START

0011243
773

WHC-MR-0209

# Borehole Summary Report for Twelve Single-Shell Tank Wells Installed in 1989

A. W. Pearson
Pacific Northwest Laboratory

Date Published
October 1990

BEST AVAILABLE COPY

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

OCT 1990
RECEIVED
EDMC

Approved for Public Release

**LEGAL DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Printed in the United States of America

DISCLM-2.CHP (10-90)

WHC-MR-0209

LIMITED DISTRIBUTION NOTICE

This document is made available to Westinghouse Hanford Company in confidence solely for use in performance of work under contracts with the U.S. Department of Energy. This document is not to be published or referenced in another publication, nor its contents otherwise disseminated or used for purposes other than specified above, without determination of final review authority. If the information contained herein is incorporated in a Westinghouse Hanford Company document, such document shall receive appropriate clearance. In the event that it is not cleared for public release within one year from the date hereof, Pacific Northwest Laboratory may submit it to the U.S. Department of Energy for clearance.

9112050003

# BOREHOLE SUMMARY REPORT FOR TWELVE SINGLE-SHELL TANK WELLS INSTALLED IN 1989

A. W. Pearson

January 1990

Pacific Northwest Laboratory
Richland, Washington 99352

THIS PAGE
INTENTIONALLY
LEFT BLANK

9 1 1 2 0 5 0 0 0 4

## SUMMARY

This report contains the data collected during the installation and geologic sampling of twelve groundwater monitoring wells for the Single Shell Tanks project. These wells were drilled in support of project W-017, installation of groundwater monitoring wells at Resource Conservation and Recovery Act (RCRA) facilities. A list of contents for the Single Shell Tanks Borehole Summary Report follows.

THIS PAGE INTENTIONALLY
LEFT BLANK

9 1 1 2 0 5 0 0 0 0 6

# CONTENTS

SUMMARY

Section A: Geologic and Geophysical Logs

Section B: Well Construction Information

Section C: Sediment Analyses

Section D: Well Development Information

Section E: Pump Installation Information

THIS PAGE INTENTIONALLY
LEFT BLANK

9112050098

# Section A

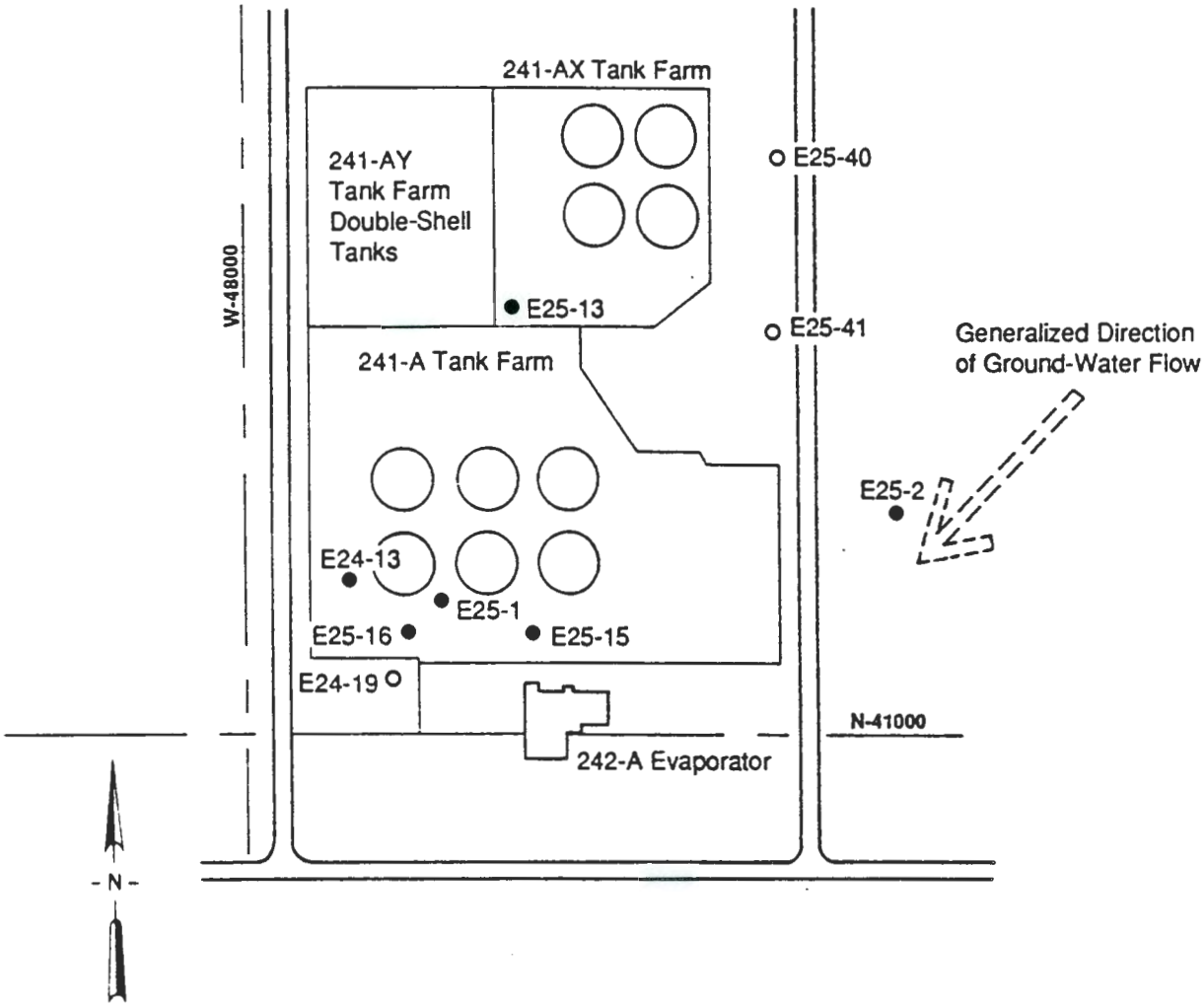
## Geologic and Geophysical Logs of Twelve Wells for Single Shell Tanks

* Well Summaries with Waste Management Area Maps
* Geologic Logs
* Geophysical Logs

THIS PAGE INTENTIONALLY
LEFT BLANK

9 1 1 2 0 5 0 0 0 1 0

Waste Management Area A-AX




Legend

- ● Existing Ground-Water Monitoring Well
- ○ Planned Ground-Water Monitoring Well
- E25-1 Numbering System for Ground-Water Monitoring Wells. All Wells Prefixed by 299-
- ○ 100 Series Single-Shell Tank
- Fences
- Roads
- Cribs
- N-42000 Hanford Plant Coordinates

Note: Not Drawn to Scale

WELL 299-E24-19

Drilling at Well 299-E24-19 began August 9, 1989, and reached total depth on August 31, 1989. The well was drilled with a Bucyrus-Erie[a] 22W to a depth of 302.55 ft below ground surface. The sediments encountered were primarily sandy gravel and sand. Static water level during completion was 285.6 ft below ground surface.

Well 299-E24-19 was completed at a depth of 300.68 ft below ground surface. Final well materials include 21.03 ft of 4-in.-dia. 10-slot Johnson Division[b] wrap channel pack stainless steel screen and 280.57 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 16-30 mesh Colorado silica sand pack along the screened interval to 2.85 ft above the top of the screen, 3.1 ft of Volclay®[c] bentonite pellets, 253.7 ft of 8-20 mesh granular bentonite crumbles, 18.05 ft of Portland cement grout, and an air-entrained concrete pad which extends 1.95 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Pettibone[d] crane during completion. Completion activities at Well 299-E24-19 were finished September 27, 1989.

The estimated volume of water added to the borehole during drilling was 353 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 40 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on October 5, 1989, and a total of 1069 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was performed on October 2, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; 350-400 cpm were detected from red sands at 187 ft and 195 ft. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar®[e] sampling pump was completed on October 23, 1989; this activity concluded well construction and installation.

---

(a) Bucyrus-Erie Company, South Milwaukee, Wisconsin.
(b) Johnson Division, UOP, Inc., St. Paul, Minnesota.
(c) Volclay is a trademark of American Colloid Company, Skokie, Illinois.
(d) Pettibone Corporation, Chicago, Illinois.
(e) HydroStar is a trademark of Instrumentation Northwest, Inc., Redmond, Washington.

9 1 1 7 0 5 0 0 1 3

| DRILL LOG | By S. M. Goodwin | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9 August 1989 | #22-14102 | Depth 0' To 5' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESEN; FINISHING W/ | 0700 | SETTING UP |
| | | | | RIG SET UP. RIG WAS STEAM CLEANED | | RIG |
| | | | | 8/8/89 & APPROVED BY KEH TITLE III | | |
| | | | | INSPECTION. FOOD GRADE OIL WAS USED | | |
| | | | | WHEN MAKING UP TOOL STRING. STARTING | | |
| | | | | W/ CORE BARREL | | |
| | | | | | 0940 | DRILLING |
| | 5' | D | SM | MUDDY SAND: 80% SAND, 20% MUD. TRACE | 0945 | SAMPLE; 2 PT. |
| | | | | CG, 10% MS, 40% FS, 30% VFS, 20% MUD. | | LITHOLOGIC & |
| | | | | MODERATELY SORTED. TOO FINE FOR MINERALOGY, | | 1 MOISTURE SAMPLE |
| | | | | WET COLOR IS 10YR 4/3 (BROWN). RX. T | 0950 | DRILLING |
| | | | | 10% HCL IS SLIGHT. NO CONSOLIDATION. | 0955 | SHUT DOWN; NO |
| | | | | Ø PPM W/ OVA & RAD = < DET. BACKGROUND | | WHC RPT SUPPORT |
| | | | | = 200-300 COUNTS | 1030 | BEVELING CASING & |
| | | | | | | WELDING DRIVE SHOE |
| | | | | | 1200-1230 | LUNCH |
| 13'7" OF 10" | | | | ADDED 13'7" OF CARBON STEEL CASING & DRIVE | 1245 | DRILLING |
| | | | | SHOE TO BOREHOLE (10" DIA.) | | |

REMARKS:

FORM-NIA-567 DO-1, REV. 0 Reviewed by W.C. Mathews 10-8-89 Shirley Dowl 8/9/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

| DRILL LOG | By: S.M. Goodwin | Rig: BE 220 | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9 August 1989 | 1422-14102 | Depth: 5' to 15' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 10' | D | SM | GRAVELLY MUDDY SAND: 15% GRAVEL, 70% SAND, | 1315 | SAMPLE; 2 PT |
| | | | | 15% MUD. TRACE CP, 3% MP, 6% FP, 6% VFP, 5% | | LITH. & 1 MOIST. |
| | | | | VCS, 10% CS, 10% MS, 20% FS, 25% VFS, 15% MUD. | | SAMPLE |
| | | | | VERY POORLY SORTED. WET COLOR IS 5Y 4/3 (OLIVE). | 1320 | DRILLING |
| | | | | GRAVELS ARE 70% MAFIC, 30% FELSIC; SA TO SR. | | |
| | | | | SANDS ARE 40% MAFIC, 60% FELSIC; SA. STRONG | | |
| | | | | RX. TO 10% HCL. NO CONSOLIDATION. COARSER | | |
| | | | | THAN 5'. Ø PPM W/ OVA & RAD = <DET. | | |
| | 15' | D | SM | GRAVELLY SAND: 12% GRAVEL, 85% SAND, 3% MUD | 1345 | SAMPLE; 2 PT. LITH |
| | | | | TRACE VCP & CP, 2% MP, 5% FP, 5% VFP, 35% | | & 1 MOISTURE SAMPLE |
| | | | | VCS, 30% CS, 10% MS, 5% FS, 5% VFS, 3% MUD. | 1350 | PREPARING TO WELD |
| | | | | MODERATELY SORTED. GRAVELS ARE 55% MAFIC, | | |
| | | | | 45% FELSIC; SA TO R. SANDS ARE 30% MAFIC, | | |
| | | | | 70% FELSIC; SA. NOT ENOUGH FINES FOR MUNSEL | | |
| | | | | CHART; DARK SALT & PEPPER. MODERATE RX. TO | | |
| | | | | 10% HCL. NO CONSOLIDATION. Ø PPM W/ OVA | | |
| | | | | & RAD = <DET. DECREASE IN % OF MUD. | | |
| | | | | | 1530 | END OF SHIFT |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by V.C. McGhan 12-8-89 [illegible] 8/9/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

| DRILL LOG | By S. M. Goodwin | Rig BE 22 w | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10 August 1989 | #22-14/02 | Depth 15' To 25' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESEN | 0700 | SERVICING RIG |
| 13'7" | | | | | 0715 | FINISHING WELD |
| + 10'3" | | | | ADDED 10'3" OF 10" CASING; TOTAL 10" = 23'10" | 0735 | DONE W/ WELD |
| 23'10" | | | | | 0745 | DRILLING |
| | 20' | D | SM | SAND: 3% GRAVEL, 97% SAND. 1% FP, 2% VFP, | 0820 | SAMPLE; 2 PT. |
| | | | | 5% VCS, 47% CS, 30% MS, 10% FS, 5% VFS. | | LITHOLOGIC, 1 |
| | | | | MODERATELY SORTED. GRAVELS ARE 50% MAFIC, | | MOISTURE, & 2 |
| | | | | 50% FELSIC; SA TO SR. SANDS ARE 25% | | 250 ML CHEM. |
| | | | | MAFIC, 75% FELSIC; SA. WET COLOR IS | | ANALYSIS SAMPLES |
| | | | | SALT & PEPPER; NO FINES FOR MUNSEL. | | (C. OF C. #SST081089) |
| | | | | NO RX. TO 10% HCL. NO CONSOLIDATION. | 0822 | DRILLING |
| | | | | LESS GRAVEL THAN 15' SAMPLE. Ø PPM | | |
| | | | | W/ OVA & RAD: < DET. | | |
| | 25' | D | SM | SLIGHTLY GRAVELLY SAND: 7% GRAVEL, 93% SAND, | 0845 | SAMPLE, 2 PT. |
| | | | | TRACE CP, 2% MP, 3% FP, 2% VFP, 5% VCS, | | LITH & 1 MOIST. |
| | | | | 43% CS, 30% MS, 10% FS, 5% VFS. MODERATELY | | SAMPLE |
| | | | | SORTED. GRAVELS & SANDS SIMILAR TO 20' | 0855 | DRILLING |
| | | | | SAMPLE. SANDS ARE VERY "CLEAN". | 0905 | PREPARING TO WELD |

REMARKS:

Ø PPM W/ OVA & RAD: < DET.

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. Mackham 12-8-89 Marilyn Mark 8/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

WHC-MR-0209

13

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22.0 | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W-017-55T |
|---|---|---|---|---|---|
| | Date: 10 August 1987 | #22-16/102 | Depth: 25' To 25' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 23'10" | | | | ADDED 9'11 1/4" OF 10" CASING ; TOTAL 10" = 33'8 1/4" | 1015 | FINISHED WELDING |
| + 9'11 1/4" | | | | | 1020 | DRILLING |
| = 33'8 1/4" | | | | RECEIVED WORD FROM TYLER GILMORE, PNL, | 1030 | STANDBY |
| | | | | THAT E24-19 WOULD BE SHUT DOWN & | | |
| | | | | RIG MOVED TO NEW SITE. RIG IS SHUT | | |
| | | | | DOWN & WE ARE AWAITING FURTHER | | |
| | | | | INSTRUCTIONS. | | |
| | | | | STILL AWAITING FINAL WORD ON RIG PLACE- | 1530 | END OF SHIFT |
| | | | | MENT; ANTICIPATE RECEIVING WORD FROM | | |
| | | | | WHC IN A.M. | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by W.L. McGehee 12-8-89 [illegible] 8/10/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine

9 1 1 2 5 7 0 9 1 7

| DRILL LOG | By AIRHART | Rig BE 22W 14102 Mel. Thoresen | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-11-89 | | Depth 25' To 35' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 33'9¼" | Note: | Measurement | | Driller on site beveling casing | 0700-0815 | |
| on 8-10-89 | should | total | | Received word from Olin Amos (KEH foreman) | 0820 | |
| 33'9¼" | of 10' | casing. | | to resume drilling @ current location | | |
| | | | | | 0830 | Resumed Drilling |
| | 30' | D | SM | SANDY GRAVEL: 45% gravel, 53% sand, 2% mud: | 0905 | Took (2) pint. |
| | | | | TR CP, A 10% MP, 15% FP, 20% VFP, 30% VCS, 10% CS, 10% MS, | | lith. samples; (1) |
| | | | | 3% FS-VFS, 2% mud - poorly sorted: gravel: 50% | | moisture sample - |
| | | | | basalt 50% granitic, felsic dom. SR: sand: | | No contam. |
| | | | | 30% basalt 70% felsic, A-SA - wet color | | detected. |
| | | | | salt & pepper (Few Fines): slight vsm. w/ 10% | | |
| | | | | HCl: unconsolidated. NOTE: Increase in gravel. | | |
| | 35' | D | | SANDY GRAVEL. same sand & gravel fraction - | 0920 | Took (2) pint lith |
| | | | | No Δ lithology or color | | samples; (1) moisture |
| | | | | | | sample. No cont. |
| | | | | | | detected. |
| 43'3" | | | | | 1020 | Added 9'5¾" of 10" casing |
| | | | | | | 33'9¼" + 9'5¾" = 43'3" |
| | | | | | 1030 | Drilling |

REMARKS:

PNL-MA-567 DO-1 REV. 0 Reviewed by [illegible] 12-8-89

STP [illegible] 8-11-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

15

WHC-MR-0209

| DRILL LOG | By: AIRHART | Rig: BE 22W 14102 Mel T. | Well Number: 299-E24-19 | Computer Number: NA | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-11-89 | | Depth: 35' To 45 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 43'3" | 40' | D | SM | SANDY GRAVEL: 57% gravel, 40% sand, 3% mud. | 1100 | Took (2) lith. samples |
| | | | | 5% CP, 10% MP, 20% FP, 22% VFP, 15% VCS, 10% CS, | | (1) moisture sample, |
| | | | | 10% MS, 5% FS-VFS, 3% mud: poorly sorted: gravel: | | (2) 250 ml chemical |
| | | | | SA-SR - 60% basalt 40% felsic - sand: A-SA - | | samples. Reference |
| | | | | 40% basalt 60% felsic - weak rxn w/ 10% | | chain of custody |
| | | | | HCl - No A color - unconsolidated. | | # SST081189. No |
| | | | | | | cont. detected. |
| | | | NOTE: | Driller indicated harder drilling @ ~42' - | 1129 | |
| | | | | Material is more coarser, and more | | |
| | | | | gravels than above. | | |
| | | | | Back into more sand @ ~ 43-44' | | |
| | 45' | D | SM | GRAVELLY SAND: 20% gravel, 77% sand, 3% mud. | 1145 | Took (2) pint lith. |
| | | | | 3% MD, 17% FP-VFP, 20% VCS, 30% CS, 15% MS, 12% | | samples, (1) moisture |
| | | | | FS-VFS, 3% mud: poorly sorted: gravel: 50% | | No contam. detected. |
| | | | | basalt 50% felsic (incl. weathered granite) - A-SA: sand. | | |
| | | | | 30% basalt 70% silicic felsic: No A color | | |
| | | | | Mod rxn. w/ 10% HCl - unconsolidated. | 1150 | Preparing to add |
| | | | | | | 10" casing |

REMARKS:

PNL-MA-567 DO-1 REV.0 Reviewed by V.L. McGhan 12-8-89 S.T.P. 8-11-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

16

9 1 1 2 0 5 0 0 0 1 9

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| AIRHART | BE 22W 14102 | 299-E24-19 | N/A | W-017 SST |
| Date: 8-11-89 | | Depth: 45' To 55' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 52'10" | | | | | 1155 | Adding 9'7" of 10" casing |
| | | | | | | 43'3" + 9'7" = 52'10" |
| | | | | | 1200-1230 | lunch |
| | | | | | 1330 | Finished Welding |
| | | | | | 1335 | Resumed Drilling |
| | 50' | D | SM | SANDY GRAVEL: 40% gravel 57% sand 3% mud: | 1415 | Took (2) pint lith. |
| | | | | TRACE CP, 10% MP, 30% FP-VFP, 20% VCS, 20% CS, | | samples, (1) moisture |
| | | | | 10% MS, 7% FS-VFS, 3% mud: poorly sorted: gravel. | | sample - No |
| | | | | 50% basalt, 50% granitic, felsic, A-SA: sand | | contam. detected. |
| | | | | 30% basalt 70% qtz, f-spar, felsic rock frags. | | |
| | | | | Mod. rxn w/ 10% HCl - No Δ color. | | |
| | | | | unconsolidated. | | |
| | 55' | D | SM | SANDY GRAVEL: 60% gravel, 38% sand, 2% mud: | 1425 | Took (2) pint lith |
| | | | | 5% CP, 20% MP, 15% FP, 20% VFP, 15% VCS, 10% CS, | | samples, (1) moisture |
| | | | | 10% MS, 3% FS-VFS, 2% mud: poorly sorted: | | sample. No contam. |
| | | | | gravel - No Δ lithology. sand: No Δ lithology. | | detected. |
| | | | | No Δ color - Mod-to-strong rxn w/ 10% HCl: | | |
| 63'1/4" of 10" casing | | | | unconsolidated | 14:50 | Preparing to Add 10'2¼" of 10" casing |
| | | | | | | 52'10" + 10'2¼" = 63'1/4" |
| | | | | | 15:00 | No welding |
| | | | | | 15:10 | Shut Down |

REMARKS:

Reviewed by

PNL MA-567 DO-1 REV. 0 J.L. McClean 8-8-89 S.L. Airhart 8-11-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

17

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22W | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 14 August 1989 | #22-14102 | Depth: 55' To 65' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 63' 1/4" | | | | DRILLER IS MSL THORESEN | 0700 | SERVICING RIG |
| | | | | TOTAL 10" = 63' 1/4" | 0715 | WELDING 10" |
| | | | | | 0825 | DRILLING |
| | 56' | D | MOIST | MUDDY SAND: 4" SILT LENS; ~70% FS & VFS, | 0850 | SAMPLE; 2 PT. |
| | | | | 30% MUD (SILT). NO VISIBLE INTERNAL | | LITH, 1 MOISTURE, |
| | | | | STRUCTURE. SURROUNDED BY VCS & CS. Ø | | & 2 125 ML CHEM |
| | | | | PPM w/ OVA & RAD = <DET. | | ANAL. SAMPLES (C. |
| | | | | | | OF C. #SST081489) |
| | | | | | 0855 | DRILLING |
| | 60' | D | SM | SAND: 97% SAND, 3% MUD. TRACE VCS, 15% | 0905 | SAMPLE; 2 PT. |
| | | | | CS, 62% MS, 15% FS, 5% VFS, 3% MUD. | | LITH, 1 MOISTURE, |
| | | | | MODERATELY SORTED. SANDS ARE 20% MAFIC, | | & 2 125 ML CHEM |
| | | | | 80% FELSIC; A TO SA. SALT & PEPPER | | ANAL. SAMPLES (C. |
| | | | | COLOR. SLIGHT RX. TO 10% HCL NO CON- | | OF C. #SST081489) |
| | | | | SOLIDATION. MUCH FINER THAN 55' SAMPLE. | 0910 | DRILLING |
| | | | | Ø PPM w/ OVA & RAD = <DET. | | |
| | 65' | D | SM | SAND: 97% SAND, 3% MUD. SAME AS PREVIOUS | 0930 | SAMPLE; 2 PT. |
| | | | | SAMPLE. SLIGHT INCREASE IN SAND SIZE; | | LITH & 1 MOIST. SAMPLE |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by [illegible] 12-8-89 [illegible] 8/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

| DRILL LOG | By: S.M. Goodwin | Rig: BE 22W | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 14 August 1989 | #22-14/100 | Depth: 65' to 70' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 65' | D | SM | (CONT.) 25% CS, 52% MS. NO D IN COLOR. | | |
| | | | | SLIGHT RX. TO 10% HCL. NO CONSOLIDATION | | |
| | | | | Ø PPM W/ OVA & RAD = <DET. | | |
| | | | | | 0940 | PREPARING TO WELD |
| | | | | PICKING UP CONSISTENT READINGS OF 5 PPM W/ | 0945 | STANDBY |
| | | | | OVA; WILL CONTINUE TO MONITOR BOREHOLE | | |
| | | | | LEVELS DROPPED TO .5 PPM; WILL CONTINUE | 0955 | WELDING 10" |
| 63'1/4" | | | | WITH WELDING 10". | | |
| + 10'6" | | | | ADDED 10'6" OF 10" CASING; TOTAL = 73'6 1/4" | 1100 | FINISHED WELDING |
| = 73'6 1/4" | | | | | 1105 | DRILLING |
| | 70' | D | SM | GRAVELLY SAND: 12% GRAVEL, 85% SAND, 3% | 1125 | SAMPLE, 2 PT. |
| | | | | MUD. 2% MP, 5% FP, 5% VFP, 35% VCS, | | LITH & 1 MOIST. |
| | | | | 25% CS, 15% MS, 5% FS, 5% VFS, 3% | | SAMPLE |
| | | | | MUD. POORLY SORTED. GRAVELS ARE 50% MAFIC, | 1127 | DRILLING |
| | | | | 50% FELSIC; SA TO SR. SANDS ARE 30% | | |
| | | | | MAFIC, 70% FELSIC; SA. WET COLOR IS | | |
| | | | | SALT & PEPPER. SLIGHT RX. TO 10% HCL. | | |
| | | | | NO CONSOLIDATION. INCREASE IN GRAVEL & | | |

REMARKS: SAND SIZE. Ø PPM W/ OVA & RAD = <DET.

PNL-MA-567 DO-1, REV. 0 Reviewed by W.L. McSlam 12-8-89 Sheila Mark 8/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

| DRILL LOG | By S.M. Goodwin | Rig BE 22.. | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 14 August 1995 | #22.14/102 | Depth 70' To 80' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 75' | D | SM | GRAVELLY SAND: 20% GRAVEL, 77% SAND, 3% | 1150 | SAMPLE; 2 PT. |
| | | | | MUD. TRACE CP, 5% MP, 15% VFP & FP, | | LITH. & 1 MOIST. |
| | | | | 30% VCS, 25% CS, 12% MS, 5% FS, 5% VFS, | | SAMPLE |
| | | | | 3% MUD. POORLY SORTED. GRAVEL & SAND | 1152 | DRILLING |
| | | | | SAME AS 70' SAMPLE. SALT & PEPPER | 1200-1230 | LUNCH |
| | | | | COLOR. MOD. RX. TO 10% HCL. NO | 1235 | PREPARING TO |
| | | | | CONSOLIDATION. Ø PPM w/ OVA & RAD = | | WELD. |
| 73'6 | 1/4" | | | < DET. | | |
| + 10'5 | 1/2" | | | ADDED 10'5 1/2" OF CASING; TOTAL 10" = 83'11 3/4" | 1340 | FINISHED WELDING |
| = 83'11 | 3/4" | | | | 1345 | DRILLING |
| | 80' | D | SM | GRAVELLY SAND: 15% GRAVEL, 82% SAND, 3% | 1410 | SAMPLE; 2 PT |
| | | | | MUD. 5% MP, 10% FP-VFP, 30% VCS, 27% | | LITH., 1 MOIST., |
| | | | | CS, 15% MS, 5% FS, 5% VFS, 3% MUD. | | & 2 125 ML CHEM. |
| | | | | MODERATELY SORTED. NO D IN LITHOLOGY FOR | | ANAL. SAMPLES |
| | | | | GRAVELS & SANDS. SLIGHT RX. TO 10% HCL. | | (C. OF C. #SST081489) |
| | | | | NO CONSOLIDATION. SALT & PEPPER COLOR. | 1415 | DRILLING |
| | | | | SLIGHT DECREASE IN GRAVEL. Ø PPM w/ | | |
| | | | | OVA & RAD = < DET. | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. McGhan 12-8-89 Alan M. Marc 8/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

9 1 1 2 0 5 1 0 0 7 3

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| S. M. Goodwin | BE 22W | 299-E24-19 | N/A | W-017 SST |
| **Date** | | **Depth** | | **Subcontract No.** |
| 14 August 1969 | #22-14102 | 80' To 87' | | N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 85' | D | SM | GRAVELLY SAND: 15% GRAVEL, 82% SAND, 3% | 1435 | SAMPLE; 2 PT. |
| | | | | MUD. GRAVELS SAME; SANDS ARE 25% | | LITH 1 / MOIST. |
| | | | | VC, 27% C, 15% M, 10% F, & 5% VF. | | SAMPLE |
| | | | | GRAVELS ARE 50% MAFIC, 50% FELSIC; SA | 1440 | DRILLING |
| | | | | TO SR. SANDS ARE 25% MAFIC, 75% | 1445 | STOP DRILLING; |
| | | | | FELSIC; SA. NO D IN COLOR OR CONSOL- | | UNLOADING MATERIAL |
| | | | | IDATION. MODERATE RX. TO 10% HCL; STRONG | | FROM FLATBED |
| | | | | ON CEMENTED SANDS. Ø DPM w/ OVA & RAD | 1500 | DRILLING |
| | | | | = <DET. | 1530 | DONE FOR DAY |

REMARKS:
Reviewed by W. L. McGhan 12-8-89

PNL-MA-567 DO-1, REV. 0

Edwin. Mark 8/14/69

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

| DRILL LOG | By S.M. GOODWIN | Rig BE 22 W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 15 AUGUST 1955 | #22-14102 | Depth 87' TO 95' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 83' 11 3/4" | | | | DRILLER IS MEL THORESEN | 0700 | SERVICING RIG |
| + 10' 6" | | | | | 0715 | PREPARING TO WELD |
| 94' 5 3/4" | | | | ADDED 10' 6" OF 10" CASING; TOTAL 10" = 94' 5 3/4" | 0815 | FINISHED WELDING |
| | | | | | 0825 | DRILLING |
| | 90' | D | SM | GRAVELLY SAND: 25% GRAVEL, 72% SAND, 3% | 0910 | SAMPLE; 2 PT. |
| | | | | MUD. TRACE CP, 5% MP, 10% FP, 10% VFP, 20% | | LITH. & 1 MOIST. |
| | | | | VCS, 20% CS, 17% MS, 10% FS, 5% VFS, | | SAMPLE |
| | | | | 3% MUD. POORLY SORTED. GRAVELS ARE 50% | 0913 | DRILLING |
| | | | | MAFIC, 50% FELSIC; SA TO SR. SANDS ARE | | |
| | | | | 25% MAFIC, 75% FELSIC; SA. WET COLOR | | |
| | | | | IS 2.5 Y 5/4 (LT. OLIVE BROWN). MODERATE | | |
| | | | | RX. TO 10% HCL. NO CONSOLIDATION. Ø PPM | | |
| | | | | W/OVA & RAD = <DET. | | |
| | 95' | D | MOIST | SANDY GRAVEL: 50% GRAVEL, 47% SAND, 3% | 0935 | SAMPLE; 2 PT. |
| | | | | MUD. TRACE VCP, 5% CP, 10% MP, 20% FP, 15% | | LITH & 1 MOIST. |
| | | | | VFP, 7% VCS, 15% CS, 20% MS, 3% FS, 2% | | SAMPLE |
| | | | | VFS, 3% MUD. POORLY SORTED. NO D IN | 0937 | DRILLING |
| | | | | LITHOLOGY; SIMILAR TO 90' SAMPLE EXCEPT | 0945 | PREPARING TO WELD |

REMARKS:
Reviewed by V.L. McClean 12-8-89

PNL-MA-567 DO-1, REV. 0

Steve M. Mark 8/15/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

ee

WHC-MR-0209

9 1 1 0 2 5 7 0 0 2 5

| DRILL LOG | By: S.M. Goodwin | Rig: BE 22 | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 15 August 1989 | #22-1410-2 | Depth: 95' To 105' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 95' | D | MOIST | (CONT.) FOR INCREASE IN P. SIZE. GRAVELS | | |
| | | | | ARE MORE ROUNDED. TOO FEW FINES FOR | | |
| | | | | MUNSEL COLOR - SALT & PEPPER. SLIGHT | | |
| | | | | RX. TO 10% HCL. NO CONSOLIDATION. | | |
| 94'5 3/4" | | | | Ø PPM W/ OVA & RAD = < DET. | | |
| + 10' 3 3/4" | | | | ADDED 10' 3 3/4" OF 10" CASING; TOTAL = 104' 9 1/2" | 1040 | FINISHED WELD |
| = 104' 9 1/2" | | | | | 1050 | DRILLING |
| | 100 | D | SM | SANDY GRAVEL: 50% GRAVEL, 48% SAND, 2% MUD. | 1100 | SAMPLE; 2 PT. |
| | | | | TRACE VCP, 5% CP, 15% MP, 20% FP, 10% VFP, | | LITH, 1 MOISTURE, |
| | | | | 8% VCS, 15% CS, 20% MS, 3% FS, 2% VFS, | | & 2 125 ML CHEM. |
| | | | | 2% MUD. POORLY SORTED. NO Δ IN LITHOLOGY; | | ANAL. SAMPLES. |
| | | | | SIMILAR TO 95' SAMPLE. NO RX. TO 10% HCL. | | (C. OF C. H5STOS1589) |
| | | | | NOT ENOUGH FINES FOR MUNSEL WET COLOR; | 1105 | DRILLING |
| | | | | SALT & PEPPER. NO CONSOLIDATION. Ø PPM | | |
| | | | | W/ OVA & RAD = < DET. | | |
| | 105' | D | SM | SANDY GRAVEL: 30% GRAVEL, 68% SAND, 2% MUD. | 1120 | SAMPLE; 2 PT. |
| | | | | TRACE CP, 8% MP, 12% FP, 10% VFP, 15% | | LITH. & 1 MOIST. |
| | | | | VCS, 23% CS, 20% MS, 5% FS, 5% VFS, 2% | | SAMPLE |

REMARKS:
Reviewed by V.L. Nicholson 12-8-89 MUD.

PNL-MA-567 DO-1, REV. 0

Stuart Mark 8/15/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

23

9 1 1 2 0 5 0 0 0 2 6

3 of 4

| DRILL LOG | By S.M. Goodwin | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 15 August 1989 | # 22-14102 | Depth 105' To 110' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 105' | D | SM | (CONT.) POORLY SORTED. NO D IN LITHOLOGY. | 1125 | PREPARING TO WELD |
| | | | | RX. TO 10% HCL IS MODERATE TO STRONG (SOME | 1200-1230 | LUNCH |
| | | | | PEBBLES w/ CaCO3 COATING). SALT & PEPPER | 1240 | WELDING |
| | | | | COLOR. NO CONSOLIDATION. Ø PPM w/ OVA | | |
| 104'9½" | | | | & RAD = <DET. FINER THAN 100'. | | |
| + 9'9½" | | | | ADDED 9'9½" OF 10" CASING; TOTAL 10" = 114'7" | 1320 | FINISHED WELDING |
| = 114'7" | | | | | 1330 | DRILLING |
| | 110' | D | SM | GRAVELLY SAND: 25% GRAVEL, 75% SAND. | 1345 | SAMPLE; 2 PT. |
| | | | | TRACE CD, 5% MP, 10% FP, 10% VFP, 25% | | LITH & 1 MOIST. |
| | | | | VCS, 25% CS, 15% MS, 10% FS & VFS, 0% | | SAMPLE |
| | | | | MUD. POORLY SORTED. NO D IN LITHOLOGY, | 1350 | DRILLING |
| | | | | SIMILAR TO PREVIOUS SAMPLES. LESS FINES; | | |
| | | | | SAMPLE APPEARS "CLEANER". SALT & PEPPER | | |
| | | | | COLOR. NO CONSOLIDATION, BUT ABLE TO | | |
| | | | | DRILL 2'-3' AHEAD OF CASING DUE TO | | |
| | | | | MOISTURE. SLIGHT RX. TO 10% HCL. Ø | | |
| | | | | PPM w/ OVA & RAD = <DET. LESS GRAVEL | | |
| | | | | & MUD THAN 105'. | | |

REMARKS:
Reviewed by V.L. McShane 12-8-89

PNL-MA-567 DO-1 REV. 0

S.M. Goodwin 8/15/89

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse

24

WHC-MR-0209

| DRILL LOG | By M. Lubrecht | Rig BE-22W #22-14102 Mel Thoresen | Well Number 299-E26-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/15/89 | | Depth 110 To 115 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 114'7" | 115 | D | SM | gravelly SAND: 15% Gravel, 85% SAND, Tr. MUD - Tr. mP, | 1410 | SAMPLES: (2), 1 pt. |
| | | | | 9% fP, 6% vfP, 30% vcS, 25% cS, 20% mS, 10% fS, tr vfS, | | Lithological; (1) moisture |
| | | | | tr. Mud; poorly-sorted; GRAVEL: 15% mafic / 85% felsic, A-WR; | | |
| | | | | SAND: 20% mafic / 80% felsic, A-R; 10YR 6/4 pale yellow brown; | | |
| + 8'-11¾" | | | | Slight ≠ w/HCl; not consolidated. Finer than 110 ft. sample. | | |
| | | | | | 1415 | Begin to add 10" casing |
| 123'-6¾" | | | | | 1500 | Shut down for fire watch |
| | | | | | | (discontinued welding) |
| | | | | | | TD: 115' |
| | | | | | | |
| | | | | | | TOTAL DRILL WATER USED: |
| | | | | | | 3½ gallons. (200 EAST |
| | | | | | | RAW WATER SUPPLY) |

REMARKS:
Reviewed by D.L. McAlum 12-8-89

DNL-MA567-DO-1, Rev. 4

Michael D. Lubrecht 8/15/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

25

9 1 1 2 0 5 0 0 0 2 3

SHT 1 of 3

| DRILL LOG | By M. LUBRECHT / S. GOODWIN | Rig BE 22W # 22-14102 M. THORESEN | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. IW-017 SST |
|---|---|---|---|---|---|
| | Date 16 AUGUST 89 | | Depth 115' To 125' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 123'-6½" | 115 | | | | 0700 | On site w/ driller; |
| | | | | | | resume welding new |
| | | | | | | casing (10" steel.) |
| | | | | | 0740 | BEGIN DRILLING 115'-120' |
| | | | | | | interval. |
| | 120' | D | sM | gravelly SAND: 15% GRAVEL, 83% SAND, 2% mud; Tr. CP, | 0808 | SAMPLES: (2), 1 pt. Litho.; |
| | | | | 5% mP, 4% fP, 6% vfP, 30% vcS, 25% cS, 23% mS, 5% | | (2) Chemical [C-o-c SST 081689]; |
| | | | | fS, Tr. vfS, 2% mud; moderately-sorted; GRAVEL: 30% basaltic, | | (1) moisture. |
| | | | | 70% felsic, A-WR; SAND: 20% basaltic/80% felsic, VA-SR; | | |
| | | | | 10YR6/4 pale yellowish brown; slight ≈ w/HCl; not consolidated. | | |
| | | | | 0 ppm on OVA; rad. < det. | | |
| | | | | | | |
| | 125' | D | M | SAND: 3% GRAVEL, 96% SAND, 1% mud; 1% fP, 2% vfP, 5% | 0851 | SAMPLES: (2), 1 pt. litho.; |
| | | | | vcS, 10% cS, 50% mS, 20% fS, 11% vfS, 1% mud; well- | | (1) moisture |
| | | | | sorted; GRAVEL: 30% basaltic / 70% felsic, SA-WR; SAND: 20% | | |
| | | | | basalt / 80% felsic, A-SA; 10YR 6/4 pale yellow brown; slight | | |
| | | | | ≈ w/HCl; unconsolidated; finer grained than above; less gravel. | | |
| | | | | | 0859 | Prepare to add casing |

REMARKS:
Reviewed by V. L. McBlan 12-8-89
PAL - MA 567 - DO-1, REV. Ø

M. D. Lubrecht 8/16/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

36

WHC-MR-0209

| DRILL LOG | By M. Lubrecht / S. Goodwin | Rig CE 22W #22-1410L | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 16 AUGUST 89 | M Thorson | Depth 130' To 140' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 123'-6¾" | | | | | 1047 | Complete casing |
| + 9'-8" | | | | | | addition. Resume drilling |
| 133' 2¾" | 130' | D | M | SAND: Similar to sample 125 ft. Slightly more moist. | 1049 | SAMPLES: (2), 1 pt. |
| | | | | | | Lith.; (1) moisture |
| | | | | | | |
| | 135' | D | M | slightly gravelly SAND: 8% Gravel, 91% SAND, 1% mud: 2% mP, | 11:04 | SAMPLES: (2), 1 pt. |
| | | | | 3% fP, 3% vfP, 15% vcS, 20% cS, 40% mS, 12% fS, 4% vfS, 1% mud; | | Lith.; (1) moisture |
| | | | | moderately sorted; Gravel: 20% BASALT/80% felsic, SA-SR; SAND: | | |
| | | | | 20% BASALT/80% felsic, SA-SR; 10YR 5/4 pale yellowish brown; | | |
| | | | | slight ⇌ w/HCl; none consolidated; more gravel than above | | |
| + 9'-2½" | | | | | 1113 | STOP TO ADD CASING. |
| 142' 5¼" | | | | | 1200 - 1230 | LUNCH |
| | | | | | 1240 | WELDING |
| | | | | ADDED 9'2½" OF 10" CASING; TOTAL 10" = 142' 5¼" | 1250 | FINISHED WELDING |
| | | | | | 1255 | DRILLING |
| | 140' | D | SM | SLIGHTLY GRAVELLY SAND: 8% GRAVEL, 91% SAND, | 1325 | SAMPLE; 2 PT. LITH, |
| | | | | 1% MUD. SAME DISTRIBUTION AS 135' SAMPLE. | | 1 MOIST. & 2 CHEM. |
| | | | | GRAVELS ARE 40% MAFIC, 60% FELSIC; SA-SR. | | ANAL. SAMPLES |

REMARKS:
Reviewed by V.L. McGlam 12-8-89
PNL-MA567-DO-1, Rev. Ø

(C. of C. #SST081689)

M. D. Lubrecht 8/16/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

WHC-MR-0209

27

| DRILL LOG | By M. LUBRECHT / S. M. GROWIN | Rig BE-22W #22-1402 M. Thorsen | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-16-89 | | Depth 140' To 149' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 140' | D | SM | (CONT.) SANDS ARE 25% MAFIC, 75% FELSIC; | 1330 | DRILLING |
| | | | | SA. SALT & PEPPER COLOR, TOO FEW FINES. | | |
| | | | | SLIGHT RX. w/ 10% HCL. NO CONSOLIDATION. | | |
| | | | | Ø PPM w/ OVA; RAD = < DET. SIMILAR TO 135' | | |
| | 145' | D | SM | SAND: 2% GRAVEL, 97% SAND, 1% MUD. 1% | 1345 | SAMPLE; 2 PT. |
| | | | | FP, 1% VFP, 15% VCS, 50% CS, 17% MS, 10% FS, | | LITH & 1 MOISTURE |
| | | | | 5% VFS, 1% MUD. MODERATELY SORTED. SANDS | | SAMPLE |
| | | | | ARE 25% MAFIC, 75% FELSIC; SA. SALT & | 1348 | DRILLING |
| | | | | PEPPER COLOR. NO CONSOLIDATION. SLIGHT RX. | 1400 | PREPARING TO |
| | | | | TO 10% HCL. Ø PPM w/ OVA & RAD = < DET. | | WELD 10" |
| 142'5 1/4" | | | | MORE UNIFORM & FINER THAN 140'. | | |
| + 9'4 3/4" | | | | ADDED 9'4 3/4" OF 10" CASING; TOTAL 10" = 151'10" | 1455 | FINISHED WELDING |
| = 151'10" | | | | | 1500 | DRILLING |
| | | | | | 1530 | END OF SHIFT |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by W. R. McGlam 12-8-89

PNL-MA567-DO-1, REV. 0

Mark D. Luber 8/16/89

| DRILL LOG | By S.M. Goodwin | Rig BE 22w | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 17 August 1989 | #22-14102 | Depth 149' To 150' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THRESER. | 0700-0730 | DRILLER MEETING |
| | | | | | 0740 | DRILLING |
| | 150' | D | SM | SLIGHTLY GRAVELLY SAND: 8% GRAVEL, 90% SAND, | 0750 | SAMPLE; 2 PT. |
| | | | | 2% MUD. TRACE MP, 4% FP, 4% VFP, 20% | | LITH & 1 MOIST. |
| | | | | VCS, 30% CS, 30% MS, 5% FS, 5% VFS, 2% MUD. | | SAMPLE |
| | | | | MODERATELY SORTED. GRAVELS ARE 45% BASALT, | 0800 | BOREHOLE BEING |
| | | | | 55% FELSIC RX. FRAGS; SA. SANDS ARE 20% | | GEOPHYSICALLY |
| | | | | MAFIC, 80% FELSIC; SA. TOO FEW FINES | | LOGGED BY VERN |
| | | | | FOR MUNSEL; SALT & PEPPER COLOR. NO | | MCGHAN, PNL |
| | | | | RX. TO 10% HCL. NO CONSOLIDATION. SLIGHTLY | | |
| | | | | COARSER THAN 145'. Ø PPM W/ OVA & RAD | | |
| | | | | = < DET. | | |
| | | | | LOGGED 150.5'-4' INTERVAL W/ NATURAL GAMMA | 0900 | FINISHED LOGGING |
| | | | | PROBE. | | RUNNING 8" |
| | | | | USING FOOD GRADE OIL ON TOOL STRING | | CASING & CHANGING |
| | | | | | | TOOLS |
| | | | | WELDING 8" CASING FOR REMAINDER OF DAY | 1200-1230 | LUNCH |
| | | | | | 1530 | END OF SHIFT |

REMARKS:
Reviewed by D.L. Mecham 12-9-89

PNL-MA-567 DS-1, REV. 0

S.M. Goodwin 8/17/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

29

| DRILL LOG | By EJ Jensen | Rig BE 224 | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 8/18/89 | #22-14102 | Depth 155' To 160' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 20' 10"<br>20' 6¼" | | | | Added 141' 4 5/8" of 8" diameter casing on 8/17/89 | 0900<br>1530 | |
| 20'<br>20' ¼" | | | | | | |
| 20' ⅛"<br>20' | | | | | | |
| 20'<br>141' 4 5/8" | | | | | | |
| 16' 9" | | | | Added 16' 9" of 8" dia. casing | 0900 | started Drilling |
| 158' 1 5/8" | | | | | | |
| | 155' | D | SM | SAND, 2% small pebbles, 3% vcs, 35% cs, 40% ms, | 0910 | 2 pint jar samples |
| | | | | 15% fs, 5% vfs - mud, well sorted, 50% mafic, | | 1 moisture sample |
| | | | | 50% felsic, color 10YR 6/2 light grayish Brown, moderate | | |
| | | | | rxn in 10% HCl, unconsolidated | | |
| | | | | | | |
| | 160' | D | SM | SAND, 5% vcs, 25% cs, 35% ms, 20% fs 10% vfs, | 0945 | 2 pint Jar samples |
| | | | | 5% mud, medium sorting, color 10YR 5/3 Brown | | 1 moisture sample |
| | | | | moderate rxn in 10% HCl, unconsolidated. | | 2 special samples 125ml |
| | | | | | | 081889 SST castol # |
| 9' 10" | | | | Added 9' 10" of 8" dia. casing | 1000 | |
| 167' 11 5/8" | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by D.L. McAlham 12-8-89

PNL-MA-567 DO-1, REV. 0

8/18/89

30

WHC-MR-0209

9 1 1 2 0 5 0 0 0 7 3

| DRILL LOG | By EJ Jensen | Rig BE 22W | Well Number 299-E24-19 | Computer Number NA | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 8/18/89 | #22-14102 | Depth 165' To 175' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 165' | D | SM | SAND, 2% small pebbles, 3% VCS, 35% CS, 40% ms, 15% fs, 5% vfs-mud, well sorted, 50% mafic, 50% felsic, color 10 YR 6/2 light grayish brown, slight rxn in 10% HCl, unconsolidated. | 1120 | 2 pint jar samples 1 moisture sample |
| | 170' | D | SM | SAND, 2% small pebbles, 3% VCS, 35% CS, 40% ms, 15% fs, 5% vfs-mud, well sorted, 50% mafic, 50% felsic, color 10 YR 6/2 light grayish brown, slight rxn in 10% HCl, unconsolidated. | 1140 | 2 pint jar sample 1 moisture sample |
| 10' 11½" | | | | Added 10' 11½" of 8" diameter casing | 1145 | |
| 178' 11⅛" | | | | | | |
| | 175' | D | SM | SAND, 2% small pebbles, 3% VCS, 35% CS, 40% ms, 15% fs, 5% vfs-mud, well sorted, 50% mafic, 50% felsic, color 10 YR 6/2 light grayish brown, slight rxn in 10% HCl, unconsolidated | 1330 | 2 pint jar sample 1 moisture sample |

REMARKS:
Reviewed by V.L. Mackham 12-8-89
PNL-MA-567 DO-1, REV. 0

8/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

3

| DRILL LOG | By EJ Jensen | Rig BE 22W | Well Number 299-E24-19 | Computer Number | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 8/18/89 | #22-14102 | Depth 180' To 185' | NA | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 180' | D | SM | SAND, 2% small pebbles, 3% vcs, 35% cs, 40% ms, 15% fs, 5% vfs-mud, well sorted, 50% mafic, 50% felsic, color 10YR 6/2 light grayish brown, slight rxn in 10% HCl, unconsolidated. | 1400 | 2 pint jar samples<br>1 moisture sample<br>2 special samples 125ml<br>081889 SST |
| | 185' | D | SM | SAND, 5% vcs, 35% cs, 40% ms, 15% fs, 5% vfs-mud, well sorted, 50% mafic, 50% felsic, color 10YR 6/2 light grayish brown, moderate rxn in 10% HCl, unconsolidated. | 1420 | 2 pint jar sample<br>1 moisture sample |
| | | | | A section of casing will be measured and welded on monday morning | | |

REMARKS:
Reviewed by D.L. Mathan 12-8-89

PNL-MA-567 DO-1, REV. 0

8/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

32

WHC-MR-0209

9 1 1 2 8 5 0 0 7 5

| DRILL LOG | By S.M. GOODWIN | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017.SST |
|---|---|---|---|---|---|
| | Date 21 AUGUST 1989 | #22-14102 | Depth 185' TO 190' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESEN | 0700 | SERVICING RIG |
| | | | | | 0715 | DRILLING |
| 178'11 1/8" | | | | | 0730 | PREPARING TO WELD |
| + 13'11" | | | | ADDED 13'11" OF 8" CASING; TOTAL 8" = 192'10 1/8" | 0815 | FINISHED WELDING |
| = 192'10 1/8" | | | | | 0820 | DRILLING |
| | 187' | D | SM | HIT DARK REDDISH BROWN SANDS (RUST COLORED); | 0845 | SHUT DOWN |
| | | | | READING ~100 COUNTS ABOVE BACKGROUND. | | |
| | | | | BACKGROUND = 250-300 COUNTS. RIG SHUT DOWN | | |
| | | | | UNTIL ZONE IS ESTABLISHED. | | |
| | | | | EXCLUSION ZONE ESTABLISHED; WORKING IN SWP'S | 1340 | DRILLING |
| | 190' | D | SM | SAND: 95% SAND, 5% MUD. SAME AS 185' | 1352 | SAMPLE; 2 PT. |
| | | | | SAMPLE. MODERATELY SORTED. 30% MAFIC, 70% | | LITH, 1 MOIST, |
| | | | | FELSIC. WET COLOR IS 10YR 6/2 (LT. GRAYISH | | & 2 125 ML. |
| | | | | BROWN), W/ THE EXCEPTION OF DARK BROWN & | | CHEM ANAL. SAMPLES |
| | | | | RUST INCLUSIONS WHICH ARE READING ~ 100 | | (C. OF C. # SST |
| | | | | COUNTS ABOVE BACKGROUND. DRILLER SAY FM. | | 082189) |
| | | | | IS "TIGHT". SOME SANDS APPEARED CEMENTED | 1355 | DRILLING |
| | | | | W/ $CaCO_3$ & CAME OUT OF CORE BARREL IN | | |

REMARKS:
Reviewed by V.T. McGehan 12-8-89

PNL-MA-567 DO-1, REV. 0

Shirley Mark 8/21/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

| DRILL LOG | By S.M. GOODWIN | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 21 AUGUST 1989 | # 22-14102 | Depth 190' TO 195' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 190' | D | SM | (CONT.) CHUNKS. ZONE OF CEMENTED SANDS COULD | | |
| | | | | POSSIBLY BE A BARRIER TO CONTAMINANT | | |
| | | | | TRANSPORT. FM. "TIGHT" FROM 189'-190'. | | |
| | 191' | D | SM | SAME MATERIAL; LESS OBVIOUS CEMENTATION & | 1400 | |
| | | | | SOIL ISN'T AS CONTAMINATED. READINGS | | |
| | | | | AREN'T SIGNIFICANTLY ABOVE BACKGROUND. | | |
| | 192' | D | SM | SAND: SIMILAR TO PREVIOUS SAMPLES. RAD. HAS | 1415 | |
| | | | | DROPPED TO LESS THAN DETECTABLE. DRILLER | 1420 | DRILLING |
| | | | | HAD BEEN INSTRUCTED TO STOP WORK IF SOIL | | |
| | | | | WAS STILL CONTAMINATED AFTER DRILLING | | |
| | | | | 5', WE'LL CONTINUE DRILLING & MONITORING | | |
| | | | | THE SEDIMENTS. BACKGROUND = 200-300 COUNTS. | | |
| | 195' | D | SM | SAND: SIMILAR TO PREVIOUS SAMPLES. SAMPLE | 1435 | SAMPLE; 2 PT. |
| | | | | CONTAINS THE SAME DARK BROWN & RUST | | LITH, 1 MOIST, 4 |
| | | | | COLORED MATERIAL THAN 190' SAMPLE | | & 125 ML CHEM. |
| | | | | CONTAINED. SEDIMENTS ARE ~100 COUNTS ABOVE | | ANAL. SAMPLES |
| | | | | BACKGROUND. SHUT DOWN JOB & WAITING FOR | | (C. OF C. # SST |
| | | | | INSTRUCTIONS. | | 082189) |

REMARKS:
Reviewed by V.L. McSelan 12-8-89

1500 DONE FOR DAY

PNL-MA-567 DO-1, REV. 0

[illegible signature] 8/21/89

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

34

WHC-MR-0209

| DRILL LOG | By: AIRHART/Jensen | Rig: BE22W 14102 Mel Thorvsen | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-22-89 | | Depth: 195' To 200' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 192'10 1/8" | | | | Waiting for RPT to arrive | 0700- | 1000 |
| | | | | No contamination detected @ well-head w/ | 1030 | |
| | | | | OVA, $O_2$ meter, & GM | | |
| | | | | | 1040 | Resumed Drilling |
| | | | | No contamination detected above background | 1045 | 198' |
| | 200' | D | SM | SAND: Predom. CS to VCS. 30% basalt. | 1050 | Took (2) pint lith. |
| | | | | 70% gtz, mafic - brownish color - | | samples, (2) 125 ml. |
| | | | | No contamination detected - chemical samples | | chemical samples- |
| | | | | were taken from plastic bucket (pounded | | ref. chain-of- |
| | | | | from core barrel). | | custody # SST082289. |
| | | | | | | |
| | | | | | 1100 | Preparing to add |
| | | | | | | 8" casing. |
| 207'10 1/8" of 8" casing | | | | | 1115 | Adding 15' of casing |
| | | | | | | 192'10 1/8" + 15' = 207'10 1/8" |
| | | | | Shut Down by RPT for lunch | 1120 | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by V.L. McGlam 12-8-89

DNL-MA-567 Do-1, REV. 0

8/22/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

9 1 1 2 0 5 0 0 0 3 8

2 of 2

| DRILL LOG | By Jensen | Rig BE 22W 14102 Mel Thoresen | Well Number 299-E24-19 | Computer Number NA | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 8/22/89 | | Depth 205' To 210' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 205' | D | SM | SAND, 10% VCS, 20% CS, 30% MS, 20% FS, 15% VFS, | 1500 | 2 pint jar samples |
| | | | | 5% mud, medium sorting, 40% basaltic, 60% | | 2 special samples |
| | | | | felsic, ~~to~~ color 10YR 6/2 light brownish gray | | 1 moisture sample |
| | | | | unconsolidated | | no contamination |
| | | | | | | |
| | 210' | D | SM | SAND, 10% VCS, 30% CS, 20% MS, 20% FS, 15% VFS | 1520 | 2 pint jar samples |
| | | | | 5% mud, medium sorting 40% basaltic | | 1 moisture sample |
| | | | | 60% felsic color 10YR 6/2 light brownish | | we were able to |
| | | | | gray, unconsolidated, no rxn in 10% HCl | | take the sample out |
| | | | | | | of the Rad. zone. |
| | | | | | | no contamination |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by V.C. McGhan 12-7-89

PNL-MA-567 DO-1, REV. 0

Eric [illegible] 8/22/89

36

WHC-MR-0209

| DRILL LOG | By S. M. Goodwin | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 23 August 1989 | # 22-14/102 | Depth 210' To 220' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESEN | 0700 | SERVICING RIG |
| 207' 10 1/8" | | | | | 0715 | PREPARING TO WELD |
| + 10' 1/4" | | | | ADDED 10'1/4" OF 8" CASING; TOTAL 8" = 217' 10 3/8" | 0830 | FINISHED WELDING |
| = 217' 10 3/8" | | | | | 0840 | DRILLING |
| | 215' | D | SM | SAND: 95% SAND, 5% MUD. SAME P. SIZE | 0915 | SAMPLE; 2 PT. |
| | | | | DISTRIBUTION AT 210' SAMPLE 25% BASALT, | | LITH & 1 MOIST. |
| | | | | 75% FELSIC. WET COLOR IS 10 YR 6/4 | | SAMPLE |
| | | | | (LT. YELLOWISH BROWN). NO CONSOLIDATION. | 0920 | DRILLING |
| | | | | NO RX. TO 10% HCL. MODERATELY WELL | | |
| | | | | SORTED. Ø PPM W/ OVA & RAD = < DET. | | |
| | 220' | D | SM | SAND: 97% SAND, 3% MUD. 10% VCS, 40% | 0940 | SAMPLE; 2 PT. |
| | | | | CS, 30% MS, 10% FS, 7% VFS, 3% MUD. | | LITH, 2 500 ML |
| | | | | MODERATELY WELL SORTED. SANDS ARE 25% | | CHEM ANAL., & |
| | | | | MAFIC, 75% FELSIC, TRACE WX. MICA; | | 1 MOIST. SAMPLE |
| | | | | SA. WET COLOR IS 10 YR 5/3 (BROWN). NO | | LC. OF C. & SST |
| 217' 10 3/8 | | | | RX TO 10% HCL. NO CONSOLIDATION. Ø | | 082369) |
| + 9' 9 3/4" | | | | PPM W/ OVA & RAD = < DET. | 0945 | PREPARING TO WELD |
| = 227' 8 1/2" | | | | ADDED 9'9 3/4" OF 8" CASING; TOTAL 8" = 227' 8 1/2" | 1045 | FINISHED WELDING |

REMARKS:
Reviewed by W. L. Mathan 12-8-89

PNL-MA-567 DO-1, REV. 0

Shirl M. Mark 8/23/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

| DRILL LOG | By S. M. Goodwin | Rig BE 22 | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 23 August 1989 | H22-14102 | Depth 220' To 235' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1050 | DRILLING |
| | 225' | D | SM | SAND: TRACE GRAVEL, 97% SAND, 3% MUD, | 1108 | SAMPLE; 2 PT. |
| | | | | TRACE FP & VFP, REMAINING SAMPLE IS | | LITH & 1 MOIST. |
| | | | | SAME AS 220'. MUD. SORTED. WET COLOR | | SAMPLE |
| | | | | IS 10 YR 5/3 (BROWN). NO CONSOLIDATION. | 1110 | DRILLING |
| | | | | NO RX. TO 10% HCL. 25% MAFIC, 75% | | |
| | | | | FELSIC; SA. Ø PPM w/ OVA & RAD = <DET. | | |
| | 230' | D | SM | SAND: 97% SAND, 3% MUD. VERY SIMILAR | 1130 | SAMPLE; 2 PT. |
| | | | | TO 220' & 225' SAMPLES. NO SIGNIF- | | LITH & 1 MOIST. |
| | | | | ICANT CHANGES IN MINERALOGY, SORTING, | | SAMPLE |
| | | | | OR P. SIZE. NO RX. TO 10% HCL. NO | 1135 | PREPARING TO |
| | | | | CONSOLIDATION. SANDS ARE CLEAN & MUD. | | WELD |
| | | | | WELL SORTED. Ø PPM w/ OVA & RAD = | 1200-1230 | LUNCH |
| 227' | 8 1/2" | | | <DET. | 1235 | WELDING |
| + 9' | 3 3/4" | | | ADDED 9' 3 3/4" OF 8"; TOTAL 8" = 237' 1/4" | 1300 | FINISHED WELDING |
| - 237' | 1/4" | | | FM. DRY; WON'T STAY IN CORE BARREL. | 1330 | ADDED 2 1/2 GALLONS |
| | | | | | | OF $H_2O$ |
| | 235' | D | MOIST | SAND: 97% SAND, 3% MUD, SAME P. SIZE | 1335 | SAMPLE; 2 PT. |

REMARKS:
Reviewed by V.L. McGhan 12-8-89

LITH SAMPLES

PNL-MA-567 DO-1, REV. 0

[signature] 8/23/89

38

WHC-MR-0203

9 1 1 0 0 5 7 0 0 1 1

| DRILL LOG | By S. M. GOODWIN | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 23 AUGUST 1989 | N 22-14102 | Depth 235' TO 244' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 235' | D | MOIST | (CONT.) DISTRIBUTION AS PREVIOUS 2 SAMPLES; | | NO MOISTURE SAMPLE |
| | | | | NO SIGNIFICANT CHANGES IN SAMPLE CHARACTER- | | DUE TO $H_2O$ ADDED |
| | | | | ISTICS. INCREASE IN $CaCO_3$ - PORTIONS | 1340 | DRILLING |
| | | | | OF SAMPLE ARE WEAKLY CEMENTED & | | |
| | | | | HAVE A STRONG RX. TO 10% HCL. MOST OF | | |
| | | | | SAMPLE IS UNCONSOLIDATED, ~10% W/ | | |
| | | | | $CaCO_3$ CEMENT. Ø PPM W/ OVA & RAD = | | |
| | | | | < DET. | | |
| | 240' | D | SM | SAND: 97% SAND, 3% MUD. P. SIZE SIMILAR TO | 1415 | SAMPLE; 2 PT. |
| | | | | PREVIOUS SAMPLES, SLIGHTLY FINER - 35% CS, | | LITH., 1 MOISTURE, |
| | | | | 35% MS, 7% FS & 7% VFS. STILL CONTAINS | | & 2 500 ML. CHEM. |
| | | | | $CaCO_3$ CEMENT ON SANDS; DRILLER SAYS FM | | ANAL. SAMPLES. |
| | | | | IS "TIGHT" FROM ~235'-240'. REMAINDER | | (C. OF C. # SST0523B1) |
| | | | | OF SAMPLE = SAME AS 235' SAMPLE. Ø PPM | 1420 | PREPARING TO WELD |
| 237' 1/4" | | | | W/ OVA & RAD = < DET. | 1450 | FINISHED WELD |
| + 9' 4 3/4" | | | | ADDED 9' 4 3/4" OF 8" CASING; TOTAL 8" = 246' 5" | 1455 | DRILLING |
| 246' 5" | | | | | 1530 | END OF SHIFT |
| | | | | | | |

REMARKS:
Reviewed by D L. McSlan 12-8-89

PNL-MA-517 DO-1, REV. 0

Stanley M. Good 8/23/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5 85)

39

WHC-MR-0209

| DRILL LOG | By S. M. GOODWIN | Rig BE 22 W | Well Number 299-F24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 24 AUGUST 1989 | #22-14102 | Depth ~244' TO 250' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESAN | 0700 | SERVICING RIG |
| | | | | | 0770 | DRILLING |
| | 245' | D | SM | SAND: 95% SAND, 5% MUD. 10% VCS, 30% CS, | 0740 | SAMPLE, 2 PT. |
| | | | | 40% MS, 10% FS, 5% VFS, 5% MUD. MODERATELY | | LITH 1 2 MOIST. |
| | | | | WELL SORTED. SANDS ARE 20% MAFIC, 80% | | SAMPLES |
| | | | | FELSIC; SA. WET COLOR IS 10 YR 5/3 (BROWN). | 0745 | DRILLING |
| | | | | SOME CONSOLIDATION; CHUNKS OF SAND CEMENTED | | |
| | | | | W/ $CaCO_3$ (LOOSELY CEMENTED). MODERATE TO | | |
| | | | | STRONG RX. TO 10% HCL. SLIGHTLY FINER | | |
| | | | | THAN 240'. Ø PPM W/ OVA & RAD = <DET. | | |
| | 250' | D | SM | SLIGHTLY GRAVELLY SAND: 6% GRAVEL, 90% SAND, | 0800 | SAMPLE; 2 PT. |
| | | | | 4% MUD. TRACE MP, 3% FP, 3% VFP, 15% | | LITH. & 1 MOIST. |
| | | | | VCS, 30% CS, 30% MS, 10% FS, 5% VFS, | | SAMPLE |
| | | | | 4% MUD. MODERATELY WELL SORTED. GRAVELS | 0805 | PREPARING TO WELD |
| | | | | ARE 40% MAFIC, 60% FELSIC, TRACE MUD- | | |
| | | | | STONE; SA TO SR. SANDS ARE 25% MAFIC, | | |
| | | | | 75% FELSIC; SA. WET COLOR IS 10 YR 5/3 | | |
| | | | | (BROWN). NO CONSOLIDATION; FM. ISN'T | | |

REMARKS:
Reviewed by V.L. McKhan 12-8-89

PNL-MA-567 DO-1, REV. 0

Stuart M. Goodwin 8/24/89

40

WHC-MR-0209

| DRILL LOG | By S. M. Goodwin | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 24 August 1989 | #22-14102 | Depth 250' To 260' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 250' | D | SM | (CONT.) DRILLING AS "TIGHT". SLIGHT RX. TO | | |
| | | | | 10% HCL. COARSER THAN 245'. Ø PPM | | |
| 246'5" | | | | w/ OVA & RAD = < DET. | | |
| + 8'8½" | | | | ADDED 8'8½" OF 8" CASING; TOTAL 8" = 255'1½" | 0930 | FINISHED WELDING |
| = 255'1½" | | | | | 0940 | DRILLING |
| | 255' | D | SM | GRAVELLY SAND: 12% GRAVEL, 85% SAND, | 1020 | SAMPLE; 2 PT |
| | | | | 3% MUD. TRACE CP, 3% MP, 5% FP, 4% | | LITH & 1 MOIST. |
| | | | | VFP, 20% VCS, 35% CS, 20% MS, 5% % FS, | | SAMPLE |
| | | | | 5% VFS, 3% MUD. LITHOLOGIC % & DESCRIPT- | 1023 | DRILLING |
| | | | | IONS ARE SAME AS 250' SAMPLE. P. SIZE | | |
| | | | | OF FM HAS INCREASED SINCE 250'. | | |
| | | | | Ø PPM w/ OVA & RAD = < DET. | | |
| | 260' | D | MOIST | SAND: 97% SAND, 3% MUD. TRACE VCS, | 1045 | SAMPLE; 2 PT |
| | | | | 5% CS, 60% MS, 30% FS, 2% VFS, 3% | | LITH., 1 MOIST., |
| | | | | MUD. SANDS ARE 15% MAFIC, 85% FELSIC, | | & 2 SIB MC CHEM. |
| | | | | TRACE MICA; SA. WET COLOR IS 10YR 5/3 | | ANAL. (C. OF C. |
| | | | | (BROWN). SLIGHT RX. TO 10% HCL. NO CON- | | #SST082459) |
| | | | | SOLIDATION. MUCH FINER & BETTER SORTED | 1050 | PREPARING TO WELD. |

REMARKS:
Reviewed by J. L. McClure 12-8-89
PNL-MA-567 DO-1, REV. 0

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

| DRILL LOG | By S.M. GOODWIN | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 24 AUGUST 1989 | A 22-14102 | Depth 260' TO 265 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 260' | D | MOIST | (CONT.) THAN 235'; SAMPLE IS WELL SORTED. | | |
| 255' 1 1/2" | | | | Ø PPM W/ OVA & RAD: < DET | | |
| 9' 5 3/4" | | | | ADDED 9'5 3/4" OF 8" CASING; TOTAL 8" = 264' 7 1/4" | 1135 | FINISHED WELDING |
| 264' 7 1/4" | | | | | 1140 | DRILLING |
| | | | | BOREHOLE BEING GEOPHYSICALLY LOGGED BY VERN | 1200-1230 | LUNCH |
| | | | | MCGHAN, PNL, TO DETERMINE IF RADIO- | | |
| | | | | ACTIVE CONTAMINATION HAS BEEN FOLLOWING | | |
| | | | | THE CASING DOWN BOREHOLE. USING NAT. | | |
| | | | | GAMMA PROBE TO LOG HOLE. | | |
| | | | | NO CONTAMINATION DETECTED IN BOREHOLE W/ NAT. | 1310 | FINISHED LOGGING |
| | | | | γ PROBE; WILL CONTINUE DRILLING W/ 8" | 1305 | DRILLING |
| | 265' | D | SM | SAND: 97%, 3%. SAME AS PREVIOUS SAMPLE IN | 1340 | SAMPLE; 2 PT. |
| | | | | ALL ASPECTS. WELL SORTED & QUARTZ-RICH. | | LITH. & 1 MOIST. |
| | | | | SAME BROWN COLOR. | | SAMPLE |
| | | | | | 1343 | DRILLING |
| | | | | PICKING UP 4.5 PPM W/ OVA PRIOR TO WELDING. | 1420 | PREPARING TO WELD |
| | | | | BOREHOLE IS "SUCKING" (NEGATIVE PRESSURE) & | | |
| | | | | DEEMED SAFE FOR WELDING BY KEH SAFETY. | | |

REMARKS:

Reviewed by V.L. McGhan 12-8-89

PNL-MA-567 DO-1, REV. 0

Alan M. Noon 8/24/89

42

WHC-MR-0209

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| S.M. Goodman | BE 220 | 299-E24-19 | N/A | W-017 SST |
| Date: 24 August 1988 | #22-14102 | Depth: 265' To 268' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 264' | 1/4" | | | ADDED 8' 6 3/4" OF 8" CASING; TOTAL 8": 273' 2" | 1500 | FINISHED WELDING |
| + 8' | 6 3/4" | | | | 1505 | DRILLING |
| = 273' | 2" | | | | 1530 | END OF SHIFT |

REMARKS:
Reviewed by V.L. McClean 12-8-89 2 1/2 gallons $H_2O$ Added Today

PNL-MA-567 DO-1, REV. 0

8/24/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

WHC-MR-0209

9 1 1 2 0 5 0 0 0 4 6

p1 of 2

| DRILL LOG | By: JAN KENNEDY | Rig: BE-22W | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W017 SST |
|---|---|---|---|---|---|
| | Date: 8-25-89 | H22-14102 | Depth: 265 To 280 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0715 | driller performing rig |
| | | | | | | maintanence |
| 273'2" | 270' | D | | SAND: 97% sand, 3% mud; Trace vcs, Trace cs, 10% ms, 80% fs, 7% vfs | 0720 | Samples (2) 1pt. lith |
| | | | | 3% mud very well sorted; Sand: 5% mafic / 95% felsic Quartz rich, SA-SR | | Samples were taken the |
| | | | | 10YR 5/3, slight HCl rxn, locally consolidated | | previous evening, and sat |
| | | | | | | out all night, so no |
| | | | | | | moisture sample available |
| | 275' | D | | SAND: 97% sand, 3% mud; Trace vcs, 5% cs, 40% ms 47% fs, 5% vfs, | 0725 | Samples (2) 1pt. lith |
| | | | | 3% mud; sand: 20% mafic / 80% felsic SA-R 10YR 5/4 slight HCl rxn, | | (1) moisture |
| | | | | locally consolidated. | | |
| | | | | | 0750 | H&S finishing |
| | 277 | D | | Mud 0% Gravel and Sand, 100% mud (~30% silt, 70% clay) | 0800 | [illegible] |
| | | | | TOP Munsell 2.5Y 5/4, lower: 5Y 5/1 | | Samples: (2) Chemical Thickness 1.5' |
| | | | | | 0815 | driller begins adding new |
| | | | | | | casing, RPT checks samples |
| +7'9½" | | | | | 0945 | driller resumes drilling |
| 280' 11½" | 279 | D | | MUDDY Sand 5% ms, 25% fs 40% vfs, 30% mud 5Y 4/3 | | |
| | | | | Sand: 25% mafic 75% felsic slight HCl rxn | | |

REMARKS:
Reviewed by D.L. Washburn 12-8-89

Jan Kennedy
8-25-89

PNL-MA-267 DO-1, rev.0

WHIC-MR-0209

474

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Jan Kennedy | CC-22W H22-1402 | 299-E24-19 | N/A | W017 SST |
| Date: 8-25-89 | | Depth: 280 To 285 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 280 | D | | MUD, 10% mud 5Y5/3 with 10YR 4/4 mottles slight HCl rxn | 1030 | Samples (2) chem |
| | | | | | | (2) lpt lith, (1) moist un |
| | 282 | D | | moist sand lense | | |
| | 285 | | | cemented gravel and cobbles | 1135 | Driller preparing to |
| | | | | | | change to HT. |
| | | | | Hard tool added with crisco oil. | 1415 | Driller finishes change |
| | | | | | | to hard tool and preparing |
| | | | | | | to add casing |
| | | | | | 1530 | end of shift |

REMARKS:
Reviewed by D.L. Mullan 12-8-89
PNL MA 509 - 002, rev. 0

Jan Kennedy
8-25-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

45

| DRILL LOG | By: S. M. GOODWIN | Rig: BE 22W | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 28 AUGUST 1989 | #22-11/102 | Depth: ~285' TO 285' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESEN | 0700 | SERVICING RIG |
| | | | | | 0730 | WELDING 8" |
| 280' 11 1/2" | | | | ADDED 10'4" OF 8"; TOTAL 8" = 291' 3 1/2" | 0820 | FINISHED WELD |
| + 10'4" | | | | BAILING INTO 55 GALLON DRUMS; UNSURE OF | 0830 | DRILLING |
| = 291' 3 1/2" | | | | D/WATER. WILL MEASURE AFTER LUNCH. | | |
| | 285' | H | WET | MUDDY SANDY GRAVEL: 32% GRAVEL, 38% SAND, | 0930 | SAMPLE; 2 PT. |
| | | | | 30% MUD. 4% CP, 8% MP, 10% FP, 10% VFP, | | LITHOLOGIC SAMPLES |
| | | | | 5% VCS, 10% CS, 6% MS, 7% FS, 10% VFS, | 0935 | DRILLING |
| | | | | 30% MUD. VERY POORLY SORTED. GRAVELS ARE | | |
| | | | | 25% MAFIC, 75% FELSIC (w/ INCREASE IN | | |
| | | | | QUARTZITE & ROUNDNESS OF CLASTS; SA | | |
| | | | | TO R. SANDS ARE 20% MAFIC, 80% | | |
| | | | | FELSIC, TRACE MICA, SA. WET COLOR IS | | |
| | | | | 10 YR 5/3 (BROWN). FM. APPEARS CONSOLIDATED | | |
| | | | | OR CEMENTED; SLOW DRILLING & DRILLING | | |
| | | | | AHEAD OF CASING. STRONG RX. TO 10% HCL. | | |
| | | | | INCREASE IN P. SIZE SINCE 250'. LOOKS | | |
| | | | | LIKE MIDDLE RINGOLD. Ø PER w/ OVA & | | |

REMARKS: Reviewed by V.L. Madlan 12-8-89 RAD = <DET. SAMPLED w/ DART BAILER.

PNL-MA-567 D0-1, REV. 0

A. Madlan 8/20/87

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| S. M. GOODWIN | BE 220 | 299-E24-19 | N/A | W-017 SST |
| **Date** | | **Depth** | | **Subcontract No.** |
| 28 AUGUST 1989 | 822.14102 | 285' TO 295' | | N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 290' | H | WET | MUDDY SANDY GRAVEL: 32% GRAVEL, 43% SAND, | 1130 | SAMPLED W/ DART |
| | | | | 25% MUD. TRACE CP, 8% MP, 12% FP, 12% | | BAILER; 2 PT |
| | | | | VFP, 5% VCS, 13% CS, 10% MS, 7% FS, 8% | | LITH. SAMPLES |
| | | | | VFS, 25% MUD. VERY POORLY SORTED. LITH | 1135 | DRILLING |
| | | | | & % SAME AS 285' SAMPLE. STRONG RX. | 1200-1230 | LUNCH |
| | | | | TO 10% HCL. CONSOLIDATED / CEMENTED. | | |
| | | | | WET COLOR IS 10YR 5/3 (BROWN). Ø | | |
| | | | | PPM W/ OVA & RAD: < DET. | | |
| | | | | D/WATER = 285.8' (PNL & TAPE & 10995); | 1240 | D/WATER |
| | | | | DIFFICULT TO DETERMINE WHETHER D/W | | |
| | | | | IS ACCURATE - COULD BE TAGGING TOP | | |
| | | | | OF DRILLING MUD. WILL CONTINUE TO | | |
| | | | | BAILER SEDIMENTS | | |
| 291' 3 1/2" | | | | | 1300 | PREPARING TO WELD |
| + 7' 1 1/2" | | | | ADDED 7' 1 1/2" OF 8" CASING; TOTAL 8" = 298' 5" | 1400 | FINISHED WELD |
| = 298' 5" | | | | | 1410 | DRILLING |
| | 295' | H | WET | SAND: WILL DESCRIBE IN A.M. | 1505 | SAMPLED W/ DART |
| | | | | | | BAILER |

REMARKS:
Reviewed by D. L. McClean 12-8-89 ADDED 20 GALLONS OF $H_2O$ — 1530 END OF SHIFT

PNL-MA-567 DO-1, REV 0 — Stuart Goodwin 8/28/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

WHC-MR-0209

| DRILL LOG | By: S.M. GOODWIN | Rig: BE 22 W | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 29 AUGUST 1989 | #22.14102 | Depth: 295' To 297' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESEN | 0700 | KEH MECHANIC |
| | | | | | | WORKING ON RIG |
| | | | | D/W = 286.2' - 3.45' STICKUP = 282.75' | 0725 | D/WATER |
| | | | | (PNL E. TAPE # 10998). ~2' PLUG IN HOLE; | | |
| | | | | WILL CLEAN OUT HOLE & CHECK D/W AFTER | | |
| | | | | DRILLING TO ~298'. | | |
| | | | | BAILING MUD & FINE SANDS; SANDS APPEAR TO BE | 0730 | BAILING WELL |
| | | | | HEAVING UP CASING | 0735 | DRILLING |
| | 295' | H | WET | SAND: 88% SAND, 12% MUD. TRACE VFP, 5% VCS, | | SAMPLED 8/28 |
| | | | | 28% CS, 35% MS, 10% FS, 10% VFS, 12% | | |
| | | | | MUD. MODERATELY SORTED. SANDS ARE 25% | | |
| | | | | MAFIC, 75% FELSIC; SA. WET COLOR IS | | |
| | | | | 10YR 5/3 (BROWN). NO CONSOLIDATION, BUT | | |
| | | | | SLOW DRILLING DUE TO HEAVING SANDS. NO | | |
| | | | | RX. TO 10% HCL. FINER THAN 290' | | |
| | | | | SAMPLE. Ø PPM w/ OVA & RAD = <DET | | |
| | | | | SLOW DRILLING; DIFFICULT TO GET PAST 297'. | 0930 | |
| | | | | CASING DOESN'T WANT TO DRIVE. | | |

REMARKS:
Reviewed by D.L. Washburn 12-8-89

DNL-MA-567 DO-1, REV. 0

Mark Bond 8/28/89

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse

WHC-MR-0209

9 1 1 2 0 5 0 0 5 1

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| S. M. GOODWIN | BE 22W | 299-E24-19 | N/A | W-017 SST |
| Date: 29 AUGUST 1989 | # 22-14102 | Depth: 297' To 297' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | D/BOTTOM = 294.2' + 2.63' TAPE - 1.2' STICKUP | 1015 | D/BOTTOM |
| | | | | = 295.65' (PNL 300' # L300-05). SANDS | 1025 | DRILLING & |
| | | | | ARE HEAVING UP INTO 6" AS DEPTH IS | | BAILING HOLE |
| | | | | MEASURED. BOTTOM OF 6" = 297.3' | | |
| | | | | BOREHOLE BEING GEOPHYSICALLY LOGGED BY | 1100 | |
| | | | | VERN McGHAN, PNL. USING NATURAL | | |
| | | | | GAMMA PROBE: | | |
| | | | | LOGGED 294.5'-225' INTERVAL w/ NATURAL GAMMA | 1200 | FINISHED LOGGING, |
| | | | | PROBE; SANDS HAD HEAVED UP CASING | | LUNCH |
| | | | | TO 294'. ESTIMATED D/W = 282' | | |
| | | | | D/WATER = 277.55' - 1.2' STICKUP = 276.35' | 1250 | D/WATER |
| | | | | D/W COULD BE ELEVATED DUE TO PLUG | 1255 | SWITCHING TO |
| | | | | IN BOREHOLE. ASSUME D/W = ~282'; | | SAND PUMP |
| | | | | WILL DRILL & BACKPRESSURE SEDIMENTS | | |
| | | | | w/ $H_2O$ @ 297'. | 1310 | BACKPRESSURING w/ |
| | | | | | | $H_2O$ |
| | | | | | 1325 | BAILING WELL |
| | | | | BAILER NOT FUNCTIONING; WAITING FOR NEW BAILER | 1330 | STANDBY |

REMARKS:
Reviewed by Vern McGhan 12-8-89
PNL-MA-567 DO-1, REV. 0

[signature] 8/29/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

WHC-MR-0209

6/7

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22 in #22-14/102 | Well Number: 299-E24-19 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 29 August 1989 | | Depth: 297' To 297' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1340 | BREAKING APART |
| | | | | | | TOOL STRING |
| | | | | | 1450 | BAILING WELL |
| | | | | DELIVERING SAMPLES TO 300 AREA ON RSR; | 1505 | GEOLOGIST LEFT |
| | | | | WILL RECORD DRILL DEPTH & $H_2O$ | | SITE |
| | | | | ADDED IN A.M. | 1530 | END OF SHIFT |

REMARKS:
Reviewed by V.L. Matlock 12-8-89 ADDED 50 GALLONS $H_2O$

PNL - MA - 567 DO-1 REV. 0

Stuart M. Goodwin 8/29/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

52

| DRILL LOG | By S.M. Goodwin | Rig BE 22 W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 '55 r |
|---|---|---|---|---|---|
| | Date 30 August 1989 | #22-14102 | Depth 296' To 298' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESEN | 0700 | SERVICING RIG |
| | | | | D/B = 296.3' (PNL STEEL TAPE # L300-05); | 0720 | D/BOTTOM |
| | | | | ~1.5' PLUG IN HOLE. NO D/W; ADDED | 0730 | DRILL & BAIL |
| | | | | 150 GALLONS OF $H_2O$ 8/29 TO BACKPRESSURE | | |
| | | | | SANDS. BAILED OUT SANDS YESTERDAY P.M. | | |
| | | | | & STARTED BRINGING UP GRAVELS AT 297'. | | |
| | 298' | H | WET | SANDY GRAVEL: 50% GRAVEL, 47% SAND, 3% MUD. | 0810 | SAMPLED W/ SAND |
| | | | | TRACE VCP & CP, 15% MP, 26% FP, 15% VFP, | | PUMP; 2 PT. & |
| | | | | 15% VCS, 15% CS, 10% MS, 4% FS, 3% VFS, | | 2 500 ML CHSM. |
| | | | | 3% MUD. POORLY SORTED. GRAVELS ARE 45% | | ANAL. (C. OF C. # |
| | | | | MAFIC, 55% FELSIC, TRACE MUDSTONE & | | 55708308 7) |
| | | | | ALTERED ANDESITE; SA TO R. SANDS ARE 30% | | |
| | | | | MAFIC, 70% FELSIC, TRACE MICA; SA. WET | | |
| | | | | COLOR IS 10 YR 3/3 (DARK BROWN). NO CON- | | |
| | | | | SOLIDATION. NO RX. TO 10% HCL. FM. | | |
| | | | | D AT 297' TO GRAVELS. Ø PPM W/OVA | | |
| | | | | & RAD = <DET. | | |
| | | | | D/BOTTOM = 297.45'; POSSIBLY FINAL D/B | 0820 | D/BOTTOM |

REMARKS:
Reviewed by W.C. Hackham 12-8-89
PNL-MA-567 DO-1, REV. 0

Stanley M. Goodwin 8/30/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

51

9 1 1 2 0 5 0 0 0 6 4

2 of 3

| DRILL LOG | By S. M. Goodwin | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SSF |
|---|---|---|---|---|---|
| | Date 30 August 1989 | #22-14102 | Depth 297' To 297' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLED TO 298'; ~1/2' OF MATERIAL HEAVED | | |
| | | | | UP PIPE BUT APPEARS TO HAVE STABILIZED | | |
| | | | | AFTER BAILING. BOTTOM OF 8" = 298' | | |
| | | | | KEH TITLE III INSPECTION MIKE EVANTS WITNESS | 0845 | STRAIGHTNESS |
| | | | | FOR STRAIGHTNESS TEST; PASSED 20' OF | | TEST |
| | | | | 6" S.S. CASING TO BOTTOM OF HOLE. | | |
| | | | | STRAIGHTNESS OF HOLE APPROVED. | 0900 | BREAKING DOWN |
| | | | | | | RIG & TOOLS |
| | | | | D/BOTTOM = 296.25'; MATERIAL STILL HEAVING | 0905 | D/BOTTOM |
| | | | | UP CASING. D/WATER = 285.6' (PNL E. TAPE | 0920 | ADDING $H_2O$ TO |
| | | | | # 10998); QUESTIONABLE D/W | | BACKPRESSURE |
| | | | | ADDED 60 GALLONS OF $H_2O$ TO BACKPRESSURE; WILL | 0930 | |
| | | | | CHECK TO SEE IF BOREHOLE IS PLUGGED | | |
| | | | | OR D/W REACHES EQUILIBRIUM. | | |
| | | | | D/WATER = 285.6'; THIS MUST BE ACTUAL | 1010 | D/W |
| | | | | STATIC. SIMILAR STATIC AS 8/28. WILL | 1015 | STRINGING TOOLS. |
| | | | | RESTRING TOOLS & DRILL TO ~301'. | 1200-1230 | LUNCH |
| | | | | | 1300 | PREPARING TO WELD |

REMARKS:
Reviewed by V.E. McClean 12-8-89

PNL-MA-567, DO-1, REV. 0

Alan M. Hook 8/30/89

52

WHC-MR-0209

9 1 1 0 2 5 0 0 7 5

| DRILL LOG | By S. M. GOODWIN | Rig BE 22 | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 30 AUGUST 1989 | #22-14102 | Depth 297' To 301' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 298'5" | | | | ADDED 7'6½" OF 8" CASING; TOTAL 8" = 305'11½" | 1415 | FINISHED WELDING |
| 7'6½" | | | | | 1470 | DRILLING |
| 305'11½" | | | | DRILLED TO ~301'; WILL MEASURE D/B IN | 1530 | END OF SHIFT |
| | | | | A.M. NO STEEL TAPE (500'). STILL | | |
| | | | | BAILING OUT GRAVELS & COBBLES; MATERIAL | | |
| | | | | MORE COARSE THAN 298' SAMPLE. | | |

REMARKS:
Reviewed by V. L. McGlam 12-8-89 ADDED 200 GALLONS TOTAL $H_2O$ TODAY

PNL-MA-567 DO-1, REV. 0

Shirley Ford 8/30/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5 85)

53

WHC-MR-0209

| DRILL LOG | By S. M. GOODWIN | Rig BE 22W | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 31 AUGUST 1969 | #22-14/102 | Depth 301' TO 303' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESON | 0700 | SERVICING RIG |
| | | | | D/BOTTOM = 299' (PNL 50' TAPE # 12120- | 0725 | D/BOTTOM |
| | | | | BWIP). BOTTOM OF 8" = 301.5'; ~2.5' OF | | |
| | | | | MATERIAL IN BOREHOLE. | | |
| | | | | D/WATER = 263'; PLUG ISN'T ALLOWING $H_2O$ | 0735 | D/WATER |
| | | | | TO REACH STATIC. | 0840 | BAILING WELL W/ |
| | | | | | | SAND PUMP & |
| | | | | | | DRILLING |
| | | | | D/B = 303.19'; BOTTOM OF 8" = 301.1'. | 0950 | D/BOTTOM |
| | | | | DRILLER SAYS BIT IS OUT BELOW CASING. | | |
| | 303' | H | WET | SANDY GRAVEL: 58% GRAVEL, 40% SAND, 2% MUD. | 1005 | SAMPLED W/ SAND |
| | | | | TRACE SMALL COBBLES, 10% VCP, 12% CP, 11% | | PUMP; 2 PT. |
| | | | | MP, 15% FP, 10% VFP, 13% VCS, 12% CS, 8% | | LITHOLOGIC SAMPLES |
| | | | | MS, 4% FS, 3% VFS, 2% MUD. VERY POORLY | | |
| | | | | SORTED. GRAVELS ARE 25% MAFIC, 75% | | |
| | | | | FELSIC; FELSIC ALOSITY QUARTZITE & | | |
| | | | | GRANITE (GNEISS), SOME CONGLOMERATE & | | |
| | | | | RED S.S.; UNBROKEN R TO WR. SANDS ARE | | |

REMARKS:
Reviewed by V.L. McGlam 12-8-89

PNL-MA-567 DO-1, REV. 0

Alexander Jack 8/31/69

54

WHC-MR-0209

| DRILL LOG | By S. M. Goodwin | Rig BE 22 | Well Number 299-E24-19 | Computer Number N/A | Project or Work Order No. W-017 SSF |
|---|---|---|---|---|---|
| | Date 31 AUGUST 1989 | # 22-14102 | Depth 303' To 303' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 303' | H | WET | (CONT.) SANDS ARE 20% BASALT, 80% FELSIC, | | |
| | | | | TRACE MICA; SA. WET COLOR IS 10 YR | | |
| | | | | 3/3 (DARK BROWN). DRILLING SLOW; FM. | | |
| | | | | DOESN'T APPEAR CONSOLIDATED - POSSIBLY | | |
| | | | | COMPACTION? Ø PPM W/ OVA & RAD = <DET. | | |
| 305' 11 1/2" | | | | T.D. = 303.19' (FINAL DRILL DEPTH) | 1015 | BREAKING DOWN |
| 3' 5 1/2" | | | | REMOVED 3' 5 1/2" AT 8" STICKUP; TOTAL 8' = 302' 6" | | RIG |
| 302' 6" | | | | D/WATER = 285.6' (PNL E. TAPE # 10998) | 1130 | D/WATER |
| | | | | D/BOTTOM = 302.55'. 16.95' OF $H_2O$ IN BORE. | 1140 | D/BOTTOM |
| | | | | HOLE. | | |

REMARKS: Reviewed by W. McClanahan 12-8-89 ADDED 75 GALLONS OF $H_2O$ TODAY

PNL-MA-567 DO-1, REV. 0

Alexander Mark 8/31/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

WHC-MR-0209

57

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E24-19 | Date SEPT. 22, 89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location SOUTH SIDE A-TANK FARMS | Project W-017 SST | |

Logged by S.P. DIGHART St P Dighart Date 9-22-89
Reviewed by W. Weekes Date 12-7-89
Measuring Equip. S-TAPE - L500-? Procedure PNL-MA-567 DCI REV. 0

Drilling Contractor KEH
Driller Mel Thoresen
Rig/Equipment Pettibone Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 1.35' stickup (8") |
| | Carbon Steel | 8" | 302.5' | 1.35' | 301.2' | | | | | D/W = 286.7' - 1.35' = 285.4' |
| | | | | | | | | | | P/B = 303.4' - 1.35' = 302.1' |
| | | | | | | | | | | E-tape # 12176 |
| | | | | | | | | | | S-tape # L500-? |
| | | | | | | | | | | Moving equipment to site - |
| | | | | | | | | | | Welding on extension to |
| | | | | | | | | | | 8" casing for Hyd. jacks. |
| | | | | | | | | | | Will set screen @ 300.5' |
| | | | | | | | | | | below land surface. |

56

WHC-MR-0209

9 1 1 2 0 5 0 0 0 5 9

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E24-19<br>Location south side of A tank Farms | Date SEPT. 25, 1989 Sheet No. 1 of 4<br>Project W-017 SST |
|---|---|---|

Logged by S. P. AIRHART SP Airhart Date 9-25-89
Reviewed by W. E. McKlean Date 12-8-89
Measuring Equip. S. TAPE 500' Procedure PNL-MA-567 DO-1 REV. 0

Drilling Contractor KEW
Driller MEL THORESEN
Rig/Equipment PETTIBONE CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Datum = land surface |
| | CARBON STEEL | 8" | | | 301.2' | BOREHOLE | | 302.1 | -.9' | From FRIDAY 9/22 |
| 0820 | screen w/ bottom cap | 4" | 10.63' | | | | | | | Began setting stainless steel (SS). |
| | screen | 4" | 10.4' | | | | | | | SS is manufactured by Johnson |
| | casing w/ cent. | " | 20.04 | | | | | | | Type 304, Schedule 5; Screens |
| | casing | " | " | | | | | | | are continuous wire-wrap channel |
| | casing w/ cent. | " | " | | | | | | | pack - 10 slot; centralizers |
| | casing | " | " | | | | | | | are factory welded, 1/2 moon |
| | casing w/ cent | " | " | | | | | | | shaped. |
| | casing | " | " | | | | | | | |
| | casing w/ cent | " | " | | | | | | | D/B annulus = 307.8' + .7' - 6.7' = |
| | casing | " | " | | | | | | | 301.8' (SS is hanging @ |
| | casing w/ cent | " | " | | | | | | | ~ 300.5') |
| | casing | " | " | | | | | | | |
| | casing w/ cent | " | " | | | | | | | |
| | casing | " | " | | | | | | | |
| | casing w/ cent | " | " | | | | | | | |
| | casing | " | " | | | | | | | |
| 0920 | TOTAL SS | 4" | 301.6' | | | | | | | |
| | | | | | 301.2' | 16-30 silica sand | 1/2 bag | 308.8' | 0.4' | 306.8' + .7' - 6.7' = 300.8' |
| | | | | | 301.2' | " | 1/2 bag | 299.3' | 1.9' | 305.3' + .7' - 6.7' = 299.3' |
| 0945 | | | 307' | 6.4' | 300.6' | " | | 299.6' | 1' | 305.9' + .7' - 7' = 299.6' |

E7

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E24-19 | Date SEPT 25, 89 | Sheet No. 2 of 4 |
|---|---|---|---|
| | Location South of A tank farms | Project W-017 SST | |

Logged by S. P. AIRHART SP Airhart Date 9-25-89
Reviewed by L.E. McGhan Date 12-8-89
Measuring Equip. S-tape 500' Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor IKEM
Driller Mel Thoresen
Rig/Equipment Pettibone Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0950 | Carbon Steel | 8" | | | 300.6' | 16-30 silica sand | 1/2 bag | 296.7' | 3.9' | 303' + .7' - 7' = 296.7' |
| | " | " | 307' | 7.25' | 299.8' | " | | 299.6' | .2' | 305.9' + .7' - 7' = 299.6' |
| 0956 | " | " | | | 299.8' | " | 1/2 bag | 295.8' | 4' | 302.1' + .7' - 7' = 295.8' |
| | " | " | 307' | 8.2' | 298.8' | " | | 297.4' | 1.4' | 303.7' + .7' - 7' = 297.4' |
| 1003 | " | " | | | 299.8' | " | 1/2 bag | 292.9' | 6.9' | 301 + .7' - 8.8' = 292.9' |
| | " | " | 307' | 9.3' | 297.7' | " | | 293.8' | 3.9' | 303.1' + .7' - 10' = 293.8' |
| 1025 | " | " | 302.5' | 6.0' | 296.5' | " | | 294.7' | 1.8' | 302.1' + .7' - 8.1' = 294.7' |
| | " | " | | | 296.5' | " | 1/2 bag | 291.7' | 4.8' | 299.1' + .7' - 8.1' = 291.7' |
| 1030 | " | " | 302.5' | 7.3' | 295.2' | " | | 292.9' | 2.3' | 301.5' + .7' - 9.3' = 292.9' |
| | " | " | | | 295.2' | " | 1/2 bag | 290' | 5.2' | 298.6' + .7' - 9.3' = 290' |
| | " | " | 300' | 6' | 294' | " | | 291' | 3' | 297' + .7' - 6.7' = 291' |
| 1050 | " | " | | | 294' | " | 1/2 bag | 288.3' | 5.7' | 294.3' + .7' - 6.7' = 288.3' |
| | " | " | 300' | 7.1' | 292.9' | " | | 289.4' | 3.5' | 296.5' + .7' - 7.8' = 289.4' |
| | | | | | 292.9' | | 1/2 bag | 286.5' | 6.4' | 293.6' + .7' - 7.8' = 286.5' |
| | | | 278' | 6.3' | 291.7' | | | 287.3' | 4.4' | 295.6' + .7' - 9.0' = 287.3' |
| 1107 | | | 297' | 6.5' | 290.5' | | | 288.3' | 2.2' | 294.4' + .7' - 6.8' = 288.3' |
| | | | | | 290.5' | | 1/2 bag | 285.2' | 5.3' | 291.3' + .7' - 6.8' = 285.2' |
| | | | 297' | 7.7' | 289.3' | | | 286.3' | 3' | 293.6' + .7' - 8' = 286.3' |
| 1118 | | | | | 289.3 | | 1/2 bag | 283.7' | 5.6' | 291' + .7' - 8' = 283.7' |
| | | | 297' | 9.0' | 288' | | | 284.6' | 3.4' | 293.2' + .7' - 9.3' = 284.6' |
| | | | | | 288' | | 1/2 bag | 282' | 6' | 290.6' + .7' - 9.3' = 282' |
| | | | | | | | | | | Changed to Stap1 & L300-07 |

58

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E24-19 | Date SEPT. 25, 89 | Sheet No. 3 of 4 |
|---|---|---|---|
| | Location South side A tank farms | Project W-017-SST | |

Logged by S. P. AIGHARET SP Aighart Date 9-25-89
Reviewed by D. E. Wallace Date 12-8-89
Measuring Equip. S. TAPE 300' Procedure PNL-MA-567 DO-1 REV. 0

Drilling Contractor ILEM
Driller MCI THOVESEN
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1135 | Carbon Steel | 8" | 291.3' | 6' | 285.3' | 16-30 Silica Sand | | 284.2' | 1.1' | 290.9' - 6.7' = 284.2' |
| | " | " | | | 285.3' | " | 1 bag | 278.9' | 6.4' | 285.6' - 6.7' = 278.9' |
| | " | " | 291.3' | 8.7' | 282.6' | " | | 281.9' | 0.7' | 291.3' - 9.4' = 281.9' |
| 1144 | " | " | | | 282.6' | " | 1½ bags | 275.2' | 7.4' | 284.6' - 9.4' = 275.2' |
| | " | " | 286' | 6' | 280.0' | | | 276.9' | 3.1' | 283.6' - 6.7' = 276.9' |
| 1200 | | | | | | | | | | LUNCH |
| | | | | | | | | | | D/B inside 4" = 306.5' + .7 - 6.7' = 300.5' |
| | " | " | 286' | 7.2' | 278.8' | " | | 277.7' | 1.1' | 285.6' - 7.9' = 277.7' |
| | | | | | 278.8' | | ½ bag | 275.4' | 3.4' | 283.3' - 7.9' = 275.4' |
| | | | 286' | 8.25' | 277.8' | | | 276 | 1.8' | 285' - 9' = 276' |
| | | | 286' | 9.2' | 276.8' | | | | .5' | 286.2' - 9.9' = 276.3 |
| 1330 | | | | | | | | | | Began bailing w/ 3" dart bailer |
| | | | | | | | | | | Water very dirty - only VF |
| | | | | | | | | | | black sand in bottom of |
| | | | | | | | | | | bucket. |
| 1345 | | | | | | | | | | 283.2' - 6.45' = 276.8' |
| 1353 | | | | | 276.8' | | | 276.8' | 0' | 283.2' - 6.45' = 276.8' |
| | | | | | | | | | | Bailed ~40 gallons $H_2O$ |
| | | | | | | | | | | TOP OF SAND @ 276.8' |
| | | | | | | | | | | 9 bags used = 9.9 $ft^3$ |

59

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E24-19 | Date SEPT 25, 89 | Sheet No. 4 of 4 |
|---|---|---|---|
| | Location South of A-tank farms | Project W-017 SST | |

Logged by S. P. Airhart SPAirhart Date 9-25-89
Reviewed by V. E. Meathum Date 10-8-89
Measuring Equip. S-tape 6300-07 Procedure PNL-MA-567 DOI, REV. 0

Drilling Contractor KEH
Driller Mel Thoresen
Rig/Equipment Pettibone Crane / Hyd. jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1410 | Carbon Steel | 8" | | | 276.8 | 1/4" bentonite pellets | 2 buckets | 272.4' | 4.4 | 278.9 - 6.5' = 272.4' |
| | " | " | 281' | 6.4' | 274.6' | " | | 273.7' | .9' | 282.3' - 8.65' = 273.7' |
| 1425 | " | " | 281' | 6.8' | 274.2' | " | | 273.7' | .5' | 282.7' - 9.0' = 273.7' |
| | | | | | | | | | | Top of pellets @ 273.7' |
| | | | | | | | | | | 2 buckets used = 1.2 ft³ |
| | | | | | 274.2' | 8-20 bentonite | 15 bags | 229' | 45.2 | 235.8' - 6.8' = 229' |
| 1458 | | | 264.6' | 6.8' | 257.8' | | | 241.1' | 16.7' | 246.9' - 6.8' = 241.1' |
| | | | | | 257.8' | | 10 bags | 209.8' | 48' | 216.6' - 6.8' = 209.8' |
| | | | | | | | | | | Shut Down |

60

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E24-19 | Date 9-26-89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location South of A tank farms | Project W-017 SST | |

Logged by S. P. Airhart SP Airhart Date 9-26-89
Reviewed by V D McGlam Date 12-8-89
Measuring Equip. S-tape # L300-07 Procedure PNL-MA-567 Out, Rev. 0

Drilling Contractor KEH
Driller Mel Thoresen
Rig/Equipment Pettibone Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0700 | Carbon Steel | 8" | | | 257.8' | 8-20 bentonite | | 209.8' | 48' | ← From yesterday |
| | " | " | 246.4 | 6.5 | 239.9 | " | | 222.2 | 17.7 | 228.7 - 6.5 = 222.2 |
| | " | " | | | | " | 10 BAGS | 192.10 | 47.8 | 198.6 - 6.5 = 192.10 |
| 0810 | " | " | 227.7 | 6.7' | 221' | " | | 204.3' | 16.7 | 211.0 - 6.7' = 204.3 |
| | " | " | | | 221' | " | 10 bags | 174.3' | 46.7 | 181' - 6.7' = 174.3' |
| 0840 | " | " | 207.8' | 6.6' | 201.2' | " | | 186.6' | 14.6' | 193.2' - 6.6' = 186.6' |
| | " | " | | | 201.2' | " | 10 bags | 157.2' | 42.8' | 163.8' - 6.6' = 157.2' |
| 0900 | " | " | 192.8' | 6.6' | 186.2' | " | | 166.8' | 19.4' | 173.4' - 6.6' = 166.8' |
| | | | | | 186.2' | " | 10 bags | 137.8' | 48.4' | 144.4' - 6.6' = 137.8' |
| | | | 168' | 6.9' | 161.1' | | | 163.2' | -2.1' | 170.1' - 6.9' = 163.2' |
| 0930 | | | | | 161.1' | | 30 bags | 80.5' | 80.6' | 87.4' - 6.9' = 80.5' |
| 1015 | | | | | | | | | | Requested RPT to survey 8" casing |
| | | | | | | | | | | from this point because of known |
| | | | | | | | | | | contamination @ 187' - RPT detected |
| | | | | | | | | | | ~ 50-100 cpm > background @ |
| | | | | | | | | | | 101.3' weld. |
| 1025 | | | | | | | | | | RPT is requesting assistance from |
| | | | | | | | | | | another RPT to determine proper |
| | | | | | | | | | | action - waiting for info. |
| 1044 | | | | | | | | | | Rechecked 101.3' weld. O.K'd |
| | | | | | | | | | | cutting w/out resp. protection |

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E24-19 | Date 9-26-89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location South of A-tank farms | Project W-017 SST | |

Logged by S. P. Airhart SPAirhart Date 9-26-89
Reviewed by U. K. McGhan Date 12-8-89
Measuring Equip. S-tape-L300-07 Procedure PNL-MA-567 DU-1, EU-6

Drilling Contractor KEH
Driller
Rig/Equipment Pedt. boom Crane / Hyd. jacks.

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1130 | | | | | | | | | | Pulled remaining 8" casing out of hole w/ RPT surveying each section |
| | Carbon Steel | 10" | 151.8' | .6' | 151.2' | 8-20 bentonite | | 124.15' | 27.6' | 124.75' - .6' = 124.15' |
| | " | " | | | 151.2' | " | 15 bags | 100.6' | 50.6' | 106.9' - 6.3' = 100.6' |
| 1400 | " | " | 142.4 | 6.7' | 135.7' | " | | 107.8' | 27.9' | 114.5' - 6.7' = 107.8' |
| | " | " | | | 135.7' | " | 15 bags | 84.3' | 51.4' | 91' - 6.7' = 84.3' |
| | " | " | 123.6' | 6.8' | 116.8' | " | | 92.9' | 23.9' | 99.7' - 6.8' = 92.9' |
| 1430 | " | " | | | 116.8' | " | 18 bags | 65.1' | 51.7' | 71.9' - 6.8' = 65.1 |
| | " | " | 104.8' | 7' | 97.8' | " | | 71.9' | 25.9 | 78.9' - 7' = 71.9' |
| 1455 | " | " | | | 97.8' | | 5 bags | 63.6' | 34.2' | 70.6' - 7' = 63.6' |
| 1510 | " | " | 84' | 6.9' | 77.1' | | | 72.3' | 4.8' | 79.2' - 6.9' = 72.3' |

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E24-19 | Date 9/27/89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

Logged by S.M. GOODWIN — Date 9/27/89 — Drilling Contractor KEH
Reviewed by T.L. McKleen — Date 12-8-89 — Driller GENE THOMAS
Measuring Equip. L300-07 — Procedure PNL-MA-567 DO-1, REV. 0 — Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | CARBON STEEL | 10" | 84' | 6.9 | 77.1 | 8-20 BENTONITE | | 72.3 | 4.8 | |
| 0730 | | | | | | " | 20 BAGS | 40.6 | 36.5 | 47.5 - 6.9 = 40.6 |
| 0750 | " | " | 63 | 6.75 | 56.25 | " | | 49.55 | 6.7 | 56.3 - 6.75 = 49.55 |
| 0800 | " | " | | | | " | 20 BAGS | 17.95 | 38.3 | 24.7 - 6.75 = 17.95 |
| 0815 | " | " | 43.3 | 6.6 | 36.7 | " | | 26.3 | 10.4 | 32.9 - 6.6 = 26.3 |
| 0825 | | " | | | | " | 8 BAGS | 13.7 | 23 | 20.3 - 6.6 = 13.7 |
| 0835 | " | " | 33.7 | 6.7 | 27.0 | " | | 17.6 | 9.4 | 24.3 - 6.7 = 17.6 |
| 0845 | " | " | 29.7 | 6.7 | 23.0 | " | | 19.0 | 4.0 | 25.7 - 6.7 = 19.0 |
| 0848 | " | " | 29.7 | 8.2 | 21.5 | " | | 19.5 | 2.0' | 27.7 - 8.2 = 19.5 |
| 0850 | " | " | 29.7 | 9.5 | 20.2 | " | | 20.0 | 0.2 | 29.5 - 9.5 = 20.0 |
| | | | | | | | | | | FINAL DEPTH BENTONITE = 20.0' |
| 0915 | " | " | 27.0 | 6.8' | 20.2 | CEMENT GROUT | 1 BATCH* | | | MIXING CEMENT GROUT |
| 0930 | *BATCH = | 6 94 LB BAGS PORTLAND CEMENT, 30 GALLONS | | | | $H_2O$, 1% ALUMINUM | | | | POURING GROUT; D/GROUT = |
| | | | POWDER (BY VOLUME) | | | | | 4.1 | 16.1 | 10.9' - 6.8 = 4.1 |
| 0935 | | " | 27.0 | 6.8 | 20.2 | | | | | MIXING CEMENT GROUT; |
| 0955 | | | | | | | 1 BATCH* | 5.5 | 25.7 | D/GROUT = +5.5' |
| 1010 | | | Ø | 5.35 | Ø | | | 3.9 | | 9.25' - 5.35 = 3.9; ALL 10" |
| | | | (STICKUP = CASING JACKS & COLLAR) | | | | | | | CASING IS REMOVED |
| 1015 | | | | | | | | | | MIXING CEMENT GROUT |
| 1030 | | | | | | | | 1.95 | | 7.45 - 5.5 = 1.95 |
| | | | | | | | 1/2 BATCH* | | | FINAL DEPTH OF CEMENT GROUT = 1.95' |

1035 D/BOTTOM INSIDE 4" = 305.80' + 0.7 TIPS - 5.9 STICKUP

WHC-MR-0209

WELL 299-E25-40

Drilling at Well 299-E25-40 began August 7, 1989, and reached total depth on August 24, 1989. The well was drilled with a Bucyrus-Erie 60L to a depth of 274.00 ft below ground surface. The sediments encountered were primarily sandy gravel and sand. Static water level during completion was 257.4 ft below ground surface.

Well 299-E25-40 was completed at a depth of 273.00 ft below ground surface. Final well materials include 21.00 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 253.25 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 16-30 mesh Colorado silica sand pack along the screened interval to 5.6 ft above the top of the screen, 3.6 ft of Volclay bentonite pellets, 224.5 ft of 8-20 mesh granular bentonite crumbles, 18.3 ft of Portland cement grout, and an air-entrained concrete pad which extends 2 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Pettibone crane during completion. Completion activities at Well 299-E25-40 were finished September 18, 1989.

The estimated volume of water added to the borehole during drilling was 20 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 30 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump from October 3 though October 4, 1989, and a total of 478 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. Slug injection and withdrawal tests were performed on May 19 and July 5, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on October 11, 1989; this activity concluded well construction and installation.

| DRILL LOG | By LUBRECHT | Rig BE-COL 22-14103 L. Watkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/7/89 | | Depth 0 To 20 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Rig had been steam cleaned & inspected by Title III inspector | 0700 | STOPPED BY SRE: L. Watkins |
| | | | | prior to setup. Food GRADE oil (CRISCO BRAND) WAS USED IN TOOL | | still setting up. Left site |
| | | | | STRING FOR THREAD LUBE, ETC. | 10:25 | On site - Start doing |
| | 5' | D | D | SAND (trace Cobbles): 1% vfP, 2% vcS, 1% cS, 70% mS | | sample. |
| | | | | 20% fS, 3% vfS, 3% mud, Sub-well-rounded. Tr. Coarse well-sorted | 10:54 | Sample - 2 lith, |
| | | | | pebbles, well rounded; 20% mafic, 80% felsic. Color = 10YR5/6 | | 1 moisture |
| | | | | mod react to HCl, unconsolidated no 0% on OVA; rad < Ø | | |
| | | | | | | |
| | 10' | D | SM | SAND: Same composition, lithology as above (5' sample). No | 10:47 | Sample: 2 lith, |
| | | | | Cobbles, V. well sorted. 0% ppm on OVA; rad Ø | | 1 moisture |
| | | | | | | |
| | 15' | D | SM | SAND: 2% vcS 2% cS, 10% mS, 40% fS, 40% vfS, | 10:55 | Sample 2 lith, 1 |
| | | | | 6% mud; V well sorted; 30% mafic; 70% felsic; sub-well | | moisture. |
| | | | | rounded; reacts well w/ HCl, 10YR 4/2 dk. grayish brown; | | Continue drilling |
| | | | | Slightly consolidated. 0 ppm on OVA; rad < Ø | | |
| | | | | | 1119 | Sample: 2 lith, 1 |
| | 20' | D | SM | SAND: V. Similar to above. less HCl reaction, Tr. well-rounded | | moisture - no analysis |
| | | | | cVc pebbles. | | jars, no chan. sample |

REMARKS:

M.H. Lubrecht 8/7/89

PNL-MA-567 DO-1, REV. 0 Reviewed by W. L. Mackham 12-4-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

65

| DRILL LOG | By M.D. Lubrecht | Rig BE GOL 22-14103 L. Watkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/7/89 | | Depth 20 To 20 | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1120 | Begin reaming hole for |
| | | | | | | 10" casing. |
| | | | | | 1155 | STOPPED FOR LUNCH |
| | | | | | 1230 | Return from lunch |
| | | | | | | Start rigging to drive |
| | | | | | | 10" casing. |
| | | | | | 1300 | Erected shade for |
| | | | | | | driller Continued to |
| | | | | | | work on casing shoe (10") |
| | | | | | 1500 | Continued to drive 10" |
| | | | | | | casing |

REMARKS:

PNL MA 567-D01. REV 0

Reviewed by V.L. McLean 12-4-89

Mike H. Lu 8/8/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

66

Sht. 1 of 2

| DRILL LOG | By M. D. Lubrecht | Rig BEGOL 22-14103 L. WATKINS | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/8/89 | | Depth 20 To 25 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0700 | On site - driller prepares |
| | | | | | | to cut off excess 10" |
| | | | | | | casing. |
| | | | | | 0800 | Begin to install 10" casing. |
| | | | | | | (Welding drive shoe, etc.) |
| | | | | | ~1000 | Begin drilling. |
| | | | | | 1054 | Driving casing. |
| | | | | | 1134 | Sample: 2 lith, 1 |
| | | | | | | moisture; 2 chain of |
| | 25 | D | Sm | 4% Gravel; 93% Sand; 3% mud<br>SAND: Tr. s Cobbles; 2% mf, 1% fP, 1% vfP; 15% vcS, 20% cS, | | custody # |
| | | | | 40% mS, 10% fS, 8% vfS, 3% mud; mod. sorted; Gravel 40% | | SST080889 |
| | | | | mafic, 60% felsic; Sand 45% mafic, 55% felsic; Gravel SA-WR; | | |
| | | | | Sand SA-R; 10YR 5/4; sl. reaction to HCl; unconsolidated | | |
| | | | | rad < Ø | 1157 | Shut down for lunch - |
| | | | | | 1230 - | return from lunch. |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PAL-MASG7-001-REV Ø

Reviewed by D. L. McGehan 12-1-89

M. D. Lubrecht 8/8/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

LG

9 1 1 2 0 5 0 0 0 7 0

Sht. 2 of 2

| DRILL LOG | By M. Lubrecht | Rig BE GOL 22-14103 L. Watkins | Well Number 299-E25-40 | Computer Number NA | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/8/89 | | Depth 25 To 40' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1258 | Sample: 2 lith; 1 |
| 29'9½" (10"ϕ) | 30' | D | Sm. | SAND: 2% vfP; 3% vcS; 30% cS; 50% mS; 10% fS; 5% vfS | | moisture. |
| | | | | VWS; 25% basalt : mafic; 75% felsic; SA - R (low-mod sphericity); | | |
| | | | | 10YR 5/4; no HCl reaction; unconsolidated; rad < ϕ; 0ppm on OVA. | | |
| | | | | ϕ no cobbles, better sorting. | 1303 | Continue drilling. |
| | | | | | | |
| | 35' | D | SM | SAND: Similar to 30' sample. Trace well-rounded Coarse Pebbles | 1317 | SAMPLE: 2 lith, |
| | | | | (1-2 in 5 gal. bucket). Slight increase in basaltic clasts (28%/72%) | | 1 moisture |
| | | | | Unconsolidated; rad < ϕ; 0 ppm on OVA | | |
| | | | | | 1320 | Continue drilling |
| | | | | | | |
| | 40' | D | Sm | Sandy GRAVEL: 5% mP; 15% fP; 20% vfP; 30% vcS; | 1346 | SAMPLE: 2 lith; |
| | | | | 15% cS; 10% mS; 5% fS; tr. vfS, tr mud; poorly Sorted; Both | | 1 moisture; 2 chemical |
| | | | | fractions 30% basaltic mafic / 70% felsic; angular - subrounded, | | samples |
| | | | | low sphericity (sand) - angular - rounded, low-mod sphericity (gravel); | | Chain of Custody # SST 080889 |
| | | | | 5Y 4/1 dk gray; unconsolidated; sl. HCl reaction. 0ppm - OVA; rad | | |
| 29'9½" +10'0" | | | | < ϕ | 1350 | begin to add 10" casing |
| 39'9½" | | | | | 1500 | welding complete - drive casing |
| | | | | | 1515 | Leave site |

REMARKS:

PNL - MA 567 - DO-1 - Rev ϕ

Reviewed by T.L. Markham 12-4-89

M. Lubrecht 8/8/89

89

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: BE 60L | Well Number: 299-E25-40 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9 August 1989 | #22-14103 | Depth: 40' to 55' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS LOUIS WATKINS | 0700 | SERVICING RIG |
| | | | | | 0720 | DRILLING |
| | 45' | D | SM | SAND: 2% GRAVEL, 98% SAND. 2% VFP, 3% | 0820 | SAMPLE; 2 PT. |
| | | | | VCS, 30% CS, 50% MS, 10% FS, 5% VFS, | | LITH & 1 MOIST. |
| | | | | WELL SORTED. SANDS ARE 25% MAFIC, 75% | | SAMPLE |
| | | | | FELSIC, SA. DRY COLOR IS SALT & PEPPER; | 0825 | PREPARING TO WELD |
| | | | | NO FINES FOR MUNSEL COLOR. NO RX. TO 10% | | |
| | | | | HCL. NO CONSOLIDATION. FINER THAN 40' | | |
| 39' 9 1/2" | | | | SAMPLE. Ø PPM W/ OVA & RAD = <DET. | | |
| + 10' 2 1/4" | | | | ADDED 10' 2 1/4" OF CASING; TOTAL 10" = 49' 11 3/4" | 0940 | FINISHED WELDING |
| = 49' 11 3/4" | | | | | 0950 | DRILLING |
| | 50' | D | SM | SAND: 2% GRAVEL, 98% SAND. SAMPLE HAS | 1035 | SAMPLE; 2 PT. LITH |
| | | | | SAME P. SIZE DISTRIBUTION & DESCRIPTION AS | | & 1 MOISTURE SAMPLE |
| | | | | 45'. Ø PPM W/ OVA & RAD = < DET. | 1038 | DRILLING |
| | 55' | D | SM | SAND: 5% GRAVEL, 95% SAND. TRACE CP & MP, | 1045 | SAMPLE; 2 PT. |
| | | | | 3% FP, 2% VFP, 10% VCS, 40% CS, 30% MS, | | LITH & 1 MOIST. |
| | | | | 10% FS, 5% VFS, MODERATELY SORTED. GRAVELS | | SAMPLE |
| | | | | ARE 50% MAFIC, 50% FELSIC; SA TO R. | 1050 | PREPARING TO WELD |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by W. L. McGhan 10-4-89 Shirlette Moore 8/9/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

| DRILL LOG | By: S.M. Goodwin | Rig: BE 60L # 22-11/1-3 | Well Number: 299-E25-4 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9 August 1989 | | Depth: 55' To 65' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 55' | D | SM | (CONT.) SANDS ARE 25% MAFIC, 75% FELSIC; | | |
| | | | | SA. SALT & PEPPER COLOR. UNCONSOLIDATED. | | |
| | | | | NO RX. TO 10% HCL COARSER THAN 50'. | | |
| 49' 11 3/4" | | | | Ø PPM w/ OVA & RAD: < DET. | | |
| + 9' 6 1/4" | | | | ADDED 9'6 1/4" OF 10" CASING; TOTAL 10" = 59'6" | 1145 | FINISHED WELDING |
| = 59' 6" of 10" | | | | | 1150 | DRILLING |
| | | | | | 1200-1230 | LUNCH |
| | | | | | 1240 | DRILLING |
| | 60' | D | SM | SAND: 5% GRAVEL, 95% SAND. VERY SIMILAR TO | 1310 | SAMPLE; 2 PT. LITH |
| | | | | 55' SAMPLE. 2% FP, 3% VFP, SAND DIST. | | 1 MOIST, & 2 |
| | | | | IS SAME AS 55' MODERATELY SORTED. SALT | | 500 ML CHEM. ANAL |
| | | | | & PEPPER COLOR Ø RX. TO 10% HCL. NO | | SAMPLES (C. OF C. |
| | | | | CONSOLIDATION. Ø PPM w/ OVA & RAD: < DET. | | #SST080989) |
| | | | | | 1315 | DRILLING |
| | 65' | D | SM | SLIGHTLY GRAVELLY SAND: 8% GRAVEL, 92% | 1330 | SAMPLE; 2 PT. |
| | | | | SAND. TRACE CP, 2% MP, 3% FP, 3% VFS, | | LITH & 1 MOIST |
| | | | | SAND DISTRIBUTION IS SIMILAR TO 60' | | SAMPLE |
| | | | | EXCEPT FOR 8% FS & 4% VFS. MODERATELY | 1335 | DRILLING |

REMARKS:

PNL-MA-567 DO-1, Rev. 0 Reviewed by W.T. Mclellan 12-4-89 Shirley Mark 8/9/89

70

MHC-MR-0209

| DRILL LOG | By S. M. Goodwin | Rig BE 60L | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9 August 1989 | # 22-14103 | Depth 65' To 74' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 65' | D | SM | (CONT.) SORTED. GRAVELS ARE 40% MAFIC, 60% | 1345 | PREPARING TO WELD |
| | | | | FELSIC; SA TO R. SANDS ARE 25% MAFIC, | | |
| | | | | 75% FELSIC; SA. NO RX. TO 10% HCL, NO | | |
| | | | | CONSOLIDATION, SALT & PEPPER COLOR. | | |
| 59'6" | | | | Ø PPM W/ OVA & RAD = <DET. | | |
| + 9'1" | | | | ADDED 9'1" OF 10" CASING; TOTAL CASING | 1440 | FINISHED WELDING |
| = 68'7" | | | | = 68'7" | 1445 | DRILLING |
| | 70' | D | SM | SLIGHTLY GRAVELLY SAND: 8% GRAVEL, 92% SAND. | 1510 | SAMPLE; 2 PT |
| | | | | SAME P. SIZE DISTRIBUTION AS 65' SAMPLE | | LITH & 1 MOIST |
| | | | | EXCEPT FOR INCREASE IN VCS TO 20% & | | SAMPLE |
| | | | | DECREASE IN MS TO 20%. GROSS MINERALOGY, | 1512 | DRILLING |
| | | | | ETC. SAME AS PREVIOUS SAMPLE. SALT & | 1530 | END OF SHIFT |
| | | | | PEPPER COLOR, NO RX. TO 10% HCL. Ø PPM | | |
| | | | | W/ OVA & RAD = <DET. | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. MacLean 12-4-89 Shirley Mark 8/9/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

9 1 1 2 0 5 0 0 0 7 4

Sht 1 of 2

| DRILL LOG | By M. D. Lubrecht | Rig BE 60L #22-14103 L. Watkins | Well Number Z99-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/10/89 | | Depth 74° To 80° | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 68'7" | 74° | D | | | 0700 | On site - Driller preparing |
| +9'7" | | | | | | to add 10" casing. |
| 78'2" | | | | | 0839 | Casing addition completed. |
| +9'8½" | | | | | 0843 | Begin drilling - Stop |
| 87'10½" (81½%) | | | | | | briefly to re-level rig. |
| | 75' | D | SM | Sandy GRAVEL: 40% Gravel, 60% Sand - 5% small-large | 0915 | SAMPLE: 2-1 pint lth; |
| | | | | Cobbles(est.); 5% c-vcP; 15% mP; 10% fP, 5% vfP, 35% | | 1 moisture. |
| | | | | vcS, 20% cS, 10% mS, 3% fS, 2% vfS; Poorly sorted; | | Continue drilling - |
| | | | | gravel: 30% basaltic/70% felsic - Sand: 20% basaltic/80% felsic. | | stop at 1000 to add |
| | | | | Gravel: SA-WR, Sand A-R; 10YR6/4 lt. yellowish brown; moderate | | casing. |
| | | | | HCl reaction; slightly consolidated. more gravelly than above. | 1053 | Completed welding. |
| | | | | | 1058 | Begin drilling. |
| | 80' | D | SM | gravelly SAND: 29% Gravel; 71% SAND - 3% vcP, 6% | 1110 | SAMPLE: (2) 1 pt. lth, |
| | | | | CP, 8% mP, 7% fP, 5% vfP, 50% vcS, 15% cS, 5% mS, | | (1) moisture, (2) 500cc. |
| | | | | 1% fS, tr. vfS, tr. mud; Poorly sorted; Gravel: 30% Basalt/mafic; | | chemical * SST 081089 |
| | | | | 70% felsic - SAND: 20% mafic, 80% felsic; Gravel: SA-WR; SAND: | | |
| | | | | A-SR; 2.5Y 7/4; No ≠ w/HCl; sl. consolidated; less gravelly than 75' | | |

REMARKS:

PNL-IWA 567-DO-1, Rev. 0

Michael D. Lubrecht 8/10/89

Reviewed by V.L. McGehan 12-4-89

72

WHC-MR-0209

9 1 1 2 0 5 0 0 0 7 5

Sht. 2 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE 60L #22-14103 L. Watkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 8/10/89 | | Depth 80' To 94' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 87' 10½" | 80' | | | | | |
| | 85' | D | SM | gravelly SAND: 20% Gravel, 80% SAND - Tr. vcP, 3% cP, 5% mP, 5% fP, 7% vfP, 40% vcS, 30% mS, 10% fS, tr. vfS. Poorly sorted. Gravel: 30% mafic / 70% felsic, SA-WR, SAND: 20% mafic / 80% felsic, A-SA; sl. ≈HCl; 10YR 5/4; unconsolidated - sl. consolidated. Coarser sand than above. | 1158 | SAMPLES: (2) 1 pt. lith.; (1) moisture. |
| | | | | | 1200 | left for lunch |
| | | | | | 1235 | returned - resumed drilling |
| | 90' | D | SM | gravelly SAND: same lithology & characteristics as 85' sample. Slightly more vcP. (2% ±), Tr. small cobbles. | 1300 | SAMPLES: (2) 1 pt. lith. (1) moisture. |
| 87' 10½" + 9' 9" = 97' 7½" | | | | ADDED 9'9" of 10" CASING; TOTAL 10" = 97' 7½" | 1310 | Prepared to add casing |
| | | | | | 1435 | Resume drilling |

REMARKS:

P&L - M14567 - DO-1, Rev. 0

Reviewed by W.L. McGhan 12-5-89

M.D. Lubrecht 8/10/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

73

WHC-MR-0209

9 1 1 2 0 5 0 0 0 7 6

SHT. 1 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE 60L #22-1403 L. Watkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/11/89 | | Depth 94' To 101 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 97'7½" | 94 | D | | | 0730 | Drillers & Geo on site, |
| | | | | | | resume drilling @ 94' |
| | 95' | D | SM | gravelly SAND: 15% Gravel; 85% SAND – Tr. sC; | 0757 | SAMPLE: (2) 1 Pt. Lith + |
| | | | | Tr. vcP, 3% mP, 5% fP, 12% vfP, 35% vcS, | | (1) moisture |
| | | | | 30% cS, 15% mS, Tr. fS; Poorly sorted; Gravel: | | |
| | | | | 20% basaltic/80% felsic; SA-WR; SAND: 15% Basaltic/ | | |
| | | | | 85% felsic; A-SR; 10 YR 5/4; V. slight ⇌ w/HCl; | | |
| | | | | Unconsolidated. 0 ppm (OVA); rad < Ø | 0841 | Stop drilling to add |
| | | | | | | casing. |
| +9'7¾" | | | | | 0950 | Casing complete – resume |
| 101'3¼" | | | | | | drilling. |
| | 100' | D | SM | SAND: 4% Gravel, 96% SAND – 2% fP, 2% vfP, 5% vcS | 1010 | SAMPLE: (2) 1pt. lith, |
| | | | | 20% cS, 40% mS, 25% fS, 6% vfS, Tr. mud.; poorly-mod. | | (1) moisture, (2) chemical. |
| | | | | sorting; Gravel 20% mafic/80% felsic, A-SP; SAND 15% mafic/ | | * SST 081189 |
| | | | | 85% felsic, A-SR; 10YR 5/4; V. Slight ⇌ w/HCl; not consd. | | |
| | | | | 0 ppm (OVA); rad < Ø | | |

REMARKS:

PNL-MA567 DO-1, Rev. Ø

Michael D. Lubrecht 8/11/89

Reviewed by V.L. Markham 12-5-89

74

WHC-MR-0209

| DRILL LOG | By: M.D. Lubracht | Rig: BE 60L 22-14103 L. Wething | Well Number: 299-E25-40 | Computer Number: N/A | Project or Work Order No.: W-017 SST. |
|---|---|---|---|---|---|
| | Date: 8/11/89 | | Depth: 101 To 117' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 107'3¼" (10" C.S.) | 101 | D | | | | |
| | 105 | D | SM | SAND: 2% GRAVEL, 98% SAND; 2% vfP, 2% vcS | 1056 | SAMPLES: (2) 1 pt. |
| | | | | 10% cS, 60% mS, 20% fS, 6% vfS; well-sorted; 15% mafic/85% | | lith; (1) moisture |
| | | | | felsic, SA-WR; 10YR 6/4; no = w/ HCl; unconsolidated. Oppm (OVA); | | |
| | | | | red < ∅ | | |
| | 110' | D | SM | SAND: Similar to 105 ft. Sample. O ppm (OVA); red | 1120 | SAMPLES: (2) 1 pt. |
| | | | | < ∅ | | Lith.; (1) moisture |
| | | | | | | |
| +9'5" | | | | | 1145 | Stop to add casing |
| | | | | 113'-114' Mud (Siltstone) interbed. | 1200 | Break for lunch. |
| 116'8¼" (10" pC.S.) | | | | | 1237 | Return from lunch - |
| | | | | | | continue to add casing |
| | | | | | 1420 | START DRILLING |
| | 115' | D | SM | SAND: Similar to 105' & 110' samples. Tr. mP, cP. | 1505 | SAMPLES: (2) 1 pt. |
| | | | | Siltstone (mudstone) @ 113'-114' interval. Slightly | | lith. No moisture |
| | | | | coarser than 110'. (15% cS, 55% mS.) | | taken (No RPT - sample |
| | | | | | | would dry out over |
| | | | | | | weekend). |

REMARKS: 1513 - Vacate site

Pnl. MA567. DO-1, Rev. 0 Reviewed by V.L. McGhan 12-5-89 Michael D. Lubracht 8/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

9 1 1 2 0 5 0 0 0 7 8

Sht. 1 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE-60L 22-14/03 L Wetkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/14/89 | | Depth 120 To 130 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 116'7½" | | D | SM | | 0715 | Begin Drilling |
| | 120' | D | SM | SAND: 3% GRAVEL; 97% SAND; 3% vfP, 50% vcS, 30% cS, 10% mS, | 0735 | SAMPLE: (2) 1 pt. Lith; |
| | | | | 7% fS, Tr. vfS; moderately sorted; GRAVEL: 70% Basalt/3% felsic, | | (2) chem. # SST 081489; |
| | | | | A-SR; SAND: 20% mafic/80% felsic, A-SR; 5Y5/2 olive gray; | | (1) moisture. |
| | | | | slight ≈ w/HCl; unconsolidated O ppm (OVA)/rad < Ø | | |
| 9'6¾" | | | | | 0806 | Begin adding casing. |
| | | | | | 0915 | Continue drilling. |
| 126'2½" | 125' | D | SM | SAND: 3% GRAVEL, 97% SAND; similar to above. | 0941 | SAMPLE: (2) 1 pt. Lith; |
| | | | | O ppm (OVA)/rad/Ø | | (1) moisture |
| | 130' | D | SM | SAND: 3% GRAVEL, 97% SAND; similar to above. Gravel: 30% | 1015 | SAMPLE: (2) 1 pt. lith; |
| | | | | Basalt/70% felsic, A-SA. finer-grained | | (1) moisture. |
| | | | | O ppm (OVA)/rad < Ø | | |
| + 8'9¾" | | | | | 1025 | START TO ADD CASING |
| 135'0" | | | | | 1119 | Resume drilling |
| | | | | | | |
| | | | | | 1200 | LUNCH |
| | | | | | 1230 | Return |

REMARKS:

PNL MA 567 DO-1, Rev. Ø Reviewed by W.L. Markham 12-5-89 Michael D. Lubrecht 8/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

76

WHC-MR-0209

9 1 1 2 0 5 0 0 0 7 9

Sht 2 of 2

| DRILL LOG | By: M.D. Lubrecht | Rig: BE-60 / 22-1413 | Well Number: 299-E25-40 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8/14/89 | L. Watkins | Depth: 130 To 140 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 135'0" | 135' | D | SM | SAND: similar to sample 130 ft. Locally slightly consolidated, w/muddy matrix. (~ 1% mud) Oppm(OVA)/rxl < ∅ | 1310 | SAMPLE: (2), 1 pt. Lith.; (1) moisture |
| | 140' | D | SM | SAND: similar to 135' sample – 2% vcS, 2% cS, 50% mS, 40% fS, 3% vfS, 3% mud; well-sorted; 20% matrix / 80% felsic; 10YR 7/4; slightly consolidated w/ muddy matrix; slight ⇌ w/ HCL; Oppm(OVA)/ rxl < ∅ | 1339 | SAMPLE: (2), 1 pt. lith.; (1) moisture; (2) chemical, # SST 081489 |
| +9'6½" | | | | | 1350 | Add casing. |
| | | | | | 1456 | Casing addition completed. |
| 144'6½" | | | | | | Resume drilling |
| | | | | | | TD ≈ 142' |
| | | | | | 1530 | End of Shift |

REMARKS:

PNL-MASGT-DO-1, Rev. 0 Reviewed by V.L. Wathen 12-5-89 Michael D. Lubrecht 8/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

77

9 1 1 2 0 5 0 0 0 1 0

Sht. 1 of 2

| DRILL LOG | By M.D. Lobrecht | Rig BE-60L 22-14103 L. WATKINS | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SSF |
|---|---|---|---|---|---|
| | Date 8/15/89 | | Depth 140 To 150 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 144'6" (10") | | | | | 0700 | On-site; start rig. |
| | | | | | 0715 | BEGIN DRILLING |
| | 145' | D | D | SAND: 3% GRAVEL, 97% SAND – Tr. fP, 3% vfP, 15% vcS, | 0737 | SAMPLES: (2) 1 pt. |
| | | | | 20% cS, 40% mS, 20% fS, 2% vfS, moderately-sorted; | | Lith.; (1) moisture. |
| | | | | GRAVEL: 30% MAFIC / 70% felsic, A-SR; SAND: 20% mafic / 80% | | |
| | | | | felsic, A-R; 10YR4/2; Locally slight ≇ w/HCl; slightly | | |
| | | | | consolidated. More coarse than 140' sample. | | |
| | | | | | 0750 | Move 10" casing down in |
| | | | | | | prep. for geophysical |
| | | | | | | logging (next ∝) and |
| | | | | | | installation of 8" casing. |
| | 150' | D | D | SAND: 3% GRAVEL, 95% SAND; 2% MUD; 1% fP, 2% vfP, 5% vcS, | 0810 | SAMPLE: (2) 1 pt. Lith; |
| | | | | 15% cS, 35% mS, 30% fS, 10% vfS, 2% mud; poorly sorted; | | (1) moisture |
| | | | | Gravel: 30% mafic / 70% felsic, A-SR; SAND: 20% mafic / 80% felsic; | | |
| | | | | A-SA; slight ≇ w/HCl (note - some limestone sand observed.); sl. | 0820 | Geophysical logging truck on |
| | | | | consolidated. Siltier than @ 145 ft. | | site. J. BROOKS presiding. |

REMARKS:

PNL-MA567-D0.1, REV. 0 Reviewed by V.L. Matthews 12-5-89 Mike D. Lobrecht 8/15/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Co[illegible]

WHC-MR-0209

31

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| M.D. Lubrecht | BE-60L | 299-E25-40 | N/A | W-017 SST |
| Date: 8/15/89 | 22-14103 | Depth: 150 To 150 | | Subcontract No.: N/A |
| | L. Watkins | | | |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 144'6" | 150 | | | | 0820- | Geophysically-logged |
| (10") | | | | | 1000 | borehole w/ nat. gamma |
| | | | | | | probe. (4-147± interval) |
| | | | | | | |
| | | | | | | Driller welding 8" drive shoe, |
| | | | | | | preparing to trip in w/ |
| | | | | | | 8" carbon steel casing. |
| | | | | | | |
| | | | | | 1130 | Removed 10" drive barrel; |
| | | | | | | installed 8" drive barrel, |
| | | | | | | using food-grade oil as |
| | | | | | | thread lubricant. |
| | | | | | 1200 | lunch |
| | | | | | 1230 | Return from lunch. Driller |
| | | | | | | tripping in w/ 8" carbon- |
| | | | | | | steel casing. |
| | | | | | 1400 | left site. |
| | | | | | | |

REMARKS:

PNL-MA 567-DO-1, Rev. 0 Reviewed by V. L. McGhan

Michael D. Lubrecht 8/15/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

SHT. 1 of 2

| DRILL LOG | By M.D Lobrecht | Rig CE GOL 22-14103 L Wheeler | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 558 |
|---|---|---|---|---|---|
| | Date 8/16/89 | | Depth 150 To 155 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 144'-6" | (10"ø) | 150' | M | | 0700 | On site - Driller is still |
| | | | | | | installing 8" ø casing — |
| | | | | | | left site for E 24-19 |
| | | | | | | |
| | | | | | 1240 | On site, nearly ready for |
| | | | | | | drilling |
| | | | | | 1244 - | Commence drilling w/ 8" |
| | | | | | | drive barrel. Food grade oil |
| | | | | | | (only) used during tool string |
| 164'7½" | (8" ø) | | | | | assembly |
| | | | | | | |
| | 155' | D | M | SAND: Same as 150' sample (8/15/89) - 3% GRAVEL, 95% Sand, | 1311 | SAMPLES: (2), 1 ø. lith; |
| | | | | 2% mud: 1% fP, 2% vfP, 5% vcS, 15% cS, 35% mS, 30% fS, | | (1) moisture. |
| | | | | 10% vfS, 2% mud; poorly sorted; GRAVEL: 30% mafic / 70% felsic, A-SR; | | |
| | | | | SAND: 20% mafic / 80% felsic, A-SA; slight ⇌ w/ HCl; slightly | | |
| | | | | consolidated. 0 ppm (OVA); rad. < det. | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL - MA567-DO-1, REV. Ø

Reviewed by V. L. McGhan

Michael D. Lobrecht 8/16/89

WHC-MR-0209

80

| DRILL LOG | By M.D. Lubrecht | Rig BE-60L 22-14108 L. Watkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. WJ-017 SST |
|---|---|---|---|---|---|
| | Date 8/16/89 | | Depth 155 To 165 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 164'-7½" | 160 | D | M | SAND: Same as 160' sample. Tr (1) cP, well-rounded, Tr. bleached biotite 0 ppm OVA; rad < det. | 1345 | SAMPLES: (2), 1 pt Lth, (1) moisture, (2) chem. # SST 081689 |
| | 165 | D | M | slightly GRAVELLY SAND; 5% Gravel, 93% SAND, 2% mud; Tr. Large cobble, Tr vcP, 2% mP, 1% fP, 2% vfP, 5% vcS, 40% cS, 30% mS, 15% fS, 3% vfS; poorly sorted; GRAVEL: 20% mafic/80% felsic, A-WR; SAND: 20% mafic/80% felsic; SA-SR; 10 YR 5/4 mod. yellowish brown; sl. ≠ w/HCl, not consolidated (locally poorly indurated by $CaCO_3$). Open-OVA; rad < det. | 1402 | SAMPLES: (2), 1 pt. lith., (1) moisture. |
| 110'-2" | | | | | | |
| 174'-9½" | | | | | 1413 | Add 8" casing, |
| | | | | | 1520 | left site. |

REMARKS:

PNL-MA567-00-1, Rev. 0 Reviewed by V.C. McMahan Michael D. Lubrecht 8/16/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

13

9 1 1 2 0 5 0 0 0 3 4

Sht. 1 of 3

| DRILL LOG | By M.D. LUBRECHT | Rig BE-GOL 322-14103 L. WATKINS | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/17/89 | | Depth 165 To 175 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 114'-9½" | 165' | | | | 0750 | ON SITE FOLLOWING SAFETY |
| | | | | | | MEETING; L. WATKINS CONTINUES |
| | | | | | | TO WELD CASING. |
| | | | | | 0830 | BEGIN DRILLING |
| | 170' | D | M | slightly Gravelly SAND: 5% GRAVEL, 94% SAND, 1% mud: 2% mP, | 0905 | SAMPLES: (2), 1 pt. lith.; |
| | | | | 1% fP, 2% vfP, 15% vcS, 35% cS, 30% mS, 10% fS, 4% vfS, | | (1) moisture |
| | | | | 1% mud; moderately sorted; GRAVEL: 30% mafic / 70% felsic, | | |
| +10'-2¼" | | | | A-SR; SAND: 20% mafic / 80% felsic, A-SR; 10YR 6/4 | 0915 | begin to add 8" casing. |
| 184'-11¾" | | | | pale yellow brown; slight ≇ w/ HCl; unconsolidated. 0 ppm OVA/ rad < det. | | |
| | | | | | 1012 | Resume drilling |
| | 175' | D | SM | SAND: 3% GRAVEL, 96% SAND; 1% mud: Tr. MP, 1% | 1045 | SAMPLES; (2), 1 pt. |
| | | | | fP, 2% vfP, 10% vcS, 15% cS, 50% mS, 20% fS, 1% | | lith.; (1) moisture. |
| | | | | vfS, 1% mud; moderately sorted; Gravel 30% mafic, | | |
| | | | | 70% felsic, VA-WR; SAND: 20% mafic/80% felsic, SA- | | |
| | | | | WR; 10YR 6/4 pale yellow brown; slight ≇ w/ HCl, | | |
| | | | | unconsolidated 0 ppm OVA/rad < det | | |

REMARKS:

PNL-MA567-DO-1, Rev. Ø Reviewed by V.L. McGhan 12-5-89 Michael D. Lubrecht 8/17/89

WHC-MR-0209

23

| DRILL LOG | By: M.D. Lubrecht | Rig: B260L 22-14102 L. Wetkins | Well Number: 299-E25-40 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8/17/89 | | Depth: 175 To 190 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 184'-11½" | 180 | D | SM | SAND: similar to 175'. Tr. SC, Tr. vcP, otherwise same size gradation. Locally poorly indurated w/ $CaCO_3$, 0 ppm (OVA)/red c dot. | 1108 | SAMPLES: (2), 1 pt. lith., (2) chem. #SST-081789, (1) moisture. |
| + 10'-2½" | | | | | 1115 | Begin adding 8" casing |
| 195'-2½" | | | | | 1200-1230 | lunch |
| | | | | | 1230 | resume welding |
| | | | | | 1240 | Begin drilling |
| | 185' | D | SM. | SAND: Tr. Gravel, 99% Sand, 1% mud; Tr. fP, Tr. vfP, 8% vcS, 15% cS, 65% mS, 9% fS, 2% vfS, 1% mud, well-sorted; 20% mafic/80% felsic, SA-SR; 10 YR 6/4 pale yellowish brown; slight ≈ w/ HCl, unconsolidated. 0 ppm OVA/red c dot. | 1334 | SAMPLES: (2), 1 pt. Lith., (1) moisture. |
| | 190' | D | SM | SAND: Similar to 185 ft. sample. Same grain-size distribution and lithology. 0 ppm (OVA), red c dot. | 1356 | SAMPLES: (2), 1 pt. lith, (1) moisture tin. |
| | | | | | 1420 | Samples drop from barrel - Driller thinks its gravel. |

REMARKS:

PNL-MA SGT-DO-1, Rev 4 Reviewed by V. L. McMahan 12-5-89 M.D. Lubrecht 8/17/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

9 1 1 2 0 5 0 0 0 0 6

SHT. 3 OF 3

| DRILL LOG | By: M O Lybrecht | Rig: BE-60L, ZZ-14103, L. Wetkins | Well Number: 299-E25-40 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8/17/89 | | Depth: 190 To 195' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 195'-2½" | 195' | D | M | Sandy GRAVEL: 50% Gravel, 49% SAND, 1% mud: 5% sC, | 1424 | SAMPLES: (2), 1 pt. |
| | | | | 5% vcP, 10% cP, 10% mP, 10% fP, 10% vfP, 15% vcS | | lith.; (1) moisture. |
| | | | | 15% cS, 10% mS, 5% fS, 4% vfS, 1% mud.; poorly sorted; | | |
| | | | | GRAVEL: 30% basaltic / 70% felsic, SA-WR; SAND: SA-SR, | | |
| | | | | 30% Basaltic / 70% felsic; 10YR 5/4 mod. yellowish brown; sl. ≈ w/ | | |
| | | | | HCl; unconsolidated, but dense. 0 ppm OVA / rad < dh | | |
| | | | | | 1433 | Switching to hard tool - |
| | | | | | | used food grade oil |
| | | | | | | for thread lubrication. |
| | | | | | | |
| | | | | | 1503 | Still working tool change - |
| | | | | | | drilling finished for day |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL - MA 567 - DO-1, Rev. Ø  Reviewed by V.L. McGhan 12-5-89  Michael O. Lybrecht 8/17/89

84

WHC-MR-0209

Sht. 1 of 3

| DRILL LOG | By M.D. Lubrecht | Rig BE-60L 22-14103 L Wetkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/18/89 | | Depth 195 To 200 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 195'-2½" | 195 | | | | 0719 | On site - driller making |
| | | | | | | change over to hard tool. |
| | | | | | | Using food-grade oil where |
| | | | | | | appropriate. |
| +10'-2¼" | | | | | 0815 | Started to add 8" casing |
| 205'-5¾" | | | | | 0913 | Begin drilling w/ 8" |
| | | | | | | hard tool. Added 12 gal. |
| | | | | | | drill water (0913-1028) |
| | | | | | | 4 gal. (1034) |
| | | | | | 1092 | WR Thackeberry - WHC |
| | | | | | | QA/QC stopped by. Asked |
| | | | | | | questions re: depth of hole, |
| | | | | | | drillers logs, etc. |
| | 200' | HT | — | Sandy GRAVEL; 75% GRAVEL, 22% SAND, 3% mud; 20% mP, 20% fP, | 1120 | SAMPLES: (2), 1 pt. Lith.; |
| | | | | 35% vfP, 7% vcS, 5% cS, 3% mS, 4% fS, 3% vfS, 3% mud; | | (2) Chemical #SST081889 |
| | | | | poorly sorted; GRAVEL: 80% basaltic-mafic / 20% felsic, A-R.; SAND; | | |
| | | | | 60% Basaltic / 40% felsic, SA-R; 2.5Y 5/6 light olive brown; | | |
| | | | | no HCl ⇌; unconsolidated | | |

REMARKS:

PNL-MA507-30-1, Rev. 0 Reviewed by [illegible] 12-5-89 Mikel D. Lubrecht 8/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

85

9 1 1 2 0 5 0 0 0 3 8

Sht. 2 of 3

| DRILL LOG | By I Kennedy / M Lubrecht | Rig BE-GOL 22-14103 L. Watkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SSO |
|---|---|---|---|---|---|
| | Date 18 Aug. 89 | | Depth 200 To 205' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 205'-5¼" | | | | | 1138 | Driller working on rig. |
| | | | | | | |
| | | | | | 1200 | Lunch. |
| | | | | | 1235 | Return from lunch. Driller |
| | | | | | | completes work on hammer |
| | | | | | 1249 | Start driving casing — |
| | | | | | | then resume drilling |
| | | | | | 1316 | Prepare to add new casing |
| +9'-7⅝" | | | | | 1410 | Resume Drilling w/8" hollow |
| 215'-1½" | | | | | | added 4 gal water |
| | 205' | HT | — | Sandy Gravel 33% Gravel, 63% sand 4% mud.; 6% mP, | 1435 | Samples: (2) 1pt lith. |
| | | | | 7% fP, 20% vfP, 15% vcS, 20% cS, 20% mS, 5% fS, 3% vfS, 4% mud | | |
| | | | | poorly sorted, Gravel: 75% basaltic - mafic / 25% felsic A-WR; | | |
| | | | | Sand: 40% basaltic / 60% felsic A-R ; 10YR 5/4 yellowish brown | | |
| | | | | no HCl rxn; unconsolidated. | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PDL-MA567-DO-1, Rev 0 Reviewed by V. E. McGlam 12-5-89 Phillip A. Fuller 8/18/89

WHC-MR-0209

80

541.3.13

| DRILL LOG | By J Kennedy M Latech | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E 2.5-40 | Computer Number N/A | Project or Work Order No. WC-017 SST |
|---|---|---|---|---|---|
| | Date 18 Aug 1989 | | Depth 210 To 210 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 210 | HT | | Gravelly SAND: 10% gravel 88% sand, 2% mud; ~~20~~ fP, 6% vfP, | 15:15 | SAMPLES: (2) 1 pt. LIN |
| | | | | 25% vcs, 25% cs, 20% ms, 12% fs, 6% vfs; 2% mud Gravel: 60% basaltic | | |
| | | | | 20% felsic A:SR; Sand: 20% basaltic / 80% felsic SA-SR 2.5Y6/6 | | |
| | | | | olive yellow; no HCl Rxn, unconsolidated | | |
| | | | | | 1531 | off site |

REMARKS:

ADDED 20 GALLONS OF $H_2O$ TODAY.

