driller

Drilling Method and Equipment Sound Dynamics SD150

Prepared By VLeking / [illegible] (Sign/Print Name) Date 11/20/91

Reviewed By Kent Reynolds (Sign/Print Name) Date 2/12/92

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
				Gravely SAND
Cement (Portland) Grout		10		
		20		SAND
		30		
Bentonite Crumbles				
		40		Gravely SAND
		50		gravely sandy SILT
		60		gravely silty SAND
Bentonite Pellets 3/8" & 1/2"		70		SAND
		79'		gravely silty SAND
		80		
3" ø stainless steel screen (T304)				
.010 Johnson continuous wire wrap		90		
		94'		GRAVEL
		100		SAND
Primary Filter Pack #10-20		103.4'		clay sandy GRAVEL
		TD		CLAY

A-16

A-6000-384 (04/90)

VALIDATED KDR 5/8/92 SIGNATURE/DATE

Run 1 of 1

Westinghouse Hanford Company | LOG HEADER | Page 1 of 2

Well No. 199-D8-4 Area 100-D Date 11/8/91

Log Run #1 Log Type Gross Gamma

Elevation Datum NGVD'29 ① Elevation 466.59' ground elevation

Survey Coordinates 152,090.41 N 573,447.39 E

Log Measured From Ground Surface

Location Description North of 100-D Area

Ground Surface Elevation 466.59'

Surface Temperature 9.2 °C Weather Overcast-Rain-Cool

BOREHOLE INFORMATION

Driller Kurt DeHart

Drill Rig Type Sonic | Bit Type/Diameter Carbon Button / 7 7/8"

Borehole Diameter(s)/Depth 7 3/8" / 103.4'

Depth Driller 103.0' | Depth Logger 101.8'

Liquid Level NA Water was shut-off Dry. | Liquid Density NA

Temperature NA

CASING RECORD

Type 7 3/8" Carbon Steel 3/8" Thick | Interval +6.1' -103.4'

Type | Interval

Type | Interval

Type | Interval

Well Screen Interval NA

Comments: Return Error = +0.2' high

Centralizer used.

① all survey entries made on 4/15/92 by NB from KEH survey

A-6000-520 (05/90)

9313021.0158

LOG HEADER

EQUIPMENT DATA

Logging Company: PNL

Operator(s): Alan Pearson

Equipment Brand: MLS — Equipment Type: Analog

Tool Type: Gamma Ray — Serial No. CG27A97

Base Calibration Date: 5/91 — Calibration Reference: PNL-7785 UC-606

Calibration/Probe Factor: 8.84×10^{-3} eU n/m²/s — Base Calibration Datum (eU): Position 1: 297.4 eU — Position 2: 64.3 eU

Dead Time: 11.8 μsec. — Warm Up Time: >15 min

LOGGING INFORMATION

Log Interval From: 101.8 — To: 0.0

Rerun(s): 30.0' to 0.0'

Pre Survey Verification: Position 1: 296.4 eU — Position 2: 65.2 eU — Background: 47 c/s

Base Calibration Difference: Position 1: 1.0 eU — Position 2: 0.9 eU

Logging Speed: 5 ft./min. — Rerun Scales, CPS/in.: 50 c/s/in

Start Time: 1400 — Completion Time: 1545

Chart Speed(s), ft/in.: 10 ft./in.

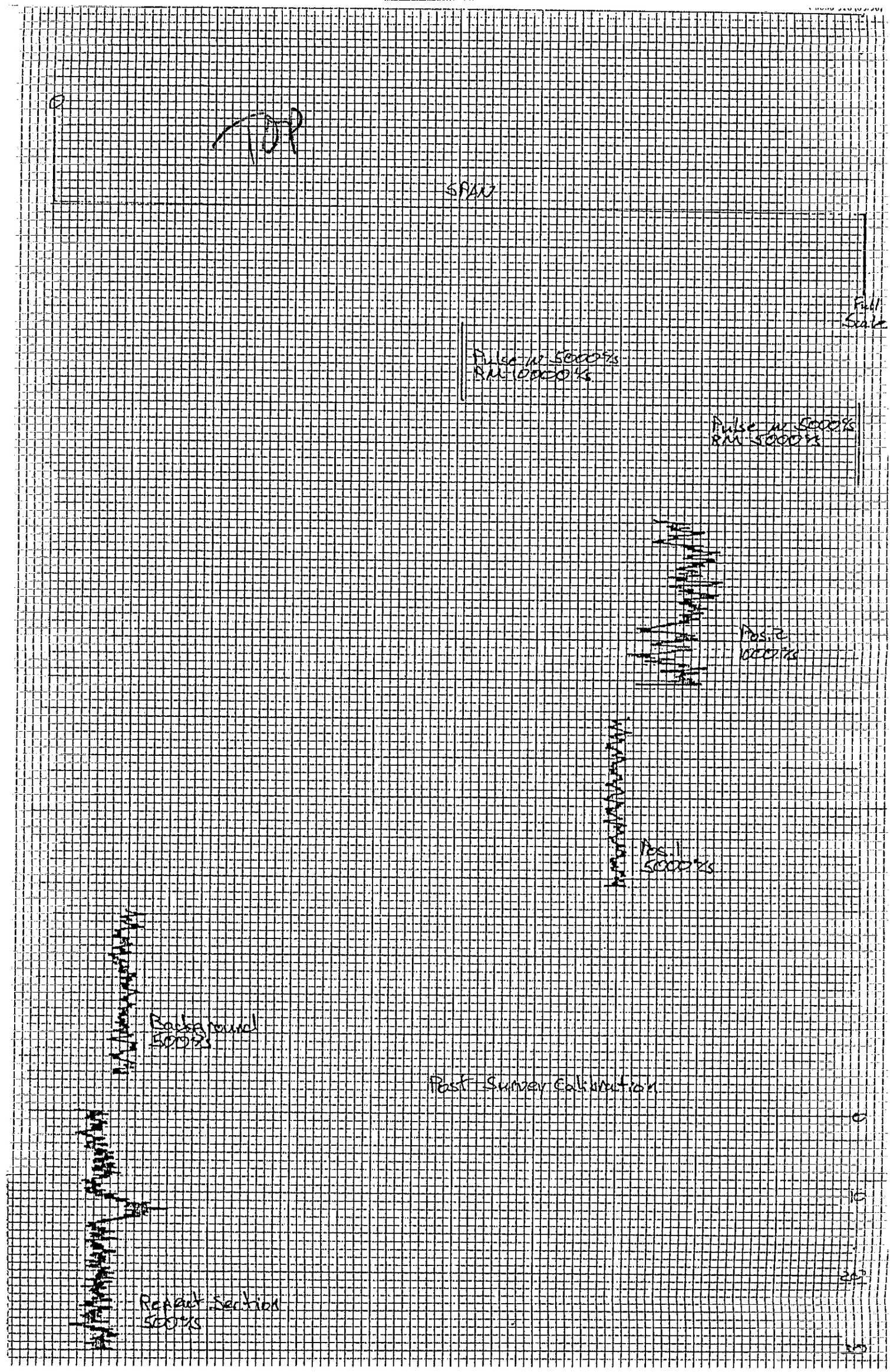
Chart Recorder Horizontal Scale, CPS/in.: 50 c/s/in. — Time Constant(s): TC-1

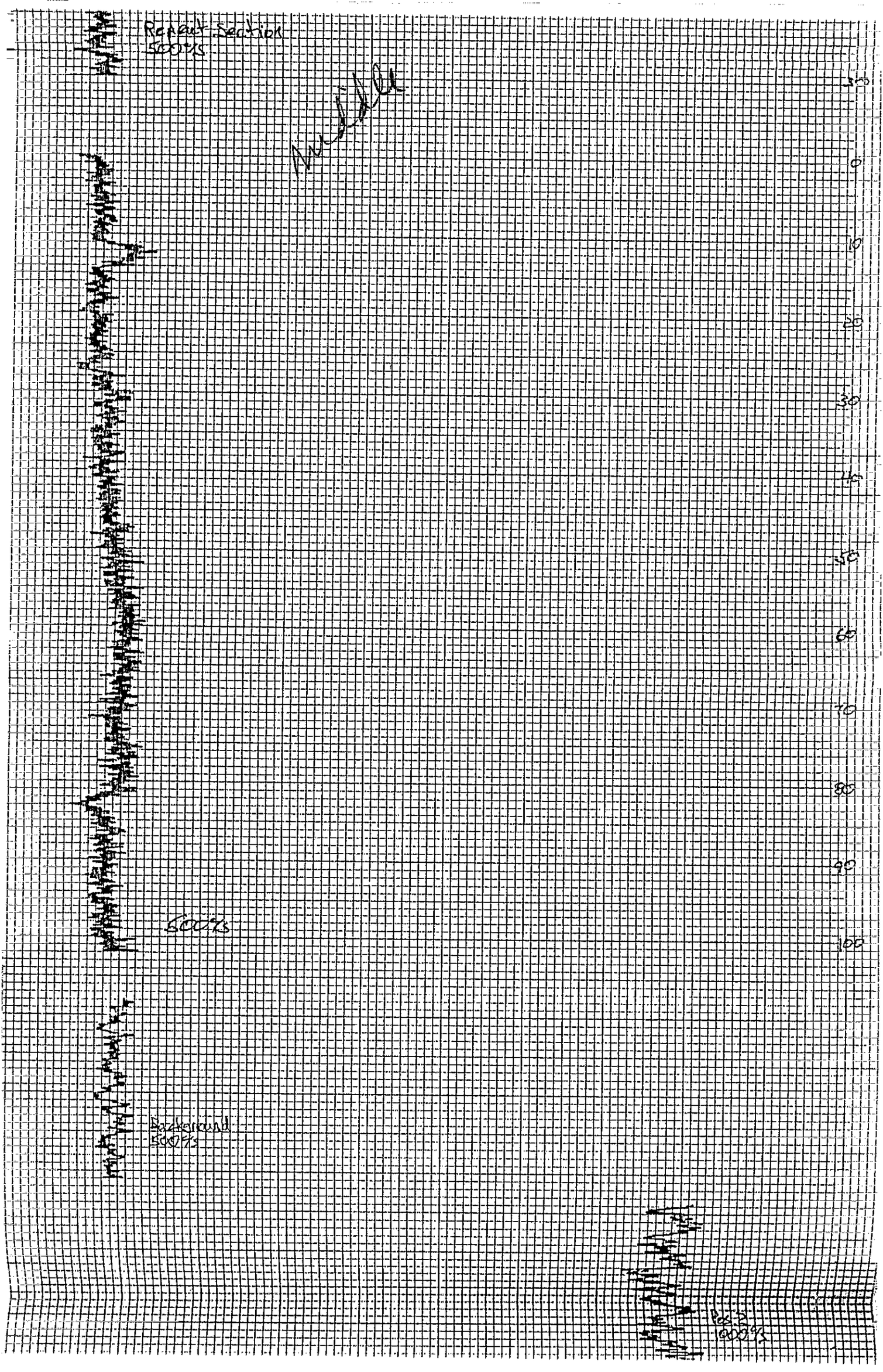
Post Survey Verification: Position 1: 305.2 eU — Position 2: 65.2 eU — Background: 47 c/s

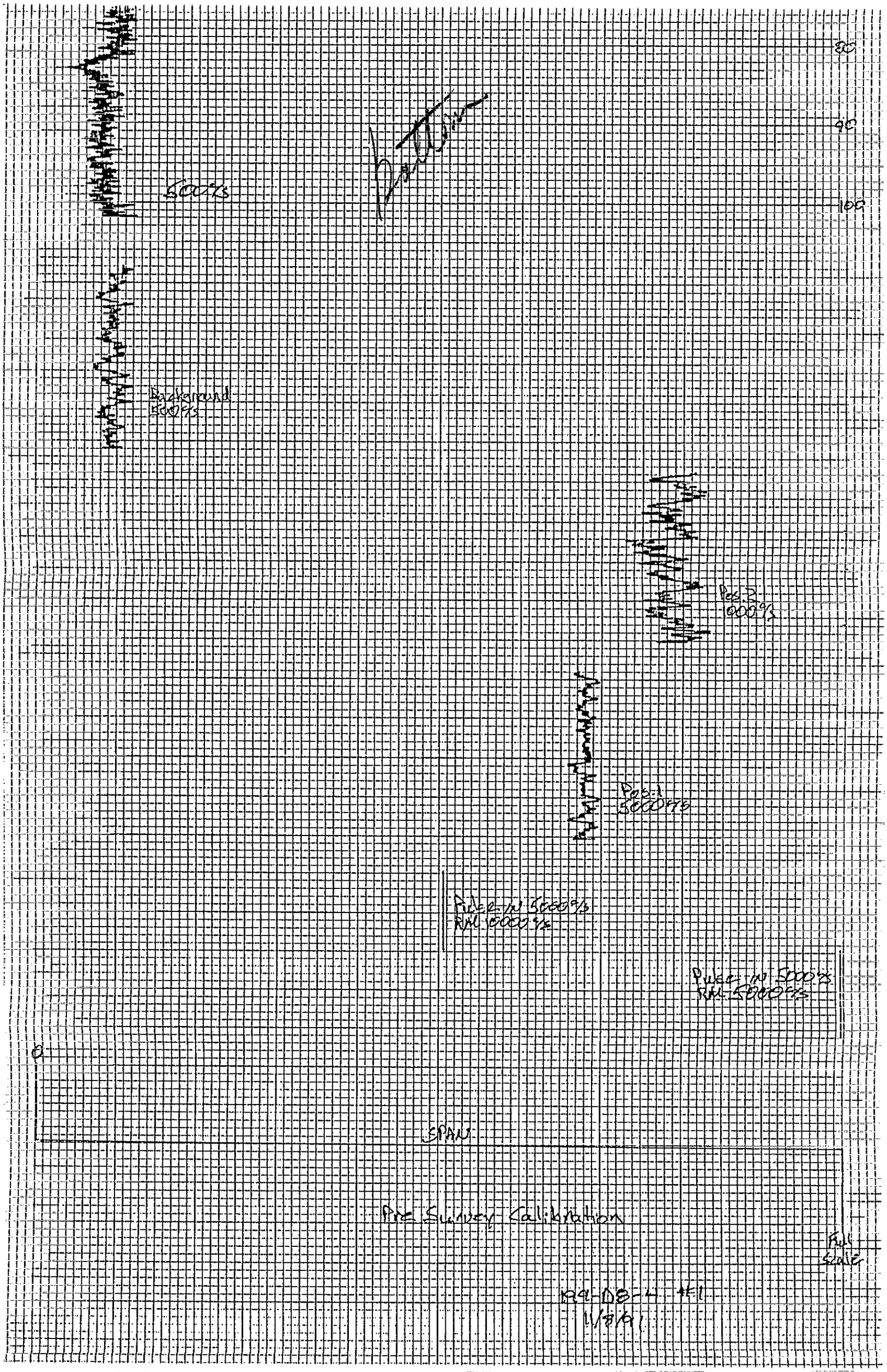
Percent Change: Position 1: 3.0% — Position 2: 0.0%

Comments: Return Error = +0.2' high
Centralizer used.

Witnessed and Verified by: (sign and print name) [illegible] — Date: 11/20/91


0
TDR
SPAN
Full Scale
Pulse W 5000 ns
RM 10000 ns
Pulse W 5000 ns
RM 5000 ns
Pos. 2
10000 ns
Pos. 1
5000 ns
Background
500 ns
Post Survey Calibration
0
10
20
30
Repair Section
500 ns


Repeat Section
500%
500%
Background
500%
Pos. 3
100%
30
0
10
20
30
40
50
60
70
80
90
100


80
90
100
500cps
Background
500cps
Pos. 2
000cps
Pos. 1
5000cps
Pulse in 5000cps
RM 5000cps
Pulse in 5000cps
RM 5000cps
0
SPAN
Pre Survey Calibration
Full
Scale
RA-D8-4 #1
11/8/91

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VALIDATED 2/18/92 SIGNATURE/DATE

Run 1 of 1

Westinghouse Hanford Company	LOG HEADER	Page 1 of 2

Well No. 199-D8-5 Area 100-D Date 10/28/91

Log Run #1 Log Type Gross Gamma

Elevation Datum NGVD'29 ① Elevation 450.02' (ground elevation)

Survey Coordinates 152,243.73 N 573,537.39 E

Log Measured From Ground Surface

Location Description North of 100 D Area

Ground Surface Elevation ~~North of 100 D Area~~ 450.02'

Surface Temperature 3.6°C Weather Overcast-Cool

BOREHOLE INFORMATION

Driller Kurt Deffant

Drill Rig Type Sonic Bit Type/Diameter Button Core / 7"

Borehole Diameter(s)/Depth 7 3/8" / 87.2'

Depth Driller 87.2' Depth Logger 84.8'

Liquid Level 68.5' Liquid ~~Density~~ Appearance Muddy

Temperature 24.3 °C

CASING RECORD

Type 7 3/8" Carbon Steel (3/8" Thick) Interval +3.2' - 87.2'

Type Interval

Type Interval

Type Interval

Well Screen Interval

Comments: Return Error = +0.13' high

Centralizer used.

① all survey entries made on 9/18/92 by NB

A-53/A-54

LOG HEADER

EQUIPMENT DATA

Logging Company: PNL

Operator(s): Alan Pearson

Equipment Brand: MLS | Equipment Type: Analog

Tool Type: Gamma Ray | Serial No. C627A97

Base Calibration Date: 5/91 | Calibration Reference: PNL-7785 UC-606

Calibration/Probe Factor: 8.84×10^{-3} eU n/m/c/s | Base Calibration Datum (eU): Position 1: 297.4 eU | Position 2: 64.3 eU

Dead Time: 11.8 μsec | Warm Up Time: >15 min

LOGGING INFORMATION

Log Interval From: 84.8' | To: 1.9'

Rerun(s): 50.0' to 20.0'

Pre Survey Verification: Position 1: 303.0 eU | Position 2: 65.2 eU | Background: 47 c/s

Base Calibration Difference: Position 1: 5.6 eU | Position 2: 0.9 eU

Logging Speed: 5 ft./min. | Rerun Scales, CPS/in.: 50 c/s/in

Start Time: 1345 | Completion Time: 1530

Chart Speed(s), ft/in.: 10 ft./in.

Chart Recorder Horizontal Scale, CPS/in.: 50 c/s/in. | Time Constant(s): TC-1

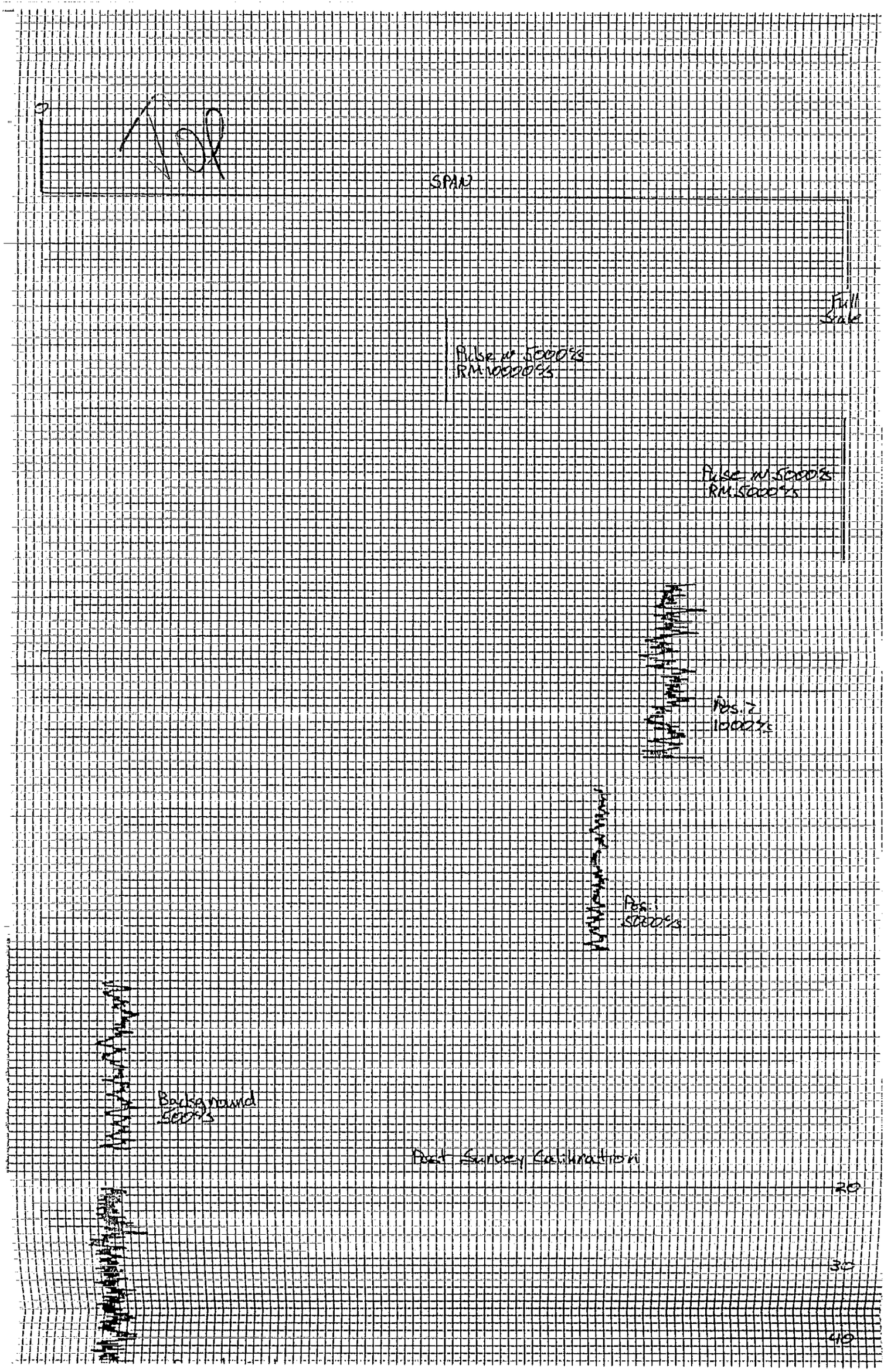
Post Survey Verification: Position 1: 300.8 eU | Position 2: 64.4 eU | Background: 47 c/s

Percent Change: Position 1: 0.7% | Position 2: 1.2%

Comments: Return Error = +0.13' high

Centralizer used.

Witnessed and Verified by: (sign and print name) Alan Pearson Alan Pearson | Date: 10/28/91


SPAN
Full Scale
Pulse w 500 ds
RM 1000 ds
Pulse w 500 ds
RM 5000 ds
Res. 2
1000 ds
Res.
5000 ds
Background
500 ds
Post Survey Calibration
20
30
40

Background
500cs

Post Survey Calibration

20

30

40

Repeat Section
500cs

60

10

20

30

40

50

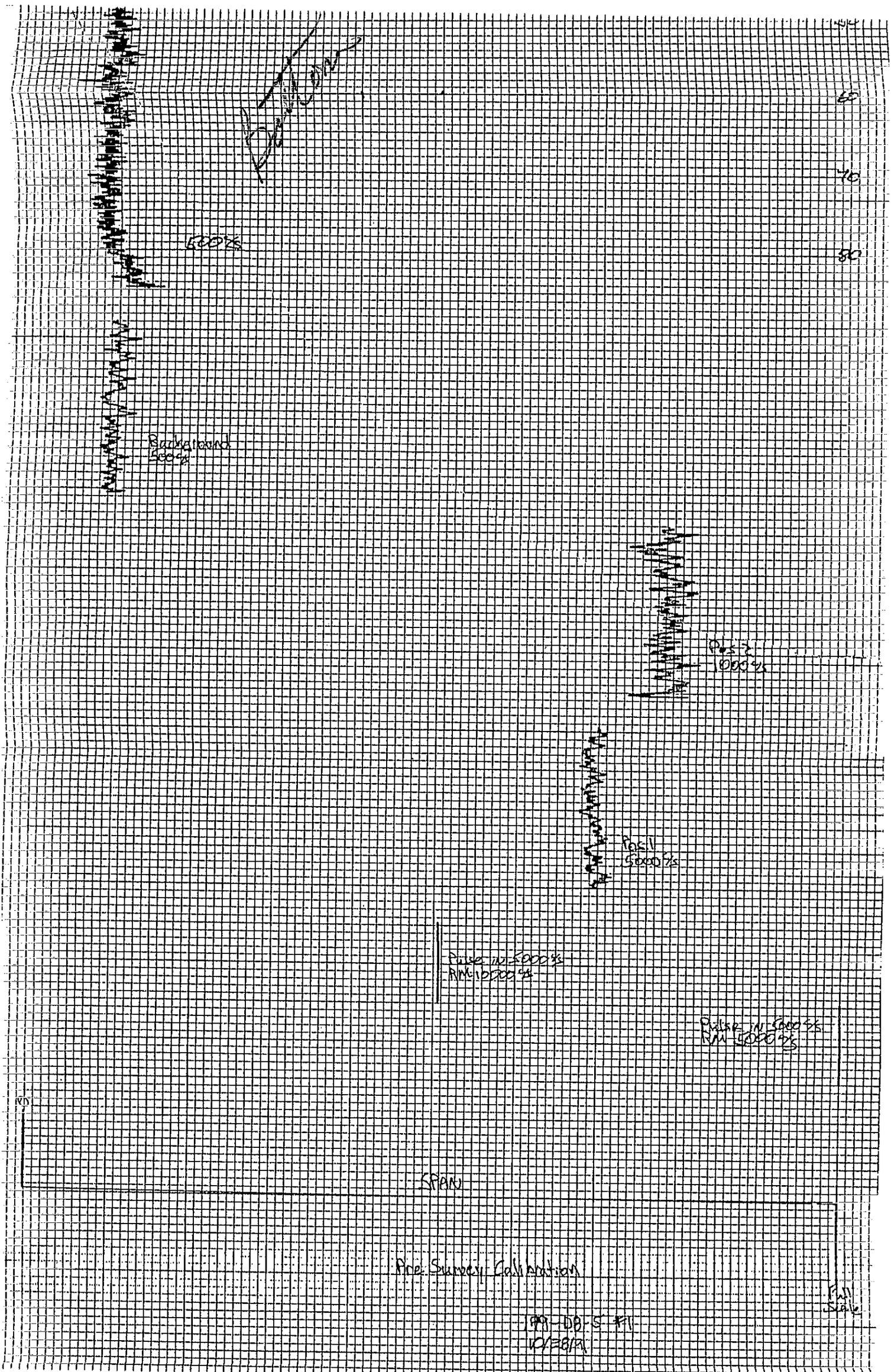
60

70

600cs

80

Background
500cs


65
70
50
5000%
Background
5000%
Pos 2
1000%
Pos 1
5000%
Pulse in 5000%
RM 10000%
Pulse in 5000%
RM 5000%
SPAN
Pre Survey Calibration
FULL
SCALE
199-DB-5 #1
10/28/99

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Run 1 of 1

Westinghouse Hanford Company	LOG HEADER	VALIDATED 3/18/92 SIGNATURE/DATE	Page 1 of 2

Well No. 199-D8-6 Area 100-D Date 11/22/91

Log Run #1 Log Type Gross Gamma

Elevation Datum NGVD '29 NB 9/17/92 Elevation 473.79' (ground elevation) NB 9/17/92

Survey Coordinates 152,061.02 NB 9/17/92 N 573,434.93 NB 9/17/92 E

Log Measured From Ground Surface

Location Description North of 100-D Area

Ground Surface Elevation 473.79' NB 9/17/92

Surface Temperature 6.1°C Weather Clear-Cool

BOREHOLE INFORMATION

Driller Grant Haney

Drill Rig Type Cable Tool	Bit Type/Diameter Hard Tool/10"
Borehole Diameter(s)/Depth 12"/20.43'	10"/110.0'
Depth Driller 110.2'	Depth Logger 109.6'
Liquid Level 89.5'	Liquid ~~Density~~ Appearance Silty
Temperature 12.5°C	

CASING RECORD

Type 12"/Carbon Steel Sch.40	Interval 0.0'-20.43'
Type 10" Carbon Steel Sch.40	Interval +2.0'-110.00'
Type	Interval
Type	Interval

Well Screen Interval NA

Comments: Return Error = +0.2' high

Centralizer used.

① all survey entries made on 9/18/92 by NB from KEH surveys.

LOG HEADER

EQUIPMENT DATA

Logging Company: PNL

Operator(s): Alan Pearson

Equipment Brand: MLS

Equipment Type: Analog

Tool Type: Gamma Ray

Serial No.: C627A97

Base Calibration Date: 5/91

Calibration Reference: PNL-7785 UC-606

Calibration/Probe Factor: 8.84×10^{-3} eU n/m²/s

Base Calibration Datum (eU): Position 1: 297.4 eU

Position 2: 64.3 eU

Dead Time: 11.8 μsec.

Warm Up Time: >15 min

LOGGING INFORMATION

Log Interval From: 109.6'

To: 3.1'

Rerun(s): 35.0' to 3.1'

Pre Survey Verification: Position 1: 305.4 eU Position 2: 64.5 eU Background: 45 c/s

Base Calibration Difference: Position 1: 8.0 eU Position 2: 0.2 eU

Logging Speed: 5 ft./min.

Rerun Scales, CPS/in.: 50 c/s/in

Start Time: 1020

Completion Time: 1220

Chart Speed(s), ft/in.: 10 ft./in.

Chart Recorder Horizontal Scale, CPS/in.: 50 c/s/in.

Time Constant(s): TC-1

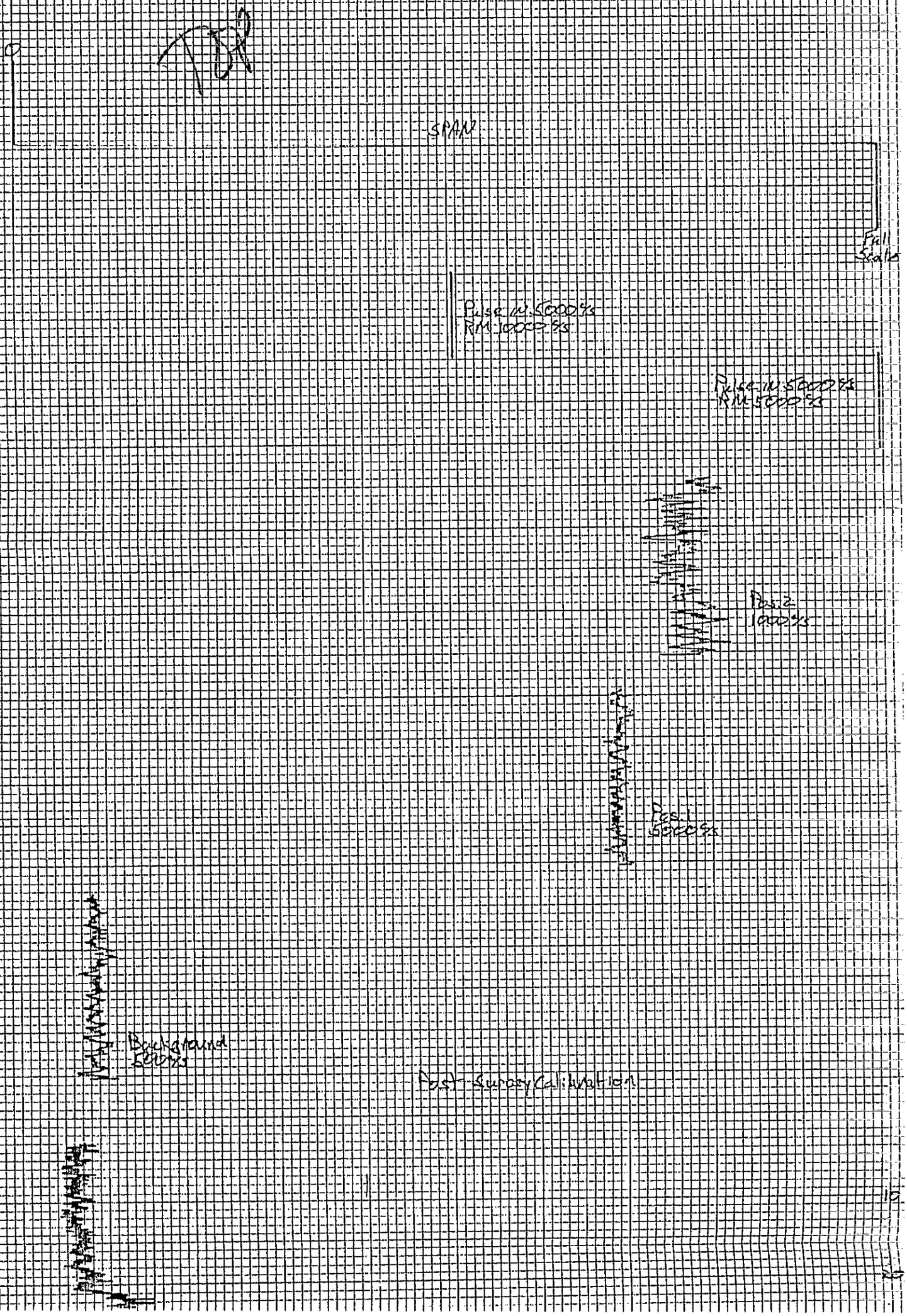
Post Survey Verification: Position 1: 301.0 eU Position 2: 64.1 eU Background: 45 c/s

Percent Change: Position 1: 1.4% Position 2: 0.6%

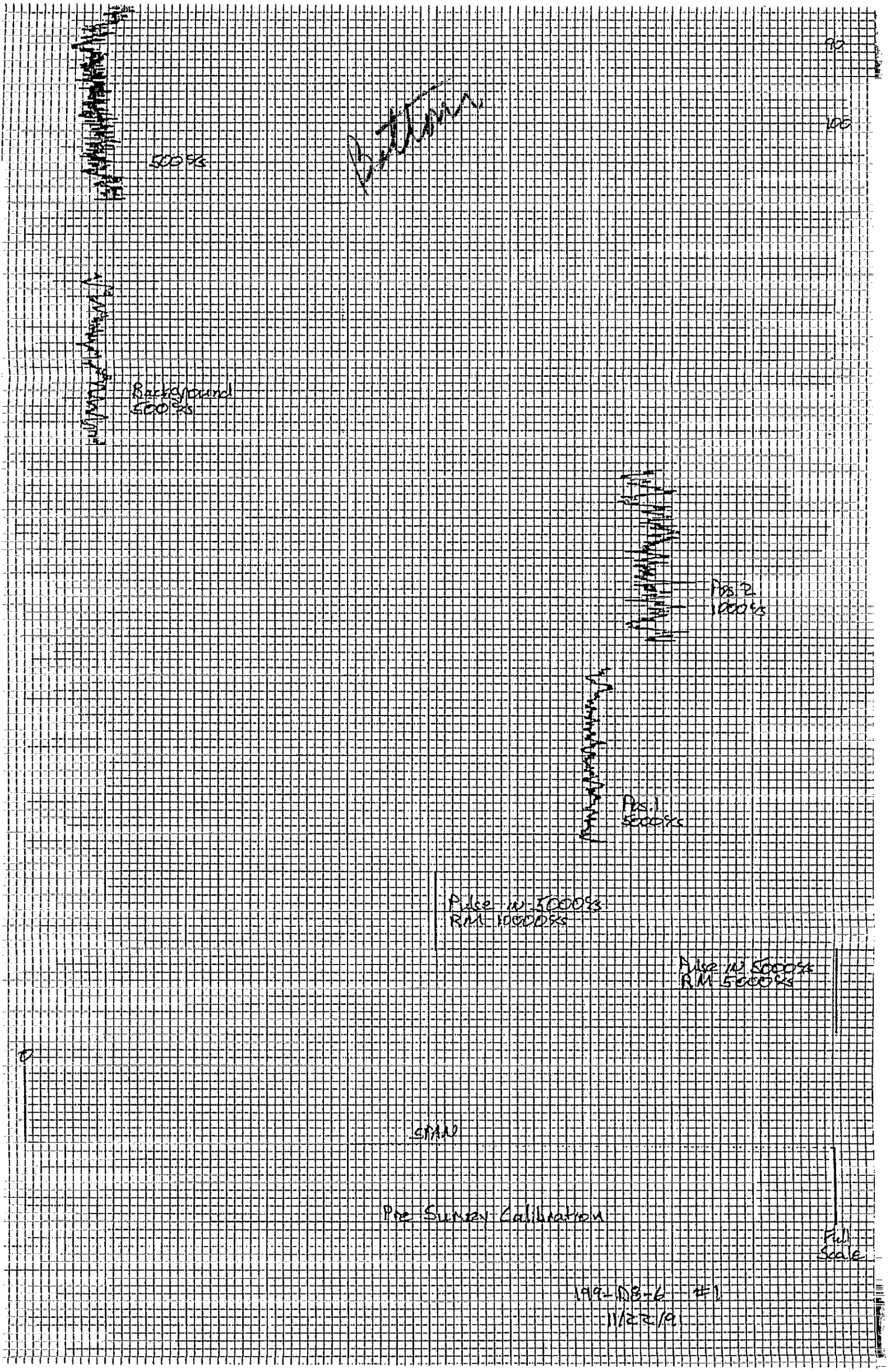
Comments: Return Error = +0.2' high

Centralizer used.

Witnessed and Verified by: (sign and print name) Alan Pearson Alan Pearson Date: 11/22/91


SPAN
Full Scale
Pulse w. 5000 cps
RM 10000 cps
Pulse w. 5000 cps
RM 5000 cps
Pos. 2
1000 cps
Pos. 1
500 cps
Background
500 cps
Post Survey Calibration

500 %
Post Survey Calibration
Repeat Section
500 %
500 %
10
20
30
10
20
30
40
50
60
70
80
90
100


90
100
500 ks
Background
500 ks
Pos 2
1000 ks
Pos. 1
5000 ks
Pulse W 5000 ks
RM 10000 ks
Pulse W 5000 ks
RM 5000 ks
0
SPAN
Pre Survey Calibration
Full
Scale
199-DB-6 #1
11/22/91

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Run 1 of 1

Westinghouse Hanford Company	LOG HEADER	VALIDATED SIGNATURE/DATE 5/11/92	Page 1 of 2

Well No. 199-D5-13 Area 100-D Date 11/1/91

Log Run #1 Log Type Gross Gamma

Elevation Datum NGVD '29 ① Elevation 468.00 ground elevation

Survey Coordinates 151,955.39 N 573,535.72 E

Log Measured From Ground Surface

Location Description North side of 100-D Area

Ground Surface Elevation 468.00'

Surface Temperature 6.1°C Weather Overcast - Cool

BOREHOLE INFORMATION

Driller Mo Wrasfir

Drill Rig Type Cable Tool | Bit Type/Diameter Hard Tool / 10"

Borehole Diameter(s)/Depth 12"/18.79' 10"/97.6'

Depth Driller 97.6' | Depth Logger 95.8'

Liquid Level 84.0' Not at Static. Recharging during logging | Liquid ~~Density~~ Appearance Muddy

Temperature 10.2°C (Driller has been adding water.)

CASING RECORD

Type 12" Carbon Steel Sch. 40 | Interval +0.3' - 18.79'

Type 10" Carbon Steel Sch. 40 | Interval +1.5 - 97.60'

Type | Interval

Type | Interval

Well Screen Interval NA

Comments: Return Error = +0.07' high

Centralizer used.

① all survey entries made on 9/18/92 by NR from KEH surveys.

LOG HEADER

EQUIPMENT DATA

Logging Company: PNL

Operator(s): Alan Pearson & Brad Gilmore

Equipment Brand: MLS | Equipment Type: Analog

Tool Type: Gamma Ray | Serial No. CG27A97

Base Calibration Date: 5/91 | Calibration Reference: PNL-7785 UC-606

Calibration/Probe Factor: 8.84x10^-3 eU ft/m/c/s | Base Calibration Datum (eU): Position 1: 297.4 eU | Position 2: 64.3 eU

Dead Time: 11.8 μsec. | Warm Up Time: >15 min

LOGGING INFORMATION

Log Interval From: 95.8' | To: 3.6'

Rerun(s): 95.7' to 60.0'

Pre Survey Verification: Position 1: 305.2 eU | Position 2: 65.2 eU | Background: 47.5 c/s

Base Calibration Difference: Position 1: 7.8 eU | Position 2: 0.9 eU

Logging Speed: 5 ft./min. | Rerun Scales, CPS/in.: 50 c/s/in

Start Time: 0930 | Completion Time: 1105

Chart Speed(s), ft/in.: 10 ft./in.

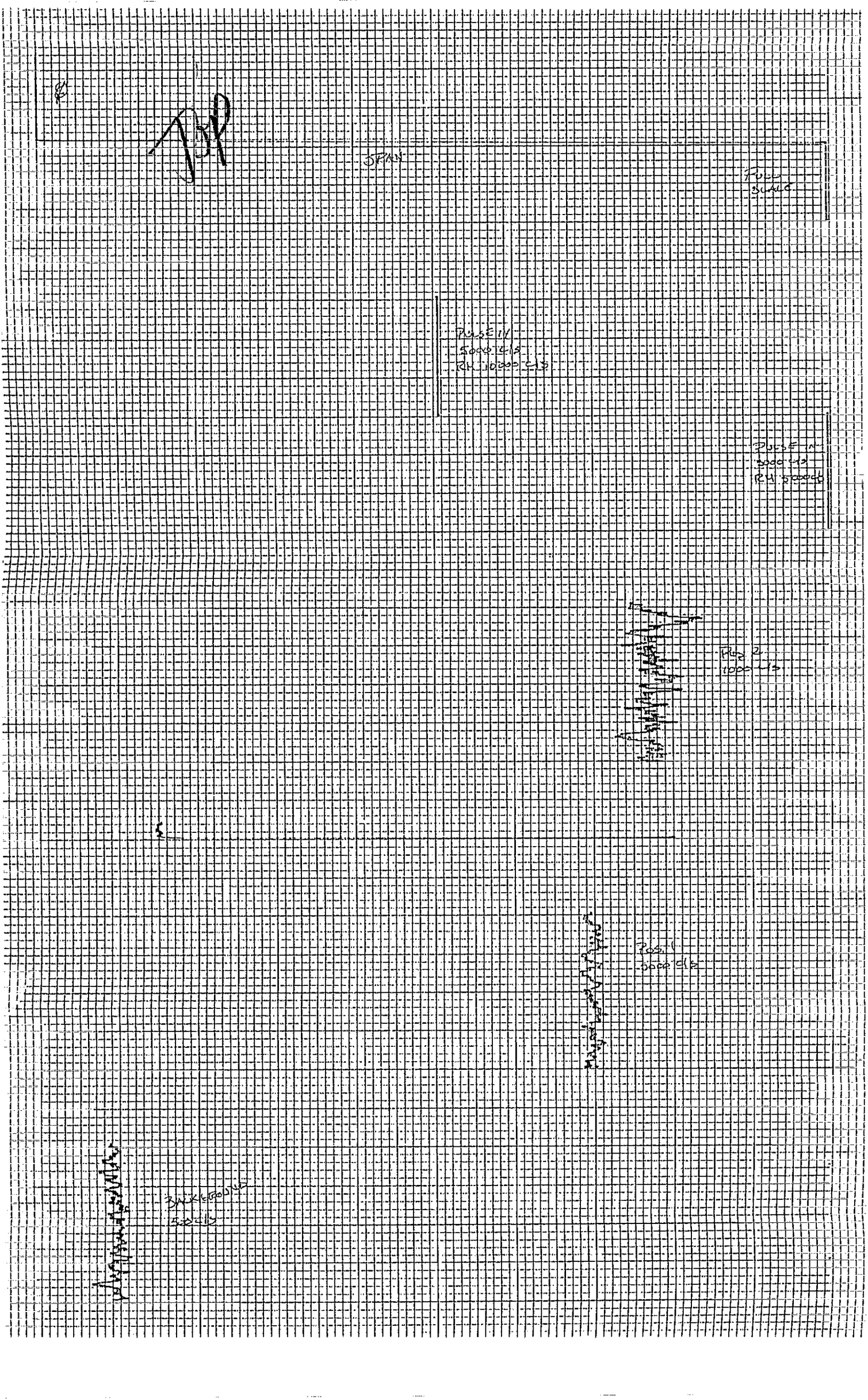
Chart Recorder Horizontal Scale, CPS/in.: 50 c/s/in. | Time Constant(s): TC-1

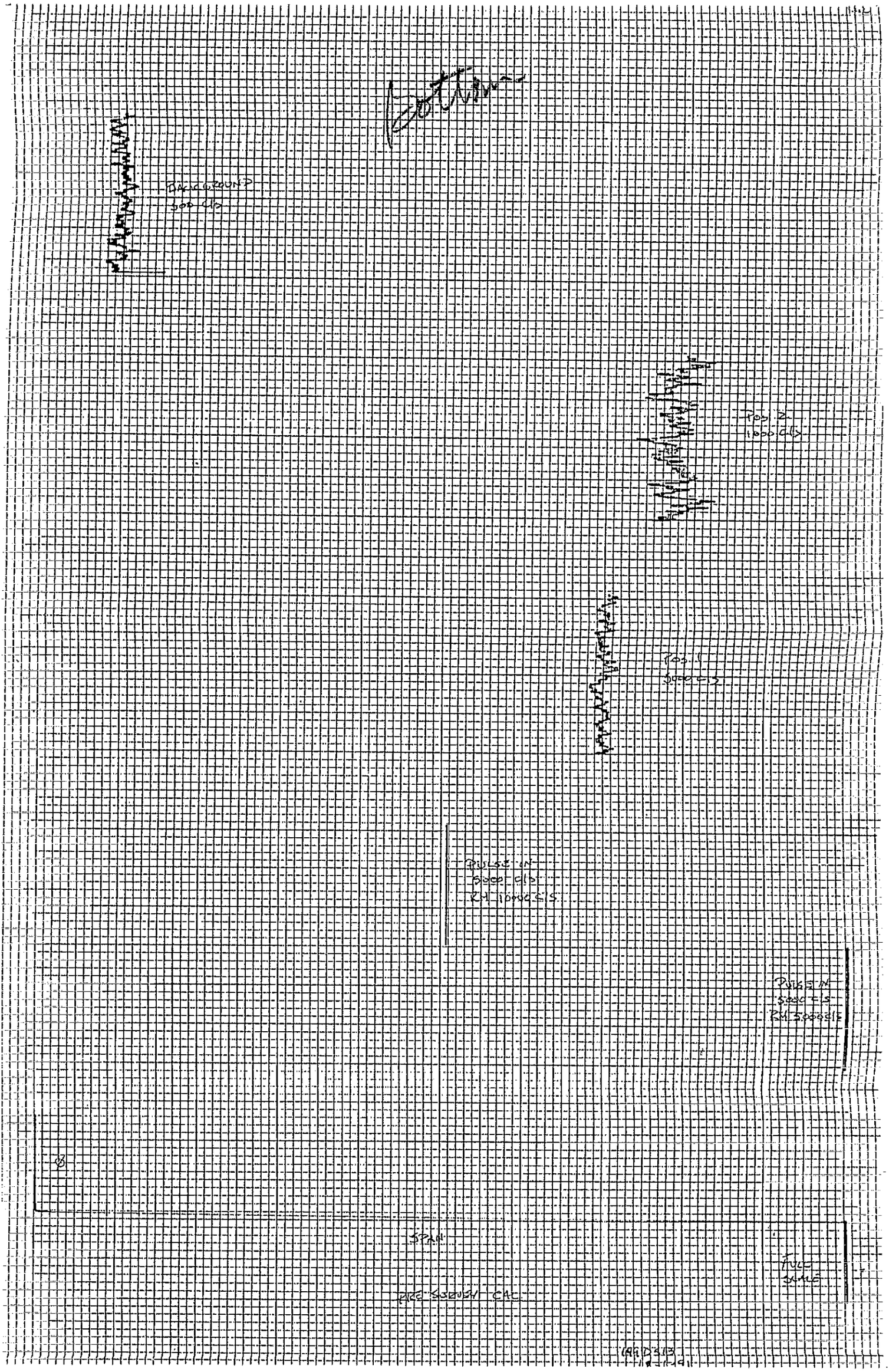
Post Survey Verification: Position 1: 305.2 eU | Position 2: 64.3 eU | Background: 47.5 c/s

Percent Change: Position 1: 0.0% | Position 2: 1.35%

Comments: Return Error = +0.07' high
Centralizer used.

Witnessed and Verified by: (sign and print name) Alan Pearson Alan Pearson | Date: 11/1/91


JPAN
PULSE
SCALE
PULSE IN
5000 cts
RH 10000 cts
PULSE IN
5000 cts
RH 50000
Pos 2
1000 cts
Pos 1
5000 cts
BACKGROUND
500 cts


BACKGROUND
500 cls
Pos. 2
1000 cls
Pos. 1
5000 cls
PULSE IN
5000 cls
RH 10000 cls
PULSE IN
5000 cls
RH 5000 cls
SPAN
FULL
SCALE
PRE SCRUB CAL

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WELL CONSTRUCTION REPORT

SIGNATURE/DATE

Specification No. WHC-S-014 Rev No. 6

ECNs 164223, 227439, 150132, 150130

Project 100D17/100 D

Location NW of 100 D Reactor

Drilling Company Harrison Western

Driller D. Bighom: Operator / K. DeHart: Driller

Other (Companies) N/A

Geologist(s) V.L. King
M.K. Vaag
J.A. Coates

Well No. 199D8-4 Temp. Well No.

Coordinates N: 152,090.41 E: 573,447.39

Casing Elev. 468.73' Ground Elev. 466.59' BRASS CAP

Drilling Method

Verification Method Visual observation

Criteria WHC-S-014, 5.2.3.3.9.5 EII 6.7 sec 6.2

			Initials	Date
Rotary	Air N/A	Mud N/A	N/A	—
Cable Tool	D N/A	H N/A	N/A	—
Drilling Fluid	Raw Water	107 GAL.	VLK	10/31/91
Other SONIC	0	103.4'	VLK	11/8/91

Geophysical Logging

Sondes	Interval	Date
Gross Gamma	0.0 - 101.8'	11/8/91
	-	
	-	
	-	
	-	

Completion Data

Drilled Depth 103.4'

Completed Depth 103.3'

Date Started 10/31/91

Date Completed 11/13/91

Static Water Level/Date 80.5' - 11/8/91
77.5' - 11/8/91

Aquifer Testing

Type Instantaneous Slug

Flow Meter I.D. No. - N/A -

Cal Due Date - N/A -

Length of Test - N/A -

Volume Pumped - N/A -

Drawdown - N/A -

Date of Test Slug Test Not Required

Completion Results

Cleaning

Verification Method Visual observation

Criteria WHC-S-014 7.6.4, 2.2, 7.7, EII 5.4

	Initials	Date
Drilling Tools/Rig	VLK	10/31/91
Temporary Materials	VLK	10/31/91
Permanent Materials	VLK	~~11/11/91~~ 11/13/91 VLK

Screen

Type	Length	Slot Size
T304 ss continuous wire wrap	15.01	.010
	5.01	.010

Depth(s) 94 - 74

____ - ____

Verification Method Steel tape measurement

Criteria WHC-S-014, 4.2.4 4.2.5, 12.2.1, 4.2.1

Initials VLK Date ~~11/11/91~~ 11/12/91 VLK

Material Storage/Packing

Verification Method Visual observation

Criteria WHC-014-S 4.2.2, 7.3

	Initials	Date
Mtl. Handling/Storage	VLK	11/11/91
Material Packing	VLK	11/11/91

Lubricants/Additives

Verification Method Visual observation

Criteria WHC-014-S 7.2

	Identify	Initials	Date
Additives	Raw H_2O	VLK	10/31/91
Lubricants	Green Stuff (King Stuff)	VLK	10/31/91

Straightness Test

Verification Method Visual observation

Criteria WHC-S-014 8.2

Initials VLK Date 11/11/91

A-6000-436 (09/90)

WELL CONSTRUCTION REPORT
(continuation sheet)

well # 199-D8-4

Casing (permanent)

Type	Size	Placement
Johnson T304 stainless steel	3"	-74 - 1.5
		-
		-
		-

Verification Method: verification by measuring w/ steel tape

Criteria: WHC-S-014 4.2.1, 4.2.4, 4.2.5, 12.2.1

Initials: VLK Date: ~~11/14/91~~ 11/12/91 VLK

Well Protection

Verification Method: visual inspection w/ tape

Criteria: WHC-S-014 4.2.10

	Initials	Date
Protective Posts	KDR	2/12/92
Protective Casing	KDR	2/12/92
Site Restored	KDR	2/12/92
Cap, Hasp and Lock	KDR	2/12/92
Surface Pad	KDR	2/12/92

Annular Seal/Filter Pack

Verification Method: verification by steel tape Criteria: WHC-S-014- 4.2.6, 4.2.7, 4.2.8, 4.2.9, 5.3.1

Type	Interval	Volume	Initials	Date
Primary Filter Pack 10-20 silica sand	** 103.3 - 71.4	11.5 sacks	VLK	11/13/91
Bentonite 1/2" Pellets	~~71.4~~ 69.8 VLK - 65.1	1 Bucket	VLK	11/13/91
Bentonite 3/8" Pellets	71.4 - 69.8	1/2 Bucket	VLK	11/13/91
Bentonite Crumbles	65.1 - 24.7	12 sacks	VLK	11/13/91
*				

Well Survey/Labeling

Verification Method: Review of Survey Report

Criteria: WHC-S-014- 3.4

	Initials	Date
Measurement Point/Surveyed	KDR	2/12/92
Protective Casing/Brass Cap Surveyed	KDR	2/12/92
Well Number Stenciled	KDR	2/12/92
Brass Cap Labeled	KDR	2/12/92

Pump Installation

Verification Method: visual observation

Criteria: WHC-S-014 4.2.11, 4.2.2

	Initials	Date
Pump Decon/Prep	JAC	12-4-91
Installed	JAC	12-4-91
Pump Tested	JAC	12-4-91

Other (initial if performed)

N.A. Well Abandonment N.A. Downhole TV Inspection (Pw) Complete As-Built Diagram, Driller's/Geologist's Logs

JAC 12-4-9 Well Development

Comments/Remarks: * Portland Cement 24.7 - 3.0 10 sacks VLK 11/13/91

** As per discussion in office with Kent Reynolds, Ed Refuse and Bruce Williams, it was determined to develop well with 10-20 sand from TD to 3' above screen since hydrostatic pressure was extremely high and flowing sand was a serious problem @ 100'.