PNL-MA 567-DO-1, Rev. 0 Reviewed by D. L. McGhan 12-5-89 Michael D. Luter 8/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

| DRILL LOG | By M.D Lubrecht and J.N. Kennedy | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 21 AUG 1989 | | Depth 210 To 215 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 215'-½" | | | | Total casing accounts for 1" addition error on 8/18/89 | 0700 | On-site - Driller performing |
| | | | | | | rig maintenance. Preparing |
| | | | | | | to switch back to drive barrel |
| | | | | | 0750 | Start Drilling w/ Hand Tool |
| | | | | | 0805 | Driller begins to switch |
| | | | | | | to drive barrel (w/crisco |
| | | | | | | oil) |
| | | | | | 0905 | Driller resumes drilling |
| | | | | | | (now with drive barrel |
| 210 | 215 | D | | Slightly gravelly sand: 9% gravel, 88% sand, 3% mud; | 0915 | Samples (2) 1pt. lith. |
| | | | | Trace fP, 9% lfP, 22% vcs, 13% cs, 40% ms, 9% fs, 4% vfs, 3% mud | | Driller starts to add |
| | | | | Grains: 55% basaltic / 45% felsic A-SR; Sand 30% basaltic 70% felsic, A-SR | | new casing |
| -½" | | | | 10YR 5/4 moderate yellowish brown, slight HCl reaction, slightly, | | |
| +8'10¾" | | | | locally consolidated. | | |
| 223'-10¾" | | | | added 8'-¾" & 8" temporary casing | 1030 | casing complete, |
| | | | | | | resume drilling |
| | | | | | | |
| | | | | | | |

REMARKS:

Michael D. Lubrecht for JN Kennedy 8/21/89

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. McElhaney 12-5-89

+1" adjustment on 8/18

9 1 1 2 0 5 0 0 0 1

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| MD. Lubrecht / Tom Kennedy | CE 60L 22 14103 L. Watkins | 299-E25-40 | — | W-017 SST |
| Date: 8-21-89 | | Depth: 215 To 235' | | Subcontract No.: — |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 223-10¾ | 220 | D | SM | SLIGHTLY GRAVELLY SAND 5% Gravel 95% sand, Trace mud; Trace fP, 5% ofp, | 1110 | Samples (2) lpt lith (1) |
| | | | | 35% vcs, 30% bcs, 20% ms, 8% fs, 2% vfs, trace mud, well sorted | | moisture (2) Chemical |
| | | | | Gravel: 80% basaltic / 20% felsic, A-SR; Sand 20% basaltic / | | (c. of c. # SST |
| | | | | 80% felsic SA-SR, slight HCl rxn, unconsolidated, 10YR 5/4 | | 082189) 500 ML |
| | | | | moderate yellowish brown | | CHEM. ANAL. |
| | 225 | D | SM | Sand: 2% gravel, 98% sand, trace mud; 2% fP, 15% vcs, | 1145 | Samples (2) lpt lith |
| | | | | 20% ms, 45% ms, 15% fs, 3% vfs, trace mud, moderately ~~well~~ sorted | | (1) moisture |
| | | | | Gravel: 80% basaltic / 20% felsic A-SR, Sand: 15% basaltic / | | Driller prepares to |
| | | | | 85% felsic A-SR; 10YR 5/4 moderate yellowish brown; slight | | add new 8" casing |
| | | | | HCl rxn, locally slightly consolidated | | Break for lunch |
| | | | | | 1230 | Return from lunch |
| +10-1¾ | | | | | 1350 | addition of casing complete |
| 234 1½ | | | | SAND: | | ream drilling |
| | 230 | D | SM | Similar to 225' except trace Gravel, 100% sand, trace mud | 1430 | Samples (2) lpt lith |
| | | | | 15% vcs, 20% cs, 45% ms, 20% fs, moderate sorting, trace vfs, trace mud, | | (1) moisture |
| | | | | unconsolidated, other properties identical | | |
| | 235 | | SM | SAND: Similar to 225' except 1% gravel, 98% sand 1% mud | 1505 | Samples (2) lpt. lith |
| | | | | moderate HCl rxn, other properties identical | | (1) moisture |

REMARKS:

1530 End of Shift

PNL-MA-567 DO-1, Rev. 0 Reviewed by U. L. McLehan 12-5-89 M.D. Lubrecht 8/21/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

9 1 1 2 0 5 0 0 0 2



| DRILL LOG | By: IAN KENNEDY | Rig: BE 60L 22-14103 L. Watkins | Well Number: 299-E25-40 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 22 Aug. 1989 | | Depth: 235 To 245 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| ?54'-1½" | | | | | 0715 | on site - driller preparing |
| | | | | | | to add new casing |
| +10'-3" | | | | | 0840 | driller finishes addition |
| 244'-4½" | | | | | | of 10'-3" of new temporary |
| | | | | | | carbon steel 8" casing and |
| | | | | | | resumes drilling |
| | 240 | D | SM | Sand: Trace Gravel 98% sand, 2% Mud; Trace vfP, 10% vcs, | 0900 | Samples (2) lpt. lith |
| | | | | 20% cs, 50% ms, 12% fs, 6% vfs, 2% mud; Gravel: 30% basaltic/mafic/ | | (1) moisture (2) Chemical |
| | | | | 70% felsic SA-SR; Sand: 20% basaltic/mafic/80% felsic SA-R | | (c. of c. # SST0822 89) |
| | | | | 10YR 5/4 moderate yellowish brown unconsolidated; no HCl rxn. | | |
| | 245 | D | SM | Sand: Trace Gravel, 97% sand, 3% mud; Trace vfp, 5% vcs, | 0940 | Samples (2) lpt. lith |
| | | | | 52% cs, 30% ms, 7% fs, 3% vfs, 3% mud; Gravel: 50% basaltic/mafic | | (1) moisture |
| | | | | 50% felsic SA; Sand 15% basaltic/mafic 85% felsic SA-SR | | |
| | | | | 2.5Y 5/4 light olive brown; slight HCl rxn, slightly loosely | | |
| | | | | consolidated. slightly higher moisture content than previous samples | | |
| | | | | | | |
| | | | | | 0950 | driller preparing to |
| | | | | | | add new casing |

REMARKS:

PNL MA-567 DO-1, Rev. 0 Reviewed by V. L. McGhan 12-5-89 Ian Kennedy 8/22/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

90

WHC-MR-0209

9 1 1 2 0 5 0 0 0 2 3

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| IAN KENNEDY | BE 60L 22-14103 L Watkins | 299-E25-40 | N/A | W-017 SST |
| Date: 8-22-89 | | Depth: 245 To 255 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 244-4½ | | | | | 1050 | driller finishes adding |
| +10'-2½" | | | | | | 10'-2½" of 8" casing |
| 254"-7" | | | | | | and prepares to resume drilling |
| | 250 | D | | slightly muddy sand: Trace Gravel, 85 % sand 15% mud | 1125 | Samples: (2) 1 pt. lith |
| | | | | Trace Gravel, 3% vcs, 5% bcs 52% ms, 20% fs, 5% vfs, 15% mud | | (1) moisture |
| | | | | Gravel: 85% basaltic/mafic / 15% felsic SR Sand: 10% basaltic/mafic / 90% felsic SA-R | | |
| | | | | 10YR 5/4 moderate yellowish brown, no HCl rxn, unconsolidated, | | |
| | | | | clayey-silt directly underneath the slightly muddy sand: Trace vfs, 100% mud | | Silt layer samples: (2) 1 pt. lith, (1) moisture |
| | | | | 2.5Y 5/4 light olive brown; slight HCl rxn (c. or c. #SST082289) | | (2) 100ml chemical |
| | | | | | 1100 | lunch |
| | | | | Silt layer becomes gray (2.5Y 6/2) after about 6" | 1230 | return from lunch |
| | | | | | | |
| | 255 | D | | mud: 100% mud 2.5Y 5/1 Gray well consolidated slight HCl rxn | 1320 | Samples (2) 1 pt. lith |
| | | | | | | (1) moisture |
| | | | | | 13:35 | driller prepares to |
| | | | | | | add casing |
| | | | | | 1445 | continue drilling |
| | | | | | 1530 | Quit |

REMARKS:

PNL-MA-567 DO-1, rev. 0 Reviewed by W. L. McClelan Ian Kennedy 6/12/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

91

9 1 1 2 0 5 0 0 0 0 4

Sht. 1 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE-60L #22-14103 L. Wilkins | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 23 AUG 1989 | | Depth 255 To 265 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| ~~23'-1½"~~ 26'-10¼" | ~257' | | | ~ Sharp contact (estimated) to medium Sand. - sampled at 260' | 0710 | ON SITE - BEGIN DRILLING |
| | | | | laminated mudstone @ 256' - Water encountered at ~ 256' | 0705 | SAMPLES: (1) hand specimen |
| | | | | Samples were moist - no free water @ start of drilling. | | in 1 pt. Lith. jar. |
| | | | | | | |
| | 260 | D | W | slightly gravelly SAND: 6% GRAVEL, 91% SAND, 3% MUD. 2% mP, 2% fP, | 0843 | SAMPLES: (2), 1 pt. lith, |
| | | | | 2% vfP, 25% vcS, 20% cS, 20% mS, 15% fS, 11% vfS, 3% mud; | | 1 moistre; (2) chem. |
| | | | | poorly sorted: GRAVEL: 40% BASALT/60% FELSIC, VA-WR; SAND: 20%/80%, | | SST 082389 |
| | | | | SA-SR; 10YR5/4 mod. yellow brown; no react < HCl; unconsolidated. - different | | |
| 264'-10¼" | | | | lithology than above. 0 ppm (OVA); rad ≤ background | 0850 | Stop to Add 8" casing |
| + 9'-4¼" | | | | | | |
| 274'-2½" | 265' | D | W | Sandy GRAVEL: 40% Gravel, 60% SAND, V. mud: Tr. large cobble, ↓ | 1047 | SAMPLES: (2), 1 pt. Lith.; |
| | | | | small cobbles, Tr. vcP, 5% cP, 20% mP, 10% fP, 5% vfP, 30% | | 1 moisture. |
| | | | | vcS, 15% cS, 10% mS, 5% fS, Tr. vfS, Tr. mud; poorly sorted; | | |
| | | | | GRAVEL: 40% Basaltic/60% mud + felsic, VA-WR; SAND: 20/80, SA-SR; | | |
| | | | | 10YR5/4 moderate yellowish brown; no reaction to HCl; unconsolidated | | |
| | | | | 0 ppm (OVA); rad ≤ back. | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA567 DO-1, Rev. 0

Reviewed by V.L. McGlam 12-5-89

Mike D. Lubrecht 8/25/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

92

WHC-MR-0209

| DRILL LOG | By: M. A. Lubrecht | Rig: BE 60L #22-14103 L. WATKINS | Well Number: 299-E25-40 | Computer Number: N/A | Project or Work Order No.: W-017 SSS |
|---|---|---|---|---|---|
| | Date: 23 AUG 1989 | | Depth: 265 To 274 | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 27a'-2½" | 270' | D | W | Sandy GRAVEL: similar to 265' sample. GRAVEL is WR. | 1124 | SAMPLES: (2), 1 pt. Lith.; |
| | | | | 50% GRAVEL, 50% SAND - INCREASE IN UKP(10%), decrease in CS(10%) | | (1) moisture |
| | | | | and MS(5%) lithology similar to above - one large granodiorite cobble | | |
| | | | | (Mt. Stuart granodiorite?) 0 ppm (OVA); pt ≤ back. | | |
| | | | | | 1200 - | |
| | | | | | 1230 | Lunch |
| +8'-9½" | | | | | 1230 | Return to site |
| 282'-11¾" | | | | Note - check water level tomorrow A.M!! | | Start changing to hard |
| | | | | | | tool & adding 8" casing. |
| | | | | | | Used food-grade oil on |
| | | | | | | drill string threads |
| | | | | | 1436 | Begin drilling |
| | | | | | 1511 | Sand is heaving in hole - |
| | | | | | | plugged casing is following |
| | | | | | | (or being driven by) hard |
| | | | | | | tool. Hole is making water. |

REMARKS:

PNL MA567 DO-1, Rev. 0 Reviewed by V. L. McGlynn 12-5-89 Michael A. Lubrecht 8/23/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)



WHC-MR-0209

9 1 1 2 0 5 0 0 0 9 6

Sht 1 of 1

| DRILL LOG | By M.O. Lubrecht | Rig BE 60L #22-14103 L WATKINS | Well Number 299-E25-40 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 24 AUG 1989 | | Depth 274 To 274 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 282'-11 5/8" | | | | WATER (STATIC WATER LEVEL) @ 258'5" (M# 10178) 257'5" (M# 10990) | 0700 | ONSITE - MEASURE TD & H2O |
| | | | | BOTTOM OF HOLE IS 269'1" (ON TOP OF CAVED OR HEAVED MATERIAL). #PNL 300-4 | | |
| | | | | BOTTOM OF CASING IS 274'-3/4" | | |
| | | | | | 0745 | Discussed w/ S. Goodwin, will |
| | | | | | | T.D. this borehole at 274' |
| | | | | | | |
| | | | | Casing is at 274'-2 3/4". A plug of heaved sand is inside | 1002 | |
| | | | | casing, with current interval of water in casing @ 15'-2". Will | | |
| -6'-0" | | | | use sand pump to bail out casing some more. | | |
| 276'11 3/4" | | | | | 1006 | Remove 6'- of 8" casing. |
| | | | | | 1020 | Logging truck on site to |
| | | | | | | geophysically log hole. |
| | | | | | 1154 | Logging completed - |
| | | | | Rechecked hole depth - = 274 ft. | | 110 - 274' interval. |
| | | | | | 1345 | Performed Title III straightness |
| | | | | | | test. Tested OK. |
| | | | | Hole 299-E25-40 T.D. 274 ft. | 1350 | Driller begins to demob. |

REMARKS:

PNL-MA567-DO-1, Rev. 0

Reviewed by V.L. McGlenn 12-5-89

Michael O. Lubrecht 8/24/89

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VS - Very Small F - Fine

Pg 1

WHC-MR-0209

9 1 1 2 0 5 0 0 0 0 7

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-40<br>Location AY TANK FARM | Date SEPT. 12, '89 Sheet No. 1 of 1<br>Project W-017 SST |
|---|---|---|

Logged by S.P AIRHART SPA Date 9-12-89
Reviewed by D.L. Mathes Date 12-6-89
Measuring Equip. S-tape L300-07, E-tape & 10998 Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Datum - land surface |
| 0730 | | | | | | | | | | 1.9' stickup on 8" casing |
| | | | | | | | | | | D/W = 238.78' - 1.9' = 236.88' |
| | | | | | | | | | | D/B = 273.9' bls. |
| | | | | | | | | | | NOTE: Driller added ~ gals |
| | | | | | | | | | | of $H_2O$ to borehole on |
| | | | | | | | | | | ∴ this D/W meas. does not |
| | | | | | | | | | | represent true static. |
| 1145 | | | | | | | | | | Set hyd. jacks over hole. |
| | | | | | | | | | | 1200-1230 lunch - |
| 1346 | screen w/ bottom | 4" | 10.6' | | | | | | | Began setting stainless |
| | screen | 4" | 10.4' | | | | | | | steel (SS) screen & casing |
| | casing w/ cent | 4" | 20.04' | | | | | | | - 10-slot continuous wire-wrap |
| | casing | 4" | 20.04' | | | | | | | channel pack screens. |
| | casing w/ cent | 4" | 20.04' | | | | | | | - Type 304, Schedule 5, SS |
| | casing | 4" | 20.04' | | | | | | | casing - some w/ factory welded |
| | casing w/ cent. | 4" | 20.04' | | | | | | | centralizers (cent.) |
| | casing | 4" | 20.04' | | | | | | | |
| | casing w/ cent. | 4" | 20.04' | | | | | | | 1445 Crane broke down - Hydraulic |
| | casing | 4" | 20.04' | | | | | | | line failed |
| | casing w/ cent. | 4" | 20.04' | | | | | | | |
| | casing | 4" | 20.04' | | | | | | | |
| 1515 | casing w/ cent. | 4" | 20.04' | → | | casing 4" | 20.04' | | | Total SS today = 261.5' |

— 1520 Shut Down

95

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-40 | Date 9/13/89 Sheet No. 1 of 3 |
|---|---|---|
| | Location SST | Project W017 SST |

Logged by EJ Jensen — Date 9/13/89
Reviewed by V.L. McGhan — Date 12-6-89
Measuring Equip. L300-07 — Procedure PNL MA-561 D2-1 Rev 0

Drilling Contractor HEH
Driller Louis Nathis
Rig/Equipment Failing Crane Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0700 | SS casing | 4" | 5' | | | | | | | Bottom of sand |
| | SS casing | 4" | 5' | | | | | | | |
| | SS casing | 4" | 3' | | | | | | | 274.5' Total 4" SS |
| | SS casing | 4" | | 8.0 | | | | | | 280.5' + .5' - 8' = 273.0 D/B of SS |
| | | | | | | | | | | 280.3' + .5' - 6.7' = 274.1 D/B of hole |
| 0815 | | | 280.8 | 6.7' | 274.1' | 10-30 C. Sand | 1/2 Bag | 271.7' | 2.4' | 277.9' + .5' - 6.7' = 271.7' |
| | CS casing | 8" | | 7.7' | 273.1' | | | 272.1 | 1.0' | 279.3' + .5' - 7.7' = 272.1' |
| | | | | | | 10-30 C. Sand | 1/2 Bag | 269.7 | 3.4' | 276.9' + .5' - 7.7' = 269.7' |
| 0845 | CS casing | 8" | | 8.7' | 272.1' | | | 270.6 | 1.5' | 278.8' + .5' - 8.7 = 270.6' |
| | | | | | | 10-30 C. Sand | 1/2 Bag | 267.2 | 4.9' | 275.4' + .5' - 8.7' = 267.2' |
| 0850 | CS casing | 8" | | 9.6' | 271.2' | | | 268.0' | 3.2' | 274.3' + .5' - 6.8' = 268.0' |
| 0900 | CS casing | 8" | | 7.7' | 270.3' | | | 268.6' | 1.7' | 275.8' + .5' - 7.7' = 268.6' |
| | | | | | | 10-30 C. Sand | 1/2 Bag | 266.3 | 4.0' | 273.5' + .5' - 7.7' = 266.3' |
| 0910 | CS casing | 8" | | 8.7 | 269.3' | | | 267.0' | 2.3' | 275.2 + .5' - 8.7' = 267.0' |
| | | | | 8.7 | | 10-30 C. Sand | 1/2 Bag | 264.0' | 5.3' | 272.2' + .5' - 8.7' = 264.0' |
| 0920 | CS casing | 8" | | 6.6 | | | | 264.9' | 4.4' | 271.0' + .5 - 6.6' = 264.9' |
| 0930 | CS casing | 8" | 275.9 | 8.0 | 267.9 | | | 265.6' | 2.3' | 273.1' + .5' - 8.0' = 265.6' |
| | | | | | | 10-30 C. Sand | 1/2 Bag | 263.1' | 4.8' | 270.6' + .5' - 8.0' = 263.1' |
| 0935 | CS casing | 8" | | 9.3 | 266.6 | | | 264.0 | 2.6 | 272.8 + .5 - 9.3 = 264.0' |
| | | | | 9.3 | | 10-30 C. Sand | 1/2 Bag | 261.2' | 5.4 | 270.0 + .5 - 9.3 = 261.2' |
| 0940 | CS casing | 8" | 271.9 | 6.6 | 265.3 | | | 262.4' | 2.9' | 268.5 + .5 - 6.6 = 262.4 |
| | | | | | | 10-30 C. Sand | 1/2 Bag | 259.9' | 5.4' | 266.0 + .5 - 6.6 = 259.9 |

9/13/89

WHC-MR-0209

96

9 1 1 2 0 5 1 0 0 2 9

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 291-E25-40 | Date 9/13/89 | Sheet No. 2 of 3 |
|---|---|---|---|
| | Location SST | Project W017 SST | |

Logged by EJ Jensen — Date 9/13/89
Reviewed by W.E. McSlan — Date 12-6-89
Measuring Equip. L300-07 — Procedure PNL MA567 Rev 0

Drilling Contractor KEH
Driller Louisiana Hills
Rig/Equipment Gaiton Crane Trucks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0950 | CS Casing | 8" | 271.9' | 8.0' | 263.9 | | | 260.9 | 3.0 | 268.4' +.5' - 8.0' = 260.9' |
| | | | | 8.0' | | 10-30 C. Sand | 1/2 Bag | 257.8 | 6.1' | 265.3' +.5' - 8.0' = 257.8' |
| 1000 | CS Casing | 8" | | 9.3' | 262.6 | | | 259.0' | 3.6' | 267.8' +.5' - 9.3' = 259.0' |
| 1005 | CS Casing | 8" | | 10.6' | 261.3' | | | 259.9' | 1.4' | 270.0' +.5' - 10.6' = 259.9' |
| | | | 267.9' | 6.6' | | 10-30 C. Sand | 1/2 Bag | 257.5' | 3.8' | 263.6' +.5' - 6.6 = 257.5' |
| 1015 | CS Casing | 8" | | 7.9' | 260.0' | | | 258.4' | 1.5' | 265.8' +.5' - 7.9 = 258.4' |
| | | | | 7.9' | | 10-30 C. Sand | 1/2 Bag | 255.7' | 4.3' | 263.1' +.5' - 7.9 = 255.7' |
| 1020 | CS Casing | 8" | | 9.0' | 258.9' | | | 257.0' | 1.9' | 265.5' +.5' - 9.0 = 257.0' |
| | | | | 9.0' | | 10-30 C. Sand | 1/2 Bag | 254.2' | 4.7' | 262.7' +.5' - 9.0 = 254.2' |
| 1030 | CS Casing | 8" | | 9.9' | 258.0' | | | 256.3' | 1.7' | 262.6' +.5' - 6.8 = 256.3' |
| | | | | 6.8' | | 10-30 C. Sand | 1/2 Bag | 252.8' | 5.2' | 259.1' +.5' - 6.8 = 252.8' |
| 1040 | CS Casing | 8" | 264.9' | 8.3' | 256.6' | | | 256.7' | 0.1' | 264.5' +.5' - 8.3 = 256.7' |
| | | | | 8.3' | | 10-30 C. Sand | 1 1/2 Bags | 249.9' | 6.7' | 257.7' +.5' - 8.3 = 249.9' |
| 1050 | CS Casing | 8" | 260.7' | 11.0' | 253.9' | | | 251.9' | 2.0' | 258.2' +.5' - 6.8 = 251.9' |
| | | | | 6.8' | | 10-30 C. Sand | 1/2 Bag | 249.5' | 4.4' | 255.8' +.5' - 6.8 = 249.5' |
| 1100 | CS Casing | 8" | | 8.1' | 252.6' | | | 250.2' | 2.4' | 257.8' +.5' - 8.1 = 250.2' |
| | | | | 8.1' | | 10-30 C. Sand | 1/2 Bag | 248.6' | 4.0' | 256.2' +.5' - 8.1 = 248.6' |
| 1110 | CS Casing | 8" | | 9.3' | 251.4' | | | 249.2' | 2.2' | 258.0' +.5' - 9.3 = 249.2' |
| | | | | 9.3' | | 10-30 C. Sand | 1/2 Bag | 247.0' | 4.4' | 255.8' +.5' - 9.3' = 247.0' |
| 1115 | CS Casing | 8" | | 10.7' | 250.0' | | | 247.6' | 2.4' | 253.9 +.5 - 6.8 = 247.6 |
| | | | 256.8' | 6.8' | | | | | | 263.8' - 6.8 = 257.0' = D/W |
| | | | | | | | | | | 279.7' +.5 - 6.8 = 273.4' = D/B |

05 SS

9/13/89

97

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-40 | Date 3/13/89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location SST | Project W017 SST | |

Logged by EJ Jensen — Date 9/13/89
Reviewed by D.L. McKhan — Date 12-6-89
Measuring Equip. L300-07 — Procedure PWL MFS67 ~~Ba-1 Rev 0.~~

Drilling Contractor TEH
Driller Louis Watkins
Rig/Equipment Galion Crane Trucks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1300 | | | | | | | | | | Bailed 1/2 barrel of |
| 1430 | | | | | | | | | | water from well. |
| | | | 256.8' | 6.8' | 250' | | | 247.8' | 2.2' | 254.1' + .5' - 6.8' = 247.8' |
| 1440 | CS Casing | 8" | | 7.7' | 249.1' | | | 248.1' | 1.0' | 255.3' + .5' - 7.7' = 248.1' |
| 1445 | CS Casing | 8" | | 8.0' | 248.8 | | | | 0.5 | 255.8' + .5' - 8.0 = 248.3 Top of sand |

9/13/89

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-40 | Date SEPT. 14, '89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location AT TANK FARM - EAST SIDE | Project W-017 - SST | |

Logged by S. D. AIRHART SDA Date 9/14/89
Reviewed by V.L. McGhan Date 12-6-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-567 PO-1, 882.0

Drilling Contractor KEH
Driller LUNS WATKINS
Rig/Equipment GALION CRANE / HTD JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0740 | CARBON STEEL | 8" | 254.6' | 5.6' | 249' | 16-30 SAND | — | 248.1' | .9' | 255.8' + .3' - 8' = 248.1' |
| | | | 254.6' | 6.1' | 248.5' | | | 248.4' | -1' | 256.5' + .3' - 8.4' = 248.4' |
| | | | | | | | | | | TOP OF SAND @ 248.4' ← |
| | | | | | | | | | | 9.5 100 lb bags 16-30 sand |
| | | | | | | | | | | used = 10.64 ft³ |
| 0755 | | | | | 248.5' | 3/8" Volclay Tablets | | 243.5' | 5' | 251.6 + .3' - 8.4' = 243.5' |
| | | | 254.6' | 7.3' | 247.3' | | | | | 252.8' + .3' - 9.6' = 243.5' |
| | | | | | | | | | | Tablets appear to have bridged. |
| | | | 254.6' | 7.8' | 246.8' | | | 243.8' | 3' | 253.7' + .3' - 10.2' = 243.8' |
| 0825 | | | 254.6' | 9.0' | 245.6' | | | 244.8' | .8' | 255.8' + .3' - 11.3' = 244.8' |
| | | | | | | | | | | Apparent bridge has dropped |
| | | | | | | | | | | TOP OF TABLETS @ 244.8' ← |
| | | | | | | | | | | 2 buckets ~ 1.24 ft³ |
| | | | | | 245.6' | 8-20 Mesh bent. Crumbles | 10 50 lb bags | 215.5' | 30' | 222' + .3' - 6.8' = 215.5' |
| | | | 244' | 6.2' | 237.8' | | | 221.6' | 16.2' | 227.9 + .3' - 6.6' = 221.6' |
| | | | | | 237.8' | | 15 bags | 177.9' | 59.9' | 184.2' + .3' - 6.6' = 177.9' |
| | | | 223.9' | 6.8' | 217.1' | | | 198.1' | 19' | 204.6' + .3' - 6.8' = 198.1' |
| | | | | | 217.1' | | 15 bags | 153.7' | 63.4' | 160.2' + .3' - 6.8' = 153.7 |
| 1100 | | | 205.5' | 6.7' | 198.8' | | | 167.8' | 31' | 174.2' + .3' - 6.7' = 167.8' |
| | | | | | 198.8' | | 10 bags | 137.4' | 61.4' | 143.8' + .3' - 6.7' = 137.4' |
| | | | 185' | 6.8' | 178.2' | | | 152' | 28.2' | 158.5' + .3' - 6.8' = 152' |

WHC-MR-0209

99

9 1 1 2 0 5 0 0 1 0 2

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-40 | Date SEPT. 14 '89 Sheet No. 2 of 2 |
|---|---|---|
| | Location AY TANK FARM - EAST SIDE | Project W-017 - SST |

Logged by S. P. AIRHART Date 9-14-89
Reviewed by T. L. McGhan Date 12-6-89
Measuring Equip. S-TAPE: L300-07 Procedure PNL-MA-567 DC-1, REV.0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HTD JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | CARBON STEEL | 8" | | | 178.2' | 8-20 Bentonite | | 152' | | ← From prev. page. |
| 1140 | | | | | 178.2' | | 10 bags | 122' | 58.2' | 128.5' + .3' - 6.8' = 122' |
| 1200 | | | | | | | | | | Lunch |
| | | | 164.6' | 6.6' | 158' | | | 134.1 | 23.9 | 140.4' + .3' - 6.6' = 134.1' |
| 1315 | | | | | 158' | | 5 bags | 118.9' | 39 | 125.2' + .3' - 6.6' = 118.9' |
| 1440 | | | | | | | | | | Removed remaining 8" casing |
| | | 10" | 144.5' | .8' | 143.7' | | | 144.4' | -0.7' | 144.9' + .3' - .8' = 144.4' |
| | | | | | | | | | | Does not appear to have |
| | | | | | | | | | | caved. |
| | | | | | 143.7' | | 2 bags | 141.5' | 2.2 | 142 + .3 - .8' = 141.5' |
| 1500 | | | | | | | | | | Adding extension |

WHC-MR-0209

100

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-40 | Date SEPT. 15 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location EAST SIDE A TANK FARMS | Project W-017 SST | |

Logged by S.P. AIRHART Date 9-15-89
Reviewed by [illegible] Date 12-6-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-567 DI-1, REV. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HTD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments DATUM = LAND SURFACE |
|---|---|---|---|---|---|---|---|---|---|---|
| 0800 | Carbon Steel | 10" | | | 143.7' | 8-20 Bentonite | | 141.5' | 2.2 | |
| | | | | | 143.7' | | 20 bags | 109.5' | 34.2 | 115.7 + .3' - 6.5' = 109.5' |
| 0841 | | | 135' | 6.7' | 128.3' | | | 116.2' | 12.1' | 122.7 + .3' - 6.8' = 116.2' |
| | | | | | 128.3' | | 20 bags | 84.5' | 43.8' | 91' + .3' - 6.8' = 84.5' |
| | | | 116.6' | 6.9' | 110.0' | | | 92' | 24.6' | 98.7' + .3' - 7' = 92' |
| | | | | | 110.0' | | 15 bags | 68.1 | 41.9 | 74.8 + .3 - 7' = 68.1 |
| | | | 97.6' | 6.9' | 90.7' | | | 76.2 | 14.5 | 82.8' + .3' - 6.9' = 76.2' |
| 1022 | | | | | 90.7' | | 20 bags | 43' | 47.7' | 49.6' + .3' - 6.9' = 43' |
| | | | 78.2' | 6.7' | 71.5' | | | 50.5' | 21' | 56.9' + .3' - 6.7' = 50.5' |
| | | | | | 71.5' | | 15 bags | 26.3' | 45.2' | 32.7' + .3' - 6.7' = 26.3' |
| | | | 59.5' | 6.7' | 52.8' | | | 34.0 | 18.8 | 40.4 + .3' - 6.7 = 34.0 |
| | | | | | 52.8' | | 15 bags | 10.9' | 41.9 | 17.3' + .3' - 6.7' = 10.9' |
| 1132 | | | 39.8' | 6.8' | 33' | | | 19.3' | 13.7' | 25.7' + .3' - 6.7' = 19.3' |
| | | | | | 33' | | 3 bags | 15.1' | 17.9' | 21.5' + .3' - 6.7' = 15.1' |
| | | | 29.8' | 7' | 22.8' | | | 26.7' | -3.9' | 33.4' + .3' - 7.0' = 26.7' |
| | | | | | 22.8' | | 3 bags | 24.9' | -2.1' | 31.6' + .3' - 7.0' = 24.9' |
| | | | | | 22.8' | | 4 bags | 22.8' | 0' | 29.5' + .3' - 7.0' = 22.8' |
| 1200 | | | | | | | | | | lunch |
| 1250 | | | 29.8' | 9.9' | 19.9' | | 3 bags | 20.2 | .3' | 26.6' + .3' - 6.7' = 20.2' |
| | | | 29.8' | 10.5' | 19.3 | | | | -1' | 27.3' + .3' - 7.3' = 20.3' |
| | | | | | | | | | | TOP OF BENTONITE @ 20.3' |
| | | | | | | | | | | 185 bags used = 131.35 ft³ |

101

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-40<br>Location EAST SIDE A TANK FARMS | Date SEPT. 15, 1989 Sheet No. 2 of 2<br>Project W-017 SST |
|---|---|---|

Logged by S.P. AIRHART Date 9-15-89
Reviewed by V.L. McGhan Date 12-6-89
Measuring Equip. S-TAPE # L300-07 Procedure PNL-MA-567 Rev. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Mixing cement for surface seal. |
| | | | | | | Portland Type I & II Cement | 13 94 lb. bags | | | This mixture = 2 batches |
| | | | | | | Water | 80 gals | | | |
| | | | | | | Aluminum Powder | ~ 2 cups. | | | |
| | | | 20.8' | 10.0' | 10.8' | | | 12.3' | -1.5' | 19' - 6.7' = 12.3' |
| | | | | | | | | | | Shut Down |

102

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-40 | Date SEPT. 18, 89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location A-TANK FARMS - EAST SIDE | Project W-017 SST | |

Logged by S.P. AIRHART Date 9-18-89
Reviewed by [illegible] Date 12-6-89
Measuring Equip. S-TAPE - L300-07 Procedure PNL-MA-567 DU-1, REV. 0

Drilling Contractor KEM
Driller CRAIG MAMSLEY
Rig/Equipment GALION CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Portland 1ta Cement | 12 bags | | | Mixed slurry (2 batches) |
| | | | | | | $H_2O$ | 80 gals | | | see contents |
| | | | | | | Al powder | 2 cups | | | ← |
| | | | | | | | | | | |
| | | | | | | | | | | Pulled remaining 8" casing |
| | | | | | | | | | | out of hole after |
| | | | | | | | | | | installing 1st batch - Used |
| | | | | | | | | | | ½ of 2nd batch to bring |
| | | | | | | | | | | surface seal to 2' bls. |
| | | | | | | | | | | |
| | | | | | | | | | | TOP OF CEMENT @ 2' |
| | | | | | | | | | | TOTAL USED 22 bags |
| | | | | | | | | | | = 14.52 ft³. |

109

WHC-MR-0209

WELL 299-E25-41

Drilling at Well 299-E25-41 began August 8, 1989, and reached total depth on August 24, 1989. The well was drilled with a Bucyrus-Erie 22W to a depth of 279.00 ft below ground surface. The sediments encountered were primarily sandy gravel and gravely sand. Static water level during completion was 262.24 ft below ground surface.

Well 299-E25-41 was completed at a depth of 276.34 ft below ground surface. Final well materials include 21.01 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 257.43 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 16-30 mesh Colorado silica sand pack along the screened interval to 2.93 ft above the top of the screen, 3.7 ft of Volclay bentonite pellets, 231.2 ft of 8-20 mesh granular bentonite crumbles, 15.5 ft of Portland cement grout, and an air-entrained concrete pad which extends 2.0 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Pettibone crane during completion. Completion activities at Well 299-E25-41 were finished September 22, 1989.

The estimated volume of water added to the borehole during drilling was 330 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 30 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on October 4, 1989, and a total of 1068 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. Slug injection and withdrawal tests were performed on September 29 and October 2, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on October 25, 1989; this activity concluded well construction and installation.

9 1 1 2 0 5 0 0 1 0 7

SHT 1 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE-60 22-14101 Craig | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/8/89 | | Depth 0 To 10 | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Rig had been steam-cleaned prior to arrival on site, with | 0700 | Arrive on site - drillers |
| | | | | decon inspected by Title III inspector. Only food-grade | | set up rig. |
| | | | | oil was used for makeup of tool string. MDL 8/8/89 | 0903 - | Continue set-up. Water (?) |
| | | | | | | from nearby facility overflow |
| | | | | | | tanks and flows past rig. |
| | | | | | | Moved all logging eq.-p. |
| | | | | | | & supplies to high ground. |
| | | | | | 0911 | Crane offloads casing, |
| | | | | | | tools, etc. |
| | | | | | 0940 | Begin drilling 0-5' interval |
| Ø | | | | | | (open hole) |
| | | D | SM | SAND: 80% fS, 18% vfS, 2% mud; 20% mafic, 80% | 0950 | Samples: 2 lith, 1 moisture |
| | | | | felsic, SA - WR, well sorted - v. well sorted; Color = 7.5 | | no rad. |
| | | | | YR 4/6 No reaction to HCl, unconsolidated rad < Ø; | | |
| | | | | | 1004 | Samples: 2 lith, 1 moist |
| | | D | M | SAND; tr. cP, tr. fP, 20% cS, 40% mS, 20% fS, 5% vfS, | | (questionable validity) |
| | | | | 5% mud; mod sorted, 20% mafic, 80% felsic; SA - VWR; | | |
| | | | | 10YR 5/6; vigorous HCl reaction; unconsol. - rad < Ø; no cont. | | |

REMARKS:

PNL-MA567-DO-1 - REV Ø

Reviewed by W. L. McSolan 12-7-89

Mark D. Lubrecht 8/8/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

105

WHC-MR-0209

9 1 1 2 0 5 0 0 1 0 8

Sht 2 of 2

| DRILL LOG | By M.D. Libreckt | Rig BE 60 22-14101 Crag | Well Number 299-E-25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/9/89 | | Depth 10 To 10' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 12'0" + 9'3" 21'3" | | D | | Picked up gravel @ 12' (gravelly SAND) | 1015 | Hole sloughing, drill decided to begin setting casing. |
| | | | | | ~1045 | Equipment on site to provide additional tools |
| | | | | | 1120 - | Started to drive 10" casing. |
| | | | | | 1157 | Stop for lunch |
| | | | | | 1230 | Return from lunch |
| | | | | | | Continued to drive |
| 21'3" | | | | | | and add 10" casing. |
| | | | | | 1530 | END OF SHIFT |

REMARKS:

PNL-MA567-001 - REV Ø

Reviewed by K.L. Wahlen - 12-7-89

M.D. Lib 8/9/89

WHC-MR-0209

901

| DRILL LOG | By AIRHART | Rig BE 22W 14101 Craig | Well Number 299-E25-41 | Computer Number NA | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-9-89 | | Depth 10' To 20' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Raining - some lightning | 0700 | on site |
| | | | | | 0720 | Drilling |
| | 15' | D | M | SLIGHTLY MUDDY SAND: 85% sand, 15% mud - | → | This sample taken |
| | | | | dom. MS-FS - Note: ~ 3" silt lense @ 14'. | | @ 1510 on 8/8/89 |
| | | | | - wet color olive brown 2.5Y 4/4 - | | Took (2) pint |
| | | | | sand composition - 60% basalt 40% qtz, felsic - | | lithologic samples - |
| | | | | Mod. rxn. w/ 10% HCl. unconsolidated. | | No moisture sample |
| | | | | | | |
| | | | | | | |
| | 20' | D | M | SANDY GRAVEL: 35% gravel (largest clast ~ 110 mm - | 0800 | Took 2 pint litho. |
| | | | | quartzite) 65% sand: TR. SC, 2% VCP, 8% CP, 10% MP, | | samples, No |
| | | | | 20% FP-VFP, 30% VCS, 20% CS, 10% MS, 5% FS-VFS - very | | moisture sample - |
| | | | | clean sedg. - essentially no mud - gravel - 40% basalt | | No chemical sample. |
| | | | | 60% qtzite, granitic - SA-SR - sand - 50% basalt | | |
| 31'4" of | 10" casing | | | 50% qtz-rich, felsic - color: very dark | 0830 | Adding 10'1" of 10" casing |
| | | | | grayish brown 2.5Y 3/2 - No rxn. w/ 10% HCl - | | 21'3" + 10'1" = 31'4" |
| | | | | unconsolidated. | 0930 | Resumed Drilling |
| | | | | | | |

REMARKS:

PNL-MA-567 DO-1 REV. 0 Reviewed by V. L. McSlan 12-7-89 S. P. A. 8/9/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

107

WHC-MR-0209

| DRILL LOG | By: AIRHART | Rig: BE 22W 14101 Craig W. | Well Number: 299-E25-41 | Computer Number: NA | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-9-89 | | Depth: 20' To 35' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 25' | D | SM | SANDY GRAVEL: same as 20' except slightly | 0955 | Took (2) pint |
| | | | | smaller gravels and presence of 15% mud. | | lith. samples (1) |
| | | | | | | moisture sample |
| | | | | | | No contamination |
| | | | | Note change in lithology @ 28' | | detected |
| | 30' | D | SM | SAND: 3% gravel, 92% sand, 5% mud: | 1025 | Took (2) pint |
| | | | | 3% VFP, 10% VCS, 10% CS, 40% MS, 32% FS-VFS, | | lith samples |
| | | | | 5% mud: Mod. sorted: sand: 25% basalt | | (1) moisture |
| | | | | 75% si-rich including: quartz, plag, mica, Felsic | | sample. No |
| | | | | rock frags - A-SA: wet color olive gray | | contam. detected. |
| | | | | 5Y 5/2 - Mod rxn w/ 10% HCl - unconsolidated. | | |
| 40'9" of 10" casing | | | | | 1145 | Added 9'5" of 10" |
| | | | | | | 31'4" + 9'5" = 40'9" |
| | | | | | 1200-1230 | lunch |
| | 35' | D | SM | SAND: 97% sand (MS-VFS dom. MS-FS) 3% mud- | 1250 | Took (2) pint |
| | | | | Well sorted: sand: 20% basalt 80% si-rich, | | lithologi samples |
| | | | | (same as above) - A-SA: wet color - light olive | | (1) moisture sample |
| | | | | brown 2.5Y 5/4: No rxn. w/ 10% HCl - unconsolidated. | | No contam. detected. |

REMARKS:

PNL-MA-567 DO-1 REV. 0 Reviewed by T.G. McGhan 12-7-89 8/9/89

301

WHC-MR-0209

| DRILL LOG | By AIRMART | Rig BE 22W 14101 Craig | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-9-87 | | Depth 35' To 40' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 13:05 | Added 1 gal. $H_2O$ |
| | | | | | | to borehole. |
| | | | | | 13:15 | Added 1 gal. $H_2O$ |
| | | | | | | to borehole. |
| | | | | | 13:25 | Added ½ gal. $H_2O$ |
| | | | | | | to borehole |
| | 40' | D | W | MUDDY SANDY GRAVEL: 40% GRAVEL, 50% SAND, | 13:45 | Took (2) lith. |
| | | | | 10% MUD - TR MP, 40% FP-VFP, 30% VCS, | | samples, (2) 500 |
| | | | | 10% CS, 10% MS-VFS, 10% MUD, Mod-Poorly | | ml chemical |
| | | | | sorted - gravel - 50% basalt, 50% quartzite, | | samples - ref. |
| | | | | granitic - note: some clasts exhibit weathering | | chain-of-custody |
| | | | | Dom. Ang. - sand - 35% basalt, 65% qtz, | | # SST080989 |
| | | | | f-spar, rock frags - A-SA - wet color | | No cont. detected. |
| | | | | olive gray 5Y4/2 - Mod.-to-strong rxn. w/ | | |
| | | | | 10% HCl - Unconsolidated. | | |
| 50'5" of | 10" casing | | | | 1450 | Added 9'8" of 10" casing |
| | | | | | | 40'9" + 9'8" = 50'5" |
| | | | | | 1455 | Drilling |

REMARKS:

PNL-MA-567 DO-1 REV. 0 Reviewed by [illegible] 12-7-89 [illegible] 8/9/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

109

WHC-MR-0209

| DRILL LOG | By: AIRHART | Rig: BE 22W 14101 Craig | Well Number: 299-E25-41 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-9-89 | | Depth: 40' To 44' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1520 | Shut Down |

REMARKS:

Added 2 1/2 Gallons of $H_2O$

PNL-MA-517 PR-1 REV. 0 Reviewed by M.C. Mahler 12-7-88 SHA 8/19/89

WHC-MR-0209

110

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| [illegible] / LUBRECHT | BE 22W 14101 Craig | 299-E25-41 | N/A | W-017 SST |
| Date: 8-10-89 | | Depth: 44' To 50' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 50'5" | 44' | | | | 0715 | Start Drilling |
| | 45' | D | D | slightly gravelly SAND; 5% gravel, 95% sand : 2% FP, | 0727 | Collected (2) pint lithologic |
| | | | | 3% VFP, 5% VCS, 30% CS, 40% MS, 13% FS, 7% VFS | | samples; (1) moisture sample |
| | | | | GRAVEL: 60% BASALT, 40% FELSIC & SEDS SA TO SR | | |
| | | | | SAND: 35% BASALT, 65% FELSIC & SEDS SA TO SR | | |
| | | | | No RXN W/10% HCl Wet color 5Y 5/2 OLIVE GRAY | | |
| | | | | Sample slightly moist Unconsolidated. 0 ppm (OVA)/< Ø = rad. | | |
| | | | | | | |
| 60'4" | | | | Adding 9'11" of 10" casing. Total = 50'5" + 9'11" = 60'4" | 0810 | Preparing to weld casing |
| | | | | | 0850 | Completed Casing Install- |
| | | | | | | start drilling |
| | 50' | D | SM | SAND: 4% Gravel, 96% SAND; 4% VFP; 6% VCS, 10% CS, | 0942 | Sample: (2)- 1pt. lith, |
| | | | | 50% MS, 20% FS, 10% VFS, tr. Mud; well sorted; gravel: | | (1) moisture tin. |
| | | | | 15% mafic, 85% felsic - SAND: Same; gravel: A-SR, sand: SA-R; | | |
| | | | | 10YR 6/4; slight reaction w/ HCl; slightly consolidated. coarser | | |
| | | | | than above (fining upwards). 0 ppm (OVA)/< Ø rad. | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA-567 DO-1, Rev. 0 Reviewed by V.L. Mulkey 12-7-89 M.A. Luber 8/10/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

9 1 1 2 0 5 0 0 1 1 4

Sht. 2 of 3

| DRILL LOG | By M.D. Lubrecht | Rig CE 22W 22-14101 Craig | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/10/89 | | Depth 50' To 65' | | Subcontract No. N/A. |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 55' | D | SM | SAND; Same description as 50' sample | 1020 | Samples: (2) 1 pt. lith, |
| | | | | | | (1) moisture |
| 60'4" | | | | | 1046 | Add 10" Casing. |
| +9'9" | | | | | | |
| 70'1" | 60' | D | SM | gravelly SAND: 12% Gravel, 88% SAND; 3% mP | 1150 | Samples: (2) 1 pt. lith; |
| | | | | 4% fP, 5% vfP; 12% vcS, 20% cS, 30% mS 15% fS, | | (1) moisture; (2) chemical |
| | | | | 11% vfS; v. P Sorted; Gravel 20% mafic, 80% felsic; SAND; | | C-O-C |
| | | | | 20% m / 80% f; Gravel SA - WR; SAND: VA - SR; 10YR6/4; | | #SST 081089 |
| | | | | Slight ≈ w/ HCl, unconsolidated. 0 ppm (OVA) / | | |
| | | | | <Ø rad. | 1200 | leave for lunch |
| | | | | | 1230 | return - continue drilling |
| 70'1" | 65' | D | SM | slightly gravelly SAND: similar to above | 1316 | Sample: (2) 1 pt lith; |
| +9'10" | | | | 0 ppm (OVA) / <Ø rad | | (1) moisture |
| 79'11" | | | | | | |
| | | | | | 1342 | Add casing |
| | | | | | 1440 | Resume drilling |

REMARKS:

PNL-MA567 DO-1, Rev 0 Reviewed by V.L. Marlow 12-7-89 M.D. Lubrecht 8/10/89

WHC-MR-0209

1/2

| DRILL LOG | By M. D. Lubrecht | Rig BE 22W 22-14101 C. WAMSLEY | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/10/89 | | Depth 65' To 74' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 79'11" | 70' | D | Sm | gravelly SAND: 15% Gravel, 85% SAND - 3% mP, 5% fP, 7% vfP, 15% vcS, 30% cS, 30% mS, 10% fS, tr. vfS. | 1450 | SAMPLE: (2) 1 pt. litho.; (1) moisture |
| | | | | Moderate sorting; Gravel: 25% mafic / 75% felsic, A-WR; | | |
| | | | | SAND: 20% mafic / 80% felsic, SA-WR, low-mod. sphericity; | | Continue drilling. |
| | | | | 5Y4/2 olive gray; slight ⇌ w/ HCl; poorly consolidated. More | | |
| | | | | gravel than above. 0ppm (OVA)/Cont. | | |
| | | | | | | |
| | | | | | 1517 | - Starting next sample |
| | | | | | | interval. Geologists |
| | End of shift | | 74' | | | held site to retrieve |
| | | | | | | geo @ 2000W |

REMARKS:

PNL-MA567 DO-1, Rev. 0 Reviewed by R.L. McGhan 12-7-89

Mill D Lub 8/10/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing W.L.

113

WHC-MR-0209

9 1 1 2 0 5 7 0 1 1 6

Sht. 1 of 3

| DRILL LOG | By M.D. Lubrecht | Rig BE-22W #22-14101 C. Wensley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/11/89 | | Depth 74' To 80 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8 79'11" | 74' | D | | | 0730 | Driller & Geo on site - |
| +9 11 | | | | | | commence drilling @ 74' |
| 88'10" | | | | | | |
| | 75' | D | SM | gravelly SAND: 25% Gravel, 75% Sand: Tr. cP; 5% mP; | 0759 | SAMPLE: (2)-1 pt. lith. + |
| | | | | 10% fP, 10% vfP, 12% vcS, 30% cS, 25% mS, 8% fS, Tr. vfS; | | (1) moisture. |
| | | | | poorly sorted; Gravel: 30% basalt / 70% felsic, A-WR; SAND | | |
| | | | | 25% mafic / 75% felsic; VA-SR; 10% CA; slight ⇌ w/HCl; un- | | |
| | | | | consolidated | 0822 | Add casing. |
| | | | | | 0946 | Casing addition complete - |
| 88'10" | 80' | D | SM | slightly gravelly SAND: 10%(-) Gravel, 90% SAND: 2% mP, | | Resume drilling. |
| | | | | 3% fP, 5% vfP, 4% vcS, 30% cS, 40% mS, 10% fS, 6% | 0955 | SAMPLES: (2) 1 pt. lith, |
| | | | | vfS; poorly-mod. sorted; Gravel: 40% basalt, 60% felsic; | | (1) moisture (2) chemical |
| | | | | SA-WR; SAND: 20% Basaltic / 80% felsic, A-SR; 10% CA; | | # SST 081109 |
| | | | | slight ⇌ w/HCl; slightly consolidated | | |
| | | | | | 1000 | Resume drilling |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA567-DO-1, Rev. Ø

Reviewed by D.L. McElroy 12-2-89

Michael D. Lubrecht 8/11/89

WHC-MR-0209

14

9 1 1 2 0 5 0 0 1 1 7

Sht. 2 of 3

| DRILL LOG | By M.D. Lubrecht | Rig BE-22W #22-1414 C. Wemsley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/11/89 | | Depth 80 To 95 | | Subcontract No. MA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 88'10" | 80 - | | | | | |
| | 85 | D | SM | gravelly SAND: 25% GRAVEL, 75% SAND — 5% cP, 5% mP 7% fP, 8% vfP, 10% vcS, 15% cS, 40% mS, 8% fS; 2% vfS; poorly sorted; GRAVEL: 35% basaltic/65% felsic, SA-WR; SAND: 30% Basaltic/70% felsic, A-SR, 10 YR 5/3; mod = w/HCl, slightly - mod. consolidated (cemented - sand matrix on some pebbles.) | 1056 | SAMPLE: (2) 1 pt. lith; (1) moisture |
| | 90 | D | SM | gravelly SAND: lithology similar to 85' sample | 1120 | SAMPLE: (2) 1 pt. lith; (1) moisture |
| +9'8" | | | | | 1129 | Add Casing. |
| 98'6" | | | | | 1200 | Break for lunch |
| | | | | | 1230 | Return - complete casing. |
| | | | | | 1330 | Begin drilling |
| | 95 | D | SM | gravelly SAND: similar to above; slightly coarser (20% cS, 35% mS); locally weakly cemented w/ caliche | 1416 | SAMPLES: (2) 1 pt. lith; (1) moisture (Note: Hard drilling in gravel.) |

REMARKS:

PNL-MA-567 DO-1, Rev. 0 Reviewed by D. L. McGlam 12-7-89 M.D. Lubrecht 8/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

115

9 1 1 2 0 5 0 0 1 1 3

Sht. 3 of 3

| DRILL LOG | By M.D. Lubrecht | Rig BE 22W 22-14101 | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/11/89 | C. Wemsley | Depth 95 To 98' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 98'6" (10" ϕ) | 95 | D | Sn | See previous page | 1449 | STOPPED DRILLING TO |
| | | | | | | ADD 10" CASING. |
| | | | | | | Geologist vacated site |
| | | | | | | to E25-90 |

REMARKS:

PNL-MA-567 DO-1, Rev. ϕ Reviewed by V.L. Markham 12-7-89 Michael D. Lubrecht 8/11/89

116

WHC-MR-0209

9 1 1 2 0 5 0 0 1 1 9

SHT. 1 of 2

| DRILL LOG | By M. Lubrecht | Rig BE-22W 22-14101 C. Wemsley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/14/89 | | Depth 100 To 110 | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 98'6" | | | | | 0715 | Begin Drilling |
| | 100' | D | SM | SAND: 2% Gravel, 98% SAND; Tr. large Cobble, Tr. mP, 2% vfP | 0740 | SAMPLES: (2) 1 pt. lith. |
| | | | | Pebbles, vcS 50%, cS 35%, mS 13%; well sorted; gravel: 70% | | (1) moisture; (2) chemical |
| | | | | basaltic / 30% felsic, A-WR; SAND: 20% mafic / 80% felsic, vA-SR; | | # SST 081489 |
| | | | | 10YR 5/4; No HCL ⇌; unconsolidated. 0 ppm-OVA / rad < Ø | | |
| | | | | | | |
| +10'5" | | | | | 0745 | Begin to add casing |
| 108'11" | | | | | 0821 | Casing addition completed - |
| | | | | | | Start drilling & driving. |
| | | | | | | |
| | 105 | D | SM | SAND: similar to above. Locally, slightly indurated w/ FeO | 0919 | SAMPLES: (2) 1 pt. lith.; |
| | | | | cement; no HCl ⇌; no cobbles noted; unconsolidated. 5Y6/3 | | (1) moisture |
| | | | | 0 ppm (OVA); rad < Ø | | |
| | | | | | 0950 | START ADDING CASING. |
| +10'5½" | | | | | 1054 | Resume drilling |
| 119'4½" | 110 | D | SM | SAND: similar to above; slight ⇌ w/ HCl; slightly indurated | 1113 | SAMPLE: (2) 1 PT. |
| | | | | (consolidated); 1-2% mud cement locally, 5Y6/3 | | LITH; (1) moisture |
| | | | | 0 ppm (OVA) / Rad < Ø | | |

REMARKS:

PNL - MA567 - DU-1, Rev. Ø

Reviewed by W.E. Mulham 12-7-89

Michael A. Jones 8/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

117

9 1 1 2 0 5 0 0 1 2 0

SHT. 2 of 2

| DRILL LOG | By M. Lubrecht | Rig BE-22W 22-14101 C. Wensley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/14/89 | | Depth 110 To 120 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 119'4½" | | | | | 1200 | Lunch |
| +9'7" | | | | | 1230 | Return from lunch |
| | 115' | D | Sm | SAND: 2% VCS, 13% CS 50% MS, 25% FS, 7% VFS, 3% mud; | 1315 | SAMPLE: (2), 1 pt. Lith; |
| | | | | well-sorted; 20% mafic / 80% felsic; A-SR; 5Y 6/3; Sl. ≡ w/HCl; | | (1) moisture. |
| | | | | slightly consolidated. 0 ppm (OVA)/rad < Ø | | |
| | | | | | 1330 | ADD CASING |
| | | | | | 1500 | Resume drilling |
| 128' 11½" | 120 | D | Sm | Interbedded SAND: same as 115' and muddy SAND: 70% vfs, 30% | 1505 | SAMPLE: (2), 1 pt. Lith; |
| | | | | mud; 10YR 6/4; reacts well w/ HCl; moderately consolidated. | | (1) moisture: Note: No |
| | | | | 0 ppm (OVA)/al < Ø | | chemical sample taken, buy |
| | | | | | | at rig E-25-40 |

REMARKS:

PNL-MA567-DO-1, REV. Ø

Reviewed by V.C. Wertsham 12-7-89

Michael R. Lubrecht 8/14/89

377

WHC-MR-0209

9 1 1 2 0 5 0 0 1 2 1

SHT 1 of 2

| DRILL LOG | By M. Lubrecht | Rig BE-22W 22-14101 C. Wamsley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/15/89 | | Depth 120 To 130 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 128'-11½" | | | | | 0700 | ON SITE - DRILLER |
| | | | | | | PERFORMING MAINTENANCE |
| | | | | | 0715 | COMMENCE DRILLING |
| | 125' | D | SM | Interbedded SAND and muddy SAND: (~40% SAND - 60% muddy SAND) | 0800 | SAMPLES: (2), 1 pt. Lith., |
| | | | | SAND: 2% vfP, 5% vcS, 20% cS, 40% mS, 30% fS, 3% vfS; 20% basalt/80% felsic moderately-sorted; A-SR; 10YR 6/4; slight-mod. ⇌ w/ HCl; slightly consolidated. | | (1) moisture, (2) chemical. |
| | | | | muddy SAND: 75% vfS, 25% mud (~70% silt, 30% clay); 10YR 6/4; mod. reaction w/ HCl; slightly consolidated (friable) | 0815 | START TO ADD CASING |
| | | | | | 0940 | Casing completed. Start drilling. |
| | 130' | D | SM | SAND; 3% GRAVEL, 95% SAND; 2% mud - 1% fP, 2% vfP, | 0944 | SAMPLES: (2), 1 pt. Lith; |
| 9'-8" | | | | 7% vcS, 20% cS, 40% mS, 20% fS, 8% vfS, 2% mud; moderately- | | (1) moisture. |
| 138'-7½" | | | | sorted, GRAVEL: 50% mafic/50% felsic, A-R; SAND: 20% MAFIC/80% FELSIC, | | |
| | | | | A-SR, low-mod. sphericity; 10YR 6/4, sl. ⇌ w/ HCl; sl. consolidated. | | |
| | | | | No interlayers! | 1000- | Geophysically-logged |
| | | | | | 1115 | borehole w/ nat. gamma |
| | | | | | | probe. |

REMARKS:

PNL - MA 567 - DO-1, Rev. 0

Reviewed by V. L. McGehan 12-7-89

Michael J. Lubrecht 8/15/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

119

WHC-MR-0209

9 1 1 2 0 5 0 0 1 2 2

SHT. 2 of 2

| DRILL LOG | By M.O. Lubrecht | Rig B6-22W 22-1414 C. Wensley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. WO17-SST |
|---|---|---|---|---|---|
| | Date 8/15/89 | | Depth 130' To 135 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 138'7½" (- stickup) 10" casing | | | | | 1130 | Logging completed - resume drilling. (4-130⊙ logged) |
| | 135 | D | SM | SAND: similar to 135' sample. Locally moderately consolidated (indurated) w/ $CaCO_3$ cement - friable. | 1150 | STRINGS: (2) 1 pt. Lithi; (1) moisture |
| | | | | | 1200 | Lunch |
| | | | | | 1239 | Return - resume drilling. |
| | | | | | 1312 | Complete driving 10" casing |
| | | | | | | Start rigging to trip in w/ 8" casing. Removed 10" drive barrel; installed 8" drive barrel, using food-grade oil as thread lubricant. |
| | | | | | 1406 | Left site; drilling tripping in 8" casing. |

REMARKS:

PNL-MA507-DO-2, Rev. 0 Reviewed by V.L. McShane 12-7-89

Mark O. Lubrecht 8/15/89

120

WHC-MR-0209

9 1 1 2 0 5 0 0 1 2 3

Sht. 1 of 1

| DRILL LOG | By M.D. Lubrecht | Rig BE-22W #22-14101 C. Wamsley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/16/89 | | Depth 135 To 145' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0700 | Drillers on site - installing |
| | | | | | | 8" casing. |
| | | | | | 1230 | On site - |
| 138'-7½" (10") | | | | | 1325 | START DRILLING 8" borehole |
| 147'-8½" (8") | 140' | D | M | SAND: 3% GRAVEL, 95% SAND; 2% mod — 1% fP, 2% vfP, | 1330 | SAMPLES: (2), 1 pt. |
| | | | | 7% vcS, 20% cS, 40% mS, 20% fS, 8% vfS, 2% mod; moderately | | lith; (1) moisture; (2) |
| | | | | sorted; GRAVEL: 50% mafic / 50% felsic, A-R; SAND: 20% mafic / | | Chemical #SST081689 |
| | | | | 80% felsic, A-SR, low-mod. sphericity; 10YR 6/4 pale yellowish | | |
| | | | | brown; slight ≠ w/ HCl; sl consolidated. 0 ppm (OVA); rad < det. | | |
| | | | | | | |
| | 145' | D | M | SAND: Same as 140' sample. Locally slightly indurated w/ | 1418 | SAMPLES: (2), 1 pt. lith. |
| | | | | calcium carbonate. 0 ppm (OVA); rad < det. | | (1) moisture. |
| +10' | | | | | 1433 | Add 8" casing. |
| 157'8½" | | | | | 1520 | Left site |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL- MA 567- DO-1, Rev. 0 Reviewed by V.L. Markham 12-7-89 Michael D. Lubrecht 8/16/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

WHC-MR-0209

121

9 1 1 2 0 5 0 0 1 2 4

SHT 1 of 3

| DRILL LOG | By MO Lebrecht | Rig BE 22W # 22-14101 C. Wemsley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/17/89 | | Depth 150 To 160 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 157'-8½" | | | | | 0752 | On-site, Driller completes |
| | | | | | | casing welding (8") |
| | | | | | | Started on 8/16 shift. |
| | | | | | 0831 | Begin Drilling |
| | 150' | D | M | SAND: 3% Gravel, 96% SAND, 1% MUD / 3% vfP; 5% vcS, | 0858 | Samples: (2), 1 pt. lith., |
| | | | | 30% cS, 50% mS, 8% fS, 3% vfS, 1% MUD; well sorted; | | (1) moisture. |
| | | | | GRAVEL: 20% mafic / 80% felsic, A-SR; SAND: 20% mafic / 80% | | |
| | | | | felsic, SA-R; 10YR 6/4 pale yellow brown; reacts w/ HCl; | | |
| | | | | unconsolidated to slightly indurated w/ CaCO3 0 ppm OVA/rad det. | | |
| | 155' | D | M | SAND: Same lithology and properties as 150 ft. sample. Locally | 0920 | Samples: (2), 1 pt. lith., |
| | | | | slightly more indurated (still friable). 0 ppm OVA rad det. | | (1) moisture. |
| +10'-0" | | | | | | |
| 167'-8½" | | | | | 0930 | Add 8" casing |
| | | | | | 1012 | Resume drilling |
| | 160' | D | M | SAND: similar to 155 ft. sample. Locally slightly more | 1039 | Samples: (2), 1 pt. |
| | | | | indurated. Contains some clasts (ripups?) of mud. | | lith.; (1) moisture, |
| | | | | 0 ppm OVA/rad det | | (2) chemical #SST 091789 |

REMARKS:

PNL-MA567-DO-1, Rev. 0

Reviewed by V.K. McGlynn 12-7-89

Michael M. Sulser 8/17/89

22

WHC-MR-0209

9 1 1 2 0 5 0 0 1 2 5

Sht. 2 of 3

| DRILL LOG | By M. Lubrecht | Rig Be-22u #22-14101 C. Wensley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/17/89 | | Depth 160 To 180 | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 167'-8½" | 165' | D | SM | SAND: similar to 160' ft. sample. Same gr. size distribution | 1112 | SAMPLES: (2), 1 pt. lith.; |
| +10:0 | | | | and lithology. 0 ppm OVA / rad < Det. | | (1) moisture. |
| | | | | | | |
| 177'-8½" | | | | | 1115 | Start to add 8" casing. |
| | | | | | 1200-1230 | Lunch break |
| | | | | | 1230 | Complete casing addition |
| | | | | | 1254 | START DRILLING |
| | 170' | D | SM | SAND: Similar to 165' (150') sample. | 1313 | SAMPLES: (2), 1 pt lith.; |
| | | | | 0 ppm OVA / rad < det | | (1) moisture. |
| | | | | | | |
| | 175' | D | SM | SAND: Similar to 170' (150') sample — same grain-size distribution, | 1340 | SAMPLES: (2), 1 pt. lith.; |
| | | | | and lithology. Slightly less indurated, reacts w/ 10% HCl. | | (1) moisture. |
| +10-0 | | | | 0 ppm OVA / rad < det. | 1349 | Begin to add 8" casing. |
| | | | | | 1420 | Casing add - resume drilling |
| 187'-8½" | 180 | D | SM | slightly gravelly SAND: 5% Gravel, 93% SAND, 2% mud; 1% cP, | 1441 | Samples: (2), 1 pt. lith.; |
| | | | | 1% mP, 1% fP, 2% vfP, 10% vcS, 15% cS, 40% mS, 20% fS, | | (2) chemical; 1 moisture |
| | | | | 8% vfS, 2% mud; poorly sorted: GRAVEL: A-WR, 20% m/80% f | | SSI 081489 |

REMARKS:

PNL - MA 567 - DO-1, Rev. 0 Reviewed by T.L. McShane 12-7-89 Mike A. Lubrecht 8/17/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

123

WHC-MR-0209

9 1 1 2 0 5 0 0 1 2 6

Sht. 3 of 3

| DRILL LOG | By M. Lubrecht | Rig BE-22W 22-14101 C Wamsley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date August 89 | | Depth 180 To 185 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 180' | D | M | (continued) SAND: 20% M / 80% C; A-SR; 10YR5/4 mod yellowish brown; strong ≠ w/ HCl, moderate consolidation locally. Coarser-grained than previous (overlying) 20'. | | |
| | | | | 0 ppm OVA / rad < det. | | |
| | 185 | D | M | slightly gravelly SAND; same as 180' sample | 1502 | Samples: (2), 1 pt. Lith., 1 moisture |
| | | | | 0 ppm / rad < det. | 1510 | Completed drilling for day. Will add casing tomorrow |

REMARKS:

PNL-MA567-DO-1, Rev 0 Reviewed by V.C. Mathews 12-7-89

Michael Lubrecht 8/18/89

124

WHC-MR-0209

| DRILL LOG | By: M.D. Lubrecht | Rig: BE-22W #22-14101 | Well Number: 299-E25-41 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 18 August 89 | C. Wamsley | Depth: 185 To 196 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 187'-8½" | | | | | 0719 | Driller performing maintenance. Begin drilling. |
| | 187 | D | | Thin (2" thick) vfS & mud lense. Coarsening upward to lithology similar to 185 ft sample. | 0755 | |
| | | | | | 0810 | Begin to add 8" casing |
| ++10'-3" / 197'-11½" | | | | | 0913 | Casing addition completed - resume drilling. |
| | 190' | D | SM | SAND: 2% GRAVEL, 96% SAND, 2% MUD: / TR fP, 2% vfP, 3% vcS, 5% cS, 70% mS, 10% fS, 8% vfS, 2% mud; well-sorted; GRAVEL: 40% basaltic / 60% felsic, A-SA; SAND: 20% basalt / 80% felsic, A-R; 10YR 7/4 very pale brown; moderate ≈ w/ HCl; slightly consolidated; less gravel than previous sample. | 0923 | SAMPLES: (2), 1 pt. Lith.; (1) moisture. |
| | 195' | D | SM | SAND: Similar to 190' - Gravel ~ 50% basaltic / 50% felsic. | 1008 | SAMPLES (2), 1 pt. Lith.; 1 moisture |
| | | | | ~196' - encountered cobbles/gravel, according to driller. | 1025 | Begin rigging for hand tool. Using food-grade |

REMARKS:

PNL-MA567-DO-1, Rev. Ø

Reviewed by W.K. Markham 12-7-89

Michael D. Lee 8/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

125

WHC-MR-0209

9 1 1 2 0 5 0 0 1 2 8

Sht. 2 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE-22 W #22-14101 | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 18 August 1989 | C. Wernsley | Depth 196 To 200 | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 197'-11½" | | | | | | oil for thread lube, |
| | | | | | | where needed. |
| | | | | | 1154 | Begin to add casing. |
| | | | | | 1200 | Lunch |
| | | | | | 1232 | Return from lunch - Continue |
| | | | | | | adding section of casing. |
| | | | | | 1333 | Casing complete - start |
| | | | | | | driving casing. Bracket |
| | | | | | | falls off mast - misses |
| | | | | | | driller. |
| | | | | | 1342 | Add 3 gal. $H_2O$ (200E Raw |
| | | | | | | water supply) to hole for HT |
| | | | | | | drilling. Start drilling. |
| | 205' | HT | — | Sandy GRAVEL; 40% GRAVEL, 57% SAND, 3% mud; 8% vcP, | 1457 | SAMPLE: (2) 1 pt. lids. |
| | | | | 15% mP 10% fP, 7% vfP, 20% vcS, 15% cS, 10% mS, 7% fS, 5% vfS, | | |
| | | | | 3% mud, poorly sorted | | |
| | | | | GRAVEL: 50% basaltic / 50% felsic (larger chunks more basalt) A-WR; | | |
| | | | | SAND: 30% Basaltic / 70% felsic, A-WR; 5Y5/2 olive gray; | | |
| | | | | no reaction/HCl; sl-mod consolidated. | 1522 | STOP DRILLING. |

REMARKS:

ADDED 3 GALLONS OF DRIN WATER

PNL-MA567-D0-1, Rev. 0

Reviewed by W.C. Matthews 12-7-89

Michael D. Lubrecht 8/18/89

WHC-MR-0209

196

9 1 1 2 0 5 0 0 1 2 9

SHT. 1 of 2

| DRILL LOG | By MD. Lubrecht and I.N. Kennedy | Rig BE-22W #22-14101 | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 21 August 1989 | | Depth 200 To 205 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 197'-11½" | | | | | 0700 | ON-SITE: CRAIG WON'T BE |
| | | | | | | DRILLING THIS MORNING. NEW |
| | | | | | | DRILLER ARRIVES. LOUIS ASSISTS |
| | | | | | | IN REMARKING CASE. (5' |
| | | | | | | INCREMENTS) |
| | | | | | 0748 | START DRILLING |
| | 205' | HT | WET | Sandy GRAVEL: 70% GRAVEL, 27% SAND, 3% mud - 5% cP, | 0855 | SAMPLES: (2), 1 pt Lith. |
| | | | | 25% mP, 20% fP, 20% vfP, 5% vcS, 10% cS, 7% mS, 4% fS, 1% vfS, | | w/ flat-bottom bailer - |
| | | | | 3% mud (?), poorly sorted; GRAVEL: 40% Basaltic / 60% felsic, A-WR; | | added drill water. |
| | | | | SAND: 30% Basaltic / 70% felsic, SA-SR; 2.5Y 6/2 light brownish gray; | | |
| | | | | no HCl reaction; unconsolidated. 0ppm OVA; red C dot. | | |
| + 10'-0" | | | | | 0900 | PREPARE TO ADD 8" CASING. |
| 207'-11½" | | | | | 1109 | CASING ADDITION COMPLETE - START |
| | | | | | | DRIVING. |
| | | | | | 1200-1230 | LUNCH |
| | | | | | 1240 | Resume drill. |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA567-D0-1, Rev.0 Reviewed by V.G. McGlynn 12-7-89

Mikel D. Lubrecht 8/21/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

177

9 1 1 2 0 5 0 0 1 7 0

Sht. 2 of 2

| DRILL LOG | By M.O. Lubrecht | Rig BE 22U | Well Number 299-E25-41 | Computer Number | Project or Work Order No. W-017 SSS |
|---|---|---|---|---|---|
| | Date 21 Aug. 1989 | # 22-14101 | Depth 205 To 215 | NA | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 210 | HT | WET | gravelly SAND; 15% Gravel, 83% SAND, 2% MUD: 3% mP, 5% | 1320 | SAMPLES: (2), 1 pl. |
| | | | | fP, 7% vfP, 5% vcS, 10% cS, 25% mS, 30% fS, 13% vfS, 2% mud. | | Lith |
| | | | | GRAVEL: 40% BASALTIC-MAFIC / 60% felsic, quartzite, VA-WR | | (f/b & bottom bailer) |
| | | | | SAND: 10% Basaltic / 90% felsic (qtz, biotite, Ksp.), SA-WR, low-mod. | | |
| | | | | sphericity; moderate yellowish brown, 10YR 5/4, no HCl ⇌, unconsolidated. | | |
| | | | | 0 ppm OVA; rad < det. | | |
| | 215 | HT | WET | gravelly SAND: Similar to 210 ft. sample. 10% Gravel, 88% SAND, | 1356 | SAMPLES: (2), 1 pl. |
| | | | | 2% mud. 1% mP, 2% fP, 7% vfP ~ 27% mS, 33% fS. | | Lithology (f/b bailer) |
| | | | | Other properties same as 210'. 0 ppm OVA; rad < det. | 1405 | Start to change over |
| | | | | | | to drive barrel. Used |
| | | | | | | food-grade oil for lube. |
| | | | | | 1437 | STILL changing over to |
| | | | | | | drive barrel. — will have to |
| | | | | | | add casing, also. Left |
| | | | | | | site for E25-40. |
| | | | | | | |
| | | | | | | Added ~ 8 gallons water |
| | | | | | | (200 E raw $H_2O$ supply) during shift |

REMARKS:

PNL-MA567-DO-1, Rev. 0 Reviewed by W.C. McKee 11-7-89

Michael O. Lubrecht 8/21/89

WHC-MR-0209

128

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| M. D. LUBRECHT | BE-22W #22-14101 | 299-E25-41 | N/A | W-017 SST |
| Date: 22 AUG 1989 | C Wemsley | Depth: 215 To 220 | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 207'-11½" | | | | | 0715 | ON-SITE - DRILLER CHANGING |
| - 0'-6" | | | | | | FROM HT to D tools. Removes |
| 207'-5½" | | | | | | 6" section of battered casing |
| | | | | | 0730 | START DRILLING |
| + 10'-0" | | | | | 0800 | PAUSE TO ADD CASING |
| 217'-5½" | | | | | 0940 | START DRIVING CASING |
| | 220' | D | SM | Gravelly SAND: 15% Gravel, 83% SAND, 2% MUD — Tr. (1) large cobble, 6% fP, 9% vfP, 15% vcS, 25% cS, 20% mS, 15% fS, 8% vfS, 2% mud, poorly sorted; GRAVEL: 70% mafic (some vesicular basalt)/30% felsic, VA-SR, SAND: SA-SR, 30% mafic/70% felsic; 10YR 5/4 mod. yellow brown; Slight ⇌ w/ HCl, slightly consolidated. Open (OVA)/rad. c back. | 1000 | SAMPLES: (2), 1 pt Lith, (2) 125 ml glass, (1) mesh (C. OF C. # 082289) |
| | | | | - drive barrel battered at end - large cobbles may be abundant. | | |
| | | | | | 1008 | Resume drilling - encountering |
| | | | | | | difficulty in advancing DB |
| | | | | | | through cobbles. |

REMARKS:

PNL-MA567-DO-1, Rev. Ø

Reviewed by V. L. McKelvey 12-7-89

Michael D. Lubrecht 8/22/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

129

WHC-MR-0209

| DRILL LOG | By: M. D. Lubrecht | Rig: BE-22W #22-14101 C. Wemsley | Well Number: 299-E25-41 | Computer Number: N/A | Project or Work Order No.: LW-017 SST |
|---|---|---|---|---|---|
| | Date: 22 AUG 1989 | | Depth: 220 To 225 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 217'-5½" | 225' | D | D | muddy sandy Gravel: 30% Gravel, 62% SAND, 8% mud; 2% small | 1140 | SAMPLES: (2), 1 pt. lith; |
| | | | | and broken large cobbles, 1% vcP, 1% cP, 5% mP, 10% fP, 11% vfP, | | |
| | | | | 3% vcS, 2% cS, 5% mS, 25% fS, 27% vfS, 8% mud, poorly sorted; | | |
| | | | | Gravel: 30% basalt / 70% felsic, vA-WR; SAND: 30% Basalt / 70% felsic | | |
| | | | | SA-SR; 2.5Y 4/2 dark grayish brown; v. slight ≠ w/HCl; slightly consolidated, | | |
| | | | | coarser than above samples. | 1148 | Change to HARD TOOL - |
| | | | | | 1200-1230 | Lunch |
| | | | | | 1230- | continue w/ changeover to |
| | | | | | | hard tool - used food-grade |
| | | | | | | oil as necessary for thread lube |
| | | | | ~ casing advancement is slow through cobbles(?) & gravel. | 1310 | Resume drilling. |
| + 10'-0" | | | | | 1330 | Add 8" casing |
| 227'-5½" | | | | | 1406 | Resume drilling |
| | | | | | 1500 | Still drilling & |
| | | | | | | advancing casing at |
| | | | | | | 225'-230' interval - |
| | | | | | | hard drilling in gravel. |
| | 230 | HT | — | To be logged in A.M. - 23 AUG, 1989 | 1516 | SAMPLES: (2), 1 pt. lith |

REMARKS:

PNL-MA567-D01, REV 0

Mark D. Lubrecht 8/22/89

Sht. 1 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE-22W #22-14102 | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 23 AUG. 1989 | C. Wemaley | Depth 230 To 245 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 227'-5½" | 230 | HT | – | muddy sandy Gravel: similar to 225' — 30% gravel, 62% sand, | 0730 | - COLLECTED YESTERDAY - |
| 410'-0" | | | | 8% mud, 2% small & large (broken) cobbles, 1% vcP, 1% cP, | | (2), 1 pt. Lith. jars. |
| | | | | 5% mP, 10% fP, 11% vfP, 3% vcS, 2% cS, 5% mS, 25% fS, 27% | | Begin drilling |
| | | | | vfS, 8% mud; poorly sorted; GRAVEL: 30% Basaltic/70% Felsic, SA-WR; | | |
| | | | | SAND: 30/70, SA-SR; 2.5Y 4/2 dk. grayish brown; Vslight HCl ⇌; | | |
| | | | | slightly consolid.ed. 0 ppm (OVA)/ Red ≤ background | ~0800 | Stop to add casing. |
| 237'-5½" | | | | | 0910 | Resume drilling. |
| | 235 | HT | – | gravelly SAND 11% Gravel, 85% Sand, 4% mud; 4% fP, 7% vfP, | 0935 | SAMPLES: (2), 1 pt. Lith. |
| | | | | 35% vcS, 25% cS, 15% mS, 6% fS, 4% vfS, 4% mud; poorly sorted, | | Added 5 gall. water |
| | | | | Gravel: 40/60 (Basalt/felsic) A-SR; SAND: 20/80, SA-SR; 10YR 5/4, | | |
| | | | | med. yellow brown; Unconsolidated, No HCl ⇌ 0 ppm (OVA)/ red. ≤ background | | |
| | 240 | HT | – | gravelly SAND: similar to 235 ft sample (C. of C. # SST | 0950 | SAMPLES: (2), 1 pt. Lith, |
| | | | | 082389) 0 ppm (OVA)/ red. ≤ back. | | (2), 125 ml Chem. |
| | | | | | 0155 | resume drilling |
| | 245 | HT | – | gravelly SAND: similar to 235 & 240 samples. Basalt gravel increases | 1037 | SAMPLES: (2), 1 pt. Lith. |
| | | | | 50%/50% Basalt/felsic 0 ppm (OVA)/ red ≤ back. | | |
| | | | | | 1045 | ADD 8" casing |

REMARKS:

PNL. MA 567-D0-1, Rev 0

Reviewed by V.L. McGehan 12-7-89

M.D. Lubrecht 8/23/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

131

WHC-MR-0209

SHT. 2 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE-22W #22-14101 C. Wensley | Well Number 299-E25-41 | Computer Number NA | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 23 AUG 1989 | | Depth 245 To 260 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 237'-5½" | | | | | 1140 | Resume drilling |
| + 10' 8" | | | | | 1200 | Stop for lunch |
| 248'-1½" | | | | | 1230 | Return & resume |
| | 250' | HT | — | gravelly SAND, similar to 245 & 240 foot samples. | 1256 | SAMPLES: (2), 1 pt. Lith. |
| | | | | 0 ppm (OVA)/rad. ≤ background. | | |
| | | | | | 1323: | Add 4 gal. $H_2O$ from |
| | | | | | | drill water supply. |
| | 253 | | | + drilling character changes - encountered smoother drilling ? | 1339: | Add 4 gal $H_2O$. |
| | 255' | HT | — | sandy MUD (STONE): 25% SAND, 75% MUD - 25% SAND, 75% MUD; | | |
| | | | | mottled - 2.5Y 6/6 olive yellow and 5B5/1 bluish gray, $H_2O_2$ w/HCl. | | |
| | | | | pH: 7 0 ppm OVA/rad ≤ background. | | |
| | | | | | 1430 | ADD 4 gal. $H_2O$ |
| | 260' | HT | | — sandy MUD - sample not taken - see comments. | 1500 | Determined that we missed |
| | | | | | | sampling at 260' |
| | | | | | | (marks on cable observed). |
| | | | | | | will sample 265' interval |
| | | | | | | 8/24/89 |
| | | | | | 1507 | Shut down for day. |

REMARKS:

ADDED 17 GALLONS $H_2O$

PNL. MAS67. DO-1, Rev. 0

Michael D. Lubrecht 8/23/89

Reviewed by [illegible] 12-2-89

132

WHC-MR-0209

| DRILL LOG | By M.D. Lubrecht | Rig BE 22W # 22-14101 C. VANSLEY | Well Number 299-E 25-41 | Computer Number N/A | Project or Work Order No. W-017 SSR |
|---|---|---|---|---|---|
| | Date 24 Aug. 1989 | | Depth 260 To 270 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 258'-5" | | | | Recalculated casing length after review of driller notes & | 0700 | ON SITE - MEASURE |
| +10'11" | | | | discussion w/ driller. Note revised depth. | | SPARK ISSUE @ 262'10" |
| 269'-4" | | | | | | (might be influenced by |
| | | | | | | drill water.) |
| | | | | | | - BEGIN ADDING 8" |
| 269'-4" | | | | | | CASING |
| +10'11" | | | | | 0830 | Finish welding - begin |
| | | | | | | driving casing - drive |
| | | | | | | entire length! |
| | 265' | HT | WET | Sandy MUD. similar to 255' sample. Based on drilling | 0902 | SAMPLES: (2), 1 pl. Lith - |
| | | | | Characteristics, Zone is ≈ 253' to 262' (G.W.S. at base of | | retrieved from bailer (flat |
| | | | | silty aquitard unit?) 0 ppm OVA/rad ≤ back. | | bottom). |
| | 270' | HT | WET | muddy sandy GRAVEL: 45% GRAVEL 45% SAND 10% MUD; 5% vcP, | 0917 | SAMPLES: (2), 1 pl. Lith. |
| | | | | 10% cP, 10% mP, 10% fP, 10% vfP, 10% vcS, 10% cS, 5% mP, | | |
| | | | | 10% fS, 10% vfS, 10% MUD, poorly sorted; GRAVEL: 30/70 Basalt/felsic, | | |
| | | | | VA-WR; SAND - 20/80 Basalt/felsic, SA-SR; 5Y 4/2 olive gray; | | |
| | | | | no ⇌ w/ HCl; unconsolidated. 0 ppm OVA/rad ≤ back. | | |
| 280'-2" | | | | | 0943 | Add casing |

REMARKS:

PNL - MA567 - DO-1, Rev. 5

Reviewed by V.L. McElhaney 12-7-89

[illegible] 8/24/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

SHT 2 of 2

| DRILL LOG | By M.D. Lobrecht | Rig BE 22W #22-14101 C. Wensley | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 24 Aug 1989 | | Depth 270 To 276 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 275 | HT | WET | Sandy Gravel: 35% Gravel, 63% Sand, 2% mud; 8% mP, 12% fP, | 1050 | Samples: (2), 1 pt Lith, |
| | | | | 15% vfP, 20% vcS, 20% cS, 12% mS, 8% fS, 3% vfS, 2% Mud; | | |
| | | | | Sorted; Gravel: 20% Basaltic / 80% felsic (Qtzite & granodiorites; qtz, | | |
| | | | | monzonite) A-WR; SAND: 15% BASALTIC / 85% felsic (fsp, qtz, muscovite, | | |
| | | | | A-WR, ss low-high sphericity; 10YR 5/4 mod. yellowish brown; no HCl react; | | |
| | | | | Unconsolidated. | | |
| | | | | | 1107 | Shut off rig after |
| | | | | | | cleaning out hole - will |
| | | | | | | recheck depth to water after |
| | | | | | | lunch. |
| | | | | | 1240 | PNL-Sinco meter #10998 Measured water depth @ |
| | | | | | | 262! will T.D. Hole @ |
| | | | | | | 278-279' |
| | | | | | 1330 | Began geophysical logging |
| | | | | | | of borehole. Interval 100'- |
| | | | | | | 276' |
| | | | | | 1515 | Perform Title II straightness test |
| | | | | | | Tested OK. Drill Site. |

REMARKS:

PNL-MA567 DO-1, Rev. Ø

Reviewed by [illegible] 12-7-89

Michael H. Luhr 8/24/89

WHC-MR-0209

134

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22W | Well Number: 299-E25-41 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 25 August 1989 | #22-14/10 | Depth: 276' To T.D. | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| | | | | D/W = 268' - 1.5' STICKUP = 266.5' (PNL 300' | 0715 | D/W |
| | | | | E. TAPE # 10996). ONLY 9.5' OF WATER | | |
| | | | | IN HOLE. HOLE HAS ~3' PLUG IN BOTTOM; | | |
| | | | | WILL DRILL OUT BELOW CASING TO SEE | | |
| | | | | IF STATIC RETURNS TO ~262'. | 0730 | DRILLING |
| | | | | D/W w/ 20' OF S.S. CASING = ~13'. 3' OF | 0810 | D/W |
| | | | | PLUG IN HOLE; SANDS HEAVING UP CASING. | | |
| | | | | ASSUME STATIC @ 262'10" AS MEASURED | | |
| | | | | 8/24. | | |
| | | | | ADDED 150 GALLONS OF DRILL SUPPLY $H_2O$ TO | 0815 | BACKPRESSURING |
| | | | | BACKPRESSURE HEAVING SANDS; WILL DRILL | | HOLE |
| | | | | TO 279' & CLEAN OUT HOLE | | |
| | | | | D/B = 279' (PNL 300' L300-04); SANDS ARE | 0915 | D/BOTTOM |
| | | | | STILL HEAVING IN. | 0920 | BREAKING DOWN RIG |
| | | | | D/BOTTOM = 275.6' + 2' TAPE - 1.8' STICKUP | 1315 | D/BOTTOM |
| | | | | = 275.4' (PNL L300-04). ~3.5' OF | | |
| | | | | MATERIAL ~~THE~~ HEAVED UP CASING, WILL BE | | |

REMARKS: REMOVED w/ PUMP RIG PRIOR TO SETTING 4" S.S. CASING

PNL-MA-567 DO-1, REV. 0 Reviewed by W.C. McClain 12-7-89 Alan M. Stark 8/25/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

135

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig NO RIG | Well Number 299-E25-41 | Computer Number N/A | Project or Work Order No. W-017 SSF |
|---|---|---|---|---|---|
| | Date 9-12-89 | | Depth COMPLETION To | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | D/W = 230.1' - 1.7' (stickup - 8") = 228.4' below land | 0755 | E-tape # 10998 |
| | | | | D/B = 276.1' + .3' - 1.7' = 274.70' below land | 0800 | S-tape # L300-07 |
| | | | | Note: D/W measurement does not represent true static - Driller added 150 gallons $H_2O$ to borehole before moving off. there is also a plug in the casing. | | |

REMARKS:

PNL-MA-567 DO-1, REV.0 Reviewed by V.L. McGehee 12-7-89

9/12/89

9 1 1 2 0 5 0 0 1 3 9

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41<br>Location A-TANK FARMS - EAST SIDE | Date SEPT. 18, '89 Sheet No. 1 of 2<br>Project W-017 - SGT |
|---|---|---|

Logged by S. P. AIRHART Date 9-18-89
Reviewed by D. L. Mathews Date 12-7-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-567 Rev. 1 EEJ.0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | DATUM - LAND SURFACE |
| | | | | | | | | | | D/B = 276.6' - 1.7' (stickup) = |
| | | | | | | | | | | 274.9'. |
| | | | | | | | | | | Due to water added by driller |
| | | | | | | | | | | & plug in casing - D/W meas. |
| | | | | | | | | | | was not taken. D/W assumed |
| | Following sections | | | | | | | | | to be 260'-261' (~2-3' deeper |
| | SS added. | | | | | | | | | than well E25-40) |
| | SS screen | 4" | 21.01' | | | | | | | Moved jacks / equip to site. |
| | SS casing w/ cent. | 4" | 20.04' | | | | | | | |
| | SS casing | 4" | 20.04' | | | | | | | Adding Type 304, SCH. 5, STAINLESS |
| | SS casing w/ cent | 4" | 20.04' | | | | | | | STEEL (SS) casing & screen - |
| | SS casing | 4" | 20.04' | | | | | | | Screen is 10-slot continuous - |
| | SS casing w/ cent | 4" | 20.04' | | | | | | | wire-wrap channel-pack. - |
| | SS casing | 4" | 20.04' | | | | | | | Factory welded centralizers |
| | SS casing w/ cent. | 4" | 20.04' | | | | | | | (cent.) on every other sections. |
| | SS casing | 4" | 20.04' | | | | | | | |
| | SS casing w/ cent. | 4" | 20.04' | | | | | | | |
| | SS casing | 4" | 20.04' | | | | | | | |
| | SS casing w/ cent | 4" | 20.04' | | | | | | | |
| | SS casing | 4" | 20.04' | | | | | | | |
| | SS casing w/ cent. | 4" | 20.04' | | | | | | | |
| | TOTAL SS = | | 281.53' | (Will cut top portion off) | | | | | | |

137

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41 | Date SEPT. 18, '89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location A-TANK FARMS - EAST SIDE | Project W-017 SST | |

Logged by S. P. AIRHART SPA Date 9-18-89
Reviewed by T.L. McGhan Date 12-7-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-567 DU-1, REV. 0

Drilling Contractor KEH
Driller CRAIG WAMSLEY
Rig/Equipment GALION CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | DATUM: LAND SURFACE |
| | | | | | | | | | | D/B inside 4" SS: 284.11' + .3' |
| | | | | | | | | | | - 7.12' (stickup) = 277.3' |
| | | | | | | | | | | Shut Down |

138

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41 | Date SEPT. 19, '89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location A-TANK FARMS - SST | Project W-017 SST | |

Logged by S.P. AIRHART SP Airhart Date 9-19-89
Reviewed by W.L. McGhan Date 12-7-89
Measuring Equip. S-TAPE - L300-07 Procedure PNL-MA-569 DO.1, REV.0

Drilling Contractor KEH
Driller CRAIG WAMSLEY
Rig/Equipment GALION CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | DATUM: LAND SURFACE |
| | | | | | | | | | | KEH moving equipment |
| 1010 | | | | | | | | | | D/B (annulus) = 281.7 + .3' - 7.75' |
| | | | | | | | | | | = 274.25' |
| | | | | | | | | | | D/B 8" casing = 278.5' |
| | | | | | | | | | | Holding D/B of SS @ 276' w/ |
| | | | | | | | | | | crane. |
| | Carbon Steel | 8" | | | 278.5' | 16-30 Colorado Silica Sand | 1/2 bag | 271' | 7.5' | 278.5' + .3' - 7.8' = 271' |
| | | | 285' | 7.8' | 277.2' | | | 270.2' | 7.0' | 277.7' + .3' - 7.8 = 270.2' |
| | | | | | | | | | | Cutting 8" casing from inside-out to |
| | | | | | | | | | | minimize slag inside borehole as per |
| | | | | | | | | | | directive 9/18/89 from E.J. Jensen (DOE) |
| | | | | | | | | | | to F.R. Jackson (WHC) KEH is making |
| | | | | | | | | | | an insert which will prevent slag |
| | | | | | | | | | | from entering borehole. |
| | | | | | | | | | | This method (cutting from inside) not working. Placed |
| | | | | | | | | | | wet coveralls inside borehole |
| | | | | | | | | | | around 4" SS. Cut casing |
| | | | | | | | | | | Coveralls did not work. Slag |
| | | | | | | | | | | went down hole when coveralls |
| | | | | | | | | | | pulled out. |
| 1130 | | | | | | | | | | Shut Down. |
| | | | | | | | | | | Will continue in a.m. |

139

WHC-MR-0209

9 1 1 2 0 5 0 0 1 4 2

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41 | Date 9/20/89 | Sheet No. 1 of 3 |
|---|---|---|---|
| | Location SST | Project W017 SST | |

Logged by EJ Jensen — Date 9/20/89
Reviewed by V.C. Marlow — Date 12-7-89
Measuring Equip. S-Tapes L300-07 — Procedure AWM-4-87 Rev. 0

Drilling Contractor KEH
Driller Craig Wamsley
Rig/Equipment Galion Crane/Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2.85' | 7.8' | 277.2' | | | | | D/W 242.5'-8' = 234.5' water left |
| | | | | | | | | | | from drilling. |
| | | | | | | | | 273.8' | 3.4' | 281.3' + .3' - 7.8' = 273.8' |
| 0900 | carbon steel | 8" | | 8.7' | 276.3' | | | | | |
| | | | 283.' | 6.9' | 276.1' | | | 272.9' | 3.2' | 279.5' + .3' - 6.9' = 272.9' |
| 0910 | carbon steel | 8" | | 7.8' | 275.2' | | | 272.9' | 2.3' | 280.4' + .3' - 7.8' = 272.9' |
| | | | 281.6' | 6.4' | | | | 274.3' | 0.9' | 280.4' + .3' - 6.4' = 274.3' |
| | | | | | | 16-30 C. Sand | 1/2 Bag | 271.8' | 3.4' | 277.9' + .3' - 6.4' = 271.8' |
| 1000 | carbon steel | 8" | | 7.7' | 273.9' | | | 273.1' | 0.8' | 280.5' + .3' - 7.7' = 273.1' |
| | | | | | | 16-30 C. Sand | 1/2 Bag | 270.6' | 3.3' | 278.0' + .3' - 7.7' = 270.6' |
| 1010 | carbon steel | 8" | | 9.1' | 272.5' | | | 271.6' | 0.9' | 280.4' + .3' - 9.1' = 271.6' |
| | | | | | | 16-30 C. Sand | 1/2 Bag | 268.3 | 4.2 | 277.1 + .3 - 9.1 = 268.3' |
| 1015 | carbon steel | 8" | 280.3 | | 271.4 | | | 269.6' | 1.8' | 275.8 + .3 - 6.5 = 269.6' |
| | | | 277.8 | | | 16-30 C. Sand | 1/2 bag | | 4.0' | 273.6 + .3 - 6.5 = 267.4' |
| 1030 | Carbon steel | 8" | | 7.8 | 270 | | | | | |
| | | | | | | 16-30 C. Sand | 1/2 bag | 265.0 | 5.0 | 272.5 + .3 - 7.8 = 265.0' |
| 1045 | Carbon steel | 8" | | 9.3 | 268.5 | | | 267.6 | 0.9 | 276.6 + .3 - 9.3 = 267.6' |
| | | | | | | | | 266.3 | 2.2 | 275.3 + .3 - 9.3 = 266.3' |
| 1100 | carbon steel | 8" | 273.7 | 6.4 | 267.3 | | | 266.5 | 0.8 | 272.6 + .3 - 6.4 = 266.5' |
| | | | | | | 16-30 C. Sand | 1 bag | 261.5 | 5.8 | 267.6 + .3 - 6.4 = 261.5' |
| 1115 | Carbon steel | 8" | | 9.2 | 264.5 | | | 264.6 | 0.1 | 273.5 + .3 - 9.2 = 264.6' |
| | | | | | | 16-30 C. Sand | 1 bag | | | |

9/20/89

WHC-MR-0209

140

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41 | Date 9/20/89 | Sheet No. 2 of 3 |
|---|---|---|---|
| | Location SST | Project W017 SST | |

Logged by EJ Jensen — Date 9/20/89
Reviewed by D.C. Mathews — Date 12-7-89
Measuring Equip. S tape L300-07 — Procedure PO-1 rev 0

Drilling Contractor KEH
Driller Craig Wamsley
Rig/Equipment Galion Crane / Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Overlap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1120 | Carbon Steel | 8" | 269.3' | 6.7' | 262.6' | | | | 5.3' | 263.7' +.3' − 6.7' = 257.3' |
| 1135 | carbon steel | 8" | | 8.0' | 261.3' | | | 260.7' | 0.6' | 268.4' +.3' − 8.0' = 260.7' |
| | | | | | | 16-30 c. sand | 1 bag | 255.0' | 6.3' | 262.7' + .3' − 8.0' = 255.0' |
| 1145 | Carbon steel | 8" | | 10.3' | 259.0' | | | 257.9' | 1.1' | 264.3' + .3' − 6.7' = 257.9' |
| | | | 265.7' | 6.7' | 259.0' | 16-30 c. sand | 1 bag | 256.0' | 3.0' | 262.4' + .3' − 6.7' = 256.0' |
| 1250 | carbon steel | 8" | | | | 16-30 c. sand | 1/2 bag | 253.5' | 5.5' | 259.9' + .3' − 6.7' = 253.5' |
| 1300 | carbon steel | 8" | | 8.2' | 257.5' | | | 255.1' | 2.4' | 263.0' + .3' − 8.2' = 255.1' |
| | | | | | | 16-30 c. sand | 1/2 bag | 252.8' | 4.7' | 260.7' + .3' − 8.2' = 252.8' |
| 1305 | carbon steel | 8" | | 9.7' | 256.0' | | | 253.7' | 2.3' | 263.1' + .3' − 9.7' = 253.7' |
| | | | | | | 16-30 c. sand | 1/2 bag | | 4.5' | 260.9' + .3' − 9.7' = 251.50' |
| 1310 | carbon steel | 8" | | 10.9' | 254.8' | | | 252.3' | 2.5' | 258.7' + .3' − 6.7' = 252.3' |
| | | | 261.5 | 6.7' | 254.8' | 16-30 c. sand | 1/4 bag | | 3.6' | 257.6' + .3' − 6.7' = 251.2' |
| 1315 | carbon steel | 8" | | 8.0' | 253.5' | | | 252.3' | 1.2' | 260.0' + .3' − 8.0 = 252.3 |
| | | | | | | 16-30 c. sand | 1/4 bag | | 2.7 | 258.5' + .3' − 8.0 = 250.8 |
| 1330 | carbon steel | 8" | | 9.3' | 252.2' | | | | 0.2 | 261.0' + .3' − 9.3 = 252.0 |
| | | | 258.4' | 6.4' | 252.0' | | | | | Bailed 1/2 Barrel of water |
| | | | | | | | | | | D/B of 5.5 = 282.2 + .3 − 6.4 = 276.1 |
| | | | | | | | | | | D/W = 269.9 − 6.4 = 263.5 |
| | | | | | | | | 252.4 | 0.4 | 258.5 + .3 − 6.4 = 252.4 Top of sand |
| | | | | | | 3/8 Bentonite Pellets | 2 Buckets | | | 248.7 Top of Pellets |
| | | | | | | | | | 5.3 | 252.8 + .3 − 6.4 = 246.7 |
| | | | | | | 8-20 crumbles | 5 Bags | 231.4 | 20.6 | 237.5 + .3 − 6.4 = 231.4 |

9/20/89

171

WHC-MR-0209

9 1 1 2 0 5 0 0 1 1 4

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41 | Date 9/20/89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location | Project W017 SST | |

Logged by EJ Jensen Date 9/20/89
Reviewed by [illegible] Date 12-7-89
Measuring Equip. Stage L300-07 Procedure DO-1 Level

Drilling Contractor KEH
Driller Craig Wamsley
Rig/Equipment Galion Crane / Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 248.1' | 6.5' | 241.6' | | | | 4.1' | 243.7' + .3' − 6.5' = 237.5' |

Tc [illegible] 9/20/89

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41 | Date SEPT 21, 1989 Sheet No. 1 of 2 |
|---|---|---|
| | Location A-TANK Farms - East Side | Project SST W-017 |

Logged by S. P. AIRHART SLPAirhart Date 9-21-89
Reviewed by V.E. McGlynn Date 12-7-89
Measuring Equip. S-Tape · L300-07 Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor KEH
Driller Craig · Wamsley
Rig/Equipment Pettibone Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0705 | CARBON STEEL | 8" | 248.1' | 6.5' | 241.6' | 8-20 bentonite | 10 bags | 208.2 | 33.4' | 214.4 + .3' - 6.5' = 208.2 |
| | " | 8" | 248.1' | 10.0' | 238.1' | " | | 214.4' | 23.7' | 220.8' + .3' - 6.7' = 214.4 |
| | | | | | | " | 10 bags | 185.1 | 53.0' | 191.5' + .3' - 6.7' = 185.1 |
| | " | 8" | 217.5' | 6.7' | 210.8' | " | | 197.6' | 13.2' | 204.0' + .3' - 6.7' = 197.6 |
| | | | | | 210.8' | " | 10 bags | 168' | 42.8' | 174.4' + .3' - 6.7' = 168' |
| | | | | | 210.8' | " | 5 bags | 154.2' | 56.6' | 160.6' + .3' - 6.7' = 154.2' |
| 0900 | " | 8" | 198' | 6.7' | 191.3' | " | | 166.7' | 24.6' | 173.1' + .3' - 6.7 = 166.7' |
| | | | | | 191.3' | " | 10 bags | 138.1' | 53.2' | 144.5' + .3' - 6.7' = 138.1' |
| 0920 | " | 8" | 177.7' | 6.6' | 171.1' | " | | 150.6' | 20.5' | 156.9' + .3' - 6.6' = 150.6' |
| | | | | | 171.1' | " | 10 bags | 122.5' | 49' | 128.8' + .3' - 6.6' = 122.5' |
| 0945 | " | 8" | 157.7' | 6.6' | 151.1' | " | | 139.9' | 11.2' | 146.2' + .3' - 6.6' = 139.9' |
| | | | | | 151.1' | " | 20 bags | 82.1' | 69' | 88.4' + .3' - 6.7' = 82.1' |
| 1010 | " | 10" | 144' | 6.5' | 137.5' | " | | 105.4' | 32.1' | 112' + .3' - 6.9' = 105.4' |
| 1030 | | | | | | | | | | Pulled remaining 8" casing out of hole |
| 1345 | | | | | | | | | | Ready to pull 10" casing |
| | " | 10" | | | 137.5' | " | | 114.1' | 23.4' | 120.5' + .3' - 6.7' = 114.10 |
| | " | 10" | | | 137.5' | " | 10 bags | 98.7' | 38.8' | 105.2' + .3' - 6.7' = 98.7 |
| | " | 10" | | | 137.5' | " | 10 bags | 84.1' | 53.3' | 90.5' + .3' - 6.7' = 84.1 |
| | " | 10" | 129' | 6.7' | 122.3' | " | | 90' | 32.3' | 96.4' + .3' - 6.7' = 90' |
| | | | | | 122.3' | " | 15 bags | 67.2' | 55.1' | 73.6' + .3' - 6.7' = 67.2' |
| | " | 10" | 108.7' | 6.6' | 102.3' | " | | 74.7' | 27.6' | 81' + .3' - 6.6' = 74.7' |
| | | | | | 102.3' | " | 15 bags | 52.2' | 50.1' | 58.5' + .3' - 6.6' = 52.2' |

1/3

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41 | Date SEPT. 21, 1982 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location A-Tank Farms - East Side | Project W-017 SST | |

Logged by S. P. AIRHART Date 9-21-89
Reviewed by V.L. McGhan Date 12-7-89
Measuring Equip.: S-tape L300-07 Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor KEH
Driller Craig Wamsley
Rig/Equipment Pettibone / Hyd. jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1520 | Carbon steel | 10" | 88.8' | 6.6' | 82.2' | 8-20 bentonite | | 60.7' | 21.5' | 67' + 3' - 6.6' = 60.7' |
| | | | | | | | | | | |
| | | | | | | | | | | Shut Down |

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41<br>Location A-tank farms - East Side | Date SEPT. 22, '89 Sheet No. 1 of 2<br>Project W-017 SST |
|---|---|---|

Logged by S.P. AIRHART SPA Date 9-22-89
Reviewed by V.G. Mashan Date 12-7-89
Measuring Equip. S-tape # L300-07 Procedure PNL-MA-567 DO-1 REV. 0

Drilling Contractor KEH
Driller Craig Wamsley
Rig/Equipment Pettibone crane / Hyd jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon steel | 10" | 88.8' | 6.6' | 82.2' | 8-20 bentonite | | 60.7 | 21.5 | ← From yesterday |
| 0745 | | | | | 82.2' | " | 15 bags | 37.1' | 45.1' | 43.4' + .3' - 6.6' = 37.1' |
| | " | 10" | 69.1' | 6.8' | 62.3' | " | | 43.7' | 18.5' | 50.2' + .3' - 6.8' = 43.7' |
| | | | | | 62.3' | " | 15 bags | 20.1' | 42.2' | 26.6' + .3' - 6.8' = 20.1' |
| 0830 | " | 10" | 50.4' | 6.8' | 43.6' | " | | 27.4' | 16.2' | 33.9' + .3' - 6.8' = 27.4' |
| | | | | | 43.6' | " | 8 bags | 14.4' | 29.2' | 20.9' + .3' - 6.8' = 14.4' |
| | " | 10" | 31.3 | 6.9' | 24.4 | " | | 21.4 | 3.0 | 28.0 + .3 - 6.9 = 21.4 |
| | | | | | | " | 5 bags | 13.5 | 11.0 | 20.1 + .3 - 6.9 = 13.5 |
| | " | 10" | 31.3' | 9.9 | 21.4' | " | | 14.8' | 6.6 | 24.4 + .3 - 9.9 = 14.80 |
| | " | 10" | 26.6' | 6.8 | 19.8 | " | | 15.4' | 4.4 | 21.9 + .3 - 6.8 = 15.40 |
| | " | 10" | 26.6' | 8.2' | 18.4' | " | | 16.8' | 1.6' | 24.7' + .3' - 8.2' = 16.8' |
| | " | 10" | 26.6' | 8.8' | 17.8' | " | | 17.2' | .6' | 25.7' + .3' - 8.8' = 17.2' |
| 0930 | " | 10" | 26.6' | 9.1' | 17.5' | " | | 17.5' | 0' | 26.3' + .3' - 9.1' = 17.5' |
| | | | | | | | | | | Top of crumbles @ 17.5' ← |
| | | | | | | | | | | 173 bags = 122.8 ft³ |
| | | | | | | | | | | |
| | | | | | | Portland cement | 6 bags | | | 1st batch cement |
| | | | | | | water | 55 gals | | | |
| | | | | | | Al powder | 1 cup | | | |
| | | | 26.6' | 14.5' | 12.1' | | | 4' | 8.1' | 18.5' - 14.5' = 4' |
| | | | | | 12.1' | 2nd batch as above | | +8' | 20.1' | Poured ~ 1/4 batch cement |

145

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-41 | Date SEPT. 22, '89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location A Tank Farms - east side | Project W-017 SST | |

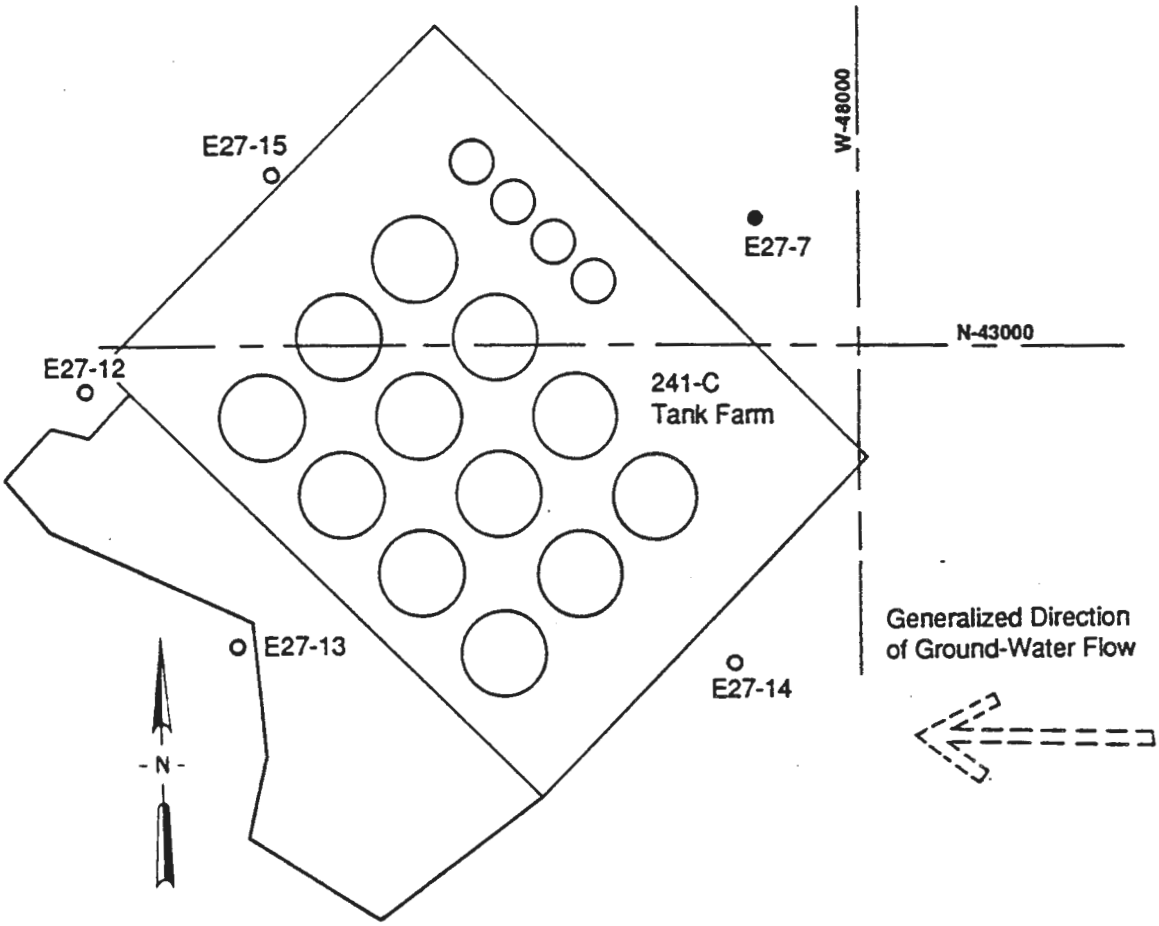
Logged by S. P. AIRHART Date 9-22-89
Reviewed by [illegible] Date 12-7-89
Measuring Equip. S-tape & L300-07 Procedure PNL-MA-567 Rev. 0

Drilling Contractor KEH
Driller Craig Wamsley
Rig/Equipment Pettibone crane / Hyd. jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0 | 0 | | | -4' | | Pulled 8" casing out of hole |
| 1030 | | | | | | cement | | 2' | | Poured ~ 1/4 batch cement ∴ 1 1/2 batches cement used which is ~ 5.94 ft³ 9 bags cement which yields 5.9 ft³. Top of cement @ 2' |
| | | | | | | | | | | D/W inside 4" = 267.45' - 5.21 = 262.24' E-tape # 12176 |
| | | | | | | | | | | D/B inside 4" = 281.55' - 5.21 = 276.34' S-tape # L300-07 |

WHC-MR-0209

Waste Management Area C




Legend

- ● Existing Ground-Water Monitoring Well
- ○ Planned Ground-Water Monitoring Well
- E25-1 Numbering System for Ground-Water Monitoring Wells. All Wells Prefixed by 299-
- ○ 200 Series Single-Shell Tank
- ○ 100 Series Single-Shell Tank
- Fences
- Roads
- Cribs
- N-42000 Hanford Plant Coordinates

Note: Not Drawn to Scale

WELL 299-E27-12

Drilling at Well 299-E27-12 began August 28, 1989, and reached total depth on September 15, 1989. The well was drilled with a Bucyrus-Erie 60L to a depth of 270.00 ft below ground surface. The sediments encountered were primarily gravely sand and sand. Static water level during completion was 252.12 ft below ground surface.

Well 299-E27-12 was completed at a depth of 267.55 ft below ground surface. Final well materials include 21.03 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 248.32 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 16-30 mesh Colorado silica sand pack along the screened interval to 3.42 ft above the top of the screen, 3.3 ft of Volclay bentonite pellets, 220.9 ft of 8-20 mesh granular bentonite crumbles, 16.9 ft of Portland cement grout, and an air-entrained concrete pad which extends 2.0 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Pettibone crane during completion. Completion activities at Well 299-E27-12 were finished October 9, 1989.

The estimated volume of water added to the borehole during drilling was 82 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 45 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on October 23, 1989, and a total of 509 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was performed on October 19 and 20, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on October 24, 1989; this activity concluded well construction and installation.

| DRILL LOG | By R.D. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 8/28/89 | | Depth 0.0 To 10.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | | rig & tools steam cleaned |
| | | | | | | 8/25/89 witnessed by |
| | | | | | | Kaiser title III insp. - rig |
| | | | | | | set-up on 8/25/89. |
| | | | | | 1830 | Air site set-up in |
| | | | | | | progress. |
| | | | | | 0930 | Safty meeting concern. |
| | | | | | | releases from tanks |
| | | | | | 1010 | begin drilling |
| 0. | 5.0' | DB | damp | GRAVELLY SAND. (5% gravel, 95% Sand), 60% vfs, | 1036 | to 5.0' RPT scan N/D. |
| | | | | 20% fs, 10% ms, 3% cs, 2% vcs, 2% vfP, 1% fp, 2% mP. very well | | |
| | | | | sorted gravels are 70% mafic 30% felsic sands are 70% mafic 30% felsic | | |
| | | | | sub rnd to well rounded, brown 10YR 5/3, no reaction to HCL, | | |
| | | | | unconsolidated, sample checked w/ OVA = N/D 260 MSA= | 1106 | hole is very loose. caving |
| | | | | N/D | 1111 | H&S scan OVA |
| 10" @ 15'0" | | | | | | install 10" casing w/shoe 15' |
| | 10.0 | DB | damp. | GRAVELLY SAND (5% gravel 95% Sand), 3% vfp 1% fp | 1150 | to 10' - H&S scan |
| | | | | 1% mp, MS -, 10% fs, 70% ms, 10% cs, 5% vcs poorly sorted | | OVA = N/D. |

REMARKS:

PNL- MA 567, DO-1, Rev 0

Reviewed by W.L. Markham 12-7-89

8/28/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

149

9 1 1 2 0 5 0 0 1 5 3

sht 2 of 2

| DRILL LOG | By R.D. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W017-SST |
|---|---|---|---|---|---|
| | Date 8/28/89. | | Depth 10.0 To 13.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 10' | D | | (cont.) gravels are 70% mafic 30% felsic, sands are 60% | 1315 | RPT - screen = < det. |
| | | | | mafic and 40% felsic, sub rnd to well rnd, very dark brown | | |
| | | | | 10YR 2/2, no reaction to HCL, unconsolidated fm. | | |
| | | | | OVA = N/D 260 MSA | | |
| 10"Ø 14'0" | | | | | 1330 | cut 10"Ø casing to 14' |
| 10" 24'1" | | | | | | add 10'1" = 24'1" ± |
| | | | | | | weld up. |
| | | | | | 1505 | resume drilling |
| | | | | | 1521 | stop drilling @ 13.0' |
| | | | | | | 10" casing to 12.5' |
| | | | | | | end of day. |

REMARKS:

PNL-MA567-DO-1, Rev Ø

Reviewed by V.L. McLehan 12-7-89

8/28/89

WHC-MR-0209

150

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| R.D. Miller | BE-60L #22-14103 Louis W. | 299-E27-12 | N/A | W017-SST |
| Date: 8/29/89 | | Depth: 13.0' bls To 20.6' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"ϕ 24'1" | 12.5' bls | | | | 0713 | Ar site - prepare to drill |
| | | | | | 0720 | H&S scan - OVA = < 1ppm. |
| | | | | | | LEL = < detect. / no RPT. |
| | | | | | | must wait for RPT to |
| | | | | | | begin drilling - |
| | | | | | 0930 | H&S scan - OVA = < 1ppm |
| | | | | | 1000 | RPT arrives - |
| | | | | | 1000 | resume drilling |
| | 15.0' bls | DB | damp. | [illegible], GRAVELLY SAND, (15% Gravel 80% Sand 5% Mud) | 1026 | to 15.0' - sample |
| | | | | 2% vcp 2% cp 3% mp 5% fp 3% vfp, [illegible], 5% vcs, | | RPT scan = < detect. |
| | | | | 5% cs, 30% ms, 30% fs, 10% vfs, mod. sorted, 5% mud. | | H&S scan = < 1ppm. |
| | | | | gravels are 50% mafic 50% felsic sands are 40% mafic 60% felsic | | |
| | | | | sub rnd to well rnded, very dark brown (10YR 2/2), slight | 1100 | RPT scan = < detect. |
| | | | | reaction to HCL, slightly consolidated (2pt lith, 1 mud) | | H&S scan - OVA = < 1ppm. |
| | 20.0' bls | DB | damp | GRAVELLY SAND (29% Gravel 71% Sand) 5% mp 7% fp 17% vfp | 1115 | to 20.0 take special |
| | | | | [illegible], 30% vcs 20% cs, 10% ms 5% fs 5% vfs, poorly | | sample. etc. - drive 10"ϕ |
| | | | | sorted. gravels are 60% mafic 40% felsic, sands are 40% mafic | | casing to 21.0' |
| | | | | 60% felsic subang to rnd, lt. yell brn (2.5Y 6/4) moderate react. HCL | | |

REMARKS: moderately consolidated, 2pt lith, 2 125ml chem and SST-082989 and 1 mud.

PNL-MA567, DO-1, Rev 0

Reviewed by W.L. McGhee 12-7-89

8/29/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5-85)

WHC-MR-0209

151

9 1 1 2 0 5 0 0 1 3 4

Sht 2 of 2

| DRILL LOG | By R.D. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W017-SST |
|---|---|---|---|---|---|
| | Date 8/29/89 | | Depth 20.0' To 33.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"ø 34' 2" | 21.0' | | | | | add casing 10"ø 10'1" |
| | 21.5' bls | DB | | | 1202 | stop for lunch |
| | | | | | 1235 | resume welding casing |
| | | | | | | H2S scan - OVA = <1 ppm |
| | | | | | 1330 | finish welding - |
| | | | | | | resume drilling - H2S scan. |
| | | | | | 1350 | RPT-scan - <det. |
| | 25.0' | DB | d. moist | SANDY, GRAVEL, (35% Gravel 65% Sand), 2% cp, | 1351 | to 25.0' - |
| | | | | 8% mp, 10% fp, 15% vfp 20% vcs, 15% cs, | | |
| | | | | 10% ms 10% fs 10% vfs, poorly sorted, gravels are | | |
| | | | | 60% mafic 40% felsic, sands are 50% mafic 50% felsic | | |
| | | | | sub ang to sub rnd. lt yell brn (2.5YR 6/4) (2pt lith. 1pd) | moder. reaction to HCL | |
| | 30.0' | DB | sl. moist. | med. consol. GRAVELLY SAND, (20% Gravel 80% Sand), 5% cp, | 1419 | to 30.0' RPT scan = <det. |
| 10"ø 43' 8" | 33' | | | 5% mp 5% fp 5% vfp, 70% vcs, 5% cs, | 1430 | add casing 9'6" 10"ø |
| | | | | 3% ms 2% fs, moderately sorted, gravels are 70% mafic | | and weld |
| | | | | 30% felsic, sands are 40% mafic 60% felsic, sub ang to | 1510 | stop for day |
| | | | | sub rnd., lt. yell brn (2.5YR 6/4) moder. reaction to HCL - (2pt lith. | | |
| | | | | 1 moist dens) moderately consolidation | | |

REMARKS:

PNL-MA567, DO-1, Rev Ø

Reviewed by D.G. McKeehan 12-7-89

8/29/89

152

WHC-MR-0209

| DRILL LOG | By R.D. Miller | Rig BE-60L #22-14103 Louie W | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W017-SST |
|---|---|---|---|---|---|
| | Date 8/30/89 | | Depth 33.0' To 45 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10" 43'8" | 33' | | | | 0710 | Ar site-prepare to drill |
| | | | | | | resume welding 10" casing. |
| | | | | | 0730 | H2S scan-OVA = <1ppm. |
| | | | | | 0755 | resume drilling |
| | | | | | 0805 | stop drilling-wait for |
| | | | | | | RPT. to scan |
| | | | | | 0810 | RPT arrives-scan=< det. |
| | | | | | | resume drilling |
| | 35.0' | DB | dry | SAND, (2% Gravel 98% Sand), 2% vfp | 0822 | H2S scan-OVA < 1ppm. |
| | | | | , 40% vcs 40% cs 10% ms 5% fs 3% vfs | | to 35.0'-sample. |
| | | | | moderately sorted, gravels are 40% mafic 60% felsic sands | | |
| | | | | are 30% mafic 70% felsic, sub ang to subrnd, lt. yell brn. | | |
| | | | | (2.5Y 6/4) slight to moderate reaction to HCL, slightly consolidated | | |
| | | | | samples (2pt-lith and 1 moist dens.) | | |
| | 40.0' | DB | dry | , SAND, (1% Gravel 99% Sand) 1% vfp , 40% vcs | 0848 | to 40.0'-sample. |
| | | | | 40% cs 10% ms 5% fs 4% vfs moder. sorted, same as above | | |
| | | | | (2pt lith, 2 125ml environmental, 1 moist dens.) | 0906 | stop to add 10" casing |
| 10" 52'8" | 41' | | | | | 9'0" and weld. |

REMARKS:

PNL-MA 567, DO-1, Rev Ø

Reviewed by W.L. McLellan 12-7-89

8/30/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

153

WHC-MR-0209

9 1 1 2 0 5 0 0 1 7 6

Sht 2 of 3

| DRILL LOG | By R.D. Miller | Rig BE-60L #22-1410-3 | Well Number 299-E27-12 | Computer Number | Project or Work Order No. W017-SST |
|---|---|---|---|---|---|
| | Date 8/30/89 | Louis W. | Depth 45.0' To 60 | N/A | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"Ø 43'8" | 45.0' | DB | dry | SAND, (1% Gravel 99% Sand) 1% vfp | 0900 | to 45.0' - samples |
| | | | | 40% vcs 40% cs 10% ms 5% fs 4% vfs. moder. sorted, same | | H&S scan - OVA = <1ppm. |
| 10"Ø 52'8" | | | | as above (2pt lith, 1 moist dens). | 0906 | stop drilling add 9'0" |
| | | | | | | of 10"Ø casing. |
| | | | | | 1014 | resume drilling |
| | 50.0' | DB | dry | SAND (1% Gravel 99% Sand) same as above. | 1045 | to 50.0' - H&S scan <1ppm |
| 10"Ø 61'11½" | 50.0' | | | (2pt lith, 1 moist dens.) | 1050 | add 10"Ø casing 9'3½" |
| | | | | | | and weld. |
| | | | | | 1200 | stop for lunch |
| | | | | | 1230 | resume welding |
| | | | | | | H&S scan - OVA = <1ppm |
| | | | | | 1255 | resume drilling |
| | | | | | 1332 | H&S scan - OVA - <1ppm |
| | 55.0' | DB | dry | SAND (1% Gravel 99% Sand) same as above | 1335 | to 55.0' |
| | | | | (2pt. lith, 1 moist dens.) | | |
| | 60.0' | DB | dry | SAND (3% Gravel 97% Sand) 1% fp, 2% vfp well | 1354 | to 60' |
| | | | | sorted 45% vcs 35% cs 10% ms 5% fs 2% vfs moder. sorted, | | add casing 9'2¾" 10"Ø |
| 10"Ø 71'2¼" | | | | same as above (2pt lith, 2 125ml environ, 1 moist dens) | | and weld. |

REMARKS:

PNL-MA 567, DO-1, Rev Ø

Reviewed by D.L. McGlean 12-8-89

8/30/89

WHC-MR-0209

154

| DRILL LOG | By R.D. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W017-55T |
|---|---|---|---|---|---|
| | Date 8/30/89 | | Depth 60 To 65 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"Ø 71' 2¼" | | | | | 1500 | resume drilling |
| | | | | | 1530 | to 65.0'-stop for |
| | | | | | | day. |

REMARKS:

PNL-MA 567, DO-1, Rev Ø

Reviewed by D.L. McKehan 12-8-89

8/30/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-86)

153

WHC-MR-0209

9 1 1 2 0 5 0 0 1 5 3

sht 1 of 2

| DRILL LOG | By R.D. Miller | Rig BE-60L # 2214103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W017-SST |
|---|---|---|---|---|---|
| | Date 8/31/89 | | Depth 65.0' To 80.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"Ø 71'2¼" | 65.0' | DB | dry | SAND, (1% Gravel 99% SAND) 1% fp; | 0710 | At site prepare to drill |
| | | | | 30% vcs 40% cs 10% ms 10% fs 9% vfs. moder. sorted | 0715 | H2S scan-OVA= <1ppm. |
| | | | | same as above (2pt lith 1 moist dens.) | 0730 | resume drilling |
| | | | | | 0810 | H2S scan-OVA= <1ppm. |
| | 70.0' | DB | dry | SAND, (2% Gravel, 98% SAND) 2% fp, well sorted | 0833 | to 70.0'- |
| | | | | 40% vcs 40% cs 10% ms 5% fs 3% vfs moder sorted. | 0840 | RPT scan = < det. |
| 10"Ø 80' 11½" | | | | same as above (2pt lith, 1 moist dens.) | 0845 | add 10"Ø casing-9'9¼" |
| | | | | | 0935 | resume drilling |
| | | | | | 0948 | Joe Caggiano WHC arrive |
| | | | | | | site ? on progress. |
| | | | | | 1006 | J. Caggiano dp site |
| | | | | | 1010 | H2S scan-OVA=<1ppm. |
| | 75.0' | DB | dry | SLIGHTLY GRAVELLY SAND (5% Gravel 95% Sand) 2% fp 3% vfp, | 1023 | to 75.0'- |
| | | | | well sorted, 40% vcs 40% cs 10% ms 3% fs 2% vfs moder. sorted. | | |
| | | | | same as above (2pt lith 1 moist dens.) | | |
| | 80.0' | DB | dry. | SLIGHTLY GRAVELLY SAND | 1049 | to 80.0'- sample |
| | | | | | | 9'5¾" |
| | | | | | 1058 | shut down-wind direct. |

REMARKS:

PNL-MA 567, DD-1, Rev Ø

Reviewed by V.G. McSlan 12-8-89

8/31/89

WHC-MR-0209

156

| DRILL LOG | By R.D.Miller | Rig BE-60L 22-14103 Lois W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. WD17-55T |
|---|---|---|---|---|---|
| | Date 8/31/89 | | Depth 80.0 To 80.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1200 | to lunch.- H+S has |
| | | | | | | shut us down temp. due |
| | | | | | | to wind direction off |
| | | | | | | of tank farm.- |
| | | | | | 1235 | Ar site - still shut dn. |
| | | | | | | air bottles on way out. |
| | | | | | | upgrade to lev. B |

REMARKS:

PNL-MA567, DO-1, Rev 0

Reviewed by D.L. McLehan 12-8-89

8/31/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-86)

157

WHC-MR-0209

9 1 1 2 0 5 0 0 1 5 0

Sht 1 of 2

| DRILL LOG | By R.D. Miller | Rig BE-60L #22-14103 Gene T. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/1/89 | | Depth 80.0' To 90.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"ø 80'11½" | 80.0' | DB | dry | SLIGHTLY GRAVELLY SAND, same as above | 0710 | Arrive site & H&S scan |
| | | | | (2pt lith, 2 125ml eno, 1 moist dens. 083189) | | OVA=<1ppm OK to proceed. |
| 10"ø 90'5¼" | | | | | | add 10"ø casing 9'5¾" and |
| | | | | | | weld up. |
| | | | | | 0802 | H&S scan OVA=<1ppm. |
| | | | | | 0915 | wind change - to north. |
| | | | | | 0920 | Sam says to shut |
| | | | | | | down - drillers to go on air. |
| | | | | | 1015 | wind change to south. |
| | | | | | | OK to proceed from H&S. |
| | | | | | 1036 | welding completed - resume |
| | | | | | | drilling - H&S scan OVA=<1ppm |
| | 85.0 | DB | dry | SLIGHTLY GRAVELLY SAND (5% Gravel 95% Sand) same as | 1131 | to 85.0' |
| | | | | above (2pt lith., 1 moist dens) | | |
| | | | | | 1202 | shut down lunch. |
| | | | | | 1245 | resume drilling |
| | 90.0 | | | SLIGHTLY GRAVELLY SAND - same as above. | 1315 | to 90.0' |
| 10"ø 99'6¾" | | | | (2pt lith, 1 moist dens) | 1330 | add 9'1½" 10"ø casing |

REMARKS:

PNL-MA567, DO-1, Rev 0

Reviewed by D.L. McGhan 12-8-89

WHC-MR-0209

158

| DRILL LOG | By R.D. Miller | Rig BE-60L #22-14103 Gene T. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/1/89 | | Depth 90.0 To 90.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10" ø 49'6 3/4" | | | | | 1511 | resume drilling |
| | | | | | 1516 | shut down. |

REMARKS:

PNL-MA-567, DO-1, Rev Ø

Reviewed by V.L. McKehan 12-8-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

9 1 1 2 0 5 0 0 1 5 2

Sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-600 #22-14103 | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/5/89 | Louis W. | Depth 90.0' To 105.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"Ø 99'6¾" | | | | | 0730 | Air sitr - welding |
| | | | | | 0756 | begin drilling - |
| | | | | | 0810 | H₂S scan - OVA = <1ppm. |
| | 95.0' | DB | dry | SLIGHTLY GRAVELLY SAND, (5% Gravel 95% Sand) 1% cp 1% mp 1% fp | 0855 | to 95.0' - |
| | | | | 2% vfp, [illegible], 35% vcs 35% cs 10% ms, 8% fs, 2% vfs, | | RPT scan <det. |
| | | | | mod to poorly sorted. 50% felsic/mafic subang - subrnd. | | |
| | | | | lt. yel brn. (2.5Y 6/4), slight to mod reaction to HCL | | |
| | | | | unconsolidated. (2pt lith 1 moist) | 0921 | to 100' - sample SST 090589 |
| | 100.0' | DB | dry | GRAVELLY SAND (10% Gravel 90% Sand) 2% cp, 3% mp | | add 10"Ø = 10' 1¾" and |
| 10"Ø 109'8½" | | | | 2% fp 3% vfp, mod. sorted, 35% vcs 35% cs 5% ms, 5% fs, 10% vfs | | weld - H₂S scan OVA = <1ppm |
| | | | | similar to 95.0' sample (2pt lith, 2/25ml enviro, 1 moist) | | |
| | | | | | 1050 | resume drilling |
| | | | | | 1126 | H₂S scan OVA = 14 ppm (paint?) |
| | 105.0' | DB | dry | SLIGHTLY GRAVELLY SAND (8% Gravel, 92% Sand) 1% cp, 2% mp, 2% fp | 1135 | to 105.0' |
| | | | | 3% vfp, 35% vcs, 40% cs, 10% ms, 5% fs, 2% vfs, mod. sorted, | | RPT scan = <det. |
| | | | | 50%/50% felsic/mafic, subang - subrnd, lt yel brn. (2.5Y 6/4) | | |
| | | | | moderate reaction to HCL, unconsolidated. (2pt. lith, 1 moist) | | |
| | | | | | 1201 | Stop for lunch. |

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by V. L. Markham 12-8-89

9/5/89

WHC-MR-0209

16C

sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/5/89 | | Depth 105.0' To 115.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"ø 109' 8½" | | | | | 1240 | resume drilling |
| | 110.0' | DB | dry | GRAVELLY SAND (10% Gravel 90% Sand) 2% cp 2% mp 2% fp | 1308 | to 110.0' - H2S scan |
| | | | | 4% vfp, 35% vcs, 35% cs, 10% ms, 5% fs, 5% vfs, mod. | | OVA = 1 ppm paint add |
| 10"ø 119' 4½" | | | | sorted 50/50% felsic/mafic, sub ang - sub rnd. lt. yel | 1315 | 10"ø casing 9'8" and weld |
| | | | | brown (2.5Y 6/4) slight to mod. react to HCL, unconsol. | | RM scan < det. |
| | | | | concretions of calcium and sands, (2pt lith, 1 moist) | | |
| | | | | | 1409 | resume drilling |
| | | | | | 1434 | H2S scan OVA = <1 ppm |
| | 115.0' | DB | dry | will log tomorrow. | 1521 | to 115.0' |
| | | | | | 1520 | stop for day. |

REMARKS:

PNL-MA567, DO-1, Rev Ø

Reviewed by W. L. Madsen 12-8-89

9/5/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

101

9 1 1 2 0 5 0 0 1 5 4

sht 1 of 3

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/6/89 | | Depth 115.0' To 120.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"Ø 119'4½" | 115.0' | DB | dry | GRAVELLY SAND (10% Gravel 90% Sand) 2% cp 2% mp 2% fp 4% vfp | 0710 | Arr site - prepare to drill |
| | | | | 35% vcs 35% cs 10% ms 5% fs 5% vfs, mod sorted, 50/50% | 0715 | H₂S scan - OVA = <1ppm. |
| | | | | felsic/mafic, subang - subrnd, lt yel brn (2.5Y 6/4) slight | 0730 | begin drilling - Lou and |
| | | | | react to HCl, unconsolid, traces of concretions (2pt lith | | I discover 1.0' discrepency |
| | | | | 1 moist.) | | in 10" casing from 9/1/89 |
| | 120.0' | DB | dry | SAND (2% Gravel 98% Sand) 1% fp 1% vfp, 20% vcs 20% cs | 0804 | to 120.0' - sample 090689 |
| | | | | 20% ms 20% fs 18% vfs, poorly sorted, 50/50% felsic/mafic, | | core barrel weldment |
| | | | | subang - subrnd, lt yel brn (2.5Y 6/4) slight to mod reat to HCl, | | is cracked - repair? |
| | | | | unconsolidated. (2pt lith, 2 125ml enviro, 1 moist) | 0838 | add the 8" core barrel |
| 10"Ø 128'2½" | | | | | 0857 | add 8'10" of 10" casing |
| | | | | | | and weld up. H₂S scan <1ppm. |
| | | | | | 0915 | Joe Caggiano - WHC |
| | | | | | | arrives ? about progress |
| | | | | | | tank farm problems etc. |
| | | | | | | also expressed concern |
| | | | | | | over well completions & security |
| | | | | | 0945 | resume drilling - J.C. departs. |

REMARKS:

PNL-MA567, D.O.-1, Rev Ø

Reviewed by V.L. McGahan 12-8-89

9/6/89

WHC-MR-0209

162

| DRILL LOG | By R. Miller | Rig BE-600 22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/6/89 | | Depth 120.0' To 130.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10" ø 128' 2½" | | | | | 1010 | H₂S scan - OVA = <1 ppm. |
| | 125.0' | 8" DB | dry | Slightly GRAVELLY SAND (6% Gravel 94% Sand) 1% sc, 1% vcp 1% cp | 1027 | to 125.0' |
| | | | | 1% mp 1% fp 1% vfp, 20% vcs 20% cs 20% ms 20% fs 14% vfs | | |
| | | | | poorly sorted, 50/50% felsic/mafic, sub ang - sub rnd, lt. yel | | |
| | | | | brn (2.5Y 6/4), slight to mod react to HCL, unconsolid. | | |
| | | | | trace of concretions (2pt lith, 1 moist) | | |
| 10" 128' 2½" | 127' 2½" | | | | 1055 | to 130.0' stick-up 1.0' |
| | 130.0 | 8" DB | dry. | SAND (1% Gravel 99% Sand) 1% vfp, 10% vcs 10% cs | 1100 | Joe Cangiano - arrive |
| | | | | 50% ms 20% fs 9% vfs moder. sorted, 60% felsic 40% mafic, | | Ammonia & NOX - in tanks |
| | | | | sub ang - sub rnd, lt yel brn (2.5Y 6/4), mod to strong react to HCL, | | WHC to test further. |
| | | | | unconsol, some concretions. (2pt. lith, 1 moist) | 1115 | Joe C. departs site |
| | | | | | 1200 | shut down for lunch |
| | | | | | | Vern McGahan, & John |
| | | | | | | Gould arrive to |
| | | | | | | geophys log hole. |
| | | | | begin to geophysically log hole with natural gamma. | 1245 | begin log |
| | | | | logged from 4.0' to 129.0' | 1319 | logging completed. |

REMARKS:

PNL-MA567, DO-1, Rev Ø

Reviewed by D.L. McGhan 12-8-89

9/6/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

163

WHC-MR-0209

9 1 1 2 0 5 0 0 1 6

sht 3 of 3

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/6/89 | | Depth 130.0' To 130.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"ø 20'10½" | | | | | 1339 | begin to add 8" carbon steel |
| | | | | | | casing 20'10½" w/ drive |
| | | | | | | shoe. |
| 8"ø A1'6¼" | | | | | 1345 | add 20'8¾" 8"ø and |
| | | | | | | weld. |
| 8"ø 101'5¼" | | | | | 1435 | add 19'11" 8"ø and weld. |
| | | | | | 1440 | H&S scan-OVA = <1 ppm. |
| | | | | | 1517 | weld completed. stop for |
| | | | | | | day |

REMARKS:

PNL-MA567, DO-1, Rev ø

Reviewed by V.L. McGhan 12-8-89

9/6/89

WHC-MR-0209

164

sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/7/89 | | Depth 130.0' To 130.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"ø 61'5½" | | | | | 0705 | Arrive site - prep casing 8" |
| | | | | | 0715 | $H_2S$ scan - OVA = <1ppm. |
| 81'2½" | | | | | 0720 | add 8"ø casing 19'9" & |
| | | | | | | weld |
| 8"ø 97'6½" | | | | | 0815 | add 16'4½" 8"ø & weld |
| | | | | | 0817 | $H_2S$ scan - OVA = <1ppm |
| | | | | | 0830 | shut down to repair cable gd. |
| | | | | | 0900 | resume welding |
| 8"ø 114'11¾" | | | | | 0930 | add 17'5½" - 8"ø & weld |
| | | | | | 0941 | $H_2S$ scan - OVA = <1ppm. |
| 8"ø 132'5¾" | | | | | 1032 | add 17'6" - 8"ø & weld |
| | | | | | 1127 | 8"ø casing to depth - add |
| 8"ø 141' 7" | | | | | | 9'1½" 8"ø and weld. |
| | | | | | 1200 | shut down for lunch |
| | | | | | 1230 | resume welding |
| | | | | | 1240 | $H_2S$ scan - OVA = <1ppm. |
| | | | | | 1310 | welding completed - mech. |
| | | | | | | here to complete cable guide |

REMARKS:

PNL-MA 567, DO-1, Rev ø

Reviewed by V.L. McGhan 12-8-89

9/7/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

165

Sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-600 #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/7/89 | | Depth 130.0' To 140.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Ø 141'7" | | | | | 1350 | repair completed |
| | | | | | 1355 | H2S scan OVA = <1ppm |
| | | | | | 1356 | begin drilling |
| | 135.0' | DB | dry | SAND (1% Gravel 99% Sand) 1% vfp, 20% vcs 20% cs 20% ms | 1428 | to 135.0' |
| | | | | 20% fs 19% vfs, mod. sorted, 60% felsic 40% mafic, sub ang- | | |
| | | | | sub rnd, lt. yel brn (2.5Y 6/4), mod to strong react to HCL | | |
| | | | | unconsol., tr. concretions. (2pt lith, 1 moist) | | |
| | 140.0' | DB | SM | SAND (3% Gravel 97% Sand) 1% fp 2% vfp, 60% vcs | 1440 | to 140.0' sample 090789 |
| 8"Ø 150'4" | | | | 20% cs 10% ms 5% fs 2% vfs, 60/40% felsic/mafic, | 1445 | add 8'9" 8"Ø ↓ weld |
| | | | | sub ang - subrnd. well sorted, lt yel brn (2.5Y 6/4), slight to | | |
| | | | | mod react to HCL, unconsol. - sl. consol. (2pt lith, 2 125ml | | |
| | | | | enviro, 1 moist.) | | |
| | | | | | 1510 | shutdown for day. |

REMARKS:

PNL-MA567, DO-1, Rev Ø

Reviewed by V.L. McKlam 12-8-89

9/7/89

166

WHC-MR-0209

| DRILL LOG | By: Ian Remsky / Goodwin | Rig: BE GOL #14-103 Louis | Well Number: 299-E27-12 | Computer Number: N/A | Project or Work Order No.: W017 SST |
|---|---|---|---|---|---|
| | Date: 9-8-89 | | Depth: 140' To 155' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8") 150'4" | 145' | | | | 0715 | arrive on site driller |
| | | | | | | continues to weld 8" casing |
| | | | | | 0720 | H&S check - ok |
| | | | | | 0800 | resume drilling |
| | | | | | 0825 | H&S check - ok |
| | 145' | D | SM | Slightly GRAVELLY SAND: 5% gravel 95% sand, trace mud: trace fp 5% vfp, 15% fcs, | 0840 | Samples: (2) 1pt. lith |
| | | | | 20% mcs, 50% ms, 8% fs, 2% vfs, trace mud (well sorted) Gravel 60% mafic/ | | (1) moisture - checked |
| | | | | 40% felsic SA-SR; Sand 20% mafic/80% felsic SA-SR; 2.5Y 5/4 (light | | and cleared by H&S and RPT |
| | | | | olive brown) slight HCl in unconsolidated | | |
| (8") 149'-3¾" (8") 159'-7¾" | | | | | 0850 | preparing to weld casing |
| | | | | | 0930 | finish welding - 9'-3¾" of |
| | | | | | | 8" carbon steel casing added |
| | 150' | D | SM | SLIGHTLY GRAVELLY SAND, 7% gravel, 93% sand trace mud, trace fp, | 0950 | Samples: (2) 1pt. lith |
| | | | | 7% vfp, 33% vcs, 40% cs, 15% ms, 5% fs, trace vfs, trace mud (well sorted) | | (1) moisture |
| | | | | gravel: 80% mafic 20% felsic SA-SR, Sand: 20% mafic/80% felsic SA-SR | | cleared by RPT |
| | | | | 10YR 4/4 (light yellowish brown) slight HCl in unconsolidated | | |
| | | | | | 1005 | H&S check - ok |
| | 155' | D | SM | GRAVELLY SAND: 12% GRAVEL, 83% SAND, 5% MUD | 1015 | SAMPLE; 2 PT. LITH & 1 MOIST. SAMPLES |

REMARKS:

ONL MA 569 (10-1 1000) Reviewed by [illegible] 10-8-89 Shuler, Mark 9/8/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

167

WHC-MR-0209

| DRILL LOG | By: Goodwin | Rig: BE 60 L #22-14103 | Well Number: 299-E27-12 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9/6/89 | | Depth: 155' To 160' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 155' | D | SM | (CONT.) 3% MP, 5% FP, 4% VFP, 34% VCS, 27% | | |
| | | | | CS, 15% MS, 4% FS, 3% VFS, 5% MUD. | | |
| | | | | MODERATELY SORTED. GRAVELS ARE 40% MAFIC, | | |
| | | | | 60% FELSIC; SA TO SR. SANDS ARE 25% | | |
| | | | | MAFIC, 75% FELSIC; SA. WET COLOR IS | | |
| | | | | 10YR 5/3 (BROWN). NO CONSOLIDATION. MODER- | | |
| | | | | ATE RX. TO 10% HCL. Ø DPM w/ OVA & RAD. | 1010 | PREPARING TO WELD |
| 159' 7 3/4" | | | | = <DET. INCREASE IN GRAVEL & MUD. | | |
| 10'-1" | | | | ADDED 10'-1" OF 8" CASING; TOTAL 8" = | 1130 | FINISHED WELD |
| = (8') 169'-8 3/4" | | | | | | |
| | 160' | D | | SANDY GRAVEL: 40% gravel 57% sand 3% mud: | 1140 | Took (2) pint lith. |
| | | | | 3% VCP (largest = 40 mm), 5% CP, 10% MP, 10% FP, 12% VFP, | | samples, (1) moisture |
| | | | | 25% VCS, 15% CS, 10% MS, 7% FS-VFS, 3% mud: poorly | | sample, (2) 125 ml. |
| | | | | sorted; gravel: 60% mafic 40% felsic, SA-SR | | chem. samples - |
| | | | | sand: 30% mafic 70% felsic - wet color | | chain-of-custody # |
| | | | | light olive brown 10YR 5/4 - slight rxn w/ | | SST090889 |
| | | | | 10% HCl - unconsolidated | | |
| | | | | Ø ppm w/ OVA & Not > background w/ GM. | | |

REMARKS:

PNL-NIA-567 D0-1 REV 0 Reviewed by D.T. Markham 12-8-89 S.L.P. 9-8-89

WHC-MR-0209

| DRILL LOG | By: AIRHART/Keiner | Rig: BE 60L 14103 L. WATKINS | Well Number: 299-E27-12 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-8-89 | | Depth: 160' To 170' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 169'8¾" | | | | | 1200-1230 | lunch |
| | | | | | 1245 | Resumed Drilling |
| | 165' | D | D | SLIGHTLY GRAVELLY SAND: 8% gravel, 87% sand, | 1310 | Took (2) pint lit. |
| | | | | 5% mud: 1% CP, 2% MP, 5% FP-VFP, 17% VCS, | | samples, (1) moisture |
| | | | | 20% CS, 25% MS, 15% FS, 10% VFS, 5% mud: poorly | | sample. |
| | | | | sorted: gravel - 60% mafic 40% felsic A-SR | | cleaned by RPT |
| | | | | sand - 40% mafic 60% felsic, A-SA - | | |
| | | | | color: light olive brown 10YR 5/4: slight | | |
| | | | | rxn w/ 10% HCl - unconsolidated. | | |
| | 170' | D | SM | SAND: 4% gravel, 96% sand, trace mud: trace VCP, 4% VFP, 10% VCS | 1330 | Samples: (2) pint lit. |
| | | | | 20% CS, 46% MS, 15% FS, 5% VFS, trace mud (well sorted); Gravel: 60% mafic/ | | (1) moisture |
| | | | | 40% felsic SA-SR; Sand: 40% mafic/60% felsic SA-SR, 10YR 5/4 (light | | cleaned by RPT |
| | | | | olive brown), slight HCl rxn, unconsolidated | 1400 | |
| 178'11" | | | | | 1440 | Added 9'2¼" of 8" casing |
| | | | | Briefing by Randy Spaniel (KEH safety) re: | | 169'8¾" + 9'2¼" = 178'11" |
| | | | | safety issues around C-Tank Farms and | 1445 | Resumed Drilling |
| | | | | strategies for ensuring safe working conditions - | | |
| | | | | also showed $NH_3$ & $NO_x$ higher than TLV @ | | |

REMARKS: 3 Tanks.

PNL-MA-567 DO-1 REV-0 Reviewed by V.E. Mathison 12-8-89

S. D. [illegible] 9-8-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

169

WHC-MR-0209

| DRILL LOG | By: AIRHART | Rig: BE 60L 14103 | Well Number: 299-E27-12 | Computer Number: N/A | Project or Work Order No.: N-017 SST |
|---|---|---|---|---|---|
| | Date: 9-8-89 | | Depth: 170' To 179' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 175 | D | D | SAND: 1% gravel, 97% sand, 2% mud. | 1500 | Took (2) pint |
| | | | | 1% FP-VFP, 15% VCS, 30% CS, 30% MS, 22% FS-VFS, | | lith samples, |
| | | | | 2% mud: mod.-to-poorly sorted; No Δ lith. | | (1) moisture |
| | | | | or color - unconsolidated - slight rxn. | | sample. |
| | | | | w/ 10% HCl - | | |
| | | | | Ø ppm w/ OVA, not > background w/ GM. | | |

REMARKS:

PNL-MA-567 DO-1 REV-0 Reviewed w/ [illegible]

WHC-MR-0209

9 1 1 2 0 5 0 0 1 7 3

sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/11/89 | | Depth 179.0' To 185.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Ø 178' 11" | | | | | 0710 | Arr site - H2S scan. |
| | | | | | | OVA=<1ppm, LEL<det. |
| 8"Ø 188' 1/2" | | | | | 0730 | add 9' 1 1/2" 8"Ø & weld |
| | | | | | 0840 | begin to drill |
| | 180.0' | DB | dry | SAND (3% Gravel, 97% Sand, trace mud) 1% fp 2% vfp | 0853 | to 180.0' - sample. |
| | | | | 15% vcs 25% cs 30% ms 10% fs 17% vfs, trace mud., | | H2S scan - OVA=<1ppm |
| | | | | mod - poorly sorted, 50/50% felsic/mafic, SA-SR, yell. brn. | | RPT - cleared |
| | | | | (10YR 5/4) slight rx to 10% HCL, unconsol. (2pt. lith, 2 enviro | | |
| | | | | 1 moist) OVA = <1ppm. | 0926 | H2S scan - OVA = <1ppm. |
| | | | | | 0949 | stop to repair core barrel |
| | | | | | 0959 | resume drilling |
| | | | | | 1008 | H2S scan - OVA=<1ppm. |
| | 185.0' | DB | dry | SAND, (4% Gravel, 96% Sand, trace mud) 4% vfp, 15% vcs | 1020 | to 185.0' - sample |
| | | | | 20% cs 30% ms, 20% fs, 11% vfs, trace mud, mod - poorly sorted, | | RPT - cleared. |
| | | | | 60/40% felsic/mafic, SA-SR, yellowish brn (10YR 5/4) slight | | |
| | | | | to mod rx to 10% HCL, unconsol. (2pt lith, 1 moist) OVA=<1ppm. | | |
| 8"Ø 196' 9 1/4" | | | | | 1023 | add 8'4"-8' & weld. |
| | | | | | 1110 | resume drilling |

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by W.C. Mathews 12-8-89

9/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

171

WHC-MR-0209

9 1 1 2 0 5 0 0 1 7 4

sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/11/89 | | Depth 185.0' To 205.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Ø 196' 9¼" | | | | | 1120 | $H_2S$ scan - OVA = <1ppm. |
| " | 190.0' | DB | SM. | Slightly GRAVELLY SAND (5% Gravel, 95% Sand, trace mud) 5% vfp, 15% vcs | 1150 | to 190.0' - RPT cleared. |
| | | | | 20% cs 30% ms 20% fs 10% vfs, trace mud, mod-poorly | 1205 | shut down - lunch. |
| | | | | sorted, 60/40% felsic/mafic, SA-SR, yell. brn (10YR5/4) | 1235 | resume activity |
| | | | | slight to moderate rx to 10% HCL, unconsolidated, trace | 1246 | $H_2S$ scan - OVA = <1ppm. |
| | | | | of black organic nodules (2pt lith, 1 moist.) | | |
| | 195.0' | DB | SM | Slightly GRAVELLY SAND (5% Gravel, 95% Sand, trace mud) 5% vfp, 15% vcs | 1256 | to 195.0' - sample |
| 8"Ø 201' 10¼" | | | | 20% cs 30% ms 20% fs 10% vfs, trace mud, mod-poorly sorted | | add 10'1"-8" & weld. |
| | | | | 60/40% felsic/mafic, SA-SR, yell brn (10YR 5/4) slight to | 1300 | $H_2S$ scan - OVA = <1ppm |
| | | | | moderate rx to 10% HCL, unconsolidated, traces of black | | RPT cleared |
| | | | | organic nodules and mud nodules. (2pt lith, 1 moist) | | |
| | | | | | 1350 | resume drilling |
| | 200.0' | DB | SM. | SAND (2% Gravel, 98% Sand, trace mud) 2% vfp, 20% vcs | 1435 | to 200.0' - sample |
| | | | | 20% cs 20% ms 20% fs 18% vfs, trace mud, poorly sorted, | 1437 | $H_2S$ scan - OVA = <1ppm |
| | | | | 60/40% felsic/mafic, SA-SR, lt. yel brn (10YR/6/4) slight | | RPT cleared. |
| | | | | rx to 10% HCL, unconsolidated, trace mud nodules. (2pt lith | | |
| | | | | 2 125ml enviro, 1 moist) | 1450 | $H_2S$ scan - OVA = <1ppm. |
| | 205.0 | DB | SM. | | 1453 | to 205.0' - sample. |

REMARKS:

1458 stop for day.