Reviewed By (Sign/Print Name): Kent D Reynolds Date: 2/12/92

A-6000-436 (09/90)

BOREHOLE LOG

VALIDATED KDR 2/12/92 SIGNATURE/DATE

Boring or Well No. 199D8-4

Sheet 1 of 6

Location NW of 100D

Project W017/100D

Elevation 466.59 Brass Cap

Drilling Contractor Harrison Western

Driller D. Bigham: Operator/K. DeHart: Driller

Drilling Method and Equipment Sound Dynamics/SD150

Prepared By VL King/[illegible]; MKVAUG/[illegible] (Sign/Print Name) Date 10/31/91

Reviewed By [illegible] (Sign/Print Name) Date 11/05/91

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
0				0' SURFICIAL MATERIAL	
5	1 RAD 2 LITH 1 CaCO3/ MOIST			5' GRAVELLY SAND (FLY ASH) (30% GRAVEL, 70% SAND) 10% LC, 10% SMG 10% CP-VCP, 10% VCS, 30% CS, 30% MS; 2.5Y 2/0 - N2 (BLACK) WET AND DRY; SAMPLE IS MOIST; POORLY SORTED; SUBANGULAR TO ROUNDED; 60% MAFIC, 40% FELSIC; NO VISIBLE REACTION TO HCl	5' SAMPLE 10/31/91 1100
10	1 RAD 2 LITH 1 CaCO3/ MOIST			10' GRAVELLY SAND (FLY ASH) AS ABOVE	10' SAMPLE 11/1/91 1100
15	1 RAD 2 LITH 1 CaCO3/ MOIST			15' GRAVELLY SAND (FLY ASH) AS ABOVE	15' SAMPLE 11/1/91 1115
20					

A-6000-382 (04/90)

9 3 0 2 1 0 1 2 6

BOREHOLE LOG

Boring or Well No. 199D8-4

Sheet 2 of 6

Location NW of 100D

Project W017/100D

Elevation 466.59 Brass Cap

Drilling Contractor Harrison Western

Driller D. Bighan: Operator/H. DeHart: Driller

Drilling Method and Equipment Sound Dynamics/SD150

Prepared By VLKing/VLK (Sign/Print Name)

Date 10/31/91

Reviewed By Edward C. Aguirre (Sign/Print Name)

Date 4/7/91

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
20	1 RAD 2 LITH 1 $CaCO_3$/ MOIST			20' GRAVELLY SAND (30% GRAVEL, 70% SAND, TR SILT) 5% LG, 10% SG, 15% CP-VCP, 10% VCS, 20% CS, 30% MS, 10% FS-VFS; DRY COLOR (5Y6/1) LIGHT GRAY, WET COLOR (5Y 4/1) DARK GRAY; SAMPLE IS DRY; POORLY SORTED SUBANGULAR-WELL ROUNDED; 60% MAFIC, 40% FELSIC; NO VISIBLE REACTION TO 10% HCl	20' SAMPLE 11/1/91 1145
25	1 rad 1 $CaCO_3$ 2 lith			25' gravelly (Fly Ash) SAND, (30% gravel, 70% SAND) 10% vcg, 20% cg, 65% mg, 5% fg-vfsg, wet color: 7.5YR 2/0, poorly sorted, sub-angular-subrounded, 70% basalt, 30% lithics, no RXN HCl	25' sample 11/4/91 910
30	1 rad 1 $CaCO_3$ 2 lith			30'-SAND (95% SAND, 5% Silt) 10% vcg, 80% cg, 20% mg, 10% fg, wet due to H_2O added for drilling aid, 2.5Y 2/0, 50% basalt, 45% qtz, 5% lithics/felsic, no RXN HCl.	30' sample. 11/4/91 1545
35	1 rad 1 $CaCO_3$ 2 lith			35'-gravely SAND (10% gravel, 89% sand, 1% clay) sand: vcg-cg-mg-fg, wet due to added H_2O, 2.5Y 2/0, 50% basalt, 25% qtz, 25% felsics, no RXN HCl, pebbles: subangular-subrounded; sand: angular-subangular-subrounded, no RXN to HCl	35' sample 11/5/91 815
40					

A-20

9312021.0127

BOREHOLE LOG

Boring or Well No. 199 68-4

Sheet 3 of 6

Location NW of 100D

Project 100D17/100D

Elevation 466.59 Brass Cap

Drilling Contractor Harrison Western

Driller D Bisham: Operator/K. DeHart: Driller

Drilling Method and Equipment Sound Dynamics/SD150

Prepared By VLKing/VLKing (Sign/Print Name) Date 10/31/91

Reviewed By Edward C. Kraus (Sign/Print Name) Date 4/17/92

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
40	1 rad 1 $CaCO_3$ 2 lith			40- gravely SAND (same as 35' sample)	40' sample 11/5/91 905
45	1 rad 1 $CaCO_3$ 2 lith			45- gravely SAND (same as 35' sample)	45' sample 11/5/91 1025
50	1 rad 1 $CaCO_3$ 2 lith			50'- sandy, gravely SILT (20% sand, 20% gravel, 60% SILT) sand: cg-mg-fg, pebbles: m-small, 5Y4/1, dry, moderately sorted, pebbles: sub-angular-subrounded, sand (cg-mg-fg-vfg) angular-subangular-subrounded, sand: 60% qtz, 35% basalt, 5% felsics & other lithics, slight RxN HCl	50' sample 11/5/91 @ 1115
55	1 rad 1 $CaCO_3$ 2 lith			55' gravely, silty SAND (40% gravel, 5% silt, 55% SAND) 2.5Y5/2, dry, moderately sorted, sand: cg-mg-fg-vfg, angular-subangular-subrounded, pebbles: sm-med, subangular-subrounded-rounded; 70% qtz, 15% basalt, 10% felsics, 5% micas, slight RxN HCl	55' sample 11/5/91 1203
60				60- same as above (55')	60' sample 11/5/91 1227

A-21

A-6000-382 (04/90)

9313021.0129

BOREHOLE LOG

Boring or Well No. 199 08-4

Sheet 4 of 6

Location NW of 100D

Project W017/100D

Elevation 466.59 Brass Cap

Drilling Contractor Harrison Western

Driller D. Bigham: Operator / K. DeHart: Driller

Drilling Method and Equipment Sound Dynamics / SD 150

Prepared By V.L. King / Virginia L. King (Sign/Print Name) Date 11/5/91

Reviewed By Edward E. Eaton / Edward E. Eaton (Sign/Print Name) Date 11/12/91

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
60	1 rad 1 $CaCO_3$ 2 lith				60' sample 11/5/91 1227
65	1 rad 1 $CaCO_3$ 2 lith			65'-Same as above (60' & 55')	65' sample 11/5/91 @ 1330
68.3	1 rad 1 $CaCO_3$ 2 lith			68.3' Sandy, gravely SILT (15% sand, 15% gravel, 70% SILT) 5Y6/1, dry, mod. sorted, angular-subangular pebbles & sand. Sand: 85% qtz 10% basalt, 5% felsic, strong RXN HCl	68.3' sample 11/5/91 @ 1400
70				70'-gravely SAND (30% gravel, 70% sand) 10YR4/2, slightly moist from added H_2O, moderately sorted, sub-rounded-rounded (some well rounded qtzite pebbles), sand: angular cg-mg, mfg, subrounded-rounded; 65% qtz, 20% basalt, 10% qtzite & felsics, 5% micas, strong RXN HCl	70' sample 11/5/91 @ 1500
73	1 rad 1 $CaCO_3$ 2 lith				73' sample 11/5/91 @ 1515
74	1 rad 1 $CaCO_3$ 2 lith			73-SAND (+1 cobble) 95% SAND, 5% silt/clay) cg-mg very clean SAND, moist, 2.5Y5/4, well sorted, sub-angular-subrounded-rounded, 80% qtz, 10% basalt, 10% felsics, very slight RXN HCl	74' sample 11/5/91 @ 1530
75	1 rad 1 $CaCO_3$ 2 lith			74-gravely silty SAND (20% gravel, 20% silt, 60% SAND) 5Y5/2, dry, poorly sorted-moderately sorted, angular-subangular gravels; angular-sub-angular-sub rounded sands, 80% qtz, 10% basalt, 5% felsics, 5% mica very slight RXN HCl	75' sample 11/6/91 @ 810
80					

A-6000-382 (04/90)

9312021.0129

BOREHOLE LOG

Boring or Well No. 199 08-4

Sheet 5 of 6

Location NW of 100 D

Project W017/100 D

Elevation 466.59 B MSL Cap

Drilling Contractor Harrison Western

Driller D. Bigham: Operator / K. DeHart: Driller

Drilling Method and Equipment Sound Dynamics/SD150

Prepared By VL King/Virginia King (Sign/Print Name)

Date 11/7/91

Reviewed By Edward C. Bonn (Sign/Print Name)

Date 11/7/91

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
80	1 rad 1 $CaCO_3$ 2 lith			80' gravelly SAND/Sandy GRAVEL (60% SAND, 50% GRAVEL) 10YR 3/2, ~~dry~~ moist, poorly-moderately sorted, pebbles: subangular-rounded; sand: angular-subrounded (cg-mg-fg), 40% qtz, 40% basalt (altered & unaltered) 8% felsics, 3% micas & other lithics, no visible RXN HCl	80' sample 11/6/91 @ 1538 tagged H_2O @ 80.5'
85	1 rad 1 $CaCO_3$ 2 lith			85' Sandy GRAVEL (45% sand, 55% GRAVEL w/ tr. silt) sand: cg-mg-fg, gravel: cobbles (lg) - sm pebbles; wet color: 5Y 3/1, wet!, poorly sorted, angular-subangular sand, subrounded-rounded cobbles & pebbles, ~~40%~~ basalt 30% 40% qtz, 10% felsics, 10% micas + other lithics, no visible RXN HCl	85' sample 11/7/91 @ 930
90	2 lith 1 rad 1 $CaCO_3$			90'-SAND (98% SAND + 1 or 2 pebbles) vcg-cg-mg-fg, 10YR 3/2, wet, poorly sorted, angular-subangular, 45% basalt, 35% qtz, 20% lithics; 5% micas, 10% felsics, 5% lithics, no visible RXN HCl	90' sample 11/7/91 @ 1113
91	1 rad 1 $CaCO_3$ 2 lith			91' GRAVEL (95% GRAVEL, 5% sand) 5YR 2.5/1, wet, poorly sorted (but very clean) angular-subangular-subrounded, 45% basalt, 35% qtz, 10% felsics, 5% calcite coated clasts & oxidized clasts, micas, RXN HCl only after white clasts were scratched w/ pen (very different looking gravel w/ white clasts in it	91' sample 11/7/91 @ 1130
94	1 rad 1 $CaCO_3$ 2 lith			94' Same gravel as above only more sand cement and some clay (70% GRAVEL 20% clay, 10% sand, everything else same	94' sample 11/7/91 @ 1328
95	1 rad 1 $CaCO_3$ 2 lith			95- Same Gravel as above only 70% GRAVEL, 25% sand, 5% clay, everything else same.	95' sample 11/7/91 @ 1355
100					

A-6000-382 (04/90)

BOREHOLE LOG

Boring or Well No. 199 08-4

Sheet 6 of 6

Location NW of 100D

Project 100D7/100D

Elevation 466.59 Brass Cap

Drilling Contractor Harrison Western

Driller D. Bighom : Operator/ H. DeHart : Driller

Drilling Method and Equipment Sound Dynamics/SD150

Prepared By VL King/ Virginia King (Sign/Print Name)

Date 11/7/91

Reviewed By Edward C. Rafuse (Sign/Print Name)

Date 11/19/91

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
100				100' SAND (98% SAND, 2% silt) 10YR 3/1, wet, poorly sorted, angular-subangular subrounded-rounded, 50% basalt, 40% qtz, 5% felsics, 5% mafics & other lithics, no RxN HCl	100' sample 11/8/91 @
103	1 rad 1 $CaCO_3$ 2 clay			103.2' - sandy clay GRAVEL (20% sand, 5% clay, 75% GRAVEL (cobbles & pebbles), (sand: vcg-cg), 2.5Y 3/2, wet, poorly sorted, angular-subangular-subrounded sand, subrounded-rounded cobbles & pebbles, 40% basalt, 35% qtz, 15% felsics, 5% mafics, 5% other lithics.	103.2' sample 11/8/91 @ 1330
.2 .4	1 rad 1 $CaCO_3$ 2 clay				103.4' sample 11/8/91 @ 1415
105				103.4' - CLAY (95%, 5% trace) 2.5Y 4/2, dry, well sorted, good RxN HCl (trace of $CaCO_3$ in clay - white veins)	
					TD 103.4'

A-24

100-D FACILITY

WELL 199-D8-4

DRILLING

START DATE	FINISH DATE	TOTAL DAYS	CURRENT DEPTH	FINAL DEPTH	DEPTH TO WATER	WATER ADDED(GAL)
10-31-91	11-12-91	8 1/2	N/A	103.7	11-7-91 80.5' 11-8-91 77.4'	107 GALLONS

DOWN HOLE COMPLETION

START DATE	FINISH DATE	TOTAL DAYS	DEPTH TO WATER	DEPTH TO BOTTOM	DEPTH OF SCREEN	WATER ADDED/ REMOVED (GAL)
11-12-91	11-14-91	2 1/2		102.8	74'-94'	30 GALLONS

DEVELOPMENT AND ASSOCIATED ACTIVITIES

TV CAMERA DATE	AQUIFER TEST DATE	DEVELOPMENT DATE	HYDROSTAR PLACEMENT DATE	WATER REMOVED(GAL)
N/A	12-4-91	12-4-91	12-4-91	3200 GALLONS

COMMENTS:

9313021.0132

VALIDATED
KDR 2/12/92
SIGNATURE DATE

1 of 5

WELL CHECK LIST

Well Number: 199-N8-4 Location: 100 D (91)

Date: 1/24/92

	Yes	No
Hasp on protective casing	✓	
Lock	✓	
Proper cap fit	✓	
Well ID number on brass cap	✓	
Protective post painted	✓	
Well ID number stenciled on post	✓	
Well ID number stenciled on protective casing	✓	
Survey mark on casing	✓	
Stock tank		✓
Site neat	✓	

Comments:

Signature: Edward C. Rafuse Date: 1/24/92

9310.1203166

WELL 199-D8-5

9313021.0134

WELL SUMMARY SHEET

Boring or Well No. 199D8-5

Sheet 1 of 1

Location 100D

Project W017/100D

Elevation 449.42' BRASS CAP

Drilling Contractor Harrison Western

Driller D. Bigham: Operator/H. DeHart: Driller

Drilling Method and Equipment Sound Dynamics SD150

Prepared By VLKing/VLK (Sign/Print Name) Date 11/29/91

Reviewed By Kurt D Reynolds/Kurt D Reynolds (Sign/Print Name) Date 2/12/92

CONSTRUCTION DATA		Depth in Feet	GEOLOGIC/HYDROLOGIC DATA	
Description	Diagram		Graphic Log	Lithologic Description
				Gravely sandy SILT
Cement (Portland) Grout		10		
				SAND
		20		silty SAND
				SAND (w/ few pebbles)
Bentonite Crumbles		30		
				GRAVEL w/ interbedded silt & clay
		40		
				SAND
		50		gravely sandy SILT
Bentonite Pellets 3/8" & 1/2"				sandy GRAVEL
		60		
				sandy silty GRAVEL
		68.5		
3" ø stainless steel		70		
				SAND
.010 Johnson continuous wire wrap screen (T304) 83'		80		gravely sandy CLAY
				CLAY
Primary Filter Pack #10-20				
T.D. 87.2' drilled				

A-6000-384 (04/90)

WELL CONSTRUCTION REPORT

SIGNATURE/DATE

Specification No. WHC-S-014 Rev No. 5 (See Comments)

ECNs 144240, 144241, 127437, 150128, 150126, 150204, 104970-L

Project 100F/100D

Location 100D Area behind 100D Reactor

Drilling Company Harrison Western

Driller Burt DeHart / Dale Bigham - Operator

Other (Companies) N/A

Geologist(s) V.L. King, Bryan G. Walz, J.A. Comes

Well No. 1999B-5 Temp. Well No

Coordinates N: 152 243.73 ; E: 573 537.39

Casing Elev. ~~452.42~~ (Rev 5/1/92 452.42) Ground Elev ~~452.02~~ (Rev 5/1/92) 452.02 .32 ASS Cit

Drilling Method

Verification Method Visual Observation

Criteria WHC-S-014 5.2.5.3 7.5, EII 6.7 SEC 6.2

			Initials	Date
Rotary	Air NA	Mud NA	NA	NA
Cable Tool	D NA	H NA	NA	NA
Drilling Fluid	Raw Water	2.2 GAL	KDR	11/10/91
~~Other~~ SONIC	0 -	87.2	VLK	10/28/91

Geophysical Logging

Sondes	Interval	Date
Gamma	87.2 - 0	10/28/91

Completion Data

Drilled Depth 87.2

Completed Depth 87.2

Date Started 10/28/91

Date Completed 10/29/91

Static Water Level/Date 68.5/10/28/91

Aquifer Testing

Type Instantaneous Slug

Flow Meter I.D. No. - NA -

Cal. Due Date - NA -

Length of Test 1 HR

Volume Pumped NA

Drawdown NA

Date of Test 12-5-91

Completion Results

Cleaning

Verification Method Visual Observation

Criteria WHC-S-014, 7.6.4, 2.2, 7.7, EII 5.4

	Initials	Date
Drilling Tools/Rig	VLK	10/9/91
Temporary Materials	KDR *	11/10/91
Permanent Materials	VLK	10/29/91

Screen

Type	Length	Slot Size
3" T304ss continuous wire wrap	20'	.010

Depth(s) 83 - 63

Verification Method Steel tape measurement

Criteria WHC-S-014 4.2.3, 4.2.5, 12.2.1, 4.2.1

Initials VLK Date 10/29/91

Material Storage/Packing

Verification Method Visual observation

Criteria WHC-S-014 4.2.2, 7.3

	Initials	Date
Mtl. Handling/Storage	VLK	10/29/91
Material Packing	VLK	10/29/91

Lubricants/Additives

Verification Method Visual observation

Criteria WHC-S-014 7.2

	Identify	Initials	Date
Additives	Raw H_2O	VK	10/14/91
Lubricants	Green Stuff/King Stuff	VK	10/10/91

Straightness Test

Verification Method Visual Observation

Criteria WHC-S-014 8.2

Initials VLKing Date 10/28/91

WELL CONSTRUCTION REPORT
(continuation sheet)

well #1 199-D8-5

Casing (permanent)

Type	Size	Placement
T304ss sch5	3"	63. - +1.5
		-
		-
		-

Verification Method: Measuring using steel tape

Criteria: WHC-S-014 4.2.1, 4.2.4, 4.2.5, 12.2.1

Initials: VLK Date: 10/29/91

Well Protection

Verification Method: visual inspection with tape

Criteria: WHC-S-014 4.2.10

	Initials	Date
Protective Posts	KDR	2/12/92
Protective Casing	KDR	2/12/92
Site Restored	KDR	2/12/92
Cap, Hasp and Lock	KDR	2/12/92
Surface Pad	KDR	2/12/92

Annular Seal/Filter Pack

Verification Method: measuring using steel tape Criteria: WHC-S-014 4.2.6, 4.2.7, 4.2.8, 4.2.9, 5.

Type	Interval	Volume	Initials	Date
10-20 Silica Sand	87.2 - 58	5.5 sacks	VLK	10/29/91
Bentonite Pellets (3/8)	58 - 54.4	1 Bucket	VLK	10/29/91
Crumbles	54.4 - 18.8	10 sacks	VLK	10/29/91
Portland Cement	18.8 - 2.0	8 sacks	VLK	10/29/91

Well Survey/Labeling

Verification Method: Review of survey report

Criteria: WHC-S-014 3.4

	Initials	Date
Measurement Point/Surveyed	KDR	2/12/92
Protective Casing/Brass Cap Surveyed	KDR	2/12/92
Well Number Stenciled	KDR	2/12/92
Brass Cap Labeled	KDR	2/12/92

Pump Installation

Verification Method: visual observation

Criteria: WHC-S-014 4.2.11, 4.2.2

	Initials	Date
Pump Decon/Prep	JAC	12-5-91
Installed	JAC	12-5-91
Pump Tested	JAC	12-5-91

Other (initial if performed)

NA Well Abandonment NA Downhole TV Inspection [illegible] Complete As-Built Diagram, Driller's/Geologist's Logs

12-5-91 JAC Well Development

Comments/Remarks: * After document review

NOTE: This work done to WHC-S-014 Rev 6 with ECN's 150132, 164223, 127439

Reviewed By (Sign/Print Name): [signature] / Kent D Reynolds Date: 2/12/92

A-30

9313021.1137

BOREHOLE LOG

VALIDATED KDR 2/12/92 SIGNATURE

Boring or Well No. 199 D8-5

Sheet 1 of 5

Location North of 100 D Area

Project W-017 100 D

Elevation 450.02 Brass Cap

Drilling Contractor Harrison Western

Driller D Bigham: Operator / K. DeHart: Driller

Drilling Method and Equipment Sound Dynamics / Super Drill

Prepared By VL King (Sign/Print Name) Date 10/14/91

Reviewed By Edward C. Rogers (Sign/Print Name) Date 12/4/91

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
				Float	
5	1 rad 1 $CaCO_3$ 2 lith			5'- gravely, sandy SILT (5% gravel, 35% sand, 60% SILT), 10YR 5/3, dry, poorly sorted, angular (sand + pebbles) - subangular, 40% basalt, 40% qtz, 20% fines (lithics) slt RXN HCl, no magnetic reading	5' sample 10/14/91
10	1 rad 1 $CaCO_3$ 2 lith			10'- cobbles (only 2 cobbles retrieved in core barrel) + gravely sandy SILT (5% gravel [cobbles], 10% sand, 85% SILT) 5Y 5/3, dry, poorly sorted, angular-subangular, 50% basalt, 40% qtz, 10% felds + other lithics, slt RXN HCl	10' sample 10/14/91
15	1 rad 1 $CaCO_3$ 2 lith			15' SAND, (95% vcg-cg sand, 5% silt), wet due to H_2O added to aid in sample retention in core barrel, mod. sorted, 10YR 5/1, sub-angular - sub-rounded, 75% basalt, 20% qtz, 5% lithics, no RXN HCl (grains stick together in clumps resembling oolitic texture)	15' Sample 10/14/91
19.6				19.6 Silty SAND (95% SAND, 5% silt - silt is in clasts, sand m-fg) dry 10YR 2/2 60% qtz, 15% bslt, 10% lithics, 5% mica, no RXN HCl	19.6' sample (sharp contact) change in lithology
20					

BOREHOLE LOG

Boring or Well No. 199-D8-5

Sheet 2 of 5

Location North of 100 D area

Project 100 D/W017

Elevation 450.02 Brass Cap

Drilling Contractor Harrison Western

Driller Dale Bingham operator/K Dethat Driller

Drilling Method and Equipment Sonic/Sonic Dynamics 150

Prepared By VLK Virginia L. Kirk (Sign/Print Name)

Date 10/14/91

Reviewed By Edward C. Rafuse (Sign/Print Name)

Date 12/4/91

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
20	1 rad 1 $CaCO_3$ 2 lith			20.0' 21.4 cy sand, fairly well sorted, 2.5Y, wet (due to added H_2O) angular-subrounded, 80% Basalt, 15% qtz, 5% lithics, no RXN HCl. ~~(same sand as @ 15' sample w/ oolitic clasts in sample~~ VLK 10/1/91	20' sample 10/15/91
25	1 rad 1 $CaCO_3$ 2 lith			25.0' gravely, silty SAND, 5% gravel & ~~sm cobbles~~ no pebbles, 20% silt, 75% sand, 2.5YR, Dry, poorly sorted, angular/pebbles rounded 50% basalt, volcanics, 50% qtz, NO RXN HCl (Same sand as @ 15' sample w/ oolitic-like clasts)	25' sample 10/15/91
30	1 rad 1 $CaCO_3$ 2 lith			30.0' gravely, sandy SILT, (15% gravel, 20% cg sand, 65% SILT), 5Y 5/1, dry, poorly sorted, angular-subrounded, 75% basalt, 20% qtz, 5% lithics, no RXN HCl	30' sample 10/15/91
35	1 rad 1 $CaCO_3$ 2 lith			35.0' silty, sandy GRAVEL w/ interbedded clays & silts (80% GRAVEL, 20% sand, 30% clay & silt) moist wet (due to added H_2O) 2.5Y 3/2, poorly sorted, angular sand grains - well rounded pebbles, 50% basalt, 30% lithics, 20% qtz, no RXN HCl [large pebbles & sm cobbles]	35' sample 10/15/91
40	1 rad 1 $CaCO_3$			SAME AS ABOVE w/out clay (see next page)	

9313021.0139

BOREHOLE LOG

Boring or Well No. 199-B8-5

Sheet 3 of 5

Location North of 100 D

Project W017/100 D

Elevation 450.02 Brass Cap

Drilling Contractor Harrison Western

Driller D. Bigham : Operator / L. DeHart : Driller

Drilling Method and Equipment Sound Dynamics / SD150 Sonic

Prepared By V.L. King / Virginia L. King (Sign/Print Name)

Date 10/15/91

Reviewed By Edward C. Rafuse / Edward C. Rafuse (Sign/Print Name)

Date 12/1/91

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
40	2 Lith			40.0' silty, sandy GRAVEL (30% silt, 20% sand, 50% GRAVEL) moist due to added H_2O to aid in drilling, 2.5 Y 3/2, poorly sorted, angular sand grains, well rounded subrounded pebbles, 50% basalt, 30% lithics (including qtzite) 20% qtz, no RXN HCl	40' sample @ 0850 10/6/91
44.4	1 rad 1 $CaCO_3$ 2 Lith			Sharp Contact 44.4 SAND, c-m-f-vfg SAND (95% SAND, 5% silt) 2.5 Y 5/4 dry poorly sorted, subangular - subrounded, 80% qtz, 5% basalt, 15% lithics (including micas and qtzite) slt RXN HCl. 45' Same as above	44.4 sample @ 1000 10/6/91
45					
50	1 rad 1 $CaCO_3$ 2 Lith			50' - gravely sandy SILT (80% SILT, 10% c-m-fg sand, 10% gravel) 2.5 Y 5/4, poorly sorted, 80% qtz, 5% basalt, 15% lithics, slight RXN HCl	50' sample @ 1020 10/10/91
51.7	1 rad 1 $CaCO_3$ 2 Lith			51.7' - silty, sandy GRAVEL (25% silt, 25% sand, 50% GRAVEL) 5 Y 6/1, dry, moderately sorted subangular (Sand grains) - subrounded (pebbles), 30% basalt, 45% qtzite, 15% qtz, 10% other lithics, strong RXN HCl	51.7' sample @ 1020 10/10/91
54.5	1 rad 1 $CaCO_3$ 2 Lith			54.5' - sandy GRAVEL, (5% silt, 45% sand, 50% GRAVEL) 5 Y 6/1, dry, moderately sorted, angular - sub-angular - subrounded pebbles, 70% basalt, 20% qtz, 10% qtzite & other lithics (pebbles) sand: 50% qtz, 40% basalt, 10% lithics, strong RXN HCl	54.5' sample @ 1141 10/17/91
55				55 - Same as above	55' Sample @ 1146
60					

BOREHOLE LOG

Boring or Well No. 199-D8-5

Sheet 4 of 5

Location North of 100D Area

Project 100-017/100D

Elevation 45002 Brass Cap

Drilling Contractor Harrison Western

Driller D. Bigham: Operator / K. DeHart: Driller

Drilling Method and Equipment Sound Dynamics / SD 150

Prepared By V. King / M. Boia (Sign/Print Name)

Date 10/17/91

Reviewed By Edward C. Rafuse (Sign/Print Name)

Date 12/1/91

Depth (ft)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
60	1 rad 1 $CaCO_3$ 2 lith			60' Sandy Gravel (50% sand, 50% GRAVEL) 10YR 5/3, dry, moderately sorted, sub-angular to subrounded, 20% basalt, 60% qtz, 20% mica & other lithics Fset RXN HCl	60' Sample 10/17/91
65	1 rad 1 $CaCO_3$ 2 lith			65'- silty, sandy GRAVEL, (50% gravel, 25% silt, 25% sand) slightly moist, poorly sorted, subangular-subrounded, 45% basalt, 30% qtz, 20% volcanics, 5% lithics, 5Y 5/2, strong RXN HCl 67.5 clayey GRAVEL w/ interbedded sandy GRAVEL, (large pieces of clay GRAVEL 50% & 25% GRAVEL, 25% sand) 5Y 3/2, poorly sorted, slightly moist, subangular to subrounded, pebbles: 50% basalt, 35% qtz rose, 15% qtz + other lithics; sand: 60% qtz, 20% basalt, 20% lithics, strong RXN HCl	65' sample 10/17/91
70	1 rad 1 $CaCO_3$ 2 lith			70- sandy GRAVEL (80% sand (cg) 60% GRAVEL) moist-wet, moderately sorted, 5Y 5/2, subrounded, 30% basalt, 40% qtz, 20% lithics, 10% volcanics, strong RXN HCl in sand	70' sample
75	1 rad 1 $CaCO_3$ 2 lith			75- SAND (95% SAND, 5% gravel) saturated, 5Y 6/2, well sorted, subrounded, 50% basalt, 40% qtz, 25% lithics, 5% volcanics, no RXN HCl [sand = cg-mg-fg]	75' sample
80					

A-6000-382 (04/90)

BOREHOLE LOG

Boring or Well No. 199085

Sheet 5 of 5

Location North of 100D Reactor

Project W017/100D

Elevation 450.02 Brass Cap

Drilling Contractor Harrison/Western

Driller D. Bighan: Operator/K. DeHart: Driller

Drilling Method and Equipment Sound Dynamics/SD150/SONIC

Prepared By VL Kring/T. [illegible] (Sign/Print Name) Date 10/28/91

Reviewed By Edward C. Rafuse (Sign/Print Name) Date 2/1/92

Depth	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
~~80~~ 80	1rad 1CaCO3 2lith			80- gravely CLAY (1% sand, 10% gravel, 89% CLAY) 2.5Y4/4, moist, poorly sorted, subrounded-rounded, sand: 5% micas, 75% qtz, 20% volcanics & lithics, no RXN HCl	80' sample 10/27/91
83	1rad 1CaCO3 2lith			83- CLAY (98% CLAY, 2% sand) 5Y7/4, slightly moist, very well sorted, rounded, sand = 100% qtz, clay?, no RXN HCl	83' sample 10/27/91
85	1rad 1CaCO3 2lith			85- silty sandy CLAY (5% sand, 10% silt, 85% CLAY) slightly moist, poorly sorted-moderately sorted, 2.5Y5/2, subrounded-rounded, sand: 5% micas, 75% qtz, 20% volcanics & lithics, no RXN HCl	85' sample 10/27/91
					TD 87.2'

9313021.0142

100-D FACILITY

WELL 199-D8-5

DRILLING

START DATE	FINISH DATE	TOTAL DAYS	CURRENT DEPTH	FINAL DEPTH	DEPTH TO WATER	WATER ADDED(GAL)
10-11-91	10-28-91	12	N/A	87.2	10-25-91 74.1 10-28-91 68.5'	2.2 GALLONS

DOWN HOLE COMPLETION

START DATE	FINISH DATE	TOTAL DAYS	DEPTH TO WATER	DEPTH TO BOTTOM	DEPTH OF SCREEN	WATER ADDED/ REMOVED (GAL)
10-29-91	10-29-91	1	10-28-91 - 68.5' see ABOVE	87.2	63.6' - 84.3'* *84.6' w/END CAP	25 GALLONS REMOVED TO DEVELOP FILTER PACK

DEVELOPMENT AND ASSOCIATED ACTIVITIES

TV CAMERA DATE	AQUIFER TEST DATE	DEVELOPMENT DATE	HYDROSTAR PLACEMENT DATE	WATER REMOVED(GAL)
N/A	12-5-91	12-5-91	12-5-91	160 GALLONS

COMMENTS:

179

VALIDATED
KDR 2/12/92
SIGNATURE/DATE

WELL CHECK LIST

Well Number: 199 08-5 Location: 100D (91)

Date: 1/24/92

	Yes	No
Hasp on protective casing	✓	
Lock	✓	
Proper cap fit	✓	
Well ID number on brass cap	✓	
Protective post painted	✓	
Well ID number stenciled on post	✓	
Well ID number stenciled on protective casing	✓	
Survey mark on casing	✓	
Stock tank		✓
Site neat	✓	

Comments:

Signature: Edward C. Rafuse Date: 1/24/92

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WELL 199-D8-6

9413202.0146

3/94

WELL SUMMARY SHEET

Boring or Well No. 199 - D8 - 6

Sheet 1 of 1

Location 100D -- NORTH FENCE LINE

Project W017H / CR-9599

Elevation -473.79 BRASS CAP

Drilling Contractor KEH

Driller GRANT HANEY

Drilling Method and Equipment CABLE TOOL, BUCYRUS ERIE

Prepared By Robert Winn ROBERT WINN (Sign/Print Name) Date 11/4/91

Reviewed By Kent D. Reynolds / Kent D. Reynolds (Sign/Print Name) Date 2/12/92

CONSTRUCTION DATA

Description

12"Ø CS CSG, TEMPORARY TO 20.43' w/ 12" BY 1.16' OD SHOE

CEMENT GROUT 0.0' - 19.9'

BENTONITE CRUMBLES 19.9' - 24.0'

BENTONITE SLURRY 24.0' - 77.9'

10" CAST STEEL DARDE SHOE PULLED OFF TEMPORARY CASING SHOE DEPTH APPROXIMATELY 70.0' - 71.0'

8"Ø C.S TEMPORARY CASING REDRILLED TO T.D @ ~110.03'

BENTONITE CRUMBLES 77.9' - 79.9'

SECONDARY FILTER SAND (20-40) 79.8-93.4

PRIMARY FILTER SAND (10-20) 93.4'-109.2'

20 SLOT CONTINUOUS WRAP SS 83.5' -107.9'

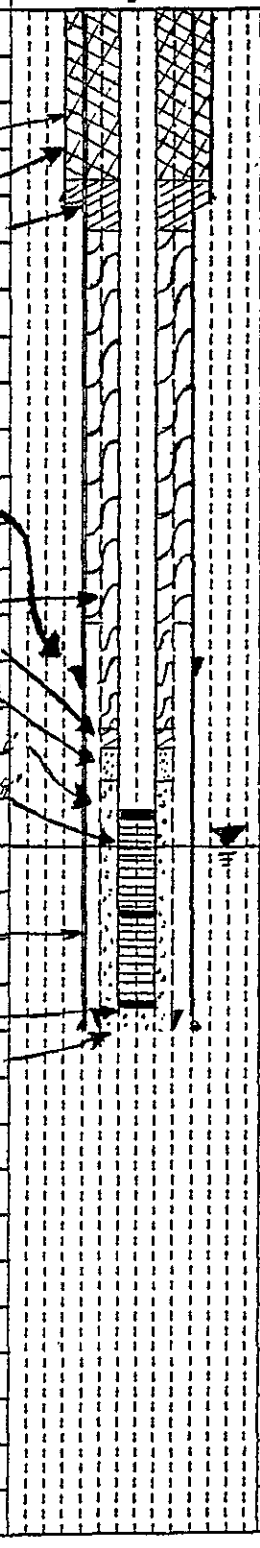
10"Ø CS CSG, TEMPORARY TO 110' W/ 10" x .96' OD SHOE

STATIC WATER LEVEL ~ 90.4' BLS

BOTTOM of WELL 107.9'

BOTTOM of HOLE 110' -- TD

Diagram

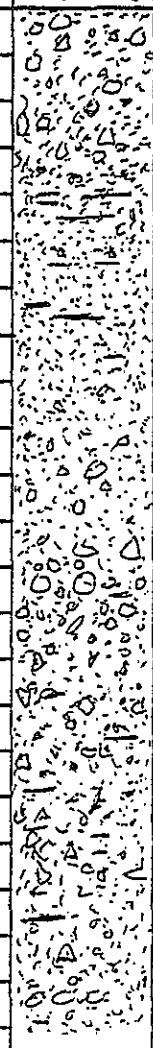


Depth in Feet

10, 20 (20.43), 30, 40, 50, 60, 70, 80, 90, 100, 110 (110')

GEOLOGIC/HYDROLOGIC DATA

Graphic Log



Lithologic Description

SAND-GRAVEL -- w/ LARGE PEBBLES, SUB-ROUNDED TO ROUND, SILT & BROKEN BASALT

FLY ASH -- VOLUME INCREASES w/ DEPTH, SUB-ROUNDED COARSE SANDS

w/ FINE SANDS, MEDIUM GRAVELS & SMALL PEBBLES, TO LARGE COBBLES

SANDS & GRAVELS BY CRUSHING / BY TOOLS, >30% GRAVEL ~ 70% SANDS

SAND - GRAVEL - PEBBLES ...

A-6000-384 (04/90)

WELL CONSTRUCTION REPORT

SIGNATURE/DATE

Specification No. WHC-S-014 Rev No. 6

ECNs 164223, 127439, 150130, 150132

Project 100D / W017

Location 100D N of 100D N Fence

Drilling Company KEH

Driller Grant Haney

Other (Companies)

Geologist(s) D Seaver, B. Winn, K. Lane, C. Wright, K. Reynolds, J.A. Coates

Well No. 199-DS-6 Temp Well No. N A

Coordinates N: 152,961.02 ; E: 573,434.93 ; LAMBERT

Casing Elev. 476.50' Ground Elev 473.29' BRASS CAP

Drilling Method

Verification Method Visual observation

Criteria WHC-S-014, 5.2, 5.3, 7.5

			Initials	Date
Rotary	Air N/A	Mud N/A	N/A	N/A
Cable Tool	D N/A	H 0-110	KDR	12/27/91
Drilling Fluid	Raw Water	291 gal	KDR	12/27/91
Other	Setlube	NA	KDR	12/27/91

Geophysical Logging

Sondes	Interval	Date
Cross Gamma	3.1 - 109.6	11/22/91
Magnetic	10.0 - 80.0	12/31/91
	-	
	-	
	-	

Completion Data

Drilled Depth 110.3'

Completed Depth 107.8'

Date Started 10/31/91

Date Completed 12/19/91

Static Water Level/Date 89.5 on 11/22/91

88.9' on 12/21/91

Aquifer Testing

Type Instantaneous Slug

Flow Meter I.D No. N A

Cal Due Date N A

Length of Test 1 HR

Volume Pumped N A

Drawdown N A

Date of Test 12/23/91

Completion Results

Cleaning

Verification Method Visual Inspection/Papers

Criteria WHC-S-014, 7.6, 4.2.2, 7.7

	Initials	Date
Drilling Tools/Rig	KDR	10/31/91
Temporary Materials	KDR	11/22/91
Permanent Materials	KDR	12/21/91

Screen

Type	Length	Slot Size
T-304 S.S. continuous wire wrap	20.02'	20 slot

Depth(s) 87.5' - 107.82'

Verification Method Verify w/steel tape

Criteria WHC-S-014, 4.2.3, 4.2.5, 4.2.1, 12.2.2

Initials KDR Date 12/21/91

Material Storage/Packing

Verification Method Visual Observation

Criteria WHC-S-014, 4.2.2, 7.3

	Initials	Date
Mtl. Handling/Storage	KDR	12/22/91
Material Packing	KDR	12/23/91

Lubricants/Additives

Verification Method Visual Observation

Criteria WHC-S-014, 4.2.2, 7.3

	Identify	Initials	Date
Additives	Raw Water (281 gal)	KDR	12/21/91
Lubricants	Set Lube	KDR	12/21/91

Straightness Test

Verification Method Visual Observation

Criteria WHC-S-014, 8.2

Initials KDR * Date 12/27/91

A-6000-436 (09/90)

WELL CONSTRUCTION REPORT
(continuation sheet)

199-D8-6

Casing (permanent)

Type	Size	Placement
T-304 S.S. Screen	4"	82.5' - 107.82' KR 9/17/92
T-304 Sch 5 blank	4"	+2.5' - 82.5'
		-
		-

Verification Method: Verify w/ steel tape

Criteria: WHC-S-014, 4.2.1, 4.2.4, 4.2.5, 12.2.1

Initials: KDR Date: 12/27/91

Well Protection

Verification Method: Visual - verify KDR 9/12/92

Criteria: WHC-S-014, 4.2.10, 11.0

	Initials	Date
Protective Posts	KDR	2/12/92
Protective Casing	KDR	2/12/92
Site Restored	KDR	2/12/92
Cap, Hasp and Lock	KDR	2/12/92
Surface Pad	KDR	2/12/92

Annular Seal/Filter Pack

Verification Method: Verify w/ steel tape Criteria: WHC-S-014, 4.2.6, 4.2.7, 4.2.8, 4.2.9, 5.3.1, 5.3.2

Type	Interval *	Volume *	Initials *	Date
Sand 10-20 mesh	108.2' - ~~79.8'~~ 83.4' KL 11/17/92	9.63 ft³	K.L. *	1-3-92
Secondary Filter Sand 20-40	83.4' - 79.8'	2.24 ft³	K.L. *	1-3-92
BENTONITE CRUMBLES	79.8'	0.71 ft³	K.L. *	
Bentonite slurry	77.9' - 24.0'	39.6 ft³	K.L.	1-3-92
BENTONITE CRUMBLES	24.0	7.1 ft³	K.L. *	
Cement Grout	15.9' - 0	23.1 ft³	K.L. *	1-3-92

Well Survey/Labeling

Verification Method: Review of Survey Report

Criteria: WHC-S-014, 3.4

	Initials	Date
Measurement Point/Surveyed	KDR	2/12/92
Protective Casing/Brass Cap Surveyed	KDR	2/12/92
Well Number Stenciled	KDR	2/12/92
Brass Cap Labeled	KDR	2/12/92

Pump Installation

Verification Method: Visual Observation

Criteria: WHC-S-014, 4.2.2, 4.2.11

	Initials	Date
Pump Decon/Prep	KDR *	12-23-91
Installed	KDR *	12-23-91
Pump Tested	KDR *	12-23-91

Other (initial if performed)

NA Well Abandonment; KDR 12/10/91 Downhole TV Inspection; (Rw) Complete As-Built Diagram, Driller's/Geologist's Logs

12-21-91 KDR Well Development

Comments/Remarks: * After document review

NCR # B05431 : RCRA WELL 199-D8-6 -- TEMPORARY 10" Ø CASING SHOE NOT REMOVED FROM COMPLETED WELL. SHOE DETACHED FROM DRIVE CASING DURING BACK PULLING OPERATIONS — DUE TO DOWNHOLE FM RESISTENCE; SHOE LOCATED, SEALED IN BENTONITE ABOVE WT; DOCUMENTED WELL SUMMARY SHEET.

Reviewed By (Sign/Print Name): Kent D Rasler / Kent D Rasler Date: 2/12/92

A-6000-436 (09/90)

BOREHOLE LOG

KDR 2/12/92

Boring or Well No. 199-D8-6

Sheet 1 of 6

Location 100D

Project. W-017/LLBG

Elevation 473.79 Brass Cap

Drilling Contractor KEH

Driller G. HANEY

Drilling Method and Equipment CABLE TOOL

Prepared By Dave Sc / DAVID SCHAUER (Sign/Print Name) Date 11/1/91

Reviewed By EDWARD C. Rafuse / Edward C. Rafuse (Sign/Print Name) Date 11/25/91

Depth (Feet)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level	
5	2 Litho 1 Rad 1 Mois	DB		5' - GRAVELLY SAND [60% SAND, 40% GRAVEL]. Medium pebbles with a few LARGE BOULDERS. 30% mp, 2% fp, 70% cs 10% ms. SAMPLE CONTAINS LARGE QUANTITY OF BLACK ASH, No RXN to HCl / very poorly sorted, 50% MAFIC, 50% felsic wet = [2.5Y 2/0] Dry = [2.5Y 2/0] ROUNDED CLASTS W/ ANGULAR PIECES OF BROKEN BOULDERS	1010	11/1/91
10'	2 Litho 1 Rad 1 Mois	DB		10' ~~Pebbly~~ Gravelly SAND - [90% SAND, 10% GRAVEL] 5% mc, 5% fc, 70% cs 20% ms. well rounded cobbles in a SUBANGULAR SAND MATRIX. Poorly sorted NO RXN to HCl / 60% MAFIC, 40% felsic SAMPLE CONTAINS FALL ASH. wet = [2.5Y 2/0], Dry = [2.5Y 4/0] Dry SAMPLE	1120	11/1/91
15	2 Litho 1 Rad 1 Mois	DB		15' - Silty Gravelly SAND, (70% SAND 20% GRAVEL, 10% SILT) 2% mb, 10% mp 8% fp, 40% cs, 20% ms, 10% fs, 10% silt) color change in some of the sample most is BLACK - some BROWNISH silt. Rounded to subrounded clasts / no RXN to HCl, Poorly sorted, 50% MAFIC, 50% felsic, Dry sample wet = [2.5Y 2/0] BLACK + [2.5Y 11/3] Brown DRY = [2.5Y 4/0] Blackish grey + [2.5Y 5/2]	1450	11/1/91
20	2-LITHO 1-RAD 1-MOIS	D.B.		20' -- SILTY GRAVELLY SAND AS ABOVE, BROKEN BASALT AS GRAVEL, GOOD REACTION W/ 10% HCl -- FLY ASH AND/OR OTHER PARTICULATE MATTER. COLOR & SOIL MIX IN PART STILL SHOWS DISRUPTION AND GENERAL MIXING. PEBBLES ARE SMALL, <10%	0835	11/4/91
25						

A-43

BOREHOLE LOG

Boring or Well No. 199 - D8 - 6

Sheet 2 of 6

Location 100 D -- NORTH FENCE LINE

Project W017 11 / CR 9599

Elevation 473.79 Brass Cap

Drilling Contractor KEH

Driller GRANT HANEY

Drilling Method and Equipment CABLE TOOL, BUCYRUS ERIE

Prepared By Robert Winn ROBERT WINN (Sign/Print Name) Date 11/4/91

Reviewed By Edward C. Rafuse (Sign/Print Name) Date 11/25/91

Depth (FEET)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
				SAND - SILTY SANDS W/ F-M GRAVELS & RICH ORGANIC CLAYS & SILTS, GENERAL DESCRIPTION AS ABOVE, APPEARS TO INDICATE A MODERATE INCREASE IN F-M SANDS/GRAVELS W/DEPTH - HIGHLY REACTIVE W/ 10% HCl	
25'	2-LITHO 1-RAD 1-MOIS	DB			5' SAMPLE - 11/4/91 @ 1335 pH 7
				SAND - AS ABOVE -- W/ SIZE INCREASE IN GRAVELS & FEW PEBBLES - BROKEN BASALT (DUE TO DRILL TOOLS) PRIMARY MATERIAL (OTHER THAN SOME QTZ F SANDS) W/ FLY ASH CONTENT INCREASING. COLOR WET : V BLACK - 2.5Y 2/2 COLOR DRY : BLACK - 2.5Y 2/2	
30'	2-LITHO 1-RAD 1-MOIS	DB			5' SAMPLE - 11/4/91 @ 1350 pH 7
				SAND - FINE MATERIALS AS ABOVE W/ INCREASE IN CLAY CONTENT - NOT AS LAYERS BUT AS PART OF THE GENERAL MIX, ALSO INCREASE IN FINE - MEDIUM - COARSE SANDS	
35'	2-LITHO 1-RAD 1-MOIS	DB			5' SAMPLE - 11/4/91 @ 0940 pH 7
				SAND - FLY ASH, RATIO OF ASH TO CLAY/F SANDS INCREASING, ACTUAL CONDITIONS SUGGEST MASSIVE FLY ASH DEPOSITIONAL AREA ; COLOR IS BLACK/WHITE (SALT & PEPPER MIX)	
40'	2-LITHO 1-RAD 1-MOIS				5' SAMPLE - 11/5/91 @ 1255 pH 7

A-44

BOREHOLE LOG

Boring or Well No 199-D8-6

Sheet 3 of 6

Location 100 D - NORTH FENCE LINE

Project W017H/CR 9599

Elevation 473.79 Brass Cap

Drilling Contractor KEH

Driller GRANT HANEY

Drilling Method and Equipment CABLE TOOL -- BUCYRUS ERIE

Prepared By Robert Winn (Sign/Print Name) ROBERT WINN Date 11/5/91

Reviewed By Edward C. Rafuse (Sign/Print Name) Date 11/25/91

Depth (FEET)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
				SAND - FLY ASH --- AS ABOVE, "MASS" IS LOW -- MATERIAL APPEARS EXPANSIVE/LIGHT WEIGHT/ FLUFFY --- ALL RELATIVE	
	2-LITHO 1-RAD 1-MOIS				
45'		DB			5' SAMPLE --- 11/5/91 @ 1325 pH 7
				SAND — FLY ASH --- AS ABOVE	
	2-LITHO 1-RAD 1-MOIS				
50'		DB			5' SAMPLE -- 11/6/91 @ 0845 pH 7
				SAND — REPLICATE OF 45' DEPTH W/ FLY ASH AS A MAJOR CONSTITUENT	
	2-LITHO 1-RAD 1-MOIS.				
55'		DB			5' SAMPLE -- 11/6/91 @ 1000 pH 7
				SAND - GRAVEL — SAND @ ~50% BY VOLUME, GRAVEL & PEBBLES < 50%, GRAVEL IS BASALT, CRUSHED BY DRILLING TOOLS & PEBBLES ARE SUB-ROUNDED TO ROUNDED, SOME BROKEN BY DRILLING. FLY ASH IS PRESENT @ < 10% OF SAND, NO REACTION W/ 10% HCl	
	2-LITHO 1-RAD 1-MOIS				
60'					5' SAMPLE - — 11/7/91 @ 1010

A-45

A-6000-382 (04/90)

BOREHOLE LOG

Boring or Well No. 199-D8-6

Sheet 4 of 6

Location 100 D --- NORTH FENCE LINE

Project W017H/CR-9599

Elevation 473.79 Brass Cap

Drilling Contractor KEH

Driller GRANT HANEY

Drilling Method and Equipment CABLE TOOL, BUCYRUS ERIE

Prepared By Robert Winn (Sign/Print Name) Date 11/7/91

Reviewed By Edward C. Rafuse (Sign/Print Name) Date 11/25/91

Depth (FEET)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
				SAND — SIMILAR TO ABOVE -- FLY ASH, FINE SAND & CLAY, SOME SMALL BROKEN GRAVELS. SECTION IS BELOW FLY ASH; PEBBLES INDICATE ROUNDING DUE TO STREAM WEAR DRY — 2.5/1; MOIST 2.5/2.	SANDS — FROM VF — COARSE TO COARSE GRAVELS TO SMALL PEBBLES — FINE BASALT — LARGEST VOL IS FINE QTZ SANDS, TRACE OF CLAY; TRACE OF CARBONATE MATERIAL REACTIVE TO 10% HCl
65'	2-LITHO 1-RAD 1-MOIS	DB			5' SAMPLE — — — 11/7/91 @ 1150
70'	1-LITHO 1-RAD 1-MOIS	DB		SAND — AS ABOVE W/INCREASE IN VOLUME OF PEBBLES AND COBBLES, DIFFICULT DRILLING; QTZ IS VERY EVIDENT, BROKEN GRAVELS REPRESENT BASALT PRIMARILY. WHITE & ORANGE CHERT GRAVELS ANGULAR TO LIGHTLY SUB-ROUNDED. >90% OF BASALT HAS BEEN BROKEN BY DRLG. GRAVELS MAKE UP ~35% BY VOLUME -- SOME CLAY	WET: OLIVE DRAB COLOR DRY: TAN-BRN-GRAY GRAVELS ARE A PRODUCT OF DRILLING TOOLS — NOT STREAM WEAR 5' SAMPLE - - - — 11/12/91 @ 1020
75'	2-LITHO 1-RAD 1-MOIS	DB		SANDS — GRAVELS: AS ABOVE TRACE CLAY — FINES (POWDERED BASALT, SOME QTZ, AND CLAYS) ARE "LOST" IN THE SLURRY -- REQUIRED TO BRING CUTTINGS TO SURFACE. GREATER AMOUNT OF MATERIAL IS BASALT, ~20% BY VOLUME IS THE QTZ — AS FLINTS, CHERTS, SOME QTZTE, MOST GRAVELS ARE BROKEN BASALTS	LIGHT REACTION TO 10% HCl 5' SAMPLE ---- 11/12/91 @ 1240
80'	2-LITHO 1-RAD 1-MOIS	DB		SANDS — GRAVELS -- AS ABOVE. SAME MATERIAL AS PREVIOUS --- FINES DUE IN GREATER AMOUNT TO BIT ACTION WHILE DRILLING. COLOR WET — LIGHT OLIVE DRAB COLOR DRY — LIGHT GRAY/TAN	LIGHT REACTION TO 10% HCl 5' SAMPLE — 11/14/91 @ 1410

A-46

A-6000-382 (04/90)

BOREHOLE LOG

Boring or Well No. 199-D8-6

Sheet 5 of 6

Location 100 D PONDS NORTH FENCE LINE

Project 6017H / CR-9599

Elevation 473.79 Brass Cap

Drilling Contractor KEH

Driller GRANT HANEY

Drilling Method and Equipment CABLE TOOL - BUCYRUS ERIE

Prepared By (Sign/Print Name) ROBERT WINN Date 11/14/91

Reviewed By (Sign/Print Name) EDWARD C. RAFUSE Date 11/25/91

Depth (FEET)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
80				SANDS - GRAVELS : AS ABOVE MATERIAL SIMILAR TO PREVIOUS, BUT DIFFERS IN PARTICLE SIZE DUE TO LESS TIME FOR TOOLS TO "GRIND" WET IS A LIGHT OLIVE DRAB, DRY IS A GRAY/TAN	DIFFERENCE (DRILLING RATE) IN SIZE OF CUTTINGS: LESS TIME IN BORE HOLE - LARGER INDIVIDUAL PIECES
	2-LITHO 1-RAD 1-MOIS	DB/HT			5' SAMPLE -- 11/14/91
85'				SANDS - GRAVELS : AS ABOVE, PRINCIPAL MATERIALS ARE CRUSHED QTZ AND BASALT. QTZ AS CHERT/FLINTS, BASALTS AS BROKEN/CRUSHED GRAVELS --- FRESHLY BROKEN SHARDS DUE TO DRILLING TOOLS, ALSO PRESENT IS QTZITE. GRAVELS ACCOUNT FOR ~ 35% BY VOLUME; REMAINDER OF DRILL CUTTINGS, ~ 65% BY VOLUME ARE THE FINE SILTS AN CLAYS	@ 1515
	2-LITHO 1-RAD 1-MOIS	HT			5' SAMPLE - - 11/18/91
90'				SANDS - GRAVELS : AS ABOVE — SAME MATERIAL, SIZE DEPENDENT ON LENGTH OF TIME SPENT IN CONTACT W/ DRILLING TOOLS. COLORS WET ARE DARK GRAY/BROWNS COLORS DRY ARE LIGHT GRAY/TAN. MATERIAL IS VF-F QTZ & BASALTS W/ SOME GRAVELS	@ 0905
	2-LITHO 1-RAD 1-MOIS	HT			5' SAMPLE - - 11/18/91
95'				SANDS - GRAVELS — AS ABOVE W/ SOME INCREASE IN GRAVELS BY VOLUME — — COLORS CONSISTENT W/ PREVIOUS 15'; GRAVELS & PEBBLES INDICATE TOOL CRUSHING; SOME OF THE CUTTINGS ARE SUB-ROUNDED TO ROUNDED INDICATING GOOD STREAM ABRASION. BASALT/QTZ & OTHER RATIOS ARE ~ = TO ABOVE	@ 1055
	2-LITHO 1-RAD 1-MOIS	HT			5' SAMPLE -- 11/19/91
100'					@ 1510

A-6000-382 (04/90)

9313021.0154

BOREHOLE LOG

VALIDATED
SIGNATURE/DATE

Boring or Well No. 199 - D8 - 6

Sheet 6 of 6

Location 100 D PONDS, NORTH FENCE LINE
Project W017 H/CR-9599
Elevation 473.79 Brass Cap
Drilling Contractor KEH
Driller GRANT HANEY
Drilling Method and Equipment CABLE TOOL BUCYRUS ERIE
Prepared By ROBERT M. WIN (Sign/Print Name) Date 11/22/91
Reviewed By EDWARD C. RAFFAS (Sign/Print Name) Date 11/25/91

Depth (FEET)	Sample Type and No.	Sample Blows or Recovery	Graphic Log	Sample Description: Soil Classification, Particle Size Distribution, Color, Moisture Content, Sorting, Angularity, Mineralogy, Reaction to HCl.	Comments: Depth of Casing, Drilling Rate, Casing Size & Type, Bit Size, Water Level
		JB/HT		SANDS - GRAVELS : SAME MATERIAL, SAME CONDITIONS AS ABOVE COLUMN	SLUMPING OF FINE SANDS CAUSES PROBLEMS IN CLEANING BORE HOLE - REVIEW DESCRIPTIONS OF UP HOLE MATERIAL ---
	2-LITHO 1-RAD 1-MOIS				5' SAMPLE -- 11/21/91 @ 0920
105'		HT		SANDS - GRAVELS --- SAME MATERIAL AS ABOVE, THE VF-F SANDS PACK-OFF THE LARGER PIECES (GRAVELS & PEBBLES) CAUSING DIFFICULTY IN DRILLING & IN CUTTINGS RECOVERY -- KEEPING HOLE "CLEAN" IS A PROBLEM. SPLIT SPOON SAMPLES CONFIRM OVERALL PARTICLE SIZE (AS NOTED ABOVE) AND EMPHASIZE THE CRUSHING ACTION OF THE DRILLING TOOLS.	SPLIT SPOON SAMPLE: 105'-105.5' @ 100 COUNTS; 105.5'-106' ✓; 106'-106.5' ✓; 106.5'-107.0' ✓ (SEE BELOW)
	2-LITHO 1-RAD 1-MOIS				5' SAMPLE -- 11/22/91 @ 1045
110'				MATERIAL RECOVERED INDICATES A GENERAL MIX OF SANDS, GRAVELS AND PEBBLES --- STREAM "ABRASION" EVIDENT W/ MUCH PARTICLE ROUNDING.	SPLIT SPOON SAMPLE: 107.0'-107.5' @ 100 COUNTS; 107.5'-108.0' ✓; 108.0'-108.5' ✓
				TD: 110'	

A-6000-382 (04/90)

W-017-100D

WELL 199-D8-6

DRILLING

START DATE	FINISH DATE	TOTAL DAYS	CURRENT DEPTH	FINAL DEPTH	DEPTH TO WATER	WATER ADDED(GAL)
10-31-91	See Below		N/A	110'	11-15-91 83.0' 11-18-91 DRY 11-20-91 DRY 11-21-91 90.7' 11-22-91 89.5'	253 GALLONS

DOWN HOLE COMPLETION

START DATE	FINISH DATE	TOTAL DAYS	DEPTH TO WATER	DEPTH TO BOTTOM	DEPTH OF SCREEN	WATER ADDED/ REMOVED (GAL)
See Below			12-2-91 101.7'	108.2	87.5'-107.8'	12-3-91 Removed ~30 GALLONS TO Develop Filter Pack

DEVELOPMENT AND ASSOCIATED ACTIVITIES

TV CAMERA DATE	AQUIFER TEST DATE	DEVELOPMENT DATE	HYDROSTAR PLACEMENT DATE	WATER REMOVED(GAL)
N/A	12-21-91 12-23-91	12-21-91 12-23-91	12-23-91	~1018 GALLONS

COMMENTS:

	START	FINISH	TOTAL	
ORIGINAL DRILLING TIME	10-31-91	11-22-91	17 DAYS	@ 8hrs
First Attempt at Completion	11-27-91	12-10-91	9 DAYS	
Redrill	12-11-91	12-18-91	7 DAYS	Double SHIFT 4 or 5 DAY
Final Completion	12-19-91	12-20-91	2 DAYS	Double SHIFT

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1 of 2

VALIDATED
KDR 2/12/92
SIGNATURE DATE

WELL CHECK LIST

Well Number: 199 D86 Location: 100 D (91)

Date: 1/24/92

	Yes	No
Hasp on protective casing	✓	
Lock	✓	
Proper cap fit	✓	
Well ID number on brass cap	✓	
Protective post painted	✓	
Well ID number stenciled on post	✓	
Well ID number stenciled on protective casing	✓	
Survey mark on casing	✓	
Stock tank		✓
Site neat	✓	

Comments: 10" SIDE - CLOSE OUT WELL UPON COMPLETED NCR AND VALIDATE APPROVAL

Signature: Edward C. Rafner Date: 1/24/92

9312.2031

APPENDIX B:

SEDIMENT SAMPLE DATA

This appendix includes grain size data, $CaCO_3$ data, and moisture data.

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WELL 199-D5-13

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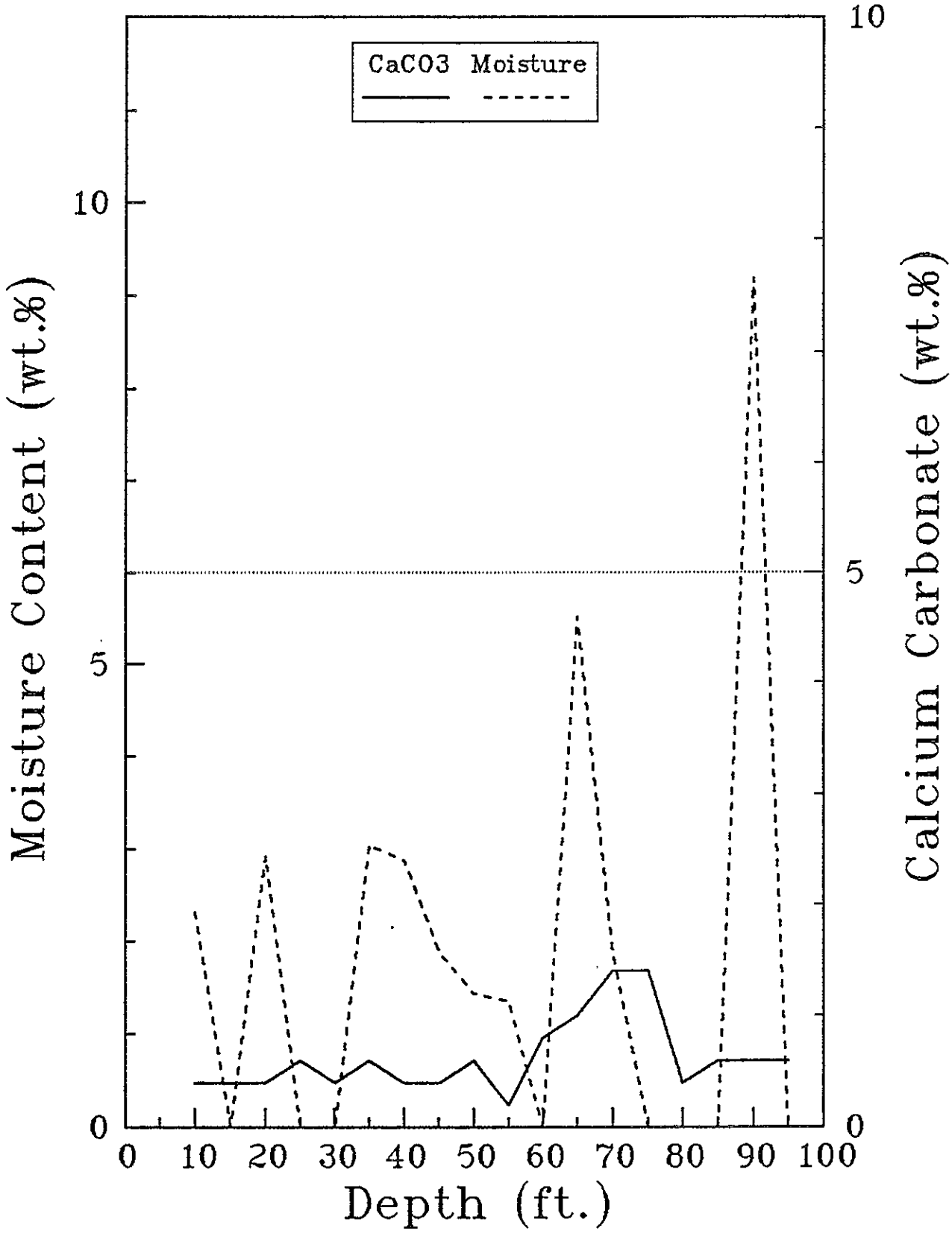
VALIDATED
KDR 4/13/92
SIGNATURE DATE

WELL 199-D5-13



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272

	A	B	C
1	WELL 199-D5-13		
2			
3	Depth	CaCO3	Moisture
4	ft.	Wt. %	Wt. %
5			
6	10	0.4	2.31
7	15	0.4	0
8	20	0.4	2.92
9	25	0.6	0
10	30	0.4	0
11	35	0.6	3.04
12	40	0.4	2.88
13	45	0.4	1.87
14	50	0.6	1.43
15	55	0.2	1.35
16	60	0.8	0
17	65	1	5.52
18	70	1.4	1.87
19	75	1.4	0
20	80	0.4	0
21	85	0.6	0
22	90	0.6	9.18
23	95	0.6	0

9313021.0166

(Reference Sheets)

KDK
11/6/91
10 slot
20-40 Sand

TEST REQUEST

WELL NO. 199-D5-13 DEPTH 88'

SAMPLE/SPECIMEN NO. 2- 0282 COST CODE/WORK ORDER NO. R331H

REQUESTED BY: ORG. 81231 PERSON B. WILLIAMS DATE 11/5/91

TEST REQUESTED	NO. OF SAMPLES	TEST LAB INFORMATION (PROCEDURE USED)
SIEVE ANALYSIS	1	GEL-07

REMARKS

RECEIVED BY: R.G. ALEXANDER DATE 11/5/91

APPROVED BY: R.G. ALEXANDER DATE 11/5/91

RADIATION RELEASE

Bldg. 199 D5-13 Expiration Date 11/7/91

Released By [signature]
Health Physics

Remarks 88

54-3000-022 (01/89)

RADIATION RELEASE

Bldg. 199 D5-13 Expiration Date 11/7/91

Released By LRK
Health Physics

Remarks 88

54-3000-022 (01/89)

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SIEVE ANALYSIS DATA SHEET

Sample No. 2-0282 Page 1 of 1

Tested By: JERRY L. ENGLAND Date 11-5-91
Procedure No: GEL-07 Rev. 1 Date Issued 11-15-89
Test Plan No: N/A Rev. N/A Date Issued N/A
Balance: ETAL- 3310 Calibration Due Date 12-25-91
Thermometer: ETAL- 6013 Calibration Due Date 9-16-92
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A

Sample Description SANDY GRAVEL Sieve Time 10 (min)

Reduced by ( ) Splitting ( ) Quartering ( ) Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed
2	1084.1	0	0	100
1½		110.4	10.2	89.8
1		502.4	46.3	53.7
¾		622.0	48.2	51.8
½		599.4	55.3	44.7
⅜		641.7	59.2	40.8
4		696.1	64.2	35.8
10	192.1	24.0	12.5	31.3
40		67.2	35.0	23.3
60		115.0	59.9	14.4
100		130.6	68.0	11.5
200		147.1	76.6	8.4

Finess Modules (FM) N/A (See ASTM C 136-83, Section 8.2)

MATERIALS FINER THAN NO. 200 SIEVE BY WASHING		Remarks
C = Percentage of material passing a 200 Sieve	N/A %	
D = Original Dry Weight of Sample	N/A g	WASHED FINES GRADING
E = Dry Weight of Sample After Washing/Sieve	N/A g	
C = <(D-E)/D>*100		

All data are accurately and completely recorded. The test operator was trained and used calibrated instruments.
Checked By: R.G. ALEXANDER Date 11-5-91

A-6400-204(2-87)

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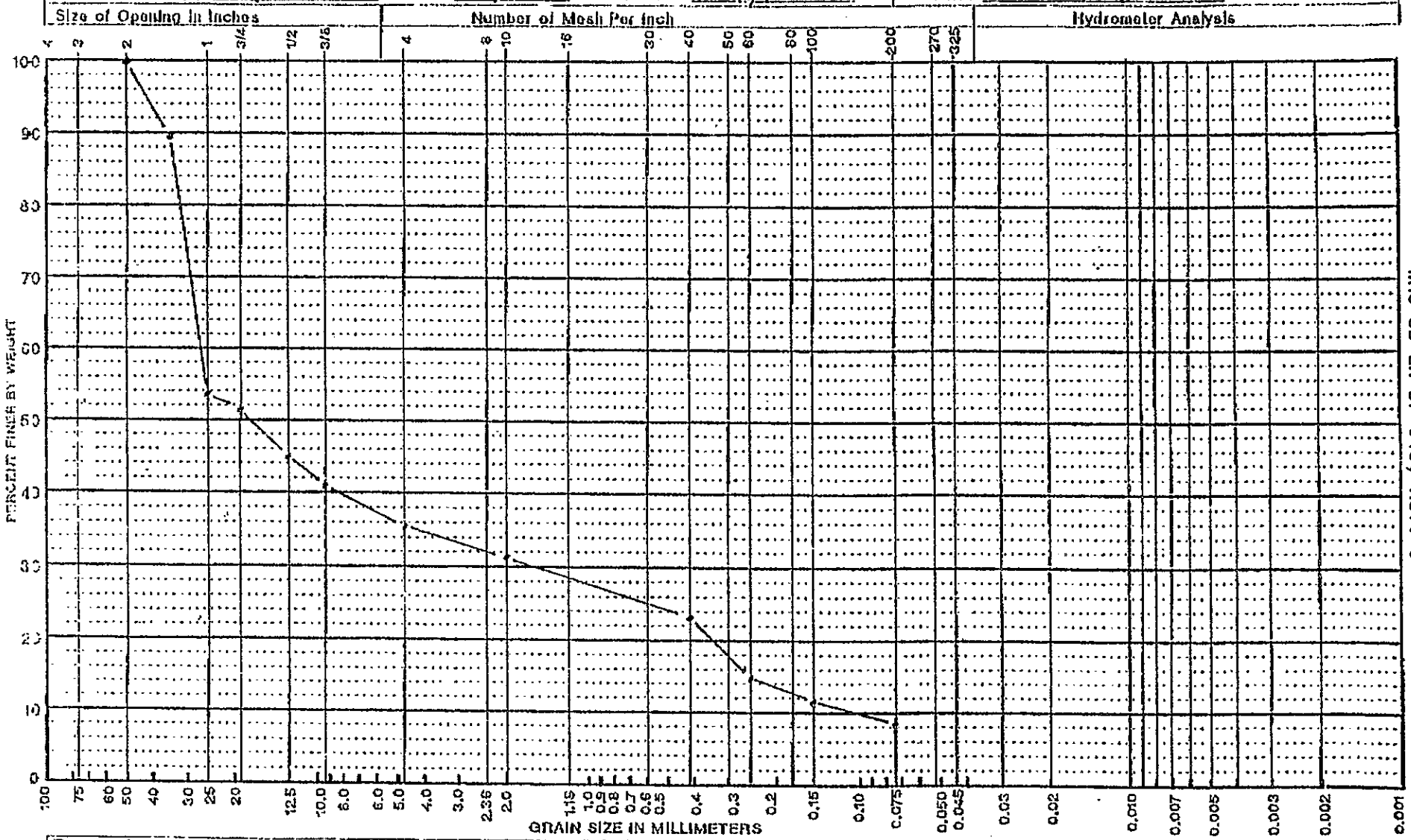
9313021.0169

GRAIN SIZE ANALYSIS PLOT

Sample No. 2.0282 Page 1 of 1

Procedure No. GEL-07 Rev. 1 Date Issued 11-15-89 Plotted By JERRY L. ENGLAND

Test Plan No. N/A Rev. N/A Date Issued N/A Date 11-6-91



Remarks SANDY GRAVEL

199-05-13 88'

All data are accurately and completely recorded. The test operator was trained and used calibrated instruments.

Checked By: R.G. ALEXANDER Date 11-5-91

SIEVE ANALYSIS DATA SHEET

Sample No. 2-0282 Page 1 of 1

Tested By: JERRY L. ENGLAND Date 11-5-91
Procedure No: GEL-07 Rev. 1 Date Issued 11-15-89
Test Plan No: N/A Rev. N/A Date Issued N/A
Balance: ETAL- 3310 Calibration Due Date 12-25-91
Thermometer: ETAL- 6013 Calibration Due Date 9-16-92
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A

Sample Description SAND Sieve Time 10 (min)

Reduced by (X) Splitting ( ) Quartering ( ) Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed
4	192.1	0	0	100
10	↓	24.0	12.5	87.5
40	↓	67.2	35.0	65.0
60	↓	115.0	59.9	40.1
100	↓	130.6	68.0	32.0
200	↓	147.1	76.6	23.4
N/A	N/A	N/A	N/A	N/A
↓	↓	↓	↓	↓

Finess Modules (FM) N/A (See ASTM C 136-83, Section 8.2)

MATERIALS FINER THAN NO. 200 SIEVE BY WASHING		Remarks
C = Percentage of material passing a 200 Sieve	N/A %	
D = Original Dry Weight of Sample	N/A g	WASHED GRADING
E = Dry Weight of Sample After Washing/Sieve	N/A g	
C = <(D-E)/D>*100		

All data are accurately and completely recorded. The test operator was trained and used calibrated instruments.
Checked By; RG ALEXANDER Date 11-5-91

A-6400-204(2-87)

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GRAIN SIZE ANALYSIS PLOT

Sample No. Z-0282

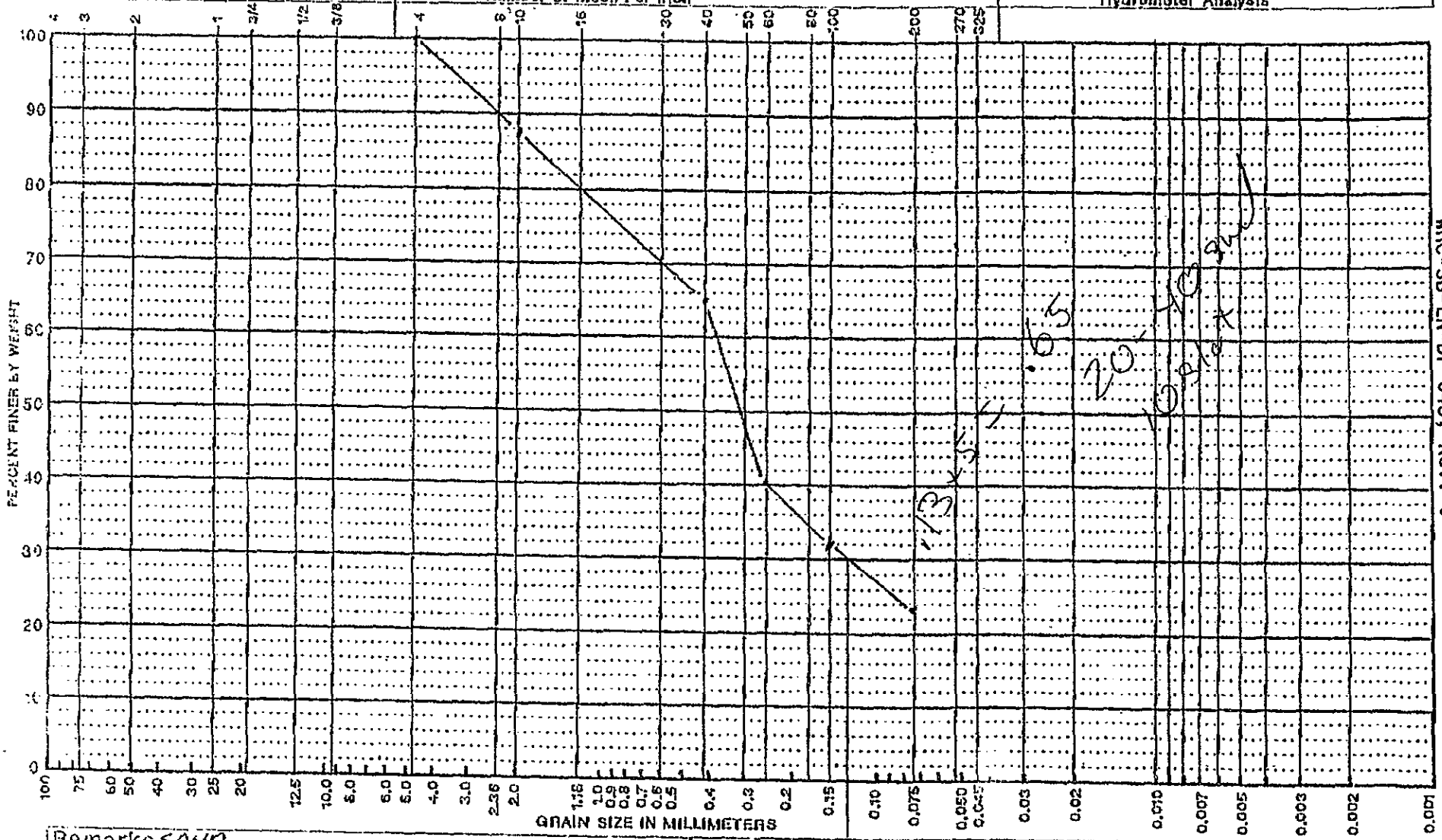
Page 1 of 1

Procedure No. GEL-07 Rev. 1 Date Issued 11-15-89

Plotted By JERRY L. ENGLAND

Test Plan No. N/A Rev. N/A Date Issued N/A

Date 11-5-91



Remarks SAND

199-05-13 88'

All data are accurately and completely recorded. The test operator was trained and used calibrated instruments.

Checked By: R.G. ALEXANDER Date 11-5-91

WHC-SD-EN-DP-043, Rev. 0

B-10

WELL 199-D8-4

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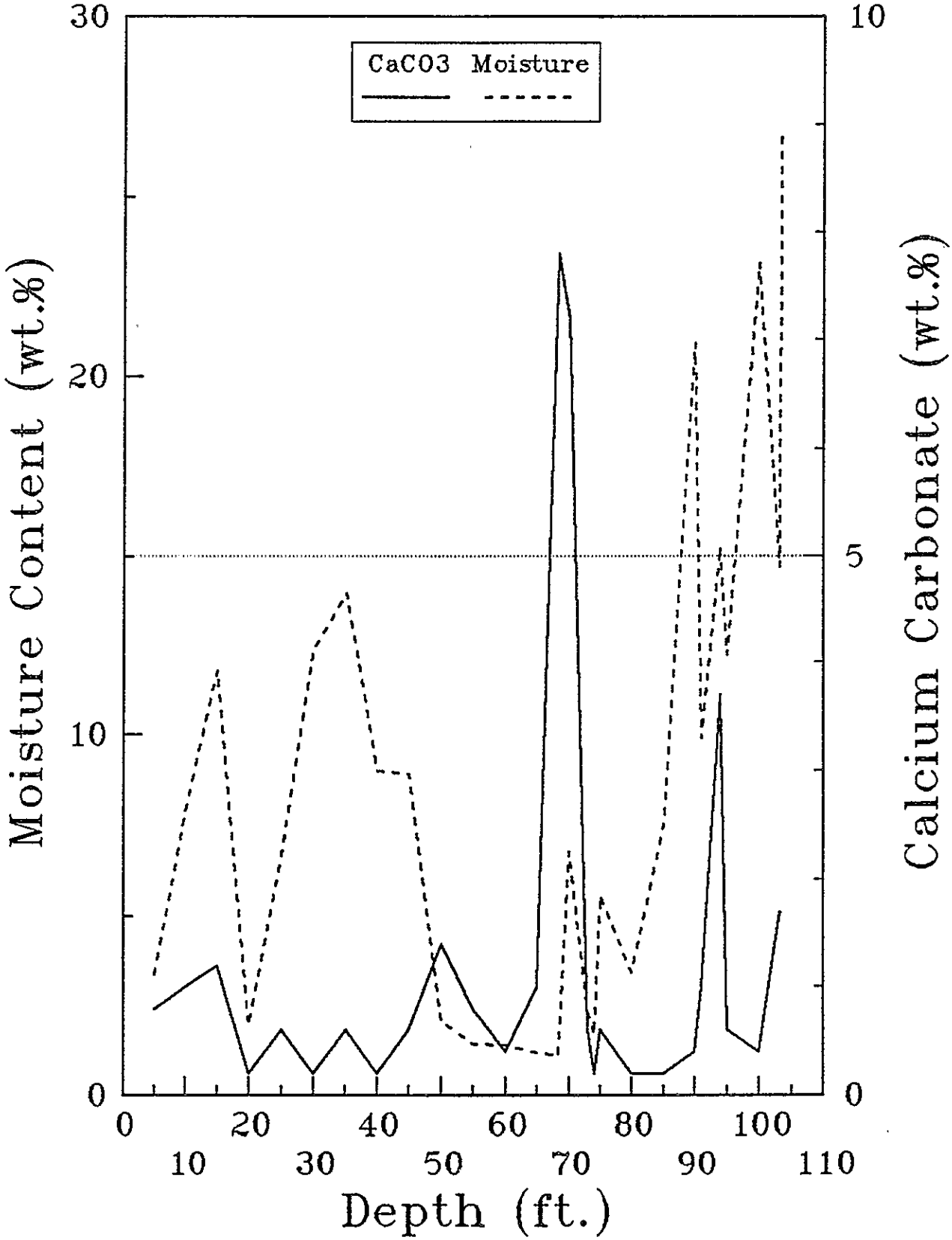
VALIDATED
KDR 2/12/92
SIGNATURE/DATE

WELL 199-D8-4



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292

	A	B	C
1	WELL 199-D8-4		
2			
3	Depth	CaCO3	Moisture
4	ft.	Wt. %	Wt. %
5			
6	5	0.8	3.34
7	10	1	7.89
8	15	1.2	11.77
9	20	0.2	1.95
10	25	0.6	6.68
11	30	0.2	12.36
12	35	0.6	13.96
13	40	0.2	8.99
14	45	0.6	8.91
15	50	1.4	2.04
16	55	0.8	1.41
17	60	0.4	1.4
18	65	1	1.18
19	68.3	7.8	1.09
20	70	7.2	6.78
21	73	0.6	2.31
22	74	0.2	1.67
23	75	0.6	5.54
24	80	0.2	3.41
25	85	0.2	7.5
26	90	0.4	20.89
27	91	1	9.9
28	94	3.7	15.23
29	95	0.6	12.22
30	100	0.4	23.14
31	103.2	1.7	14.71
32	103.4	1.7	26.75

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WELL 199-D8-5

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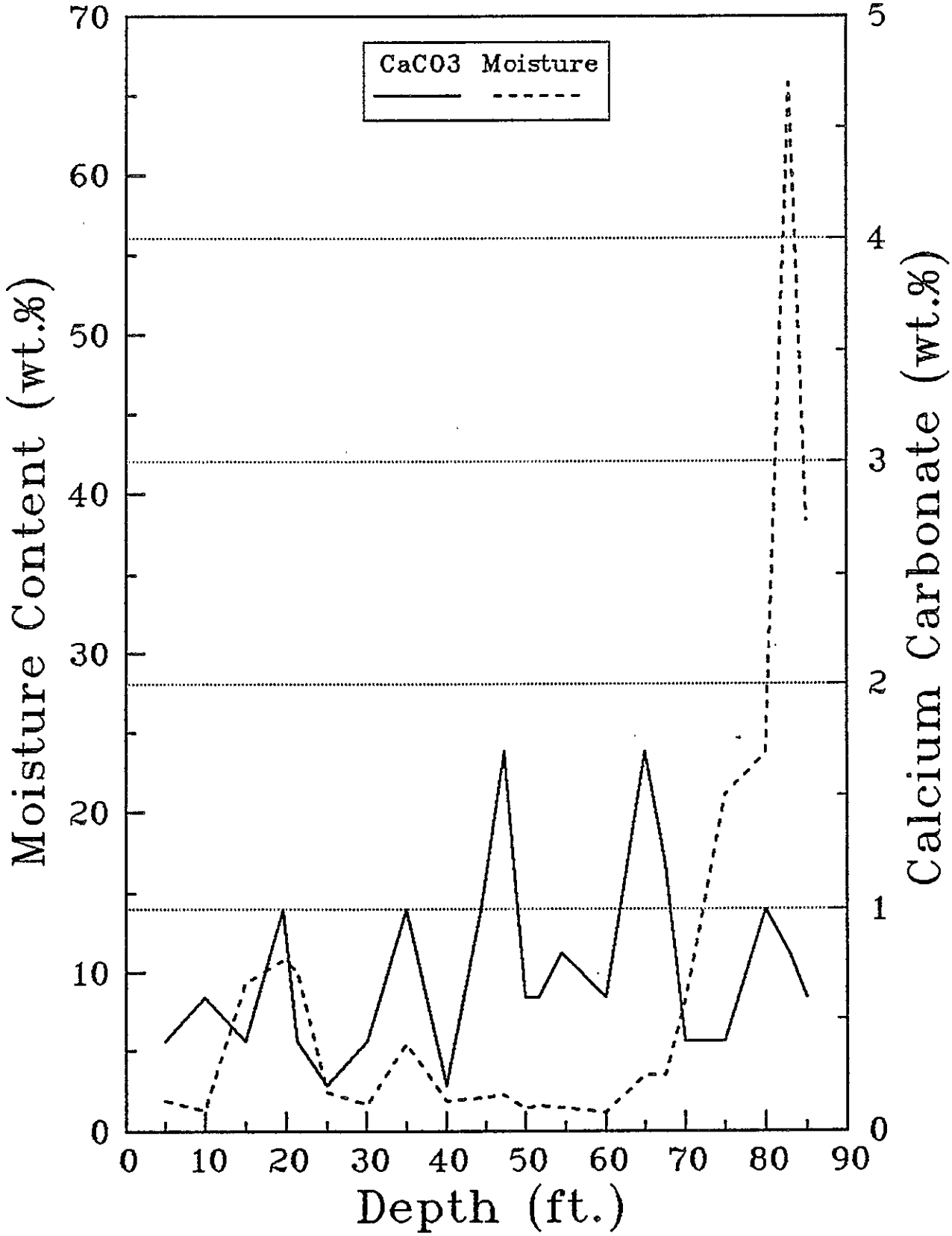
1 of 2

VALIDATED
KDR 2/12/92
SIGNATURE/DATE

WELL 199-D8-5



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2g2

	A	B	C
1	WELL 199-D8-5		
2			
3	Depth	CaCO3	Moisture
4	ft.	Wt. %	Wt. %
5			
6	5	0.4	1.86
7	10	0.6	1.24
8	15	0.4	9.34
9	19.6	1	10.74
10	21.4	0.4	10.1
11	25	0.2	2.4
12	30	0.4	1.62
13	35	1	5.44
14	40	0.2	1.88
15	44.4	1	2.03
16	47.3	1.7	2.22
17	50	0.6	1.39
18	51.7	0.6	1.56
19	54.5	0.8	1.45
20	60	0.6	1.14
21	65	1.7	3.45
22	67.5	1.2	3.48
23	70	0.4	8.1
24	75	0.4	21.1
25	80	1	23.65
26	83	0.8	65.74
27	85	0.6	38.36

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WELL 199-D8-6

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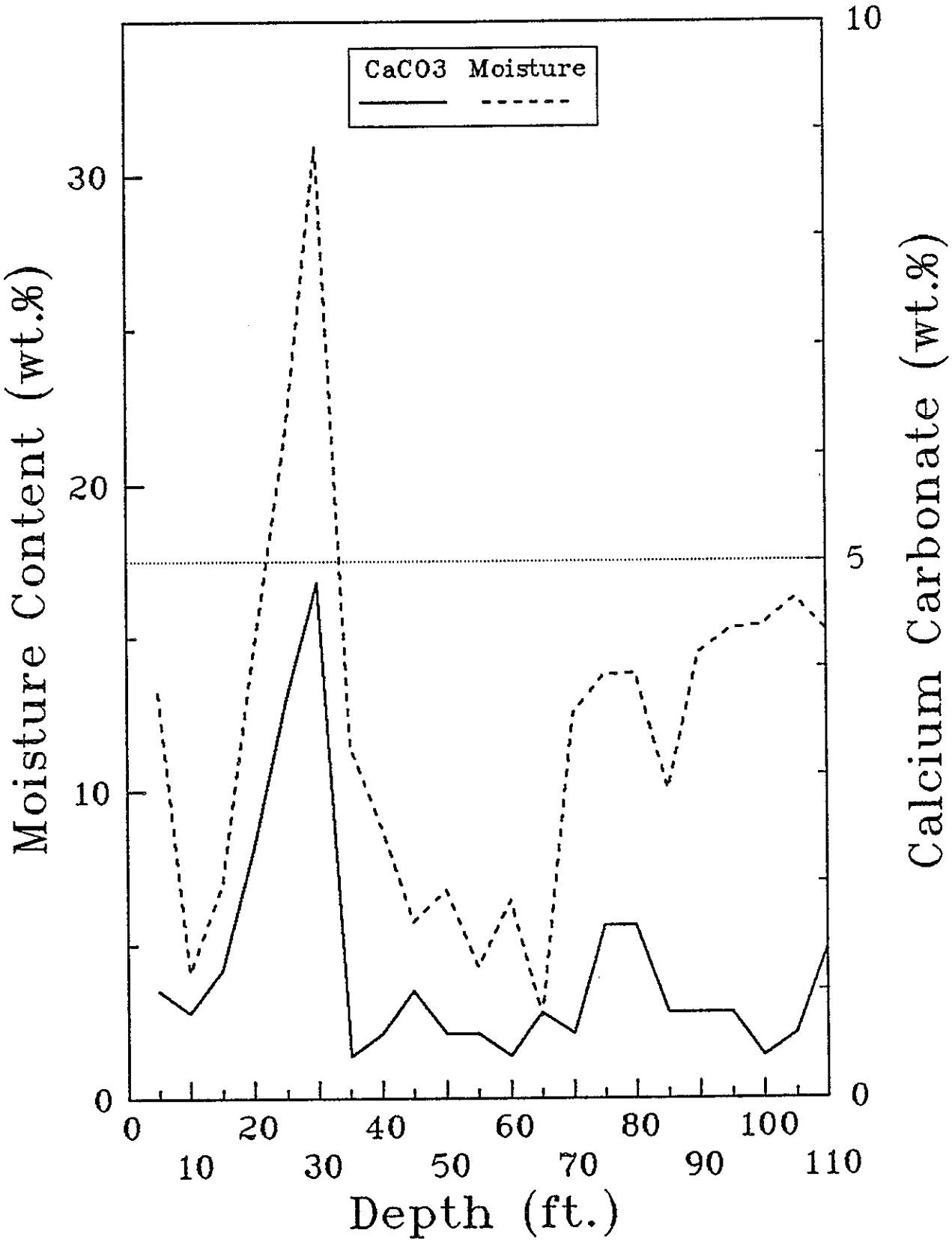
VALIDATED
KDR 3/12/92
SIGNATURE/DATE

WELL 199-D8-6



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2 of 2

	A	B	C
1	WELL 199-D8-6		
2			
3	Depth	CaCO3	Moisture
4	ft.	Wt. %	Wt. %
5			
6	5	1	13.23
7	10	0.8	4.09
8	15	1.2	6.91
9	20	3.3	14.35
10	25	3.7	21.54
11	30	4.8	30.94
12	35	0.4	11.44
13	40	0.6	8.84
14	45	1	5.73
15	50	0.6	6.76
16	55	0.6	4.29
17	60	0.4	6.42
18	65	0.8	2.70
19	70	0.6	12.54
20	75	1.6	13.79
21	80	1.6	13.80
22	85	0.8	10.05
23	90	0.8	14.49
24	95	0.8	15.28
25	100	0.4	15.43
26	105	0.6	16.27
27	110	1.4	15.23

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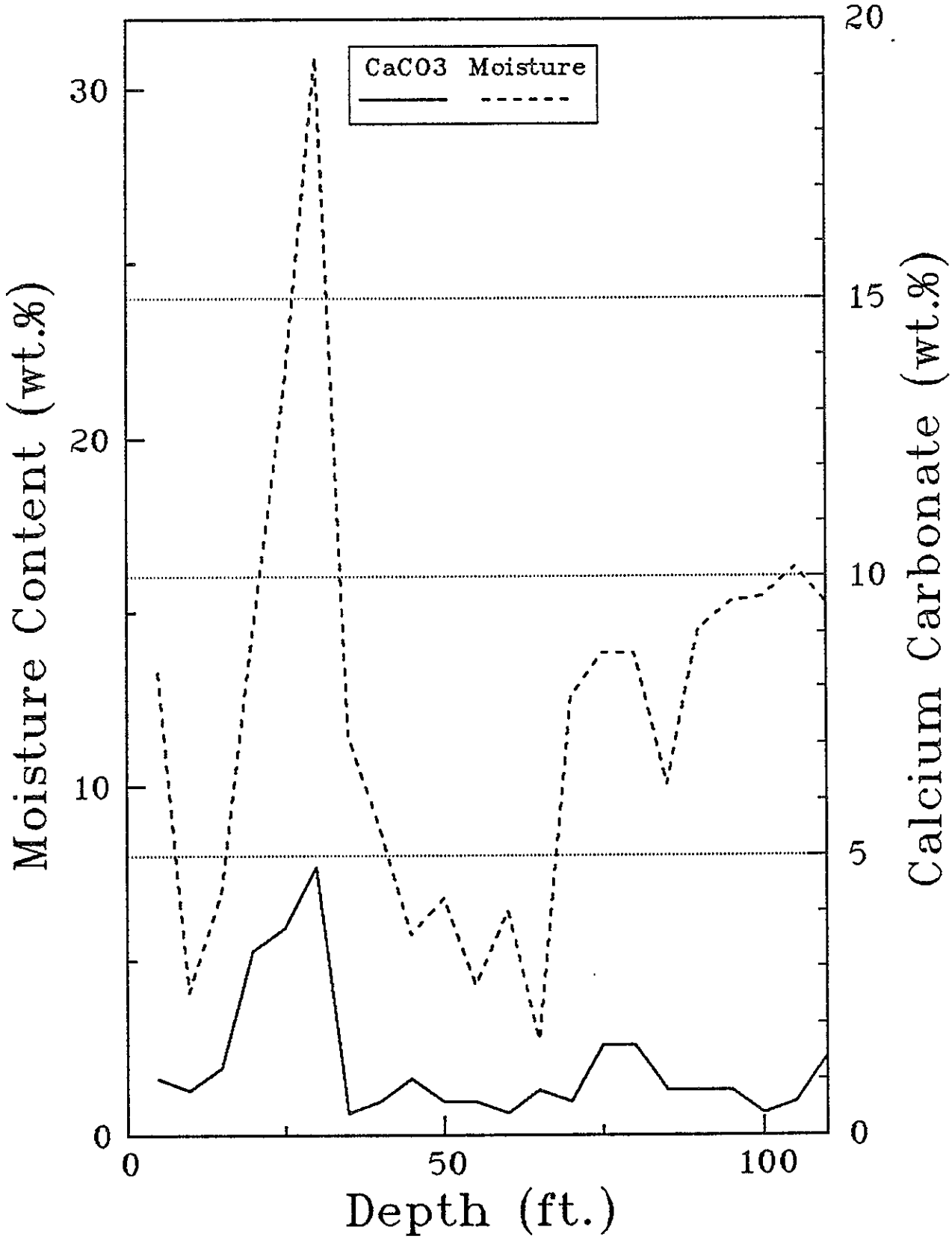
WELL 199-D8-6



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	A	B	C
1	WELL 199-D8-6		
2			
3	Depth	CaCO3	Moisture
4	ft.	Wt. %	Wt. %
5			
6	5	1	13.23
7	10	0.8	4.09
8	15	1.2	6.91
9	20	3.3	14.35
10	25	3.7	21.54
11	30	4.8	30.94
12	35	0.4	11.44
13	40	0.6	8.84
14	45	1	5.73
15	50	0.6	6.76
16	55	0.6	4.29
17	60	0.4	6.42
18	65	0.8	2.70
19	70	0.6	12.54
20	75	1.6	13.79
21	80	1.6	13.80
22	85	0.8	10.05
23	90	0.8	14.49
24	95	0.8	15.28
25	100	0.4	15.43
26	105	0.6	16.27
27	110	1.4	15.23

9313021.0184

20 slot
10-20 sand
KDR
11/27/91

WESTINGHOUSE HANFORD COMPANY
P.O. BOX 1970
RICHLAND, WA 99352

WHC We're making sure

FAX NO. (509) 373-5052 VERIFY NO. (509)373-1957

DATE: 11-25-91 PHONE:

TO: KENT REYNOLDS FAX NO: 6-6476

LOCATION: ETC "C" PHONE: 2-0640

FROM: J. ENGLAND MSIN: SO-11

THIS FAX CONSISTS OF 6 PAGES. INCLUDING COVER SHEET

MESSAGE:

DO YOU WANT YOUR ORIGINALS RETURNED TO YOU? ☐ YES ☐ NO

9313021.0185

TEST REQUEST

WELL NO. 199-D8-6 DEPTH 105-108.5'

SAMPLE/SPECIMEN NO. 2-0785 COST CODE/WORK ORDER NO. R331H

REQUESTED BY: ORG. 81231 PERSON B. WILLIAMS DATE 11-25-91

TEST REQUESTED	NO. OF SAMPLES	TEST LAB INFORMATION (PROCEDURE USED)
SIEVE ANALYSIS	1	GEL-07

REMARKS

RECEIVED BY: R.G. ALEXANDER DATE 11-25-91

APPROVED BY: R.G. ALEXANDER DATE 11-25-91

RADIATION RELEASE

Bldg. 199 D8-6 Expiration Date 11/22/91

Released By TEC
Health Physics

Remarks 107-108.5

54-3000-022 (01/89)

RADIATION RELEASE

Bldg. 199 D8-6 Expiration Date 11/22/91

Released By TEC
Health Physics

Remarks 105-107

54-3000-022 (01/89)

SIEVE ANALYSIS DATA SHEET

Sample No. 2-0785 Page 1 of 1

Tested By: JERRY L. ENGLAND Date 2-91
Procedure No: GEL-07 Rev. Date Issued 11-15-89
Test Plan No: N/A P- N/A Date Issued N/A
Balance: ETAL- 2310 Calibration Due Date 12-25-91
Thermometer: ETAL- 0013 Calibration Due Date 9-16-92
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL N/A Calibration Due Date N/A

Sample Descriptio SANDY GRAVEL Sieve Time 10 (min)

Reduced by (X) Splitting ( ) Quartering ( ) Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed
2	1141.9	0	0	100
1½		0	0	100
1		0	0	100
¾		15.5	1.4	98.6
½		52.1	4.6	95.4
⅜		73.3	6.4	93.6
4		123.2	10.8	89.2
10	123.4	9.1	7.4	82.6
40		44.9	36.4	56.7
60		82.7	67.0	29.4
100		101.5	82.3	16.8
200		110.3	89.4	9.5

Finess Modules (FM) N/A (See ASTM C 136-83, Section 8.2)

MATERIALS FINER THAN NO. 200 SIEVE BY WASHING		Remarks
C = Percentage of material passing a 200 Sieve	N/A %	
D = Original Dry Weight of Sample	N/A g	WASHED FINE GRADING
E = Dry Weight of Sample After Washing/Sieve	N/A g	
C = <(D-E)/D>*100		

All data are accurately and c letely recorded. The test operator wa ined and use brated instruments.
Checked By; R. G. ALEXANDER Date 11-25-91

A-6400-204(2-87)

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GRAIN ANALYSIS PLOT

Sample No. 2-0785

Page 1 of 1

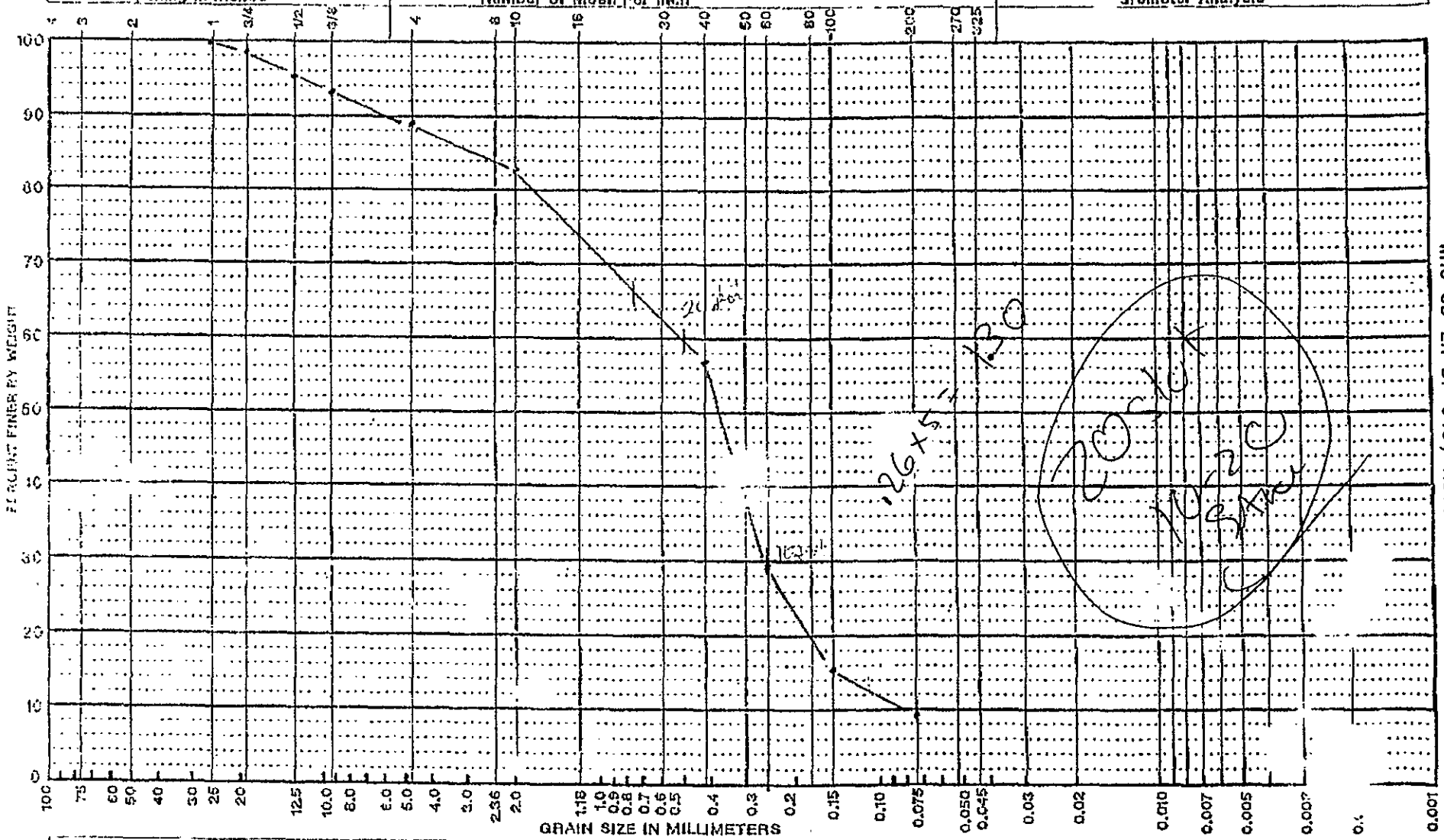
Procedure No. GEL-07 Rev. 1 Date Issued 11-15-89

Plotted By ENGLAND

Test Plan No. N/A Rev. N/A Date Issued N/A

Date 25-91

Size of Opening in Inches — Number of Mesh Per Inch — Hydrometer Analysis



Remarks SANDY GRAVEL

199-D8-6 105-108.5

All data are accurately and completely recorded. The test operator was trained and used calibrated instruments.