9/11/89

PNL-MA 567, DO-1, Rev Ø Reviewed by D. G. Markham 12-8-89

WHC-MR-0209

172

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/12/89 | | Depth 205.0' To 215.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"ø 206' 10¼" | 205.0 | DB | SM. | from 9/11/89 SAND (2% Gravel 96% Sand 2% Mud) 2% vfp, 20% vcs 20% cs | 0705 | Ar site - H&S scan |
| | | | | 20% ms 20% fs 16% vfs, 2% md, mod sorted, 40/60% | | OVA = <1ppm LEL < det. |
| 8"ø 216' 1¾" | | | | felsic/mafic, A-SR, lt yel brn (10YR 6/4) mod rx to 10% HCL, | 0710 | add 9' 3½" - 8" & weld |
| 9 10½" | | | | unconsolidated, tr concretions & mud nodules. (2pt lith, | 0745 | H&S scan - OVA = <1ppm. |
| | | | | 1 moist) | 0840 | begin to drill |
| | | | | | 0920 | to 210.0' - sample |
| | 210.0' | DB | SM | SAND (2% Gravel 96% Sand 2% Mud) same as 205.0' | 0921 | H&S scan - OVA = 1ppm. |
| | | | | (2pt lith, 1 moist) | | RPT - Cleared |
| | 215.0' | DB | SM. | SAND (3% Gravel 97% Sand trace mud) 3% vfp, 30% vcs | 0948 | to 215.0' - sample |
| | | | | 20% cs 20% ms 15% fs 12% vfs, mod. sorted, 40/60% felsic/ | | H&S scan - OVA = <1ppm. |
| | | | | mafic, A-SR, lt. yel brn (10YR 6/4) slight to mod rx | | RPT - cleared |
| | | | | to 10% HCL, unconsolidated, trace concretions, mud | | |
| 8"ø 225' ¼" | | | | nodules and micaceous frags. (2pt lith, 1 moist) | 0955 | add 8' 10½" - 8" & weld. |
| | | | | | 1039 | resume drilling - maint. |
| | | | | | 1107 | resume drilling |
| | | | | | 1130 | wedge stuck in 10" |
| | | | | | 1154 | resume drilling |
| | | | | | 1200 | stop for lunch. |

REMARKS:

PNL-MA 567, DO-1, Rev Ø Reviewed by V. L. Merkham 12-8-89

9/12/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

178

WHC-MR-0209

9 1 1 2 0 5 0 0 1 7 5

Sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/12/89 | | Depth 215.0 To 230.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"@ 225' 1/4" | | | | | 1230 | resume drilling |
| 8 2½ | 220.0' | DB | SM | SAND (3% Gravel 97% Sand) 3% vfp, 40% vcs 20% cs | 1250 | to 220.0'- sample. |
| | | | | 20% ms 10% fs 7% vfs, trace mud, well sorted, 40/60% | | H2S scan-OVA=<1ppm. |
| | | | | felsic/mafic, A-SR, lt. yel brn (10YR 6/4) moderate rx | | PPT-cleaned. |
| | | | | to 10% HCL, unconsolidated, traces of vdk brn (2.5Y3/2) | | |
| | | | | clay stone (soft) (2pt lith, 2 125ml enviro, 1 moist) | | |
| | 225.0 | DB | SM | SAND (1% Gravel 98% Sand 1% Mud) 1% vfp, 25% vcs | 1318 | to 225.0'- sample |
| | | | | 20% cs 15% ms 15% fs 23% vfs, 1% mud, poorly sorted, | | H2S scan-OVA=<1ppm. |
| | | | | 40/60% felsic/mafic, lt yel brn (10YR 6/4) moder. rx to | | PPT-cleaned. |
| 8"@ 233 2¼ | | | | 10% HCL, unconsolidated, trace concretions. (2pt lith | 1320 | add 8' 2½"-8" & weld |
| | | | | 1 moist) | 1415 | resume drilling |
| | | | | C.S 1/4 | 1440 | H2S scan OVA=<1ppm. |
| | 228.0 | DB | SM | Gravelly Sandy MUD (20% Gravel 39% Sand 41% Mud) | 1454 | to 228.0'- sample. |
| | | | | will describe in AM | | |
| | 230.0' | DB | SM. | Will describe in AM | 1513 | to 230.0'- sample |
| | | | | | 1530 | Dp site |
| | | | | | | cofc 091289 |
| | | | | | | |

REMARKS:

PNL-MA-207, DO-1, Rev 0 Reviewed by V.L. Markham 12-8-89

9/12/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

174

| DRILL LOG | By: R. Millar | Rig: BE-60L #22-14103 Louis W. | Well Number: 299-E27-12 | Computer Number: N/A | Project or Work Order No.: W-017-SST |
|---|---|---|---|---|---|
| | Date: 9/13/89 | | Depth: 230.0' To 245.0' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Ø 233'2¾" | 228.0' | DB | SM. | GRAVELLY SANDY MUD (20% Gravel 39% Sand 41% MUD) | 0715 | Air site - H&S scan |
| | 228.8' | | | 5% cp, 5% mp, 5% fp, 5% vfp, 5% vcs 5% cs 5% ms 10% fs 14% vfs, | | OVA: <1ppm, LEL=<det |
| | | | | 41% Mud, very poorly sorted, 40/60% f/m, SA-WR, ol. brn. | 0725 | begin drilling |
| | | | | (2.5Y 4/4), slight rx to 10% HCL (2pt lith, 2 125ml enviro, 1 moist) | | |
| | 230.0 | DB | SM-dry | MUDDY SANDY GRAVEL (15% Mud 55% Sand 30% Gravel) | 0745 | add 2gal $H_2O$ to aid drilling |
| | | | | 10% cp, 5% mp 5% fp 10% vfp, 10% vcs 10% cs 10% ms 10% fs 15% vfs | | |
| | | | | 15% Mud, very poorly sorted, 50/50% f/m, SA-WR, lt. yel. brn? | | |
| 8"Ø 240' 3½" | | | | (10Y 6/4), slight rx to 10% HCL, (2pt lith, 1 moist) unconsolidated | 0820 | add 1'3¼"-8" & weld |
| | | | | trace of vcp & s cobble in drive tube. | 0914 | resume drilling |
| | 235.0' | DB | SM. | SANDY GRAVEL (40% Sand, 60% Gravel, trace mud) 15% mp | 0938 | to 235.0' - sample |
| | | | | 15% fp 30% vfp, 10% vcs 5% cs 5% ms 10% fs 10% vfs, trace | 0945 | H&S scan - OVA = <1ppm |
| | | | | mud., poorly sorted, 50/50% f/m, SA-WR, ol. brn (2.5Y | | cleaned - RPT. |
| | | | | 4/4) wet., slight rx to 10% HCL, unconsolidated, traces of | 1015 | H&S scan - OVA = <1ppm. |
| 8"Ø 246' 8½" | | | | vcp, cp in drive tube, (2pt lith, 1 moist) | 1025 | add 6' 5"-8" & weld |
| | | | | | 1115 | resume drilling |
| | 240.0' | DB | SM | SANDY GRAVEL - similar to 235.0' (2pt lith, 2 125ml enviro, | 1127 | to 240.0' |
| | | | | 1 moist) | | |
| | | | | | 1200 | stop for lunch. |

REMARKS:

PNL-MA 567, DO-1, Rev Ø Reviewed by V.L. McGlean 12-8-89

9/13/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

175

WHC-MR-0209

9 1 1 2 0 5 0 0 1 7 8

sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/13/89 | Louis W. | Depth 245.0' To 255.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8" 246' 8½" | | | | | 1238 | resume drilling |
| | 245.0' | DB | SM | SANDY GRAVEL (50% Sand, 50% Gravel, trace Mud) 2% Scdob | 1256 | to 245.0' - sample |
| | | | | 3% vcp, 5% cp 10% mp 15% fp 15% vfp, 15% vcs 10% cs 10% ms | | $H_2S$ scan = OVA: <1 ppm |
| | | | | 10% fs, 5% vfs, trace mud, very poorly sorted, 60/40% f/m, | | RPT - cleared. |
| 8" 254' 10¾" | | | | SA - WR, dl. brn. (2.5Y 4/4 wet), slight rx to 10% HCL | 1320 | add 8' 2¼" - 8" & weld. |
| | | | | unconsolidated (2pt lith, 1 moist) | 1415 | resume drilling |
| | 250.0' | DB | SM | MUDDY SANDY GRAVEL (60% Gravel 25% Sand 15% Mud) | 1448 | to 250.0' - sample |
| | | | | 10% cp, 15% mp, 15% fp 20% vfp, 5% vcs 5% cs 5% ms 5% fs | | $H_2S$ scan - OVA: <1 ppm |
| | | | | 5% vfs, 15% mud, very poorly sorted, 60/40% f/m, SA - WR, | | RPT - cleared |
| | | | | dl. brn (2.5Y 4/4 wet), slight rx to 10% HCL, unconsol. | | |
| | | | | (2pt. lith, 1 moist.) | | |
| | 255.0' | DB | W | will log in AM. - water! | 1518 | to 255.0' - sample |
| | | | | | | RPT - cleared |
| | | | | | | $H_2S$ scan - OVA: <1 ppm |
| | | | | | 1530 | Shut down for day |
| | | | | | | samples on COC091389 |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA 567, DO-1, Rev 0 Reviewed by V.L. McElhaney 12-8-89

9/13/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

176

WHC-MR-0209

9 1 1 2 0 5 0 0 1 7 9

sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/14/89 | Louis W. | Depth 255.0' To 265.0' | | Subcontract No. N/a |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"ø 254'10¾" | 255.0 | DB | W | MUDDY SANDY GRAVEL (70% Gravel, 15% Sand, 15% Mud) 10% cp | 0715 | Ar site. attempt a |
| | | | | 15% mp 20% fp 25% vfp, 4% vcs 4% cs 3% ms 2% fs 2% vfs, | | w/c - no response. |
| | | | | 15% mud, poorly sorted 60/40% f/m, SA WR, dl brn (2.5Y | | H&S scan - OVA = <1ppm |
| | | | | 4/4) wet, slt. to none rx to 10% HCL, unconsolidated (2pt lith, 1 moist) | | LEL = <det. |
| | | | | sample is wet (capillary) | 0740 | begin to drill. |
| | 258.0' | DB | W | MUDDY SANDY GRAVEL (similar to 255.0') | 0800 | stop. - to 258.0' |
| | | | | (2pt lith, 2 125ml enviro, 1 moist) | 0830 | H&S scan - spoils pile |
| | | | | | | OVA = 13.75ppm LEL <det |
| | | | | | 0835 | sample - |
| 8"ø 263'7" | | | | | 0840 | add 8'8¼" 8" & weld. |
| | | | | | 0930 | resume drilling |
| | 260.0' | DB | W | SANDY GRAVEL (75% Gravel, 25% Sand, tr mud) 10% cp | 0945 | to 260.0' - sample |
| | | | | 20% mp 20% fp 25% vfp, 5% vcs 5% cs 5% ms 5% fs 5% vfs, | | H&S scan - OVA = <1ppm w/H |
| | | | | trace mud, mod. sorted, 60/40% f/m, SA-WR dl brn (2.5Y | | spoils = 6ppm. |
| | | | | 4/4 wet), slight to none rx to 10% HCL, Unconsolidated (2pt lith | | RPT - cleared. |
| | | | | 2 125ml enviro) | 1010 | H&S scan - OVA = 2ppm |
| | | | | | | spoils = <1ppm |
| | 265.0' | DB | W | | 1033 | to 265.0' - sample. |

REMARKS:

PNL-MA 567, DO-1, Rev Ø

Reviewed by V.L. McGhan 12-8-89

9/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

177

WHC-MR-0209

9 1 1 2 0 5 0 0 1 1 0

sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-1410 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/14/89 | | Depth 265.0' To 270.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Ø 263' 7" | 265.0' | DB | W. | SANDY GRAVEL (similar to 260.0') (2pt lith) | 1038 | H2S scan OVA = <1ppm w/H |
| | | | | | | spails = 5.5ppm. |
| | | | | | | RPT. cleaned. |
| 8"Ø 269' 7" | | | | | 1100 | add 6'0" -8" & weld |
| | | | | | 1200 | stop for lunch |
| | | | | | 1230 | resume activity |
| | | | | | 1240 | take w/L - 261.91' bls |
| | | | | tenetive T.D. = 267.21' bls | | -9.65' SU = 252.26' bls |
| | | | | | 1250 | resume drilling |
| | | | | | 1325 | - casing plugged - drill |
| | | | | | | out. |
| | 270.0 | DB | W | SANDY GRAVEL (75% Gravel, 25% Sand, trace Mud) 5% vcp | 1414 | to 270.0' - sample. |
| | | | | 10% cp 15% mp 20% fp 25% vfp, 5% vcs 5% cs 5% ms 5% fs | 1415 | H2S scan OVA = <1ppm |
| | | | | 5% vfs, trace mud, poorly sorted, 60/40% f/m, SA-WR | | RPT - cleaned. |
| 8"Ø 269' 7" | 261' 7" | | | ol. brn. (2.5Y 4/4) wet, slight rx to 10% HCL, Unconsd. | 1500 | casing plugged. - clean |
| | | | | (2pt lith.) | | out |
| | | | | | 1515 | tape 1300-08 tag hole - 266.10' bls |
| | | | | | 1520 | shut down. |

REMARKS:

Samples on cofc 091489

DNL-MA 567, DO-1, Rev Ø Reviewed by V.L. McGhan 12-8-89

9/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

178

9 1 1 2 0 5 0 0 1 3 1

Sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/15/89 | | Depth 270.0' To 267.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 0'0" 264'7" | 267'9" | | | | 0710 | Ar site - $H_2S$ scan |
| | | | | | | OVA: <1ppm LEL=<det. |
| | | | | | 0715 | w/c 254.30bls - SU 1.97' = 252.33' bls |
| | | | | | | TD 268.06bls - SU 1.97' = 266.09' bls |
| | | | | | 0735 | $H_2S$ scan - OVA=<1ppm. |
| | | | | | 0740 | begin to clean-out. |
| | | | | | 0810 | sound hole to 265.70' bls |
| | | | | | | lost hole - will add 50 gal |
| | | | | | | of approved $H_2O$ |
| | | | | | 0820 | $H_2S$ scan - OVA: <1ppm. |
| | | | | target TD - 267.33 | 0845 | sound hole to 267.19' bls |
| | | | | | 0850 | add 30 gal $H_2O$. |
| | | | | | 0905 | sound hole to - 266.67' bls |
| 272'1" | 268'7" | | | | 0912 | add 2'6" 8" and weld |
| | | | | | 0950 | resume drilling |
| | | | | | 1010 | sound hole to 267.46' bls |
| | | | | | | S.U. 3.40' - prep for |
| | | | | | | straightness test. |

REMARKS:

PNL-MA567, DO-1, Rev 0 Reviewed by V.L. McKhan 12-8-89

9/15/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

179

9 1 1 2 0 5 0 0 1 3 2

sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-602 #22-14103 | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/15/89 | | Depth 267' To 267' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1835 | begin straightness test |
| | | | | straightness test witnessed by - Curtis Hoover (WHC) and passed | | w/ 20' of 6" stainless steel |
| | | | | | | casing |
| 8" @ 270'9" | 268'7" | | | | 1040 | cut 8" - 16" and break |
| | | | | | | rig down. |
| | | | | | 1200 | stop for lunch |
| | | | | | 1230 | resume break down |
| | | | | | 1400 | rig off hole - weld |
| | | | | | | cap on 8" casing. |
| | | | | | | continue clean-up. |

REMARKS:

PNL-MA567, DO-1, Rev 0 Reviewed by W.L. McGhee 12-8-89

9/15/89

WHC-MR-0209

80

Sht 1 of 1

| DRILL LOG | By R. Miller | Rig N/A | Well Number 299-E27-12 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/18/89 | | Depth 267.66' To — | | Subcontract No. N/A. |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0810 | Logging truck arrives |
| | | | | | | hammer open cover. |
| | | | | | 0825 | wtr. 254.19' btc - 2.09' su = |
| | | | | | | 252.10' bls |
| | | | | | 0830 | Logging truck to |
| | | | | | | 299-E27-13 |
| | | | | Vern McGahan (logger) & John Gould (WHC Insp) | 0945 | Logging truck arrives |
| | | | | begin to geophysically log hole w/ natural gamma | | |
| | | | | logged from 267.0' to 3.1' | 1100 | logging completed |
| | | | | | | stand by to access |
| | | | | | | 299-E27-15 |
| | | | | | 1130 | Dry site |

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by V. L. McGhan 12-8-89

9/15/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small

181

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-12 | Date 10-4-89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location North of C Tank Farm | Project W-017 SST | |

Logged by S.P. ARHART S.P. Arhart — Date 10-4-89
Reviewed by W.L. McSlam — Date 12-8-89
Measuring Equip. S-TAPE #4 — Procedure PNL-MA-567 DOI, REV. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment PETTIBONE CRANE / HYD JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | DATUM = land surface |
| 0720 | | | | | | | | | | D/W: 254.22' − 2.10' (stickup) |
| | | | | | | | | | | = 252.12' E-tape #12176 |
| | | | | | | | | | | D/B = 267.85' + 2.15' (tape add-on) |
| | | | | | | | | | | − 2.10' (stickup) = 267.90' |
| | CARBON STEEL | 8" | 270.75' | 2.1' | 268.65' | | | | | ∴ 0.75' mud inside casing |
| | | | | | | | | | | |
| | | | | | | | | | | Moved equipment to hole. |
| 1154 | " | 8" | | | 268.65' | 16-30 Col. Silica Sand | ½ bag | 265.9' | 2.7' | 270.3' + 2.2' − 6.6' = 265.9' |
| | | | 275' | 7.4' | 267.6' | | | 266.4' | 1.2' | 271.7' + 2.2' − 7.5' = 266.4' |
| | 10-slot channel pack | 4" | 21.03' | | | | | | | Begin installing stainless steel (SS) |
| | w/ bottom cap | | | | | | | | | screen & casing. SS is type 304. |
| | casing w/ cent | 4" | 20.03' | | | | | | | Sch. 5. Centralizers (cent.) are |
| | casing | 4" | 20.03' | | | | | | | factory installed. Measured |
| | casing w/ cent | 4" | 20.03' | | | | | | | sections of casing & screen. |
| | casing | 4" | 20.03' | | | | | | | Casing lengths ave. 20.03' |
| | casing w/ cent | 4" | 20.03' | | | | | | | |
| | casing | 4" | 20.03' | | | | | | | |
| | casing w/ cent | 4" | 20.03' | | | | | | | |
| | casing | 4" | 20.03' | | | | | | | |
| | casing w/ cent. | 4" | 20.03' | | | | | | | |
| | casing | 4" | 20.03' | | | | | | | |
| | casing w/ cent. | 4" | 20.03' | | | | | | | |

WHC-MR-0209

782

9 1 1 2 0 5 0 0 1 2 5

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-12 | Date 10-4-89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location North of C Tank Farm | Project W-017 SST | |

Logged by S.P. AIRHART SPAirhart — Date 10-4-89
Reviewed by [illegible] — Date 12-8-89
Measuring Equip. S-tape #4 — Procedure PNL-MA-567 DO-1, REV.0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment Pettibone crane / Hyd jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments (2.2' addition to tape figured in) |
|---|---|---|---|---|---|---|---|---|---|---|
| | SS casing | 4" | 20.03' | | | | | | | |
| | SS casing | 4" | 5' | | | | | | | |
| | SS casing | 4" | 3' | | | | | | | |
| | Total SS | 4" | 269.4' | | | | | | | |
| | | | | | | | | | | |
| | carbon steel | 8" | 275 | 7.8' | 267.2' | 16-30 silica sand | | 265.9' | 1.3' | 273.9' - 8' = 265.9' |
| | " " | 8" | 275' | 8.6' | 266.4' | | | | | 273' - 8.75' = 264.25' |
| | | | | | | | | | | Bottom of 4" SS @ 267.5' |
| | " " | 8" | 272' | 6.4' | 265.6' | sand | | 265.9' | -.3' | Slag catcher will be used |
| | " " | | | | 265.6' | | 1/2 bag | 263.2' | 2.4' | when cutting pipe |
| | " " | 8" | 272' | 7.5' | 264.5' | | | 264.1' | .4' | |
| | | | | | 264.5' | | 1/2 bag | 261.7' | 2.8' | |
| | | 8" | 270' | 6.5' | 263.5' | | | 262.3' | 1.2' | |
| | | | | | 263.5' | | 1/2 bag | 259.4' | 4.1' | |
| | | | 268' | 0.9' | 267.1' | | | | | |

153

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-12 | Date 10-5-89 | Sheet No. 1 of 3 |
|---|---|---|---|
| | Location North of C tank farm | Project W-017 SST | |

Logged by S. P. Airhart SP Airhart — Date 10-5-89
Reviewed by V.G. McGhan — Date 12-8-89
Measuring Equip. S-tape #4 — Procedure PNL-MA-567 Sec-1 Rev.0

Drilling Contractor KEH
Driller Louis Watkins
Rig/Equipment Pettibone Crane / Hyd jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments (Datum = land surface) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 8" | | | 262.1' | 16-30 sand | | 261' | ~1.1' | D/sand ~ 260-261 - tape sticking |
| | " | 8" | | | 262.1' | " | 1/2 bag | 257.2' | 4.9' | 262.5' + 2.2' - 7.5' = 257.2' |
| | " | 8" | 268' | 7.3' | 260.7' | " | | 258' | 2.7' | 264.7' + 2.2' - 8.9' = 258' |
| | " | 8" | | | 260.7' | " | 1/2 bag | 255.1' | 5.6' | 261.8' + 2.2' - 8.9' = 255.1' |
| | " | 8" | 267' | 7.7' | 259.3' | " | | 256.8' | 2.5' | 262' + 2.2' - 7.4' = 256.8' |
| | " | 8" | | | 259.3' | " | 1/2 bag | 253.4' | 5.9' | 258.6' + 2.2' - 7.4' = 253.4' |
| | " | 8" | 263' | 6.5' | 256.5' | " | | 255.4' | 0.9' | 263.5' + 2.2' - 10.3' = 255.4' |
| | " | 8" | | | 256.5' | " | 1 bag | 249.9' | 6.6' | 258' + 2.2' - 10.3' = 249.9' |
| | " | 8" | 261' | 5.9' | 255.1' | " | | 250.7 | 4.4' | 256' + 2.2' - 7.5' = 250.7' |
| | " | | 261' | 7.3' | 253.7' | " | | 251.8' | 1.9' | 258.5' + 2.2' - 8.9' = 251.8' |
| | " | | | | 253.7' | " | 1 bag | 246.3' | 7.4' | 253' + 2.2' - 8.9' = 246.3' |
| | " | | 257' | 6' | 251' | " | | 247.9' | 3.1' | 253.5' + 2.2' - 7.8' = 247.9' |
| | " | | | | 251' | " | 1/2 bag | 245.4' | 5.6' | 251' + 2.2' - 7.8' = 245.4' |
| | " | | 257' | 7.5' | 249.5' | | | 246.2' | 3.3' | 253.2' + 2.2' - 9.2' = 246.2' |
| | | | | | 249.5' | | 1/2 bag | 244' | 5.5' | 251' + 2.2' - 9.2' = 244' |
| | | | 254' | 7.3' | 246.7' | | | 245.7' | 1.0' | 250.8' + 2.2' - 7.3' = 245.7' |
| | | | | | 246.7' | | 1/2 bag | 243.2' | 3.5' | 248.3' + 2.2' - 7.3' = 243.2' |
| | | | 254' | 8.8' | 245.2' | | | 243.7' | 1.5' | 250.3' + 2.2' - 8.8' = 243.7' |
| | | | | | 245.2' | | 1/2 bag | 241.7' | 3.5' | 248.3' + 2.2' - 8.8' = 241.7' |
| | | | 254' | 10' | 244' | | | 242.4' | 1.6' | 250.2' + 2.2' - 10' = 242.4' |
| | | | 254' | 10.5' | 243.5' | | | 242.7' | .8' | 251' + 2.2' - 10.5' = 242.7' |
| 0906 | | | | | | | | | | Waiting for KEH pump rig |

184

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-12 | Date 10-5-89 | Sheet No. 2 of 3 |
|---|---|---|---|
| | Location North of C Tank Farm | Project W-017 SST | |

Logged by S. P. Airhart — Date 10-5-89
Reviewed by D. L. Mathews — Date 12-8-89
Measuring Equip. Stape #4 — Procedure PNL-MA-567 DO-1 REV. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment Pettibone Crane / Hyd jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 8" | | | 243.5' | 16-30 sand | | 242.7' | .8' | |
| 0930 | | | | | | | | | | Pump truck arrived - began |
| | | | | | | | | | | bailing to settle sand. |
| | | | | | | | | 243.1' | | 248.4' + 2.2' - 7.5' = 243.1' |
| | | | | | 243.5' | | | 243.1' | .4' | |
| 1050 | | | | | | | | | | quit bailing - Total bailed = 45 gals |
| | | | | | | | | | | ∴ Top of SAND @ 243.1' |
| | | | | | | | | | | (243.1' - 267.9') ; 7.5 bags used |
| | | | | | | | | | | = 8.4 ft³ |
| | | | | | 243.5' | 1/4" Volclay pellets | 1 bucket | 240.5' | 3' | 245.8' + 2.2' - 7.5' = 240.5' |
| | | | | | 243.5' | " " | 1 bucket | 238.5' | 5' | 243.8' + 2.2' - 7.5' = 238.5' |
| | | | 247' | 6.2' | 240.8' | | | 239.2' | 1.6' | 247.3' + 2.2' - 10.3' = 239.2' |
| | | | 247' | 7.1' | 239.9' | | | 239.8' | .1' | 248.7' + 2.2' - 11.1' = 239.8' |
| | | | | | | | | | | ∴ Top of PELLETS @ 239.8' |
| | | | | | | | | | | (239.8' - 243.1') ; 2 buckets = 1.24 ft³ |
| | | | | | | | | | | Lunch |
| 1300 | | | | | | | | | | Safety mtg for KEH |
| | | | | | 239.9' | 8-20 Bentonite (crumbles) | 10 bags | 210.5' | 29.4' | 215.2' + 2.2' - 6.9' = 210.5' |
| | | | 240.3' | 7.2' | 233.1' | | | 215' | 18.1 | 220' + 2.2' - 7.2' = 215' |
| | | | | | 233.1 | | 10 bags | 186.3' | 46.8' | 191.3' + 2.2' - 7.2' = 186.3' |
| | | | 225' | 7.1' | 217.9' | | | 194.1' | 23.8' | 199 + 2.2' - 7.1' = 194.1' |
| | | | | | 217.9' | | 11 bags | 163' | 59.9' | 167.9' + 2.2' - 7.1' = 163' |

185

WHC-MR-0209

9 1 1 2 0 5 0 0 1 9 8

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-12 | Date 10-5-89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location North of C Tank Farms | Project N-017 SST | |

Logged by S. P. Airhart SP Airhart Date 10-5-89
Reviewed by J. E. McGhan Date 12-8-89
Measuring Equip. S-TAPE # 4 Procedure PNL-MA-567 Sect. 1, Rev. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment Bethlehem Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 8" | | | 217.9' | 8-20 bentonite | | 163' | | |
| | | | | | 210.8' | | | 172.3' | 38.5' | 177.2' + 2.2' − 7.1' = 172.3' |
| | | | | | 210.8' | | 6-bags | 155.6' | 55.2 | 160.5' + 2.2' − 7.1' = 155.6' |
| | | | 188' | 7' | 181' | | | 164.4' | 16.6' | 169.2' + 2.2' − 7' = 164.4' |
| | | | | | 181' | | | 136.2' | 44.8' | 141' + 2.2' − 7' = 136.2' |
| | | | 169' | 6.3' | 162.7' | | | 146.8' | 15.9' | 151.6' + 2.2' − 7' = 146.8' |

WHC-MR-0209

181

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-12 | Date 10-6-89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location North of C Tank Farm | Project W-017 SST | |

Logged by S. P. Airhart — Date 10-6-89
Reviewed by D. C. McKhan — Date 12-8-89
Measuring Equip. S-tape #4 — Procedure PNL-MA-567 Ch-1, Rev. 0

Drilling Contractor KEH
Driller Louis Watkins
Rig/Equipment Pettibone Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 8" | | | 162.7' | 8-20 bentonite | | 146.8' | 15.9' | ← From yesterday |
| 0740 | " | 8" | | | 162.7' | | 10 bags | 115.8' | 46.9' | 120.6' + 2.2' - 7' = 115.8' |
| | " | 8" | 150' | 6.5' | 143.5' | | | 125.3' | 18.2' | 130' + 2.2' - 6.9' = 125.3' |
| 0820 | " | 8" | | | 143.5' | | 20 bags | 67.8' | 73.7' | 74.5' + 2.2' - 6.9' = 67.8' |
| | | | | | | | | | | Pulled remaining 8" casing |
| | | | | | | | | | | out of hole |
| | " | 10" | 127.2' | 1' | 126.2' | | | 126.7' | -.5' | 125.5' + 2.2' - 1' = 126.7' |
| | | | | | | | | | | |
| | Carbon steel | 10" | | | 126.2' | | 40 bags | 61.3' | 64.9' | 66.1' + 2.2' - 7' = 61.3' |
| 1105 | " | 10" | 119.4' | 7.1' | 112.3' | | | 67.3' | 45' | 72.2' + 2.2' - 7.1' = 67.3' |
| | " | 10" | 99.5' | 7' | 92.5' | | | 74.2' | 18.3' | 79' + 2.2' - 7' = 74.2' |
| | " | 10" | | | 92.5' | | 12 bags | 56.6' | 35.9' | 61.4' + 2.2' - 7' = 56.6' |
| | " | 10" | 80.9 | 7' | 73.9 | | | 62.7' | 11.2 | 67.5 + 2.2 - 7 = 62.7 |
| | " | 10' | | | | | 15 bags | 39.2' | 34.7 | 44 + 2.2 - 7 = 39.2 |
| | " | 10' | 61.9 | 6.9' | 55' | | | 46.3' | 8.7' | 51' + 2.2' - 6.9 = 46.3' |
| | " | 10" | | | 55 | | 20 bags | 11.2' | 43.8' | 15.9' + 2.2' - 6.9' = 11.2' |
| | " | 10" | 43.7' | 7.1' | 36.6' | | | 17.1' | 19.5' | 22' + 2.2' - 7.1' = 17.1' |
| | " | 10" | 34.2' | 7.1' | 27.1' | | | 20.4 | 6.7 | 25.3 + 2.2 - 7.1 = 20.4 |
| | " | 10" | 34.2' | 10.1 | 24.1 | | | 21.7' | 2.4' | 26.5' + 2.2' - 7' = 21.7' |
| | " | 10' | | | 24.1' | | 3 bags | 17.1' | 7 | 21.9' + 2.2' - 7' = 17.1 |
| | " | 10" | 27.2' | 7.9' | 19.3' | | | 18.9' | -1' | 24.6' + 2.2' - 7.9' = 18.9' |

WHC-MR-0209

187

9 1 1 2 0 5 0 0 1 2 0

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-12 | Date 10-6-89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location North of C Tank Farm | Project W-017 SST | |

Logged by S. D. AIRHART SDAirhart Date 10-6-89
Reviewed by V L McBean Date 12-3-89
Measuring Equip. S-tape #4 Procedure PNL-MA-567 OU-1, REV. 0

Drilling Contractor KEH
Driller LOUIS. WATKINS
Rig/Equipment Pettibone Crane / Hyd. jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | ∴ Top of bentonite crumbles |
| | | | | | | | | | | @ 18.9' (18.9'-239.8') |
| | | | | | | | | | | 157 bags used 111.47 ft³ |
| | | | | | | | | | | |
| | | | | | | | | | | Mixed 2½ batches cement |
| | | | | | | | | | | Each batch contained |
| | | | | | | | | | | 15 bags Portland I & II cement |
| | | | | | | | | | | ~85 gals $H_2O$ |
| | | | | | | | | | | ~ 3 cups Al powder |
| | | | | | | | | | | - Pulled remaining 8" casing |
| | | | | | | | | | | out of hole. |
| | | | | | | | | | | Final D/Cement = 2' |
| | | | | | | | | | | (2'-18.9') = 9.9 ft³ |

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-12<br>Location North of C tank farms | Date 10-9-89 Sheet No. 1 of 1<br>Project W-017 SST |
|---|---|---|

| | |
|---|---|
| Logged by S.P. AIRHART SPAirhart Date 10-9-89<br>Reviewed by V.L. McGhan Date 12-8-89<br>Measuring Equip. S-tape #4 Procedure PNL-MA-567 DO-1 REV. 0 | Drilling Contractor KEH<br>Driller LOUIS WATKINS<br>Rig/Equipment NONE |

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 267.15' + 2.2' - 1.8' (stickup) |
| | | | | | | | | | | = 267.55' inside 4" s.s. |
| | | | | | | | | | | S-tape # PNL 4 |
| | | | | | | | | | | NOTE: Bentonite dust on |
| | | | | | | | | | | inside of 4" casing |
| | | | | | | | | | | E-tape not functioning properly. |

189

WHC-MR-0209

WELL 299-E27-13

Drilling at Well 299-E27-13 began September 1, 1989, and reached total depth September 27, 1989. The well was drilled with a Bucyrus-Erie 22W to a depth of 275.90 ft below ground surface. The sediments encountered were primarily gravely sand and sand. Static water level during completion was 260.73 ft below ground surface.

Well 299-E27-13 was completed at a depth of 274.68 ft below ground surface. Final well materials include 21.00 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 255.48 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 16-30 mesh Colorado silica sand pack along the screened interval to 3.08 ft above the top of the screen, 3.1 ft of Volclay bentonite pellets, 228.1 ft of 8-20 mesh granular bentonite crumbles, 17.35 ft of Portland cement grout, and an air-entrained concrete pad which extends 2.05 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Pettibone crane during completion. Completion activities at Well 299-E27-13 were finished October 12, 1989.

The estimated volume of water added to the borehole during drilling was 113 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 30 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on October 24, 1989, and a total of 547 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was performed on October 20, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on November 8, 1989; this activity concluded well construction and installation.

| DRILL LOG | By: Ian Kennedy | Rig: BE-22W #22-14101 MEL | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W 017-65T |
|---|---|---|---|---|---|
| | Date: 9-1-89 | | Depth: 0.0' To 5' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"Ø 20' 4 1/8" | | | | | 1310 | begin to drill - |
| | 5' | D | | SANDY GRAVEL: 50% Gravel, 70% Sand, trace mud; 1% vcp, 3% pcf 5% mp | 1330 | Samples: (2) 1pt. lith |
| | | | | 5% fp, 16% vfp, 10% vcs, 10% cs, 25% ms, 20% fs, 5% vfs, trace mud | | (1) moisture |
| | | | | poorly sorted; gravel: 75% mafic/25% felsic A-R; Sand: 75 mafic/25% | | |
| | | | | felsic SA-SR; 2.5Y 4/4 olive brown slight HCl rxn unconsolidated | | |
| | | | | | 1350 | driller performs some |
| | | | | | | welding on casing |
| | | | | | 1415 | driller welding on drive head |
| | | | | | 1440 | driller begins to add first |
| | | | | | | length of 10" carbon steel |
| | | | | | | casing. |
| | | | | | 1515 | leave site for day |

REMARKS:

PNL MA-567, DO-1, REV. 0

Reviewed by W.L. McGhan 12-6-89

Ian Kennedy 9-1-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

WHC-MR-0209

191

9 1 1 2 0 5 0 0 1 2 4



| DRILL LOG | By Ian Kennedy / Goodwin | Rig BE 22W #22-14110 Mel | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-5-89 | | Depth 5 To 10 | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0730 | arrive on site, driller driving |
| | | | | | | and straightening first length |
| | | | | | | of 10" casing. |
| | | | | | 0810 | still working on casing |
| | | | | | | Driller Pours 4 gal of |
| | | | | | | water down the |
| | | | | | 0815 | Driller welding |
| | | | | | 0900 | resume drilling |
| | 10' | | | | 1000 | Drive barrel comes out |
| | | | | | | with severe deformation, |
| | | | | | | it has hit something |
| | | | | | | "harder than stone" as |
| | | | | | | the driller says. |
| | | | | | 1040 | Driller works on |
| | | | | | | future casing |
| | | | | UNSURE WHAT DRILLER HIT; POSSIBLY ON TOP OF PIPE. | 1300 | |
| | | | | MOVING RIG 4' SW OF PRESENT LOCATION. HIT | | |
| | | | | OBJECT BETWEEN 10'-11'. | | |

REMARKS: PNL MA567 DO1, REV 0

Reviewed by V.L. McSlan 12-6-89 Stuart Mark 7/6/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

196

sht 1 of 1

| DRILL LOG | By R. Miller, Ian Kennedy | Rig BE 22W #22-14101 | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-6-89 | | Depth 0 To 9' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0950 | Driller enters site or |
| | | | | | | supervised air - wind direct. |
| | | | | | 1015 | begin drilling |
| | 5.0' | D | Dry | SANDY GRAVEL: Same as 5' sample from first hole, had strong HCl rxn | 1100 | Samples: (2) 1st. lith |
| | | | | | 1200 | break for lunch |
| | | | | | 1230 | Arr from lunch - resume |
| | | | | | | drilling - get on air |
| | | | | | 1257 | resume drilling - |
| | | | | | 1335 | to 8.0' add 10"ø |
| | | | | | | carbon steel casing w/ |
| 10"ø 11'0" | | | | | | drive shoe 11'0" |
| | | | | | 1500 | to 9.0' |
| | | | | | 1510 | stop for day. |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA567-PD-1, Rev 0

Reviewed by V. L. [illegible] 12-6-89

9/6/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

195

9 1 1 2 0 5 0 0 1 9 6



| DRILL LOG | By: Ian Kennedy | Rig: BE 22W #22-14101 wel | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-7-89 | | Depth: 9' To 10' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10") 11'-0" | | | | Original 10" casing from yesterday was 20'-4⅜", but because of high wind conditions | 7:10 | arrive on site - driller |
| | | | | The top 9'-4⅜" of this casing were cut off yesterday, leaving the figure at left. | | performing rig maintenance |
| | | | | | 0735 | Driller preparing the casing |
| | | | | | | cut off yesterday for welding |
| | | | | | 0815 | begin drilling and stratigraphic |
| | | | | | | casing |
| | | | | | 0820 | RPT check with β/γ and α probes |
| | | | | | | (nothing over background) |
| | | | | | 0825 | H&S Check - no readings |
| | | | | | | over background |
| | | | | | | Rad. Check - no readings |
| | | | | | | over background |
| | | | | | 0835 | RPT check with β/γ - OK |
| | 10' | D | | SAMPLE GRADER: 35% gravel, 65% sand, trace mud: 15% vcp, 6% cp, 4% mp, 4% fp, | 0842 | Samples: (2) 1pt. lith |
| | | | | 7% vfp, 5% vcs, 10% ccs, 22% ms, 7% fs, 1% vfs, trace mud (poorly sorted) | | (1) moisture checked and |
| | | | | gravel: 75% mafic/25% felsic SA-SR sand: 75% mafic/25% felsic SA-SR 10YR 6/4 | | cleared by H&S and by RPT |
| | | | | (light yellowish brown) slight HCl rxn unconsolidated, finer sands are closer | | with β/γ w/ α. |
| | | | | to 25% mafic/75% felsic and account for the lighter color | 0845 | driller preparing to add casing |

REMARKS:

PNL MA 567 DO1 REVO

Reviewed by [illegible] 12-6-89

Ian Kennedy 9-7-89

WHC-MR-0209

194

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Jan Kennedy | BE32W 22-14101 | 299-E27-13 | N/A | W017551 |
| Date: 9-7-89 | Mel | Depth: 10' To 10' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 11'-0" | | | | | 0940 | finishes welding 9'-4 7/8" |
| +9'-4 7/8" | | | | | | of 10" diameter carbon |
| (10" casing) 20'-4 7/8" | | | | | | steel temporary casing |
| | | | | | 0955 | resume drilling & straightening |
| | | | | | | H&S Check - ok |
| | | | | | 1003 | RPT check with β/γ - ok |
| | | | | | 1010 | Hit something hard (again) |
| | | | | | 1020 | RPT check β/γ & α - ok |
| | | | | | | drive barrel in deli soil beside |
| | | | | Decision made to drill with hand tool. Hard object could be concrete vault | 1040 | H&S check - ok |
| | | | | | | begin change to hand tool |
| | | | | | 1044 | RPT check β/γ - ok |
| | | | | | 1115 | Site evacuated due to wind. |
| | | | | | 1125 | return to site |
| | | | | | | |
| | | | | | 1151 | begin drilling with HT |
| | | | | | | tool string assembled with |
| | | | | | | food grade oil |

REMARKS:

Jan Kennedy

PNL MA 563 DO-1 REV. 6

Reviewed by V.L. McSlan 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

195

WHC-MR-0209

9 1 1 2 0 5 0 0 1 9 8

P 3 of 4

| DRILL LOG | By: Tom Kennedy | Rig: BE 22W # 22-14101 | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: WOM 55T |
|---|---|---|---|---|---|
| | Date: 9-7-89 | | Depth: 10' To 12' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 12:00 to 12:30 | lunch |
| | | | | | 13:00 | driller adds 1 bucket (~3 gal.) of water |
| | | | | | 13:10 | site evacuated on account of fire |
| | | | | | 13:20 | return to site driller |
| | | | | | | adds another bucket (3 gal) $H_2O$ |
| | | | | | 1325 | H&S Check - ok |
| | | | | | 13:30 | RPT Check - no [illegible] contam |
| | | | | | 13:33 | driller adds another bucket |
| | | | | | | (3 gal) of water) |
| | | | | | 13:40 | driller adds another bucket |
| | | | | | | (3 gal) of drill water) |
| | | | | | 1350 | RPT check - ok |
| | | | | | 1355 | driller adds water (1 bucket - 3 gal) |
| | | | | | 1400 | RPT check - ok |
| | | | | | 1402 | driller add another bucket of $H_2O$ |
| | | | | | 1405 | RPT check - ok |
| | | | | | 1408 | H&S check - ok |
| | | | | | 11:09 | driller adds another bucket of $H_2O$ |

REMARKS:

Tom Kennedy
9-7-89

PNL MASE7 D01 Ed 0

Reviewed by W. L. Mahlan 12-6-89

WHIC-MR-0209

196

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Jan Kennedy | BE 22W # 22-1410 | 2-11-E27-13 | N/A | W-017 SST |
| Date: 9-7-89 | | Depth: 12 To 17 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8) 20' 4 3/8 | | | | | 1413 | RPT check -ok |
| | | | | | 1416 | adds another bucket of water (sight) |
| | 15' | HT | — | SLIGHTLY GRAVELLY MUDDY SAND: 5% gravel, 80% sand 15% mud | 1420 | Samples (2) 1pt. 1 TG |
| | | | | lsanfp, 5%vfp, 5%vcs, 40%bcs, 15%bms, 10%bfs, 10%vfs, 15%mud: (materials sorting) | | cleaned by RPT |
| | | | | gravel 75% mafic/25% felsic SA-SR Sand: 90% mafic / 10% felsic | | |
| | | | | SA-SR 2.5Y6/4 light yellowish brown nonplastic unconsolidated. | | |
| | | | | | 14:45 | switching back to DB |
| | | | | | | |
| | | | | | 15:30 | leave site for day. |

REMARKS: • 24 GALLONS OF $H_2O$ TODAY

Jan Kennedy 9-7-89

PNL MU367 DO-1, REV.0 Reviewed by V.G. Mathan 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

9 1 1 2 0 5 0 0 2 0 0

p 1 of 1

| DRILL LOG | By: Ian Kennedy | Rig: BE 22W #22-14101 Mel | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: N-017 SST |
|---|---|---|---|---|---|
| | Date: 9-8-89 | | Depth: 19' To 20' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0715 | arrive on site driller |
| | | | | | | performing pre-trip moisture |
| | | | | | 0730 | driller continues switch |
| | 20' | D | M | gravelly SAND: 10% gravel, 70% sand; trace mud; trace fp, 10% vcp, 10% vcs, 20% cs | | back to Drive Barrel |
| | | | | 20% ms, 15% fs, 5% vfs, trace mud (moderate sorting) gravel: 80% mafic/20% | 0845 | Sampler (1) 1pt. lith |
| | | | | felsic SA-SR; sand: 15% mafic/85% felsic SA-SR, 10YR 5/4 (reddish brown) | | (2) chemical (090889) |
| | | | | no HCl rxn unconsolidated | | (no moisture sample due to |
| | | | | | | drill water dampness |
| | | | | | 0915 | Site evacuated (wind) |
| | | | | | | |
| | | | | | 1245 | driller on air-drilling |
| | | | | | 1400 | Meeting with Randy Spniel |
| | | | | other chemicals in tank headspace but below TLV include Benzene | | on the C-farm tanks |
| | | | | | | - $NH_4$ and $NO_x$ both Higher Than |
| | | | | | | TLV in tank headspace |
| | | | | | | - monitoring with PID w/ 10.6eV |
| | | | | | | lamp |
| | | | | | 1500 | Quitting, (can't weld w/ the wind) |

REMARKS:

Ian Kennedy 9-8-89

PNL-MA-567 DO-1, rev. 0

Reviewed by V. L. McGlynn 12-6-89

WHC-MR-0209

198

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Ian Kennedy | BE 22W #2R-14601 Mcl | 299-E27-13 | N/A | W-017 SST |
| Date: 9-11-89 | | Depth: 20 To 30 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 20'-4 7/8" | | | | | 0710 | Driller performing pre-mobilization |
| | | | | | 0720 | Driller continues adding casing |
| +9'-2 1/4" | | | | | 0730 | Driller finishes adding |
| 29'-7 1/8" | | | | | | casing - 9'-2 1/4" of 10" Carbon |
| | | | | | | steel temporary casing added |
| | | | | | 0830 | RPT Arrives - checks hole - ok |
| | | | | | 0845 | RPT & H&S Check - nothing |
| | 25' | D | M | GRAVELLY SAND: 15% gravel, 80% Sand, 5% mud: 15% vfp, 15% vcs 15% ccs, 20% | 0915 | Samples (2) 1st lith |
| | | | | 20% fs, 10% fs, 5% mud (Poorly sorted.) Gravel: 70% mafic/30% felsic A-SR | | |
| | | | | SAND: 30% mafic/70% felsic SA-SR; 2.5Y 6/4 (light yellowish brown) no HCl rxn | | |
| | | | | unconsolidated. Still wet from drill water added during Hand tool drilling | | |
| | | | | | 1000 | H&S Check - ok. RPT has been |
| | | | | | | checking each time the DB is |
| | | | | | | removed from the hole) |
| | 30' | D | Sm | SANDY GRAVEL: 60% Gravel, 40% Sand, trace mud: Trace vcp, 10% cp, 10% mp, 15% fp, 25% vfp, | 1015 | Samples (2) 1st. lith |
| | | | | 25% vcs, 10% ccs, 2% cms 2% fcs, trace vfcs, trace mud (moderate sorting) Gravel: 60% mafic/ | | (1) moisture |
| | | | | 40% felsic SA-R; sand: 25% mafic/75% felsic SA-SR 10YR 6/3 (Pale brown) no HCl rxn | | |
| | | | | unconsolidated - thin layer of vfs came out of next drive barrel, but not enough to sample | | |

REMARKS: RPT Check at every Drive Barrel removal.

Ian Kennedy 9-11-89

PNL MA 567 - DO-1, rev. 0

Reviewed by V.L. McKillen 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing W...

9 1 1 2 0 5 0 0 2 0 2

p. 2 of 2

| DRILL LOG | By Tom Kennedy | Rig BE 22W #22-14101 Mel | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W017SST |
|---|---|---|---|---|---|
| | Date 9-11-89 | | Depth 30 To 49 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10") 39'-7 1/8" | | | | | 10 25 | begins to weld new casing |
| | | | | | 11 35 | reaum drilling - 9'-5 1/2" of |
| (10") 39'-5 1/2 | | | | | | 10" carbon steel casing added. |
| 39'-0 5/8" | | | | | 12:00 to 12:30 | lunch |
| | 35' | D | SM | SANDY GRAVEL: 50% gravel, 50% sand, trace mud: trace cp, 5% mp, 20% fp, 25% vfp | 13:40 | Samples (2) 1 pt lith |
| | | | | 15% vcs, 15% cs, 10% ms, 8% fs, 2% vfs, trace mud (moderate sorting) | | (1) moisture |
| | | | | Gravel: 75% mafic / 25% felsic SA-SR; Sand: 45% mafic / 55% felsic SA-SR | | |
| | | | | 2.5Y 5/4 (light olive brown) slight HCl rxn unconsolidated | | |
| | 40' | D | SM | SAND: 2% gravel: 98% sand trace mud; trace fp, 7% vfp, 15% vcs, 23% cs, 50% ms, | 13:50 | Samples (2) 1 pt. lith, |
| | | | | 8% fs, 2% vfs, trace mud (well sorted) gravel: 80% mafic / 20% felsic SA-SR Sand: 15% | | (1) moisture, |
| | | | | mafic / 85% felsic SA-SR 2.5Y 5/4 (light olive brown) slight HCl rxn unconsolidated | | (6) chemical (091189) |
| | 45' | D | SM | SAND: 4% gravel, 96% sand, trace mud: trace fp, 4% vfp, 20% vcs, 25% cs, 45% ms | 14:05 | Samples: (2) 1 pt. lith |
| | | | | 5% fs, 1% vfs, trace mud (well sorted) Gravel: 60% mafic / 40% felsic SA-SR | | (1) moisture |
| | | | | Sand: 20% mafic / 80% felsic SA-SR 10YR 5/4 light yellowish brown | | driller begins welding |
| | | | | slight HCl rxn unconsolidated | | new casing |
| (10") + 10'-1 1/4" | | | | | 14:50 | reaum drilling - added |
| 49'-1 7/8" | | | | | | 10'-1 1/4" of 10" casing |
| | | | | | 15:15 | Quit (no RPT to screen 30' sample) |

REMARKS:

PNL MA567 10-1, rev. 0

Reviewed by V. L. McGehan 12-6-89

Tom Kennedy 9-11-89

WHC-MR-0209

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Jim Kennedy | BE22 W #14-101 Brad Strode | 299-E27-17 | N/A | W-017 SST |
| Date: 9-12-89 | | Depth: 49 To 55 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10" dia) 49'-1 3/8" | 50' | D | SM | SAND: 3% gravel, 97% sand, trace mud: trace fp, 3% vrfp | 0940 | Arrive on site - Sample |
| | | | | 30% vcs, 60% ccs, 5% ms, 2% fs, trace vfs, trace mud (well sorted) | | writing Sand with 1pt lith |
| | | | | gravel: 50% mafic/50% felsic SA-SR, sand: 15% mafic/85% felsic SA-SR | | (1) Moisture |
| | | | | 10YR 5/3 (brown) no HCl rxn unconsolidated | | driller begins adding casing |
| | | | | | 1025 | Mud returns to take over |
| | | | | Air monitoring is not being carried out continuously | | drilling, but Brad continues |
| | | | | today because of concerns for the SIP-1000's battery — | | welding |
| +7'-0" | | | | this leaves us in the same position as before but without | 1055 | finishes welding - 7'-0" |
| (10" dia) 56'-1 3/8" | | | | evacuation because of wind direction | | of 10" diameter Carbon steel |
| | | | | | | temporary casing added |
| | | | | | 11:15 | RPT leaves for lunch - drilling |
| | | | | | | ceases - drillers work on new |
| | | | | | | casing segments. |
| | | | | | 1130 | H&S Check - ok |
| | | | | | 1200 to 1230 | lunch |
| | | | | | | |
| | | | | | 13:00 | RPT returns |
| | | | | | | |

REMARKS:

PNL MA567 DO-1, rev.0

Reviewed by V.L. McGehee 12-6-89

J. Kennedy 9-12-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

9 1 1 2 0 5 0 0 2 0 4



| DRILL LOG | By: Ian Kennedy | Rig: BE 22 W, 22-14101, mel T. | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-12-89 | | Depth: 55 To 60 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10") 56'-1 7/8" | 55' | D | SM | SAND: 3% gravel, 97% sand, trace mud: trace vfp, 3% fp, 30% vcs, 60% cs, 5% ms, | 13:05 | Samples: (2) 1pt. lith |
| | | | | 2% fs, trace vfs, trace mud (well sorted) gravel: 50% mafic/50% felsic SA-SR; sand: | | (1) moisture. Screened |
| | | | | 15% mafic/85% felsic SA-SR 10YR 5/3 (brown) no HCl rxn unconsolidated | | and cleaned by 11 & 5 and RPT |
| | 60' | D | SM | SAND: 4% gravel/96% sand, trace mud: trace mp, trace fp, 4% vfp, | 13:25 | Samples: (2) 1pt. lith |
| | | | | 40% vcs, 50% cs, 5% ms, 1% fs, trace vfs, trace mud (well sorted) | | (1) moisture (2) Chemical |
| | | | | Gravel: 50% mafic/50% felsic A-SR; sand: 20% mafic/80% felsic SA-SR, | | (091289) screened and |
| | | | | 10YR 5/3 (brown) no HCl rxn unconsolidated | | cleaned by 11 & 5 and RPT |
| | | | | | 13:35 | driller begins to add |
| | | | | | | casing |
| | | | | | 14:35 | finish welding - 8'-2" of |
| (10") +8'-2" | | | | | | 10" carbon steel temporary |
| (10") 64'-3 7/8" | | | | | | casing added |
| | | | | SLIGHTLY GRAVELLY SAND: 7% gravel, 93% sand: trace mud: trace mp, trace fp, | 15:00 | Samples: (2) 1pt. lith |
| | | | | 7% vfp, 13% vcs, 50% cs, 20% ms, 5% fs trace vfs, trace mud (well sorted) | | (1) moisture |
| | | | | gravel: 50% mafic/50% felsic SA-SR; sand: 15% mafic/85% felsic SA-SR | | RPT Cleaned |
| | | | | 10YR 5/3 (brown) slight HCl rxn, unconsolidated | | |
| | | | | | 15:10 | RPT leaves |
| | | | | | 15:15 | Quitting (next to weld casing) |

REMARKS:

PNL MA 567 DO-1, rev. 0

Reviewed by V. L. McKellar 12-6-89

9-12-89

WHC-MR-0209

202

| DRILL LOG | By Ian Kennedy | Rig BE 22W #27-14101 Mel T. | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-13-89 | | Depth 65 To 75 ft | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10" diameter) 64'-3 7/8" | | | | | 0705 | Arrive on site - H&S check |
| +9'-5 5/8" | | | | | | nothing found - driller |
| (10") 73'-9 1/2" | | | | | | preparing to weld new casing |
| | | | | 9'-5 5/8" of 10" carbon steel temporary casing added. | 0800 | rig arrives, - Driller finishes welding |
| | | | | | 0815 | H&S check - ok |
| | | | | | 0830 | RPT check - ok |
| | 70' | D | SM | SLIGHTLY GRAVELLY SAND: 5% gravel, 95% sand, trace mud: trace mp, trace fp, | 0835 | Samples: (2) 1pt. lith |
| | | | | 5% vfp, 30% vcs, 45% ocs, 15% ms, 5% fs, trace vfs, trace mud (well sorted) | | (1) moisture RPT cleaned |
| | | | | gravel: 85% mafic / 15% felsic S A-SR sand: 10% mafic / 90% felsic SA-SR 10YR 6/4 (light | | |
| | | | | yellowish brown no HCl rxn unconsolidated. | | |
| | 75' | D | SM | SLIGHTLY GRAVELLY SAND: 8% gravel, 92% sand, trace mud; trace mp, 1% fp, 7% vfp, | 0855 | Samples: (2) 1pt. lith |
| | | | | 30% ocs, 45% ocs, 15% ms, 2% fs, trace vfs, (well sorted) Gravel: 60% mafic / | | (1) moisture |
| | | | | 40% felsic SA-SR; Sand: 10% mafic / 90% felsic SA-SR 10YR 5/4 (yellowish | | RPT cleaned |
| | | | | brown) no HCl rxn unconsolidated | | |
| | | | | | 0905 | driller begins adding casing |
| | | | | | | H&S check - ok |
| (10") +9'-3 3/4" | | | | | 1010 | H&S check - ok; welding |
| (10") 83'-1 1/4" | | | | | | finished resume drilling |

REMARKS:

PNL MA 567 D-1, rev. 0

Reviewed by V.C. McGhan 12-6-89

Ian Kennedy 9-13-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

303

9 1 1 2 0 5 0 0 2 0 6

p 2 of 3

| DRILL LOG | By Ian Kennedy | Rig BE22W #22-14101 Mel T | Well Number 299-E27-113 | Computer Number N/A | Project or Work Order No. W-017-555 |
|---|---|---|---|---|---|
| | Date 9-13-89 | | Depth 75 To 90 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10" dia.) 83'-1¼" | 80' | D | SM | SAND: 4% Gravel, 96% sand, trace Mud. trace mp, trace fp, 4% vfp, 26% vcs, 60% cs | 1040 | H&S Check - ok |
| | | | | 10% ms, trace fs, tran vfs (well sorted) Gravel: 40% mafic/60% felsic SA-SR; | | Samples: (2) 1pt lith |
| | | | | Sand: 10% mafic/90% felsic SA-SR 10YR 6/3 (pale brown) no HCl rxn unconsolidated | | (1) moisture (2) chemical (091389) |
| | | | | | | Rat Cleaned |
| | 85' | D | SM | SLIGHTLY GRAVELLY SAND: 9% gravel, 91% sand, trace mud trace mp, 2% fp, | 1100 | RPT leaves for lunch |
| | | | | 7% vfp, 45% vcs, 40% cs, 5% ms, 1% fs, trace vfs trace mud (well sorted) | 1115 | Samples: (2) 1pt lith (1) moisture |
| | | | | 10YR 5/3 (brown) gravel: 60% mafic/40% felsic SA-SR Sand: 20% | | H&S Check - ok |
| | | | | mafic/80% felsic SA-SR slight HCl rxn unconsolidated not as | | drill on begins to add casing |
| | | | | moist as sample from above. | 1200-1230 | lunch |
| +9'-4⅜" | | | | | 1255 | finish welding 9'-4⅜" of 10" |
| 92'-5⅝" | | | | | | carbon steel temp casing added |
| | | | | | | H&S Check - ok |
| | | | | | 13:40 | H&S Check - ok |
| | 90' | D | SM | SLIGHTLY GRAVELLY SAND: 9% gravel, 91% sand: 1% fp, 8% vfp, 25% vcs, 55% cs, | 1405 | Samples: (2) 1pt lith. |
| | | | | 10% ms, 1% fs, trace vfs, trace mud (well sorted) Gravel: 50% mafic/50% felsic | | (1) moisture RPT Cleaned |
| | | | | SA-SR; sand: 15% mafic/85% felsic SA-SR; 10YR 5/3 (brown) | | 85' sample RPT cleaned |
| | | | | slight HCl rxn unconsolidated | | |
| | | | | | 14:35 | drill to add regional water |

REMARKS:

Ian Kennedy
9-13-89

PNL MA 567 DO-1, rev. 0

Reviewed by V. L. McKelvey 12-6-89

204

WHC-MR-0209

9 1 1 2 0 5 0 0 2 0 7

p. 3 of 3

| DRILL LOG | By: Ian Kennedy | Rig: BE 22W #22-14101 Mel T | Well Number: 219-E27-13 | Computer Number: N/A | Project or Work Order No.: W017555 |
|---|---|---|---|---|---|
| | Date: 9-13-89 | | Depth: 90 To 95' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 92'-5 5/8" | | | | | 1435 | H&S Check - ok |
| | | | | | 1505 | RPT check of geologist's |
| | | | | | | equipment - ok - RPT leaves |
| | | | | | | H&S Check of hole - ok |
| | 95' | D | Dry | SLIGHTLY GRAVELLY SAND: 8% gravel / 92% sand, trace mud: trace mg | 1510 | Samples (2) lpl. lith |
| | | | | 1% fg, 7% mg, 47% vcs, 40% cs, 5% ms trace fs, trace vfs (well sorted) | | (1) moisture |
| | | | | Gravel 50% mafic / 50% felsic SA-SR, sand: 15% mafic / 85% felsic SA-SR | | (no RPT) |
| | | | | 10YR 5/3 (brown) no HCl rxn unconsolidated | | |

REMARKS:

Ian Kennedy 9/13/89

PNL MA 567 DO-1, rev. 0

Reviewed by V.L. McAllen 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse

WHC-MR-0209

905

9 1 1 2 0 5 0 0 2 0 8

P 1 of 3

| DRILL LOG | By Ian Kennedy | Rig BE 22W #22-14101 | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-14-89 | | Depth 95' To 100' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10") 92'-5 5/8" | | | | | 0720 | Arrive onsite of/ on minor delays |
| | | | | | | H&S check perfed - ok; driller |
| | | | | | | working on drill barrel. |
| | | | | | 0750 | begin drilling |
| | | | | | 0805 | H&S check - OK; RPT Arrives |
| | | | | | 0810 | driller begins to add casing |
| | | | | | | RPT check of 95' sample and of |
| | | | | | | wellsite - both ok |
| (10") + 9'-0" | | | | add 9' section of 10" diameter carbon steel temporary casing | 0905 | H&S Check ok - resume drilling |
| 101'-5 5/8" | | | | | 0920 | J.F. Heller and Dee Lloyd visit site |
| | | | | | | Delivery of $O_2$ for $C_2H_2$ torch |
| | | | | | 0935 | H&S Check - ok |
| | 100' | D | Dry | GRAVELLY SAND: 20% gravel; 80% sand, trace mud: trace m, 8% fg, 12% vfg, 10% | 0950 | Samples: (2) 1pt. jars |
| | | | | 40% cs, 20% ms, 9% fs, 1% vfs, trace mud (medium sorting) Gravel: 70% mafic | | (1) moisture |
| | | | | 30% felsic A-SR; sand: 10% mafic / 90% felsic SA-SR 10YR 5/4 (yellowish brown) | | (2) Chem (Log C-11 09/14/89) |
| | | | | slight HCl rxn unconsolidated. Driller says the sands seem to be packed | | RPT checked and cleaned. |
| | | | | better here than higher up | | |
| | | | | 5 ppm is probably due to spray paint on cable | 1010 | H&S check - ~5 ppm |

REMARKS:

Ian Kennedy
9-14-89

PNL MA567 DD-1, rev. 0

Reviewed by V.L. Markham 12-6-89

WHC-MR-0209

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Jan Kennedy | BE 22W # 22-14101 Mel T | 299-E27-13 | N/A | W-017 SST |
| Date: 9-14-89 | | Depth: 100' To 105 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10" dwndy) 101'-5¾' | | | | agreed that previous reading was due to point on the cable | 10 30 | H&S Check - ok (<1ppm) |
| | | | | | 10 55 | RPT check (B/G) of driller |
| | | | | | | and Geologist - ok H&S check ok |
| | | | | | 11:00 | RPT leaves driller adds 2gal H2O |
| | | | | | 11:30 | H&S Check - ok driller, |
| | | | | | | prepares to add 10" casing |
| | | | | | 12:00 to 12:30 | lunch |
| | | | | | 12 45 | H&S sets up PID for |
| | | | | | | continuous monitoring |
| (10" dwn) +9'-5¾' | | | | added 9'-5¾ of 10" diameter temporary casing | 13 20 | finish welding |
| 110'-11 3/8" | | | | | 13 25 | H&S Check - ok |
| | 105' | D | Dry | GRAVELLY SAND: 19% gravel, 80% sand, 1% mud: trace mp, 3% fp, 16% vfp, 10% vks | 13 35 | Sample: (2) 1qt. lids |
| | | | | 35% cs, 20% ms, 10% fs, 5% vfs, 1% mud (moderate sorting) Gravel: 20% mafic/ | | (1) moisture; RPT and H&S |
| | | | | 80% felsic SA-SR; sand: 15% mafic/85% felsic SA-SR 10YR6/3 (pale brown) | | Screened and Cleaned |
| | | | | moderate HCl rxn unconsolidated. the sand in the drive barrel just | | |
| | | | | above the sample was wet with the drill water added earlier, but | | |
| | | | | the sample seems dry, so a moisture sample was taken | | |
| | | | | | 1415 | H&S Check - ok |

REMARKS:

Jan Kennedy
9-14-89

PNL MA 567 DO-1,000

Reviewed by V. L. McKellar 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

207

WHC-MR-0209

9 1 1 2 0 5 0 0 2 1 0

p. 3 of 3

| DRILL LOG | By Ian Kennedy | Rig BE 22W #22-14101 Mel T. | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-14-89 | | Depth 105 To 115' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 110'-11 5/8" | 108' | | | Several very coarse Pebbles come up, but quickly disappear | | |
| | 110' | D | very slightly moist | GRAVELLY SAND: 15% Gravel, 85% sand, trace mud: trace mp, 2% fp, 13% vfp | 14 30 | Samples: (2) 1pt lith |
| | | | | 55% vcs 35% cs, 13% ms, 2% fs, trace vfs, trace mud (moderate sorting) | | (1) moisture |
| | | | | Gravel: 55% mafic/45% felsic SA-SR; sand 20% mafic/80% felsic SA-SR | | |
| | | | | 10YR 6/3 (pale brown) slight HCl rxn, unconsolidated. Still very dry, but | | |
| | | | | higher moisture than above | | |
| | 115' | D | very slightly moist | SLIGHTLY GRAVELLY SAND: 7% gravel; 93% sand, trace mud: 2% fp, 5% vfp | 14 45 | Samples: (2) 1pt. lith |
| | | | | 15% vcs, 65% cs, 10% ms, 3% fs, trace vfs, trace mud (well sorted) | | (1) moisture RPT and $H_2O_2$ |
| | | | | Gravel: 55% mafic/45% felsic SA-SR; sand: 15% mafic/85% felsic SA-SR | | checked and ok's |
| | | | | 10YR 6/3 (pale brown) slight HCl rxn unconsolidated, moisture like at 110' | | driller begins to add |
| | | | | | | water |
| | | | | | | |
| | | | | | 15:00 | quit for day |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL MA 567, DO-1, rev. 0

ADDED 2 GALLONS OF $H_2O$

Reviewed by W. L. Markham 12-6-89

Ian Kennedy 9-14-89

WHC-MR-0209

208

9 1 1 2 0 5 0 0 2 1 1

p. 1 of 3

| DRILL LOG | By: Ian Kennedy | Rig: BE 22W #22-14101 Mel T | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-15-89 | | Depth: 115' To 124 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10") 110'-11 3/8" | | | | | 0700 | arrive on site |
| | | | | | 0705 | driller arrives w/ H&S |
| | | | | | | H&S test shole - ok |
| + 9'-1/2" | | | | | | driller preparing to resume welding |
| 119'-11 3/8" | | | | added 9'-0 1/2" of 10" diameter Carbon steel temporary casing. | 0755 | finish welding |
| | | | | | 0800 | H&S check - ok; RPT arrives. |
| | | | | | 0815 | Curtis Hoover looks at PID with our |
| | | | | | | site H&S officer, Dale Wallace. |
| | | | | | | Curtis takes over as H&S officer |
| | | | | | 0840 | H&S and RPT checks of tailings - ok |
| | | | | | 0845 | driller shortening drive barrel |
| | | | | | 0850 | Resume drilling |
| | | | | SAND: 4% Gravel, 96% sand, trace mud: trace MP, trace CP, 4% vfp. 10% lvocs, | 0910 | Samples: (2) 1qt. jars |
| | | | | 90% lvocs, 30% lvms, 60% fs, trace vfs, trace mud (well sorted) Gravel: 40% mafic/60% felsic | | (1) Moisture, (2) Chem. (cy/cu 091589) |
| | | | | SA-SR; sand: 10% mafic/90% felsic SA-SR 10YR 5/4 (yellowish brown) no HCl rxn | | RPT cleared |
| | | | | unconsolidated | | H&S Check - ok |
| | | | | | 0930 | H&S Check - ok |
| | | | | | 1000 | driller preparing to weld casing |

REMARKS:

Ian Kennedy
9-15-89

PNL WA567 DO-1, rev. 0

Reviewed by V.L. McGlynn 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

409

9 1 1 2 0 5 0 0 2 1 2

p. 2 of 3

| DRILL LOG | By: Ian Kennedy | Rig: BE 22 W #22-14101 Mel Thorensen | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-15-89 | | Depth: 124 To 134 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10" dia) 119'-11 7/8" | | | | this casing was not used when drilling 299-E27-12, so it has | 1030 | delivery of more 10" diameter |
| | | | | not been in the ground since being steam cleaned | | casing. |
| +9'-1/4" | | | | | 11 00 | finish welding |
| 129'-0 1/8" | 125 | D | Dry | SAND: 4% gravel, 96% sand, 1% mud: trace fp, 4% vfp, 6% vcs, 25% cs, | 1150 | Samples: (2) 1pt. lith |
| | | | | 50% ms, 10% lfs, 4% vfs, 1% mud: (well sorted) Gravel: 50% mafic/50% felsic | | (1) moisture |
| | | | | SA-SR; sand: 10% mafic/10% felsic SA-SR 10YR 5/4 (yellowish brown) | | RPT cleaned (13:00) |
| | | | | slight to moderate HCl rxn (with occasional concretions with strong HCl rxn) | | |
| | | | | unconsolidated | 12:00 - 1230 | lunch |
| | | | | | 1245 | H&S Check - ok |
| | | | | | 13:15 | maintenance on welding generator |
| | | | | | 13 20 | H&S check - ok |
| | 130' | D | Dry | SLIGHTLY GRAVELLY SAND: 8% gravel 91% sand 1% mud: trace fp; 8% vfp, 10% vcs | 13:30 | Samples: (2) 1pt. lith |
| | | | | 20% cs, 50% ms, 9% fs, 2% vfs, 1% mud (moderate sorting) Gravel: 75% mafic/25% | | (1) moisture, RPT Cleaned |
| | | | | felsic SA-SR; sand, 15% mafic/85% felsic SA-SR 10YR 5/4 (yellowish brown) | | |
| | | | | moderate to strong HCl rxn unconsolidated. | | |
| | | | | | 1410 | H&S Check - ok; Driller |
| (10" dia) +9'-6" | | | | | | Preparing to add casing. |
| 138'-6 1/8" | | | | added 9'-6" of 10" diameter Cabon steel temporary casing | 1455 | Finish welding |

REMARKS:

Ian Kennedy
9-15-89

PNL MA567 PO-1, rev 0

Reviewed by V.L. Markham 12-6-89

WHC-MR-0209

70

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Ian Kennedy | BE 22W #22-14101 Mel T | 299-E27-13 | N/A | W-017 SST |
| Date: 9-15-89 | | Depth: 134 To 135 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 138'-6½" | 135' | D | Almost Dry | SAND: 3% gravel; 97% sand, trace mud: trace vf, 3% vfu 15% vcs, 35% cs, | 15:10 | Samples: (2) 1pt 1.Th |
| | | | | 45% ms, 2% fs, trace mud (Well sorted): Gravel: 50% mafic/50% felsic | | (1) moistum |
| | | | | SA-SR, Sand 10% mafic/90% felsic SA-SR 10YR 6/4 (yellowish brown) | | |
| | | | | slight HCl rxn unconsolidated | | |
| | | | | | 15:30 | quitting |

REMARKS:

PNL MA567 DO-1, rev 0 Reviewed by W.L. McMahan 12-6-89

Ian Kennedy
9-15-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF

116

9 1 1 2 0 5 0 0 2 1 4

sht 1 of 2

| DRILL LOG | By R. Miller/T. Kennedy | Rig BE-22W #22-14101 Mel T. | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/18/89 | | Depth 135.0' To 137.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10" drand) 138' 6 1/8" | 135' | | | Total 10" diameter casing is 138'-6 1/8" in length | 0700 | Arrive site - H2S scan - |
| | | | | | | PID=<1ppm, LEL=< det. |
| | | | | | 0715 | begin to drill |
| | | | | | 0740 | stop drilling - 137.0' |
| | | | | | 0830 | Logging truck arrives |
| | | | | Vern McGahn (logger) & John Gould (WHC Insp.) | | to log 10" hole |
| | | | | begin to geophysically log hole with natural gamma | 0850 | begin to log |
| | | | | logged from 135.7' to 2.8' | 0930 | logging completed. |
| | | | | | 0935 | resume activity - prep |
| | | | | | | to install 8" ø change |
| | | | | | | tools from 10" to 8" |
| | | | | | | core barrel. |
| | | | | | 1015 | H2S scan OVA=<1ppm. |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

Tom Kennedy
9-18-89

PNL MA 567 100.1, rev 0

Reviewed by W.L. McGahan 12-6-89

WHC-MR-0209

312

| DRILL LOG | By: Ian Kennedy | Rig: BC 22W # 22-14101 Mel | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-019 SST |
|---|---|---|---|---|---|
| | Date: 9-18-89 | | Depth: 135' To 135' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 18" dia) 22'-1" | | | | up to this time lengths of 8" casing measuring | 1400 | arrive on site |
| 20'-6 3/8" | | | | 22'-1", 20'-6 3/8", 21'-6" have been added, and the driller | | driller is welding |
| 21'-6" | | | | is currently adding a 20' 9 7/8" length | | 8" casing |
| 64'-1 7/8" | | | | | 1420 | H & S Check - ok |
| + 20'-9 7/8 | | | | | 1430 | driller begins adding |
| 84'-11 7/8" | | | | | | 21'-6" section of 8" casing |
| + 21'-6" | | | | | 1455 | finish adding section |
| 106'-5 3/8" | | | | | | driller prepares next section |
| | | | | | | (21'-10 3/8") for tomorrow |
| | | | | | | (the final section of 8' casing |
| | | | | | | measures 20'-4 3/8", and will |
| | | | | | | also be added tomorrow |
| | | | | | 1500 | H & S Check - ok |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL MA 567 DQ1, rev. 0 Reviewed by V.L. Nicholson 12-6-89

Ian Kennedy
9-18-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

9 1 1 2 0 5 0 0 2 1 6

p. 1 of 2

| DRILL LOG | By: Ian Kennedy | Rig: BE 22W #22-14101 Mel T. | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-19-89 | | Depth: 135' To 142 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8" diameter) 106'-5 5/8" | | | | | 0730 | driller welding 21'-10 7/8' |
| +21'-10 7/8' | | | | | | section of 8" dia. casing |
| 128'-4 5/8" | | | | | 0800 | finishes welding - begins |
| + 20'-4 3/4" | | | | | | adding next section |
| 148'-9 3/8" | | | | | 0855 | finish welding 20'-4 5/8" section |
| | | | | | | of 8" diameter temporary carbon |
| | | | | | | steel casing; driller works |
| | | | | | | on drive barrel |
| | | | | | 0915 | begin drilling |
| | | | | | 0955 | $H_2S$ check - ok |
| | | | | | | driller adds 1.25 gal of water |
| | 140' | D | Dry | SAND: 4% gravel, 95% sand, 1% mud; trace Cp, 4% vfp, 5% vcs, 15% ocs, 25% oms | 1100 | Samples: (2) 1 pt. Lth |
| | | | | 40% fs, 10% vfs, 1% mud (moderate sorting) Gravel: 90% mafic / 10% felsic, SA, | | (1) moisture; (2) Chemical |
| | | | | Sand: 20% mafic / 80% felsic SA-SR 10YR 4/3 (pale brown) strong HCl rxn | | (Coc # 091989) |
| | | | | unconsolidated | | $H_2S$ and RPT Cleared |
| | | | | | 1120 | driller adds 3/4 gal of water |
| | | | | | 1200 to 1230 | lunch |
| | | | | | | |

REMARKS:

PNL MA 567 PO-1, rev. 0

Reviewed by V.L. Markham 12-6-89

Ian Kennedy 9-19-89

WHC-MR-0209

014

9 1 1 2 0 5 0 0 2 1 7

p. 2 of 2

| DRILL LOG | By: Ian Kennedy | Rig: GE 22 W #22-1410X Mel Thoresen | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-19-89 | | Depth: 142 To 151 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8" diameter) 148-9 5/8 | 145' | D | Dry | SAND. 4% gravel, 95% sand, 1% mud: trace fp, 4% mp, 10% vcs, 30% cs, | 1300 | Samples: (2) 1pt. lith |
| | | | | 40% ms, 13% fs, 2% vfs, 1% mud (moderate sorting) Gravel: 90% mafic/10% | | (no moisture due to |
| | | | | felsic S SA-SR Sand 20% mafic/80% felsic SA-SR 10YR 6/3 (pale brown) | | drill water added above) |
| | | | | moderate HCl rxn unconsolidated screened by $H_2S$ (nothing detected) | 1320 | Sample checked by RPT |
| (10" diameter) 138-6 1/2 | | | | | 1315 | visit by Ron Jackson |
| -1-5 1/4 | | | | | | and Joe Caggiano, WAC |
| 137'-0 7/8" | | | | | 1320 | driller removes top 1'-5 1/4" |
| | | | | | | of 10" diameter casing |
| (8" diameter) 148'-9 5/8" | 150' | D | SM | SAND: 4% gravel, 96% sand, trace mud, 10% vcs, 40% cs, 40% ms, 9% fs, | 1335 | Samples: (2) 1pt. lith |
| | | | | 1% vfs, trace mud (well sorted) Gravel: 80% mafic/20% felsic A-SA | | (1) moisture |
| | | | | sand: 20% mafic/80% felsic SA SR 10YR 5/3 (brown) slight HCl rxn | | RPT and $H_2S$ Cleared |
| | | | | unconsolidated; Moisture may be due to drill water added above, but | | |
| | | | | since that is not definite, a moisture sample was taken | 1400 | $H_2S$ check - PID with |
| | | | | | | 10.6eV lamp reads ~1 ppm, |
| | | | | | | |
| | | | | | 1410 | driller prepares to add casing |
| | | | | | 1505 | Quit |
| | | | | | | |

REMARKS:

Ian Kennedy 9-19-89

PNL MA 567 DQ-1, rev. 0 ADDED 2 GALLONS $H_2O$ Reviewed by D.L. McKellar 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine

WHC-MR-0209

215

9 1 1 2 0 5 0 0 2 1 8



| DRILL LOG | By: Ian Kennedy | Rig: BE 22W 22-14101 Mel | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-20-89 | | Depth: 151 To 160 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 148'-9 7/8" (8" dia) | | | | | 0700 | H&S check - nothing arriv - driller continue welding |
| +8'-7" | | | | added 8'-0 7/8" of 8" diameter carbon steel temporary casing | 0720 | finish welding - driller |
| (8" diameter) 156'-10 1/8" | | | | | | lubricating rig |
| | | | | | 0730 | begin drilling |
| | | | | | 0745 | first Drivebarrel removed, checked |
| | | | | | | by H&S - no contamination |
| | 155' | D | SM | SLIGHTLY GRAVELLY SAND: 5% gravel, 95% sand trace mud: 1% fg, 4% sfg, 15% vcs, 45% cs | 0855 | Samples: (2) 1pt lith |
| | | | | 30% ms, 4% fs, 1% vfs, (well sorted) Gravel: 80% mafic / 20% felsic SA-SR | | (1) moisture RPT Cleared |
| | | | | sand: 5% mafic / 95% felsic SA-SR 10YR 5/3 (brown) slight HCl rxn unconsolidated | 0840 | Drill water delivery |
| | | | | | 0900 | H&S Check - ok |
| | | | | | 0905 | driller prepares to add casing |
| (8" dia) +8'-5" | 160' | D | SM | added 8'-5" of 8" diameter carbon steel temporary casing | 0950 | resume drilling |
| 165-3 1/8" | | | | GRAVELLY SAND: 11% gravel, 89% sand; trace mud: 1% fg, 10% sfg, 45% vcs, | 1000 | Samples: (2) 1pt lith |
| | | | | 40% cs, 3% ms, 1% fs, trace vfs, trace mud (well sorted) Gravel: 85% mafic | | (1) moisture; (2) Chem (092089) |
| | | | | 15% felsic SA-SR; sand: 20% mafic / 80% felsic SA-SR 10YR 5/3 (brown) | | RPT Cleared |
| | | | | very slight HCl rxn unconsolidated | | |
| | | | | | | |
| | | | | | | |

REMARKS:

Ian Kennedy

PNL MA567 DO.1, 100.0

Reviewed by D.L. Westlake 12-6-89

WHC-MR-0209

216

| DRILL LOG | By Jan Kennedy | Rig BE22-W 22-1401 Mel T. | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-20-89 | | Depth 160 To 175 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8" dia) 165'-3 1/8" | 165' | D | Dry | SLIGHTLY GRAVELLY SAND: 5% gravel, 95% sand, trace mud: trace fp, 5% fp | 1030 | Samples: (2) 1 pt. lith |
| | | | | 25% vcs, 40% cs, 25% ms, 4% fs, 1% vfs, trace mud (well sorted) | | (1) moisture |
| | | | | Gravel: 70% mafic/30% felsic SA-SR, sand 5% mafic/95% felsic SA-SR | | RPT Cleared |
| | | | | 10YR 5/3 (brown) slight HCl rxn unconsolidated | 1045 | Driller preparing to add Casing |
| +8'-11" | | | | added 8'-11" of 8" diameter carbon steel temporary casing | 1135 | resume drilling |
| 174'-2 1/8" | | | | | 1145 to 1230 | lunch |
| | | | | | 1240 | H&S check w/ PID - ok |
| | 170' | D | very slightly moist | SAND: 1% gravel, 99% sand, trace mud; 1% vfp, 7% vcs, 45% cs, 45% ms, | 1255 | Samples: (2) 1 pt. lith |
| | | | | 2% fs, trace vfs, trace mud (Well sorted) Gravel: 80% mafic/20% | | (1) moisture |
| | | | | felsic SA-SR Sand: 5% mafic/95% felsic SA-SR: 10YR 5/3 (brown) | | RPT cleared |
| | | | | slight HCl rxn unconsolidated. | | |
| | 175' | D | almost Dry | SAND: 2% gravel, 98% sand, trace mud, trace fp, 2% vfp, 5% vcs, 42% cs | 1320 | Samples: (2) 1 pt. lith |
| | | | | 49% ms, 2% fs, trace vfs, trace mud (Well sorted) Gravel: 70% mafic/ | | (1) moisture |
| | | | | 30% felsic SA-SR, sand: 5% mafic/95% felsic SA-SR 10YR 5/3 | | RPT Cleared |
| | | | | (brown) slight HCl rxn unconsolidated | | driller prepares to add |
| | | | | | | casing; H&S check - ok |
| (8" dia) +9'-9 1/8" | | | | added 9'-9 1/8" of 8" diameter carbon steel temporary casing | 1420 | Resume drilling |
| 183'-11 1/4" | | | | | | |

REMARKS:

Jan Kennedy
9-20-89

PNL MA 567 DO-1, rev. 0

Reviewed by V. L. Merkhan 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

9 1 1 2 0 5 0 0 2 2 0

p.3 of 3

| DRILL LOG | By Ian Kennedy | Rig BE 22W #22-14101 Mel T. | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-20-89 | | Depth 175 To 187 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8" liner) 183'-11 1/4" | 180' | D | almost dry | SAND: 3% gravel, 97% sand, trace mud: trace fp, 3% vfp, 5% vcs, 45% ccs, | 1440 | Samples: (2) 1pt. lith |
| | | | | 45% mcs, 2% fs, trace vfs, trace mud (well sorted) Gravel: 70% mafic | | (1) moisture |
| | | | | 30% felsic SA-SR; Sand: 5% mafic/95% felsic SA-SR; 10YR5/3 (brown) | | (2) chemical (cofc 092089) |
| | | | | no HCl rxn unconsolidated | | RPT cleaned |
| | 185' | D | almost Dry | SLIGHTLY GRAVELLY SAND: 7% gravel, 93% sand, trace mud: trace fp, | 1505 | Samples: (2) 1pt. lith |
| | | | | 7% vfp, 15% vcs, 43% ccs, 23% mcs, 10% fs, 2% vfs trace mud | | (1) moisture |
| | | | | Gravel: 85% mafic/15% felsic SA-SR; sand: 15% mafic/85% felsic SA-SR | | RPT cleaned |
| | | | | 10YR 5/3 (brown) no HCl rxn unconsolidated | | |

REMARKS:

Ian Kennedy
9-20-89

PNL 1M1567 DO-1, rev. 0

Reviewed by D.L. Westphalen 12-6-89

WHC-MR-0209

9 1 1 2 0 5 0 0 2 3 1

sht 1 of 2

| DRILL LOG | By R. Miller / Date 9/21/89 | Rig BE 22W #22-14109 M. Thomsen | Well Number 299-E27-13 Depth 187.0' To 195 | Computer Number N/A | Project or Work Order No. W-017 SST Subcontract No. N/A |
|---|---|---|---|---|---|

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Φ 183' 11¼" | | | | | 0658 | Ar site H₂S scan. |
| | | | | | | PID: <1ppm, LEL=<det. |
| | | | | | 0700 | begin drilling |
| | | | | | 0730 | stop - need to repair |
| | | | | | | level wind. |
| | | | | | 0835 | resume drilling |
| 8"Φ 194' 5½" | | | | | 0915 | add 10' 5¾" - 8" & weld |
| | | | | | 0945 | resume drilling |
| | 190.0 | DB | dry | SLIGHTLY GRAVELLY SAND (7% Gravel, 93% Sand, trace Mud) | 1010 | to 190.0' - sample. |
| | | | | trace fp, 7% vfp, 15% vcs 30% cs 20% ms 20% fs 8% vfs, trace | 1019 | add 1/2 gal - $H_2O$ to hole. |
| | | | | mud, moderately sorted, 30/70 f/m, SA-SR, brown (10YR 5/3) | | RPT - Cleared H₂S |
| | | | | slight to moderate rx to 10% HCL, unconsolidated. | | PID = <1ppm LEL=<det. |
| | | | | (2pt lith, 1 moist) | 1047 | H₂S scan - PID = <1ppm. |
| | 195.0 | DB | dry | SLIGHTLY GRAVELLY SAND (6% Gravel, 94% Sand, trace Mud) | 1056 | to 195.0' - sample. |
| | | | | 2% fg, 4% vfg, 15% vcs 20% cs, 20% ms 20% fs 19% vfs, trace | | H₂S scan - PID = <1ppm |
| | | | | mud, moder sorted, 35/65 f/m, SA-SR, brown (10YR 5/3) | | RPT - cleared. |
| | | | | slight to moderate rx to 10% HCL, unconsolidated, (2pt lith | | |
| | | | | 1 moist) | | |

REMARKS:

PNL 1MA 567 DD-1 REV. 0

Reviewed by V.L. McGhan 12-6-89

9/21/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

Page 9

sht 2 of 2

| DRILL LOG | By R. Miller/I Kennedy | Rig BE 22W # 22-14101 Mel Thorsen | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/21/89 | | Depth 195 To 205 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8" dia) 194'-5½" | | | | | 1120 | driller prepares to add casing |
| | | | | | 1150 to 1240 | lunch |
| +W-2" | | | | added 10'-2" of 8" diameter carbon steel temporary casing | 1250 | resume drilling |
| 204'-7½" | | | | | 1255 | H&S w/PID - nothing detected |
| | | | | | 1310 | driller adds ½ gal water |
| | 200' | D | almost Dry | SLIGHTLY GRAVELLY SAND: 9% gravel, 91% sand, trace mud: 1% vfp, 8% vfp, 15% vcs, 50% ms, | 1330 | Samples: (2) 1pt. lith |
| | | | | 20% ms, 5% fs, 1% vfs. trace mud (well sorted) Gravel: 80% mafic/20% felsic | | (1) moisture; (3) Chemical |
| | | | | SA-SR; Sand: 10% mafic/90% felsic SA-SR 10YR 5/3 (brown) no HCl rxn | | (c/c 092189); (2) 125ml |
| | | | | unconsolidated, possibly, slightly contaminated (PID reads 0.3 ppm at top | | chem glass, (1) VOA |
| | | | | of casing | | H&S Check - 0.3ppm |
| | 205' | D | almost Dry | SAND: 3% gravel, 97% sand, trace mud: 3% vfp, 3% vcs, 82% ms, 10% ms, 2% fs, | 1410 | samples: (3) 1pt. lith (1) moisture |
| | | | | trace vfs trace mud (very well sorted): Gravel: 50% mafic/50% felsic SA-SR, | | H&S Scanned (no detection) |
| | | | | sand: 15% mafic/85% felsic SA-SR 10YR 5/3 (brown) no HCl rxn unconsolidated | | |
| | | | | PID reads 0 ppm | | |
| | | | | | | driller prepares to add casing |
| (8") +9'-6¼" | | | | added 9'-6¼" of 8" casing | 1500 | finish welding |
| 214 | | | | | 1510 | finish for day |
| | | | | | | |

REMARKS:

Added 1 Gallon $H_2O$

Reviewed by V.L. Wickham 12-6-89

Jim Kennedy 9-21-89

PNL MA567 DO-1, rev. 0

220

WHC-MR-0209

| DRILL LOG | By: Ian Kennedy | Rig: BE 221U #22714101 Mel Thorsen | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-22-89 | | Depth: 205' To 215 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 18" 2 rounds 214'-1 3/4" | | | | | 0710 | arrive - driller maintaining |
| | | | | | | rig, H&S check - ok |
| | | | | | 0720 | begin drilling |
| | 210' | D | very slightly moist | SLIGHTLY GRAVELLY SAND: 7% gravel, 93% sand, trace mud: trace vcp, trace cp, | 0745 | Samples: (2) 1 pt. lith |
| | | | | trace mp, 1% fp, 6% vfp, 5% vcs, 50% cs, 35% ms, 3% bs, trace vfs, trace mud | | (1) moisture |
| | | | | (well sorted): Gravel: 80% mafic/20% felsic SA-SR, sand: 10% mafic/90% felsic | | RPT not here yet |
| | | | | SA-SR 10YR 5/3 (brown) slight HCl rxn with occasional concretions | | H&S screened - not detected |
| | | | | exhibiting moderate HCl rxn, unconsolidated, first larger pebbles since surface | 0815 | RPT cleans 2nd sample |
| | 215' | D | almost Dry | GRAVELLY SAND: 12% gravel, 88% sand, trace mud; trace mp, 2% fp bbp, | 0825 | Samples: (2) 1 pt. lith |
| | | | | 8% vcs, 50% cs, 25% ms, 4% fs, 1% vfs, trace mud (well sorted) | | (1) moisture |
| | | | | Gravel: 85% mafic/15% felsic SA-SR; sand: 15% mafic/85% felsic SA-SR | | H&S Screened - ok |
| | | | | 10YR 5/3 (brown) slight HCl rxn unconsolidated, no larger pebbles | | no RPT; driller begins |
| +9'-7 1/4" | | | | | | adding casing. |
| 223'-9" | | | | added 9'-7 1/4" of 8" diameter carbon steel temporary casing | 0920 | finish welding |
| | | | | | 0925 | Gas delivery |
| | | | | | | H&S Check - ok |
| | | | | | | |
| | | | | | | |

REMARKS:

Ian Kennedy
9-22-89

PNL MA 567 DO-1, rev. 0 Reviewed by W. L. Markham 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

ee

9 1 1 2 0 5 0 0 2 2 4

p. 2 of 3

| DRILL LOG | By Ian Kennedy | Rig BE 22W H-22-14101 Mel T. | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-22-89 | | Depth 215 To 230 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 223'-9" | 220 | D | almost Dry | GRAVELLY SAND: 10% gravel, 90% sand, trace mud: trace vcp, 1% lcp, 9% lcp, | 10 00 | Samples: (2) lpl. lith |
| | | | | 10% lvcs, 45% lcs, 30% lms, 4% lfs, 1% vfs, trace mud (well sorted): gravel 90% mfic/ | | (1) moisture, (1) Chem (092789) |
| | | | | 10% felsic SA-SR Sand: 10% mfic/90% felsic SA-SR 10YR 5/3 (brown) | | no RPT |
| | | | | slight HCl rxn; unconsolidated | 1035 | H&S check - ok; Maintenance |
| | | | | | | truck comes by to grease rig. |
| | 225 | D | almost Dry | SAND: trace gravel, 100% sand, trace mud: trace vfp, trace vcs 10% lcs, | 1055 | Samples: (2) lpl. lith |
| | | | | 40% lms, 50% lfs, trace vfs, trace mud (well sorted) Gravel: 60% mfic/ | | (1) moisture |
| | | | | 40% felsic (1" pebbles) SA; sand 10% mfic/90% felsic SA-SR 10YR 5/3 (brown) | | H&S and RPT Cleaned |
| | | | | slight HCl rxn unconsolidated | | Previous samples also RPT Cleaned |
| 410'-1" | | | | | 1130 | John Kellen stopped to talk to Mel |
| 233'-10" | | | | | 1140 | resume drilling |
| | | | | | 1150 to 1235 | lunch |
| | | | | | 1240 | H&S check w/PID no |
| | | | | | | combustible gas - nothing |
| | 230' | D | almost Dry | SAND: (exactly the same as 225') tr. gravel, 100% sand, tr. mud: tr. fp, tr. vcs, 10% lcs, | 1315 | Samples: (2) lpl lith |
| | | | | 40% lms, 50% lfs, tr. vfs, tr. mud (well sorted) Gravel: 60% mfic/40% felsic (12 pebbles) SA | | (1) moisture |
| | | | | sand: 10% mfic/90% felsic SA-SR 10YR 5/3 (brown) slight HCl rxn unconsolidated | | RPT Cleaned. |
| | | | | concretions with moderate HCl rxn | | |

REMARKS:

Ian Kennedy 9-22-89

PNL MA 567 DO-1, rev. 0

Reviewed by D.L. Markham 12-6-89

WHC-MR-0209

222

| DRILL LOG | By: Ian Kennedy | Rig: BE 22W # 22-14101 Mel T. | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-22-89 | | Depth: 230 To 240 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8" Elevation) 233'-10" | 235' | D | almost Dry | SAND: trace gravel, 100% sand, trace mud: trace vfp, trace vcs, 5% cs, 10% ms, 82% fs, | 1335 | Samples: (2) 1pt. lith |
| | | | | 3% vfs, trace mud (very well sorted) gravel: 60% mafic/40% felsic SA-Sub: 10% | | (1) moisture |
| | | | | mafic/90% felsic SA-SR 10YR 5/3 (brown) slight to moderate HCl rxn | | driller prepares to |
| | | | | unconsolidated, concretions present with moderate HCl rxn | | add casing |
| +0'-2½" | | | | | 1340 | $H_2S$ check - ok |
| 244'-0⅝" | 238' | D | Moist | thin area of muddy Gravelly sand - too thin for samples | 1450 | l |
| | | | | (description similar to 240' sample (below), but has ~2% mud | | |
| | | | | | | |
| | | | | | 1500 | Samples: (2) 1pt. lith |
| | 240' | D | almost dry | SANDY GRAVEL: 35% gravel, 65% sand, trace mud: 4% cp 6% mp, 10% fp, 15% vfp | | (1) moisture (2) chemical (cofc # |
| | | | | 5% vcs, 6% cs, 12% ms, 35% fs, 7% vfs, trace mud (poorly sorted) | | 092289) |
| | | | | Gravel: 60% mafic/40% felsic SA-SR Sand: 65% mafic/35% felsic SA-SR 10YR 5/3 | | |
| | | | | (brown) moderate HCl rxn, some concretions, unconsolidated | | |

REMARKS:

Ian Kennedy 9-22-89

PNL MA567 DO-1, REV. 0

Reviewed by V.K. Markham 12-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

223

| DRILL LOG | By: Ian Kennedy | Rig: BE 22W #14101 | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-25-89 | | Depth: 240 To 246 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8" I.D.) 244'-5/8" | | | water added | | 0725 | visit site - driller already |
| | | | | | | drilling |
| | 243' | Switching to HT | | | 0855 | Arrive permanently on site |
| | | | | | | driller switching to Hard Tool |
| | | | | | 1005 | resume drilling - switch |
| | | | | | | to HT mud with (Crisco Oil) |
| | | | | | | driller adds 3 gal water |
| | | | | | 1040 | H&S check - ok |
| | | | 6½ gal | | 1055 | adding water - now (6½ gal for day) |
| | | | 8 gal | | 1115 | adding 1½ gal water (7½ gal) |
| +8'-6" | | | | | 1120 | driller prepares to add casing |
| 252'-6⅝" | | | | | 1200 to 1255 | lunch |
| | | | | added 8'-6" of 8" diameter Cobar steel casing. | 1305 | H&S check ok, resume drilling |
| | 245' | HT | W | SANDY GRAVEL: 45% gravel, 50% sand, 5% mud: , 1% mp, 14% tp, 30% vtp, 8% vcs, | 1355 | Samples: (2) 1 pt lids |
| | | | | 30% cs, 8% ms, 4% fs, 5% mud: (poorly sorted) Gravel: 85% mafic/15% felsic | | RPT Cleaned |
| | | | | B-R; sand: 40% mafic/60% felsic SA-SR; 2.5Y 4/2 (dark grayish brown) | | |
| | | | 17 gal. | HCl rxn unconsolidated | 1420 | adds water - 9 gal since lunch |
| | | | | | 1435 | H&S check - nothing |

REMARKS:

Ian Kennedy
9-25-89

PNL MA 567, PD-1 REV. 0

Reviewed by V. L. Madsen 12-6-89

WHC-MR-0209

294

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Jan Kennedy | BE22W #22-1410 Mel T. | 299-E27-13 | N/A | W-017 SST |
| Date: 9-25-89 | | Depth: 246 To 252' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8"2.0) 252'6" | 250 | H | W | SANDY GRAVEL 65% gravel, 27% sand, 8% mud: 1% cmp, 19% fp, 43% ufp, | 1505 | Sample: (2) 1pt. 1.'Th |
| | | | | 9% vcs, 4% cs, 10% ms, 5% fs, 5% vfs, 8% mud \| (poorly sorted) Gravel: | | RPT Cleaned |
| | | | | 85% mafic / 15% felsic A-R; Sand: 45% mafic / 55% felsic SA-SR | | H&S checked - nothing |
| | | | | 10YR 4/2 (dark grayish brown) no HCl rxn unconsolidated | | |

REMARKS:

Reviewed by V.L. Markham 12-6-89

Jan Kennedy

PNL MA 567 DO-1, REV. 0

ADDED 17 GRAMS OF HNO3 TODAY

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

9 1 1 2 0 5 0 0 2 2 3

p. 1 of 2

| DRILL LOG | By Ian Kennedy | Rig BE 22W #22-14101 Mel Thoresen | Well Number 299-E27-13 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-26-89 | | Depth 250 To 260 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 252'-6 5/8" | | | | | 0720 | Arrive on site - driller is |
| | | | | | | fishing for Oxygen/combustible |
| | | | | | | gas meter hose |
| | | | | | 0800 | hose recovered - driller |
| + 8'-3 5/8" | | | | | | preparing to add casing |
| 260'-10 1/4" | | | | added 8'-3 5/8" of 8" diameter casing | 0905 | resume drilling |
| | | | | | 0915 | H&S check-ok |
| | | | | | | has added 12 gal of water |
| | | | | | 0955 | H&S check - ok |
| | 255' | HT | W | SANDY GRAVEL: 73% g, 26% sand, 1% mud: 1% mp, 22% vfp, 50% mfp, 16% ccs, 10% cs, trace mg, | 1015 | Samples: (2) 1pt. lith |
| | | | | trace fs, trace vfs, 1% mud (well sorted): Gravel 85% mafic/15% felsic SR-WR; | | RPT Cleaned (11:10) |
| | | | | sand 25% mafic/75% felsic SA-R; 2.5Y 5/2 (grayish brown) no HCl rxn (wet) | | |
| | | | | unconsolidated | 1041 | H&S check-ok |
| | 260' | HT | W | SANDY GRAVEL: 75% gravel, 24% sand, 1% mud: 5% mp, 40% vfp, 30% mfp, 3% vcs, 5% cs, | 1115 | Samples: (2) 1pt. lith |
| | | | | 10% ms, 5% fs, 1% vfs, 1% mud; (moderate sorting) Gravel: 80% mafic/20% felsic SR-WR, | | (2 chem) (092689) |
| | | | | sand: 25% mafic/75% felsic SA-R 2.5Y 5/2 (grayish brown) no HCl rxn (wet) | | Has scheduled - nothing; RPT cleaned |
| | | | | unconsolidated | 1135 | Water delivery |
| | | | | | 1200 to 1230 | lunch |

REMARKS:

Ian Kennedy

PNL MA567 DO-1 REV.0

Reviewed by T. L. Wagstaff 12-6-89

9-26-89

WHC-MR-0209

| DRILL LOG | By: Ian Kennedy | Rig: BE 22W # 22-1410 Mel T. | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-26-89 | | Depth: 260(259.8') To 265' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| ~~(8" 3.16)~~ 260'-10¼" | | | | depth to bottom 265.5' + 0.7' - 1.4 stickup = 257.8' ; D/W 260.8-1.4 = 259.4 | 1240 | measure D/B and D/W |
| + 7'-1¼" | | | | added 7'-1¼" of 8" diameter carbon steel temporary casing | 1250 | drillers begins to add casing |
| 268'-9½" | | | | | 13:25 | finished welding |
| | | | | | 13:35 | H&S check - ok |
| | 265 | HT | — | | 1455 | Samples: (2) 1 pt. 1:1 |
| | | | | CANDY GRAVEL: 74% gravel, 25% sand, 1% mud: 8% fp, 12% mp, 29% fp, | | RPT Cleaned |
| | | | | 25% vfp, 15% vcs, 6% cs, 3% ms, 1% fs, 1% vfs, 1% mud (moderate sorting) | | H&S Checked - nothing |
| | | | | Gravel: 80% mafic/20% felsic SA-WR; sand: 60% mafic/40% felsic SA-SR, | | |
| | | | | 2.5Y 5/2 (Grayish brown) no HCl rxn (wet) unconsolidated | | |
| | | | | | 1515 | Quitting - added 67 gal |
| | | | | | | of water tested for day |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

Ian Kennedy

PNL MA 567 DO-1 rev. 0 67 GALLONS $H_2O$ TODAY Reviewed by V.T. Drumheller 12-6-89 9-26-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

9 1 1 2 0 5 0 0 2 1 0

p. 1 of 2

| DRILL LOG | By: Ian Kennedy | Rig: BE 22W #22-14101 M. Thorsen | Well Number: 299-E27-13 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-27-89 | | Depth: 265 To 270 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8" lowered) 268'-9½" | | | | Stickup: 3'-2" d/w: 164'-3" - 3'-2" = 161'-1" (or about 161.1') | 0715 | Begin measure d/B and D/W |
| | | | | d/b: 166'-3" + 2'-3" - 3'-2" = 165'-4" (or about 165.3') | | using top of 10" casing as |
| | | | | | | ground level. |
| +7'-4⅛" | | | | | 0740 | driller prepare to add casing |
| 276'-1⅞ | | | | added 7'-4⅛" of 8" Hamilton carbon steel temporary casing | 0840 | resume drilling |
| | | | | | 0920 | H&S check - ok |
| | | | | | 0955 | John Keller, KEH stop by talk to |
| | | | | | | driller. Harold Litz, DOE-RL |
| | | | | | | visits site |
| | 270' | HT | Wet | GRAVEL: 75% gravel, 24% sand, 1% mud: 2% vcp, 14% ccp, 30% mp, 15% fp, | 1015 | Samples: (2) 1pt. lith |
| | | | | 10% vfp, 7% vcs, 9% ccs, 4% ms, 2% fs, 2% vfs, 1% mud (poorly sorted) | | Cleaned by RPT |
| | | | | Gravel: 60% mafic/40% felsic R-VR; sand: 40% mafic/60% felsic SA-SR, | | nothing detected by PID |
| | | | | 10YR 5/3 (brown) no HCl rxn (wet) unconsolidated | | |
| +4'-7¾" | | | | | 1035 | Driller prepare to add casing |
| 280'-9⅛" | | | | added 4'-7¾" of 8" casing - total 8" casing = 280'-9⅛" | 1115 | finish welding H&S - ok |
| | | | | | | |
| | | | | | 1140 | H&S check - ok |
| | | | | | | |

REMARKS:

Ian Kennedy 9-27-89

PHL MA 567 DO-1, rev. 0

Reviewed by V.L. Mashburn 12-6-89

228

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Tom Kennedy | BE 27W #22-14101 Mcl | 299-E27-13 | N/A | W-017 SST |
| Date: 9-27-89 | | Depth: 275 To bottom (276') | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 280'-9 1/8" | | | | d/w = 258.1 - 3.7' stickup = 254.4' d/B = 276.0' + 2.2' - 3.7' stickup = 274.5 | 1230 | measure depth to bottom and |
| | | | | Steel tape # L500-02 ; E-tape # 12176 | | to water - numbers suspect |
| | | | | | | due to wet sides of casing |
| | 275' | HT | Wet | GRAVEL: Exactly the same as 270' sample: See 270' sample description | 1300 | Samples: (2) 1pt. lith |
| | | | | | | (collected at 12:00) |
| | | | | | | (3) Chem (092789) Collected |
| | | | | | | fine fraction only at 13:10 |
| | | | | | | RPT cleaned, H2S-clean. |
| | | | | d/B = 278.9' + 0.7' - 3.7' stickup = 275.9' (500' steel tape w/o number) | 1340 | measure depth to bottom |
| | | | | d/w = 264.0' - 3.7' = 260.3 - 15.6 ft. of water | | & depth to water |
| | | | | | 1420 | Mike Evarts arrives to |
| | | | | test pipe shows 16' of water. | | inspect straightness test |
| 278'-8 1/8" | | | | | 1430 | driller cutting 2'-1" off top |
| | | | | | | of 8" casing |

REMARKS: PNL MA567 DO-1 144.0

Reviewed by W.L. Mahlum 12-6-89

Tom Kennedy 9-27-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5-85)

WHC-MR-0209

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| S M. GOODWIN | NO RIG | 299-F27-13 | N/A | W-017 SST |
| Date: 28 SEPT. 1984 | | Depth: T.D. To | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | BOREHOLE BEING LOGGED WITH NATURAL GAMMA | 0900 | LOGGING HOLE |
| | | | | PROBE BY VERN MCGHAN, PNL. | | |
| | | | | LOGGED 274.7' - 100' INTERVAL W/ γ PROBE | 1030 | FINISHED LOGGING |

REMARKS:

PNL-MA-567, DO 1 REV. 0 Reviewed by V.L. McGhan 12-6-89

[illegible] 9/21/89

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-13 | Date 10-9-89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location West of C Tank Farm | Project W-017 SST | |

Logged by S. P. AIRHART S.P. Airhart Date 10-9-89
Reviewed by V.P. Mathews Date 12-6-89
Measuring Equip. S-tape #4 Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor KEH
Driller Mel Thoresen
Rig/Equipment Pettibone Crane / Hyd. jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Datum = land surface |
| 0720 | | | | | | | | | | D/B = 275.56' |
| | | | | | | | | | | D/W = 260.73' |
| 1020 | | | | | | | | | | Moving equipment, etc. |
| | Carbon Steel | 8" | 278.7' | 1.5' | 277.2' | | | | | |
| | | | | | 275' | | | | | Pulled 6" before setting SS. |
| | | | | | | | | | | D/B came up 2' - will have |
| | channel-pack screen | 4" | 21' | | | | | | | to sand pump out - waiting |
| | w/ bottom cap | | | | | | | | | sand pumped - D/B = 274' |
| | casing w/ cent | 4" | 20.04' | | | | | | | Setting Stainless Steel (SS) |
| | casing | 4" | 20.04' | | | | | | | casing & screen. SS is sch. |
| | casing w/ cent | 4" | 20.04' | | | | | | | 5, type 304, screen is contin. |
| | casing | 4" | 20.04' | | | | | | | wire-wrap 10-slot channel pack |
| | casing w/ cent | 4" | 20.04' | | | | | | | Centralizers (cent.) are factory |
| | casing | 4" | 20.04' | | | | | | | welded. |
| | casing w/ cent | 4" | 20.04' | | | | | | | |
| | casing | 4" | 20.04' | | | | | | | |
| | casing w/ cent | 4" | 20.04' | | | | | | | |
| | casing | 4" | 20.04' | | | | | | | |
| | casing w/ cent | 4" | 20.04' | | | | | | | |
| | casing | 4" | 20.04' | | | | | | | Total SS = 276.48' |
| | casing | 4" | 5' | | | | | | | |
| | casing | 4" | 5' | | | | | | | |
| 1520 | casing | 4" | 5' | | | | | | | |

WHC-MR-0209

29

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-13 | Date 10-10-89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location West of C Tank Farm | Project W-017 SST | |

Logged by S. P. Airhart SPA
Reviewed by V.E. McGhan
Measuring Equip. S-tape #4
Date 10-10-89
Date 12-6-89
Procedure PNL-WA-604 DD-1 R.0

Drilling Contractor KFH
Driller Mel Thoresen
Rig/Equipment Pettibone Crane / Hyd. jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | datum = land surface |
| | | | | | | | | | | Want ss to drop ~ 1'. |
| 0745 | Carbon steel | 8" | 281' | 6.5' | 274.5' | D/B | | 273.8' | .7' | 278.4' + 2.2' − 6.8' = 273.8' |
| | | | | | 274.5' | 16-30 silica sand | 1/2 bag | 270.6' | 3.9' | 275.2' + 2.2' − 6.8' = 270.6' |
| | | | 279' | 5.8' | 273.2' | | | 271.9' | 1.3' | 277.8' + 2.2' − 8.1' = 271.9' |
| | | | | | | | | | | ss dropped to 274.2' bls. |
| | | | | | | | | | | most likely will not drop more |
| | | | | | 273.2' | " " " | 1/2 bag | 268.7' | 4.5' | 274.6' + 2.2' − 8.1' = 268.7' |
| | | | | | | | | | | ss dropped to 274.3' bls. |
| | | | 278.7' | 6.6' | 272.1' | | | 269.8' | 2.3' | 274.1' + 2.2' − 6.5' = 269.8' |
| 0810 | | | | | 272.1' | " " " | 1/2 bag | 266.7' | 5.4' | 271' + 2.2' − 6.5' = 266.7' |
| | | | 278.7' | 8.0' | 270.7' | | | 267.4' | 3.3' | 273' + 2.2' − 7.8' = 267.4' |
| | | | 278.7' | 9.2' | 269.5' | | | 268.2' | 1.3' | 275' + 2.2' − 9.0' = 268.2' |
| | | | | | 269.5' | " " " | 1/2 bag | 265.5' | 4' | 272.3' + 2.2' − 9.0' = 265.5' |
| | | | 274' | 5.8' | 268.2' | | | 266.1' | 2.1' | 270.5' + 2.2' − 6.6' = 266.1' |
| | | | | | 268.2' | " " " | 1/2 bag | 263.6' | 4.6' | 268' + 2.2' − 6.6' = 263.6' |
| | | | 274' | 7.2' | 266.8' | | | 264.8' | 2' | 270.4' + 2.2' − 7.8' = 264.8' |
| 0840' | | | | | 266.8' | | 1/2 bag | 261.4' | 5.4' | 267' + 2.2' − 7.8' = 261.4' |
| | | | 274' | 8.5' | 265.5' | | | 262.5' | 3' | 269.5' + 2.2' − 9.2' = 262.5' |
| | | | 270' | 6' | 264' | | | | | Now using slag catcher. |
| | | | | | 264' | | | 263.5' | .5' | 267.7' + 2.2' − 6.4' = 263.5' |
| | | | | | 264' | | 1 bag | 257.3' | 6.7' | 261.5' + 2.2' − 6.4' = 257.3' |
| 0855 | | | 270' | 8.7' | 261.3' | | | 259.2' | 2.1' | 266.3' + 2.2' − 9.3' = 259.2' |

232

WHC-MB-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-13 | Date 10-10-89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location West of C Tank Farm | Project W-017 SST | |

Logged by S. P. Airhart SPAirhart Date 10-10-89
Reviewed by V.C. Markham Date 10-6-89
Measuring Equip. S-tape #4 Procedure PNL-MA-567 DU-1, REV. 0

Drilling Contractor KEH
Driller Mel Thoresen
Rig/Equipment Pettibone Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 8" | | | 261.3' | 16-30 Silica Sand | | 259.2' | 2.1' | |
| | | | | | 261.3' | | 1/2 bag | | 5' | 263.4' + 2.2' - 9.3' = 256.3' |
| | | | 266' | 6' | 260' | | | 257.3' | 2.7' | 261.7' + 2.2' - 6.6' = 257.3' |
| | | | | | 260' | | 1 bag | 251.6' | 3.4' | 256' + 2.2' - 6.6' = 251.6' |
| | | | 262' | 6.1' | 255.9' | | | 254.4' | 1.5' | 258.8' + 2.2' - 6.6' = 254.4' |
| | | | | | 255.9' | | 1 bag | 249.2' | 6.7' | 253.6' + 2.2' - 6.6' = 249.2' |
| | | | 260.8' | 7.7' | 253.1' | | | 250.9' | 2.2' | 258' + 2.2' - 9.3' = 250.9' |
| 0925 | | | | | 253.1' | | 1/4 bag | 249.4' | 3.7' | 256.5' + 2.2' - 9.3' = 249.4' |
| | | | 258' | 6.2' | 251.8' | | | 250.2' | 1.6' | 254.5' + 2.2' - 6.5' = 250.2' |
| | | | | | 251.8' | | 1/4 bag | 249.2' | 2.6' | 253.5' + 2.2' - 6.5' = 249.2' |
| | | | 258' | 7.5' | 250.5' | | | 250' | .5' | 255.6' + 2.2' - 7.8' = 250' |
| | | | | | | | | | | Bailed ~ 30 gals $H_2O$ from hole to settle sand. |
| | | | | | 250.5' | | | 250.6' | -.1' | 254.6' + 2.2' - 6.2' = 250.6' Top of Sand |
| 1200-1230 | | | | | | | | | | Lunch |
| 1230- | | | | | | | | | | Shut down due to wind |
| 1414 | | | | | 250.5 | 3/8" Volclay Pellets | 2 Buckets | | 5. | 249.5 + 2.2 - 6.2 = 245.5 |
| | | | 253.5 | 5.8 | 248.0 | | | | 1.3 | 253.5 + 2.2 - 9 = 246.7 |
| | | | | 6.5 | 247. | | | | .5 | 254.7 + 2.2 - 9.7 = 247.5 Top of Pellets |
| | | | 252.5 | 5.6 | 246.9 | 8-20 Bentonite | 15 bags | | 43.3 | 208 + 2.2 - 6.6 = 203.0 |
| | | | 244.0 | 6.8 | 237.2 | " | | | 20.8 | 221 + 2.2 - 6.8 = 216.4 |

233

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-13 | Date 10/11/89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

Logged by S.M. GOODWIN [signature] Date 10/11/89
Reviewed by [signature] Date 12-6-89
Measuring Equip. L300-04 Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0715 | CARBON STEEL | 8" | 244.0 | 6.8 | 237.2 | 8-20 CRUMBLES | | 216.4 | 20.8 | D/CRUMBLES = 216.4 |
| 0730 | " | " | " | " | " | " " | 5 BAGS | 202' | 35.2 | D/CRUMBLES = 202.0' |
| 0750 | " | " | 223.8 | 6.5 | 217.3 | " | | 210.9 | 6.4 | D/CRUMBLES = 210.9 |
| 0800 | " | " | " | " | " | " | 15 BAGS | 169.95 | 47.35 | D/CRUMBLES = 169.95 |
| 0825 | " | " | 204.6 | 6.6 | 198.0 | " | | 182.6 | 15.4 | D/CRUMBLES = 182.6 |
| 0830 | " | " | " | " | " | " | 10 BAGS | 153.4 | 44.6 | D/CRUMBLES = 153.4 |
| 0850 | " | " | 183.9 | 6.5 | 177.4 | " | | 165.9 | 11.5 | D/CRUMBLES = 165.9 |
| 0855 | " | " | " | " | " | " | 10 BAGS | 130' | 47.4 | D/CRUMBLES = 130' |
| 0910 | " | " | 165.3 | 6.6 | 158.7 | " | | 147.2 | 11.5 | D/CRUMBLES = 147.2 |
| 0920 | " | " | " | " | " | " | 15 BAGS | 103.1 | 44.1 | D/CRUMBLES = 103.1 |
| 0930 | | | | | | | | | | 10" CASING COMING UP w/ 8"; |
| | | | | | | | | | | PLACING 10" SLEEVE OVER CASING |
| 1030 | | | | | | | | | | BOTTOM of 8" = 133.9 |
| | | | | | | | | | | BOTTOM of 10" = 134.2 |
| | | | | | | | | | | 8" & 10" DRIVE SHOES APPEAR TO |
| | | | | | | | | | | BE "LOCKED"; 10" STILL MOVING |
| | | | | | | | | | | UP w/ 8" PULLS. |
| 1120 | " | 10" | 134.2 | 6.5 | 127.7 | " | | 119.7 | 8.0 | DECIDED TO PULL 8" & 10" |
| | | | | | | | | | | TOGETHER; D/CRUMBLES = 119.7 |
| 1135 | " | " | " | " | " | " | 20 BAGS | 60.9 | 66.8 | D/CRUMBLES = 60.9 |
| 1155 | " | " | 120 | 6.8 | 113.2 | " | | 72.7 | 40.5 | D/CRUMBLES = 72.7 |
| 1245 | " | " | " | " | " | " | 10 BAGS | 43.4 | 69.8 | D/CRUMBLES = 43.4 |

WHC-MR-0209

234

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-13 | Date 10/11/89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

Logged by S M. GOODWIN [signature] Date 10/11/89
Reviewed by W.S. McGlam Date 12-6-89
Measuring Equip. L300-04 Procedure DO-1, REV.0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1310 | CARBON STEEL | 10" | 101.5 | 6.85' | 94.65 | 8-20 CRUMBLES | | 58.05 | 36.6 | D/CRUMBLES = 58.05 |
| 1320 | " | " | " | " | " | " | 15 BAGS | 15.85 | 78.8 | D/CRUMBLES = 15.85 |
| 1340 | " | " | 83.1 | 7.2 | 75.9 | " | | 28.0 | 47.9 | D/CRUMBLES = 28.0 |
| 1400 | " | " | 64.3 | 7.0 | 57.3 | " | | 66.5 | -9.2 | D/CRUMBLES = 66.5 ; 9.2' of OPEN HOLE. |
| 1410 | " | " | " | " | " | " | 20 BAGS | 60.2 | -2.9 | D/CRUMBLES = 60.2 ; ADDED 20 BAGS & STILL HAVE 2.9' OF OPEN HOLE. |
| 1420 | " | " | " | " | " | " | 24 BAGS | 11.0 | 46.3 | D/CRUMBLES = 11.0 |
| 1425 | " | " | " | " | " | " | 5 BAGS | +4.0 | 61.3 | D/CRUMBLES = +4.0' |
| 1435 | " | " | 49.2 | 7.25 | 41.95 | " | | 49.85 | -7.9 | D/CRUMBLES = 49.85 ; 7.9' of OPEN HOLE AFTER 61.3' OF OVERLAP. |
| 1445 | " | " | " | " | " | " | 21 BAGS | 42.15 | 0.2 | D/CRUMBLES = 42.15 ; 0.2' OF |
| 1448 | " | " | " | " | " | " | 12 BAGS | 8.85 | 33.1 | OPEN HOLE. D/CRUMBLES = 8.85 |
| 1500 | " | " | 39.0 | 6.8 | 32.2 | " | | 37.5 | -5.3 | D/CRUMBLES = 37.5 ; 5.3' OF OPEN HOLE W/ ~10' PULL |
| 1505 | " | " | " | " | " | " | 20 BAGS | 1.9 | 30.3 | D/CRUMBLES = 1.9 |
| | " | " | 29.6 | 6.85 | 22.75 | " | | 26.85 | -4.1 | D/CRUMBLES = 26.85 ; OPEN HOLE 4.1 |
| 1520 | | | 29.6 | 7.0 | 22.6 | " | 6 BAGS | 18.1 | 4.5 | D/CRUMBLES = 18.1 |

285

WHC-MR-0209

9 1 1 2 0 5 0 0 2 3 8

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-13 | Date 10/12/89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project WT017 | |

Logged by S.M. GOODWIN Date 10/12/89
Reviewed by D.L. McKlenny Date 12-6-89
Measuring Equip. L300-04 / E. TAPE #12176 Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0730 | CARBON STEEL | 10" | 29.6 | 7.0 | 22.6 | 8-20 CRUMBLES | | 18.1 | 4.5 | D/CRUMBLES = 18.1 |
| 0800 | " | " | 26.75 | 6.5 | 20.25 | " | | 21.8 | -1.55 | D/CRUMBLES = 21.8; 1.55' OF OPEN HOLE. |
| 0805 | " | " | " | " | " | " | 5 BAGS | 17.3 | 2.95 | D/CRUMBLES = 17.3 |
| 0806 | " | " | 26.75 | 6.8 | 19.95 | " | | 18.2 | 1.75 | D/CRUMBLES = 18.2 |
| 0809 | " | " | 26.75 | 7.1 | 19.65 | " | | 19.1 | 0.55 | D/CRUMBLES = 19.1 |
| 0811 | " | " | 26.75 | 7.2 | 19.55 | " | | 19.4 | 0.15 | D/CRUMBLES = 19.4 FINAL DEPTH OF CRUMBLES |
| 0830 | | | | | | | | | | MIXING CEMENT GROUT: 1 BATCH = 6 94 LB. BAGS OF PORTLAND CEMENT, ~35 GALLONS OF $H_2O$, & 1% ALUMINUM POWDER |
| 0950 | " | " | " | " | " | CEMENT GROUT | 2 BATCHES | +6' | 25.55 | ADDED 1.25 BATCHES TO ~6' ABOVE GROUND SURFACE; SLOWLY PULLING & ADDING REMAINING BATCH AS WE PULL. ANTICIPATE LARGE CAVITIES IN FM. |
| 1010 | " | " | 20.4 | 7.2 | 13.2 | " | | +6' | 19.2 | STILL ADDING REMAINDER OF 2ND BATCH. |
| 1030 | " | " | 15.85 | 6.75 | 9.1 | " | | +4 | 13.1 | CEMENT GROUT 4' ABOVE SURFACE |
| 1050 | Ø | | | | | | | 2.05 | Ø | D/CEMENT GROUT = 2.05; 10" CASING REMOVED. FINAL D/GROUT |

D/INSIDE 4" = 274.1' + 2.2' TAPE − 1.8' 4" STICKUP = 274.5' } = 13.77' OF $H_2O$ EXPOSED

WHC-MR-0209

230

WELL 299-E27-14

Drilling at Well 299-E27-14 began September 19, 1989, and reached total depth October 6, 1989. The well was drilled with a Bucyrus-Erie 60L to a depth of 266.05 ft below ground surface. The sediments encountered were primarily sandy gravel and sand. Static water level during completion was 249.81 ft below ground surface.

Well 299-E27-14 was completed at a depth of 266.83 ft below ground surface. Final well materials include 21.00 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 246.48 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 16-30 mesh Colorado silica sand pack along the screened interval to 3.13 ft above the top of the screen, 3.25 ft of Volclay bentonite pellets, 219.60 ft of 8-20 mesh granular bentonite crumbles, 17.00 ft of Portland cement grout, and an air-entrained concrete pad which extends 2.85 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Pettibone crane during completion. Completion activities at Well 299-E27-14 were finished October 17, 1989.

No water was added to the hole during drilling. The estimated volume of water removed during sand pack development was 55 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on October 25, 1989, and a total of 489 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was performed on October 20, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; 9 ppm organic vapors were discovered at 115 ft using the PID. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on November 11, 1989; this activity concluded well construction and installation.

sht. 1 of 1

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/19/89 | | Depth 0.0 To 0.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0710 | Arr site - rig too close |
| | | | | | | to overhead pwr lines |
| | | | | | | may have to move, Louis |
| | | | | | | to continue prep. |
| | | | | | | |
| | | | | | 0930 | rig moving - area |
| | | | | | | needs excavation |
| | | | | | | permit w/ utilities |
| | | | | | | locate. |
| | | | | | 1500 | Dp site for day. |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by W.L. Mahlum 12-7-89 Ronald L. Miller 9/19/89

238

WHC-MR-0209

sht 1 of 3

| DRILL LOG | By R.Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/20/89 | | Depth 0.0 To 15.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0705 | Ar site - H&S |
| | | | | | | PID w/ 11.8 lamp - MSA |
| | | | | | | 260 LEL. - prep to |
| | | | | | | drill - check rig level, lay |
| | | | | | | down deck, etc. |
| | | | | | 0808 | ready to drill - no RPT |
| | | | | | 0855 | begin to drill - no RPT |
| | | | | | 0900 | RPT - Ruben arrives. |
| | | | | | 0903 | H&S scan PID = 27.0 ppm |
| | | | | | | LEL = <det. in soils |
| | | | | | | Rd & b = <det. |
| | 5.0 | DB | slightly moist | ~~Slightly~~ MUDDY SAND (85% Sand 15% Mud) 5% cs, 10% ms 30% fs | 0920 | to 5.0' - H&S = PID = 28 ppm |
| | | | | 40% vfs, 15% Mud, well sorted, 50/50 f/m, A-SR, dk gray brn, | | LEL = <det, RPT & b = <det. |
| | | | | (2.5Y 4/2), strong rx to 10% HCL, unconsolidated, PID = 28 ppm | | sample = 28 ppm |
| | | | | w/ 11.8 lamp (2 pt lith 2 125ml enviro, 1 moist) | 0930 | H&S = 18 ppm @ 7.0' |
| | 10.0 | DB | slightly moist | MUDDY SAND (85% Sand 15% Mud) trace vfg, trace silt pockets | 0940 | to 10.0' - H&S = PID = 28 ppm |
| | | | | 28 ppm, similar to 5.0' sample (2 pt lith, 1 moist) | | LEL = <det, RPT = <det. |
| | | | | samples on COC 092089 | | |

REMARKS:

PNL-MA-567, DO-1, Rev. 0 Reviewed by D.L. Nicholson 12-7-89

9/20/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

239

WHC-MR-0209

sht 2 of 3

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/20/89 | | Depth 15.0' To 15.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 15.0 | DB | slightly moist | GRAVELLY SAND (15% Gravel, 85% Sand) 2% vcp 3% cp 3% mp | 1003 | to 15.0' H&S = |
| | | | | 3% fp 4% vfp, 5% vcs 20% cs 40% ms 10% fs 10% vfs, trace | | PID = 28.28 ppm LEL = < det |
| | | | | mud, poorly sorted, 40/60 f/m, SA-WR, ol gray (5Y 4/2) | | RPT = < det |
| 10"Ø 18' 1/2" | | | | unconsolidated, no rx to 10% HCL - PID = 29.8 ppm OVA (fid) | 1030 | add 18' 1/2 w/ drive shoe |
| | | | | = < 1 ppm (2 pt. lith, 2 125ml enviro, 1 moist.) | | of 10" Ø carbon steel |
| | | | | samples on cofc 092089 | | casing - H&S - scan |
| | | | | | | OVA = 1 ppm |
| | | | | | | PID = 29.8 ppm head space |
| | | | | | | test in jar w/ d.i. $H_2O$. |
| | | | | | | Ammonia tube = < det |
| | | | | | | NO-NOx tube = < det. |
| | | | | | 1200 | Stop - lunch |
| | | | | casing not straight - need to adjust casing | 1232 | resume activity - H&S |
| | | | | | | PID = < 1 ppm, LEL = < det. |
| | | | | | 1315 | H&S = PID = < 1 ppm |
| | | | | | 1355 | " - PID = < 1 ppm |
| | | | | | 1435 | " - PID = 2 ppm |
| | | | | | | " LEL = < det. |

REMARKS:

FNL-MA 567, DO-1 Rev 0 Reviewed by [illegible] 12-7-89

9/20/89

WHC-MR-0209

240

| DRILL LOG | By R Miller | Rig BE-60L #22-14103 | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-55T |
|---|---|---|---|---|---|
| | Date 9/20/89 | Louis W. | Depth 15.0' To | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"ø 27' 10" | | | | | 1445 | add 9'9½"-10"ø weld |
| | | | | | 1510 | stop for day - can't |
| | | | | | | weld up - fire watch. |

REMARKS:

PNL-MA 567, DO-1, Rev Ø Reviewed by D.L. McKhan 12-7-89

9/20/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 0000 021 (5-85)

WHC-MR-0209

241

sht 1 of 3

| DRILL LOG | By R. Miller | Rig BE 60L #22-14103 Louis W. | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/21/89 | | Depth 15.0' To 25.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"Ø 27' 10" | | | | | 0710 | Av site H&S scan |
| | | | | | | PID = <1ppm LEL = <det |
| | | | | | 0715 | resume welding - |
| | | | | | 0810 | welding completed - wait |
| | | | | | | for mechanic to get rig |
| | | | | | | running - batt. terminal. |
| | | | | | 0832 | begin to drill |
| | | | | | 0846 | H&S PID = 2.7ppm. OVA = <1ppm |
| | | | | | | RPT = <det. |
| | 20.0' | DB | SM | SANDY GRAVEL (35% Gravel, 65% Sand, trace Mud) 2% vcp | 0920 | to 20.0' - sample |
| | | | | 3% cp 7% mp 8% fp 15% vfr, 20% vcs, 15% cs, 10% ms, 10% | | H&S - PID = 2.6ppm |
| | | | | fs, 10% vfs, trace mud, very poorly sorted, 30/70 f/m, SA- | | OVA = <1ppm - LEL = <det |
| | | | | WR, ltyel brn (2.5Y 6/4), slight rx to 10% HCL, unconsolid, | | RPT = <det. |
| | | | | PID w/ 11.8 lamp = 2.6ppm. (2pt. lith, 2 125ml enviro, 1moist) | | |
| | 25.0 | DB | SM | SANDY GRAVEL (35% Gravel 65% Sand, trace Mud) | 0951 | to 25.0 - sample. |
| | | | | similar to 20.0' (2pt lith, 1moist). | | H&S - PID = <1ppm |
| | | | | | | RPT <det, LEL <det |
| 10"Ø 37' 1" | | | | | 1004 | add 9'9" 10" & weld |

REMARKS:

PDL-MA567, DO-1, Rev Ø  Reviewed by [illegible] 12-7-89

9/21/89

WHC-MR-0209

248

9 1 1 2 0 5 0 0 2 1 5

sht 2 of 3

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/21/89 | | Depth 25.0 To 35.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"ø 31' 7" | | | | | 1110 | resume drilling |
| " " | | | | | 1115 | $H_2S$ scan PID = <1ppm |
| | | | | | | LEL = <det |
| | | | | | 1120 | RPT departs site - |
| | | | | | | stop drilling - install |
| | | | | | | fire blanket. |
| | | | | | 1200 | stop - lunch |
| | | | | | 1230 | resume - wait for RPT |
| | | | | | 1248 | RPT arrives - resume |
| | 30.0' | DB | SM | SANDY GRAVEL (40% Gravel 60% Sand) 3% mp 17% fp | 1251 | to 30.0' - sample |
| | | | | 20% vfp, 30% vcs 10% cs 10% ms 10% fs trace vfs, mod to | | $H_2S$ - PID = <1ppm |
| | | | | poorly sorted, 30/70 f/m, SA - WR, lt yel brn (2.5Y 6/4) | | LEL = <det OVA = <1ppm |
| | | | | slight rx to 10% HCL, unconsolidated, (2pt lith, 1 moist) | | RPT = <det |
| | 35.0' | DB | SM | SANDY GRAVEL (40% Gravel 60% Sand) similar to | 1323 | to 35.0' - sample |
| | | | | 30.0' (trace of cp) (2pt lith, 1 moist) | | $H_2S$ - PID = <1ppm |
| | | | | | | LEL = <det OVA = <1ppm |
| | | | | | | RPT = <det. |
| 10"ø 41' 4" | | | | | 1345 | add 9'9" - 10" - & weld |

REMARKS:

TNL-MA567, DO-1, Rev 0 Reviewed by [illegible] 12-7-89

9/21/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

243

WHC-MR-0209

9 1 1 2 0 5 0 0 2 1 6

sht 3 of 3

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/21/89 | | Depth 35.0 To 43.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"ø 41' 4" | | | | | 1430 | resume drilling - |
| | 40.0' | DB | SM | SANDY GRAVEL (35% Gravel 65% Sand) 5%mp 10%fp | 1446 | to 40.0' - sample |
| | | | | 20%vfp, 25%vcs 20%cs 15%ms 5%fs trace vfs, mod | | H&S - FID = <1ppm |
| | | | | sorted, 40/60 f/m, SA-WR, lt yel brn (2.5Y 6/4) | | OVA = <1ppm LEL = <det |
| | | | | slight rx to 10% HCL, unconsolidated (2pt lith, 2 125 | | RPT = < det |
| | | | | ml enviro, 1 moist) | 1502 | RPT departs site |
| | | | | | | shut down drilling |
| | | | | | | samples cofc 092189 |

REMARKS:

FNL-MA567, DO-1, Rev 0 Reviewed by V.G. Mathews 12-7-89

9/21/89

Rand H. Miller

244

WHC-MR-0209

9 1 1 2 0 5 0 0 2 1 7

Sht 1 of 3

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/22/89 | | Depth 43.0' To 50.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 47' 4" | | | | | 0700 | Ar-site - prepare to drill |
| 9' 1" | | | | | | $H_2S$ scan - PID = <1 ppm |
| | | | | | | LEL = <det, no RPT |
| | | | | | 0757 | RPT - arrives site |
| | | | | | 0758 | begin to drill |
| | 45.0' | DB | SM | SAND (3% Gravel 97% Sand) 3% vfp, 20% vcs 50% cs, 20% | 0813 | to 45.0' - sample |
| | | | | ms 7% fs, well sorted, 50/50 f/m, SA-SR, lt.yel.brn. (2.5Y 6/4) | | $H_2S$ - PID = 2.5 ppm, LEL = <det |
| | | | | slight rx to 10% HCL, unconsolidated. PID = 2.5 ppm w/11.8 lamp | | RPT - cleared <det. |
| | | | | (2 pt lith, 1 moist) | 0822 | to 48.0' - sample |
| | 48.0' | DM | M-W | SLIGHTLY MUDDY SAND (85% Sand, 15% Mud) 2% ms 3% fs 80% vfs, | | $H_2S$ - 2.5 ppm w/PID. |
| | | | | 15% Mud, very well sorted, 50/50 f/m, SA-SR, lt olbrn (2.5Y 5/4 | | RPT = <det |
| 10"Ø 56' 5½" | | | | wet) - lt yel brn (2.5Y 6/4 dry), slt bomd rx to 10% HCL, unconsolid, | 0830 | add 9' 1½" - 10" & weld. |
| | | | | PID = 2.5 ppm w/11.8 lamp - traces of fe stains, wet when vibrated, | 0914 | wind dir N x W - odors |
| | | | | (2 pt lith, 2 125 ml enviro, 1 moist) ~ 1.0' thick to 149.0' | | from Tank Farm. $H_2S$ |
| | | | | | | scan w/ $NH_3$ tube - no det. |
| | | | | | 0925 | resume drilling |
| | | | | | 0935 | $H_2S$ - PID = <1 ppm |
| | | | | | | |

REMARKS:

PNL-MA-567, DO-1, Rev 0 Reviewed By W. E. McClam 12-7-89

9/22/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Vary Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

215

9 1 1 2 0 5 0 0 2 1 8

10"/1

sht 2 of 3

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-35T |
|---|---|---|---|---|---|
| | Date 9/22/89 | | Depth 50.0 To 65.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"Ø 56' 5½" | 50.0' | DB | SM | SAND (2% Gravel, 98% Sand) 1% fp 1% vfp, 30% vcs 60% cs | 0949 | to 50.0' - sample |
| | | | | 6% ms 2% fs, well sorted, 50/50 f/m, SA-WR, lt yel brn (2.5Y | | H&S - PID = < 1 ppm |
| | | | | 6/4), slight rx to 10% HCL, unconsolidated, (2pt. lith, 1 moist.) | | RPT = < det. |
| | 55.0' | DB | SM | SAND (3% Gravel, 97% Sand) 1% fp 2% vfp, 25% vcs 65% cs | 1007 | to 55.0' - sample. |
| 10"Ø 66' 9½" | | | | 4% ms 3% fs, well sorted, 50/50 f/m, SA-WR, lt yel brn (2.5Y | 1017 | add 10'4"-10" ⅛ weld |
| | | | | 6/4), slight rx to 10% HCL, unconsolidated (2pt. lith, 1 moist.) | 1115 | RPT - departs. after |
| | | | | | | personnel scan = < det. |
| | | | | | 1134 | resume drilling |
| | | | | | 1157 | stop - lunch. |
| | | | | | 1221 | safty meeting - cyc hzd |
| | | | | | 1240 | Ar site - resume. |
| | 60.0' | DB | SM | SAND (2% Gravel, 98% Sand) 1% fp 1% vfp, 15% vcs 20% cs | 1245 | to 60.0' - sample |
| | | | | 25% ms 25% fs 13% vfs, moder. sorted, 50/50 f/m, SA-SR, | | H&S - PID = < 1 ppm |
| | | | | lt yel brn. (2.5Y 6/4) moderate rx to 10% HCL, unconsolidated. | | RPT = < det. |
| | | | | (2pt lith; 2 125ml enviro, 1 moist) | | |
| | 65.0' | DB | SM-M | see sht 3 — | 1324 | to 65.0' - sample. |
| | | | | | | H&S - PID = < 1 ppm |
| | | | | | | RPT = < det. |

REMARKS:

PNL-MA567, DO-1, Rev 0

Reviewed by D. L. McGlaun 12-7-89

9/22/89

WHC-MR-0209

246

9 1 1 2 0 5 0 0 2 1 9

sht 3 of 3

| DRILL LOG | By R. Miller | Rig BE-60L #22-14103 Louis W. | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/22/89 | | Depth 65.0' To 73.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10" ø 60.0' 9 1/2 | 65.0 | DB | SM-M | SAND (4% Gravel 96% Sand) 1% fp 3% vfp, 35% vcs | 1330 | add 10' 1/4"-10"-¼ weld |
| 76' 9 3/4 | | | | 30% cs 15% ms 10% fs 6% vfs, well-mod sorted, 40/60 f/m, | 1340 | wind N-NW - odor? |
| | | | | SA-WR, lt yel. brn. (2.5Y 6/4), slight rx to 10% HCL, | 1345 | odor gone - chlorine? |
| | | | | unconsolidated. (2pt lith, 1 moist) | 1420 | resume drilling |
| | 70.0' | DB | M | SANDY GRAVEL (35% Gravel 65% Sand) 2% vcp 3% cp | 1455 | to 70.0' - sample |
| | | | | 5% mp 10% fp 15% vfp, 30% vcs 15% cs 10% ms 10% fs | | H2S scan - RD = <1 ppm |
| | | | | poorly sorted, 30/70 f/m, SA-WR, lt yel brn (2.5Y 6/4) | | RPT = < det |
| | | | | slight rx to 10% HCL, unconsolidated. (2pt. lith, 1 moist) | | |
| | | | | | 1510 | stop for day |
| | | | | | | samples on LOC |
| | | | | | | 9A2289-SST. |

REMARKS:

PNL-MA567, DO-1, Rev 0 Reviewed by D. L. McGlum 12-7-89

9/22/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

WHC-MR-0209

297

9 1 1 2 0 5 0 0 2 7 0



| DRILL LOG | By: Ian Kennedy / Ron Bloyer | Rig: BE 60 L #22-14103 L. Watkins | Well Number: 299-E27-14 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-25-89 | | Depth: 73 To 85' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10" diameter) 76'-9 3/8" | | | | | 0720 | Arrive onsite - driller |
| | | | | | | performing rig maintenance |
| | | | | | 0735 | driller marking 5' intervals |
| | | | | | | on cable w/ spray paint |
| | | | | | 0745 | begin drilling |
| | 75' | D | Moist | SANDY GRAVEL: 40% gravel, 60% sand, trace mud: trace cmp, 5% bfp, 35% vfp | 0750 | Sample: (2) 1pt. lith |
| | | | | 55% vcs, 4% cms, 1% fs, trace vfs, trace mud (well sorted) Gravel: 90% mafic | | (1) moist |
| | | | | 10% felsic SA-R, sand: 50% mafic / 50% felsic SA-SR; 2.5Y 5/4 (light | | (no RPD) |
| | | | | olive brown) slight HCl rxn unconsolidated | 0755 | driller preparing to add casing |
| 78'-9 1/2" | | | | | 0820 | RPT arrives and cleans sample |
| 85'-7 1/4" | | | | | 0922 | Driller welding casing |
| | | | | | | Welding Complete |
| | | | | | 0928 | Resume Drilling |
| | 80' | D | SM | sandy GRAVEL: 35% gravel, 65% sand, trace mud. | 0946 | 80' Sample - |
| | | | | Trace CP, 5% MP, 12% FP, 18% VFP, 5% VCS, 10% CS, 40% MS, 8% FS, 2% VFS | | 2 pint jars (Lith) / moisture |
| | | | | Moderately Sorted GRAVEL: 75% Basalt, 10% Quartzite, 15% Felsic & sedi. | | 2 1/25 ml Enviro. - Reference |
| | | | | VA-SR, SAND: 30% Basalt, 40% Qtz & Felds, 30% Frags. SA-SR. | | Chain of Custody #092589 SST |
| | | | | Wet Color (of frags): 2.5Y 6/4 Light Yellowish Brown. No rxn w/10% HCl, | | PID 1 |
| | | | | Unconsolidated. [Sorting. Less Basalt] | | RPT - Background |
| | | | | | | Resume drilling |

REMARKS: PNL MA 567, 00-1, rev. 0

9-25-89

Reviewed by V. L. McClelan 12-7-89

Ronald P. Bloyer

248

WHC-MR-0209

| DRILL LOG | By: Ron Bleger | Rig: BE 60L #22 #103 L. Watkins | Well Number: 299-E27-14 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9/25/89 | | Depth: 80' To 93' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 85' 7¼" | 85' | D | SM | sandy GRAVEL: 35% gravel, 65% sand, trace mud. Trace VCP | 1005 | 85' Sample |
| | | | | (one in bucket - SR), 2% MP, 13% FP, 20% VFP, 8% VCS, 15% CS, | | 2 pint lith. 1 Moisture |
| | | | | 30% MS, 10% FS, 2% VFS. Moderately Sorted. | | PID <1, RPT - Back. |
| | | | | GRAVEL: 70% Basalt, 30% Felsic & seds. SA-SR. SAND: 30% Basalt, | | |
| | | | | 45% Qtz & felds, 25% Frags. SA-SR. DRY COLOR: 5Y 6/2 LT. OLIVE GRAY. | | |
| | | | | WET COLOR: 5Y 5/3 OLIVE. No rxn w/10% HCl | | |
| | | | | Unconsolidated. [No major changes] | | |
| 94' 4" | | | | Adding 8'8¾" of 10" DIA. Casing. Total 10" = 94'4" | 1010 | Welding casing |
| | | | | | 1110 | Welding complete. |
| | | | | | 1117 | Resume drilling |
| | 90' | D | SM | gravelly SAND: 15% gravel, 83% sand, 2% mud. | 1141 | Sample (90') |
| | | | | 2% MP, 3% FP, 10% VFP, 8% VCS, 10% CS, 40% MS, 20% FS, 5% VFS, | | 2 pint lithe. |
| | | | | 2% MUD. Moderately to poorly sorted. GRAVEL: 80% Basalt, | | 1 moisture |
| | | | | 20% Felsic & seds. VA-SR; SAND: 25% Basalt, 50% qtz & felds, | | PID - <1 |
| | | | | 25% Misc. frags SA-R. Strong rxn w/10% HCl. Wet Color: 5Y 4/3 | | RPT - Background |
| | | | | Olive, Unconsolidated. | | |
| | 93' | | | | 1200 | Break for lunch |
| | | | | | 1240 | On-site |

REMARKS: PNL-MA567, DO-1, Rev. 0

Reviewed by D. L. McKehan 12-7-89

Ronald L. Bleger 9-25-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

2 of 4

| DRILL LOG | By: R. Bhagwan | Rig: BE 60L #22-14103 L. Watkins | Well Number: 299-E27-14 | Computer Number: N/A | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 9-25-89 | | Depth: 93' To 100 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 94'4" | | D | | | 1242 | Preparing to add casing |
| 102'7" | | | | Adding 8'3" of 10" dia. casing. Total 10" = 102'7" | | |
| | | | | | 1343 | Welding complete |
| | | | | | 1350 | Resume drilling |
| | 95' | D | SM | SAND: 5% gravel, 93% sand, 2% mud. Trace MP | 1356 | SAMPLE. Collected |
| | | | | 1% FP, 4% VFP, 5% VCS, 12% CS, 50% MS, 18% FS, 8% VFS, 2% MUD | | two (2) pint litho. |
| | | | | Well sorted. GRAVEL. 80% Basalt, 20% Felsic & seds SA-SR. | | and one (1) moisture |
| | | | | SAND: 25% Basalt, 50% qtz + felds, 25% Misc. frags. A-SR | | PID: < 1 ppm |
| | | | | Wet color: 5Y 5/3 olive. Slight rxn w/10% HCl | | RPT: Background |
| | | | | Unconsolidated. [Δgrain size] | | |
| | | | | Collected ~6" Thick clay lense at approx. 94'. Took | | |
| | | | | one (1) pint litho sample. - Dense clay, moist, | | |
| | | | | color: 2.5Y 4/4 olive brown. | | |
| | | | | | | |
| | 100' | D | SM | See pg. 4 | 1427 | Sample |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA567, DO-1, Rev. 0 Reviewed by V. L. Wakefield 12-7-89

Ronald P. Bhagwan 9-25-89

WHC-MR-0209

292

9 1 1 2 0 5 0 0 2 7 3

4 of 4

| DRILL LOG | By R. Blagen | Rig BE 60L #22-14103 L. Watkins | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 9-25-89 | | Depth 100' To 100' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 102'7" | 100' | D | SM | slightly muddy SAND: Trace gravel, 90% sand, 10% mud | 1427 | Sample. Took |
| | | | | Trace VCS, 3% CS, 50% MS, 22% FS, 15% VFS, 10% mud. | | two (2) pint lith. |
| | | | | Well Sorted. Sand: 20% Basalt, 80% Felsic (Difficult to distinguish | | Two (2) 125 ml enviro: |
| | | | | due to small grain size) VA-R. Wet Color: 2.5Y 5/4 Lt. Olive Brown | | one (1) moisture |
| | | | | Slight rxn w/10% HCl. Slight-to-moderate consolidation. | | Reference Chain-of- |
| | | | | [Δ grain size, Δ consolidation] | | custody #092589 SST |
| | | | | | | PID - 21 |
| | | | | | | RPT - Background |
| | | | | | | |
| 110'2½" | | | | Adding 7'7½" of 10" dia. casing. Total 10" = 110'2½" | 1430 | Welding casing |
| | | | | | 1515 | Welding complete |
| | | | | | | |
| | | | | | 1520 | Shut down for day |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL MA567, DO-1, Rev. 0 Reviewed by D.L. Mahlum 10-7-89

Randall P. Blagen 9-25-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

150

WHC-MR-0209

9 1 1 2 0 5 0 0 2 5 4



| DRILL LOG | By: R. Elogan | Rig: BE 60L #22-14103 L. Watkins | Well Number: 299-E27-14 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-26-89 | | Depth: 100' To 110' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 110' 2½" | | | | | 0700 | Driller on-site. Finishing |
| | | | | | | casing weld. Rig Maintenance. |
| | | | | | 0759 | START DRILLING (DRIVE BARREL) |
| | 105' | D | SM | SAND: 5% GRAVEL, 93% SAND, 2% MUD. TRACE MP, 1% FP, | 0815 | DRIVE BARREL SAMPLE |
| | | | | 4% VFP, 10% VCS, 35% CS, 30% MS, 15% FS, 3% VFS, 2% MUD. | | COLLECTED ONE (1) MOISTURE, |
| | | | | MODERATELY SORTED. GRAVEL: 60% BASALT, 40% FELSIC & SEDS. SA-SR | | TWO (2) PINT LITHO. SAMPLES. |
| | | | | SAND: 30% BASALT, 50% QTZ & FELDS, 20% MISC. FRAGS SA-SR. | | PID - CHECKING INSTRUMENT RPT - BACKGROUND |
| | | | | WET COLOR: 5Y 5/3 OLIVE SLIGHT RXN W/10% HCl, | | SAMPLED AND CONTINUED |
| | | | | UNCONSOLIDATED [Δ GRAIN SIZE (SOME GRAVEL, LESS MUD), Δ COLOR, | | DRILLING. |
| | | | | Δ SORTING] | | |
| | | | | | | |
| | 110' | D | SM | SAND: SAME AS 105' SAMPLE (~5% GRAVEL, 93% SAND, 2% MUD) | 0840 | DRIVE BARREL SAMPLE |
| | | | | PID PEKING UP ~14 ppm. IN SAMPLE. VOA SAMPLE COLLECTED. | | COLLECTED ONE (1) MOISTURE |
| | | | | SAFETY OFFICER WILL MONITOR BETWEEN 110' AND 115' TO SEE IF | | AND TWO (2) PINT LITHO. SAMPLES. |
| | | | | WE CAN DRIVE PAST CONTAMINATION. | | ONE (1) VOA SAMPLE |
| | | | | [VOA SAMPLE REFERENCE CHAIN-OF-CUSTODY # 092689 SST]. | | PID - 14 ppm RPT - BACKGROUND |
| | | | | | | SAMPLED, THEN PREPARED |
| 110' 2½" | | | | | | TO ADD CASING. |

REMARKS:

PNL MA 567, DO-1, Rev. 0 Reviewed by V.S. Markham 12-7-89 Lowell P. Blair 9-26-89

WHC-MR-0209

9 1 1 2 0 5 0 0 2 5 5

2 of 4

| DRILL LOG | By: R. Blegen | Rig: BE 60L #22-14103 L. Watkins | Well Number: 299-E27-14 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-26-89 | | Depth: 110' To 120' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 120'2" | | D | | ADDING 9 "11½" OF 10" DIA. CASING. TOTAL 10" = 120'2" | 0845 | WELDING CASING |
| | | | | | 0945 | WELDING COMPLETE |
| | | | | | 0955 | RESUME DRILLING |
| | | | | SAFETY OFFICER MONITORING CUTTINGS AND INSIDE CASING. PICKED UP | 1009 | |
| | | | | ~8 PPM ON PID IN CUTTINGS (FROM ~113'). | | |
| | | | | 6 PPM FROM 114' CUTTINGS. | 1011 | |
| | | | | | | |
| 1 | 115' | D | SM | SAND: SAME AS 105' AND 110' (~5% GRAVEL, 93% SAND, 2% MUD) | 1016 | DRIVE BARREL SAMPLE |
| | | | | VOA SAMPLE REFERENCE CHAIN-OF-CUSTODY #092689 SST | | COLLECTED ONE (1) MOISTURE, |
| | | | | | | AND TWO (2) PINT LITHO SAMPLES |
| | | | | | | COLLECTED ONE (1) VOA SAMPLE |
| | | | | | | PID - 9 ppm<br>RPT - BACKGROUND |
| 1 | 120' | D | SM | SAND; 2% GRAVEL, 95% SAND, 3% MUD, 2% VFP, TRACE VCS | 1037 | DRIVE BARREL SAMPLE |
| | | | | 30% CS, 40% MS, 20% FS, 5% VFS, 3% MUD. WELL SORTED. | | COLLECTED ONE (1) MOISTURE, TWO (2) PINT LITHO, TWO (2) |
| | | | | GRAVEL: 50% BASALT, 50% FELSIC & SEDS VA-SA, SAND: 25% BASALT, | | 125 ml ENVIRON. AND ONE (1) VOA SAMPLE. |
| | | | | 60% QTZ & FELDS, 15% MIX. FRAGS SA-R, WET COLOR; 5Y 5/3 OLIVE. | | (SPECIAL SAMPLES REFERENCE CHAIN-OF-CUSTODY #092689 SST) |
| | | | | NO RXN W/10% HCl. UNCONSOLIDATED. NO MAJOR CHANGES. | | PID - 3 ppm<br>RPT - BACKGROUND |
| 120'2" | | | | | | SAMPLED AND STARTED WELDING CASING. |

REMARKS:

PNL MA 567, DO-1, Rev. 0 Reviewed by V.L. Washburn 12-7-89 Ronald P. Blegen 9-26-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

253

WHC-MR-0209

| DRILL LOG | By: R. Bogan | Rig: BE 60L #22-14103 L. Watkins | Well Number: 299-E27-14 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-26-89 | | Depth: 120' To 130' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 129'8" | | | | ADDING 9'6" OF 10" DIA. CASING. TOTAL 10" = 129'8" | 1050 | WELDING CASING |
| | | | | | 1146 | WELDING COMPLETE |
| | | | | | 1150 | RESUME DRILLING |
| | | | | | 1156 | BREAK FOR LUNCH |
| | | | | | 1240 | ON-SITE |
| | | | | | 1245 | RESUME DRILLING |
| | 125' | D | SM | SAND: SAME DESCRIPTION AS @ 120'. A LITTLE MORE VCS | 1300 | DRIVE BARREL SAMPLE |
| | | | | (PERHAPS 5%), BUT SAME BASIC DESCRIPTION (~95% SAND, 2% GRAVEL, | | COLLECTED ONE (1) MOISTURE, |
| | | | | 3% MUD). | | AND TWO (2) PINT LITHO. |
| | | | | | | SAMPLES. |
| | | | | | | PID - <1<br>RPT - Background. |
| | 130' | D | SM | SAND: TRACE GRAVEL, 98% SAND, 2% MUD. 8% VCS, 45% CS, | 1320 | DRIVE BARREL SAMPLE. |
| | | | | 30% MS, 12% FS, 3% VFS, 2% MUD. WELL SORTED. SAND: 30% BASALT, | | COLLECTED ONE (1) MOISTURE |
| | | | | 35% QTZ & FELDS., 35% MIS. FRAGS. SA-WR. | | AND TWO (2) PINT LITHO. |
| | | | | WET COLOR OF FINES: 2.5Y 5/4 LIGHT OLIVE BROWN. | | SAMPLES. |
| | | | | WEAK RXN W/10% HCl. UNCONSOLIDATED [CHANGES: VERY LITTLE | | PID - <1<br>RPT - Background |
| | | | | GRAVEL, Δ COLOR, SAME RXN W/HCl] | | COLLECTED SAMPLE AND |
| | | | | | | PREPARING TO ADD CASING. |

REMARKS:

PNL MA 567, DO-1, Rev. 0

Reviewed by [illegible] 12-7-89

9-26-89

WHC-MR-0209

254

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| R. Blagen | BE 60L #22-14103 L. Watkins | 299-E27-14 | N/A | W-017 SST |
| Date: 9-26-89 | | Depth: 130' To 138' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 137'7" | | | | ADDING 7'11" OF 10" DIA. CASING. TOTAL 10" = 137'7" | 1355 | WELDING CASING |
| | | | | | 1443 | WELDING COMPLETE |
| | | | | | 1446 | RESUME DRILLING |
| | | | | | | |
| | 135' | D | SM | SAND: SAME DESCRIPTION AS @ 130'. WILL EXAMINE | 1505 | DRIVE BARREL SAMPLE |
| | | | | MORE CLOSELY IN THE MORNING | | COLLECTED ONE (1) MOISTURE |
| | | | | | | AND TWO (2) PINT LITHO. |
| | | | | | | SAMPLES |
| | | | | | | PID - 41 |
| | | | | | | RPT - Backgrnd |
| | | | | | | |
| | | | | | 1520 | SHUT DOWN FOR DAY |
| | | | | | | TD ≈ 138 FT. |
| | | | | | | CASING DRIVEN. LEFT |
| | | | | | | WITH APPROX. 1 FT. STICKUP |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL MA 567, DO-1, Rev. 0 Reviewed by V.L. Markham 12-7-89

Randall P. Blagen 9-26-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing W...