Checked By: R.G. ALEXANDER Date 11-25-91

SIEVE ANALYSIS DATA SHEET

Sample No. 2.0785 Page 1 of 1

Tested By: JERRY L. ENGLAND Date 11-25-91
Procedure No: GEL-07 Rev. 1 Date Issued 11-15-89
Test Plan No: N/A Rev. N/A Date Issued N/A
Balance: ETAL- 3310 Calibration Due Date 12-25-91
Thermometer: ETAL- 6013 Calibration Due Date 9-16-92
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A
N/A : ETAL- N/A Calibration Due Date N/A

Sample Description SAND Sieve Time 10 (min)

Reduced by ☒ Splitting ( ) Quartering ( ) Stockpile

Sieve Size	Sample Weight	Cumulative Wt. Retained	Cumulative % Retained	Cumulative % Passed
4	123.4	0	0	100
10	↑	9.1	7.4	92.6
40		44.9	36.4	63.6
60		82.7	67.0	33.0
100		101.5	82.3	17.7
200	↓	110.3	89.4	10.6
N/A	N/A	N/A	N/A	N/A
↓	↓	↓	↓	↓

Finess Modules (FM) N/A (See ASTM C 136-83, Section 8.2)

MATERIALS FINER THAN NO. 200 SIEVE BY WASHING		Remarks
C = Percentage of material passing a 200 Sieve	N/A %	
D = Original Dry Weight of Sample	N/A g	WASHED GRADING
E = Dry Weight of Sample After Washing/Sieve	N/A g	
C = <(D-E)/D>*100		

All data are accurately and completely recorded. The test operator was trained and used calibrated instruments.
Checked By: RG ALEXANDER Date 11-25-91

A-6400-204(2-87)

9313021.0189

9313021.0190

GRAIN SIZE ANALYSIS PLOT

Sample No. 2-0785

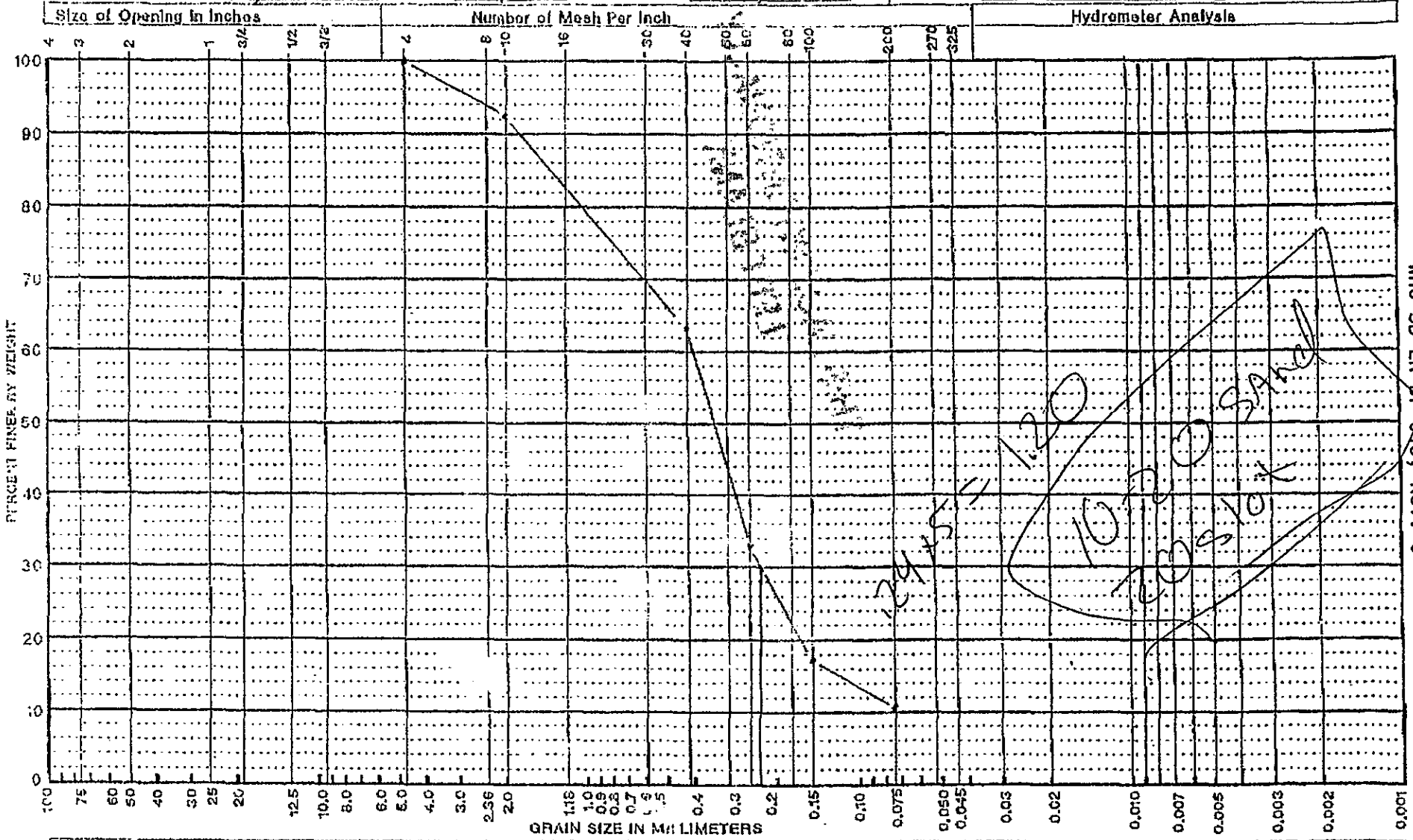
Page 1 of 1

Procedure No. GHL-07 Rev. 1 Date Issued 11-15-89

Plotted By JERRY L. ENGLAND

Test Plan No. N/A Rev. N/A Date Issued N/A

Date 11-25-91



Remarks SAND

199-08-9 105'-1086'

All data are accurately and completely recorded. The test operator was trained and used calibrated instruments.

Checked By: R.G. ALEXANDER Date 11-25-91

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APPENDIX C:

WELL DEVELOPMENT AND PUMP INSTALLATION

This appendix includes for each well: well development log; pump installation report.

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WELL 199-D5-13

9313023.0193

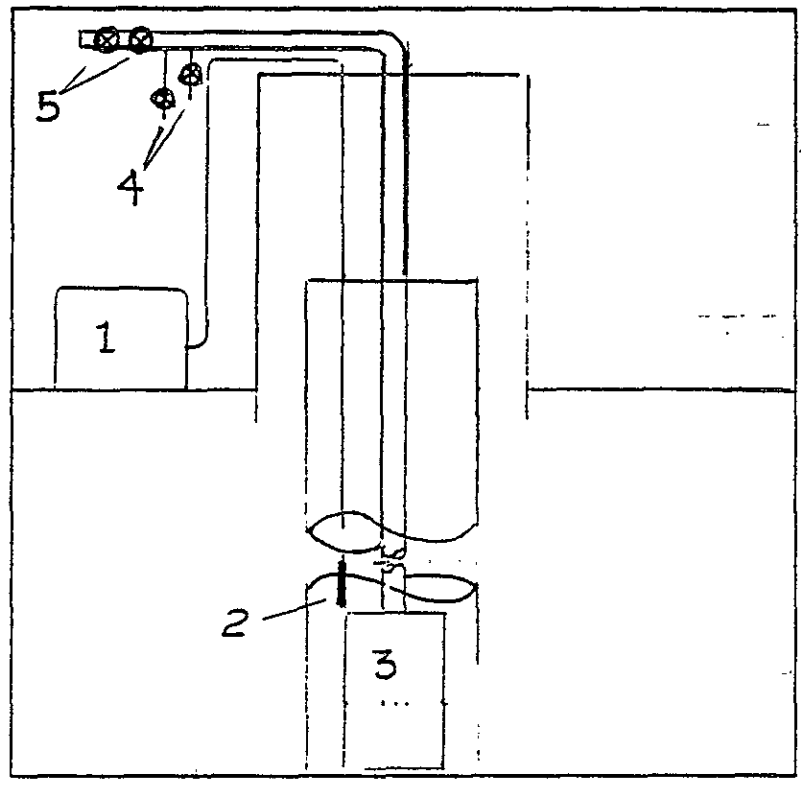
EQUIPMENT CONFIGURATION AND WELL HEAD DIAGRAM

Well Designation 199-D5-~~8~~ 13 JAC Depth 101.1' BTOC

Equipment Configuration

Item	Description
1	HERMIT DATA LOG. SN-11B700
2	TRANSDUCER SN-23241
3	PUMP
4	SAMPLING PORTS
5	SHUT OFF VALVES

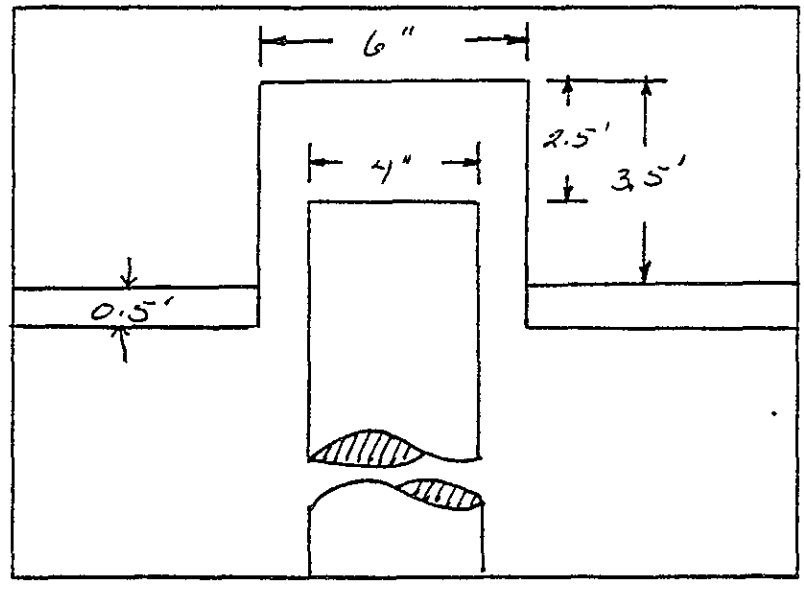
Diagram



Well Head

Comments

Diagram



Signature of Recorder JAMES A. COATES JAMES A. COATES Date 12-11-91

399

WELL DEVELOPMENT FORM

Well Designation 199-D5-13 Well Depth 101.1' BTOC

Screened Interval 101.1' - 80.36' BTOC Date Well Development is Performed 12-6-91

BAILING

Water Level Prior to Bailing _____ Time of Measurement _____

Volume of Bailer _____ Number of Bails Removed _____ Gallons _____

Summary Description of Water Removed _____

Water Level After Bailing _____ Time of Measurement _____

SURGE BLOCK

Type of Surge Block _____ Dimension of Surge Block _____

TD BEFORE	STROKE LENGTH	STROKE FREQUENCY	SURGE INTERVAL	SURGE TIME	TD AFTER	TD DIFFERENCE

AIRLIFT

Depth of Eductor Pipe _____ Airlift Start Time _____

Flow Rate _____ Accumulated Flow _____ Airlift Stop Time _____

Turbidity _____, _____, _____, _____, _____, _____, _____, _____

_____, _____, _____, _____, _____, _____, _____, _____

MECHANICAL PUMPING

Pumping Technique Constant Discharge Pump Depth 99.9' BTOC Pump Start Time 0805 | 1100

Flow Rate 12.5 GPM | 5.1 GPM Accumulated Flow 1500 gal Pump Stop Time 0900 | 1340

Turbidity 81 NTU, 39 NTU, 21 NTU, 12 NTU, 10 NTU, 27 NTU, 16 NTU, 7.9 NTU

6.3 NTU, 14. NTU, 12 NTU, 9.8 NTU, 7.8 NTU, 3.6 NTU, -, -

Comments Hydrostar pump used to develop borehole from 1100 - 1340.

Signature of Recorder JAMES A. GATES JAMES A. GATES Date 12-11-91
Sign and Print Name

A-6000-393 (03/90)

9313021.0195

SAMPLING PUMP INSTALLATION FORM

VALIDATED KDR 2/12/92 SIGNATURE

Well Number 199-D5-B

Pump Mode. 8001

Installed by: B STRODE / M MUNSON

Depth to Bottom 101.1

Well 100D

Type ANDROSMAN

Installed: 12-6-91

Depth to water: 86.71

Reported Depth to water:

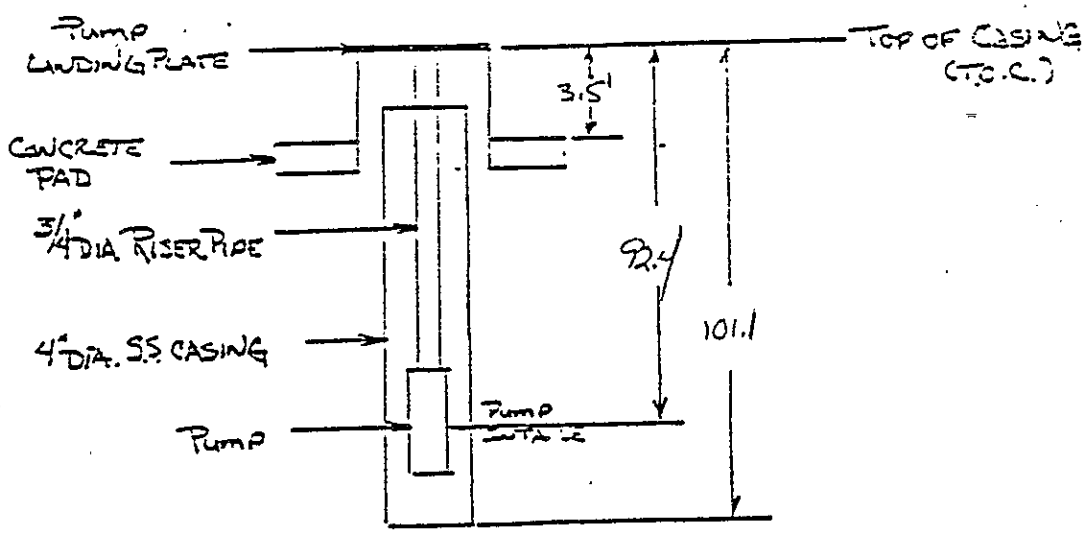
Screened Interval (2074) 101.1 - 80.36

Pump/Riser Pipe Description:
- pipe: 3/4" S.S. DISCHARGE
- pump length: 4.3
- pump screen length: 1.9
- material cleaning: MANUFACTURER

Comments:

PUMP INSTALLATION SKETCH

Total material length 94.3
Loc. of pump intake: 92.4



Completed By: J.A LOMAS

Date: 12-6-91

9313021.0196

WELL 199-D8-4

9313021.0197

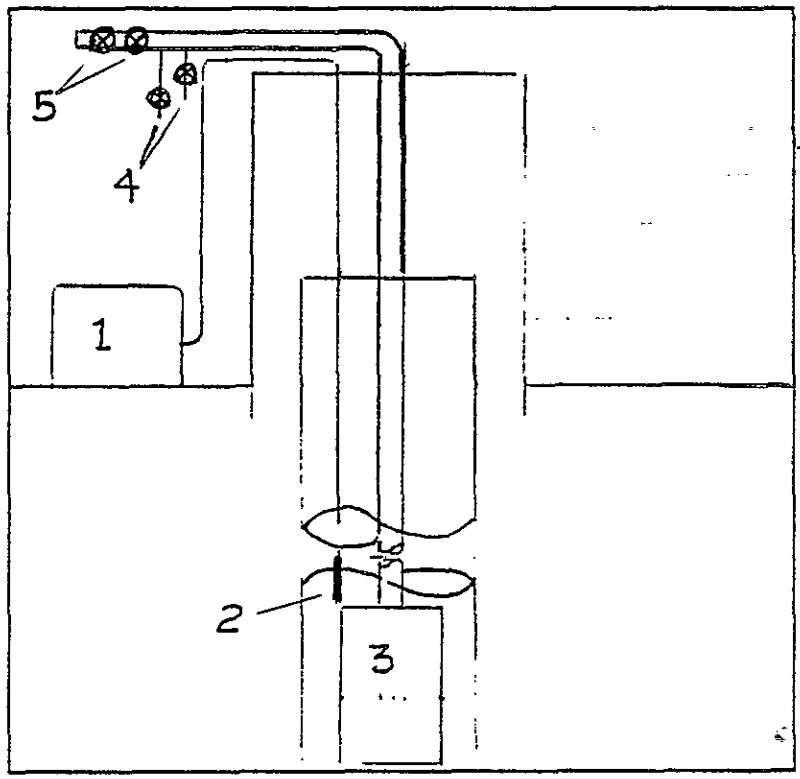
EQUIPMENT CONFIGURATION AND WELL HEAD DIAGRAM

Well Designation 199-D8-4 Depth 97.34'

Equipment Configuration

Item	Description
1	HERMIT DATA LOG. SN-2K192
2	TRANSDUCER SN-2324
3	PUMP
4	SAMPLING PORTS
5	SHUT OFF VALVES

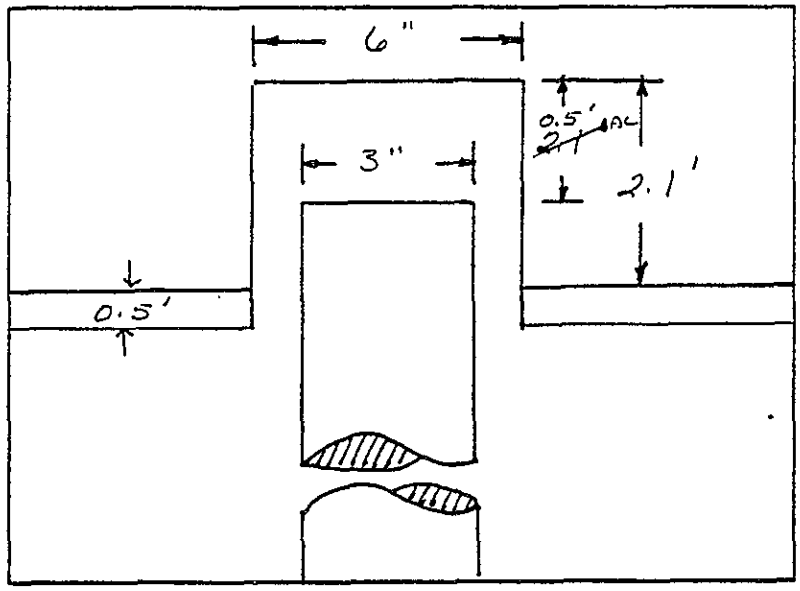
Diagram



Well Head

Comments

Diagram



Signature of Recorder James A. Coates James A. Coates Date 12-11-91

3/15

WELL DEVELOPMENT FORM

Well Designation 199-D8-4 Well Depth 97.34' BTOC

Screened Interval 97.34'-77.32' BTOC Date Well Development is Performed 12-4-91

BAILING

Water Level Prior to Bailing _____ Time of Measurement _____

Volume of Bailer _____ Number of Bails Removed _____ Gallons _____

Summary Description of Water Removed _____

Water Level After Bailing _____ Time of Measurement _____

SURGE BLOCK

Type of Surge Block _____ Dimension of Surge Block _____

TD BEFORE	STROKE LENGTH	STROKE FREQUENCY	SURGE INTERVAL	SURGE TIME	TD AFTER	TD DIFFERENCE

AIRLIFT

Depth of Eductor Pipe _____ Airlift Start Time _____

Flow Rate _____ Accumulated Flow _____ Airlift Stop Time _____

Turbidity _____, _____, _____, _____, _____, _____, _____, _____

_____, _____, _____, _____, _____, _____, _____, _____

MECHANICAL PUMPING

Pumping Technique Positive Displacement Pump Depth 94.5' BTOC Pump Start Time 1030

Flow Rate 5.4 GPM / 5.1 GPM Accumulated Flow 3200 gal Pump Stop Time 1805

Turbidity 7100 NTU, 98 NTU, 52 NTU, 40 NTU, 26 NTU, 29 NTU, 9.8 NTU, 10.2 NTU, 11.0 NTU/11.0 NTU, 9.2 NTU, 10.1 NTU, 8.5 NTU, 6.4 NTU, 5.6 NTU, 5.2 NTU, 4.7 NTU

Comments Hydrostar used to develop well. Borehole diameter too small to use development pump.

Signature of Recorder James A. Coates James A. Coates Date 12-11-91
Sign and Print Name

A-6000-393 (03/90)

9313021.0199

SAMPLING PUMP INSTALLATION FORM

VALIDATED
KDR 2/12/92
SIGNATURE DATE

Project: W017 / 100D

Well Number 199-D8-4

Pump Type HYDROSTAR

Pump Model 8001

Date Installed: 12/4/91

Installed by: B. STRODE / M MUNSON

Depth to water: 84.69

Depth to Bottom 97.34

Reported Depth to water:

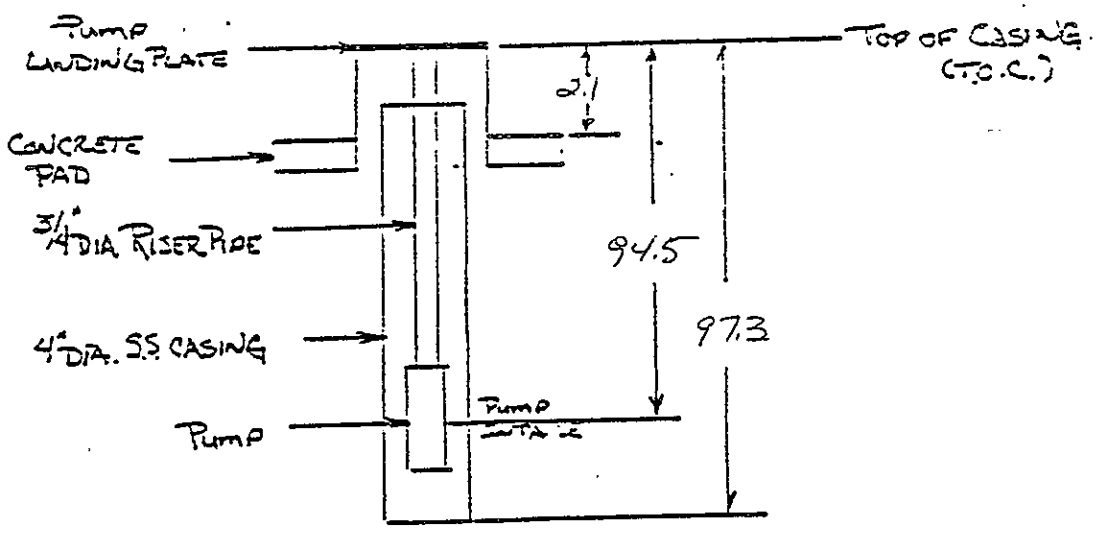
Screened Interval: 97.34 - 77.32

Pump/Riser Pipe Description:
pipe: 3/4" S.S.
pump length: 4.4
pump screen length 2.0
material cleaning: MANUFACTURER

Comments:

PUMP INSTALLATION SKETCH

Total material length 96.4
Loc. of pump intake: 94.5



Completed By: J A. Coates

Date: 12.4.91

93130210200

2.3
2.84
92.50

WELL 199-D8-5

9313021.0201

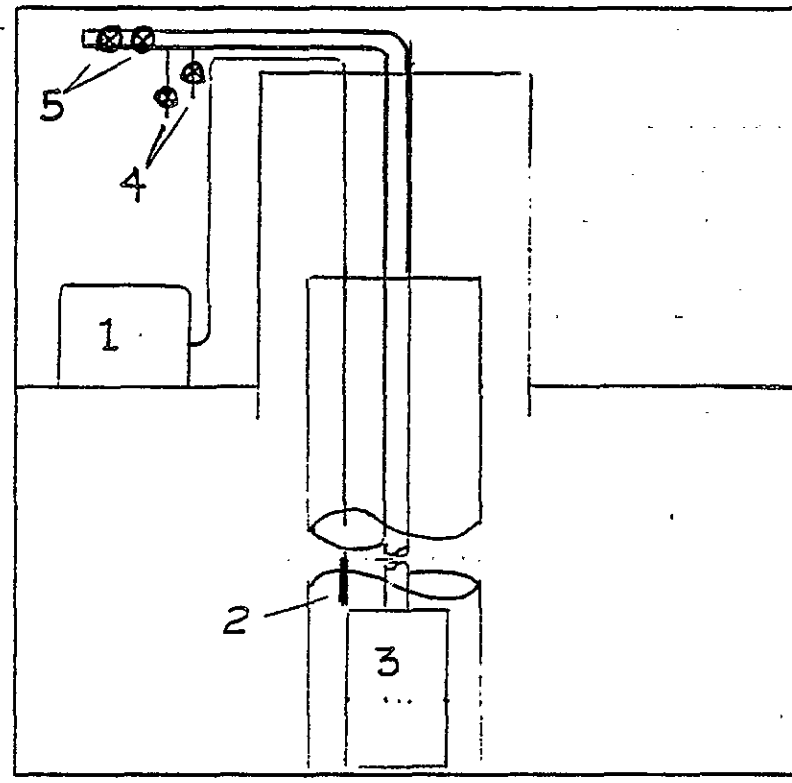
EQUIPMENT CONFIGURATION AND WELL HEAD DIAGRAM

Well Designation 199-D8-5 · Depth 86.71' BTOC

Equipment Configuration

Item	Description
1	HERMIT DATA LOG. SN-2K192
2	TRANSDUCER SN-2324
3	PUMP
4	SAMPLING PORTS
5	SHUT OFF VALVES

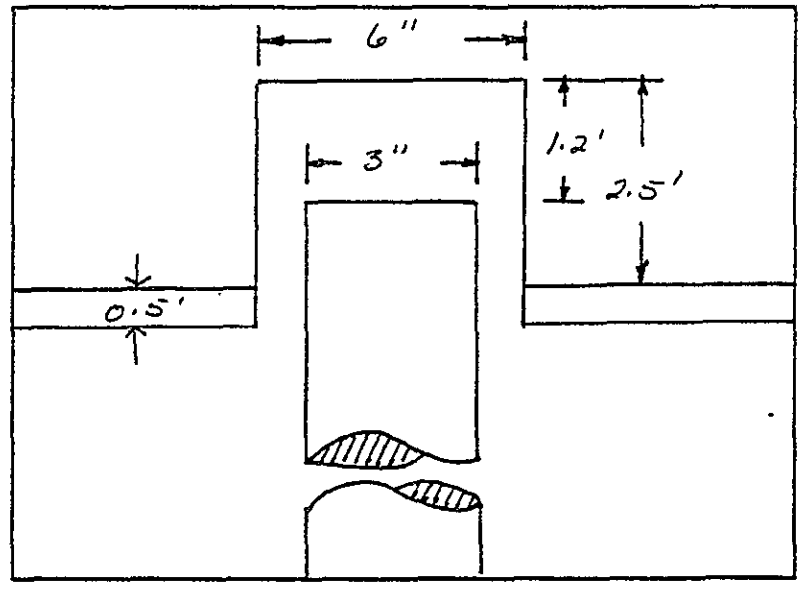
Diagram



Well Head

Comments

Diagram



Signature of Recorder James A. Coates James A. Coates Date 12-1-91

A-6000-417 (08/89)

9313021.0202

SAMPLING PUMP INSTALLATION FORM

VALIDATED
KRR 2/24/92
SIGNATURE DATE

Project: W-017 / 100D

Well Number 199-D8-5

Pump Type HYDROSTAR

Pump Model 8001

Date Installed: 12-5-91

Installed by: B. STRODE

Depth to water: 69.98

Depth to Bottom 86.71

Reported Depth to water: ~~86.71~~ 66.71

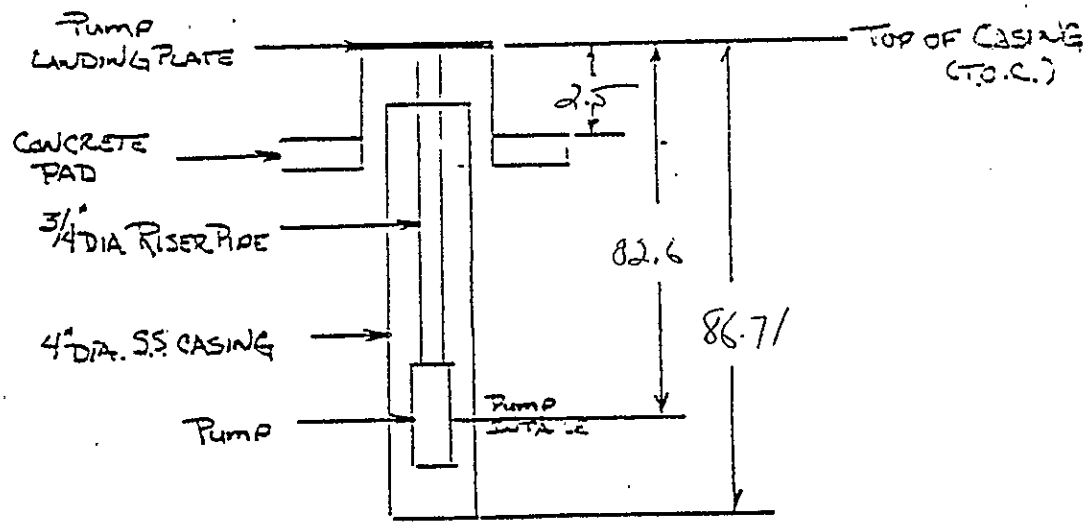
Screened Interval: 86.71-66.71'

Pump/Riser Pipe Description:
- pipe: 3/4" S.S DISCHARGE
- pump length: 4.3
- pump screen length: 1.9
- material cleaning: MANUFACTURES

Comments:

PUMP INSTALLATION SKETCH

Total material length 84.3
Loc. of pump intake: 82.6



Completed By: J.A. COATES

Date: 12-5-91

WELL DEVELOPMENT FORM

Well Designation 199-D8-5 Well Depth 86.71' BTOC

Screened Interval 86.71' - 66.71' BTOC Date Well Development is Performed 12-5-91

BAILING

Water Level Prior to Bailing _____ Time of Measurement _____

Volume of Bailer _____ Number of Bails Removed _____ Gallons _____

Summary Description of Water Removed _____

Water Level After Bailing _____ Time of Measurement _____

SURGE BLOCK

Type of Surge Block _____ Dimension of Surge Block _____

TD BEFORE	STROKE LENGTH	STROKE FREQUENCY	SURGE INTERVAL	SURGE TIME	TD AFTER	TD DIFFERENCE

AIRLIFT

Depth of Eductor Pipe _____ Airlift Start Time _____

Flow Rate _____ Accumulated Flow _____ Airlift Stop Time _____

Turbidity _____, _____, _____, _____, _____, _____, _____, _____

_____, _____, _____, _____, _____, _____, _____, _____

MECHANICAL PUMPING

Pumping Technique Positive Displacement Pump Depth 82.6' BTOC Pump Start Time ~~1100~~ 1220

Flow Rate 2.3 GPM Accumulated Flow 160 gal Pump Stop Time 1330

Turbidity 7100 NTU, 7.3 NTU, 12.2 NTU, 7.0 NTU, 31 NTU, –, –, –

–, –, –, –, –, –, –, –

Comments Hydrostar used to develop pump.

Signature of Recorder James A. Gates James A. Gates Date 12-1-91

Sign and Print Name

A-6000-393 (03/90)

9313021.0204

WELL 199-D8-6

9313021.0205

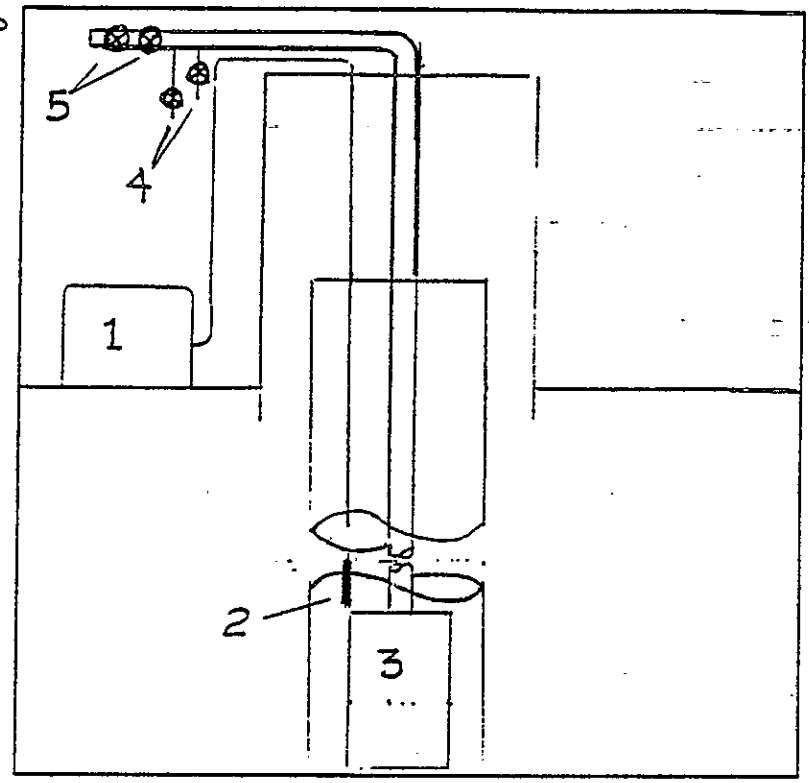
EQUIPMENT CONFIGURATION AND WELL HEAD DIAGRAM

Well Designation 199-D8-6 Depth 109.41' BTOC

Equipment Configuration

Item	Description
1	HERMIT DATA LOG. SN-1K3700
2	TRANSDUCER SN-1989
3	PUMP
4	SAMPLING PORTS
5	SHUT OFF VALVES

Diagram

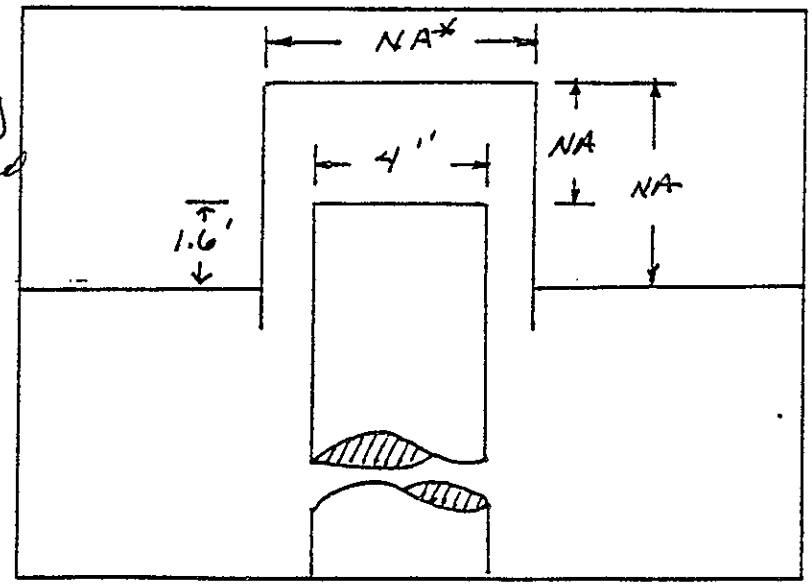


Well Head

Comments

*No outer 6" casing
- reference from Top of 4" Casing (TOC)
- no outer casing, well developed without pad.

Diagram



Signature of Recorder JAMES A. GATES JAMES A. GATES Date 12/23/91

A-6000-417 (08/89)

9313021.0206

2 of 2

Well-Head Configuration
Information

Well No. 199-D8-6

Date: 4/10/92

WELL INFORMATION

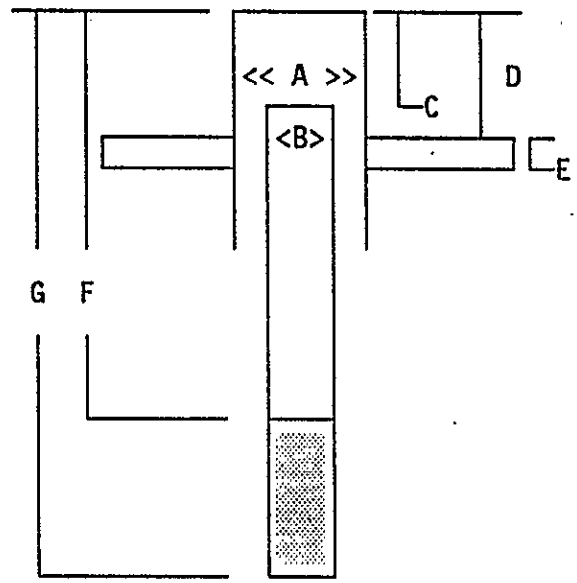
A. Outer Casing Diameter 6"

B. Inner Casing Diameter 4"

C. Difference in stick-up 1.70'

D. Stick-up of outer casing 2.72'

E. Thickness of well pad 0.5'



Comments: Development original performed on 12/21/~~92~~ 91 Hydrostar original installed on 12/23/~~92~~ 91 Bret did not pour the pad, it was done "by hand" (not up to Bret's quality). No additional 4" was added. The pad was a standard 4'x 4'.

9313021.0207

BTOC = Below Top Of Casing.

BLS = Below Land Surface

SAMPLING PUMP INSTALLATION FORM

VALIDATED
KDR 3/12/92
SIGNATURE/DATE

1 of 2

Project: W017

Well Number 199-D8-6

Pump Type HYDROSTAR

Pump Model 8001

Date Installed: 12-23-91

Installed by: B. STREDE / M. MANSON

Depth to water: 90.45 TOP OF 4"

Depth to Bottom 109.41

Reported Depth to water: —

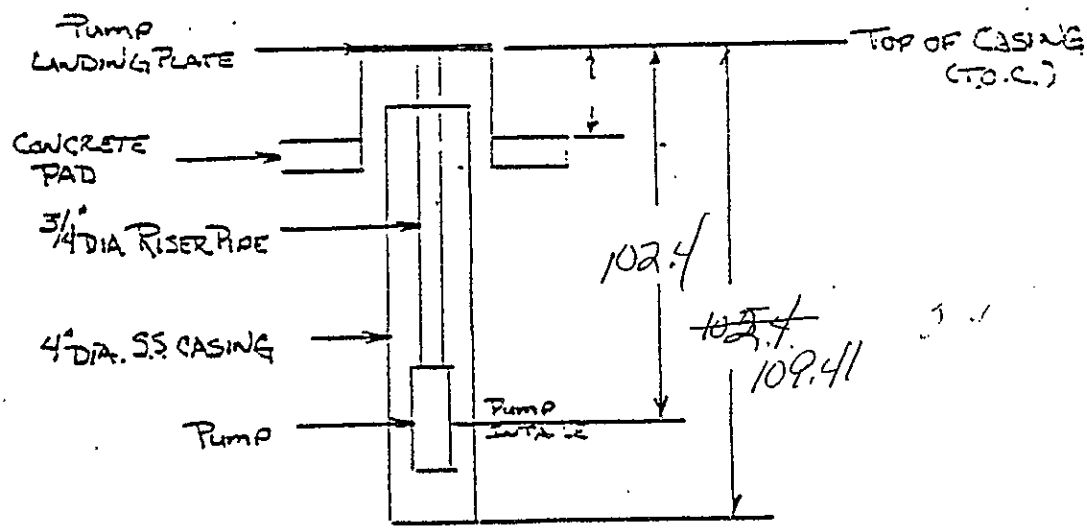
Screened Interval: 109.4' - 89.39' BTOC

Pump/Riser Pipe Description:
pipe: 3/4" S.S. DISCHARGE
pump length: 41.3
pump screen length 1.9
material cleaning: MANUFACTURES

Comments: — NOTE 6" PROTECTIVE CASING & PADS NOT POURED
PUMP INSTALLED ON 4" S.S. CASING

PUMP INSTALLATION SKETCH

Total material length 104.3
Loc. of pump intake: 102.4



Completed By: J.A. COATES

Date: 12-23-91

9213021.0208

3910

WELL DEVELOPMENT FORM

Well Designation 199-D8-6 Well Depth 109.41' BTOC

Screened Interval 109.41' - 89.39' BTOC Date Well Development is Performed 12-21-91

BAILING

Water Level Prior to Bailing _____ Time of Measurement _____

Volume of Bailer _____ Number of Bails Removed _____ Gallons _____

Summary Description of Water Removed _____

Water Level After Bailing _____ Time of Measurement _____

SURGE BLOCK

Type of Surge Block _____ Dimension of Surge Block _____

TD BEFORE	STROKE LENGTH	STROKE FREQUENCY	SURGE INTERVAL	SURGE TIME	TD AFTER	TD DIFFERENCE

AIRLIFT

Depth of Eductor Pipe _____ Airlift Start Time _____

Flow Rate _____ Accumulated Flow _____ Airlift Stop Time _____

Turbidity _____, _____, _____, _____, _____, _____, _____, _____

_____, _____, _____, _____, _____, _____, _____, _____

MECHANICAL PUMPING

Pumping Technique CONSTANT DISCHARGE Pump Depth 108.2' BTOC Pump Start Time 1225

Flow Rate 5.5 GPM Accumulated Flow 1018 GAL Pump Stop Time 1530

Turbidity >100 NTU, 65 NTU, 51 NTU, 22 NTU, 15 NTU, 12 NTU, 11 NTU, 9.2 NTU

8.3 NTU, 7.8 NTU, 6.0 NTU, 4.9 NTU, -, -, -, -

Comments _____

Signature of Recorder James A. Coates JAMES A. COATES Date 12/23/91

Sign and Print Name

A-6000-393 (03/90)

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APPENDIX D:

AQUIFER TESTS

This appendix includes aquifer test data and interpretations for each well.

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APPENDIX D:

Aquifer Tests in Wells D5-13, D8-5, and D8-6

This appendix includes descriptions and interpretations of aquifer tests conducted in three new 100-D Ponds wells in 1991. Data and interpretations are compiled by well. For each aquifer test there is an "Aquifer Test Summary" form. Raw data and data plots follow the summary form.

D.1 SUMMARY OF AQUIFER TEST RESULTS

Table D-1 presents results of aquifer tests in wells D5-13, D8-5, and D8-6. Well D8-4 was not tested because equipment was not available to fit in its narrower casing. Data collected during well development were not useful for estimating aquifer properties. Estimated hydraulic conductivity from slug withdrawal data ranged from 3.9 ft/d at well D8-5 to 130 ft/d at well D5-13.

Table D-2 summarizes well completion and geologic information for the four wells. Well D8-5 encountered more fine-grained sediments than the other wells; its hydraulic conductivity was also the lowest of the three wells tested. However, it is important to note that well D8-5 was slug tested before development and the other wells were tested after development. Hydraulic conductivity in the vicinity of well D8-5 may have increased after development.

9313021.0212

D.2 WELL DEVELOPMENT TESTS

D.2.1 Field Procedures

The wells were pumped after completion to develop the sand pack and reduce turbidity. The water level was measured with an electrical tape before development and a pressure transducer was set to the measured level. In the data tables that follow, the "Reference" value is measured depth to water in feet. The tables labeled "Baseline" are transducer data collecte prior to starting development. The water level was monitored with a pressure transducer while the well was pumped and after the pump was shut off, until within 95% of its static level.

D.2.2 Data Analysis

None of the development data were useful for analyzing hydraulic properties. Two of the wells were developed with Hydrostar pumps, which pump with a pulsing action and do not maintain a constant discharge. The other wells also had changes in pumping rates.

D.3 SLUG INJECTION AND SLUG WITHDRAWAL TESTS

Slug tests can often provide an estimate of aquifer properties in the immediate vicinity of a borehole. Slug injection and withdrawal were performed on three of the 100-D Ponds wells.

D.3.1 Field Procedures

The water level was measured with an electrical tape before the test and a pressure transducer was set to the measured level. A solid slugging rod was suddenly submerged in the water column of the well. The water level was measured with a pressure transducer until it had returned to nearly static. The slugging rod was then withdrawn from the water column, and water level monitored again until it returned to static.

D.3.2 Data Analysis

Two methods of analysis were attempted: Cooper et al. (1967) and Bouwer and Rice (as modified by Bouwer, 1989). The Cooper method accounts for borehole and aquifer storage; the Bouwer and Rice method treats the well as having an infinitesimally small diameter.

The Cooper method involves plotting log time on the horizontal axis and the change in head divided by initial change in head on the vertical axis. For the 100-D tests the initial change in head was assumed to be 1.5 or 2.6 ft, the theoretical displacement from a slug volume of 0.13 ft^3 in a 4-in or 3-in diameter well, respectively. Theoretical values were used because the measured change in head oscillated.

The Cooper method was applied to the 100-D ponds slug tests, but most data were not matchable to the type curves. The data that could be matched (well D8-6 withdrawal) fit best with the "line source approximation" curve.

The Bouwer and Rice method is designed for fully- or partially-penetrating wells in unconfined aquifers. Time is plotted on the horizontal axis and the log of depth to water (or log of change in water level) on the vertical axis. The updated method (Bouwer, 1989) also accounts for the sand pack around the screen, which effectively increases the diameter of the screened interval. An effective casing radius is also calculated. Definitions are illustrated in figure D-1.

The 100-D Ponds slug test data were plotted by hand, and a best-fit line was chosen visually. A computer program was used to perform Bouwer and Rice calculations. The program requires inputting the y-intercept of the line, and the head at some time t; it uses these data to calculate the slope of the line. It also calculates an effective casing radius and other parameters required by the Bouwer and Rice method.

D.3.3 Assumptions and Limitations

Slug tests stress a relatively small portion of the aquifer immediately around the borehole. Results may not be representative of the entire aquifer.

Slug withdrawal data are generally more representative of aquifer properties than are injection data when injection wets a previously unsaturated portion of the formation. This was the case in the 100-D slug tests.

9313021.0213

Measured water levels at the start of some of the slug injection tests were greater than what was calculated based on the volume of the slugging rod. In all cases, slug injection caused oscillations in water level. These very early data were not used in analyzing the data.

Other input parameters to the Bouwer and Rice methods are porosity of the sand pack and aquifer thickness. Two of the boreholes penetrated the entire aquifer; aquifer thickness was estimated for the other two wells. Sand pack porosity was estimated. Additional limitations are included in the discussion of individual tests.

9313021.0244

Table D-1. SUMMARY OF AQUIFER TESTS AT 100-D RCRA WELLS, 1991

Well		Drawdown/Recovery	Slug Injection	Slug Withdrawal
D5-13	K (ft/d)	Not determined	Not determined	130
	T (ft^2/d)	Not determined	Not determined	1800
D8-4	K (ft/d)	Not determined	Not tested	Not tested
	T (ft^2/d)	Not determined	Not tested	Not tested
D8-5	K (ft/d)	Not determined	2.2	3.9
	T (ft^2/d)	Not determined	29	51
D8-6	K (ft/d)	Not determined	Not determined	29
	T (ft^2/d)	Not determined	Not determined	560

Transmissivity was calculated according to the equation T=Kb, where b is the thickness of the screened interval below the water table. For well D8-5, the entire aquifer thickness was screened. Wells D5-13 and D8-6 had only part of the aquifer screened.

Table D-2. Summary of Geologic Logs and construction information for screened interval of 1991 Wells.

Well	Screened Interval		Depth of Hanford/ Ringold Contact	Sand pack	Screen	Comments
	Depth bls	Lithologic Log				
D5-13	97.3 - 76.3	Mostly sandy gravel. Poorly sorted. Aquifer is in the Ringold Formation.	50 ft	20-40 mesh	10-slot	Sampled with hard tool and drive barrel.
D8-4	94 - 74	Sand, gravel, and sandy gravel. Poorly to moderately sorted. Aquifer is in the Ringold Formation.	50 ft	10-20 mesh	10-slot	Sonic rig.
D8-5	83 - 63	Silty sandy gravel, sandy gravel, sand, and gravelly clay. Mostly poorly sorted. Aquifer is in the Ringold Formation.	44 ft	10-20 mesh	10-slot	Sonic rig. Tested before development.
D8-6	107.8 - 87.5	Sand and gravel. Aquifer is in the Ringold Formation.	70 ft	10-20 mesh	20-slot	Sampled with hard tool.

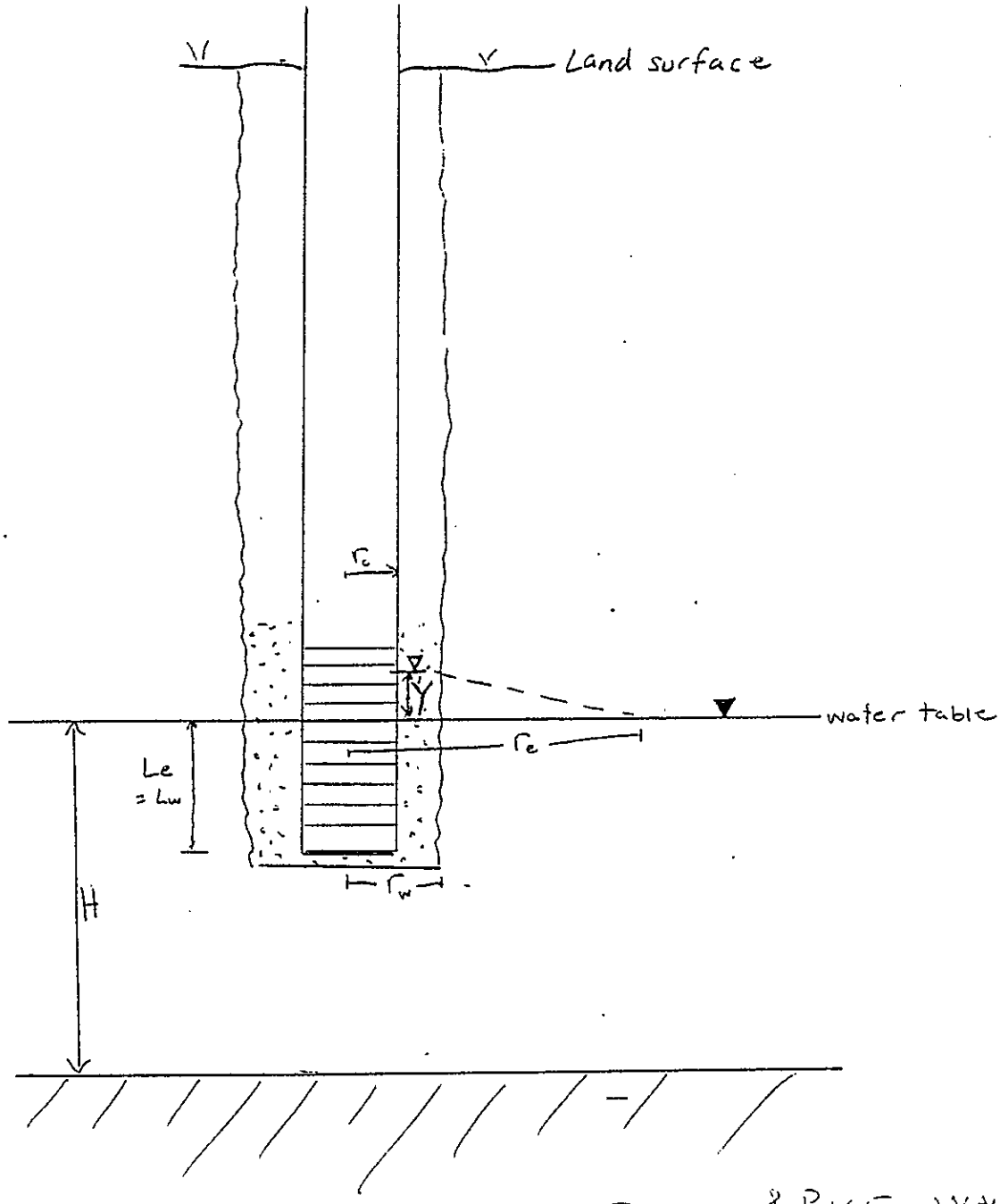

FIG. D-1: DEFINITION OF TERMS FOR BOUWER & RICE ANALYSES

9313021.0216

REFERENCES FOR APPENDIX D

Bouwer, H., 1989, "The Bouwer and Rice Slug Test -- An Update," in Ground Water, v. 27, no.3, pp. 304-309.

Cooper, H.H. Jr., J.D. Bredehoeft, and I.S. Papadopulos, 1967, "Response of a finite diameter well to an instantaneous charge of water," in Water Resources Research, vol. 3, no. 1, pp. 263-269.

93/302/1.027

WELL 199-D5-13

9313021.0218

AQUIFER TEST SUMMARY

WELL 199-D5-13 DEVELOPMENT AND RECOVERY

Purpose of Tests: The well was pumped for development. Water levels were measured during drawdown and recovery for use in estimating aquifer transmissivity.

Hydrogeologic Unit Tested: The uppermost aquifer (Ringold Formation), comprising sand and gravel

Thickness of Aquifer: 24 ft (estimated from aquifer thickness at well D8-4; borehole D5-13 did not fully penetrate aquifer)

Depth of Screened or Open Interval Exposed to Aquifer During Test: Screened 101.1 to 80.36 ft below top of casing; Water level at 86.71 ft below top of casing; tested thickness = 14.4 ft

Diameter of Well Casing: 4 in (0.333 ft)

Diameter of Well Screen: 4 in (0.333 ft)

Diameter of Screen plus Sand Pack: 8 in (0.667 ft)

Porosity of Sand Pack: 0.30 (estimated)

Observation Well(s) Used: None Distance from Pumping Well: N/A

Depth of Screened Interval of Observation Well: N/A

Date of Tests: 6 Dec 92 Start Time of Test: 08:05

Pumping Rate: average discharge = 12.5 gal/min (2410 ft^3/d)

Duration of Test: Discharge: 42 min; Recovery monitored for 10 min

Water-Level Measurement Methods: E-tape and pressure transducer with data logger

Maximum Change in Water Level: 3.13 ft

RESULTS: Drawdown data were plotted on semilog paper for analysis by Cooper and Jacob method; however, data could not be analyzed. The water level rose sharply near the end of development, but was lower again at the start of recovery data. The well was re-developed with a Hydrostar pump later, but drawdown and recovery data were not recorded.