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Ian Kennedy | BE 60L #22-14103 L. WATKINS | 299-E27-14 | N/A | W-017 SST |
| Date: 9-27-89 | | Depth: 138 To 140 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10" dia) 137'-7" | | | | | 0725 | begin drilling |
| | 140' | D | SM | SLIGHTLY GRAVELLY SAND: 8% gravel, 92% sand, trace mud: trace fA | 0750 | samples: (2) 1 pt. lith |
| | | | | 8% vfgr, 22% vcs, 65% cs, 5% ms trace vfs, trace vfs, trace mud | | (1) moisture |
| | | | | (Well sorted) Gravel: 70% mafic/30% felsic (SA-SR) Sand: 10% mafic/90% felsic | | 3 Chem (092789) |
| | | | | SA-SR 2.5Y 6/6 (olive yellow) no HCl rxn unconsolidated. PID w/10.6eV | | (1 rc. & VOA) |
| | | | | lamp reads ~5 ppm | | RPT Cleaned. |
| | | | | | 8:00 | preparing to add 8" casing |
| | | | | | | waiting for logging of |
| | | | | | | 10" casing |
| | | | | | 10 30 | truck arrives to geophysically |
| | | | | | | log 10" casing |
| | | | | | 11 40 | logging complete |
| | | | | | | - begin adding 8" casing |

REMARKS:

Ian Kennedy
9-27-89

ANL-MA-567, DO-1, Rev. 0

Reviewed by W.L. McGlynn 12-7-89

WHC-MR-0209

9 1 1 2 0 5 0 0 2 7 9

p. 1 of 1

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Ian Kennedy | BE 60L #22-14103 L. Watkins | 299-E27-14 | N/A | W-017 SST |
| Date: 9-28-89 | | Depth: 140 To 150 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8" 18'-7¼" | | | | driller has added 8" diameter casing lengths of 18'-7¼" and 20'-5", | 0710 | Visit site - driller about to |
| +20'-5" | | | | and off 2¼", then added 20'-6" yesterday | | continue welding 8" casing |
| =39'-0¼" | | | | | 1355 | Arrive on site driller |
| -2¼" | | | | today, the driller has added 8" diameter casing lengths of | | has drilled to just above |
| 38'-10" | | | | 20'-5¾", 20'-1½", 21'-10½" and 21'-5½" | | 145' and is welding on |
| +20'-6" | | | | | | new 8" dia. casing |
| 59'-4" | | | | added 10'-11" of 8" diameter Carbon steel temp. casing. | 1405 | finished welding |
| +20'-5¾" | 145' | D | SM | GRAVELLY SAND: 25% gravel, 75% sand; trace mud: 1% vcp, 2% cp, 10% mp, | 1425 | Samples: (2) 1 pt. lith |
| 79'-9¾" | | | | 5% fp, 7% vfp; 35% vcs, 25% cs, 10% ms, 4% ts, 1% vfs, trace mud (poorly | | (1) moisture |
| +20'-1½" | | | | sorted) 10YR 5/4 (yellowish brown) Gravel: 40% mafic / 60% felsic SA-R | | RPT Cleared |
| =99'-11¼" | | | | Sand: 5% mafic / 95% felsic SA-SR slight HCl rxn unconsolidated | | PID reads nothing |
| +21'-10½" | | | | | | visit by Rich Johnson, WHC |
| 121'-9¾" | | | | | | safety - someone smelled |
| +21'-5½" | | | | | | $NH_3$ at grand plant |
| =143'-2¼" | | | | | 15:15 | Sampler: (2) 1 pt lith |
| +10'-11" | | | | | | (1) moisture |
| =154'-2¼" | | | | | | to be described tomorrow |
| | | | | | 15:20 | go home |

REMARKS:

Ian Kennedy 9-28-89

PNL MA 567, DO-1, Rev. 0

Reviewed by D. L. McSchan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

25.7

| DRILL LOG | By: Ian Kennedy (S. Goodwin) | Rig: BE 60L #22-14103 L. Watkins | Well Number: 299-E27-14 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-29-89 | | Depth: 150 To 160' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8" diameter) 154'-2¼" | 150' | D | SM | SAND: trace gravel; 100% sand, trace mud: trace fp, 10% vcs, 25% cs, 50% ms, | 0710 | Arrive, H&S Check-ok |
| | | | | 13% fs, 2% vfs, trace mud (well sorted) Gravel: 85% mafic 15% felsic SA | | Describe 150' sample from |
| | | | | Sand: 5% mafic/95% felsic SA-SR; 10YR 5/2 (grayish brown) slight HCl rxn, | | yesterday |
| | | | | unconsolidated | 0715 | begin drilling |
| | | | | | 0730 | driller begins adding casing |
| + 15'-5½" | | | | added 15'-5½" of 8" diameter Carbon steel casing | 0820 | FINISHED WELDING |
| 170'-7¼" | | | | | 0830 | DRILLING |
| | 155' | D | SM | SAND: 2% GRAVEL, 98% SAND, TRACE MUD. | 0900 | SAMPLE, 2 PT. |
| | | | | 2% VFP, 8% VCS, 25% CS, 50% MS, 10% FS, | | LITH & 1 MOISTURE |
| | | | | 5% VFS. MODERATELY SORTED. SANDS ARE | | SAMPLE |
| | | | | 15% MAFIC, 85% FELSIC; SA. WET COLOR IS | 0905 | DRILLING |
| | | | | 10 YR 5/2 (GRAYISH BROWN). NO CONSOLIDATION. | | |
| | | | | SLIGHT RX. TO 10% HCL SIMILAR TO 150'. | | |
| | | | | Ø PPM w/ OVA & RAD: < DET | | |
| | 160' | D | SM | SLIGHTLY GRAVELLY SAND: 8% GRAVEL, 92% SAND, | 0920 | SAMPLE; 2 PT. |
| | | | | TRACE MUD. 2% MP, 3% FP, 3% VFP, 20% VCS, | | LITH, 1 MOIST, |
| | | | | 45% CS, 15% MS, 8% FS, 4% VFS, TRACE | | & 2 125 ML CHEM. |
| | | | | MUD; MODERATELY SORTED. GRAVELS ARE 60% MAFIC, | | ANAL SAMPLES |

REMARKS:

(C. of C. # SST0927-89)

PNL MA 567, DO-1, REV. 0 Reviewed by W. E. McElhaney 12-7-89 Mark. Mark 9-27-89

| DRILL LOG | By: S. GOODWIN | Rig: BE 60L #22-14102 L. WATKINS | Well Number: 299-E27-14 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-29-89 | | Depth: 160' To 165 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 160' | D | SM | (CONT.) 40% FELSIC; SA TO SR. SANDS ARE | 0925 | DRILLING |
| | | | | 15% MAFIC, 85% FELSIC; SA. WET COLOR | | |
| | | | | IS 10YR 5/2 (GRAYISH BROWN). SLIGHT RX. | | |
| | | | | TO 10% HCL. NO CONSOLIDATION. Ø PPM | | |
| | | | | W/OVA & RAD = <DET. COARSER THAN 155' | | |
| | 165' | D | MOIST | SAND: 4% GRAVEL, 96% SAND, TRACE MUD. | 0945 | SAMPLE; 2 PT. |
| | | | | 1% FP, 3% VFP, 10% VCS, 40% CS, 30% | | LITH & 1 MOIST. |
| | | | | MS, 10% FS, 6% VFS, TRACE MUD. MOD. | 0950 | DRILLING |
| | | | | SORTED. GRAVEL: 50% MAFIC, 50% FELSIC; | | |
| | | | | A TO SA. SANDS: 15% MAFIC, 85% FELSIC; | | |
| | | | | SA. WET COLOR IS 10YR 4/2 (DARK GRAYISH | | |
| | | | | BROWN). NO CONSOLIDATION. NO RX. TO 10% | | |
| | | | | HCL. NO CONSOLIDATION. FINER THAN 160' | | |
| | | | | Ø PPM W/OVA & RAD = <DET. | | |
| 170' 7 3/4" | | | | | 1000 | PREPARING TO WELD |
| + 10' 11" | | | | ADDED 10' 11" OF 8" CASING; TOTAL 8" = 181' 6 3/4" | 1050 | FINISHED WELD |
| 181' 6 3/4" | | | | | | |
| | | | | | | |

REMARKS:

PNL MA 567, DO-1, Rev. 0 Reviewed by V. L. McKhann 12-7-89 Martha Stahl 9/29/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

259

WHC-MR-0209

9 1 1 2 0 5 0 0 2 1 2



| DRILL LOG | By: I. Kennedy | Rig: BE 60L #22-14103 Louie W. | Well Number: 299-E27-14 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: | | Depth: 165 To 180 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 170' | D | SM | GRAVELLY SAND. 15% gravel, 85% sand, trace mud: 2% vfp, 13% vfp, 35% bcs, 40% bcs, | 1110 | Samples: (2) 1pt. 1.1% |
| | | | | 8% bms, 2% bfs, trace vfs, trace mud (well sorted); Gravel: 60% mafic/40% felsic | | (1) moisture |
| | | | | A-SA - Sand: 5% mafic/95% felsic SA-SR; 10YR 5/4 (yellowish brown) (wet) | | |
| | | | | no HCl rxn unconsolidated | | |
| | 175' | D | SM | GRAVELLY SAND: 25% gravel, 75% sand, trace mud: 3% fp, 22% vfp, 30% bcs, | 1150 | Samples: (2) 1pt 1.1% |
| | | | | 25% bcs, 15% bms, 5% bfs, trace mud; Gravel: 90% mafic 10% felsic SA-SR | | (1) Moisture |
| | | | | sand. 15% mafic/85% felsic SA-SR 10YR 5/3 (brown) slight HCl rxn | 1200 to 1230 | lunch |
| | | | | unconsolidated. Layer just above sample (174') contained several | 1240 | H&S check - nothing |
| | | | | small cobbles | 1245 | RPT returns, cleans 170' and |
| | | | | | | 175' samples |
| | | | | | 13:05 | driller begins adding |
| | | | | | | casing, H&S Check |
| 181'-6 3/4" | | | | | | PID w/10.6eV reads ~0.5ppm |
| +10'-8 1/2" | | | | added 10' | 1400 | Resume drilling. Visit |
| 192'-3 1/4" | | | | | | by TL Wollen, KEH who |
| | | | | | | talks with Louie and Scott (H&S) |
| | | | | | 1408 | H&S Check - ~0.1ppm |
| | | | | | | |

REMARKS: PNL MA 567 DO-1, rev 0

Tom Kennedy
9-29-89

Reviewed by V.L. McGlynn 12-7-89

WHC-MR-0209

220

| DRILL LOG | By Ian Kennedy | Rig BE 60L #22-14103 Louis Watkins | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. N-017 SST |
|---|---|---|---|---|---|
| | Date 7-29-89 | | Depth 180 To 190 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 180 | D | SM | GRAVELLY SAND: 25% gravel, 75% sand, trace mud: 3% fp, 22% vfp, 20% vcs, | 1420 | Samples: (2) 1 pt. lith |
| | | | | 25% cs, 24% ms, 5% fs, 1% vfs, trace mud (moderate sorting) Gravel: | | (1) Moisture (2) Chemical |
| | | | | 80% mafic/20% felsic SA-SR. Sand 15% mafic 85% felsic SA-SR | | (c/c # SST 092987) |
| | | | | 10YR 5/3 (brown) slight HCl rxn unconsolidated | | RPT Cleaned, PID - nothing |
| | 185' | D | SM | GRAVELLY SAND: 25% gravel: 75% sand: trace mud; 1% vcp, 1% cp, | 1435 | Samples: (2) 1 pt. lith |
| | | | | 10% mp 1% fp, 21% vfp, 38% vcs, 25% cs, 9% ms, 3% fs, trace vfs, trace mud | | (1) moisture |
| | | | | (well sorted) Gravel: 80% mafic/20% felsic SA-SR Sand: 20% mafic/80% felsic | | RPT Cleaned |
| | | | | SA-SR 10YR 5/3 (brown); slight HCl rxn unconsolidated | | |
| | 190' | D | SM | GRAVELLY SAND. 15% gravel, 85% sand: trace mud: 1% fp, 14% vfp, | 1455 | Samples: (2) 1 pt. lith |
| | | | | 35% vcs, 35% cs, 20% ms, 4% fs, 1% vfs, trace mud: Gravel: 90% mafic/ | | (1) Moisture |
| | | | | 10% felsic SA-SR Sand: 15% mafic/85% felsic SA-SR 10YR 5/3 (brown) | | RPT Cleaned |
| | | | | slight HCl rxn unconsolidated | | |

REMARKS:

Ian Kennedy
7-29-89

PNL MA567 DO-1, REV.0

Reviewed by D. L. Mulham 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

WHC-MR-0209

96

9 1 1 2 0 5 0 0 2 6 4

SW 1 of 2

| DRILL LOG | By M. D. Lobrecht | Rig BE 60L # 22-14103 L Walkins | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/2/89 | | Depth 192 To 205 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 191' 3¼" | | | | | 10:05 | Geologist on site after |
| + 10' 8½" | | | | | | Driller completed welding |
| 20 11¾" | | | | | (10:03) | Started drilling 195' interval. |
| | 195' | D | Sl. Moist. | GRAVELLY SAND, 15% GRAVEL, 83% SAND, 2% MUD; 15% vfP, | 10:22 | Samples: (2) lith., (1) |
| | | | | 25% vcS, 20% cS, 15% mS, 15% fS, 8% vfS, 2% mud; GRAVEL: | | moisture |
| | | | | 80% mafic (basalt), 20% felsic, A-SR; SAND: 60% felsic, 40% mafic, | | |
| | | | | SA-R; moderate yellowish brown, 10YR 5/4, sl. ⇄ w/ HCl, unconsolidated | | |
| | | | | to sl. consol. | | |
| | | | | | | |
| | 200' | D | S.M. | slightly GRAVELLY SAND; 8% G/90% S/2% M – 8% vfP | 10:53 | SAMPLES: (2) lith, (1) |
| | | | | 15% vcS, 10% cS, 30% mS, 20% fS, 15% vfS, 2% mud; | | moisture, (2) chemical |
| | | | | GRAVEL: 60% qtz & felsic / 40% mafic & basalt; A-SR; SAND: 75% felsic / 25% mafic, | | # 100289SST |
| | | | | A-SR; mod. yell. brown, 10YR 5/4; sl. ⇄ w/ HCl unconsolidated. | | |
| 204' 11¾" | | | | | 11:12 | Driller adding 8" casing. |
| + 19' 7" | | | | | 12:00-12:30 | LUNCH - Return |
| 212' 6¾" | | | | | 12:49 | Driller arrives |
| | 205 | D | SM. | slightly GRAVELLY SAND; Similar to above, only 5% vfP, 11% cS, 32% mS | 13:26 | Sample: (2) lith-1 pt Jars, |
| | | | | other characteristics same. | | (1) moisture tin. |

REMARKS:

Mill D. Lobrecht 10/2/89

Reviewed by V. L. McGhan 12-7-89

PNL MA567 DO-1, REV. 0

WHC-MR-0209

9 1 1 2 0 5 0 0 2 3 5

Sht. 2 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE 60L #22-14103 L. Watkins | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/2/89 | | Depth 205 To 215 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 212'6¾" | 210 | D | SM | SAND; 3% Gravel, 95% SAND, 2% mud – 3% vfP, 10% vcS, | 1346 | Samples: (2)-1 pt. Lith; |
| +10'7" | | | | 15% cS, 40% mS, 20% fS, 10% vfS, 2% mud Gravel: 15% | | 1 moisture. |
| 223' 1¾" | | | | felsitic / 85% matrix A SR; SAND: 20% matrix / 80% felsic, SA-R; | | |
| | | | | No ⇄ w/HCl; med. yell. brown 10YR 5/4; unconsolidated | | |
| | | | | | 1357 | begin adding casing. |
| | | | | | 1443 | begin drilling. |
| | 215 | D | SM | SAND: similar to 210' sample. | 1512 | Samples: (2)-1 pt. |
| | | | | | | Lith. |
| | | | | | 1525 | Left site. |

REMARKS:

Michael D. Lubrecht 10/2/89

PHL MA 567 DO-1, rev. 0

Reviewed by [illegible] 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

203

WHC-MR-0209

9 1 1 2 0 5 0 0 2 5 6

Sht. 1 of 2

| DRILL LOG | By M.D. Lubrecht | Rig BE 60L #22-14103 L Watkins | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/3/89 | | Depth 215 To 230 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 223'1½" | 215 | D | | | 0700 | Arrive on site – driller |
| | | | | | | arrives |
| | | | | | 0729 | Begin drilling |
| | 220' | D | SM | SAND: similar to 210' (3% gravel, 95% sand, 2% mud – see | 0800 | Samples: (2) 1 pt. Lith, (1) |
| | | | | log from 10-02-89 @ 210') NO RAD / NO VOC | | moisture; (2) 250 ml. chem. |
| | | | | | | # 100389 SST |
| 18' 11" | | | | | 0805 | Adding 8" casing |
| 232' 0½" | | | | | 0906 | Resume Drilling |
| | 225' | D | SM | SAND: similar to 210' & 220'. Lithology & composition same; | 0928 | Samples: (2) - 1 pt. Lith; |
| | | | | slightly consolidated. Color change to dusky yellow brown, 10YR 5/6 | | ~~(1) moisture~~. |
| | 230' | D | SM. | muddy SANDY GRAVEL: 50% Gravel, 42% Sand, 8% mud. | 1026 | Samples: (2) - 1 pt. Lith; |
| | | | | 10% vcP, 20% cP, 10% mP, 5% fP, 5% vfP, 5% vcS, 10% cS, | | |
| | | | | 10% mS, 10% fS, 5% vfS, 8% mud: GRAVEL: 30% mafic, | | |
| | | | | 70% felsic, well Rounded – R.; Sand: 30% mafic / 70% felsic | | |
| | | | | SA-R; consolidated, 10YR5/6 Dusky yell. brn., sl. ⇌ w/HCl | | |
| | | | | H₂S noted 7ppm VOC in borehole screen / NO RAD | 1105 | Begin to add casing. |
| | | | | | 1200 | Lunch |
| | | | | | 1231 | Return |

REMARKS:

Michael D. Lubrecht 10/3/89

PNL MA567 DO-1, REV.0 Reviewed by D.L. McLellan 12-7-89

WHC-MR-0209

204

9 1 1 2 0 5 0 0 2 6 7

Sht. 2 of 2

| DRILL LOG | By M.D. Lubecht | Rig BE 60L #22-14103 L. Walkins | Well Number 259-627-14 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/3/89 | | Depth 230 To 243 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 232 0 7/8" | | | | | 1240 | Casing Installation completed |
| 8 2/3" | 235 | D | SM | Sandy Gravel: 45% GRAVEL, 50% SAND, 5% mud - | | Resume drilling |
| | | | | tr. sm. cobble, tr. vcP, 5% cP, 20% mP, 10% fP, | 1350 | Pause from drilling to work |
| 240'-3 1/4" | | | | 10% vfP, 5% vcS, 10% cS, 15% mS, 15% fS, 5% vfS, | | on rig. |
| | | | | 5% mud: GRAVEL: 80% felsic / 20% basalt, SA-WR; SAND: | 1411 | Resume drilling. |
| | | | | 80% felsic / 20% mafic, SA-SR; mod. yell. brown, 10YR 5/4; | 1419 | Samples: (2), 1 pt. |
| | | | | reacts w/ HCl; consolidated locally. No Rad / ~.3 ppm VOC | | Lith; 1 moisture |
| | | | | | | |
| | 240 | D | SM | Sandy Gravel - same as 235. No Rad / ~.3 VOC | 1440 | Samples: (2), 1 pt. Lith, |
| | | | | | | (2) chem # 1003897SST, |
| | | | | | | 1 moist. |
| | | | | | | |
| | | | | | 1300 | Left Site |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

Reviewed by V.T. McMahan 12-7-89

Mark H. Lee 10/4/89

PNL MA 567 ID-1, REV.0

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

265

9 1 1 2 0 5 0 0 2 1 8

Sht 1 of 1

| DRILL LOG | By M.D. Lubrecht | Rig BE GOL # 22-14103 L. Watkins | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/4/89 | | Depth 240 To 245 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 240'5¼" | | | | | 0700 | Arrive on site - driller |
| + 8'-2½" | | | | | | does rig maintenance. Add casing |
| 248'-5¾" | | | | | 0730 | Drilling |
| | | | | | | S.P. Airhart watching |
| | | | | | | rig. |
| | 245' | D | SM | MUDDY SANDY GRAVEL: 50% gravel, 40% sand, 10% mud: | 0900 | Took (2) pint lith |
| | | | | Trace SC, 5% VCP, 10% CP, 10% MP, 10% FP, 15% VFP, | | samples, (1) moist. |
| | | | | 10% VCS, 5% CS, 10% MS, 10% FS-VFS, 10% mud: poorly | | sample. - < det. |
| | | | | sorted: (GRAVEL) 60% basalt, 40% igneous. felsic | | w/ OVA, < back- |
| | | | | SA-R (SAND) 35% basalt 65% felsic, A-SA - | | ground w/ GM. |
| | | | | wet color olive gray 5Y5/2, slight rxn w/ | | |
| | | | | 10% HCl - unconsolidated. | | |
| | | | | | 0945 | Driller left for |
| | | | | | | United Way mtg. |
| | | | | | 1100 | Lubrecht returns from |
| + 8'-9½" | | | | | 1113 | SCBA training. - Add casing. |
| 257'2½" | | | | | 1200-1230 | Lunch - |
| | | | | | 1230 | Continue welding casing. |

REMARKS:

Michael D. Lub 10-4-89

PNL MA 567 DO-1, REV 0

Reviewed by V.L. Wilkins - 12-7-89

WHC-MR-0209

246

9 1 1 2 2 5 0 0 2 3 9

Sht 2 of 2

| DRILL LOG | By M.D Lubrecht | Rig BEGOL #22-14103 L. Watkins | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10-4-89 | | Depth 245 To | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 257'-2¼" | 250 | D | M | Sandy Gravel: 40% Gravel, 55% Sand, 5% mud. Tr. vcP, | 1245 | Start drilling. |
| | | | | Tr. cP, 10% mP, 15% fP, 15% vfP, 10% vcS, 15% cS, 15% mS, 5% fS, | 1320 | Samples: (2), 1 pt. Lith, |
| | | | | 5% vfS, 5% mud, poorly sorted; Gravel: ~50% mafic/50% felsic, | | (1) moisture, (2) chem. |
| | | | | A-SR; Sand 30% mafic/70% felsic, SA-SR; sl. ≡ to HCl; yellow brown. | | # 100497SST |
| | | | | 10 YR 5/6; sl. consolidated. no mud/no VOC. | | driller notes water @ 251 |
| | | | | | 1330 | J. Caggiano (WHC) on site. |
| | 255 | D | M | Sandy Gravel - similar to 250' sample. | 1415 | Samples: (2)-1 pt. Lith, |
| | | | | | | (moisture taken - below water table) |
| | | | | | 1425 | Add 8" casing |
| | | | | | 1500 | Shut down welding for |
| | | | | | | fire watch. |
| | | | | | 1520 | left site. |

REMARKS:

Mike D. Lub 10-9-89

PNL MA 567, DO-1, rev. 0

Reviewed by V.L. McGhan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

WHC-MR-0209

207

9 1 1 2 0 5 0 0 2 7 0

Sht 1 of 2

| DRILL LOG | By M.D. Lubrecht | Rig RE-60L 22-14103 L. Watkins | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10-5-89 | | Depth 255 To 265 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 257'-2¼" | 255 | D | | | | |
| + 8'-2" | | | | | 0730 | On site. Driller completes |
| 265-4¼" | | | | | | casing weld. checked |
| | | | | Static water @ 250.1 | | W.L. w/ E-TAPE - Water |
| | | | | | | @ 250.1 |
| | | | | | 0741 | Begin drilling. |
| | | | | | 0848 | Depth ~ 258' - Recovery poor w/ |
| | | | | | | core barrel, switch to HT. |
| | | | | | 0945 | Rerigged - resume drilling |
| | 260 | HT | WET- | gravelly SAND; 15% vfP, 15% vcS, 15% cS, 20% mS, 15% fS, | 1050 | Samples: (2)-1pt. Lith, |
| | | | | 15% vfS, 5% mud; poorly sorted; Grains: 20% mafic/80% | | (2)-250ml chem, (1)-40ml |
| 265'-4¼" | | | | felsic A-SA; SAND: 30% mafic/70% felsic, SA-SR; | | chem (VOA) # 100587SST |
| 4'-2" | | | | sl. consolidated, no ⇌ w/ HCl, dusky yell. brn 10YR 5/6 | | dart bailer |
| 269'-6¼" | | | | rad < background/no VOC | 1102 | Add casing. |
| | | | | Static water @ 251'-5" | 1200-1220 | Lunch - driller to safety mtg. |
| | | | | | 1315 | - resume drilling, water [illegible] |
| | 265 | HT | Wet. | SAND: 20% vcS, 15% cS, 20% mS, 20% fS, 20% vfS, 5% mud; | 1448 | SAMPLES: (2), 1pt. Lith. |
| | | | | 70% mafic/80% felsic, SA-AR; no ⇌ w/ HCl; unconsol. 10YR 5/6 dusky yellow brown. rad < back./no VOC. | | |

REMARKS:

PHL MASS PD-1 1040

Reviewed by [illegible] 12-7-89

Michael D. Lubrecht 10-5-89

WHC-MR-0209

208

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| M.D. Lubrecht | BE-60L #22-14103 L. Wetkins | 299-E27-14 | N/A | W-017 SST |
| Date: 10-5-89 | | Depth: 265 To | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 269'-6½" | | | | | 1428 | Hole cleanout completed. |
| | | | | | | Start cleaning site— |
| | | | | | 1445 | Switched to sand pump, |
| | | | | Checked TD w/ PNL #4 Steel tape depth = 264.7' | | continued to clean hole. |
| | | | | | 1520 | left site |

REMARKS:

BPNL MA567 DO-1, rev. 0 Reviewed by V.L. McMillan 10-7-89

Michael D. Lubrecht
10-5-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

269

SHEET 1 of 1

| DRILL LOG | By M.D. Lubrecht | Rig BE-60L #22-14103 L. Walkins | Well Number 299-E27-14 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 6 OCT. 1989 | | Depth 265 To 265 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 269'-6 1/4" | | | | | 0902 | Arrive on site. |
| 2.4' stick-up | | | | | | check TD (264.5) |
| 267.1' to bottom | | | | | | WLS (253.6) |
| | | | | | | E-TAX 12176 ST. PNL#4 |
| | | | | | 0720 | Driller on site w/ safety mtg |
| | | | | | 0749 | Commence drilling |
| | | | | GWS = 258' TD = 267 + 2.2(-2.4) = 266.8 | 0830 | Removed bailer. |
| | | | | GWS = 250.8 TD = 267 + 2.2(-2.4) = 266.8 | 0858 | " " |
| | | | | GWS = 250.8 266.25 + 2.2(-2.4) = 266.05 | 0920 | Prepared for straightness test |
| | | | | | 0925 | Straightness test successfully |
| | | | | | | completed - observed by |
| | | | | | | Title III inspector MDL 1/4/89 |
| 266.05 +0.80 ≈ 15.25 | | | | SAME AS ABOVE GWS = 250.8 TD = 266.05 CASING = 267.1 | 0945 | Measured TD & GWS |
| | | | | | | Begin to demob |

REMARKS:

BPNL MA567 DO-1, Rev. Ø

Reviewed by V.L. McGhan 12-7-89

M.D. Lubrecht 10-6-89

276

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-14 | Date 10/12/89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

Logged by S. M. GOODWIN Date 10/12/89
Reviewed by V.G. McGlam Date 12-7-89
Measuring Equip. L300-04 / E. TAPE 12176 Procedure DO-1, REV. 0

Drilling Contractor KSH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1300 | CARBON STEEL | 8" | 267.1 | 2.2 | 265' | | | | | D/WATER = 252.3 - 2.1 = 250.2 |
| 1305 | " | " | " | " | " | | | | | D/BOTTOM = 265.72 + 2.2 TAPE |
| | | | | | | | | | | - 2.1 STICKUP = 265.82' |
| 1315 | | | | | | | | | | PREPARING SITE TO BEGIN |
| | | | | | | | | | | WELL COMPLETION |

WHC-MR-0209

371

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-14 | Date 10/13/89 | Sheet No. 1 of 3 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

Logged by S. M. GOODWIN — Date 10/13/89
Reviewed by D. L. Mahlum — Date 12-7-89
Measuring Equip. L300-04 — Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0700 | CARBON STEEL | 8" | 267.1 | 2.2 | 265 | | | | | PREPARING TO SET STAINLESS |
| 0740 | STAINLESS STEEL | 4" | : | | | | | | | SETTING 4" STAINLESS STEEL |
| 1 | CHANNEL PACK | 4" | 21' | (10 SLOT CHANNEL PACK SCREEN) | | | | | | CASING & SCREEN; SCREEN IS |
| 6 x | CASING | 4" | 20.04' | | | | | | | 10 SLOT JOHNSON DIV. CONTINUOUS |
| 6 x | CASING | 4" | 20.04' | (w/ CENTRALIZERS) | | | | | | WRAP CHANNEL PACK (2) w/ |
| 2 x | CASING | 4" | 3.0' | | | | | | | S.S. END CAP (SCREW ON) |
| | | | | | | | | | | & 4" CASING IS TYPE 304, |
| 0920 | TOTAL CASING | 4" | 267.48 | | | | | | | SCH. 5 STAINLESS STEEL. |
| | & SCREEN | | | | | | | | | FACTORY WELDED CENTRALIZERS |
| | | 4" | 5.0' | (CONSTRUCTION PIECE) | | | | | | ARE LOCATED ABOVE SCREEN & |
| | | | | | | | | | | THEN EVERY 40' TO LAND |
| | | | | | | | | | | SURFACE. |
| 0920 | STAINLESS | 4" | 272.48 | 6.6 | 265.88 | | | 265.88 | | D/B OF 4" = 265.88 |
| 0925 | CARBON STEEL | 8" | 271.45 | 6.55 | 264.9 | | | 265.65 | | D/B BETWEEN 4" & 8" = 265.65 |
| | | | | | | | | | | (0.75' OF OPEN HOLE ALONG |
| | | | | | | | | | | SCREEN) |
| 0930 | | | | | | 20-40 SAND | 1 BAG | | | ADDING SAND; 1 BAG = 100 LBS |
| 0935 | | | " | " | 264.9 | " | | 269.55 | 5.35 | D/SAND = 259.55 |
| 0945 | " | 8" | 271.45 | 8.0 | 263.45 | | | 261.0 | 2.45 | D/SAND = 261.0' |
| 0950 | " | " | " | " | " | " | 1/2 BAG | 257.9 | 5.55 | D/SAND = 257.9 |
| 0955 | " | " | 271.45 | 9.4 | 262.05 | " | | 258.8 | 3.25 | D/SAND = 258.8 |
| 1000 | " | " | " | " | " | " | 1/2 BAG | 256.3 | 5.75 | D/SAND = 256.3 |

WHC-MR-0209

272

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-14<br>Location SINGLE SHELL TANKS | Date 10/13/89 Sheet No. 2 of 3<br>Project UJ-017 |
|---|---|---|

Logged by C.M. GOODWIN Date 10/13/89
Reviewed by V.G. Mathews Date 12-7-89
Measuring Equip. L300-04 Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRAIG & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1015 | CARBON STEEL | 8" | 267.65 | 6.95 | 260.7 | 20-40 SAND | | 257.15 | 3.55 | D/SAND = 257.15 |
| 1020 | " | " | " | " | " | " | 1/2 BAG | 251.65 | 9.05 | D/SAND = 251.65 |
| 1025 | " | " | 267.65 | 8.3 | 259.35 | " | | 252.0 | 7.35 | D/SAND = 252.0 |
| 1027 | " | " | 267.65 | 9.7 | 257.95 | " | | 252.6 | 5.35 | D/SAND = 252.6 |
| 1045 | " | " | 265.7 | 6.7 | 259.0 | " | | 256.1 | 2.9 | D/SAND = 256.1 |
| 1050 | " | " | " | " | " | " | 1/2 BAG | 254.3 | 4.7 | D/SAND = 254.3 |
| 1055 | " | " | " | 8.05 | 257.65 | " | | 255.1 | 2.55 | D/SAND = 255.1 |
| 1100 | " | " | " | " | " | " | 1 BAG | 249.55 | 8.1 | D/SAND = 249.55 |
| 1110 | " | " | 261.45 | 6.55 | 254.9 | " | | 251.45 | 3.45 | D/SAND = 251.45 |
| 1115 | " | " | " | " | " | " | 1 BAG | 245.65 | 9.25 | D/SAND = 245.65 |
| 1118 | " | " | 261.45 | 9.2 | 252.25 | " | | 247.3 | 4.95 | D/SAND = 247.3 |
| 1120 | " | " | " | " | " | " | 1 BAG | 242.4 | 9.85 | D/SAND = 242.4 |
| 1130 | " | " | 255.25 | 6.5 | 248.75 | " | | 244.3 | 4.45 | D/SAND = 244.3 |
| 1135 | " | " | " | " | " | " | 1/2 BAG | 241.9 | 6.85 | D/SAND = 241.9 |
| 1140 | STAINLESS | 4" | 273.05 | 6.5 | 266.55 | | | | | D/INSIDE 4" = 266.55; |
| | | | | | | | | | | WILL BRING SAND TO 242.55 |
| 1145 | CARBON STEEL | 8" | 255.25 | 8.9 | 246.35 | " | | 243.4 | 2.95 | D/SAND = 243.4 |
| 1150 | " | " | " | " | " | " | 1/2 BAG | 241.5 | 4.85 | D/SAND = 241.5 |
| 1240 | " | 8" | 250.15 | 6.45 | 243.7 | " | | 242.65 | 1.05 | D/SAND = 242.65 |
| 1245 | | | | | | | | | | STANDBY; WAITING FOR PUMP RIG |
| 1345 | | | | | | | | | | PUMP RIG ARRIVED |
| 1350 | | | | | | | | | | BAILING WELL w/ 2 1/2" DART BAILER (VOLUME = ~5 GALLONS) |

273

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-14 | Date 10/13/89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 SST | |

Logged by S.M. GOODWIN Date 10/13/89
Reviewed by D.S. McKhan Date 12-7-89
Measuring Equip. L300-04 Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1415 | CARBON STEEL | 8" | 250.15 | 6.45 | 243.7 | 20-40 SAND | | 243.05 | 0.7 | D/SAND = 243.05'; BAILED |
| 1420 | " | " | " | " | " | " | 1/4 BAG | 242.45 | 1.25 | 50 GALLONS OF $H_2O$ INTO 55 |
| | | | | | | | | | | GALLON DRUM. SAND PACK |
| | | | | | | | | | | DAMPED .4'. D/SAND = 242.45 |
| 1430 | " | " | " | 7.0 | 243.15 | " | | 242.7 | 0.45 | D/SAND = 242.7 FINAL D/SAND |
| 1432 | | | | | | 1/4" PELLETS | 2 BUCKETS | | | ADDING 2 5 GALLON BUCKETS |
| | | | | | | | | | | OF 1/4" VOLCLAY TABLES |
| 1435 | " | " | " | " | " | " | | 237.6 | 5.5 | D/PELLETS = 237.6 |
| 1440 | " | " | 250.15 | 9.0 | 241.15 | " | | 238.3 | 2.85 | D/PELLETS = 238.3 |
| 1442 | " | " | " | 10.4 | 239.75 | " | | 239.1 | 0.65 | D/PELLETS = 239.1 |
| 1450 | " | " | 245.95 | 6.45 | 239.5 | " | | 239.25 | 0.25 | D/PELLETS = 239.25 |
| 1452 | " | " | " | 6.6 | 239.35 | " | | 239.45 | 0.1 | D/PELLETS = 239.45; 0.1' OF |
| | | | | | | | | | | OPEN HOLE. FINAL D/PELLETS |
| | | | | | | | | | | WILL WAIT UNTIL 10/16 A.M. |
| | | | | | | | | | | TO START W/ CRUMBLES. |

274

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-14 | Date 10-16-89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location South of C Tank Farm | Project W-017 SST | |

Logged by S. P. AIRHART SPA Date 10-16-89
Reviewed by V. C. Mathison Date 12-7-89
Measuring Equip. S-Tape #4 Procedure PNL-MR-529 DO-1, REV. 0

Drilling Contractor IKEN
Driller LOUIS WATKINS
Rig/Equipment PETTIBONE CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0810 | Carbon Steel | 8" | 246' | 6.6' | 239.4' | Pellets | | 239.5' | -.1' | 243.9' + 2.2' - 6.6' = 239.5' |
| | | | | | 239.4' | 8-20 bentonite | 10 bags | 209' | 30.4' | 213.4' + 2.2' - 6.6' = 209' |
| | " | 8" | 232' | 6.7' | 225.3' | | | 217.2' | 8.1' | 221.7' + 2.2' - 6.7' = 217.2' |
| | | | | | 225.3' | | 12 bags | 181.3' | 44' | 185.8' + 2.2' - 6.7' = 181.3' |
| | " | 8" | 212.5' | 6.8' | 205.7' | | | 192.8' | 12.9' | 197.4' + 2.2' - 6.8' = 192.8' |
| 0915 | | | | | 205.7' | | 10 bags | 163.4' | 42.3' | 168' + 2.2' - 6.8' = 163.4' |
| | " | 8" | 192.3' | 6.7' | 185.6 | | | 175.3' | 10.3' | 179.8' + 2.2' - 6.7' = 175.3' |
| | | | | | 185.6' | | 11 bags | 143' | 42.6' | 147.5' + 2.2' - 6.7' = 143' |
| 1000 | " | 8" | 170.7' | 6.8' | 163.9' | | | 155' | 8.9' | 159.6' + 2.2' - 6.8' = 155' |
| | | | | | 163.9' | | 10 BAGS | 125.6 | 38.3 | 130.2 + 2.2 - 6.8 = 125.6 |
| 10:16 | " | 8" | 154.2 | 6.9 | 147.3 | | | 134.0 | 13.3 | 138.7 + 2.2 - 6.9 = 134.0 |
| | | | | | 147.3 | | 17 BAGS | 84.9 | 62.4 | 89.6 + 2.2 - 6.9 = 84.9 |
| 10:28 | " | 8" | 143.3 | 6.8 | 136.5 | | | 100.6 | 35.9 | 105.2 + 2.2 - 6.8 = 100.6 |
| | | | | | | | | | | 8" PIPE IS INSIDE 10" NOW |
| | | | | | | | | | | REST OF the 8" PIPE IS BEING |
| | | | | | | | | | | PULLED OUT. |
| 1100 | | | | | | | | | | SETTING UP ON 10" PIPE. |
| 1300 | " | 10" | 143.5 | 6.6 | 136.9 | | | 119.2 | 17.7 | 123.6 + 2.2 - 6.6 = 119.2 |
| | | | | | 136.9 | | 10 BAGS | 103.6 | 33.3 | 108 + 2.2 - 6.6 = 103.60 |
| 1350 | " | 10" | 129.7 | 6.7' | 123' | | | 112.3' | 10.7' | 116.8' + 2.2' - 6.7' = 112.3' |
| | " | | | | 123' | | 15 bags | 88.9' | 34.1' | 93.4' + 2.2' - 6.7' = 88.9' |

275

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-14 | Date 10-16-89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location South of C Tank Farm | Project W-017 SST | |

Logged by S.P. Airhart SPA Date 10-16-89
Reviewed by W.E. McCha Date 12-7-89
Measuring Equip. S-TAPE #4 Procedure PNL-MA-567 DG-1, REV 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment PETTIBONE CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1415 | Carbon Steel | 10" | 116.2' | 6.7' | 103.5' | 8-20 bentonite | | 95.7' | 7.8' | 100.2' + 2.2' - 6.7' = 95.7' |
| | | | | | 103.5' | | 23 bags | 60.3' | 43.2' | 64.8' + 2.2' - 6.7' = 60.3' |
| 1450 | | 10" | 94.3' | 6.7' | 87.6' | | | 66.7 | 20.9' | 71.2' + 2.2' - 6.7' = 66.7' |
| | | | | | 87.6' | | 18 bags | 38.2' | 49.4' | 42.7' + 2.2' - 6.7' = 38.2' |
| 1510 | | 10" | 76.8' | 6.8' | 70' | | | 44' | 26' | 48.6' + 2.2' - 6.8' = 44.0' |
| | | | | | | | | | | |
| 1515 | | | | | | | | | | Shut Down |

276

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-14 | Date 10/17/89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

Logged by S.M. GOODWIN Date 10/17/89
Reviewed by V.L. McMahan Date 12-7-89
Measuring Equip. L300-04 / E.TAPE 12176 Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0730 | CARBON STEEL | 10" | 76.8 | 6.8 | 70 | 8-20 BENTONITE | | 44 | 26 | D/CRUMBLES = 44.0 |
| 0740 | " | " | " | " | " | " | 15 BAGS | 20.1 | 49.9 | D/CRUMBLES = 20.1 |
| 0800 | " | " | 56.5 | 6.6 | 49.9 | " | | 29.1 | 20.8 | D/CRUMBLES = 29.1 |
| 0805 | " | " | " | " | " | " | 10 BAGS | 13.1 | 36.8 | D/CRUMBLES = 13.1 |
| | | | | | | | | | | WORKING ON CRANE |
| 0855 | " | " | 37.6 | 7.0 | 30.6 | " | | 20.2 | 10.4 | D/CRUMBLES = 20.2 |
| 0900 | " | " | " | " | " | " | 3 BAGS | 15.5 | 15.1 | D/CRUMBLES = 15.5 |
| 0930 | " | " | 27.83 | 7.0 | 20.83 | " | | 19.2 | 1.63 | D/CRUMBLES = 19.2 |
| 0932 | " | " | 27.83 | 7.85 | 19.98 | " | | 19.85 | 0.1 | D/CRUMBLES = 19.85 FINAL D/CRUMBLES |
| 0940 | | | | | | | | | | MIXING GROUT |
| 1015 | " | " | " | " | " | CEMENT GROUT | 1 BATCH* | 3.85 | 16.13 | D/GROUT = 3.85' |
| | | | | | | | | | | *1 BATCH = 6 94 LB. SACKS |
| | | | | | | | | | | OF PORTLAND CEMENT, 35 |
| | | | | | | | | | | GALLONS OF $H_2O$, & 1% ALUM. |
| | | | | | | | | | | POWDER (BY VOLUME) |
| 1040 | " | " | " | " | " | " | 1/2 BATCH | +6.35 | 26.33 | D/GROUT = +6.35' |
| 1050 | " | " | 18.05 | 6.7 | 11.35 | " | | | | NO D/GROUT BEFORE ADDING |
| 1055 | " | " | " | " | " | " | 1/2 BATCH | +5.7 | 17.05 | D/GROUT = +5.7 |
| 1057 | Ø | | | | | | | | | REMOVING 10" & JACKS FROM |
| | | | | | | | | | | HOLE |
| 1105 | | | | | | | | | | D/GROUT = 2.85' FINAL D/GROUT |
| | | | | | | | | | | (RECEIVED O.K. BY KEH TITLE III MIKE EVARTS) |

1110 D/B INSIDE 4" = 265.05' + 2.2' TAPE − 0.65' S.S. STICKUP = 266.6'

1115 D/W = 250.46' − 0.65' STICKUP = 249.81'

WHC-MR-0209

277

WELL 299-E27-15

Drilling at Well 299-E27-15 began August 28, 1989, and reached total depth Septeber 18, 1989. The well was drilled with a Bucyrus-Erie 60L to a depth of 262.54 ft below ground surface. The sediments encountered were primarily gravely sand and sand. Static water level during completion was 244.77 ft below ground surface.

Well 299-E27-15 was completed at a depth of 259.03 ft below ground surface. Final well materials include 21.00 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 240.48 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 16-30 mesh Colorado silica sand pack along the screened interval to 3.28 ft above the top of the screen, 3.50 ft of Volclay bentonite pellets, 213.05 ft of 8-20 mesh granular bentonite crumbles, 16.40 ft of Portland cement grout, and an air-entrained concrete pad which extends 1.8 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Pettibone crane during completion. Completion activities at Well 299-E27-15 were finished October 3, 1989.

The estimated volume of water added to the borehole during drilling was 87 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 130 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on October 23, 1989, and a total of 542 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was performed on October 19, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on October 25, 1989; this activity concluded well construction and installation.

9 1 1 2 0 5 0 0 2 7 1

sht 1 of 2

| DRILL LOG | By RD. Miller | Rig BE-COOL # 22-14100 | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 8/28/89 | Craig W. | Depth 0.0 To 10 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0830 | Ar site - set-up still |
| | | | | | | in progress - $H_2S$ screen |
| | | | | | 0930 | Safty meeting - concern |
| | | | | | | releases from tanks - |
| | | | | | | rig was set-up on |
| | | | | | | 8/25/89 - steam clean |
| | | | | | | rig & tool witnessed by |
| | | | | | | Kaiser title III insp. |
| | | | | | | food grade oil used |
| | | | | | | on drill string - rig |
| | | | | | | is too close to ovhd |
| | | | | | | wire - WHC to boot |
| | | | | | | lines. 18' |
| | | | | | 1100 | OK to proceed drilling |
| | | | | | | from WHC. |
| | | | | | | |
| | | | | SAND: Trace gravel, 100% sand Trace mud; Trace fg, Trace vfP, Trace vcs, 1% ccs, | 1300 | to 5.0' - $H_2S$ scan |
| | | | | 9% ms 80% fs, 60% vfs, trace mud. Sand: 5% mafic / 95% felsic SA-SR | | OVA = N/D. Samples (2) pH: |
| | | | | 10YR 4/3 brown - dark brown slight HCl rxn unconsolidated | | (1) no iron |

REMARKS:

Jean Kiernicki 8-28-89

PNL MA 567 DO-1, rev. 0 Reviewed by W. L. McGhan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine

WHC-MR-0209

279

9 1 1 2 0 5 0 0 2 1 2

Sheet 2 of 2

| DRILL LOG | By: Jean Kennedy | Rig: BE 60L #22 14100 Craig W. | Well Number: 299-E27-15 | Computer Number: N/A | Project or Work Order No.: W017-SST |
|---|---|---|---|---|---|
| | Date: 8-28-89 | | Depth: 10' To 10' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 10' | D | sm | slightly gravelly sand: 1% gravel, 98% sand, trace mud: 2% cp, 5% mp, | 1317 | to 10.0'-1ft.5 screen |
| | | | | 1% fp 2% vfp 3% vcs 5% cs, 7% ms, 30% fs, 40% vfs, trace mud | | OVA=N/D. RPT-<1ppm |
| | | | | medium sorted Gravel: 65% mafic/35% felsic SA-SR; Sand: 10% mafic/ | | det. |
| | | | | 90% felsic SA-SR moderate HCl rxn locally consolidated 10YR 4/3 | | Samples: 1) moisture |
| | | | | | | 2) 1pt lithol. |
| | | | | | 1330 | welding 10" casing to shoe |
| 15'-6" | | | | 15'-0" casing + 6" shoe | 1440 | finish welding - begin |
| | | | | | | driving and straightening |
| | | | | | | 10" casing |
| | | | | | 1530 | END OF SHIFT |

REMARKS:

Jim Hamelp
8-28-89

PNL IMA569 DO-1, 100.0

Reviewed by D. E. McGhan 12-7-89

WHC-MR-0209

290

9 1 1 2 0 5 0 0 2 3

1 of 2

| DRILL LOG | By: Ian Kennedy | Rig: BE 60L #22-14100 Craig Wamsley | Well Number: 299-E27-15 | Computer Number: N/A | Project or Work Order No.: W017 SST |
|---|---|---|---|---|---|
| | Date: 8-29-89 | | Depth: 10 To 15 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 15'-6" | | D | | | 0710 | arrive on site. driller steals |
| | | | | | | rig, begins rig maintenance. |
| | | | | | | H&S checks hole & site. |
| | | | | | 0785 | Driller begins driving 10" casing |
| | | | | | 0740 | H&S checks hole |
| | | | | | 0750 | RPT has not appeared yet. |
| | | | | | | driller working on casing. |
| | | | | | 1000 | RPT Arrives drilling proceeds |
| | 15' | D | SM | SANDY GRAVEL: 40% gravel, 60% sand, trace mud; 10% vcP, 10% cP, 8% mP, | 1035 | Samples (2) lot. 1,4h |
| | | | | 7% fP, 5% vfP, 20% vcs, 20% cs, 12% ms, 5% fs, 3% vfs, trace mud | | (1) moisture, checked and |
| | | | | very poorly sorted; Gravel: 75% mafic/25% felsic SA-R; Sand: 65% | | approved by H&S and RPT. |
| | | | | mafic/35% felsic SA-SR 2.5Y 5/4 light olive brown, unconsolidated | | |
| | | | | mild HCl rxn. | 1040 | Driller prepares to add |
| | | | | | | more casing |
| +10'-0" | | | | | 1200 | lunch |
| 25'-6" | | | | 10'-0" of 10" carbon steel temporary casing added | 1240 | resume drilling |
| | | | | | 1350 | RPT checks hole |
| | | | | | | |

REMARKS:

PNL MA569 DO-1, rev. 0 Reviewed by V.L. McGhan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5/85)

WHC-MR-0209

182

| DRILL LOG | By: Ian Kennedy | Rig: BE 60L #22-1410D C. Wamsley | Well Number: 299-E27-15 | Computer Number: N/A | Project or Work Order No.: WBIF SAR |
|---|---|---|---|---|---|
| | Date: 8-29-89 | | Depth: 20 To 20 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 25'-6" | 20' | D | | Interface between two layers: SAND | 1435 | Samples: (1) moisture |
| | | | | above: SAND trace gravel, 100% sand, trace mud: trace vfp, trace vcs, | | (2) Chemical, 125 ml |
| | | | | well sorted 10% vcs, 35% ms 50% fs, 5% vfs, trace mud, Sand: 20% mafic/80% felsic SA-SR | | # 082989 |
| | | | | 10YR 5/2 brown slight HCl rxn, unconsolidated | | |
| | | | | below: SAND 98% sand, 2% mud: 6% fs, 92% vfs, 2% mud very well | | |
| | | | | sorted, SAND: 20% mafic/80% felsic SA-SR 10YR 4/4 dark yellowish brown | | |
| | | | | slight HCl rxn consolidated. | | |
| | | | | Also, a thin layer of very fine (mafic, SA) pebbles between the | | |
| | | | | two | | |

REMARKS:

PNL MA 567 DO-1, REV.0 Reviewed by D.L. McGhan 12-7-89

Ian Kennedy 8/29/89

WHC-MR-0209

| DRILL LOG | By: Ian Kennedy | Rig: BE 60L #22-14100 | Well Number: 299-E27-15 | Computer Number: N/A | Project or Work Order No.: W017 551 |
|---|---|---|---|---|---|
| | Date: 8-30-89 | C. Wamsley | Depth: 20 To 30 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 25'-6" | | | | | 0710 | Arrive on site |
| +9'-6" | | | | | 0730 | Driller begins adding casing |
| 35'-0" | | | | | 0835 | Driller finishes adding 9'-6" |
| | | | | | | of 10" carbon steel casing added |
| | 25' | D | | SAND: 3% Gravel, 97% sand, trace mud; trace-mg, trace fp, 3% of p | 0840 | Samples: (2) 1pt. lith |
| | | | | 10% vcs, 25% cs, 35% ms, 22% fs, 5% vfs; moderate sorting gravel: 20% mafic/80% felsic SA-SR, | | (1) moist can |
| | | | | sand: 10% mafic/90% felsic SA-SR; 10YR 4/3 brown to dark brown no HCl rxn | | |
| | | | | unconsolidated | | |
| | 30' | | | SAND: 5% gravel; 95% sand, 2% mud; trace fp, 5% of p, 5% vcs, 10% cs, | 0855 | Samples (2) 1pt lith |
| | | | | 10% ms, 30% fs, 40% vfs, 2% mud gravel: moderate sorting 50% mafic/50% felsic SA-SR | | (1) moist can |
| | | | | sand: 5% mafic/95% felsic SA-SR, 10YR 5/3 brown-dark brown | | |
| | | | | slight HCl rxn, unconsolidated. Some areas are richer in medium to coarse | | |
| | | | | sand, while others are richer in very fine sand. These were intermixed | | |
| | | | | in the drive barrel and bucket. | | |
| | | | | | 0915 | Driller begins to add |
| | | | | | | casing. |
| +9'-5" | | | | | 1015 | resume drilling 9'-5" of |
| 44'-5" | | | | | | 10" carbon steel casing added. |

REMARKS:

Ian Kennedy
8-30-89

PNL MAS67 DO-1, rev. 0 Reviewed by V.L. McGhan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

283

WHC-MR-0209

| DRILL LOG | By: Ian Kennedy | Rig: BE 60L 22-1410D Craig W. | Well Number: 299-E27-15 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-30-89 | | Depth: 30 To 45 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 44'-5" | 35' | D | | GRAVELLY SAND: 25% gravel, 75% sand; trace cP, trace mP, 5% fP, | 1040 | Samples: (2) 1pt lith |
| | | | | 20% vfP, 50% vcS, 20% cS, 5% fS, trace vfS, trace mud | | (1) moisture |
| | | | | well sorted Gravel: 75% mafic/25% felsic A-SR; Sand: 30% mafic | | |
| | | | | 70% felsic SA-SR 10YR 4/3 brown; slight HCl rxn, unconsolidated | | |
| 4 | 40' | D | | SLIGHTLY GRAVELLY SAND: 5% gravel, 95% sand, trace mud; Trace fP, | 1105 | Samples: (2) 1pt. lith |
| | | | | 5% vfP, 15% vcS, 55% cS, 20% mS, 5% fS, trace vfS, trace mud, | | (1) moisture, (1) Chemical |
| | | | | gravel: 65% mafic/35% felsic A-SR; Sand: 35% mafic/65% felsic | | # 088089 |
| | | | | SA-SR 10YR 4/3 brown 1% HCl rxn unconsolidated | | |
| | | | | | 1135 | Driller prepares to add |
| | | | | | | more casing |
| | | | | | 1200 | lunch |
| 18'-7½" | | | | | 1240 | return |
| 53'-½" | | | | | 1330 | resume drilling 8'-7½" of |
| | | | | | | 10" carbon steel casing added. |
| | 45' | D | | SAND: 4% gravel, 96% sand, trace mud; trace fP, 4% vfP, 40% vcS, | 13:45 | Samples (2) 1pt lith |
| | | | | 40% cS, 11% mS, 5% fS, trace vfS, trace mud. gravel 40% mafic/60% felsic | | (1) moisture |
| | | | | SA-SR; Sand: 25% mafic/75% felsic SA-SR 10YR 4/3 (brown) slight | | checked and cleared by |
| | | | | HCl rxn unconsolidated | | $H_2S$ |

REMARKS:

Ian Kennedy 8-30-89

PNL MA567 DO-1, rev.0

Reviewed by V.C. McGlam 12-7-89

WHC-MR-0209

254

| DRILL LOG | By: Ian Kennedy | Rig: BEGOL #22-14100 Craig W. | Well Number: 299-E27-15 | Computer Number: N/A | Project or Work Order No.: W017-55T |
|---|---|---|---|---|---|
| | Date: 8-30-89 | | Depth: 45 To 52 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 53'-½" | 50 | D | | Slightly gravelly SAND: Same as 45' sample but coarser: 10% gravel | 1410 | Samples: (2) 1pt lith |
| | | | | 90% sand trace mud: trace mp, 1% fp, 9% vfp, 45% mcs, 35% cs, | | (1) moisture |
| | | | | 9% fs, 1% vfs, well sorted gravel. 70% mafic/30% felsic SA-SR; sand: | | checked and cleaned by |
| | | | | 30% mafic/70% felsic SA-SR 10YR 5/3 brown slight HCl rxn | | H&S. This and previous |
| | | | | unconsolidated | | sample checked and |
| | | | | | | cleaned by RPT. |
| | | | | | | Driller begins adding casing |
| +9'-8½" | | | | | 1500 | Finish addition of |
| 62'-9" | | | | | | 9'-8½" of Carbon steel |
| | | | | | | temporary casing, resume |
| | | | | | | drilling with Drive Barrel |
| | | | | | 1530 | end of day |

REMARKS:

Ian Kennedy
8-30-89

PNL MA567 DO-1, rev. 0

Reviewed by D.L. McGhan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

9 1 1 2 0 5 0 0 2 1 3

page 1 of 1

| DRILL LOG | By Ian Kennedy | Rig BE 60L #22 14101 | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 8-31-89 | | Depth 50 To 65 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 62'-9" | | | | | 0610 | Arrive, driller gets set up |
| " | 55' | D | | SLIGHTLY GRAVELLY SAND 5% gravel, 95% sand, trace mud: Trace fg, 5% vfg, | 0740 | Samples (2) 1 pt. lith |
| | | | | 25% vcs, 40% cs, 25% ms, 5% fs, trace vfs: gravel 50% mafic/ | | (1) moisture, no RPT |
| | | | | 50% felsic SA-SR, sand: 20% mafic/80% felsic SA-SR, 2.5Y 5/2 | | |
| | | | | very slight HCl rxn unconsolidated, but occasion concretion with moderate HCl rxn. | | |
| | 60' | D | | SAND: Same as 55' sample, but 3% gravel, 97% sand: 3% vfg, 27% vcs | 0805 | Samples: (2) 1 pt. lith |
| | | | | all other proportions identical except for the absence of concretions. | | (1) moisture, 21 samples taken. |
| | | | | | | checked by H&S, still no RPT. |
| | | | | | 0825 | driller begins adding casing |
| +8'-10½" | | | | | 0825 | RPT Arrives and checks samples |
| 71'-7½" | | | | 8'-10½" of 10" cardboard temporary casing added. | 0930 | resume drilling |
| | 65' | D | | SAND: Same as 60' sample, but no fg observed: | 0950 | Samples (2) 1 pt. lith |
| | | | | | | (1) moisture |
| | | | | | 1020 | driller begins adding casing |
| | | | | | 1050 | Area evacuated on |
| | | | | | | account of wind direction |
| | | | | | | |
| | | | | | | |

REMARKS:

Ian Kennedy 9/1/89

PNL MA 567 DO-1, rev. 0 Reviewed by V.L. McGhan 12-7-89

WHC-MR-0209

286

| DRILL LOG | By Ian Kennedy | Rig BE 60 L' + 22 HMM Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. MD17 SST |
|---|---|---|---|---|---|
| | Date 9-1-89 | | Depth 65 To 75 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 71'-7½" | | | | | 0730 | Arrive on site - driller |
| | | | | | | continuing to add casing, |
| 79'-7½ | | | | | 0830 | finish adding 8'-0" |
| | | | | | | of 10" casing, resume drilling |
| | 70' | D | | SAND: 2% gravel, 98% sand, trace mud: 2% vfp, 20% vcs, 30% cs, 35% ms, 13% fs, | 0855 | Samples (2) 1pt. lith |
| | | | | trace lts, trace mud; gravel: 50% mafic/50% felsic SA-SR; sand 25% mafic/ | | (1) moist on |
| | | | | 75% felsic SA-SR 10YR 5/3 brown, slight HCl rxn unconsolidated | | |
| | | | | med to poorly sorted. | | |
| | 75' | D | | SAND: Same as 70' sample, but trace mp, trace fp. | 0910 | Samples 2 1pt. lith |
| | | | | | | (1) moisture |
| | | | | | 0915 | concluded |
| | | | | | 1020 | return |
| +9'-9½" | | | | | 10 30 | driller begins adding |
| 89'-5" | | | | | | casing |
| | | | | | 11:50 | resume drilling 9'-9½" of |
| | | | | | | 10" carbon steel |
| | | | | | | temporary casing |
| | | | | | | added. |

REMARKS:

Ian Kennedy
9-1-89

PNL MA 567 DOL, REV 0 Reviewed by V. L. Mathan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

287

| DRILL LOG | By: L. Kennedy / R. Miller | Rig: BE 22W # 22-14101 Craig W. | Well Number: 299-E27-15 | Computer Number: N/A | Project or Work Order No.: W017 SST |
|---|---|---|---|---|---|
| | Date: 9-1-89 | | Depth: 80 To 95.0 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1202 | shut down - lunch. |
| 89' 5" | 80 | D | | SAND - 1% gravel, 99% sand, trace mud: 1% ufp, 2% lucs otherwise | 1245 | return from lunch |
| | | | | same as 75' sample. Some concretions w/ strong HCl rxn | | Samples: (2) 1pt. lith |
| | | | | | | (1) moisture |
| | | | | | | (1) Chemical (SST 09010891) |
| | 85.0' | D | dry | SAND (1% Gravel, 99% Sand) same as above | 1315 | to 85.0' - |
| | | | | moderate HCL reaction unconsolidated. (2 pt lith, 1 moist) | | |
| | | | | | 1335 | add 8' 1" 10" ø casing |
| 10" ø 97' 6" | | | | | 1442 | resume drilling |
| | | | | | 1450 | H2S scan - O'A = < 1 ppm. |
| | 90.0' | | dmp. | SAND (1% Gravel 99% Sand) same as 85' | 1452 | to 90.0' |
| | | | | (2pt lith, 1 moist.) | | |
| | 95.0' | | dmp | SAND (1% Gravel 99% Sand) same as 90' | 1506 | to 95.0' |
| | | | | 2pt lith, 1 moist) | 1516 | shut down. |

REMARKS:

PNL MA 567 DD-1 REV. 0 Reviewed by D.L. McSham 12-7-89

WHC-MR-0209

9 1 1 2 0 5 0 0 2 0 1

Sht 1 of 2

| DRILL LOG | By R. Miller/Goodwin | Rig BE-60L #22-14101 Graig | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/5/89 | | Depth 95.0' To 105' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 10"Ø 97'6" | | | | | 0730 | ON-SITE |
| | | | | | | CUTTING 10' CASING SECTION |
| | | | | | 0740 | |
| | | | | | 0750 | begin drilling - |
| | | | | | 0803 | H2S scan = OVA = <1ppm. |
| | 100' | DB | damp | SAND, (1% Gravel, 99% SAND) 1% vfp well sorted, | 0820 | to 100.0' - sample 090589 |
| 10"Ø 105' 11½" | | | | 40% vcs 40% cs 10% ms 5% fs 4% vfs, moderat. sorted, 50% felsic/mafic, | | add 10"Ø casing 8'5½" |
| | | | | avg to sub rnd., lt. yell. brn; 2.5Y 6/4; slight ~~to mod~~ reax to HCL | | and weld. |
| | | | | unconsolidated. (2 pt lith, 2 125ml enviro, 1 moist) | | |
| | | | | | 0930 | resume drilling |
| | 105' | D | SM | GRAVELLY SAND: 12% GRAVEL, 88% SAND. TRACE | 1035 | SAMPLE; 2 PT. LITH. |
| | | | | CP, 3% MP, 5% FP, 4% VFP, 35% VCS, 35% | | & 1 MOIST. SAMPLE |
| | | | | CS, 10% MS, 4% FS, 4% VFS. MODERATELY SORTED. | 1040 | PREPARING TO WELD |
| | | | | GRAVELS ARE 40% MAFIC, 60% FELSIC; SA TO SR. | | |
| | | | | SANDS ARE 35% MAFIC, 65% FELSIC; SA. WET | | |
| | | | | COLOR IS 2.5 Y 6/4 (LT. YELL. BRN). SLIGHT RX. | | |
| 105' 11½" | | | | TO 10%. HCL. NO CONSOLIDATION. Ø PPM w/ OVA & | | |
| + 8' 8" | | | | RAD. <DET. INCREASE IN GRAVEL %. | | |
| = 114' 7½" | | | | ADDED 8'8" OF 10" CASING; TOTAL 10" = 114'7½" | 1150 | FINISHED WELDING |

REMARKS:

PNL MA 567 Dec 1, REV 0 Reviewed by W.L. McGhan 12-7-89 Schuck. Good 9/5/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

682

WHC-MR-0209

| DRILL LOG | By: Goodwin/Kennedy | Rig: BE 60L #22-14101 | Well Number: 299-E27-15 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 5 SEPTEMBER 1989 | | Depth: 105' To 115' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 114-7½ | | | | | 1155 | DRILLING |
| | | | | | 1200-1230 | LUNCH |
| +7'-7" | | | | | 1330 | Preparing to add Casing |
| 27'-2½" | | | | | 1430 | finish welding: 7'-7" of 10" |
| | | | | | | carbon steel casing added |
| | 110' | D | Dry | SLIGHTLY GRAVELLY SAND: 7% Gravel, 93% sand, trace mud: trace fp, 7% vfp, | 1440 | Samples (2) 1pt. lith |
| | | | | 8% vcs, 19% cs, 15% ms, 45% fs, 10% vfs, trace mud (moderate sorting) | | (1) moist cup |
| | | | | Gravel: 45% mafic/55% felsic SA-SR; Sand: 10% mafic/90% felsic SR; 10YR 6/3 (pale brown) | | |
| | | | | slight HCl rxn, unconsolidated; no readings above background recorded by RPT or $H_2S$ | | |
| | 115' | D | SM | Gravelly SAND: 10% gravel; 90% sand; trace mud: trace mp, 2% fp, 8% vfp, | 1500 | Samples: (2) 1pt. lith |
| | | | | 25% vcs, 45% cs, 15% ms, 5% fs, trace vfs, trace mud, (well sorted) | | (1) moist cup |
| | | | | Gravel: 55% mafic/45% felsic SA-SR; SAND 10% mafic/90% felsic SA-SR | | |
| | | | | 10YR 6/3 (pale brown), no HCl rxn, unconsolidated; no abnormal readings | | |
| | | | | from RPT or $H_2S$. | | |
| | | | | | | |
| | | | | | 1530 | Quit for day |
| | | | | | | |
| | | | | | | |

REMARKS:

Ian Kennedy
9-5-89

PNL IMA 567 DO-1, rev. 0 Reviewed by V.L. McGhan 12-7-89

WHC-MR-0209

270

9 1 1 2 0 5 0 0 2 0 3

sht 1 of 2

| DRILL LOG | By Ian Kennedy | Rig BE 60L #22-14100 | Well Number 299-E27-15 | Computer Number | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-6-89 | Craig W. | Depth 115 To 125 | n/A | Subcontract No. n/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 122'-2½" | | | | | 0700 | arrive on site driller |
| | | | | | | performing rig maintenance |
| | | | | | 0730 | begin drilling |
| | 120 | D | SM | GRAVELLY SAND: 15% gravel; 85% sand; trace mud: 1% mp 3% fp, 11% vfp, 15% vcs, | 0735 | Samples (2) 1 pt. 1:14 |
| | | | | 50% cs, 15% ms, 5% fs, trace vfs, trace mud, wellsorted; GRAVEL: 55% mafic/ | | (1) moist on, (2) chemical 091089 |
| | | | | 45% felsic SA-SR; sand: 10% mafic/90% felsic SA-SR 10YR 6/3 (pale brown) | | |
| | | | | no HCl rxn, unconsolidated, checked and OK'd by RPT and HES. | | driller prepares to add casing |
| +7'-3" | | | | | 0840 | resume drilling 7'-3" of 10" |
| 129'-5½" | | | | | | carbon steel casing added. |
| | | | | | | resume drilling |
| | | | | | 0950 | driller welding |
| | | | | | 10.00 | drilling again |
| | 125.0' | DB | | GRAVELLY SAND: 15% gravel, 85% sand, trace mud, 1% mp, 3% fp, 11% vfp, 5% vcs, | 10 05 | samples: (2) 1 pt. 1:14 |
| | | | | 50% cs, 20% ms, 10% fs, trace vfs, trace mud, wellsorted. Gravel: 55% mafic/ | | (1) moist on |
| | | | | 45% felsic SA-R, sand 10% mafic/90% felsic SA-SR 10YR 6/3 (pale brown) | | |
| | | | | no HCl rxn unconsolidated, checked and cleared by HES and RPT. | | |
| | | | | | 1020 | waiting for logging of 10" |
| | | | | | | casing - driller preparing 8" tools |

REMARKS:

PNL MA567, DO1, rev. 0

Received by K.L. Markham 12-7-89

Ian Kennedy 9-6-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

168

Sht 2 of 2

| DRILL LOG | By Tom Kennedy | Rig BE GOL #22-14100 C Wamsley | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. WO17 SS1 |
|---|---|---|---|---|---|
| | Date 9-6-89 | | Depth 125.0' To 125.0' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"ø 21'-3" | | | | | 1130 | driller preparing first length |
| | | | | | | of 8" carbon steel casing. |
| 10" 128' 5½" | 128' 4½" | | | | | 10" casing + 1'1" - 128' 4½" |
| | | | | | 1200 | break for lunch |
| | | | | | 1230 | resume activity |
| | | | | | 1335 | Vern McGhan & John |
| | | | | | | Gould arrive to log |
| | | | | | | hole. set-up. |
| | | | | begin to geophysically log hole with natural gamma | 1350 | begin to log. |
| | | | | logged from 4.0' to 127.7' | 1430 | logging completed. |
| | | | | | 1445 | Vern dp site. |
| | | | | | 1447 | begin to install 8"ø |
| | | | | | | carbon steel casing w/ |
| | | | | | | drive shoe 21' 3" |
| 8"ø 38' 10" | | | | | 1450 | add 17' 7" 8"ø & weld. |
| | | | | | 1510 | stop for day |
| | | | | | | |
| | | | | | | |

REMARKS:

PIL WA 567 SD-1 Rev. 0 Reviewed by W.L. Matthan ~~12-11~~ 12-7-89

9/6/89

WHC-MR-0209

292

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/7/89 | | Depth 125.0' To 130.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Ø 38'10" | | | | | 0705 | Ar site-prep casing 8" |
| | | | | | 0712 | H&S scan-OVA <1ppm. |
| | | | | | 0715 | weld casing |
| 8"Ø 59'5" | | | | | 0810 | add 20'7" 8"Ø casing & weld |
| | | | | | 0812 | H&S scan-OVA = <1ppm |
| 8Ø 80'1" | | | | | 0915 | add 20'8"-8"Ø casing & weld |
| | | | | | 0930 | H&S scan-OVA = <1ppm. |
| 8"Ø 100'7" | | | | | 1010 | add 20'6" 8"Ø casing & weld |
| 8"Ø 119'4" | | | | | 1110 | add 18'9" 8"Ø casing & weld. |
| 179 | | | | | 1200 | shut down - lunch |
| | | | | | 1230 | resume welding |
| | | | | | 1235 | H&S scan-OVA = <1ppm |
| 8"Ø 137'1" | | | | | 1250 | add 17'9" 8"Ø casing & weld. |
| | | | | | 1345 | casing to depth |
| | | | | | 1347 | H&S scan-OVA= |
| | | | | | 1349 | begin drilling |
| | 130.0' | DB | dry | SAND (2% Gravel 98% Sand) 1% mp 1% vfp, 20% vcs 20% cs | 1401 | to 130.0' |
| | | | | 20% ms 20% fs 18% vfs, mod sorted, 60/40% felsic/mafic, (cont sht 2) | | |

REMARKS:

PNL-MA 567, DO-1, Rev Ø

Reviewed by V.L. McGlum 12-7-89

9/7/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5 85)

293

WHC-MR-0209

9 1 1 2 0 5 0 0 2 9 6

sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/7/89 | | Depth 130.0 To 135.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"ø 137'1" | 130.0' | DB | dry | (cont sht 1) - subang - subrnd, lt. yel brn (2.5Y 6/4), mod - strong react to HCL, unconsolid. (2pt lith, 1 moist) | | |
| | 135.0' | DB | sm | will log in Am. | 1440 | to 135.0 |
| 8"ø 148'9" | | | | | 1450 | add 11'8" 8"ø & weld. |
| | | | | | 1510 | shut down. |

REMARKS:

PNL-MA567, DO-1, Rev 0

Reviewed by D.L. McGhan 12-7-89

9/7/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ___ Standing Water

WHC-MR-0209

294

9 1 1 2 0 5 0 0 2 2 7

p 1 of 3

| DRILL LOG | By: Ian Kennedy | Rig: BE 606 #22-14100 Craig Wansley | Well Number: 249E27-15 | Computer Number: N/A | Project or Work Order No.: W017-SST |
|---|---|---|---|---|---|
| | Date: 9-8-89 | | Depth: 135' To 150 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 148'-9" | 135' | D | Dy | (from previous day): SANDY GRAVEL: 30% gravel 70% sand: trace mud: trace mp, | 0715 | arrive on site. driller |
| | | | | 12% vfp, 18% vfp, 15% vcs, 25% cs, 25% ms, 4% fs, 1% vfs (moderate sorting) | | performing rig maintenance |
| | | | | gravel: 60% mafic/40% felsic SA-SR; sand: 10% mafic/90% felsic SA-SR | 0720 | driller continues welding |
| | | | | 2.5Y 6/4 light yellowish brown, no HCl rxn, unconsolidated | | H2S check - ok |
| | | | | | 0810 | resume drilling |
| | | | | | 0830 | H2S check - all clear |
| | 140' | D | SM | SAND: trace gravel 98% sand, 2% mud: trace vfp, 1% vcs, 4% cs, 15% ms, 55% fs 23% vfs, | | Samples: 1 pt. lith |
| | | | | 2% mud (well sorted) gravel: 40% mafic/60% felsic SA-SR (what than is of it) | | (1) moisture |
| | | | | sand: 10% mafic/90% felsic SA-SR 2.5Y 5/2 Grayish brown strong HCl rxn | | (2) chemical: 0908851 |
| | | | | unconsolidated | | screened and tested by H2S and RPT |
| | 145 | D | SM | Slightly GRAVELLY SAND: 8% gravel, 92% sand, trace mud: 1% vfp, 7% vfp | 0900 | Samples 1 pt. lith |
| | | | | 30% vcs, 30% cs, 15% ms, 15% fs, 2% vfs, trace mud (moderate sorting) | | 1 moisture |
| | | | | gravel: 60% mafic/40% felsic SA-SR; sand: 30% mafic/70% felsic SA-SR, | | |
| | | | | 10YR 5/3 (brown) slight HCl rxn, unconsolidated - checked all clear by RPT | | |
| | | | | | 0915 | driller preparing to weld |
| 9'-5½" | | | | | 0955 | finish adding 9'-5½" |
| 16'-2½" | | | | | | 8" carbon steel casing |
| | | | | | | resume drilling |

REMARKS:

Ian Kennedy

SNL NA-567 DO-1, rev. 0 Reviewed by V.L. Westhaver 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

295

WHC-MR-0209

9 1 1 2 0 5 0 0 2 7 8

p2 of 3

| DRILL LOG | By Jan Kennedy | Rig BE 60L #22-14100 C. Ubensley | Well Number 299-E27-15 | Computer Number | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 9-8-89 | | Depth 150 To 155 | N/A | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 150 | D | SM | SLIGHTLY GRAVELLY SAND - 8% gravel, 92% sand; trace mud: 1% fp, 7% vfp, | 1005 | Samples: (2) 1pt. 1/4th |
| | | | | 30% vcs, 30% ccs, 15% ms, 15% fs, 2% vfs trace mud (well sorted), Gravel 45% | | (1) moist um |
| | | | | mafic/55% felsic SA-SR; sand: 30% mafic/70% felsic SA-SR, 10YR 4/4 | | |
| | | | | (brown to dark brown) slight HCl rxn unconsolidated checked and cleaned | | |
| | | | | by H&S and RPT | 10:10 | H&S Check-ok |
| | | | | | 10 25 | rig maintenance by Kaiser |
| | | | | | 10 35 | resume drilling |
| | 155' | D | SM | SAND: 4% gravel, 96% sand, trace mud; 4% vfp, 10% vcs, 16% vccs, 30% ms | 11:00 | Samples: (2) 1pt. 1/4th |
| | | | | 30% fs, 10% vfs, trace mud (well sorted) Gravel: 65% mafic/35% felsic SA SR | | (1) moist um |
| | | | | Sand 10% mafic/90% felsic SA-SR 10YR 5/3 brown slight HCl rxn unconsolidated | | Preparing to weld |
| 158.2½ | | | | cleaned by RPT. | | |
| ~~+9'5"~~ | | | | | 12:00 | finished welding 9'5" |
| 167-7½" (8") | | | | | | of 8" carbon steel casing |
| | | | | | 1200 - 1230 | lunch |
| | | | | | 12 30 | rig broken (belt rubbing) |
| | | | | | 200 | H&S meeting with |
| | | | | | | Randy Spaniel |
| | | | | | | (See log of 299-E27-13) |

REMARKS:

Jan Kennedy

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. Trentham 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

296

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Jim Kennedy | GE 60L #22-14150 C. Wanday | 299-E27-15 | N/A | WJ-017 SST |
| Date: 9-8-89 | | Depth: 155 To 165' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (8") 167'-7½" | | | | | 1420 | rig repaired - drilling continues |
| | 160' | D | SM | SLIGHTLY GRAVELLY SAND. 8% gravel, 92% sand, trace mud; trace vfp, 8% fp | 1445 | Samples: (2) 1pt. lith |
| | | | | 10% cs, 20% mcs, 47% ms, 10% fs, 5% vfs, trace mud, moderate sorting, Gravel: 70% mafic | | (1) moist in, |
| | | | | 30% felsic SA-SR, Sand: 15% mafic / 85% felsic SA-SR, 2.5Y 6/2 light | | (2) Chemical (09/08/89) |
| | | | | brownish gray, moderate HCl rxn unconsolidated | | cleaned by RPT |
| | | | | | | |
| | 165' | D | SM | GRAVELLY SAND: 10% gravel, 90% sand, trace mud, trace fp, 10% vfp | 1510 | Samples: (2) 1pt lith |
| | | | | 10% vfcs, 20% cs, 40% ms, 15% fs, 5% vfs, trace mud moderate sorting, | | (1) moist in |
| | | | | gravel: 70% mafic / 30% felsic SA-SR, Sand 30% mafic / 70% felsic SA-SR | | |
| | | | | 2.5Y 5/2 grayish brown, slight HCl rxn unconsolidated | | |

REMARKS:

PNL MA567 DO-1, 1.01.0 Reviewed by D. L. Markham 12-7-89

Jim Kennedy
9-8-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

297

WHC-MR-0209

9 1 1 2 0 5 0 0 3 0 0

sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/11/89 | | Depth 165.0 To 180.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Ø (8½") 167' 7½" | | | | | 0710 | Air sitr - H₂S scan. |
| | | | | | | OVA = <1 ppm, LEL - <det. |
| | | | | | 0730 | add 9' 3" 8" & weld. |
| 8"Ø 176' 10½" | | | | | 0900 | begin to drill |
| | 170.0' | DB | dry | slightly GRAVELLY SAND, (8% Gravel 92% Sand trace mud) | 0928 | to - 170.0' - sample. |
| | | | | 8% vfp, 20% vcs 20% cs 20% ms 20% fs 12% vfs, mod- | 0930 | H₂S scan - OVA = <1 ppm. |
| | | | | poorly sorted, 60/40% felsic/mafic, SA-SR., lt. yel brn. | | RPT - cleared |
| | | | | (10YR 6/4) slight rx to 10% HCL, unconsol. (2pt lith, 1 moist) | | |
| 8"Ø 185' 11" | | | | | 0956 | add 9' ½" 8" & weld. |
| | | | | | 1102 | resume drilling |
| | 175.0' | DB | dry. | SANDY GRAVEL (40% Gravel 60% Sand trace mud) 2% fp | 1119 | to 175.0' - sample. |
| | | | | 38% vfp, 20% vcs 10% cs 10% ms 10% fs 10% vfs, trace | | H₂S scan - OVA = <1 ppm. |
| | | | | mud, poorly sorted, 30/70% felsic/mafic, SA-SR, lt. | | RPT - cleared. |
| | | | | yel. brn (10YR 6/4) slight rx to 10% HCL, unconsol. | | |
| | | | | (2pt lith, 1 moist) | | |
| | | | | | 1145 | to 180.0' - sample |
| | 180.0' | DB | SM. | see sht 2 | | H₂S scan - OVA = <1 ppm. |
| | | | | | 1158 | stop for lunch. |

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by V.L. McGhan 12-7-89

[illegible] 9/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

278

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/11/89 | | Depth 180.0' To 190.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 56 185'11" | 180.0' | DB | sm | GRAVELLY SAND (15% Gravel 85% Sand trace mud) 15% | 1235 | ~~At~~ site - resume. |
| 80 195'10" | | | | vfp, 30% vcs 30% cs 15% ms 5% fs 5% vfs, trace mud, | | add 9'11"-8" ↓ weld |
| | | | | moderately sorted, 50/50% felsic/mafic, SA-SR., yell. | 1245 | H↑S scan-OVA=<1ppm. |
| | | | | brn, (10YR 6/4) slight rx to 10% HCL unconsolidated | | RPT-cleared |
| | | | | (2pt lith, 2 125ml enviro, 1 moist) traces of mud nodules. | | |
| | | | | (C. of C. # SST091189) | 1350 | resume drilling |
| | 185.0' | DB | sm. | GRAVELLY SAND (10% Gravel 90% Sand, trace mud) 10% | 1402 | to 185.0'-sample. |
| | | | | vfp, 25% vcs 25% cs 15% ms 10% fs 15% vfs, trace mud, | 1405 | H↑S scan OVA=<1ppm |
| | | | | moder-poorly sorted, 50/50% felsic/mafic, SA-SR, lt. | | RPT-cleared |
| | | | | yell brn (10YR 6/4) slight to mod rx to 10% HCL, unconsolid. | | |
| | | | | traces of yel. brn claystone frag. mud nodules. (2pt. lith, | | |
| | | | | 1 moist) | | |
| | 190.0' | DB | SM | SAND (4% Gravel 96% Sand, trace mud) 4% vfp, 30% vcs | 1421 | to 190.0'-sample. |
| | | | | 30% cs 10% ms 10% fs 16% vfs, trace mud) moder. poorly | 1423 | H↑S scan OVA=<1ppm. |
| | | | | sorted, 50/50% felsic/mafic., SA-SR lt. yel. brn (10YR | | RPT-cleared. |
| | | | | 6/4) mod rx to 10% HCL, unconsolidated (2pt lith, 1 moist) | | |
| | | | | | 1502 | stop for day. |

REMARKS:

PNL-MA567, DO-1, Rev 0 Reviewed by V.L. Markham 12-7-89

9/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-0

299

WHC-MR-0209

9 1 1 2 0 5 0 0 3 0 2

Sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/12/89 | | Depth 190.0' To 205.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"ø 195' 10" | | | | | 0705 | Ar site - H&S scan |
| | | | | | | OVA = <1ppm, LEL <det. |
| 8"ø 204' 11" | | | | | 0715 | add 9' 1" - 8" & weld |
| ? " | | | | | 0755 | H&S scan - OVA = <1ppm |
| | | | | | 0850 | begin to drill |
| | 195.0 | DB | sm. | SAND (2% Gravel 98% Sand, trace mud) 2% vfp, 20% vcs | 0910 | to 195.0' - H&S scan |
| | | | | 20% cs 20% ms 20% fs 18% vfs, trace mud, mod. sorted, | | OVA = <1ppm |
| | | | | 50/50% felsic/mafic, SA-SR, lt. yel. brn. (10YR 6/4) | | RPT - cleared |
| | | | | slight to mod rx to 10% HCl, unconsolidated, trace of | | |
| | | | | mud nodules. (2pt lith, 1 moist). | | |
| | 200.0' | DB. | sm | SAND (2% Gravel 98% Sand, trace mud) same as 195.0' | 1003 | to 200.0' - sample |
| | | | | trace of mud nodules (2pt lith, 2 125ml enviro, 1 moist) | | H&S scan - OVA = <1ppm. |
| 8"ø 213' 5" | | | | (C. of C. # SST091289) | 1035 | add 8' 6" - 8" & weld |
| | | | | | 1140 | resume drilling |
| | 205.0' | DB | sm | SAND (2% Gravel, 98% Sand, trace mud) same as 200.0' | 1152 | to 205.0' |
| | | | | (2pt lith, 1 moist) | 1158 | stop for lunch. |
| | | | | | 1230 | resume drilling |
| | | | | | | |

REMARKS:

PNL-MA567, DO-1, Rev Ø  Reviewed by V.L. McElhaney 12-2-89  9/12/89

D - Drive Barrel  H - Hard Tool  L - Large  M - Medium  S - Small  VC - Very Coarse  C - Coarse  F - Fine  VF - Very Fine

300

WHC-MR-0209

sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-60L # 22-1460 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/12/89 | | Depth 205.0' To 220.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"@ 213'5" | 210.0 | DB | sm. | SAND (2% Gravel, 98% Sand, trace Mud) 2% vfp, 20% vcs | 1320 | to 210.0' - sample |
| | | | | 20% cs 20% ms 20% fs 18% vfs, trace mud, mod. sorted. | | $H_2S$ scan - OVA = <1ppm |
| | | | | 40/60% felsic/mafic, A-SR, lt. yel. brn (10YR 6/4) | | RPT cleaned |
| 8"@ 222'3" | | | | slight to mod rx to 10% HCL, unconsolidated, trace | | add 8'10"-8" ∢weld |
| | | | | concretions, mud nodules (2pt lith., 1 moist.) | | |
| | | | | | 1415 | resume drilling |
| | 215.0' | DB | sm. | SAND (2% Gravel, 98% Sand, trace mud) similar | 1430 | to 215.0' - sample |
| | | | | to 210.0' | 1437 | $H_2S$ scan OVA <1ppm |
| | | | | | | RPT-cleaned. |
| | | | | | | |
| | 220' | DB | SM | WILL DESCRIBE IN AM. | 1500 | TOOK 2 PINT LITH. |
| | | | | | | SAMPLES, 1 MOISTURE |
| | | | | | | SAMPLE, (2) 125ml |
| | | | | | | CHEM. SAMPLES. |
| | | | | | | C of C # SST091289. |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA-567, DO-1, Rev 0 Reviewed by V. L. McGlam 12-7-89 9/12/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

WHC-MR-0209

30

9 1 1 2 0 5 0 0 3 0 4

Sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/13/89 | | Depth 220.0' To 230.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Ø 222' 3" | 220.0' | DB | SM | SAND (2% Gravel, 98% Sand, trace Mud) 2% vfp, 20% vcs | 0715 | Ar site - H&S scan |
| | | | | 20% cs 20% ms 20% fs, 18% vfs, trace mud, mod. sorted, 50/50 f/m, | | OVA = <1 ppm, LEL = < det. |
| 8"Ø 230' 9" | | | | A-SR, lt yel brn (10YR 6/4) mod rx to 10% HCL, unconsolidated, | 0720 | add 8'6" - 8" & weld |
| | | | | trace concretions. (2pt lith, 2 125 ml enviro, 1 moist.) | 0840 | resume drilling |
| | | | | | 0902 | H&S scan - OVA = <1 ppm |
| | 225.0' | DB | SM. | SAND (3% Gravel, 97% Sand, trace Mud) 1% mp 1% fp 1% vfp, | 0904 | to 225.0' - sample |
| | | | | 15% vcs 25% cs 20% ms 20% fs 17% vfs, trace mud, mod. sorted | | cleared by RPT |
| | | | | 50/50 f/m, A-SR, lt. yel. brn (10YR 6/4) slight rx to 10% HCL, | | |
| | | | | unconsolidated, (2pt lith, 1 moist) | | |
| | 230.0' | DB | SM | SANDY GRAVEL (50% Gravel, 50% Sand, trace Mud) 5% cp | 0955 | to 230.0' - sample |
| | | | | 10% mp 15% fp 20% vfp, 10% vcs 10% cs 10% ms 10% fs | | H&S scan - OVA = <1 ppm |
| | | | | 10% vfs, trace mud, very poorly sorted, 50/50% f/m, A-WR, | | RPT - cleared |
| 8"Ø 238' 10½" | | | | dl brn (2.5Y 4/4 wet), slight rx to 10% HCL, unconsolidated, | 1000 | add 8'1½" - 8" & weld |
| | | | | 2pt lith, 2 125 ml enviro, 1 moist.) traces of cobble, & vcp. in | 1054 | resume drilling |
| | | | | drive tube. | | |
| | | | | | 1200 | stop for lunch. |
| | | | | | | |
| | | | | | | |

REMARKS:

FNL · MA 567, DO-1, Rev 0 Reviewed by V.G. Markham 12-7-89

9/13/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

50.0

| DRILL LOG | By: R Miller | Rig: BE-60L #22-14100 Craig W. | Well Number: 299-E27-15 | Computer Number: N/A | Project or Work Order No.: W-017-SST |
|---|---|---|---|---|---|
| | Date: 9/13/89 | | Depth: 230.0' To 244.0' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"ø 238'10½" | | | | | 1238 | resume drilling |
| | | | | | 1240 | H&S scan-OVA=<1ppm |
| | 235.0' | DB | sm-dry | SANDY GRAVEL (60% Gravel, 40% Sand, trace mud) 2% Scotts | 1250 | to-235.0'-sample |
| | | | | 3% vcp 5% cp 10% mp 10% fp 20% vfp. 20% vcs 10% cs 10% ms | | RPT-cleared |
| 8"ø 247'7½" | | | | 5% fs 5% vfs, trace mud, very poorly sorted, 60/40% f/m, | 1310 | add 8'4"-8" ⅞ weld. |
| | | | | SA-WR, dl. brn. (2.5Y 4/4 wet) slight rx to 10% HCL, | | |
| | | | | Unconsolidated. (2pl lith, 1 moist) | 1358 | resume drilling |
| | | | | | 1415 | H&S scan-OVA= |
| | 240.0' | DB | sm | SANDY GRAVEL (60% Gravel, 40% Sand trace mud) | 1420 | to 240.0' |
| | | | | similar to 235.0' (2pt lith, 2 125ml envirо, 1 moist) | | RPT-cleared. |
| | | | | | 1520 | to 244.0'-water! |
| | | | | | 1530 | shut down for day |
| | | | | | | samples cofc091389 |

REMARKS:

FNL-MA567, DO-1, Rev Ø Reviewed by W.L. Markham 12-7-89

11/13/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

303

WHC-MR-0209

9 1 1 2 0 5 0 0 3 0 6

sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/14/89 | | Depth 244.0' To 250.0 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"Ø 247' 7½" | | | | casing error from - 9/13/89 1310hr. - 7'9" vs 8'9" | 0715 | Arr site - H₂S scan |
| 8"Ø 246' 7½" | | | | | | OVA = <1 ppm, LEL < det. |
| | 245.0' | DB | W | MUDDY SANDY GRAVEL (60% Gravel, 25% Sand 15% Mud) | 0755 | to 245.0' - sample |
| | | | | 3% scobb., 7% vcp 10% cp 10% mp 10% fp 20% vfp, 5% vcs 5% cs | 0800 | H₂S scan spoils pile |
| | | | | 5% ms, 5% fs 5% vfs, 15% Mud, very poorly Sorted, 60/40% | | OVA = 22 ppm, LEL < det. |
| | | | | f/m, SA-WR, dl. brn (2.5Y 4/4) wet, slight rx to 10% HCL, | | RPT - no rad: B/G/A |
| | | | | unconsolidated, (2pt lith, 2 125ml enviro, 1 moist) | | soils PH-6, Head space |
| | | | | | | w/ OVA - 23 ppm. |
| 8"Ø 254' 11" | | | | | 0830 | add 8' 3½" - 8" & weld |
| | | | | | 0945 | resume drilling |
| | | | | | 1000 | H₂S scan - OVA = <1 ppm w/H |
| | | | | | | spoils = 6.5 ppm. |
| | 250.0' | DB | W | MUDDY SANDY GRAVEL (similar to 245.0') (2pt lith.) | 1030 | to 250.0' - sample |
| | | | | | | H₂S scan - OVA = <1 ppm w/H |
| | | | | | | spoils = 1.5 ppm. |
| | | | | | 1050 | casing plugged - weld |
| | | | | | | cars |
| | | | | | 1107 | resume drilling |

REMARKS:

PNL-MA 567, DO-1, Rev Ø Reviewed by V. L. Mathison 9/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

304

WHC-MR-0209

| DRILL LOG | By R. Miller | Rig BE-600 #22-14100 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-35T |
|---|---|---|---|---|---|
| | Date 9/14/89 | | Depth 250.0' To 254.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8"@ 254'11" | | | | | 1110 | $H_2S$ scan OVA = <1ppm |
| | | | | | 1140 | change over to hard |
| | | | | | | tool. |
| | | | | | 1200 | stop for lunch. |
| | | | | | 1230 | resume change over. |
| | | | | | | food grade lubricant |
| | | | | | | used- |
| | | | | | 1310 | w/L @ 245.98' bte (1.09?) |
| | | | | | | -5.12' = 240.86' bls |
| | | | | | | (possible plug? in casing) |
| | | | | | 1430 | resume drilling |
| | | | | | 1519 | shut-down. |
| | | | | | | samples on c of c 091489 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: Total 25 gal. $H_2O$ added Today

PNL-MA567, DO-1, Rev 0 Reviewed by W. McGlam 12-7-89

9/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

305

WHC-MR-0209

9 1 1 2 0 5 0 0 3 0 3

sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Craig W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/15/89 | | Depth 250.0' To 257.79' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8'0 254' 11" | | | | | 0710 | Ar. site - H&S scan |
| | | | | | | OVA: <1ppm, LEL=<det. |
| | | | | | 0730 | w/c 245.80'bls-SU 4.93' |
| | | | | measurement w/steel tape L300-08, target T.D. 255.87'bls | | 240.87'bls T.D.= 247.17'bls |
| | | | | | 0735 | H&S scan - OVA=<1ppm. |
| | | | | | 0740 | begin drilling- |
| | | | | | 0815 | H&S scan - OVA=<1ppm. |
| 2163' 2½" | | | | | | add 8'3½"-8" & weld |
| | | | | | 0907 | resume drilling |
| | 255.0' | HT | W | MUDDY SANDY GRAVEL (60% GRAVEL, 25% Sand, 15% Mud) | 1015 | to 255.0'-sample |
| | | | | 5% mp 25% fp 30% vfp, 5% vcs 5% cs 5% ms 5% fs 5% vfs, 15% mud, | | H&S scan - OVA= <1ppm |
| | | | | very poorly sorted, 60/40% f/m, A-SR, ol brn (2.5Y 4/4) wet, | | RPT - cleared. |
| | | | | slight rx to HCL, unconsolidated, (2pt lith) | 1100 | H&S scan - OVA= <1ppm |
| | 258' 11¼" | | | | 1140 | sound hole 257.79'bls |
| | | | | | | S.U. 4.44' (4'5¼") |
| | | | | | 1154 | shut down for lunch. |
| | | | | | 1230 | Ar & resume |
| | | | | what happened to static w/c ? | 1240 | w/c 299.69'bls-245.25'bls |

REMARKS:

FNL-MA567, DO-1, Rev 0 Reviewed by V.L. Markham 12-7-89

9/15/89

306

WHC-MR-0209

| DRILL LOG | By R. Miller | Rig BE-60 #22-14100 Craig W. | Well Number 299-E27-15. | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/15/89 | | Depth 257.79' To 259.0' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8'0 | | | | | | |
| 263' 2½" | | | | | 1308 | w/L 249.58' bls = 245.14' bls |
| | | | | | | water is rising - slow. |
| | | | | | 1326 | w/L 249.51' bls = 245.07' bls |
| | | | | | | will bail hole and check |
| | | | | | 1340 | stop bailing |
| | | | | | 1344 | w/L 249.60' - 245.16' bls |
| | | | | | 1350 | sand hole to - 257.83' bls |
| | | | | | 1400 | w/L 249.55' bls - 245.11' bls |
| | | | | | | will drill down another |
| | | | | | | 5.0' - assume that 240.87' bls |
| | | | | | | previous w/L's were |
| | | | | | | influenced by a plug. |
| | | | | target TD. 260.11' ± | 1405 | resume drilling. |
| 264' 1½ | | | | | 1422 | add 5'11"-8" ½ weld |
| | | | | | 1503 | stop for day. |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: Total 30 gal. $H_2O$ added Today

PNL-MA567, DO-1, Rev Ø Reviewed by W.L. Markham 12-7-89

9/15/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

307

WHC-MR-0209

9 1 1 2 0 5 0 0 3 1 0

Sht 1 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Inis W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/18/89 | | Depth 259.0' To | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8" Ø 249'1½" | | | | 9/18/89 w/l - 245.11' bls | 0710 | At site - H₂S scan |
| | | | | | | OVA = <1ppm |
| | | | | | | resume welding - |
| | | | | | 0725 | w/l 253.79' bls - 8.74' su = |
| | | | | | | 245.05' bls |
| | | | | | 0740 | TD 265.57 + 2.44 = 268.01' bls |
| | | | | | | - 8.74' su. = 259.27' bls |
| | | | | | 0800 | H₂S scan OVA = <1ppm |
| | | | | | 0805 | resume drilling |
| | 260.0' | HT | wet | MUDDY SANDY GRAVEL (60% Gravel, 25% Sand, 15% Mud) | 0840 | to 260.0' - H₂S scan |
| | | | | 5%cmp 25%fp 30% vfp, 5%vcs 5%cs 5% ms 5% fs 5% vfs, | | OVA = <1ppm - RPT cleaned |
| | | | | 15% Mud, very poorly sorted, 60/40% f/m, A-WR ol brn | | |
| | | | | 2.5Y(A/A) wet, slight rx to HCL, Unconsolidated (2pt lith, | | |
| | | | | 2 125m enviro.) | 0915 | H₂S scan - OVA = 27-29ppm |
| | | | | | 0945 | sound hole 267.35' + 2.44' bls |
| | | | | | | s.u. 7.25' = 262.54' bls |
| | | | | | 0946 | H₂S scan OVA = 28ppm |
| | | | | | | LEL = <det |

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by V.L. Markham 12-7-89

9/18/89

WHC-MR-0209

20

9 1 1 2 0 5 0 0 3 1 1

sht 2 of 2

| DRILL LOG | By R. Miller | Rig BE-60L #22-14100 Lovin W. | Well Number 299-E27-15 | Computer Number N/A | Project or Work Order No. W-017-SST |
|---|---|---|---|---|---|
| | Date 9/18/89 | | Depth 262.54' To — | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8" ø 209' 1½" | 261.87' | | | TD. 262.54' bls | 1002 | H&S scan OVA = <1 ppm. |
| 209' 1½" | 261.87' | | | | | cut casing - 5.0' off. |
| | | | | | 1015 | crews arrive to break |
| | | | | | | down & move rig. |
| | | | | witnessed by Mike Evart | 1020 | straightness test |
| | | | | | | |
| | | | | N. L. McGhan (PNL) geophysically logged borehole | | |
| | | | | w/ Nat. γ probe - interval = 100'-262' | | |
| | | | | Witnessed by John Gould (WHC) | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: Total of 32 gal. added Today

PNL-MA567, DO-1, Rev 0 Received by N. L. McGhan 12-7-89

9/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

309

WHC-MR-0209

9 1 1 2 0 5 0 0 3 1 2

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-15 | Date 9/28/89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS / C FARM | Project W-017 | |

Logged by S.M. GOODWIN Date 9/28/89
Reviewed by V.E. McKlary Date 12-7-89
Measuring Equip. L300-07 / E. TAPE 12176 Procedure PNL-MA-567 DS-1, REV. 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0800 | CARBON STEEL | 8" | 264.1 | 1.65 | 262.45 | | | | | D/B = 261.8 - 1.65 = 260.15 |
| | | | | | | | | | | D/W = 244.45 - 1.65 = 242.8 |
| 0915 | | | | | | | | | | SETTING 4" S.S. CASING; |
| | | | | | | | | | | RECEIVED WORD TO SET BOTTOM |
| | TOTAL SCREEN & CASING: | | | | | | | | | OF SCREEN @ 260' |
| 1010 | 1 21' 10-SLOT CHANNEL PACK SCREEN (4" S.S.) | | | | | | | | | FINISHED SETTING 4" |
| | 6 20.04' SECTIONS OF 4" S.S. | | | | | | | | | |
| | 6 20.04' SECTIONS OF 4" S.S. w/ CENTRALIZERS | | | | | | | | | |
| | 261.48' | | CASING CENTRALIZERS PLACED EVERY 40' | | | | | ABOVE | TOP | OF SCREEN |
| 1025 | CARBON STEEL | 8" | 269.15 | 6.7 | 262.45 | 16-30 SAND | 1/2 BAG | | | ADDING SAND (USING 100 LB |
| | | | | ADDED 5.09' OF 8" FOR BACKFILL | | | | | | BAGS OF COLORADO SILICA SAND) |
| 1030 | | | | | | | | | | BROKE TAPE; LOST STAINLESS |
| | | | | | | | | | | STEEL WEIGHT & TEFLON TAPE |
| | | | | | | | | | | DOWN HOLE - NO LOSS OF S. TAPE |
| 1130 | | | | | 262.45 | | | 254.0 | 8.45 | D/SAND = 260.7 - 6.7 = 254.0 |
| 1135 | | | | | | | | 254.5 | 7.95 | D/SAND = 254.5; SEEMS HIGH. |
| 1140 | | | | | | 16-30 SAND | 1 BAG | | | ADDING SAND |
| 1145 | | | | | | | | | | CAN'T GET TAPE PAST 249.7'; |
| | | | | | | | | | | 4" IS STABLE @ 260' |
| 1147 | | | | | | 16-30 SAND | 1/2 BAG | 247.9 | 14.95 | D/SAND = 254.6 - 6.7 = 247.9 |
| 1150 | CARBON STEEL | 8" | 269.15 | 7.5 | 261.65 | " | | | | D/SAND = 256.45 - 6.7 = 249.75; |
| | | | | | | | | | | TAPE STILL STICKING @ ~249.7 |

310

WHC-MR-0209

9 1 1 2 0 5 0 0 3 1 3

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299 - E27 - 15 | Date 9/28/89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS / C FARM | Project W-017 | |

Logged by S. M. GOODWIN Date 9/28/89
Reviewed by D.K. McBean Date 12-7-89
Measuring Equip. L300-07 Procedure PNL-MA-567 DO-1 Rev. 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1300 | CARBON STEEL | 8" | 269.15 | 7.5 | 261.65 | 16-30 SAND | 1/2 BAG | 246.8 | 14.85 | 254.3 - 7.5 = 246.8, AMOUNT |
| | | | | | | | | | | OF OVERLAP IS QUESTIONABLE |
| 1305 | | | 269.15 | 7.9 | 261.25 | | | | | 255 - 7.9 = 247.1, SCREEN |
| | | | | | | | | | | STILL ISN'T LOCKED IN PLACE. |
| | | | | | | | | | | CAN'T HAVE ~14' OF OVERLAP |
| | | | | | | | | | | THE MUST BE GETTING CAUGHT |
| | | | | | | | | | | ON SCREEN JOINT. |
| 1310 | | | | | | | 1/2 BAG | | | WILL ADD SAND UNTIL WE GET |
| | | | | | | | 1/2 BAG | | | SCREEN SET; FINAL D/SAND |
| | | | | | | | | | | WILL BE ~236'. |
| 1400 | | | 269.15 | 8.6 | 260.55 | | | | | D/SAND = 251.6 - 8.6 = 243.0 |
| 1415 | | | 269.15 | 9.85 | 259.3 | | | | | STEEL TAPE BROKE; 30' OF TAPE |
| | | | | | | | | | | + WEIGHT DOWN HOLE WILL |
| | | | | | | | | | | REMOVE 4" CASING & FISH |
| | | | | | | | | | | TAPE OUT W/ PUMP RIG. |
| | | | | | | | | | | SCREEN & CASING ARE STILL |
| | | | | | | | | | | FREE INSIDE 8" CASING. |

311

WHC-MR-0209

9 1 1 2 0 5 0 0 3 1 4

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-15 | Date 9/29/89 Sheet No. 1 of 3 |
|---|---|---|
| | Location SINGLE SHELL TANKS | Project SST W-017 |

Logged by S.M. GOODWIN Date 9/29/89
Reviewed by V.L. Nathan Date 12-7-89
Measuring Equip. L300-04 / E TAPE 12176 Procedure PNL: MA-667 Rev. 1 PROC.

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0700 | | | | | | | | | | REMOVING 4" CASING |
| 0750 | CARBON STEEL | 8" | 266.15 | 6.8 | 259.35 | | | | | D/BOTTOM = 255.2 + 2.2 − 6.8 |
| | | | | | | | | | | = 250.6 |
| 0800 | | | | | | | | | | D/WATER = 251.05 − 6.8 = 244.25 |
| 0855 | | | | | | | | | | D/BOTTOM = 262.6 + 2.2 − 6.8 = 258 |
| 1017 | | | | | | | | | | " 263! + 2.2 − 6.8 = 258.4 |
| 1130 | | | | | | | | | | D/WATER − 251.22 − 6.8 = 244.42 |
| 1135 | | | | | | | | | | D/BOTTOM = 263.1 + 2.2 − 6.8 |
| | | | | | | | | | | = 258.5 |
| | BAILED $H_2O$ & MATERIAL WAS CONTAINED IN | | | | | 55 GALLON | | | | BAILED ~80 GALLONS OF $H_2O$ |
| | DRUMS. | | | | | | | | | & SAND PACK; FM. IS |
| | | | | | | | | | | COMING IN HOLE. 14.05' |
| | | | | | | | | | | OF $H_2O$ IN BOREHOLE; |
| | | | | | | | | | | RECEIVED O.K. BY WHC |
| | | | | | | | | | | TO SET FINAL CASING |
| | | | | | | | | | | AT THIS DEPTH |
| 1140 | 4" STAINLESS HAD BEEN PLACED IN PROTECTIVE | | | | | PLASTIC | | | | SETTING STAINLESS |
| | & TAPED CLOSED UPON REMOVAL ON 9/20 & 9/29. | | | | | | | | | |
| 1325 | | | | | | | | | | STAINLESS CASING SET; |
| | | | | | | | | | | D/B = 258.78' |
| 1330 | | | | | | 16-30 SAND | 1/2 BAG | | | CAN'T GET TAPE PAST 242' |
| 1335 | | | | | | " | 1/2 BAG | | | " " " " " |

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-15 | Date 9-29-89 | Sheet No. 2 of 3 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

| | | | |
|---|---|---|---|
| Logged by S.M. Goodwin | Date 9-29-89 | Drilling Contractor KEH | |
| Reviewed by V.L. McGhan | Date 12-7-89 | Driller GENE THOMAS | |
| Measuring Equip. L300-04 | Procedure PNL-MA-567 DD-1, REV 0 | Rig/Equipment CRANE & JACKS | |

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1350 | | | | | | | | | | CHANGED TO THINNER WEIGHT |
| 1355 | CARBON STEEL | 8" | 266.15 | 7.0 | 259.15 | 16-30 SAND | | 253.3 | 5.85 | D/SAND = 253.3 |
| 1400 | " | " | 266.15 | 7.6 | 258.55 | " | | 253.7 | 4.85 | D/SAND = 253.7 |
| 1402 | " | " | 266.15 | 8.8 | 257.35 | " | | 254.7 | 2.65 | D/SAND = 254.7 |
| 1405 | | | | | | " | 1/2 BAG | 243.2 | 12.15 | D/SAND = 245.2 |
| 1410 | | | | | | | | | | PLACING SLAG CATCHER TO PREVENT |
| | | | | | | | | | | CUTTING SLAG FROM FALLING |
| | | | | | | | | | | DOWN BOREHOLE. |
| 1420 | " | " | 262.05 | 6.6 | 255.45 | " | | 252 | 3.45 | D/SAND = 252 |
| 1425 | " | " | | | | " | 1/2 BAG | 245.2 | 10.25 | D/SAND = 245.2 |
| 1430 | " | " | 262.05 | 7.9 | 254.15 | " | | 248.1 | 6.05 | D/SAND = 248.1 |
| | | | | | | " | 1/2 BAG | | | D/SAND = ? ; TAPE IS STOPPING |
| | | | | | | | | | | AT 248.1' |
| 1435 | " | " | 262.05 | 9.2 | 252.85 | " | | | | TAPE STICKS @ 248.3' |
| 1437 | | | | | | " | 1/2 BAG | 245.8 | 7.05 | D/SAND = 245.8 |
| 1445 | " | " | 258.1 | 6.55 | 251.55 | | | | | D/SAND = 245.5 ? ; TAPE |
| | | | | | | | | | | STILL HANGING UP |
| 1450 | | | | | | " | 1/2 BAG | 244.65 | 6.9 | D/SAND = 244.65 |
| 1452 | " | " | 258.1 | 7.85 | 250.25 | " | | 245.75 | 4.5 | D/SAND = 245.75 |
| 1453 | " | " | 258.1 | 9.15 | 248.95 | " | | 246.65 | 2.3 | D/SAND = 246.65 |
| 1455 | | | | | | " | 1/2 BAG | 243.35 | 5.6 | D/SAND = 243.35 |
| 1500 | " | " | 254.25 | 6.6 | 247.65 | | | 244.6 | 3.05 | D/SAND = 244.6 |

3/3

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-15 | Date 9/29/89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

Logged by S.M. Goodwin — Date 9/29/89
Reviewed by V.L. McGhan — Date 12-7-89
Measuring Equip. C300-04 — Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1503 | CARBON STEEL | 8" | 254.25 | 6.6 | 247.65 | 16-30 SAND | 1/2 BAG | 241.9 | 5.75 | D/SAND = 241.9 |
| 1505 | " | " | 254.25 | 7.95 | 246.3 | " | " | 242.85 | 3.45 | D/SAND = 242.85 |
| 1508 | " | " | 254.25 | 9.3 | 244.95 | | | 242.8 | 2.15 | D/SAND = 242.8'; TAPE MAY BE STICKING @ 242.8' |
| 1515 | | | | | | | | | | DONE FOR DAY |

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-15 | Date 10/2/89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

| | | | |
|---|---|---|---|
| Logged by S. M. Goodwin | Date 10/2/89 | Drilling Contractor KEH | |
| Reviewed by D. L. McKhann | Date 12-7-89 | Driller GENA THOMAS | |
| Measuring Equip. 1300-04 | Procedure PNL MA 567 | Rig/Equipment SPACK & JACKS | |

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0725 | CARBON STEEL | 8" | 254.1 | 9.2 | 244.9 | 16-30 MESH | | 242.5 | 2.4 | D/SAND = 242.5 |
| 0730 | " | | | | | " | 1 BAG | 238.4 | 6.5 | D/SAND = 238.4 |
| 0740 | " | " | 254.1 | 10.6 | 243.5 | | | | | |
| 0743 | " | " | 250 | 6.5 | 243.5 | | | 239.5 | 4.0 | D/SAND = 239.5 |
| 0747 | | | | | | " | 1/2 BAG | | 6.7 | D/SAND = 236.8 |
| 0752 | " | " | 250 | 7.85 | 242.15 | | | 237.75 | 4.4 | D/SAND = 237.75 |
| 0756 | | | | | | " | 1/2 BAG | 235.45 | 6.7 | D/SAND = 235.45 |
| 0757 | " | " | 250 | 9.25 | 240.75 | " | | 236.35 | 4.4 | D/SAND = 236.35 |
| 0803 | " | " | 250 | 9.25 | 240.75 | " | 1/2 BAG | 233.95 | 6.8 | D/SAND = 233.95 |
| 0812 | " | " | 246 | 6.8 | 239.2 | | | 234.6 | 4.6 | D/SAND = 234.6 |
| 0815 | " | " | 246 | 8.0 | 238.0 | | | 235.6 | 2.4 | D/SAND = 235.6 |
| 0817 | | | | | | | 1/4 BAG | 234.5 | 3.5 | D/SAND = 234.5 |
| | | | | 9.3 | 236.7 | | | 235.2 | 1.5 | D/SAND = 235.2 |
| | | | | | | | 1/4 BAG | 234.4 | 2.3 | D/SAND = 234.4 |
| | " | " | 246 | 9.9 | 236.1 | | | 234.9 | 1.2 | D/SAND = 234.9 |
| 0920 | | | BAILING w/ PUMP RIG & 3" DIA BAILER; BAILING | | | | | | | BAILING SAND PACK |
| 0940 | | | VARIES | INTO | 55 | GALLON DRUM. | | | | BAILED 50 GALLONS OF $H_2O$ |
| 0942 | " | " | 242.6' | 6.5 | 236.1 | " | | 236.4 | 0.7 | D/SAND = 235.4' |
| 0947 | | | | | | " | 1/4 BAG | 234.0 | 2.1 | D/SAND = 234.0 |
| 0957 | " | " | 242.6 | 7.3 | 235.3 | " | | 234.4 | 0.9 | D/SAND = 234.4 |
| 1004 | " | " | 242.6 | 7.75 | 234.85 | | | 234.75 | 0.1 | D/SAND = 234.75 FINAL D/SAND |
| 1030 | | | | | - | 1/4" PELLETS | 12 BUCKETS | 234.85 | 5.25 | D/PELLETS = 229.6' |

(BENTONITE PELLETS)

315

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-15 | Date 10/2/89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

Logged by S.M. Goodwin Date 10/2/89
Reviewed by D.E. McGhan Date 12-7-89
Measuring Equip. L300-04 Procedure PNL-MA-567 Rev. 0

Drilling Contractor ICEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1040 | CARBON STEEL | 8" | 238.9 | 6.5 | 232.4 | 1/4" PELLETS | | 231.0 | 1.4 | D/PELLETS = 231.0 |
| 1047 | " | " | | 7.05 | 231.85 | " | | 231.25 | 0.6 | D/PELLETS = 231.25 FINAL D/PELLETS |
| 1051 | | | | | | 8-20 CRUMBLES | 15 BAGS | | | ADDING CRUMBLES; |
| | | | | | | | | | | 50 LB. BAGS OF ACE CRUMBLES |
| 1058 | " | " | 238.9 | 7.05 | 231.85 | " | " | 231.85 | 47.7 | D/CRUMBLES = 184.15 |
| 1120 | " | " | 222.3 | 6.5 | 215.80 | " | | 195.9 | 19.9 | D/CRUMBLES = 195.9 |
| 1125 | | | | | | " | 10 BAGS | 166.5 | 49.3 | D/CRUMBLES = 166.5 |
| 1140 | " | " | 205 | 6.7 | 198.3 | " | | 178.5 | 19.8 | 183 + 2.0 - 6.7 = 178.3 |
| 1150 | | | | | | " | 10 BAGS | 148.5 | 49.8 | 153.2 + 2 - 6.7 = 148.5 |
| 1300 | " | " | 185.9 | 6.75 | 179.15 | " | | 161.7 | 17.45 | D/CRUMBLES = 161.7 |
| 1305 | | | | | | " | 8 BAGS | 119.25 | 59.9 | D/CRUMBLES = 119.25 |
| 1320 | | | 167.6 | 6.7 | 160.9 | " | | 148.8 | 12.1 | 153.3 + 2.2 - 6.7 = 148.8 |
| 1325 | | | | | | " | 10 BAGS | 120.1 | 40.8 | 124.6 + 2.2 - 6.7 = 120.1 |
| 1340 | " | " | 148.8 | 6.6 | 142.2 | " | | 132.4 | 9.8 | D/CRUMBLES = 132.4 |
| 1350 | | | | | | " | 15 BAGS | 88.8 | 53.4 | D/CRUMBLES = 88.8 |
| 1400 | | | | | | " | | | | D/CRUMBLES = 111.3 |
| 1410 | | | | | | | | | | REMOVING 8" CASING FROM |
| | | | | | | | | | | BOREHOLE |

WHC-MR-0209

9 1 1 2 0 5 0 0 3 1 9

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-15 | Date 10/3/89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

Logged by S.M. GOODWIN [signature] Date 10/3/89
Reviewed by [signature] Date 12-7-89
Measuring Equip. L300-04 Procedure PNL-MA-567 DO-1, REV.0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0800 | CARBON STEEL | 10" | 136' | 7.2 | 128.8 | 8-20 CRUMBLES | | 111.3 | 17.5 | D/CRUMBLES = 111.3 |
| 0805 | " | " | 136 | 8.55 | 127.45 | " | | 113.05 | 14.4 | D/CRUMBLES = 113.05 |
| 0820 | " | " | " | " | " | " | 15 BAGS | 86.25 | 41.2 | D/CRUMBLES = 86.25 |
| 0830 | " | " | 122.2 | 6.55 | 115.65 | " | | 90.45 | 25.2 | D/CRUMBLES = 90.45 |
| 0835 | " | " | " | " | " | " | 10 BAGS | 75.35 | 40.3 | D/CRUMBLES = 75.35 |
| 0900 | " | " | 106 | 6.7 | 99.3 | " | | 81.6 | 17.7 | D/CRUMBLES = 81.6 |
| 0905 | " | " | " | " | " | " | 13 BAGS | 61.6 | 37.7 | D/CRUMBLES = 61.6 |
| 0920 | " | " | 89.4 | 6.65 | 82.75 | " | | 68.55 | 14.2 | D/CRUMBLES = 68.55 |
| 0930 | " | " | " | " | " | " | 15 BAGS | 45.15 | 37.6 | D/CRUMBLES = 45.15 |
| 0945 | " | " | 71.6 | 6.8 | 64.8 | " | | 51.6 | 13.2 | D/CRUMBLES = 51.6 |
| 0950 | " | " | " | " | " | " | 15 BAGS | 27.9 | 36.9 | D/CRUMBLES = 27.9 |
| 1000 | " | " | 53 | 6.9 | 46.1 | " | | 46.5 | -0.4 | D/CRUMBLES = 46.5 ; 0.4' OF |
| 1020 | " | " | " | " | " | " | 24 BAGS | 46.1 | 37.0 | OPEN HOLE) D/CRUMBLES = 9.1 |
| 1030 | " | " | 35 | 6.7 | 28.3 | " | | 22 | 6.3 | D/CRUMBLES = 22 |
| 1045 | " | " | " | " | " | " | 3 BAGS | 17.1 | 11.2 | D/CRUMBLES = 17.1 |
| 1050 | " | " | 29.55 | 6.6 | 22.95 | | | 19.2 | 3.75 | D/CRUMBLES = 19.2 |
| 1058 | | " | " | " | " | " | 2 BAGS | 16.1 | 6.85 | D/CRUMBLES = 16.1 |
| 1110 | " | " | 29.55 | 9.65 | 19.9 | " | | 17.5 | 2.4 | D/CRUMBLES = 17.5 |
| 1112 | " | " | 25.5 | 6.9 | 18.6 | " | | 18.2 | 0.4 | D/CRUMBLES = 18.2 FINAL D/CRUMBLES |
| 1220 | | | | | | CEMENT GROUT | | | | MIXING CEMENT GROUT |
| 1300 | " | " | " | " | " | " | 2 BATCHES* | +4.8 | 23.4 | PULLING 10" ; D/GROUT = +4.8 |
| 1305 | " | " | 15.5 | 6.3 | 9.2 | " | | 11.9 | -2.7 | D/GROUT = 11.9 |

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E27-15 | Date 10/3/89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 | |

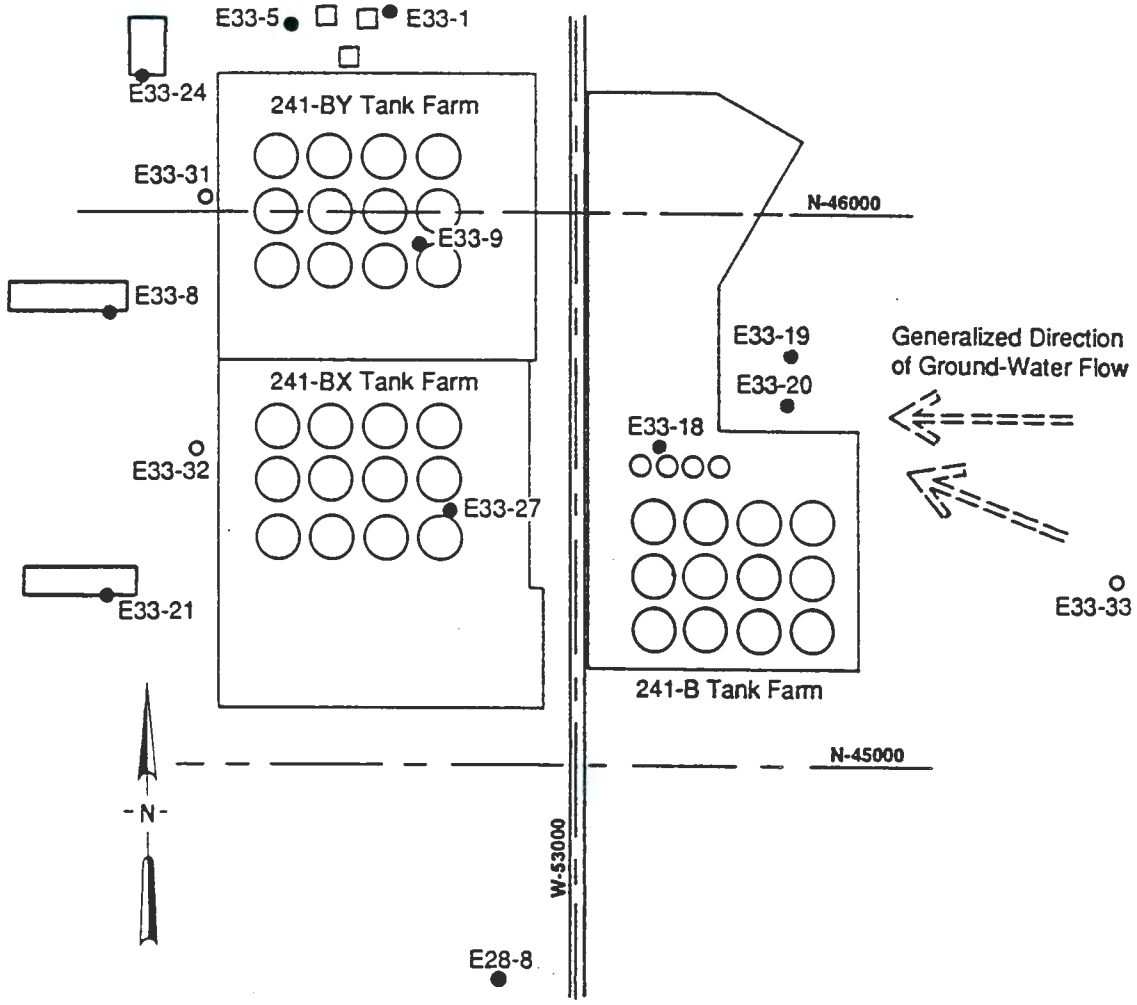
Logged by S.M. GOODWIN Date 10/3/89
Reviewed by D.L. McGlam Date 12-7-89
Measuring Equip. L300-04, E.TAPE #12176 Procedure PNL-MA-567 DI-1, REV 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1320 | CARBON STEEL | 10" | 15.5 | 6.3 | 9.2 | CEMENT GROUT | 1 BATCH* | | | ADDING CEMENT GROUT |
| 1330 | " | " | " | " | " | " | | 2.9 | 6.3 | D/GROUT = 2.9 |
| 1335 | | | | | | | | | | MIXING GROUT |
| 1400 | | " | " | " | " | CEMENT GROUT | 1 BATCH* | +4.2 | 10.5 | POURING GROUT; D/GROUT = +4.2 |
| 1410 | | | | | | | | | | REMOVED 10" CASING; HOLE CAVED IN TO .5' BLS. WILL DIG DOWN TO TOP OF CEMENT GROUT AFTER REMOVING CASING JACKS |
| 1420 | | | | | | | | | | FINAL D/GROUT = 1.8' |
| | | | | | | | | | | *USED 4 BATCHES OF CEMENT GROUT. EACH BATCH = 6 94 LB. SACKS OF PORTLAND CEMENT, 30 GALLONS OF WATER, & 1% BY VOLUME ALUMINUM POWDER. |
| 1450 | STAINLESS STEEL | 4" | 261.48 | 2.13 | 259.35 | | | | | D/BOTTOM INSIDE 4" = 259.03 |
| 1455 | " | " | | | | | | | | D/WATER = 244.77 BLS (~ .32' OF MATERIAL APPEARS TO BE INSIDE 4" CASING & SCREEN) |

WHC-MR-0209

Waste Management Area B-BX-BY




**Legend**

- ● Existing Ground-Water Monitoring Well
- ○ Planned Ground-Water Monitoring Well
- E25-1 Numbering System for Ground-Water Monitoring Wells. All Wells Prefixed by 299-
- ○ 200 Series Single-Shell Tank
- ◯ 100 Series Single-Shell Tank
- —— Fences
- ═══ Roads
- ▭ Cribs
- N-42000 Hanford Plant Coordinates

Note: Not Drawn to Scale

WELL 299-E33-31

Drilling at Well 299-E33-31 began July 11, 1989, and reached total depth on August 7, 1989. The well was drilled with a Bucyrus-Erie 22W to a depth of 254.50 ft below ground surface. The sediments encountered were primarily sandy gravel and sand. Static water level during completion was 239.2 ft below ground surface.

Well 299-E33-31 was completed at a depth of 255.9 ft below ground surface. Final well materials include 21.00 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 235.56 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 20-40 mesh Colorado silica sand pack along the screened interval to 3.7 ft above the top of the screen, 5.2 ft of Volclay bentonite pellets, 206.3 ft of 8-20 mesh granular bentonite crumbles, 17.7 ft of Portland cement grout, and an air-entrained concrete pad which extends 2.0 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Galion[a] crane during completion. Completion activities at Well 299-E33-31 were finished September 11, 1989.

The estimated volume of water added to the borehole during drilling was 47 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 85 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on September 27, 1989, and a total of 892 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was not performed at this site.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on October 17, 1989; this activity concluded well construction and installation.

---

(a) Galion Manufacturing Division, Dresser Industries, Inc., Galion, Ohio.

| DRILL LOG | By AIRHART | Rig BE 22W 14102 Mel | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-11-89 | | Depth 0' To 0' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Melvin Thoresen is driller | | |
| | | | | Rig, tools, casing - steam cleaned prior to coming on site - inspected by Curtis Hoover (KEH Title III Inspector) | | |
| | | | | Performing final set up of rig | 0700- | 1045 |
| | | | | Safety meeting led by Randy (KEH) - discussed Health & Safety Plan for project | 0900- | 0945 |
| | | | | Welding drive shoe on 10" casing - O.D of drive shoe = 11 3/4" | 1045-1200<br>1200-1230 | lunch |
| | | | | Personnel on site: Safety/Title III Curtis Hoover - RPT Mike Copeland | | |
| | | | | Core barrel drilling | 1340 | started drilling |

REMARKS:
Reviewed by W.L. McGhan 12-14-89

PNL MA-567, DO-1, REV.0

STP [signature]
7/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

321

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig BE 22W 1410Z Mcl | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-11-89 | | Depth 0' To 10' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | 0'-5' - Muddy Sandy Gravel - probably | | |
| | | | | backfill - cobble-size gravel | | |
| | 6' | D | D | MUDDY SANDY GRAVEL: 70% gravel, 25% sand, | 1400 | Took (2) pint |
| | | | | 5% mud : 10% VCP, 15% CP, 25% MP, 20% FP-VFP, | | lithologic samples & |
| | | | | 10% vcs, 2% cs, 5% MS, 6% FS-VFS, 5% mud : | | (1) moisture sample |
| | | | | gravel SR-R - 60% basalt 40% qtzite & other - | | No contamination |
| | | | | caliche on clasts - sand - 50% basalt | | detected. |
| | | | | 50% qtz-rich - rcts strongly w/ 10% HCl : | | |
| | | | | unconsolidated. | | |
| | 10' | D | D | SANDY GRAVEL : 80% gravel, 20% sand : | 1430 | Took (2) pint |
| | | | | gravel - range VFP-SC - dom. MP-CP - | | lithologic samples |
| | | | | dom. basaltic - sand - range VFS-VCS - | | & (1) moisture |
| | | | | dom. VCS - 50% basalt 50% qtzitic & | | sample. |
| | | | | rock frags. - strong rxn. w/ 10% HCl - | | No contamination |
| | | | | unconsolidated - | | detected. |
| | | | | Note: sediment becoming dryer & | | |
| | | | | coarser | | |

REMARKS:
Reviewed by V.L. Dreckman 12-18-89

PNL-MA-567 . DD-1 . REV-0

STP [signature]
7/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig BE 22W 14102 MEI | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-11-89 | | Depth 10' To 10' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Sediments keep caving - have to add | | |
| | | | | casing | | |
| | | | | 100% vegetable oil (Crisco) will be used | | |
| | | | | as lubricant for tool changing during | | |
| | | | | project | | |

REMARKS:
Reviewed by V.L. McGhan 12-14-89

PNL-MA-567, DO-1, REV-0

STP [signature] 7/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5-85)

323

WHC-MR-0209

| DRILL LOG | By: AIRHART | Rig: 14102 BE 22W Mcl | Well Number: 299-E33-31 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-12-89 | | Depth: 10' To 14' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0900 | Driller Arrived |
| 11' | of 10" | casing | | | 0930 | Added 11' of 10" casing |
| | | | | | 0940 | Resumed drilling |
| | | | | | | w/ drive barrel |
| | | | | Site / sediments surveyed by: | | |
| | | | | Mike Copeland - RPT - using GM | | Background rad = |
| | | | | Curtis Hoover - Safety / Title III - using | | 200-250 cpm w/ |
| | | | | OVA & combustible gas, $O_2$ meter | | GM @ geologists |
| | | | | | | table - ~600 cpm |
| | | | | | | @ fence around |
| | | | | | | Tank Farm. |
| | | | | | | |
| | | | | Drilling difficult - sediments very coarse - | | |
| | | | | having difficulties keeping casing straight | 1200-1230 | lunch |
| | | | | | 1240 | Continued drilling |
| | | | | 10'-14' - sediments mostly gravel - some clasts | | |
| | | | | 100-200 mm dia. - Driller having to add | | |
| | | | | small amounts of water to keep seds in | | |

REMARKS:
Reviewed by D.C. McGhan 12-14-89

PNL-MA-567 DO-1, REV-0

Steve D. [illegible] 7/12/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ___ Standing Water

WHC-MR-0209

324

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| AIRHART | 1410 2 BE 22W Mel | 299-E33-31 | NA | W-017 |
| Date: 7-12-89 | | Depth: 14' To 14' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | barrel. | 1400 | Has added 3 |
| | | | | | | gallons $H_2O$. |
| | | | | Drilled out to 14.5' - hole keeps caving- | 1409 | |
| | | | | must add casing | | |
| 21' of | 10" casing | | | | 1445 | Adding 10' of 10" casing |
| | | | | | | 11' + 10' = 21' |

REMARKS: Reviewed by D.L. McKeehan 12-14-89 USED 3 GALLONS OF $H_2O$

PNL-MA-567, DO-1, REV. 0

St P. A 7-12-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

305

| DRILL LOG | By AIRHART | Rig BE 22W 14102 | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-13-89 | | Depth 14' To 14 | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Driller @ Haz. training 8 hr. refresher | | |
| | | | | course all day. | | |

REMARKS:
Reviewed by V.L. McKlean 12-14-89
PNL-MA-567 DO-1, REV-0

SLP [illegible] 7/13/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

326

| DRILL LOG | By AIRHART | Rig BE 22W 14102 Mel Thorsen | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-14-89 | | Depth 14' To 20' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 21' | | | | | 0700-0730 | safety mtg. |
| | | | | | 0750 | Resumed welding |
| | | | | Has added 1 gallon $H_2O$ to borehole | 0950 | |
| | | | | to keep sediments in drive barrel | | |
| | 15' | D | M | MUDDY SANDY GRAVEL: 60% gravel 35% sand | 1040 | Took (2) pint |
| | | | | 5% mud: 7% CP, 23% MP, 30% FP-VFP, 10% | | lithologic samples |
| | | | | VCS, 10% CS-MS, 15% FS-VFS, 5% mud: poorly | | No moisture sample |
| | | | | sorted: gravel - SA-SR - 70% basalt 30% ign. | | taken - $H_2O$ added. |
| | | | | sand: A-SA, 60% basalt 40% qtz-rich - | | |
| | | | | wet color dark brown 10YR 3/3 - strong | | |
| | | | | rxn. w/ 10% HCl - unconsolidated | | |
| | | | | | 1045 | Resumed drilling |
| | | | | | 1050 | Added ½ gallons |
| | | | | | | $H_2O$ to borehole |
| | | | | | 1120 | Added 1½ gallons |
| | | | | | | $H_2O$ to borehole |
| | 20' | D | W | MUDDY SANDY GRAVEL: 70% gravel, 25% sand | 1135 | Took 2 lithologic |
| | | | | 5% mud - dom. MP-CP, dom. CS-VCS - | | samples → |

REMARKS:
Reviewed by H.C. McKlem 12-14-89

PNL-MA-567 DO-1, REV. 0

S.L.P. [signature] 7-14-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

327

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig BE 22W 1410Z | Well Number 299-E33-31 | Computer Number ~A | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-14-89 | | Depth 20' To | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 21' | | | | No Δ lithology or color - rxn w/ | | No moisture |
| | | | | 10% HCl - unconsolidated - | | sample - will |
| | | | | | | take chem. |
| | | | | | | sample @ 25'- |
| | | | | | | No contamination |
| | | | | | | detected. |
| | | | | Encountered sand @ 22' | | |
| | 25 | D | D | SANDY GRAVEL = 50% gravel 50% sand : 10% MP | 1315 | Took (2) pint |
| | | | | 40% FP-VFP, 40% VCS-CS, 10% MS-FS - well sorted. | | lithologic samples, |
| | | | | gravel - 80% basalt, 20% qtzite, ign - SA-SR | | (1) moisture sample, |
| | | | | sand - 40% basalt 60% qtz-rich & rock frags - A-SA, | | (2) 500 ml chem. |
| | | | | weak rxn. w/ 10% HCl, not enough fines to determine | | samples - ref chain |
| | | | | wet color, unconsolidated. | | of custody # |
| | | | | | | SST 71489. |
| | | | | | 1320 | Putting up sun shade |
| 32' of | 10" casing | | | | 1350 | Adding 11' of 10" casing |
| | | | | | | 21' + 11' = 32' |
| | | | | | 1415 | Shut Down |

REMARKS: Reviewed by V.L. McKhan 12-14-89 ADDED 3 GALLONS OF $H_2O$

PNL-MA-567 DO-1, REV. 0

S. P. [illegible] 7-14-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

328

| DRILL LOG | By AIRHART | Rig BE 22W 14102 Mel Thoresen | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-17-89 | | Depth 25' To 36' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 32' | | | | Finishing welding 10" casing | 730-820 | |
| | | | | | 0830 | Drilling |
| | | | | | 0855 | Added ½ gallon $H_2O$ |
| | 30' | D | SM | GRAVELLY SAND : 15% gravel, 85% sand : | 0915 | Took (2) pint |
| | | | | Trace VCP (1 in sample bucket) - otherwise 5% | | lithologic samples |
| | | | | FP, 10% VFP, 30% VCS, 40% CS, 15% MS-VFS : | | (1) moisture sample |
| | | | | gravel - 60% basalt, 40% igneous w/ some qtzite - | | No contamination |
| | | | | A-SA ; sand : 35% basalt 65% qtz, f-spar, rx frags - | | detected. |
| | | | | A-SA ; wet color grayish brown 2.5Y 5/2 (few fines | | |
| | | | | so hard to tell) ; No rxn. w/ 10% HCl ; | | |
| | | | | unconsolidated | | |
| | 36' | D | SM | GRAVELLY SAND: 15% gravel, 85% sand - as | 0945 | Took (2) pint |
| | | | | above except gravel contains 2% MP, 13% | | lithologic samples |
| | | | | FP-VFP. | | (1) moisture sample |
| | | | | | | No contamination |
| | | | | | | detected. |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by W.L. McGlam 12-14-89

PNL-MA-567 DO-1 REV. 0

Steve [illegible] 7/17/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

329

| DRILL LOG | By AIRHART | Rig BE 22W 14102 Mel | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-17-89 | | Depth 36' To 45' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 32' | 40' | D | SM | GRAVELLY SAND: No change in lithology | 1015 | Took (2) pint |
| | | | | | | lithologic samples |
| | | | | | | (1) moisture sample |
| | | | | | | (2) 500 ml. chem. |
| | | | | | | samples (only 3/4 |
| | | | | | | full) - reference |
| | | | | | | chain-of-custody |
| | | | | | | # SST 71789 - No |
| | | | | Driller has 14' of open hole | 1030 | contamination |
| | 45' | D | SM | SANDY GRAVEL: 60% gravel, 40% sand - | 1050 | Took (2) pint |
| | | | | 2% CP, 8% MP, 50% FP-VFP, 10% VCS, 12% CS, 12% MS, | | lithologic samples |
| | | | | 6% FS-VFS - Mod-well sorted - gravel → 70% basalt | | (1) moisture sample |
| | | | | 20% ign. 10% qtzite, SA-SR - sand → 30% basalt | | No contamination |
| | | | | 70% qtz, f-spar, rock frags, A-SA → wet color | | detected. |
| | | | | grayish brown 2.5Y 5/2 → unconsolidated - | | |
| | | | | wk. rxn w/ 10% HCl. | | |
| | | | | | | |
| | | | | Driller has ~ 20' open hole | 1110 | |

REMARKS:
Reviewed by D.L. McGlam 12-14-89

PNL MA-567 DO-1, REV. 0

Stp [illegible] 7/17/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

00-021 (5-85)

WHC-MR-0209

326

| DRILL LOG | By AIRHART | Rig BE 22W 14102 | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-17-89 | | Depth 45' To 55' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 32' | 50' | D | SM | SANDY GRAVEL: No change from 45' sample. | 1115 | Took (2) pint |
| | | | | Note: slight calcic cementation on clasts | | lithologic samples |
| | | | | (sand grains cemented to clasts - very | | (1) moisture sample. |
| | | | | friable however) - This was evident on | | No contamination |
| | | | | 45' sample also. | | detected. |
| | | | | Preparing to add casing | 1145 | |
| | | | | | 1200-1230 lunch | |
| | | | | Checked D/B = 48.8' below land surface | 1240 | S-tape # L300-07 |
| 52'9½" | of 10" casing | | | | 1340 | Added 20'9½" of 10' |
| | | | | | | 32' + 20'9½" = 52'9½" |
| | | | | | 1350 | Resumed Drilling |
| | | | | Drilling rate decreased slightly @ ~52' - appears | 1420 | |
| | | | | to be slightly compacted or consolidated | | |
| | 55' | D | SM | SAND: 3% FP-VFP, 97% sand - 3% FP-VFP, | 1450 | Took (2) pint |
| | | | | 35% VCS, 40% CS, 15% MS, 7% FS-VFS - well sorted. | | lithologic samples |
| | | | | gravel - 60% basalt 40% ign, other A-SA - sand - 30% | | (1) moisture sample. |
| | | | | basalt 70% qtz, f-spar, rock frags - weak rxn w/ 10% | | No contamination |
| | | | | HCl, No Δ color, slightly consolidated (?) | | detected |

REMARKS:
Reviewed by V.K. McGhan 12-14-89

PNL-MA-567 DO-1, REV. 0

S.P. Ad[illegible] 7/17/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

WHC-MR-0209

33

| DRILL LOG | By: AIRHART | Rig: BE 22W 14102 | Well Number: 299-E33-31 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-17-89 | | Depth: 55' To 61' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 60' | D | SM | SLIGHTLY GRAVELLY SAND - (will describe tomorrow) | 1515 | Took (2) pint lithologic samples, (1) moisture sample, (2) 500 ml chemical samples - reference chain-of-custody # SST 71789. No contamination detected. |
| | | | | Thin silt (~1/2") lense @ ~62' | 1525 | |

REMARKS:
Reviewed by V. L. McGlohon 12-14-89 ADDED 1/2 GALLON $H_2O$
PNL-MA-567 DO-1, REV-0

Stop 7/17/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

9112050037 5

| DRILL LOG | By AIRHART | Rig BE 22W 14102 | Well Number 299-E33-31 | Computer Number | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-18-89 | Mel T. | Depth 61' To 65' | NA | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 52'9½" | | | | | 0720 | Rig Prep. |
| | | | | | 0750 | Drilling |
| | 60' | D | SM | SLIGHTLY GRAVELLY SAND: 8% gravel, 92% sand: | TAKEN | YESTERDAY 7/17 |
| | | | | 8% FP-VFP, 25% VCS, 35% CS, 20% MS, 12% FS-VFS- | | |
| | | | | well-to-mod sorted. - gravel: 50% basalt, | | |
| | | | | 50% igneous (mostly granitic), some metam. | | |
| | | | | - sand: 35% basalt 65% qtz, fspar, rock frags - | | |
| | | | | wet color 2.5Y 5/2 grayish brown - mod. rxn. | | |
| | | | | w/ 10% HCl - unconsolidated. | | |
| | | | | | | |
| | | | | ~15' open hole | 0815 | |
| | 65' | D | SM | GRAVELLY SAND: 15% gravel, 85% sand: | 0825 | Took (2) pint |
| | | | | 15% FP-VFP, 30% VCS, 40% CS, 15% MS-VFS - | | lithologic samples |
| | | | | No change in lithology or color - just | | (1) moisture sample |
| | | | | increase in gravel fraction | | No contamination |
| | | | | | | detected. |
| | | | | (KEH Safety Officer) Doug Wright detected ~2.5 ppm w/ OVA @ | 0930-1030 | |
| | | | | well-head - He detected extremely high readings | | |

REMARKS:
Reviewed by D.L. Markham 12-14-89
PNL-MA-567, DO-1, REV-0

S.P. [illegible] 7/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

333

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig BE 22W 14102 | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-18-89 | | Depth 65' To 70' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 52'9½" | | | | around Acetylene tank and propane tank. | | |
| | | | | Shut down drilling until values were fixed | | |
| | | | | in order to determine if these were source | | |
| | | | | of contamination - Values were fixed - | | |
| | | | | borehole readings returned to background. | | |
| | | | | | | |
| | | | | Preparing to add casing - drilled out to | 1047 | |
| | | | | ~68' | | |
| 73'5" | of 10" | casing | | | 1150 | Added 20'7½" of 10" |
| | | | | | | 52'9½" + 20'7½" = 73'5" |
| | | | | | 1200-1230 | lunch |
| | | | | | 1320 | Resumed drilling |
| | 70' | D | D | SLIGHTLY GRAVELLY SAND: 8% gravel, 90% sand, | 1415 | Took (2) pint |
| | | | | 2% mud: 8% FP-VFP, 25% VCS, 25% CS, 30% MS, | | lithologic samples, |
| | | | | 10% FS-VFS, 2% mud: mod. sorted: gravel: | | (1) moisture sample - |
| | | | | A-SA, 50% basalt, 50% ign.: sand: 30% basalt | | No contamination |
| | | | | 70% qtz, fspar, A-SA: No Δ color: Wk. rxn. | | detected. |
| | | | | w/ 10% HCl, unconsolidated. | | |

REMARKS:
Reviewed by D. L. Mathes 12-14-89

PNL-MA-567 DO-1, REV. 0

Steve Airhart 7/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

(20.021 (5-85)

WHC-MR-0209

334

8 1 1 2 0 5 0 0 3 1 7

| DRILL LOG | By AIRHART | Rig 14102 | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-18-89 | | Depth 70' To 80' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 73'5" | | | | Encountered finer sands @ 73' | 1450 | |
| | 75' | D | SM | SAND - 100% well sorted FS-VFS - 5% basalt | 1455 | Took (2) pint lithologic |
| | | | | 95% qtz, mica, f-spar, rock frags - weak rxn w/ | | samples, (1) moisture |
| | | | | 10% HCl → only a few CaCO3 grains - wet color | | sample - No contam. |
| | | | | brown 10YR 5/3 - unconsolidated. | | encountered. |
| | 80 | D | SM | SAND - No change from 75' sample. | 1510 | Took (2) pint |
| | | | | | | lithologic samples |
| | | | | | | (1) moisture and |
| | | | | | | (2) 500 ml. chemical |
| | | | | | | samples - ref. |
| | | | | | | chain of custody |
| | | | | | | #SST071889. |
| | | | | | | No contamination |
| | | | | | | detected. |

REMARKS:
Reviewed by V.L. McGlam 12-14-89
PNL-MA-567 DO-1, REV. 0

Step [illegible] 7/12/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

333

WHC-MR-0209

9 1 1 2 0 5 0 0 3 3 8



| DRILL LOG | By: AIRHART | Rig: BE 22W 14102 | Well Number: 299-E33-31 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-19-89 | | Depth: 80' To 80' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 73'5" | | | | Driller not here due to illness. | | |

REMARKS:
Reviewed by V.L. McKhann 12-14-89
PNL-MA-567 DO-1 REV.0

STP 7/19/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

336

| DRILL LOG | By AIRHART | Rig BE 22W 14102 Mel. T. | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-20-89 | | Depth 80' To 90' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0700-0730 | Safety Mtg |
| | | | | | 0730-0815 | Rig Prep. |
| | | | | | 0815 | Resumed Drilling |
| | 85' | D | M | MUDDY SAND : 80% FS-VFS, 20% mud (silt) - mod. to- | 0820 | Took (2) pint |
| | | | | strong rxn. w/ 10% HCl, wet color brown | | lithologic samples |
| | | | | 7.5YR 5/2, - This sample same as 75', 80' | | (1) moisture sample |
| | | | | sample - just slightly finer grained. | | No Contam. detected |
| | 90' | D | SM | SAND : 3% gravel, 97% sand : 3% FP-VFP, 43% VCS, | 0915 | Took (2) pint |
| | | | | 40% CS, 10% MS, 7% FS-VFS, - well sorted. | | lithologic samples, |
| | | | | - sand - 30% basalt 70% qtz., fspar, rock frags - | | (1) moisture sample. |
| | | | | - Weak rxn. w/ 10% HCl, unconsolidated - | | No contamination |
| | | | | Note: increase in grain size | | encountered. |
| | | | | | | |
| | | | | ~ 20' open hole | 0930 | |
| 94' 1/2" | of 10" | casing | | | 1100 | Adding 20' 7 1/2" of 10" |
| | | | | | | 73' 5" + 20' 7 1/2" = 94' 1/2" |
| | | | | | 1140 | Finished Welding |
| | | | | | 1200 - | 230 lunch - |

REMARKS:
Reviewed by D.L. Weathman 12-14-89

PNL-MA-567 DO-1 REV. 0

S.D. [illegible] 7-20-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

337

WHC-MR-0209

| DRILL LOG | By: AIRHART | Rig: 14102 | Well Number: 299-E33-31 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-20-89 | | Depth: 90' To 95' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1250 | Resumed Drilling |
| | | | | Driller noticed saturated sediments @ | 1340 | Took (2) 250ml |
| | | | | top inside drive barrel. Tried to | | chemical samples. |
| | | | | knock these seds out of barrel | | Ref. chain-of- |
| | | | | but packed too tight - No | | custody # |
| | | | | contamination detected w/ OVA or | | SST072089 |
| | | | | GM. - Took chemical sample from | | Depth = 91' |
| | | | | some of seds knocked out of | | |
| | | | | barrel. Seds appear to be inter- | | |
| | | | | layered coarse & fine sands. | | |
| | 95' | D | M | SLIGHTLY GRAVELLY SAND: 7% gravel, 93% sand, | 1405 | Took (2) pint |
| | | | | 7% VFP-FP, 20% VCS, 30% CS, 30% MS, 13% FS- | | lithologic samples, |
| | | | | VFS - Mod. sorted - gravel - 50% basalt | | (1) moisture |
| | | | | 5% caliche, 45% igneous (granitic) - A-SA - sand - | | sample. No |
| | | | | 25% basalt 75% qtz-rich, A-SA - weak | | contamination |
| | | | | rxn w/ 10% HCl, unconsolidated. | | detected |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by V.L. Markham 12-14-89

DNL-MA-567 DO-1 REV. 6

7/20/89

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

9112050031 1

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| AIRHART | BE 22W 14102 | 299-E33-31 | NA | W-017 |
| Date: 7-20-89 | | Depth: 95' To 101' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 100' | D | M | SLIGHTLY GRAVELLY SAND: same as 95' sample- | 1430 | Took (2) pint |
| | | | | except sand dominantly MS-FS. | | lithologic samples, |
| | | | | | | (1) moisture |
| | | | | | | sample, (2) |
| | | | | | | 250 ml. chemical |
| | | | | | | samples - Ref |
| | | | | | | chain-of-custody |
| | | | | | | # SST072089 |
| | | | | Sediments keep caving @ 101' - | | |
| | | | | Preparing to add casing | 1510 | |
| | | | | | | |
| | | | | | 1515 | Shut Down |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by L. McGlean 12-14-89

PNL-MA-567 DO-1 REV. 0

Stp [illegible] 7/20/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

339

WHC-MR-0209

9 1 1 2 0 5 0 0 3 1 2



| DRILL LOG | By AIRHART/LANIGAN | Rig BE 22W 14102 Mcl. Thorssen | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-21-89 | | Depth 101' To 110' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0800-1015 | Driller @ training |
| | | | | | | class. |
| 103'8¼" | of 10" | casing | | | 1115 | Adding 9'7¾" of 10" casing |
| | | | | | | 94'½" + 9'7¾" = 103'8¼" |
| | | | | | 1125 | Finished Welding |
| | | | | | 1140 | Drilling |
| | | | | | 1150-1230 | lunch |
| | | | | | 1245 | Drilling |
| | 105' | D | M | SAND: 3% gravel, 97% sand – 3% VFP, 10% vcs, | 1340 | Took (2) pint |
| | | | | 15% cs, 50% MS, 22% FS-VFS – well sorted – gravel – | | lithologic samples, |
| | | | | 50% basalt 50% chert (brown), ign – A-SA – sand – | | (1) moisture sample |
| | | | | A-SA – 25% basalt 75% qtz, chert, f-spar, rock frags – | | No contamination |
| | | | | wet color olive brown 2.5Y 4/4, weak rxn. w/ 10% | | detected |
| | | | | HCl – unconsolidated. | | |
| | 110' | D | M | SAND: same as 105' same – slightly finer grained | 1355 | Took (2) pint |
| | | | | (less vcs) | | lithologic samples |
| | | | | | | (1) moisture sample |
| | | | | | | No contamination |
| | | | | | | detected. |

REMARKS:
Reviewed by D. L. McKhan 12-14-89

PNL-MA-567 DO-1 REV. 0

STP 7/21/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

340

9 1 1 2 0 5 0 0 3 1 3

2 of 2

| DRILL LOG | By: AIRHART | Rig: BE 22W 14102 M. Thorssen | Well Number: 299-E33-31 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-21-89 | | Depth: 110' To 120' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 115 | D | M | SAND: 2% VFP, 98% sand (20% VCS, 40% CS, 30% MS | 1455 | Took (2) pint |
| | | | | 8% FS-VFS) - No change in lithology from | | lithologic samples |
| | | | | previous sample - Note coarser texture - | | (1) moisture |
| | | | | weak rxn. w/ 10% HCl - No change in | | sample - No |
| | | | | color - unconsolidated. | | contam. detected. |
| | | | | | | |
| | 120' | D | M | SAND: 3% VFP, 97% sand (40% VCS, 30% CS, | 1445 | Took (2) pint |
| | | | | 20% MS, 7% FS-VFS) - Mod. sorted - gravel - | | lithologic samples |
| | | | | 60% basalt 40% granitic, qtzite, Trace caliche | | (1) moisture sample - |
| | | | | - A-SA - sand; A-SA, 30% basalt, 70% qtz, | | No moisture sample. |
| | | | | chert, fspar - Weak rxn w/ 10% HCl - | | |
| | | | | No change in color - unconsolidated - | | |
| | | | | Will take chemical sample @ 125'. | | |

REMARKS:
Reviewed by W.L. Nielsen 12-14-89

PNL-MA-567 DO-1 REV. 0

S.T.P. [illegible]
7/21/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

341

WHC-MR-0209

| DRILL LOG | By: AIRHART | Rig: BE 22W 14102 M. Thoresen | Well Number: 299-E33-31 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-24-89 | | Depth: 120' To 130' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 103'8¼" | | | | | | |
| | | | | Hole stayed open over weekend - | | |
| | | | | ~ 20' open hole | | |
| | | | | Preparing to add casing | 0745 | |
| 124'4" of 8" casing | | | | | 0905 | Added 20'7¾" of 10" |
| | | | | | | 103'8¼" + 20'7¾" = 124'4" |
| | | | | | 0915 | Driving 10" casing |
| | | | | | 0940 | Resumed Drilling |
| | 125' | D | M | SLIGHTLY GRAVELLY SAND: 3% FP, 2% MP, (1 each CP), | 1055 | Took (2) pint |
| | | | | 30% VCS, 50% CS, 15% MS; Well Sorted; gravel: | | lithologic samples, |
| | | | | 50% basalt, 45% granitic, 5% cemented sand, SA-SR; | | (1) moisture sample, |
| | | | | sand: 40% basalt, 60% granitic, SA-SR; no rxn | | and (2) 250 ml |
| | | | | to 10% HCl, wet color: grayish brown 10YR 5/2 (hard | | chemical samples |
| | | | | to pinpoint color due to lack of fines), slightly | | Ref. chain-of-custody |
| | | | | consolidated - No contamination detected. | | # SST072489 |
| | 130' | D | M | SLIGHTLY GRAVELLY SAND: 1% FP, 4% VFP, 5% VCS, | 1135 | Took (2) pint lithologic |
| | | | | 40% CS, 50% MS; well sorted; gravel: 60% basalt, | | samples and (1) |
| | | | | 40% granitic, SA-SR; sand: 40% basalt, 60% granitic, | | moisture sample |

REMARKS:
Reviewed by D.L. McKhan 12-14-89

PNL-MA-567 DO-1 REV. 0

STP 7/24/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

272

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| LANIGAN/ Aichart | BE 22W 14102 M. Thorensen | 299-E33-31 | NA | W-017 |
| Date: 7-24-89 | | Depth: 130' To 132' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 124'4" | 130' (cont.) | | | SA-SR; very slight reaction to 10% HCl; wet color; | | No contamination |
| | | | | can't determine due to lack of fines, seems to be | | detected |
| | | | | same color (dry) as 125' sample | | |
| | | | | | 1155 | stopped drilling |
| | | | | | | for lunch break |
| | | | | | 1250 | Resumed Drilling |
| | | | | Formation keeps caving - must add casing | | |
| 134'5¾" | of 10" casing | | | | 1430 | Added 10'1¾" of 10" |
| | | | | | | 124'4" + 10'1¾" = 134'5¾" |
| | | | | | 1442 | Resumed Drilling |
| | | | | | 1520 | Shut Down |

REMARKS:
Reviewed by L. Nicklaus 12-14-89

PNL-MA-567 DO-1 REV. 0

7/24/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

345

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| AIRHART | BE 22W 14102 | 299-E33-31 | NA | W-017 |
| Date: 7-25-89 | Mel Thoresen | Depth: 132' To 140' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 134'5 3/4" | | | | | 0700-0715 | Rig Prep |
| | | | | | 0720 | Drilling |
| | 135' | D | M | SAND: 1% gravel, 99% sand: 1% VFP, 15% VCS, | 0800 | Took (2) pint |
| | | | | 30% CS, 45% MS, 9% FS-VFS : Mod-to-well sorted : | | lithologic samples, |
| | | | | sand: A-SA, 20% basalt, 80% qtz, f-spar, : wet | | (1) moisture sample. |
| | | | | color - grayish brown 2.5Y 5/2 (hard to determine | | No contamination |
| | | | | - few fines) - weak rxn w/ 10% HCl - unconsolidated | | detected. |
| | | | | | | |
| | 140' | D | M | SAND: Same as 135' sample - same | 0820 | Took (2) pint |
| | | | | grain size distribution as well. | | lithologic samples, |
| | | | | | | (1) moisture sample, |
| | | | | | | (2) 250 ml. chemical |
| | | | | | | samples - Reference |
| | | | | | | Chain-of-custody |
| | | | | | | # SST072589 |
| | | | | | | No contamination |
| | | | | | | detected. |
| | | | | | | |

REMARKS:
Reviewed by K. L. McGhan 12-14-89

PNL-MA-567 DO-1 REV. 0

Step Airhart 7/25/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig 14102 | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-25-89 | | Depth 140' To 150' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 134'5¾" | | | | | 0915 | Preparing to add |
| | | | | | | casing |
| 144'8¾" | of 10" | casing | | | 1000 | Added 10'3" of 10" |
| | | | | | | 134'5¾" + 10'3" = 144'8¾" |
| | | | | | 1005 | Drilling |
| | | | | | 1010 | Added 2½ gallons $H_2O$ |
| | 145' | D | M | SLIGHTLY GRAVELLY SAND: 5% gravel, 95% sand - | 1035 | Took (2) pint |
| | | | | 2% FS, 3% VFS, 40% VCS, 20% CS, 30% MS, 5% FS-VFS | | lithologic samples |
| | | | | - Mod. sorted - gravel - 50% basalt 50% | | (1) moisture |
| | | | | granitic, qtzite, A-SA - sand - 35% basalt | | sample - No |
| | | | | 65% qtz, Fspar, rock frags - A-SA - | | contam. detected. |
| | | | | Moderate rxn. w/ 10% HCl - No Δ color - | | |
| | | | | unconsolidated. | | |
| | 150' | D | M | SLIGHTLY GRAVELLY SAND: 5% gravel, 95% sand - | 1055 | Took (2) pint |
| | | | | Same as 145' sample - slightly Finer | | lithologic samples |
| | | | | grained - dom. CS-MS. - wk - mod. rxn. w/ | | (1) moisture sample - |
| | | | | 10% HCl - NO Δ color - unconsolidated. | | No contam. |
| | | | | | | detected. |

REMARKS:
Reviewed by W L McShane 12-14-89

PNL-MA-567 DO-1 REV-0

Step. [illegible] 7/25/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

345

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| GOODWIN | # 14102 | 299-E33-31 | N/A | W-017 SST |
| Date: 25 JULY 1989 | BE-22W | Depth: 150' To 159' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1100 | DRILLING |
| | | | | WELDING 8" DRIVE SHOE & BANS | 1110 | WELDING |
| 144' 8 3/4" | | | | | 1200 - 1230 | LUNCH |
| + 10' 4 1/2" | | | | ADDING 10' 4 1/2" of 10" CARBON STEEL CASING; | 1240 | WELDING 10" |
| = 154' 1 1/4" | | | | TOTAL 10" = 154' 1 1/4" | 1400 | DRILLING |
| | 155' | D | SM | GRAVELLY SAND: 20% GRAVEL, 77% SAND, 3% | 1450 | SAMPLE |
| | | | | MUD. 3% MP, 7% FP, 10% VFP, 40% VCS, 22% | 1455 | DRILLING |
| | | | | CS, 10% MS, 3% FS, 2% VFS, 3% MUD. | 1530 | END OF SHIFT |
| | | | | MODERATELY SORTED. GRAVELS ARE 50% MAFIC, | | |
| | | | | 50% FELSIC; A TO SA. SANDS ARE 35% | | |
| | | | | MAFIC, 65% FELSIC; A TO SA. SLIGHT RX. | | |
| | | | | TO 10% HCL. NO COLOR CHANGE. 2 PT. | | |
| | | | | LITHOLOGIC & 1 MOISTURE SAMPLE. Ø PPM | | |
| | | | | w/ OVA & RAD = <DET. SAMPLE COARSER | | |
| | | | | THAN PREVIOUS. | | |

REMARKS:
Reviewed by W.L. Walker 12-14-89 ADDED 2 1/2 GALLONS OF $H_2O$ TODAY

PNL-MA-567 DO-1, REV. 0

Sheila Mark 7/25/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

000 031 (5 85)

WHC-MR-0209

346

9 1 1 2 0 5 0 0 3 1 9

| DRILL LOG | By S. M. GOODWIN | Rig BE 22.. | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 26 JULY 1989 | #22-14102 | Depth 159' To 159' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS MEL THORESEN | 0700 | SERVICING RIG |
| | | | | | 0730 | PREPARING TO |
| | | | | | | RUN 8" CASING |
| | | | | | | |
| | | | | Geophysically logged borehole using | 1130 | |
| | | | | procedure PNL-MA-567 GL-7 Rev. 0. | | |
| | | | | Logged using Natural gamma probe | | |
| | | | | Logged interval = 3' - 155.7' below land | | |
| | | | | surface. Bottom of 10" casing @ | | |
| | | | | 155.1' - 1.7' (stickup) = 153.4' below land | | |
| | | | | surface. | | |
| | | | | | | |
| | | | | Added the following sections of 8" dia | | |
| | | | | casing: | | |
| | | | | 21' 3½" w/ shoe (shoe = 9¾" dia. O.D) | | |
| | | | | 20' 5¾" | | |
| | | | | 20' 11¼" | 1520 | Shut Down |
| | | | | 62' 8½" | | |

REMARKS:
Reviewed by D. L. McSellan 12-14-89
PNL-MA-567 DO-1, REV. 0

Sheila Hart 7/26/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

347

| DRILL LOG | By BRANDENBERGER | Rig BE 22W 1410Z MEL THORESON | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7/27/89 | | Depth 159 To 165 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | ADDED FOLLOWING SECTIONS OF 8" DIA. CASING: 20'-7½", 20'-9½", | | |
| | | | | 21'-0", 20'-7½", 21'-0", = 104' ½" | | |
| | | | | ∴ TOTAL 8" CASING = 62'8½" + 104'½" = | 1120 | RESUMED DRILLING |
| 166'9" | | | | 166'9" | | 8" DRIVE BARREL |
| | | | | | 1200 | LUNCH |
| | | | | | 1240 | DRILLING |
| | 160' | D | M | SAND: 4% GRAVEL, 96% SAND: 3% VFP, 1% FP, 15% VCS, | 1305 | TOOK (2) PINT |
| | | | | 35% CS, 40% MS, 6% FS-VFS. A-SA, 23% BASALT, 77% QTZ, | | LITHOLOGIC SAMPLES, |
| | | | | FELDSPAR, : WET COLOR - 2.5Y 6/4 LIGHT YELLOWISH BROWN | | (1) MOISTURE SAMPLE, |
| | | | | SLIGHT RXN W/10% HCL. | | (2) 250 ml. CHEMICAL |
| | | | | | | SAMPLES - REFERENCE |
| | | | | | | CHAIN-OF-CUSTODY |
| | | | | | | # 55T072789 |
| | 165 | D | M | SAND: SAME AS 160'. SAME ~~AS~~ GRAIN SIZE | 1330 | TOOK (2) PINT |
| | | | | DISTRIBUTION. | | LITHOLOGIC SAMPLES, |
| | | | | | | (1) MOISTURE SAMPLE, |
| | | | | | | NO CONTAMINANTS DETECTED. |
| | | | | | | |

REMARKS:
Reviewed by T. D. Madden 12-14-89

PNL-MA-567 DO-1 REV. 0

Seth Brandenberger 7/27/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ___ Standing Water

WHC-MR-0209

| DRILL LOG | By BRANDENBERGER | Rig BE 22W 14102 | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7/27/89 | MEL THORESON | Depth 165' To 175' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | 170' | D | M | GRAVELLY SAND: 17% GRAVEL, 82% SAND, 1% MUD. | 1340 | TOOK (2) PINT |
| | | | | 5% CP, 3% MP, 7% F-VFP, 20% VCS, 20% CS, 37% MS, | | LITHOLOGIC SAMPLES, |
| | | | | 7% FS-VFS, 1% MUD, MODERATELY SORTED, GRAVELS ARE | | (1) MOISTURE SAMPLE. |
| | | | | 70% MAFIC, 30% FELSIC; SA TO SR, SLIGHT RXN TO 10% HCL, | | NO CONTAMINATES DETECTED |
| | | | | SANDS ARE 25% MAFIC, 75% FELSIC, A TO SA, | | |
| | | | | SLIGHT RXN TO 10% HCL. | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | 175' | D | M | SANDY GRAVEL: 35% GRAVEL, 64% SAND, 1% MUD, | 1356 | TOOK (2) PINT |
| | | | | 3% CP, 12% MP, 15% FP, 5% VFP, 19% VCS, 20% CS, 20% MS, | | LITHOLOGIC SAMPLES |
| | | | | 5% VFS-FS, 1% MUD. MODERATELY SORTED, GRAVELS ARE | | (1) MOISTURE SAMPLE. |
| | | | | 60% MAFIC, 40% FELSIC; SA TO SR, SANDS ARE 35% | | NO CONTAM. DETECTED. |
| | | | | MAFIC, 65% FELSIC, A TO SA. SLIGHT RXN TO 10% HCL. | | |
| | | | | COLOR - 2.5Y 6/4 LIGHT YELLOWISH BROWN. | 1400 | WELDING |
| 177'1" | | | | - WELDED ON 10'4" 8" DIA. STEEL CASING. 166'9" + 10'4" = 177'1" | | |

REMARKS:
Reviewed by D. L. McKellar 12-14-89
PNL-MA-567 DO-1 REV. 0

[signature] 7/27/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

379

| DRILL LOG | By: BRANDENBERGER | Rig: BE22W 14102 MEL THORESON | Well Number: 299-E33 31 | Computer Number: N/A | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7/27/89 | | Depth: 175' To 179' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1449 | RESUMED DRILLING |
| | | | | | 1510 | SHUT DOWN |

REMARKS:
Reviewed by D.L. Matthias 12-14-89

PNL-MA-567 DO-1 REV-0

S.L. Brandenberger 7/27/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

WHC-MR-0209

340

| DRILL LOG | By LANIGAN | Rig BE 22W 14102 Mel Thoresen | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-28-89 | | Depth 175' To 180' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 177'1" | | | | | 0700 | Started maintenance |
| | | | | | | on drill rig |
| | | | | | 0730 | Maintenance completed |
| | | | | | 0731 | Started drill rig |
| | | | | | | |
| 177'1" | 180' | D | M | SAND: 2% VFP, 10% VCS, 20% CS, 25% MS, 43% FS; | 0740 | Took (2) pint lithologic |
| | | | | moderately sorted; gravel: 80% basalt, 20% granitic, | | samples, (1) moisture |
| | | | | SR-SA; sand: 20% basalt, 80% granitic, SR-SA; | | sample, (2) 250 ml |
| | | | | Very weak rxn to 10% HCl; wet color: light olive brown, | | chemical samples |
| | | | | 2.5Y 5/4, no consolidation | | Reference Chain of Custody |
| | | | | NOTE: large decrease in gravel | | #SST072889 |
| | | | | | | (111, 112 and C69, 742) |
| | | | | | | No contamination detected |
| 187'2" | | | | Added 10'1" of 8" casing | 0755 | Stopped drilling to |
| | | | | Total casing: 177'1" + 10'1" = 187'2" | | add 8" dia. casing. |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by D.L. McGlum 12-14-89

D.C. Lanigan
7-28-89

PNL-MA-567 DO-1, REV. 0

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

35

| DRILL LOG | By LANIGAN | Rig BE 22W 14102 N. Thoresen | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-28-89 | | Depth 180' To 195' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 187'2" | 185' | D | SM | SAND: 1% VFP, 10% VCS, 10% CS, 40% MS, 39% FS; | 0930 | Took (2) pint lithologic |
| | | | | Well Sorted; gravel: 70% basalt, 30% granitic, SR-SA; | | samples, (1) moisture |
| | | | | sand: 20% basalt, 80% granitic, SR-SA; | | sample, no contamination |
| | | | | weak rxn to 10% HCl; wet color: light olive brown, | | detected |
| | | | | 2.5Y 5/4, no consolidation | | |
| | | | | | | |
| | 190' | D | SM | same as 185' | 0947 | Took (2) lithologic |
| | | | | | | samples, (1) moisture |
| | | | | | | sample, no contamination |
| | | | | | | detected |
| | | | | | | |
| | | | | | | |
| | 195' | D | SM | SAND: 1% VFP, 5% VCS, 5% CS, 75% MS, 14% FS | 0955 | Took (2) lithologic |
| | | | | well sorted; gravel: 50% basalt, 50% granitic, SR-SA; | | samples, (1) moisture |
| | | | | sand: 30% basalt, 70% granitic, SR-SA; weak rxn | | sample, no contamination |
| | | | | to 10% HCl; wet color: 2.5Y 5/4, light olive brown; | | detected. |
| | | | | no consolidation, | | |
| | | | | NOTE: increase in Medium Sand | | |

REMARKS:
Reviewed by V.L. McClam 12-14-89

PNL-MA-567 DO-1, REV. 0

D.C. Lanigan
7-28-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

352

WHC-MR-0209

| DRILL LOG | By LANIGAN | Rig BE 22W 14102 M. Thomsen | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-28-89 | | Depth 195' To 202' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 187'2" | | | | Added 10'4" of 8" diameter casing | 0955 | Stopped drilling to |
| | | | | Total Casing : 187'2" + 10'4" = 197'6" | | add 8" casing |
| | | | | | | |
| 197'6" | | | | | 1050 | started drilling |
| | | | | | | |
| | 200' | D | SM | SAND : 100% FS, very well sorted ; | 1120 | Took (2) pint lithologic |
| | | | | 10% basalt, 90% granitic, SR ; weak rxn | | samples, (1) moisture |
| | | | | to 10% HCl ; wet color: 2.5Y 4/4 olive brown | | sample, (2) 250 ml |
| | | | | no consolidation ; quite a bit of muscovite | | chemical samples |
| | | | | NOTE : Change to well sorted, fine sand | | (111, 112 and C69, 742) |
| | | | | | | no contamination |
| | | | | | | detected |
| | | | | | | |
| | 202' | D | M | lens of clay-like material with large clasts. | 1135 | Took (2) pint lithologic |
| | | | | largest clast: granite 5¼" x 3½" x 2½", SR | | samples |
| | | | | smallest clast: 2" x 1½" x ½", R granite? | | SPLIT LITHOLOGIC SAMPLES AND TOOK |
| | | | | | | (2) ENVIRONMENTAL |
| | | | | | | SAMPLES, SJB 1309 7/28/89 |
| | | | | | | |

REMARKS:
Reviewed by W.L. McGhan 12-14-89
PNL-MA-567 DO-1, REV. 0

D.C. Lanigan
7-28-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

| DRILL LOG | By LANIGAN/ BRANDENBERGER | Rig BE 22W 14702 | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7/28/89 | | Depth 205 To 205' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 197'6" | 205' | D | D | 202' PUNGENT ODOR FROM STEEL CASING. | 1150 | LUNCH |
| | | | | SAMPLE AT 205' SANDY GRAVEL, 48% SAND, 50% GRAVEL, 2% MUD: | 1235 | RETURNED FROM LUNCH. ON STANDBY |
| | | | | 13% VCP, 12% CP, 5% MP, 10% FP, 10% VFP, 8% VCS, 10% CS, | | WHILE SAFETY OFFICERS INVESTIGATE. |
| | | | | 18% MS, 6% FS, 6% VFS, 2% MUD. GRAVELS 65% MAFIC | | TOOK (2) LITHOLOGIC |
| | | | | 35% FELSIC; SUBANGULAR TO SUBROUNDED SAND | | SAMPLES. NO CONTAMINATES |
| | | | | 60% MAFIC, 40% FELSIC, SA TO SR. WET COLOR 2.5Y 4/4 | | DETECTED WITH DVM |
| | | | | OLIVE BROWN. NO CONSOLIDATION. MODERATELY SORTED. | | OR HSA 36L |
| | | | | - DRILLER SAYS ODOR AT 202' MADE HIS MOUTH FEEL | 1328 | SAFETY OFFICER: RANDY SPANIEL FROM |
| | | | | DRY. RANDY SPANIEL ARRIVES ON SITE. | | KAISER ARRIVES. |
| | | | | 1337 - DECIDED TO CALL HEHF. SHUT DOWN FOR THE DAY. | 1337 | SHOT DOWN FOR |
| | | | | NO DRILLING UNTIL HHF INSPECTS SITE. | | DAY |

REMARKS:
Reviewed by D.L. McKellar 12-14-89

DNL-MA-567 DO-1 REV.0

7/28/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

354

WHC-MR-0209

8 1 1 3 0 5 0 0 3 5 7

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| LANIGAN | BE 22W 14102 M. Thoresen | 229-E33-31 | N/A | W-017 |
| Date: 7-31-89 | | Depth: 205' To — | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 197'6" | | | | No samples will be taken today. | 0700 | Rig shut down – |
| | | | | | | waiting for HEHF |
| | | | | | | to inspect site. |
| | | | | | | |
| | | | | | 1000 | resumed drilling |
| | | | | | | driller on fresh air. |
| | | | | | | |
| | | | | | 1040 | well has been capped |
| | | | | | | off with monitoring |
| | | | | | | instrumentation |
| | | | | | | – rig shut down |
| | | | | | | for the day. |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by V.L. McSchan 12-14-89
PNL-MA-567 DO-1, Rev. Ø

D.C. Lanigan 7-31-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

WHC-MR-0209

335

| DRILL LOG | By LANIGAN | Rig BE 22W 14102 M. Thoresen | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-1-89 | | Depth 205' To 205' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 197'6" | | | | No activity at this well today. Sample analysis results have not been received. It's still not known what, if any, contaminants were encountered. | | |

REMARKS:
Reviewed by W L McLellan 12-14-89

PNL - MA - 567 DO-1, REV. 0

D. C. Lanigan
8-1-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

GOODWIN/ 9 1 1 2 0 5 0 0 3 7 9

| DRILL LOG | By LANIGAN | Rig BE 22W 14102 M. Thoresen | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-2-89 | | Depth 205' To 210' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 197'6" | | | | | 0915 | Driller is in level |
| 10'3 1/2" | | | | | | B PPE. |
| 207' 9 1/2" | | | | | 0930 | PREPARING TO WELD |
| | | | | ADDED 10' 3 1/2" OF 8" CARBON STEEL CASING; | 1015 | FINISHED WELDING |
| | | | | TOTAL 8" : 207' 9 1/2" | 1030 | DRILLING |
| | | | | HIT GRAVELS @ 206' - INCREASING THROUGH | 1050 | FM. CHANGE |
| | | | | 208' | | |
| | 210 | D | DRY | WILL DESCRIBE LATER; NO SMALL PPE FROM | 1110 | SAMPLE; NO |
| | | | | GEOLOGIST. DRILLER 1 KEH SAFETY ARE | | MOISTURE SAMPLE |
| | | | | IN LEVEL B 1 FRESH AIR. IT APPEARS | 1115 | SHUT DOWN UNTIL |
| | | | | THAT FM. IS QUITE GRAVELLY; CAN'T | | AFTER LUNCH |
| | | | | DRIVE CASING. WILL HAVE TO SWITCH TO | 1200 - 1230 | LUNCH |
| | | | | HARD TOOL. | | |
| | | | | | | |
| | | | | NOTE: Now using Hard Tool | 1345 | Changing to Hard Tool |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by D.L. Markham 12-14-89

PNC - MA - 567 DO - 1, REV. 0

D.C. Lanigan
8-2-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

357

WHC-MR-0209

9 1 1 2 0 5 0 0 3 6 0

2 of 2

| DRILL LOG | By EJ Jensen | Rig BE 22W 14102 | Well Number 299-E33-31 | Computer Number NA | Project or Work Order No. 2017 SST |
|---|---|---|---|---|---|
| | Date 8/2/89 | M. Thorenson | Depth 210' To 210' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 210 | D | Dry | MUDDY SANDY GRAVEL, 60% gravel, 30% sand, 10% mud, most pebbles are smaller than medium pebbles and none are larger than very coarse, Sand is 10% VCS, 10% CS, 15% MS, 20% FS, 25% VFS, 20% mud Gravel is mostly Basaltic with some quartz, poor sorting, unconsolidated, wet color is 10YR 5/3 Brown. Moderate RXN in 10% HCl. | 1110 | 2 pint jar sample no moisture sample |
| | | | | sample was put into jars and described at 1430 hrs. after the Level B restriction was removed. | | |

REMARKS:
Reviewed by D.L. McGhan 12-14-89
PNL-MA-567 DO-1 REV. 0

E. J. 8/2/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ___ Standing Water

WHC-MR-0209

456

9112050031

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| BLEGEN | BE 22W 14102 M. THORESEN | 299-E33-31 | N/A | W-017 SST |
| Date: 8-3-89 | | Depth: 210' To 215' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 210' | H | D | ADDED SMALL AMOUNTS OF $H_2O$ (1 gal.) | 0725 | START DRILLING, HARD TOOL |
| | | | | | | CLEANING OUT CASING |
| | | | | | 0805 | STOP DRILLING, PULLED HARD TOOL ADDING 10'8" OF 8" CASING |
| 218' 5½" | | | | TOTAL CASING: 207'9½" + 10'8" = 218'5½" | 0900 | WELDING COMPLETED |
| | | | | | 0912 | DRIVING CASING |
| | | | | ADDED APPROX. 4 gal $H_2O$ | 0915 | RESUME DRILLING - HARD TOOL |
| | | | | | 0955 | (STILL CLEANING OUT BOREHOLE. CURRENTLY AT ~208') |
| | | | | | 0957 - 1000 | DRIVING CASING |
| | | | | | 1000 | RESUME DRILLING |
| | | | | | 1025 | DRIVING CASING |
| | | | | ADDED ≈ 5 gal $H_2O$ | 1027 | RESUME DRILLING |
| | 215 | H | W | muddy sandy GRAVEL: 60% gravel, 30% sand, 10% mud | 1124 | TOOK TWO (2) PINT LITHOLOGIC SAMPLES, (1) MOISTURE SAMPLE |
| | | | | 10% MP, 30% FP, 20% VFP, 5% VCS, 5% MS, 20% FS | | No no-share sample (RPB) |
| | | | | Gravel: 50% Basalt, 50% Granitic, etc. SA-SR Sand: 70% Basalt SR | | |
| | | | | Poorly sorted, Wet color 5Y 4/4 olive, Well consolidated (according to driller) | | |
| | | | | Slight reaction to 10% HCl | 1200 | Lunch |
| | | | | | 1230 | Return from lunch Start drilling |
| | | | | | 1245 | Stop drilling to add casing |

REMARKS:
Reviewed by W. L. McKlean 12-14-89

PNL-MA-567 DO-1, REV. 0

Kenneth P. Blegen 8-3-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

299

| DRILL LOG | By: Bleyen | Rig: BE 22 W 14102 M. Thorson | Well Number: 299-E33-31 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-3-89 | | Depth: 215' To 224' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 215 | | | Adding 10'7¾" of 8" casing | 1310 | Start welding |
| 229' 1¼" | | | | Total casing 218'5½" + 10'7¾" = ~~230~~ 229'1¼" | 1342 | Stop welding |
| | | | | | 1345 | Driving casing |
| | | | | | 1350 | Start drilling |
| | | | | Added approximately 5 gal $H_2O$ | 1355 | |
| | 220' | | | Sandy GRAVEL: ~~very~~ SIMILAR TO 215' | 1424 | Took (2) PINT LITHOLOGY |
| | | | | 60% gravel, 35% sand, 5% mud | | SAMPLES, (2) 250 ml |
| | | | | 5% MP (Possibly broken pieces of cobbles), 25% FP, 30% VFP | | CHEMISTRY SAMPLES - REFERENCE CHAIN-OF-CUSTODY #SST 080389 |
| | | | | 5% ~~10%~~ VCS, 25% MS, 5% FS | | |
| | | | | GRAVEL; 50% BASALT, 50% Granitics & feldspathic minerals. SA-A | | |
| | | | | SAND; 30% BASALT, 70% Quartz & felds. SA | | |
| | | | | POORLY SORTED. WET COLOR 5Y 5/3 OLIVE | | |
| | | | | MODERATE REACTION W/10% HCl MODERATELY WELL CONSOLIDATED | | |
| | | | | | | |
| | 225' | | | | 1520 | Shut Down |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: Reviewed by V.L. Nebelsick 12-14-89 ADDED 15 GALLONS of $H_2O$ TODAY

PNL-MA-567 DO-1, REV. 0

Ronald P. Bleyen

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

20

| DRILL LOG | By: Bleyer | Rig: BE 22W 14102 M. Thoresen | Well Number: 299-E33-31 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-4-89 | | Depth: 224' To 230' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 229' 1¼" | 224 | H | W | | 0710 | Driller on site |
| | | | | | 0725 | Start Drilling |
| | | | | Added ~5 gal $H_2O$ [Sample too thick to get out of dart bailer] | 0740 | |
| | 225' | H | W | sandy GRAVEL: 50% gravel, 45% sand, 5% fines (silt & mud) | 0742 | Took (2) pint lithologic |
| | | | | Trace CB (1) pebble in sample), 5% MP (probably broken pieces of larger pebbles) | | samples. No moisture sample |
| | | | | 15% FP, 30% VFP, 10% CS, 10% MS, 20% FS, 5% VFS | | No contam., No rad. |
| | | | | Gravel: 40% Basalt, 50% Granitics & felsic minerals; 10% metamorphics, etc | | |
| | | | | A-SA, The one CP was well rounded, Poorly sorted | | |
| | | | | Sand: 30% Basalt, 40% qtz., 30% felds. & misc. A-SA | | |
| | | | | Wet Color: 5Y 5/3 OLIVE, Moderate consolidation; Slight rxn w/10% HCl | | |
| | | | | | 0818 | Rig shut down for quick maintenance |
| | | | | | 0820 | Drilling again |
| | 230' | H | W | mod. sandy GRAVEL: 60% Gravel, 35% SAND, 5% mud - 15% cP, | 0845 | Took (2) pint Lithologic Samples |
| | | | | 15% mP, 20% fP, 10% vfP, 10% vCS, 15% cS, 5% mS, 3% fS, 2% | | No moisture sample |
| | | | | vfS, 5% mud - Gravel A-SR; Sand SA-SR - low-mod sphericity. | | No contam, No rad. |
| | | | | Grav: 40% Basalt, 60% felsic - Sand: 30% Basalt, 70% felsic - | | |
| | | | | Wet Color: 5Y 5/3 Olive; moderately consolidated Slight rxn w/10% HCl | | |
| | | | | Adding 10'8" of 8" casing; Total Casing 229' 1¼" + 10'8" = 239' 9¼" | 0850 | Start welding |

REMARKS:

PNL-MA-567 DO-1, Rev. 0

Ronald P. Bleyer

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

301

254

| DRILL LOG | By: Blegen/Aubrecht | Rig: BE 22 W, 14102, M. Thoresen | Well Number: 299-E33-31 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-4-89 | | Depth: 230' To | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 239' 9¼" | 230' | H | W | | 0930 | Finish Welding |
| | | | | Driller noted difficulty driving casing - harder material | 0945 | Drive Casing |
| | | | | | 0953 | Resume Drilling |
| | | | | | 1005 | Drive Casing (very slow) |
| | | | | | 1006 | Resume Drilling |
| | | | | Added ~5gal $H_2O$ | 1039 | |
| | 235 | H | W | sandy GRAVEL : 45% gravel, 55% sand | 1128 | took (2) pint lithologic samples |
| | | | | 10% MP, 30% FP, 5% VFP, ~~30% VCS, 15% CS~~ 10% VCS, 25% CS | | No moisture sample |
| | | | | 15% FS, 5% VFS | | No contam. |
| | | | | GRAVEL : 45% Basalt, 55% felsic & seds A-SA | | |
| | | | | SAND : 40% Basalt, 60% Qtz & ~~granit~~ felsics SA | | |
| | | | | Poorly sorted, Wet color 5Y 5/4 olive | | |
| | | | | Moderately consolidated, Slight rxn w/10% HCl | | |
| | | | | | | |
| | | | | | 1200 | Break for lunch |
| | | | | | 1240 | Back on site, drilling |
| | | | | Added ~5gal $H_2O$ | 1259 | |
| | 240 | | | | 1310 | Stop drilling for sample |

REMARKS:
Reviewed by D.L. McKlem 12-14-89
PNL-MA-567 DO-1, Rev. 0

Randall P. Blegen

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

202

9 1 1 2 0 5 0 0 3 4 5

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Bryan/Lubrecht | BE 22-W 14102 M. Thoresen | 299-E33-31 | N/A | W-017 SST |
| Date: 8-4-89 | | Depth: 240' To 245 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 240' | H | W | sandy GRAVEL: 60% gravel, 40% sand | 1310 | Collected (2) pint lithologic |
| | | | | 10% MP, 30% FP, 20% VFP [Most pieces broken, Driller suggested | | samples and (2) 250ml |
| | | | | that he may be going through large pebbles or cobbles] | | Chemistry samples [ No moisture samples No contam. detected ] |
| | | | | 10% VCS, 15% CS, 8% MS, 4% FS, 3% VFS | | Reference Chain-of-Custody #SST 080489 |
| | | | | GRAVEL: 40% Basalt, 60% Felsic + seds SA-SR | | No rad. |
| | | | | SAND: 40% BASALT, 60% Felsic + seds SA | | |
| | | | | Moderate consolidation. Wet color 5Y 4/3 OLIVE | | |
| | | | | No rxn w/10% HCl | | |
| 250' 5¼" | | | | Adding 10'8" of 8" Casing 239' 9¼" + 10'8" = 250' 5¼" | 1330 | Welding |
| | | | | | 1355 | Stop Welding |
| | | | | | 1400 | Driving Casing |
| | | | | | 1403 | Stop driving |
| | | | | | 1405 | Start drilling |
| | 245' | H | W | sandy GRAVEL: 50% gravel, 50% sand | 1451 | Collected (2) Lithologic Samples |
| | | | | Trace MP, 5% FP, 45% VFP, 15% VCS, 10% CS, 20% MS, 5% FS & VFS | | No moisture sample |
| | | | | Gravel: 50% Basalt, 50% Felsic + seds A-SA; Sand: 40% basalt, 60% felsic + seds - SA | | No contam, No rad |
| | | | | Wet color 5Y 5/3 OLIVE, No rxn w/10% HCl | | |
| | | | | Moderately sorted, [Much smaller pebble size] | | |

REMARKS:
Reviewed by D.L. McGhan 12-14-89

PNL-MA-567 DO-1, Rev. 0

Ronald P. Bryan

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

363

WHC-MR-0209

9 1 1 2 0 5 0 0 3 6

4 of 4

| DRILL LOG | By Bloyer / Lubrecht | Rig BE 22W 14102 M. Thoresen | Well Number 2.59-E33-31 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-4-89 | | Depth 245' To 245' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 245 | H | W | Driller thinks he ~~may~~ have hit water a ≈ 242' | | |
| | | | | (Difference in drilling characteristics, clean tools) | | |
| | | | | Cleaning out borehole | 1515 | |
| | | | | | 1520 | Shut down |

REMARKS: Reviewed by V.L. Markham 12-14-89 ADDED 15 GALLONS OF $H_2O$ TODAY

PNL-MA-567 DO-1, Rev. 0

Ronald P. Bloyer

204

WHC-MR-0209

R11205003 7

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| Bleger | BE 22W 14102 M. Thoresen | 299-E33-31 | N/A | W-017 SST |
| Date: 8-7-89 | | Depth: 245' To 250' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 250' 5¼" | 245' | H | W | | 0715 | On-site |
| | 248' | H | W | Driller noted that the depth was actually down to ≈248' by Fri. shut-down | 0730 | Resume drilling (cleaning out |
| | | | | | | borehole) |
| | 249' | H | W | Shut down for repairs. Driller noted that both casings (10" and 8") | 0750 | Stop drilling |
| | | | | were sinking while drilling with the hard tool. | | |
| | | | | | 0812 | Resume drilling |
| | 250' | H | W | sandy GRAVEL: 55% gravel, 45% sand; 5% MP, 20% FP | 0830 | Took (2) pint lithologic samples |
| | | | | 30% VFP, 8% VCS, 10% CS, 20% MS, 5% FS, 2% VFS | | No moisture sample |
| | | | | GRAVEL: 45% Basalt, 55% Felsic and seds A-SA | | No contam. detected |
| | | | | SAND: 40% Basalt, 60% Felsic and seds A-SA | | No rad. " |
| | | | | Poorly sorted, Wet color: 5Y 4/3 OLIVE Moderately consolidated | | |
| | | | | No rxn w/10% HCl | | |
| | | | | | | |
| | | | | Steel tape broke while checking TD. Driller was able to | 0848 | |
| | | | | Fish it out. Lufkin Steel Tape #L300-05 | | |
| | | | | New tape TD = 247.3' - Possibly in heaving sands | 0900 | |
| 261' 1¼" | | | | Adding 10'8" of 8" casing. Total casing = 250' 5¼" + 10'8" = 261' 1¼" | 0915 | Start welding |
| | | | | | 1005 | Welding complete |

REMARKS:
Reviewed by V. L. Markham 12-14-89

PNL-MA-567 DO-1, Rev. 0

Ronald V. Bleger

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

9 1 1 2 0 5 0 0 3 5 8

2 of 3

| DRILL LOG | By Blegen | Rig BE 22W 14102 M. Thoresen | Well Number 299-E33-31 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-7-89 | | Depth 250 To 255 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 261' 1¼" | 250' | H. | W | Measured depth to water = 239.70' below top of 10" casing | 1015 | |
| | | | | [Held 250.90, 11.20' Stick-up] | | |
| | | | | Slope Indicator Co. Water Level Indicator Model 51453 | | |
| | | | | Serial #10998 [Ron Blegen, 8/7/89 Procedure WL-1] | | |
| | | | | | 1026 | Driving casing |
| | | | | | 1030 | Resume drilling |
| | | | | Added ~5gal $H_2O$ | 1153 | |
| | | | | | 1155 | Break for lunch |
| | | | | Measured depth to water = 234.6 below top of 10" casing | 1245 | |
| | | | | [Held 241.1', 6.5' stick up] | | |
| | | | | [Slope Indicator Co. Water Level Indicator Model 51453 | | |
| | | | | SERIAL #10998 (Ron Blegen, 8/7/89, WL-1)] | | |
| | 255 | H | W | sandy GRAVEL: 50% gravel, 50% sand; 10% MP, 15% FP, 25% VFP | 1255 | Took (2) pint lithologic samples |
| | | | | 10% VCS, 15% CS, 20% FS, 5% VFS, GRAVEL: 60% Basalt, 40% felsic & seds | | No moisture sample. |
| | | | | A-SA, Some pieces rounded on edges (broken VCP), | | No contam. |
| | | | | SAND: 30% Basalt, 70% felsic & seds A-SA Poorly sorted | | |
| | | | | Wet color 5Y 5/3 olive No rxn w/10% HCl | | |
| | | | | | | |

REMARKS:
Reviewed by D.L. McGehan 12-14-89

PNL-MA-567 DO-1, Rev. 0

Ronald P. Blegen

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very C... C - Coarse F - Fine VF - Very Fine

3906

WHC-MR-0209

| DRILL LOG | By: Bkyer | Rig: BE 22W 14102 M. Thoresen | Well Number: 299-E33-31 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-7-89 | | Depth: 255 To 255 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 261' 1¼" | 255 | | | Measured total depth of well = 254.5' | 1330 | |
| | | | | Lufkin Steel Tape #L350-05 | | |
| | | | | | | |
| | | | | Attempted to drive casing further. Driller thinks casing is on | 1400 | HIT BASALT |
| | | | | top of basalt. Total well depth (by tape measurement = 254.5) | | |
| | | | | (based on length of casing = 255.6) | | |
| | | | | | | |
| | | | | Straightness Test - passed | 1420 | |
| | | | | Witnessed by: J.F. Keller, D.P. Frey (KEH) | | |

REMARKS:
Reviewed by V.L. McLean 12-14-89 ADDED 5 GALLONS OF $H_2O$ TODAY

AVL-MA-567 DO-1 Rev. 0

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

367

WHC-MR-0209

9 1 1 2 0 5 0 0 3 7 0

1 of 1

| DRILL LOG | By: Blagen | Rig: BE 22W | Well Number: 299-E33-31 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 8-8-89 | | Depth: 255 To 255 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 261' 1¼" | 255' | | | Drill rig is being broken down. | 0730 | |
| | | | | Driller said there is approx. 1' to 1½' of material in the | | |
| | | | | bottom of the borehole. This material will be bailed | | |
| | | | | out just before the stainless steel casing is set. | | |
| | | | | D/W = 245.75' - 1.65' STICKUP = 244.10' | 1350 | D/WATER |
| | | | | (PNL E. TAPE H 10998). | | |
| | | | | D/BOTTOM = 253.63' + 2' TAPE - 1.65' STICKUP | 1355 | D/BOTTOM |
| | | | | = 253.98' (PNL 300' H L300-04). FINE | | |
| 261' 1¼" | | | | & MEDIUM SANDS HAVE HEAVED UP CASING 1½' | | |
| - 3' 10" | | | | REMOVED 3'10" OF 8" CASING THIS A.M.; TOTAL | | |
| = 257' 3¼" | | | | 8" CASING = 257' 3¼" | | |

REMARKS:
Reviewed by D.L. McBlane 12-14-89
PNL-MA-567, DO-1, Rev. 0

Ronald P. Blagen

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

368

WHC-MR-0209

9 1 1 2 0 5 0 0 3 7 1

1 of 1

| DRILL LOG | By: S. M. GOODWIN | Rig: NO RIG | Well Number: 299-E33-31 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9 AUGUST 1989 | | Depth: T.D. To | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | VERN McGHAN, PNL, GEOPHYSICALLY LOGGING | 1020 | LOGGING WSW |
| | | | | BOREHOLE WITH NATURAL GAMMA PROBE | | |
| | | | | LOGGED 253' - 3' INTERVAL | 1115 | FINISHED LOGGING |

REMARKS:
Reviewed by V. L. McGhan 12-14-89

PNL-MA-567 DO-1, REV. 0

S. M. Goodwin 8/9/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

369

WHC-MR-0209

| DRILL LOG | By: S.M. GOODWIN | Rig: NO RIG | Well Number: 299-E33-31 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 14 AUGUST 1989 | | Depth: T.D. To | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | D/W = 244.12' - 1.5' STICKUP = 242.62' | 1500 | D/WATER |
| | | | | (PNL E. TAPE # 10995) | | |

REMARKS:
Reviewed by D.L. McGehan 12-14-89

PNL-MA-567 DO-1, REV. 0

Stuart. Good. 8/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

370

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-31<br>Location B-BX-BY Tank Farms | Date SEPT 5, 1989 Sheet No. 1 of 1<br>Project W-017 SST |
|---|---|---|

Logged by S.P. AIRHART SP Airhart Date 9-5-89
Reviewed by D.E. McKlean Date 12-4-89
Measuring Equip. S-tape #L300-07 Procedure PNL-MA-567 Div-1, Rev-0

Drilling Contractor KEL
Driller Mel Thoresen
Rig/Equipment Galion Crane / Hyd. jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Datum - land surface |
| 1045 | | | | | | | | | | D/W = 244' - 2.28' - 1.4' (stickup) |
| | | | | | | | | | | = 240.32 S-tape L300-07 |
| | | | | | | | | | | D/B = 252.55' + .3' - 1.4' = 251.45' |
| 1300 | | | | | | | | | | Added on 8" casing extension |
| 1340 | | | | | | | | | | Began bailing out bottom w/ |
| | | | | | | | | | | 4" dia. sand pump - Fine |
| | | | | | | | | | | black sand being bailed - |
| | | | | | | | | | | Coarser sand below fine |
| | | | | | | | | | | sand |
| 1420 | | | | | | | | | | Bailed ~ 20 gals - only ~3' |
| | | | | | | | | | | of $H_2O$ in borehole - added |
| | | | | | | | | | | ~50 gallons $H_2O$ in order |
| | | | | | | | | | | for sand pump to work & |
| | | | | | | | | | | to inhibit heaving sands. |
| | | | | | | | | | | Began bailing gravels |
| | | | | | | | | | | D/B = 262.45' + .3' - 6.75' = 256' |
| 1615 | | | | | | | | | | Bailed ~ 60-70 gallons $H_2O$ |
| | | | | | | | | | | Shut Down |
| | | | | | | | | | | Note: Put bailed water in 55 |
| | | | | | | | | | | gallon drums. |

371

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-31 | Date SEPT. 6, 1989 Sheet No. 1 of 2 |
|---|---|---|
| | Location B-BX-BY Tank Farms | Project W-017 SST |

Logged by S.P. AIRHART SPA Date 9/6/89
Reviewed by D.L. Nelson Date 12-14-89
Measuring Equip. steel tape # L300-07 Procedure PNL-MA-567 DD-1 REV. 0

Drilling Contractor KEH
Driller Mel Thoresen
Rig/Equipment Galion Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Datum = land surface. |
| 0740 | | | | | | | | | | D/W = 245.9 - 6.73 (stickup) = |
| | | | | | | | | | | 239.2' E-tape # 10998 |
| 0745 | | | | | | | | | | D/B = 262.45 + .3 - 6.73 = 256.02 |
| 0815 | Stainless Steel | | | | | | | | | S.S. is Sch. 5, Type 304 |
| | 10-slot channel | 4" | 10.65' | | | | | | | This section includes bottom |
| | pack screen | | | | | | | | | cap. |
| | 10-slot channel | 4" | 10.37' | | | | | | | |
| | pack screen | | | | | | | | | |
| | | | | | | | | | | Casing sections measured |
| | | | | | | | | | | consistently @ 20'½" = 20.04' |
| 0830-1245 | | | | | | | | | | Shut Down due to hydraulic hose |
| | | | | | | | | | | failure on crane - Changed |
| | | | | | | | | | | cranes. now using Pettibone. |
| 1250 | (6) casing w/ | 4" | 20.04' each | | | | | | | Resumed adding S.S. - casing |
| | centralizers | | | | | | | | | sections measured consistently |
| | (6) casing | 4" | 20.04' each | | | | | | | @ 20'½" = 20.04' - every |
| | w/ out cent. | | | | | | | | | other section casing has |
| | | | | | | | | | | centralizers starting w/ section |
| | Total S.S casing | | | | | | | | | directly above screen. |
| | + screen | = | 261.5' | | | | | | | |

372

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-31<br>Location B-BX-BY Tank Farms | Date SEPT. 6, 1989 Sheet No. 2 of 2<br>Project W-017 SST |
|---|---|---|

Logged by S.P. AIRHART SPA
Reviewed by V.L. Mashan
Measuring Equip. steel tape # L300-07 Procedure PNL-MA-567 Rev. 0

Date 9-6-89
Date 12-14-89

Drilling Contractor KEH
Driller Mel Thoresen
Rig/Equipment Pettibone Crane / Hyd. jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1334 | | | | | | | | | | D/B inside 4" = |
| | | | | | | | | | | 262.6' + .3' − 7' = 255.9' |
| 1336 | | | | | | | | | | D/B annulus = |
| | | | | | | | | | | 262.4' + .3' − 6.7' = 256' |
| | Carbon Steel | 8" | 262' | 6.1' | 255.9 | 20-40 Col. Silica | 1/2 bag | 253.4' | 2.5' | 259.8' + .3' − 6.7' = 253.4' |
| | | | | | | Sand | | | | |
| | | | 262' | 7.0' | 255' | | | 254' | 1' | 261.4' + .3' − 7.7' = 254' |
| 1415 | | | | | 255' | | 1/2 bag | 252.4' | 2.6' | 259.8' + .3' − 7.7' = 252.4' |
| | | | 262' | 7.8' | 254.2' | | | 252.9' | 1.3' | 261' + .3' − 8.4' = 252.9' |
| | | | | | 254.2' | | 1/2 bag | 250.9 | 3.3' | 259' + .3' − 8.4' = 250.9' |
| | | | 262' | 8.6' | 253.4' | | | 251.1' | 2.3' | 260.1' + .3' − 9.3' = 251.1' |
| | | | 259' | 6.4' | 252.6' | | | 251.2' | 1.4' | 257.4' + .3' − 6.5' = 251.2' |
| | | | | | 252.6' | | 1/2 bag | 248.8' | 3.8' | 255' + .3' − 6.5' = 248.8' |
| | | | 258' | 6.4' | 251.6' | | | 249.5' | 2.1' | 256.8' + .3' − 7.6' = 249.5' |
| | | | | | 251.6' | | 1/2 bag | 247.3' | 4.3' | 254.6' + .3' − 7.6' = 247.3' |
| | | | 257' | 6.6' | 250.4' | | | 248' | 1.6' | 256.4' + .3' − 8.7' = 248.0' |
| 1500 | | | | | 250.4' | | 1/2 bag | 245.1' | 5.3' | 253.5' + .3' − 8.7' = 245.1' |
| | | | 255' | 5.8' | 249.2' | | | 245.8' | 3.4' | 251.9' + .3' − 6.4' = 245.8' |
| | | | 255' | 7' | 248' | | | 246.7' | 1.3' | 254' + .3' − 7.6' = 246.7' |
| 1515 | | | | | 248' | | 1/2 bag | 244.5' | 3.5' | 251.8' + .3' − 7.6' = 244.5' |
| | | | 253' | 6.3' | 246.7 | | | 245.3' | 1.4' | 253.9' + .3' − 8.9' = 245.3' |
| 1520 | | | | | | | | | | Shut Down. |

373

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-31 | Date 9/7/89 | Sheet No. 1 of 3 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 SST | |

Logged by SHANNON GOODWIN Shannon Goodwin Date 9/7/89
Reviewed by Nita McKhan Date 12-14-89
Measuring Equip. 300' 6300-07 Procedure FNL-MA-567 00-1 REV. 0

Drilling Contractor KEH
Driller GARY LYDIN
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0730 | CARBON STEEL | 8" | 253' | 8.8' | 244.2' | | | | -1.2' | D/SAND = 245.4' ; 1.2' OPEN HOLE |
| 0745 | | | | | | 20-40 COL. SILICA | 1/2 BAG | 242.9' | 1.3' | D/SAND = 242.9' |
| 0750 | | | | | | | 1/2 BAG | 240.3' | 3.9' | D/SAND = 240.3' |
| 0755 | | | 251.9' | 6.5' | 245.4' | | | | | CASING TOTAL FROM 9/6 INCORRECT; |
| | | | | | | | | | | MEASURED FROM 250.44' WELD |
| 0800 | | | | | | | | 241.1' | 4.3' | D/SAND = 241.1' |
| 0805 | | | 251.9' | 7.5' | 244.4' | | | 242' | 2.4' | D/SAND = 242' |
| 0807 | | | | | | | 1/2 BAG | 240.3' | 4.1' | D/SAND = 240.3' |
| 0810 | | | 251.9' | 9.0' | 242.9' | | | 241' | 1.9' | D/SAND = 241' |
| | | | | | | | 1/2 BAG | 238.3' | 4.6' | D/SAND = 238.3' |
| 0820 | | | 247.9' | 6.4' | 241.5' | | | 240.2' | 1.3' | D/SAND = 240.2' |
| 0823 | | | | | | | 1/2 BAG | 237.3' | 4.2' | D/SAND = 237.3' |
| 0825 | | | 247.9' | 7.7' | 240.2' | | | 239.6' | 0.6' | D/SAND = 239.6' |
| 0826 | | | | | | | 1/2 BAG | 237.6' | 2.6' | D/SAND = 237.6' |
| 0828 | | | | | | | 1/2 BAG | 234.6' | 5.6 | D/SAND = 234.6' |
| 0830 | | | 247.9' | 9.2 | 238.7' | | | 238.8' | 0.1' | D/SAND = 238.8' |
| 0833 | | | | | | | 1 BAG | 232.9' | 5.8' | D/SAND = 232.9' |
| 0837 | | | 243.7' | 6.4' | 237.3' | | | 234.8' | 2.5' | D/SAND = 234.8' |
| 0843 | | | | | | | 1/2 BAG | 232.5' | 4.8' | D/SAND = 232.5' |
| | | | | | | | 1/2 BAG | 230.3' | 7.0' | D/SAND = 230.3' |
| 0847 | | | 243.7' | 7.8' | 235.9' | | | 230.8' | 5.1' | D/SAND = 230.8' |
| 0851 | | | 243.7' | 9.2' | 234.5' | | | 232.2' | 2.3' | D/SAND = 232.2' |

374

WHC-MR-0209

9 1 1 2 0 5 0 0 3 7 7

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299 - E33-31 | Date 9/7/89 | Sheet No. 2 of 3 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 SST | |

Logged by SHANNON GOODWIN [signature] Date 9/7/89
Reviewed by [signature] Date 12-14-89
Measuring Equip. L300-07 / E. TAPE #10998 Procedure PNL-MA-567 DO-1, REV.0

Drilling Contractor KEH
Driller GARY LYDIN
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0853 | CARBON STEEL | 8" | 243.7' | 9.2' | 234.5' | 20-40 SILICA SAND | 1/2 BAG | 229.9' | 4.6' | D/SAND = 229.9' |
| 0900 | | | 240.0' | 6.4' | 233.6 | | | 230.9' | 2.7' | D/SAND = 230.9' |
| 0905 | | | | | | | | | | STANDBY, WAITING FOR PUMP RIG TO BAIL SAND PACK. |
| 0920 | | | | | | | | | | D/W = 238.95' |
| 0925 | | | | | | | | | | D/B INSIDE 4" = 255.75' |
| 0930 | | | | | | | | | | BAILING INSIDE 4" TO DEVELOP SILICA SAND PACK, BAILING INTO 55 GALLON DRUM. |
| 0950 | | | | | | | | | | BAILED VOLUME = 50 GALLONS, $H_2O$ TURBID, BUT NO SILICA SAND PACK IN 5 GALLON BUCKET |
| 0952 | | | | | | | | | | D/B INSIDE 4" = 255.8' |
| 0955 | | | | | | | | 232.2' | 1.4' | D/SAND = 232.2', SAND SETTLED 1.3' |
| 1023 | | | 240.0' | 6.4' | 233.6' | | 1/2 BAG | | 2.4' | D/SAND = 229.8' |
| 1035 | | | 240.0' | 7.55' | 232.45 | | | | 1.85' | D/SAND = 230.6' |
| 1037 | | | 240.0' | 8.35' | 231.65' | | | | 0.45' | D/SAND = 231.2' TOTAL 10 bags FINAL D/SAND |
| 1040 | | | | | | 1/4" BENTONITE PELLETS | 2 5 GAL. BUCKETS | | 5.05' | D/PELLETS = 226.6' |
| 1052 | | | 237.25' | 8.35' | 228.9' | | | | 2.3' | D/PELLETS = 226.6'; NO LOSS w/ ~2.8' PULL. |
| 1057 | | | 237.25' | 9.8' | 227.5' | | | | | D/PELLETS = 225.9'; PELLETS MOVING UP w/ 8". APPEAR TO BE BRIDGED. |

375

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-31 | Date 9/7/89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 SST | |

Logged by SHANNON GOODWIN Date 9/7/89
Reviewed by V.C. McKhan Date 12-14-89
Measuring Equip. L300-07 Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor KEH
Driller GARY - LYDIN
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1100 | CARBON STEEL | 8" | 237.25' | 9.8' | 227.5 | 8-20 MESH CRUMBLES | 5 50LB. BAG | 211.5' | 16' | D/CRUMBLES = 211.5'; WILL SEE IF WEIGHT OF CRUMBLES BREAKS BRIDGE. |
| 1105 | | | 232.4' | 6.3' | 226.1' | | | 215.3' | 10.8' | D/CRUMBLES = 215.3'; CRUMBLES GOING DOWN. PULLED 1.4' & DROPPED 3.8' |
| | | | 232.4' | 7.7' | 224.7' | | | 215.9' | 8.8' | D/CRUMBLES = 215.9' |
| 1120 | | | 229.77' | 6.3' | 223.47 | | | 217.2' | 6.3' | D/CRUMBLES = 217.2' |
| 1125 | | | | | | 8-20 CRUMBLES | 12 BAGS | | 40.9' | D/CRUMBLES = 182.6' |
| 1153 | | | 207.79' | 6.35' | 201.44 | | | 196.55' | 11.24' | D/CRUMBLES = 196.55' |
| 1200 | | | | | | | | | | LUNCH |
| 1230 | | | | | | | | | | END LUNCH |
| 1255 | | | | | | 8-20 CRUMBLES | 10 BAGS | 167.45' | 33.99' | D/CRUMBLES = 167.45' |
| 1258 | | | | | | 8-20 CRUMBLES | 5 BAGS | 153.05' | 48.39' | D/CRUMBLES = 153.05 |
| 1331 | | | 187.17' | 6.5' | 180.67' | | | 166.1' | 14.57' | D/CRUMBLES = 166.1' |
| 1336 | | | | | | 8-20 CRUMBLES | 12 BAGS | 131.3' | 49.37' | D/CRUMBLES = 131.3' |
| 1400 | | | 166.75' | 6.6' | 160.15' | | | 150.6' | 9.55' | D/CRUMBLES = 150.6' |
| 1406 | | | | | | 8-20 CRUMBLES | 10 BAGS | 122.1' | 38.05' | D/CRUMBLES = 122.1' |
| 1410 | | | | | | | | | | PULLING 8" FREE FROM 10"; |
| 1420 | CARBON STEEL | 10" | 154.10' | | | | | 146.4' | ~7.7' | D/CRUMBLES = 146.4' |
| 1530 | | | | | | | | | | DONE FOR DAY; 8" REMOVED. |

376

WHC-MR-0209

9 1 1 2 0 5 0 0 3 7 9

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-31 | Date 9/8/89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 SST | |

Logged by SHANNON GOODWIN Date 9/8/89
Reviewed by D.E. McGlam Date 12-14-89
Measuring Equip. L300-07 Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor KEH
Driller GARY LYDIN
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0700 | CARBON STEEL | 10" | 154.10' | 0.25' | 153.85' | 8-20 CRUMBLES | | 146.4' | 7.45' | MOVING JACKS & WELDING 10" |
| 0825 | | | 160.27' | 6.5' | 153.77' | | | | | D/CRUMBLES = 148.2', D/B |
| | | | | | | | | | | AFTER WELDING ON 10" |
| 0830 | | | | | | 8-20 CRUMBLES | 18 BAGS | 119.7' | 34.07' | D/CRUMBLES = 119.70' |
| | | | | | | 8-20 CRUMBLES | 10 BAGS | 103.10' | 50.67' | D/CRUMBLES = 103.10' |
| 0900 | | | 144.73' | 6.7' | 138.03' | | | 111.90' | 26.13' | D/CRUMBLES = 111.90' |
| 0910 | | | | | | 8-20 CRUMBLES | 15 BAGS | 88.90' | 49.13' | D/CRUMBLES = 88.90' |
| 1050 | | | 124.33' | 6.75' | 117.58' | | | 97.05' | 20.53' | D/CRUMBLES = 97.05' |
| 1100 | | | | | | 8-20 CRUMBLES | 15 BAGS | 74.85' | 42.73' | D/CRUMBLES = 74.85' |
| 1130 | | | 94.04' | 6.65' | 87.39' | | | 82.25' | 5.14' | D/CRUMBLES = 82.25' |
| 1135 | | | | | | | | | | STANDBY; WORKING ON CRANE |
| 1300 | | | | | | 8-20 CRUMBLES | 20 BAGS | 50.1' | 37.29' | D/CRUMBLES = 50.1' |
| 1305 | | | | | | 8-20 CRUMBLES | 5 BAGS | 39.1' | 48.29' | D/CRUMBLES = 39.1' |
| 1340 | | | | | | | | | | S.P. AIRHART TAKES OVER |
| 1345 | | | 83.8' | 6.7' | 77.1 | | | 50' | 27.1' | D/CRUMBLES = 50' |
| 1350 | | | | | | | | | | |
| | | | | | | | | | | Crane Malfunction - |
| | | | | | | | | | | Shut Down |

377

WHC-MR-0209

9 1 1 2 0 5 0 0 3 1 0

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-31 | Date 9/6/89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W-017 SSF | |

Logged by EJ Jensen — Date 9/11/89
Reviewed by D.C. McKhan — Date 12-14-89
Measuring Equip. L300-08 — Procedure PNL-MA-597 DD-1, REV. 0

Drilling Contractor KEH
Driller GARY LYDIN
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1115 | | | | | 77.1' | | | 50.1' | 27.0' | 54.4' + 2.5' - 6.8' = 50.1' 0/crumbles |
| | carbon steel | 10" | 73.4' | 6.9' | 86.5' | | | 54.1' | 12.4' | 58.5' + 2.5' - 6.9' = 54.1' |
| | | | | | | 8-20 crumbles | 15 Bags | 30.2' | 36.3' | 34.6' + 2.5' - 6.9' = 30.2' |
| 1200 | carbon steel | 10" | 52.8' | 6.8' | 46.0' | | | 7.2' | 38.8 | 43.1 + 2.5' - 6.8' = 38.8' |
| | | | | | | 8-20 crumbles | 15 Bags | 15.4' | 30.6 | 19.7 + 2.5 - 6.8 = 15.4' |
| | | | | | | | 2 Bags | 11.9' | 34.1' | 16.2 + 2.5 - 6.8 = 11.9' |
| 1310 | carbon steel | 10" | 32.0' | 6.9' | 25.1 | | | 4.6 | 20.5 | 24.9 + 2.5 - 6.9 = 20.5' |
| | | | | | | 8-20 crumbles | 2 Bags | 7.7 | 17.4 | 21.8 + 2.5 - 6.9 = 17.4 |
| 1340 | | | | 11.9 | 20.1 | | | 19.5 | 0.6 | 23.6 + 2.5 - 6.6 = 19.5 |
| | | | | | 19.7 | | | 19.7 | 0.0 | 24.2 + 2.5 - 7.0 = 19.7 top of crumbles |
| 1415 | | | | | | | | | | Adding cement grout and pulling remander of pipe. |

EJ Jensen 9/11/89

378

WHC-MR-0209

WELL 299-E33-32

Drilling at Well 299-E33-32 began July 11, 1989, and reached total depth on August 4, 1989. The well was drilled with a Bucyrus-Erie 60L to a depth of 270.33 ft below ground surface. The sediments encountered were primarily slightly gravely sand and sand. Static water level during completion was 251.65 ft below ground surface.

Well 299-E33-32 was completed at a depth of 267.0 ft below ground surface. Final well materials include 21.00 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 246.97 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 20-40 mesh Colorado silica sand pack along the screened interval to 3.2 ft above the top of the screen, 3.6 ft of Volclay bentonite pellets, 219.1 ft of 8-20 mesh granular bentonite crumbles, 18.5 ft of Portland cement grout, and an air-entrained concrete pad which extends 2.0 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Galion crane during completion. Completion activities at Well 299-E33-32 were finished September 5, 1989.

The estimated volume of water added to the borehole during drilling was 99 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 70 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on September 27, 1989, and a total of 679 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was not performed at this site.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on October 17, 1989; this activity concluded well construction and installation.

| DRILL LOG | By: AIRHART | Rig: BE 60L | Well Number: 299-E33-32 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-11-89 | Louis | Depth: 0' To 0' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Louis Watkins is driller | | |
| | | | | Rig, tools, casing - steam cleaned prior | | |
| | | | | to coming on site - inspected by | | |
| | | | | Curtis Hoover (KEH Title III inspector) | | |
| | | | | Performing final rig set up | 0700 | |
| | | | | Pre-job safety meeting - discussed Health | 0900- | 0950 |
| | | | | and Safety Plan - led by Randy (KEH) | | |
| | | | | 100% vegetable oil (Crisco) will be used | | |
| | | | | as lubricant for tool changing during | | |
| | | | | project. | | |
| | | | | | 1200-1230 | lunch |
| | | | | Welding 10" drive shoe - O.D of drive shoe | | |
| | | | | = 11 3/4" | | |
| | | | | | 1515 | Shut Down |

REMARKS:
Reviewed by V.L. McGehan 12-14-89
PNL-MA-567 DO-1, REV. 0

St P. Airhart
7/11/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

380

WHC-MR-0209

9112050033

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| AIRHART | BE 60L 14105 L. Watkins | 299-E33-32 | NA | W-017 |
| Date: 7-12-89 | | Depth: 0' To 10' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Finishing welding drive shoe | 0700- | 0745 |
| | | | | Set up exclusion zone | | |
| | | | | RPT on site - Mike Copeland - surveying w/ GM - | | background ~100 cpm |
| | | | | Safety Officer / Title III - Curtis Hoover - | | |
| | | | | surveying w/ OVA + combustible gas, $O_2$ meter | 0825 | Started Drilling |
| | 5 | D | D | MUDDY SANDY GRAVEL: Largest clast in | 0835 | Took (2) pint |
| | | | | sample ~5½" - 70% gravel, 25% sand, 5% | | lithologic samples |
| | | | | mud - This is most likely backfill material. | | & (1) moisture |
| | | | | Seds. unconsolidated. - strong rxn w/ 10% HCl | | sample - No |
| | | | | | | Rad. or organics |
| | | | | 5'-10' - very gravelly. | | detected. |
| | 10 | D | D | MUDDY SANDY GRAVEL: 75% gravel, 20% sand, | 0900 | Took (2) pint |
| | | | | 5% mud - clasts dom. MP-CP - sand | | lithologic samples |
| | | | | dom. MS-CS - unconsolidated - strong rxn | | & (1) moisture |
| | | | | w/ 10% HCl | | sample. No Rad |
| | | | | | | or organics detected |

REMARKS:

Reviewed by D.L. Westhaver 12-14-89

PNL-MA-567 - DO-1, REV-0

S.D. [illegible] 7/12/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-86)

WHC-MR-0209

384

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| AIRHART | BE 60L 14103. L. Watkins | 299-E33-32 | NA | W-017 |
| Date: 7/12/89 | | Depth: 10' To 12' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Sediments loose, dry and coarse - hard to | | |
| | | | | drive barrel. | | |
| 10'9" of 10" w/ shoe | | | | | 1000 | Added 10'9" of 10" casing |
| | | | | | | w/ shoe |
| | | | | Drilling difficult - too coarse | | Resumed Drilling |
| | | | | | 1200-1230 | lunch |
| 21'5½" | | | | | 1300 | Adding 10'8½" of 10" casing |
| | | | | | | 10'9" + 10'8½" = 21'5½" |
| | | | | | 1415 | Resumed Drilling |
| | | | | | 1520 | Shut Down |
| | | | | Added 10 gallons of water to borehole | | |
| | | | | to allow sediments to soak overnight - | | |
| | | | | unable to hold anything in drive | | |
| | | | | barrel. | | |

REMARKS:
Reviewed by W. L. Mitchell 12-14-89

PNL-MA-567 DO-1, REV. 0

St P. A[illegible]
7/12/89

D - Drive Barrel, H - Hard Tool, L - Large, M - Medium, S - Small, VC - Very Coarse, C - Coarse, F - Fine, VF - Very Fine, Sl - Slight

WHC-MR-0209

357

| DRILL LOG | By: AIRHART | Rig: BE 60L 14103 L. Wetling | Well Number: 299-E33-32 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-13-89 | | Depth: 12' To 20' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0700 | Resumed Drilling |
| | 15' | D | M | SANDY GRAVEL : 60% gravel, 37% sand, 3% | 0800 | Took (2) pint |
| | | | | mud : largest clast in sample 60-70 mm | | lithologic samples |
| | | | | (basalt) - 2% SC, 5% VCP, 15% CP, 10% MP, | | No moisture sample- |
| | | | | 28% FP-VFP , 10% VCS, 15% CS, 5% MS, 7% FS-VFS, | | $H_2O$ was added. |
| | | | | 3% mud : poorly sorted : gravel - dom. | | No contamination |
| | | | | rounded - 70% basalt, 30% igneous sand - | | detected. |
| | | | | A-SA - 30% basalt 70% qtz-f-spar-rock | | |
| | | | | frags ; wet color dark grayish brown | | |
| | | | | 2.5Y 4/2 ; mod. rxn w/ 10% HCl ; unconsolidated | | |
| | | | | | 0910 | Added 2 gals $H_2O$ |
| | | | | At 19-20' encountered GRAVELLY SAND | 0940 | Added 2 gals $H_2O$ |
| | 20' | D | M | GRAVELLY SAND : 25% gravel, 73% sand, 2% | 1000 | Took (2) pint |
| | | | | mud - 25% VFP-MP - dom. MP - 40% VCS, 20% CS, | | lithologic samples. |
| | | | | 13% MS-VFS, 2% mud : mod. sorted : gravel | | (2) 500 ml. chem. |
| | | | | same lithology as above - SA-SR - sand | | sample - Reference |
| | | | | same lithology as above - note : dominately vcs- | | chain-of-custody |
| | | | | No A color ; weak rxn. w/ 10% HCl ; unconsolidated | | # SST 71389. |

REMARKS:
Reviewed by D.L. Mackham 12-14-89
PNL-MA-567 DO-1 , REV-0

No moisture sample
No contamination detected
S.L.P. Airhart 7-13-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

386

| DRILL LOG | By: AIRHART | Rig: BE 60L 14103 L. Watkins | Well Number: 299-E33-32 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-13-89 | | Depth: 20' To 26' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1055 | Cutting off 1½" casing |
| 21'4" | of 10" | casing | | | | 21'5½" - 1½" = 21'4' |
| 31'6" | of 10" | casing | | | 1130 | Adding 10'2" of 10" |
| | | | | | | 21'4" + 10'2" = 31'6" |
| | | | | | 1200-1230 | lunch |
| | | | | | 1240 | Resumed drilling |
| | 25' | D | D | SANDY GRAVEL: 50% gravel, 47% sand, 3% mud: | 1450 | Took (2) pint |
| | | | | largest clast in sample ~100 mm, 2% VCP, | | lithologic samples |
| | | | | 8% CP, 15% MP, 25% FP-VFP, 15% VCS, 10% CS, | | and (1) moisture |
| | | | | 7% MS, 15% FS-VFS, 3% mud: poorly sorted: | | sample. |
| | | | | gravel: 60% basalt 40% igneous - A-SR - | | No contamination |
| | | | | sand: 60% qtz-rich 40% basalt A-SA - | | detected |
| | | | | No Δ color - strong rxn. w/ 10% HCl - | | |
| | | | | unconsolidated. | | |
| | | | | | 1520 | Shut Down |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by W. L. McGhan 12-14-89
Added 4 gallons of $H_2O$ today.
S. P. [illegible]
7-13-89

PNL-MA-567, DO-1, REV. 0

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Co... C - Coarse F - Fine VF - Very Fine

9 1 1 2 0 5 0 0 3 0 7

| DRILL LOG | By AIRHART | Rig BE 60L 14103 L. Watkins | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-14-89 | | Depth 26' To 31' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 31'6" | | | | | 0700-0730 | Safety mtg. |
| | | | | | 0745 | Resumed drilling |
| | | | | | 0800 | Added 3 gals $H_2O$ |
| | | | | | | to borehole. |
| | | | | on site: Sam Turney (LLEM) surveying w/ | | |
| | | | | OVA & combustible gas, $O_2$ meter | | |
| | | | | Mike Copeland (WHC) surveying w/ | | |
| | | | | GM. | | |
| | 31' | D | M | GRAVEL: 80% gravel, 19% sand, 1% mud - | 0900 | Took (2) pint |
| | | | | largest clast 100-130 mm. - 1% LC, | | lithologic samples |
| | | | | 5% SC, 15% VCP, 10% CP, 20% MP, 29% FP-VFP, | | No moisture sample |
| | | | | 7% VCS, 5% CS, 5% MS, 2% FS-VFS, 1% mud - poorly | | ($H_2O$ added) - No |
| | | | | sorted: gravel - 70% basalt 30% qtzite, ign. | | contamination |
| | | | | SR: sand - 50% basalt 50% qtz-rich - A-SA: | | detected. |
| | | | | wet color grayish brown 2.5Y 5/2 - mod. rxn. | | |
| | | | | w/ 10% HCl - unconsolidated. | | |
| | | | | | 0905 | Resumed Drilling |

REMARKS:
Reviewed by V.L. McKhan 12-14-89

S.L.P. [illegible]
7/14/89

PNL-MA-567, DO-1, REV.0

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

385

| DRILL LOG | By: AIRHART | Rig: BE 60L 14103 | Well Number: 299-E33-32 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-14-89 | | Depth: 31' To 35' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 31'6" | | | | Needs to add casing | 0940 | |
| | | | | D/B = 34' - 2.9' (stickup) = 31.1' bls | 0950 | |
| | | | | steel tape No. L300-07 | | |
| 42'1" | of 10" | casing | | | 1110 | Added 10'7" of 10" |
| | | | | | | 31'6" + 10'7" = 42'1" |
| | | | | | 1115 | Resumed Drilling |
| | | | | | 1130 | Added 2 gals $H_2O$ |
| | | | | | | to borehole. |
| | | | | | 1154 | Added 2 gals |
| | | | | | | $H_2O$ to borehole |
| | | | | | 1200-1230 | lunch - |
| | | | | | 1240 | Drilling |
| | | | | Encountered sand @ 33' | 1330 | |
| | 35' | D | D | GRAVELLY SAND: 30% gravel, 70% sand - | 1340 | Took (2) pint |
| | | | | gravel - dom. VF-FP w/ some MP - 70% basalt | | lithologic samples |
| | | | | 30% ign. sand - dom. VCS - well sorted - | | (1) moisture sample |
| | | | | 40% basalt, 60% qtz-rich - v. slight rxn w/ 10% | | No contamination |
| | | | | HCl - unconsolidated | | detected |

REMARKS:

Reviewed by V. G. McGhan 12-14-89

PNL-MA-567 DO-1, REV. 0

S. P. [illegible]
7/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

386

8 1 1 2 0 5 0 0 3 2 9

| DRILL LOG | By AIRHART | Rig BE 60L 14103 | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. NW-017 |
|---|---|---|---|---|---|
| | Date 7-14-89 | | Depth 35' To 45' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 42'1" | 40' | D | D | GRAVELLY SAND: 30% gravel, 70% sand - | 1400. | Took (2) pint |
| | | | | Dom. VCS & VFP - well sorted - same | | lithologic samples |
| | | | | as prev. sample however gravel is finer | | (1) moisture sample |
| | | | | | | (2) 500 ml |
| | | | | | | chem. samples - |
| | | | | | | reference chain- |
| | | | | | | of custody # |
| | | | | | | SST 71489. No |
| | | | | | | contamination |
| | | | | | | detected. |
| | 45 | D | D | GRAVELLY SAND: No change from previous | 1425 | Took (2) pint |
| | | | | sample | | lithologic samples |
| | | | | | | (1) moisture |
| | | | | | | sample. |
| | | | | Preparing to add casing | 1430 | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: Reviewed by W.L. McGhan 12-14-89 ADDED 7 GALLONS of $H_2O$

PNL-MA-567, DO-1, REV. 0

St P. [illegible] 7/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

387

WHC-MR-0209

9 1 1 2 0 5 0 0 3 9 0

1 of 1

| DRILL LOG | By: AIRHART | Rig: BE 60L 14103 | Well Number: 299-E33-32 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-17-89 | | Depth: 45' To 45' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Driller @ physical today - no activity @ well. | | |

REMARKS:
Reviewed by D.S. McKhan 12-14-89

PNL MA-567, DO-1, REV-0

S.E.P. 7-17-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Co C - Coarse F - Fine VF - Very Fi

386

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig BE 60L 14103 L. Watkins | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-18-89 | | Depth 45' To 55' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 42'1" | | | | Driller finishing physical | 0700- | 1115 |
| | | | | | 1130 | Rig Prep |
| | | | | | 1200-1230 | lunch |
| | | | | | 1250 | Adding 9'6" of 10" |
| 51'7" of 10" casing | | | | | | 42'1" + 9'6" = 51'7" |
| | | | | | 1400 | Resumed Drilling |
| | 50' | D | SM | GRAVELLY SAND: 15% FP-VFP 85% sand - | 1430 | Took (2) pint |
| | | | | dom. vcs-cs - gravel - 40% basalt, | | lithologic samples |
| | | | | 60% igneous, qtzite, mudstone - A-SR - | | (1) moisture sample. |
| | | | | sand - 40% basalt 60% qtz-rich - grayish | | No contamination |
| | | | | brown color 2.5YR 5/2 - wk rxn. w/ 10% HCl | | detected |
| | | | | unconsolidated. | | |
| | 55' | D | SM | GRAVELLY SAND: Same as previous sample | 1455 | Took (2) pint |
| | | | | | | lithologic samples |
| | | | | | | (1) moisture |
| | | | | | | sample. No |
| | | | | | | contamination |
| | | | | | | detected. |

REMARKS:
Reviewed by V.L. Markham 12-14-89

PNL-MA-567 DO-1, REV.0

S.t.P. 7-18-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

389

| DRILL LOG | By: AIRHART | Rig: 14102 | Well Number: 299-E33-32 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-18-89 | | Depth: 55' To 60' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 60' | H | SM | GRAVELLY SAND: same as above | 1515 | Took (2) pint |
| | | | | | | lithologic samples |
| | | | | | | (1) moisture |
| | | | | | | sample. - No |
| | | | | | | contamination |
| | | | | | | detected. |

REMARKS:
Reviewed by V. E. McKham 12-14-89

PNL-MA-567 · DO-1 · REV.0

S.E.P. 7-18-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

9112050323

| DRILL LOG | By AIRHART | Rig BE 60L 14103 L. Watkins | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-19-89 | | Depth 60' To 68' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 51'7" | | | | | 0700-0720 | Rig Prep. |
| | | | | Preparing to weld casing | 0730 | |
| 61'1" of | 10" casing | | | | 0910 | Added 9'6" of 10" casing |
| | | | | | | 51'7" + 9'6" = 61'1" |
| | | | | | 0915 | Resumed Drilling |
| | 65' | D | D | SLIGHTLY GRAVELLY SAND: 5% gravel, 95% sand - | 0940 | Took (2) pint |
| | | | | 5% VFP w/ trace FP-MP, 30% vcs, 35% cs, 20% ms, | | lithologic samples, (1) |
| | | | | 10% FS-VFS - mod sorted - gravel → 40% basalt | | moisture sample, (2) |
| | | | | 60% igneous, few qtzite, A-SA - sand → | | 500 ml chem. sample, |
| | | | | 25% basalt 75% qtz, fspar rock frags, A-SA - | | Ref. chain-of-custody |
| | | | | No rxn. w/ 10% HCl, wet color grayish brown | | # SST071989 - No |
| | | | | 2.5Y 5/2 - unconsolidated | | Contam. detected. |
| | 68' | D | M | MUD: Encountered ~9" thick fine | 0945 | Took (2) pint |
| | | | | unit - 15% sand 85% mud (dom. silt) - | | lithologic samples, |
| | | | | wet color - brown 10YR 5/3 - No rxn. | | (1) moisture sample, |
| | | | | w/ 10% HCl - Took chem. sample → | | (2) 500 ml chem. |
| | | | | | | sample - Ref. chain- |
| | | | | | | of-custody # SST071989 |

REMARKS:
Reviewed by W.L. Westhem 12-14-89
PNL-MA-567 DO-1, REV. 0

No contam. detected

S.P. [illegible] 7/19/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

93/

| DRILL LOG | By AIRHART | Rig 14103 | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. NW-017 |
|---|---|---|---|---|---|
| | Date 7-19-89 | | Depth 68' To 75' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 61'1" | 70' | D | D | SAND: 3% gravel (FP-VFP) 97% sand - | 1010 | Took (2) pint |
| | | | | 3% FP-VFP, 7% VCS, 35% CS, 40% MS, 15% FS-VFS - | | lithologic samples, |
| | | | | No change in lithology - Note finer grained - | | (1) moisture sample. |
| | | | | No rxn. w/ 10% HCl - unconsolidated - No | | No contam detected |
| | | | | change in color. | | |
| 75'½" of 10" casing | | | | | 1030 | Adding 13'11½" of 10' |
| | | | | | | 61'1" + 13'11½" = 75'½" |
| | | | | | 1130 | Resumed Drilling |
| | | | | | 1200-1230 | lunch |
| | | | | Sand as per 70' sample - 70'-75' | 1240 | Resumed Drilling |
| | | | | Encountered ~6" mud lense @ 75' - see sample | | |
| | 75' | D | M | SANDY GRAVELLY MUD: Mud w/ small amount | 1305 | Took (2) pint |
| | | | | sand & gravel - mostly silt as per 68' - | | lithologic samples - |
| | | | | At 75.5'-76' sediments change to VCS | | (1) moisture sample. |
| | | | | | | No contam. |
| | | | | | | detected. |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by V.L. McClean 12-14-89

PNL-MA-567 DO-1 REV. 0

S.P.A. 7/19/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

392

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig 14103 | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-19-89 | | Depth 75' To 85' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 80' | D | D | SLIGHTLY GRAVELLY SAND: 5% gravel, 95% sand | 1330 | Took (2) pint |
| | | | | 5% FP-VFP, 15% VCS, 40% CS, 30% MS, 10% FS-VFS- | | lithologic samples, |
| | | | | mod. sorted - gravel - 50% basalt 50% ign., | | (1) moisture sample, |
| | | | | quartzite - A-SA - sand- 30% basalt 70% qtz. | | (2) 500 ml chem. |
| | | | | rich - A-SA - No Δ color, Note: some | | samples. Ref. |
| | | | | small chunks (VFP size) of $CaCO_3$ cemented | | chain-of-custody |
| | | | | sand in sample - otherwise unconsolidated. | | # SST071989. |
| | 85' | D | D | SLIGHTLY GRAVELLY SAND: same as 80' sample- | 1350 | Took (2) pint |
| | | | | slightly coarser sand @ 85'. | | lithologic sample |
| | | | | | | (1) moisture sample |
| | | | | | | |
| 93'8¾" | of 10" casing | | | | 1415 | Adding 18'8¼" of 10" |
| | | | | | | 75'½" + 18'8¼" = 93'8¾" |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by V. L. McSchan 12-14-89

PNL-MA-567 DO-1 REV. 0

St P [illegible] 7-19-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

393

| DRILL LOG | By AIRHART | Rig BE 60L 14103 L. Watkins | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-20-89 | | Depth 85' To 100' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 93'8¾" | | | | | 0700-0730 | Safety Mtg. |
| | | | | | 0730-0800 | Rig Prep. |
| | | | | | 0800 | Resumed Drilling |
| | 90' | D | SM | SAND: 100% sand: 10% VCS, 60% CS, 20% MS, 10% FS-VFS | 0850 | Took (2) pint |
| | | | | - well sorted - sand: A-SA, 30% basalt 70% | | lithologic samples, |
| | | | | qtz., fspar, rock frags, weak rxn. w/ 10% HCl, | | (1) moisture sample |
| | | | | wet color: grayish brown 2.5Y 5/2, unconsolidated. | | No contamination |
| | | | | Note: No gravel in sample | | detected |
| | 95' | D | D | SLIGHTLY GRAVELLY SAND: 10% gravel, 90% sand. | 0910 | Took (2) pint |
| | | | | - 3% FP, 7% VFP, 25% VCS, 50% CS, 10% MS, | | lithologic sample, |
| | | | | 5% FS-VFS - Mod. sorted - gravel: 65% basalt | | (1) moisture |
| | | | | 35% granitic, some qtzite. - A-SA - sand: | | sample - No |
| | | | | A-SA, same lithology as 90' sample: very | | contamination |
| | | | | weak rxn. w/ 10% HCl: No change in color: | | detected. |
| | | | | unconsolidated: Note: increase in gravel | | |
| | 100' | D | SM | SAND: 100% sand: 10% VCS, 70% CS, 15% MS, 5% FS | 0925 | Took (2) pint |
| | | | | Well Sorted - sand: A-SA, same lithology as 90' sample: | | lithologic samples, |
| | | | | weak reaction to 10% HCl: wet color: 2.5Y, 5/2 grayish | | (1) moisture sample |

REMARKS:
Reviewed by T.L. Nesbitt 12-14-89

DNL-MA-567 DO-1 REV-0

7-20-89

394

WHC-MR-0209

9112050037

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| LANIGAN | BE 60L 14103 L. Watkins | 299-E33-32 | NA | W-017 |
| Date: 7-20-89 | | Depth: 100' (cont.) to 105' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 100' (cont.) | | | brown, unconsolidated, NOTE: No gravel in sample | | (2) 250 ml chemical |
| | | | | | | samples - reference |
| | | | | | | chain-of-custody, |
| | | | | | | SST 072089. No |
| | | | | | | contamination detected |
| | | | | | 10:00 | stopped drilling to add |
| | | | | | | 16'3½" - 1"¼" = 15'3¼" |
| | | | | | | casing: 93'8¾" + |
| 109'0" | | | | | | 15'3¼" = 109'0" |
| | | | | | 11:44 | finished placing 10" dia. casing |
| | | | | | 11:50 | resumed drilling |
| | | | | | 11:55 | stopped for lunch |
| | | | | | 12:40 | resumed drilling |
| | 105' | D | D | SLIGHTLY GRAVELLY SAND: 5% gravel, 95% sand | 12:50 | Took (2) pint lithologic |
| | | | | 5% VFP, 20% VCS, 60% CS, 10% FS, 5% VSS | | samples, (1) moisture |
| | | | | - moderately sorted - gravel: 80% basalt, 20% granitic, | | sample - no contamination |
| | | | | A-SA, sand: same lithology as 96' sample, very weak | | detected |
| | | | | reaction to 10% HCl, unconsolidated, wet color: 2.5Y, 5/2 | | |

REMARKS:
Reviewed by V.L. McKlam 12-14-89

PUL-MA-567 DO-1 REV-0

D.C. Lanigan
7-26-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

395

WHC-MR-0209

| DRILL LOG | By LANIGAN | Rig BE 60L 14103 L. Watkins | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-20-89 | | Depth 105' (cont.) To 115' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 105' (cont.) | | | grayish brown, NOTE: gravel in sample | | |
| | | | | | 13:15 | Stopped drilling to |
| | | | | | | drive casing |
| | | | | | 13:17 | resumed drilling |
| | | | | | 13:40 | stopped drilling to |
| | | | | | | drive casing |
| | | | | | 13:45 | resumed drilling |
| | 110' | D | D | SAND (~1% gravel): 1% VFP, 5% CS, 64% | 14:00 | Took (2) pint lithologic |
| | | | | MS, 30% FS; Well Sorted; gravel: 100% basalt, | | samples, (1) moisture |
| | | | | Subrounded; sand: 25% basalt, 75% granitic, | | sample, no contamination |
| | | | | SA-A, wet color - 2.5Y 5/2 grayish brown; | | detected, sand is |
| | | | | very weak reaction to 10% HCl, slight consolidation | | very tightly compacted |
| | | | | NOTE: what first appears to be coarse sand breaks | | in core barrell |
| | | | | up into fine sand | | |
| | 115' | D | D | SAND (~1% gravel): 1% VFP, 5% CS, 44% MS, | 14:32 | Took (2) pint lithologic |
| | | | | 50% FS; Moderately Sorted; gravel: 50% basalt, 50% | | samples, (1) moisture |
| | | | | granitic, subrounded; sand: 25% basalt, 75% granitic, | | sample, no contamination |
| | | | | SA-A; wet color - 2.5Y 6/2 light brownish gray | | detected, sand is |

REMARKS:
Reviewed by V.L. McGlam 12-14-89

PNL-MA-567 DO-1 REV.0

D.C. Lanigan
7-20-89

396

WHC-MR-0209

D - Drive Barrel  H - Hand Tool  L - Large  M - Medium  S - Small  VC - Very Coarse  C - Coarse  F - Fine  VF - Very Fine  Sig. Fig. Water

9 1 1 2 0 5 0 0 3 2 9

| DRILL LOG | By LANIGAN | Rig BE 60L 14103 L. Watkins | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-20-89 | | Depth 115' (cont) To 115' (cont.) | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 115' (cont.) | | | slight reaction to 10% HCl; slight consolidation; | | compacted in core barrel |
| | | | | NOTE: what first appears to be coarse sand breaks | | and comes out in clumps |
| | | | | up into fine sand. | | |
| | | | | | 14:35 | stopped drilling |
| | | | | | | to cut & weld |
| | | | | | | casing |
| | | | | | 14:40 | dumped ~8 gal. |
| | | | | | | water into hole. |
| | | | | | | Will let sit overnight |
| | | | | | | |
| | | | | | 15:15 | Shut Down |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by D.L. McGlam 12-14-89 ADDED 8 GALLONS OF $H_2O$

PUL-MA-567 DO-1 REV. 0

D. C. Lanigan
7-20-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

| DRILL LOG | By LANIGAN / AIRHART | Rig BE 60L 14103 L. Watkins | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-21-89 | | Depth 115' To 115' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 109'0" | | | | | 0700 | Discussion of whether |
| | | | | | | to use 8" casing now |
| | | | | | | the 10" casing at the |
| | | | | | | bottom of the hole is |
| | | | | | | going off at an angle. |
| | | | | | | It is decided to back- |
| | | | | | | pull about 30' of 10" |
| | | | | | | casing and reinstall it. |
| | | | | | | This will take the |
| | | | | | | rest of the day. |
| | | | | Pulled 33'11¾" of 10" casing out of hole - | | |
| | | | | 75'1¼" of 10" casing remains in hole - | | |
| | | | | Borehole caved beneath shoe - Driller | | |
| | | | | decided to run 8" dia. casing. | | |
| | | | | | | |
| | | | | V.L. McGhan logging borehole w/ Nat. gamma | 1525 | |
| | | | | probe - logged interval = 2.5'-83.5' | | |
| | | | | Logging witnessed by J. Gould (WHC) | | |

REMARKS:
Reviewed by V.L. McGhan 12-14-89

PNL-MA-567 DO-1 REV. 0

S.C.P. [signature] 7-21-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

398

WHC-MR-0209

| DRILL LOG | By: AIRHART | Rig: BE 60L 14103. L. Watkins | Well Number: 299-E33-32 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-24-89 | | Depth: 115' To 115' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | Welding drive-shoe on 8" casing. O.D of | 0720 | |
| | | | | drive-shoe = 9 15/16" | | |
| | | | | | | |
| | | | | Adding the following sections of 8" casing | | |
| | | | | 20' 8 1/2" w/ shoe | | |
| | | | | 20' 10 1/4" | | |
| | | | | 21' 0" | | |
| | | | | 21' 0" | | |
| | | | | 20' 11 3/4" | | |
| | | | | 104' 6 1/2" of 8" casing | | |
| | | | | | 1400 | Resumed Drilling |
| | | | | Redrilled 85' - 110' | | |
| | | | | | 1530 | Shut Down |
| | | | | Added 3 gals. $H_2O$ to borehole | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by V.L. McGhan 12-14-89

PNL-MA-567 DO-1 REV.0

S.P.A. 7/24/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5 85)

399

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig BE 60L 14103 L. Watkins | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-25-89 | | Depth 115' To 120' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 104'6½" | | | | | 0700 | Rig Prep |
| | | | | | 0730 | Drilling |
| 125'6¼" | of 8" | casing | | | 0800 | Adding 20'11¾" of 8" |
| | | | | | | 104'6½" + 20'11¾" = 125'6¼" |
| | | | | | 0905 | Drilling |
| | 118' | D | M | SANDY MUD: 20% vcs-vfs (dom. vfs) (cs4) 80% mud | 0940 | Took (2) pint |
| | | | | (dom. silt) - wet color olive brown 2.5Y 4/4 | | lithologic samples |
| | | | | strong rxn. w/ 10% HCl - unconsolidated | | (1) moisture sample |
| | | | | This unit encountered 117'-119'. | | (2) 250 ml. chemical |
| | | | | NOTE: 10 gals $H_2O$ added @ 115' before 10" casing | | sample - ref. chain |
| | | | | was pulled back. Unsure whether sediments @ | | of-custody # |
| | | | | this depth (118') are affected by this added | | 56T072589. No |
| | | | | moisture - Took moisture sample anyway. | | contam. detected. |
| | 120' | D | M | SAND: 3% gravel, 92% sand, 5% mud: 3% VFP, | 1005 | Took (2) pint |
| | | | | 30% vcs, 40% cs, 15% ms, 7% fs-vfs, 5% mud: | | lithologic samples |
| | | | | - mod. sorted - sand: A-SR, 30% basalt | | (1) moisture sample. |
| | | | | 70% qtz, fspar, chert (?) - color (wet) | | No contam. detected. |
| | | | | grayish brown 2.5Y 5/2. weak rxn. w/ 10% HCl - | | |
| | | | | unconsolidated | | |

REMARKS:
Reviewed by V.L. McBlan 12-14-89

7/25/89

PNL-MA-567 DO-1 REV. 0

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

400

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig BE 60L 14103 | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-25-89 | | Depth 120' To 135' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 125 | D | SM | SLIGHTLY MUDDY SAND : 5% gravel, 80% sand, | 1035 | Took (2) pint |
| | | | | 15% mud : 5% FP-VFP, 30% VCS, 20% CS, 15% MS, 15% FS- | | lithologic samples |
| | | | | VFS, 15% mud : mod. sorted ; gravel - SA-SR - | | (1) moisture sample- |
| | | | | 50% basalt 50% granitic, qtzite : sand - A-SA, | | No contamination |
| | | | | 35% basalt, 65% qtz, fspar, rock frags - Note: | | detected. |
| | | | | some semi-consolidated chunks of sandy mud in | | |
| | | | | sample : strong rxn. w/ 10% HCl : uncons - to- | | |
| | | | | semi-consolidated : wet color olive brown 2.5Y 4/4 | | |
| | | | | | | |
| | 130' | D | M | SAND: 5% gravel, 90% sand, 5% mud (silt) : 5% FP- | 1055 | Took (2) pint |
| | | | | VFP, 15% VCS, 40% CS, 25% MS, 10% FS-VFS, 5% mud : | | lithologic samples |
| | | | | mod. sorted : gravel : 50% basalt 50% granitic, | | (1) moisture sample |
| | | | | other ign., A-SA : sand - 25% basalt 75% qtz, | | No contamination |
| | | | | fspar, rock frags, A-SA : Weak rxn. w/ 10% HCl : | | detected. |
| | | | | unconsolidated - No Δ color | | |
| | 135' | D | M | SAND: 2% gravel, 93% sand, 5% mud : same | 1105 | Took (2) pint |
| | | | | as 130' sample - slightly finer grained | | lithologic samples- |
| | | | | | | (1) moisture sample |
| | | | | | | No contamination detected. |

REMARKS:
Reviewed by J.L. McClain 12-14-89

PNL-MA-567 DO-1 REV. 0

S.P. Nichol 7/25/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

107

| DRILL LOG | By AIRHART | Rig BE 60L 14103 | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-25-89 | | Depth 135' To 145' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1200-1230 | lunch |
| 146'6" of 8" casing | | | | | 1310 | Added 20'11¾" of 8" |
| | | | | | | 125'6¼" + 20'11¾" = 146'6" |
| | | | | | 1315 | Drilling |
| | 140' | D | SM | SAND: 98% sand 2% mud - 5% vcs, 15% cs, | 1400 | Took (2) pint |
| | | | | 60% MS, 18% FS-VFS, 2% mud - well sorted | | lithologic samples |
| | | | | sand. A-SA, 20% basalt, 80% qtz, fspar, rock | | (1) moisture sample- |
| | | | | frags. No A color: weak rxn. w/ 10% HCl; | | (2) 250 ml. chemical |
| | | | | unconsolidated. | | samples - reference |
| | | | | | | chain-of-custody |
| | | | | | | # SST072589 - No |
| | | | | | | contam. detected. |
| | 145' | D | SM | SLIGHTLY MUDDY SAND: 5% gravel, 85% sand, | 1430 | Took (2) pint |
| | | | | 10% mud: 5% VFP (dom. VCS-CS) - | | lithologic samples |
| | | | | No change lithology or color - weak rxn | | (1) moisture sample |
| | | | | w/ 10% HCl: unconsolidated | | No contamination |
| | | | | | | detected. |
| | | | | | | |

REMARKS:
Reviewed by V.L. McShane 12-14-89

PNL-MA-567 DO-1 REV. 0

S.P. [illegible] 7/25/89

D - Drive Barrel H - Hand Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

| DRILL LOG | By: AIRHART | Rig: BE 60L 14103 | Well Number: 299-E33-32 | Computer Number: NA | Project or Work Order No.: W-017 |
|---|---|---|---|---|---|
| | Date: 7-25-89 | | Depth: 145' To 158' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 150' | D | SM | SLIGHTLY MUDDY SAND: No change | 1445 | Took (2) pint |
| | | | | from 145' sample. | | lithologic samples |
| | | | | | | (1) moisture - No |
| | | | | | | contamination |
| | | | | | | detected. |
| | | | | | | |
| | 155' | D | D | SLIGHTLY MUDDY SAND: 5% gravel, 80% sand, | 1455 | Took (2) pint |
| | | | | 15% mud - Note: increase in mud fraction. | | lithologic samples |
| | | | | mod-to-strong rxn - w/ 10% HCl - | | (1) moisture sample. |
| | | | | No Δ lithology or color. | | No contamination |
| | | | | | | detected. |
| | | | | | | |
| | | | | | 1515 | Shut Down. |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by V. L. McShane 12-14-89

PNL-MA-567 DO-1 REV. 0

St P. [illegible] 7/25/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

WHC-MR-0209

405

| DRILL LOG | By: S. M. Goodwin | Rig: BE-60L | Well Number: 299-E33-32 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 26 July 1989 | #22-14103 | Depth: 158' to 165' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS LOUIS WATKINS | 0700 | SERVICING RIG |
| | | | | | 0715 | PREPARING TO |
| 146'6" | | | | | | WELD 8" |
| + 20'11 3/4" | | | | ADDED 20'11 3/4" OF 8" CARBON STEEL CASING; TOTAL | 0840 | FINISHED WELDING |
| 167'5 3/4" | | | | 8" = 167'5 3/4" | 0850 | DRILLING |
| | 160' | D | DRY | SAND: 5% GRAVEL, 90% SAND, 5% MUD. 2% FP, | 1020 | SAMPLE; 2 PT. |
| | | | | 3% VFP, 35% VCS, 25% CS, 15% MS, 10% FS, 5% | | LITHOLOGIC, 1 |
| | | | | VFS, 5% MUD. MODERATELY SORTED. GRAVELS ARE | | MOISTURE, & 2 |
| | | | | 50% MAFIC, 50% FELSIC; A TO SA. SANDS ARE | | 250 ML. CHEM. |
| | | | | 30% MAFIC, 70% FELSIC; SA. WET COLOR IS | | ANAL. SAMPLES |
| | | | | 10YR 5/3 (BROWN). MODERATE RX. TO 10% HCL. | | (C. of C. #SST072659) |
| | | | | NO CONSOLIDATION. Ø PPM W/OVA & RAD = | 1025 | DRILLING |
| | | | | < DET. INCREASE IN SAND. | | |
| | 165' | D | DRY | SAND: 5% GRAVEL, 90% SAND, 5% MUD. | 1040 | SAMPLE; 2 PT. |
| | | | | SIMILAR TO 160' SAMPLE. GRAVELS SAME; SANDS | | LITHOLOGIC & 1 |
| | | | | ARE 30% VCS, 30% CS, 20% MS, 5% FS, 5% | | MOISTURE SAMPLE |
| | | | | VFS. MODERATELY SORTED. REMAINDER OF SAMPLE | 1050 | DRILLING |
| | | | | DESCRIPTION IS SAME AS 160'. Ø PPM W/OVA | | |

REMARKS:
Reviewed by V.T. McShane & RAD = < DET.
12-14-89
PNL-MA-567, DO-1, REV. 0.

7/20/89

D - Drive Barrel  H - Hand Tool  L - Large  M - Medium  S - Small  VC - Very Coarse  C - Coarse  F - Fine  VF - Very Fine  Standing Water

404

WHC-MR-0209

9112850427

| DRILL LOG | By: S M. Goodwin | Rig: BE 60L | Well Number: 299-E33-32 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 26 July 1989 | #22-14103 | Depth: 165' To 175' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 170' | D | DRY | SAND: 4% GRAVEL, 88% SAND, 8% MUD. TRACE | 1115 | SAMPLE; 2 PT. |
| | | | | MP, 2% FP, 2% VFP, 20% VCS, 33% CS, 20% MS, | | LITH. & 1 MOIST. |
| | | | | 8% FS, 7% VFS, 8% MUD. POORLY SORTED. | | SAMPLE |
| | | | | GRAVEL & SAND DESCRIPTION SAME AS PREVIOUS | 1120 | PREPARING TO WELD |
| | | | | SAMPLES. WET COLOR IS 10YR 4/3 (BROWN). | | |
| | | | | MODERATE RX. + 10% HCL. NO CONSOLIDATION. | | |
| | | | | MORE FINES & SLIGHT DECREASE IN GRAVEL. | | |
| | | | | Ø PPM w/ OVA & RAD = <DET | | |
| | | | | | 1200-1230 | lunch |
| | | | | | 1300 | Added 10'2¼" of 8" |
| | | | | | | 167'5¾" + 10'2¼" = 177'8" |
| | 175' | D | D | GRAVELLY MUDDY SAND: 20% Gravel, 72% sand, 8% | 1305 | Drilling |
| | | | | mud: Trace MP, 5% FP, 15% VFP, 10% VCS, 25% CS, | 1405 | Took (2) pint |
| | | | | 25% MS, 12% FS-VFS, 8% mud: poorly sorted - | | lith. samples, 1 |
| | | | | No change in lithology for sand & gravel - | | moist sample. No |
| | | | | No color change. Mod. rxn. w/ 10% HCl - | | contamination |
| | | | | unconsolidated. Increase in gravel - | | detected. |

REMARKS:
Reviewed by V. L. McClain 12-14-89

PNL-MA-567 DO-1, REV. 0

Shirley Moore 7/26/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

405

WHC-MR-0209

| DRILL LOG | By AIRHART | Rig 14103 | Well Number 299-E33-32 | Computer Number NA | Project or Work Order No. W-017 |
|---|---|---|---|---|---|
| | Date 7-26-89 | | Depth 175' To 180' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 180' | D | D | SLIGHTLY GRAVELLY SLIGHTLY MUDDY SAND: 8% | 1455 | Took (2) pint |
| | | | | gravel, 77% sand 15% mud (silt) : 8% FP-VFP, | | lithologic samples |
| | | | | 15% VCS, 10% CS, 10% MS, 42% FS-VFS, 15% mud : | | (1) moisture sample |
| | | | | poorly sorted - No ∆ lithology, color - | | (2) 250 ml. chem. |
| | | | | mod.-to-strong rxn. w/ 10% HCl - unconsolidated. | | samples - Ref. |
| | | | | Increase in fines - decrease in gravel. | | chain-of-custody |
| | | | | | | # SST072689. |
| | | | | | | No contamination |
| | | | | | | detected |
| | | | | | | |
| | | | | | 1510 | Preparing to add |
| | | | | | | casing |
| | | | | | | |
| | | | | | 1515 | Shut Down |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by H. L. McShane 12-14-89
PNL-MA-567 DO-1 REV-0

SLP 7/26/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

406

WHC-MR-0209

| DRILL LOG | By: S M. GOODWIN | Rig: BE 60L | Well Number: 299 - E33 - 32 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 27 JULY 1989 | #22-14103 | Depth: 180' TO 190' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS LOUIS WATKINS | 0700 | SERVICING RIG |
| 177' 8 1/2" | | | | | 0715 | WELDING 8" |
| + 10' 2 1/2" | | | | ADDED 10'2 1/2" OF 8" CARBON STEEL CASING, TOTAL | 0830 | FINISHED WELDING |
| = 187' 11" | | | | 8" CASING = 187'11" | 0845 | DRILLING |
| | 185' | D | DRY | GRAVELLY SAND: 25% GRAVEL, 72% SAND, 3% | 0945 | SAMPLE; 2 PT. |
| | | | | MUD. TRACE VCP & CP, 3% MP, 10% FP, 12% | | LITHOLOGIC & 1 |
| | | | | VFP, 32% VCS, 25% CS, 10% MS, 3% FS, | | MOISTURE SAMPLE |
| | | | | 2% VFS, 3% MUD. POORLY SORTED. GRAVELS | 0950 | DRILLING |
| | | | | ARE 60% MAFIC, 40% FELSIC; A TO R. SANDS | | |
| | | | | ARE 40% BASALT, 60% FELSIC; SA. WET | | |
| | | | | COLOR IS 10YR 5/3 (BROWN). NO CONSOLIDA- | | |
| | | | | TION. SLIGHT RX. TO 10% HCL. MORE GRAVEL | | |
| | | | | & LESS SILT; INCREASE IN BASALT. Ø PPM | | |
| | | | | W/ OVA & RAD = < DET | | |
| | 190' | D | SM | GRAVELLY SAND: 20% GRAVEL, 77% SAND, 3% MUD. | 1030 | SAMPLE; 2 PT. |
| | | | | TRACE VCP & CP, 2% MP, 10% FP, 8% VFP, | | LITHOLOGIC & 1 |
| | | | | 27% VCS, 30% CS, 15% MS, 3% FS, 2% VFS, | | MOISTURE SAMPLE |
| | | | | 3% MUD. POORLY SORTED. GRAVELS & SANDS | | |

REMARKS:
Reviewed by V. L. McKlem 12-14-89

PNL-MA-567 DO-1, REV. 0

Alexander Bank 7/27/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine

LOH

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: BE 60L | Well Number: 299-E33-32 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 27 July 1989 | #22-141-3 | Depth: 190' To 200 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 190' | D | SM | (CONT.) SIMILAR TO 185'. WET COLOR IS 10YR | | |
| | | | | 4/3 (BROWN). SLIGHT RX. TO 10% HCL, NO | | |
| | | | | CONSOLIDATION. DECREASE IN GRAVELS. Ø | | |
| | | | | PPM w/ OVA & RAD = <DET. | | |
| 187' 11" | | | | | 1035 | PREPARING TO WELD |
| + 10'6" | | | | ADDED 10'6" of 8" CARBON STEEL CASING; TOTAL | 1130 | FINISHED WELDING |
| 198' 5" | | | | 8" CASING = | 1135 | DRILLING |
| | | | | | 1200-1230 | LUNCH |
| | 195' | D | (S)M | SLIGHTLY GRAVELLY SAND: 10% GRAVEL, 80% SAND, 4% MUD. | 1236- | S. GOODWIN left site - started drilling for P.M. |
| | | | | TR. Large Cobble (1-5" @ 193'), TR. VCP-TR.CP 2% MP, 4% FP | 1333- | SAMPLE; 2 Pl. Lith. & 1 MOISTURE SAMPLE - No rad, |
| | | | | 4% VFP, 5% VCS, 25% CS, 30% MS, 16% FS, 10% VFS, 4% mud. | 1340 | START DRILLING. No Contamination |
| | | | | moderately sorted, Gravel ~ 40% mafic, 60% felsic, Sand ~ 50% | | |
| | | | | mafic 50% felsic, ang-SR - low sphericity, wet color 10YR 5/3 (brown) No consolidation, | | |
| | | | | reacts w/ HCL, sandier than above Ø above background w/ radiation. Opma OVA | | |
| | 200' | D | (Sl)M | SLIGHTLY GRAVELLY SAND: 10% Gravel, 85% SAND, 5% mud. | 1353 | SAMPLE; 2 Pl. Lithologic, |
| | | | | TR. MP, 5% FP, 5% VFP, 5% VCS, 30% CS, 30% MS, 15% FS, 5% VFS, | | 1 moisture, (2) 250 ml. |
| | | | | 5% mud. Gravel 40% mafic, 60% felsic, Sand 50% mafic 50% felsic ang-subrounded, reacts w/ HCL, wet color = | | Chemical samples. No radiation, no contamination. |
| | | | | 10YR 5/4 Med. yellow brown. Red < detect. Ø ppm on OVA | | |

REMARKS:
Reviewed by V. L. Mackham 12-14-89 no consolidation. Similar to above

PNL-MA-567 DO-1, REV. 0

Alan M. Morris 7/27/89

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| M.D. Lobrecht | BE 60L | 299-E33-32 | N/A | W-017 SST |
| Date: 27 July 1989 | #22-141-3 | Depth: 200' To 200' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 198'5" | | D | | Added 10'4¾" Carbon steel casing; Total casing string | 1400 | 1400 - Start to add |
| + 10'4¾" | | | | length = 188'4½" | | casing. |
| 208'9¾" | | | | | | |
| | | | | | 1520 | Shut Down |

REMARKS:
Reviewed by V.L. McGlam 12-14-89

PNL-MA-567 DU-1 REV 0

SLP [illegible] 7/27/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse

WHC-MR-0209

407

| DRILL LOG | By: M.D. Lubrecht / S.J. Brandt | Rig: BE-60L 22-14103 | Well Number: 299-E33-32 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 7-28-89 | | Depth: 200 To 210 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 208' 9 7/8" | 200 | D | | ARRIVED ON SITE 0706 - Driller (LOUIS WATKINS) IS ADDING | 0706 | Welding casing |
| | | | | Carbon steel (8") casing to string. (Finished welding-casing | | |
| | | | | added yesterday) | | |
| | | | | | 0800 | Commence |
| | 205 | D | SM | SLIGHTLY GRAVELLY SAND: 8% GRAVEL 90% SAND 2% MUD; | | drilling |
| | | | | Tr. cP, 8% vfP, 26% vcS, 18% cS, 40% mS, 3% fS, 3% vfS, | 0838 | Sample; 2pt. lithologic & 1 moisture sample. |
| | | | | 2% M, moderately sorted, Gravel 50% mafic / 50% felsic | 0839 | continue drilling no contamination. |
| | | | | a-sa; SAND, 40% mafic, 60% felsic, subang-subrounded, low | | |
| | | | | sphericity, Color 10YR 6/4 (brown), slight HCl no consolidation | | |
| | | | | 0 ppm = OVA / Rad < Det. Similar to 200 - finer sand. | | |
| | | | | | | |
| | 210 | D | SM | SLIGHTLY GRAVELLY SAND: 8% GRAVEL 90% SAND, 2% MUD | 0856 | Sample; 2pt. lithologic 1 moisture - no contamination |
| | | | | 2% mP, 3% fP, 3% vfP, 26% vcS, 18% cS, 40% mS, | | |
| | | | | 3% fS, 3% vfS, 2% M., moderately sorted; Gravel 45% mafic | | |
| | | | | 45% felsic, SAND 40% mafic, 60% felsic; Subang-rounded, | | |
| | | | | low-mod sphericity, Color = 10YR 6/4; slight HCl, not consolidated | | |
| | | | | 0 ppm = OVA Rad < det. similar to 205 sample. | | |
| | | | | | 0900 | Begin to add casing |

REMARKS:
Reviewed by V.L. McShane 12-14-89

PNL-MA-567 DO-1 REV. 0

Michael D. Lubrecht 7/28/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

410

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| MDLubrecht/SJBrandah | BE-COL 22-14103 L. Watkins | 299-E 33-32 | N/A | W-017 SST |
| Date 7/28/89 | | Depth 210 To 220 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 208'9¼" + 10'6" | | | | Added casing 10'6" length, carbon steel. Total = 219'3¾" | 0915 | Drill foreman on site briefly. Leaves - continue to add casing |
| 219'3¾" | | | | | | |
| | 215 | D | Sm. | SAND: Tr. vf Gravel, 98% Sand, 2% mud. Tr. vfG, | 1027 | Casing welds complete - resume drilling. |
| | | | | 5% vcs 3% cS, 80% mS, 7% fS, 3% vfS, 2% mud. | 1109 | SAMPLE: 2 pt. lithological + 1 moisture sample |
| | | | | well sorted, 30% mafic/lithic, 70% felsic, subangular-rounded, | 1114 | Resume drilling no rad. no contamination |
| | | | | low-mod. sphericity, color = 10YR 6/4, no HCl, v. slightly | | |
| | | | | consolidated (some s/s clasts, friable) 0ppm on OVA; rad. < det. | | |
| | | | | Sandier, less mafic than previous | | |
| | | | | | | |
| | | | | large cobbles (mafic - well rounded) at 218-219'. Grades to | ~1135 | |
| | | | | v.f. sand, slightly consolidated. | | |
| | | | | | 1200- | Break for lunch |
| | | | | | 1230- | Return to site - driller |
| | | | | | | does routine maintenance. |
| | 220 | D | Sm | fine SAND: 98% sand, 2% mud. 96% fS, 2% vfS, 2% mud | 1240 | Resume drilling |
| | | | | well sorted, 25% mafic / 75% felsic, subang-rounded, 10YR 6/4, | 1350 | Sample: 2 pt. lith + 1 |
| | | | | no HCl reaction, finer than above. generally no consolidation - | | moist + 2 chemical |
| | | | | slightly indurated thin siltstone @ 222'. Sl. coarser sand (to vcs - mafic) @ 221'. | 1355 | resume drilling |

REMARKS:

Reviewed by D.L. McGhan 12-14-89

PNL-MA-567 DO-1, REV. 0

Michael D. Lubrecht 7/28/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5-85)

| DRILL LOG | By: MD Lubrecht | Rig: BE-60L 22-1413 L. Weddens | Well Number: 299-E33-32 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 7-28-89 | | Depth: 220 To 223' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 219'3¾" | | | | mudstone, moist, sl. indurated @ ~ 223' | 13:25 | Cohesive mudstone - |
| | | | | | | some difficulty in removing |
| | | | | | | from core barrel. Drilling |
| | | | | | | penetration rate decreasing. |
| | | | | | | Driller indicates caving |
| | | | | | | problems at bottom, in |
| | | | | | | Sand (slightly muddy). |
| | | | | | 13:51 | Stop drilling. Begin |
| | | | | | | bueling casing in prep |
| 219'3¾" | | | | | | for adding new section. |
| + 10'5½" | | | | ADDED 10'5½" OF 8" CARBON STEEL CASING. | 1445 | FINISHED WELD |
| = 229'9¼" | | | | TOTAL 8". 229'9¼" | 1455 | DRILLING |
| | | | | STILL IN SLIGHTLY SAND MUD; MOSTLY SILT. | 1530 | END OF SHIFT |
| | | | | DRILLER SAYS SILTS HAVE BEEN CONTINOUS SINCE | | |
| | | | | 221'. | | |

REMARKS:
Reviewed by V.L. Matthews 12-14-89

PNL - MA - 567 DO-1, REV. 0

Neil D. Fuller 7/28/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

9112250041 5

| DRILL LOG | By LANIGAN | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 7-31-89 | | Depth 225' To 230' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 229'9½" | | | | | 0700 | Started rig |
| | | | | | | |
| | 225 | D | SM | SAND: 90%: VFS, 10% mud; after treating | 0800 | Took (2) lithological |
| | | | | with 10% HCl (moderate reaction) and dissolving | | samples, (1) moisture |
| | | | | the mud, mineralogy + textures can be identified: | | sample, no contamination |
| | | | | 95% granitic, 5% basalt; SA (very hard to | | Very slow drilling. |
| | | | | tell because of ultra small size of grains); | | Very tightly packed |
| | | | | very well sorted; wet color: olive brown, 2.5Y 4/4 | | in core barrel. |
| | | | | | | |
| | ~227' | D | SM | Encountered gravelly SAND (see 230') | 0840 | |
| | | | | | | |
| | 230' | D | | Gravelly SAND: 1% CP, 1% MP, 2% FP, 6% VFP, | 0852 | took (2) lithologic |
| | | | | 40% VCS, 20% MS, 30% VFS; moderately sorted; | | samples, (1) moisture |
| | | | | gravel: 99% basalt, SR-SA; 1% granitic, R; | | sample |
| | | | | sand: 40% basalt, 60% granitic R-SA; | | no contamination |
| | | | | moderate reaction to 10% HCl; wet color: grayish | | |
| | | | | brown 2.5Y 5/2 | | |
| | | | | | | |

REMARKS: Reviewed by V.L. McLean 12-14-89
PNL-MA-567 DO-1, Rev. 0

D.C. Lanigan 7-31-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

419

| DRILL LOG | By LANIGAN | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 7-31-89 | | Depth 235' To 239' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 229'9½" | 235' | D | SM | gravelly SAND: same as 230' - except, there | 0930 | Took (2) pint lithologic |
| +10'3" | | | | now small cobbles and very coarse pebbles mixed in, | | samples, (1) moisture |
| 240'0¼" | | | | largest cobble is 90mm x 75m x 45m, basalt, R | | sample |
| | | | | even mix of basalt and granitic cobbles | | no contamination |
| | | | | | | |
| | | | | | 1015 | stopped drilling to |
| | | | | | | add casing |
| | | | | | | |
| | | | | | 1100 | D.L. leaves site - |
| | | | | | | M. Lworecki takes over |
| | | | | | | logging. |
| | | | | | 1128 | Resume drilling @ 235' |
| 240' 0¼" | | | | | | 240' interval. |
| | | | | | 1152 | Cave fell in behind drive tube - |
| | | | | | | difficulty in extracting barrel |
| | | | | | | dropped sample. |
| | | | | | 1158 | Stop for lunch |
| | | | | | 1238 | resume operations |

REMARKS:
Reviewed by V.L. Mashan 12-14-89
PNL-MA-567 DO-1, Rev. 0

D.C. Lanigan 7-31-89
M.R. Fuller 7/31/89

WHC-MR-0209

4/4

9 1 1 2 0 5 0 0 4 1 7

| DRILL LOG | By: Lubrecht | Rig: BE-60L 22-14103 L. Wetkins | Well Number: 299-E33-32 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 7-31-89 | | Depth: 239' To 240' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 240' 0¼" | | | | ~237' - Drilling in cobbly (gravelly) SAND; gravel is well-rounded, | 1243 | STILL HAVING RECOVERY |
| | | | | mod. sphericity. Dry (adding water to enhance recovery). | | PROBLEMS: ADDED 2 |
| | | | | | | GALLONS DRILL WATER. |
| | | | | | 12:56 | Coving continues - hard |
| | | | | | | to retrieve barrel. Added |
| | | | | | | 2 gal. $H_2O$. |
| | | | | | 1332 | PROGRESS SLOW IN GRAVELLY |
| | | | | | | SAND; DROP CASING BAND |
| | | | | | 1337 | Resume drilling. |
| | | | | Note: Louis commented that he might have to switch to a | 1359 | Added 2 gal. $H_2O$ |
| | | | | hard tool to make progress through gravel. | 1410 | Pause to confer w/ drill |
| | | | | | | foreman. |
| | 240' | D | | gravelly SAND: sC Tr.; vcG, Tr; 1% cP, 2% mP, 4% fP, | 1437 | Sample: 2 pt. lithologic, |
| | | | | 3% vfP, 20% vcS, 30% cS, 20% mS, 12% fS, 8% vfS | | 1 moisture; 2-500 ml |
| | | | | Tr. mud; moderately well sorted; Gravel 15% mafic 85% felsic; | | chemical no cont. |
| | | | | Sand: 30% mafic (basalt) 70% felsic; mod. sphericity, | | chain of custody # |
| | | | | ang, sub-rounded, mod. reaction to HCl; 10YR 5/4 mod. yellow brown | | 073189 SST |
| | | | | val. < Ø detect.; no contamination on OVA. Unconsolidated. | | |

REMARKS:
Reviewed by W.L. Buchanan 12-14-89
PNL-MA-567, DO-1, Rev. Ø

M.D. Lubrecht 7/31/89

ADDED 6 GALLONS OF $H_2O$

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

415

WHC-MR-0209

| DRILL LOG | By LANIGAN | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-1-89 | | Depth 245' To 245' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 240'0¼" | | | | | 0700 | Arrived on site. |
| | | | | | | Driller getting |
| | | | | | | rig ready to start. |
| | | | | | | |
| | | | | | 0715 | Drilling starts |
| | | | | MUDDY | | |
| | 245' | D | D | sandy GRAVEL: 5% VCP, 5% CP, 5% MP, 2% FP, | 0750 | Took (2) pint lithologic |
| | | | | 53% VFP, 10% VCS, 10% VFS, 10% silt; mod. sorted | | samples, (1) moisture |
| | | | | gravel: VCP + CP: 10% basalt, 90% granitic; MP + FP: | | sample |
| | | | | 90% basalt, 10% granitic; R-SA; sand: 80% basalt | | Drilling is slow and |
| | | | | 20% granitic; SA-A; weak rxn to 10% HCl; | | difficult |
| | | | | wet color: light brownish gray, 2.5Y 6/2 | | No contamination detected |
| | | | | | | |
| 250'6¼" | | | | Total 8" casing: 240'0¼" + 10'6" = 250'6¼" | 0755 | Stopped drilling to |
| | | | | | | add 10'6" of 8" |
| | | | | | | carbon steel casing |
| | | | | | 0855 | Finished welding |
| | | | | | | casing. |

REMARKS:
Reviewing by U.L. McKlean 12-14-89
PNL-MA-567, DO-1, Rev. 0

D.C. Langgan
8-1-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine —— Standing Water

WHC-MR-0209

4/16

8 1 1 2 0 5 0 0 4 1 9

| DRILL LOG | By LANIGAN | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-1-89 | | Depth 245' (cont.) To — | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 250'6¼" | | | | | 0900 | Resumed drilling |
| | | | | | | |
| | | | | | 0940 | added 2 gallons |
| | | | | | | of water to hole. |
| | | | | | | Material from side |
| | | | | | | of borehole is caving |
| | | | | | | in. Rig is stopped. |
| | | | | | | |
| | | | | | 0955 | Resumed drilling. |
| | | | | | | |
| | | | | | 1017 | Stopped drilling. |
| | | | | | | Changing to Hard |
| | | | | | | Tool. |
| | | | | | | |
| | | H | | NOTE: Changed to Hard Tool | 1137 | Completed change |
| | | | | | | to Hard Tool. |
| | | | | | | Used crisco to lubricate. |
| | | | | | | Added 5 gal. $H_2O$ to hole. |

REMARKS:
Reviewed by V.L. McLehan 12-14-89
PNL-MA-567, DO-1, Rev Ø

D.C. Lanigan
8-1-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

417

| DRILL LOG | By LANIGAN | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-1-89 | | Depth 245' (cont.) To ——— | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 250'6¼" | | | | | 1138 | Started drilling |
| | | | | | 1145 | Stopped drilling to drive casing |
| | | | | | 1200 | Stopped work for lunch |
| | | | | | 1245 | Resumed drilling |
| | | | | | 1300 | Added 5 gallons drilling water |
| | | | | | 1305 | Stopped drilling to tie dart bailer on. |
| | | | | | 1113 | Started to bail |

REMARKS: Reviewed by D.L. McKlam 12-14-89
PNL-MA-567, DO-1, Rev. Ø

D.C. Lanigan
8-1-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ——— Standing Water

WHC-MR-0209

8/4

9 1 1 2 0 5 2 0 4 2 1

| DRILL LOG | By LANIGAN | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-1-89 | | Depth 245 (cont.) To 248' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 250'6¼" | | | | | 1116 | Finished bailing. |
| | | | | | | Resumed drilling. |
| | | | | | | Added 2½ gal. $H_2O$ |
| | | | | | 1323 | Drive casing |
| | | | | | 1328 | Resumed drilling - add |
| | | | | | | 2 gal. $H_2O$ |
| | | | | | 1333 | Drive Casing |
| | | | | | 1340 | Resume drilling |
| | | | | | 1342 | Added 2½ gal. $H_2O$ |
| | | | | | 1348 | Bailing |
| | | | | | 1352 | Resumed drilling - |
| | | | | | | Add 2 gal. $H_2O$ |
| | | | | | 1400 | Drive casing. |
| | | | | | 1405 | Resume drilling |
| | | | | | 1412 | Bailing |
| | | | | | 1415 | Resumed drilling |
| 260'10¾" | | | | Total casing: 250'6¼" + 10'4½" = 260'10¾" | 1423 | Added 10'4½" of 8" casing. |
| | | | | total depth of casing: ~ 248' | 1530 | End of shift |

REMARKS:
Reviewed by V.L. Markham 12-14-89
PNL-NA-567, DO-1, Rev. 0

ADDED 21 GALLONS OF $H_2O$

D.C. Lanigan
8-1-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

WHC-MR-0209

419

9 1 1 2 0 5 0 0 4 2 2

1 of 3

| DRILL LOG | By LANIGAN | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-2-89 | | Depth 248' To 255' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 260' 16 3/4" | | H | | | 0700-0745 | Completed welding |
| | | | | | 0745 0750 | Drive casing |
| | | | | | 0750 | Start drilling |
| | | | | | 0815 | Bailing (dart bailer) |
| | 250' | H | W | sandy GRAVEL: 5% FP, 60% VFP, 5% VCS, 5% CS, | 0817 | Took (2) pint lithologic |
| | | | | 20% MS, 5% VFS; well sorted; gravel: 50% basalt, | | samples - Driller |
| | | | | 50% granitic, SA-A; sand: 50% basalt, 50% | | thinks he's encountered |
| | | | | granitic, SA-A; wet color: dark olive gray, 5Y | | water and heaving |
| | | | | 3/2; no reaction to 10% HCl, pH = 6 | | sands @ 249'-251' |
| | | | | ⇒ dart bailer used to collect sample | | NOTE: sediments + |
| | | | | | | water are being |
| | | | | | | put into 55 gal. drums |
| | | | | | | no contamination |
| | 255' | H | W | gravelly SAND: 10% VFP, 50% VCS, 35% CS, | 0930 | Took (2) pint |
| | | | | 5% VFS, well sorted; gravel: 30% basalt, 70% granitic, | | lithologic samples, |
| | | | | SA-A; sand: 50% basalt, 50% granitic, SR-SA; | | no contamination. |
| | | | | wet color: olive gray, 5Y, 5/2; no reaction to 10% HCl; | | |
| | | | | dart bailer | | |

REMARKS:
Reviewed by D.C. McMahan 12-14-89
PNL-MA-567, DO-1, Rev. 0

D.C. Lanigan 8-2-89

024

WHC-MR-0209

9 1 1 2 0 5 0 0 4 2 3

| DRILL LOG | By LANIGAN | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-2-89 | | Depth 255' To 255' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 260'10 3/4" | | | | | 1010 | Driving casing |
| | | | | Depth to water = 251'1" from ground surface | 1100 | Stopped drilling to |
| | | | | Slope Indicator Co., Water Level Indicator model 51453, | | measure depth to water |
| | | | | Serial # 10998 | | |
| | | | | Depth to bottom ≈ 256' from ground surface | 1140 | Take depth to bottom |
| | | | | Lufkin steel tape # L-300-4 | | |
| | | | | | 1150 | Will let well sit |
| | | | | | | until after lunch |
| | | | | Depth to water = 251'7 1/2" from ground surface | 1240 | Took depth to water |
| | | | | SINCo model 51453, serial # 10998 | | measurement |
| | | | | Will drill 15' feet below water level: 266'7 1/2" | | |
| | | | | | 1245 | Adding 10'3" of 8" |
| 271'1 3/4" | | | | Total casing = 260'10 3/4" + 10'3" = 271'1 3/4" | | carbon steel casing |

REMARKS: Reviewed by V.L. Mathison 12-14-89
PNL-MA-567, DO-1, Rev. 0

R.C. Lanigan
8-2-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

12H

| DRILL LOG | By LANIGAN | Rig BE 60L 22-14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-2-89 | | Depth 255' To 260' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 271' 1¾" | | | | | 1345 | Finished welding. |
| | | | | | | Driving casing. |
| | | | | | 1358 | Resumed drilling. |
| | | | | | | |
| | 260' | H | D | SAND: 45% CS, 45% MS, 10% VFS, well sorted; | 1500 | Took (2) pint lithologic |
| | | | | sand: 50% basalt, 50% granitic, SA-A; wet color: | | samples, (2) 500 ml |
| | | | | olive, 5Y, 5/3; moderate rxn to 10% HCl | | chemical samples |
| | | | | | | (111, 112 and C69, 742) |
| | | | | | | chain-of-custody #080289SST |
| | | | | | | no contamination |
| | | | | | | |
| | | | | | 1530 | end of shift |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: Reviewed by D.L. McKlem 12-14-89
PNL-MA-567, DO-1, Rev. 0

D C Lanigan
8-2-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

2-47

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| LUBRECHT | BE GOL 22-14103 L. Watkins | 299-E33-32 | N/A | W-017 SST |
| Date: 8-3-89 | | Depth: ~~255~~ 260 To 265 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 271' 1¾" | | | | | 0700 | START DRILLING w/ HARDTOOL |
| | | | | | 0740 | Drove casing down. |
| | | | | | | Note: ~ 0730 Rec'd word |
| | | | | | | from T. Gilmore to drill this |
| | | | | | | hole to basalt bedrock. Notified |
| | | | | | | Lewis of new directions. |
| | | | | | 0805- | Bailed hole (dart bailer) - |
| | | | | | | Bailer methods not entirely |
| | | | | | | satisfactory. (switched to |
| | | | | | | sand pump - problems here, too). |
| | | | | | 0842- | Rigged to drive casing. & |
| | | | | | | Drove casing |
| | | | | | 0847- | Resume drilling |
| | 265' | HT SAND PUMP | WET | S. gravelly SAND: 95% SAND, 5% Gravel ; 2% mP, 3% fP, 2% vcS, | 0920 | Sample: 2 pt. lith sample. |
| | | | | 5% cS, 50% mS, 34% fS, 4% med; Gravel 20% Basalt, 80% granitic | 0930 | Resume drilling - Sand |
| | | | | | | is heaving up casing, accord |
| | | | | & mm; Sand; 30% mafic, 70% felsic; both SA-R; 10YR 6/2 (H. | | to driller. |
| 271' 1¾" | | | | brownish gray) no HCl RX; no contamination. unconsolidated red < Ø background | 0952- | Added 40 gallons $H_2O$ |
| + 10' 5¾" | | | | | | continue drilling; bailing |
| | | | | | 1054- | Add casing (10' 5¾") |
| 281' 7½" | | | | | 1200 | Break for lunch - |
| | | | | | 1235 | Return. Driller welds |
| | | | | | | 1"x4"x6" metal plate onto |
| | | | | | | HT to help in chopping fan. |
| | | | | | 1328 | Drive casing & resume |
| | | | | | | Drilling. |
| | | | | | 1409 | 269' - Drilling hard. bottoned up |
| | | | | | | extension on bit - more cuttings. |
| | | | | | | Basalt? |

REMARKS: Reviewed by D.L. Mickham 12-14-89
PNL-MA-567, DO-1, Rev. Ø

M. A. [illegible] 8-3-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

WHC-MR-0209

433

| DRILL LOG | By Lubrecht | Rig BE 60L 22.14103 L. Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8-3-89 | | Depth 265 To 2271 | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 281' 7½" | | | | gravelly SAND: 25% gravel, 70% SAND; 5% mud | 1430 | Sample: 2 pt. lithological |
| | 270 | RT | W | (est.) 5% cP - vcP or Cobble; 10% mP, 5% fP, 5% vfP, | | Drills very hard; |
| | | | | 3% vcS, 30% cS, 28% mS, ~~10%~~ 7% fS, 2% vfS, | 1440 | Resumed drilling after |
| | | | | 5% mud. Sand 30% mafic, 70% felsic; gravel 40% | | consultation w/S. |
| | | | | mafic 60% felsic; all SA-WR; no HCl reaction; | | Goodwin. |
| | | | | possibly consolidated. | 1505 | Stop drilling for the |
| | | | | | | day. Depth = ~271' |
| | | | | | | O. Amos on site - pick up |
| | | | | | | mining desks on rig. |
| | | | | | | Driven casing. |

REMARKS: Reviewed by D.L. Markham 12-14-89
PNL - MA - 567, DØ
ADDED 40 GALLONS of $H_2O$

M.A. Lee 8-3-89

484

WHC-MR-0209

9 1 1 2 0 5 0 0 4 2 7

| DRILL LOG | By M.D. Lubrecht | Rig BE GOL 22-14103 L Watkins | Well Number 299-E33-32 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/4/89 | | Depth 271' To 271' (T.D.) | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 281'7½" | 271' | HT | | | 0700 | Arrived on site w/ |
| | | | | | | S. Goodwin. Based on |
| | | | | | | review of drilling chara- |
| | | | | | | cteristics and top of |
| | | | | | | bedrock in adjacent |
| | | | | | | holes, S. Goodwin told |
| | | | | | | drillers to T.D. 299-E33 |
| 281'7½" | | | | | | 32. |
| 10'6¼" | | | | | 0730 | Driller removed 10'6¼" |
| 271'1¼" | | | | Depth to water - 252 14' Since E-tape # 10998 | | of 8" casing. |
| | | | | Depth to Bottom - 270 33' Lufkin tape # L-300-4 | 0740 | Measured depth and |
| | | | | Temp (ambient) ≈ 65° | | w.t. |
| | | | | | | |
| | | | | | 0810 | Performed straightness |
| | | | | | | test Hole OK. witnessed |
| | | | | | | by M. Everette (Title III). |
| | | | | | | |
| | | | | | | |

REMARKS: Reviewed by V.C. Mulham 12-14-89
PNL-MA567, DQ-1, Rev. Ø ; WL-1, Rev. 1 ;

M.D. Lubrecht 8/4/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5 85)

WHC-MR-0209

475

| DRILL LOG | By: S.M. GOODWIN | Rig: NO RIG | Well Number: 299-E33-32 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9 AUGUST 1989 | | Depth: T.D. To | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | VERN McGHAN, PNL, GEOPHYSICALLY LOGGING | 1140 | LOGGING WELL |
| | | | | BOREHOLE WITH NATURAL GAMMA PROBE. | | |
| | | | | LOGGED 269' - 50' INTERVAL | 1240 | FINISHED LOGGING |

REMARKS:
Reviewed by V.L. McGhan 12-14-89
PNL-MA-567 DO-1, REV 0

Shelly Mark 3/9/89

WHC-MR-0209

027

9 1 1 2 0 5 0 0 4 2 9

| DRILL LOG | By: S. M. GOODWIN | Rig: NO RIG | Well Number: 299-E33-32 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 14 AUGUST 1989 | | Depth: T.D. To | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | D/W = 253.53' - 1.7' STICKUP = 251.83' | 1505 | D/WATER |
| | | | | (PNL E. TAPE # 10998) | | |

REMARKS:
Reviewed by V.L. McGhan 12-14-89
PNL-MA-567 DO-1, REV. 0

Steve M. Goodwin 8/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-86)

427

WHC-MR-0209

9 1 1 2 0 5 0 0 4 3 0

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-32 | Date 8-30-89 Sheet No. 1 of 2 |
|---|---|---|
| | Location SST | Project W-017 SST |

Logged by S.P. AIRHART SPA Date 8-30-89
Reviewed by D.L. McKlean Date 12-14-89
Measuring Equip. S-tape L300-07/E-tape 1098 Procedure

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE/HYDRAULIC JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments (bls) below land surface. |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 8" | 271.1' | 1.7' | 269.5' | Formation | — | 269.9' | | Datum land surface |
| | | 8" | 271.1' | 4.7' | 266.4' | " | — | 267' | | ~3' natural fill |
| | | | | | | | | | | |
| 1241 | | | | | | | | | | D/W = 258' - 6.35' = 251.65' bls |
| 1315 | Stainless steel | 4" | 20'11¾" | | | | | | | (2) ~10' sections |
| | 10-slot channel- | | | | | | | | | Note: Measured screen lengths |
| | pack screen | | | | | | | | | w/ tape measure - all |
| | SS casing w/ | 4" | 20' | | | | | | | other lengths nominal. |
| | centralizers | | | | | | | | | |
| 1330 | SS casing | 4" | 20' | | | | | | | |
| 1334 | SS casing w/ cent | 4" | 20' | | | | | | | |
| 1338 | SS casing | 4" | 20' | | | | | | | |
| | SS casing w/ cent. | 4" | 20' | | | | | | | |
| 1350 | SS casing | 4" | 20' | | | | | | | |
| | SS casing w/ cent | 4" | 20' | | | | | | | |
| | SS casing | 4" | 20' | | | | | | | |
| | SS casing w/ cent | 4" | 20' | | | | | | | |
| | SS casing | 4" | 20' | | | | | | | |
| | SS casing w/ cent | 4" | 20' | | | | | | | |
| | SS casing | 4" | 20' | | | | | | | Total SS casing + screen |
| | SS casing | 4" | 5' | | | | | | | = 268'11¾" |

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-32 | Date 8-30-89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location SST | Project W-017 SST | |

Logged by S.P AIRHART SPA Date 8-30-89
Reviewed by V.L. McGhan Date 12-14-89
Measuring Equip. S-TAPE L300-07 Procedure

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HYDRAULIC JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 2/8 inside 4" = 267.4' bls |
| | | | | | | | | | | 273.15 - 6.8' = 266.9' bls (outside 4") |
| | carbon steel | 8" | | | 266.4' | 20-40 Col. sand | 1/2 bag | 264' | 2.4' | |
| | " | " | 271.1' | 4.9' | 266.2' | | | 264.2' | .7' | 271 + .3' - 6.8' = 264.5' |
| 1500 | " | " | | | 266.2' | 20-40 Col. sand | 1/2 bag | 262.0' | 4.2' | 268.5 + .3' - 6.8' = 262.0' |
| 1508 | " | " | 271.1' | 6.2' | 264.9' | | | 262.8' | 2.1' | 270.3 + .3 - 7.8' = 262.8' |
| 1510 | " | " | | | 264.9' | 20-40 Col. sand | 1/2 bag | 260.2' | 4.7' | 267.7 + .3 - 7.8' = 260.2' |
| 1515 | " | " | 271.1' | 7.5' | 263.6' | | | 261.3' | 2.3' | 270.0 + .3 - 9.0' = 261.3' |
| 1520 | | | | | | | | | | Shut Down — |

BLD

BCH

WHC-MR-0209

9 1 1 2 0 5 0 0 4 3 2

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-32 | Date AUG. 31, 1989 | Sheet No. 1 of 3 |
|---|---|---|---|
| | Location SST | Project W-017 SST | |

Logged by S.P. AIRHART SPA Date 8-31-89
Reviewed by D.C. McKhan Date 12-14-89
Measuring Equip. STAPE L300-07 Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor IKEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE/HYDRAULIC JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0730 | CARBON STEEL | 8 | 269.5' | 6.1' | 263.4' | SAND | | | 2.1' | 267.3' + .3' - 6.35' = 261.3' |
| | | | | | 263.4' | 20-40 SAND | 1/2 BAG | 258.7' | 4.7' | 264.7' + .3' - 6.35' = 258.7' |
| | | | 269.5' | 7.4' | 262.1' | | | 260.0' | 2.1' | 267.5' + .3' - 7.75' = 260.0' |
| 0743 | | | | | 262.1' | | 1/2 BAG | 257.6' | 4.6' | 265' + .3' - 7.75' = 257.6' |
| | | | 269.5' | 8.8' | 260.7' | | | 259 | 1.7' | 267.8' + .3' - 9.1' = 259' |
| 0750 | | | | | 260.7' | | 1/2 BAG | 256.2 | 4.5' | 265' + .3' - 9.1' = 256.2' |
| | | | 264' | 5.7' | 258.3' | | | 258.6' | 1.0' | 263.3' + .3' - 6.35' = 257.3' |
| 0800 | | | | | 258.3' | | 1/2 BAG | 254.8' | 3.5' | 260.9' + .3' - 6.35' = 254.8' |
| | | | 264' | 7' | 257' | | | 256.2' | .8' | 263.6' + .3' - 7.75' = 256.2' |
| | | | | | 257' | | 1 BAG | 250.4' | 6.6' | 257.8' + .3' - 7.75' = 250.4' |
| | | | 261.5' | 6' | 255.5' | | | 252.1' | 3.3' | 258.2' + .3' - 6.4' = 252.1' |
| | | | | | 255.5' | | 1/2 BAG | 248.9' | 6.6' | 255' + .3' - 6.4' = 248.9' |
| | | | 260.9' | 5.5' | 255.4' | | | 250.9' | 4.5' | 258.4' + .3' - 7.8' = 250.9' |
| | | | 260.9' | 7' | 253.9' | | | 253' | .9' | 261.8' + .3' - 9.1' = 253' |
| | | | | | 253.9' | | 1 BAG | 247.2' | 6.7' | 253.3' + .3' - 6.4' = 247.2' |
| | | | 260' | 7.4' | 252.6' | | | 249.1' | 3.5' | 256.5' + .3' - 7.7' = 249.1' |
| 0850 | | | | | 252.6' | | 1/2 BAG | 247.5' | 5.1' | 254.9' + .3' - 7.7' = 247.5' |
| | | | 257' | 5.9' | 251.1' | | | 250.8' | .3' | 256.9' + .3' - 6.4' = 250.8' |
| | | | | | 251.1' | | 1 BAG | 244.3' | 6.8' | 250.4' + .3' - 6.4' = 244.3' |
| | | | 257' | 7.2' | 249.8' | | | 245.6 | 4.2' | 253 + .3' - 7.7' = 245.6' |
| 0905 | | | 254' | 5.7' | 248.3' | | | 246.4' | 1.9' | 252.6' + .3' - 6.5' = 246.4' |

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-32 | Date AUG. 31, 1989 | Sheet No. 2 of 3 |
|---|---|---|---|
| | Location SST | Project W-017 SST | |

Logged by S.P. AIRHART
Reviewed by J.L. McGhee
Measuring Equip. STAPE L300-07/E-tape 10998 Procedure PNL-MA-567 Rev. 0

Date 8-31-89
Date 12-14-89

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments (bls = below land surface) |
|---|---|---|---|---|---|---|---|---|---|---|
| | CARBON STEEL | 8" | | | 248.3' | 20-40 SAND | | 246.4' | | |
| | | | | | 248.3' | | 1/2 BAG | 243.8' | 4.5' | 250 + 3' - 6.5' = 243.8' |
| | | | 254 | 7' | 247' | | | 244.8' | 2.2' | 252.3 + .3' - 7.8' = 244.8' |
| | | | | | 247' | | 1/2 BAG | 242.7' | 4.3' | 250.2 + .3' - 7.8' = 242.7' |
| | | | 251.5' | 5.7' | 245.8' | | | 243.5' | 2.3' | 249.7 + .3' - 6.5' = 243.5' |
| | | | | | 245.8' | | 1/2 BAG | 241.2' | 4.6' | 247.4 + .3' - 6.5' = 241.2' |
| | | | 250.5' | 6.2' | 244.3' | | | 242 | 2.3' | 249.5' + .3' - 7.8' = 242' |
| | | | 249' | 5.6' | 243.4' | | | 242.7' | .6' | 251.1' + .3' - 8.7' = 242.7' |
| 1053 | | | | | | | | | | D/W: 258.65' (below top of 4") - 7' = 251.65' bls |
| 1055 | | | | | | | | | | Began bailing - 3" dart bailer 10' long |
| | | | | | | | | | | 249.35 + .3' - 6.4' = 243.3' |
| 1114 | | | | | | | | | | 250.0 + .3' - 6.4' = 243.9' |
| 1124 | | | | | | | | | | 250.1 + .3' - 6.4' = 244' ~ 80 gals |
| | | | | | | | | | | bailed. |
| 1130 | | | | | | | | | | No more settling has occurred |
| | | | | | | | | | | ~ 35-40 gallons bailed - water |
| | | | | | | | | | | very turbid - dark brown. |
| | | | | | 243.4' | | | 244' | -.6' | |
| | | | | | 243.4' | 20-40 sand | 1/4 bag | 243.2' | .2' | 249.3' + .3' - 6.4' = 243.2' |
| 1145 | | | | | | | | | | FINAL D/SAND = 243.2' bls. |
| | | | | | | | | | | Total 9 1/4 100 lb. bags used. |
| | | | | | | | | | | = 10.4 ft3 |

431

9 1 1 2 0 5 0 0 4 3 4

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-32 | Date AUG. 31, 1989 Sheet No. 3 of 3 |
|---|---|---|
| | Location SST B-BX-BY Tank Farms | Project W-017 SST |

Logged by S. P. AIRHART SPA Date 8-31-89
Reviewed by T.L. McLehan Date 12-14-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-FLM DU-1 REV.0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HYDRAULIC JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | CARBON STEEL | 8" | | | 243.4' | 20-40 sand | | 243.2' | | Top of Sand |
| 1255 | | | | | | 1/4" pellets | 1 bucket | | | S.S. Teel takesover for SP Airhart |
| | | | 249.0 | 8.1 | 241.1 | 3/8" pellets | 1 bucket | 239.55 | 2.70 | 244.5 + .3' - 6.4 = 238.4 |
| | | | | | | " | — | 239.55 | 1.55 | 245.85 + .3' - 6.6' = 239.55 |
| | | | | | | 8-20 crumbles | 5 bags | 223.3 | 7.80 | 229.6 + .3 - 6.6 = 223.3 |
| | | " | 240' | 6.85 | 233.15 | | | 228.15 | 5.00 | 235.2 + .3 - 6.85 = 228.15 |
| | | | | | | " | 10 bags | 196.65 | 36.50 | 203.2 + .3 - 6.85 = 196.65 |
| | | | 219.31 | 6.65 | 212.66 | | | 210.25 | 2.41 | 216.6 + .3 - 6.65 = 210.25 |
| | | | | | | " | 15 bags | 162.93 | 49.73 | 169.28 + .3 - 6.65 = 162.93 |
| | | | 198.42 | 6.85 | 197.57 | | — | 177.75 | | 184.3 + .3 - 6.85 = 177.75 |
| | | | | | | " | 41 bags | | | 171.6 + .3 - 6.85 = 165.05 |
| | | | | | | | | | | Exposed 177' weld |
| | | | | | | | | | | Ran out of $O_2$ |
| 1515 | | | | | | | | | | End of Day |

1.24 ft³

Top of Pellets

WHC-MR-0209

432

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-32<br>Location SST B-BX-BY TANK FARMS | Date SEPT. 1, 1989 Sheet No. 1 of 2<br>Project W-017 |
|---|---|---|

Logged by S.D. NIRHART — Date 9-1-89
Reviewed by D.L. McKhan — Date 12-14-89
Measuring Equip. S-TAPE L300-07 — Procedure PNL-~~MA-SET-01~~ REV. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment CALION CRANE / HYD. JACK

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0755 | CARBON STEEL | 8" | 178' | 6.8' | 171.2' | Bent. Crumbles | — | 174.8' | -3.6' | 181.3' + .3' - 6.8' = 174.8' |
| | | | | | 171.2' | | 20 Bags | 119.1' | 52.1' | 125.6' + .3' - 6.8' = 119.1' |
| | | | 167.5' | 11.5' | 156' | | | 128.6' | 27.4' | 139.8' + .3' - 11.5' = 128.6' |
| 0900 | | | 146.5' | 6.7' | 139.8' | | | 139.4' | .4' | 145.8' + .3' - 6.7' = 139.4' |
| | | | | | 139.8' | | 15 Bags | 95.3' | 44.5' | 101.7' + .3' - 6.7' = 95.3' |
| 0930 | | | 125.5' | 6.8' | 118.7' | | | | 9.6' | 115.6' + .3' - 6.8' = 109.1' |
| | | | | | 118.7' | | 13 Bags | 71.2' | 47.5' | 77.7' + .3' - 6.8' = 71.2' |
| | | | 104.6' | 6.6' | 98' | | | 84.5' | 13.5' | 90.8' + .3' - 6.6' = 84.5' |
| | | | | | 98' | | 10 Bags | 55.7' | 42.3' | 62' + .3' - 6.6' = 55.7' |
| | | | 83.6' | 6.6' | 77' | | | 70.4' | 6.6' | 76.7' + .3' - 6.6' = 70.4' |
| 1115 | | | | | | | | | | Pulled remaing 8" casing out of borehole |
| | | 10" | 75' (+ weld on 6') | 1' | 74' | | | 76.8' | -2.8' | 77.5' + .3' - 1' = 76.8' |
| 1200-1230 | | | | | | | | | | Lunch — |
| 1230 | | | | | | | | | | Set Jacks over well |
| 1315 | | 10" | 75' + (weld on 6') | 1' | 74' | Bentonite Crumbles 8-20 Mesh | 15 bags | 75.7' | -1.7' | Big open hole |
| 1330 | | | | | | | 10 bags | 75.3' | -1.4' | |
| 1345 | | | | | | | 12 bags | 74.3' | -0.3' | |
| 1400 | | | | | | | 15 bags | 51.7' | +22.3' | Move more Crumbles on to Platform |
| 1410 | | | | | | | 10 bags | 43.5' | +30.5 | |
| 1415 | | 10" | 75' | 6.9' | 68.1' | | | 42.0' | 29.0' | Pull 7' (cut off add on) |
| 1430 | | | | | | | 10 bags | 25.4' | 42.7' | |

7 Bags 9.1.89

433

BLD

WHC-MR-0209

9 1 1 2 0 5 0 0 4 3 6

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-32 | Date 9/1/89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location SST B-BX-BY Tank Farm 200 East | Project | |

Logged by J Gilmore — Date 9/1/89
Reviewed by D.L. McGhan — Date 12-14-89
Measuring Equip. S-TAPE # 6300-07 — Procedure PNL-MA-567 DO-1 REV. 0

Drilling Contractor KEH
Driller Louis Watkins
Rig/Equipment Galion Crane / Jacks

BLD

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1435 | Carbon Steel Temp | 10" | 75' | 6.9' | 68.1' | | | 25.4' | 42.7' | |
| 1435 | Carbon Steel Temp | 10" | 61'1" | 6.9' | 54.15' | | | 31' | 23.15' | Cut off ~12' |
| 1450 | " " | 10" | 51'7" | 7.1' | 44.5' | | | 34.9' | 9.6' | |
| 1530 | | | | | | | | | | End of Day |
| | | | | | | | | | | J D Moore 9/1/89 |

494

WHC-MR-0209

9 1 1 2 8 5 0 4 3 7

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-32<br>Location B-BX-BY TANK FARMS | Date SEPT. 5. 1989 Sheet No. 1 of 2<br>Project W-017 SST |
|---|---|---|

Logged by S. P. AIRHART Date 9-5-89
Reviewed by D. L. Mathews Date 12-14-89
Measuring Equip. S-TAPE · L300-07 Procedure PNL-MA-567 DO-1, REV. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Overlap | Comments (bls = below land surface) |
|---|---|---|---|---|---|---|---|---|---|---|
| 0730 | Carbon Steel | 10" | 51.6 | 7 | 44.6' | Bent. Crumbles | | 35' | 9.6' | 41.7 + .3' − 7' = 35' |
| | | | | | 44.6' | | 10 bags | 19.9' | 24.7 | 26.6 + .3' − 7' = 19.9' |
| 0745 | | | 41' | 6.1' | 34.9' | | | 23.1' | 11.8' | 29.6 + .3' − 6.8' = 23.1' |
| 0756 | | | | | 34.9' | | 2 bags | 20.1' | 14.8' | 26.6' + .3' − 6.8' = 20.1' |
| 0805 | | | 31' | 6.7' | 24.3' | | | 24.6' | −.3' | 31.5' + .3' − 7.2' = 24.6' |
| | | | | | 24.3' | | 4 bags | 18.9' | 5.4' | 25.8' + .3' − 7.2' = 18.9' |
| 0818 | | | 31' | 10.8' | 20.2' | | | 20.5' | −.3' | 27.1' + .3' − 6.9' = 20.5' |
| | | | | | | | | | | TOP OF BENTONITE CRUMBLES = 20.5' bls |
| | | | | | | | | | | (183) 50 lb bags 8 mesh bentonite crumbles = 130 ft³ |
| | | | | | | Type I-II Portland | 6 bags | | | |
| | | | | | 20.2' | cement | | 4.1' | 16.1' | 10.7' + .3' − 6.9' = 4.1' |
| | | | | | | Water | 35-40 gals | | | |
| | | | | | | Aluminum Powder | 1 cup | | | |
| | | | 17' | 6.3' | 11.7' | | | 13.1' | −1.4' | 19.6' + .3' − 6.8' = 13.1' |
| | | | | | | Slurry mixture | 6 bags | | | |
| | | | | | 11.7' | as per above | 35-40 gals | +1' | 12.7' | |
| | | | | | | | 1 cup | | | |
| | | | 0' | | | | | 4.9' | NA | Pulled 10" out of borehole ~6" cave material on top of cement |

435

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-32 | Date SEPT. 5, 1989 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location B-BX-BY Tank Farms | Project W-017 SST | |

Logged by S.P. AIRHART Date 9-5-89
Reviewed by V.G. McGhan Date 12-14-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-567 TO-1 REV. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment GALION CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1055 | | | | | | ½ batch slurry mixture as per previous. | 3 bags 20 gals ½ cup | 0' | | Slurry settled to 1' below land - removed additional 1' w/ shovel - ∴ top of cement = 2' below land |

WELL 299-E33-33

Drilling at Well 299-E33-33 began July 17, 1989, and reached total depth on August 7, 1989. The well was drilled with a Bucyrus-Erie 22W to a depth of 252.0 ft below ground surface. The sediments encountered were primarily muddy sandy gravel and sand. Static water level during completion was 232.8 ft below ground surface.