9313021.0219

DRAWDOWN/RECOVERY

Well Designation 199-D5-13 Date 12-6-91

Well Depth 101.1' BTOC Screened Interval 101.1'-80.36' BTOC

Pumping Method CONSTANT DISCHARGE

Equipment Used to Measure Water Level E.TAPE/TRANSDUCER S.N. ET-1/2324 Calibation Due 1-24-92/7-19-92

Equipment Used to Measure Flow —NA— S.N. —NA— Calibation Due —NA—

Measuring Point TOP OF CASING 6" (T.O.C. 6") Pump Start Time 0905/1100 Pump Stop Time 0900/1340

Time		Water Level		Discharge
Date	Time	Reading Unit:	Water Level Unit:	Reading Unit:
				BUCKET METHOD.
				5 gal/24 sec = 12.5 GPM
				5 gal/58 sec/50 strokes = 5.1 GPM
		SEE		
		ATTACHED		

Signature of Recorder James A. Coates JAMES A. COATES Date 12-11-91

Sign and Print Name

A-6000-402 (03/90)

9313021.0220

WELL D5-13 BASELINE

p 2 of 7

SE1000B
Environmental Logger
12/09 07:34

Unit# 00700 Test# 0

INPUT 1: Level (F) TOC

Reference 86.71
Scale factor 10.09
Offset 0.00

Step# 0 12/06 07:33

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft
0.0000	0.0000	86.710	-86.710
1.0000	0.0167	86.700	-86.700
2.0000	0.0333	86.700	-86.700
3.0000	0.0500	86.700	-86.700
4.0000	0.0667	86.700	-86.700
5.0000	0.0833	86.700	-86.700
6.0000	0.1000	86.700	-86.700
7.0000	0.1167	86.700	-86.700
8.0000	0.1333	86.700	-86.700
9.0000	0.1500	86.700	-86.700
10.0000	0.1667	86.700	-86.700
11.0000	0.1833	86.700	-86.700
12.0000	0.2000	86.700	-86.700
13.0000	0.2167	86.700	-86.700

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WELL D5-13 DEVELOPMENT

p 3 of 7

SE1000B
Environmental Logger
12/09 07:30

Unit# 00700 Test# 1

INPUT 1: Level (F) TOC

Reference 86.71
Scale factor 10.09
Offset 0.00

Step# 0 12/06 08:05

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.0000	0.0000	86.710	-86.710	0
0.0033	0.0001	86.880	-86.880	0.17
0.0066	0.0001	86.900	-86.900	0.19
0.0099	0.0002	86.970	-86.970	0.26
0.0133	0.0002	87.020	-87.020	0.31
0.0166	0.0003	87.070	-87.070	0.36
0.0200	0.0003	87.100	-87.100	0.39
0.0233	0.0004	87.140	-87.140	0.43
0.0266	0.0004	87.170	-87.170	0.46
0.0300	0.0005	87.200	-87.200	0.49
0.0333	0.0006	87.230	-87.230	0.52
0.0500	0.0008	87.350	-87.350	0.64
0.0666	0.0011	87.440	-87.440	0.73
0.0833	0.0014	87.510	-87.510	0.8
0.1000	0.0017	87.570	-87.570	0.86
0.1166	0.0019	87.610	-87.610	0.9
0.1333	0.0022	87.650	-87.650	0.94
0.1500	0.0025	87.670	-87.670	0.96
0.1666	0.0028	87.700	-87.700	0.99
0.1833	0.0031	87.720	-87.720	1.01
0.2000	0.0033	87.730	-87.730	1.02
0.2166	0.0036	87.740	-87.740	1.03
0.2333	0.0039	87.760	-87.760	1.05
0.2500	0.0042	87.760	-87.760	1.05
0.2666	0.0044	87.770	-87.770	1.06
0.2833	0.0047	87.770	-87.770	1.06
0.3000	0.0050	87.750	-87.750	1.04
0.3166	0.0053	87.750	-87.750	1.04
0.3333	0.0056	87.740	-87.740	1.03
0.4167	0.0069	87.740	-87.740	1.03
0.5000	0.0083	87.770	-87.770	1.06

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WELL D5-13 DEVELOPMENT

p 4 of 7

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.5833	0.0097	87.830	-87.830	1.12
0.6667	0.0111	87.880	-87.880	1.17
0.7500	0.0125	87.930	-87.930	1.22
0.8333	0.0139	87.970	-87.970	1.26
0.9167	0.0153	88.030	-88.030	1.32
1.0000	0.0167	88.080	-88.080	1.37
1.0833	0.0181	88.130	-88.130	1.42
1.1667	0.0194	88.190	-88.190	1.48
1.2500	0.0208	88.240	-88.240	1.53
1.3333	0.0222	88.310	-88.310	1.6
1.4166	0.0236	88.360	-88.360	1.65
1.5000	0.0250	88.420	-88.420	1.71
1.5833	0.0264	88.490	-88.490	1.78
1.6667	0.0278	88.550	-88.550	1.84
1.7500	0.0292	88.600	-88.600	1.89
1.8333	0.0306	88.660	-88.660	1.95
1.9167	0.0319	88.730	-88.730	2.02
2.0000	0.0333	88.790	-88.790	2.08
2.5000	0.0417	89.040	-89.040	2.33
3.0000	0.0500	89.210	-89.210	2.5
3.5000	0.0583	89.310	-89.310	2.6
4.0000	0.0667	89.380	-89.380	2.67
4.5000	0.0750	89.450	-89.450	2.74
5.0000	0.0833	89.500	-89.500	2.79
5.5000	0.0917	89.530	-89.530	2.82
6.0000	0.1000	89.560	-89.560	2.85
6.5000	0.1083	89.580	-89.580	2.87
7.0000	0.1167	89.600	-89.600	2.89
7.5000	0.1250	89.620	-89.620	2.91
8.0000	0.1333	89.640	-89.640	2.93
8.5000	0.1417	89.640	-89.640	2.93
9.0000	0.1500	89.660	-89.660	2.95
9.5000	0.1583	89.670	-89.670	2.96
10.0000	0.1667	89.670	-89.670	2.96
12.0000	0.2000	89.700	-89.700	2.99
14.0000	0.2333	89.720	-89.720	3.01
16.0000	0.2667	89.740	-89.740	3.03
18.0000	0.3000	89.750	-89.750	3.04
20.0000	0.3333	89.770	-89.770	3.06
22.0000	0.3667	89.770	-89.770	3.06
24.0000	0.4000	89.790	-89.790	3.08
26.0000	0.4333	89.800	-89.800	3.09
28.0000	0.4667	89.810	-89.810	3.1
30.0000	0.5000	89.820	-89.820	3.11
32.0000	0.5333	89.840	-89.840	3.13
34.0000	0.5667	89.840	-89.840	3.13
36.0000	0.6000	89.840	-89.840	3.13
38.0000	0.6333	89.840	-89.840	3.13

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WELL D5-13 DEVELOPMENT

p 5 of 7

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
40.0000	0.6667	87.430	-87.430	0.72
42.0000	0.7000	87.160	-87.160	0.45

9313021.0224

WELL D5-13 RECOVERY AFTER DEVELOPMENT

p. 6 of 7

SE1000B
Environmental Logger
12/09 07:27

Unit# 00700 Test# 2

INPUT 1: Level (F) TOC

Reference 86.71
Scale factor 10.09
Offset 0.00

Step# 0 12/06 09:08

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.0000	0.0000	88.050	-88.050	1.34
0.0033	0.0001	88.040	-88.040	1.33
0.0066	0.0001	88.030	-88.030	1.32
0.0099	0.0002	88.020	-88.020	1.31
0.0133	0.0002	88.020	-88.020	1.31
0.0166	0.0003	88.010	-88.010	1.3
0.0200	0.0003	88.010	-88.010	1.3
0.0233	0.0004	88.000	-88.000	1.29
0.0266	0.0004	88.000	-88.000	1.29
0.0300	0.0005	87.990	-87.990	1.28
0.0333	0.0006	87.990	-87.990	1.28
0.0500	0.0008	87.950	-87.950	1.24
0.0666	0.0011	87.930	-87.930	1.22
0.0833	0.0014	87.900	-87.900	1.19
0.1000	0.0017	87.870	-87.870	1.16
0.1166	0.0019	87.850	-87.850	1.14
0.1333	0.0022	87.830	-87.830	1.12
0.1500	0.0025	87.800	-87.800	1.09
0.1666	0.0028	87.790	-87.790	1.08
0.1833	0.0031	87.760	-87.760	1.05
0.2000	0.0033	87.750	-87.750	1.04
0.2166	0.0036	87.730	-87.730	1.02
0.2333	0.0039	87.710	-87.710	1
0.2500	0.0042	87.700	-87.700	0.99
0.2666	0.0044	87.680	-87.680	0.97
0.2833	0.0047	87.670	-87.670	0.96
0.3000	0.0050	87.660	-87.660	0.95
0.3166	0.0053	87.650	-87.650	0.94
0.3333	0.0056	87.640	-87.640	0.93
0.4167	0.0069	87.590	-87.590	0.88
0.5000	0.0083	87.550	-87.550	0.84

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WELL D5-13 RECOVERY AFTER DEVELOPMENT

p. 7 of 7

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.5833	0.0097	87.520	-87.520	0.81
0.6667	0.0111	87.500	-87.500	0.79
0.7500	0.0125	87.480	-87.480	0.77
0.8333	0.0139	87.470	-87.470	0.76
0.9167	0.0153	87.460	-87.460	0.75
1.0000	0.0167	87.440	-87.440	0.73
1.0833	0.0181	87.430	-87.430	0.72
1.1667	0.0194	87.420	-87.420	0.71
1.2500	0.0208	87.400	-87.400	0.69
1.3333	0.0222	87.390	-87.390	0.68
1.4166	0.0236	87.370	-87.370	0.66
1.5000	0.0250	87.360	-87.360	0.65
1.5833	0.0264	87.350	-87.350	0.64
1.6667	0.0278	87.330	-87.330	0.62
1.7500	0.0292	87.320	-87.320	0.61
1.8333	0.0306	87.310	-87.310	0.6
1.9167	0.0319	87.300	-87.300	0.59
2.0000	0.0333	87.290	-87.290	0.58
2.5000	0.0417	87.230	-87.230	0.52
3.0000	0.0500	87.180	-87.180	0.47
3.5000	0.0583	87.140	-87.140	0.43
4.0000	0.0667	87.110	-87.110	0.4
4.5000	0.0750	87.090	-87.090	0.38
5.0000	0.0833	87.070	-87.070	0.36
5.5000	0.0917	87.050	-87.050	0.34
6.0000	0.1000	87.030	-87.030	0.32
6.5000	0.1083	87.010	-87.010	0.3
7.0000	0.1167	87.000	-87.000	0.29
7.5000	0.1250	86.990	-86.990	0.28
8.0000	0.1333	86.970	-86.970	0.26
8.5000	0.1417	86.970	-86.970	0.26
9.0000	0.1500	86.950	-86.950	0.24
9.5000	0.1583	86.940	-86.940	0.23
10.0000	0.1667	86.940	-86.940	0.23

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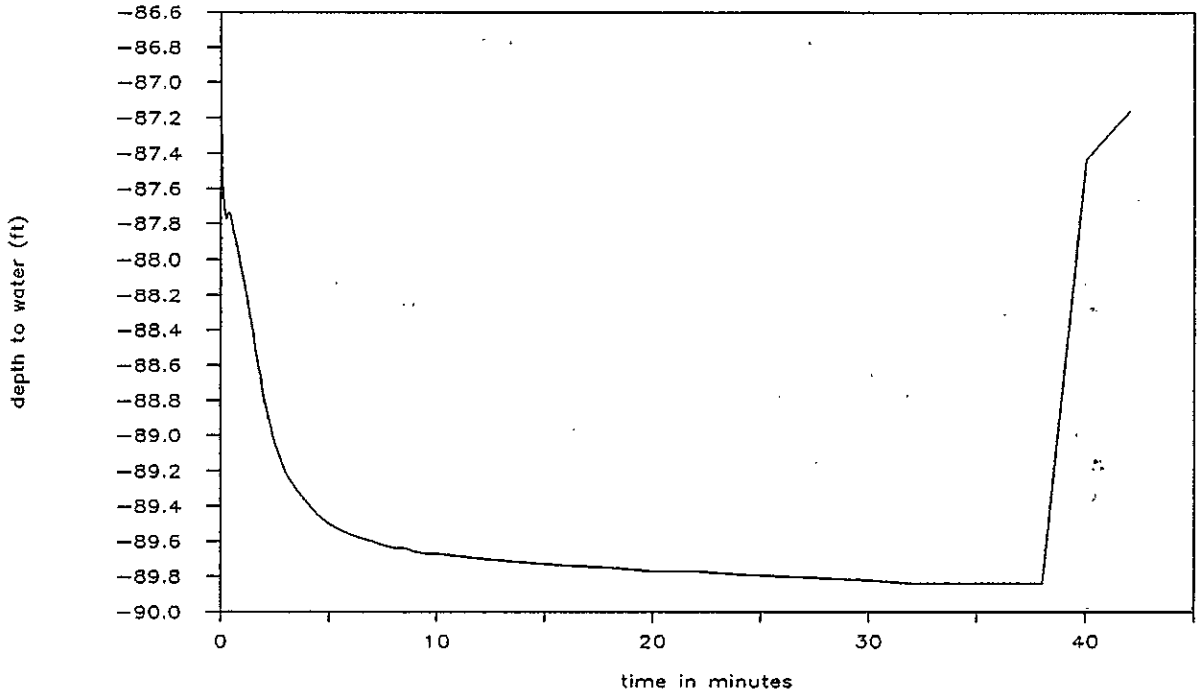
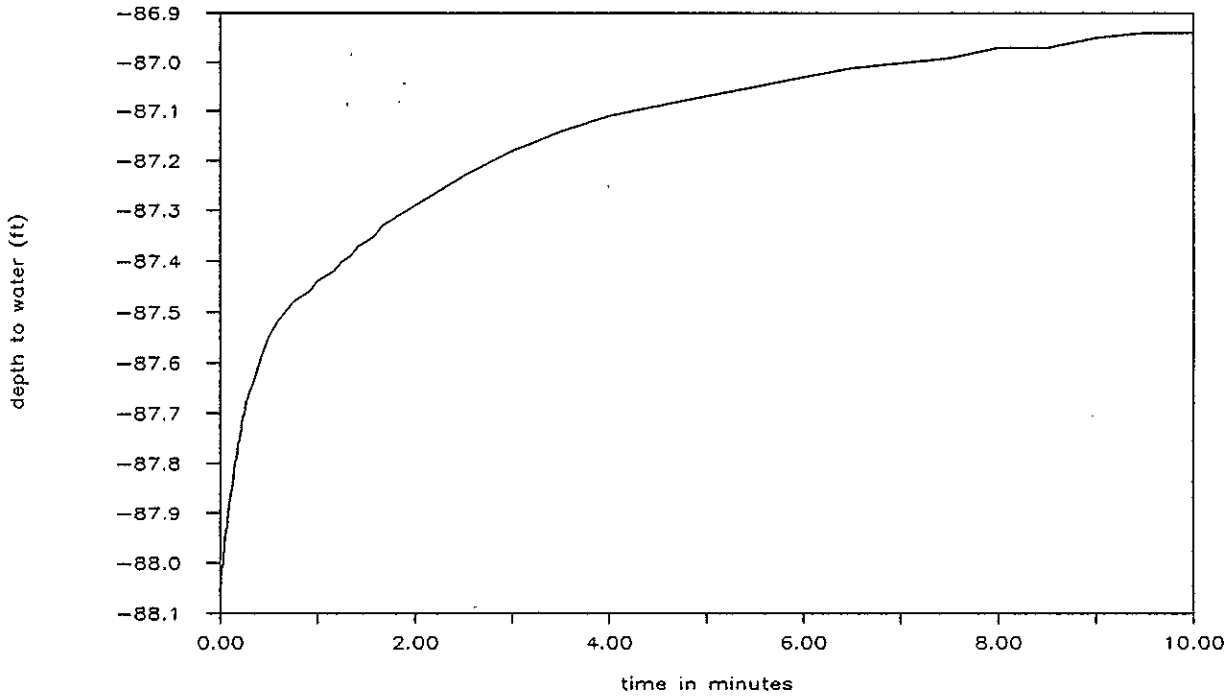
WELL D5-13 DEVELOPMENT



WELL D5-13 RECOVERY



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AQUIFER TEST SUMMARY

WELL 199-D5-13 SLUG INJECTION AND WITHDRAWAL

Purpose of Tests: to estimate aquifer transmissivity or hydraulic conductivity

Hydrogeologic Unit Tested: The uppermost aquifer (Ringold Formation), comprising sand and gravel

Thickness of Aquifer: Thickness of Aquifer: 24 ft (estimated from aquifer thickness at well D8-4; borehole D5-13 did not fully penetrate aquifer)

Depth of Screened or Open Interval Exposed to Aquifer During Test: Screened 101.1 to 80.36 ft below top of casing; Water level at 86.71 ft below top of casing; tested thickness = 14.4 ft

Diameter of Well Casing: 4 in (0.333 ft)

Diameter of Well Screen: 4 in (0.333 ft)

Diameter of Screen plus Sand Pack: 8 in (0.667 ft)

Porosity of Sand Pack: 0.30 (estimated)

Observation Well(s) Used: None Distance from Pumping Well: N/A

Depth of Screened Interval of Observation Well: N/A

Date of Tests: 6 Nov 91 Start Time of Test: 09:58

Slugging Rod Dimension: 2-in diameter by 6-ft length (0.13 ft^3)

Duration of Test: Injection: 14 min; Withdrawal: 10 min

Water-Level Measurement Methods: Steel tape and pressure transducer with data logger

Maximum Change in Water Level: 6.97 ft (see remarks)

RESULTS:

The maximum change in water level during slug injection was 6.97 ft, which is much greater than the theoretical displacement in a 4-in well casing from the given slug volume (i.e., 1.5 ft). This was probably due to splashing and waves from dropping in the slug rod. This peak in water level disappeared almost immediately; Water levels recovered too rapidly to be analyzed.

Water levels also recovered rapidly after slug withdrawal, but the data were analyzed by the Bouwer and Rice method. The resulting estimate of hydraulic conductivity is 130 ft/d. Transmissivity of the screened interval was calculated to be 1800 ft^2/d.

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VALIDATED
KDR 2/12/92
SIGNATURE/DATE

BOREHOLE TEST INFORMATION

Borehole 199-D5-13 Borehole Diameter 4" Hanford Coordinates — NA —

Interval Tested 101.1' – 80.36' BTOC Depth Interval 101.1' – 80.36' BTOC

Test Type Instantaneous Slug Test Injection/Withdrawal Borehole Depth 101.1' BTOC

Instruction Used WHC-CM-7-7-EII 10.1

EQUIPMENT

NAME	DESCRIPTION
ELECTRIC SOUNDER	SOUNST SN-ET-1 C
DATA LOGGER.	IN-SITU INC. SN.-1KB 700
PRESSURE TRANSDUCER	IN-SITU INC. S.N.- 2324
SLUGGING ROD	2.0' x 6.0' 0.1374 ^{3}
STEEL MEASURING TAPE	500' GRADUATED STEEL TAPE

MEASUREMENT DATUM

Control Datum TOP OF CASING 6" (T.O.C. 6")

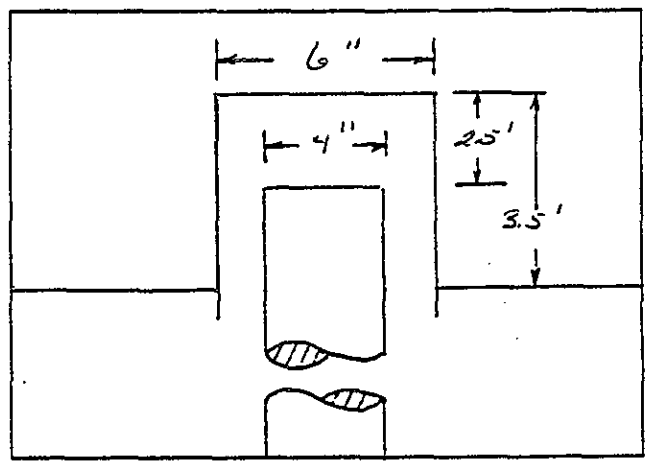
Elevation NA

Electric Sounder T.O.C. 6"

Steel Tape T.O.C. 6"

Pressure Transducer T.O.C. 6"

WELL HEAD DIAGRAM



COMMENTS

Recorded by: JAMES A. COATES JAMES A. COATES 12-11-91

Sign and Print Name Date

BD-6000-295 (05/89)

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-298

INSTANTANEOUS SLUG TEST DATA SHEET

INJECTION

Borehole 199-D5-13

Interval Tested 101.1'-80.36' BTOC

Depth to Water 86.71' BTOC

Date 12-6-91

Measured by JAMES A. COATES

Slug Volume .13ft³ Barometer Reading (Beginning) -NA- (End) -NA-

Time 0950-inj. baseline, 1005-injection

Transducer Measurement Units FEET.

Depth to Transducer 11.31' BWL

Initial Pressure (P_i) 86.71' BTOC

Slug Level or Pressure (P_{max}) 86.79'

Borehole Diameter 4"

Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement
		SEE ATTACHED			SEE ATTACHED			

Recorded by James A. Coates JAMES A. COATES (Sign and Print Name) 12-11-91 (Date)

BD-6000-293 (07/90)

WELL D5-13 SLUG INJECTION

p 245

SE1000B
Environmental Logger
12/09 07:15

Unit# 00700 Test# 4

INPUT 1: Level (F) TOC

Reference 86.71
Scale factor 10.09
Offset 0.00

slug volume = 0.13 ft3
theoretical d(Y) = 1.5 ft

Step# 0 12/06 09:58

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0	0	86.71	-86.71	0	0.0000
0.0033	0.000055	86.71	-86.71	0	0.0000
0.0066	0.00011	86.72	-86.72	-0.01	-0.0067
0.0099	0.000165	86.72	-86.72	-0.01	-0.0067
0.0133	0.000221	86.72	-86.72	-0.01	-0.0067
0.0166	0.000276	86.72	-86.72	-0.01	-0.0067
0.02	0.000333	86.72	-86.72	-0.01	-0.0067
0.0233	0.000388	86.72	-86.72	-0.01	-0.0067
0.0266	0.000443	86.72	-86.72	-0.01	-0.0067
0.03	0.0005	86.72	-86.72	-0.01	-0.0067
0.0333	0.000555	86.72	-86.72	-0.01	-0.0067
0.05	0.000833	86.72	-86.72	-0.01	-0.0067
0.0666	0.00111	86.72	-86.72	-0.01	-0.0067
0.0833	0.001388	79.74	-79.74	6.97	4.6467
0.1	0.001666	85.69	-85.69	1.02	0.6800
0.1166	0.001943	86.53	-86.53	0.18	0.1200
0.1333	0.002221	86.79	-86.79	-0.08	-0.0533
0.15	0.0025	86.7	-86.7	0.01	0.0067
0.1666	0.002776	86.63	-86.63	0.08	0.0533
0.1833	0.003055	86.6	-86.6	0.11	0.0733
0.2	0.003333	86.63	-86.63	0.08	0.0533
0.2166	0.00361	86.64	-86.64	0.07	0.0467
0.2333	0.003888	86.63	-86.63	0.08	0.0533
0.25	0.004166	86.64	-86.64	0.07	0.0467
0.2666	0.004443	86.63	-86.63	0.08	0.0533
0.2833	0.004721	86.63	-86.63	0.08	0.0533
0.3	0.005	86.63	-86.63	0.08	0.0533
0.3166	0.005276	86.63	-86.63	0.08	0.0533
0.3333	0.005555	86.63	-86.63	0.08	0.0533
0.4167	0.006945	86.63	-86.63	0.08	0.0533
0.5	0.008333	86.63	-86.63	0.08	0.0533

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WELL D5-13 SLUG INJECTION

p. 3 of 5

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.5833	0.009721	86.63	-86.63	0.08	0.0533
0.6667	0.011111	86.63	-86.63	0.08	0.0533
0.75	0.0125	86.63	-86.63	0.08	0.0533
0.8333	0.013888	86.64	-86.64	0.07	0.0467
0.9167	0.015278	86.64	-86.64	0.07	0.0467
1	0.016666	86.64	-86.64	0.07	0.0467
1.0833	0.018055	86.64	-86.64	0.07	0.0467
1.1667	0.019445	86.64	-86.64	0.07	0.0467
1.25	0.020833	86.64	-86.64	0.07	0.0467
1.3333	0.022221	86.65	-86.65	0.06	0.0400
1.4166	0.02361	86.65	-86.65	0.06	0.0400
1.5	0.025	86.65	-86.65	0.06	0.0400
1.5833	0.026388	86.65	-86.65	0.06	0.0400
1.6667	0.027778	86.65	-86.65	0.06	0.0400
1.75	0.029166	86.65	-86.65	0.06	0.0400
1.8333	0.030555	86.65	-86.65	0.06	0.0400
1.9167	0.031945	86.65	-86.65	0.06	0.0400
2	0.033333	86.66	-86.66	0.05	0.0333
2.5	0.041666	86.66	-86.66	0.05	0.0333
3	0.05	86.65	-86.65	0.06	0.0400
3.5	0.058333	86.66	-86.66	0.05	0.0333
4	0.066666	86.66	-86.66	0.05	0.0333
4.5	0.075	86.66	-86.66	0.05	0.0333
5	0.083333	86.66	-86.66	0.05	0.0333
5.5	0.091666	86.67	-86.67	0.04	0.0267
6	0.1	86.67	-86.67	0.04	0.0267
6.5	0.108333	86.67	-86.67	0.04	0.0267
7	0.116666	86.67	-86.67	0.04	0.0267
7.5	0.125	86.67	-86.67	0.04	0.0267
8	0.133333	86.67	-86.67	0.04	0.0267
8.5	0.141666	86.67	-86.67	0.04	0.0267
9	0.15	86.68	-86.68	0.03	0.0200
9.5	0.158333	86.69	-86.69	0.02	0.0133
10	0.166666	86.69	-86.69	0.02	0.0133
12	0.2	86.71	-86.71	0	0.0000
14	0.233333	86.71	-86.71	0	0.0000

9313021.0232

WELL D5-13 SLUG WITHDRAWAL

SE1000B
Environmental Logger
12/09 06:55

Unit# 00700 Test# 5

INPUT 1: Level (F) TOC

Reference 86.71
Scale factor 10.09
Offset 0.00

slug volume = 0.13 ft3
theoretical d(Y) = 1.5 ft

Step# 0 12/06 10:13

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0	0	87.82	-87.82	1.11	0.7400
0.0033	0.000055	86.07	-86.07	-0.64	-0.4267
0.0066	0.00011	89.2	-89.2	2.49	1.6600
0.0099	0.000165	88.32	-88.32	1.61	1.0733
0.0133	0.000221	88.33	-88.33	1.62	1.0800
0.0166	0.000276	88.2	-88.2	1.49	0.9933
0.02	0.000333	88.12	-88.12	1.41	0.9400
0.0233	0.000388	88.02	-88.02	1.31	0.8733
0.0266	0.000443	87.95	-87.95	1.24	0.8267
0.03	0.0005	87.86	-87.86	1.15	0.7667
0.0333	0.000555	87.79	-87.79	1.08	0.7200
0.05	0.000833	87.5	-87.5	0.79	0.5267
0.0666	0.00111	87.29	-87.29	0.58	0.3867
0.0833	0.001388	87.13	-87.13	0.42	0.2800
0.1	0.001666	87	-87	0.29	0.1933
0.1166	0.001943	86.92	-86.92	0.21	0.1400
0.1333	0.002221	86.86	-86.86	0.15	0.1000
0.15	0.0025	86.83	-86.83	0.12	0.0800
0.1666	0.002776	86.8	-86.8	0.09	0.0600
0.1833	0.003055	86.78	-86.78	0.07	0.0467
0.2	0.003333	86.77	-86.77	0.06	0.0400
0.2166	0.00361	86.76	-86.76	0.05	0.0333
0.2333	0.003888	86.75	-86.75	0.04	0.0267
0.25	0.004166	86.75	-86.75	0.04	0.0267
0.2666	0.004443	86.74	-86.74	0.03	0.0200
0.2833	0.004721	86.74	-86.74	0.03	0.0200
0.3	0.005	86.74	-86.74	0.03	0.0200
0.3166	0.005276	86.74	-86.74	0.03	0.0200
0.3333	0.005555	86.74	-86.74	0.03	0.0200
0.4167	0.006945	86.74	-86.74	0.03	0.0200
0.5	0.008333	86.73	-86.73	0.02	0.0133

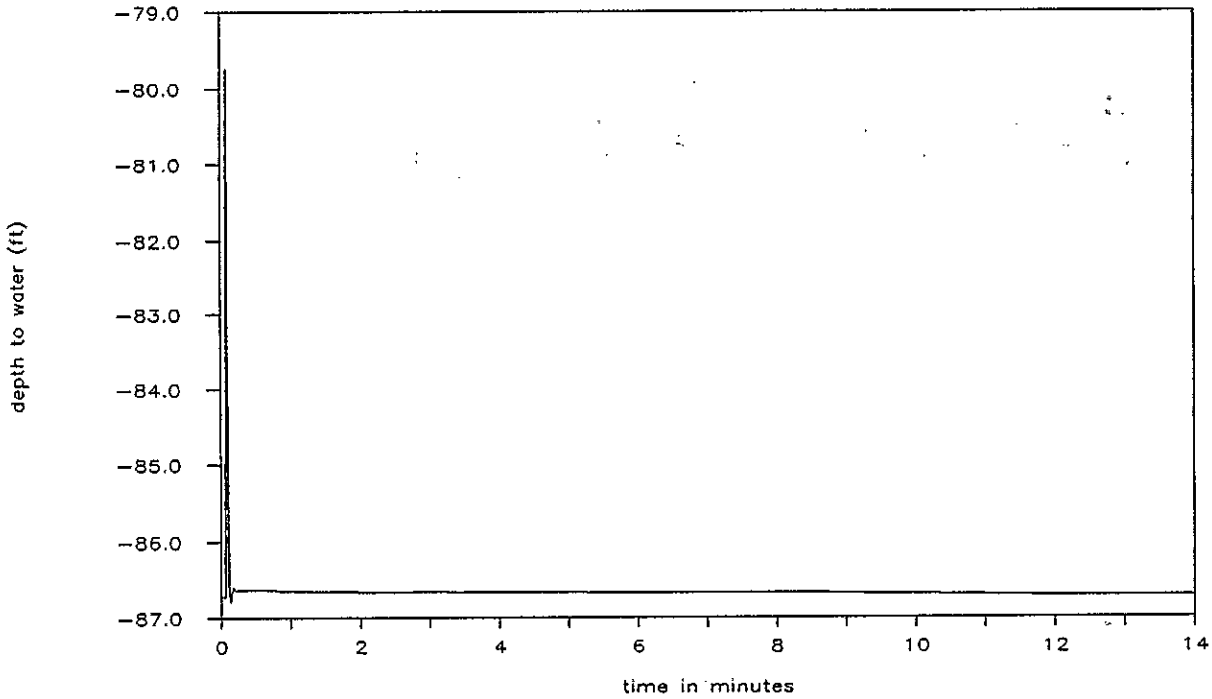
9313021.0233

WELL D5-13 SLUG WITHDRAWAL

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.5833	0.009721	86.73	-86.73	0.02	0.0133
0.6667	0.011111	86.73	-86.73	0.02	0.0133
0.75	0.0125	86.73	-86.73	0.02	0.0133
0.8333	0.013888	86.73	-86.73	0.02	0.0133
0.9167	0.015278	86.73	-86.73	0.02	0.0133
1	0.016666	86.73	-86.73	0.02	0.0133
1.0833	0.018055	86.73	-86.73	0.02	0.0133
1.1667	0.019445	86.72	-86.72	0.01	0.0067
1.25	0.020833	86.72	-86.72	0.01	0.0067
1.3333	0.022221	86.72	-86.72	0.01	0.0067
1.4166	0.02361	86.72	-86.72	0.01	0.0067
1.5	0.025	86.72	-86.72	0.01	0.0067
1.5833	0.026388	86.72	-86.72	0.01	0.0067
1.6667	0.027778	86.72	-86.72	0.01	0.0067
1.75	0.029166	86.72	-86.72	0.01	0.0067
1.8333	0.030555	86.72	-86.72	0.01	0.0067
1.9167	0.031945	86.72	-86.72	0.01	0.0067
2	0.033333	86.72	-86.72	0.01	0.0067
2.5	0.041666	86.72	-86.72	0.01	0.0067
3	0.05	86.71	-86.71	0	0.0000
3.5	0.058333	86.71	-86.71	0	0.0000
4	0.066666	86.71	-86.71	0	0.0000
4.5	0.075	86.71	-86.71	0	0.0000
5	0.083333	86.71	-86.71	0	0.0000
5.5	0.091666	86.71	-86.71	0	0.0000
6	0.1	86.71	-86.71	0	0.0000
6.5	0.108333	86.71	-86.71	0	0.0000
7	0.116666	86.71	-86.71	0	0.0000
7.5	0.125	86.71	-86.71	0	0.0000
8	0.133333	86.71	-86.71	0	0.0000
8.5	0.141666	86.71	-86.71	0	0.0000
9	0.15	86.71	-86.71	0	0.0000
9.5	0.158333	86.71	-86.71	0	0.0000
10	0.166666	86.71	-86.71	0	0.0000

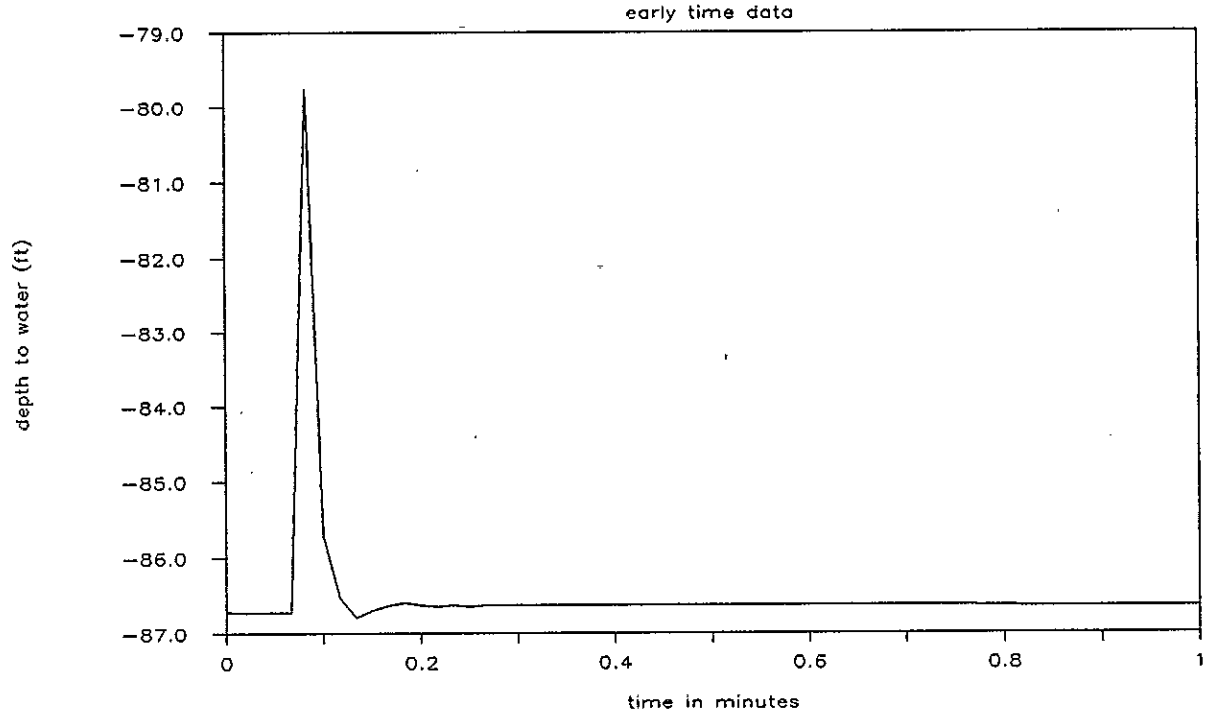
9313021.0234

WELL D5-13 SLUG INJECTION



WELL D5-13 SLUG INJECTION

early time data



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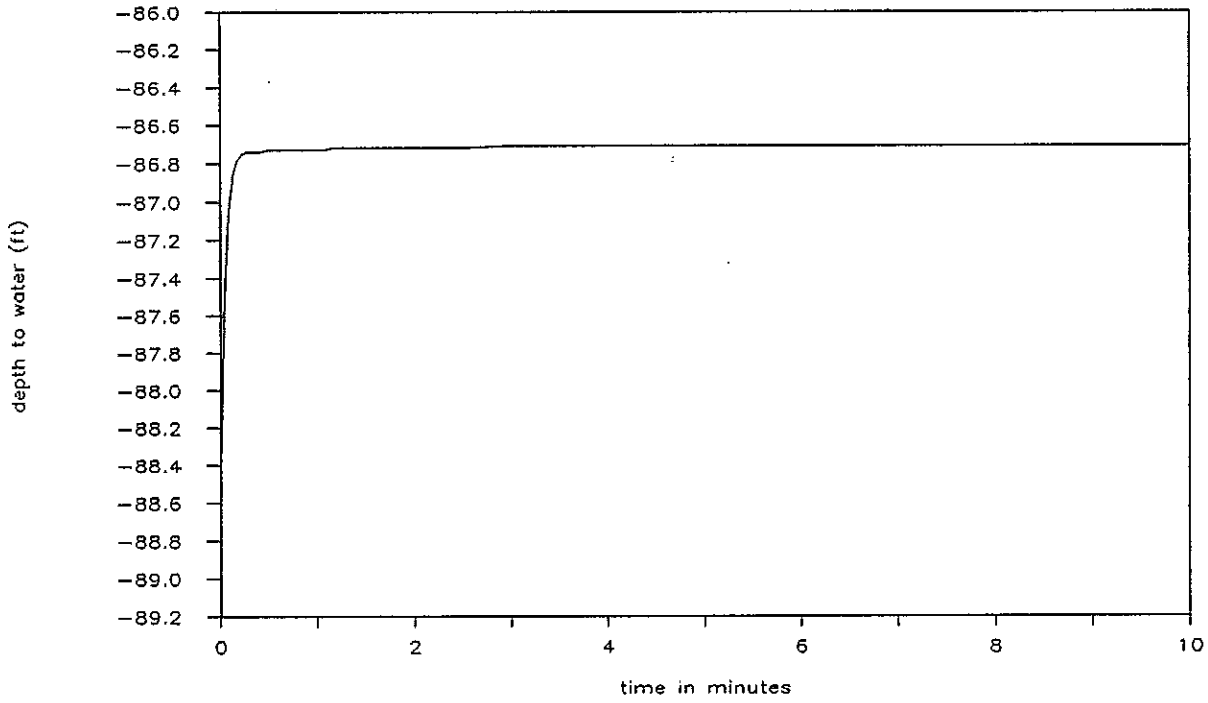
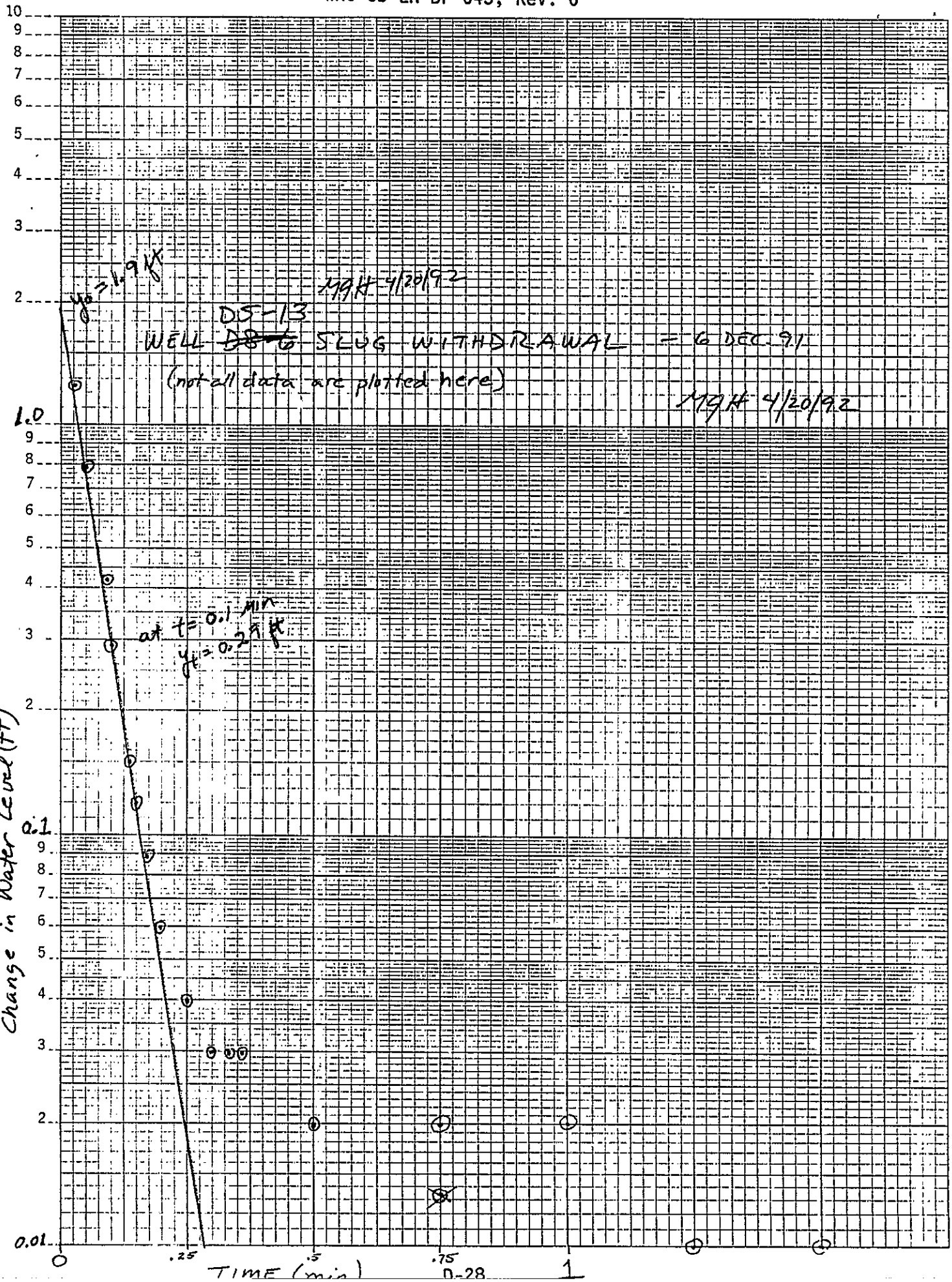
WELL D5-13 SLUG WITHDRAWAL



9313021.0236


$y_0 = 1.9$ ft
MHH 4/20/92
DS-13
WELL ~~DS-6~~ SLUG WITHDRAWAL = 6 DEC 91
(not all data are plotted here)
MHH 4/20/92
at $t = 0.1$ min
$y_t = 0.29$ ft
Change in Water Level (ft)
TIME (min)
10
9
8
7
6
5
4
3
2
1.0
0.1
0.01
0
.25
.5
.75
1
K+E SEMI-LOGARITHMIC • 3 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 5493

WELL D5-13 SLUG WITHDRAWAL CALCULATIONS
****
THE BELOW HYDRAULIC CONDUCTIVITY VALUE WAS CALCULATED
USING THE BOUWER AND RICE SLUG TEST METHOD.
SOURCE= "THE BOUWER AND RICE SLUG TEST-AN UPDATE"
GROUND WATER, VOL 27, NO. 3, MAY-JUNE 1989.
****
****
RADIUS OF CASING USED IN CALCULATIONS HAS BEEN
CORRECTED FOR THE THICKNESS OF GRAVEL OR SAND
PACK DUE TO WATER LEVEL CHANGES IN THE SCREEN OR
OPEN INTERVAL OF WELL.
****

Rc (ft)	Rw (ft)	Le (ft)	Lw (ft)	H (ft)
.2298	.3330	14.4000	14.4000	24.0000

****
Le/Rw = 43.2432400
A= 2.9312200
B= 4.656601E-001
C= 2.5405020
SANDPACK POROSITY= 3.000000E-001
t (min)= 1.000000E-001
1/t= 10.0000000
Yo= (ft) 1.9000000
Yt= (ft) 2.900000E-001
1/t ln(Yo/Yt)= 18.7972800
ln[(H-Lw)/Rw]= 3.3613760
ln(Re/Rw)= 2.5252340
****
K (ft/day) = 125.2882000
****
T OF THE SATURATED SCREEN INTERVAL
(ft2/day)= 1804.1500000
****

9313021.0238

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9313021.0239

WELL 199-D8-4

9313021.0240

AQUIFER TEST SUMMARY

WELL 199-D8-4 DEVELOPMENT AND RECOVERY

Purpose of Tests: The well was pumped for development. Water levels were measured during drawdown and recovery for use in estimating aquifer transmissivity.

Hydrogeologic Unit Tested: The uppermost aquifer (Ringold Formation), comprising sand and gravel

Thickness of Aquifer: 24 ft

Depth of Screened or Open Interval Exposed to Aquifer During Test: Screened 97.34 to 77.32 ft below top of casing; Water level at 84.69 ft below top of casing; tested thickness = 12.7 ft

Diameter of Well Casing: 3 in (0.25 ft)

Diameter of Well Screen: 3 in (0.25 ft)

Diameter of Screen plus Sand Pack: 7 in (0.583 ft)

Porosity of Sand Pack: 0.30 (estimated)

Observation Well(s) Used: None Distance from Pumping Well: N/A

Depth of Screened Interval of Observation Well: N/A

Date of Tests: 4 Dec 92 Start Time of Test: 10:28

Pumping Rate: average discharge = 5.4 gal/min (1040 ft^3/d)

Duration of Test: Discharge: 445 min (7.4 hr); Recovery monitored for 835 min (13.9 hr)

Water-Level Measurement Methods: E-stape and pressure transducer with data logger

Maximum Change in Water Level: 4.0 ft

RESULTS: Drawdown data were plotted on semilog paper for analysis by Cooper and Jacob method; however, data were not analyzable. The well was developed with a Hydrostar pump, which does not keep a constant discharge.