Well 299-E33-33 was completed at a depth of 248.3 ft below ground surface. Final well materials include 21.00 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 227.77 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 20-40 mesh Colorado silica sand pack along the screened interval to 3.1 ft above the top of the screen, 4.0 ft of Volclay bentonite pellets, 201.5 ft of 8-20 mesh granular bentonite crumbles, 16.7 ft of Portland cement grout, and an air-entrained concrete pad which extends 2.0 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Galion crane during completion. Completion activities at Well 299-E33-33 were finished August 29, 1989.

The estimated volume of water added to the borehole during drilling was 332 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 35 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on September 28, 1989, and a total of 1080 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was performed on September 27, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on October 18, 1989; this activity concluded well construction and installation.

| DRILL LOG | By: S. M. GOODWIN | Rig: BE 22 W | Well Number: 299 - E33 - 33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 17 JULY 1989 | #22-14101 | Depth: 0' To 5' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY; SITE SAFETY | 0700 | |
| | | | | MEETING W/ KEH & SETTING UP EXCLUSION | | |
| | | | | ZONE. | | |
| | | | | RIG WAS SET UP 7/14/89; STEAM CLEANING | 0815 | DRILLING |
| | | | | WAS WITNESSED BY KEH TITLE III | | |
| | | | | INSPECTOR MIKE EVARTS. FOOD GRADE OIL | | |
| | | | | USED ON DRILL STRING. DRILLING WITH | | |
| | | | | LONG STROKE JARS & CORE BARREL. | | |
| | 5' | D | DRY | MUDDY SANDY GRAVEL: 40% GRAVEL, 50% SAND, | 0830 | SAMPLE; 2 PT. |
| | | | | 10% MUD. TRACE SM. COBBLE, 10% VCP, 5% CP, | | LITHOLOGIC & 1 |
| | | | | 5% MP, 10% FP, 10% VFP, 10% VCS, 10% CS, 15% | | MOISTURE SAMPLE |
| | | | | MS, 10% FS, 5% VFS, 10% MUD. VERY POORLY | | |
| | | | | SORTED. GRAVELS ARE 70% MAFIC, 30% FELSIC | | |
| | | | | (Q-ZITE & GRANITE); SA TO WR, SOME W/ | | |
| | | | | $CaCO_3$ COATING. SANDS ARE 50% BASALT, 50% | | |
| | | | | FELSIC; SA TO SR. UNCONSOLIDATED. STRONG RX. | | |
| | | | | TO 10% HCL. WET COLOR IS 10YR 3/2 (VERY | | |
| | | | | DARK GRAYISH BROWN). 0 PPM W/ OVA & <DET. | | |

REMARKS:
RADIATION.

Reviewed by V.L. McClam 12-19-89

PNL-MA-567 DO-1, REV. 0

S. M. Goodwin 7/17/89

438

WHC-MR-0209

| DRILL LOG | By 299-E33-33 | Rig BE 22w | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 17 JULY 1989 | # 22-14101 | Depth 5' To 10' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 8'8" | of 10' | | | STARTED RUNNING 10" CASING; USED 8'8" | 0850 | STARTING 10" |
| | | | | SECTION OF 10" CARBON STEEL w/ DRIVE | 0900 | DRILLING |
| | | | | SHOE. | | |
| | | | | | 1130 | WELDING 10" |
| 8'8" | | | | | 1200 - 1230 | LUNCH |
| + 10'4" | | | | ADDED 10'4" OF 10" CARBON STEEL CASING; | 1240 | WELDING |
| = 19' | | | | TOTAL 10" = 19' | 1300 | DRILLING |
| | | | | MANY PROBLEMS DRILLING w/ CORE BARREL; FM. | 1330 | |
| | | | | IS VERY DRY & % OF COARSE MATERIAL IS | | |
| | | | | HIGH. IT IS NECESSARY TO ADD $H_2O$ TO KEEP | | |
| | | | | MATERIAL IN CORE BARREL. | | |
| | 10' | D | MOIST | SANDY GRAVEL: 50% GRAVEL, 45% SAND, 5% MUD. | 1415 | SAMPLE; 2 PT. |
| | | | | SEVERAL SMALL COBBLES, 10% VCP, 15% CP, 15% | | LITH. SAMPLES, |
| | | | | MP, 5% FP, 5% VFP, 15% VCS, 15% CS, 10% MS, | | NO MOISTURE |
| | | | | 3% FS, 2% VFS, 5% MS. VERY POORLY SORTED. | | SAMPLE DUE TO |
| | | | | GRAVELS ARE 70% MAFIC, 30% FELSIC; SA TO | | $H_2O$ ADDED |
| | | | | R (SOME DISC-SHAPED & w/ $CaCO_3$ CEMENT) | 1425 | DRILLING |
| | | | | SANDS ARE 50% BASALT, 50% FELSIC, TRACE MICA. | | |

REMARKS:

Reviewed by W. L. McClain 12-19-89

PNL-MA-567 DO-1, REV. 0

Arthur Mook 7/17/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

439

WHC-MR-0209

| DRILL LOG | By 299-E33-33 | Rig BE 22 W | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 17 JULY 1989 | # 22-14/101 | Depth 10' TO 15' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 10' | D | MOIST | (CONT.) A TO SA. WET COLOR IS 10 YR 4/2 (DARK | | |
| | | | | GRAYISH BROWN). NO CONSOLIDATION. STRONG RX. TO | | |
| | | | | 10% HCL. LESS SILT & FINE SANDS; MORE | | |
| | | | | PEBBLES. 0 PPM W/ OVA & < DET RADIATION. | | |
| | 15' | D | MOIST | SANDY GRAVEL: SIMILAR TO PREVIOUS SAMPLE. | 1505 | SAMPLE; 2 PT. |
| | | | | SOME LARGE COBBLES & INCREASE IN GRAVEL | | LITH. SAMPLES. |
| | | | | SIZE. WET COLOR 10 YR 4/2 (DARK GRAYISH | | NO MOIST. SAMPLE |
| | | | | BROWN). NO CONSOLIDATION. 0 PPM W/ OVA | | DUE TO $H_2O$ ADDED |
| | | | | & < DET. RADIATION. | 1510 | DRILLING |

Reviewed by W.L. McGhan 12-19-89

REMARKS: 12 GALLONS OF $H_2O$ ADDED TODAY DURING DRILLING; 10 TO BOREHOLE BEFORE LEAVING. TOTAL $H_2O$ ADDED = 22 GALLONS

Andrea Stark 7/17/89

PNL-MA-567 DO-1, REV. 0

440

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: BG 22 w | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 19 July 1989 | # 22-14101 | Depth: 15' To 20' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | KEH SAFETY MEETING |
| | | | | | 0720 | SERVICING RIG |
| | | | | | 0730 | DRILLING |
| | | | | BRINGING UP COARSE GRAVEL & SOME COBBLES | 0800 | |
| | | | | (UP TO LARGE COBBLE SIZE). ADDING $H_2O$ | 0830 | PREPARING TO WELD |
| 19' | | | | TO DRILL. | | |
| + 10'4" | | | | ADDED 10'4" OF 10" CARBON STEEL CASING; | 0925 | FINISHED WELDING. |
| = 29'4" | | | | TOTAL 10" - 29'4" | 0930 | DRILLING |
| | 20' | D | SM | SANDY GRAVEL: 50% GRAVEL, 45% SAND, 5% MUD. | 1015 | SAMPLE; 2 PT. |
| | | | | SEVERAL SMALL COBBLES, SOME LARGE COBBLES, 15% | | LITH, 1 MOIST., |
| | | | | VCP, 8% CP, 7% MP, 10% FP, 10% VFP, 15% | | & 2 500 ML |
| | | | | VCS, 15% CS, 10% MS, 3% FS, 2% VFS, 5% | | CHEM. ANAL. SAMPLES |
| | | | | MUD. VERY POORLY SORTED. GRAVELS ARE 80% | | (C. OF C. #SST071889) |
| | | | | MAFIC, 20% FELSIC; SA TO R. SANDS ARE | 1020 | DRILLING |
| | | | | 60% BASALT (MAFIC), & 40% FELSIC. WET | | |
| | | | | COLOR IS 10 YR 3/2 (VERY DARK GRAYISH BROWN). | | |
| | | | | MODERATE RX. TO 10% HCL. NO CONSOLIDATION. | | |
| | | | | SIMILAR TO 15' SAMPLE. 0 PPM w/ OVA & | | |

REMARKS: < DET. RADIATION.

Reviewed by D.L. McSham 12-19-89

PNL-MA-567, DO-1 REV. 0

Schmidt Mark 7/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

1447

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22w #22-14101 | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 19 July 1989 | | Depth: 20' to 30' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. * | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 25' | D | Moist | SANDY GRAVEL: 50% GRAVEL, 45% SAND, 5% | 1110 | SAMPLE; 2 PT. |
| | | | | MUD. VERY SIMILAR TO 20' SAMPLE; 15% VCS, | | LITH. SAMPLES & |
| | | | | 10% CP, 10% MP, 8% FP, 7% VFP, SANDS | | NO MOISTURE |
| | | | | & MUD SAME AS 20'. SOME SM. & LARGE | | SAMPLE |
| | | | | COBBLES. VERY POORLY SORTED. LITHOLOGIC | 1115 | DRILLING |
| | | | | DESCRIPTION SAME AS 20'. STRONG RX. TO | 1140 | PREPARING TO WELD |
| | | | | 10% HCL. 0 PPM w/ OVA & <DET RAD. | 1200-1230 | LUNCH |
| 29'4" | | | | | 1240 | WELDING 10" |
| + 10' 3½" | | | | ADDED 10'3½" OF 10" CARBON STEEL CASING; TOTAL | 1400 | DRILLING |
| = 39' 7½" | | | | 10" = 39' 7½" | | |
| | 30' | D | DRY | SANDY GRAVEL: 50% GRAVEL, 45% SAND, 5% | 1415 | SAMPLE; 2 PT. |
| | | | | MUD. 5% VCP, 5% CP, 10% MP, 15% FP, 15% | | LITHOLOGIC & 1 |
| | | | | VFP, 15% VCS, 10% CS, 10% MS, 5% FS, 5% | | MOISTURE SAMPLE. |
| | | | | VFS, 5% MUD. VERY POORLY SORTED. GRAVELS | 1420 | DRILLING |
| | | | | ARE 70% BASALT, 30% QUARTZITE & GRANITE; | | |
| | | | | SA TO SR. SANDS ARE 45% BASALT, 55% | | |
| | | | | QUARTZ, Q-RICH, & PLAG. A TO SA. WET | | |
| | | | | COLOR IS 10YR 4/2 (DARK GRAYISH BROWN). | | |

REMARKS:
Reviewed by D. G. McSlan 12-19-89

PNL-MA-567 DO-1 REV. 0

Steven M. Goodwin 7/19/89

442

WHC-MR-0209

| DRILL LOG | By: S. M Goodwin | Rig: BE 22 w | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 18 July 1989 | #22-14/10, | Depth: 30' To 35' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 30' | D | DRY | (CONT.) STRONG Rx. TO 10% HCL NO CONSOLI- | | |
| | | | | DATION. SAME OVERALL % OF GRAVELS & | | |
| | | | | SANDS, BUT GRAVELS ARE DECREASING IN | | |
| | | | | SIZE. | | |
| | 35' | D | DRY | FM. CHANGE @ 35'; SIGNIFICANT INCREASE | 1515 | SAMPLE; 2 PT. |
| | | | | IN SAND. WILL DESCRIBE SAMPLE IN | | LITH & 1 MOIST. |
| | | | | A.M. | | SAMPLE |
| | | | | | 1530 | END OF SHIFT. |

REMARKS:
37 GALLONS OF $H_2O$ USED TODAY
Reviewed by D.L. Markham 12-19-89
PNL-MA-567 DD-1, REV. 0

Linda L. Good 7/18/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

443

WHC-MR-0209

| DRILL LOG | By: S. M. GOODWIN | Rig: BE 22W | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 19 JULY 1989 | #22-14101 | Depth: 35' TO 40' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 39' 7 1/2" OF | | 10" | | DRILLER IS CRAIG WAMSLEY | 0700 | DRILLER SERVICING |
| | | | | | | RIG |
| | 35' | D | DRY | (SAMPLED @ 1515 ON 7/18/89), GRAVELLY SAND: | 0730 | DRILLING |
| | | | | 15% GRAVEL, 80% SAND, 5% MUD. TRACE VCP | | |
| | | | | + CP, 5% MP, 5% FP, 5% VFP, 20% VCS, | | |
| | | | | 35% CS, 15% MS, 5% FS, 5% VFS, 5% MUD. | | |
| | | | | POORLY SORTED. GRAVELS ARE 60% MAFIC, 40% | | |
| | | | | FELSIC; A TO R. SANDS ARE 35% MAFIC, 65% | | |
| | | | | FELSIC; A TO SA. WET COLOR IS 10YR 4/2 (DRK. | | |
| | | | | GRAYISH BROWN). NO CONSOLIDATION. MODERATE | | |
| | | | | RX. TO 10% HCL. SIGNIFICANT Δ IN FM. | | |
| | | | | AT 35'; LESS GRAVEL, MORE SAND, + | | |
| | | | | LESS BASALT. Ø PPM W/ OVA; < DET. | | |
| 39' 7 1/2" | | | | RADIATION. | 0745 | PREPARING TO WELD |
| + 10' 4" | | | | ADDED 10' 4" OF 10" CARBON STEEL CASING; | 0840 | FINISHED WELD |
| 49' 11 1/2" | | | | TOTAL 10" = 49' 11 1/2" | 0850 | DRILLING |
| | 40' | D | DRY | SAND: 5% GRAVEL, 92% SAND, 3% MUD. 2% FP, | 0855 | SAMPLE |
| | | | | 3% VFP, 50% VCS, 27% CS, 10% MS, 3% FS, | | |

REMARKS:

Reviewed by V. L. McGhan 12-19-89

PNL-MA-567 DO-1, REV. 0

Shirley Stark 7/19/89

WHC-MR-0209

| DRILL LOG | By: S.M. GOODWIN | Rig: BE 22 w / H 22-1110, | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 19 JULY 1989 | | Depth: 40' TO 45' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 40' | D | DRY | (CONT.) 2% VFS, 3% MUD. MODERATELY SORTED, | | 2 PT LITHOLOGIC |
| | | | | SANDS ARE 35% MAFIC, 65% FELSIC; SA. | | SAMPLES, 1 MOIST. |
| | | | | WET COLOR IS 10 YR 4/2 (DRK. GRAYISH BRN.) | | & 2 500 ML. CHEM. |
| | | | | NO CONSOLIDATION. FINES RX. MODERATELY TO | | ANAL. SAMPLES |
| | | | | 10% HCL. LESS GRAVEL & SILT, BETTER | | (C. OF C. # SST |
| | | | | SORTING. Ø PPM W/ OVA & < DET. RAD. | | 071989) |
| | | | | | 0905 | DRILLING |
| | 45' | D | MOIST | SAND: 5% GRAVEL, 92% SAND, 3% MUD. TRACE | 1005 | SAMPLE; 2 PT. |
| | | | | MP, 1% FP, 4% VFP, 42% VCS, 30% CS, 15% | | LITHOLOGIC & NO |
| | | | | MS, 3% FS, 2% VFS., 3% MUD. MODERATELY | | MOISTURE SAMPLE |
| | | | | SORTED. SLIGHT RX. TO 10% HCL. LITHOLOGIC | | DUE TO $H_2O$ ADDED. |
| | | | | DESCRIPTION SAME AS 40' SAMPLE. BOTH | 1015 | DRILLING |
| | | | | GRAVELS & SANDS FINER. Ø PPM W/ | | |
| | | | | OVA & < DET. RADIATION. (BACKGROUND | | |
| | | | | RAD = ~100 COUNTS) | 1045 | PREPARING TO WELD |
| 49'11 1/2" | | | | | 1200-1230 | LUNCH |
| + 10'5" | | | | ADDED 10'5" OF 10" CARBON STEEL CASING; | 1240 | DRILLING |
| 60'4 1/2" | | | | TOTAL 10" = 60'4 1/2" | | |

REMARKS:

Reviewed by V.L. Mathews

PNL-MA-567 DO-1, REV. 0

S.M. Goodwin 7/19/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

474

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22 W #22-14101 | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 19 July 1989 | | Depth: 45' to 60' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 50' | D | MOIST | SAND: 3% GRAVEL, 92% SAND, 5% MUD. 1% | 1255 | SAMPLE; 2 PT. |
| | | | | FP, 2% VFP, 30% VCS, 37% CS, 15% MS, 5% | | LITH. SAMPLES & |
| | | | | FS, 5% VFS, 5% MUD. MODERATELY SORTED. | | NO MOISTURE |
| | | | | SANDS ARE 40% MAFIC, 60% FELSIC; SA. | | SAMPLE DUE TO |
| | | | | WET COLOR IS 10 YR 4/2 (DRK. GRAYISH BROWN) | | $H_2O$ ADDED |
| | | | | NO CONSOLIDATION. MODERATE RX. TO 10% HCL. | 1300 | DRILLING |
| | | | | SLIGHT DECREASE IN GRAVEL & INCREASE IN | | |
| | | | | MUD. Ø PPM w/ OVA & < DET. RADIATION. | | |
| | 55' | D | DRY | SAND: 5% GRAVEL, 87% SAND, 8% MUD. 1% MP, | 1340 | SAMPLE; 2 PT |
| | | | | 2% FP, 2% VFP, 24% VCS, 28% CS, 20% MS, 10% | | LITH. & 1 MOIST. |
| | | | | FS, 5% VFS, 5% MUD. POORLY SORTED. | | SAMPLE |
| | | | | SANDS ARE 35% MAFIC, 65% FELSIC; SA. | 1345 | DRILLING |
| | | | | WET COLOR IS 10 YR 4/2 (DRK. GRAYISH BRN). | | |
| | | | | MODERATE RX. TO 10% HCL NO CONSOLIDATION. | | |
| | | | | INCREASE IN GRAVEL & MUD, SANDS ARE FINER. | | |
| | | | | Ø PPM w/ OVA & < DET. RAD | | |
| | 60' | D | MOIST | SAND: 3% GRAVEL, 92% SAND, 5% MUD. | 1420 | SAMPLE |
| | | | | TRACE MP, 1% FP, 2% VFP, 20% VCS, 40% CS, | | |

REMARKS:
Reviewed by D. L. Mackelman 12-19-89
PNL-MA-567 DO-1, REV. 0

S. M. Goodwin 7/19/89

446

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Hole No.: BE 22 | Project: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 19 July 1989 | H22-1/1/01 | 60' to 62' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 60' | D | Moist | (cont.) 22% MS, 5% FS, 5% VFS, 5% MUD. | | 2 pt. lith. |
| | | | | Moderately sorted. Description same as | | samples of 2 |
| | | | | 55' sample. No moisture sample due | | 500 ml chem. |
| | | | | to $H_2O$ added to borehole. Ø ppm w/ | | anal. samples |
| | | | | OVA & RAD < DET. | | (C. of C. # SST |
| | | | | | | 071989) |
| | | | | | 1425 | Preparing to weld |
| 60' 4 1/2" | | | | Added 10' 5 1/2" or 10" carbon steel casing; | 1515 | Finished weld |
| + 10' 5 1/2" | | | | Total 10" = 70' 10" | 1520 | Drilling |
| = 70' 10" | | | | | 1530 | End of shift |

REMARKS: 50 gallons of drill supply $H_2O$ used today

Reviewed by D. L. Matchan 12-19-89

PNL-MA-567 DO-1, REV. 0

Alexander Moore 7/19/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

4747

WHC-MR-0209

| DRILL LOG | By S. M. Goodwin | Rig BE 22W #22-1410. | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 20 JULY 1989 | | Depth 62' TO 65' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 70' 10" or 10" | | | | DRILLER IS CRAIG WAMSLEY | 0700 | KEH SAFETY |
| | | | | | | MEETING |
| | | | | | 0740 | SERVICING RIG |
| | | | | | 0800 | DRILLING |
| | | | | DRY SANDS; DRILLER IS FINDING IT NECESSARY | 0835 | |
| | | | | TO ADD WATER TO KEEP MATERIAL IN | | |
| | | | | CORE BARREL. | | |
| | 65' | D | DRY | SLIGHTLY GRAVELLY SAND: 8% GRAVEL, 84% | 0850 | SAMPLE; 2 PT. |
| | | | | SAND, 8% MUD. TRACE VCP & CP, 2% MP, | | LITHOLOGIC & 1 |
| | | | | 3% FP, 3% VFP, 14% VCS, 30% CS, 25% | | MOISTURE SAMPLE |
| | | | | MS, 10% FS, 5% VFS, 8% MUD. POORLY | 0900 | DRILLING |
| | | | | SORTED. GRAVELS ARE 60% MAFIC, 40% | | |
| | | | | FELSIC; SA TO SR. SANDS ARE 40% MAFIC, | | |
| | | | | 60% FELSIC; SA TO SR. WET COLOR IS | | |
| | | | | 10 YR 5/3 (BROWN). MODERATE RX TO 10% | | |
| | | | | HCL. NO CONSOLIDATION. SLIGHT INCREASE | | |
| | | | | IN GRAVEL & MUD, MORE FINES IN | | |
| | | | | SAND. Ø PPM W/ OVA; RAD. = < DET. | | |

REMARKS:
Reviewed by D.E. Mathews 12-19-89

PNL-MA-567 DO-1 REV. 0

Stephen M. Goodwin 7/20/89

WHC-MR-0209

878

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22 | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 20 July 1988 | #22-1410 | Depth: 65' to 75' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 70' | D | DRY | SLIGHTLY GRAVELLY SAND: 8% GRAVEL, 84% SAND, | 0940 | SAMPLE; 2 PT. |
| | | | | 8% MUD. VERY SIMILAR TO PREVIOUS SAMPLE; | | LITHOLOGIC & 1 |
| | | | | SLIGHT INCREASE IN VCS TO 19% & DECREASE | | MOISTURE SAMPLE |
| | | | | IN MS TO 20%. REMAINDER OF SAMPLE | 0945 | PREPARING TO WELD |
| | | | | = SAME AS 65'. Ø PPM w/ OVA & | | |
| | | | | RAD: < DET. | | |
| 70' 10" | | | | ADDED 10' 5" OF 10" CARBON STEEL CASING; | 1055 | FINISHED WELDING |
| + 10' 5" | | | | TOTAL 10" = 81' 3" | 1105 | DRILLING |
| 81' 3" | | | | | | |
| | 75' | D | MOIST | SAND: 5% GRAVEL, 87% SAND, 8% MUD. TRACE | 1145 | SAMPLE; 2 PT. |
| | | | | CP & MP, 2% FP, 3% VFP, 15% VCS, 37% CS, | | LITH & NO MOIST. |
| | | | | 20% MS, 10% FS, 5% VFS, 8% MUD. POORLY | | SAMPLE DUE TO |
| | | | | SORTED. GRAVELS ARE 70% MAFIC, 30% FELSIC; | | $H_2O$ ADDED |
| | | | | SA TO SR. SANDS ARE 40% MAFIC, 60% FELSIC; | 1148 | DRILLING |
| | | | | SA TO SR. WET COLOR IS 10 YR 5/3 (BROWN); | 1200-1230 | LUNCH |
| | | | | COLOR OF FINES MODERATE TO STRONG RX. | 1240 | DRILLING |
| | | | | TO 10% HCL; SOME $CaCO_3$ CEMENTED SANDS. | | |
| | | | | NO CONSOLIDATION. Ø PPM OVA & RAD = < DET. | | |

REMARKS:

Reviewed by D.L. McSchan 12-19-89

PNL-MA-567 DO-1, REV. 0

Alexander Mowbray 7/2/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

4479

WHC-MR-0209

| DRILL LOG | By S. M. Goodwin | Rig BE 22 | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 20 July 1989 | # 22-14/10 | Depth 75' To 85' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 80' | D | MOIST | SLIGHTLY GRAVELLY SAND: 8% GRAVEL, 87% SAND, | 1315 | SAMPLE, 2 PT. |
| | | | | 5% MUD. TRACE MP, 4% FP, 4% VFP, 25% VCS, | | LITHOLOGIC & 2 |
| | | | | 35% CS, 17% MS, 5% FS, 5% VFS, 5% MUD, | | 500 ML CHGM |
| | | | | MODERATELY SORTED. MODERATE RX TO 10% HCL. | | ANAL. SAMPLES |
| | | | | WET COLOR IS 10YR 4/2 (DARK GRAY. BROWN). | | (C OF C. #SST |
| | | | | REMAINDER OF SAMPLE SIMILAR TO 75'. | | 072089) |
| | | | | NO MOISTURE SAMPLE DUE TO $H_2O$ ADDED. | 1320 | PREPARING TO WELD |
| | | | | Ø PPM W/ OVA & RAD. = < DET. | | |
| 81'3" | | | | ADDED 10'5" OF 10" CARBON STEEL CASING; TOTAL | 1405 | FINISHED WELDING |
| + 10'5" | | | | 10" CASING = 91'8" | 1410 | DRILLING |
| = 91'8" | | | | | | |
| | 85' | D | DRY | GRAVELLY SAND 12% GRAVEL, 83% SAND, 5% | 1500 | SAMPLE, 2 PT. |
| | | | | MUD. 2% MP, 5% FP, 5% VFP, 20% VCS, | | LITH. & 1 MOIST. |
| | | | | 35% CS, 13% MS, 10% FS, 5% VFS, 5% MUD. | | SAMPLE |
| | | | | POORLY SORTED. REMAINDER OF SAMPLE IS | 1510 | DRILLING |
| | | | | SIMILAR TO 75' & 85'. INCREASE IN | 1530 | END OF SHIFT |
| | | | | GRAVELS, HAD 3' OF OPEN HOLE & HOLE | | |
| | | | | CAVED. FM. VERY DRY. Ø PPM W/ OVA & | | |

REMARKS: RAD < DET. USED 43 GALLONS OF DRILL $H_2O$ TODAY.

Reviewed by [signature] 12-19-89

PNL-MA-567 DO-1, REV. 0

[signature] 7/20/89

254

WHC-MR-0209

9 1 1 2 0 5 0 0 4 5 3

| DRILL LOG | By S.M. Goodwin | Rig BE 22w | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 21 July 1989 | #22-14101 | Depth 85' to 95' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| | | | | | 0720 | DRILLING |
| | 90' | D | DRY | SLIGHTLY GRAVELLY SAND: 10% GRAVEL, 82% SAND, | 0755 | SAMPLE; 2 PT |
| | | | | 8% MUD. 1% MP, 5% FP, 4% VFP, 22% VCS, | | LITHOLOGIC & 1 |
| | | | | 30% CS, 15% MS, 10% FS, 5% VFS, 8% MUD | | MOISTURE SAMPLE |
| | | | | POORLY SORTED. GRAVELS ARE 60% MAFIC, 40% | 0800 | DRILLING |
| | | | | FELSIC; A TO SA. SANDS ARE 35% MAFIC, 65% | 0825 | PREPARING TO WELD |
| | | | | FELSIC; SA. WET COLOR IS 10 YR 5/3 (BROWN). | | |
| | | | | MODERATE TO STRONG RX. TO 10% HCL; SOME | | |
| | | | | CACO3 CEMENTED SANDS. NO CONSOLIDATION. | | |
| | | | | SIMILAR TO 85' SAMPLE. Ø PPM W/ OVA | | |
| | | | | & RAD. = < DET. | | |
| 91'8" | | | | ADDED 10'5" OF 10" CARBON STEEL CASING; TOTAL | 0920 | FINISHED WELDING |
| + 10'5" | | | | 10": 102'1" | 0930 | DRILLING |
| = 102'1" | 95' | D | DRY | SLIGHTLY MUDDY SAND: 5% GRAVEL, 85% SAND, | 1005 | SAMPLE; 2 PT. |
| | | | | 10% MUD. 2% FP, 3% VFP, 20% VCS, 30% CS, | | LITH SAMPLES |
| | | | | 15% MS, 10% FS, 10% VFS, 10% MUD. POORLY | | & 1 MOISTURE |
| | | | | SORTED. GRAVELS ARE 55% MAFIC, 45% FELSIC, | | SAMPLE. |

REMARKS:

Reviewed by V.L. McClean 12-19-89

PNL-MA-567 DO-1, REV. 0

Stanley M. Goodwin 7/21/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse

WHC-MR-0209

157

| DRILL LOG | By: S. M. GOODWIN | Rig: BE 22W | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 21 JULY 1989 | #22-11/101 | Depth: 95' TO 100' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 95' | D | DRY | (CONT). A TO SR. SANDS ARE 40% MAFIC, | 1010 | DRILLING |
| | | | | 60% FELSIC; SA. REMAINING DESCRIPTION | | |
| | | | | = SAME AS 90'. MORE FINES & LESS | | |
| | | | | GRAVEL. Ø PPM w/ OVA & RAD. = < DET. | | |
| | 100' | D | MOIST | SAND: 2% GRAVEL, 93% SAND, 5% MUD. | 1105 | SAMPLE; 2 PT. |
| | | | | 1% FP, 1% VFP, 8% VCS, 50% CS, 20% MS, 10% | | LITH. & 2 500 ML |
| | | | | FS, 5% VFS, 5% MUD. MODERATELY SORTED. | | CHEM. ANALYSIS |
| | | | | SANDS ARE 30% MAFIC, 70% FELSIC, TRACE | | SAMPLES (C. OF C. |
| | | | | MICA; SA. WET COLOR IS 10YR 5/2 (BROWN). | | # SST072189) |
| | | | | MODERATE RX. TO 10% HCL. NO CONSOLIDATION. | | NO MOISTURE SAMPLE |
| | | | | DECREASE IN GRAVEL & SILT; DECREASE IN | | DUE TO $H_2O$ ADDED |
| | | | | BASALT. SANDS BETTER SORTED. Ø PPM | 1110 | DRILLING |
| | | | | w/ OVA & RAD = < DET. | 1125 | PREPARING TO WELD |
| | | | | | 1200-1230 | LUNCH |
| 102'1" | | | | | 1245 | WELDING |
| + 10'4 1/2" | | | | ADDED 10'4 1/2" OF 10" CARBON STEEL CASING; | 1330 | DRILLING |
| = 112' 5 1/2" | | | | TOTAL 10" = 112' 5 1/2" | | |
| | | | | | | |

REMARKS:

Reviewed by D.L. McSlan 12-19-89

PNL-MA-567 DO-1, REV. 0

Shelly Mook 7/21/89

454

| DRILL LOG | By S. M. GOODWIN | Rig BE 22W | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 21 JULY 1989 | # 22-14101 | Depth 100' To 110' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 105' | D | SM | SAND: 4% GRAVEL, 91% SAND, 5% MUD. 1% FP, | 1400 | SAMPLE; 2 PT. |
| | | | | 3% VFP, 6% VCS, 45% CS, 25% MS, 10% FS, | | LITHOLOGIC SAMPLES |
| | | | | 5% VFS, 5% MUD. MODERATELY SORTED. VERY | | & 1 MOISTURE |
| | | | | SIMILAR DESCRIPTION TO 100'. SLIGHT IN- | | SAMPLE |
| | | | | CREASE IN GRAVEL; SANDS CONTAIN MORE | | |
| | | | | MS. Ø PPM OVA & RAD. = <DET. | 1410 | DRILLING |
| | 110' | D | SM | SAND: 5% GRAVEL, 90%, 5% MUD. 2% FP, | 1450 | SAMPLE; 2 PT. |
| | | | | 3% VFP, SAND % & MUD % SAME AS | | LITH. & 1 MOIST. |
| | | | | 105', LITHOLOGY, ETC., VERY SIMILAR | | SAMPLE |
| | | | | TO 100' & 105' SAMPLES. Ø PPM W/ OVA | 1500 | PREPARING TO WELD |
| | | | | & RAD = <DET. | 1530 | END OF SHIFT |

REMARKS:
Reviewed by V. L. McSlean 12-19-89 46 GALLONS OF $H_2O$ USED TODAY
PNL-MA-567 DO-1, REV. 0

Shirley M. Monk 7/21/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

153

WHC-MR-0209

| DRILL LOG | By: S.M. GOODWIN | Rig: BE 22W | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 24 JULY 1989 | #22-14101 | Depth: 110' To 120' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| | | | | | 0720 | CUTTING CASING |
| | | | | | 0745 | DRILLING |
| | | | | | 0815 | PREPARING TO WELD |
| 112'5½" | | | | ADDED 9'4½" OF 10" CARBON STEEL CASING; TOTAL | 0930 | FINISHED WELDING |
| + 10'4½" | | | | 10" = 122'10" | | |
| = 122'10" | | | | | | |
| | 115' | D | DRY | SLIGHTLY MUDDY SAND: 5% GRAVEL, 85% SAND, | 0940 | SAMPLE; 2 PT. |
| | | | | 10% MUD. TRACE MP, 2% FP, 3% VFP, 10% VCS, | | LITHOLOGIC & 1 |
| | | | | 30% CS, 30% MS, 10% FS, 5% VFS, 10% MUD. | | MOISTURE SAMPLE |
| | | | | POORLY SORTED. GRAVELS ARE 60% BASALT, 40% | 0945 | DRILLING |
| | | | | Q-RICH; A TO SR. SANDS ARE 40% MAFIC, | | |
| | | | | 60% FELSIC, TRACE MUSCOVITE & BIOTITE; | | |
| | | | | SA. WET COLOR IS 10YR 5/3 (BROWN), MODERATE | | |
| | | | | RX. TO 10% HCL, STRONG ON CEMENTED | | |
| | | | | SANDS. NO CONSOLIDATION. INCREASE IN FINES. | | |
| | | | | Ø PPM w/ OVA & RAD. = < DET. | | |
| | 120' | D | DRY | SAND: 5% GRAVEL, 90% SAND, 5% MUD: | 1025 | SAMPLE |

REMARKS:

Reviewed by V.C. McGhan 12-19-89

PNL-MA-567 DO-1 REV. 0

[illegible] 7/24/89

454

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22 w | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 24 July 1989 | # 22-14101 | Depth: 120' To 125' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 120' | D | DRY | (CONT) TRACE MP, 2% FP, 3% VFP, 10% VCS, 35% | | 2 PT. LITHOLOGIC, |
| | | | | CS, 35% MS, 5% FS, 5% VFS, 5% MUD. | | 1 MOISTURE, 1 |
| | | | | MODERATELY SORTED. GRAVELS ARE 50% MAFIC, | | 2 500 ML GLASS |
| | | | | 50% FELSIC (MOSTLY GRANITE); A TO SR | | CHEM. ANAL. |
| | | | | SANDS ARE 35% MAFIC, 65% FELSIC, TRACE | | SAMPLES (C. OF C. |
| | | | | MICA; MOSTLY SA WET COLOR IS 10 YR 5/3 | | # SST072469) |
| | | | | (BROWN). MODERATE RX. TO 10% HCL. NO CON- | 1035 | DRILLING |
| | | | | SOLIDATION. Ø PPM w/ OVA + RAD = < DET. | 1050 | PREPARING TO WELD |
| 122'10" | | | | ADDED 10'5" OF 10" CARBON STEEL CASING; | 1155 | FINISHED WELDING |
| + 10'5" | | | | TOTAL 10" CASING = 133'3" | 1200-1230 | LUNCH |
| = 133'3" | | | | CORRECTED CASING TOTAL FROM DRILLER'S LOG | 1240 | DRILLING |
| + 1/4" | | | | = 133'3 1/4" SECTION ADDED AT 1400 ON | | |
| = 133'3 1/4" | | | | 7/18 = 10'3 1/4" | | |
| | 125' | D | DRY | SAND. 2% GRAVEL, 90% SAND, 8% MUD. 1% FP, | 1315 | SAMPLE; 2 PT. |
| | | | | 1% VFP, 5% VCS, 25% CS, 40% MS, 10% FS, 10% | | LITHOLOGIC & 1 |
| | | | | VFS, 8% MUD. MODERATELY SORTED. SANDS ARE | | MOISTURE SAMPLE |
| | | | | 30% MAFIC, 70% FELSIC, TRACE MICA; SA. | 1320 | DRILLING |
| | | | | WET COLOR IS 10 YR 5/2 (BROWN) MODERATE | | |

REMARKS:
Reviewed by D. L. McClean 12-19-89

PNL-MA-567 DO-1, REV. 0

Author Mark 7/24/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

455

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22 w | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 24 July 1989 | #22-14101 | Depth: 125' To 130' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 125' | D | DRY | (CONT). RX. TO 10% HCL. NO CONSOLIDATION. Ø | | |
| | | | | PPM W/ OVA & RAD. = < DET. | | |
| | 127' | D | SM | FM APPEARS TO BE MORE CONSOLIDATED & | 1340 | |
| | | | | SOMEWHAT MORE MOIST. MATERIAL APPEARS | | |
| | | | | SIMILAR TO 125'. | | |
| | | | | "CONSOLIDATED" ZONE APPEARS TO BE 1' THICK; | 1348 | |
| | | | | SEEMS TO BE A MORE SILT-RICH LAYER | | |
| | | | | FROM 127'-128'. | | |
| | 130' | D | DRY | SAND: 5% GRAVEL, 90% SAND, 5% MUD. 1% MP, | 1405 | SAMPLE; 2 PT. |
| | | | | 2% FP, 2% VFP, 15% VCS, 40% CS, 25% MS, 5% FS, | | LITHOLOGIC & 1 |
| | | | | 5% VFS, 5% MUD. MODERATELY SORTED. GRAVELS ARE | | MOISTURE SAMPLE |
| | | | | 50% MAFIC, 50% FELSIC; A TO SA. SANDS ARE | 1410 | DRILLING |
| | | | | 30% BASALT, 70% FELSIC, TRACE MICA; SA. | 1440 | PREPARING TO WELD |
| | | | | WET COLOR IS 10YR 5/3 (BROWN). SLIGHT RX. | 1500 | SHUTDOWN; CAN'T |
| | | | | TO 10% HCL. NO CONSOLIDATION. DECREASE IN | | WELD ON CUT |
| | | | | FINES. Ø PPM W/ OVA & RAD = < DET. | | AFTER 3:00 |
| | | | | | | ACCORDING TO KEH |
| | | | | | | SAFETY. |

REMARKS:

Reviewed by W. L. McGhan 12-19-89

34 GALLONS OF $H_2O$ ADDED TODAY

PNL-MA-567 DO-1 REV. 0

Alan M. Hall 7/24/89

9 1 1 2 0 5 0 0 4 5 9

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22W | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 25 July 1989 | #22-14101 | Depth: 130' To 140' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| 133' 3 1/4" | | | | | 0720 | WELDING 10" |
| + 10' 4 1/2" | | | | ADDED 10' 4 1/2" OF 10" CARBON STEEL CASING; | 0820 | FINISHED WELD |
| = 143' 7 3/4" | | | | TOTAL 10" = 143' 7 3/4" | 0835 | DRILLING |
| | 135' | D | DRY | SLIGHTLY GRAVELLY SAND 5% GRAVEL, | 0920 | SAMPLE; 2 PT. |
| | | | | 87% SAND, 5% MUD. TRACE MP, 4% FP, 4% | | LITHOLOGIC & 1 |
| | | | | VFP, 20% VCS, 42% CS, 15% MS, 5% FS, 5% VFS, | | MOISTURE SAMPLE |
| | | | | 5% MUD. MODERATELY SORTED. GRAVELS ARE | 0925 | DRILLING |
| | | | | 50% MAFIC, 50% FELSIC; A TO SA. SANDS ARE | | |
| | | | | 35% MAFIC, 65% FELSIC; SA. WET COLOR IS | | |
| | | | | 10YR 5/3 (BROWN). SLIGHT RX. TO 10% HCL. NO | | |
| | | | | CONSOLIDATION. SLIGHT INCREASE IN GRAVEL. Ø | | |
| | | | | PPM W/OVA & RAD = <DET. | | |
| | 140' | D | DRY | SLIGHTLY GRAVELLY SAND: 10% GRAVEL, 85% SAND, | 1020 | SAMPLE; 2 PT. LITH., |
| | | | | 5% MUD. TRACE MP, 5% FP, 5% VFP, 35% VCS, | | 1 MOISTURE, & 2 |
| | | | | 30% CS, 10% MS, 5% FS, 5% VFS, 5% MUD. | | 500 ML CHEM. ANAL. |
| | | | | MODERATELY SORTED. SAMPLE DESCRIPTION SAME | | SAMPLES (C. OF C. |
| | | | | AS 135'. Ø PPM W/OVA & RAD = <DET. | | # SST072589) |

REMARKS:
Reviewed by V.L. McGlam 12-19-89

PNL-MA-567 DO-1 REV. 0

[signature] 7/25/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing W...

157

WHC-MR-0209

| DRILL LOG | By S. M. GOODWIN | Rig BE 22W | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 25 JULY 1989 | #22-14101 | Depth 140' To 150' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 140' | D | DRY | (CONT.) INCREASE IN GRAVELS; SANDS ARE | 1025 | DRILLING |
| | | | | COARSER THAN PREVIOUS SAMPLE. | 1050 | PREPARING TO WELD |
| | | | | | 1200-1230 | LUNCH |
| 143' 7 3/4" | | | | | 1240 | WELDING 10" |
| + 10' 4 1/2" | | | | ADDED 10' 4 1/2" OF 10" CARBON STEEL CASING; | 1300 | FINISHED WELDING |
| = 154' 1/4" | | | | TOTAL 10" = 154' 1/4" | 1305 | DRILLING |
| | 145' | D | WET | SLIGHTLY GRAVELLY SAND: 10% GRAVEL, 85% SAND, | 1340 | SAMPLE; 2 PT. |
| | | | | 5% MUD. TRACE MP, 5% FP, 5% VFP, 40% VCS, | | GEO SAMPLES & |
| | | | | 30% CS, 10% MS, 3% FS, 2% VFS, 5% MUD. | | NO MOISTURE |
| | | | | MODERATELY SORTED. GRAVELS ARE 50% BASALT, | | SAMPLE DUE TO |
| | | | | 50% Q-RICH; A. TO SR. SANDS ARE 40% MAFIC, | | $H_2O$ ADDED |
| | | | | 60% FELSIC; SA. WET COLOR IS 10 YR 4/3 (DRK. | 1345 | DRILLING |
| | | | | BROWN). NO RX. TO 10% HCL. NO CONSOLIDATION. | 1410 | DELIVERING 8" |
| | | | | DECREASE IN FINES & SLIGHT COLOR CHANGE. | | CASING |
| | | | | Ø PPM W/ OVA & RAD = <DET. | 1440 | DRILLING |
| | 150' | D | DRY | SAND: 5% GRAVEL, 90% SAND, 5% MUD. 2% FP, | 1450 | SAMPLE; 2 PT. |
| | | | | 3% VFP, CS INCREASED TO 40%; REMAINING | | LITHOLOGIC & |
| | | | | SAMPLE IS SAME AS 145' DESCRIPTION. | | 1 MOISTURE SAMPLE |

REMARKS:
Reviewed by D.L. McSkane 12-19-89

458

WHC-MR-0209

9 1 1 2 0 5 0 0 4 6 1

| DRILL LOG | By: S.M. Goodwin | Rig: BE 22W | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 25 July 1989 | #22-14101 | Depth: 150' To 153' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 150' | D | DRY | (CONT:) SAMPLE IS VERY SIMILAR TO 145'. | 1455 | DRILLING |
| | | | | Ø PPM W/ OVA & RAD = <DET. | 1530 | END OF SHIFT |

REMARKS:
Reviewed by V.L. McGhan 12-19-89 USED 42 GALLONS OF $H_2O$ TODAY
PNL-MA-567 DO-1, REV. 0

Shirley Stout 7/26/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

459

WHC-MR-0209

9 1 1 2 0 5 0 0 4 6 2



| DRILL LOG | By S. M. Goodwin | Rig BE 22m | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 26 July 1989 | H-22-11101 | Depth 153' To 153' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| TOTAL | 10" | | | PREPARING TO RUN 8" CASING; WELDING DRIVE | 0770 | |
| 154' 1/4" | | | | SHOE & BEVELING PIPE | | |
| | | | | GEOPHYSICALLY LOGGING BOREHOLE WITH NATURAL | 1150 | LOGGING HOLE |
| | | | | GAMMA PROBE. | | |
| | | | | FINISHED LOGGING BOREHOLE; LOGGED INTERVAL | 1235 | FINISHED LOGGING |
| | | | | FROM 3.2' TO 151.2'. STEVE AIRHART, | 1240 | WELDING 8" |
| | | | | PNL, LOGGED BOREHOLE | 1530 | END OF SHIFT |
| | | | | | | |
| | | | | USED FOOD GRADE OIL TO CHANGE TOOL STRING | | |

REMARKS:

Reviewed by V.L. McAshan 12-19-89

PNL-MA-567 DO-1 REV. 0

A. Hull Nov. 7/24

440

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22 W | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 27 JULY 1989 | # 22-14101 | Depth: 153' To 153' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS ILL; NO ACTIVITY AT WELL SITE | 0700 | |
| | | | | TODAY. | | |

REMARKS:
Reviewed by V.L. McGhan 12-19-89
PNL-MA-567 DO-1, REV. 0

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine

194

WHC-MR-0209

| DRILL LOG | By S. M. Goodwin | Rig BE 22 | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 28 July 1989 | # 22-14101 | Depth 153' To 157' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| TOTAL 8" ADDED: | | | | | 0715 | WELDING 8" |
| 21'8" | | | | FINISHED WELDING 8", TOTAL 8" ADDED | 1140 | |
| + 20'2" | | | | = 158'11" OF CARBON STEEL CASING | 1145 | DRILLING |
| + 19'11" | | | | | | |
| + 20'5" | 155' | D | DRY | SLIGHTLY GRAVELLY SAND: 7% GRAVEL, 85% | 1150 | SAMPLE, 2 PT. |
| + 21'10" | | | | SAND, 8% MUD. TRACE MP, 4% FP, 3% | | LITHOLOGIC & 1 |
| + 21'10" | | | | VFP, 20% VCS, 30% CS, 20% MS, 10% FS, | | MOISTURE SAMPLE |
| + 21'10" | | | | 5% VFS, 8% MUD. POORLY SORTED. GRAVELS | 1200-1230 | LUNCH |
| + 11'3" | | | | ARE 50% MAFIC, 50% FELSIC; SA TO SR. | 1240 | DRILLING |
| = 158'11" | | | | SANDS ARE 40% BASALT, 60% FELSIC & RX | | |
| | | | | FRAGS; SA WET COLOR IS 10YR 4/3 (BROWN). | | |
| | | | | MODERATE RX. TO 10% HCL. NO CONSOLIDATION. | | |
| | 157' | D | MOIST | MUD: 10% SAND, 90% MUD (70% CLAY, 70% SILT) | 1300 | SAMPLE, 2 500ML |
| | | | | STRONG RX. TO 10% HCL. WET COLOR IS 10YR | | CHEM. ANALYSIS |
| | | | | 3/3 (DARK BROWN). SILT LENS ~3" THICK; | | SAMPLES (C. of |
| | | | | NO OBVIOUS STRUCTURE OR LAMINATIONS. | | C. #SST072889) |
| | | | | BOUNDED BY VC & C SANDS. MOISTURE | 1305 | DRILLING |
| | | | | INCREASE. NOT ENOUGH SAMPLE FOR LITH. | | |

REMARKS:

Reviewed by D.L. McGlam 12-19-89

PNL-MA-567 DO-1 REV. 0

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22.. | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 55T |
|---|---|---|---|---|---|
| | Date: 28 July 1959 | #22-11/101 | Depth: 157' To 165' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 157' | D | MOIST | (CONT.) ON MOISTURE SAMPLES. Ø PPM W/ OVA | | |
| 158'11" | " | | | & RAD = <DET. | | |
| + 10' | | | | | 1315 | PREPARING TO WELD |
| = 168'11" | " | | | ADDED 10' OF 8" CASING; TOTAL 8" = 168'11" | 1415 | FINISHED WELDING |
| | 160' | D | SM | SLIGHTLY GRAVELLY SAND: 7% GRAVEL, 85% | 1425 | SAMPLE; 2 PT. |
| | | | | SAND, 8% MUD. SAME AS 155' SAMPLE | | LITHOLOGIC & 1 |
| | | | | W/ SLIGHT INCREASE IN GRAVEL SIZE (2% | | MOISTURE SAMPLE |
| | | | | MP, 3% FP, 2% VFP). REMAINING SAMPLE | 1430 | DRILLING |
| | | | | IS SAME AS 155'. NO CHEM. SAMPLE; | 1435 | SHUT DOWN FOR JEH |
| | | | | TOOK 2 @ 157'. Ø PPM W/ OVA & RAD: <DET | | MECHANIC |
| | | | | | 1450 | DRILLING |
| | 165' | D | DRY | SLIGHTLY GRAVELLY SAND: 7% GRAVEL, 85% | 1500 | SAMPLE; 2 PT. |
| | | | | SAND, 8% MUD. VERY SIMILAR TO 155' & | | LITH & 1 MOISTURE |
| | | | | 160' SAMPLES. TRACE CP, SLIGHT INCREASE | | SAMPLE |
| | | | | IN OVERALL GRAVEL SIZE. WET COLOR IS 10YR | 1505 | DRILLING |
| | | | | 5/3 (BROWN). MODERATE RX. TO 10% HCL. | 1530 | END OF SHIFT |
| + | | | | NO CONSOLIDATION; CAN'T DRILL OPEN HOLE | | |
| | | | | DUE TO CAVING. Ø PPM W/ OVA & RAD = <DET. | | |

REMARKS:

Reviewed by V. L. McKlean

NO WATER ADDED TODAY

PNL-MA-567 DO-1, REV. 0

[illegible] 7/28/59

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

463

WHC-MR-0209

| DRILL LOG | By EJ Jensen | Rig BE 22W #22-14101 | Well Number 299-E33-33 | Computer Number NA | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 7/31/89 | | Depth 170' To 175' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 9'11" | | | | Added 9'11" of 8" diameter casing | 0700 | |
| 178'10" | | | | | | |
| | 170' | D | Dry | SLIGHTELY GRAVELLY MUDDY SAND, 10% gravel, 75% sand, 15% mud, gravel is mostly small Basaltic pebbles; poor sorting, Subrounded pebbles, Moderate Rxn in 10% HCl, wet color 10YR 5/3 Brown, unconsolidated, SLIGHTLY MUDDY, | 0900 | 2 pint jar samples 1 moisture sample |
| | 175' | D | Dry | SAND, 5% small pebbles, 10% VCS, 15% CS, 15% MS 20% FS, 25% VFS, 10% mud, poor sorting, mostly unconsolidated (some round compacted balls were noticed) moderate rxn in 10% HCl, wet color 10YR 5/3 Brown. | 0930 | 2 pint jar samples 1 moisture sample |
| 10' | | | | Added 10' of 8" diameter casing | 1000 | |
| 188'10" | | | | | | |

REMARKS:
Reviewed by V.L. McClean 12-19-89
PNL-MA-567, DO-1 REV. 0

7/31/89

WHC-MR-0209

| DRILL LOG | By EJ Jensen | Rig BE 22W #22-14101 | Well Number 299-E33-33 | Computer Number NA | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 7/31/89 | | Depth 180' To 190' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 180' | D | dry | SLIGHTLY MUDDY SAND, 5% small pebbles, 10% VCS, 15% CS, 15% ms, | 1100 | 2 pint jar samples |
| | | | | 20% fs, 25% vfs, 10% mud, poor sorting, unconsolidated | | 1 moisture sample |
| | | | | moderate rxn in 10% HCl, wet color 10y R 5/3 | | 2 special samples |
| | | | | Brown. | | 073189 SST chain |
| | | | | MUDDY | | of custody, Form |
| | 185' | D | dry | SAND, 10% VCS, 10% CS, 15% ms, 20% fs, 25% | | 2 pint jar samples |
| | | | | vfs, 20% mud, poor sorting, semi consolidated, | | no moisture sample |
| | | | | moderate rxn in 10% HCl, wet color 10yR 4/3 | | because water was |
| | | | | dark brown. Increase in silt content has | | added to the hole |
| | | | | cause some compaction of the sediments. | | |
| | | | | | | |
| 10'6" | | | | Added 10'6" of 8" diameter casing | 1300 | |
| 199'4" | | | | | | |
| | 190' | D | dry | SLIGHTLY GRAVELY MUDDY SAND, 10% gravel, 75% sand, | 1430 | 2 pint jar sample |
| | | | | 15% mud, Gravel is small pebbles, Basaltic, | | |
| | | | | poor sorting, unconsolidated, moderate rxn | | |
| | | | | in 10% HCl, wet color 10YR 5/3 Brown. | | |
| | | | | | | |

REMARKS:
Reviewed by V.E. McGhan 12-19-89
PNL-MA-567 DO-1 REV. 0

E. J. 7/31/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse

WHC-MR-0209

465

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22w #22-14101 | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 1 August 1989 | | Depth: 190' to 200' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.* | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 199'4" | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| | | | | RIG WAS SHUT DOWN 7/31/89 FROM 1430 - 1530 | 0715 | DRILLING |
| | | | | DUE TO HIGH WINDS & POTENTIAL CONTAMINA- | | |
| | | | | TION | | |
| | 195' | D | DRY | SLIGHTLY GRAVELLY MUDDY SAND: 8% GRAVEL, | 0800 | SAMPLE: 2 PT. |
| | | | | 80% SAND, 12% MUD. TRACE MP, 4% FP, 4% | | LITHOLOGIC & 1 |
| | | | | VFP, 20% VCS, 25% CS, 15% MS, 10% FS, 10% | | MOISTURE SAMPLE |
| | | | | VFS, 12% MUD. POORLY SORTED. GRAVELS ARE | 0805 | DRILLING |
| | | | | 50% BASALTIC & 50% FELSIC; SA TO R. SANDS | | |
| | | | | ARE 35% MAFIC, 65% FELSIC; SA. WET | | |
| | | | | COLOR IS 10YR 3/3 (DRK. BROWN). MODERATE | | |
| | | | | RX. TO 10% HCL NO CONSOLIDATION. Ø PIN | | |
| | | | | W/ OVA & RAD. = < DET. | | |
| | 200' | D | DRY | GRAVELLY MUDDY SAND: 15% GRAVEL, 75% SAND, | 0825 | SAMPLE: 2 PT. |
| | | | | 10% MUD. 3% MP, 6% FP, 6% VFP, 15% VCS, | | LITHOLOGIC, 1 MOIST. |
| | | | | 25% CS, 20% MS, 10% FS, 5% VFS, 10% MUD. | | SAMPLE & 2 500 |
| | | | | POORLY SORTED. GRAVELS & SANDS SAME AS | | ML. CHEM. ANAL. |
| | | | | 195' SAMPLE MODERATE RX TO 10% HCL. | | (C. OF C. # SST0501 |
| | | | | | | 89). |

REMARKS:

Reviewed by D. L. McLellan 12-19-89

PNL-MA-567 DO-1 REV. 0

[illegible] 8/1/89

WHC-MR-0209

| DRILL LOG | By: S. M. Goldwin | Rig: BC 22m | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 1 August 1989 | #22-14/101 | Depth: 200' to 203' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 200' | D | DRY | (CONT.) WET COLOR IS 10 YR 4/3 (BROWN). | 0830 | PREPARING TO |
| | | | | NO CONSOLIDATION. Ø PPM W/ OVA & RAD: | | WELD |
| 199'4" | | | | < DET. | | |
| + 10'5" | | | | ADDED 10'5" OF 8" CARBON STEEL CASING; | 0940 | FINISHED WELDING |
| = 209'9" | | | | TOTAL 8" = 209'9" | 0950 | DRILLING |
| | 202' | D | SM | FM APPEARS MORE CONSOLIDATED THAN PREVIOUS | 1100 | SLOW DRILLING |
| | | | | SAMPLES; DRILLER SAYS IT FEELS "STICKY". | | |
| | | | | PARTICLE SIZE DISTRIBUTION APPEARS SIMILAR | | |
| | | | | TO 200' SAMPLE. Ø PPM W/ OVA & RAD: < DET. | | |
| | | | | STRONG RX TO 10% HCL | 1200-1230 | LUNCH |
| | | | | | 1240 | DRILLING |
| | 203' | D | MOIST | FM STILL "STICKY"; APPEARS TO BE ALTERNAT- | 1255 | TOOK 2 PT. LITH |
| | | | | ING LAYERS OF DARK BROWN GRAVELLY MUDDY | | & 2 500 ML CHEM |
| | | | | SAND & TAN QUARTZ-RICH COARSE & MEDIUM | | ANAL. SAMPLES |
| | | | | SANDS. MATERIAL IS MOIST; DRILLER HAS | | (C. OF C #SST080187) |
| | | | | ADDED $H_2O$, SO IT IS DIFFICULT TO DETER- | 1300 | DRILLING |
| | | | | MINE IF FM. IS MOIST OR IF MOISTURE IS | | |
| | | | | FROM $H_2O$ ADDED TO BOREHOLE. Ø PPM W/ OVA | | |

REMARKS:
& RAD. = < DET.

Reviewed by V.L. McGlam 12-19-89

PNL-MA-567 DO-1, REV. 0

Signature 8/1/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22 | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 1 August 1989 | #22-14101 | Depth: 203' To 210' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 205' | D | D | SAND: 95% SAND, 5% MUD. 15% CS, 50% MS, 20% | 1310 | SAMPLE; 2 PT. |
| | | | | FS, 10% VFS, 5% MUD. MODERATELY SORTED. | | LITH. & 1 MOIST. |
| | | | | SANDS ARE 20% MAFIC, 80% FELSIC, TRACE | | SAMPLE |
| | | | | MICA. SA. WET COLOR IS 10 YR 5/3 (BROWN). | 1315 | DRILLING |
| | | | | NO CONSOLIDATION. MODERATE TO STRONG RX. TO | 1330 | SHUT DOWN for |
| | | | | 10% HCL. SIGNIFICANT CHANGE IN P. SIZE | | KEH MECHANIC |
| | | | | DISTRIBUTION, & IN BASALT CONTENT. ∅ PLM | | |
| | | | | w/ OVA & <DET RADIATION. | | |
| | 207' | D | SM | FM. APPEARS CONSOLIDATED & CONTAINS MORE MUD. | 1330 | |
| | | | | FM HAS CHANGED TO A SANDY MUD w/ ~90% | | |
| | | | | OF MUD SILT, 10% CLAY. SANDS ARE MOSTLY | | |
| | | | | F & VF. HARD TO TELL OVERALL % SAND | | |
| | | | | & MUD. STRONG RX. TO 10% HCL. | | |
| | 210' | D | SM | MUDDY SAND: BROUGHT UP 1'8" CORE OF OLIVE GRAY CLAY | 1435 | SAMPLE; 2 PT. |
| | | | | (5Y 4/2). SAMPLE WAS INTACT & EXHIBITED NO | | LITH. & 2 500ML |
| | | | | INTERNAL STRUCTURE. DENSE, MASSIVE CLAY | | CHEM. ANAL. |
| | | | | w/ OCCASIONAL FE-STAINED SAND STRINGERS (FS | | SAMPLES (C of |
| | | | | TO VFS). MODERATE TO STRONG RX. TO 10% HCL → | | C. & SST050189) |

REMARKS:
(SANDS ARE MOSTLY VF w/ SOME F. ~60% SAND, 40% MUD)

Reviewed by V.L. McGhan 12-19-89

PNL-MA-567 DO-1, REV. 0

Steve M. Goodwin 8/1/89

WHC-MR-0209

464

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22 w | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 1 August 1989 | #22-1410, | Depth: 210' To 212' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 210' | D | SM | (CONT.) WHERE SAND IS PRESENT, DIFFICULT TO | | |
| | | | | DETERMINE % OF CLAY & SILT VS. SAND; | | |
| | | | | MUD IS PROBABLY 70% SILT & 30% CLAY. | | |
| | | | | Ø PID w/ OVA & RAD = <DET. | | |
| | 212' | D | SM | FM. APPEARS TO BE A MUDDY SAND TO | 1500 | FM CHANGE |
| | | | | SANDY MUD @ 211' & SOME GRAVELS ARE | 1510 | PREPARING TO |
| | | | | PRESENT @ 212'. MUST BE GETTING OUT | | WELD |
| | | | | OF MUDDY SECTION & BACK TO GRAVELLY | 1530 | END OF SHIFT |
| | | | | SANDS. COLOR D BACK TO DARK BROWN; | | |
| | | | | SIMILAR TO ALTERNATING GRAVELLY MUD | | |
| | | | | & SANDS AT 203'. | | |

REMARKS: ADDED 10 GALLONS OF $H_2O$ TODAY.

Reviewed by W. L. McAlham 10-19-89

PNL - TIA - 567 DO-1, REV. 0

Stephen M. Goodwin 8/1/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

409

WHC-MR-0209

| DRILL LOG | By Goodwin / S.J. BRANDENBERGER | Rig BE 22W # 22-14101 | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 55T |
|---|---|---|---|---|---|
| | Date 8/2/89 | | Depth 212' To 216' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMBLEY. | 0700 | SERVICING RIG. |
| | | | | | 0740 | DRILLING. |
| | 215' | D | (ADDED H.O) M | SAND: TRACE GRAVEL, 90% SAND, 10% MUD. | 0755 | TOOK (2) LITHOLOGIC |
| | | | | TRACE CP - FP, TRACE VCS - CS, 10% MS, 20% | | SAMPLES. |
| | | | | FS, 60% VFS, 10% MUD (MOSTLY SILT.) | | |
| | | | | WELL SORTED. WET COLOR IS 5Y 3/2 (DARK | | |
| | | | | OLIVE GRAY). CONSOLIDATED, NO OBVIOUS | | |
| | | | | LAMINATIONS. SILTS & SANDS APPEAR TO BE | | |
| | | | | ALTERNATING FROM 202'. SLOW DRILLING; | | |
| | | | | FM. IS "STICKY". Ø PIA w/ OVA. | | |
| | 216' | D | M | FM. CHANGED TO GRAVELLY SAND; SANDS ARE | 0820 | PREPARING TO WELD. |
| | | | | COARSER. CONTAINS GRAVELS UP TO VCP | | |
| 209' 0" | | | | SIZE. | | |
| + 11' 6" | | | | ADDED 11'6" OF 8" CARBON STEEL CASING; TOTAL | 0930 | FINISHED WELDING |
| = 221' 3" | | | | 8" CASING = 221'3" | 0940 | DRILLING |
| | | | | CLEANING OUT HOLE; DRIVING 8" CASING THROUGH | 1030 | SLOW DRILLING |
| | | | | HOLE DRILLED w/ 6" CORE BARREL. | | |
| | 216 | D | DRY | BACK DOWN TO 216'; BRING UP GRAVELS & | 1145 | |

REMARKS: SAND. GRAVELS UP TO SMALL COBBLE SIZE

Reviewed by V.L. Markham 12-19-89

PNL-MA-567 DO-1, REV. 0

[signature] 8/2/89

470

| DRILL LOG | By GOODWIN / S.J. BRANDENBERGER | Rig BEZZW #22-14101 | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 8/2/89 | | Depth 216 To 216 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1200/1230 | LUNCH |
| | | | | DENSE GRAVELLY SAND ENCOUNTERED. DRILLER SWITCHING | 1312 | DRILLER NOT MAKING ANY PROGRESS, SWITCH TO HARD TOOL |
| | | | | TO HARD TOOL. | | |
| | | | | ADDED 5 GAL. $H_2O$ TO BOREHOLE. RESUMED DRILLING. | 1443 | |
| | | | | ADDED 5 GAL. $H_2O$ TO BOREHOLE. | 1458 | |
| | | | | SHUT DOWN, PREPARED TO LEAVE THE SITE. | 1515 | |

REMARKS: Reviewed by V.L. Markham 12-19-89 ADDED 10 GALLONS OF $H_2O$ TODAY

PNL-MA-567 DO-1, REV. 0

8/2/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

471

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: RE 22W # 22-141101 | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 3 August 1989 | | Depth: 216' To 220' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 221' 3" | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| + 10' 0" | | | | USED FOOD GRADE OIL WHEN SWITCHING TOOL | 0715 | PREPARING TO |
| = 231' 3" | | | | STRING ON 5/2/89 | | WELD 5" |
| | | | | ADDED 10' OF 8" CARBON STEEL CASING, TOTAL | | FINISHED WELDING |
| | | | | 8" = 231' 3" | 0835 | DRILLING |
| | 220' | H | WET | MUDDY SANDY GRAVEL: 43% GRAVEL, 45% SAND, | 0910 | SAMPLE 2 PT. |
| | | | | 12% MUD. TRACE VCP, 6% CP, 12% MP, 15% FP, | | LITHOLOGIC 1 2 |
| | | | | 10% VFP, 5% VCS, 20% CS, 10% MS, 5% FS, 5% | | 500 ML. CHEM. ANAL. |
| | | | | VFS, 12% MUD. VERY POORLY SORTED. GRAVELS | | SAMPLES (C. of C. |
| | | | | ARE 35% BASALT, 30% GRANITIC, 30% QUART- | | # SST050389) |
| | | | | ZITE, 5% GREEN META (CHLORITIZED?), TRACE | 0915 | DRILLING |
| | | | | MUDSTONE; A TO WR. SANDS ARE 25% BASALT, | | |
| | | | | 75% Q-RICH, TRACE MICA; SA. WET COLOR IS | | |
| | | | | 5Y 3/2 (DRK. OLIVE GRAY). SLIGHT RX. TO 10% | | |
| | | | | HCL. CONSOLIDATED; DRILLER SAYS FM IS | | |
| | | | | CEMENTED ($SiO_2$?). SLOW DRILLING, CASING | | |
| | | | | WON'T DRIVE. FM CHANGED @ 216' & HAS | | |
| | | | | BEEN CEMENTED GRAVELS SINCE THEN. DECREASE | | |

REMARKS:
Reviewed by D. G. Maclean 12-19-89 IN BASALT. SAMPLED w/ SAND PUMP.

PNL-MA-567 DO-1 REV. 0

Sheila Moore 8/3/89

472

WHC-MR-0209

9 1 1 2 0 5 0 0 4 7 5

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| S. M. Goodwin | BE 22 w | 299-E33-33 | N/A | W-017 SST |
| **Date** | | **Depth** | | **Subcontract No.** |
| 3 August 1989 | H 22-11/101 | 220' To 230' | | N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 225' | H | W | MUDDY SANDY GRAVEL: 43% GRAVEL, 45% SAND, | 1005 | SAMPLED w/ DART |
| | | | | 12% MUD. SIMILAR TO 220'; SLIGHT INCREASE | | BAILER, 2 PINT |
| | | | | IN VCP & VCS. VERY POORLY SORTED. GRAVELS | | LITHOLOGIC SAMPLES |
| | | | | ARE SIMILAR TO 220'; TRACES OF ANDESITE & | 1010 | DRILLING |
| | | | | CONGLOMERATE. SANDS SIMILAR TO 220'. WET | 1030 | BUILDING UP BIT |
| | | | | COLOR IS 2.5Y 4/4 (OLIVE BROWN). SLIGHT | 1110 | DRILLING |
| | | | | RX. TO 10% HCL. CONSOLIDATED, NO SIGNS | 1200-1230 | LUNCH |
| | | | | OF CEMENTATION ON GRAVELS. SLIGHT CHANGE | 1240 | DRILLING |
| | | | | IN COLOR TO MORE BROWNISH. Ø PPM w/ | | |
| | | | | OVA & RAD = <DET. | | |
| | 230' | H | WET | MUDDY SANDY GRAVEL: 45% GRAVEL, 43% SAND, 12% | 1300 | SAMPLED w/ SAND |
| | | | | MUD. 3% VCP, 12% CP, 15% MP, 10% FP, 5% VFP, | | PUMP; 2 PINT |
| | | | | 13% VCS, 15% CS, 5% MS, 5% FS, 5% VFS, 12% | | LITHOLOGIC SAMPLES |
| | | | | MUD. VERY POORLY SORTED. GRAVELS & SANDS | 1305 | PREPARING TO WELD |
| | | | | SAME AS PREVIOUS. WET COLOR IS 2.5Y 4/2 (DARK | | |
| | | | | GRAYISH BROWN). SLIGHT RX. TO 10% HCL. | | |
| | | | | CONSOLIDATED ?; VERY SLOW DRILLING. $SiO_2$ | | |
| | | | | CEMENTED (?); NO $SiO_2$ CEMENT IN SAMPLE. | | |

REMARKS: Reviewed by V.L. McKlam 12-19-89 Ø PPM w/ OVA & RAD = <DET.

PNL-MA-567 DO-1, REV. 0

Sherlin Good 8/3/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

476

WHC-MR-0209

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| S. M. Goodwin | BE 22m | 299-E33-33 | N/A | W-017 SST |
| Date: 3 August 1989 | #22-1410 | Depth: 230' To 234.5' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 231'3" | | | | FINISHED ADDING 8" ; ADDED 10'0" of 8" CASING | 1410 | FINISHED WELDING |
| + 10'0" | | | | TOTAL 8" - 241'3" | 1425 | DRILLING |
| = 241'3" | | | | | 1515 | DONE for DAY |

REMARKS:
Reviewed by D.L. Maclean 12-19-89 ADDED 38 GALLONS of $H_2O$ TODAY

PNL-MA-567 DO-1 REV. 0

Sandra Goodwin 8/3/89

474

WHC-MR-0209

9 1 1 2 0 5 0 0 4 7 7

| DRILL LOG | By: S. M. Goodwin | Rig: RE 22u | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 4 August 1989 | #22-14/101 | Depth: 234.5' to 235' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| | | | | WAITING FOR BARRELS; DRILLER THINKS HE'S | 0715 | STANDBY |
| | | | | IN $H_2O$. ESTIMATES $H_2O$ @ 232'. | | |
| | | | | WILL DRILL TO ~247' & GET STATIC $H_2O$ | | |
| | | | | AFTER LUNCH. | | |
| | 235' | H | WET | MUDDY SANDY GRAVEL: 50% GRAVEL, 40% | 0755 | BAILING WELL |
| | | | | SAND, 10% MUD. TRACE VCP, 15% CP, 15% | | INTO BARRELS; |
| | | | | MP, 10% FP, 10% VFP, 10% VCS, 10% CS, 10% | | SAMPLED W/ SAND |
| | | | | MS, 5% FS, 5% VFS, 10% MUD. VERY | | PUMP. 2 PT. LITH |
| | | | | POORLY SORTED. GRAVELS ARE 35% BASALT, | | & 1 SIEVE SAMPLE |
| | | | | 60% QUARTZITE & GRANITE, 5% ALTERED | 0800 | DRILLING |
| | | | | ANDESITE & VOLCANIC PORPHYRY; UN- | 0845 | MEASURING CABLE |
| | | | | BROKEN ARE R TO WR. SANDS ARE 25% | | |
| | | | | MAFIC, 75% FELSIC; SA. WET COLOR | | |
| | | | | IS 2.5Y 4/4 (OLIVE BROWN). SLIGHT RX | | |
| | | | | TO 10% HCL. APPEARS CONSOLIDATED / | | |
| | | | | CEMENTED. SIMILAR TO PREVIOUS SAMPLE. | | |
| | | | | 0 PPM W/ OVA. & RAD - < DET. | | |

REMARKS:
Reviewed by K. G. Markham 12-19-89
PNL-MA-567 DO-1, REV. 0

Shirley M. Hall 8/4/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse

4/75

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22W #22-14/101 | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 4 August 1995 | | Depth: 235' To 245' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0900 | PREPARING TO WELD |
| 241' 3" | | | | ADDED 10' OF 8" CARBON STEEL CASING; TOTAL | 1010 | FINISHED WELDING |
| + 10' 0" | | | | 8" = 251' 3" | 1015 | DRILLING |
| = 251' 3" | | | | | | |
| | 240' | H | WET | MUDDY SANDY GRAVEL: 55% GRAVEL, 40% SAND, | 1040 | SAMPLED w/ SAND |
| | | | | 5% MUD. TRACE VCP, 15% CP, 15% MP, 15% | | PUMP; 2 PT. |
| | | | | FP, 10% VFP, 15% VCS, 10% CS, 10% MS, | | LITHOLOGIC, 1 |
| | | | | 3% FS, 2% VFS, 5% MUD. POORLY SORTED. | | SIEVE, + 2500 |
| | | | | GRAVELS ARE 35% BASALT, 15% ALTERED | | ML CHEM. ANAL |
| | | | | GREEN RX (CHLORITIZED ANDESITE ?), 50% | | SAMPLES. (C. OF |
| | | | | QUARTZITE & GRANITE, TRACE MUDSTONE, | | C. # SST050487) |
| | | | | UNBROKEN R TO WR. SOME BASALT w/ WX. | 1045 | DRILLING |
| | | | | RINDS SANDS ARE 30% BASALT, 60% FELSIC, | | |
| | | | | 10% OTHER RX. FRAGS; A TO SA. WET COLOR | | |
| | | | | IS 2.5Y 4/4 (OLIVE BROWN). NO RX. TO 10% | | |
| | | | | HCL. CONSOLIDATED / CEMENTED. Ø PIM w/ | | |
| | | | | UVA & RAD: CDET. | | |
| | 245' | H | WET | MUDDY SANDY GRAVEL; 50% GRAVEL, 45% SAND | 1120 | SAMPLED w/ SAND PUMP |

REMARKS:
Reviewed by D. L. McKhan 12-19-89

PNL-MA-567 DO-1 REV. 0

Alan M. Mark 8/4/95

WHC-MR-0209

474

| DRILL LOG | By S. M. Goodwin | Rig BE 22 W | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 4 August 1989 | #22-14101 | Depth 245' To 250' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 245' | H | WET | (CONT.) 5% MUD. P. SIZE DISTRIBUTION | | 2 PT. LITH & |
| | | | | SIMILAR TO PREVIOUS SAMPLE; SLIGHT | | 1 SIEVE SAMPLE |
| | | | | DECREASE IN CP & INCREASE IN FS & | 1125 | DRILLING |
| | | | | VFS. GRAVELS SIMILAR TO 240'; SLIGHT | | |
| | | | | INCREASE IN GRANITE & DECREASE IN | | |
| | | | | ALTERED GREEN RX. SANDS SAME. | | |
| | | | | CONSOLIDATION / COMPACTION OF FM. MUST | | |
| | | | | BE CHANGING; DRILL RATE HAS INCREASED | | |
| | | | | SINCE 240'. Ø PPM W/ OVA & RAD = <DET. | | |
| | | | | | 1200-1230 | LUNCH |
| | | | | D/W = 241.05' - 5.67' STICKUP = 235.38' (PNL | 1240 | D/W |
| | | | | E. TREE # 10998). | 1245 | DRILLING |
| | 250' | H | WET | MUDDY SANDY GRAVEL: 50% GRAVEL, 45% SAND, | 1330 | SAMPLED W/ SAND |
| | | | | 5% MUD. 5% VCP, 10% CP, 15% MP, 10% FP, | | PUMP, 2 PT. LITH |
| | | | | 10% VFP, 10% VCS, 15% CS, 10% MS, 5% FS, | | & 1 SIEVE SAMPLE |
| | | | | 5% VFS, 5% MUD. VERY POORLY SORTED. | 1335 | DRILLING |
| | | | | GRAVEL & SANDS SIMILAR TO PREVIOUS | 1400 | PREPARING TO |
| | | | | SAMPLE. SLIGHT RX. TO 10% HCL. WET | | WELD. |

REMARKS:
Reviewed by D.L. McCollum 12-19-89

PNL-MA-567 DO-1, REV. 0

Stuart L. Hart 8/4/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

477

WHC-MR-0209

| DRILL LOG | By: S.M. Goodwin | Rig: BE 22 | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 4 August 1989 | # 22-14/101 | Depth: 250' To 252' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 250' | H | WET | (CONT.) COLOR IS 2.5 Y 4/4 (OLIVE BROWN). | | |
| | | | | DRILLING & DRIVING HARD; DRILLER SAYS | | |
| | | | | FM IS CHANGING @ 250'. MATERIAL IN | | |
| | | | | HOLE WANTS TO HEAVE UP PIPE. SLIGHT | | |
| | | | | DECREASE IN OVERALL GRAIN SIZES. Ø | | |
| 251' 3" | | | | PPM w/ OVA & RAD: < DET. | | |
| + 10' | | | | ADDED 10' OF 8" CARBON STEEL CASING, | 1440 | FINISHED WELD |
| = 261' 3" | | | | TOTAL 8" = 261' 3" | 1445 | DRIVING CASING |
| | | | | UNABLE TO DRIVE CASING PAST 252'; ASSUME | 1450 | BASALT |
| | | | | THIS TO BE TOP OF BASALT. WILL CLEAN | | |
| 261' 3" | | | | OUT HOLE & LOOK FOR CHIPS. | | |
| - 7' 7 1/4" | | | | REMOVED 7' 7 1/4" OF 8" CASING, TOTAL 8" | 1500 | CUTTING CASING |
| = 253' 7 3/4" | | | | = 253' 7 3/4" | 1505 | DRILLING |
| | | | | | 1530 | END OF SHIFT |

REMARKS:

Reviewed by V.L. McMahan 12-19-89

PNL-MA-567 DO-1, REV. 0

S.M. Goodwin 8/4/89

478

WHC-MR-0209

| DRILL LOG | By S. M. Goodwin | Rig RE 22 w | Well Number 299-E33-33 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 7 August 1989 | #22-14101 | Depth 250' To T.D. | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | SERVICING RIG |
| | | | | CLEANING OUT HOLE TO TOP OF BASALT | 0715 | DRILLING |
| | | | | HEAVING SANDS COMING IN CASING; PREVENTS | 0815 | FINISHED DRILLING |
| | | | | OBTAINING GOOD BASALT CHIPS. DRILLER | | BAILED MEDIUM |
| | | | | SAYS BASALT IS DIPPING AT AN ANGLE | | SANDS FROM HOLE. |
| | | | | WHICH PREVENTS GETTING A GOOD SEAL | | |
| | | | | WITH THE CASING | | |
| | | | | D/BOTTOM = 249.03' + 2.02' TAPE - 1.98' | 0820 | D/BOTTOM |
| | | | | STICKUP = 249.07' (PNL TAPE # L300-4) | | |
| | | | | KEH TITLE III INSPECTOR MIKE EVANS WITNESS- | 0825 | STRAIGHTNESS TEST |
| | | | | ED STRAIGHTNESS TEST; USED 20' OF 6" | | |
| | | | | S S CASING TO DETERMINE STRAIGHTNESS OF | | |
| | | | | HOLE. | | |
| | | | | | 0835 | BREAKING DOWN RIG |
| | | | | D/WATER = 237.4' - 2.3' STICKUP = 235.1' | 1415 | D/WATER |
| | | | | (PNL E. TAPE # 10998) | | |
| | | | | | | |
| | | | | | | |

REMARKS:
Reviewed by V.L. Markham 12-19-89

PNL-MA-567 DO-1, REV. 0

Alfred Moore 8/7/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

479

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: No Rig | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9 August 1989 | | Depth: T.D. To | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | VERN McGHAN, PNL, GEOPHYSICALLY LOGGING | 0830 | LOGGING WELL |
| | | | | BOREHOLE WITH NATURAL GAMMA PROBE | | |
| | | | | LOGGED 247'-3' INTERVAL | 0950 | FINISHED LOGGING |

REMARKS:
Reviewed by V. C. McGhan 12-19-89
PNL-MA-567 DO-1, REV. 0

Shirk. Mark 8/9/89

WHC-MR-0209

480

9 1 1 2 0 5 0 0 4 2 3

| DRILL LOG | By: S.M. GOODWIN | Rig: NO RIG | Well Number: 299-E33-33 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 14 AUGUST 1989 | | Depth: T.D. To | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | D/W = 234.8' - 2' STICKUP = 232.8' | 1515 | D/WATER |
| | | | | (PNL E. TAPE # 10996) | | |

REMARKS:
Reviewed by V.G. McMahan 12-19-89
PNL-MA-567 DO-1, Rev. 0

Shirlen Goodwin 8/14/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

187

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-33 | Date 8/24/89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project | |

Logged by B.N. Bjornstad — Date 8/24/89
Reviewed by D.E. Markham — Date 12-19-89
Measuring Equip. Steel tape L300-14 — Procedure PNL-MA-567

Drilling Contractor KEH
Driller GARY. LYDIN
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1330 | | | | | | | | | | D/B 246.4 - 2.0' stickup = 244.4 |
| | | | | | | | | | | +2.45 = 246.85 |
| | | | | | | | | | | Need to bail out 1.15' from |
| | | | | | | | | | | bottom of well since bottom |
| | | | | | | | | | | of screen needs to be |
| | | | | | | | | | | at 248! |
| 1400 | | | | | | | | | | Call for pump to remove |
| | | | | | | | | | | material from well. |
| 1430 | | | | | | | | | | Welded on casing for jacks |
| | | | | | | | | | | to grab onto |
| 1500 | | | | | | | | | | Set jacks in place |
| 1530 | | | | | | | | | | Quit for day |

287

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-33 | Date 8/25/89 | Sheet No. 1 of 3 |
|---|---|---|---|
| | Location Single Shell Tanks | Project SST W-017 | |

Logged by S.S. Teel S.S. Teel Date 8/25/89
Reviewed by V.L. Michelson Date 12-19-89
Measuring Equip. L300-14 PNL steel tape Procedure PNL-MA-567 ~~DO-1 Rev 0~~

Drilling Contractor KGH
Driller Gary Lydin
Rig/Equipment Crane / Hyd Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0700 | Carbon Steel | 8" | 253.65 | | | | | | | |
| | | | 258.15 | 7.9' | 250.25 | | | | | Added 4.5' of 8" Casing |
| | | | | | | | | | | D/Bottom = 252.2 + 2.45 - 7.9 = 246.75 |
| | | | | | | | | | | Will set 4" stainless steel Casing |
| | 10 slot Channel Pack | 4" | 1 - 10.70' | | | | | | | |
| | (stainless steel) | | 1 - 10.30' | | | | | | | |
| | Stainless steel | 4" | 6 - 20' | | | | | | | |
| | (w/centralizer) | | | | | | | | | |
| | Stainless steel | 4" | 5 - 20' | | | | | | | |
| | (w/o centralizer) | | | | | | | | | Switching to PNL steel tape |
| | " | 4" | 1 - 5' | | | | | | | # L300-08 |
| | " | 4" | 1 - 3' | | | | | | | |
| | | | | | | | | | | 253.41 + 2.48 - 9.1 = 246.79 |
| | | 8" | | | 248.85 | | | | | Pulled 1.4' |
| | | | | | | | | | | Stainless dropped 13" |
| | | | | | | | | | | D/stainless = 247.87 |
| | | | | | | 20-40 CS Sand | 1/2 Bag | | | 244.75 + 2.48 - 7.2 = 240.03 |
| | | | | | 247.95 | | | | D/B = | 253.52 + 2.48 - 8.1 = 247.9 |
| | | | | | | | | | | D/stainless = 248.12 |
| | | | | | | | 1/2 Bag | 246.48 | | 252.1 + 2.48 - 8.1 = 246.48 |
| | | | | | | | 1/2 Bag | | | 244.0 + 2.48 - 8.1 = 238.38 |
| | | | 252.75 | 6.3 | 246.45 | | | | | D/stainless = 248.29 |

WHC-MR-0209

483

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-33<br>Location SINGLE SHELL TANKS | Date 8/25/89 Sheet No. 2 of 3<br>Project SST W-017 |
|---|---|---|

Logged by S.S. Teel S.S. Teel Date 8/25/89
Reviewed by [illegible] Date 12-19-89
Measuring Equip. PNL steel tape #C300-08 Procedure PNL-MA-567 ~~DO-1 Rev 0~~

Drilling Contractor KGH
Driller Gary Lydin
Rig/Equipment Crane & Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel Casing | 8" | 252.75 | 7.5 | 245.25 | 20-40 Sand | — | 240.28 | | 245.3 + 2.48 − 7.5 = 240.28 |
| | | " | 252.75 | 8.7 | 244.05 | " | — | 242.28 | | 248.5 + 2.48 − 8.7 = 242.28 |
| | | | | | | 20-40 CS Sand | 1/2 Bag | | | 245.0 + 2.48 − 8.7 = 238.78 |
| | 251' weld exp. | " | 251.25 | 6.8 | 244.45 | | | | | |
| | " | | | | 243.05 | " | — | | | 243.6 + 2.48 − 6.7 = 239.38 |
| 1125 | | | | | | | | | | 245.4 + 2.48 − 7.95 = 239.93 |
| | " | | | | 241.65 | | | | | 247.4 + 2.48 − 9.2 = 240.68 |
| | | | | | | | 1/2 Bag | | | 244.75 + 2.48 − 9.2 = 238.03 |
| | " | " | | | 240.25 | " | — | | | 242.80 + 2.48 − 6.4 = 238.88 |
| | | | | | | " | 1/2 bag | | | 240.5 + 2.48 − 6.4 = 236.58 |
| | " | | | | 238.85 | | | | | 242.60 + 2.48 − 7.7 = 237.38 |
| | " | | | | | | 1/2 bag | | | 240.0 + 2.48 − 7.7 = 234.78 |
| | | | 241.25 | 3' | 238.25 | | | | | 242.3 + 2.48 − 9' = 235.78 |
| | | | | | | | 1/2 bag | | | 239.5 + 2.48 − 9' = 232.98 |
| | | | | | 236.85 | | | | | 237.8 + 2.48 − 6.3 = 233.98 |
| | | | | | | | 1/2 bag | | | 235 + 2.48 − 6.3 = 231.18 |
| | (241.75 weld | | 241.25 | 5.75 | 235.50 | | | | | 237.4 + 2.48 − 7.8 = 232.08 |
| | exposed) | | | | | | 1/2 bag | | | 234.7 + 2.48 − 7.8 = 229.38 |
| | | | 241.25 | 8.40 | 232.85 | | | | | 240.0 + 2.48 − 10.8 = 232.18 |

5
1.8

474

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-33 | Date 8/25/89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project SST W-017 | |

Logged by S.S. Teel S.S. Teel — Date 8/25/89
Reviewed by [illegible] — Date 12-19-89
Measuring Equip. PNL steel tape # L300-08 — Procedure ~~PNL-MA-567~~ ~~DO-1 Rev 0~~

Drilling Contractor KEH
Driller Gary Lydin
Rig/Equipment

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 8" | | | 232.85 | | | | | |
| | | | | | | 20-40 Sand | " | | | 236.2 + 2.48 - 6.45 = 232.23 |
| | | | | | | " | 1/2 bag | | | 233.2 + 2.48 - 6.45 = 230.72 |
| | | | | | | " | 1/2 bag | | | 230.5 + 2.48 - 6.45 = 226.53 |
| | | | | | | " | — | | | 236.1 + 2.48 - 9.1 = 229.48 |
| | | | | | 230.29 | " | 1 bag | | | 228.4 + 2.48 - 6.4 = 224.48 |
| | | | 231.25 | 3.9 | 227.35 | " | | | | 233.0 + 2.48 - 9 = 226.48 |
| | | | | | | " | 1/2 bag | | | 230.5 + 2.48 - 9 = 223.98 |
| | | | | | 226.09 | " | — | | | 228.3 + 2.48 - 6.4 = 224.38 |
| 1345 | | | | | | | | | | Went to get pump truck to begin bailing |
| 1430 | | | | | | | | | | Setting-up pump rig. |
| 1450 | | | | | | | | | | Bailing. 3" dia, 15 gal capacity, 10' long. Bailing rate ≈ 2.5 gal/min. D/water = 238.10 - 6.4 = 231.7 |
| | | | | | | | | | | Total bailed ≈ 35 gal |
| | | | | | | | | | | D/water = 238.10 - 6.4 = 231.7 |
| | | | | | | | | | | 229.10 + 2.48 - 6.4 = 225.18 |
| 1530 | | | | | | | | | | End of Day. |
| | | | | | | | | | | Water was very turbid but contained < 1/16 tsp sand total |

484

WHC-MR-0209

9 1 1 2 0 5 0 0 4 1 8

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E25-33 | Date 8/28/89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location Single Shell Tanks | Project SST W-017 | |

Logged by S.S. Teel S.S Teel — Date 8/28/89
Reviewed by V.G. McGlynn — Date 12-19-89
Measuring Equip. PNL steel tape # L300-08 — Procedure PNL MA-567 ~~DO-1 Rev 0~~

Drilling Contractor KEH
Driller Gary Lydin
Rig/Equipment Galion Crane / Hyd Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 8" | | | 226.00 | 20-40 Sand | | | | |
| | | | | | | | | 225.18 | .82 | 229.1 + 2.48 - 6.4 = 225.18 |
| | | | | | | | 1/2 bag | 223.08 | 2.92 | 227.0 + 2.48 - 6.4 = 223.08 |
| | 231.25 weld exp | | 231.25 | 6.4 | 224.85 | | | 224.03 | .82 | 229.1 + 2.48 - 7.55 = 224.03 |
| | | | " | 7.3 | 223.95 | | | 224.23 | -.28 | 230.15 + 2.48 - 8.4 = 224.23 |
| | | | | | | 1/4" volclay pellets | 2 buckets | 219.38 | 4.57 | 225.3 + 2.48 - 8.4 = 219.38 |
| | | | 231.25 | 9.8 | 221.45 | | | 220.18 | 1.27 | 224.0 + 2.48 - 6.3 = 220.18 |
| | | | | | " | | | | | Top of pellets |
| | | | | | " | 8-20 mesh crumbles | 8 bags | 195.83 | 26.27 | 199.65 + 2.48 - 6.3 = 195.83 |
| | 221.25 weld | | 221.25 | 6.35 | 214.90 | | — | 200.98 | 13.92 | 204.85 + 2.48 - 6.35 = 200.98 |
| | exposed | | | | " | " | 12 bags | 164.48 | 50.42 | 168.35 + 2.48 - 6.35 = 164.48 |
| | 199.33 weld | | 199.33 | 6.5 | 192.83 | | — | 178.98 | 13.85 | 188.0 + 2.48 - 6.5 = 178.98 |
| 0905 | | | | | " | | | | | Inspecting crane |
| 0930 | | | | | " | " | 10 bags | 146.98 | 45.85 | 151.0 + 2.48 - 6.5 = 146.98 |
| | 178.84' weld | | 178.84 | 6.4 | 172.44 | | — | 160.93 | 11.51 | 164.85 + 2.48 - 6.4 = 160.93 |
| | | | | | " | " | 11 bags | 129.08 | 43.36 | 133.0 + 2.48 - 6.4 = 129.08 |
| | 158.92 weld | | 158.92 | 6.4 | 152.52 | | — | 142.43 | 10.09 | 146.35 + 2.48 - 6.4 = 142.43 |
| 1030 | | | | | | | | | | Removing 8" casing |
| 1120 | | | | | | | | | | 8" casing removed |
| | | 10" | | | 153' | " | — | 146.30 | 6.70 | 144.82 + 2.48 - 1' = 146.30 |
| 1130 | | 10" | 153' | — | 153' | " | 15 bags | 121.08 | 31.92 | 126.0 + 2.48 - 7.4 = 121.08 |

Top of sand

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-33 | Date 8-28-89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location Single Shell Tanks | Project W-017 SST | |

Logged by S.S. Teel S.S. Teel Date 8-28-89
Reviewed by W.E. Mathews Date 6-19-89
Measuring Equip. PNL steel tape #L300-08 Procedure PNL-MA-567 ~~DO-1 Rev 0~~

Drilling Contractor KEH
Driller Gary Lydin
Rig/Equipment Galion Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1240 | Carbon Steel | 10" | 143.65 | 6.7 | 136.95 | 8-20 crumbles | — | 127.78 | 9.17 | 132.0 + 2.48 − 6.7 = 127.78 |
| | | | | | | " | 15 bags | 102.98 | 33.97 | 107.2 + 2.48 − 6.7 = 102.98 |
| | | | | | | " | 5 bags | 96.18 | 40.77 | 100.40 + 2.48 − 6.7 = 96.18 |
| | | | 122.10 | 6.6 | 115.50 | | — | 104.73 | 10.77 | 108.85 + 2.48 − 6.6 = 104.73 |
| 1430 | | | | | | | | | | Hose is leaking on crane. Will be shut down until it can be repaired. No hydraulic fluid came into contact with the borehole |
| | | | | | | | | | | Need to add 20 bags of crumbles before backpulling begins |

BLD

LBT

WHC-MR-0209

9 1 1 2 0 5 0 0 4 9 0

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-E33-33 | Date 8/29/89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location SINGLE SHELL TANKS | Project W017 SST | |

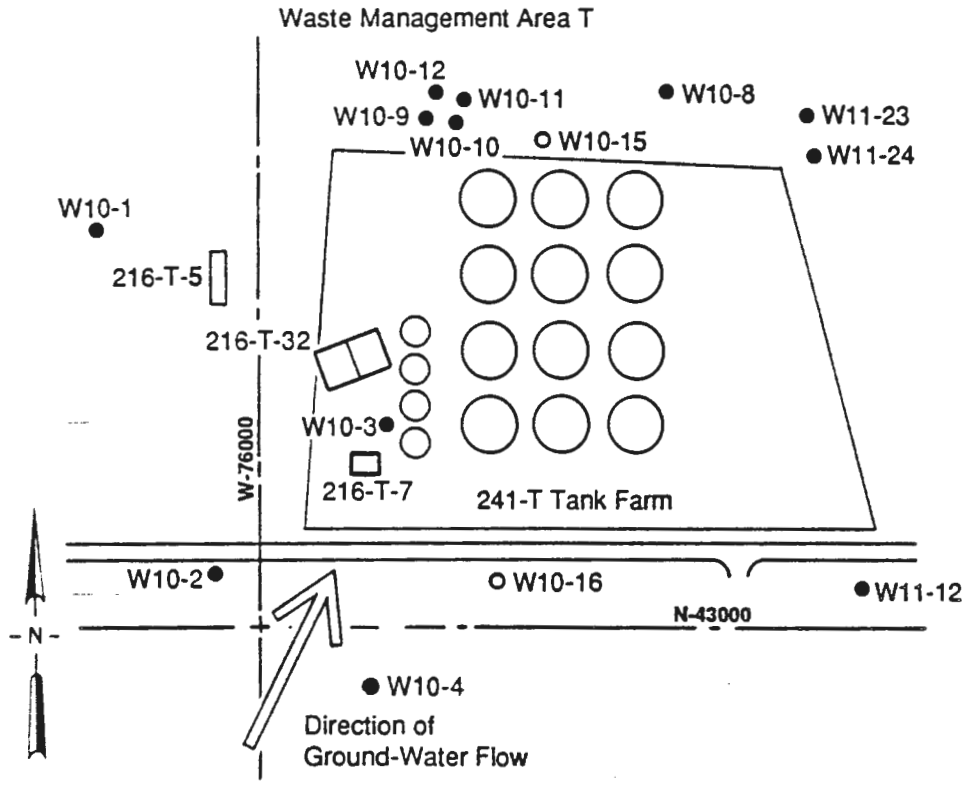
Logged by EJ Jensen — Date 8/29/89
Reviewed by [illegible] — Date 12-19-89
Measuring Equip. PNL steel tape #L300-08 Procedure PNL MA-567 00-1 Rev 0

Drilling Contractor HEH
Driller Gary Lydin
Rig/Equipment Galion Crane / Hy Jack

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1020 | | | | 6.6' | | 8-20 crumbles | 20 Bags | 75.6 | 39.90' | 79.8 +2.4 - 6.6 = 75.6 |
| | carbon steel | 10" | 102.1' | 6.7' | 95.4' | | | 82.7 | 12.7 | 87.0 + 2.4 - 6.7 = 82.7 |
| 1100 | | | | 6.7' | | 8-20 crumbles | 15 Bags | 60.7 | 34.7 | 65.0 + 2.4 - 6.7 = 60.7 |
| | carbon steel | 10" | 81.3' | 6.6' | 74.7' | | | 68.6 | 6.1 | 72.8 + 2.4 - 6.6 = 68.6 |
| 1125 | | | | 6.6' | | 8-20 crumbles | 20 Bags | 36.8 | 37.9 | 41.0 + 2.4 - 6.6 = 36.8 |
| | Carbon steel | 10" | 60.4' | 6.7' | 53.7 | | | 45.0 | 8.7 | 49.3 + 2.4 - 6.7 = 45.0 |
| 1245 | | | | 6.7' | | 8-20 crumbles | 20 Bags | 13.1 | 40.6 | 17.4 + 2.4 - 6.7 = 13.1 |
| | Carbon steel | 10" | 39.6 | 6.6 | 33.0' | | | 21.5 | 11.5 | 25.7 + 2.4 - 6.6 = 21.5 |
| 1320 | | | | 6.6' | | 8-20 crumbles | 5 Bags | 12.8 | 20.2 | 17.0 + 2.4 - 6.6 = 12.8 |
| | Carbon steel | 10" | 29.3 | 6.7' | 22.6 | | | 17.20 | 5.4 | 21.5 + 2.4 - 6.7 = 17.20 |
| | Carbon steel | 10" | | 8.0' | 21.3 | | | 17.90 | 3.4 | 23.5 + 2.4 - 8.0 = 17.90 |
| | Carbon steel | 10" | | 9.4' | 19.90 | | | 18.20 | 1.7' | 25.2 + 2.4 - 9.4 = 18.20 |
| | Carbon steel | 10" | | 10.8' | 18.50 | | | 18.7 | -.2 | 22.9 + 2.4 - 6.6 = 18.7 top of crumbles |
| 1430 | | | | | | concrete | 6 bags | | | |
| | carbon steel | 10" | 19' | 9.8 | 9.2 | | | | | |
| | | | | | | concrete | 6 bags | | | |
| 1450 | carbon steel | 10" | | | 00 | | | | | |
| | | | | | | concrete | 4 bags | | | Filled hole from 18.7 to the surface with concrete. Alum powder was added to the concrete. |

BLD

WHC-MR-0209




**Legend**

- ● Existing Ground-Water Monitoring Well
- ○ Planned Ground-Water Monitoring Well
- E25-1 Numbering System for Ground-Water Monitoring Wells. All Wells Prefixed by 299-
- ○ 200 Series Single-Shell Tank
- ◯ 100 Series Single-Shell Tank
- —— Fences
- ═══ Roads
- ▭ Cribs
- N-42000 Hanford Plant Coordinates

Note: Not Drawn to Scale

WELL 299-W10-15

Drilling at Well 299-W10-15 began September 20, 1989, and reached total depth on October 16, 1989. The well was drilled with a Bucyrus-Erie 60L to a depth of 222.34 ft below ground surface. The sediments encountered were primarily muddy sand and sandy gravel. Static water level during completion was 206.2 ft below ground surface.

Well 299-W10-15 was completed at a depth of 221.95 ft below ground surface. Final well materials include 21.00 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 203.25 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 20-40 mesh Colorado silica sand pack along the screened interval to 3.85 ft above the top of the screen, 3.8 ft of Volclay bentonite pellets, 105.2 ft of 8-20 mesh granular bentonite crumbles, 68.5 ft of Volclay Pure Gold Slurry, 17.6 ft of Portland cement grout, and an air-entrained concrete pad which extends 2.0 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Pettibone crane during completion. Completion activities at Well 299-W10-15 were finished November 7, 1989. Reference NRC # PNL-89-071 for more details on this completion.

The estimated volume of water added to the borehole during drilling was 446 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 40 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on November 13, 1989, and a total of 944 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was performed on November 3, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on November 20, 1989; this activity concluded well construction and installation.

9 1 1 2 0 5 0 0 4 0 3

| DRILL LOG | By B.N. Bjornsted | Flig BE-22W Craig Wamsley | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W017-SST |
|---|---|---|---|---|---|
| | Date 9/20/89 | | Depth 0 To 10' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Driller is Craig Wamsley | 0830 | Service Rig |
| | | | | | 1010 | Begin Drilling |
| | 5' | D | SM | Muddy SAND (80% sand, 20% mud); sand is | 1015 | Sample - Drive |
| | | | | fine-v.fine; moderately well sorted; Sand = | | barrel |
| | | | | 25% mafic, 75% felsic; wet color (2.5Y 4/2 - | | |
| | | | | dark grayish brown); weak rxn to HCl; uncon- | | |
| | | | | solidated [Samples: 2 lith, 1 moist] | | |
| | 10' | D | SM | Slightly gravelly, slightly muddy SAND (5% gravel, 80% | 1025 | Sample - drive |
| | | | | sand, 15% mud); Gravel = 100% vfn pebble, | | barrel |
| | | | | 75% angular basalt; Sand = 50% basalt, 50% | | |
| | | | | felsic; wet color (2.5Y 4/2 - dk grayish brown); wk | | |
| | | | | rxn to HCl, unconsolidated [samples: 2 lith, 1 moist] | | |
| 19'5" | | | | Set in 19'5" of 10" starter casing | 1045 | Prepare starter casing |
| | | | | | 1110 | Shut down so |
| | | | | | | RPT can monitor |
| | | | | | | other well (W10-16) |
| | | | | | 1230 | Back to work |
| | | | | | 1305 | Drill with drive barrel |

REMARKS:

Bruce Bjornsted 9/20/89

PNL-MA567, DO-1, Rev 00 Reviewed by D.T. McGhan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

BEST AVAILABLE COPY

WHC-MR-0209

191

BEST AVAILABLE COPY



# DRILL LOG

| | |
|---|---|
| By | B.N. Bjornstad |
| Date | 9/20/89 |
| Rig | BE-22W |
| | Craig Wamsley |
| Depth | 10 To 10 |

| | |
|---|---|
| Hole Number | 299-W10-15 |
| Computer Number | N/A |
| Project or Work Order No. | W-017 SST |
| Subcontract No. | N/A |

| LOGIC DESCRIPTION Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|
| | 1400 | Driller can't re- |
| | | cover sample - |
| | | boulders. Added |
| | | 2 gal $H_2O$ but |
| | | can't make progress |
| | | with drive barrel |
| | 1500 | Quit for day |

| DRILL LOG | By T Gilmore | Rig BE 60 L Craig Laboratory | Well Number 299 W10 15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/21/89 | | Depth 10 To 20 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Depth to Bottom 13' | 700 | Rig Maintenance |
| | | | | Casing Total 19' 5" of 10" | | |
| | | | | | 800 | Drilling |
| | 15' | DB | Dry-Moist | SANDY GRAVEL 65% Gravel 35% Sand, 5% SC, 5% VCp, | 805 | Sample |
| | | | | 20% Cp, 15% Mp, 15% Fp, 5% VFp, 10% VCS, 10% CS, 5% MS, | | Background Radiation |
| | | | | 5% FS, 5% VFS, poor Srt, 65% BSLT, 35% felsic, | | Ø ppm OVA |
| | | | | round - Subround, 10YR 5/2, No rxn in HCl, No consol, | | |
| | | | | Water added so no moisture sample taken, 2 LHn | | |
| | | | | Samples taken | | |
| 29' 1" of 10" | | | | Add 9' 8" of 10" Total 29' 1" of 10" | 900 | weld |
| | | | | | 1020 | Drive Casing |
| | | | | | 1030 | Drill |
| | | | | | 12-1230 | Lunch |
| | 20' | DB | Dry-Moist | SANDY GRAVEL 35% Gravel, 63% Sand, 3% Silt, | 1300 | Sample |
| | | | | 5% SC, 5% Cp, 10% Mp, 10% Fp, 5% VFp, 25% VCS, 20% CS | | Background Radiation |
| | | | | 10% MS, 5% FS, 2% VFS, 3% Silt, poor Srt, 80% felsic | | Ø ppm on OVA |
| | | | | (BSLT), 20% felsic, round - Subround N3 vdk gy, No rxn in HCl | | |
| | | | | No consol, less gravel than previous incr in Sand | | |

REMARKS:

PNL-MA567, DO-1, Rev Ø

T Gilmore 9/21/89

Reviewed by D.C. McGlam 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

9 1 1 2 0 5 0 0 4 9 6

252

| DRILL LOG | By T Gilmore | Rig BE 60L | Well Number 299 W10 15 | Computer Number N/A | Project or Work Order No. W-217 |
|---|---|---|---|---|---|
| | Date 9/21/89 | Craig Whusky | Depth 20' To 26' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 29'1" of 10" | | DB | Moist | SANDY GRAVEL 40% Gravel, 60% Sand; 20% Mp, 15% Fp, | 1350 | Sample |
| | | | | 5% VFp, 10% VCS, 10% CS, 10% MS, 20% FS, 10% VFS; poor- | | Background radiation |
| | | | | Moderate S.t, 60% Matrix, 40% Felsic, round-Subrd, | | 0 ppm OVA |
| | | | | (Sounds Subang), 5Y 3/2, Mod rxn in HCl, No consol. | | |
| | | | | Smaller Gravel sizes than previous | | |
| | | | | | | |
| | | | | Depth to Bottom 26' | 1500 | Add 5gal $H_2O$ |
| | | | | Casing Total 29'1" of 10" | | |
| | | | | Shut down RPT went home | 1500 | End of Day |

REMARKS:

Gilmore 9/21/89

Reviewed by V.K. McGhan 12-7-89

PNL-MA567, DO-1, Rev. 0

404

WHC-MR-0209

| DRILL LOG | By: S. S. Teel | Rig: BE 60L Craig Wamsky | Well Number: 299-W10-15 | Computer Number: NA | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9/22/89 | | Depth: 26' To 35' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 29'1" | of 10" | | | | | |
| +9'3' | | | | Added 9'3" of 10" | 0800 | Adding Casing |
| 38'4" | | | | | 0850 | Drilling |
| | 30' | D | Dry | SAND 30% CS, 40% MS, 20% FS, 5% VFS, 5% mud. | 0915 | Sample w/ D. Barrel |
| | | | | Well sorted. 30% basalt/mafics, 30% feldspar, 40% qtz/ | | Background w/ GM |
| | | | | Si-rich, trace mica. A-SA. Weak reaction to 10% HCL. | | |
| | | | | Unconsolidated but has thin (2-4"?) layers of semi- | | |
| | | | | consolidated MS-VFS - some mud. Wet color: 2.5Y 3/2 | | |
| | | | | (very dark grayish brown). 2 pt. jars, 1 moist. sample taken. | | |
| | | | | MUDDY SST 10-9-89 | | |
| | 35' | D | Dry | SANDY GRAVEL (65% gravel, 30% sand, 5% mud) | 0950 | Sample w/ Drive Barrel |
| | | | | 10% Large cobble, 20% CP, 15% MP, 10% FP, 10% VFP, | | Background w/ GM. |
| | | | | 6% CS, 10% MS, 10% FS, 4% VFS, 5% mud. Very poorly | | |
| | | | | sorted. (Gravel) - 60% basalt, andesite, & other volcanics, | | |
| | | | | 40% qtzite, granite, & other Si-rich. SR-WR. (Sand) - | | |
| | | | | 25% basalt/mafics, 25% feldspar, 50% qtz & Si-rich, | | |
| | | | | A-SA. Unconsol. Wet color: 2.5Y 4/2 (dark grayish brown). | | |
| 38'4" | of 10" | | | No reaction to 10% HCL. More gravel than previous | | |

REMARKS:

S. S. Teel 9-22-89

PNL-MA-567 DO-1 Rev 0 Reviewed by W. L. Markham 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

495

| DRILL LOG | By: S. S. Teel | Rig: BE 60L, Craig Nemsley | Well Number: 299-W10-15 | Computer Number: NA | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-22-89 | | Depth: 35' To | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 38'4" of 10" | | | | | 1025 | Preparing to add |
| 8'10½" | | | | | | casing |
| 47'2½" | | | | Added 8' 10½" of 10" | | |
| | | | | | 1130 | RPT leaves for lunch |
| | | | | | 1230 | RPT returns |
| | | | | | 1250 | Driving Casing |
| | | | | | 1253 | Stop driving |
| | | | | | 1300 | Drilling |
| | 40' | D | Dry | GRAVEL (80% gravel, 20% sand) 10% large cobble, | 1310 | Sample w/ core barrel |
| | | | | 10% small cobble, 20% VCP, 15% CP, 10% MP, 10% FP, 5% VFP, | | Background w/ GM |
| | | | | 2% VCS, 5% CS, 5% MS, 3% FS, 2% VFS, 3% mud, | | C of C # 92289-SST SST 10/11/89 |
| | | | | Very poorly sorted. (Gravel) - 80% basalt, andesite, and breccia; | | |
| | | | | 20% granite + qtzite, SR-R on orig surfaces. (Sand) - | | |
| | | | | - 85% basalt/mafics, 15% feldspar, 60% qtz + Si-rich, | | |
| | | | | A-SA. Wet color: 2.5Y 3/2 (very dark grayish brown). | | |
| | | | | Strong reaction to 10% HCL. Unconsolidated, coarser + | | |
| | | | | more gravel than previous. Moisture, 2-500ml chem., | | |
| 47'2½" | of 10" | | | and 2-pt geol samples taken. Trace caliche-cemented | | |

REMARKS:

conglomerate in gravel portion. Most gravels are fairly "fresh" and do not show caliche rinds however,

S. S. Teel 9-22-89

Reviewed by V.L. McKellar 12-7-89

PNL-MA-567 DO-1 Rev 0

4916

| DRILL LOG | By: S.S Teel | Rig: BE 60L Craig | Well Number: 299-W10-15 | Computer Number: NA | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-22-89 | | Depth: 40' To 40 | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 47'2½" | of 10" | | | | 1410 | Having trouble keeping |
| 9'3" | " | | | | | samples in barrel – |
| 56'5½" | | | | | | – added 2gal $H_2O$ |
| | | | | Adding 9'3" of 10" | 1417 | Adding Casing |
| | | | | | 1500 | End of Day |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 56'5½" | of 10" | | | | | |

REMARKS:

PNL-MA-567 DO-1 Rev 0 Reviewed by D. L. M. Glass 12-9-89

S.S. Teel
9-22-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

297

WHC-MR-0209

| DRILL LOG | By B.N. Bjornstad | Rig BE-60L Craig Wamsley | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 7/25/89 | | Depth 40 To 50 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 56' 5½" | | | | | 0715 | Continue to weld |
| | | | | | | casing |
| | | | | | 0810 | Drill w/drive barrel |
| | 45' | D | M | (Sample is moist due to water added at end of 9/22) | 0820 | Sample - drive barrel |
| | | | | Muddy Sandy GRAVEL (60% sand, 30% gravel, 10% mud). | 0822 | Drive casing |
| | | | | 2% med pebble, 28% fine-v.fn pebble, 20% | | |
| | | | | v. crs sand, 15% med-crs sand, 25% fine- | | |
| | | | | v. fn sand, 10% mud; poorly sorted; Gravel = 75% | | |
| | | | | basalt, 10% qtzite, 15% others; Sand = | | |
| | | | | 50% mafic, 50% felsic; gravel = SA/SR; | | |
| | | | | Sand = A/SA; wet color (2.5Y 4/2 - dark | | |
| | | | | grayish brown); sl. rxn to HCl; weak | | |
| | | | | consolidation [2 lithologic samples] | | |
| | | | | Intercepted 6" silty sand, moist, grayish brown; | | |
| | | | | @ 48' | | |
| | 50' | D | SM | Sandy GRAVEL (50% Sand, 45% gravel, | 0850 | Sample - drive barrel |
| | | | | 5% mud) Same as previous sample except | | |
| | | | | better sorted (more gravel, less mud); | 0910 | Drive casing |

REMARKS: [samples: 2 lithologic, 1 moisture]

FNL-MA-567 DO-1 Rev.0.

Bruce J. Bjornstad 9/25/89

Reviewed by W. C. McKee 12-7-89

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| B.N. Bjornstad | BE-60L Craig Wamsley | 299-W10-15 | N/A | W-017 SST |
| Date 9/25/89 | | Depth 50 To 65 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 56'5½" | | | | Another silty sand lens @ 49' ~ 3" thick | | |
| | 55' | D | SM | Sandy GRAVEL (58% Sand, 40% gravel, 2% | 0928 | Sample-drive barrel |
| | | | | mud); 2% med pebble, 10% fine pebble, | | |
| +9'10" | | | | 28% v fn pebble, 10% v crs sand, | 0930 | Prepare to weld |
| 66' 3½" | | | | 20% crs sand; 20% fn sand; 8% | 0945 | Weld on 9'10"/10" |
| | | | | v. fn sand, 2% mud; poorly sorted; Gravel = | | casing |
| | | | | 75% basalt, 5% caliche frag., 20% other; | | |
| | | | | Sand = 40% basalt, 60% felsic; | | |
| | | | | moderate rxn to HCl; wet color (2.5Y 4/2 - | | |
| | | | | dark grayish brown), unconsolidated; | | |
| | | | | More sand than previous sample, | 1045 | Drill w/drive barrel |
| | | | | [samples: 2 lithologic, 1 moisture] | | |
| | 60' | D | SM | Gravelly SAND - same as previous sample except | 1100 | Sample-drive barrel |
| | | | | more crs-vcrs sand and more basalt (~60%) | | C/C# 092589 W10-15 |
| | | | | in sand [samples: 2 lith, 1 moist., 2 chem.] | | |
| | 65' | D | | Gravelly SAND (85% Sand, 15% gravel); 15% | 1130 | Sample-drive barrel |
| | | | | v. fine pebble; 8% v. crs sand; 25% crs sand; | 1135 | Prepare to weld |
| | | | | 25% med sand, 15% fine sand, 12% v. fn sand; | | |

REMARKS:

PNL-MA-567 DO-1 Rev. 0

Bruce Bjornstad 9/25/89

Reviewed by V.L. McElhan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

499

WHC-MR-0209

| DRILL LOG | By B N. Bjornsted | Rig BE-60L Craig Wamsley | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/25/89 | | Depth 65 To 70 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 66' 3½" | | | | 65' (cont.); moderately sorted; Gravel = 70% basalt, | | |
| | | | | 20% caliche fragments, 10% other; Sand = 35% | | |
| | | | | basalt, 10% caliche grains, 55% other; Gravel is | | |
| | | | | angular to subrounded - predominantly subangular; | | |
| | | | | wet color (2.5Y 4/2 - dark grayish brown); moderate | | |
| | | | | rxn to HCl, unconsolidated; Δ = more sand, | | |
| | | | | more caliche fragments (caliche fragments are | | |
| +10' ½" | | | | detrital grains and not ground up by drilling) | 1150 | Break for lunch |
| 76' 4" | | | | [Samples: 2 lith., 1 moisture] | 1335 | Finished welding |
| | | | | | | 10' ½" of 10" casing |
| | | | | | 1345 | Drill w/drive barrel |
| | 70' | D | SM | Gravelly SAND (85% sand, 15% gravel); 2% | 1355 | Sample-drive barrel |
| | | | | med pebble, 3% fine pebble, 10% v. fine | | |
| | | | | pebble; 30% crs sand, 25% med sand, | | |
| | | | | 20% fine sand, 10% v. fine sand; moderately | | |
| | | | | sorted; Gravel = 75% basalt, 25% others; | | |
| | | | | Sand = 40% mafic / 60% felsic; wet color ( | | |
| | | | | 2.5Y 4/2 - dark grayish brn; mod. rxn to HCl | | |

REMARKS: [Samples: 2 lith, 1 moisture]

PNL-MA-567 DD-1 Rev. 0

Bruce Bjornsted 9/25/89

Reviewed by W.T. Mclean 12-7-89

500

WHC-MR-0209

| DRILL LOG | By B.N. Bjornstad | Rig BE-60L Craig Wamsley | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/25/89 | | Depth 70 To 75 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 76'4" | 73' | D | M | Muddy fine SAND (30% mud, 70% fine-v.fn sand); | 1430 | Sample-drive |
| | | | | well sorted; faint, thin laminations; 1-2' thick; | | barrel |
| | | | | grades downward into loose sand; wet color | | |
| | | | | (2.5Y 4/2 - olive brown); mod. rxn to HCl; | | |
| | | | | weakly consolidated; v. micaceous; | | |
| | | | | [samples: 2 lith, 1 moisture] | | |
| | 75' | D | SM | Gravelly SAND (85% Sand, 15% gravel); | 1430 | Sample-drive barrel |
| | | | | 15% v. fine pebbles, 25% v crs sand, 25% | 1440 | Prepare to weld |
| | | | | med sand, 20% fine sand, 15% v. fn sand; | | |
| | | | | Gravel = 70% basalt, 15% caliche frag., | | |
| | | | | 15% other, Sand = 40% mafic, 60% felsic. | | |
| | | | | wet color (2.5Y 4/2 - dk grayish brn.); | | |
| | | | | moderate rxn to HCl; unconsolidated; | | |
| | | | | v. similar to 70-80' samples. [Samples: | | |
| 76'4" | | | | 2 lith, 1 moist] | 1500 | Quit for day |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA-567 DO-1 Rev. 0

Bruce Bjornstad 9/25/89

Reviewed by V.L. Matthews 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

521

WHC-MR-0209

9 1 1 2 0 5 0 0 5 0 4

1 of 2

| DRILL LOG | By T Gilmore | Rig BE 60L Craig Wamsley | Well Number 299 W10 15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/26/89 | | Depth 75' To 85' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Add 9' 8" of 10" 85' 4" of 10" Total | 700 | Welding |
| | | | | Depth 76' | 810 | Drilling |
| | 80' | DB | Moist | MUDDY SAND 90% Sand, 10% Silt; 20% FS, 70% VFS, | 905 | Sample |
| | | | | 10% Silt v well Sort, ~50% Mafic, ~50% Felsic, | | Background Radiation |
| | | | | (difficult to distinguish), Subrd-Subang, Wet color | | |
| | | | | 10YR 3/3 dk brn, Strong rxn in HCl, no consol, | | |
| | | | | no apparent clay; not ductile or plastic cohesive | | |
| | | | | (2) Lith Smpls; (1) 250ml samples; 1 moist Smpl | | |
| | | | | Add 8' 3" of 10" Total 93' 7" of 10" | 945 | Welding |
| 93'7" | 85' | DB | Moist | MUDDY SAND 85% Sand 15% Mud (undifferentiated | 1110 | Sample |
| | | | | Silt and Clay) 10% FS, 75% VFS, 15% Silt & Clay, | | Background Radiation |
| | | | | Some cohesiveness, slight ductility, v-well Sort, 50% | | |
| | | | | Mafic, 50% Felsic, Subrd-Subang, wet color | | |
| | | | | 10YR 3/3 dk brn, Strong rxn in HCl, slight | | |
| | | | | consolidation incr in clay content from last | | |
| | | | | sample, (2) Lith Sample, no moisture sample set for | | |
| | | | | ~20min while at other Rig | | 0 ppm OVA |
| | | | | | 12-1230 | Lunch |

REMARKS: PNL MA 567 DO-1 Rev 0

Reviewed by V.L. McGehan 12-7-89

T Gilmore 9/26/89

WHC-MR-0209

9 1 1 2 0 5 0 0 5 0 5

252

| DRILL LOG | By: T Gilmore | Rig: BE 60L | Well Number: 299 W11 15 | Computer Number: N/A | Project or Work Order No.: W-017 OOT |
|---|---|---|---|---|---|
| | Date: 9/26/89 | Craig Wamsley | Depth: 85' To 90' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 90' | DB | moist | MUDDY SAND 90% Sand, 10% undifferentiated Silt & | 1250 | Sample |
| | | | | Clay (mud), 5% MS, 25% FS, 60% VFS, 10% Silt & | | Background Radiation |
| | | | | Clay; Clay is small percentage of Mud present, | | |
| | | | | well sort, 50% felsic, 50% mafic, subang-subrd, | | |
| | | | | 10YR 3/3 dk brn, strong rxn in HCl, Slight-to | | |
| | | | | no consol decr in Cly, incr in Sand, | | |
| | | | | (2) Lith Smpls (1) moisture Smpl | | |
| | | | | | 1255 | Oppra UVA |
| | | | | Repair coverboard | 1300 | Welding |
| | | | | @ 93' Caliche layer ~1' Thick | 1310 | Drilling |
| 102' 0" | | | | Add 8' 5" of 10" 102' 0" of 10" Total | 1340 | Welding |
| | | | | | 1510 | Drilling |
| | | | | | 1530 | End of Day |

REMARKS:

PNL - MA 567, DO-1, Rev. 0

Reviewed by V.L. McLellan 12-7-89

T Gilmore 9/26/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

503

WHC-MR-0209

| DRILL LOG | By: S. BRANDENBERGER | Rig: BE 60L | Well Number: 299 W10 15 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-27-89 | CRAIG WAMSLEY | Depth: 95' To 100' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 95' | DB | SM | MUDDY SAND, 90% SAND, 10% MUD, | 0723 | DRILLING |
| | | | | 50% FS, 20% MS, 20% VFS, 8% SILT, 2% CLAY, | | |
| | | | | V. WELL SORTED, 60% MAFIC, 40% FELSIC, | | |
| | | | | SUBANGULAR GRAINS, DK BROWN 10YR 3/3, | | |
| | | | | STG RXN W/10% HCL, WKLY CONSOLIDATED, | | |
| | | | | [(2) LITH, (1) MOISTURE]. | | |
| | | | | | 0807 | RPT ARRIVES. ADJUSTED BLOCKS ON RIG, |
| | | | | 96' CALICHE - SWITCHED TO HARD TOOL. Grounded | 0815 | DRILLING. |
| | | | | white calcareous chunks recovered with drive | 0850 | CHANGED BITS. |
| | | | | barrel before switching to hand tool. | 1110 | ADDED ~10 gal $H_2O$ |
| | | | | | 1112 | RESUME DRILLING W/ |
| | | | | | | hand tool |
| | | | | | 1200 | Break for lunch |
| | | | | | 1230 | Resume drilling |
| | | | | | 1330 | Repair rig |
| | 100' | H | N/A | Caliche (10% gravel, 70% sand, 20% mud - | 1145 | Sample - Hand tool |
| | | | | sized particles). wet color (2.5Y 7/2 - light gray), | 1458 | Drilling w/hand tool |
| | | | | v. strong rxn to HCl; consolidated fragments; | | . |

REMARKS:

Bruce Bjornstad 9/27/89

PNL-MA-567 DO-1 Rev. 0 Reviewed by V.L. Watkins 12-7-89

WHC-MR-0209

204

| DRILL LOG | By B.N. Bjornstad | Rig BE-60L | Well Number 299-W10-15 | Computer Number | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/27/89 | # 22-14100 | Depth 100' To 100 | N/A | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 100' | H | | 100' (continued); ~ 10% gravel = basalt, 90% | | |
| | | | | caliche fragments; ~ 15% sand = basalt, | | |
| | | | | 50% caliche frag., 35% other [samples: | | |
| | | | | 2 lith, 2 - 250ml special chem. samples] | | |
| | | | | | | |
| | | | | | 1510 | Quit for day |

REMARKS: Total 20 gal. $H_2O$ added Today

Bruce Bjornstad 9/27/89

PNL-MA-567 DO-1 Rev. 0

Reviewed by D.L. Markham 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

9 1 1 2 0 5 0 0 5 0 8

p. 1 of 2

| DRILL LOG | By: Ian Kennedy | Rig: BE 60L #27-14100 Craig Wamsley | Well Number: 299-W10-15 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-28-89 | | Depth: 100' To 115 | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| (10" liner) 102'-0" | | | | | 0740 | Arrive on site. driller drill. |
| | 105' | HT | Wet | SLIGHTLY MUDDY SAND: trace gravel, 80% sand, 15% mud: trace vfp, trace vcs 5% cs, 15% ms, | 0755 | Samples. (2) 1pt 1.Th |
| | | | | 50% fs, 15% vfs, 15% mud (Well sorted): Gravel: too little to determine mineralogy, | | RPT Cleaned |
| | | | | SAND: 5% mafic/95% felsic SR; 10YR 5/3 (brown) strong HCl rxn, unconsolidated | | Driller begins adding casing |
| | | | | many small (2-6mm) concretions which do not slake in water and show only a moderate HCl rxn | | |
| (10" dia) + 10'-6" | | | | added 10'-6" of 10" diameter carbon steel temporary casing | 0900 | resume drilling |
| 112'-6" | | | | | 0945 | H&S check |
| | 110' | HT | | SLIGHTLY MUDDY SAND: trace Gravel, 90% sand, 10% mud: trace vfp, trace vcs, | 1000 | Samples: (2) 1pt 1.Th |
| | | | | 20% cs, 30% ms, 30% fs, 10% vfs, 10% mud (moderate sorting) GRAVEL: too little, | | RPT Cleaned |
| | | | | SAND: 10% mafic/90% felsic SA-SR; 10YR 5/3 (brown) strong HCl rxn | | |
| | | | | unconsolidated; many small aggregations as above | 1030 | Samples: (2) 1pt. 1.Th |
| | 115' | HT | | SLIGHTLY MUDDY SAND: 90% sand, 10% mud; trace G, trace vcs, 10% cs, | | RPT Cleaned |
| | | | | 15% ms, 40% fs, 25% vfs, 10% mud (Well sorted) Gravel: (insufficient) | | |
| | | | | Sand: 10% mafic/90% felsic SA-SR 10YR 5/3 (brown) slight HCl rxn | | |
| | | | | unconsolidated, small aggregations as above, pockets of 100% mud. | | |
| | | | | | 1010 | driller begins adding casing |
| +10'-7" | | | | | | |
| 123'-1" | | | | | 1300 | finish adding |

REMARKS:

Ian Kennedy 9-28-89

Reviewed by V.L. McGehan 12-7-89

PNL MAS67 122-1 REV.0

WHC-MR-0209

506

| DRILL LOG | By B.N. Bjornstad | Rig BE-60L #22-14100 Craig Wamsley | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W-017 LLBG |
|---|---|---|---|---|---|
| | Date 9/28/89 | | Depth 115 To 130' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 123'1" | 120 | HT | Wet | Muddy SAND: (~10% gravel, 60%, 30% mud); | 1330 | Sample-hand tool |
| | | | | Gravel-size clasts are caliche fragments; Sand= | 1335 | Drill w/hand tool |
| | | | | 30% basalt, 30% caliche fragments, 40% | | |
| | | | | other; poorly sorted; wet color = 2.5Y5/4 | | |
| | | | | (light olive brown); strong rxn to HCl; | | Chemical samples ref. chain of custody |
| | | | | uncons olidated; sand mostly med-crs. [2-lith 2-chem samples] | | # 092089 W10-15 |
| | 125 | HT | Wet | Muddy SAND; same as previous sample | 1358 | Sample-hand tool |
| | | | | except sand is better sorted and mostly | 1410 | Drill w/hand tool |
| | | | | fine-grained. [samples: 2 lith] | | |
| | 130 | HT | Wet | Muddy SAND; same as 125' sample; several | 1420 | Sample-hand tool |
| | | | | pebble-size caliche fragments [samples: | 1430 | Prepare to weld |
| | | | | 2 lith] | | Driller says there's |
| | | | | | | ~10' open hole |
| | | | | | 1500 | Quit for day |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: Total of 45 gal. $H_2O$ added today

PNL-MA-567 DO-1 Rev. 0 Reviewed by W.L. Martin 12-7-89 Bernie Bjornstad 9/28/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

9 1 1 2 0 5 0 0 5 1 0



| DRILL LOG | By AIRHART | Rig BE 60L 14100 CRAIG WAMSLEY | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-29-89 | | Depth 130' To 135' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 123'1" | | | | | 0700-0830 | Welding |
| 132'10" | | | | Added 9'9" of 10" casing. 123'1" + 9'9" = 132'10" | 0835 | Drove Casing easily |
| | | | | | | (open hole in mud) |
| | | | | | 0836 | Added 10 gals $H_2O$ |
| | 135' | H | W | MUDDY SANDY GRAVEL: 40% gravel, 35% sand, 25% mud: | 0900 | Took (2) pint litho |
| | | | | 10% CP, 15% MP, 15% FP-VFP, 5% CS, 10% MS, 20% FS-VFS, | | samples. |
| | | | | 25% mud: poorly sorted: (GRAVEL) 30% basalt, 20% | | Rad & background |
| | | | | quartzite 50% ign. - SR-R NOTE: trace of consolidated | | No det. w/ OVA. |
| | | | | sandstone frags - slightly friable (SAND) 20% mafic | | |
| | | | | 80% felsic, A-SA NOTE: trace caliche: strong | | |
| | | | | rxn. w/ 10% HCl: wet color yellowish brown | | |
| | | | | 10YR 5/4: unconsolidated. | | |
| 142'6" | | | | | 0930 | Preparing to add casing |
| | | | | NOTE: Encountered hard drilling (consolidated seds.) | 1100 | Added 9'8" of 10" casing |
| | | | | @ ~135'. Gravels were encountered @ ~132'. | | 132'10" + 9'8" = 142'6" |
| | | | | | 1115 | Resumed Drilling |
| | | | | | 1124 | $H_2S$ check w/ OVA |
| | | | | | | no detectables |

REMARKS:

PNL-MA567-DO-1, Rev 0

Reviewed by V.L. Washburn 12-7-89

SLP 9-29-89

568

WHC-MR-0209

| DRILL LOG | By: AIRHART | Rig: BE 60L 14100 C. WAMSLEY | Well Number: 299-W10-15 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-29-89 | | Depth: 135' To 139' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1200-1230 | lunch |
| | | | | | 1240 | Resumed Drilling |
| | | | | Drilling rate decreased dramatically | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | Added 50 gals of |
| | | | | | | $H_2O$ to borehole |
| | | | | | | today |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-NN567-DO-1, Rev. 0

Reviewed by V.L. McGlam 12-7-89

S.L.P. 9-29-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

9 1 1 2 0 5 0 0 5 1 2



| DRILL LOG | By B.N. Bjorustad | Rig BE-60L 14100 Craig Wamsley | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/2/89 | | Depth 135 To 140 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0700 | Drilling |
| | 140' | H | W | Muddy Sandy GRAVEL (50% gravel, 35% sand, | 0835 | Sample |
| | | | | 15% mud). HIGHLY PULVERIZED; Gravel= | | |
| | | | | 50% basalt, 30% qtzite, 20% other; | 0940 | V. McGhan arrives |
| | | | | Sand = 30% mafic, 70% felsic; wet | | to log well w/ |
| | | | | color = 10YR 4/2 (dark grayish brown). no | | natural gamma |
| | | | | rxn to HCl, slow drilling - probably | | probe |
| | | | | consolidated [Samples: 2 lith, 2 special | 1100 | Logging complete - |
| | | | | chemical] (C. of C. # SST100289) | | begin welding 8" |
| | | | | Total 8" casing: 20' 8" + 19' 11½" + | | casing |
| | | | | | 1200 | Break for lunch |
| | | | | | 1230 | Welding |
| | | | | | 1525 | Quit for day |

REMARKS: Total of 30 gal. $H_2O$ Added Today

PNL-MA-567 DD-1 Rev. 0

Bruce Bjorustad 10/2/89

Reviewed by V.L. McGhan 12-7-89

WHC-MR-0209

G10

| DRILL LOG | By EJ Jensen | Rig BE-60L 14100 Craig Wansley | Well Number 299-W10-15 | Computer Number NA | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 10/3/89 | | Depth 140 To 140 | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 20' 8" 19' 11½" | These two are from | | sections 10/2/89 | Welding 8" casing | 0700 | |
| 40' 7½" | | | | | | |
| 20' 10½" | | | | | | |
| 61' 6" | | | | | | |
| 19' 11½" | | | | | | |
| 81' 5½" | | | | | | |
| 20' 5½" | | | | | | |
| 101' 11" | | | | | | |
| 21' 0" | | | | | | |
| 122' 11" | | | | | | |
| 19' 11½" | | | | | | |
| 142' 10½" | | | | | | |
| 9' 11" | | | | | | |
| 152' 9½" | | | | total 8" casing added. | 1530 | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. McGlam 12-7-89

10/3/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ___ Standing Water

WHC-MR-0209

571

| DRILL LOG | By B.N. Bjornstad | Rig BE-60L 14100 Craig Wamsley | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/4/89 | | Depth 140 To 150 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 152'9½" | | | | | 0700 | Set up |
| | | | | | 0750 | Drilling w/hand tool |
| | | | | | 0830 to 1115 | DRILLER'S MEETING, SHUT DOWN |
| | 145' | H | W | MUDDY SANDY GRAVEL: 60% GRAVEL, 28% SAND, 12% MUD. | 1133 | HARD TOOL SAMPLE |
| | | | | HIGHLY PULVERIZED GRAVEL: 35% MAFIC, 25% FELSIC, | | COLLECTED TWO(2) PINT |
| | | | | 15% QUARTZITE; 25% OTHER VA-SR (IF PRESERVED) | | LITH. SAMPLES. |
| | | | | SAND: 30% MAFIC, 60% FELSIC, 10% MISC. FAGS. VA-SR | | |
| | | | | WET COLOR: 5Y 5/3 OLIVE. MODERATE RXN W/10% HCl | | SAMPLED AND CONTINUED |
| | | | | SLIGHT TO MODERATE CONSOLIDATION (SLOW DRILLING) | | DRILLING. |
| | | | | | | |
| | | | | | 1155 | SHUT DOWN FOR LUNCH |
| | | | | | 1230 | Drilling w/hand tool |
| | 150' | H | W | Muddy Sandy GRAVEL (50% gravel, 40% sand, 10% | 1450 | Sample-hand tool |
| | | | | mud; pulverized; Gravel = 40% basalt, | | |
| | | | | 20% gtzite, 40% other; Sand = 25% | | |
| | | | | mafic, 75% felsic; wet color = 2.5Y 4/2 | | |
| | | | | (dk grayish brown); no rxn. to HCl; | | |
| | | | | [samples: 2 lith] | 1515 | Quit for day |

REMARKS:

Total of 40 gal. $H_2O$ Added today

Bruce Bjornstad 10/11/89

PNL MIA 567 DO-1 Rev. 0 Reviewed by D.L. Mathison 12-7-89

D - Drive; H - Hard Tool; L - Large; M - Medium; S - Small; VS - Very S

WHC-MR-0209

518

9 1 1 2 0 5 0 0 5 1 5



| DRILL LOG | By EJ Jensen MA Chauvness | Rig BE 60L 14100 | Well Number 299-W10-15 | Computer Number | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/5/89 | Craig Wheatley | Depth 150' To 155' | NA | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 152'9½" of 8" | | | | | 730/840 | welding on 10' of 8" |
| +10' | 155' | H | — | SANDY GRAVEL: 50% gravel, 45% sand, 5% mud. 5% vcg, 10% | 1100 | 2 lith samples taken |
| 162'9½" | | | | cg, 20% mg, 10% fg, 5% vfg, 10% vcs, 15% cs, 10% ms, 6% fs, 4% vfs, 5% mud. | | |
| | | | | PS. Gravel - 40% basalt, 40% qtz/qtzite, 20% jsp/metam. Mostly | | |
| | | | | broken, VA-R. Sand - 30% basalt, 55% qtz/qtzite, 15% rk frags, VA-SR. | | |
| | | | | Wet color - 5Y5/2 (olive gray). No rxn. to HCl. Moderately consol. to | | |
| | | | | consolidated. Similar to last sample. | | |
| | | | | | | |
| | | | | | 1530 | hard drilling |
| | | | | | | brought up large |
| | | | | | | piece of granite |
| | | | | | | with the bailer. |

REMARKS: Total 15 gal $H_2O$ added today

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. McGhan 12-7-89

10/5/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

613

| DRILL LOG | By: S M. Goodwin | Rig: BE-60L | Well Number: 299-W10-15 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 6 OCT. 1989 | # 22-14100 | Depth: 155' TO 165' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS CRAIG WAMSLEY | 0700 | DRILLING |
| | 160' | H | WET | MUDDY SANDY GRAVEL: 60% GRAVEL, 35% SAND, | 0755 | SAMPLED W/ SAND |
| | | | | 5% MUD. 5% VCP, 10% CP, 20% MP, 15% FP, 10% | | PUMP; 2 PT. LITH |
| | | | | VFP, 5% VCS, 10% CS, 15% MS, 3% FS, 2% VFS, | | & 2 125ML CHEM. |
| | | | | 5% MUD. VERY POORLY SORTED. GRAVELS: 35% | | ANAL. SAMPLES |
| | | | | MAFIC, 65% FELSIC; UNBROKEN = R TO WR. | | (C. OF C. # SST |
| | | | | SAND: 25% MAFIC, 75% FELSIC; SA. WET | | 100684) |
| | | | | COLOR IS N.5 Y 4/2 (DARK GRAYISH BROWN) | 0800 | DRILLING |
| | | | | NO RX. TO 10% HCL. FM. APPEARS CONSOLIDATED; | 0810 | PREPARING TO WELD |
| ~~152'9 1/2"~~ | 162'9 1/2" | SOH | 10/20/89 | SLOW DRILLING. SLIGHT Δ IN COLOR. | 0905 | FINISHED WELDING |
| + 8'5 1/2" | | | | ADDED 8'5 1/2" OF 8" CASING; TOTAL 8" = 161'3" | 0915 | DRILLING |
| = ~~161'3"~~ | 171'3" | | | | 1200 - 1230 | LUNCH |
| | | | | | 1240 | DRILLING |
| | 165' | H | WET | MUDDY SANDY GRAVEL: 60% GRAVEL, 35% SAND, | 1400 | SAMPLED W/ SAND |
| | | | | 5% MUD. SAME P. SIZE DISTRIBUTION AS 160'; | | PUMP; 2 PT. |
| | | | | VPS. GRAVEL: 45% MAFIC, 55% FELSIC; | | LITH. SAMPLES |
| | | | | UNBROKEN = R TO WR. SAND: 30% MAFIC, | 1405 | DRILLING |
| | | | | 70% FELSIC; SA. WET COLOR IS 5Y 4/3 | | |

REMARKS:

PNL-MA-SLT DD-1, REV. 0 Reviewed by D.L. McGhan 12-7-89 Matthew Stoll 10/6/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ——— Standing Water

514

WHC-MR-0209

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| S. M. Goodwin | BE 60L | 299-W10-15 | N/A | W-017 SST |
| Date: 6 OCT. 1989 | # 22-14100 | Depth: 165' To ~167' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 165' | H | WET | (CONT) (OLIVE). NO RX. TO 10% HCL. CON- | | |
| | | | | SOLIDATED; VERY SLOW DRILLING | | |
| | | | | USED 40 GALLONS OF DRILL SUPPLY $H_2O$ | 1530 | END OF SHIFT |

REMARKS:

Reviewed by V. L. McGehan

PNL-MA-567 DO-1, REV. 0 40 GALLONS OF $H_2O$ TODAY

10/6/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000 021 (5 85)

5/5

WHC-MR-0209

9 1 1 2 0 5 0 0 5 1 3

1 of 1

| DRILL LOG | By: MA Chamness | Rig: BE 60L 14100 Craig Wamsley | Well Number: 299-W10-15 | Computer Number: NA | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 10/9/89 | | Depth: 167' To 178' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 171'3" of 8" | | | | | 725 | Driller building up bit |
| | | | | | ~800 | started drilling |
| 178'4" | | | | | 825 | welding on 8'4" of 8" |
| 179'7" of 8" | | | | | | |
| | 170' | H | — | MUDDY SANDY GRAVEL: 45% gravel, 47% sand, 8% mud, 5% vcg, | 1040 | 2 lith samples. |
| | | | | 15% cg, 15% mg, 7% fg, 3% vfg, 8% vcs, 15% cs, 15% ms, 8% fs, 6% vfs, | | |
| | | | | 8% mud. PS-VPS. Gravel - 45% basalt, 35% ign/metam., 20% qtz/qtzite; | | |
| | | | | mostly broken. A-R. Sand - 20% basalt, 55% qtz/qtzite, 15% rk frags; | | |
| | | | | dry color 2.5Y 7/2 (lt. gray) VA-SR. Wet color - 5Y 4/2 (olive gray). Very sl. rxn. in HCl. Mod. consol. | | |
| | | | | Similar to last sample. Rad. + chem. measurements at background. | 1200/1230 | lunch |
| | 175' | H | — | MUDDY SANDY GRAVEL: 43% gravel, 50% sand, 7% mud. 6% vcg, | 1315 | 2 lith. samples |
| | | | | 15% cg, 13% mg, 5% fg, 4% vfg, 10% vcs, 15% cs, 10% ms, 10% fs, 5% vfs, | | |
| | | | | 7% mud. PS-VPS. Gravel - 20% basalt, 50% ign/metam., 30% qtz/qtzite, | | |
| | | | | mostly broken. A-WR. Sand - 20% mafic, 20% rk frags, 50% qtz, some biotite, | | |
| | | | | dry color - 2.5Y 7/2 (lt. gray) VA-SA. Wet color - 5Y 4/2 (olive gray). Very sl. rxn in HCl. Mod. consol. | | |
| | | | | Similar to last sample. Rad. + chem. measurements at background. | | |
| | | | | | | |
| | | | | Will have to build up bit and add on casing in the morning. | 1515 | quit for day |

REMARKS:

Total of 40 gal. $H_2O$ added Today

Reviewed by T.L. McClam 12-7-89

DNL-MA-567 DO-1, RSV.0

MA Chamness

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

516

WHC-MR-0209

1051

| DRILL LOG | By EJ Jensen | Rig BE 10 14100 Craig Ramsly | Well Number 299-W10-15 | Computer Number NA | Project or Work Order No. W017 SST |
|---|---|---|---|---|---|
| | Date 10/10/89 | | Depth 175 To 185' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 179 7" 10' 7" | | | | Added 10' 7" of 8" diameter Casing | 0800 | |
| 190' 2" | 180' | HT | – | SANDY GRAVEL, 50% gravel, 45% sand, 5% mud | 1045 | |
| | | | | 20% mafic, 80% felsic, very fragmented, | | |
| | | | | wet color 5/y 4/2 olive gray, no rxn in 10% HCl | | |
| | | | | hard drilling, semi consolidated, poor sorting. | | |
| | | | | Drilling got easier at 180', but same material, Maybe less consolidated, | | |
| | | | | | | |
| | 185' | HT | – | GRAVELLY SAND, 40% gravel, 60% sand, 40% mafic, 60% | 1330 | |
| | | | | felsic, fragmented wet color 5y 4/2 olive gray, no | | |
| | | | | rxn in 10% HCl, semi consolidated, poor sorting, | | |
| | | | | increase in sand content from last sample | | |

REMARKS:

Reviewed by V.L. Markham 12-7-89

DNL-MA-567 DO-1, REV. 0 40 GALLONS OF H2O USED

10/10/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000 021 (5 85)

WHC-MR-0209

515

9 1 1 2 0 5 0 0 5 0 0



| DRILL LOG | By B.N. Bjornstad | Rig BE-60L 14100 Craig Wansky | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/11/89 | | Depth 185' To 190' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 190'2" | | | | | 0715 | Prepare to weld |
| +9'2" | | | | | | casing |
| 199'4" | | | | | 0952 | Finish welding |
| | | | | | | 9'2" of 8" casing |
| | | | | | 1000 | Drilling w/hand tool |
| | | | | | | Added 5 gal. $H_2O$ |
| | 190' | H | W | Sandy GRAVEL (55% sand, 40% gravel, 5% mud); | 1050 | Collect sample |
| | | | | highly pulverized; Gravel = 30% basalt, 40% | 1100 | Drill w/hand tool |
| | | | | qtzite, 30% other; Sand = 25% basalt, 20% | | |
| | | | | qtzite fragments, 55% felsic minerals; wet | 1200-1230 | Lunch |
| | | | | color = 2.5Y 4/2 (dk grayish brown); mod. rxn | | |
| + 10'2 3/4" | | | | to HCl; driller says formation is slightly | 1320 | Prepare to weld |
| 209'6 3/4" | | | | less consolidated. | | 10'2 3/4" of 8" casing |
| | | | | | 1440 | Finish welding |
| | | | | | 1450 | Drill w/hand tool |
| | 195' | H | W | Sandy GRAVEL - same as previous sample | 1455 | Collect sample |
| | | | | | 1515 | Quit for day |
| | | | | | | |

REMARKS: Total of 32 gal. $H_2O$ added Today Bruce Bjornstad 10/11/89

PNL-MA-567 DO-1 Rev.0 Reviewed by D.L. McGhan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very C... C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

5 of 8

9112050021

1651

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| EJ Jensen | BE-60L 14100 Craig Warsly | 299-W10-15 | NA | W017 SST |
| Date: 10/12/89 | | Depth: 200' To 210' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 200' | HT | – | SANDY GRAVEL, 55% gravel, 40% sand, 5% mud | 0930 | 2 lith samples |
| | | | | 60% felsic, 40% Mafic, semi consolidated wet | | 2 chemical samples |
| | | | | color 5Y 4/2 olive gray, poor sorting no rxn | | 101289 SST chain |
| | | | | in 10% HCl | | of custody form. |
| | 205' | HT | – | SANDY GRAVEL, 60% gravel, 35% sand, 5% mud, | 1100 | 2 lith samples |
| | | | | 60% felsic, 40% mafic, semi consolidated, wet | | |
| | | | | color 5Y 4/2 olive gray, poor sorting, no rxn | | |
| | | | | in 10% HCL. | | |
| | 210' | HT | – | SANDY GRAVEL, 60% gravel, 35% sand, 5% mud, | 1440 | 2 lith samples |
| | | | | 55% felsic, 45% mafic, semi consolidated, wet | | |
| | | | | color 5Y 4/2 olive gray, poor sorting, no rxn | | |
| | | | | in 10% HCL. | | |

REMARKS: Added 50 gallons $H_2O$ today
Added 40 gallons $H_2O$ on 10/10/89

10/12/89

Reviewed by [illegible] 12-7-89

PNL-MA-567 DO-1, REV. 0

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A-6000-021 (5-85)

519

WHC-MR-0209

| DRILL LOG | By B.N. Bjornstad | Rig BE-60L 14100 | Well Number 299-W10-15 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/13/89 | | Depth 210 To 215 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 209'6 3/4" | | | | 8'0" of 8" casing added 10/12/89 | 0720 | Drill w/hand tool |
| +8'0" | 215' | H | W | Sandy GRAVEL (35% gravel, 60% sand, 5% | 0925 | Collect sample |
| 217'6 3/4" | | | | mud); highly pulverized angular fragments; | 1030 | Prepare to weld |
| +8'10" | | | | moderately sorted; Gravel = 25% basalt, | | 8'10" of 8" casing |
| 226'4 3/4" | | | | 60% qtzite, 10% granitic, 5% other; | | Driller thinks he |
| | | | | Sand is mostly med-crs grained: 20% | | hit water between |
| | | | | mafic, 30% qtzite fragments, 50% | | 210-215. |
| | | | | felsic; wet color = 2.5Y 4/4 (olive brown); | | |
| | | | | no rxn to HCl; hard drilling - probably | | |
| | | | | consolidated; Δ from previous sample: | | |
| | | | | more sand, less basalt, browner color | | |
| | | | | | | |
| | | | | | 1200 | BREAK FOR LUNCH |
| | | | | | 1240 | RESUME DRILLING |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: PNL-MA-567 DO-1 Rev. 0

Bruce Bjornstad 10/13/89

Reviewed by V.L. Madelan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

WHC-MR-0209

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| R.P. BLEGEN | BE-60L | 299-W10-15 | N/A | W-017 SST |
| Date: 10-15-87 | 14100 | Depth: 220' To 220' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | 220' | H | W | SANDY GRAVEL: 30% GRAVEL, 65% SAND, 5% MUD SAMPLE IS HIGHLY | 1415 | SLOW DRILLING. |
| | | | | PULVERIZED. GRAVEL IS BROKEN AND ANGULAR. MODERATE TO POORLY SORTED. | | COLLECTED TWO (2) PINT |
| | | | | GRAVEL: 20% BASALT, 40% QUARTZITE, 10% GRANITIC, 30% MISC. FRAGS VA-SA | | LITHO. SAMPLES AND |
| | | | | SAND: 15% BASALT, 20% QUARTZITE FRAGMENTS, 40% QTZ & FELDS., 25% MISC. FRAG | | TWO (2) 125ml ENVIRONMENTAL |
| | | | | SA-R (MOSTLY MS). WET COLOR: 5Y 5/3 OLIVE. NO RXN W/HCl | | SAMPLES (REF. CHAIN-OF- |
| | | | | LITTLE CHANGE FROM PREVIOUS SAMPLE. | | CUSTODY # 101389 299-W10-15 SST |
| | | | | | | |
| | | | | | | |
| | | | | | 1505 | SHUT DOWN FOR DAY |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: Total of 35 gal. $H_2O$ added today..

PNL-MA-567 DO-1, REV. 0 Reviewed by D.L. Mulligan 12-7-89 Donald P. Kelly 10-13-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine ____ Standing Water

A 6000-021 (5-85)

521

WHC-MR-0209

| DRILL LOG | By: MA Chamness | Rig: BE-60L 14100 Craig Wimsley | Well Number: 299-W10-15 | Computer Number: NA | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 10/16/89 | | Depth: 220' To 221' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 226'4¾" of 8" | | | | LW = 211'11" from top of casing, casing stickup 5'4½" = 206.5' bgs | 735 | |
| | | | | DB = 219.8 + 2.44 (tape) = 222.04' − 5.3' (stickup) = 216.74' bgs | 740 | |
| | | | | Bottom of casing at 221'1¼" | 745 | Driller cleaning out hole |
| | | | | DB 225.2' + 2.44' = 227.64' − 5.3' = 222.34' bgs, hole is 15.84' | 900 | |
| | | | | below water table. | | |
| | | | | Either cuttings settled or sand is heaving in, LB ~ 220' bgs. Craig | 920 | |
| | | | | will clean out hole and drive casing down a little more. | 925 | straightness test ok |
| | | | | Drove casing down, tagged bottom at 221' bgs. Water is slow | 1030 | |
| | | | | coming into hole, but should return to static at [illegible]. | 1045 | Tearing down rig. |
| | | | | Casing was driven to 222'. | | |
| | | | | | 1330/1545 | Geophysical logging w/ |
| | | | | | | nat. & probe |
| | | | | | 1530 | drill rig leaves. |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. McGehan 12-7-89 MA Chamness 10/16/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VS - Very S[illegible] C - Coarse F - Fine

WHC-MR-0209

523

9 1 1 2 0 5 0 0 5 2 5

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 10-25-89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location 200 WEST | Project PST W-017 | |

Logged by S.P AIRHART SAP Date 10-25-89
Reviewed by D.C. Walker Date 12-7-89
Measuring Equip. S-TAPE-L300-08 E-TAPE 10997 Procedure PNL-MQ-567 00-1 REV.0

Drilling Contractor KEH
Driller CRAIG WAMSLEY
Rig/Equipment NO RIG

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 14:00 | | | | | | | | | | D/W = 208.5' - 1.7' (stickup) = 206.8' |
| | | | | | | | | | | D/B = 220.2' + 2.44' - 1.7' = 220.9' |
| | | | | | | | | | | According to logs casing is |
| | | | | | | | | | | @ 222' |

523

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 10-27-89 | Sheet No. 1 of 3 |
|---|---|---|---|
| | Location 200 WEST | Project W-017 SST | |

Logged by S. P. AIRHART SPA Date 10-27-89
Reviewed by W. L. McKahan Date 10-27-89
Measuring Equip. S. tape L300-08 E. tape 10997 Procedure PNL-MA-567 Div. REV 0

Drilling Contractor KEH
Driller CRAIG WAMBLEY
Rig/Equipment PETTIBONE CRANE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Stainless steel (SS) casing & |
| | | | | | | | | | | screen was set by KEH |
| | | | | | | | | | | yesterday 10/26. PNL |
| | | | | | | | | | | geologists were attending |
| | | | | | | | | | | RCRA supervisor training. |
| | 10-slot channel-pack screen | 4" | 21' | | | | | | | |
| | casing | 4" | 20.04' | (10-sections) | | | | | | |
| | casing | 4" | 5' | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | D/W = 211.6' - 5.9' = 205.7' |
| | | | | | 222' | | | 221.8' | | inside 4" D/S = 225.25' + 2.44' - 5.9' = 221.8' |
| | | | | | 222' | 20-40 silica sand | 1/2 bag | 217.3' | 4.7' | 220.8' + 2.44' - 5.9' = 217.3' |
| | | | | | 220.8' | | | | 2.4' | 222.9' + 2.44' - 7.1' = 218.4' |
| | | | | | 220.8' | | 1/2 bag | 216.0' | 4.8' | 220.7' + 2.44' - 7.1' = 216.0' |
| | | | | | 219.5' | | | 217' | 2.5' | 223' + 2.44' - 8.4' = 217' |
| | | | | | 219.5' | | 1/2 bag | 214.9' | 4.6' | 220.9' + 2.44' - 8.4' = 214.9' |
| | | | | | 218.1' | | | 216.0' | 2.1' | 223.4' + 2.44' - 9.8' = 216.0' |
| | | | | | | | | | | Using slag catcher when cutting casing |
| 0840 | | | | | 218.1' | | 1/2 bag | 213.1' | 5' | 217.3' + 2.44' - 6.6' = 213.1' |
| | | | | | 216.4' | | | 214.1' | 2.3' | 220' + 2.44' - 8.3' = 214.1 |
| 0855 | | | | | 216.4' | | 1/2 bag | 212' | 4.4' | 217.9' + 2.44' - 8.3' = 212.0' |

524

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 10-27-89 | Sheet No. 2 of 3 |
|---|---|---|---|
| | Location 200 West | Project W-017 SST | |

Logged by S. P. AIGHART SHP Date 10-27-89
Reviewed by W. L. McKleen Date 12-7-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-567 00-1 REV. 0

Drilling Contractor KEN
Driller CRAIG WAMSLEY
Rig/Equipment PETTIBONE / HYD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0908 | Carbon steel | 8" | | | 216.4' | | | 214.2' | 2.2' | 218.4' + 2.44' − 6.6' = 214.2' |
| | " | " | | | 216.4' | 20-40 Silica Sand | 1/2 bag | 212.7' | 3.7' | 216.9' + 2.44' − 6.6' = 212.7' |
| | " | " | | | 215.1' | " | | 214.4' | .7' | 219.4' + 2.44' − 7.9' = 214.4' |
| 0918 | " | " | | | 215.1' | " | 1 bag | 212.0' | 3.1' | 217.5' + 2.44' − 7.9' = 212.0' |
| | " | " | | | 213.7' | " | | 213.3' | .4' | 220.2' + 2.44' − 9.3' = 213.3' |
| 0924 | " | " | | | 213.7' | " | 2 bags | 208.5' | 5.2' | 215.4' + 2.44' − 9.3' = 208.5' |
| | " | " | 217.5' | 6.7' | 210.8' | " | | 211.1' | −.3' | 215.4' + 2.44' − 6.7' = 211.1 |
| | " | " | | | 210.8' | " | 2 bags | 205.5' | 5.3' | 209.8' + 2.44' − 6.7' = 205.5' |
| | " | " | 217.5' | 8.1' | 209.4' | " | | 206.8' | 2.6' | 212.5' + 2.44' − 8.1' = 206.8' |
| | " | " | | | 209.4' | " | 1 bag | 201.7' | 7.7' | 207.4' + 2.44' − 8.1' = 201.7' |
| | " | " | 217.5' | 9.5' | 208' | " | | 203.4' | 4.6' | 210.5' + 2.44' − 9.5' = 203.4' |
| 1020 | " | " | 217.5' | 10.9' | 206.6' | " | | 207.0' | −.4' | 211.1' + 2.44' − 6.5' = 207.0' |
| 1025 | " | " | | | 206.6' | " | 2 bags | 199.4' | 7.2' | 203.5' + 2.44' − 6.5' = 199.4' |
| | " | " | | | 205.2' | " | | 204.4' | 1.1' | 209.9' + 2.44' − 7.9' = 204.4' |
| | " | " | | | 205.2' | " | 2 bags | 195.2' | 10' | 200.7' + 2.44' − 7.9' = 195.2' |
| | " | " | | | | " | 1/2 bag | | | Added after first pull |
| 1046 | " | | 209.5' | 7.1' | 202.4' | " | | 198.8' | 3.6' | 203.5' + 2.44' − 7.1' = 198.84' |
| | | | | | 202.4' | | 1 1/2 bags | 193.8' | 8.9' | 198.2' + 2.44' − 7.1' = 193.5' |
| | | | | 9.9' | 199.6' | | | 196.3' | 3.3' | 200.6' + 2.44' − 6.7' = 196.3' |
| | | | | | 198.4' | | | 197.8' | .6' | 203.3' + 2.44' − 7.9' = 197.8' |
| | | | | | 198.4' | | 1/2 bag | 195.3' | 2.6' | 201.3' + 2.44' − 7.9' = 195.3' |
| | | | | | 197.1' | | | 198.1' | −1' | 204.9' + 2.44' − 9.2' = 198.1' |

525

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 10-27-89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location 200 WEST | Project W-017 | |

Logged by S. P. AIRHART SPAirhart Date 10-27-89
Reviewed by W. C. McMahan Date 12-7-89
Measuring Equip. L300-08 Procedure PNL-MA-567 Qu.1 - Rev.0

Drilling Contractor KEN
Driller CRAIG WAMBLEY
Rig/Equipment PETTIBONE / MTD. JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1120 | Carbon Steel | 8" | | | 197.1' | 20-40 Silica Sand | 1/2 bag | 194.7' | 2.4' | 201.5' + 2.44' - 9.2' = 194.7' |
| | | | | | 196' | | | 195.9' | -1' | 203.8' + 2.44' - 10.3' = 195.9' |
| | | | | | | | | | | |
| 1348 | | | | | | | | | | Started bailing w/ 3" duct bailer |
| | | | | | | | | | | to settle sand |
| 1415 | | | | | | | | | | Quit bailing. Note: surged |
| | | | | | | | | | | during bailing |
| | | | | | 196' | | | 197.1' | -1.1' | 201.5' + 2.44 - 6.8' = 197.1' |
| | | | | | | | | | | Sand dropped 1.2' - |
| | | | | | | | | | | TOP OF SAND @ 197.1' |
| | | | | | | | | | | lb bags used = 17.9 ft³ |
| | | | | | 196' | 3/8" Volclay tablets | 2 buckets | 193.3' | 2.7' | 197.7' + 2.44' - 6.8' = 193.3' |
| | | | | | 194.6' | | | 194.4' | .2' | 200.2' + 2.44' - 8.2' = 194.4' |
| | | | | | 194.6' | " | 1 bucket | 191.8' | 2.8' | 197.6' + 2.44' - 8.2' = 191.8' |
| | | | 199.3' | 6' | 193.3' | " | | 193.3' | 0' | 200.5' + 2.44' - 9.6' = 193.3' |
| | | | | | | | | | | TOP OF PELLETS @ 193.3' |
| | | | | | | | | | | 3 buckets used = 1.86 ft³ |
| 1500 | | | | | | | | | | Shut Down - can't cut casing |
| | | | | | | | | | | due to 1/2 hr. fire watch |

WHC-MR-0209

526

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 10-30-89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location 200 West | Project W-017 SST | |

Logged by S. P. AIRHART Date 10-30-89
Reviewed by V. C. McElhaney Date 12-7-89
Measuring Equip. STAKE · L300-08 Procedure PNL-MA-567 DO-MA-RO

Drilling Contractor KEN
Driller CRAIG WAMSLEY
Rig/Equipment PETTIBONE / HYD. JACKS.

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0735 | Carbon steel | 8" | 199.3' | 6.2' | 193.1' | Pellets | | 193.3' | -.2' | 197.5' + 2.44' - 6.6' = 193.3' |
| 0805 | " | 8" | | | 193.1' | 8-20 bentonite | 15 bags | 150.1' | 43' | 154.3' + 2.44' - 6.6' = 150.1' |
| 0825 | " | 8" | 179.6' | 7' | 172.6' | | | 174.3' | -1.74' | 178.9' + 2.44' - 7' = 174.3' |
| | | | | | | | | | | Note: No caving occurred |
| | " | 8" | | | 172.6' | " " | 21 bags | 118.1' | 54.5' | 122.7' + 2.44' - 7' = 118.1' |
| 0900 | " | 8" | 162.8' | 5.9' | 156.9' | " | | 139.1' | 17.8' | 143.8' + 2.44' - 7.1' = 139.1' |
| | | | | | | | | | | casing tightening - lots of stretch |
| | | | | | | | | | | when pulling w/ jacks. |
| 0940 | | | | | | | | | | started pulling - broke 8" casing |
| | | | | | | | | | | uncertain @ this time where |
| | | | | | | | | | | break is. |
| | | | | | | | | 140.8' | | 144.5' + 2.44' - 6.1' = 140.8' |
| 1030 | | | | | | | | | | Pulled 8" casing out - Noted break |
| | | | | | | | | | | @ 81.5' weld - ∴ 81.5' of casing |
| | | | | | | | | | | remains in ground (75.4' - 156.9') |
| | | | | | | | | | | below land surface. |
| 1050 | | | | | | | | | | O/B inside 4" SS = 221.8' - No |
| | | | | | | | | | | obvious damage to SS using |
| | | | | | | | | | | steel tape |
| 1200 | | | | | | | | | | Initiated NCR - waiting for decision |
| | | | | | | | | | | to continue completion leaving 8" |
| | | | | | | | | | | in ground |

WHC-MR-0209

527

9 1 1 2 0 5 0 0 5 3 0

142 4'

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 11-1-89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location 200 WEST | Project W-017 SST | |

Logged by S. P. AIRHART SP Airhart — Date 11-1-89
Reviewed by D.C. Mathison — Date 12-7-89
Measuring Equip. S-TAPE L300-08 — Procedure PNL-MA-567 DO-7 R.0

Drilling Contractor KEH
Driller CRAIG WAMSLEY
Rig/Equipment PETTIBONE CRANE / HYD JACKS.

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0700 | | | | | | | | | | Decided to proceed w/ |
| | | | | | | | | | | completion as per NCR |
| | | | | | | | | | | # PNL-89-071 (see attached) |
| | | | | | | | | | | This decision was made |
| | | | | | | | | | | in meeting w/ WHC, KEH, & |
| | | | | | | | | | | PNL (see attached meeting |
| | | | | | | | | | | minutes) |
| 0900 | | | | | | | | | | Added extension to 10" casing |
| | | | | | | | | | | set jacks |
| | | | | | | | | | | D/crumbles inside 8"s 140.8' (same |
| | | | | | | | | | | as taken 10/30/89) |
| 1024 | | | | | | | | | | Added 1¾" tremie pipe to 96.5' |
| | | | | | | | | | | When adding tremie encountered |
| | | | | | | | | | | assumed to of 8' @ 75.9' - |
| | | | | | | | | | | also encountered another obstruction |
| | | | | | | | | | | @ 79.9' (possibly ear which was |
| | | | | | | | | | | dropped by driller (??) - |
| 1038 | | | | | | | | | | Pulled 10" casing .5' to make sure |
| | | | | | | | | | | it moves. |

WHC-MR-0209

BCG

# NONCONFORMANCE REPORT

Page 1 of 2

No. PNL-89-071

| | | | |
|---|---|---|---|
| O., W.O., or Authorization: N/A | 2. Nomenclature: Groundwater Monitoring Well | 3. Dwg./Spec./Other No.: WHC-S-014 | Rev. 3 |
| ogram, Project or Other: ingle Shell Tanks | 5. Hold Location: Well 299-W10-15 | | 6. Hold Tag. No.: N/A |
| upplier Name Address: EH (driller) | | | |

| ode: Lot/Heat/Serial | 9. Lot Size | 10. Sample | 11. Qty. Acc. | 12. Inspection Criteria |
|---|---|---|---|---|
| 1 299-W10-015 | 1 | 1 | 0 | ☐ Dwg. ☒ Spec. ☐ Insp. Plan ☐ Other |

Item

14. Description of Nonconformance (List serial No. where applicable)

See attached Construction Nonconformance Report (KEH form).

Originator: Complete Blocks Inside Heavy Border.

17. Disposition, Justification, & Instructions.

See attached Construction Nonconformance Report.

Impact Level II
IR/UOR Required? No

See Reverse Side Of Page One For Disposition Instructions.

. Originator's Signature: P Airhart (signature attached) Date: 10-30-89

. Supervisor's/Manager's Signature: N/A Date:

8. Design Document Change Required? ☐ Yes, Doc. No. _____ ☒ No

19. Corrective Action Required? ☐ Yes, CAR No. _____ ☒ No

| | | | |
|---|---|---|---|
| 0. Technical Representative: SP Airhart (signature attached) Date: 10-31-89 | 21. Signature: WHC Design CE Hodge (attached) Date: 10-31-89 | Signature: N/A Date: | |
| QA Representative: DR Dahl (signature attached) Date: 10-31-89 | Signature: WHC QA WR Thackaberry (attached) Date: 10-31-89 | Signature: N/A Date: | |

2. ☒ Disposition Effected As Directed, ☐ Other (Specify)

SP Airhart (signature attached) 11-7-89
Originator or Representative Date

23. Action: SP Airhart (PNL), TL Walton (KEH), DR Dahl (PNL)

Information: EJ Jensen (PNL), GV Last (PNL), JF Keller (KEH), CE Hodge (WHC), LC Swanson (WHC), WR Thackaberry (WHC), PNL Process Quality

RL-604 (2-80)
(54-2099-604)

# CONSTRUCTION NONCONFORMANCE REPORT

WHC-MR-0209



| (1A) Project, Location or WO | (1B) Title | (1C) NCR No. |
|---|---|---|
| W-017 | Groundwater Monitoring Wells | ~~W10-15-1~~ PNL-89-071 |

(1D) Requirements
(1E) Nonconformance Description

(1D) In the event the Contractor's well does not meet the specifications requirements and the contractor is unable to pull back the casing, the government representative may direct that the well shall be abandoned at the Contractor's expense , or that w WHC alternative to completing the well be developed. The well abandonment must meet WHC requirments.

Contract Specification WHC-S-014, Section 8.4

(1E) During removal of 8" diameter casing @ well 299-W10-15 the 8" casing broke apart at weld leaving 81.5' of casing in the ground. The casing extends from 75.4' to 156.9' below land surface. Depth to water is measured @ 206.8' therefore bottom of 8" casing is 49.9' above the saturated zone. Currently 8-20 mesh bentonite crumbles are installed from' 139.1' to 193.3' below land surface. 10" diameter carbon steel extends from land surface to 142.5' below land.

~~Contractor shall use bentonite grout in the 10" casing instead of cement to insure a proper seal~~ CEH/10/30/89

(1J) Distribution

PNL
E.J. Jensen K6-96
G. V. Last K6-96

KEH
J. F. Keller Trlr 6/2E
T.L. Walton Trlr. 6/2E

WHC
C.E. Hodge R3/27
L.C. Swanson H4-56
W.R. Thackaberry S1-54

OK 10/31

| (1F) Tag No. | (1G) Originator, Company and Date, | (1H) Supervisors Review |
|---|---|---|
| | SLD Dahl, PNL, 10-30-89 | G.V. Last by phone 10/30/89 |

(2A) Disposition

- [X] Accept As Is
- [ ] Conditional Accept
- [ ] Rework
- [ ] Repair
- [ ] Reject
- [ ] Other (Specify)

(2B) Instructions
(2C) Justification

The parted casing is well above the saturated zone and will not hamper the well completion or sealing effort. ~~[illegible]~~ CEH - 10/30/89

Contractor shall use bentonite grout in the 10" casing to insure a proper seal.

Bentonite grout shall be placed to an approximate depth of 75' ± 5' using the tremie method. Granular bentonite will be placed from 75' to 20'.

(2D) Additional Doc Required

- [ ] As-Builts
- [ ] DFC No. _____
- [ ] Other Specify _____
- [x] N/A

| (2E) Contr. Approval (Signature and Date) | (2F) A-E Approval (Signature and Date) | | (2G) Opr. Contr. Approval (Signature and Date) | (2H) Concurrence (Signature and Date) |
|---|---|---|---|---|
| Engr. SLD Dahl 10/31/89 | Design C.E. Hodge 10/30/89 | Safety N/A. | Engr. C.E. Hodge 10/30/89 | AI (ASME) SLD Dahl 10/31/89 |
| QA DR Dahl 10/31/89 | QA WR Thackaberry 10-30-89 | PE C.E. Hodge 10/30/89 | QA WR Thackaberry 10-30-89 | DGE N/A. |

(3A)
- [X] Disposition Effected As Directed. NCR Closed
- [ ] Other (Specify)

SLD Dahl — Originator or Representative — Date 11-7-89

| (4A) List of Documents Affected | (4B) Documents Revised |
|---|---|
| | By _____ Date _____ |

# MEETING MINUTES

SUBJECT: Remediation of Casing Break in Single-Shell Tank Well W10-15

| TO: | | BUILDING | | |
|---|---|---|---|---|
| Distribution | | 450 Hills | | |
| FROM: LC Swanson L. C. Swanson | | CHAIRMAN L. C. Swanson | | |
| DEPARTMENT-OPERATION-COMPONENT | AREA | SHIFT | DATE OF MEETING | NUMBER ATTENDING |
| Geosciences Group | 3000 | Day | 10/31/89 | 5 |

Attendees

Pacific Northwest Laboratory

S. P. Airhart K6-77

Kaiser Engineers Hanford Company

J. F. Keller Trl. 6/200E

Westinghouse Hanford Company

C. E. Hodge R3-43
R. L. Jackson H4-56
L. C. Swanson H4-56

Distribution

Attendees
K. R. Fecht KRF H4-56
File/LB

Reference: Construction Nonconformance Report, Number PNL-89-071, October 30, 1989.

Background: During Kaiser Engineers Hanford Company backpulling operations at Single-Shell Tank (SST) well W10-15, the temporary 8 in. carbon steel casing parted at a weld area. It is not clear if the break occurred directly at the weld or near the weld.

The break is located at a depth of about 73 ft inside the 10 in. temporary casing. The casing shoe for the 8 in. casing was backpulled to approximately 50 ft above the saturated zone before the casing parted. The permanent 4 in. stainless steel casing, well screen, and filter pack material were already installed, with a 50 ft bentonite seal extending close to the 10 casing shoe. A verbal description for the configuration of the well is given in the Construction Nonconformance Report (referenced above) that was completed by Pacific Northwest Laboratory. Also, see the as-built attached to these meeting minutes.

Remediation Options: Two principle remediation options were discussed and are as follows:

1. Complete the borehole by first removing the 8 in. casing. This option would involve unscrewing the 4 in. stainless steel casing below the break (inside the 8 in. casing) using a sand lock method. The downhole 4 in. casing would be capped to prevent material from falling inside the casing

9112050573

and screen. A trip spear would then be lowered from the surface, attached to the 8 in. casing and the 8 in. casing removed by backpulling. After reattaching the 4 in. permanent casing the well would completed while the temporary 10 in. carbon steel casing is backpulled.

2. Leave the 8 in. casing in the borehole. This option involves using a tremie pipe to place grout from the top of the current bentonite sealant along the outside of the 8 in. casing. During this operation the 10 in. casing would be backpulled as the grout was added. When the grout level reached the break, it would enter the 8 in. casing and surround the 4 in. stainless steel casing. After the grout level is above the break, the well will be completed to about 20 ft with the designed bentonite seal.

Recommendation: The second option was recommended for several reasons. First, leaving the temporary 8 in. carbon steel casing would not impact the groundwater quality. The casing is above the water table by about 50 ft, so no material would be added to the saturated zone that might affect the water chemistry; Second, using the grouting method as the sealant will probably provide a good annular seal, preventing the migration of fluids or contaminants along the casing; Third, it was felt that the other method involved more risk through unscrewing and reattaching the 4 in. casing, with the added possibility that the 8 in. casing may not be removable with the trip spear.

One concern about grouting the 8 in. casing was the possibility that a significant amount of grout might invade the surrounding formation and be lost. However, the formation material from the casing shoe to about the casing break consists of relatively fine grained sediments. Under such conditions the likelihood of losing a significant volume of the grout to the formation is reduced as compared to coarser grained sediments. The formation material from the break to the surface was much coarser grained, and therefore warranted using the designed bentonite sealant instead of the grout.

Action: Although the exact cause for the casing break is currently unknown, Mr. J. F. Keller will speak to the drillers about welding technique as a step toward reducing the possibility of recurrence.

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-W 10-15 Geologist BJORNSTAD, GILMORE, TEEL, AIRHART, GOODWIN, ETC. Page 1 of 2

Reviewed by [illegible] Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 10" temporary casing | | | | Muddy sand DB drilling |
| steel casing to 140' | | | | |
| | | | | Sandy gravel |
| | | | | Sand w/mud layers |
| | | | | Sandy gravel |
| | | | | Gravel |
| | | | | Muddy sandy gravel |
| | | | | Sandy gravel |
| | | | | Gravelly sand |
| | | | | silty fn sand, laminated |
| | | | | Muddy sand, calcareous dark brown |
| | | | | 96' switch to HT |
| | | | | Caliche - calcareous cemented muddy sand |

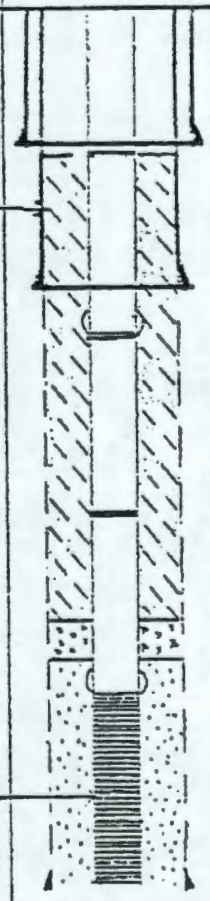
A-(300-125)(2/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-W10-15 Geologist BJORNSTAD, GILMORE, TEEL, MARTINEZ, GOODWIN, ETC. Page 2 of 2

Reviewed by D. L. McKenna Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| |  | | | Caliche |
| | | | | ∆ gravels @ 132' |
| 8" temporary carbon-steel casing to 222' | | | | Muddy |
| | | 150 | | Sandy |
| | | | | Gravel |
| | | 175 | | Sandy gravel |
| | | | | GRAVELLY SAND |
| | | | | SANDY GRAVEL |
| | | 200 | | |
| 21' OF 10 SLOT CONTINUOUS WRAP STAINLESS STEEL CHANNEL PACK SCREEN | | 220 | | |
| | | | | DRILL DEPTH = 221' |
| | | | | COMPLETION DEPTH = |

A-1800-188 (2/87)

WHC-MR-0209

NONCONFORMANCE REPORT

Page _____ Of _____

| (1A) Project, Location or WO | (1B) Title | (1C) NCR No. |
|---|---|---|
| W-017 | Groundwater Monitoring Wells | ~~[illegible]~~ PNL-89-071 |

(1D) Requirements
(1E) Nonconformance Description

(1D) In the event the Contractor's well does not meet the specifications requirements and the contractor is unable to pull back the casing, the government representative may direct that the well shall be abandoned at the Contractor's expense , or that w WHC alternative to completing the well be developed. The well abandonment must meet WHC requirments.

Contract Specification WHC-S-014, Section 8.4

(1E) During removal of 8" diameter casing @ well 299-W10-15 the 8" casing broke apart at weld leaving 81.5' of casing in the ground. The casing extends from 75.4' to 156.9' below land surface. Depth to water is measured @ 206.8' therefore bottom of 8" casing is 49.9' above the saturated zone. Currently 8-20 mesh bentonite crumbles are installed from' 139.1' to 193.3' below land surface. 10" diameter carbon steel extends from land surface to 142.5' below land.

(1J) Distribution

PNL
E.J. Jensen K6-96
G. V. Last K6-96

KEH
J. F. Keller Trlr 6/2E
T.L. Walton Trlr. 6/2E

WHC
C.E. Hodge R3/27
L.C. Swanson H4-56
W.R. Thackaberry S1-54

CEH/10/30/89

| Tag No. | (1G) Originator, Company and Date, | (1H) Supervisors Review |
|---|---|---|
| | , PNL, 10-30-89 | G.V. Last by phone 10/30/89 |

Disposition
- Accept As Is
- Conditional Accept
- Rework
- Repair
- Reject
- Other (Specify)

(2B) Instructions
(2C) Justification

The parted casing is well above the saturated zone and will not hamper the well completion or sealing effort. CEH - 10/30/89

Contractor shall use bentonite grout in the 10" casing to insure a proper seal.

Bentonite grout shall be placed to an approximate depth of 75' ± 5' using the tremie method. Granular bentonite will be placed from 75' to 20'.

Additional Doc Required
- As-Builts
- DFC No. _____
- Other Specify _____
- N/A

| Contr. Approval (Signature and Date) | (2F) A-E Approval (Signature and Date) | | (2G) Gov. Contr. Approval (Signature and Date) | (2H) Concurrence (Signature and Date) |
|---|---|---|---|---|
| 10/31/89 | Design C.E. Hodge 10/30/89 | Safety N/A | Engr C.E. Hodge 10/30/89 | AI (ASME) 10/31/89 |
| 10/31/89 | QA 10-30-89 | PE C.E. Hodge 10/30/89 | QA 10-30-89 | QCE N/A |

☒ Disposition Effected As Directed. CNCR Closed
☐ Other (Specify)

Originator or Representative _____ Date 11-7-89

List of Documents Attached

(4B) Documents Revised
By _____ Date _____

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 11-1-89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location 200 W | Project W-017 SST | |

Logged by S.P. Aichart SPA Date 11-1-89
Reviewed by V.L. Mathews Date 12-7-89
Measuring Equip. STAPE · L300-08 Procedure PNL-MA-567 DO-1 R-0

Drilling Contractor KEH
Driller CRAIG WAMSLEY
Rig/Equipment PETTIBONE CRANE / HYD JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Mixed & pumped the following: |
| | | | | | | Voklay Grout | 1 batch → | | | 2 50 lb bags Voklay Pure Gold |
| | | | | | | | | | | 25 gallons $H_2O$ · Density = 10.4 lbs/gal |
| | | | | | | " " | 1 batch → | | | 2 bags Voklay Pure Gold |
| | | | | | | | | | | 27 gallons $H_2O$ · Density = 10.2 lbs/gal |
| | | | | | | " " | 1 batch → | | | 2 bags Voklay Pure Gold |
| | | | | | | | | | | 27 gallons $H_2O$, Density = 10.2 lbs/gal |
| 1140 | | | | | | " " | 1 batch → | | | as above, Density = 10.3 lbs/gal |
| | | | | | | " " | 1 batch → | | | as above, Density = 10.2 lbs/gal |
| | | | | | | " " | 1 batch → | | | as above, Density = 10.2 lbs/gal |
| | | | | | | " " | | 76' | | D/slurry = 76' |
| | | | | | | " " | 1 batch → | | | as above, Density = 10.3 lbs/gal |
| | Carbon Steel | 10" | | | 141.8' | | | 68' | 73.8' | D/slurry = 68' |
| 1250 | | | | | | | | | | Removing Tremie pipe |
| 1350 | | | | | | | | | | Began pulling 10" casing |
| 1412 | " " | 10" | 123.1' | 6.2' | 116.9' | | | ~74' | 42.6' | D/slurry ~74' |
| | " " | 10" | 102' | 6.3' | 95.7' | | | ? | | No measurement taken - pipe too |
| | | | | | | | | | | goopy on inside |
| 1510 | " " | 10" | 85.3' | 10' | 75.3' | | | | | |
| | | | | | | | | | | Will measure D/slurry w/ tremie |
| | | | | | | | | | | pipe first thing in a.m. |

534

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 11-2-89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location 200 W | Project W-017 SST | |

Logged by S. P. AIRHART SPA Date 11-2-89
Reviewed by W. G. McKlam Date 12-7-89
Measuring Equip. S-TAPE: L300-08 Procedure PNL-MA-SLT DO-1 R-0

Drilling Contractor KEH
Driller C. WAMBLEY
Rig/Equipment PETTIBONE / HYD JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0745 | | | | | 75.3' | Volclay Slurry | | 76.1' | -.8' | 81.2' + 2.4' - 7.5' = 76.1' |
| | | | | | 75.3' | 8-20 Bentonite | 1 bag | | | Dumped in slowly - Noted |
| | | | | | | | | | | when taking O/B tape |
| | | | | | | | | | | went down between 8" & 10" |
| | | | | | | | | | | casing. decided to add more |
| | | | | | | | | | | slurry - first will pull pipe 3' |
| 0850 | Carbon Steel | 10" | | | 72.3' | | | | | |
| | | | | | | | | | | Put in tremie pipe |
| | | | | | | | | | | |
| | | | | | | | | | | Grout pump wouldn't start |
| | | | | | | | | | | Mechanic can't fix - shut down |

537

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 11-6-89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location 200 W | Project W-017 SST | |

Logged by S. D. Airhart SDA
Date 11-6-89
Reviewed by W. G. McKlean
Date 12-7-89
Measuring Equip. S-TAPE L300-08
Procedure PNL-MA-567 DO-1 R-0

Drilling Contractor KEH
Driller C. Wamsley
Rig/Equipment Pettibone Crane / Hyd. Jacks.

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1000 | | | | | | | | | | It was reported that transducer had bentonite on it when pulled from well after Friday's (11/3) slug test. Instructed KEH to bail well. Bailed ~ 5 gallons w/ 3" sand pump - No bentonite only brown silt & some sand |
| 1030-1230 | | | | | | | | | | Mixed 5 batches - each batch contained 2 bags Volclay Pure Gold, ~ 25-28 gallons $H_2O$, Density of mud from each batch was checked w/ mud balance. Densities included: 10.4, 10.2, 10.3, 10.3, 10.3 lbs/gal. |
| | Carbon steel | 10" | | | 72.3' | | | 72.3' | 0 | Pulled tremie pipe out of hole slurry showed 2' up on and ∴ D/slurry = 72.3' |
| | | | | | 71.5' | | | 72.3' | -.8' | Pulled 10" casing |
| | | | | | 71.5' | 8-20 bentonite | 2 bags | 70' | 1.5' | Pulled casing 1' - bentonite fell ∴ no bridge |
| | | | | | 71.5' | | 9 bags | 60' | 11.5' | |
| 1328 | | | 76.3' | 7.4' | 68.9' | | | 59.6' | 9.3' | |
| 1344 | | | | | 68.9' | | 15 bags | 33.7' | 35.2' | |

538

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 11-6-89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location 200 West | Project W-017 SST | |

Logged by S. P. Airhart SPA Date 11-6-89
Reviewed by D. S. McKellar Date 12-7-89
Measuring Equip. STAPE L300-08 Procedure PNL-MA-567 Div-1 R.0

Drilling Contractor KEH
Driller C. Wamsley
Rig/Equipment Pettibone Crane / Hyd. Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 10" | 56.5' | 6.5' | 50' | 8-20 bentonite | — | 44.5' | 5.5' | |
| | | | | | 50' | | 18 bags | 13.1' | 36.9' | |
| 1430 | | | 38.3' | 6.3' | 32' | | | 22.4' | 9.6' | |
| | | | | | 32' | | 6 bags | 11.8' | 20.2' | |
| 1440 | | | 29.1' | 9.2' | 19.9' | | | 18.1' | 1.8' | |
| 1450 | | | 29.1' | 10.3' | 18.8' | | | 19.6' | -.8' | Top of bentonite @ 19.6' |

539

WHC-MR-0209

9 1 1 2 0 5 0 0 5 1 2

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 11-7-89 | Sheet No. 1 of 1 |
|---|---|---|---|
| | Location 200W | Project W-017 SST | |

Logged by S. P. AIRHART SPAirhart — Date 11-7-89
Reviewed by V. C. McMahan — Date 12-7-89
Measuring Equip. 1-TAPE L300-08 — Procedure PNL-MA-567 PO-1, R.0

Drilling Contractor KEH
Driller C. Wamsley
Rig/Equipment Bethlehem Crane / Hyd. Jacks.

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0730 | | | | | | | | | | Waiting for cement |
| 0830 | | | | | | | | | | Cement arrives - |
| | | | | | | | | | | Mixing cement. Each batch |
| | | | | | | | | | | includes: 6-7 bags Portland I & II |
| | | | | | | | | | | Cement, 40 gals $H_2O$, 1 cup Al |
| | | | | | 18.8' | | | + 7' | 25.8' | powder. |
| 0914 | Carbon Steel | 10" | 19.5' | 10.4' | 9.1' | | | 9' | -1' | |
| | | | | | 9.1' | | | +6' | 15.1' | Mixed another batch |
| | | | | | | | | | | Pulled remaining 10" casing |
| | | | | | | | | | | out of hole |
| | | | | | | | | 2' | | |
| | | | | | | | | | | 4" SS casing, 2.3' stickup |
| | | | | | | | | | | D/W = 208.5' - 2.3' = 206.2' |
| | | | | | | | | | | E-tape # 10997 |
| 1025 | | | | | | | | | | D/B = 221.6' + 2.65' - 2.3' = 221.95' |
| | | | | | | | | | | ∴ 15.75' of water |

540

WHC-MR-0209

WELL 299-W10-16

Drilling at Well 299-W10-16 began September 7, 1989, and reached total depth on October 9, 1989. The well was drilled with a Bucyrus-Erie 22W to a depth of 219.04 ft below ground surface. The sediments encountered were primarily muddy sandy gravel and sandy gravel. Static water level during completion was 202.9 ft below ground surface.

Well 299-W10-16 was completed at a depth of 219.8 ft below ground surface. Final well materials include 21.00 ft of 4-in.-dia. 10-slot Johnson Division wrap channel pack stainless steel screen and 200.4 ft of 4-in.-dia. Johnson Division type 304 stainless steel casing. Factory-welded stainless steel casing centralizers are located at the top of the stainless steel screen and at approximately 40-ft intervals from the top of the screen to ground surface. The annular seal consisted of a 20-40 mesh Colorado silica sand pack along the screened interval to 2.85 ft above the top of the screen, 4.1 ft of Volclay bentonite pellets, 173.25 ft of 8-20 mesh granular bentonite crumbles, 16.0 ft of Portland cement grout, and an air-entrained concrete pad which extends 2.1 ft below ground surface. The temporary casing was backpulled with hydraulic casing jacks and a Galion crane during completion. Completion activities at Well 299-W10-16 were finished October 25, 1989.

The estimated volume of water added to the borehole during drilling was 155 gallons; water added to the borehole was obtained from the 200 East Area raw water supply and stored on site in steam cleaned plastic drums. The estimated volume of water removed during sand pack development was 90 gallons; sand pack development was performed with a pump rig and dart bailer. Final development was performed with a submersible pump on November 1, 1989, and a total of 341 gallons of water was removed from the borehole. Water and sediments removed during drilling and sand pack development were contained on site; sediments encountered below the water table were also contained. A slug injection and withdrawal test was performed on October 30, 1989, to assist with the characterization of the aquifer.

Field monitoring for contamination was performed by Kaiser Engineering Safety and Westinghouse Health Physics; no contamination was detected with field instrumentation. Soil samples were collected at 20-ft intervals or at significant lithologic changes and sent to U.S. Testing, Inc. for gross beta, anion, and total organic carbon analyses. Samples collected at 40-ft intervals were analyzed by PNL for XRF.

Installation of the HydroStar sampling pump was completed on October 25, 1989; this activity concluded well construction and installation.

| DAILY BOREHOLE LOG | Boring or Well Number 299-W10-16<br>Location 200-W | Date 9-7-89 Sheet No. 1 of 3<br>Project W-017 SST |
|---|---|---|

| | | |
|---|---|---|
| Logged by R.P. BLEGEN | Date 9-7-89 | Drilling Contractor KAISER |
| Reviewed by V.L. McKhan | Date 12-4-89 | Driller D GARCIA |
| Lith. Class. Scheme FOLK | Procedure DO-1, Rev. 0 | Rig/Method BE 22W #22-5211 / DRIVE BARREL (D) |

| Depth | Contamination Inst | Contamination Rea | Moisture | Samples Type | Samples No | Graph Log | Class | Lithologic Description Particle size dist., Sorting, Mineralogy, Roundness, Color, Reaction to HCl, etc. | Pene. Rate/ Blows | Time | Drilling Comments Bit, Casing, Water level, fluid added |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 0700 | DRILLER, SAFETY OFFICER |
| | | | | | | | | | | | ON SITE - RIG SERVICING |
| | | | | | | | | | | 0904 | START DRILLING - D |
| 5' | GR | BACK | SM | LITH | 2 | 0 | | SAND: 98% SAND, 2% MUD, TRACE VFP | | 0910 | DRIVE BARREL SAMPLE |
| | | | | MOIST | 1 | | | 10% MS, 70% FS, 18% VFS, 2% MUD WELL SORTED | | | |
| | | | | | | | | SAND: 25% BASALT; 75% QTZ + FELDS (DIFFICULT TO | | | |
| | | | | | | | | DISTINGUISH) - SR DRY COLOR: 10YR 5/2 GRAYISH | | | |
| | | | | | | 5 | | BROWN. NO RXN W/10% HCl. UNCONSOLIDATED. | | | |
| | | | | | | | | [SURFICIAL 1' CONTAINED SEVERAL SUBROUNDED COBBLES AND | | | |
| | | | | | | | | LARGE GRAVEL] | | | |
| 10' | GR | BKG | M | LITH | 2 | | | MUDDY SAND: TRACE GRAVEL, 80% SAND, 20% MUD | | 0935 | DRIVE BARREL SAMPLE |
| | OVA | <1 | | MOIST | 1 | | | (TRACE GRAVEL IS SR-R, MP), 25% VCS, 30% CS, 10% MS | | | |
| | | | | | | 10 | | 10% FS, 5% VFS, 20% MUD POORLY SORTED | | | |
| | | | | | | | | SAND: 40% BASALT, 30% QTZ & FELDS, 30% FRAGS SA-SR | | | |
| | | | | | | | | WET COLOR: 2.5Y 4/4 OLIVE BROWN. STRONG RXN W/10% HCl | | | |
| | | | | | | | | MODERATELY CONSOLIDATED - DIFFICULT TO DRIVE THROUGH | | | |
| | | | | | | | | Δ GRAIN SIZE, LOT OF MUD + SILT, Δ SORTING, | | | |
| | | | | | | | | PRESENCE OF $CaCO_3$, Δ CONSOLIDATION] | | 0950 | SETTING 10" SURFACE |
| | | | | | | | | [- A FEW LARGE PEBBLES AND COBBLES IN BUCKET] | | | CASING [12'5"] |
| | | | | | | | | | | 1002 | RESUME DRILLING - D |

542

9 1 1 2 0 5 0 0 5 1 5

| DAILY BOREHOLE LOG | Boring or Well Number 299-W10-16 | Date 9-7-89 | Sheet No. 2 of 3 |
|---|---|---|---|
| | Location 200-W (T-FARM) | Project W-017 SST | |

Logged by R.P. BLEGEN — Date 9-7-89
Reviewed by J.L. McGhan — Date 12-4-89
Lith. Class. Scheme FOLK — Procedure DO-1, Rev. 0

Drilling Contractor KAISER
Driller D. GARCIA
Rig/Method BE 22 W #22-5211 / DRIVE BARREL (O)

| Depth | Contamination Inst | Contamination Rea | Moisture | Samples Type | Samples No | Graph Log | Class | Lithologic Description (Particle size dist., Sorting, Mineralogy, Roundness, Color, Reaction to HCl, etc.) | Pene. Rate/ Blows | Time | Drilling Comments (Bit, Casing, Water level, fluid added) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15' | GR | BACK | | LITH | L | | | MUDDY SANDY GRAVEL: 60% GRAVEL, 57% SAND, 3% MUD | | 1032 | DRIVE BARREL SAMPLE |
| | OVA | L1 | | MOIST | 1 | | | 3% SC, 5% VCP, 8% CP, 12% MP, 10% FP, 22% VFP | | | DRILLER SAID MATERIAL IS |
| | | | | | | | | 5% VCS, 2% CS, 11% MS, 10% FS, 6% VFS, 5% MUD | | | EASY TO DRILL THROUGH, BUT |
| | | | | | | | | VERY POORLY SORTED. GRAVEL: 60% BASALT, 40% FELSIC, | | | THE BOREHOLE DOESN'T STAY |
| | | | | | | | | *QUARTZITE A-R. SAND: 50% BASALT, 25% QTZ + | | | OPEN. |
| | | | | | | | | FELDS. 25% FRAGS [DIFFICULT TO DISTINGUISH, PARTICLES COATED | | | |
| | | | | | | | | WITH SILT] A-R. WET COLOR (WETTED FINES): 5Y 3/2 DARK | | | |
| | | | | | | | | OLIVE GRAY, STRONG RXN W/10% HCl UNCONSOLIDATED. | | | |
| | | | | | | | | Δ TEXTURE, Δ SORTING, Δ COLOR, Δ MINERALOGY | | 1037 | WELDING CASING |
| | | | | | | | | Δ CONSOLIDATION] | | | ADDING 7'6" OF 10" CASING |
| | | | | | | | | | | | TOTAL 10" = 19'11" |
| | | | | | | | | | | 1113 | WELDING COMPLETE |
| | | | | | | | | | | 1115-1139 | DIFFICULTY DRILLING CASING |
| | | | | | | | | | | 1150 | SHUT DOWN FOR LUNCH |
| | | | | | | | | | | 1245 | BACK ON SITE |
| | | | | | | | | | | | RESUME DRILLING |

Ronald P. Blegen
9-7-89

548

WHC-MR-0209

| DAILY BOREHOLE LOG | Boring or Well Number 299-W10-16<br>Location 200W (T-FARM) | Date 9-7-89 Sheet No. 3 of 3<br>Project W-017 SST |
|---|---|---|

| | | |
|---|---|---|
| Logged by R.P. BIEGEN | Date 9-7-89 | Drilling Contractor KAISER |
| Reviewed by D.K. McClean | Date 12-4-89 | Driller D. GARCIA |
| Lith. Class. Scheme FOLK | Procedure DO-1, Rev. 0 | Rig/Method BE 22W #22-5211 / DRIVE BARREL (D) |

| Depth | Contamination Inst | Contamination Rea | Moisture | Samples Type | Samples No | Graph Log | Class | Lithologic Description (Particle size dist., Sorting, Mineralogy, Roundness, Color, Reaction to HCl, etc.) | Pene. Rate/ Blows | Time | Drilling Comments (Bit, Casing, Water level, fluid added) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MUCH OF THE 10" CASING ON SITE HAS CEMENT | | | |
| | | | | | | | | CAKED ON THE INNER WALL, DRILLER WILL USE | | | |
| | | | | | | | | HIS CLEAN STOCK UNTIL IT CAN BE DETERMINED | | | |
| | | | | | | | | IF THE REST OF THE CASING IS ACCEPTABLE | | | |
| 20' | GR | BACK | SM | LITH | 2 | | | MUDDY SANDY GRAVEL: 35% GRAVEL, 58% SAND, 7% MUD | | 1357 | DRIVE BARREL SAMPLE |
| | OVA | <1 | | MOIST | 1 | | | 1%SC, 1%VCP, 3%CP, 6%MP, 8%FP, 16%VFP, 5%VKS | | | SPECIAL SAMPLES REFERENCE |
| | | | | 500 ml A/G | 2 | | | 10%CS, 12%MS, 18%FS, 13%VFS, 7% MUD | | | CHAIN-OF-CUSTODY |
| | | | | 40 ml A/G | 1 | | | POORLY SORTED, GRAVEL: 70% BASALT, 8% QUARTZITE, | | | #090789 SST |
| | | | | | | | | 22% GRANITICS+SEDS A-SR. SAND: 60% BASALT, | | | |
| | | | | | | | | 15% QTZ & FELDS, 25% FRAGS. VA-SR | | | |
| | | | | | | | | WET COLOR: 5Y 4/3 OLIVE. STRONG RXN W/10% HCl | | | |
| | | | | | | | | UNCONSOLIDATED. [Δ TEXTURE (LESS GRAVEL), Δ COLOR] | | | |
| | | | | | | | | GRAVEL CONTENT INCREASING (BACK UP TO 50-60% @ 23') | | 1455 | |
| | | | | | | | | | | 1500 | WELDING CASING. |
| | | | | | | | | | | | ADDING 9'2" OF 10" CASING |
| | | | | | | | | | | | TOTAL 10" = 29'1" |
| | | | | | | | | | | 1515 | SHUT DOWN FOR DAY |

544

WHC-MR-0209

9 1 1 2 5 1 0 5 1 7

| DAILY BOREHOLE LOG | Boring or Well Number 299-W10-16 | Date 9-8-89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location 200 West Area | Project W-017 | |

Logged by M. Birch — Date 9-8-89
Reviewed by V.L. Smithson — Date 12-4-89
Lith. Class. Scheme Folk — Procedure DO-1

Drilling Contractor Kaiser
Driller Dave Garcia
Rig/Method BE 22-W / Drive Barrel

| Depth | Contamination Inst | Contamination Rea | Moisture | Samples Type | Samples No | Graph Log | Class | Lithologic Description (Particle size dist., Sorting, Mineralogy, Roundness, Color, Reaction to HCl, etc.) | Pene. Rate/ Blows | Time | Drilling Comments (Bit, Casing, Water level, fluid added) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Ended 9-7-89 at 23' | | 0800 | Drilling W-Drive |
| | | | | | | | | Total casing 29'1" | | | Barrel |
| | | | | | | | 20 | Borehole keeps falling in | | | |
| | | | | | | | | (Gravel), progress slow | | | |
| 20-25' | | | SM | Moist | 1 | | G. | GRAVEL 80% Gravel 10% Sand | | 0945 | D Sample |
| | | | | Lith | 2 | | | 10% mud, 30% SG, 10% VCP, 15% CP | | | |
| | | | | | | | 25 | 10% MP, 7% EP, 8% VFP, 6% VCS | | | |
| | | | | | | | | 2% CS, 2% VFS, 10% mud | | | |
| | | | | | | | | Very Poorly Sorted Gravels: 60% | | | |
| | | | | | | | | Basalt, 20% Quartzite, 20% Felsic, SA-R | | | |
| | | | | | | | | Sands 60% Basalt, 40% Felsic & seds | | | |
| | | | | | | | | A-SR Wet Color 5YR 4/1 Dark Grey | | | |
| | | | | | | | | Strong react w 10% HCL | | | |
| | | | | | | | | Unconsolidated | | | |
| | | | | | | | | | | 0850 | Driving Casing |
| | | | | | | | | | | 1000 | Drilling w-D Barrel |
| | | | | | | | | | | 1044 | Driving Casing |
| | | | | | | | | | | 1045 | Drilling w-D. Barrel |
| | | | | | | | | 28.5-29' Soil noticeably wetter, | | 1115 | |
| | | | | | | | | No detectable levels of contaminants | | | |
| | | | | | | | | Found (OVA/Geiger Counter) | | | |

Mark Bird 9-8-89

545

WHC-MR-0209

9 1 1 2 0 5 0 0 5 4 8

| DAILY BOREHOLE LOG | Boring or Well Number 299-W10-16<br>Location 200 West Area | Date 9-8-89 Sheet No. 2 of 2<br>Project W-017 |
|---|---|---|

| | | |
|---|---|---|
| Logged by M. Birch | Date 9-2-89 | Drilling Contractor Kaiser |
| Reviewed by [illegible] | Date 12-4-89 | Driller Dave Garcia |
| Lith. Class. Scheme Folk | Procedure DO-1 | Rig/Method BE 22-W |

| Depth | Contamination Inst | Contamination Rea | Moisture | Samples Type | Samples No | Graph Log | Class | Lithologic Description (Particle size dist., Sorting, Mineralogy, Roundness, Color, Reaction to HCl, etc.) | Pene. Rate/ Blows | Time | Drilling Comments (Bit, Casing, Water level, fluid added) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 1130 | Shut down for Lunch |
| | | | | | | | 25 | | | 1245 | Drilling w- D. Barrel |
| 25-30' | DVA (FID) | <1ppm | M | Moist | 1 | | MSG | MUDDY SANDY GRAVEL 60% Gravel 25% | | 1305 | D Sample |
| | | | | Lith | 2 | | | Sand 15% mud, 15% SG, 9% UCP | | | |
| | | | | | | | | 15% CP, 9% MP, 3% FP, 6% VFP, | | | |
| | | | | | | | 30 | 8% VCS, 12% CS, 4% MS, 1% FS, 2% VFS | | | |
| | | | | | | | | 15% mud, Very poorly sorted Gravel: 85% Basalt 10% | | | |
| | | | | | | | | Quartzite, 5% Other A-SR Sand: | | | |
| | | | | | | | | 70% Basalt, 30% Felsic & Seds SA-SR | | | |
| | | | | | | | | Wet Color 10YR 4/1 Dark Grey Strong react | | | |
| | | | | | | | | w- 10% HCL, Unconsolidated. Changes | | | |
| | | | | | | | | noted from 20-25': Increased Sand/mud Vs Gravel | | | |
| | | | | | | | | Added 8.6' of casing | | 1310 | Welding |
| | | | | | | | | Total Casing = 29'1" + 8'6" = 37'7" | | | |
| | | | | | | | | | | 1355 | Driving Casing |
| | | | | | | | | | | 1400 | Drilling w- D. Barrel |
| | | | | | | | | at ~ 35' having difficulty picking | | 1450 | |
| | | | | | | | | up sample | | 1455 | Driving casing |
| | | | | | | | | | | 1500 | Shut down for |
| | | | | | | | | Final depth for day ~35' | | | the day |
| | | | | | | | | Total Casing 37.7' | | 1505 | off site |

546

WHC-MR-0209

| DAILY BOREHOLE LOG | Boring or Well Number 299-W10-16 | Date 9-11-89 | Sheet No. 1 of 3 |
|---|---|---|---|
| | Location 200 West Area | Project W-017 SST | |

Logged by M. Birch — Date 9-11-89
Reviewed by J.L. Mathes — Date 12-4-89
Lith. Class. Scheme Folk — Procedure DO-1

Drilling Contractor Kaiser
Driller Gary Lydin
Rig/Method GE 22-W / Drive Barrel

| Depth | Contamination Inst | Contamination Rea | Moisture | Samples Type | Samples No | Graph Log | Class | Lithologic Description (Particle size dist., Sorting, Mineralogy, Roundness, Color, Reaction to HCl, etc.) | Pene. Rate/ Blows | Time | Drilling Comments (Bit, Casing, Water level, fluid added) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 0730 | On site. Drillers |
| | | | | | | | | | | | on site, waiting for |
| | | | | | | | | | | | RPT |
| | | | | | | | | Driller measuring tool string | | 0800 | RPT on site |
| | | | | | | | | | | 0805 | Drilling w/D. Barrel |
| | | | | | | | | | | 0819 | Dropped sample |
| | | | | | | | | | | 0820 | Drive Casing |
| | | | | | | | | | | 0822 | Drilling |
| | | | | | | | | | | 0835 | Dropped sample again |
| | | | | | | | 30 | Driller added ~2.5 gal water to | | 0840 | Drilling w/D. Barrel |
| | | | | | | | | help in retrieving sample | | | |
| 30-35 | OVA (FID) | <1ppm | N/A | Lith | 2 | | | GRAVEL 80% Gravel 10% Sand | | 0856 | Drive Barrel Sample |
| | | | | | | | | 10% Mud, 20% SG, 30% VCP, 12% CP | | | |
| | | | | | | | 35 | 8% MP, 5% FP, 5% VFP, 4% VCS, 2% | | | |
| | | | | | | | | CS, 2% MS, 2% FS-VFS, 10% Mud, Very poorly | | | |
| | | | | | | | | sorted Gravels: 60% Basalt, 20% Felsic, 20% Felsic | | | |
| | | | | | | | | & Frags SA-R Sands: 70% Basalt 30% Felsic & Frags SA-SR | | | |
| | | | | | | | | Wet color 10YR 3/2 Very dark greyish | | | |
| | | | | | | | | Brown Strong React w/ 10% HCL | | | |
| | | | | | | | | Unconsolidated Changes noted From | | | |
| | | | | | | | | 25-30' Increased gravel vs sand/mud | | | |

Mark Birch 9-11-89

547

WHC-MR-0209

9 1 1 2 0 5 0 0 5 5 0

| DAILY BOREHOLE LOG | Boring or Well Number 299-W10-16<br>Location 200 West area | Date 9-11-89 Sheet No. 2 of 3<br>Project W-017 SST |
|---|---|---|

| | | |
|---|---|---|
| Logged by M. Birch | Date 9-11-89 | Drilling Contractor Kaiser |
| Reviewed by R.L. McGhan | Date 12-4-89 | Driller G. Lydin |
| Lith. Class. Scheme Folk | Procedure DO-1 | Rig/Method BE 22-W/ Drive Barrel |

| Depth | Contamination Inst | Contamination Rea | Moisture | Samples Type | Samples No | Graph Log | Class | Lithologic Description (Particle size dist., Sorting, Mineralogy, Roundness, Color, Reaction to HCl, etc.) | Pene. Rate/ Blows | Time | Drilling Comments (Bit, Casing, Water level, fluid added) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 0900 | Driving casing |
| | | | | | | | | | | 0905 | Drilling w-D. Barrel |
| | | | | | | | 35 | 8'2" of 10" casing added; Total = 37'7" + 8'2" = 45'9" | | 0940 | Welding casing |
| | | | | | | | | | | 1052 | Drilling w-D. Barrel |
| 35-40' | DVA (FED) | Clean | N/A | Lith | 2 | | G. | GRAVEL 70% gravel, 10% Sand, | | 1107 | Drive Barrel Sample |
| | | | | 500ml Ale | 2 | | 40 | 10% Mud, 30% SC, 20% VCP, 20% CP | | | Special Sample |
| | | | | | | | | 10% MP, 5% FP, 5% VFP, 4% VCS, 2% | | | reference Chain-of- |
| | | | | | | | | CS, 2% MS, 2% FS-VFS, 10% mud | | | Custody #091189 SST |
| | | | | | | | | Very poorly sorted Gravel: | | | |
| | | | | | | | | 50% Basalt, 10% Felsic, 40% Quartzite | | | |
| | | | | | | | | & Sandstone SA-R Sands: 70% Basalt | | | |
| | | | | | | | | 30% Felsic, Qtzite & Frags SA-SR | | | |
| | | | | | | | | Wet Color 2.5Y 4/2 Dark greyish | | | |
| | | | | | | | | brown Strong react w- 10% HCL | | | |
| | | | | | | | | Unconsolidated Changes noted from | | | |
| | | | | | | | | 30-35': Slight color change, may | | | |
| | | | | | | | | be slight change in size & composition | | | |
| | | | | | | | | of gravels (Sample is still wet | | | |
| | | | | | | | | from water putin at 30-35') | | 1130 | Shut down for Lunch |
| | | | | | | | | | | 1300 | Drilling w-D. Barrel |

Michael R. 9-11-89

548

WHC-MR-0209

| DAILY BOREHOLE LOG | Boring or Well Number 299-W10-16 | Date 9-11-89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location 200 West area | Project W-017 SST | |

Logged by M. Birch Date 9-11-89
Reviewed by D.L. McGlam Date 12-4-89
Lith. Class. Scheme Folk Procedure DO-1

Drilling Contractor Kaiser
Driller L. Lydin
Rig/Method BE 22-W/ Drive Barrel

| Depth | Contamination Inst | Contamination Rea | Moisture | Samples Type | Samples No | Graph Log | Class | Lithologic Description: Particle size dist., Sorting, Mineralogy, Roundness, Color, Reaction to HCl, etc. | Pene. Rate/ Blows | Time | Drilling Comments: Bit, Casing, Water level, fluid added |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Drilling extremely slow (large boulder) | | 1330 | |
| | | | | | | | | at ~ 42' | | | |
| | | | | | | | | Driller added ~ 1 gal of water | | 1335 | |
| | | | | | | | | | | 1400 | Drilling Casing |
| | | | | | | | | | | 1402 | Drilling w/ Drive Barrel |
| | | | | | | | | No progress made in last hour | | 1435 | Switching to Hard tool |
| | | | | | | | | — Total depth at end of day 43' | | 1515 | Finished switching |
| | | | | | | | | — Total casing at end of day = 45'9" | | | tools & shut down |
| | | | | | | | | | | 1530 | off-site |

3½ Gallons of $H_2O$

Mark Birch 9-11-89



5419

| DRILL LOG | By M. Birch | Rig BE 22-W Hard Tool | Well Number 299-W10-16 | Computer Number | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-12-89 | | Depth 43 To 45 | | Subcontract No. |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 45'9" | 43 | H | | Beginning T. casing and Depth for the day | | |
| | | | | Driller will use hard tool until he gets past | | |
| | | | | the large Bolder that slowed progress 9-11-89 | | |
| | | | | | 0745 | Driller on site |
| | | | | | 0805 | RPT On Site |
| | | | | | 0810 | Driller changing train 8" |
| | | | | | | bit to 10" bit |
| | | | | added 4gal water | 0906 | Drilling w- Hard tool |
| | | | | | 0940 | added another 2gal water |
| | | | | detected something w-in borehole with OVA (FID) peaked at | 1015 | |
| | | | | 8ppm & subsided, Nothing detected outside of borehole. | | |
| | | | | Driller allowed to continue (SSO thinks | | |
| | | | | it may have been the joint lube (Crisco) | | |
| 54'2½" | | | | Added 8'5½" of casing | 1040 | Welding casing |
| | | | | | 1130 | Driving casing |
| | | | | | 1138 | added 2gal of water |
| | | | | | 1140 | Drilling w- Hard tool |
| | | | | | 1154 | added 2gal water |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by W.E. McKee 12-4-89

550

WHC-MR-0209

| DRILL LOG | By M. Birch | Rig BE 22-W Hard Tool | Well Number 299-W17-16 | Computer Number | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-12-89 | | Depth 45 To 50 | | Subcontract No. |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1200 | Shut down for Lunch |
| 54'2½" | 45' | H | N/A | GRAVEL (sample similar to D. Barrel sample | 1256 | Hard tool sample |
| | | | | @40') ~80% gravel, 10% Sand, 10% Mud | | (dart bailer) |
| | | | | Gravels: ~70% Basalt, 20% Quartzite & Seds, 10% Felsic | | -2 Lith samples taken |
| | | | | Sands: ~70% Basalt, 30% Quartzite & Seds, SA-SR | | |
| | | | | Wet color 5Y 4/2 Olive grey Strong react w. 10% HCL | | |
| | | | | Unconsolidated Changes noted from 40' sample: | | |
| | | | | slight color change. [difficult to determine | 1304 | Driving casing |
| | | | | texture (Hard tool sample)] | 1307 | Drilling |
| | | | | PH ~7 | 1320 | Bailed |
| | | | | | 1325 | added 2gal water |
| | | | | Drilling becoming easier, driller will | 1400 | |
| | | | | switch back to Drive Barrel after drilling a | | |
| | | | | few more feet. | | |
| 54'2½" | 50' | H | N/A | MUDDY SANDY GRAVEL (?) ~50% GRAVEL 40% | 1428 | Hard tool sample |
| | | | | Sand, 10% Mud Gravel: 70% Basalt, 15% Felsic, 15% | | |
| | | | | Quartzite & seds Sands: 60% Basalt, 40% Felsic & | | |
| | | | | Seds SA-SR Wet Color 2.5Y 5/2 grayish brown | | |

REMARKS:

PNL-MA-567 DO-1, REV.0 Reviewed by D.L. Walker 12-4-89 Mark Birch 9-12-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse

557

WHC-MR-0209

| DRILL LOG | By M. Birch | Rig B.E 22-W Hard Tool | Well Number 299-W10-16 | Computer Number | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-12-89 | | Depth 50 . To 50 | | Subcontract No. |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | (50' Log contin) Strong react w- 10% HCL, Unconsolidated | | |
| | | | | Changes noted from 45' sample; less gravel, | | |
| | | | | coarser sands, slight color change (appears | | |
| | | | | there are no longer any large cobbles) | | |
| 54' 2½" | 50 | H | | | | |
| | | | | Final depth for day 50' | 1500 | Shut down |
| | | | | Total casing 54' 2½" | 1515 | off site |
| | | | | Driller will finish cleaning hole out in the | | |
| | | | | morning and change back to drive barrel | | |

REMARKS:

Reviewed by V.L. McGhan 12-4-89

PNL-MA-567 DO-1, REV. 0 USED 12 GALLONS of $H_2O$

552

WHC-MR-0209

| DRILL LOG | By M. Birch | Rig BE 22-W Hard Tool/Drive Barrel | Well Number 299-W10-16 | Computer Number NA | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-17-89 | | Depth 50' To 55' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 54'2½" | 50' | | | Beginning depth and total casing for the day | | |
| | | | | | | |
| | | | | | 0730 | changing to Drive Barrel |
| | | | | | 0816 | Drilling w. D. Barrel |
| 54'2½" | 55' | D | M | SLIGHTLY GRAVELLY SAND 5% Gravel, 90% Sand | 0833 | D. Barrel Sample |
| | | | | 5% Mud; 2% FP, 3% VFP, 15% VFS, 15% CS, 40% MS | | |
| | | | | 20% FS, 5% VFS, 5% Mud Moderately sorted, Gravels: | | |
| | | | | 70% Basalt, 20% Quartzite & Seds, 10% Felsic SA-SR | | |
| | | | | Sands: 40% Basalt, 60% Felsic & Seds, Trace micas SA-SR | | |
| | | | | Wet Color 5YR 4/3 Light reddish brown Slight react w. 10% | | |
| | | | | HCL, non consolidated changes noted from 50': | | |
| | | | | Much more sand, less gravel, sands less basalt, color | | |
| | | | | change [2 Lith & 1 Moist. Samples taken] | | |
| | | | | Note: Moisture may be influenced by water added | 0835 | Drilling w. D. Barrel |
| | | | | during hard tooling (to 50') | 0840 | welding casing |
| 64'1" | | | | - Added 9'10½" of casing | 0950 | finished welding |
| | | | | | 0954 | Driving casing |
| | | | | | 0959 | Drilling w. D. Barrel |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by W. L. McGhan 12-4-89 Mark Birch 9-13-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

553

WHC-MR-0209

| DRILL LOG | By M. Birel | Rig BE 22-W Drive Barrel | Well Number 299-W10-16 | Computer Number NA | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-13-89 | | Depth 55' To 65' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 64'1" | 60' | D | VM | GRAVELLY MUDDY SAND 15% Gravel 70% Sand 15% | 1004 | D Barrel Sample |
| | | | | Mud, 5% MP, 5% FP, 5% VFP, 5% VCS, 15% CS, 35% MS | | Amber Glass Chain |
| | | | | 8% FS, 7% VFS, 15% mud Moderately to Poorly sorted | | of Custody # 091389 |
| | | | | Gravels: 70% Basalt, 20% Quartzite & Seds, 10% Felsic | | |
| | | | | SA-R, Sands: 40% Basalt, 60% Sed., Quartzite & Felsics, Trace | | |
| | | | | mica SA-SR Wet color 10YR 5/2 Greyish brown Strong | | |
| | | | | React w-10% HCl non consolidated Changes noted | | |
| | | | | from 55': more gravel and mud slight color change | | |
| | | | | [2 Lith Samples, 1 moist Sample, 2 500ml A/G samples] | | |
| | | | | Note: Increased moisture may still be due to | | |
| | | | | water added during hard tooling (to 50') | | |
| 64'1" | 65' | D | M | SLIGHTLY GRAVELLY SAND 5% Gravel 93% Sand 2% | 1104 | D. Barrel Sample |
| | | | | Mud 1% FP, 4% VFP, 15% VCS, 30% CS, 40% MS 8% PG | | |
| | | | | 5% VFS, 2% mud, Well to Moderately sorted Gravel: 70% | | |
| | | | | Basalt, 15% Quartzite & Seds (Including LS Frags, caliche?), 15% Felsic | | |
| | | | | SA-R Sands: 40% Basalt, 60% Quartzite, Felsic, Seds (Including LS Frags) | | |

REMARKS:

PNL-MA-567 DO-1 REV.0 Reviewed by D.L. Wathen 10-4-89 Mark Birel 9-13-89

557

WHC-MR-0209

9 1 1 2 0 5 0 0 5 5 7

| DRILL LOG | By M. Birch | Rig BE 22-W Drive Barrel | Well Number 299-W10-16 | Computer Number MA | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-13-89 | | Depth 65' To 70' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | (65' Description cont.) Trace Micas, SA-SR, wet color 5YR 3/2 dark reddish | | |
| | | | | brown slightly react w-10% HCl nonconsolidated changes | | |
| | | | | noted from 60': less gravel & mud, better sorted, | | |
| | | | | slight color change, more LS frags | | |
| | | | | | | |
| 73'0" | | | | Added 8'11" of Casing | 1110 | welding Casing |
| | | | | | 1200 | shut down for lunch |
| | | | | | 1330 | Back from lunch |
| | | | | | 1255 | Finished welding |
| | | | | | 1300 | Rig motor won't start, |
| | | | | | | called for service |
| | | | | | 1435 | Rig motor fixed - |
| | | | | | | Driving casing |
| | 70' | | M | | 1500 | D. Barrel Sample |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by D. L. Matthews 12-4-89 Mark Bird 9-15-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

WHC-MR-0209

355

| DRILL LOG | By: M. Birch | Rig: 13E 22-W | Well Number: 299-W1D-16 | Computer Number: NA | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 9-14-89 | Drive Barrel | Depth: 70' To 75' | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0715 | Driller on site |
| | | | | [Contin. Description of 70' Sample taken 9-13-89 (See 9-13-89 log)] | | Depth to Bottom = 69-2.6 = 66.4 |
| 73'0" | 70' | D | M | SAND, 3% Gravel, 95% Sand, 2% mud, 3% FP-VFP, | | |
| | | | | 10% VCS, 40% CS, 30% MS, 15% FS-VFS, 2% mud, Moderately | | |
| | | | | to Well sorted, Gravels: 70% Basalt, 20% Felsic, 10% Quartzite | | |
| | | | | Fragds, SA-SR. Sands: 40% Basalt, 60% Qtz, Felsic & Sed Frags | | |
| | | | | SA-SR, Wet color 7.5YR N5/ grey [material too coarse for accurate | | |
| | | | | color descrip. (mottled)] Slight react. w/ 10% HCL, none consolidation | | |
| | | | | Changes noted from 65': less gravel, less LS Frags & micas. | | |
| | | | | [Samples: 2 Lith, 1 moist] | 0720 | Drilling w/ D. Barrel/ |
| | | | | | | Cleaning borehole to 70' |
| | | | | | 0740 | Drilling w/ D. Barrel |
| 73'0" | 75' | D | M | SAND, 3% Gravel 95% Sand, 2% mud (Sample | 0758 | D. Barrel Sample |
| | | | | Very similar to 70' Sample) Exceptions noted: presence | | |
| | | | | of soft shale Frags or weathered Feldspars | | |
| 82'1½" | | | | - Added 9'1½" of casing. Total casing: 73' + 9'1½" = 82'1½" | 0805 | Welding casing |
| | | | | | 0850 | Finished welding |
| | | | | | 0900 | Driving casing |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. Madsen 12-4-89 Mark B. Kaminski

556

WHC-MR-0209

| DRILL LOG | By M. Birch | Rig BE 22-W Drive Barrel | Well Number 299-W10-16 | Computer Number NA | Project or Work Order No. W-817 SST |
|---|---|---|---|---|---|
| | Date 9-14-89 | | Depth 75' To 83' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0910 | Drilling w- D. Barrel |
| | | | | | 0925 | Driving Casing |
| 82'1½" | 80' | D | SM | SLIGHTLY GRAVELLY SAND 5% Gravel 93% Sand 2% | 0934 | D. Barrel/Sample |
| | | | | Mud, 1% FP 4% VFP, 20% VCS, 50% CS 15% MS | | Sample Custody # |
| | | | | 8% FS-VFS, 2% Mud, Moderately to well sorted, | | 091489 W10-16 SST |
| | | | | Gravels: 70% Basalt, 20% Shale Frag (Cemented w- $CaCO_3$), 10% | | |
| | | | | Quartzite & Seds, Trace Felsics SA-SR Sands: 40% Basalt | | |
| | | | | 60% Qtz, Beds & Felsic Frags, Trace Micas SA-SR Wet | | |
| | | | | Color 7.5 YR N5/ Grey [Material too coarse to determine | | |
| | | | | color accurately] Slight React w- 10% HCL, Unconsolidated | | |
| | | | | Changes noted from 75': Slight increase in gravel fraction, | | |
| | | | | sands slightly coarser overall, Gravels consist of larger | | |
| | | | | fraction of shale frag [Samples: 2 Lith, 1 moist, 2 500ml | | |
| | | | | A/G] | | |
| | | | | | | |
| | | | | | 0940 | Drilling w- D. Barrel |
| | | | | ~83' 2" lager of V. Fine silty sand | 0945 | |
| | | | | | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by V.L. McGehan 12-4-89 Mark Birch 9-14-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

557

| DRILL LOG | By M. Birch | Rig BE 22-W Drive Barrel | Well Number 299-W10-16 | Computer Number NA | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-14-89 | | Depth 83' To 90' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 82'1½" | 85' | D | M | MUDDY SAND (w-1-2cm lens of silt) 80% Sand, 20% mud | 0950 | |
| | | | | 80% FS-VFS, 20% mud Moderately to well sorted, Sands: | | |
| | | | | 80% Basalt, 20% Qtz, Seds & Feldic Grays, trace mica: SA-SR | | |
| | | | | wet color 10YR 5/3 Brown Strong react w-10% HCL | | |
| | | | | Consolidation none Changes from 80': Much finer | | |
| | | | | grained, more silt/clay, definite color change, greater | | |
| | | | | reaction w-HCL [Samples: 2 Lith, 1 moist] | | |
| | | | | | 0955 | Preparing to weld casing |
| 91'11½" | | | | Added 9'10" of casing. Total casing = 82'1½"+9'10" = 91'11½" | 1015 | Welding casing |
| | | | | | 1110 | Driving casing |
| | | | | | 1115 | Drilling w- D. Barrel |
| | | | | | 1155 | Shut down for lunch |
| | | | | | 1235 | Drilling w- D. Barrel |
| 91'11½" | 90' | D | M | SANDY MUD (Buried soil?), 40% Sand, 60% Mud, 40% FS- | 1313 | D. Barrel Sample |
| | | | | VFS 60% mud (mostly silt), Moderately to well sorted, Sands: 20% | | |
| | | | | basalt, 80% other (light colored), Trace micas, Wet color 10YR 5/3 | | |
| | | | | Pale brown, Strong react w-10% HCL, moderately consolidated | | |
| | | | | Changes from 85': more silt/clay, stronger react w-HCL | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by J. Maclean 12-4-89 Mark Birch 9-14-89

558

WHC-MR-0209

| DRILL LOG | By M. Birch | Rig BE 22-W Drive Barrel | Well Number 299-W10-16 | Computer Number NA | Project or Work Order No. W-217 SST |
|---|---|---|---|---|---|
| | Date 9-14-89 | | Depth 90' To 95' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | (90' descrip. contin) greater consolidation [Samples: 2 Lith, | | |
| | | | | 1 moist] - note: Contact between muddy sand & sandy mud | | |
| | | | | decreased ~ 87' | | |
| | | | | | | |
| 91'11½" | 95' | D | SM | SLIGHTY GRAVELLY MUDDY SAND (Calliche), 5% Gravel | 1410 | D. Barrel Sample |
| | | | | 75% Sand, 20% mud, 2% MP 3% FP-VFP, 10% VCS, 20% | | |
| | | | | CS, 45% MS-VFS, 20% mud (difficult to determine texture | | |
| | | | | due to variable cementation) Moderatly to poorly sorted | | |
| | | | | Gravels: ~ 70% Basalt, 30% Quartz & Sed Frags & other SA-R | | |
| | | | | Sands: 30% Basalt, 70% Other. SA-SR Wet color 10YR 7/3 Very | | |
| | | | | pale brown Very Strong react w/ 10% HCL none to well consolidated | | |
| | | | | changes from 90': greater $CaCO_3$ cementation (Variably | | |
| | | | | cemented), greater grain size distribution (Presence of | | |
| | | | | gravel), lighter color [Samples: 2 Lith, 1 moist] | | |
| | | | | | 1415 | welding casing |
| | | | | Final depth for the day = 95' | 1520 | Finished welding/Shut |
| | | | | Total casing for the day = 91'11½" + ___ (must get | | down |
| | | | | (from driller in the morning) 9'10" = 101'9½" | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by D. L. Washburn 12-4-89 Mark Birch 9-14-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

659

WHC-MR-0209

9 1 1 2 0 5 0 0 5 5 2

pg 1 of 1

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| M. Birch | BE 22-W | 299-W10-16 | N/A | W-P17 SST |
| Date: 9-15-89 | Drive Barrel | Depth: 95' To 95' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Beginning depth for the day 95' | | |
| | | | | Total casing at beginning of day = 91'11½" + 9'10" = 101'9½" | | |
| | | | | | 0815 | Rig motor has a |
| | | | | | | blown head gasket |
| | | | | | | called for service |
| | | | | | 0914 | mechanic on site |
| | | | | | | -won't be able to fix it |
| | | | | | | today |
| | | | | Driller & SSO remaining on site to move | 0930 | off site |
| | | | | rig off of hole for repair | | |
| | | | | Sent M. Birch home to stay within 50 hour work | 1000 | End of Day |
| | | | | week | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by W. L. Matthews 12-4-89 Mark Birch 9-15-89

560

WHC-MR-0209

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| M. Birch | BE 22-W | 299-W10-16 | N/A | W-017 SST |
| Date: 9-19-89 | Drive Barrel | Depth: 98' To 100' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | 09-18-89 New rig set over hole. Casing cut and | 0715 | Driller onsite - Rig |
| | | | | recutbed in order to set rig platform around casing. | | being serviced, flipped |
| | | | | Total casing now is: 91'11½" + 8'10" = 100'9½" | | Drive belt yesterday |
| | | | | | 0907 | Driving Casing |
| | | | | | 0907 | Drilling w- D. Barrel |
| 100'9½" | 100' | D | SM | GRAVELLY MUDDY SAND, 10% Gravel, 70% Sand, 20% | 0914 | D. Barrel Sample |
| | | | | mud, Trace CP, 10% FP-VFP, 10% VCS, 10% CS, 30% MS, 20% | | Chain of custody # |
| | | | | FS-VFS, 20% mud, Poorly sorted, Gravels: 70% Basalt, 30% | | 091989 W10-16 SST |
| | | | | other (gravels coated w- $CaCO_3$) SA-SR, Sands: 40% Basalt, 60% | | |
| | | | | other (light colored) (Sand grains often coated w- $CaCO_3$) SA-SR | | |
| | | | | Wet color 2.5Y 6/2 (Light brownish gray) strong react w- HCL | | |
| | | | | slightly consolidated Changes noted from 95' to longer | | |
| | | | | highly cemented (caliche ~99'), darker color | | |
| | | | | [Samples taken: 2 Lith, 1 moist, 2- 250ml A/b] | | |
| | ~102' | | | ~15ppm detected in spoils w- PID 11.7eV - <1ppm in breathing zone | 0930 | - Servicing rig |
| | | | | - not detected w- FID | 1130 | rig fixed |
| 108'5" | | | | Adding 7'7½" Total = 100'9½" + 7'7½" = 108'5" | 1140 | Preparing to weld casing |
| | | | | | 1200 | Lunch Break |

REMARKS:

PNL-MA-567 DO-1, Rev. 0 Reviewed by W. L. Mathews 12-4-89 Mark Birch 9-19-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

125

WHC-MR-0209

| DRILL LOG | By M. Birch | Rig BE 22-W | Well Number 299-W10-16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9-19-89 | Drive Barrel | Depth 100' To 105' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1235 | Return from Lunch |
| | | | | | | -Finish welding casing |
| | | | | | 1340 | Driving Casing |
| | | | | | 1346 | Drilling w- D. Barrel |
| | | | | | 1402 | Driving Casing |
| | | | | | 1405 | Drilling w- D. Barrel |
| 100'9½" | 105' | D | M | GRAVELLY MUDDY SAND, 20% Gravel 60% Sand, 20% | 1445 | D. Barrel Sample |
| | | | | Mud, 15% VCP-CP, 5% MP-VFP, 5% VCS, 10% CS, 35% MS- | | |
| | | | | FS, 10% VFS, 20% mud Moderately to poorly sorted, | | |
| | | | | Gravels: 40% Basalt, 60% Felsic & other (difficult to determine | | |
| | | | | coated w- $CaCO_3$) SA-R Sands: 50% Basalt, 50% other | | |
| | | | | (light color) SA-SR wet color 10YR 7/2 (Light grey) | | |
| | | | | strong React w-HCL Moderately consolidated, some | | |
| | | | | fine sandy clumps of highly consolidated material Changes | | |
| | | | | from 100' : greater percent gravels and larger size | | |
| | | | | lighter color of fines [Samples: 2 Lith, 1 moist] | | |
| | | | | - Depth at end of Day: 105' | 1515 | Driller off site |
| | | | | Total casing end of Day: 100'9½" | | |

REMARKS:

Reviewed by [illegible] 12-1-89

PNL-MA-567 DRILL REV. 0



WHC-MR-0209

9 1 1 2 0 5 0 0 5 6 5

| DRILL LOG | By B. Bjornstad | Rig BE-22W Gary Lydin-driller | Well Number 299-W10-16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/20/89 | | Depth 105 To 115 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 715 | Begin drive barrel drilling |
| 108'5" | 110' | D | M | Sandy MUD (fine sandy silt); 30% v. fn sand; 70% silt; appear to be layers several centimeters thick in alternating sandy silt and silty fn sand; individual layers are well sorted; wet color (10YR 5/6 - yellowish brown); v. strng rxn w/ HCl; moderately consolidated; abundant $CaCO_3$ stringers and nodules [Samples: 2 lith., 1 Moisture] | 758 | Sample - drive barrel |
| | | | | | 800 | No detectable contamination in well or of samples with OVA |
| | | | | | 835 | Prepare to weld casing |
| | | | | | | |
| 115'3½" | | | | Add on 6'10½" of 10" casing, Total = 108'5" + 6'10½" = 115' 3½" | 850 | Weld on casing |
| | | | | | 950 | Begin drilling with drive barrel |
| | 115' | D | M | Sandy MUD; same as previous sample but without $CaCO_3$ stringers and nodules; still v. strng rxn w/ HCl; breaks apart in plates meaning it's finely laminated [samples: 2 lith, 1 moisture] | 1015 | Sample - drive barrel |

REMARKS:

Bruce Bjornstad 9/20/89

PNL-MA-567 DO-1, REV. 0 Reviewed by V. L. Madsen 12-4-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

323

| DRILL LOG | By B.N. Bjornstad | Rig BF-22W Gary Lydin | Well Number 299-W10-16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/20/89 | | Depth 115 To 120 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 115'3½" | 120 | D | M | Sandy MUD (40% v fn sand, 60% silt), well | 1155 | Sample. Drive barrel |
| | | | | sorted; platy laminations; wet color (10YR 5/4- | 1200 | Break for lunch |
| | | | | yellowish brown); strong rxn to HCl; | | |
| | | | | moderately consolidated; no CaCO3 | | |
| | | | | stringers or nodules; slightly more | | |
| | | | | fine sand than previous sample. | | |
| | | | | [samples: 2 lith, 1 moist, 2 250-ml | 1230 | Prepare to weld |
| 123'11" | | | | A/6 - reference COC # 092089/W10-16] | | casing |
| | | | | Add on 9'7½" of 10" casing. Total casing = | 1300 | Weld on casing |
| | | | | 115'3½" + 9'7½" = 124'11" Driller has 123' | | |
| | | | | 11" total, which is 1 foot less. Apparently | | |
| | | | | when rigs were changed on 9/15 an extra | | |
| | | | | foot of casing was removed and not | | |
| | | | | recorded in log - therefore drillers casing | | |
| | | | | length is correct. | 1420 | Finish weld |
| | | | | | 1430 | Drive casing |
| | | | | | 1440 | Drill w/drive barrel |
| | | | | | 1515 | Quit for day |

REMARKS:

Bruce Bjornstad 9/20/89

Reviewed by D.L. McGhan 12-4-89

DNL-MA-507 Rev. 1 Rev. 0

WHC-MR-0209

504

9 1 1 2 0 5 0 0 5 6 7

13/2

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| T Gilmore | BE22W | 299 W10 16 | N/A | W-017 SST |
| Date: 9/21/89 | Gary Lydin Driller | Depth: 120 To 125' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | D/B 119' Caved in after driller drove casing yesterday | 700 | |
| 123' 11" of 10" | | | | Total Casing 123' 11" of 10" | | |
| | | | | Drilling w/ Drive Barrel | 720 | Drilling |
| | | | | Trouble getting sample up w/ Drive Barrel will | 920 | Switch to Hand Tool |
| | | | | Switch to Hand Tool; Food grade grease used on Tools | | |
| | | | | | 1030 | Drilling |
| | | | | | 1035 | Add 5 gal $H_2O$ |
| | | | | | 1040 | Add 2 gal $H_2O$ |
| | 125' | HT | N/A Wet | SLIGHTLY MUDDY SAND 3% Gravel 85% Sand, 12% Mud (undif silt/clay) | 1130 | Sample |
| | | | | 3% Fp, 15% VCS, 25% CS, 20% MS, 15% FS, 10% VFS, 12% Mud; | 1135 | Weld |
| | | | | Moderate-poor srt, 50% Mafic, 50% Felsic w/ | 12-1230 | Lunch |
| | | | | abnt wht-clr qtz, Subround-subang, Mud rxn | | |
| | | | | in HCl, No consol, 2.5Y 3/2 vdk gy brn (Salt & | | |
| | | | | pepper appearance of Sands) | | |
| 132' 11" of 10" | | | | Add 9'0" of 10" 132' 11" of 10" casing | | |
| | | | | | 1410 | Drilling |
| | | | | | 1450 | Add 10 gal $H_2O$ |

REMARKS:

T Gilmore 9/21/89

Reviewed by D.T. Markham 12-4-89

PNL-MA-567 DO-1, REV. 0

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

565

WHC-MR-0209

252

| DRILL LOG | By T Gilmore | Rig BE22W Gary Lydick Driller | Well Number 299 W10 16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 5/21/89 | | Depth 125' To 128' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 132' 11" | | | | Depth to Bottom 128' | 1530 | |
| | | | | Casing 132' 11" | 1530 | End of Day |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

Reviewed by V.L. Markham 12-4-89 J.K. Wood 9/21/89

PNL-MA-567 DO-1 REV. 0 USED 17 GALLONS OF H2O

906

WHC-MR-0209

| DRILL LOG | By S.S. Teel | Rig RE22W | Well Number 299-W10-16 | Computer Number | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/22/89 | Gary Lydin | Depth 128' To 130' | NA | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 132'11" of 10" | | | | | 0720 | Drilling w/H.T. |
| | | | | | 0745 | Driving Casing |
| | | | | | 0752 | Drilling |
| | | | | (Hit Gravel @ ≈ 129') | 0831 | Driving Casing |
| | | | | | 835 | Drilling |
| | 130' | H | Wet | SANDY GRAVEL (55% Gravel, 40% sand, 5% mud) | 0845 | |
| | | | | 18% MP, 25% FP, 12% VFP, 5% VCS, 8% CS, 8% MS, | | |
| | | | | 11% FS, 8% VFS, 5% mud. Poorly Sorted. (Gravel)- | | |
| | | | | 65% basalt, + other volcanics + mafics, 35% felsic incl. | | |
| | | | | qtzite. Rounded on orig. surfaces. (Sand)- 40% mafic / basalt, | | |
| | | | | 60% Si-rich. A-SR. Wet color: 2.5Y 4/2 (dark grayish brown) | | |
| | | | | Mod. reaction to 10% HCL. Unconsolidated. 2 geol. | | |
| | | | | (pt.) samples taken. | | |
| | | | | Vern McGhan, PNL, arrives to geophysically log the 10" | 0930 | |
| | | | | Casing; - waiting for WHC witness to arrive. | | |
| | | | | Logging w/ natural gamma probe. | 1030 | Begin Logging |
| | | | | Logging complete: 130.8' - 3.8' | 1115 | |

REMARKS:

S.S. Teel
9-22-89

PNL-MA-567 DO-1 Rev 0 Reviewed by V.L. McGhan 12-4-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing W.L.

567

WHC-MR-0209

| DRILL LOG | By S.S. Teel | Rig BE22W | Well Number 299-W10-16 | Computer Number NA | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/22/89 | Gary Lydin | Depth 131' To 131' | | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | 21' 3" (with drive shoe) | 1130 | Adding 8" Casing |
| | | | | + 21' 1/2" | | |
| | | | | 42' 3 1/2" | | |
| | | | + | 21 | | |
| | | | | 63' 3 1/2" | | |
| | | | | | 1500 | Stop welding for |
| | | | | | | 1/2 hr firewatch |

REMARKS:

S.S Teel
9-22-89

PNL-MA-567 D01 - Rev 0 Reviewed w/ W.L. Matthew 12-4-89

WHC-MR-0209

568

| DRILL LOG | By B.N. Bjornstad | Rig BE-22W Gary Lydia | Well Number 279-W10-16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/25/89 | | Depth 130 To 131 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 132'11" of 10" casing | | | | Total 8" casing = 63'3½" + 17'11" + 17'1" + 16'1½" + 17'8" + 11'6" = 143'7" | 0715 | Continue welding 8" casing |
| | | | | | 0748 | Add 17'11" of 8" casing |
| | | | | | 0930 | Add 17'1" of 8" casing |
| | | | | | 1030 | Add 16'1½" of 8" |
| | | | | | 1130 | Add 17'8" of 8" |
| 143'7" | | | | | 1300 | Add 11'6" of 8" |
| | | | | | 1440 | Drilling w/ drive barrel |
| 143'7" | | | | Depth at end of day ~131' | 1510 | Quit for day |

REMARKS:

PNL-MA-567 DO-1 Rev. 0

Reviewed by D.L. McGlam 12-4-89

Bruce Bjornstad 9/25/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

569

WHC-MR-0209

1 of 1

| DRILL LOG | By T Gilmore | Rig BE 22 W Gary Griffin | Well Number 299 W10 16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/26/89 | | Depth 131 To 143' | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 143'7" | | | | Rig Maintenance | 700 | |
| | | | | Depth to bottom 131' (estimated) | | Drilling |
| | | | | Casing total 143'7" | | Add 5gal $H_2O$ |
| | 135' | HT | N/A | Muddy SANDY GRAVEL 55% Gravel, 40% Sand, 5% Silt; | 1000 | Sample |
| | | | | 5% Mp, 25% Fp, 25% vFp, 15% vCS, 10% CS, 10% MS, 5% FS, | | Background Radiation |
| | | | | 5% Silt, poor Sort, 70% Mafic, 30% Felsic, Subround | | 0ppm OVA |
| | | | | when preserved, very fragmented size distrib not | | |
| | | | | representative, Wet N3 dk gy, No rxn in HCl, | | |
| | | | | No consol (2) Lith Smpls taken | | |
| | | | | | 12-1230 | Lunch |
| | | | | | 1400 | Sample |
| | 140' | HT | N/A | SANDY GRAVEL 50% Gravel, 45% Sand, 5% Silt, | | Add 10gal $H_2O$ |
| | | | | 5% Mp, 20% Fp, 25% vFp, 15% vCS, 15% CS, 10% MS, 5% FS, | | Background Radiation |
| | | | | 5% Silt, p Srt, 75% Mafic, 25% Felsic, Subang, | | 0ppm OVA |
| | | | | N3 dk gy, very fragmented, No rxn in HCl, No consol | | Add 5gal $H_2O$ |
| | | | | similar to previous (2) Lith smpls taken (2) 250ml | | |
| | | | | Amberglass COC # 092689 W10-16 | | |
| | | | | Depth to Bottom ~143' | 1530 | End of Day |

REMARKS: Drilled by $H_2O$ Added 20gal casing 143'7"

T Gilmore 9/26/89

PNL-MA-567 DO-1 REV. 0 D. Walker 1-1-89 Footage 12'

570

WHC-MR-0209

9 1 1 2 0 5 0 0 5 7 3

1 of 1

| DRILL LOG | By B N. Bjornstad / R. Bloyan | Rig BE 22W 422-14102 G. Lydin | Well Number 299-W10-16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/27/89 | | Depth 143 To 144 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 143'7" | 143' | H | | | 0705 | ON-SITE, SERVICING RIG |
| " | | | | | 0735 | ADDED 5 gal $H_2O$ |
| | | | | | 0737 | START DRILLING - HARD TOOL |
| | | | | | 0754 | TEMPORARY SHUT-DOWN SSO |
| | | | | | | HAD TO CHECK OTHER WELL. |
| | | | | | 0803 | RESUME DRILLING |
| | | | | | 0830 to 0923 | ADDED ~12 gal $H_2O$ |
| " | | | | | 0935 | SSO TO OTHER WELL-SITE |
| " | | | | | 0948 | DRILLER BUILDING UP HARD-TOOL BIT. |
| | | | | | 1200 | Break for lunch |
| 10'2½" | | | | | 1245 | Add on 10'2½" |
| 153'9½" | | | | | | of 8" casing |
| | | | | | 1424 | Drive casing |
| | | | | | 1429 | Drill w/ hard tool |
| | | | | Total depth @ end of day ~144' | 1515 | Quit for day |
| | | | | | | |
| | | | | | | |

REMARKS:

Bruce Bjornstad 9/27/89

PNL-MA-567, DO-1, Rev. 0 17 GALLONS of $H_2O$ Reviewed by W.R. McGhan 12-4-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

571

WHC-MR-0209

| DRILL LOG | By B.N. Bjornstad | Rig BE-22W Gary Lydin | Well Number 299-W10-16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 9/28/89 | | Depth 144 To 150 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 153'9½" | | | | | 0715 | Rig Maintenance |
| | | | | | 0725 | Drill w/hand tool |
| | 145' | H | N/A | Muddy Sandy GRAVEL (30% gravel, 60% sand, 10% | 905 | Sample-hand tool |
| | | | | mud); Gravel - 70% basalt, 10% quartzite, | 910 | Drill w/hand tool |
| | | | | 20% other; Sand = 50% mafic, 50% felsic; | | |
| | | | | sample is highly pulverized - mostly v. angular | 1200 | Quit for lunch |
| | | | | rock fragments; v. poorly sorted; wet | | |
| | | | | color = 2.5Y 3/0 (v. dark gray); slight rxn. to | | |
| | | | | HCl; unconsolidated | 1230 | Drill w/hand tool |
| | 150' | H | Wet | Muddy Sandy GRAVEL (60% gravel, 30% sand, | 1300 | Sample-hand tool |
| | | | | 10% mud); Gravel = 40% basalt, 20% | 1430 | Prepare to weld |
| | | | | quartzite, 40% other; Sand = 25% | | on 10'2" of 8" |
| +10'2" | | | | mafic, 75% felsic; pulverized - mostly | | casing |
| 163'11½" | | | | v. angular rock fragments; poorly | 1510 | Quit for day |
| | | | | sorted; wet color = 2.5Y 5/2 (grayish brn); | | |
| | | | | no rxn to HCl; unconsolidated; Δ from | | |
| | | | | previous sample: < basalt, > gravel, | | |
| | | | | lighter color. | | |

REMARKS:

Reviewed by V.L. McKinney 12-4-89

Bruce Bjornstad 9/28/89

HNF-PRO-567, DO-1, Rev. 0

572

WHC-MR-0209

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| AIRHART | BE 22W 14102 GARY LYDIN | 299-W10-16 | N/A | W-017 SST |
| Date: 9-29-89 | | Depth: 150' To 160' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0700-0750 | Welding |
| | | | | | 0750-0810 | Driller w/ H&S officer |
| | | | | | | @ other well |
| | | | | | 0810 | Drilling |
| | | | | | 1000 | H&S check w/ OVA |
| | | | | | | no detectables |
| | 155' | H | W | MUDDY SANDY GRAVEL: (Highly crushed/altered) - | 1135 | Took (2) pint lith |
| | | | | 50% gravel, 40% sand, 10% mud: sample is predom. | | samples. |
| | | | | FP-VFP w/ FS-VFS however is highly altered- | | |
| | | | | No preserved clasts - poorly sorted: (gravel) 30% | | |
| | | | | basalt 70% felsic (sand) 80% felsic 20% basalt - | | |
| | | | | wet color: olive gray 5Y4/2: Mod. rxn w/ 10% | | |
| | | | | HCl: consolidated | | |
| | | | | | 1200-1230 | lunch |
| | | | | | 1240 | Resumed drilling |
| | | | | | 1520 | Shut Down |
| | | | | | | Added ~ 50 gals |
| | | | | | | $H_2O$ to hole today |

REMARKS:

Reviewed by H. L. McLellan 12-4-89

PNL-MA-567 DO-1, REV. 0

50 GALLONS OF $H_2O$

S. P. Airhart 9.29.89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

578

| DRILL LOG | By B. N. Bjornstad | Rig BE-22W 14102 Gary Lydin | Well Number 299-W10-16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/2/89 | | Depth 160 To 165 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 0700 | Drilling w/hand tool |
| 163'11½" | 160' | H | W | Sandy GRAVEL (50% gravel, 40% sand, 10% | 0815 | Sample - 160' |
| | | | | mud); HIGHLY PULVERIZED; poorly sorted; | | |
| | | | | Gravel = 50% basalt, 30% g'zite, 20% other; | 0930 | Bail w/hand |
| | | | | Sand = 25% mafic, 75% felsic; wet | | bailer; prepare |
| | | | | color = 10YR 5/2 (grayish brown); no rxn | | to weld 9'8½" |
| 9'8½" | | | | to HCl; slow drilling - probably consolidated; | | of 8" casing |
| 173'8" | | | | [samples: 2 lith, 2 special chemical] | 1047 | Drilling |
| | | | | | 1200 | Break for lunch |
| | | | | | 1230 | Drilling |
| | 165 | H | W | Sandy GRAVEL (50% gravel, 40% sand, 10% mud); | 1325 | Sample - 165' |
| | | | | HIGHLY PULVERIZED; poorly sorted; Gravel = | 1330 | Drilling |
| | | | | 40% basalt, 30% g'zite, 30% other; Sand = | | |
| | | | | 20% basalt, 30% g'zite fragments, 50% | | |
| | | | | felsic; wet color = 2.5Y 4/2 (grayish brown); | | |
| | | | | dry color = 5Y 6/1 (gray); no rxn to HCl; | | |
| | | | | no obvious Δ from previous sample | | |
| | | | | [samples: 2 lith.] | | |

REMARKS:

Bruce Bjornstad 10/2/89

PNL-MA-567 DO-1 Rev. 0 Reviewed by V. L. Wakefield 12-4-89

574

WHC-MR-0209

9 1 1 2 0 5 0 0 5 7 7

| DRILL LOG | By B.N. Bjornstad | Rig BE-22W 14102 Gary Lydin | Well Number 299-W1C-16 | Computer Number N/A. | Project or Work Order No. W-017 SSST |
|---|---|---|---|---|---|
| | Date 10/2/89 | | Depth 165 To | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 173'8" | | | | | 1455 | Bail /Add 5 gal $H_2O$ |
| | | | | | 1520 | Bail |
| | | | | | 1525 | Quit for day |

REMARKS:

PNL-MA-567 DO-1 Rev. 0

Bruce Bjornstad 10/2/89

Reviewed by W.L. Malahan 12-4-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Wat

575

WHC-MR-0209

1 of 1

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| EJ Jensen | BE-22W 14102 (Gary Lydin) | 299-W10-16 | NA | W017 SST |
| Date: 10/3/89 | | Depth: . To | | Subcontract No.: NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1330 | DRILLER BACK ON SITE AFTER LUNCH AND SAFETY MEETING |
| | 170' | H | N/A | MUDDY SANDY GRAVEL: 50% GRAVEL, 38% SAND, 12% MUD. | | PRIOR TO LUNCH, ADDED 8'8½" |
| | | | | 10% MP, 25% FP, 15% VFP (HIGHLY PULVERIZED), TRACE VCS, CS, | | OF 8" DIA. CASING. |
| 182'4½" | | | | 15% MS, 15% FS, 8% VFS, 12% MUD POORLY SORTED. | | TOTAL 8" = 182'4½" |
| | | | | GRAVEL: 50% BASALT, 20% QUARTZITE, 30% GRANITICS, SEDS. & META | | |
| | | | | VA-SR SAND: 15% BASALT, 60% QTZ + FELDS, 25% MISC FRAGS | | |
| | | | | VA-SR. WET COLOR: 5Y 4/2 OLIVE GRAY, NO RXN 4/10% HCl. | | |
| | | | | SLOW DRILLING SUGGESTS SOME CONSOLIDATION, NO MAJOR CHANGES | | |
| | | | | FROM PREVIOUS SAMPLE. [2 PINT LITH. SAMPLES] | | |
| | | | | | | |
| | 175' | H | N/A | SANDY GRAVEL: 50% gravel, 45% sand, 5% mud, | 1500 | 2 pint jar samples |
| | | | | poor sorting, 75% Felsic, 25, mafic, | | |
| | | | | wet color 5Y 4/2 olive gray, slow drilling, | | |
| | | | | may be partially consolidated, no rxn in | | |
| | | | | 10% HCl. | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

+4½

Reviewed by W.C. Mathes 12-4-89

10/3/89

576

WHC-MR-0209

| DRILL LOG | By B.N. Bjornstad | Rig BE-22W 14102 Gary Lydin | Well Number 299-W10-16 | Computer Number N/A | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/4/89 | | Depth 175 To 185 | | Subcontract No. N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 182'4½" | 180' | H | W | Sandy GRAVEL (50% gravel, 40% sand, 10% mud) | 0700 | Drill w/ hard tool |
| | | | | Pulverized rock fragments - mostly; Gravel = | | Drillers says |
| | | | | 30% basalt, 40% ztzite, 30% other; | | gravels are drilling easier |
| | | | | Sand = 20% mafic, 80% felsic; wet color = | 0820 | Sample - 180' |
| | | | | 2.5Y5/2 (grayish brn); no rxn to HCl; | | Driller thinks he hit water |
| | | | | unconsolidated [samples: 2 lith, 2 special | | @ 179' - will barrel cuttings |
| | | | | chemical] | | until confirmed Perched zone? |
| +8'9" | | | | | 1050 | Weld on 8'9" of |
| 191'1½" | | | | | | 8" casing |
| | 185' | H | W | Sandy GRAVEL - same as 180' sample | 1150 | Drive casing |
| | | | | | 1155 | Break for lunch |
| | | | | | 1230 | Drilling |
| | | | | | 1400 | Sample - 185' |
| | | | | | 1515 | Quit for day |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS:

Bruce Bjornstad 10/4/89

PNL-MA-567 DO-1 Rev. 0 Reviewed by V.L. McGhan 12-4-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine Standing Water

577

WHC-MR-0209

| DRILL LOG | By BJ Jensen MA Chauness | Rig BE 22W 14102 Gary Lydin | Well Number 299-W10-16 | Computer Number | Project or Work Order No. W-017 SST |
|---|---|---|---|---|---|
| | Date 10/5/89 | | Depth 185 To | NA | Subcontract No. NA |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 191'1½" of 8" | | | | | | drilling |
| | 190' | H | — | MUDDY SANDY GRAVEL: 40% gravel, 50% sand, 10% mud. | 745 | 2 lith samples |
| | | | | 10% vc-cg, 15% mg, 10% fg, 5% vfg, 5% vcs, 20% cs, 12% ms, 6% fs, | | |
| | | | | 7% vfs, 10% mud. VPS. Gravel - 5% basalt, 50% qtz/qtzite, 45% | | |
| | | | | ign./metam. 1 piece caliche; Mostly broken, R-A. Sand - 10% | | |
| | | | | basalt, 70% qtz/qtzite, 20% rk frags. VA-SR. Wet color - 5Y5/3 | | |
| | | | | (olive). VSl. rxn to HCl. Moderately consolidated, not as hard | | |
| +6'7½" | | | | as ~20' before. Less basalt than before, sl. different color. | 800/850 | welding on 6'7½" of 8" |
| 197'9" | 195' | H | — | MUDDY SANDY GRAVEL: 50% gravel, 45% sand, 5% mud. 20% vc-cg, | 1020 | 2 lith samples |
| | | | | 15% mg, 10% fg, 5% vfg, 15% vcs, 15% cs, 10% ms, 3% fs, 2% vfs, 5% mud. | | |
| | | | | PS. Gravel - 35% basalt, 40% qtz/qtzite, 25% ign/metam., mostly | | |
| | | | | broken, VA-WR. Sand - 25% basalt, 65% qtz/qtzite, 10% rk frags. VA-SR. | 1130 | welding on |
| +8'4" | | | | No rxn to HCl. Mod. consol. More basalt than before. Wet | | |
| 206'1" | | | | color - 5Y5/3 (olive) | | |
| | 200' | H | — | SANDY GRAVEL, 45% gravel, 50% sand, 5% mud, | 1310 | 2 lith samples |
| | | | | Gravel is 40% Basaltic 60% felsic and others, | | 2 special sample |
| | | | | mod. consolidation, poor sorting, color 5Y 5/3 olive, | | Added 20 gals $H_2O$ |
| | | | | No rxn in 10% HCl | | today |

REMARKS:

Reviewed by V.L. McGhan 12-4-89

10/5/89

578

9 1 1 2 0 5 0 0 5 1 1

| DRILL LOG | By: S. M. Goodwin | Rig: BC 22 W #22-14102 | Well Number: 299-W10-16 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 10-6-89 | | Depth: 200' To 210' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | DRILLER IS GARY LYDIN | 0700 | DRILLING |
| | 205' | HT | WET | SANDY GRAVEL: 45% GRAVEL, 50% SAND, | 0805 | SAMPLED W/ DART |
| | | | | 5% MUD. 15% MP, 20% FP, 10% VFP, 10% | | BAILER; 2 PT. |
| | | | | VCS, 15% CS, 15% MS, 5% FS, 5% VFS; VPS. | | LITH. SAMPLES |
| | | | | GRAVEL: 30% MAFIC, 45% Q-ZITE, 25% GRANITE; | 0810 | PREPARING TO WELD |
| | | | | UNBROKEN = SR TO WR. SANDS ARE 25% MAFIC, | | |
| | | | | 75% FELSIC; SA. WET COLOR IS 2.5Y 4/4 | | |
| | | | | (OLIVE BROWN). MOD. CONSOLIDATION. NO RX. TO | | |
| | | | | 10% HCL. SIMILAR TO 200'. | | |
| ~~197'4"~~ | 206'1" | SPA 10/20/89 | | ADDED 8' 3" OF 8" CASING; TOTAL 8" = 206' | 0910 | FINISHED WELDING |
| + 8'3" | | | | | 0920 | DRILLING |
| = ~~206'0"~~ 214'4" | 210' | HT | WET | SANDY GRAVEL: 50% GRAVEL, 45% SAND, 5% | 1120 | SAMPLED W/ DART |
| | | | | MUD. SIMILAR P. SIZE DIST. AS 205' SAMPLE; | | BAILER; 2 PT. LITH. |
| | | | | VPS. GRAVELS ARE 25% MAFIC, 50% Q-ZITE, | | SAMPLES |
| | | | | 25% GRANITE; MOST A, SOME UNBROKEN R TO | 1125 | DRILLING |
| | | | | WR. SANDS: 70% MAFIC, 30% FELSIC; SA. | 1200-1230 | LUNCH |
| | | | | WET COLOR IS 2.5Y 4/4 (OLIVE BRN.) MOD. | | |
| | | | | CONSOLIDATION. NO RX. TO 10% HCL. SIMILAR TO 205' | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by D.H. Weekley 12-4-89 Mark Mark 10/6/89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine VF - Very Fine

579

WHC-MR-0209

| DRILL LOG | By: S. M. Goodwin | Rig: BE 22 w | Well Number: 299-W10-16 | Computer Number: N/A | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 6 Oct. 1989 | #22-14102 | Depth: 210' To 215' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | | 1245 | M. Lubrecht on site. Driller thinks might have |
| | | | | | | encountered water. Moist at |
| | | | | | | ~208' |
| ~~206'0"~~ | | | | | | Begin to add 8" casing |
| 214'4" + 8'8" | SPA | | | | 1353 | Casing added - remove cable. |
| 223'0" | 215 | HT | Wet | SANDY GRAVEL; 55% Gravel, 40% Sand, 5% mud | 1447 | Samples: (2), 1 pt. Lith. |
| | | | | 10% mP, 35% fP, 10% vfP, 15% vcS, 10% cS, 10% mS, 3% fS, | | |
| | | | | 2% vfS, 5% mud; Gravel: 80% felsic/20% mafic, VA-SR; | 1457 | Chris Olson stopped by |
| | | | | Sand: 80% felsic/20% mafic, SA-R; no = w/HCl, dusky | | site w/ Eric Jensen |
| | | | | Yellow brown, 10YR 5/6; Unconsolidated | | |
| | | | | | | |
| | | | | | 1512 | S. Goodwin on site. |
| | | | | | | Leave site. |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

REMARKS: Total of 25 gal. $H_2O$ added Today

PNL-MA-567 DO-1, REV. 0 Reviewed by D. L. McGhan 12-4-89 [illegible] 10/5/89

WHC-MR-0209

070

| DRILL LOG | By: MA Chamness | Rig: PE22W 14102 Gary Lydin | Well Number: 299-W10-16 | Computer Number: NA | Project or Work Order No.: W-017 SST |
|---|---|---|---|---|---|
| | Date: 10/9/89 | | Depth: 215' To TD@219.1' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| 223' of 8" | | | | Driller measured D/W at 204' bgs. | 715 | |
| | | | | | 720 | drilling |
| | | | | sediment is becoming sandier, will take a sample from the | 810 | |
| | | | | next bailer to determine particle-size for screen. At 218'6" | 820 | |
| | | | | looks similar to last sample, still gravel but w/ more sand | | |
| | | | | and mud. Won't take an extra sample after all. | | |
| | | | | | 900 | finished cleaning out hole |
| | | | | | 910 | straightness test. |
| | | | | | | Debbie ? is witness |
| | | | | DB measured at 217.44' and rising (4' stickup, 221.44' from | 920 | |
| | | | | top of casing). Heaving sand | | |
| | | | | Driller will attempt to get back down to depth and keep the | 930 | |
| | | | | hole clear of heaving sand. Will drive casing down a little | | |
| | | | | further. Bottom of casing at 220' bgs. | | |
| | | | | DB at 219.4' and rising slowly due to heaving sand. We'll | 1000 | |
| | | | | let it sit a few minutes & measure again. | | |
| | | | | DB at 219.6' + 2.44' = 222.04' - 3' stickup is 219.04' bgs. | 1030 | |
| | | | | | 1045 | tearing down rig |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by W.L. McGhan 12-4-89 MA Chamness

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse C - Coarse F - Fine

WHC-MR-0209

581

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-16 | Date 10/23/89 | Sheet No. 1 of 3 |
|---|---|---|---|
| | Location 200 WEST SINGLE SHELL TANKS | Project W-017 | |

Logged by S.M. GOODWIN Date 10/23/89
Reviewed by D.L. McElhaney Date 12-4-89
Measuring Equip. L300-04. S.TAPE 12176 Procedure DO.1, REV.0

Drilling Contractor KEH
Driller BRETT STODE
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0730 | CARBON STEEL | 8" | 223 | 1.6 | 221.2 | | | | | D/B = 218.62 ; D/W = 215.1 |
| | | | | | | | | | | BOTTOM OF 8" = 221.2 ; $H_2O$ |
| | | | | | | | | | | SHUT OFF - D/W SHOULD BE |
| | | | | | | | | | | ~204'. |
| 0800 | STAINLESS STEEL | 4" | 21.0 | (.) 10 SLOT CHANNEL PACK SCREEN | | | | | | SETTING 4" S.S. CASING & |
| | | 4" | 20.04 | (S) TYPE 304 SCH. 5 CASING | | | | | | SCREEN. |
| | | 4" | 20.04 | (S) " " | | " " " w/ CENTRALIZERS | | | | |
| | TOTAL CASING | | | | | | | | | |
| | & SCREEN = | | 221.4' | +3' CONSTRUCTION PIECE = | | | 224.4 | | | D/STAINLESS = 219.3' |
| | CENTRALIZERS | PLACED | ABOVE | SCREEN & | THEN EVERY | | 40' TO | SURFACE | | SCREEN = CONTINUOUS WRAP |
| | | | | | | | | | | CHANNEL PACK |
| | | | | | | | | | | CASING = TYPE 304, SCH. 5 |
| 0850 | CARBON STEEL | 8" | 227.8 | 6.6 | 221.2 | | | | | |
| 0920 | " | " | " | 8.45 | 219.35 | 20-40 SAND | 1/2 BAG | 215.25 | 4.1 | D/SAND = 215.25 |
| 0930 | " | " | " | 9.47 | 218.33 | " | | 216.23 | 2.1 | D/SAND = 216.23 |
| | " | " | 224.93 | 6.6 | 218.33 | " | 1/2 BAG | 213.2 | 5.13 | D/SAND = 213.2 |
| | " | | " | 7.4 | 217.53 | " | | 214.2 | 3.33 | D/SAND = 214.2 |
| 1000 | " | " | " | " | " | " | 1/2 BAG | 212.2 | 5.33 | D/SAND = 212.2 |
| | " | " | " | 9.2 | 215.73 | " | | 212.3 | 3.43 | D/SAND = 212.3 |
| | " | " | " | " | " | " | 1/2 BAG | 210.3 | 5.43 | D/SAND = 210.3 |
| | " | " | 220.65 | 6.6 | 214.05 | " | | 210.8 | 3.25 | D/SAND = 210.8 |
| | " | " | " | " | " | " | 1/2 BAG | 208.5 | 5.55 | D/SAND = 208.5 |

WHC-MR-0209

582

9 1 1 2 0 5 0 0 5 3 5

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-15 | Date 10/23/89 | Sheet No. 2 of 3 |
|---|---|---|---|
| | Location 200 West Single Shell Tanks | Project W-017 | |

Logged by S. M. Goodwin Date 10/23/89
Reviewed by D. L. McGhan Date 12-4-89
Measuring Equip. L300-04 Procedure DO-1, Rev. 0

Drilling Contractor KEH
Driller Brett. Strode
Rig/Equipment Crane + Jacks

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Carbon Steel | 8" | 220.65 | 7.8 | 212.85 | 20-40 Sand | | 208.5 | 4.35 | D/Sand = 208.5 |
| | " | | 220.65 | 9.25 | 211.4 | " | 1/2 Bag | 206.5 | 4.90 | D/Sand = 206.5 |
| | " | " | 215.15 | 6.65 | 208.5 | " | | 207.35 | 1.15 | D/Sand = 207.35 |
| 1105 | " | " | " | " | " | " | 1 Bag | 201.25 | 7.25 | D/Sand = 201.25 |
| | " | " | 212.1 | 6.3 | 205.8 | " | | 206.05 | -.25 | D/Sand = 206.05 |
| | " | " | " | " | " | " | 1 Bag | 195.7 | 10.1 | D/Sand = 195.7 |
| | " | " | " | 9.0 | 203.1 | " | | | | Open Hole; Tree gets stuck |
| | | | | | | | | | | on bottom of 8" |
| | " | " | " | " | " | " | 4 Bags | 204.2 | -1.1 | Still open hole; Large voids |
| | | | | | | | | | | in fm. |
| 1150 | " | " | " | " | " | " | 2 Bags | 200.8 | 2.3 | D/Sand = 200.8 |
| 1250 | " | " | " | " | " | " | 2 Bags | 193.95 | 9.05 | D/Sand = 193.95 |
| | " | " | 207.05 | 6.45 | 200.6 | " | | 197.15 | 5.85 | D/Sand = 197.15 |
| | " | " | " | " | " | " | 1/2 Bag | 194.6 | 6.0 | D/Sand = 194.6 |
| | | | | | | | | 197.85 | 1.85 | D/Sand = 197.85 |
| | " | " | " | " | " | " | 1 Bag | 193.95 | 5.75 | D/Sand = 193.95 |
| | " | " | 204.65 | 6.55 | 197.5 | " | | 195.15 | 2.35 | D/Sand = 195.15 |
| | " | " | " | 7.45 | 196.6 | " | | 196.25 | 0.35 | D/Sand = 196.25 |
| 1325 | " | " | " | " | " | " | 1/2 Bag | 194.0 | 2.6 | D/Sand = 194.0 |
| 1330 | | | | | | | | | | Bailing with pump rig to |
| | | | | | | | | | | settle sand pack; 3 1/2" |
| | | | | | | | | | | Dia. Dart Bailer w/ ~5 Gal. |
| | | | | | | | | | | Volume. |

583

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-16 | Date 10/23/89 | Sheet No. 3 of 3 |
|---|---|---|---|
| | Location 200 WEST SINGLE SHELL TANKS | Project W-017 | |

Logged by S.M. GOODWIN [signature] Date 10/23/89
Reviewed by [signature] Date 12-4-89
Measuring Equip. L300-04 Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller BRETT STROOS
Rig/Equipment CRANE of JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1400 | CARBON STEEL | 8" | 204.05 | 7.45 | 196.6 | 20-40 SAND | | | | BAILED 50 GALLONS of $H_2O$; |
| | | | | | | | | | | BOTTOM of 4" = 219.15' |
| | | | | | | | | | | D/SAND = 195.53 |
| 1405 | " | " | " | " | " | " | 1/4 BAG | | | ADDED SAND w/o PUTTING |
| | | | | | | | | | | CAP on 4"; SAND IN 4" |
| | | | | | | | | | | WILL BE BAILED w/ PUMP |
| | | | | | | | | | | RIG. |
| 1410 | " | " | " | " | " | " | | | | BAILING 4" CASING; BAILING |
| | | | | | | | | | | ALL $H_2O$ INTO 55 GALLON DRUMS. |
| 1500 | | | | | | | | | | FINISHED BAILING; BAILED |
| | | | | | | | | | | 40 GALLONS |
| | | | | | | | | | | D/INSIDE 4" = 219.05' |
| 1505 | | | | | " | " | | 196.4 | 0.2 | D/SAND = 196.4 |
| 1510 | | | | | | " | 1/4 BAG | 195.35 | 1.25 | D/SAND = 195.35' |
| 1515 | " | " | " | 8.0 | 196.05 | " | | | | LOST WEIGHT DOWN HOLE; NO |
| | | | | | | | | | | D/BOTTOM |

584

WHC-MR-0209

9 1 1 2 0 5 0 0 5 9 7

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-16 | Date 10/24/89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location 200 WEST SINGLE SHELL TANKS | Project W-017 | |

Logged by S. M. GOODWIN [signature] Date 10/24/89
Reviewed by [signature] Date 12-4-89
Measuring Equip. LS,DD-13 Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller BRETT STROOD
Rig/Equipment CRANE + JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0730 | CARBON STEEL | 8" | 204.05 | 8.0 | 196.05 | 20-40 SAND | | 196.45 | -.4 | D/SAND = 196.45 |
| | " | " | " | " | " | " | 1/4 BAG | 194.45 | 1.6 | D/SAND = 194.45 |
| 0815 | " | " | " | 8.9 | 195.15 | " | | 196.55 | -1.4 | D/SAND = 196.55 |
| | " | " | " | " | " | " | 1/4 BAG | 194.15 | 1.0 | D/SAND = 194.15 |
| | " | " | " | 9.3 | 195.25 | " | | 194.55 | 0.7 | D/SAND = 194.55 |
| | " | " | " | 9.5 | 194.55 | " | | 195.45 | -0.9 | D/SAND = 195.45 FINAL D/SAND |
| 0830 | " | " | " | " | " | 3/8" PELLETS | 2 BUCKETS | 188.85 | 5.7 | D/PELLETS = 188.85 |
| | | | | | | | | | | (PELLETS = VOLCLAY TABLETS, |
| | | | | | | | | | | 5 GALLON BUCKET = 50 LBS) |
| 0835 | " | " | 199.95 | 6.75 | 193.2 | " | | 189.3 | 3.9 | D/PELLETS = 189.3 |
| 0840 | " | " | 199.95 | 8.2 | 191.75 | " | | 191.35 | 0.4 | D/PELLETS = 191.35 FINAL D/PELLETS |
| 0850 | " | " | " | " | " | 8-20 CRUMBLES | 5 BAGS | 166.25 | 25.5 | D/CRUMBLES = 166.25 ; CRUMBLES |
| | | | | | | | | | | = 50 LB. ACC BENTONITE CRUMBLES |
| 0900 | " | " | " | " | " | " | 6 BAGS | 147.55 | 44.2 | D/CRUMBLES = 147.55 |
| 0910 | " | " | 182.3 | 6.55 | 175.75 | " | | 172.40 | 3.35 | D/CRUMBLES = 172.40 |
| 0925 | | " | " | " | " | " | 12 BAGS | 136.9 | 38.85 | D/CRUMBLES = 136.90 |
| 0930 | " | " | " | " | " | " | 4 BAGS | 125.25 | 50.5 | D/CRUMBLES = 125.25 |
| 1115 | " | " | 163.9 | 6.7 | 157.2 | " | | 146.75 | 10.45 | D/CRUMBLES = 146.75 |
| 1123 | " | " | " | " | " | " | 15 BAGS | 101.05 | 55.55 | D/CRUMBLES = 101.65 |
| 1140 | " | " | 143.6 | 6.65 | 136.95 | " | | 138.3 | -1.35 | D/CRUMBLES = 138.3 |
| 1145 | " | " | " | " | " | " | 6 BAGS | 130.2 | 6.95 | D/CRUMBLES = 130.2 |
| 1147 | " | " | " | " | " | " | 7 BAGS | 109.5 | 27.8 | D/CRUMBLES = 109.15 |

585

WHC-MR-0209

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-16 | Date 10/24/89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location 200 WEST SINGLE SHELL TANKS | Project W-017 | |

Logged by S M. GOODWIN Date 10/24/89
Reviewed by D.K. McFlan Date 12-4-89
Measuring Equip. L300-13 Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller BRETT STRODE
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1150 | CARBON STEEL | 10" | 132.9 | 1.05 | 131.85 | 8-20 CRUMBLES | | 124.7 | 7.15 | PULLING 8" FREE FROM 10" CASING |
| 1430 | " | " | 138.9 | 7.05 | 131.85 | " | | " | " | D/CRUMBLES = 124.7 |
| 1440 | " | | " | " | " | " | 20 BAGS | 95.25 | 36.6 | D/CRUMBLES = 95.25 |
| 1500 | " | | 123.9 | 6.95 | 116.95 | " | | 102.0 | 14.95 | D/CRUMBLES = 102.0 |
| | | | | | | | | | | SHUT DOWN; FIRE WATCH |

9 1 1 2 0 5 0 0 5 9 9

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-16 | Date 10/25/89 | Sheet No. 1 of 2 |
|---|---|---|---|
| | Location 200 WEST SINGLE SHELL TANKS | Project W-017 | |

Logged by S.M. Goodwin [signature] Date 10/25/89
Reviewed by [signature] Date 12-4-89
Measuring Equip. L300-13 Procedure DO-1, REV. 0

Drilling Contractor KEH
Driller BRETT. STRADE
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 0715 | CARBON STEEL | 10" | 123.9 | 6.95 | 116.95 | 8-20 BENTONITE | | 102.0 | 14.95 | D/CRUMBLES = 102.0 |
| 0725 | " | " | " | " | " | " | 15 BAGS | 79.6 | 37.15 | D/CRUMBLES = 79.8 |
| 0730 | " | " | " | " | " | " | 5 BAGS | 72.05 | 44.9 | D/CRUMBLES = 72.05 |
| 0750 | " | " | 108.4 | 6.85 | 101.55 | " | | 77.2 | 24.35 | D/CRUMBLES = 77.2 |
| 0800 | " | " | " | " | " | " | 12 BAGS | 58.9 | 42.65 | D/CRUMBLES = 55.9 |
| 0815 | " | " | 92 | 6.9 | 85.1 | " | | 63.45 | 21.65 | D/CRUMBLES = 63.45 |
| 0820 | " | " | " | " | " | " | 10 BAGS | 47.95 | 37.15 | D/CRUMBLES = 47.95 |
| 0825 | " | " | " | " | " | " | 5 BAGS | 39.9 | 45.2 | D/CRUMBLES = 39.9 |
| 0835 | " | " | 73.0 | 7.0 | 66.0 | " | | 46.15 | 19.85 | D/CRUMBLES = 46.15 |
| 0840 | " | " | " | " | " | " | 15 BAGS | 22.25 | 43.75 | D/CRUMBLES = 22.25 |
| 0950 | " | " | 54.2 | 7.15 | 47.05 | " | | 32.9 | 14.15 | D/CRUMBLES = 32.90 |
| 0955 | " | " | " | " | " | " | 10 BAGS | 16.7 | 30.35 | D/CRUMBLES = 16.7 |
| 1000 | " | " | " | " | " | " | 5 BAGS | 8.8 | 39.25 | D/CRUMBLES = 8.8 |
| 1015 | " | " | 37.6 | 6.85 | 30.75 | " | | 14.3 | 16.45 | D/CRUMBLES = 14.30 |
| 1025 | " | " | 29.1 | 7.1 | 22.0 | " | | 16.25 | 5.75 | D/CRUMBLES = 16.25 |
| 1030 | " | " | " | 8.9 | 20.2 | " | | 17.05 | 2.7 | D/CRUMBLES = 17.05 |
| 1032 | " | " | " | 9.8 | 19.3 | " | | 17.35 | 1.95 | D/CRUMBLES = 17.35 |
| 1035 | " | " | " | 10.75 | 18.35 | " | | 18.1 | 0.25 | D/CRUMBLES = 18.1 FINAL D/CRUMBLES |
| 1110 | " | " | 25.25 | 6.9 | " | CEMENT GROUT | 1 BATCH* | 1.9 | 16.45 | POURING CEMENT GROUT; |
| | | | | | | | | | | *1 BATCH = 6 94 LB. SACKS OF |
| | | | | | | | | | | PORTLAND CEMENT, 35 GALLONS OF |
| | | | | | | | | | | $H_2O$, & 1% ALUM. POWDER. |

WHC-MR-0209

587

9 1 1 2 0 5 0 0 5 9 0

| DAILY BOREHOLE/WELL COMPLETION LOG | Boring or Well Number 299-W10-16 | Date 10/25/89 | Sheet No. 2 of 2 |
|---|---|---|---|
| | Location 200 WEST SST | Project W-017 | |

Logged by S. M. Goodwin [signature] Date 10/25/89
Reviewed by D. L. Markham Date 12-4-89
Measuring Equip. L200-13 E-TAPE 10998 Procedure DO-1, REV. 0

Drilling Contractor ICH
Driller BRETT STRODE
Rig/Equipment CRANE & JACKS

| Time | Casing/Screen Type | Dia | Length | Stickup | Depth | Annular Fill Type | Quantity | Depth | Over lap | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| 1130 | CARBON STEEL | 10" | 25.25 | 6.9 | 18.35 | CEMENT GROUT | 1/2 BATCH" | +6.25 | 24.6 | D/GROUT = +6.25' |
| 1140 | " | " | 12.4 | 6.9 | 5.5 | " | | 7.75 | -2.25 | D/GROUT = 7.75 |
| 1145 | " | " | " | " | " | " | 1/2 BATCH" | 7.0 | -1.5 | D/GROUT = 7.0 ; LARGE VOIDS IN FM. |
| 1200 | " | " | " | " | " | " | 1 BATCH" | .3 | 7.2 | D/GROUT = 0.3 |
| 1210 | | | | | | " | | 2.1 | | D/GROUT = 2.1 ; 10" CASING REMOVED FROM HOLE. |
| | | | | | | | | | | BOTTOM OF 4" = 219.1' WITH STEEL TAPE; TOTAL 4" = 221.4' - 1.6' STICKUP = 219.8' |
| | | | | | | | | | | D/WATER = 202.9 ; 16.2' OF $H_2O$ EXPOSED TO SCREEN. |

585

WHC-MR-0209

# GEOPHYSICAL LOGS

All logging was performed by V. L. McGhan with an MLS (Gearhart)[a], Analog, Natural Gamma Ray Probe, Serial number CG27A97. This instrument was calibrated in January of 1988, according to WHC-EP-0246. J. I. Gould witnessed and verified all logging.

Copies of the logs with their corresponding well numbers and interval printed at the top follow.

(a) Gearhart Industries, Inc., Fort Worth, Texas.

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E24-19 AREA 200 East

DATE 8-17-89

LOG RUN First Casing LOG TYPE Analog - Nat. Gamma

SURVEY COORDINATES -NA- N -NA- E

ELEVATION DATUM Top of 10" Casing ELEVATION -NA-

LOG. MEASURED FROM -3.7' Below Ground Surface

LOCATION DESCRIPTION Outside South Perimeter of 241-A Tank Farm

GROUND SURFACE ELEVATION NA

SURFACE TEMPERATURE 20.5°C WEATHER Clear, Cool

## BOREHOLE INFORMATION

| | | | |
|---|---|---|---|
| DRILLER | KEH MEL THORESEN | | |
| DRILL RIG TYPE | Cable Tool | BIT TYPE/DIAMETER | 10" |
| BOREHOLE DIAMETER(S)/DEPTH | 10" to 150' | | |
| DEPTH DRILLER | 151 Ft | DEPTH LOGGER | -150.5' |
| LIQUID LEVEL | -NA- | LIQUID APPEARANCE | Dry Hole |
| TEMPERATURE | -NA- | | |

## CASING RECORD

| | | | |
|---|---|---|---|
| TYPE | 10" Sch 40 Steel | INTERVAL | Surface to 150 |
| TYPE | | INTERVAL | |
| TYPE | | INTERVAL | |
| TYPE | | INTERVAL | |

WELL SCREEN INTERVAL: -NA-

COMMENTS: Probe is not sidewalled, since hole is dry. Depth Return Error less than 0.5 inch.

9 1 1 2 0 5 0 0 5 2 3

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) VL McGHAN

EQUIPMENT BRAND MLS (GEARHART) EQUIPMENT TYPE ANALOG

TOOL TYPE NaI (NAT GAMMA) BASE CALIBRATION DATE 12-88

SERIAL NO. CG 27 A97 CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ e ll $\frac{PPM}{cps}$

DEAD TIME 7.4 μSec WARM UP TIME >15 Min

# LOGGING INFORMATION

LOG INTERVAL FROM -150.5' TO -3.7'

RERUN(S) -150.5 - TO -120'

PRE SURVEY CALIBRATION: POSITION 1 ~74%, 286 cll P/m FS = 5000 cps POSITION 2 ~95%, 51 cll P/m FS = 1000 cps BACKGROUND ~69%, 350 c/s FS=500

LOGGING SPEED 5 FT/MIN

START TIME 8:10 AM COMPLETION TIME 9:10 AM

CHART SPEED(S), FT/IN. 10 FT/IN

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 cps/IN, 500 cps F.S.

RERUN SCALES, CPS/IN. 50 cps/IN

TIME CONSTANT(S) 1 Sec.

POST SURVEY CALIBRATION: POSITION 1 ~75%, 290 cll P/m FS = 5000 POSITION 2 ~21%, 60 cll P/m FS = 5000 BACKGROUND ~70%, 345 c/s FS=500

PERCENT CHANGE: POSITION 1 ~1% 1.4% POSITION 2 ~11% 15%

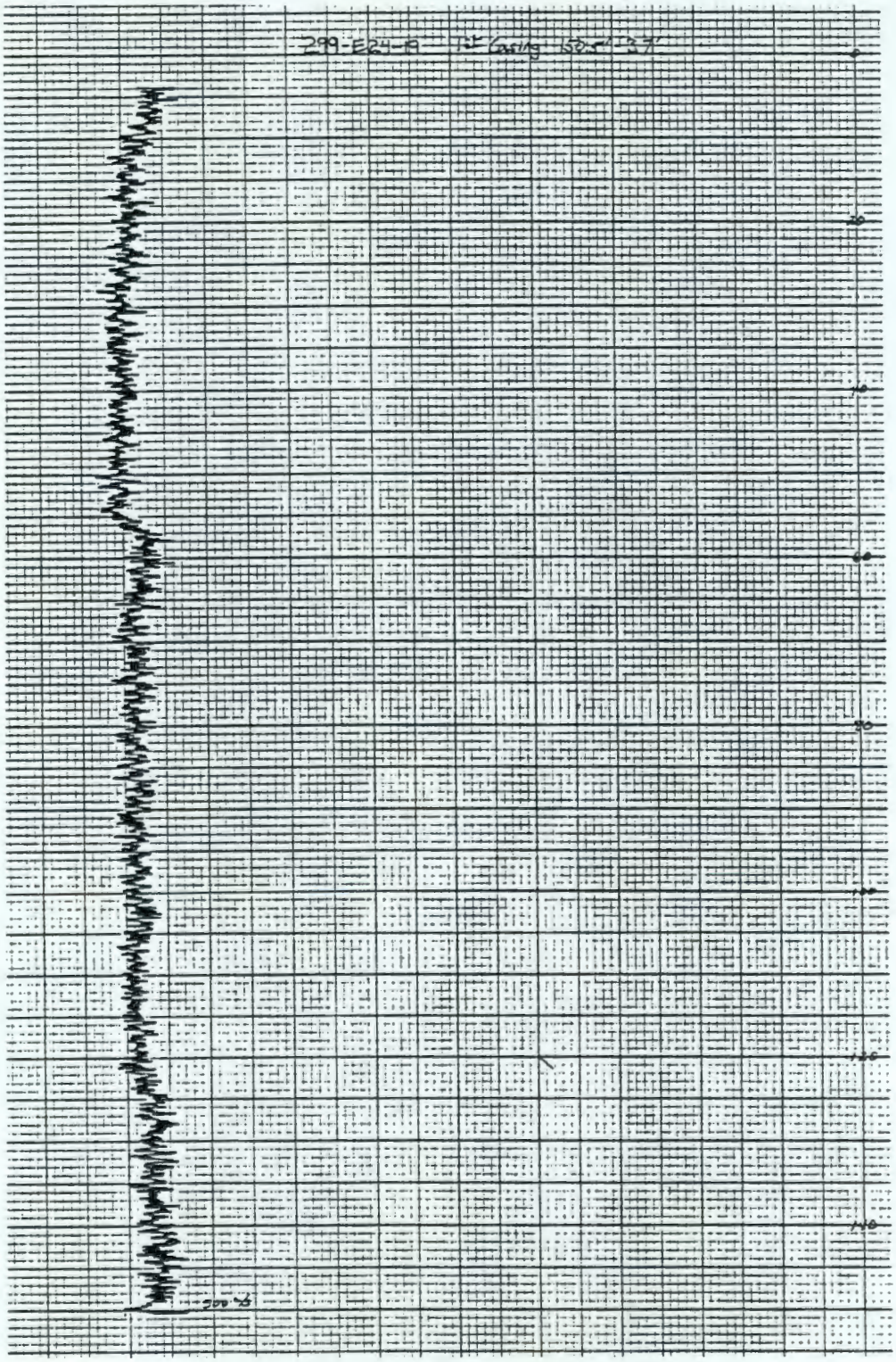
COMMENTS: High BKgd, due to "Shine" from A-Tank Farm

Change in Pos 2 Reading is indication, log should be used as Indicator Only

WITNESSED AND VERIFIED BY: J. S. Jones 8/17/89

591

WHC-MR-0209




9 1 1 2 0 5 0 0 5 7 4

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E24-19 AREA 200-EAST
DATE 8-24-89
LOG RUN #2 LOG TYPE NAT. GAMMA
SURVEY COORDINATES N/A N/A E
ELEVATION DATUM Top of 8" CASING ELEVATION N/A
LOG MEASURED FROM GROUND SURFACE
LOCATION DESCRIPTION South Side 241 A TANK FARM
GROUND SURFACE ELEVATION N/A
SURFACE TEMPERATURE 26.6°C WEATHER Cloudy-WARM

## BOREHOLE INFORMATION

| | |
|---|---|
| DRILLER MEL THORESON KEH | |
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER 8" |
| BOREHOLE DIAMETER(S)/DEPTH 10"-151'/8"-255' | |
| DEPTH DRILLER 255' | DEPTH LOGGER 255' |
| LIQUID LEVEL DRY | LIQUID APPEARANCE NA |
| TEMPERATURE NA | |

## CASING RECORD

| | |
|---|---|
| TYPE CARBON STEEL | INTERVAL 10" TO 151'-SURFACE |
| TYPE " " | INTERVAL 8" TO 258'-SURFACE |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| WELL SCREEN INTERVAL: NA | |

COMMENTS:

RETURN ERROR ~ 1"

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGhan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE Pulse Analog

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG-27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ eU P/m lc/s

DEAD TIME 7.4 μ SEC. — WARM UP TIME CONT. RUNNING FROM WELL E25-40

# LOGGING INFORMATION

LOG INTERVAL FROM 255' TO 120'

RERUN(S) 255'- 225'

PRE SURVEY CALIBRATION: POSITION 1 274 eU P/m POSITION 2 61 eU P/m BACKGROUND 385 c/s ~~715 c/s~~

LOGGING SPEED 5'/MIN.

START TIME 1220 — COMPLETION TIME 1330

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s/in.

RERUN SCALES, CPS/IN. 50 c/s/in.

TIME CONSTANT(S) TC = 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 280 eU P/m POSITION 2 51 BACKGROUND 370 c/s

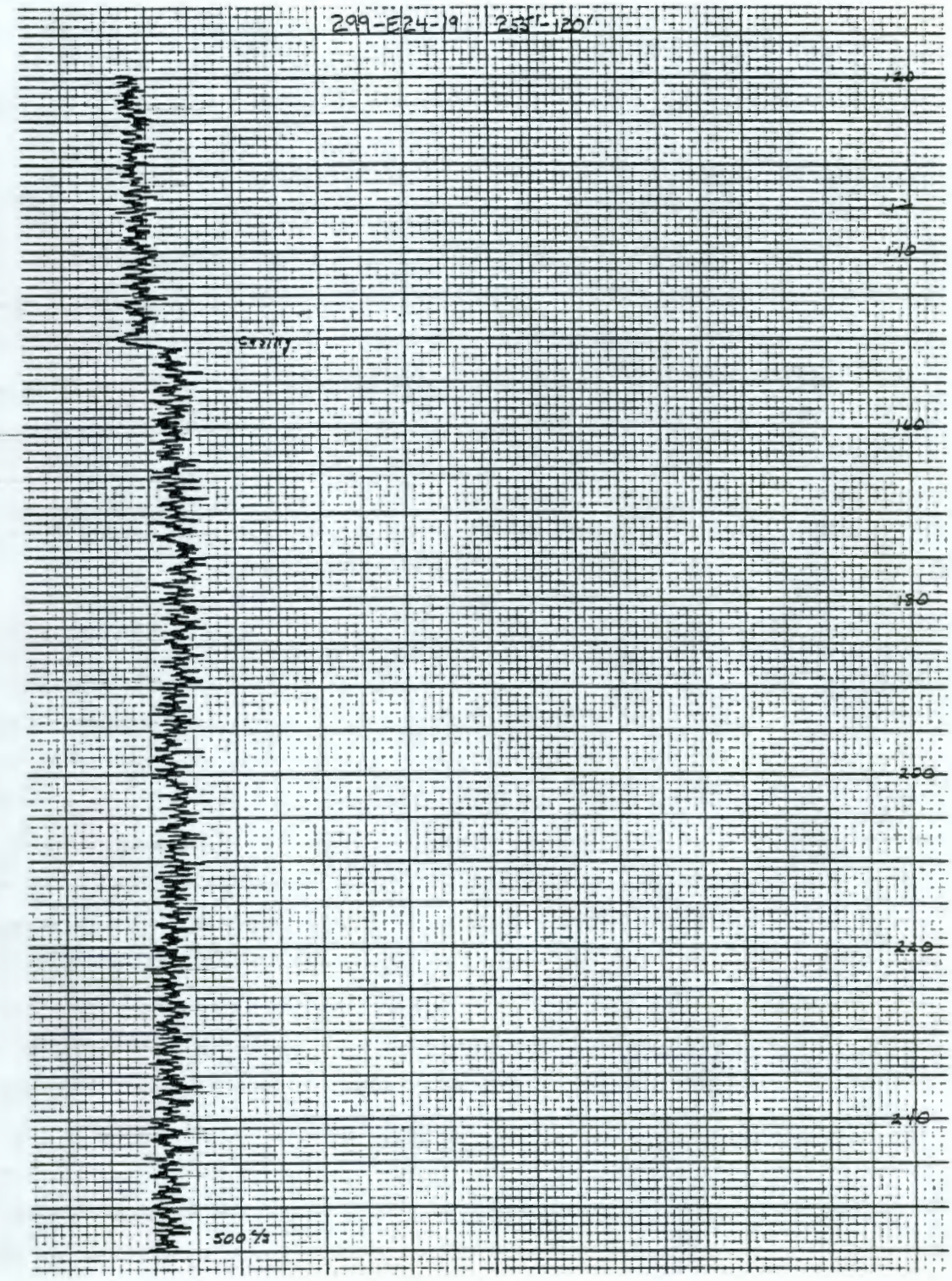
PERCENT CHANGE: POSITION 1 2.1% POSITION 2 16%

COMMENTS:

WITNESSED AND VERIFIED BY: J.R. Bradley 8/24/89

594

WHC-MR-0209


299-E24-19
255'-120'
120
130
140
150
160
170
180
190
200
210
220
230
240
500 %

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E24-19 AREA 200-East

DATE 8-29-89

LOG RUN #3 LOG TYPE Pulse/Analog

SURVEY COORDINATES N/A N N/A E

ELEVATION DATUM Top of 8" Casing ELEVATION N/A

LOG MEASURED FROM Ground Surface

LOCATION DESCRIPTION Outside S. Side 241-A Tank Farm

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 25.5°C WEATHER Cloudy-Warm

## BOREHOLE INFORMATION

DRILLER Mel Thoresen KEH

| | |
|---|---|
| DRILL RIG TYPE Cable Tool | BIT TYPE/DIAMETER 8" |
| BOREHOLE DIAMETER(S)/DEPTH 10" to 150.5 / 8" to 297' | |
| DEPTH DRILLER 297' | DEPTH LOGGER 294.5' |
| LIQUID LEVEL 279.4 Ground Surface | LIQUID APPEARANCE Muddy |
| TEMPERATURE 20.9°C | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" Carbon Steel | INTERVAL 150' – Surface |
| TYPE 8" Carbon Steel | INTERVAL 297' – Surface |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS:

9 1 1 2 0 5 0 0 5 7 9

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGhan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE Pulse / Analog

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG-27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll p/m/c/s

DEAD TIME 7.4 μ sec — WARM UP TIME Cont. Running from well 1E34-8

# LOGGING INFORMATION

LOG INTERVAL FROM 294.5' TO 225'

RERUN(S) 294.5'-259'

PRE SURVEY CALIBRATION: POSITION 1 287 cll p/m POSITION 2 56 cll p/m BACKGROUND 390 c/s

LOGGING SPEED 5'/min.

START TIME 1115 — COMPLETION TIME 1150

CHART SPEED(S), FT/IN. 10'/in.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s / in

RERUN SCALES, CPS/IN. 50 c/s / in.

TIME CONSTANT(S) 1 sec.