93 3021.0241

DRAWDOWN/RECOVERY

Well Designation 199-D8-4 Date 12-4-91

Well Depth 97.34' BTOC Screened Interval 97.34' - 77.32' BTOC

Pumping Method ~~CONSTANT DISCHARGE~~ JAC Positive Displacement

Equipment Used to Measure Water Level E.TAPE / TRANSDUCER S. N. ET-1 / 2324 Calibration Due 1-24-92 / 7-19-92

Equipment Used to Measure Flow — NA — S. N. — NA — Calibration Due — NA —

Measuring Point TOP OF CASING 6" (T.O.C. 6") Pump Start Time 1030 Pump Stop Time 1805

Time		Water Level		Discharge
Date	Time	Reading Unit:	Water Level Unit:	Reading Unit:
				BUCKET METHOD.
				5gal/55.4 sec/50strokes = 5.4 GPM
				5gal/59 sec/47strokes = 5.1 GPM
		SEE		
		ATTACHED		

Signature of Recorder James A. Coates Date 12-11-91

Sign and Print Name

A-6000-402 (03/90)

9313021.0242

WELL D8-4 BASELINE

SE2000
Environmental Logger
12/05 15:57

p 2 of 3

Unit# 192 Test 0

INPUT 1: Level (F) TOC

Reference	84.690
SG	1.000
Linearity	0.000
Scale factor	10.090
Offset	0.000
Delay mSEC	50.000

Step 0 12/04 10:14:33

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft
0.0000	0.0000	84.686	-84.686
1.0000	0.0167	84.683	-84.683
2.0000	0.0333	84.680	-84.680
3.0000	0.0500	84.680	-84.680
4.0000	0.0667	84.680	-84.680
5.0000	0.0833	84.680	-84.680
6.0000	0.1000	84.680	-84.680
7.0000	0.1167	84.677	-84.677
8.0000	0.1333	84.677	-84.677
9.0000	0.1500	84.680	-84.680
10.0000	0.1667	84.683	-84.683
11.0000	0.1833	84.686	-84.686
12.0000	0.2000	84.686	-84.686

9313021.0243

WELL D8-4 DEVELOPMENT

SE2000
Environmental Logger
12/05 16:03

Unit# 192 Test 1

INPUT 1: Level (F) TOC

Reference	84.690
SG	1.000
Linearity	0.000
Scale factor	10.090
Offset	0.000
Delay mSEC	50.000

Step 0 12/04 10:27:51

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.0000	0.0000	84.814	-84.814	0.124
0.0083	0.0001	84.661	-84.661	-0.029
0.0166	0.0003	84.760	-84.760	0.07
0.0250	0.0004	84.756	-84.756	0.066
0.0333	0.0006	84.358	-84.358	-0.332
0.0416	0.0007	84.935	-84.935	0.245
0.0500	0.0008	84.823	-84.823	0.133
0.0583	0.0010	84.897	-84.897	0.207
0.0666	0.0011	85.247	-85.247	0.557
0.0750	0.0013	84.326	-84.326	-0.364
0.0833	0.0014	85.295	-85.295	0.605
0.1000	0.0017	85.101	-85.101	0.411
0.1166	0.0019	84.600	-84.600	-0.09
0.1333	0.0022	84.795	-84.795	0.105
0.1500	0.0025	85.120	-85.120	0.43
0.1666	0.0028	85.687	-85.687	0.997
0.1833	0.0031	85.314	-85.314	0.624
0.2000	0.0033	85.164	-85.164	0.474
0.2166	0.0036	84.584	-84.584	-0.106
0.2333	0.0039	85.168	-85.168	0.478
0.2500	0.0042	85.493	-85.493	0.803
0.2666	0.0044	85.725	-85.725	1.035
0.2833	0.0047	85.429	-85.429	0.739
0.3000	0.0050	84.967	-84.967	0.277
0.3166	0.0053	85.053	-85.053	0.363
0.3333	0.0056	85.422	-85.422	0.732
0.4166	0.0069	85.585	-85.585	0.895
0.5000	0.0083	85.630	-85.630	0.94

9413021.0244

WELL D8-4 DEVELOPMENT

p. 4 of 13

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.5833	0.0097	85.658	-85.658	0.968
0.6666	0.0111	85.757	-85.757	1.067
0.7500	0.0125	85.802	-85.802	1.112
0.8333	0.0139	85.805	-85.805	1.115
0.9166	0.0153	85.955	-85.955	1.265
1.0000	0.0167	85.964	-85.964	1.274
1.0833	0.0181	86.015	-86.015	1.325
1.1666	0.0194	86.146	-86.146	1.456
1.2500	0.0208	86.359	-86.359	1.669
1.3333	0.0222	86.429	-86.429	1.739
1.4166	0.0236	86.286	-86.286	1.596
1.5000	0.0250	86.136	-86.136	1.446
1.5833	0.0264	86.159	-86.159	1.469
1.6666	0.0278	85.754	-85.754	1.064
1.7500	0.0292	85.579	-85.579	0.889
1.8333	0.0306	86.197	-86.197	1.507
1.9166	0.0319	86.496	-86.496	1.806
2.0000	0.0333	86.595	-86.595	1.905
2.5000	0.0417	86.907	-86.907	2.217
3.0000	0.0500	86.793	-86.793	2.103
3.5000	0.0583	87.290	-87.290	2.6
4.0000	0.0667	86.876	-86.876	2.186
4.5000	0.0750	86.860	-86.860	2.17
5.0000	0.0833	86.468	-86.468	1.778
5.5000	0.0917	87.108	-87.108	2.418
6.0000	0.1000	87.338	-87.338	2.648
6.5000	0.1083	87.395	-87.395	2.705
7.0000	0.1167	87.669	-87.669	2.979
7.5000	0.1250	87.695	-87.695	3.005
8.0000	0.1333	87.484	-87.484	2.794
8.5000	0.1417	86.684	-86.684	1.994
9.0000	0.1500	86.761	-86.761	2.071
9.5000	0.1583	86.659	-86.659	1.969
10.0000	0.1667	87.213	-87.213	2.523
12.0000	0.2000	87.312	-87.312	2.622
14.0000	0.2333	87.554	-87.554	2.864
16.0000	0.2667	86.930	-86.930	2.24
18.0000	0.3000	87.717	-87.717	3.027
20.0000	0.3333	87.985	-87.985	3.295
22.0000	0.3667	87.443	-87.443	2.753
24.0000	0.4000	87.083	-87.083	2.393
26.0000	0.4333	87.841	-87.841	3.151
28.0000	0.4667	87.653	-87.653	2.963
30.0000	0.5000	87.800	-87.800	3.11
32.0000	0.5333	87.570	-87.570	2.88
34.0000	0.5667	88.147	-88.147	3.457
36.0000	0.6000	87.965	-87.965	3.275
38.0000	0.6333	87.997	-87.997	3.307

9313021.0245

WELL D8-4 DEVELOPMENT

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
40.0000	0.6667	88.246	-88.246	3.556
42.0000	0.7000	87.781	-87.781	3.091
44.0000	0.7333	87.389	-87.389	2.699
46.0000	0.7667	88.275	-88.275	3.585
48.0000	0.8000	87.462	-87.462	2.772
50.0000	0.8333	88.115	-88.115	3.425
52.0000	0.8667	88.351	-88.351	3.661
54.0000	0.9000	88.131	-88.131	3.441
56.0000	0.9333	87.338	-87.338	2.648
58.0000	0.9667	88.329	-88.329	3.639
60.0000	1.0000	88.125	-88.125	3.435
62.0000	1.0333	87.417	-87.417	2.727
64.0000	1.0667	87.867	-87.867	3.177
66.0000	1.1000	87.889	-87.889	3.199
68.0000	1.1333	87.605	-87.605	2.915
70.0000	1.1667	88.173	-88.173	3.483
72.0000	1.2000	88.501	-88.501	3.811
74.0000	1.2333	87.475	-87.475	2.785
76.0000	1.2667	88.565	-88.565	3.875
78.0000	1.3000	87.797	-87.797	3.107
80.0000	1.3333	87.991	-87.991	3.301
82.0000	1.3667	87.975	-87.975	3.285
84.0000	1.4000	87.698	-87.698	3.008
86.0000	1.4333	88.526	-88.526	3.836
88.0000	1.4667	87.478	-87.478	2.788
90.0000	1.5000	88.393	-88.393	3.703
92.0000	1.5333	87.449	-87.449	2.759
94.0000	1.5667	88.319	-88.319	3.629
96.0000	1.6000	88.042	-88.042	3.352
98.0000	1.6333	87.564	-87.564	2.874
100.0000	1.6667	88.456	-88.456	3.766
105.0000	1.7500	88.163	-88.163	3.473
110.0000	1.8333	87.468	-87.468	2.778
115.0000	1.9167	87.975	-87.975	3.285
120.0000	2.0000	87.545	-87.545	2.855
125.0000	2.0833	88.125	-88.125	3.435
130.0000	2.1667	87.746	-87.746	3.056
135.0000	2.2500	87.921	-87.921	3.231
140.0000	2.3333	88.150	-88.150	3.46
145.0000	2.4167	88.485	-88.485	3.795
150.0000	2.5000	87.937	-87.937	3.247
155.0000	2.5833	88.058	-88.058	3.368
160.0000	2.6667	88.396	-88.396	3.706
165.0000	2.7500	88.300	-88.300	3.61
170.0000	2.8333	88.271	-88.271	3.581
175.0000	2.9167	88.370	-88.370	3.68
180.0000	3.0000	88.342	-88.342	3.652
185.0000	3.0833	88.408	-88.408	3.718

9313021.0246

WELL D8-4 DEVELOPMENT

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
190.0000	3.1667	88.386	-88.386	3.696
195.0000	3.2500	87.813	-87.813	3.123
200.0000	3.3333	88.488	-88.488	3.798
205.0000	3.4167	87.656	-87.656	2.966
210.0000	3.5000	88.144	-88.144	3.454
215.0000	3.5833	88.571	-88.571	3.881
220.0000	3.6667	88.530	-88.530	3.84
225.0000	3.7500	87.914	-87.914	3.224
230.0000	3.8333	87.848	-87.848	3.158
235.0000	3.9167	87.991	-87.991	3.301
240.0000	4.0000	88.083	-88.083	3.393
245.0000	4.0833	88.297	-88.297	3.607
250.0000	4.1667	87.921	-87.921	3.231
255.0000	4.2500	88.214	-88.214	3.524
260.0000	4.3333	88.482	-88.482	3.792
265.0000	4.4167	88.361	-88.361	3.671
270.0000	4.5000	88.249	-88.249	3.559
275.0000	4.5833	87.704	-87.704	3.014
280.0000	4.6667	88.530	-88.530	3.84
285.0000	4.7500	88.510	-88.510	3.82
290.0000	4.8333	88.176	-88.176	3.486
295.0000	4.9167	88.204	-88.204	3.514
300.0000	5.0000	88.558	-88.558	3.868
305.0000	5.0833	88.233	-88.233	3.543
310.0000	5.1667	88.463	-88.463	3.773
315.0000	5.2500	88.249	-88.249	3.559
320.0000	5.3333	88.673	-88.673	3.983
325.0000	5.4167	88.686	-88.686	3.996
330.0000	5.5000	88.769	-88.769	4.079
335.0000	5.5833	88.322	-88.322	3.632
340.0000	5.6667	87.816	-87.816	3.126
345.0000	5.7500	88.291	-88.291	3.601
350.0000	5.8333	88.268	-88.268	3.578
355.0000	5.9167	88.638	-88.638	3.948
360.0000	6.0000	88.539	-88.539	3.849
365.0000	6.0833	88.568	-88.568	3.878
370.0000	6.1667	87.777	-87.777	3.087
375.0000	6.2500	88.268	-88.268	3.578
380.0000	6.3333	88.246	-88.246	3.556
385.0000	6.4167	88.265	-88.265	3.575
390.0000	6.5000	87.828	-87.828	3.138
395.0000	6.5833	88.141	-88.141	3.451
400.0000	6.6667	88.600	-88.600	3.91
405.0000	6.7500	88.632	-88.632	3.942
410.0000	6.8333	88.275	-88.275	3.585
415.0000	6.9167	88.612	-88.612	3.922
420.0000	7.0000	87.969	-87.969	3.279
425.0000	7.0833	88.574	-88.574	3.884

9313021.0247

WELL D8-4 DEVELOPMENT

p 7 of 13

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
430.0000	7.1667	88.399	-88.399	3.709
435.0000	7.2500	87.857	-87.857	3.167
440.0000	7.3333	88.584	-88.584	3.894
445.0000	7.4167	88.737	-88.737	4.047

9313021.0248

WELL D8-4 RECOVERY

p. 8 of 13

SE2000
Environmental Logger
12/05 16:08

Unit# 192 Test 2

INPUT 1: Level (F) TOC

Reference	84.690 (err?) Revised: 82.1
SG	1.000
Linearity	0.000
Scale factor	10.090
Offset	0.000
Delay mSEC	50.000

Step 0 12/04 18:09:56 tp = 445 min

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft	(tr+tp)/tr
0.0000	0.0000	85.378	-85.378	3.278	
0.0083	0.0001	85.046	-85.046	2.946	53615.46
0.0166	0.0003	85.081	-85.081	2.981	26808.23
0.0250	0.0004	85.094	-85.094	2.994	17801.00
0.0333	0.0006	85.072	-85.072	2.972	13364.36
0.0416	0.0007	85.066	-85.066	2.966	10698.12
0.0500	0.0008	85.056	-85.056	2.956	8901.00
0.0583	0.0010	85.046	-85.046	2.946	7633.93
0.0666	0.0011	85.037	-85.037	2.937	6682.68
0.0750	0.0013	85.027	-85.027	2.927	5934.33
0.0833	0.0014	85.021	-85.021	2.921	5343.14
0.1000	0.0017	85.002	-85.002	2.902	4451.00
0.1166	0.0019	84.986	-84.986	2.886	3817.47
0.1333	0.0022	84.970	-84.970	2.87	3339.33
0.1500	0.0025	84.954	-84.954	2.854	2967.67
0.1666	0.0028	84.935	-84.935	2.835	2672.07
0.1833	0.0031	84.919	-84.919	2.819	2428.71
0.2000	0.0033	84.906	-84.906	2.806	2226.00
0.2166	0.0036	84.890	-84.890	2.79	2055.48
0.2333	0.0039	84.874	-84.874	2.774	1908.42
0.2500	0.0042	84.858	-84.858	2.758	1781.00
0.2666	0.0044	84.846	-84.846	2.746	1670.17
0.2833	0.0047	84.830	-84.830	2.73	1571.77
0.3000	0.0050	84.817	-84.817	2.717	1484.33
0.3166	0.0053	84.801	-84.801	2.701	1406.56
0.3333	0.0056	84.788	-84.788	2.688	1336.13
0.4166	0.0069	84.718	-84.718	2.618	1069.17
0.5000	0.0083	84.648	-84.648	2.548	891.00

9313021.0249

WELL D8-4 RECOVERY

p 9 of 13

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft	(tr+tp)/tr
0.5833	0.0097	84.584	-84.584	2.484	763.90
0.6666	0.0111	84.511	-84.511	2.411	668.57
0.7500	0.0125	84.444	-84.444	2.344	594.33
0.8333	0.0139	84.377	-84.377	2.277	535.02
0.9166	0.0153	84.313	-84.313	2.213	486.49
1.0000	0.0167	84.256	-84.256	2.156	446.00
1.0833	0.0181	84.192	-84.192	2.092	411.78
1.1666	0.0194	84.132	-84.132	2.032	382.45
1.2500	0.0208	84.068	-84.068	1.968	357.00
1.3333	0.0222	84.004	-84.004	1.904	334.76
1.4166	0.0236	83.944	-83.944	1.844	315.13
1.5000	0.0250	83.877	-83.877	1.777	297.67
1.5833	0.0264	83.816	-83.816	1.716	282.06
1.6666	0.0278	83.756	-83.756	1.656	268.01
1.7500	0.0292	83.702	-83.702	1.602	255.29
1.8333	0.0306	83.644	-83.644	1.544	243.73
1.9166	0.0319	83.584	-83.584	1.484	233.18
2.0000	0.0333	83.536	-83.536	1.436	223.50
2.5000	0.0417	83.278	-83.278	1.178	179.00
3.0000	0.0500	83.138	-83.138	1.038	149.33
3.5000	0.0583	83.023	-83.023	0.923	128.14
4.0000	0.0667	82.927	-82.927	0.827	112.25
4.5000	0.0750	82.854	-82.854	0.754	99.89
5.0000	0.0833	82.800	-82.800	0.7	90.00
5.5000	0.0917	82.755	-82.755	0.655	81.91
6.0000	0.1000	82.723	-82.723	0.623	75.17
6.5000	0.1083	82.695	-82.695	0.595	69.46
7.0000	0.1167	82.672	-82.672	0.572	64.57
7.5000	0.1250	82.653	-82.653	0.553	60.33
8.0000	0.1333	82.637	-82.637	0.537	56.63
8.5000	0.1417	82.624	-82.624	0.524	53.35
9.0000	0.1500	82.612	-82.612	0.512	50.44
9.5000	0.1583	82.602	-82.602	0.502	47.84
10.0000	0.1667	82.593	-82.593	0.493	45.50
12.0000	0.2000	82.558	-82.558	0.458	38.08
14.0000	0.2333	82.532	-82.532	0.432	32.79
16.0000	0.2667	82.510	-82.510	0.41	28.81
18.0000	0.3000	82.487	-82.487	0.387	25.72
20.0000	0.3333	82.468	-82.468	0.368	23.25
22.0000	0.3667	82.456	-82.456	0.356	21.23
24.0000	0.4000	82.443	-82.443	0.343	19.54
26.0000	0.4333	82.427	-82.427	0.327	18.12
28.0000	0.4667	82.417	-82.417	0.317	16.89
30.0000	0.5000	82.408	-82.408	0.308	15.83
32.0000	0.5333	82.398	-82.398	0.298	14.91
34.0000	0.5667	82.389	-82.389	0.289	14.09
36.0000	0.6000	82.382	-82.382	0.282	13.36
38.0000	0.6333	82.376	-82.376	0.276	12.71

9313021.0250

WELL D8-4 RECOVERY

p 10 of 13

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft	(tr+tp)/tr
40.0000	0.6667	82.370	-82.370	0.27	12.13
42.0000	0.7000	82.363	-82.363	0.263	11.60
44.0000	0.7333	82.354	-82.354	0.254	11.11
46.0000	0.7667	82.347	-82.347	0.247	10.67
48.0000	0.8000	82.341	-82.341	0.241	10.27
50.0000	0.8333	82.338	-82.338	0.238	9.90
52.0000	0.8667	82.334	-82.334	0.234	9.56
54.0000	0.9000	82.328	-82.328	0.228	9.24
56.0000	0.9333	82.322	-82.322	0.222	8.95
58.0000	0.9667	82.319	-82.319	0.219	8.67
60.0000	1.0000	82.315	-82.315	0.215	8.42
62.0000	1.0333	82.312	-82.312	0.212	8.18
64.0000	1.0667	82.309	-82.309	0.209	7.95
66.0000	1.1000	82.306	-82.306	0.206	7.74
68.0000	1.1333	82.303	-82.303	0.203	7.54
70.0000	1.1667	82.299	-82.299	0.199	7.36
72.0000	1.2000	82.293	-82.293	0.193	7.18
74.0000	1.2333	82.290	-82.290	0.19	7.01
76.0000	1.2667	82.287	-82.287	0.187	6.86
78.0000	1.3000	82.284	-82.284	0.184	6.71
80.0000	1.3333	82.280	-82.280	0.18	6.56
82.0000	1.3667	82.280	-82.280	0.18	6.43
84.0000	1.4000	82.274	-82.274	0.174	6.30
86.0000	1.4333	82.271	-82.271	0.171	6.17
88.0000	1.4667	82.268	-82.268	0.168	6.06
90.0000	1.5000	82.264	-82.264	0.164	5.94
92.0000	1.5333	82.264	-82.264	0.164	5.84
94.0000	1.5667	82.261	-82.261	0.161	5.73
96.0000	1.6000	82.261	-82.261	0.161	5.64
98.0000	1.6333	82.258	-82.258	0.158	5.54
100.0000	1.6667	82.255	-82.255	0.155	5.45
105.0000	1.7500	82.248	-82.248	0.148	5.24
110.0000	1.8333	82.242	-82.242	0.142	5.05
115.0000	1.9167	82.236	-82.236	0.136	4.87
120.0000	2.0000	82.233	-82.233	0.133	4.71
125.0000	2.0833	82.229	-82.229	0.129	4.56
130.0000	2.1667	82.223	-82.223	0.123	4.42
135.0000	2.2500	82.220	-82.220	0.12	4.30
140.0000	2.3333	82.217	-82.217	0.117	4.18
145.0000	2.4167	82.210	-82.210	0.11	4.07
150.0000	2.5000	82.207	-82.207	0.107	3.97
155.0000	2.5833	82.204	-82.204	0.104	3.87
160.0000	2.6667	82.204	-82.204	0.104	3.78
165.0000	2.7500	82.201	-82.201	0.101	3.70
170.0000	2.8333	82.201	-82.201	0.101	3.62
175.0000	2.9167	82.197	-82.197	0.097	3.54
180.0000	3.0000	82.194	-82.194	0.094	3.47
185.0000	3.0833	82.191	-82.191	0.091	3.41

9313021.0257

WELL D8-4 RECOVERY

p 11 of 13

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft	(tr+tp)/tr
190.0000	3.1667	82.191	-82.191	0.091	3.34
195.0000	3.2500	82.188	-82.188	0.088	3.28
200.0000	3.3333	82.182	-82.182	0.082	3.23
205.0000	3.4167	82.182	-82.182	0.082	3.17
210.0000	3.5000	82.178	-82.178	0.078	3.12
215.0000	3.5833	82.178	-82.178	0.078	3.07
220.0000	3.6667	82.175	-82.175	0.075	3.02
225.0000	3.7500	82.172	-82.172	0.072	2.98
230.0000	3.8333	82.169	-82.169	0.069	2.93
235.0000	3.9167	82.172	-82.172	0.072	2.89
240.0000	4.0000	82.169	-82.169	0.069	2.85
245.0000	4.0833	82.169	-82.169	0.069	2.82
250.0000	4.1667	82.162	-82.162	0.062	2.78
255.0000	4.2500	82.162	-82.162	0.062	2.75
260.0000	4.3333	82.162	-82.162	0.062	2.71
265.0000	4.4167	82.162	-82.162	0.062	2.68
270.0000	4.5000	82.159	-82.159	0.059	2.65
275.0000	4.5833	82.156	-82.156	0.056	2.62
280.0000	4.6667	82.156	-82.156	0.056	2.59
285.0000	4.7500	82.156	-82.156	0.056	2.56
290.0000	4.8333	82.153	-82.153	0.053	2.53
295.0000	4.9167	82.153	-82.153	0.053	2.51
300.0000	5.0000	82.153	-82.153	0.053	2.48
305.0000	5.0833	82.150	-82.150	0.05	2.46
310.0000	5.1667	82.150	-82.150	0.05	2.44
315.0000	5.2500	82.150	-82.150	0.05	2.41
320.0000	5.3333	82.146	-82.146	0.046	2.39
325.0000	5.4167	82.143	-82.143	0.043	2.37
330.0000	5.5000	82.143	-82.143	0.043	2.35
335.0000	5.5833	82.143	-82.143	0.043	2.33
340.0000	5.6667	82.140	-82.140	0.04	2.31
345.0000	5.7500	82.140	-82.140	0.04	2.29
350.0000	5.8333	82.140	-82.140	0.04	2.27
355.0000	5.9167	82.140	-82.140	0.04	2.25
360.0000	6.0000	82.140	-82.140	0.04	2.24
365.0000	6.0833	82.137	-82.137	0.037	2.22
370.0000	6.1667	82.137	-82.137	0.037	2.20
375.0000	6.2500	82.137	-82.137	0.037	2.19
380.0000	6.3333	82.134	-82.134	0.034	2.17
385.0000	6.4167	82.134	-82.134	0.034	2.16
390.0000	6.5000	82.134	-82.134	0.034	2.14
395.0000	6.5833	82.134	-82.134	0.034	2.13
400.0000	6.6667	82.134	-82.134	0.034	2.11
405.0000	6.7500	82.131	-82.131	0.031	2.10
410.0000	6.8333	82.131	-82.131	0.031	2.09
415.0000	6.9167	82.131	-82.131	0.031	2.07
420.0000	7.0000	82.127	-82.127	0.027	2.06
425.0000	7.0833	82.127	-82.127	0.027	2.05

9313021.0252

WELL D8-4 RECOVERY

p.12 of 13

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft	(tr+tp)/tr
430.0000	7.1667	82.124	-82.124	0.024	2.03
435.0000	7.2500	82.127	-82.127	0.027	2.02
440.0000	7.3333	82.127	-82.127	0.027	2.01
445.0000	7.4167	82.127	-82.127	0.027	2.00
450.0000	7.5000	82.127	-82.127	0.027	1.99
455.0000	7.5833	82.127	-82.127	0.027	1.98
460.0000	7.6667	82.124	-82.124	0.024	1.97
465.0000	7.7500	82.127	-82.127	0.027	1.96
470.0000	7.8333	82.124	-82.124	0.024	1.95
475.0000	7.9167	82.124	-82.124	0.024	1.94
480.0000	8.0000	82.124	-82.124	0.024	1.93
485.0000	8.0833	82.121	-82.121	0.021	1.92
490.0000	8.1667	82.121	-82.121	0.021	1.91
495.0000	8.2500	82.121	-82.121	0.021	1.90
500.0000	8.3333	82.121	-82.121	0.021	1.89
505.0000	8.4167	82.118	-82.118	0.018	1.88
510.0000	8.5000	82.115	-82.115	0.015	1.87
515.0000	8.5833	82.115	-82.115	0.015	1.86
520.0000	8.6667	82.115	-82.115	0.015	1.86
525.0000	8.7500	82.121	-82.121	0.021	1.85
530.0000	8.8333	82.118	-82.118	0.018	1.84
535.0000	8.9167	82.115	-82.115	0.015	1.83
540.0000	9.0000	82.118	-82.118	0.018	1.82
545.0000	9.0833	82.118	-82.118	0.018	1.82
550.0000	9.1667	82.118	-82.118	0.018	1.81
555.0000	9.2500	82.115	-82.115	0.015	1.80
560.0000	9.3333	82.111	-82.111	0.011	1.79
565.0000	9.4167	82.115	-82.115	0.015	1.79
570.0000	9.5000	82.111	-82.111	0.011	1.78
575.0000	9.5833	82.115	-82.115	0.015	1.77
580.0000	9.6667	82.111	-82.111	0.011	1.77
585.0000	9.7500	82.115	-82.115	0.015	1.76
590.0000	9.8333	82.111	-82.111	0.011	1.75
595.0000	9.9167	82.111	-82.111	0.011	1.75
600.0000	10.0000	82.108	-82.108	0.008	1.74
605.0000	10.0833	82.111	-82.111	0.011	1.74
610.0000	10.1667	82.111	-82.111	0.011	1.73
615.0000	10.2500	82.111	-82.111	0.011	1.72
620.0000	10.3333	82.111	-82.111	0.011	1.72
625.0000	10.4167	82.111	-82.111	0.011	1.71
630.0000	10.5000	82.111	-82.111	0.011	1.71
635.0000	10.5833	82.111	-82.111	0.011	1.70
640.0000	10.6667	82.108	-82.108	0.008	1.70
645.0000	10.7500	82.108	-82.108	0.008	1.69
650.0000	10.8333	82.108	-82.108	0.008	1.68
655.0000	10.9167	82.105	-82.105	0.005	1.68
660.0000	11.0000	82.108	-82.108	0.008	1.67
665.0000	11.0833	82.108	-82.108	0.008	1.67

9313021.0253

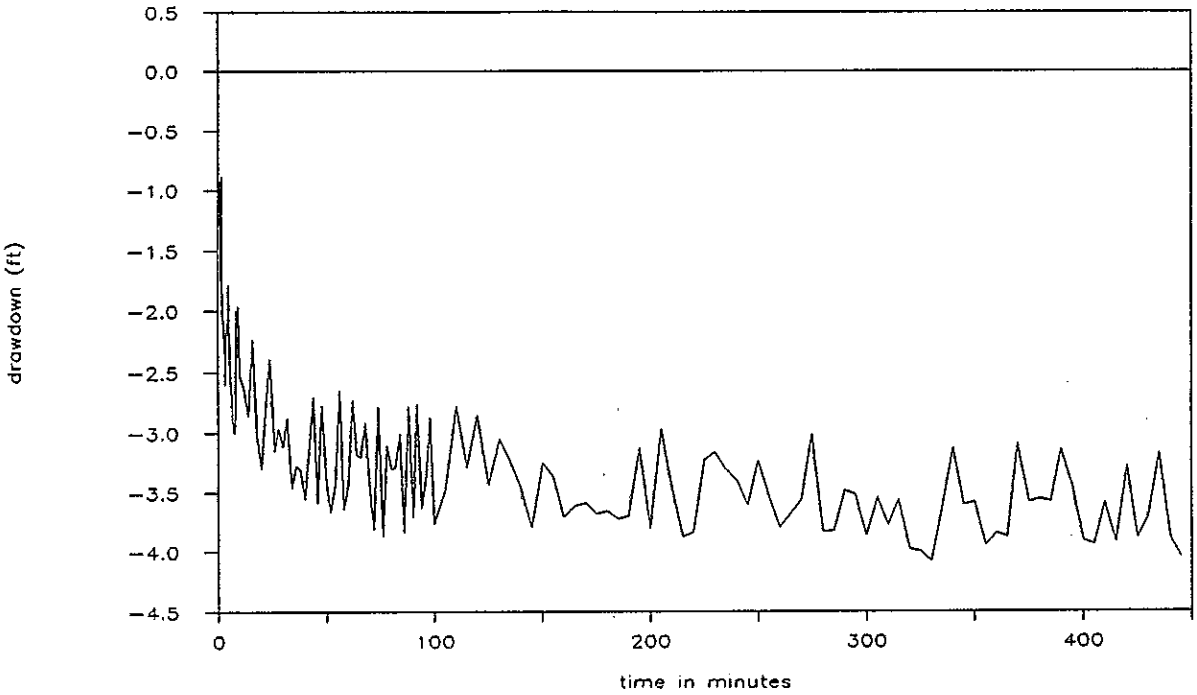
WELL D8-4 RECOVERY

p 13 of 13

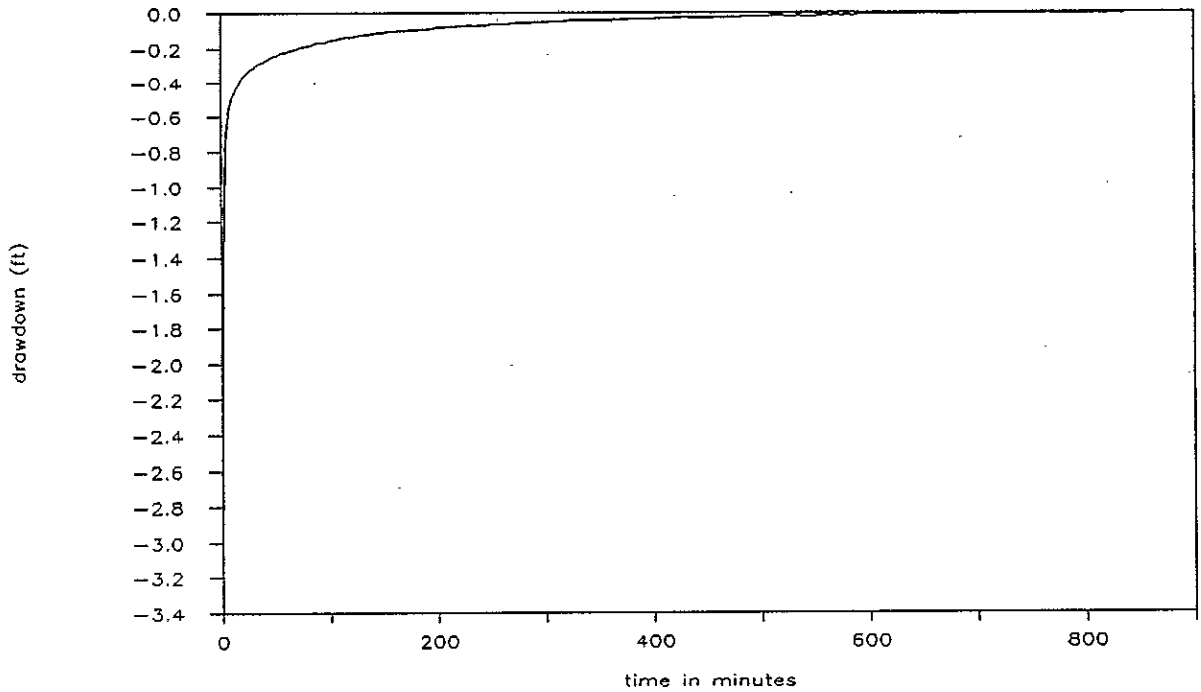
Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft	(tr+tp)/tr
670.0000	11.1667	82.111	-82.111	0.011	1.66
675.0000	11.2500	82.111	-82.111	0.011	1.66
680.0000	11.3333	82.111	-82.111	0.011	1.65
685.0000	11.4167	82.108	-82.108	0.008	1.65
690.0000	11.5000	82.108	-82.108	0.008	1.64
695.0000	11.5833	82.105	-82.105	0.005	1.64
700.0000	11.6667	82.108	-82.108	0.008	1.64
705.0000	11.7500	82.108	-82.108	0.008	1.63
710.0000	11.8333	82.108	-82.108	0.008	1.63
715.0000	11.9167	82.105	-82.105	0.005	1.62
720.0000	12.0000	82.105	-82.105	0.005	1.62
725.0000	12.0833	82.108	-82.108	0.008	1.61
730.0000	12.1667	82.105	-82.105	0.005	1.61
735.0000	12.2500	82.108	-82.108	0.008	1.61
740.0000	12.3333	82.105	-82.105	0.005	1.60
745.0000	12.4167	82.105	-82.105	0.005	1.60
750.0000	12.5000	82.105	-82.105	0.005	1.59
755.0000	12.5833	82.105	-82.105	0.005	1.59
760.0000	12.6667	82.105	-82.105	0.005	1.59
765.0000	12.7500	82.102	-82.102	0.002	1.58
770.0000	12.8333	82.105	-82.105	0.005	1.58
775.0000	12.9167	82.105	-82.105	0.005	1.57
780.0000	13.0000	82.105	-82.105	0.005	1.57
785.0000	13.0833	82.108	-82.108	0.008	1.57
790.0000	13.1667	82.111	-82.111	0.011	1.56
795.0000	13.2500	82.108	-82.108	0.008	1.56
800.0000	13.3333	82.105	-82.105	0.005	1.56
805.0000	13.4167	82.105	-82.105	0.005	1.55
810.0000	13.5000	82.102	-82.102	0.002	1.55
815.0000	13.5833	82.105	-82.105	0.005	1.55
820.0000	13.6667	82.105	-82.105	0.005	1.54
825.0000	13.7500	82.108	-82.108	0.008	1.54
830.0000	13.8333	82.108	-82.108	0.008	1.54
835.0000	13.9167	82.105	-82.105	0.005	1.53

9313021.0254

WELL D8-4 DEVELOPMENT



WELL D8-4 RECOVERY



9313021.0255

AQUIFER TEST SUMMARY

WELL 199-D8-4 SLUG INJECTION AND WITHDRAWAL

No slug tests were performed at well D8-4.

9312021.0256

BOREHOLE TEST INFORMATION

VALIDATED KDR 3/12/92 SIGNATURE DATE

Page 1 of 1

Borehole 199-D8-4 Borehole Diameter ~~4~~ 3" JAC Hanford Coordinates —NA—

Interval Tested 97.34'-77.32' BTOC Depth Interval 97.34'-77.32' BTOC

Test Type -NA- Borehole Depth 97.34' BTOC

Instruction Used WHC-CM-7-7-EII 10.1

EQUIPMENT

NAME	DESCRIPTION
ELECTRIC SOUNDER	SOUNST SN-ET-1
DATA LOGGER.	IN-SITU INC. S.N.- ~~24192~~ -NA- JAC
PRESSURE TRANSDUCER	IN-SITU INC. S.N.- NA-
SLUGGING ROD	-NA-
STEEL MEASURING TAPE	500' GRADUATED STEEL TAPE

MEASUREMENT DATUM

Control Datum TOP OF CASING 6" (T.O.C. 6")

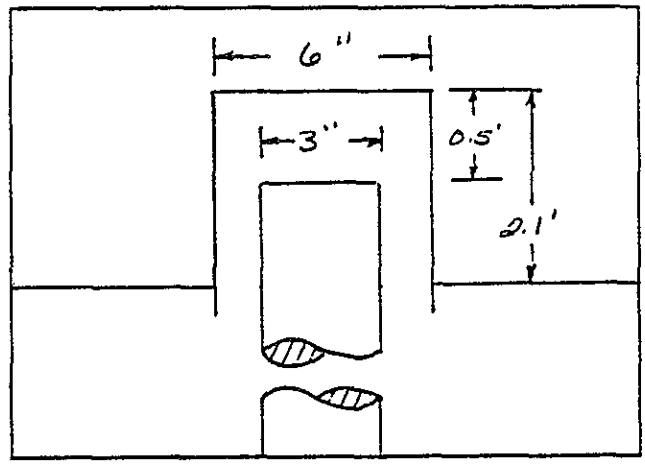
Elevation NA

Electric Sounder T.O.C. 6"

Steel Tape T.O.C. 6"

Pressure Transducer T.O.C. 6"

WELL HEAD DIAGRAM



COMMENTS

No borehole tests were run. Borehole diameter is too narrow to accept test equipment (for Instantaneous Slug Tests).

Recorded by JAMES A. COATES JAMES A. COATES Sign and Print Name 12-11-91 Date

BD-6000-295 (05/89)

9313021.0257

INSTANTANEOUS SLUG TEST DATA SHEET

Borehole 199-D8-4

Interval Tested 97.34' - 77.32' BTOC

Depth to Water 84.69' BTOC

Date 12/4/91

Measured by James A Coates

Slug Volume -NA- Barometer Reading (Beginning) -NA- (End) -NA-

Time -NA-

Transducer Measurement Units -NA-

Depth to Transducer -NA-

Initial Pressure (P_i) -NA-

Slug Level or Pressure (P_{max}) -NA-

Borehole Diameter 3"

Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement

No slug tests were performed. Borehole diameter to small to accept test equipment. No data generated.

Recorded by James A. Coates James A. Coates (Sign and Print Name) 12-11-91 (Date)

BD-6000-293 (07/90)

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9313021.0259

WELL 199-D8-5

9313021.0260

AQUIFER TEST SUMMARY

WELL 199-D8-5 DEVELOPMENT AND RECOVERY

Purpose of Tests: The well was pumped for development. Water levels were measured during drawdown and recovery for use in estimating aquifer transmissivity.

Hydrogeologic Unit Tested: The uppermost aquifer (Ringold Formation), comprising sandy silty gravel and sand

Thickness of Aquifer: 13 ft

Depth of Screened or Open Interval Exposed to Aquifer During Test: entire thickness of aquifer: water level at 70 ft below top of casing; bottom of aquifer at approximately 83 ft below top of casing (80 ft bls plus 3 ft casing stickup and concrete pad).

Diameter of Well Casing: 3 in (0.25 ft)

Diameter of Well Screen: 3 in (0.25 ft)

Diameter of Screen plus Sand Pack: 7 in (0.583 ft)

Porosity of Sand Pack: 0.30 (estimated)

Observation Well(s) Used: None Distance from Pumping Well: N/A

Depth of Screened Interval of Observation Well: N/A

Date of Tests: 5 Dec 92 Start Time of Test: 11:52

Pumping Rate: average discharge = 2.3 gal/min (443 ft^3/d)

Duration of Test: Discharge: 10 min; Recovery monitored for 16 min

Water-Level Measurement Methods: E-tape and pressure transducer with data logger

Maximum Change in Water Level: 11.7 ft

RESULTS:

During development, the water level dropped down to near the pump intake at approximately 5 minutes. The pumping rate was lowered and the water level remained fairly constant. Because of the changes in pumping rate, the data were not analyzed.

9313021.0261

DRAWDOWN/RECOVERY

Well Designation 199-D8-5 Date 12-5-91

Well Depth 86.71'-66.71' BTOC Screened Interval 86.71'

Pumping Method CONSTANT DISCHARGE

Equipment Used to Measure Water Level E-TAPE / TRANSDUCER S.N ET-1 / 2324 Calibation Due 1-24-92 / 7-19-92

Equipment Used to Measure Flow — NA — S.N. — NA — Calibation Due — NA —

Measuring Point TOP OF CASING 6" (T.O.C. 6") Pump Start Time 1220 Pump Stop Time 1330

Time		Water Level		Discharge
Date	Time	Reading Unit:	Water Level Unit:	Reading Unit:
				BUCKET METHOD.
				5 gal / 131 sec / 51 strokes = 2.3 GPM
		SEE		
		ATTACHED		

Signature of Recorder James A. Coates James A. Coates Date 12-1-91

Sign and Print Name

A-6000-402 (03/90)

9313021.0262

WELL D8-5 DEVELOPMENT

SE2000
Environmental Logger
12/05 16:20

p 2 of 5

Unit# 192 Test 7

INPUT 1: Level (F) TOC

Reference	69.980
SG	1.000
Linearity	0.000
Scale factor	10.090
Offset	0.000
Delay mSEC	50.000

Step 0 12/05 11:52:02

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.0000	0.0000	69.913	-69.913	-0.067
0.0083	0.0001	70.059	-70.059	0.079
0.0166	0.0003	70.161	-70.161	0.181
0.0250	0.0004	69.514	-69.514	-0.466
0.0333	0.0006	70.260	-70.260	0.28
0.0416	0.0007	70.690	-70.690	0.71
0.0500	0.0008	69.957	-69.957	-0.023
0.0583	0.0010	70.030	-70.030	0.05
0.0666	0.0011	71.018	-71.018	1.038
0.0750	0.0013	70.241	-70.241	0.261
0.0833	0.0014	69.925	-69.925	-0.055
0.1000	0.0017	70.422	-70.422	0.442
0.1166	0.0019	70.840	-70.840	0.86
0.1333	0.0022	70.097	-70.097	0.117
0.1500	0.0025	71.025	-71.025	1.045
0.1666	0.0028	70.493	-70.493	0.513
0.1833	0.0031	70.563	-70.563	0.583
0.2000	0.0033	71.050	-71.050	1.07
0.2166	0.0036	70.767	-70.767	0.787
0.2333	0.0039	71.092	-71.092	1.112
0.2500	0.0042	71.468	-71.468	1.488
0.2666	0.0044	70.623	-70.623	0.643
0.2833	0.0047	71.117	-71.117	1.137
0.3000	0.0050	71.104	-71.104	1.124
0.3166	0.0053	70.814	-70.814	0.834
0.3333	0.0056	71.777	-71.777	1.797
0.4166	0.0069	71.525	-71.525	1.545
0.5000	0.0083	71.614	-71.614	1.634

9313021.0263

WELL D8-5 DEVELOPMENT

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.5833	0.0097	72.494	-72.494	2.514
0.6666	0.0111	72.809	-72.809	2.829
0.7500	0.0125	72.797	-72.797	2.817
0.8333	0.0139	72.736	-72.736	2.756
0.9166	0.0153	73.144	-73.144	3.164
1.0000	0.0167	73.641	-73.641	3.661
1.0833	0.0181	73.730	-73.730	3.75
1.1666	0.0194	73.950	-73.950	3.97
1.2500	0.0208	74.320	-74.320	4.34
1.3333	0.0222	74.409	-74.409	4.429
1.4166	0.0236	74.705	-74.705	4.725
1.5000	0.0250	75.037	-75.037	5.057
1.5833	0.0264	74.827	-74.827	4.847
1.6666	0.0278	75.480	-75.480	5.5
1.7500	0.0292	75.767	-75.767	5.787
1.8333	0.0306	75.834	-75.834	5.854
1.9166	0.0319	75.607	-75.607	5.627
2.0000	0.0333	76.098	-76.098	6.118
2.5000	0.0417	77.564	-77.564	7.584
3.0000	0.0500	78.039	-78.039	8.059
3.5000	0.0583	79.202	-79.202	9.222
4.0000	0.0667	80.091	-80.091	10.111
4.5000	0.0750	80.859	-80.859	10.879
5.0000	0.0833	81.598	-81.598	11.618
5.5000	0.0917	81.668	-81.668	11.688
6.0000	0.1000	81.668	-81.668	11.688
6.5000	0.1083	81.659	-81.659	11.679
7.0000	0.1167	81.691	-81.691	11.711
7.5000	0.1250	81.716	-81.716	11.736
8.0000	0.1333	81.637	-81.637	11.657
8.5000	0.1417	81.713	-81.713	11.733
9.0000	0.1500	81.729	-81.729	11.749
9.5000	0.1583	81.678	-81.678	11.698
10.0000	0.1667	81.624	-81.624	11.644

9313021.0254

WELL D8-5 RECOVERY

p. 4 of 5

SE2000
Environmental Logger
12/05 16:22

Unit# 192 Test 8

INPUT 1: Level (F) TOC

Reference	69.980
SG	1.000
Linearity	0.000
Scale factor	10.090
Offset	0.000
Delay mSEC	50.000

Step 0 12/05 12:02:37 tp = 10 min

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.0000	0.0000	81.614	-81.614	11.634
0.0083	0.0001	81.586	-81.586	11.606
0.0166	0.0003	81.554	-81.554	11.574
0.0250	0.0004	81.528	-81.528	11.548
0.0333	0.0006	81.503	-81.503	11.523
0.0416	0.0007	81.477	-81.477	11.497
0.0500	0.0008	81.452	-81.452	11.472
0.0583	0.0010	81.426	-81.426	11.446
0.0666	0.0011	81.401	-81.401	11.421
0.0750	0.0013	81.375	-81.375	11.395
0.0833	0.0014	81.350	-81.350	11.37
0.1000	0.0017	81.302	-81.302	11.322
0.1166	0.0019	81.251	-81.251	11.271
0.1333	0.0022	81.203	-81.203	11.223
0.1500	0.0025	81.152	-81.152	11.172
0.1666	0.0028	81.111	-81.111	11.131
0.1833	0.0031	81.069	-81.069	11.089
0.2000	0.0033	81.031	-81.031	11.051
0.2166	0.0036	80.990	-80.990	11.01
0.2333	0.0039	80.951	-80.951	10.971
0.2500	0.0042	80.907	-80.907	10.927
0.2666	0.0044	80.869	-80.869	10.889
0.2833	0.0047	80.824	-80.824	10.844
0.3000	0.0050	80.783	-80.783	10.803
0.3166	0.0053	80.744	-80.744	10.764
0.3333	0.0056	80.703	-80.703	10.723
0.4166	0.0069	80.499	-80.499	10.519
0.5000	0.0083	80.250	-80.250	10.27

9313021.0265

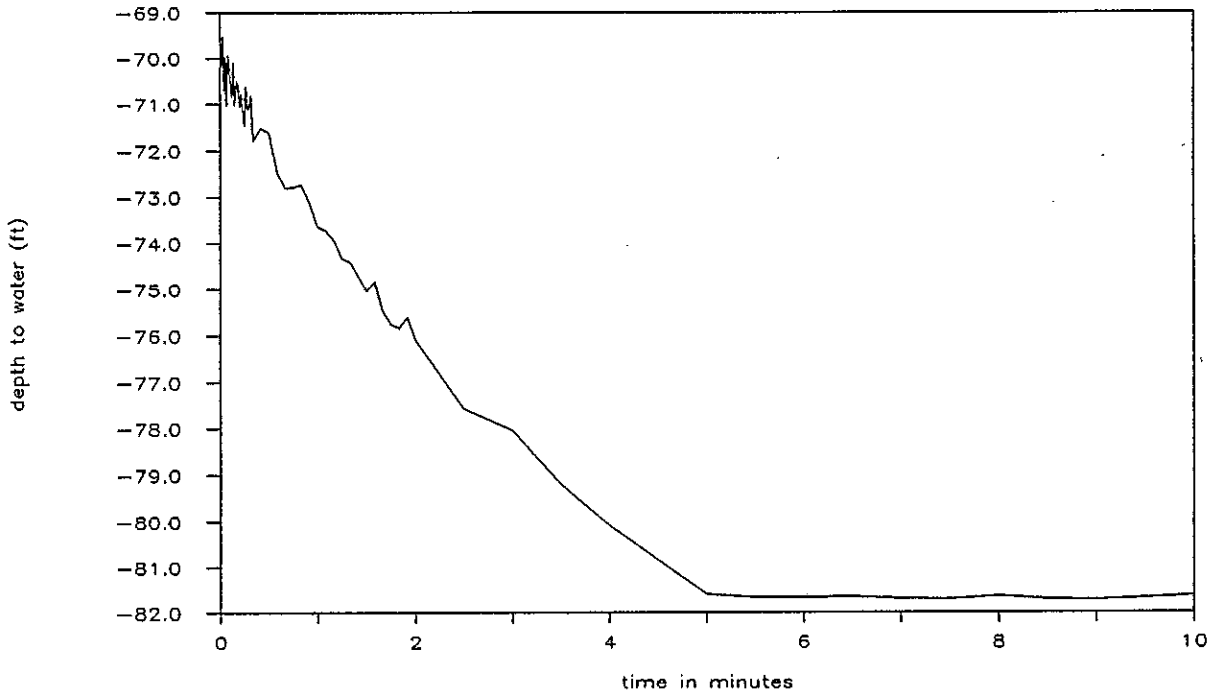
WELL D8-5 RECOVERY

p. 5 of 5

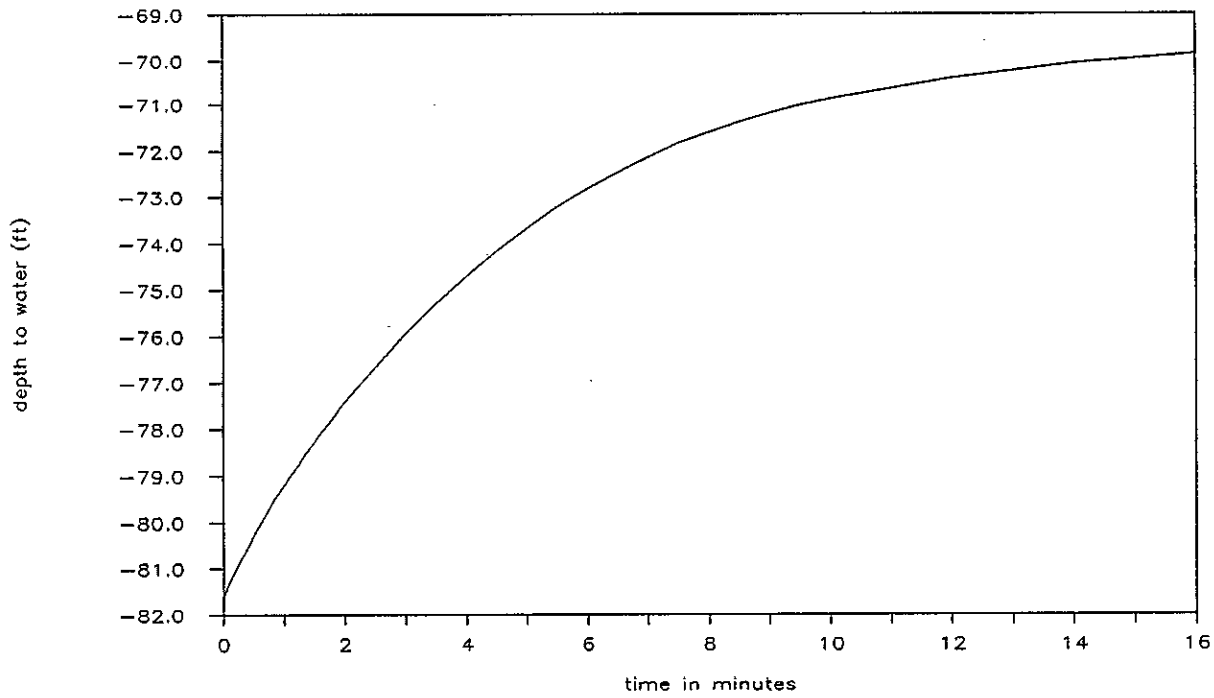
Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.5833	0.0097	80.081	-80.081	10.101
0.6666	0.0111	79.897	-79.897	9.917
0.7500	0.0125	79.696	-79.696	9.716
0.8333	0.0139	79.517	-79.517	9.537
0.9166	0.0153	79.345	-79.345	9.365
1.0000	0.0167	79.183	-79.183	9.203
1.0833	0.0181	79.030	-79.030	9.05
1.1666	0.0194	78.880	-78.880	8.9
1.2500	0.0208	78.724	-78.724	8.744
1.3333	0.0222	78.568	-78.568	8.588
1.4166	0.0236	78.415	-78.415	8.435
1.5000	0.0250	78.265	-78.265	8.285
1.5833	0.0264	78.122	-78.122	8.142
1.6666	0.0278	77.978	-77.978	7.998
1.7500	0.0292	77.835	-77.835	7.855
1.8333	0.0306	77.691	-77.691	7.711
1.9166	0.0319	77.548	-77.548	7.568
2.0000	0.0333	77.414	-77.414	7.434
2.5000	0.0417	76.646	-76.646	6.666
3.0000	0.0500	75.923	-75.923	5.943
3.5000	0.0583	75.285	-75.285	5.305
4.0000	0.0667	74.702	-74.702	4.722
4.5000	0.0750	74.164	-74.164	4.184
5.0000	0.0833	73.673	-73.673	3.693
5.5000	0.0917	73.220	-73.220	3.24
6.0000	0.1000	72.819	-72.819	2.839
6.5000	0.1083	72.465	-72.465	2.485
7.0000	0.1167	72.143	-72.143	2.163
7.5000	0.1250	71.844	-71.844	1.864
8.0000	0.1333	71.602	-71.602	1.622
8.5000	0.1417	71.388	-71.388	1.408
9.0000	0.1500	71.194	-71.194	1.214
9.5000	0.1583	71.025	-71.025	1.045
10.0000	0.1667	70.875	-70.875	0.895
12.0000	0.2000	70.397	-70.397	0.417
14.0000	0.2333	70.069	-70.069	0.089
16.0000	0.2667	69.852	-69.852	-0.128

9313021.0266

WELL D8-5 DEVELOPMENT



WELL D8-5 RECOVERY



9313021.0267

AQUIFER TEST SUMMARY

WELL 199-D8-5 SLUG INJECTION AND WITHDRAWAL

Purpose of Tests: to estimate aquifer transmissivity or hydraulic conductivity

Hydrogeologic Unit Tested: The uppermost aquifer (Ringold Formation), comprising sandy silty gravel, and sand

Thickness of Aquifer: 13 ft

Depth of Screened or Open Interval Exposed to Aquifer During Test: entire thickness of aquifer: water level at 70 ft below top of casing; bottom of aquifer at approximately 83 ft below top of casing (80 ft bls plus 3 ft casing stickup and concrete pad).

Diameter of Well Casing: 3 in (0.25 ft)

Diameter of Well Screen: 3 in (0.25 ft)

Diameter of Screen plus Sand Pack: 7 in (0.583 ft)

Porosity of Sand Pack: 0.30 (estimated)

Observation Well(s) Used: None Distance from Pumping Well: N/A

Depth of Screened Interval of Observation Well: N/A

Date of Tests: 5 Nov 91 Start Time of Test: 09:26

Slugging Rod Dimension: 2-in diameter by 6-ft length (0.13 ft^3)

Duration of Test: Injection: 43 min; Withdrawal: 19 min

Water-Level Measurement Methods: Steel tape and pressure transducer with data logger

Maximum Change in Water Level: 5.02 ft (see remarks)

RESULTS:

The maximum change in water level during slug injection was 5.02 ft, which is much greater than the theoretical displacement in a 3-in well casing from the given slug volume (i.e., 2.6 ft). This was probably due to turbulence or inaccurate measurements by the transducer, caused by air in the water column.

Data were analyzed by the Bouwer and Rice method. Two straight-line portions of the graphs were recognized in the injection and withdrawal data. The earlier, steeper portions may represent the higher transmissivity of the sand pack, not the formation. However, the steeper lines intersect the time=0 axis at head values closer to the theoretical head displacement than the shallow lines. Thus the early-time data are judged more representative of the formation.

9313021.0259

WELL 199-D8-5 SLUG INJECTION AND WITHDRAWAL (cont.)

Results are:

Injection:		
(early time):	K = 2.2 ft/d	T = 29 ft^2/d
(later time):	K = 0.94 ft/d	T = 12 ft^2/d
Withdrawal		
(early time):	K = 3.9 ft/d	T = 51 ft^2/d
(later time):	K = 1.1 ft/d	T = 14 ft^2/d

9313021.0269

BOREHOLE TEST INFORMATION

VALIDATED KDR 3/12/92 SIGNATURE/DATE

Borehole 199-D8-5 Borehole Diameter ~~4~~ 3" Hanford Coordinates — NA —

Interval Tested 86.71'-66.71' BTOC Depth Interval 86.71'-66.71' BTOC

Test Type Instantaneous Slug Test Injection/Withdrawal Borehole Depth 86.71' BTOC

Instruction Used WHC-CM-7-7-EII 10.1

EQUIPMENT

NAME	DESCRIPTION
ELECTRIC SOUNDER	SOUNST SN- ET-1
DATA LOGGER.	IN-SITU INC. S.N.- 2 ~~1~~192
PRESSURE TRANSDUCER	IN-SITU INC. S.N.- 2324
SLUGGING ROD	2.0' x 6.0' 0.13 ft^3
STEEL MEASURING TAPE	500' GRADUATED STEEL TAPE

MEASUREMENT DATUM

Control Datum TOP OF CASING 6" (T.O.C. 6")

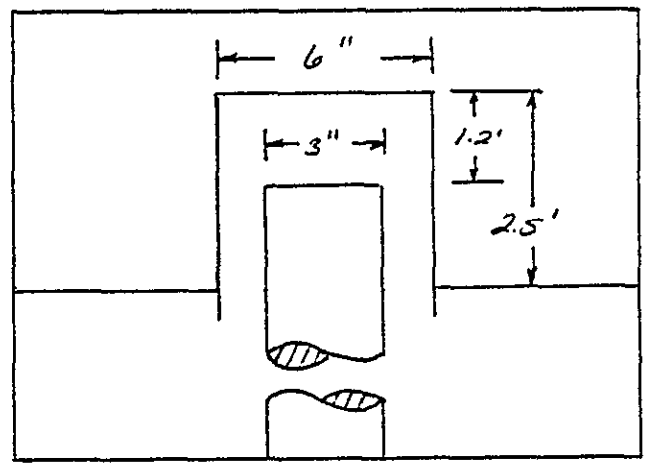
Elevation NA

Electric Sounder T.O.C. 6"

Steel Tape T.O.C. 6"

Pressure Transducer T.O.C. 6"

WELL HEAD DIAGRAM



COMMENTS

Recorded by: ~~JAMES A GATES~~ JAMES A. GATES. Sign and Print Name 12-11-91 Date

BD-6000-295 (05/89)

9313021.0270

INSTANTANEOUS SLUG TEST DATA SHEET

INJECTION

Borehole 199-D8-5

Interval Tested 86.71'-66.71' BTOC

Depth to Water ~~First~~ JAC 69.98' BTOC

Date 12-5-91

Measured by JAMES A. COATES

Slug Volume .13 ft³ Barometer Reading (Beginning) -NA- (End) -NA-

Time 0910-inj. baseline, 0925-injection

Transducer Measurement Units FEET.

Depth to Transducer 15.79' BWL

Initial Pressure (P_i) 69.98'

Slug Level or Pressure (P_{max}) 64.944'

Borehole Diameter ~~4"~~ JAC 3"

Time		Pressure Trans. Measurement	Time		Pressure Trans. Measurement	Time		Pressure Trans. Measurement
Observed	Elapsed		Observed	Elapsed		Observed	Elapsed	
		SEE ATTACHED			SEE ATTACHED			

Recorded by James A. Coates (Sign and Print Name) JAMES A. COATES 12-1-91 (Date)

D-62

BD-6000-293 (07/90)

9313221.0973

WELL D8-5 BASELINE FOR SLUG TESTS

p 2 of 5

SE2000
Environmental Logger
12/05 16:12

Unit# 192 Test 3

INPUT 1: Level (F) TOC

Reference	69.980
SG	1.000
Linearity	0.000
Scale factor	10.090
Offset	0.000
Delay mSEC	50.000

Step 0 12/05 09:08:39

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft
0.0000	0.0000	69.964	-69.964
5.0000	0.0833	69.938	-69.938
10.0000	0.1667	69.932	-69.932
15.0000	0.2500	69.929	-69.929

9313021.0272

WELL D8-5 SLUG INJECTION

p3 of 5

SE2000
Environmental Logger
12/05 16:14

Unit# 192 Test 4

INPUT 1: Level (F) TOC

Reference	69.980
SG	1.000
Linearity	0.000
Scale factor	10.090
Offset	0.000
Delay mSEC	50.000

slug volume = 0.13 ft3
theoretical d(Y) = 2.6 ft

Step 0 12/05 09:26:33

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.0000	0.0000	69.976	-69.976	0.004	0.0015
0.0083	0.0001	67.988	-67.988	1.992	0.7662
0.0166	0.0003	64.960	-64.960	5.02	1.9308
0.0250	0.0004	64.944	-64.944	5.036	1.9369
0.0333	0.0006	66.828	-66.828	3.152	1.2123
0.0416	0.0007	69.881	-69.881	0.099	0.0381
0.0500	0.0008	68.192	-68.192	1.788	0.6877
0.0583	0.0010	68.297	-68.297	1.683	0.6473
0.0666	0.0011	69.400	-69.400	0.58	0.2231
0.0750	0.0013	67.997	-67.997	1.983	0.7627
0.0833	0.0014	69.390	-69.390	0.59	0.2269
0.1000	0.0017	69.116	-69.116	0.864	0.3323
0.1166	0.0019	68.781	-68.781	1.199	0.4612
0.1333	0.0022	68.660	-68.660	1.32	0.5077
0.1500	0.0025	68.698	-68.698	1.282	0.4931
0.1666	0.0028	68.769	-68.769	1.211	0.4658
0.1833	0.0031	68.813	-68.813	1.167	0.4488
0.2000	0.0033	68.842	-68.842	1.138	0.4377
0.2166	0.0036	68.864	-68.864	1.116	0.4292
0.2333	0.0039	68.874	-68.874	1.106	0.4254
0.2500	0.0042	68.877	-68.877	1.103	0.4242
0.2666	0.0044	68.886	-68.886	1.094	0.4208
0.2833	0.0047	68.896	-68.896	1.084	0.4169
0.3000	0.0050	68.909	-68.909	1.071	0.4119
0.3166	0.0053	68.915	-68.915	1.065	0.4096
0.3333	0.0056	68.928	-68.928	1.052	0.4046
0.4166	0.0069	68.972	-68.972	1.008	0.3877
0.5000	0.0083	69.008	-69.008	0.972	0.3738

9313021.0273

WELL D8-5 SLUG INJECTION

p 4 of 5

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.5833	0.0097	69.043	-69.043	0.937	0.3604
0.6666	0.0111	69.071	-69.071	0.909	0.3496
0.7500	0.0125	69.094	-69.094	0.886	0.3408
0.8333	0.0139	69.116	-69.116	0.864	0.3323
0.9166	0.0153	69.135	-69.135	0.845	0.3250
1.0000	0.0167	69.157	-69.157	0.823	0.3165
1.0833	0.0181	69.173	-69.173	0.807	0.3104
1.1666	0.0194	69.189	-69.189	0.791	0.3042
1.2500	0.0208	69.205	-69.205	0.775	0.2981
1.3333	0.0222	69.221	-69.221	0.759	0.2919
1.4166	0.0236	69.234	-69.234	0.746	0.2869
1.5000	0.0250	69.250	-69.250	0.73	0.2808
1.5833	0.0264	69.262	-69.262	0.718	0.2762
1.6666	0.0278	69.278	-69.278	0.702	0.2700
1.7500	0.0292	69.288	-69.288	0.692	0.2662
1.8333	0.0306	69.301	-69.301	0.679	0.2612
1.9166	0.0319	69.310	-69.310	0.67	0.2577
2.0000	0.0333	69.317	-69.317	0.663	0.2550
2.5000	0.0417	69.364	-69.364	0.616	0.2369
3.0000	0.0500	69.419	-69.419	0.561	0.2158
3.5000	0.0583	69.463	-69.463	0.517	0.1988
4.0000	0.0667	69.505	-69.505	0.475	0.1827
4.5000	0.0750	69.540	-69.540	0.44	0.1692
5.0000	0.0833	69.578	-69.578	0.402	0.1546
5.5000	0.0917	69.610	-69.610	0.37	0.1423
6.0000	0.1000	69.639	-69.639	0.341	0.1312
6.5000	0.1083	69.667	-69.667	0.313	0.1204
7.0000	0.1167	69.696	-69.696	0.284	0.1092
7.5000	0.1250	69.718	-69.718	0.262	0.1008
8.0000	0.1333	69.740	-69.740	0.24	0.0923
8.5000	0.1417	69.760	-69.760	0.22	0.0846
9.0000	0.1500	69.776	-69.776	0.204	0.0785
9.5000	0.1583	69.791	-69.791	0.189	0.0727
10.0000	0.1667	69.807	-69.807	0.173	0.0665
11.0000	0.1833	69.833	-69.833	0.147	0.0565
12.0000	0.2000	69.852	-69.852	0.128	0.0492
13.0000	0.2167	69.871	-69.871	0.109	0.0419
14.0000	0.2333	69.887	-69.887	0.093	0.0358
15.0000	0.2500	69.897	-69.897	0.083	0.0319
16.0000	0.2667	69.909	-69.909	0.071	0.0273
17.0000	0.2833	69.919	-69.919	0.061	0.0235
18.0000	0.3000	69.929	-69.929	0.051	0.0196
19.0000	0.3167	69.935	-69.935	0.045	0.0173
20.0000	0.3333	69.941	-69.941	0.039	0.0150
21.0000	0.3500	69.948	-69.948	0.032	0.0123
22.0000	0.3667	69.948	-69.948	0.032	0.0123
23.0000	0.3833	69.951	-69.951	0.029	0.0112
24.0000	0.4000	69.954	-69.954	0.026	0.0100

9313021.0274

WELL D8-5 SLUG INJECTION

P.5 of 5

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
25.0000	0.4167	69.960	-69.960	0.02	0.0077
26.0000	0.4333	69.960	-69.960	0.02	0.0077
27.0000	0.4500	69.964	-69.964	0.016	0.0062
28.0000	0.4667	69.967	-69.967	0.013	0.0050
29.0000	0.4833	69.967	-69.967	0.013	0.0050
30.0000	0.5000	69.970	-69.970	0.01	0.0038
31.0000	0.5167	69.973	-69.973	0.007	0.0027
32.0000	0.5333	69.976	-69.976	0.004	0.0015
33.0000	0.5500	69.980	-69.980	0	0.0000
34.0000	0.5667	69.980	-69.980	0	0.0000
35.0000	0.5833	69.983	-69.983	-0.003	-0.0012
36.0000	0.6000	69.983	-69.983	-0.003	-0.0012
37.0000	0.6167	69.983	-69.983	-0.003	-0.0012
38.0000	0.6333	69.983	-69.983	-0.003	-0.0012
39.0000	0.6500	69.983	-69.983	-0.003	-0.0012
40.0000	0.6667	69.983	-69.983	-0.003	-0.0012
41.0000	0.6833	69.983	-69.983	-0.003	-0.0012
42.0000	0.7000	69.986	-69.986	-0.006	-0.0023
43.0000	0.7167	69.986	-69.986	-0.006	-0.0023

9313021.0275

INSTANTANEOUS SLUG TEST DATA SHEET

Borehole 199-D8-5

Interval Tested 86.71' - 66.71' BTOC

Depth to Water 69.98' BTOC

Date 12-5-91

Measured by JAMES A. COATES

Slug Volume .13ft³ Barometer Reading (Beginning) -NA- (End) -NA-

Time 1010

Transducer Measurement Units FEET.

Depth to Transducer 15.79' BWL

Initial Pressure (P_i) 69.98'

Slug Level or Pressure (P_{max}) 77.185'

Borehole Diameter ~~4~~ HSAC 3"

Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement
		SEE ATTACHED			SEE ATTACHED			

Recorded by JAMES A. COATES (Sign and Print Name) D-67 (Date)

WELL D8-5 SLUG WITHDRAWAL

p 2 of 3

SE2000
Environmental Logger
12/05 16:29

Unit# 192 Test 5

INPUT 1: Level (F) TOC

Reference	69.980
SG	1.000
Linearity	0.000
Scale factor	10.090
Offset	0.000
Delay mSEC	50.000

slug volume = 0.13 ft3
theoretical d(Y) = 2.6 ft

Step 0 12/05 10:13:36

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.0001	0.0000	77.185	-77.185	7.205	2.7712
0.0083	0.0001	70.939	-70.939	0.959	0.3688
0.0166	0.0003	70.349	-70.349	0.369	0.1419
0.0250	0.0004	73.545	-73.545	3.565	1.3712
0.0333	0.0006	74.521	-74.521	4.541	1.7465
0.0416	0.0007	73.364	-73.364	3.384	1.3015
0.0500	0.0008	72.255	-72.255	2.275	0.8750
0.0583	0.0010	72.494	-72.494	2.514	0.9669
0.0666	0.0011	73.144	-73.144	3.164	1.2169
0.0750	0.0013	73.201	-73.201	3.221	1.2388
0.0833	0.0014	72.809	-72.809	2.829	1.0881
0.1000	0.0017	72.739	-72.739	2.759	1.0612
0.1166	0.0019	72.793	-72.793	2.813	1.0819
0.1333	0.0022	72.637	-72.637	2.657	1.0219
0.1500	0.0025	72.663	-72.663	2.683	1.0319
0.1666	0.0028	72.574	-72.574	2.594	0.9977
0.1833	0.0031	72.554	-72.554	2.574	0.9900
0.2000	0.0033	72.503	-72.503	2.523	0.9704
0.2166	0.0036	72.468	-72.468	2.488	0.9569
0.2333	0.0039	72.427	-72.427	2.447	0.9412
0.2500	0.0042	72.389	-72.389	2.409	0.9265
0.2666	0.0044	72.354	-72.354	2.374	0.9131
0.2833	0.0047	72.315	-72.315	2.335	0.8981
0.3000	0.0050	72.274	-72.274	2.294	0.8823
0.3166	0.0053	72.242	-72.242	2.262	0.8700
0.3333	0.0056	72.207	-72.207	2.227	0.8565
0.4166	0.0069	72.064	-72.064	2.084	0.8015
0.5000	0.0083	71.936	-71.936	1.956	0.7523

9313021.0277

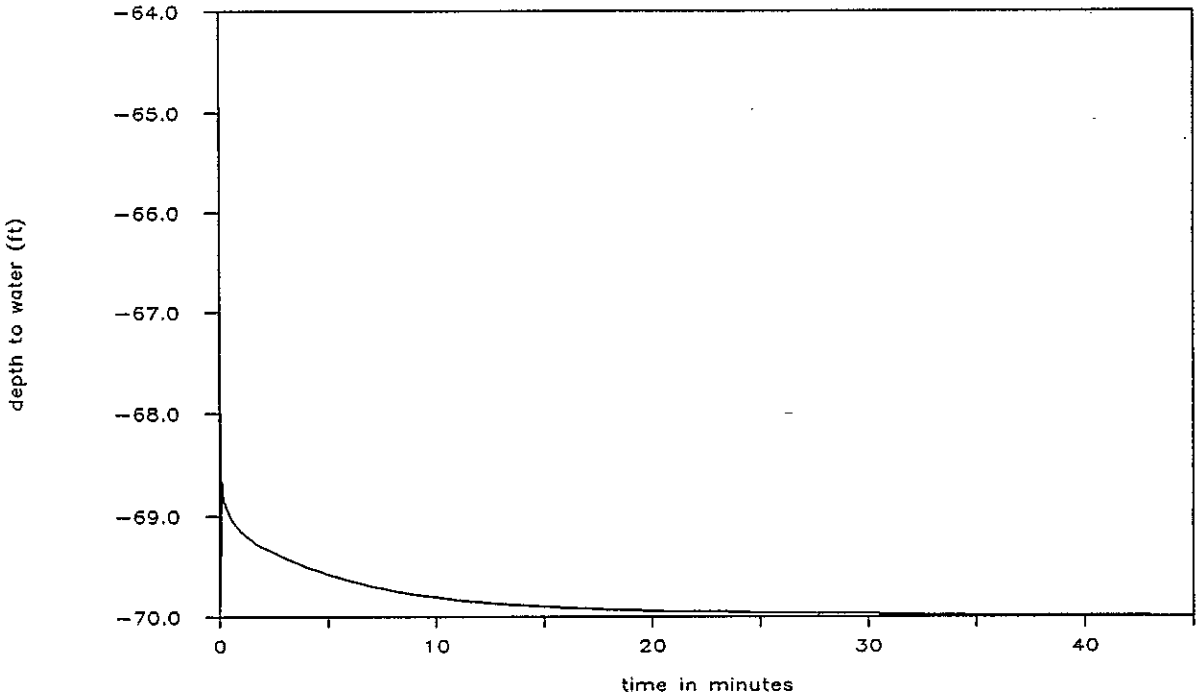
WELL D8-5 SLUG WITHDRAWAL

p 3 of 3

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.5833	0.0097	71.844	-71.844	1.864	0.7169
0.6666	0.0111	71.783	-71.783	1.803	0.6935
0.7500	0.0125	71.732	-71.732	1.752	0.6738
0.8333	0.0139	71.688	-71.688	1.708	0.6569
0.9166	0.0153	71.646	-71.646	1.666	0.6408
1.0000	0.0167	71.608	-71.608	1.628	0.6262
1.0833	0.0181	71.573	-71.573	1.593	0.6127
1.1666	0.0194	71.541	-71.541	1.561	0.6004
1.2500	0.0208	71.509	-71.509	1.529	0.5881
1.3333	0.0222	71.480	-71.480	1.5	0.5769
1.4166	0.0236	71.452	-71.452	1.472	0.5662
1.5000	0.0250	71.423	-71.423	1.443	0.5550
1.5833	0.0264	71.394	-71.394	1.414	0.5438
1.6666	0.0278	71.369	-71.369	1.389	0.5342
1.7500	0.0292	71.343	-71.343	1.363	0.5242
1.8333	0.0306	71.321	-71.321	1.341	0.5158
1.9166	0.0319	71.296	-71.296	1.316	0.5062
2.0000	0.0333	71.277	-71.277	1.297	0.4988
2.5000	0.0417	71.149	-71.149	1.169	0.4496
3.0000	0.0500	71.041	-71.041	1.061	0.4081
3.5000	0.0583	70.942	-70.942	0.962	0.3700
4.0000	0.0667	70.856	-70.856	0.876	0.3369
4.5000	0.0750	70.776	-70.776	0.796	0.3062
5.0000	0.0833	70.703	-70.703	0.723	0.2781
5.5000	0.0917	70.639	-70.639	0.659	0.2535
6.0000	0.1000	70.582	-70.582	0.602	0.2315
6.5000	0.1083	70.528	-70.528	0.548	0.2108
7.0000	0.1167	70.480	-70.480	0.5	0.1923
7.5000	0.1250	70.438	-70.438	0.458	0.1762
8.0000	0.1333	70.400	-70.400	0.42	0.1615
8.5000	0.1417	70.368	-70.368	0.388	0.1492
9.0000	0.1500	70.336	-70.336	0.356	0.1369
9.5000	0.1583	70.311	-70.311	0.331	0.1273
10.0000	0.1667	70.285	-70.285	0.305	0.1173
11.0000	0.1833	70.244	-70.244	0.264	0.1015
12.0000	0.2000	70.209	-70.209	0.229	0.0881
13.0000	0.2167	70.174	-70.174	0.194	0.0746
14.0000	0.2333	70.148	-70.148	0.168	0.0646
15.0000	0.2500	70.126	-70.126	0.146	0.0562
16.0000	0.2667	70.107	-70.107	0.127	0.0488
17.0000	0.2833	70.094	-70.094	0.114	0.0438
18.0000	0.3000	70.075	-70.075	0.095	0.0365
19.0000	0.3167	70.069	-70.069	0.089	0.0342

9313021.0278

WELL D8-5 SLUG INJECTION



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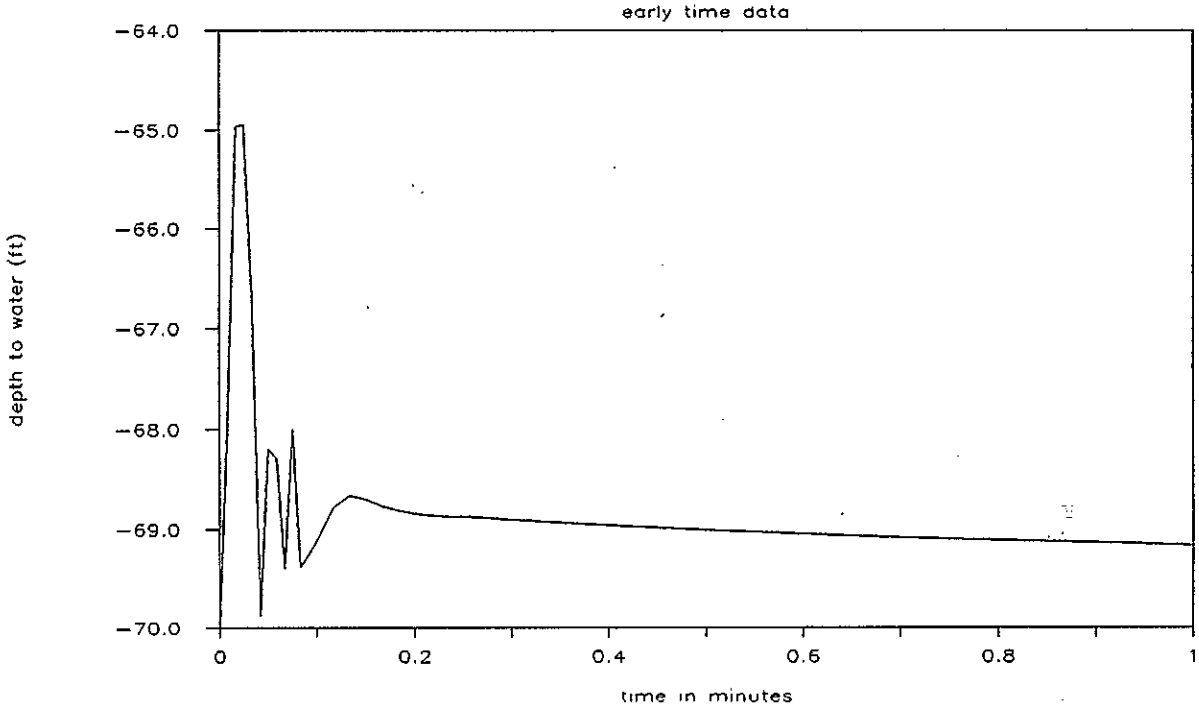
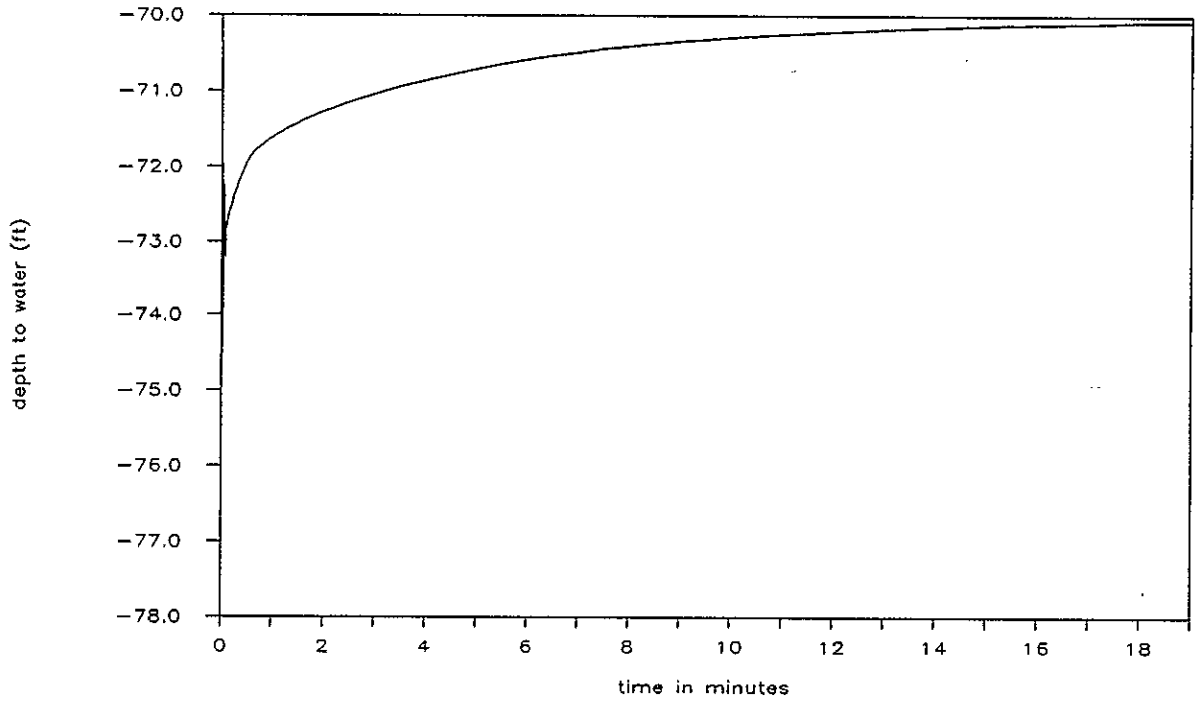
WELL D8-5 SLUG INJECTION

early time data

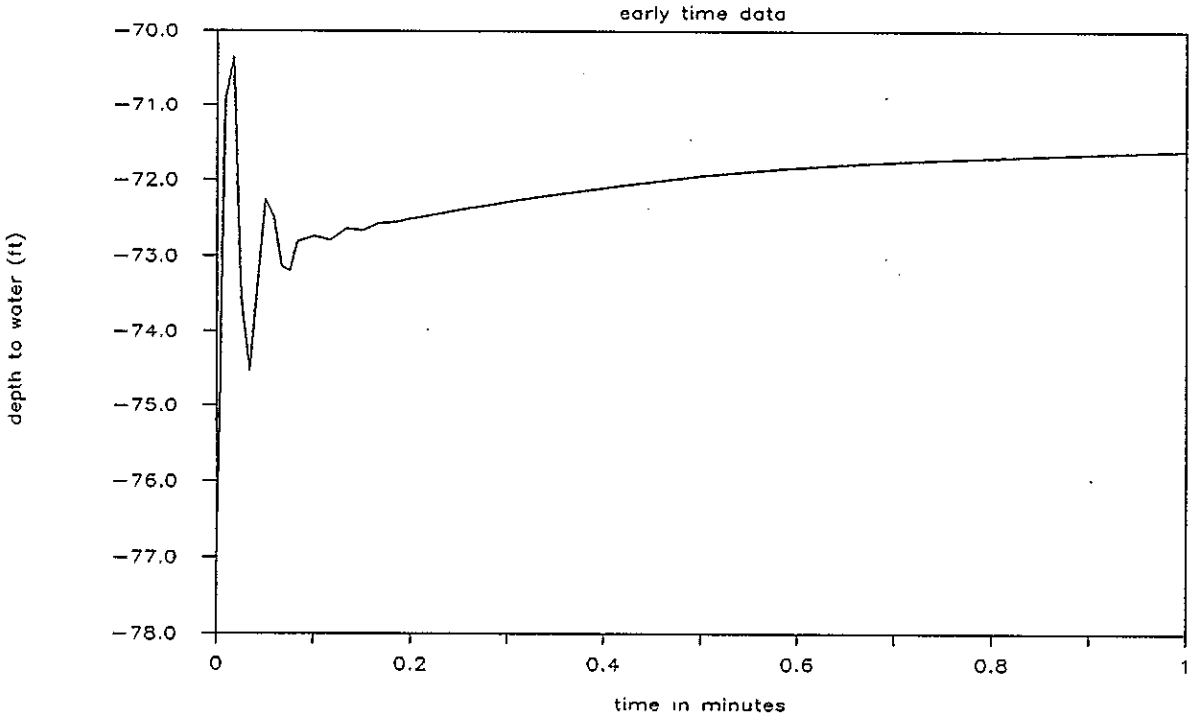


WELL D8-5 SLUG WITHDRAWAL

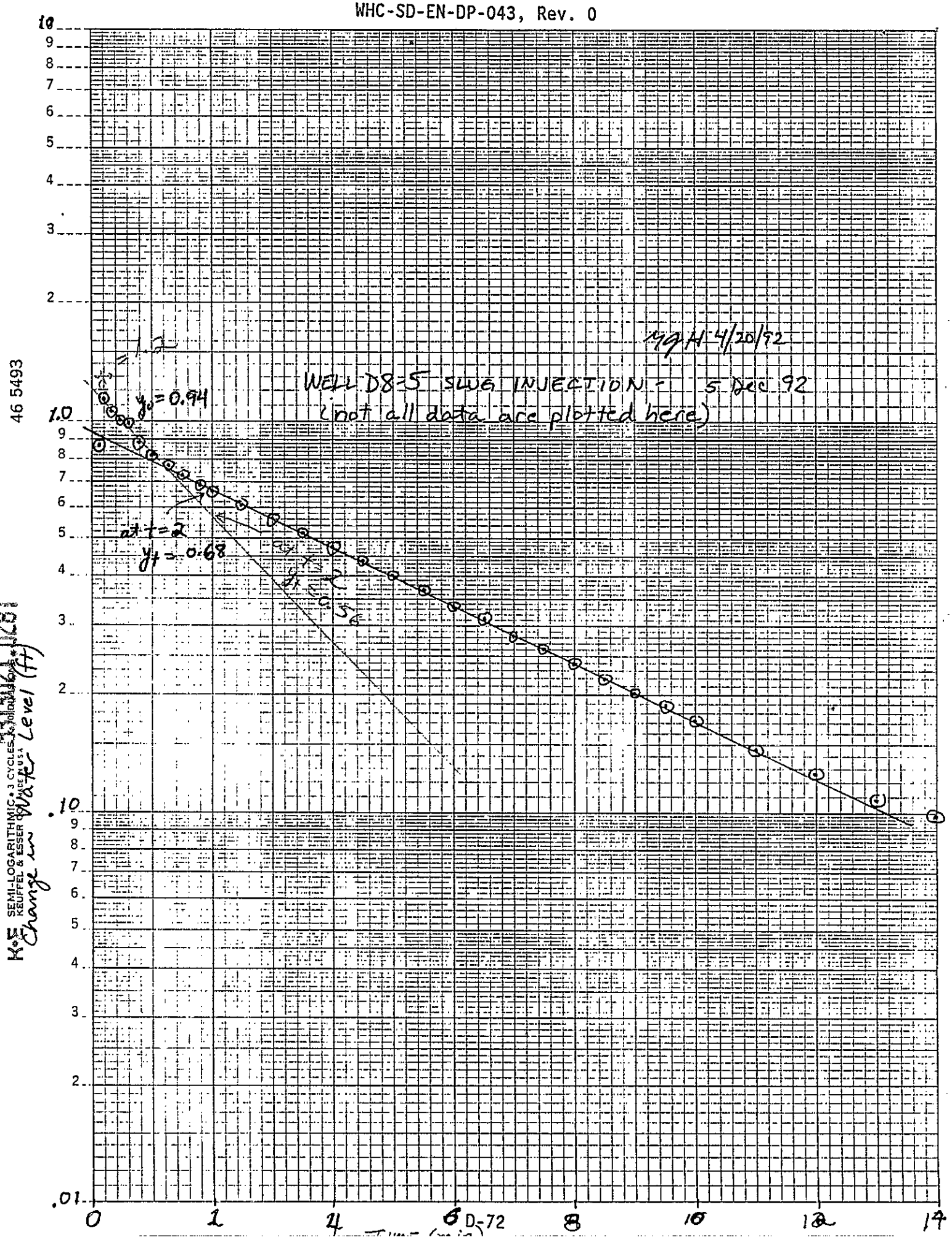


WELL D8-5 SLUG WITHDRAWAL

early time data



9313021.1280


WELL D8-5 SLUG INJECTION - 5 Dec 92
(not all data are plotted here)
MGH 4/20/92
$y_0 = 0.94$
at $t = 2$
$y_t = 0.68$
K+E SEMI-LOGARITHMIC 3 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 5493
Change in Water Level (ft)
Time (min)
10
1.0
.10
.01
0
2
4
6
8
10
12
14

WELL D8-5 SLUG INJECTION CALCULATIONS: EARLY TIME DATA
****
THE BELOW HYDRAULIC CONDUCTIVITY VALUE WAS CALCULATED
USING THE BOUWER AND RICE SLUG TEST METHOD.
SOURCE= "THE BOUWER AND RICE SLUG TEST-AN UPDATE"
GROUND WATER, VOL 27, NO. 3, MAY-JUNE 1989.
****
****
RADIUS OF CASING USED IN CALCULATIONS HAS BEEN
CORRECTED FOR THE THICKNESS OF GRAVEL OR SAND
PACK DUE TO WATER LEVEL CHANGES IN THE SCREEN OR
OPEN INTERVAL OF WELL.
****

Rc (ft)	Rw (ft)	Le (ft)	Lw (ft)	H (ft)
.1911	.2920	13.0000	13.0000	13.0000

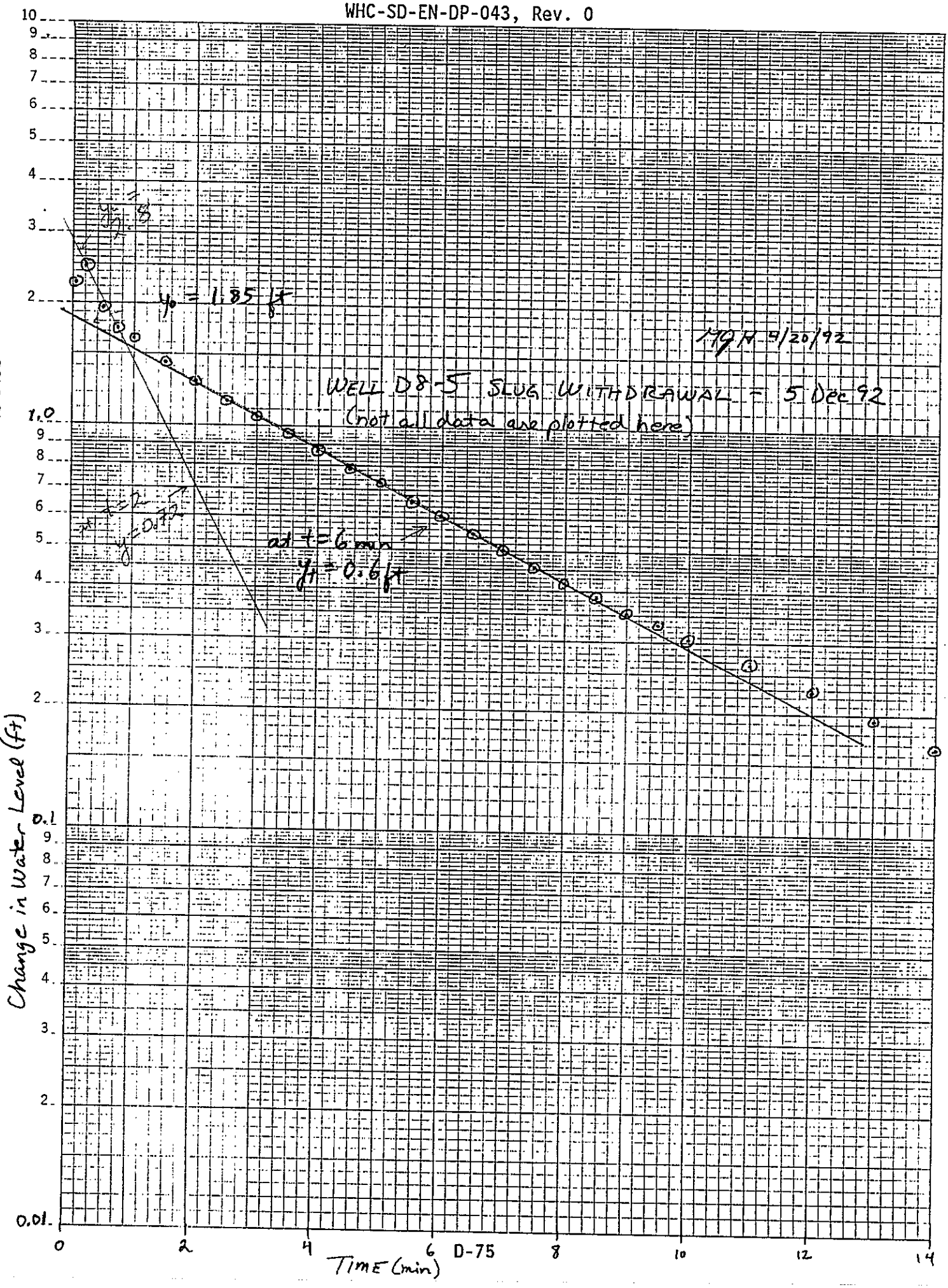
****
Le/Rw = 44.5205500
A= 2.9599010
B= 4.751957E-001
C= 2.5682260
SANDPACK POROSITY= 3.000000E-001
t (min)= 2.0000000
1/t= 5.000000E-001
Yo= (ft) 1.2000000
Yt= (ft) 5.600000E-001
1/t ln(Yo/Yt)= 3.810701E-001
ln[(H-Lw)/Rw]= .0000000
ln(Re/Rw)= 2.8779560
****
K (ft/day) = 2.2180420
****
T OF THE SATURATED SCREEN INTERVAL
(ft2/day)= 28.8345500
****

9313021.0282

WELL D8-5 SLUG INJECTION CALCULATIONS: LATER TIME DATA

```
*****************************************************
THE BELOW HYDRAULIC CONDUCTIVITY VALUE WAS CALCULATED
USING THE BOUWER AND RICE SLUG TEST METHOD.
SOURCE= "THE BOUWER AND RICE SLUG TEST-AN UPDATE"
GROUND WATER, VOL 27, NO. 3, MAY-JUNE 1989.
*************************************************
*************************************************
RADIUS OF CASING USED IN CALCULATIONS HAS BEEN
CORRECTED FOR THE THICKNESS OF GRAVEL OR SAND
PACK DUE TO WATER LEVEL CHANGES IN THE SCREEN OR
OPEN INTERVAL OF WELL.
*************************************************
Rc (ft)    Rw (ft)   Le (ft)    Lw (ft)    H (ft)
-------------------------------------------------
  .1911     .2920   13.0000     13.0000     13.0000
*************************************************
Le/Rw =          44.5205500
A=          2.9599010
B=  4.751957E-001
C=          2.5682260
SANDPACK POROSITY=  3.000000E-001
t (min)=          2.0000000
1/t=  5.000000E-001
Yo= (ft)  9.400000E-001
Yt= (ft)  6.800000E-001
1/t ln(Yo/Yt)=  1.618935E-001
ln[(H-Lw)/Rw]=           .0000000
ln(Re/Rw)=          2.8779560
*************************************************
K (ft/day) =  9.423113E-001
*************************************************
T OF THE SATURATED SCREEN INTERVAL
(ft2/day)=         12.2500500
*************************************************
```

9313021.0283


WELL D8-5 SLUG WITHDRAWAL - 5 DEC 92
(not all data are plotted here)
y_0 = 1.85 ft
at t = 6 min
y_1 = 0.6 ft
Change in Water Level (ft)
TIME (min)
K+E SEMI-LOGARITHMIC • 3 CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 5493

WELL D8-5 SLUG WITHDRAWAL CALCULATIONS: EARLY TIME DATA
****
THE BELOW HYDRAULIC CONDUCTIVITY VALUE WAS CALCULATED
USING THE BOUWER AND RICE SLUG TEST METHOD.
SOURCE= "THE BOUWER AND RICE SLUG TEST-AN UPDATE"
GROUND WATER, VOL 27, NO. 3, MAY-JUNE 1989.
****
****
RADIUS OF CASING USED IN CALCULATIONS HAS BEEN
CORRECTED FOR THE THICKNESS OF GRAVEL OR SAND
PACK DUE TO WATER LEVEL CHANGES IN THE SCREEN OR
OPEN INTERVAL OF WELL.
****

Rc (ft)	Rw (ft)	Le (ft)	Lw (ft)	H (ft)
.1911	.2920	13.0000	13.0000	13.0000

****
Le/Rw = 44.5205500
A= 2.9599010
B= 4.751957E-001
C= 2.5682260
SANDPACK POROSITY= 3.000000E-001
t (min)= 2.0000000
1/t= 5.000000E-001
Yo= (ft) 2.8000000
Yt= (ft) 7.200000E-001
1/t ln(Yo/Yt)= 6.790617E-001
ln[(H-Lw)/Rw]= .0000000
ln(Re/Rw)= 2.8779560
****
K (ft/day) = 3.9525200
****
T OF THE SATURATED SCREEN INTERVAL
(ft2/day)= 51.3827700
****

9313021.0285

WELL D8-5 SLUG WITHDRAWAL CALCULATIONS: LATER TIME DATA

```
**************************************************
THE BELOW HYDRAULIC CONDUCTIVITY VALUE WAS CALCULATED
USING THE BOUWER AND RICE SLUG TEST METHOD.
SOURCE= "THE BOUWER AND RICE SLUG TEST-AN UPDATE"
GROUND WATER, VOL 27, NO. 3, MAY-JUNE 1989.
**************************************************
**************************************************
RADIUS OF CASING USED IN CALCULATIONS HAS BEEN
CORRECTED FOR THE THICKNESS OF GRAVEL OR SAND
PACK DUE TO WATER LEVEL CHANGES IN THE SCREEN OR
OPEN INTERVAL OF WELL.
**************************************************
Rc (ft)    Rw (ft)   Le (ft)    Lw (ft)    H (ft)
--------------------------------------------------
  .1911     .2920   13.0000     13.0000    13.0000
**************************************************
Le/Rw =          44.5205500
A=          2.9599010
B=  4.751957E-001
C=          2.5682260
SANDPACK POROSITY=  3.000000E-001
t (min)=          6.0000000
1/t=  1.666667E-001
Yo= (ft)          1.8500000
Yt= (ft)  6.000000E-001
1/t ln(Yo/Yt)=  1.876685E-001
ln[(H-Lw)/Rw]=           .0000000
ln(Re/Rw)=          2.8779560
**************************************************
K (ft/day) =          1.0923360
**************************************************
T OF THE SATURATED SCREEN INTERVAL
(ft2/day)=         14.2003700
**************************************************
```

9313021.0286

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9313021.0287

WELL 199-D8-6

9313021.0288

AQUIFER TEST SUMMARY

WELL 199-D8-6 DEVELOPMENT AND RECOVERY

Purpose of Tests: The well was pumped for development. Water levels were measured during drawdown and recovery for use in estimating aquifer transmissivity.

Hydrogeologic Unit Tested: The uppermost aquifer (Ringold Formation), comprising sand and gravel and silt

Thickness of Aquifer: 24 ft (estimated from aquifer thickness at well D8-4; borehole D8-6 did not fully penetrate aquifer)

Depth of Screened or Open Interval Exposed to Aquifer During Test: 109.41 to 89.39 ft below top of casing; water level at 90.36 ft below top of casing; thickness of tested interval: 19 ft

Diameter of Well Casing: 4 in (0.333 ft)

Diameter of Well Screen: 4 in (0.333 ft)

Diameter of Screen plus Sand Pack: 8 in (0.667 ft)

Porosity of Sand Pack: 0.30 (estimated)

Observation Well(s) Used: None Distance from Pumping Well: N/A

Depth of Screened Interval of Observation Well: N/A

Date of Tests: 21 Dec 92 Start Time of Test: 12:21

Pumping Rate: average discharge = 5.5 gal/min (1059 ft^3/d)

Duration of Test: Discharge: 180 min (3.0 hr); Recovery monitored for 12 min

Water-Level Measurement Methods: E-tape and pressure transducer with data logger

Maximum Change in Water Level: 1.24 ft

RESULTS:

Water levels indicate that the pumping rate apparently varied significantly. The maximum drawdown was very small, and relatively constant throughout the test. The data were not analyzed.

9313021.0289

4 of 10

DRAWDOWN/RECOVERY

Well Designation 199-D8-6 Date 12-21-91

Well Depth 109.41' Screened Interval 109.41'-89.39' BTOC

Pumping Method CONSTANT DISCHARGE

Equipment Used to Measure Water Level E.TAPE/TRANSDUCER S.N ET-1/1989 Calibration Due 2-24-92/7-19-92

Equipment Used to Measure Flow —NA— S.N. —NA— Calibration Due —NA—

Measuring Point TOP OF CASING 6" (T.O.C. 6") Pump Start Time 1225 Pump Stop Time 1530

Time		Water Level		Discharge
Date	Time	Reading Unit:	Water Level Unit:	Reading Unit:
				BUCKET METHOD.
				5 GAL/55 sec = 5.5 GPM
		SEE		
		ATTACHED		

Signature of Recorder James A. Coates James A. Coates Date 12/23/91

Sign and Print Name

A-6000-402 (03/90)

9313021.0290

WELL D8-6 BASELINE

SE1000B
Environmental Logger
12/23 06:59

Unit# 00700 Test# 0

INPUT 1: Level (F) TOC

p. 2 of 7

Reference 90.36
Scale factor 10.11
Offset 0.00

Step# 0 12/21 11:48

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft
0	0.0000	90.36	-90.36
1	0.0167	90.36	-90.36
2	0.0333	90.36	-90.36
3	0.0500	90.36	-90.36
4	0.0667	90.36	-90.36
5	0.0833	90.36	-90.36
6	0.1000	90.36	-90.36
7	0.1167	90.36	-90.36
8	0.1333	90.36	-90.36
9	0.1500	90.36	-90.36
10	0.1667	90.36	-90.36
11	0.1833	90.36	-90.36
12	0.2000	90.36	-90.36
13	0.2167	90.36	-90.36
14	0.2333	90.36	-90.36
15	0.2500	90.36	-90.36
16	0.2667	90.36	-90.36
17	0.2833	90.36	-90.36
18	0.3000	90.36	-90.36
19	0.3167	90.36	-90.36
20	0.3333	90.36	-90.36
21	0.3500	90.36	-90.36
22	0.3667	90.36	-90.36
23	0.3833	90.36	-90.36
24	0.4000	90.36	-90.36
25	0.4167	90.36	-90.36
26	0.4333	90.36	-90.36
27	0.4500	90.36	-90.36
28	0.4667	90.36	-90.36
29	0.4833	90.36	-90.36
30	0.5000	90.36	-90.36

9313021.0291

WELL D8-6 DEVELOPMENT

SE1000B
Environmental Logger
12/23 06:56

Unit# 00700 Test# 1

INPUT 1: Level (F) TOC

Reference 90.36
Scale factor 10.11
Offset 0.00

1 3 4 7

Step# 0 12/21 12:21

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.0000	0.0000	90.88	-90.88	0.52
0.0033	0.0001	90.59	-90.59	0.23
0.0066	0.0001	90.51	-90.51	0.15
0.0099	0.0002	90.57	-90.57	0.21
0.0133	0.0002	90.60	-90.60	0.24
0.0166	0.0003	90.67	-90.67	0.31
0.0200	0.0003	90.73	-90.73	0.37
0.0233	0.0004	90.79	-90.79	0.43
0.0266	0.0004	90.83	-90.83	0.47
0.0300	0.0005	90.87	-90.87	0.51
0.0333	0.0006	90.89	-90.89	0.53
0.0500	0.0008	91.06	-91.06	0.7
0.0666	0.0011	91.16	-91.16	0.8
0.0833	0.0014	91.25	-91.25	0.89
0.1000	0.0017	91.30	-91.30	0.94
0.1166	0.0019	91.36	-91.36	1
0.1333	0.0022	91.42	-91.42	1.06
0.1500	0.0025	91.43	-91.43	1.07
0.1666	0.0028	91.46	-91.46	1.1
0.1833	0.0031	91.51	-91.51	1.15
0.2000	0.0033	91.54	-91.54	1.18
0.2166	0.0036	91.55	-91.55	1.19
0.2333	0.0039	91.53	-91.53	1.17
0.2500	0.0042	91.55	-91.55	1.19
0.2666	0.0044	91.55	-91.55	1.19
0.2833	0.0047	91.60	-91.60	1.24
0.3000	0.0050	91.41	-91.41	1.05
0.3166	0.0053	91.39	-91.39	1.03
0.3333	0.0056	91.34	-91.34	0.98
0.4167	0.0069	91.28	-91.28	0.92
0.5000	0.0083	91.27	-91.27	0.91

9313021.0292

WELL D8-6 DEVELOPMENT

p 4 of 7

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.5833	0.0097	91.20	-91.20	0.84
0.6667	0.0111	91.17	-91.17	0.81
0.7500	0.0125	91.19	-91.19	0.83
0.8333	0.0139	91.17	-91.17	0.81
0.9167	0.0153	91.12	-91.12	0.76
1.0000	0.0167	91.11	-91.11	0.75
1.0833	0.0181	91.11	-91.11	0.75
1.1667	0.0194	91.07	-91.07	0.71
1.2500	0.0208	91.09	-91.09	0.73
1.3333	0.0222	91.09	-91.09	0.73
1.4166	0.0236	91.08	-91.08	0.72
1.5000	0.0250	91.11	-91.11	0.75
1.5833	0.0264	91.06	-91.06	0.7
1.6667	0.0278	91.08	-91.08	0.72
1.7500	0.0292	91.06	-91.06	0.7
1.8333	0.0306	91.09	-91.09	0.73
1.9167	0.0319	91.06	-91.06	0.7
2.0000	0.0333	91.07	-91.07	0.71
2.5000	0.0417	91.05	-91.05	0.69
3.0000	0.0500	91.05	-91.05	0.69
3.5000	0.0583	91.08	-91.08	0.72
4.0000	0.0667	91.06	-91.06	0.7
4.5000	0.0750	91.04	-91.04	0.68
5.0000	0.0833	91.06	-91.06	0.7
5.5000	0.0917	91.05	-91.05	0.69
6.0000	0.1000	91.07	-91.07	0.71
6.5000	0.1083	91.06	-91.06	0.7
7.0000	0.1167	91.04	-91.04	0.68
7.5000	0.1250	91.06	-91.06	0.7
8.0000	0.1333	91.07	-91.07	0.71
8.5000	0.1417	91.08	-91.08	0.72
9.0000	0.1500	91.05	-91.05	0.69
9.5000	0.1583	91.06	-91.06	0.7
10.0000	0.1667	91.06	-91.06	0.7
12.0000	0.2000	91.08	-91.08	0.72
14.0000	0.2333	91.20	-91.20	0.84
16.0000	0.2667	91.29	-91.29	0.93
18.0000	0.3000	91.27	-91.27	0.91
20.0000	0.3333	91.27	-91.27	0.91
22.0000	0.3667	91.26	-91.26	0.9
24.0000	0.4000	91.29	-91.29	0.93
26.0000	0.4333	91.28	-91.28	0.92
28.0000	0.4667	91.27	-91.27	0.91
30.0000	0.5000	91.28	-91.28	0.92
32.0000	0.5333	91.28	-91.28	0.92
34.0000	0.5667	91.28	-91.28	0.92
36.0000	0.6000	91.26	-91.26	0.9
38.0000	0.6333	91.27	-91.27	0.91

9313021.0293

WELL D8-6 DEVELOPMENT

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
40.0000	0.6667	91.25	-91.25	0.89
42.0000	0.7000	91.24	-91.24	0.88
44.0000	0.7333	91.27	-91.27	0.91
46.0000	0.7667	91.27	-91.27	0.91
48.0000	0.8000	91.28	-91.28	0.92
50.0000	0.8333	91.25	-91.25	0.89
52.0000	0.8667	91.25	-91.25	0.89
54.0000	0.9000	91.27	-91.27	0.91
56.0000	0.9333	91.27	-91.27	0.91
58.0000	0.9667	91.27	-91.27	0.91
60.0000	1.0000	91.29	-91.29	0.93
62.0000	1.0333	91.29	-91.29	0.93
64.0000	1.0667	91.28	-91.28	0.92
66.0000	1.1000	91.27	-91.27	0.91
68.0000	1.1333	91.26	-91.26	0.9
70.0000	1.1667	91.30	-91.30	0.94
72.0000	1.2000	91.26	-91.26	0.9
74.0000	1.2333	91.29	-91.29	0.93
76.0000	1.2667	91.28	-91.28	0.92
78.0000	1.3000	91.26	-91.26	0.9
80.0000	1.3333	91.26	-91.26	0.9
82.0000	1.3667	91.30	-91.30	0.94
84.0000	1.4000	91.29	-91.29	0.93
86.0000	1.4333	91.29	-91.29	0.93
88.0000	1.4667	91.26	-91.26	0.9
90.0000	1.5000	91.27	-91.27	0.91
92.0000	1.5333	91.28	-91.28	0.92
94.0000	1.5667	91.26	-91.26	0.9
96.0000	1.6000	91.25	-91.25	0.89
98.0000	1.6333	91.26	-91.26	0.9
100.0000	1.6667	91.28	-91.28	0.92
110.0000	1.8333	91.30	-91.30	0.94
120.0000	2.0000	91.29	-91.29	0.93
130.0000	2.1667	91.31	-91.31	0.95
140.0000	2.3333	91.28	-91.28	0.92
150.0000	2.5000	91.30	-91.30	0.94
160.0000	2.6667	91.28	-91.28	0.92
170.0000	2.8333	91.32	-91.32	0.96
180.0000	3.0000	91.29	-91.29	0.93

9413021.0294

WELL D8-6 RECOVERY

p. 6 of 7

SE1000B
Environmental Logger
12/23 06:47

Unit# 00700 Test# 2

INPUT 1: Level (F) TOC

Reference 90.36
Scale factor 10.11
Offset 0.00

Step# 0 12/21 15:31

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.0000	0.00000	90.97	-90.97	0.61
0.0033	0.00006	91.15	-91.15	0.79
0.0066	0.00011	91.15	-91.15	0.79
0.0099	0.00017	91.17	-91.17	0.81
0.0133	0.00022	91.18	-91.18	0.82
0.0166	0.00028	91.19	-91.19	0.83
0.0200	0.00033	91.16	-91.16	0.8
0.0233	0.00039	91.14	-91.14	0.78
0.0266	0.00044	91.12	-91.12	0.76
0.0300	0.00050	91.10	-91.10	0.74
0.0333	0.00056	91.09	-91.09	0.73
0.0500	0.00083	91.04	-91.04	0.68
0.0666	0.00111	91.00	-91.00	0.64
0.0833	0.00139	90.97	-90.97	0.61
0.1000	0.00167	90.94	-90.94	0.58
0.1166	0.00194	90.91	-90.91	0.55
0.1333	0.00222	90.89	-90.89	0.53
0.1500	0.00250	90.86	-90.86	0.5
0.1666	0.00278	90.83	-90.83	0.47
0.1833	0.00306	90.80	-90.80	0.44
0.2000	0.00333	90.76	-90.76	0.4
0.2166	0.00361	90.72	-90.72	0.36
0.2333	0.00389	90.68	-90.68	0.32
0.2500	0.00417	90.64	-90.64	0.28
0.2666	0.00444	90.60	-90.60	0.24
0.2833	0.00472	90.56	-90.56	0.2
0.3000	0.00500	90.53	-90.53	0.17
0.3166	0.00528	90.50	-90.50	0.14
0.3333	0.00556	90.48	-90.48	0.12
0.4167	0.00695	90.38	-90.38	0.02
0.5000	0.00833	90.34	-90.34	-0.02

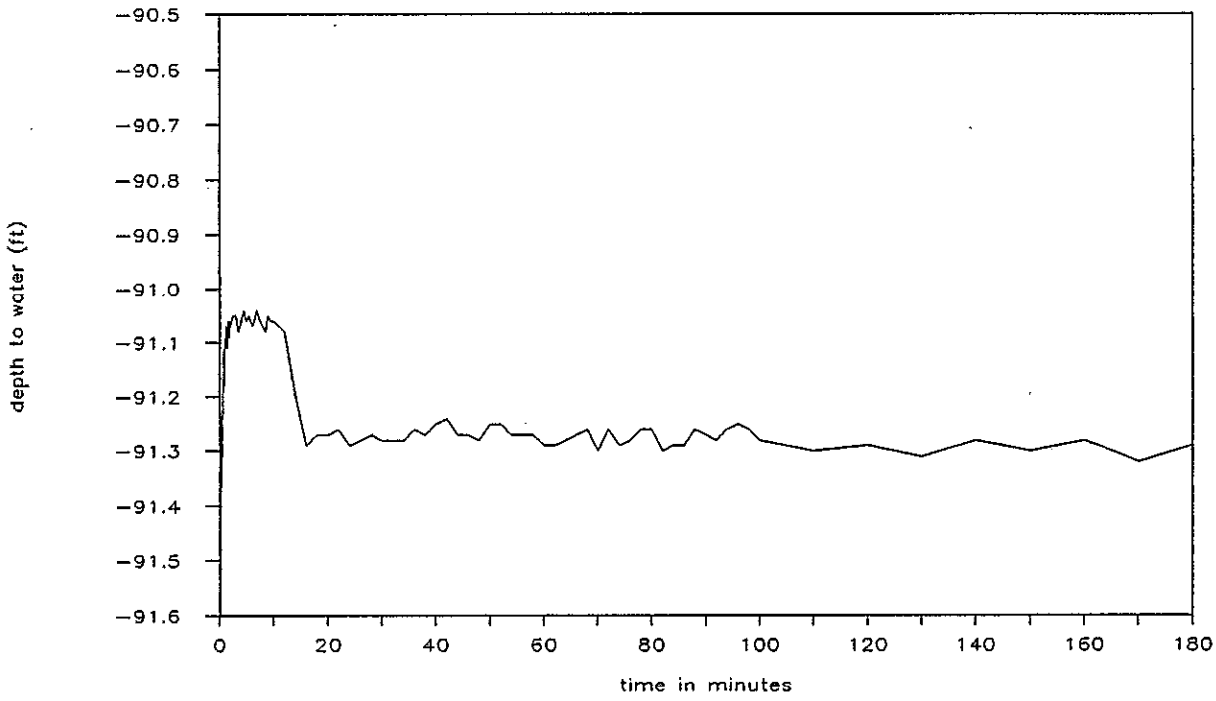
9413021.0295

WELL D8-6 RECOVERY

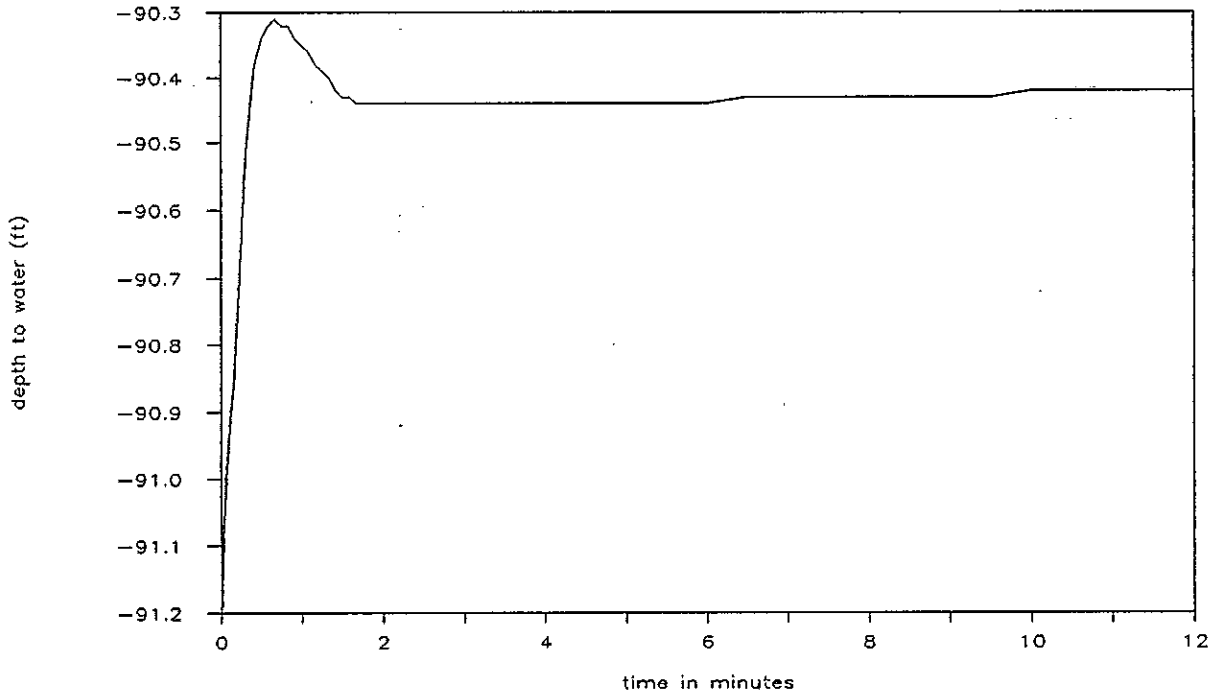
Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	Drawdown:Ft
0.5833	0.00972	90.32	-90.32	-0.04
0.6667	0.01111	90.31	-90.31	-0.05
0.7500	0.01250	90.32	-90.32	-0.04
0.8333	0.01389	90.32	-90.32	-0.04
0.9167	0.01528	90.34	-90.34	-0.02
1.0000	0.01667	90.35	-90.35	-0.01
1.0833	0.01805	90.36	-90.36	0
1.1667	0.01945	90.38	-90.38	0.02
1.2500	0.02083	90.39	-90.39	0.03
1.3333	0.02222	90.40	-90.40	0.04
1.4166	0.02361	90.42	-90.42	0.06
1.5000	0.02500	90.43	-90.43	0.07
1.5833	0.02639	90.43	-90.43	0.07
1.6667	0.02778	90.44	-90.44	0.08
1.7500	0.02917	90.44	-90.44	0.08
1.8333	0.03056	90.44	-90.44	0.08
1.9167	0.03195	90.44	-90.44	0.08
2.0000	0.03333	90.44	-90.44	0.08
2.5000	0.04167	90.44	-90.44	0.08
3.0000	0.05000	90.44	-90.44	0.08
3.5000	0.05833	90.44	-90.44	0.08
4.0000	0.06667	90.44	-90.44	0.08
4.5000	0.07500	90.44	-90.44	0.08
5.0000	0.08333	90.44	-90.44	0.08
5.5000	0.09167	90.44	-90.44	0.08
6.0000	0.10000	90.44	-90.44	0.08
6.5000	0.10833	90.43	-90.43	0.07
7.0000	0.11667	90.43	-90.43	0.07
7.5000	0.12500	90.43	-90.43	0.07
8.0000	0.13333	90.43	-90.43	0.07
8.5000	0.14167	90.43	-90.43	0.07
9.0000	0.15000	90.43	-90.43	0.07
9.5000	0.15833	90.43	-90.43	0.07
10.0000	0.16667	90.42	-90.42	0.06
12.0000	0.20000	90.42	-90.42	0.06

9313021.0296

WELL D8-6 DEVELOPMENT



WELL D8-6 RECOVERY



9313021.0297

AQUIFER TEST SUMMARY

WELL 199-D8-6 SLUG INJECTION AND WITHDRAWAL

Purpose of Tests: to estimate aquifer transmissivity or hydraulic conductivity

Hydrogeologic Unit Tested: The uppermost aquifer (Ringold Formation), comprising sand and gravel and silt

Thickness of Aquifer: Thickness of Aquifer: 24 ft (estimated from aquifer thickness at well D8-4; borehole D8-6 did not fully penetrate aquifer)

Depth of Screened or Open Interval Exposed to Aquifer During Test: 109.41 to 89.39 ft below top of casing; water level at 90.36 ft below top of casing; thickness of tested interval: 19 ft

Diameter of Well Casing: 4 in (0.333 ft)

Diameter of Well Screen: 4 in (0.333 ft)

Diameter of Screen plus Sand Pack: 8 in (0.667 ft)

Porosity of Sand Pack: 0.30 (estimated)

Observation Well(s) Used: None Distance from Pumping Well: N/A

Depth of Screened Interval of Observation Well: N/A

Date of Tests: 23 Dec 91 Start Time of Test: 09:57

Slugging Rod Dimension: 2-in diameter by 6-ft length (0.13 ft^3)

Duration of Test: Injection: 10 min; Withdrawal: 8 min

Water-Level Measurement Methods: Steel tape and pressure transducer with data logger

Maximum Change in Water Level: 2.8 ft (see remarks)

RESULTS:

The maximum change in water level during slug withdrawal was 2.8 ft, which is greater than the theoretical displacement in a 4-in well casing from the given slug volume (i.e., 1.5 ft). This was probably due to turbulence or inaccurate measurements by the transducer, caused by air in the water column.

Water levels oscillated after slug injection. By the time the oscillations had stopped, the water level had essentially recovered. Injection data were not analyzed.

Water levels recovered rapidly after the slugging rod was withdrawn. The data were analyzed by the Bouwer and Rice method. Two lines were fit to the data. Resulting estimates of aquifer properties were: K = 23 to 29 ft/d; T of the screened interval = 440 to 560 ft^2/d.

9313021.0258

BOREHOLE TEST INFORMATION

VALIDATED KDR 2/12/92 SIGNATURE OF

Borehole 199-D8-6 Borehole Diameter 4" Hanford Coordinates NA

Interval Tested 109.41' - 89.39' BTOC Depth Interval 109.41' - 89.39' BTOC

Test Type Instantaneous Slug Test Injection / Withdrawal Borehole Depth 109.41' BTOC

Instruction Used WHC-CM-7-7-EII 10.1

EQUIPMENT

NAME	DESCRIPTION
ELECTRIC SOUNDER	SOUNST SN-ET-1
DATA LOGGER.	IN-SITU INC. S.N.-1KB700
PRESSURE TRANSDUCER	IN-SITU INC. S.N.-1989
SLUGGING ROD	2.0' x 6.0' 0.13 ft^3
STEEL MEASURING TAPE	500' GRADUATED STEEL TAPE

MEASUREMENT DATUM

Control Datum ~~TOP OF CASING 6" (T.O.C. 6")~~ TOP OF 4" Casing AC

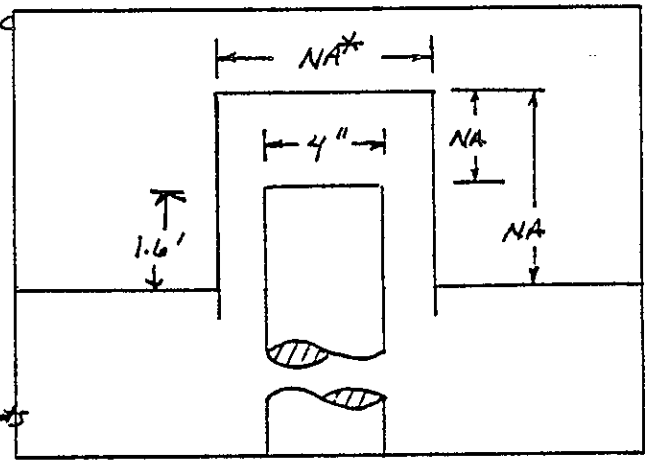
Elevation NA

Electric Sounder T.O.C. ~~6~~ AC 4"

Steel Tape T.O.C. ~~6~~ AC 4"

Pressure Transducer T.O.C. ~~6~~ AC 4"

WELL HEAD DIAGRAM



COMMENTS

* No 6" outer casing - measurements all taken from inner casing (4").

Recorded by: James A Coates JAMES A. COATES
Sign and Print Name

12/23/91
Date

BD-6000-295 (05/89)

9313021.0299

298

INSTANTANEOUS SLUG TEST DATA SHEET

INJECTION

Borehole 199-D8-6

Interval Tested 109.41'-89.39' BTOC

Depth to Water 90.~~316~~ 45 WAC BTOC

Date 12-23-91

Measured by JAMES A. COATES

Slug Volume .13ft³ Barometer Reading (Beginning) -NA- (End) -NA-

Time Baseline Injection-0900, Injection-0915

Transducer Measurement Units FEET

Depth to Transducer 17.004' BWL

Initial Pressure (P_i) 90.450'

Slug Level or Pressure (P_{max}) 88.103'

Borehole Diameter 4"

Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement
		SEE ATTACHED			SEE ATTACHED			

Recorded by James A. Coates JAMES A. COATES (Sign and Print Name) 12/23/91 (Date)

BD-6000-293 (07/90)

9213272.0060

WELL D8-6 BASELINE FOR SLUG TESTS

p 2 of 7

SE2000
Environmental Logger
12/26 09:18

Unit# 192 Test 0

INPUT 1: Level (F) TOC

Reference	90.450
SG	1.000
Linearity	0.000
Scale factor	10.110
Offset	0.000
Delay mSEC	50.000

Step 0 12/23 08:57:37

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft
0	0.0000	90.440	-90.440
1	0.0167	90.408	-90.408
2	0.0333	90.389	-90.389
3	0.0500	90.379	-90.379
4	0.0667	90.366	-90.366
5	0.0833	90.357	-90.357
6	0.1000	90.351	-90.351
7	0.1167	90.347	-90.347
8	0.1333	90.344	-90.344
9	0.1500	90.341	-90.341
10	0.1667	90.338	-90.338
11	0.1833	90.341	-90.341
12	0.2000	90.338	-90.338
13	0.2167	90.335	-90.335
14	0.2333	90.335	-90.335
15	0.2500	90.335	-90.335
16	0.2667	90.335	-90.335
17	0.2833	90.335	-90.335

9313021.0301

298

INSTANTANEOUS SLUG TEST DATA SHEET

INJECTION

Borehole 199-D8-6

Interval Tested 109.41'-89.39' BTOC

Depth to Water 90.~~36~~ 45' BTOC

Date 12-23-91

Measured by JAMES A. COATES

Slug Volume .13ft³ Barometer Reading (Beginning) -NA- (End) -NA-

Time Baseline Injection-0900, Injection-0915

Transducer Measurement Units FEET

Depth to Transducer 17.004' BWL

Initial Pressure (P.) 90.450'

Slug Level or Pressure (P_{max}) 88.103'

Borehole Diameter 4"

Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement
		SEE ATTACHED			SEE ATTACHED			

Recorded by James A. Coates JAMES A. COATES (Sign and Print Name) 12/23/91 (Date)

BD-6000-293 (07/90)

9312021.0202

WELL D8-6 BASELINE FOR SLUG TESTS

SE2000
Environmental Logger
12/26 09:18

p 2 of 7

Unit# 192 Test 0

INPUT 1: Level (F) TOC

Reference	90.450
SG	1.000
Linearity	0.000
Scale factor	10.110
Offset	0.000
Delay mSEC	50.000

Step 0 12/23 08:57:37

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft
0	0.0000	90.440	-90.440
1	0.0167	90.408	-90.408
2	0.0333	90.389	-90.389
3	0.0500	90.379	-90.379
4	0.0667	90.366	-90.366
5	0.0833	90.357	-90.357
6	0.1000	90.351	-90.351
7	0.1167	90.347	-90.347
8	0.1333	90.344	-90.344
9	0.1500	90.341	-90.341
10	0.1667	90.338	-90.338
11	0.1833	90.341	-90.341
12	0.2000	90.338	-90.338
13	0.2167	90.335	-90.335
14	0.2333	90.335	-90.335
15	0.2500	90.335	-90.335
16	0.2667	90.335	-90.335
17	0.2833	90.335	-90.335

9413021.0803

WELL D8-6 SLUG INJECTION

SE2000
Environmental Logger
12/26 09:16

p. 3 of 4

Unit# 192 Test 2

INPUT 1: Level (F) TOC

Reference	90.450
SG	1.000
Linearity	0.000
Scale factor	10.110
Offset	0.000
Delay mSEC	50.000

slug volume = 0.13 ft3

Step 0 12/23 09:57:20

theoretical d(Y) = 1.5 ft

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.0000	0.0000	88.103	-88.103	2.347	1.5647
0.0083	0.0001	89.805	-89.805	0.645	0.4300
0.0166	0.0003	89.993	-89.993	0.457	0.3047
0.0250	0.0004	90.169	-90.169	0.281	0.1873
0.0333	0.0006	90.133	-90.133	0.317	0.2113
0.0416	0.0007	90.229	-90.229	0.221	0.1473
0.0500	0.0008	90.239	-90.239	0.211	0.1407
0.0583	0.0010	90.210	-90.210	0.24	0.1600
0.0666	0.0011	90.258	-90.258	0.192	0.1280
0.0750	0.0013	90.252	-90.252	0.198	0.1320
0.0833	0.0014	90.239	-90.239	0.211	0.1407
0.1000	0.0017	90.271	-90.271	0.179	0.1193
0.1166	0.0019	90.287	-90.287	0.163	0.1087
0.1333	0.0022	90.296	-90.296	0.154	0.1027
0.1500	0.0025	90.306	-90.306	0.144	0.0960
0.1666	0.0028	90.315	-90.315	0.135	0.0900
0.1833	0.0031	90.328	-90.328	0.122	0.0813
0.2000	0.0033	90.335	-90.335	0.115	0.0767
0.2166	0.0036	90.341	-90.341	0.109	0.0727
0.2333	0.0039	90.347	-90.347	0.103	0.0687
0.2500	0.0042	90.354	-90.354	0.096	0.0640
0.2666	0.0044	90.360	-90.360	0.09	0.0600
0.2833	0.0047	90.366	-90.366	0.084	0.0560
0.3000	0.0050	90.366	-90.366	0.084	0.0560
0.3166	0.0053	90.373	-90.373	0.077	0.0513
0.3333	0.0056	90.376	-90.376	0.074	0.0493
0.4166	0.0069	90.389	-90.389	0.061	0.0407
0.5000	0.0083	90.386	-90.386	0.064	0.0427

9313071.0204

WELL D8-6 SLUG INJECTION

p 4 of 4

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.5833	0.0097	90.405	-90.405	0.045	0.0300
0.6666	0.0111	90.411	-90.411	0.039	0.0260
0.7500	0.0125	90.414	-90.414	0.036	0.0240
0.8333	0.0139	90.418	-90.418	0.032	0.0213
0.9166	0.0153	90.421	-90.421	0.029	0.0193
1.0000	0.0167	90.421	-90.421	0.029	0.0193
1.0833	0.0181	90.424	-90.424	0.026	0.0173
1.1666	0.0194	90.424	-90.424	0.026	0.0173
1.2500	0.0208	90.424	-90.424	0.026	0.0173
1.3333	0.0222	90.424	-90.424	0.026	0.0173
1.4166	0.0236	90.424	-90.424	0.026	0.0173
1.5000	0.0250	90.427	-90.427	0.023	0.0153
1.5833	0.0264	90.427	-90.427	0.023	0.0153
1.6666	0.0278	90.424	-90.424	0.026	0.0173
1.7500	0.0292	90.424	-90.424	0.026	0.0173
1.8333	0.0306	90.427	-90.427	0.023	0.0153
1.9166	0.0319	90.427	-90.427	0.023	0.0153
2.0000	0.0333	90.427	-90.427	0.023	0.0153
2.5000	0.0417	90.424	-90.424	0.026	0.0173
3.0000	0.0500	90.427	-90.427	0.023	0.0153
3.5000	0.0583	90.427	-90.427	0.023	0.0153
4.0000	0.0667	90.427	-90.427	0.023	0.0153
4.5000	0.0750	90.427	-90.427	0.023	0.0153
5.0000	0.0833	90.421	-90.421	0.029	0.0193
5.5000	0.0917	90.424	-90.424	0.026	0.0173
6.0000	0.1000	90.424	-90.424	0.026	0.0173
6.5000	0.1083	90.424	-90.424	0.026	0.0173
7.0000	0.1167	90.424	-90.424	0.026	0.0173
7.5000	0.1250	90.421	-90.421	0.029	0.0193
8.0000	0.1333	90.421	-90.421	0.029	0.0193
8.5000	0.1417	90.421	-90.421	0.029	0.0193
9.0000	0.1500	90.421	-90.421	0.029	0.0193
9.5000	0.1583	90.421	-90.421	0.029	0.0193
10.0000	0.1667	90.421	-90.421	0.029	0.0193

9413021.0305

INSTANTANEOUS SLUG TEST DATA SHEET

WITHDRAWAL

Borehole 199-D8-6

Interval Tested 109.41'-89.39' BTOC

Depth to Water 90.45' BTOC

Date 12-23-91

Measured by JAMES A. COATES

Slug Volume .13ft³ Barometer Reading (Beginning) -NA- (End) -NA-

Time 0925

Transducer Measurement Units FEET

Depth to Transducer 17.004' BWL

Initial Pressure (P_i) 90.45'

Slug Level or Pressure (P_{max}) 93.255'

Borehole Diameter 4"

Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement	Time Observed	Time Elapsed	Pressure Trans. Measurement
		SEE ATTACHED			SEE ATTACHED			

Recorded by James A. Coates JAMES A. COATES (Sign and Print Name) 12/23/91 (Date)

WELL D8-6 SLUG WITHDRAWAL

p2 of 3

SE2000
Environmental Logger
12/26 09:14

Unit# 192 Test 3

INPUT 1: Level (F) TOC

Reference	90.450
SG	1.000
Linearity	0.000
Scale factor	10.110
Offset	0.000
Delay mSEC	50.000

slug volume = 0.13 ft3

Step 0 12/23 10:09:32

theoretical d(Y) = 1.5 ft

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.0000	0.0000	93.255	-93.255	2.80	1.8698
0.0083	0.0001	92.787	-92.787	2.34	1.5581
0.0166	0.0003	92.447	-92.447	2.00	1.3312
0.0250	0.0004	92.161	-92.161	1.71	1.1409
0.0333	0.0006	91.947	-91.947	1.50	0.9982
0.0416	0.0007	91.773	-91.773	1.32	0.8822
0.0500	0.0008	91.654	-91.654	1.20	0.8029
0.0583	0.0010	91.559	-91.559	1.11	0.7396
0.0666	0.0011	91.488	-91.488	1.04	0.6919
0.0750	0.0013	91.440	-91.440	0.99	0.6602
0.0833	0.0014	91.385	-91.385	0.93	0.6232
0.1000	0.0017	91.274	-91.274	0.82	0.5496
0.1166	0.0019	91.187	-91.187	0.74	0.4913
0.1333	0.0022	91.124	-91.124	0.67	0.4493
0.1500	0.0025	91.068	-91.068	0.62	0.4123
0.1666	0.0028	91.021	-91.021	0.57	0.3806
0.1833	0.0031	90.973	-90.973	0.52	0.3486
0.2000	0.0033	90.925	-90.925	0.48	0.3169
0.2166	0.0036	90.886	-90.886	0.44	0.2906
0.2333	0.0039	90.846	-90.846	0.40	0.2643
0.2500	0.0042	90.822	-90.822	0.37	0.2483
0.2666	0.0044	90.791	-90.791	0.34	0.2273
0.2833	0.0047	90.767	-90.767	0.32	0.2113
0.3000	0.0050	90.743	-90.743	0.29	0.1956
0.3166	0.0053	90.719	-90.719	0.27	0.1796
0.3333	0.0056	90.704	-90.704	0.25	0.1693
0.4166	0.0069	90.632	-90.632	0.18	0.1216
0.5000	0.0083	90.577	-90.577	0.13	0.0846

9313021.0307

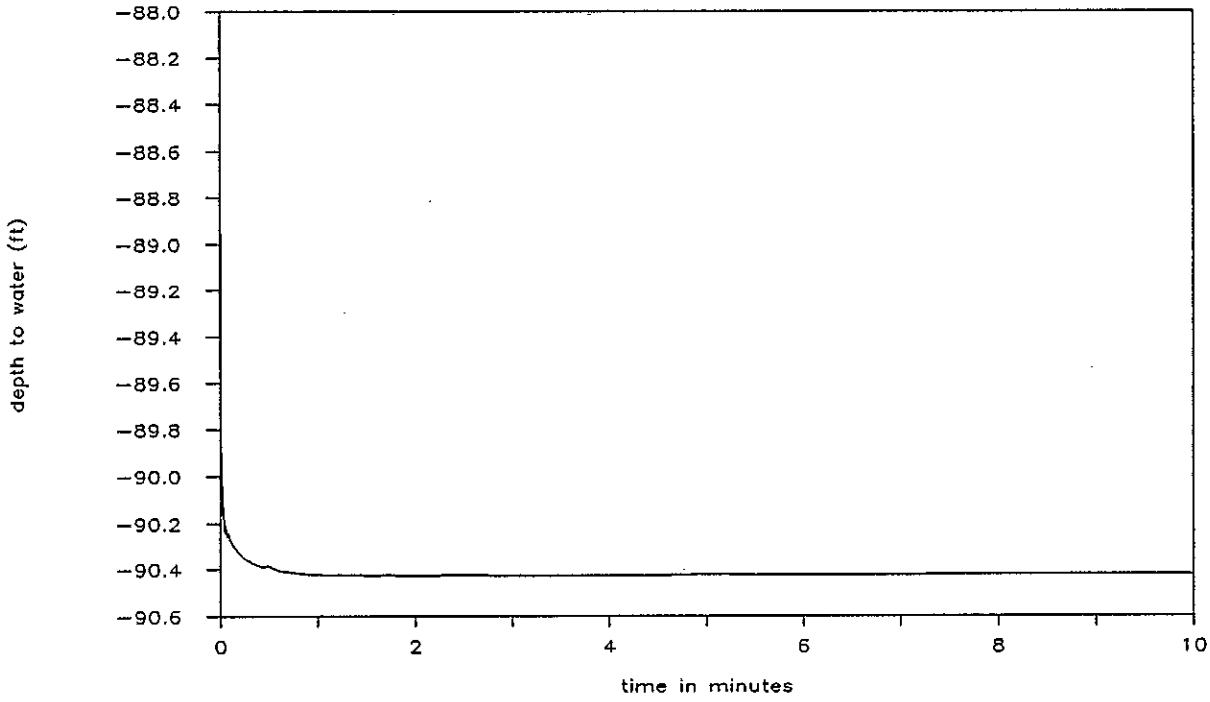
WELL D8-6 SLUG WITHDRAWAL

p 3 of 3

Time:min	Time:hrs	D-T-W:Ft	d(WL):Ft	d(Y):Ft	d(Y)/d(Yo)
0.5833	0.0097	90.545	-90.545	0.10	0.0636
0.6666	0.0111	90.521	-90.521	0.07	0.0476
0.7500	0.0125	90.498	-90.498	0.05	0.0320
0.8333	0.0139	90.490	-90.490	0.04	0.0266
0.9166	0.0153	90.482	-90.482	0.03	0.0213
1.0000	0.0167	90.474	-90.474	0.02	0.0160
1.0833	0.0181	90.474	-90.474	0.02	0.0160
1.1666	0.0194	90.466	-90.466	0.02	0.0106
1.2500	0.0208	90.466	-90.466	0.02	0.0106
1.3333	0.0222	90.466	-90.466	0.02	0.0106
1.4166	0.0236	90.466	-90.466	0.02	0.0106
1.5000	0.0250	90.466	-90.466	0.02	0.0106
1.5833	0.0264	90.466	-90.466	0.02	0.0106
1.6666	0.0278	90.458	-90.458	0.01	0.0053
1.7500	0.0292	90.458	-90.458	0.01	0.0053
1.8333	0.0306	90.458	-90.458	0.01	0.0053
1.9166	0.0319	90.458	-90.458	0.01	0.0053
2.0000	0.0333	90.458	-90.458	0.01	0.0053
2.5000	0.0417	90.458	-90.458	0.01	0.0053
3.0000	0.0500	90.458	-90.458	0.01	0.0053
3.5000	0.0583	90.458	-90.458	0.01	0.0053
4.0000	0.0667	90.450	-90.450	0.00	0.0003
4.5000	0.0750	90.450	-90.450	0.00	0.0003
5.0000	0.0833	90.450	-90.450	0.00	0.0003
5.5000	0.0917	90.450	-90.450	0.00	0.0003
6.0000	0.1000	90.450	-90.450	0.00	0.0003
6.5000	0.1083	90.450	-90.450	0.00	0.0003
7.0000	0.1167	90.450	-90.450	0.00	0.0003
7.5000	0.1250	90.450	-90.450	0.00	0.0003
8.0000	0.1333	90.450	-90.450	0.00	0.0003

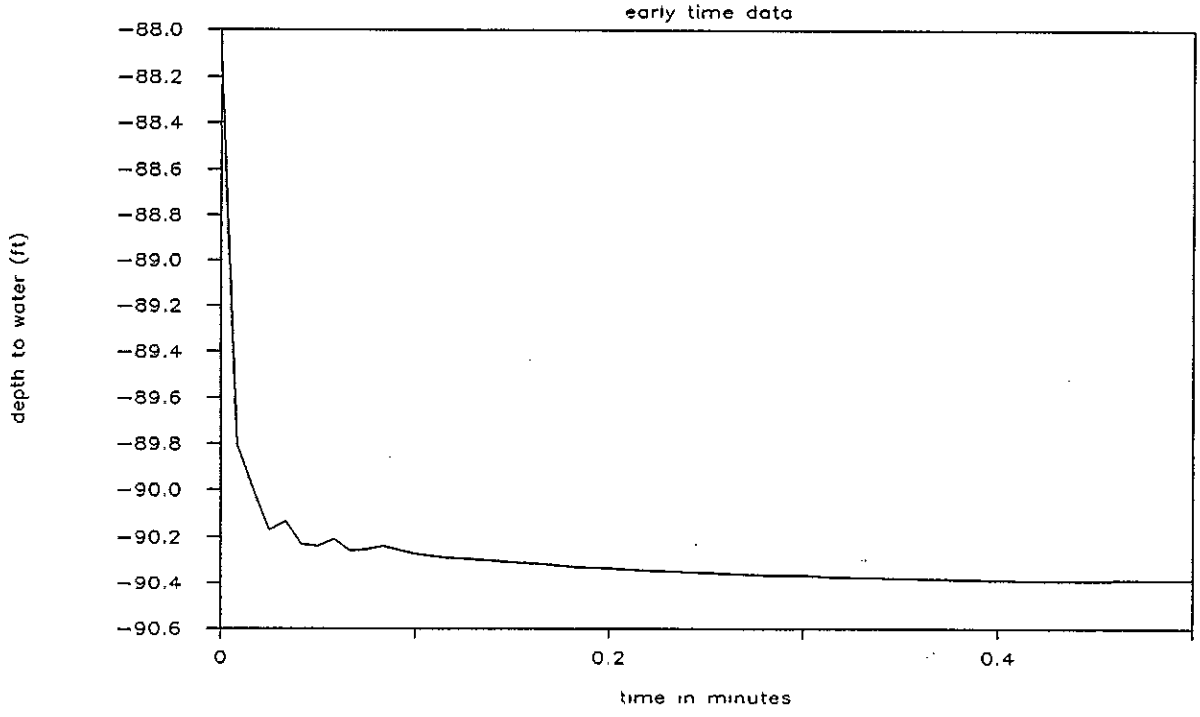
9313021.0308

WELL D8-6 SLUG INJECTION

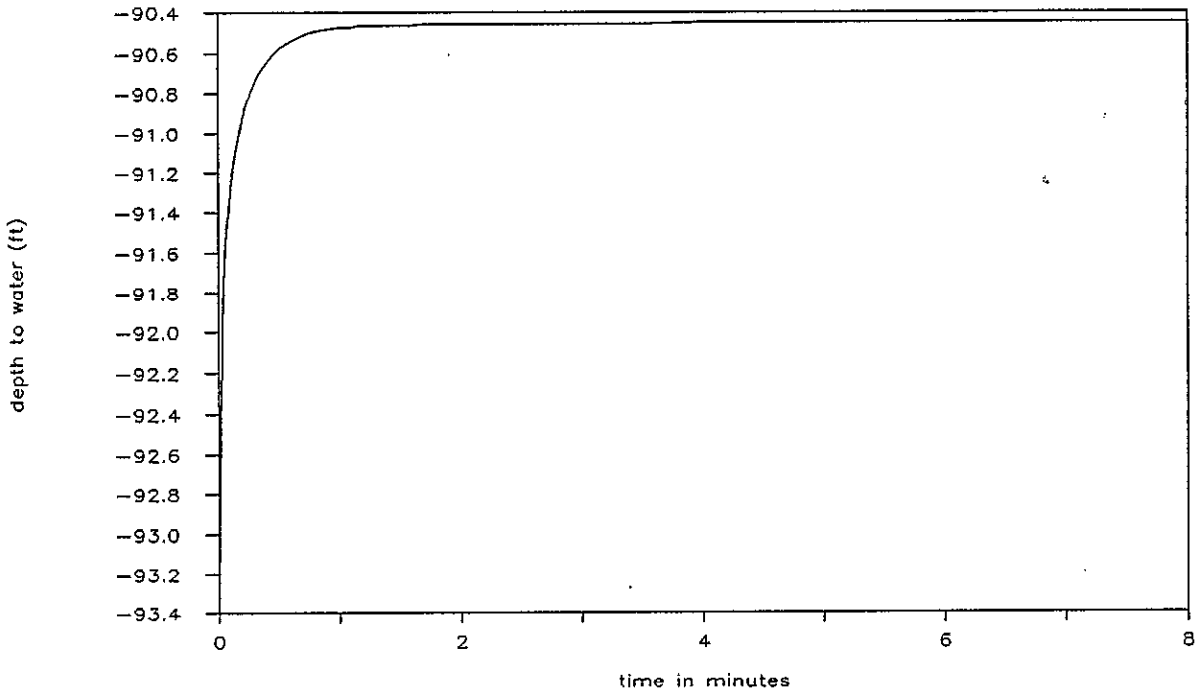


WELL D8-6 SLUG INJECTION

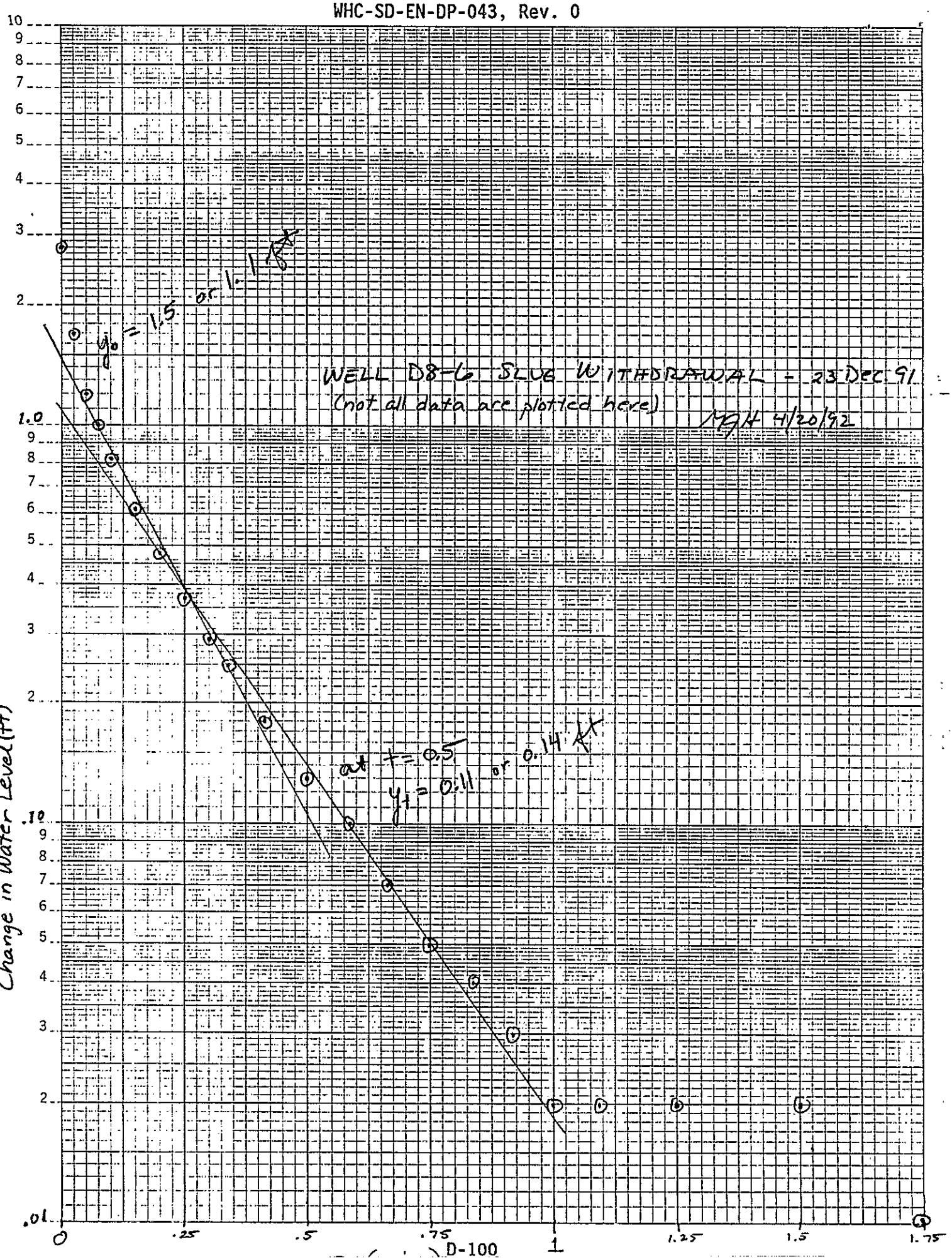
early time data



WELL D8-6 SLUG WITHDRAWAL



9313027.0210


WELL D8-6 SLUG WITHDRAWAL - 23 DEC. 91
(not all data are plotted here)
MJH 4/20/92
y_0 = 1.5 or 1.1 ft
at t = 0.5
y_1 = 0.11 or 0.14 ft
Change in Water Level (ft)
D-100
K+E SEMI-LOGARITHMIC • 3 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 5493

WELL D8-6 SLUG WITHDRAWAL CALCULATIONS
****
THE BELOW HYDRAULIC CONDUCTIVITY VALUE WAS CALCULATED
USING THE BOUWER AND RICE SLUG TEST METHOD.
SOURCE= "THE BOUWER AND RICE SLUG TEST-AN UPDATE"
GROUND WATER, VOL 27, NO. 3, MAY-JUNE 1989.
****
****
RADIUS OF CASING USED IN CALCULATIONS HAS BEEN
CORRECTED FOR THE THICKNESS OF GRAVEL OR SAND
PACK DUE TO WATER LEVEL CHANGES IN THE SCREEN OR
OPEN INTERVAL OF WELL.
****

Rc (ft)	Rw (ft)	Le (ft)	Lw (ft)	H (ft)
.2298	.3330	19.0000	19.0000	24.0000

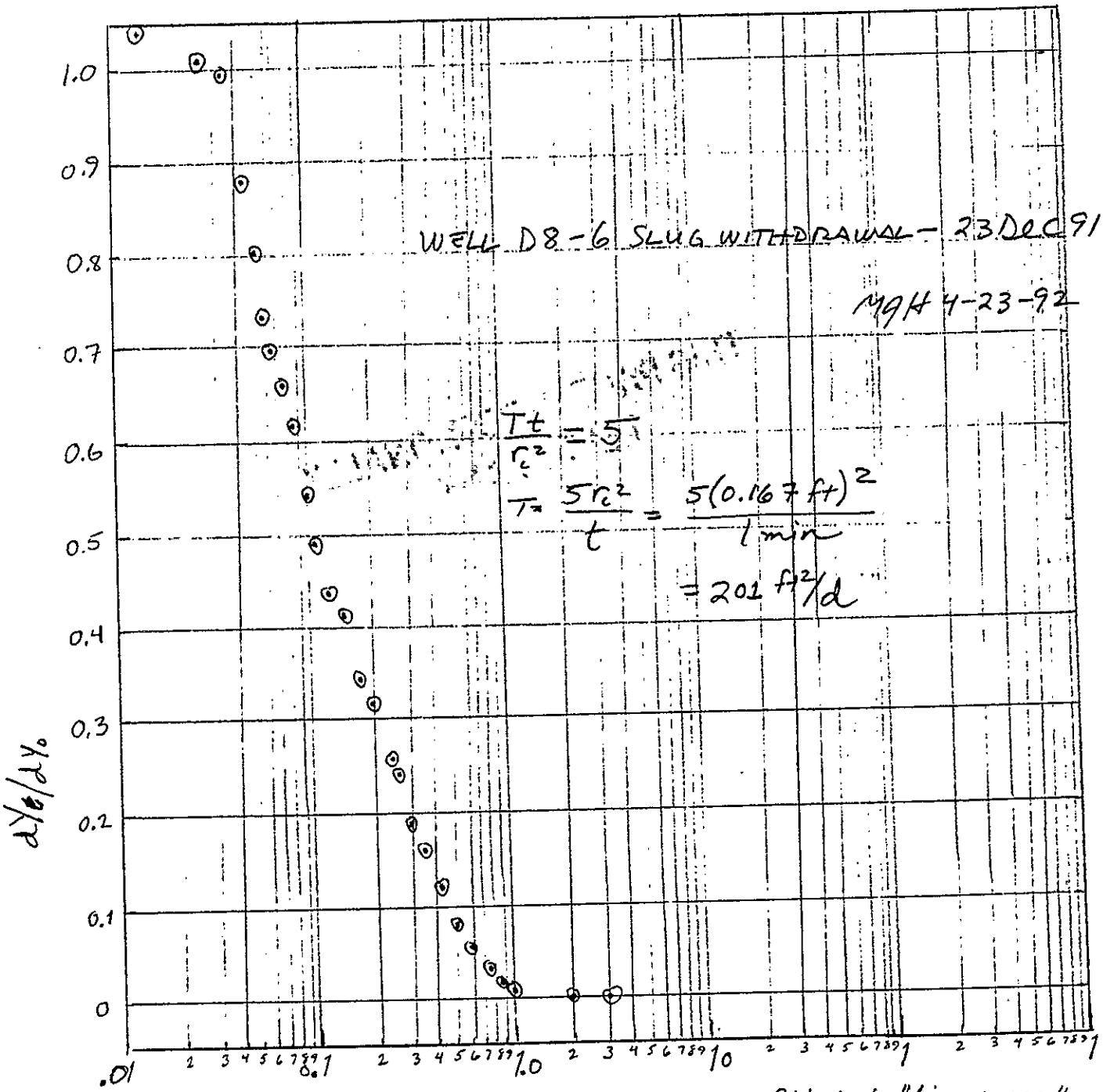
****
Le/Rw = 57.0570600
A= 3.2844110
B= 5.365443E-001
C= 2.9479060
SANDPACK POROSITY= 3.000000E-001
t (min)= 5.000000E-001
1/t= 2.0000000
Yo= (ft) 1.5000000
Yt= (ft) 1.100000E-001
1/t ln(Yo/Yt)= 5.2254800
ln[(H-Lw)/Rw]= 2.7090510
ln(Re/Rw)= 2.8165600
****
K (ft/day) = 29.4420100
****
T OF THE SATURATED SCREEN INTERVAL
(ft2/day)= 559.3983000
****

9313021.0312

WELL D8-6 SLUG WITHDRAWAL CALCULATIONS (1)
****
THE BELOW HYDRAULIC CONDUCTIVITY VALUE WAS CALCULATED
USING THE BOUWER AND RICE SLUG TEST METHOD.
SOURCE= "THE BOUWER AND RICE SLUG TEST-AN UPDATE"
GROUND WATER, VOL 27, NO. 3, MAY-JUNE 1989.
****
****
RADIUS OF CASING USED IN CALCULATIONS HAS BEEN
CORRECTED FOR THE THICKNESS OF GRAVEL OR SAND
PACK DUE TO WATER LEVEL CHANGES IN THE SCREEN OR
OPEN INTERVAL OF WELL.
****

Rc (ft)	Rw (ft)	Le (ft)	Lw (ft)	H (ft)
.2298	.3330	19.0000	19.0000	24.0000

****
Le/Rw = 57.0570600
A= 3.2844110
B= 5.365443E-001
C= 2.9479060
SANDPACK POROSITY= 3.000000E-001
t (min)= 5.000000E-001
1/t= 2.0000000
Yo= (ft) 1.1000000
Yt= (ft) 1.400000E-001
1/t ln(Yo/Yt)= 4.1228460
ln[(H-Lw)/Rw]= 2.7090510
ln(Re/Rw)= 2.8165600
****
K (ft/day) = 23.2294200
****
T OF THE SATURATED SCREEN INTERVAL
(ft2/day)= 441.3590000
****



best fit is to "line source" curve.
1 min corresponds to 5 on type curve.

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GEOPHYSICAL LOGS

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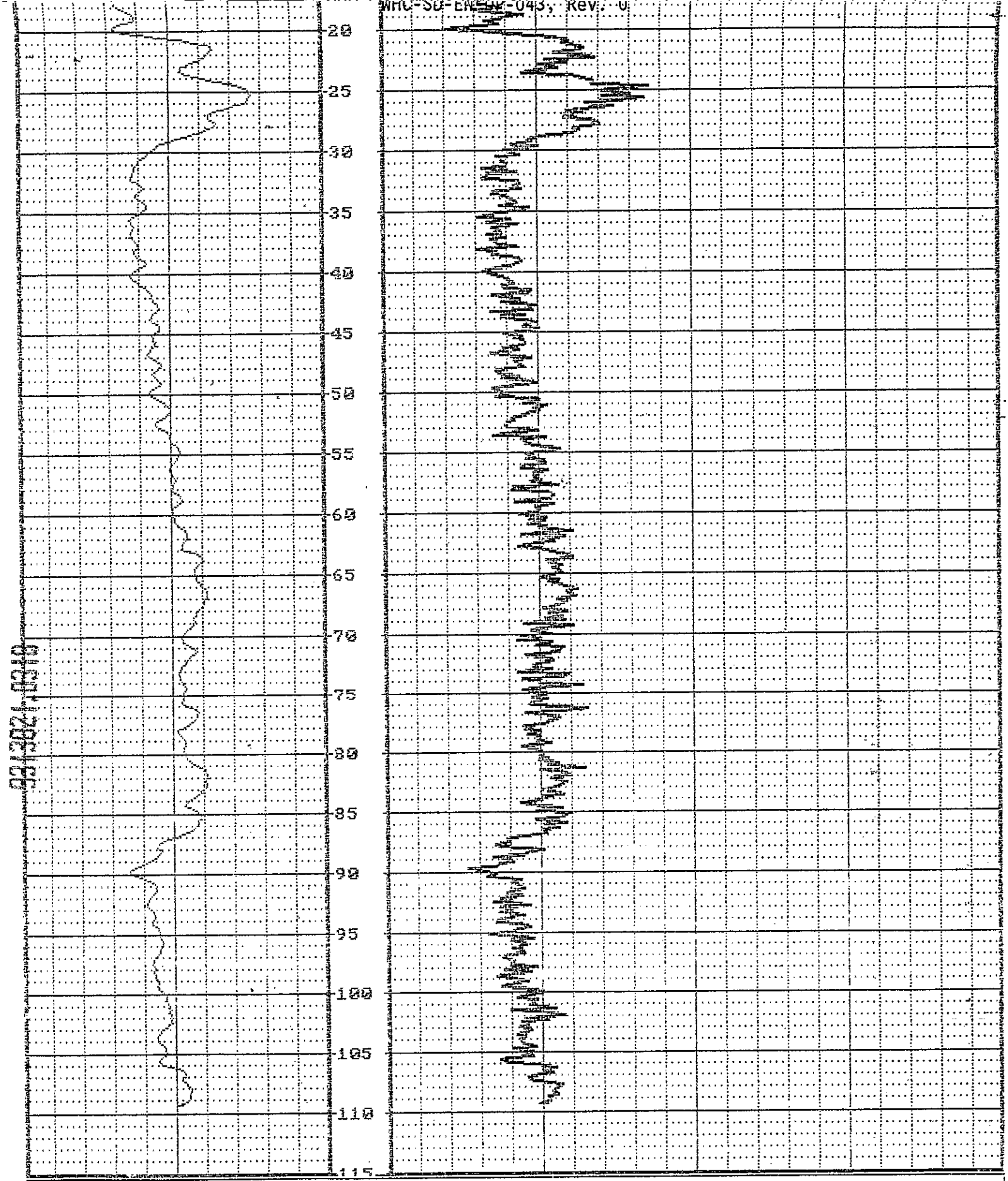


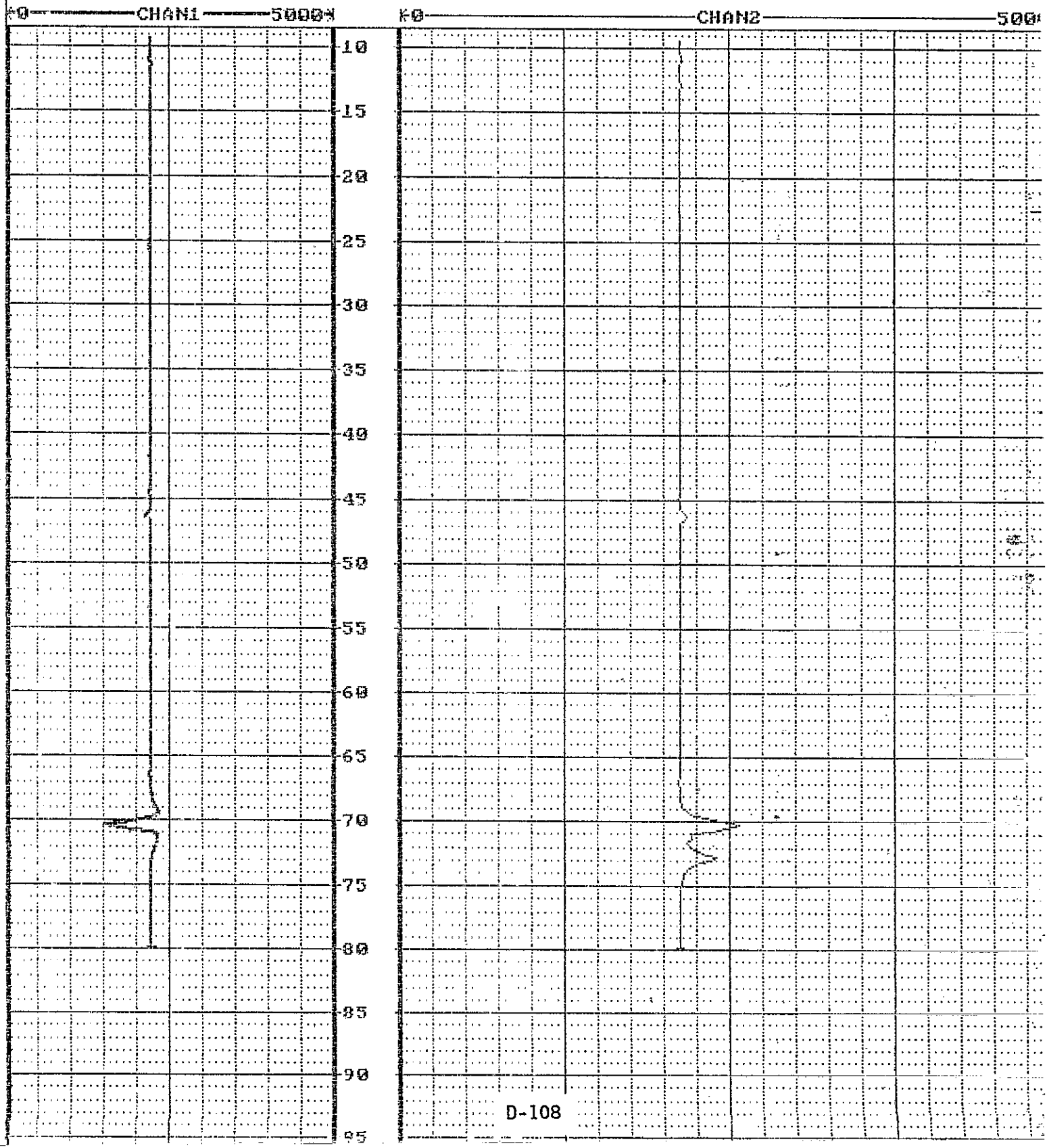
OUT:E:\100D\199D86.GA1 (ON) Recs:13 Bytes:597 Free:25328K
109.4 0.0 50.7 49.3 -19.6 -19.5

*0 GAMMA 100 *0 GAM-AN 200

199-D8-6.

Magnetic 80.0' - 10.0' 12/31/91

OUT:E:\100D\199D86.TA0 (OFF) Recs:711 Bytes:52557 Free:25674K
9.4 0.8 2192.1 2114.6 1569.0 466.4 5000.0 4804.6 4837.20



9313021.0319