POST SURVEY CALIBRATION: POSITION 1 287 cll p/m POSITION 2 57 cll p/m BACKGROUND 385 c/s

PERCENT CHANGE: POSITION 1 0 % POSITION 2 1.8 %

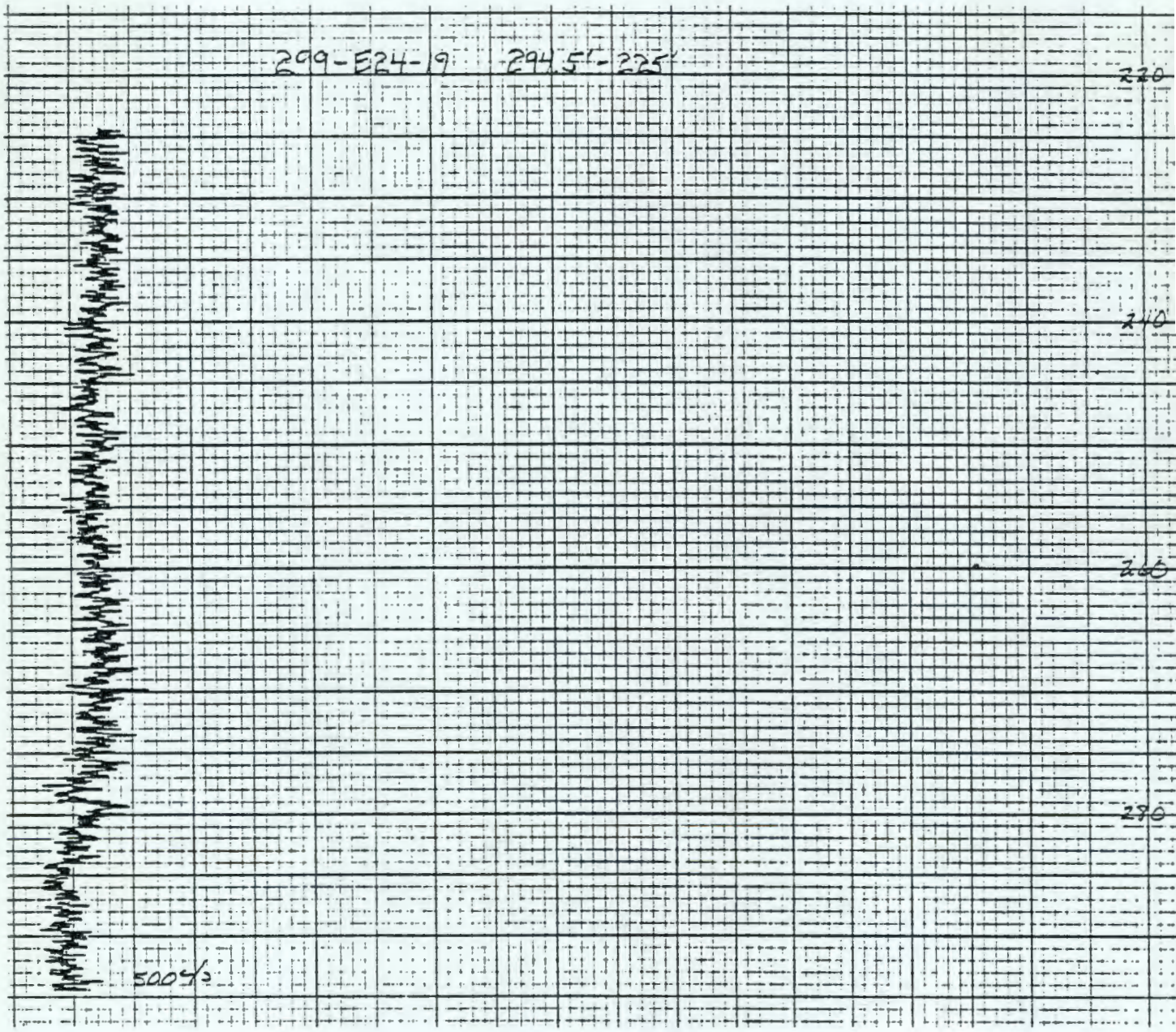
COMMENTS:

Δ's are Acceptable; Log OK for Analysis. JGF

WITNESSED AND VERIFIED BY: J.L. Fuller 8/29/88

597

WHC-MR-0209




9112250300

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E25-40 AREA 200-E

DATE 8-15-89

LOG RUN #1 LOG TYPE NAT. GAMMA

SURVEY COORDINATES - N - E

ELEVATION DATUM TOP OF 10" CASING ELEVATION -

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION EAST SIDE OF "A" TANK FARM

GROUND SURFACE ELEVATION -

SURFACE TEMPERATURE 27.2 WEATHER SUNNY - WARM

## BOREHOLE INFORMATION

DRILLER LOUIS WATKINS KEH.

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER 10" |
| BOREHOLE DIAMETER(S)/DEPTH 10" - 150' | |
| DEPTH DRILLER 150' | DEPTH LOGGER 147.6 |
| LIQUID LEVEL DRY | LIQUID APPEARANCE NA |
| TEMPERATURE NA | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEELE | INTERVAL ~~0-TDM~~ 0-144.5' |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL:

COMMENTS: RETURN ERROR 2"

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGHAN

EQUIPMENT BRAND GOI/MLS — EQUIPMENT TYPE Pulse

TOOL TYPE NAT. GAMMA — BASE CALIBRATION DATE 12/88

SERIAL NO. GG-27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^2$ cu P/M/c/s

DEAD TIME 7.4 μ SEC — WARM UP TIME 25 MIN.

# LOGGING INFORMATION

LOG INTERVAL FROM 147.6' TO 4'

RERUN(S) 147.6' - 115'

PRE SURVEY CALIBRATION: POSITION 1 3600 c/s (397 cu P/m) — POSITION 2 840 c/s (61 cu P/m) — BACKGROUND 120 c/s (10 cu P/m)

LOGGING SPEED 5'/MIN

START TIME 9:00 — COMPLETION TIME 10:00

CHART SPEED(S), FT/IN. 10'/IN

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s /IN

RERUN SCALES, CPS/IN. 50 c/s /IN

TIME CONSTANT(S) 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 3550 c/s (241 cu P/m) — POSITION 2 780 c/s (55 cu P/m) — BACKGROUND 135 c/s (12 cu P/m)

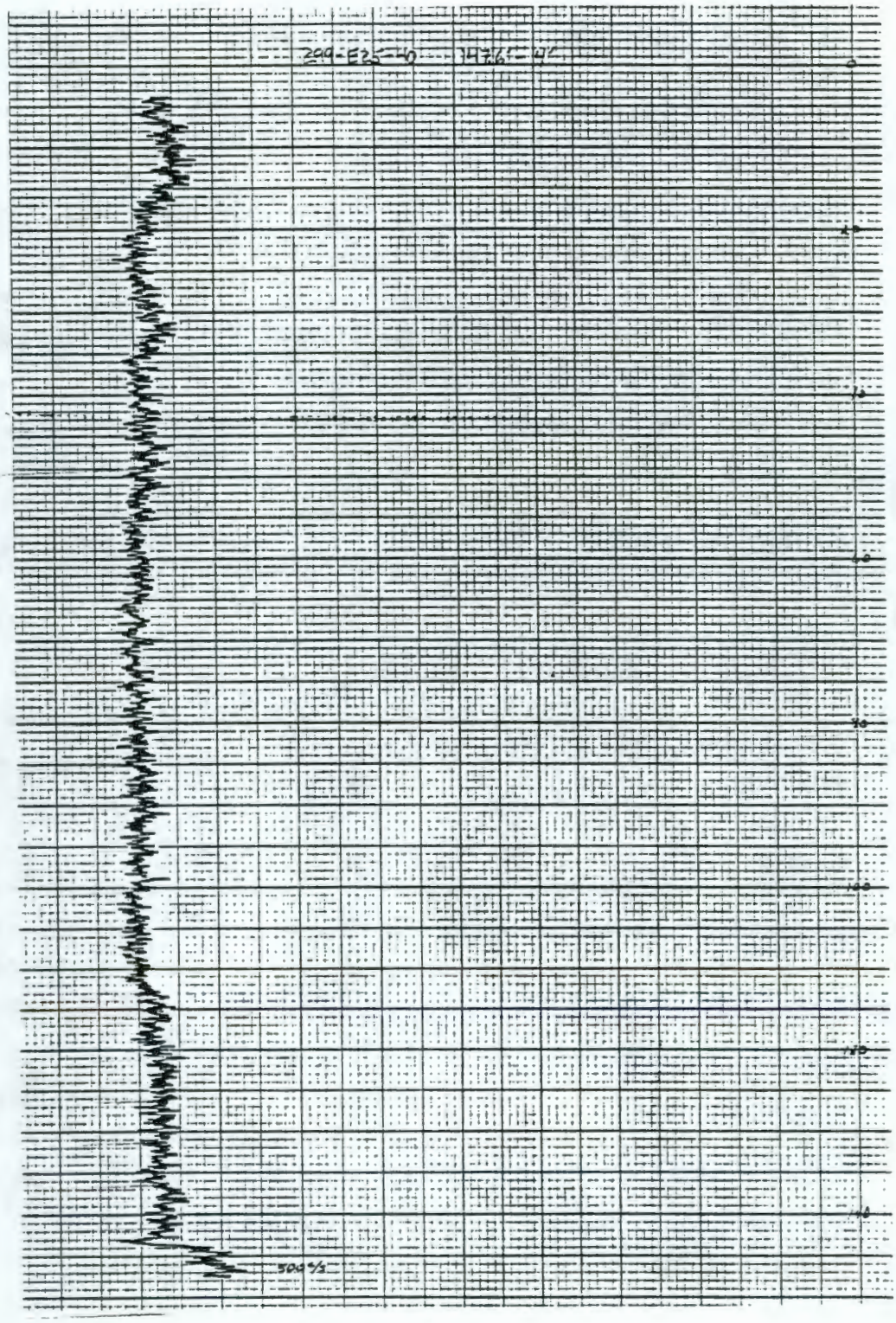
PERCENT CHANGE: POSITION 1 2.0% — POSITION 2 10.0%

COMMENTS:

WITNESSED AND VERIFIED BY: J. A. Throden 8-15-89

600

WHC-MR-0209




9112050603

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E25-40 AREA 200-EAST

DATE 8-24-89

LOG RUN #2 LOG TYPE NAT. GAMMA

SURVEY COORDINATES N/A N N/A E

ELEVATION DATUM Top of 8" CASING ELEVATION N/A

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION EAST SIDE 241-AW TANK FARM

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 25.8°C WEATHER Cloudy - WARM

## BOREHOLE INFORMATION

DRILLER LOUIS WATKINS KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER 8" |
| BOREHOLE DIAMETER(S)/DEPTH 8" - 275' / 10" - 145' | |
| DEPTH DRILLER 275' | DEPTH LOGGER 274' |
| LIQUID LEVEL 224' | LIQUID APPEARANCE N/A |
| TEMPERATURE N/A | |

## CASING RECORD

| | |
|---|---|
| TYPE CARBON STEEL | INTERVAL 10" 144.5 - SURFACE |
| TYPE " " | INTERVAL 8" 275 - SURFACE |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL:

COMMENTS: NO FLUID SAMPLE TAKEN. DRILLER HAD DUMPED 100 GAL. OF WATER IN THE HOLE PRIOR TO LOGGING

RETURN ERROR ~ 2"

602

9112050094

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) T.L. McGhan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE Pulse

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG-27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ eU P/m / C/S

DEAD TIME 7.4 μ SEC. — WARM UP TIME 20 MIN.

# LOGGING INFORMATION

LOG INTERVAL FROM 274' TO 110'

RERUN(S) 274'-245'

PRE SURVEY CALIBRATION: POSITION 1 281 eU ppm POSITION 2 61 eU ppm BACKGROUND 150 cps

LOGGING SPEED 5'/MIN.

START TIME 1040 — COMPLETION TIME 1150

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s/in.

RERUN SCALES, CPS/IN. 50 c/s/in.

TIME CONSTANT(S) TC = 1 sec.

POST SURVEY CALIBRATION: POSITION 1 285 eU ppm POSITION 2 63 eU ppm BACKGROUND 160 cps

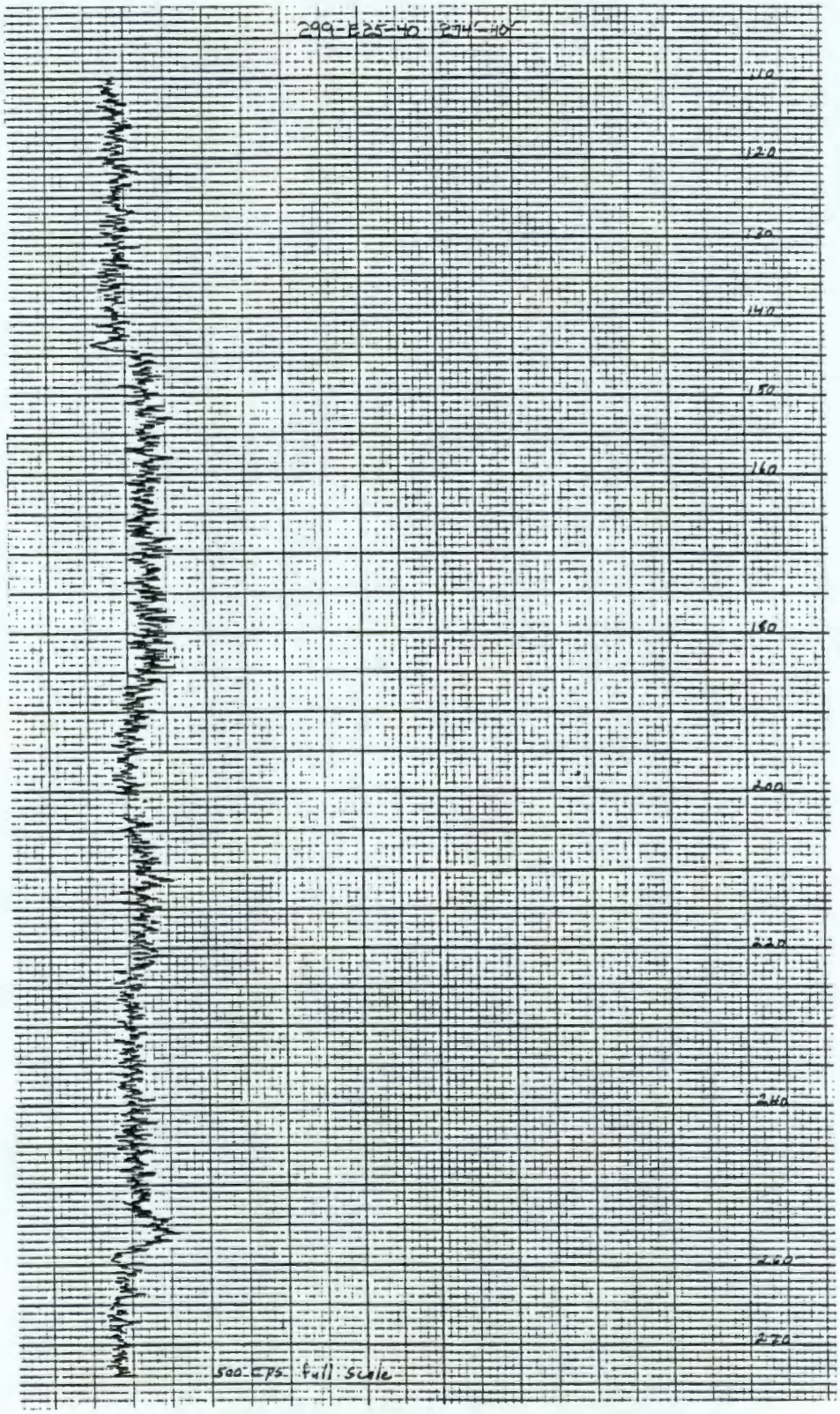
PERCENT CHANGE: POSITION 1 1.4% POSITION 2 3.2%

COMMENTS:

WITNESSED AND VERIFIED BY: J.R. Broderick 8/24/89

603

WHC-MR-0209


299-E25-40 B74-40
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
500 cps full scale

9112050306

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E25-41 AREA 200-EAST

DATE 8-15-89

LOG RUN #1 LOG TYPE NAT GAMMA

SURVEY COORDINATES N E

ELEVATION DATUM Top of 10" CASING ELEVATION

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION EAST SIDE AX TANK FARM

GROUND SURFACE ELEVATION

SURFACE TEMPERATURE 27.8 WEATHER SUNNY - WARM

## BOREHOLE INFORMATION

DRILLER CRAIG WALMSLY KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER DRIVE BARREL 10" |
| BOREHOLE DIAMETER(S)/DEPTH 10" to 130' | |
| DEPTH DRILLER 135' | DEPTH LOGGER 130.4' |
| LIQUID LEVEL DRY | LIQUID APPEARANCE NA |
| TEMPERATURE NA | |

## CASING RECORD

| | |
|---|---|
| TYPE CARBON STEELE | INTERVAL 0-130' |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS:

Depth Return Error <1"

605

9112050007

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGHAN

EQUIPMENT BRAND GO — EQUIPMENT TYPE Pulse

TOOL TYPE NAT. GAMMA — BASE CALIBRATION DATE 12-88

SERIAL NO. GG-27A97 — CALIBRATION REFERENCE WHC-IEP-0246

CALIBRATION / PROBE FACTOR 8.53 X10$^{-2}$ eu P/m /c/s

DEAD TIME 7.4 μ SEC. — WARM UP TIME CONT. RUNNING FROM WELL E25-40

# LOGGING INFORMATION

LOG INTERVAL FROM 130.4' TO 0'

RERUN(S) 130.4' - 93'

PRE SURVEY CALIBRATION: POSITION 1 ~~292 xKM~~ ~~309 eu~~ P/m 3600 c/s POSITION 2 ~~54 xKM~~ ~~69 eu~~ P/m 810 c/s BACKGROUND 15 eu P/m 175 c/s

LOGGING SPEED 5'/MIN.

START TIME 1030 — COMPLETION TIME 1105

CHART SPEED(S), FT/IN. 10'/IN

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s/IN.

RERUN SCALES, CPS/IN. 50 c/s/IN.

TIME CONSTANT(S) 1 SEC.

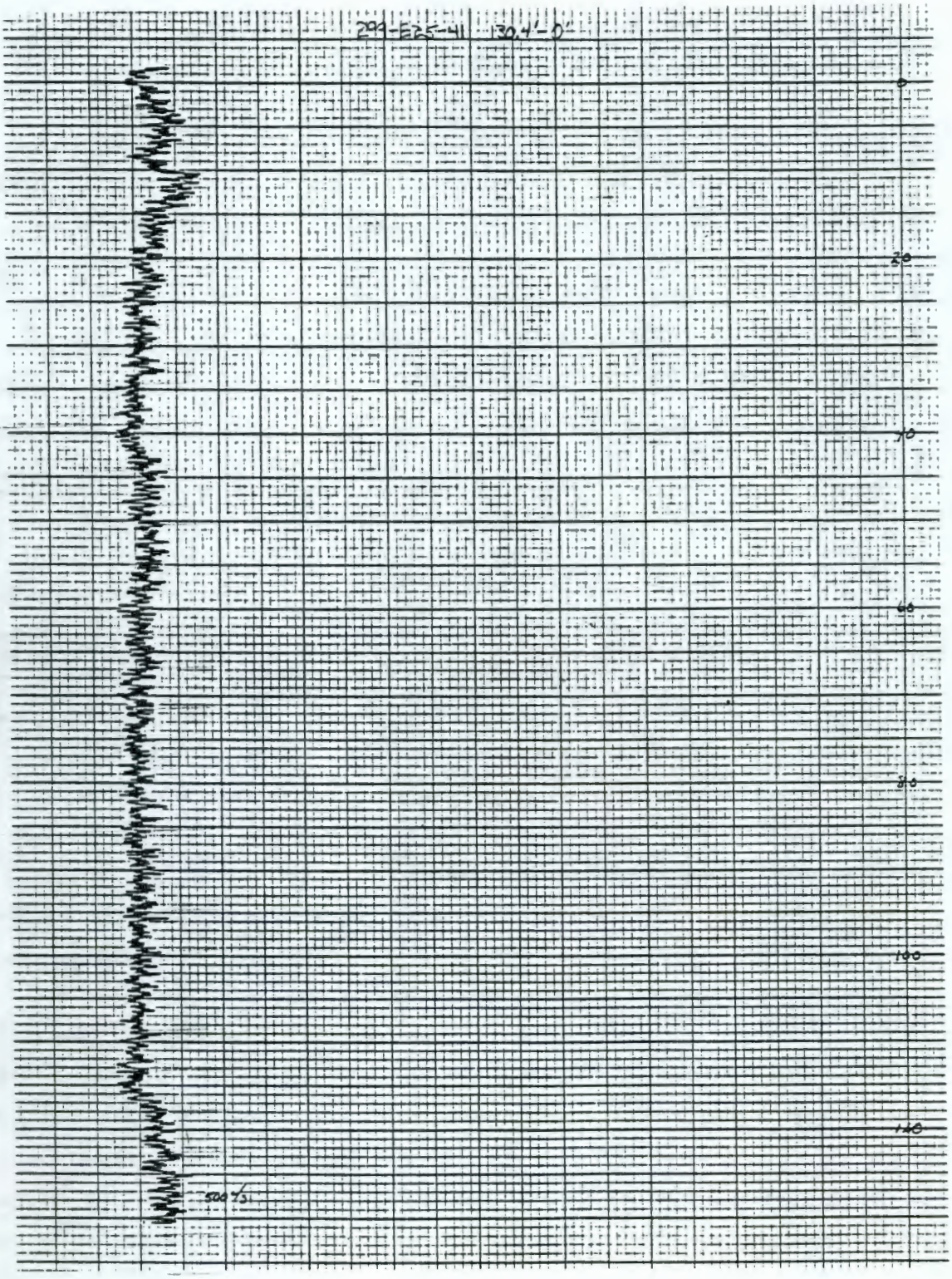
POST SURVEY CALIBRATION: POSITION 1 ~~288 xKM~~ ~~323 eu~~ P/m 3550 c/s POSITION 2 ~~54 xKM~~ ~~69 eu~~ P/m 810 c/s BACKGROUND 15 eu P/m 175 c/s

PERCENT CHANGE: POSITION 1 1.4% POSITION 2 0%

COMMENTS:

WITNESSED AND VERIFIED BY: John R. Broder 8-15-89

606




9112050609

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E 25-41 AREA 200-EAST

DATE 8-24-89

LOG RUN #2 LOG TYPE NAT. GAMMA

SURVEY COORDINATES NA N NA E

ELEVATION DATUM TOP OF 8" CASING ELEVATION NA

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION EAST SIDE 241 A TANK FARM

GROUND SURFACE ELEVATION NA

SURFACE TEMPERATURE 27.8°C WEATHER Cloudy - WARM

## BOREHOLE INFORMATION

DRILLER CRAIG WALMSLY KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER 8" |
| BOREHOLE DIAMETER(S)/DEPTH 10" to 134' / 8" to 275' | |
| DEPTH DRILLER 276' | DEPTH LOGGER 276' |
| LIQUID LEVEL 262' | LIQUID APPEARANCE Muddy |

TEMPERATURE NO TEMP. TAKEN, TOO MUDDY

## CASING RECORD

| | |
|---|---|
| TYPE CARBON STEEL | INTERVAL 10" 138' 8" - SURFACE |
| TYPE " " | INTERVAL 8" 275' - SURFACE |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS: Depth Return ERROR 0

## EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGhan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE Pulse Analog

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG 27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll P/m/c/s

DEAD TIME 7.4 μ SEC. — WARM UP TIME CONT. RUN FROM WELL E24-19

## LOGGING INFORMATION

LOG INTERVAL FROM 276' TO 100'

RERUN(S) 276' - 244'

PRE SURVEY CALIBRATION: POSITION 1 293 cll P/m POSITION 2 58 cll P/m BACKGROUND 170 c/s

LOGGING SPEED 5'/MIN.

START TIME 1340 — COMPLETION TIME 1440

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s / IN.

RERUN SCALES, CPS/IN. 50 c/s / IN.

TIME CONSTANT(S) TC = 1 SEC.

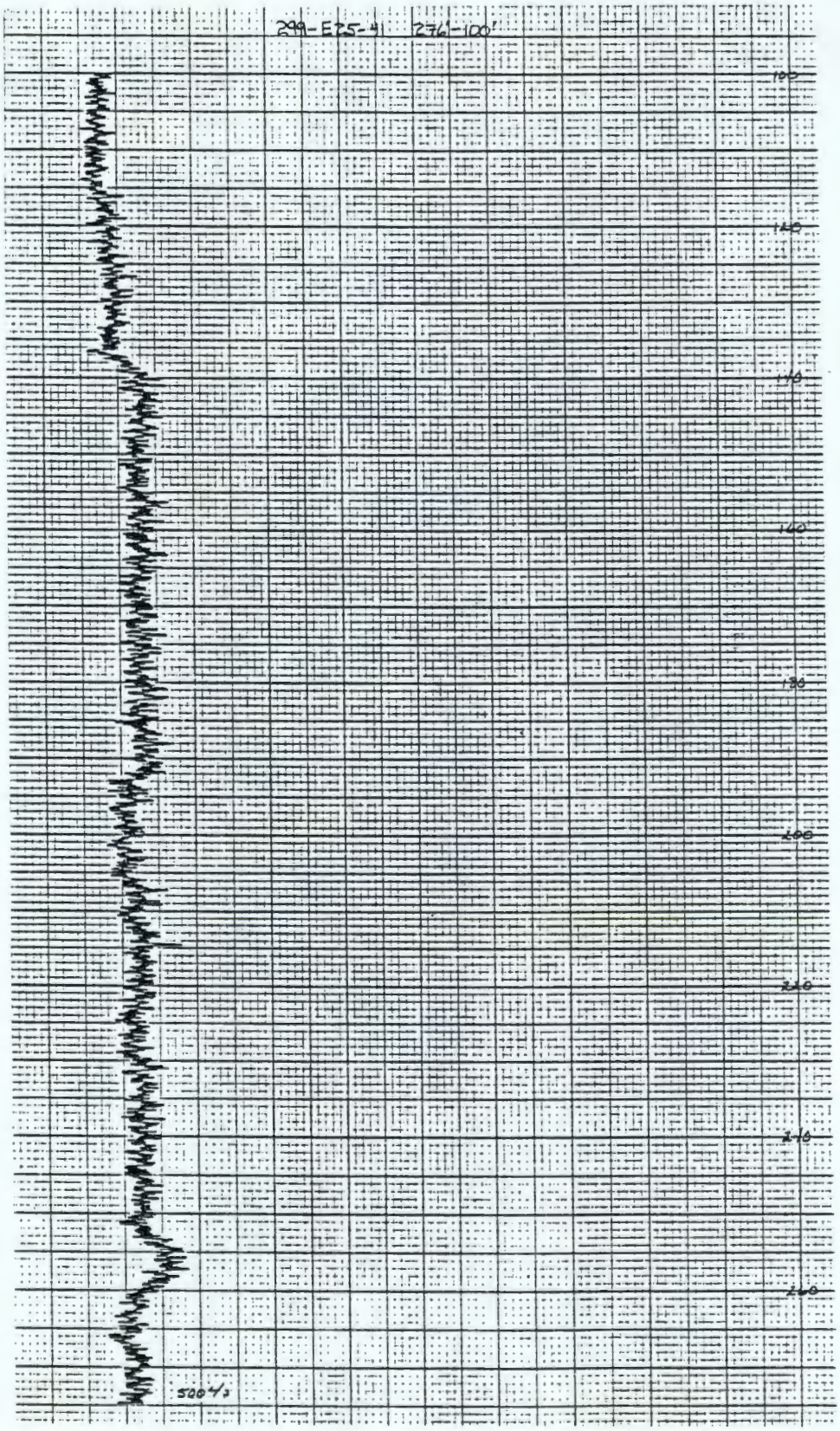
POST SURVEY CALIBRATION: POSITION 1 279 cll P/m POSITION 2 55 cll P/m BACKGROUND 175 c/s

PERCENT CHANGE: POSITION 1 4.8% POSITION 2 5.1%

COMMENTS:

WITNESSED AND VERIFIED BY: J.R. Broderick 8/24/89

609




9 1 1 2 0 5 0 0 6 1 2

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E27-12 AREA 200-EAST

DATE 9-6-89

LOG RUN #1 LOG TYPE GAMMA RAY

SURVEY COORDINATES N/A N/A E

ELEVATION DATUM Top of 10" CASING ELEVATION N/A

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION North SIDE 241-C TANK FARM

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 275°C WEATHER WINDY

## BOREHOLE INFORMATION

DRILLER LOUIS WATKINS - KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER DRIVE BARREL |
| BOREHOLE DIAMETER(S)/DEPTH 10" / 130 | |
| DEPTH DRILLER 130' | DEPTH LOGGER 129' |
| LIQUID LEVEL DRY | LIQUID APPEARANCE NA- |
| TEMPERATURE -NA- | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 129 - SURFACE |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS:

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) J. L. McGhan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE Pulse/ANALOG

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG-27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll p/m/c/s

DEAD TIME 7.4 μ SEC. — WARM UP TIME 20 MIN.

# LOGGING INFORMATION

LOG INTERVAL FROM 129' TO 4'

RERUN(S) 129 - 100'

PRE SURVEY CALIBRATION: POSITION 1 277 cll p/m POSITION 2 65 cll p/m BACKGROUND 200 c/s

LOGGING SPEED 5'/MIN.

START TIME 1240 — COMPLETION TIME 1325

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s/in.

RERUN SCALES, CPS/IN. 50 c/s/in.

TIME CONSTANT(S) 1 sec.

POST SURVEY CALIBRATION: POSITION 1 287 cll p/m POSITION 2 65 cll p/m BACKGROUND 185 c/s

PERCENT CHANGE: POSITION 1 3.5% POSITION 2 0

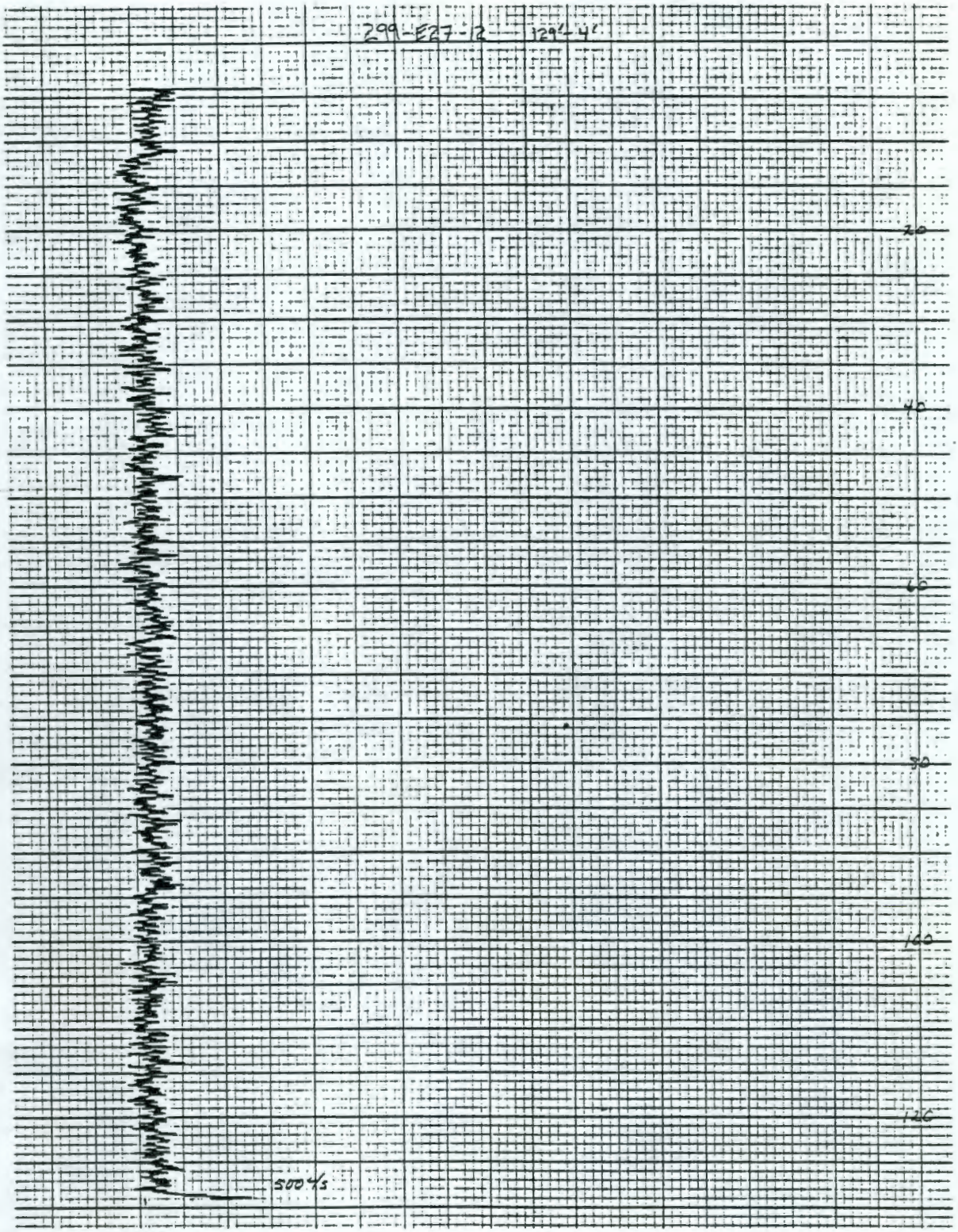
COMMENTS:

Log OK. for Analysis

WITNESSED AND VERIFIED BY: J. D. Zobel 9/6/89

WHC-MR-0209

612




9 1 1 2 0 5 0 0 6 1 5

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E27-12 AREA 200-EAST

DATE 9-18-89

LOG RUN #2 LOG TYPE GAMMA RAY

SURVEY COORDINATES N/A N N/A E

ELEVATION DATUM Top of 8" CASING ELEVATION N/A

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION NW SIDE OF 241-C TANK FARM

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 19.5°C WEATHER CLEAR - WARM

## BOREHOLE INFORMATION

DRILLER LOUIS WATKINS KEH.

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER REGULAR 8" |
| BOREHOLE DIAMETER(S)/DEPTH 8" TO 267 | |
| DEPTH DRILLER 267' | DEPTH LOGGER 267' |
| LIQUID LEVEL 254.12 TOC. | LIQUID APPEARANCE CLEAR |
| TEMPERATURE 19.3°C | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 129' - SURFACE |
| TYPE 8" CARBON STEEL | INTERVAL 267' - SURFACE |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS:

Depth Return Error +1" high

9112050061 6

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.T. McGhan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE ANALOG – PULSE

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG 27-A97 — CALIBRATION REFERENCE

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll p/m/c/s

DEAD TIME 7.4 μ SEC. — WARM UP TIME CONT. FROM WELL 15 27-13

# LOGGING INFORMATION

LOG INTERVAL FROM 267' TO 100'

RERUN(S) 267' – 235'

PRE SURVEY CALIBRATION: POSITION 1 28 cll p/m POSITION 2 55 cll p/m BACKGROUND 190 c/s

LOGGING SPEED 5'/MIN.

START TIME 1010 — COMPLETION TIME 1055

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s/IN.

RERUN SCALES, CPS/IN. 50 c/s/IN.

TIME CONSTANT(S) TC – 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 28 cll p/m POSITION 2 56 cll p/m BACKGROUND 190 c/s

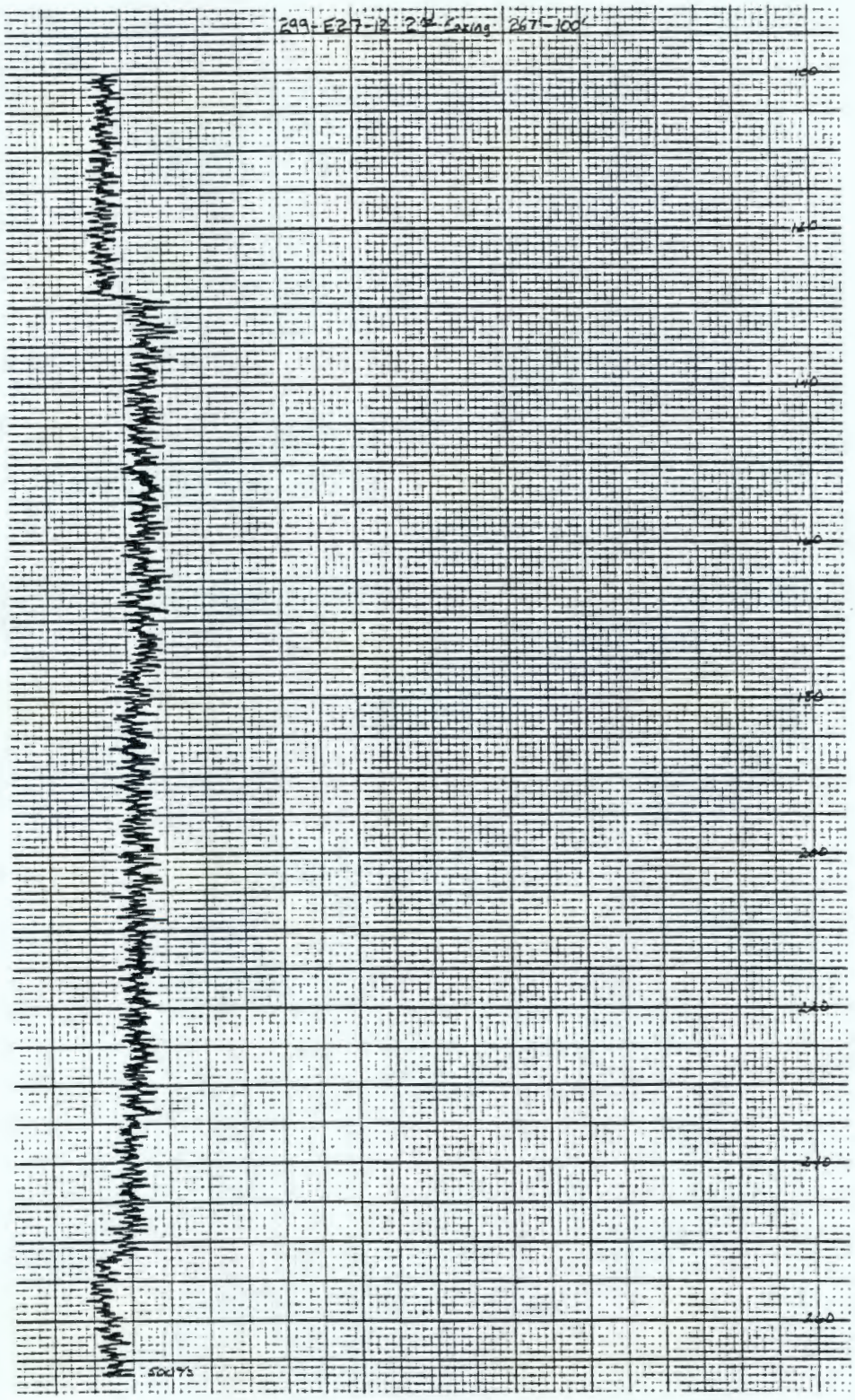
PERCENT CHANGE: POSITION 1 0 POSITION 2 1.8 %

COMMENTS:

WITNESSED AND VERIFIED BY: J.L. Gould — Log is Acceptable for Analysis KY 9-18-89

WHC-MR-0209

104


299-E27-12 2" Casing 267'-100'
100
120
140
160
180
200
220
240
260
280
50093

9112050618

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E27-13 AREA 200-EAST

DATE 9-18-89

LOG RUN #1 LOG TYPE GAMMA RAY

SURVEY COORDINATES N/A N/A E

ELEVATION DATUM Top of 10" CASING ELEVATION N/A

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION SW SIDE of 241-C TANK FARM

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 17°C WEATHER CLEAR - WARM

## BOREHOLE INFORMATION

DRILLER MEL THORESEN KEH.

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER 10" CORE BARREL |
| BOREHOLE DIAMETER(S)/DEPTH 10" TO 140' | |
| DEPTH DRILLER 140' | DEPTH LOGGER 136' |
| LIQUID LEVEL DRY | LIQUID APPEARANCE |
| TEMPERATURE | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 0 - ~~140'~~ 138' |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS:

Depth Return Error (+3 inches, high)

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. Markham

EQUIPMENT BRAND MLS — EQUIPMENT TYPE Analog pulse

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG 27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR ~~7.4 μ sec~~ $8.53 \times 10^{-2}$ cll p/m/c/s

DEAD TIME 7.4 μ sec — WARM UP TIME > 15 MIN.

# LOGGING INFORMATION

LOG INTERVAL FROM 135.7 TO ~~105'~~ 3'

RERUN(S) 135.7' – 105'

PRE SURVEY CALIBRATION: POSITION 1 280 cll p/m POSITION 2 55 cll p/m BACKGROUND 155 c/s

LOGGING SPEED 5'/MIN.

START TIME 0850 — COMPLETION TIME 0930

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s/IN.

RERUN SCALES, CPS/IN. 50 c/s/IN.

TIME CONSTANT(S) TC-1 sec.

POST SURVEY CALIBRATION: POSITION 1 285 cll p/m POSITION 2 61 cll p/m BACKGROUND 160 c/s

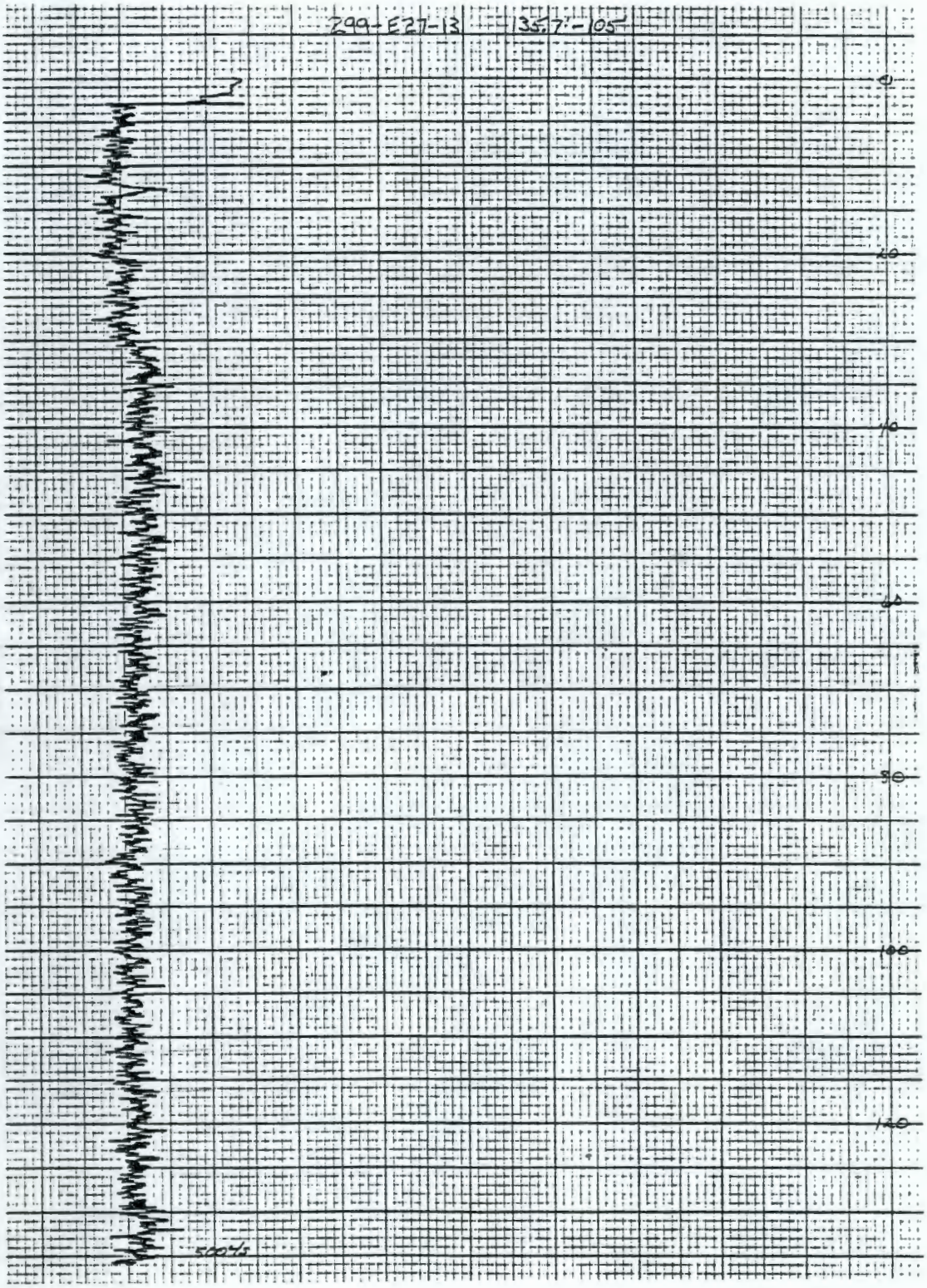
PERCENT CHANGE: POSITION 1 1.8% POSITION 2 10%

COMMENTS:

WITNESSED AND VERIFIED BY: J. J. Hinds, Log is acceptable for lithologic Correlation (9/18/89)

WHC-MR-0209

619


299-E27-13
135.7'-105'
0
20
40
60
80
100
120
500cts

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E27-13 AREA 200-EAST
DATE 9-28-89
LOG RUN #2 LOG TYPE GAMMA RAY
SURVEY COORDINATES N/A N N/A E
ELEVATION DATUM Top of 8" CASING ELEVATION N/A
LOG MEASURED FROM GROUND SURFACE
LOCATION DESCRIPTION S.W. SIDE 241-C TANK FARM
GROUND SURFACE ELEVATION N/A
SURFACE TEMPERATURE 21.7°C at End of Logging WEATHER CLEAR

## BOREHOLE INFORMATION

| | |
|---|---|
| DRILLER MEL THORESEN KEH | |
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER REGULAR 8" |
| BOREHOLE DIAMETER(S)/DEPTH 8" TO 276' | |
| DEPTH DRILLER 276' | DEPTH LOGGER 274.7' |
| LIQUID LEVEL 261.42' G.S. | LIQUID APPEARANCE CLEAR |
| TEMPERATURE 17.9°C | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 137 - SURFACE |
| TYPE 8" CARBON STEEL | INTERVAL 278.8 Stickup 1'6" |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: - NA -

COMMENTS: Drilling Spoils are heaped ≈6" above nominal ground surface
Central 8" Casing Stickup = 1'-6" above 10" Casing, ≈ 2'-0 above n.g.s.
DEPTH RETURN ERROR = +2" (high)

620

9112050062

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McAdam

EQUIPMENT BRAND MLS — EQUIPMENT TYPE ANALOG

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG 27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll p/m/c/s

DEAD TIME 7.4 μ SEC. — WARM UP TIME 20 MINUTES

# LOGGING INFORMATION

LOG INTERVAL FROM 274.7' TO 100'

RERUN(S) 274.7' - 237'

PRE SURVEY CALIBRATION: POSITION 1 281 cll p/m/c/s POSITION 2 57 cll p/m/c/s BACKGROUND 160 c/s

LOGGING SPEED 5'/MIN.

START TIME 0920 — COMPLETION TIME 1000

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s/IN.

RERUN SCALES, CPS/IN. 50 c/s/IN.

TIME CONSTANT(S) 1 SEC.

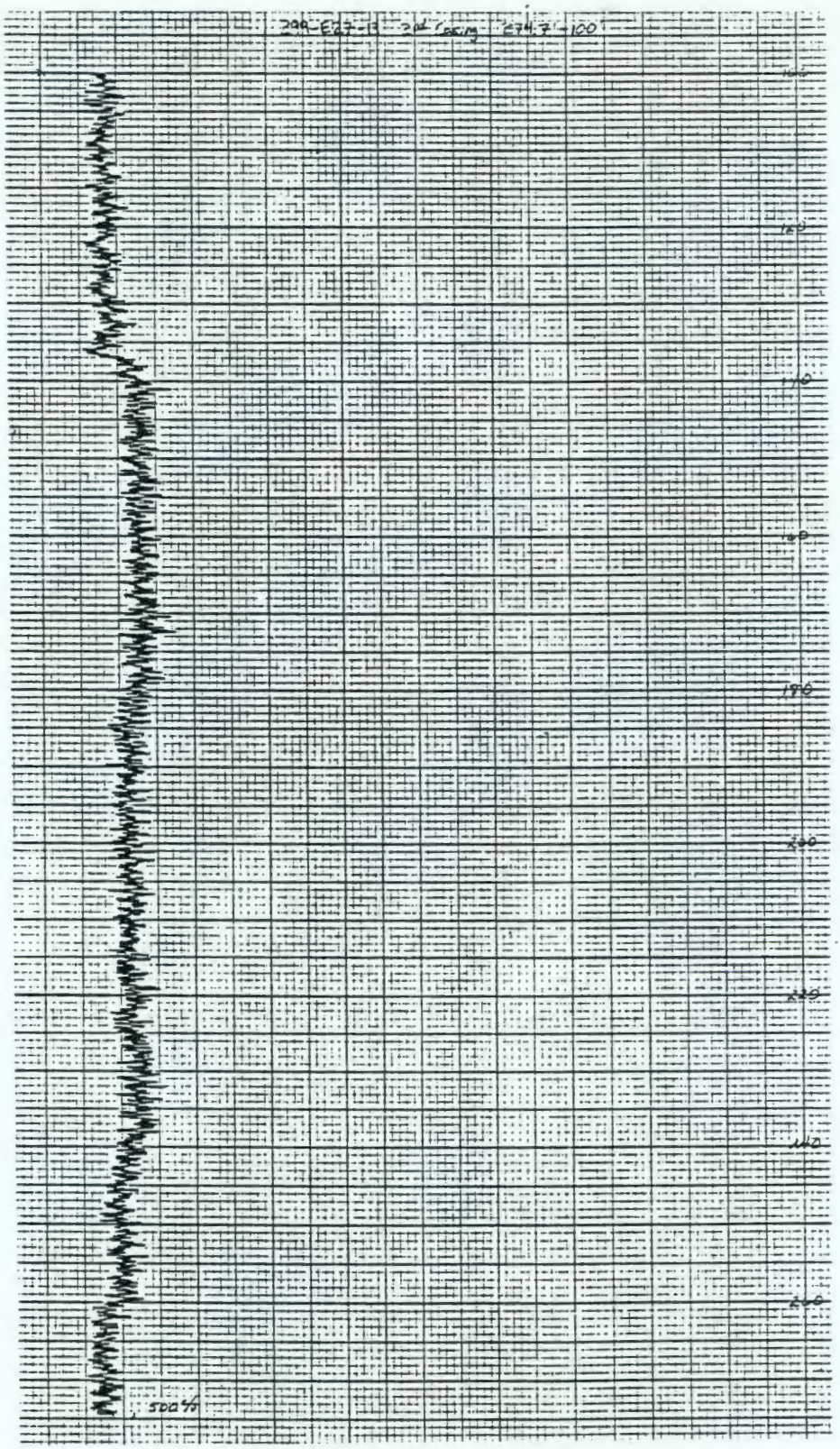
POST SURVEY CALIBRATION: POSITION 1 285 cll p/m/c/s POSITION 2 57 cll p/m/c/s BACKGROUND 155 c/s

PERCENT CHANGE: POSITION 1 1.4 % POSITION 2 0 %

COMMENTS: Probe is sidewalled w/ Bowspring

WITNESSED AND VERIFIED BY: J. J. Thold Log is Acceptable for Analysis - JJT 9/28/89

129




9112005006524

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E27-14 AREA 200-E

DATE 9-27-89

LOG RUN #1 LOG TYPE GAMMA RAY

SURVEY COORDINATES N E

ELEVATION DATUM Top of 10" CASING ELEVATION

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION S.E. SIDE 241-C TANK FARM

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 21°C at End of Run WEATHER CLEAR

## BOREHOLE INFORMATION

DRILLER LOUIS WATKINS KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER 6" DRIVE BARREL |
| BOREHOLE DIAMETER(S)/DEPTH 10" TO 240' | |
| DEPTH DRILLER 240' | DEPTH LOGGER 137.4 |
| LIQUID LEVEL DRY | LIQUID APPEARANCE NA |
| TEMPERATURE NA | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 237.7" 12" Stickup |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS:

Depth Return Error, +3" (high)

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McAlan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE ANALOG

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG 27 A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll p/m/c/s

DEAD TIME 7.4 μ SEC — WARM UP TIME 15 MIN.

# LOGGING INFORMATION

LOG INTERVAL FROM 137.4' TO 4.1'

RERUN(S) 137.4' – 105'

PRE SURVEY CALIBRATION: POSITION 1 275 cll p/m/c/s POSITION 2 66 p/m/c/s BACKGROUND 275 c/s

LOGGING SPEED 5'/MIN

START TIME 1050 — COMPLETION TIME 1130

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s /IN.

RERUN SCALES, CPS/IN. 50 c/s /IN.

TIME CONSTANT(S) 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 284 cll p/m/c/s POSITION 2 53 p/m/c/s BACKGROUND 275 c/s

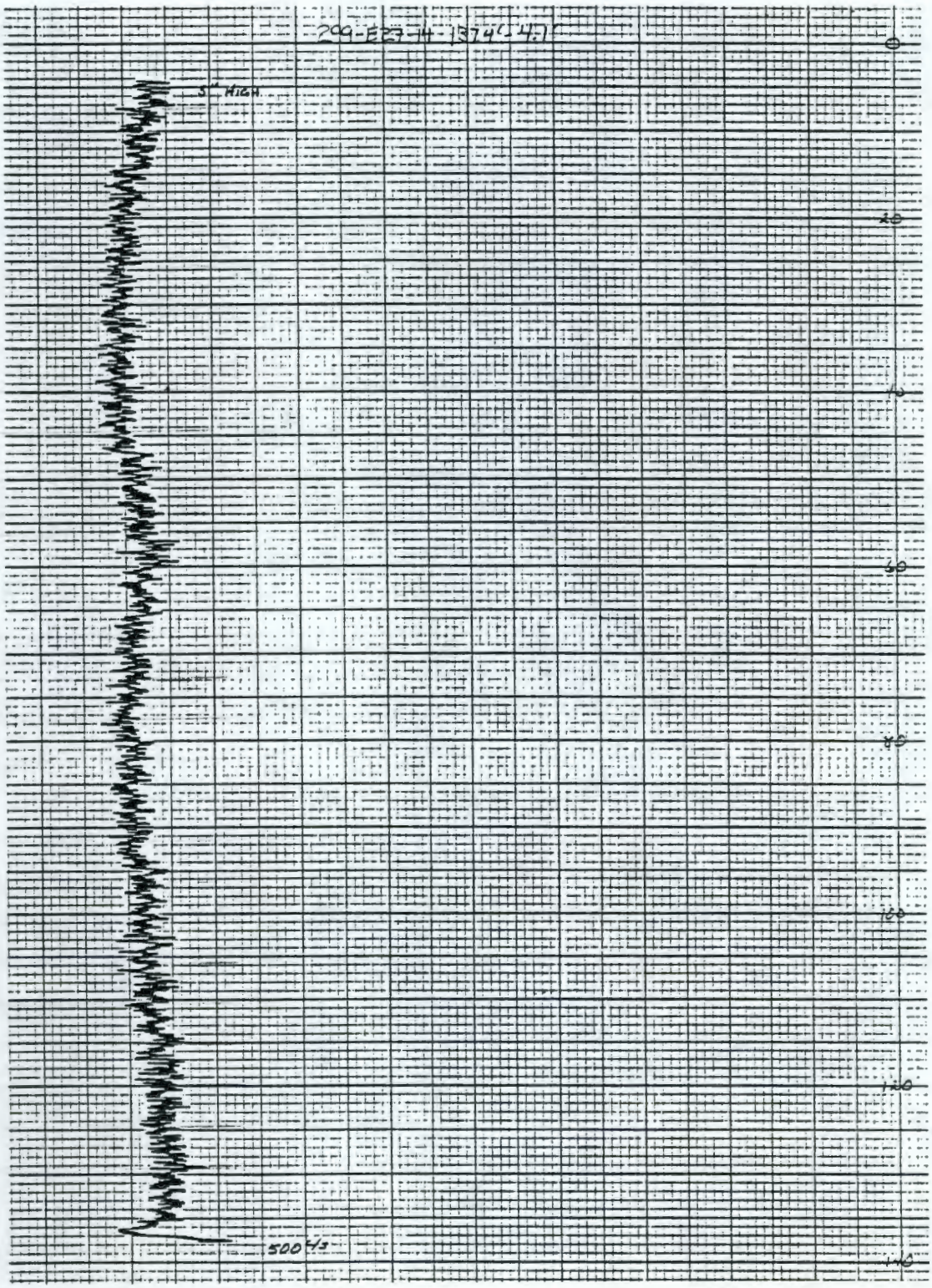
PERCENT CHANGE: POSITION 1 3.2% POSITION 2 20%

COMMENTS:

WITNESSED AND VERIFIED BY: [signature] Well log is acceptable for Lithologic Correlation [signature] 9/27/89

624

WHC-MR-0209


299-E27-14-1974 (4.7)
5" HIGH
500 Hz
0
20
40
60
80
100
120
140

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E27-14 AREA 200-EAST

DATE 10-11-89

LOG RUN #2 LOG TYPE GAMMA RAY

SURVEY COORDINATES _____ N _____ E

ELEVATION DATUM Top of 8" CASING ELEVATION _____

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION S.E. SIDE 241-C TANK FARM

GROUND SURFACE ELEVATION _____

SURFACE TEMPERATURE 14.7°C WEATHER Cloudy

## BOREHOLE INFORMATION

DRILLER LOUIS WATKINS KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER Regular Pattern 8" |
| BOREHOLE DIAMETER(S)/DEPTH 10"-137' & 8"-266' | |
| DEPTH DRILLER 266 | DEPTH LOGGER 265.6 |
| LIQUID LEVEL 250.02 G.S | LIQUID APPEARANCE CLEAR |
| TEMPERATURE | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 137'-SURFACE |
| TYPE 8" CARBON STEEL | INTERVAL 8", 266'-SURFACE 2.1' STICK-UP |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS: Depth Return ERROR 2"

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McAthan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE ANALOG

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12/88

SERIAL NO. CG 27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ all ppm/c/s

DEAD TIME 7.4 μ SEC — WARM UP TIME 20 MIN.

# LOGGING INFORMATION

LOG INTERVAL FROM 265.6' TO 100'

RERUN(S) 265.6' - 230'

PRE SURVEY CALIBRATION: POSITION 1 250 all ppm/c/s POSITION 2 61 all ppm/c/s BACKGROUND 265 c/s

LOGGING SPEED 5'/MIN.

START TIME 0915 — COMPLETION TIME 1000

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 500 c/s, 50 c/s/IN.

RERUN SCALES, CPS/IN. 500 c/s, 50 c/s/IN.

TIME CONSTANT(S) 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 280 all ppm/c/s POSITION 2 61 all ppm/c/s BACKGROUND 260 c/s

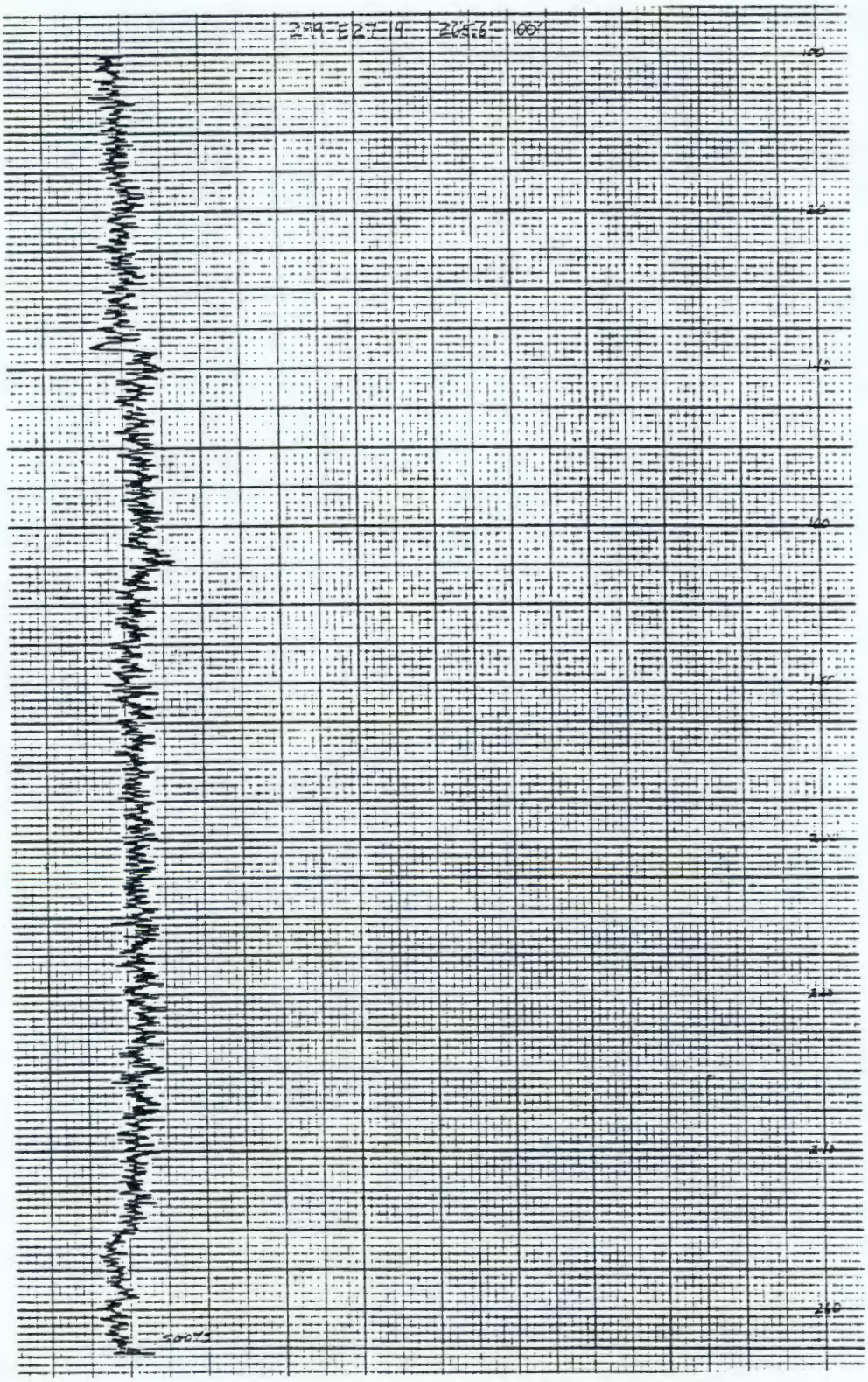
PERCENT CHANGE: POSITION 1 10.7% POSITION 2 0 %

COMMENTS:

WITNESSED AND VERIFIED BY: J.A. Brooler 10-11-89

687

WHC-MR-0209




9112050670

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E27-15 AREA 200-EAST

DATE 9-6-89

LOG RUN #1 LOG TYPE GAMMA RAY

SURVEY COORDINATES NA N NA E

ELEVATION DATUM Top of 10" CASING ELEVATION NA

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION NORTH SIDE 241-C TANK FARM

GROUND SURFACE ELEVATION NA

SURFACE TEMPERATURE 26°C WEATHER WINDY

## BOREHOLE INFORMATION

DRILLER CRAIG WAMSLEY - KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER DRIVE BARREL |
| BOREHOLE DIAMETER(S)/DEPTH 10" to 127.7' | |
| DEPTH DRILLER NA | DEPTH LOGGER 127.7' |
| LIQUID LEVEL DRY | LIQUID APPEARANCE -NA- |
| TEMPERATURE -NA- | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 128' - SURFACE |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS:

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGhan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE Pulse / Analog

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG-27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll p/m/cls

DEAD TIME 7.4 μ sec. — WARM UP TIME cont. RUNNING FROM WELL E27-12

# LOGGING INFORMATION

LOG INTERVAL FROM 127.7' TO 4'

RERUN(S) 127.7'- 98'

PRE SURVEY CALIBRATION: POSITION 1 284 cll p/m POSITION 2 61 cll p/m BACKGROUND 120 c/s

LOGGING SPEED 5'/min.

START TIME 1350 — COMPLETION TIME 1430

CHART SPEED(S), FT/IN. 10'/in.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s/in.

RERUN SCALES, CPS/IN. 50 c/s/in.

TIME CONSTANT(S) 1 sec

POST SURVEY CALIBRATION: POSITION 1 282 cll p/m POSITION 2 56 cll p/m BACKGROUND 120 c/s

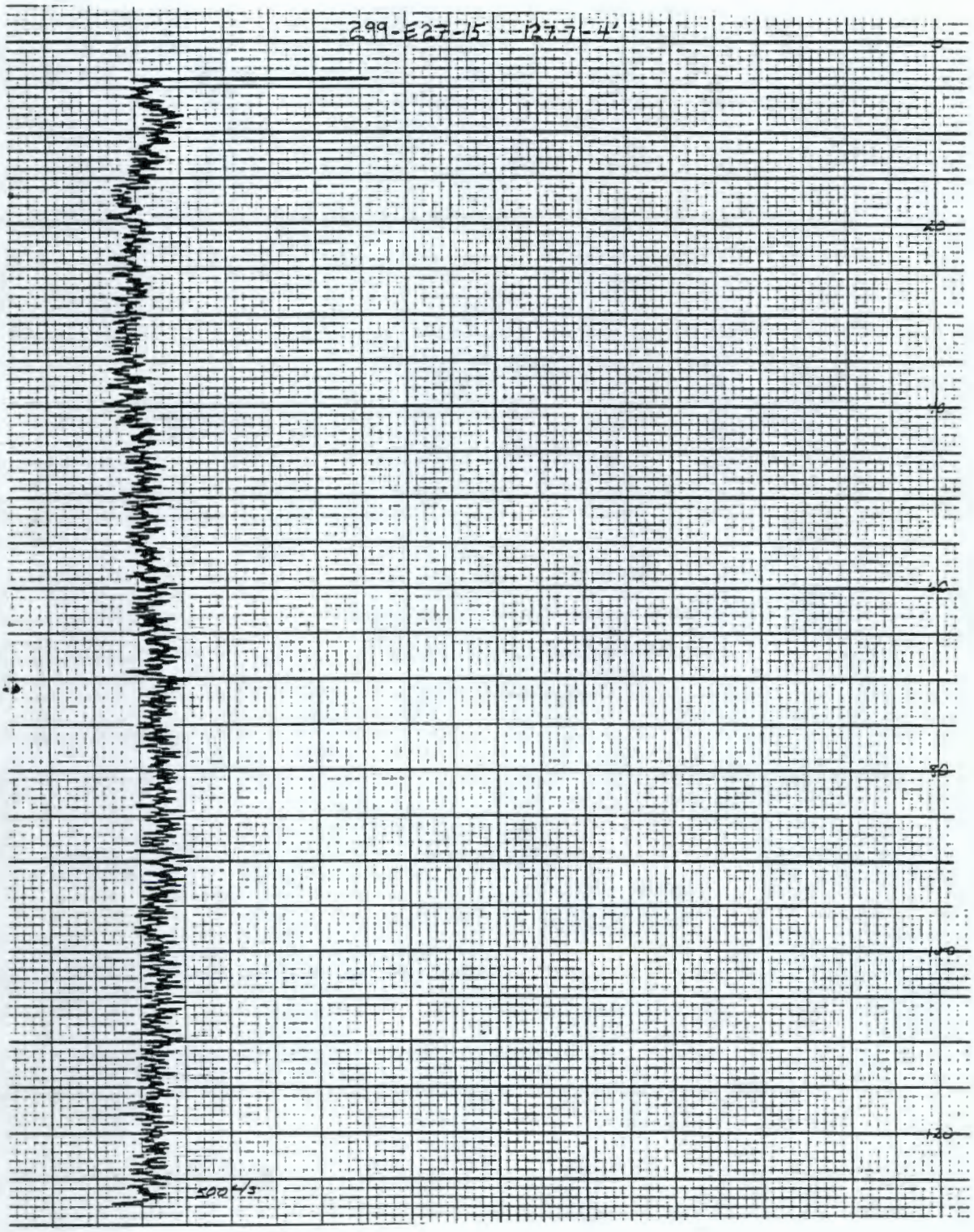
PERCENT CHANGE: POSITION 1 1% POSITION 2 8.2%

COMMENTS:

WITNESSED AND VERIFIED BY: Log is acceptable for geotech. indicated lithology - J.K. Ball 9-6-89

630

WHC-MR-0209




9 1 1 2 0 5 0 0 6 7 3

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E27-15 AREA 200-EAST
DATE 9-18-89
LOG RUN # 2 LOG TYPE GAMMA RAY
SURVEY COORDINATES NA N NA E
ELEVATION DATUM TOP OF 8" CASING ELEVATION NA
LOG MEASURED FROM GROUND SURFACE
LOCATION DESCRIPTION NW SIDE OF 241-C TANK FARM
GROUND SURFACE ELEVATION NA
SURFACE TEMPERATURE 22.5°C WEATHER CLEAR - WARM

## BOREHOLE INFORMATION

DRILLER CRAIG WALMSLEY KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER REGULAR 8" |
| BOREHOLE DIAMETER(S)/DEPTH 8", 262 - SURFACE / 10" to 129' | |
| DEPTH DRILLER 262 | DEPTH LOGGER 261.6' |
| LIQUID LEVEL 253.78 | LIQUID APPEARANCE MUDDY |
| TEMPERATURE 20.7°C | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 129' TO SURFACE |
| TYPE 8" CARBON STEEL | INTERVAL 262 TO SURFACE |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS:

DEPTH RETURN ERROR (+2", high)



9112050067 4

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) D.L. McGhan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE ANALOG - Pulse

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG-27-A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll g/m/cts

DEAD TIME 7.4 μ SEC. — WARM UP TIME Cont. RUNNING FROM WELL E27-12

# LOGGING INFORMATION

LOG INTERVAL FROM 261.6' TO 100'

RERUN(S) 261.6' - 227'

PRE SURVEY CALIBRATION: POSITION 1 284 cll g/m POSITION 2 59 cll g/m BACKGROUND 125 c/s

LOGGING SPEED 5'/min.

START TIME 1150 — COMPLETION TIME 1240

CHART SPEED(S), FT/IN. 10'/in.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s / in.

RERUN SCALES, CPS/IN. 50 c/s / in.

TIME CONSTANT(S) TC - 1 sec

POST SURVEY CALIBRATION: POSITION 1 284 cll g/m POSITION 2 65 cll g/m BACKGROUND 115 c/s

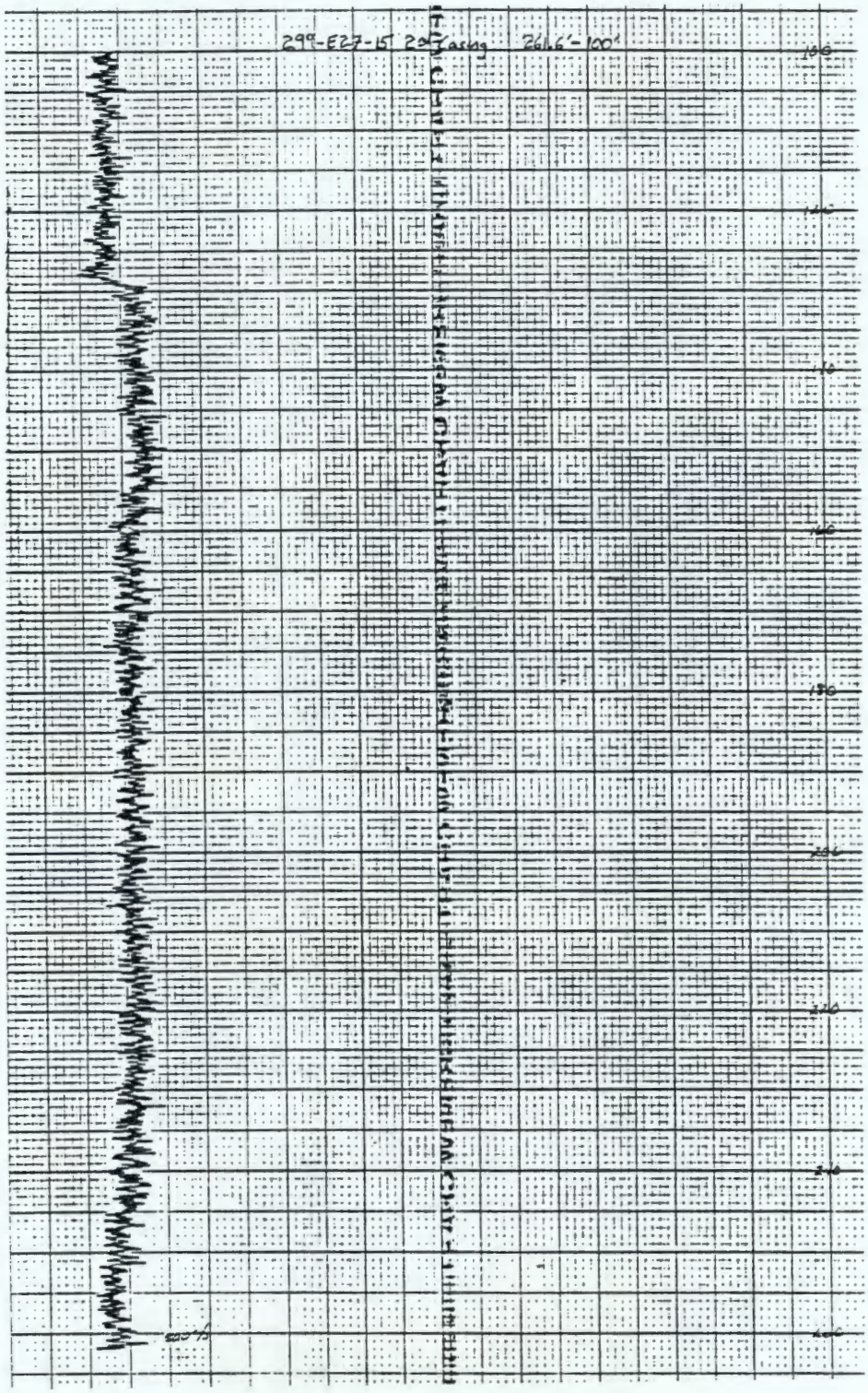
PERCENT CHANGE: POSITION 1 0 POSITION 2 9%

COMMENTS:

WITNESSED AND VERIFIED BY: J.D. Ball — Log is Acceptable for Lithologic Correlation. JG 9-18-89

633

WHC-MR-0209


299-E27-15 2nd Jasing 261.6'-100'
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E33-31 AREA 200 EAST

DATE 8-9-89

LOG RUN #1 LOG TYPE ANALOG NAT. GAMMA

SURVEY COORDINATES N/A N/A E

ELEVATION DATUM TOP OF CASING ELEVATION N/A

LOG MEASURED FROM SURFACE OF GROUND

LOCATION DESCRIPTION OUTSIDE OF 241-BY WEST FENCE, NORTH WELL OF PAIR

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 26.5°C WEATHER PT. CLOUDY, SC. SHOWERS

## BOREHOLE INFORMATION

| | | | |
|---|---|---|---|
| DRILLER | KEH | | |
| DRILL RIG TYPE | CABLE-TOOL | BIT TYPE/DIAMETER | 8" |
| BOREHOLE DIAMETER(S)/DEPTH | 10" to 155' / 8" to 253' | | |
| DEPTH DRILLER | -NA- | DEPTH LOGGER | 252.8' |
| LIQUID LEVEL | 246.18 (T/C) | LIQUID APPEARANCE | CLOUDY |
| TEMPERATURE | 18.6°C | | |

## CASING RECORD

| | | | |
|---|---|---|---|
| TYPE | 10" SCH-40, STEEL | INTERVAL | ~154' to Surface |
| TYPE | 8" SCH-40, STEEL | INTERVAL | ~253' to Surface |
| TYPE | | INTERVAL | |
| TYPE | | INTERVAL | |

WELL SCREEN INTERVAL: -NA-

COMMENTS: DRILLER DEPARTED

2nd CASING LOG! SEE OTHER DATA FOR 1ST RUN, by PNL

Bottom of 10" CASING APPROX -154.5

DEPTH RETURN ERROR +4 in (High)

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGAHAN

EQUIPMENT BRAND MLS (GEARHART-OWEN INC) EQUIPMENT TYPE ANALOG

TOOL TYPE NaI (NAT. GAMMA) BASE CALIBRATION DATE 12-88

SERIAL NO. CG 27A97 CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cell PPM/cps

DEAD TIME 7.4 μSec [from EP-0246] WARM UP TIME CONTINUOUS SINCE 8:15 AM

# LOGGING INFORMATION

LOG INTERVAL FROM -253' TO -3.6'

RERUN(S) -253 TO -220'

PRE SURVEY CALIBRATION: POSITION 1 ~83.5%, FS=5000 (349 cell p/m) POSITION 2 ~34%, FS=5000 (136 cell p/m) BACKGROUND ~21%, FS-5000 cps (105 c/s)

LOGGING SPEED 5 FT/MIN

START TIME 10:20 AM COMPLETION TIME 11:15 AM

CHART SPEED(S), FT/IN. 10 FT/IN

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 cps/IN, FS=500

RERUN SCALES, CPS/IN. 50 cps/IN

TIME CONSTANT(S) 1 Sec

POST SURVEY CALIBRATION: POSITION 1 ~84%, FS=5000 (349 cell p/m) POSITION 2 ~31.5%, FS=5000 (128 cell p/m) BACKGROUND ~20.5% FS=5000 (105 c/s)

PERCENT CHANGE: POSITION 1 -0- 0% POSITION 2 ~10% 5.9%

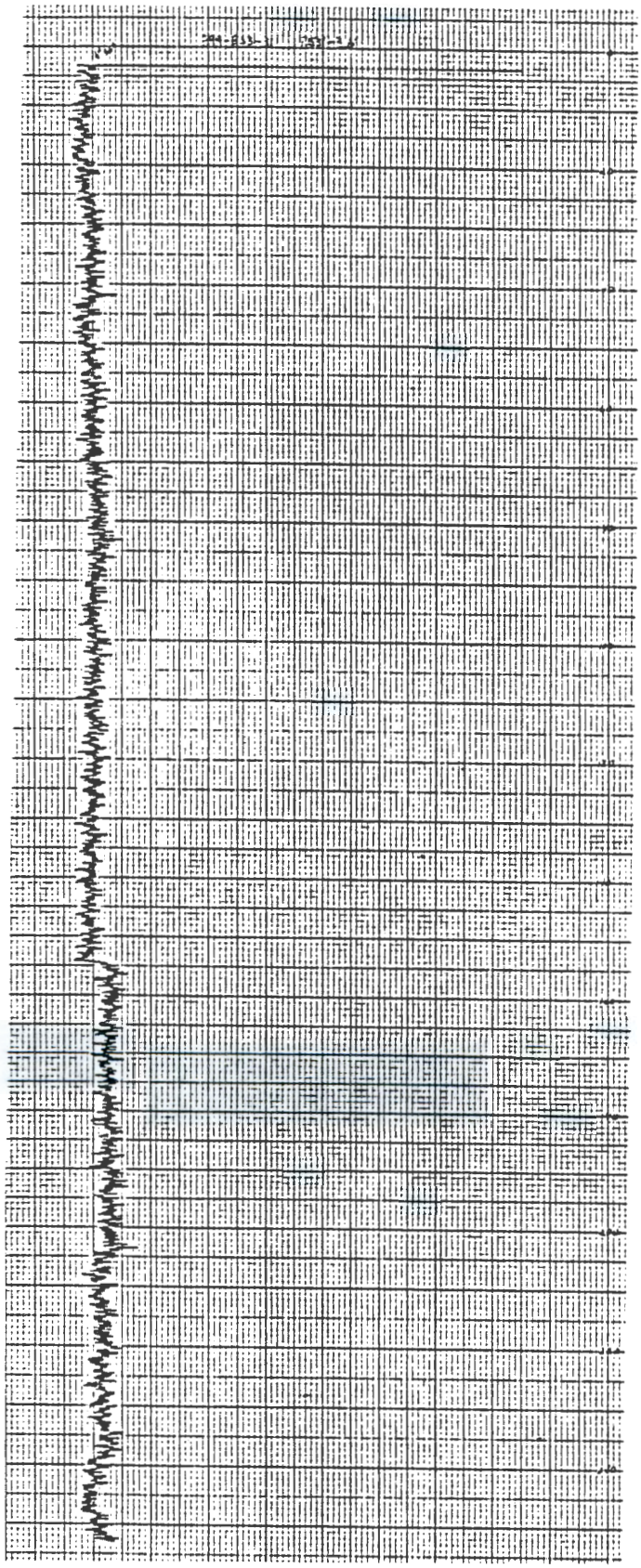
COMMENTS: HIGH BKGD, due to "Shine" from BY TANK FARM, USED FS=5000 RANGE OF RATEMETER

PRE & POST SURVEY CHECK IS ACCEPTABLE. due in PART TO High "RAD. SHINE" from BY-FARM

WITNESSED AND VERIFIED BY: J. L. Gold 8/9/89

936

WHC-MR-0209



# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E33-32 AREA 200E

DATE 7/21/89

LOG RUN 1ST LOG TYPE ANALOG, NIT GAMMA

SURVEY COORDINATES N E

ELEVATION DATUM Top of 10" Casing ELEVATION NA

LOG MEASURED FROM -3.7' Below Surface

LOCATION DESCRIPTION Just Outside West Boundary of 241-BY Tank Farm

GROUND SURFACE ELEVATION NA

SURFACE TEMPERATURE 29.4°C WEATHER Warm, Light Breeze

## BOREHOLE INFORMATION

| | | | |
|---|---|---|---|
| DRILLER | KEH | | |
| DRILL RIG TYPE | Cable-Tool | BIT TYPE/DIAMETER | 10" |
| BOREHOLE DIAMETER(S)/DEPTH | | | |
| DEPTH DRILLER | ~84 | DEPTH LOGGER | 83.5' |
| LIQUID LEVEL | NA (Dry) | LIQUID APPEARANCE | NA |
| TEMPERATURE | NA | | |

## CASING RECORD

| | | | |
|---|---|---|---|
| TYPE | 10" Sch-40, Steel | INTERVAL | -75' to Surface |
| TYPE | Open | INTERVAL | -83 to -75 |
| TYPE | | INTERVAL | |
| TYPE | | INTERVAL | |
| WELL SCREEN INTERVAL: | | | |
| COMMENTS: | Tool Not Sidewalled | | |

## EQUIPMENT DATA

LOGGING COMPANY: PNL

OPERATOR(S): VL McGHAN

EQUIPMENT BRAND: M.L.S. — EQUIPMENT TYPE: ANALOG, NAT. GAMMA

TOOL TYPE: ~~CG 27A97~~ 7/21/89 NaI (Gamma) — BASE CALIBRATION DATE: 12-88

SERIAL NO.: CG 27A97 — CALIBRATION REFERENCE: WHC-EP-0246

CALIBRATION / PROBE FACTOR: $8.53 \times 10^{-2}$ eU (ppm/cps)

DEAD TIME: 7.4 μSec — WARM UP TIME: ~15 min

## LOGGING INFORMATION

LOG INTERVAL FROM: -83.5 TO: -3.7'

RERUN(S): #1 -83 to -50

PRE SURVEY CALIBRATION: POSITION 1 ~ 72% (FS=5000) 33% ell p/m — POSITION 2 ~ 87% (FS=1000) 52 ell p/m — BACKGROUND ~51 2160 c/s

LOGGING SPEED: 5 FT/MIN

START TIME: 2 30 PM — COMPLETION TIME: 3 30 PM

CHART SPEED(S), FT/IN.: 10 FT/IN

CHART RECORDER HORIZONTAL SCALE, CPS/IN.: 00 (FS=500 cps)

RERUN SCALES, CPS/IN.: 50 (FS=500 cps)

TIME CONSTANT(S): 1 sec

POST SURVEY CALIBRATION: POSITION 1 ~73% 33 ell p/m — POSITION 2 ~87% 52 ell p/m — BACKGROUND ~51% 2165 c/s

PERCENT CHANGE: POSITION 1 +1% 0% — POSITION 2 +2% 0% — OK!

COMMENTS: Repeat Section -83 to 50 prior to full run

Depth meter error >1', due to slack in line at start.

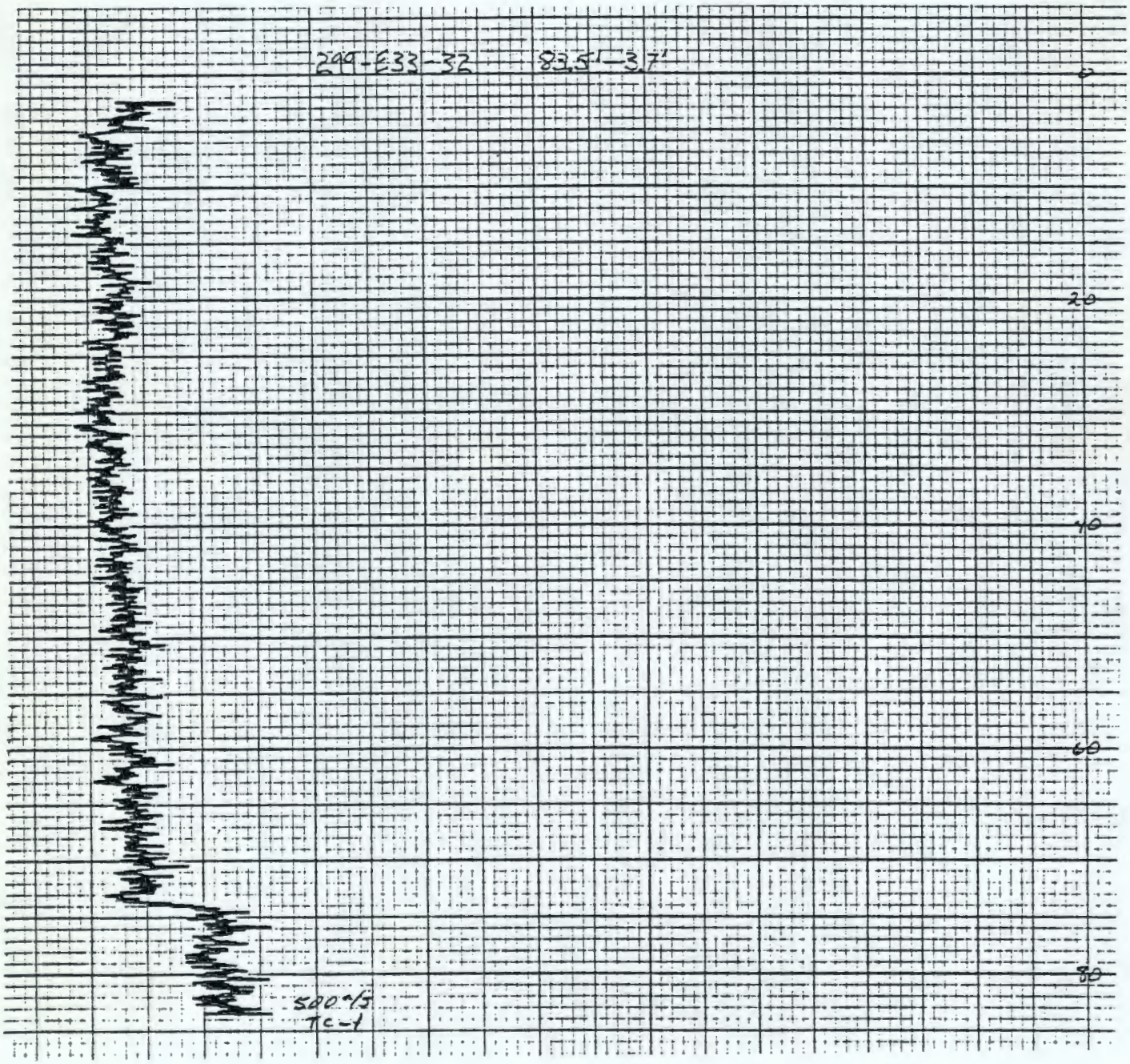
Ratemeter not acting very stable, 5Khz pulser shows ~1.5% decrease.

WITNESSED AND VERIFIED BY: J.L. Gould 7/21/89

High Background may be due to "shine" from tank farm.

639

WHC-MR-0209




9112050612

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E33-32 AREA 200 East

DATE 8-9-89

LOG RUN 2nd Casing LOG TYPE Analog - Nat. Gamma

SURVEY COORDINATES -N/A- N -N/A- E

ELEVATION DATUM Top of 8" Casing ELEVATION -N/A-

LOG MEASURED FROM -3.1' Below Apparent Ground Surface

LOCATION DESCRIPTION West Side of 241-~~BY~~ B Tank Farm, South West of Pair

GROUND SURFACE ELEVATION -N/A-

SURFACE TEMPERATURE 21.2 °C WEATHER Raining

## BOREHOLE INFORMATION

| | | | |
|---|---|---|---|
| DRILLER | KEH | | |
| DRILL RIG TYPE | Cable-Tool | BIT TYPE/DIAMETER | 8" |
| BOREHOLE DIAMETER(S)/DEPTH | | | |
| DEPTH DRILLER | -N/A- | DEPTH LOGGER | -269' |
| LIQUID LEVEL | -253.52 (Top of Casing) | LIQUID APPEARANCE | Clear |
| TEMPERATURE | 18.4 °C | | |

## CASING RECORD

| | | | |
|---|---|---|---|
| TYPE | 10" Sch-40 Steel | INTERVAL | ~74' to Surface |
| TYPE | 8" Sch-40 Steel | INTERVAL | ~268' to Surface |
| TYPE | | INTERVAL | |
| TYPE | | INTERVAL | |

WELL SCREEN INTERVAL: -NA-

COMMENTS: Driller Gone.

Probe run w/ Decentralizer Bowspring

Refer to 1st Run on 7-21-89

Clay Layer ~226'-220'

Depth Return Error < 1/2 in

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGHAN

EQUIPMENT BRAND MLS (GRAEHARDT-OWEN INC) EQUIPMENT TYPE ANALOG

TOOL TYPE NaI (NAT. GAMMA) BASE CALIBRATION DATE 12-88

SERIAL NO. CG 27A97 CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ ell PPM/cps

DEAD TIME 7.4 μ Sec (per WHC-EP-0246) WARM UP TIME 15 MIN

# LOGGING INFORMATION

LOG INTERVAL FROM -269' TO -50'

RERUN(S) -269' to -239'

PRE SURVEY CALIBRATION: POSITION 1 ~73%, FS=5000 cps 252 ell p/m POSITION 2 ~21.5%, FS=5000 cps 31 ell p/m BACKGROUND ~69%, FS=500 cps 690 c/s

LOGGING SPEED 5 FT/MIN

START TIME 8:20 AM CUMPLETION TIME 9:50 AM

CHART SPEED(S), FT/IN. 10 FT/IN

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 cps/IN, 500=FS

RERUN SCALES, CPS/IN. 50 cps/IN.

TIME CONSTANT(S) 1 Sec

POST SURVEY CALIBRATION: POSITION 1 ~74%, FS=5000 257 ell p/m POSITION 2 ~20%, FS=5000 29 ell p/m BACKGROUND ~67%, FS=500 680 c/s

PERCENT CHANGE: POSITION 1 ~1% 1.9% POSITION 2 ~7% 13%

COMMENTS: WATER LEVEL SEEN AT -253' (BELOW SURFACE)

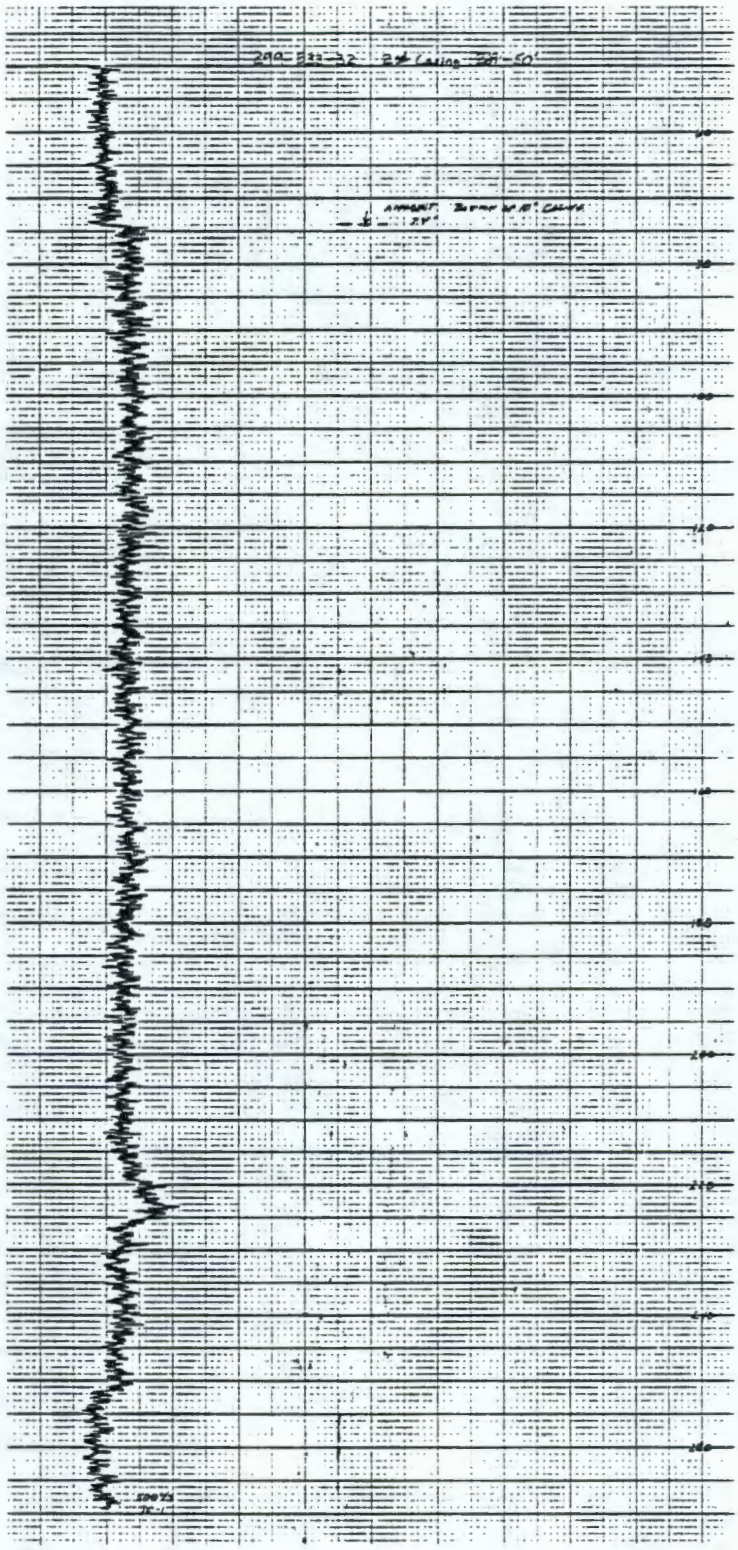
OUTER (10") CASING SEEN AT ~74'

PRE & POST SURVEY CHECK, ELECTRONICS SHIFT SEEN, BUT OVERALL IS ACCEPTABLE

WITNESSED AND VERIFIED BY: J.L. Hall 8-9-89

642

WHC-MR-0209



9 1 1 2 0 5 0 0 6 4 5

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E33-33 AREA 200 East

DATE 8/9/89

LOG RUN Double Casing LOG TYPE Analog, Nat. Gamma

SURVEY COORDINATES N/A N/A E

ELEVATION DATUM Top of 8" Casing ELEVATION N/A

LOG MEASURED FROM Surface (Apparent) of Ground

LOCATION DESCRIPTION North of Gravel Road (10th St), 1/4 Mi East of Baltimore

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 28.5°C at end of run WEATHER Fair, Light Breeze

## BOREHOLE INFORMATION

| | | | |
|---|---|---|---|
| DRILLER | KEH | | |
| DRILL RIG TYPE | Cable-Tool | BIT TYPE/DIAMETER | 8" |
| BOREHOLE DIAMETER(S)/DEPTH | | | |
| DEPTH DRILLER | N/A | DEPTH LOGGER | 247' |
| LIQUID LEVEL | -235.22 (T/C) -233.07 (surface) | LIQUID APPEARANCE | Clear |
| TEMPERATURE | 19.1°C | | |

## CASING RECORD

| | | | |
|---|---|---|---|
| TYPE | 10" Sch-40, Steel | INTERVAL | Surface to 153' |
| TYPE | 8" Sch-40, Steel | INTERVAL | Surface to ? |
| TYPE | | INTERVAL | |
| TYPE | | INTERVAL | |

WELL SCREEN INTERVAL: -NA-

COMMENTS: Driller Departed
Probe Sidewalled
Depth Return Error, +4" (high)



9112050316

9 1 1 2 0 5 0 0 6 1 7

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) VL McGHAN

EQUIPMENT BRAND MLS (GERHARDT-OWEN INC) EQUIPMENT TYPE ANALOG

TOOL TYPE NaI (NAT. GAMMA) BASE CALIBRATION DATE 12-88

SERIAL NO. CG27497 CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ ell PPM/cps

DEAD TIME 7.4μ Sec WARM UP TIME > 15 Min

# LOGGING INFORMATION

LOG INTERVAL FROM -247' TO -2.9'

RERUN(S) -247' to -220'

PRE SURVEY CALIBRATION: POSITION 1 ~67%, FS=5000 (276 ell p/m) POSITION 2 ~81%, FS=1000 (60 ell p/m) BACKGROUND ~23%, FS=500 (115 c/s)

LOGGING SPEED 5 FT/MIN

START TIME 11:40 AM COMPLETION TIME 12:40 PM

CHART SPEED(S), FT/IN. 10 FT/IN

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 cps/IN, FS=500

RERUN SCALES, CPS/IN. 50 cps/IN

TIME CONSTANT(S) 1 Sec

POST SURVEY CALIBRATION: POSITION 1 ~70%, FS=5000 (287 ell p/m) POSITION 2 ~80%, FS=1000 (58 ell p/m) BACKGROUND ~23% FS=500 (115 c/s)

PERCENT CHANGE: POSITION 1 ~4% 4.5% POSITION 2 ~1% 3.3%

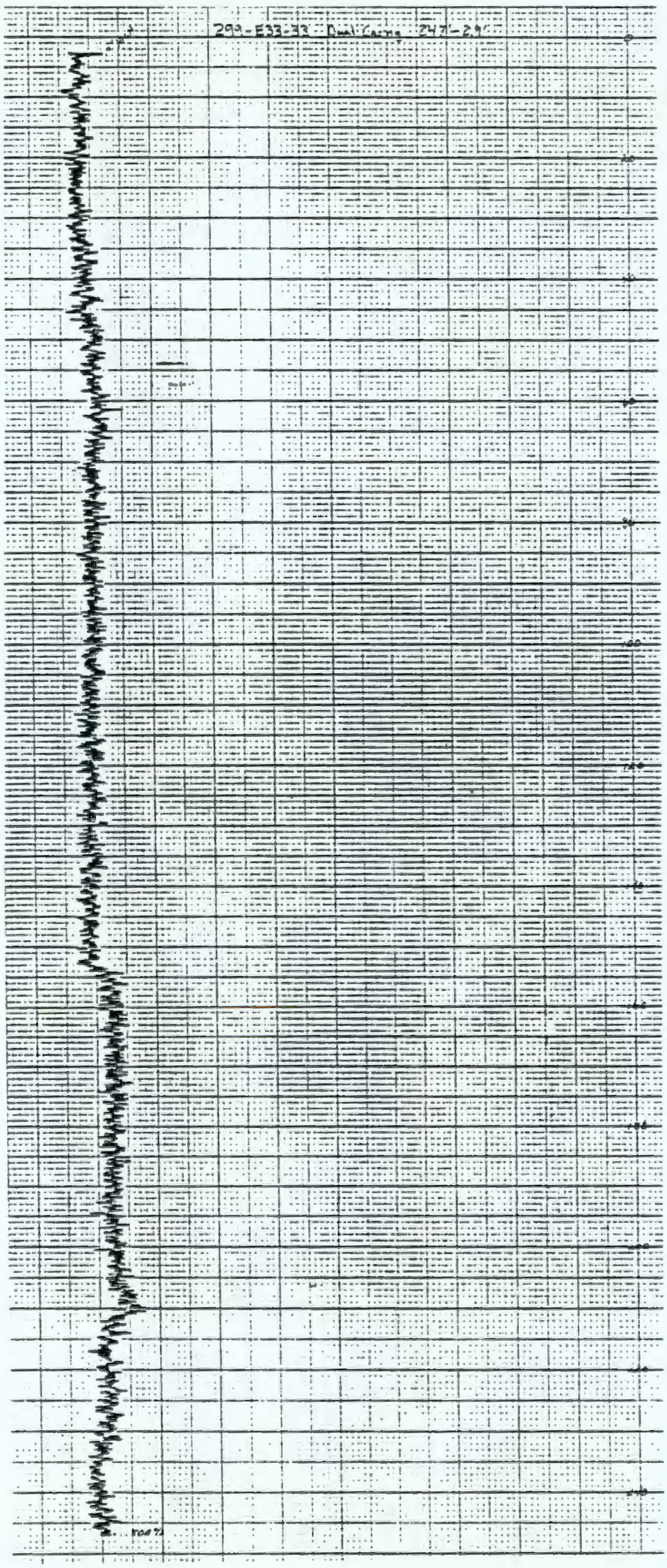
COMMENTS: RERUN SECTION TAKEN FIRST, TO EXPEDITE TIME OF STAFF

Pre & Post Survey field checks are acceptable.

WITNESSED AND VERIFIED BY: J J Knoll 8/9/89

645

WHC-MR-0209




91120500648

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-W10-15 AREA 200-WEST

DATE 10-2-89

LOG RUN #1 LOG TYPE ANALOG - GAMMA RAY

SURVEY COORDINATES _____ N _____ E

ELEVATION DATUM TOP OF TEN INCH CASING ELEVATION _____

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION North of 241-T TANK FARM

GROUND SURFACE ELEVATION -

SURFACE TEMPERATURE 14.9 °C AT END OF LOG RUN WEATHER WINDY - CLEAR

## BOREHOLE INFORMATION

| | |
|---|---|
| DRILLER CRAIG WALMSLEY KEH | |
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER DRIVE BARREL & REGULAR PATTERN |
| BOREHOLE DIAMETER(S)/DEPTH 10" | |
| DEPTH DRILLER 140 | DEPTH LOGGER 139.2 |
| LIQUID LEVEL DRY | LIQUID APPEARANCE NA |
| TEMPERATURE NA | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 140 - SURFACE, 2.14' Stickup |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| WELL SCREEN INTERVAL: NA | |

COMMENTS: LOG STRUCTURE, COMPLEX. SHOWS, POSSIBLE LAYERS >75'

Depth Return Error = +2" (high)

CASING STICKUP - 2.14' above NOMINAL GROUND SURFACE

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) D. L. McArthur

EQUIPMENT BRAND MLS — EQUIPMENT TYPE ANALOG

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG 27 A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll p/m/c/M

DEAD TIME 7.4 μ SEC — WARM UP TIME 30 MINUTES

# LOGGING INFORMATION

LOG INTERVAL FROM 139.3' TO 2.9'

RERUN(S) 139.3 - 109'

PRE SURVEY CALIBRATION: POSITION 1 287 cll p/m/c/s POSITION 2 55 cll p/m/c/s BACKGROUND 85

LOGGING SPEED 5'/min.

START TIME 1026 — COMPLETION TIME 1105

CHART SPEED(S), FT/IN. 10'/in.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50c/s/in.

RERUN SCALES, CPS/IN. 50c/s/in.

TIME CONSTANT(S) 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 292 cll p/m/c/s POSITION 2 55 cll p/m/c/s BACKGROUND 80

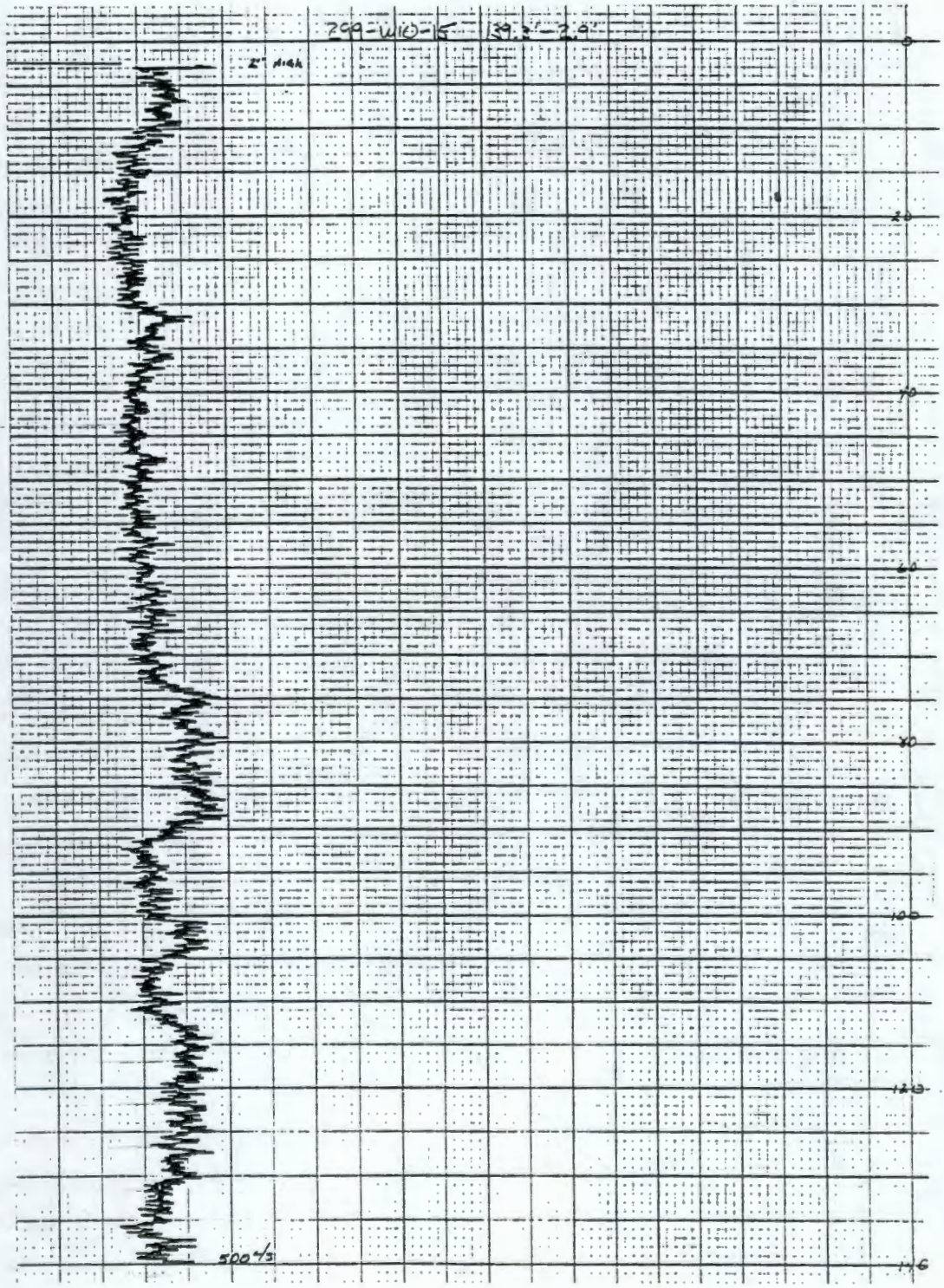
PERCENT CHANGE: POSITION 1 1.8% POSITION 2 0%

COMMENTS:

WITNESSED AND VERIFIED BY: J. I. Gould — Log is SUITABLE for Analysis - JK 10/2/89

148

WHC-MR-0209


299-W10-15
2" high
500 c/s
0
20
40
60
80
100
120
140

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-W10-15 AREA ~~200~~-WEST

DATE 10-16-89

LOG RUN #2 LOG TYPE GAMMA RAY

SURVEY COORDINATES N/A N N/A E

ELEVATION DATUM Top of 8" CASING ELEVATION N/A

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION North SIDE of 241-T TANK FARM

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 16.2°C WEATHER CLEAR

## BOREHOLE INFORMATION

DRILLER CRAG WAMSLEY KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER REGULAR PATTERN 8" |
| BOREHOLE DIAMETER(S)/DEPTH 10" to 140' / 8" to 221' | |
| DEPTH DRILLER 221' | DEPTH LOGGER 220.7' |
| LIQUID LEVEL 206.96' G.S | LIQUID APPEARANCE MUDDY |
| TEMPERATURE 18.1°C | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 140' to + .6" Stickup |
| TYPE 8" CARBON STEEL | INTERVAL 222' to + 1.8' Stickup |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL: NA

COMMENTS:

RETURN ERROR 1" HIGH

9 1 1 2 0 5 0 0 6 5 3

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGhan

EQUIPMENT BRAND MLS — EQUIPMENT TYPE ANALOG

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12/88

SERIAL NO. CG 27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ eU ppm/c/s

DEAD TIME 7.4 μ SEC — WARM UP TIME > 15 MIN.

# LOGGING INFORMATION

LOG INTERVAL FROM 220.7' TO 110'

RERUN(S) 220.7' – 190'

PRE SURVEY CALIBRATION: POSITION 1 287 eU ppm/c/s POSITION 2 55 eU ppm/c/s BACKGROUND 80 c/s

LOGGING SPEED 5'/MIN.

START TIME 1410 — COMPLETION TIME 1450

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 500 c/s, 50 c/s/IN.

RERUN SCALES, CPS/IN. 500 c/s, 50 c/s/IN.

TIME CONSTANT(S) 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 283 eU ppm/c/s POSITION 2 59 eU ppm/c/s BACKGROUND 80 c/s

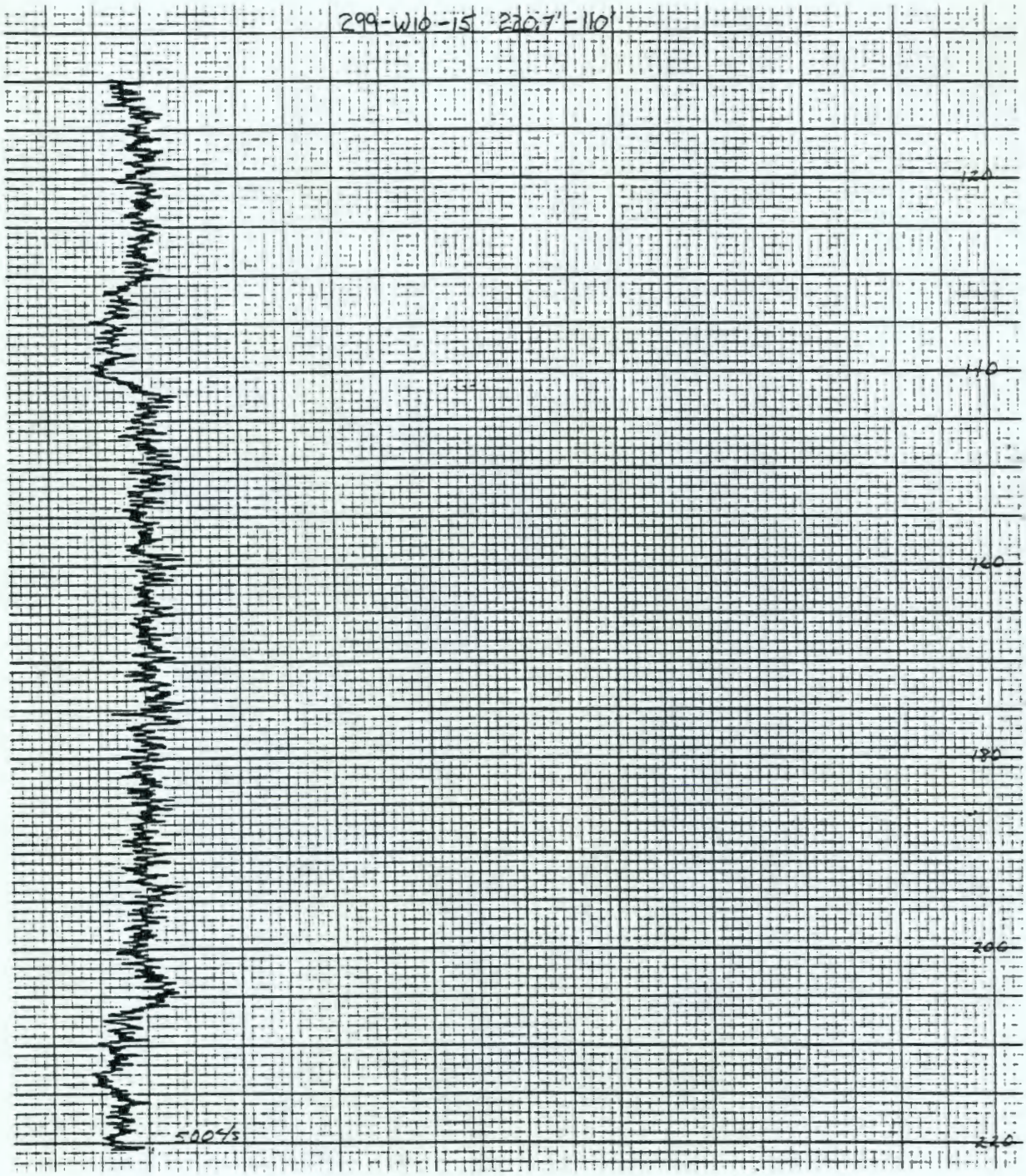
PERCENT CHANGE: POSITION 1 1.4% POSITION 2 6.8%

COMMENTS:

WITNESSED AND VERIFIED BY: John R. Broden 10-16-89

WHC-MR-0209

1501




9 1 1 2 0 5 0 0 6 7 4

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-W10-16 AREA 200-West

DATE 9-22-89

LOG RUN #1 LOG TYPE GAMMA RAY

SURVEY COORDINATES N/A N N/A E

ELEVATION DATUM Top of 10" CASING ELEVATION N/A

LOG MEASURED FROM GROUND SURFACE

LOCATION DESCRIPTION S. SIDE OF 241-T TANK FARM

GROUND SURFACE ELEVATION N/A

SURFACE TEMPERATURE 23.3°C WEATHER CLEAR

## BOREHOLE INFORMATION

DRILLER GARY LYDIN KEH

| | |
|---|---|
| DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER 8" ~~CLAY~~ VEN DRIVE BBL. |
| BOREHOLE DIAMETER(S)/DEPTH 10" | |
| DEPTH DRILLER 132' | DEPTH LOGGER 130.8' |
| LIQUID LEVEL DRY | LIQUID APPEARANCE -NA- |
| TEMPERATURE -NA- | |

## CASING RECORD

| | |
|---|---|
| TYPE 10" CARBON STEEL | INTERVAL 132' - ~~SURFACE~~ TO 0'2" 1'2" ABOVE SURFACE |
| TYPE | INTERVAL |
| TYPE | INTERVAL |
| TYPE | INTERVAL |

WELL SCREEN INTERVAL:

COMMENTS: Top of Casing ~1'2" above Nominal Ground Surface

Depth Return Error, +3" (high)

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McBlean

EQUIPMENT BRAND MLS — EQUIPMENT TYPE ANALOG

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12-88

SERIAL NO. CG-27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ cll p/m

DEAD TIME 7.4 μ SEC. — WARM UP TIME 30 MINUTES

# LOGGING INFORMATION

LOG INTERVAL FROM 130.8 TO 3.9

RERUN(S) 130.8 - 100'

PRE SURVEY CALIBRATION: POSITION 1 291 cll p/m POSITION 2 61 cll p/m BACKGROUND 85 c/s

LOGGING SPEED 5'/MIN.

START TIME 1015 — COMPLETION TIME 1120

CHART SPEED(S), FT/IN. 10'/in.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 50 c/s /in.

RERUN SCALES, CPS/IN. 50 c/s /in.

TIME CONSTANT(S) 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 296 cll p/m POSITION 2 54 cll p/m BACKGROUND 80 c/s

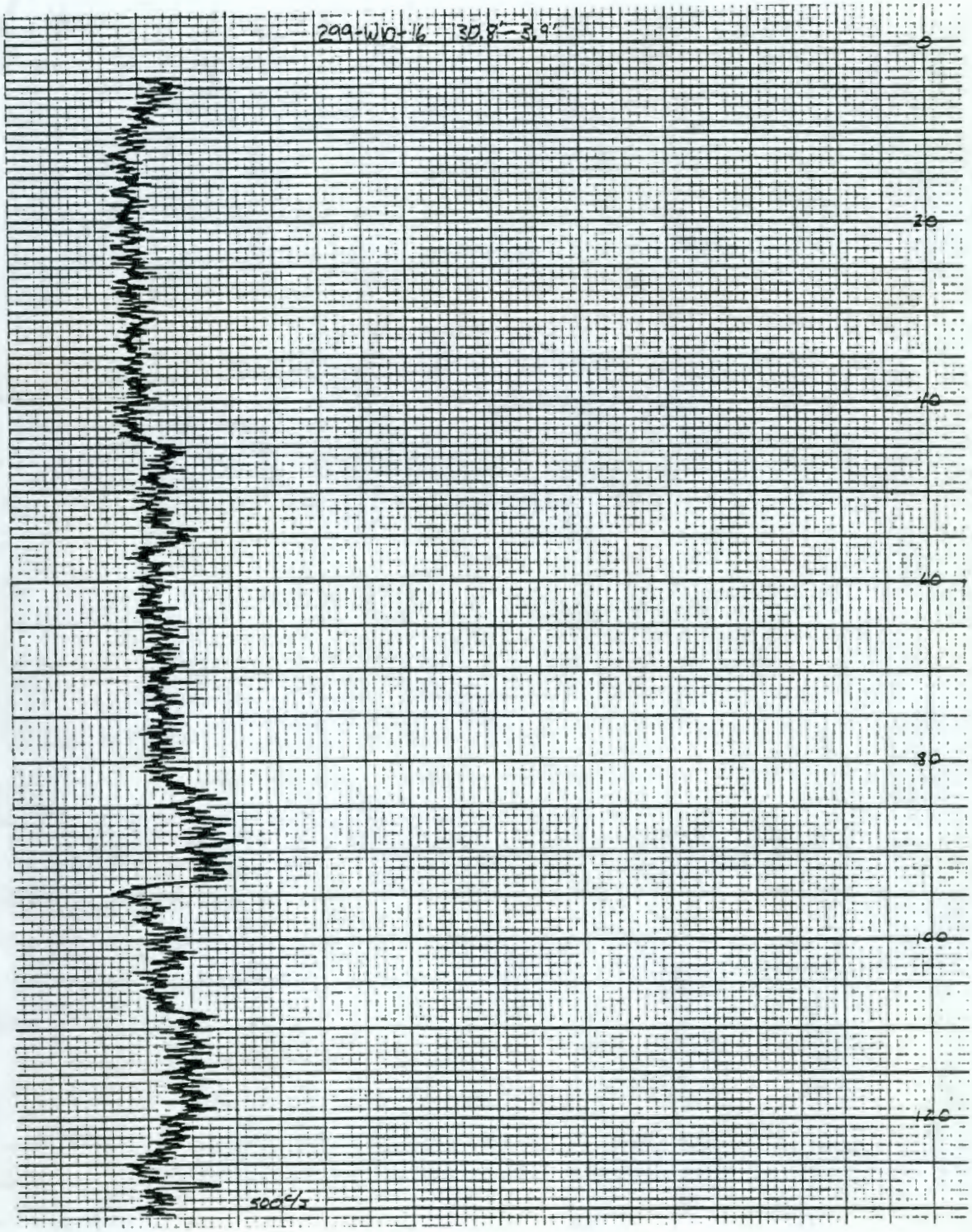
PERCENT CHANGE: POSITION 1 1.7 % POSITION 2 18 %

COMMENTS: WAITING ON WITNESS, 1 HR. 20 MIN.

WITNESSED AND VERIFIED BY: [signature] Well log is suitable for lithologic correlation. [signature] 9/22/89

454

WHC-MR-0209




9112050063 7

# WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-W10-16 AREA 200-WEST
DATE 10-11-89
LOG RUN #2 LOG TYPE GAMMA RAY
SURVEY COORDINATES _____ N _____ E
ELEVATION DATUM Top of 8" CASING ELEVATION _____
LOG MEASURED FROM GROUND SURFACE
LOCATION DESCRIPTION S. SIDE of 241-T TANK FARM
GROUND SURFACE ELEVATION _____
SURFACE TEMPERATURE 18.8°C WEATHER Cloudy

## BOREHOLE INFORMATION

DRILLER GARY LYDIN KEH
DRILL RIG TYPE CABLE TOOL | BIT TYPE/DIAMETER REGULAR PATTERN 8"
BOREHOLE DIAMETER(S)/DEPTH 10" - 131' / 8" - 219'
DEPTH DRILLER 219' | DEPTH LOGGER 218.5
LIQUID LEVEL 216.28 G.S. | LIQUID APPEARANCE CLEAR
TEMPERATURE 18.7°C

## CASING RECORD

TYPE 10" CARBON STEEL | INTERVAL 131 - SURFACE
TYPE 8" CARBON STEEL | INTERVAL 121 - SURFACE 1.6' Stickup
TYPE | INTERVAL
TYPE | INTERVAL

WELL SCREEN INTERVAL: NA

COMMENTS: WATER Shut off BY CASING.
Depth RETURN ERROR 1"

# EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McElhaney

EQUIPMENT BRAND MLS — EQUIPMENT TYPE ANALOG

TOOL TYPE GAMMA RAY — BASE CALIBRATION DATE 12/88

SERIAL NO. CG 27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR $8.53 \times 10^{-2}$ eU ppm/c/s

DEAD TIME 7.4 μ SEC — WARM UP TIME 15 MIN.

## LOGGING INFORMATION

LOG INTERVAL FROM 218.5' TO 100'

RERUN(S) 218.5' - 186'

PRE SURVEY CALIBRATION: POSITION 1 292 eU ppm/c/s POSITION 2 55 eU ppm/c/s BACKGROUND 80 c/s

LOGGING SPEED 5'/MIN.

START TIME 1105 — COMPLETION TIME 1130

CHART SPEED(S), FT/IN. 10'/IN.

CHART RECORDER HORIZONTAL SCALE, CPS/IN. 500 c/s, 50 c/s/IN.

RERUN SCALES, CPS/IN. 500 c/s, 50 c/s/IN.

TIME CONSTANT(S) 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 292 eU ppm/c/s POSITION 2 55 eU ppm/c/s BACKGROUND 80 c/s

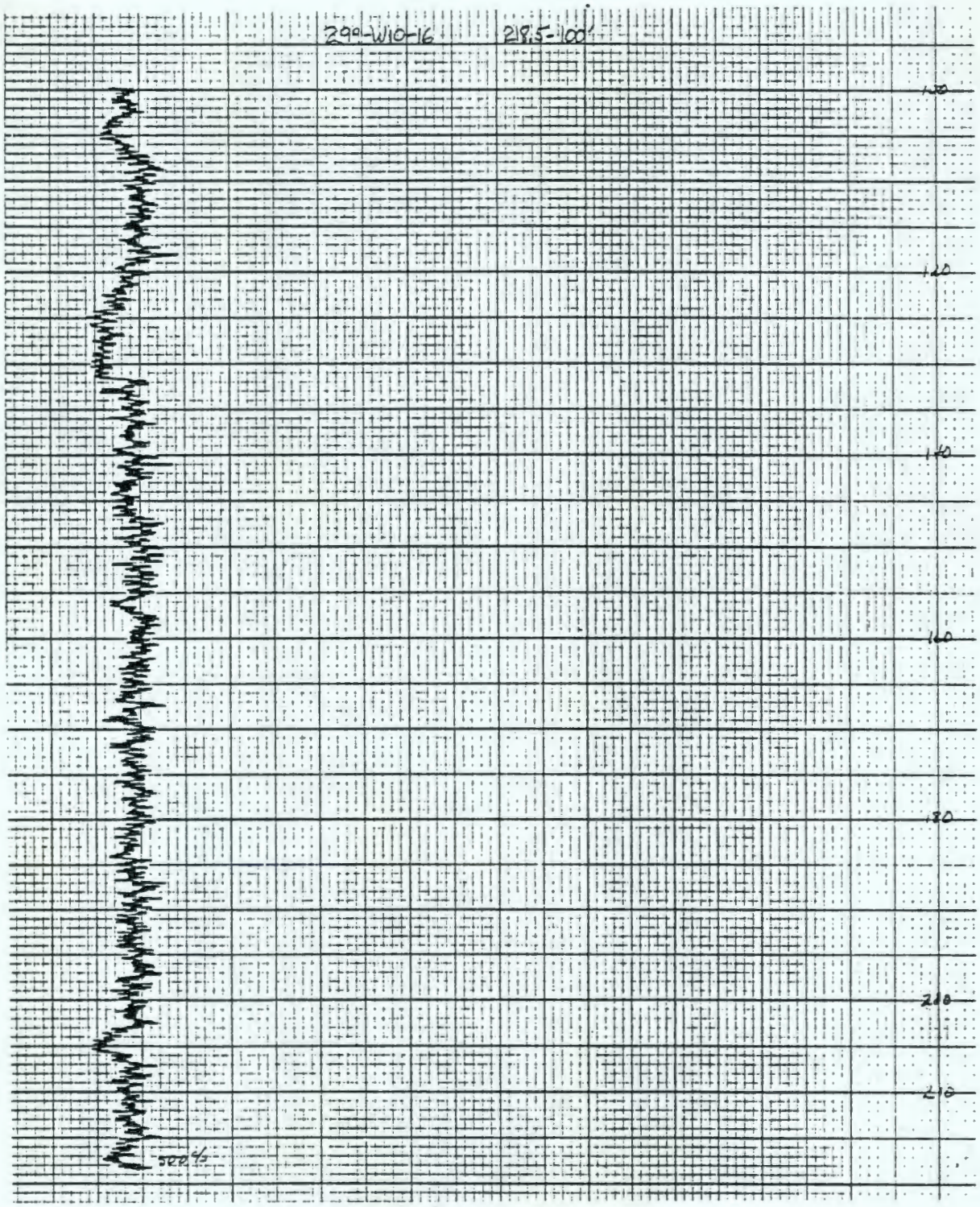
PERCENT CHANGE: POSITION 1 0% POSITION 2 0%

COMMENTS: post survey calibration was run twice. The first post survey calibration was off. The reason for this is unknown.

WITNESSED AND VERIFIED BY: J.R. Rhodes 10-11-89

WHC-MR-0209

657


299-W10-16
218.5-100'
100
120
140
160
180
200
220
500 c/s

# Section B

## Well Construction Information of Twelve Wells for Single Shell Tanks

* Table of Significant Dates
* Well Completion/Inspection Forms
* As Built Diagrams
* Survey Reports (not completed)

9 1 1 2 0 5 0 0 6 5 1

# DRILL LOG

| By | Rig | Well Number | Computer Number | Project or Work Order No. |
|---|---|---|---|---|
| M. Birch | BE 22-W | 299-W10-16 | N/A | W-P17 SST |
| Date: 9-15-89 | Drive Barrel | Depth: 95' To 95' | | Subcontract No.: N/A |

| Total Casing | Depth | Drill Method | Wet/Dry Sample | LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc. | Time | Drilling Comments |
|---|---|---|---|---|---|---|
| | | | | Beginning depth for the day 95' | | |
| | | | | Total casing at beginning of day = 91'11½" + 9'10" = 101'9½" | | |
| | | | | | 0815 | Rig motor have a |
| | | | | | | blown head gasket |
| | | | | | | called for service |
| | | | | | 0914 | mechanic on site |
| | | | | | | - won't be able to fix it |
| | | | | | | today |
| | | | | Driller & SSO remaining on site to move | 0930 | off site |
| | | | | rig off of hole for repair | | |
| | | | | Sent M. Birch home to stay within 50 hour work | 1000 | End of Day |
| | | | | week | | |

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by W. L. Matthews 12-1-89 Mark Birch 9-15-89

WHC-MR-0209

560

SIGNIFICANT WELL CONSTRUCTION, COMPLETION AND DEVELOPMENT DATES

| WELL NUMBER | STARTED | COMPLETION | SLUG TEST | DEVELOPMENT | HYDROSTAR |
|---|---|---|---|---|---|
| 299-E24-19 | 08/09/89 | 09/27/89 | 10/02/89 | 10/05/89 | 10/23/89 |
| 299-E25-40 | 08/07/89 | 09/15/89 | 09/29/89 | 10/04/89 | 10/18/89 |
| 299-E25-41 | 08/08/89 | 09/22/89 | 09/25/89 | 10/04/89 | 10/25/89 |
| 299-E27-12 | 08/28/89 | 10/06/89 | 10/19/89 | 10/23/89 | 10/24/89 |
| 299-E27-13 | 09/01/89 | 10/12/89 | 10/20/89 | 10/24/89 | 11/08/89 |
| 299-E27-14 | 09/19/89 | 10/17/89 | 10/20/89 | 10/25/89 | 11/07/89 |
| 299-E27-15 | 08/28/89 | 10/03/89 | 10/19/89 | 10/23/89 | 10/25/89 |
| 299-E33-31 | 07/11/89 | 09/11/89 | N/A | 09/27/89 | 10/17/89 |
| 299-E33-32 | 07/11/89 | 09/05/89 | N/A | 09/27/89 | 10/17/89 |
| 299-E33-33 | 07/17/89 | 08/30/89 | 09/28/89 | 09/28/89 | 10/18/89 |
| 299-W10-15 | 09/20/89 | 11/07/89 | 11/03/89 | 11/13/89 | 11/20/89 |
| 299-W10-16 | 09/07/89 | 10/25/89 | 10/30/89 | 11/01/89 | 11/09/89 |

* N/A - Hydrostar pump was installed before a slug test could be preformed.

# WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, R0)

Specification No. WHC-S-014 Rev. No. 3
Project W-017
Location SINGLE SHELL TANKS
Drilling Co. KAISER ENG. HANFORD
Driller MEL THORESSEN
Other (companies) N/A
Geologist(s) GOODWIN, LUBRECHT, AIRHART, KENNEDY

Well No. 299-E24-19 Temp. Well No. N/A
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-285' H 285'-303'
Drilling Fluid 200 E RAW WATER SUPPLY
Other NONE

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| NAT. GAMMA | 150.5' - 4' | 8/17/89 |
| ~~NAT. GAMMA~~ | ~~255' - 120'~~ | ~~8/24/89~~ |
| NAT. GAMMA | 255' - 120' | 8/24/89 |
| NAT. GAMMA | 294.5' - 225' | 8/29/89 |

## COMPLETION DATA

Drilled Depth 303.19'
Completed Depth 300.68'
Date Started 8/9/89
Date Completed 9/27/89
Static Water Level/Date 285.6' 8-31-89

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method VISUAL
Acceptance Criteria SECT. 7.6

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | SMW | | 8/9/89 |
| Temporary Materials | SMW | | 8/31/89 |
| Permanent Materials | SMW | | 9/27/89 |

### MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SMW | | 9/27/89 |
| Material Packing | SMW | | 9/27/89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| CONTINUOUS WIRE WRAP STAINLESS STEEL CHANNEL PACK | 21.03' | 10 |
| | — | — |

Depth(s) 300.68' - 279.65'
— - —

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SPA Reject Date 9-25-89

### LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria SECT. 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | NONE | SMW | | 9/27/89 |
| Lubricants | FOOD GRADE OIL | SMW | | 9/27/89 |

### STRAIGHTNESS TEST

Inspection Method 20' OF 6" S.S. CASING DOWN HOLE
Acceptance Criteria SECT. 5.3
Accept SMW Reject Date 8/30/89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| JOHNSON TYPE 304 SCH 5 STAINLESS STEEL | 4" | 279.65' - 0.92 |
| | — | — - — |

Inspection Method VISUAL
Acceptance Criteria ~~VISU~~ SECT. 4.2.4
Accept SPA Reject Date 9-25-89

### WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method MEASURED W/ STEEL ~~TAPE~~
Acceptance Criteria SECT. 4.2.6

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 16-30 MESH SILICA SAND | 302.1' - 276.8' | 9.9 FT³ | SPA | | 9/25/89 |
| 1/4" BENTONITE PELLETS | 276.8' - 273.7' | 1.24 FT³ | SPA | | 9/25/89 |
| 8-20 MESH BENTONITE CRUMBLES | 273.7' - 20.0' | 139.16 FT³ | SMW | | 9/27/89 |
| CEMENT GROUT | 20.0' - 1.95' | 9.9 FT³ | SMW | | 9/27/89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
DLM Downhole TV Inspection
~~DLM~~ Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

PNL MA567 DO-1, Rev. 0

662

Reviewed by D.L. McGhan 12-8-89

9112050064

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E24-19 Geologist GOODWIN, AIRHART, LUBRECHT, KENNEDY Page 1 of 3

Reviewed by V.C. McGlan Date 12-8-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 151'10" OF 10" CARBON STEEL CASING | | 5' | | MUDDY SAND |
| | | 10' | | GRAVELLY MUDDY SAND |
| | | 15' | | GRAVELLY SAND |
| 302'6" OF 8" CARBON STEEL CASING | | 20' | | SAND |
| | | 25' | | SLIGHTLY GRAVELLY SAND |
| | | 30' | | SANDY GRAVEL |
| 290.57' OF 4" STAINLESS STEEL CASING | | 35' | | " " |
| | | 40' | | " " |
| | | 45' | | GRAVELLY SAND |
| | | 50' | | SANDY GRAVEL |
| | | 55' | | " " |
| | | 60' | | MUDDY SAND @ 56' SAND |
| | | 65' | | " |
| | | 70' | | GRAVELLY SAND |
| | | 75' | | " " |
| | | 80' | | " " |
| | | 85' | | " " |
| | | 90' | | " " |
| | | 95' | | SANDY GRAVEL |
| | | 100' | | " " |
| | | 105' | | " " |
| | | 110' | | GRAVELLY SAND |
| | | 115' | | " " |
| | | 120' | | " " |
| | | 125' | | SAND |
| | | 130' | | " |

A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299 - E2W - 19 Geologist GOODWIN, AIRHART, LUBRECHT, KENNEDY Page 2 of 3

Reviewed by [illegible] Date 12-8-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 151'10" OF 10" CARBON STEEL CASING WITH DRIVE SHOE | | 135' | | SLIGHTLY GRAVELLY SAND |
| | | 140' | | " " " |
| | | 145' | | SAND |
| | | 150' | | SLIGHTLY GRAVELLY SAND |
| 302'6" OF 8" CARBON STEEL CASING | | 155' | | SAND |
| | | 160' | | " |
| | | 165' | | " |
| 280.57' OF 4" STAINLESS STEEL CASING | | 170' | | " |
| | | 175' | | " |
| | | 180' | | " |
| | | 185' | | " |
| | | 190' | | ENCOUNTERED 350-400 cpm @ 187' " |
| | | 195' | | NO CONTAM. DETECTED 191'-194' " 350-400 cpm @ 195' " |
| | | 200' | | NO CONTAM. DETECTED @ 200' " |
| | | 205' | | " |
| | | 210' | | " |
| | | 215' | | " |
| | | 220' | | " |
| | | 225' | | " |
| | | 230' | | " |
| | | 235' | | " |
| | | 240' | | " |
| | | 245' | | " |
| | | 250' | | SLIGHTLY GRAVELLY SAND |
| | | 255' | | GRAVELLY SAND |
| | | 260' | | SAND |

A-1800-186 (3/87)

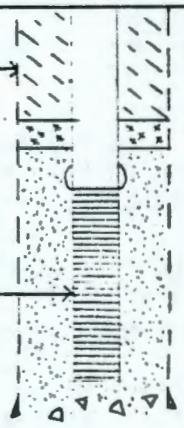
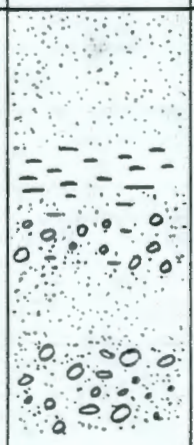
9112050066

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E24-19 Geologist GOODWIN, AIRHART, LUBRECHT, KENNEDY Page 3 of 3

Reviewed by [illegible] Date 12-8-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 302'6" OF 8" CARBON STEEL CASING W/ DRIVE SHOE |  | 265' |  | SAND |
| | | 270' | | " |
| | | 275' | | " |
| | | 280' | | MUD |
| | | 285' | | MUDDY SANDY GRAVEL |
| 21.03' OF 4" STAINLESS STEEL CHANNEL-PACK SCREEN | | 290' | | " " " |
| | | 295' | | SAND |
| | | 298' | | SANDY GRAVEL |
| | | 303' | | " " |
| | | | | T.D. = 303.19' |
| | | | | COMPLETION DEPTH = 300.68' |
| COMPLETION SYMBOLS: | | | | |
| CEMENT GROUT | | | | |
| BENTONITE CRUMBLES | | | | |
| BENTONITE PELLETS | | | | |
| SILICA SAND | | | | |
| CASING JOINTS | | | | |
| CASING CENTRALIZER | | | | |

A-1800-186 (3/87)

9112050065 7

PNL-MA-567 DO-1, REV. 0.

665

# WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project W-017
Location SINGLE SHELL TANKS
Drilling Co. KAISER ENG. HANFORD
Driller LOUIS WATKINS
Other (companies) NONE
Geologist(s) M. LUBRECHT, J. KENNEDY, S. AIRHART, E. JENSEN, S. GOODWIN

Well No. 299-E25-40 Temp. Well No. —
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-274' H —
Drilling Fluid $H_2O$ 200 E Raw Water Supply
Other NONE

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| NAT. GAMMA | 4' - 147.5' | 8-15-89 |
| NAT. GAMMA | 110' - 274' | 8-24-89 |

## COMPLETION DATA

Drilled Depth 274'
Completed Depth 8-7-89 SPA ~~274'~~ 273'
Date Started 8-7-89
Date Completed 9/18/89
Static Water Level/Date 257.4'/8-24-89

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method VISUAL
Acceptance Criteria SECT. 7.6

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | MOL | | 8-7-89 |
| Temporary Materials | MOL | | 8-7-89 |
| Permanent Materials | SPA | | 9-12-89 |

### MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SECT 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SPA | | 9-12-89 |
| Material Packing | SPA | | 9-12-89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| STAINLESS STEEL CHANNEL-PACK | 21' | 10 |

Depth(s) 252' - 273'
Inspection Method Visual
Acceptance Criteria Sect. 4.2.3
Accept SPA Reject Date 9-12-89

### LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria SECT 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | None | MOL | | 8-24-89 |
| Lubricants | CRISCO OIL | MOL | | 8-24-89 |

### STRAIGHTNESS TEST

Inspection Method 20' of 6" S.S. CASING DOWN HERE
Acceptance Criteria SECT 8.3
Accept MOL Reject Date 8-24-89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| STAINLESS STEEL | 4" | +1.25 - 252' |

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.4
Accept SPA Reject Date 9-12-89

### WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method VISUAL, MEAS. W/ STEEL TAPE Acceptance Criteria SECT. 4.2.6 - 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 16-30 COL. SILICA SAND | 248.4' - 274.1' | 10.64 $ft^3$ | SPA | | 9-13-89 |
| 3/8" VOLCLAY TABLETS | 244.8' - 248.4' | 1.24 $ft^3$ | SPA | | 9-14-89 |
| 8-20 BENTONITE CRUMBLES | 20.3' - 244.8' | 131.35 $ft^3$ | SPA | | 9-15-89 |
| CEMENT GROUT | 2' - ~~14~~ 20.3' SPA | 14.52 $ft^3$ | SPA | | 9-18-89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
VGM 9/14 Downhole TV Inspection
~~VGM~~ Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

PNL MA567 DO-1, Rev. 0 666 Reviewed by V. L. McClain 12-4-89

9112050068

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E25-40 Geologist M.D. Lubrecht, Goodwin Page 1 of 3

Reviewed by V. T. McGhan Date 12-4-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 143.7' OF 10" CARBON STEEL CASING | | 5 | | SAND (Tr Cobbles) |
| | | 10 | | SAND |
| CEMENT GROUT | | 15 | | SAND |
| | | 20 | | SAND (Tr. Cobbles) |
| 273.1' OF 8" CARBON STEEL CASING | | 25 | | " |
| | | 30 | | " |
| | | 35 | | " |
| | | 40 | | SANDY GRAVEL |
| | | 45 | | SAND |
| FACTORY INSTALLED CENTRALIZERS | | 50 | | " |
| | | 55 | | " |
| 253.25' of 4" DIA STAINLESS STEEL CASING | | 60 | | " |
| | | 65 | | SLIGHTLY GRAVELLY SAND |
| | | 70 | | Sl. Gravelly SAND |
| | | 75 | | Sandy GRAVEL |
| | | 80 | | Gravelly SAND |
| | | 85 | | Gravelly SAND |
| 8-20 BENTONITE | | 90 | | Gravelly SAND |
| | | 95 | | gravelly SAND |
| | | 100 | | SAND |
| | | 105 | | SAND |
| | | 110 | | SAND |
| | | 115 | | SAND |
| | | 120 | | SAND |
| | | 125 | | SAND |
| | | 130 | | SAND |

A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E25-40 Geologist M.O Lobrecht, GOODWIN Page 2 of 3

Reviewed by V. L. McElhan Date 12-4-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 10" DIA CARBON STEEL | | 135 | | SAND |
| CASING 0'- 143.7' | | 140 | | SAND |
| | | 145 | | SAND |
| | | 150 | | SAND |
| 8" DIA. CARBON STEEL | | 155 | | " |
| CASING 0'- 273.1' | | 160 | | " |
| | | 165 | | slightly gravelly SAND |
| | | 170 | | " " " |
| | | 175 | | SAND |
| | | 180 | | " |
| | | 185 | | " |
| | | 190 | | " |
| | | 195 | | Sandy GRAVEL |
| | | 200 | | " " |
| | | 205 | | " " |
| | | 210 | | SLIGHTLY GRAVELLY SAND |
| | | 215 | | " " " |
| | | 220 | | SAND |
| | | 225 | | " |
| 8-20 BENTONITE | | 230 | | " |
| | | 235 | | " |
| | | 240 | | " |
| 3/8" VOLCLAY TABLETS | | 245 | | " |
| | | 250 | | SLIGHTLY MUDDY SAND |
| 16-30 COL. SILICA SAND | | 255 | | MUD |
| | | 260 | 8-24-89 | SLIGHTLY GRAVELLY SAND |

A-1800-186 (3/87)

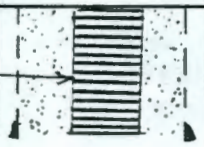
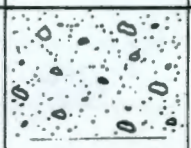
9112050670

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E25-40 Geologist LUBRECHT, GOODWIN Page 3 of 3

Reviewed by W. L. McKhan Date 12-4-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 10-SLOT, STAINLESS STEEL CHANNEL PACK SCREEN -21.0' |  | 265 |  | SANDY GRAVEL |
| | | 270 | | " " |
| | | 275 | T.D. 274' | |

A-1800-186 (3/87)

# WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, RO)

Specification No. ~~W-017~~ WHC-S-014 Rev. No. 3
Project W-017
Location SINGLE SHELL TANKS
Drilling Co. KAISER ENGINEERING HANFORD
Driller CRAIG WHAMSLEY
Other (companies)
Geologist(s) Lubrecht, Bleyer, Goodwin, AIRHART, JENSEN

Well No. 299-E25-41 Temp. Well No. N/A
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-225' H 225'-279'
Drilling Fluid 200-E RAW WATER SUPPLY
Other NONE

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| Nat. Gamma | 130±-4' | 8/15/89 |
| Nat. Gamma | 276'-100' | 8/24/89 |

## COMPLETION DATA

Drilled Depth 279'
Completed Depth 276.34'
Date Started 8/8/89
Date Completed 9/22/89
Static Water Level/Date 262.24' 9-22-89

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method VISUAL
Acceptance Criteria 7.6

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | RB | | 8-8-89 |
| Temporary Materials | MAL | | 8-24-89 |
| Permanent Materials | SPA | | 9-18-89 |

### MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria Sec. 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | MAL | | 8/9/89 |
| Material Packing | MAL | | 8/9/89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| STAINLESS STEEL CONTINUOUS WIRE-WRAP CHANNEL PACK | 21.01' | 10 |

Depth(s) 276.34' - 255.33'

Inspection Method VISUAL
Acceptance Criteria 4.2.3
Accept SPA Reject Date 9-18-89

### LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria Sec. 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | NONE | MAL | | 8-9-89 |
| Lubricants | FOOD OIL | MAL | | 8-9-89 |

### STRAIGHTNESS TEST

Inspection Method 20 FEET OF 6 INCH STAINLESS CASING DOWN BOREHOLE
Acceptance Criteria Sec. 8.3
Accept MAL Reject Date 8-24-89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| TYPE 304, SCH. 5 STAINLESS STEEL | 4" | 255.33' ± 2.1 |

Inspection Method VISUAL
Acceptance Criteria Sec. 4.2.4
Accept SPA Reject Date 9-18-89

### WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria 4.3.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method MEASURED WITH STEEL TAPE
Acceptance Criteria Sec. 4.26 TO 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 16-30 COLORADO SILICA SAND | 277.3'-252.4' | 9.9 FT³ | EJ | | 9-20-89 |
| 3/8" BENTONITE PELLETS | 252.4'-248.7' | 1.24 FT³ | EJ | | 9-20-89 |
| 8-20 BENTONITE CRUMBLES | 248.7'-17.5' | 122.83 FT³ | SPA | | 9-22-89 |
| CEMENT GROUT | 17.5'-2.0' | 5.94 FT³ | SPA | | 9-22-89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
~~TV~~ Downhole TV Inspection
~~Complete~~ Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

PNL MA 567 DO-1, Rev. 0
Reviewed by D.L. MacLean 12-7-89 670

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E25-41 Geologist M Lubrecht Page 1 of 3

Reviewed by: D.E. McGhan Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 10" CARBON STEEL CASING | | 5 | | SAND |
| 0-138'7 1/2" (TEMPORARY) | | 10 | | SAND |
| | | 15 | | Sl. Muddy SAND |
| | | 20 | | Sandy GRAVEL |
| 280'3" of 8" CARBON | | 25 | | Sandy GRAVEL |
| STEEL CASING | | 30 | | SAND |
| | | 35 | | SAND |
| | | 40 | | Muddy Sandy GRAVEL |
| 257.43' of 4" STAINLESS | | 45 | | Sl. Gravelly SAND |
| STEEL CASING | | 50 | | SAND |
| | | 55 | | SAND |
| | | 60 | | Sl. Gravelly SAND |
| | | 65 | | Sl. Gravelly SAND |
| | | 70 | | Gravelly SAND |
| | | 75 | | Gravelly SAND |
| | | 80 | | Sl. Gravelly SAND |
| | | 85 | | Gravelly SAND |
| | | 90 | | Gravelly SAND |
| | | 95 | | Gravelly SAND |
| | | 100 | | SAND |
| | | 105 | | SAND |
| | | 110 | | SAND |
| | | 115 | | SAND |
| | | 120 | | Interbedded SAND & muddy f. SAND |
| | | 125 | | Interbedded SAND & muddy f. SAND |
| | | 130 | | SAND |

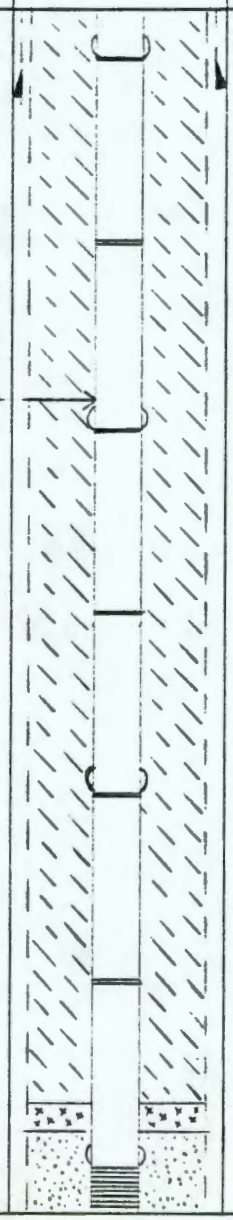
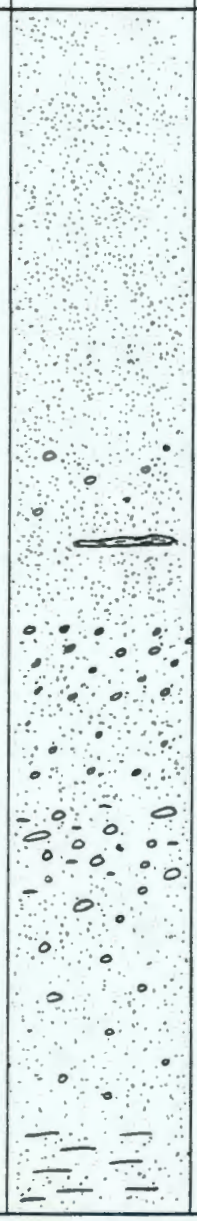
A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299 - E25 - 41 Geologist M. LUBRECHT Page 2 of 3

Reviewed by V. L. McGhan Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 139' 7 1/2" OF 10" CARBON |  | 135 |  | SAND |
| STEEL CASING | | 140 | | " |
| | | 145 | | " |
| 280' 3" OF 8" CARBON | | 150 | | " |
| STEEL CASING | | 155 | | " |
| | | 160 | | " |
| | | 165 | | " |
| 257.43' OF 4" STAINLESS | | 170 | | |
| STEEL CASING | | 175 | | " |
| | | 180 | | slightly Gravelly SAND |
| | | 185 | | " " " |
| | | 190 | | SAND |
| | | 195 | | " |
| | | 200 | | Sandy GRAVEL |
| | | 205 | | Sandy GRAVEL |
| | | 210 | | gravelly SAND |
| | | 215 | | " " |
| | | 220 | | MUDDY SANDY GRAVEL |
| | | 225 | | " " " |
| | | 230 | | GRAVELLY SAND |
| | | 235 | | " " |
| | | 240 | | " " |
| | | 245 | | " " |
| | | 250 | | " |
| | | 255 | | SANDY MUD |
| | | 260 | | " " |

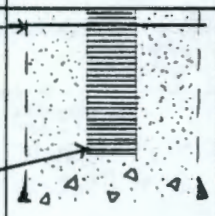
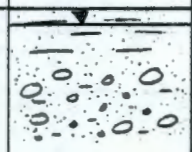
A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E25-41 Geologist M. LUBRECHT Page 3 of 3

Reviewed by V.E. McGhan Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description D/W @ 262.24 9-22-89 |
| 280' 3" of 8" CARBON |  | 265 |  | SANDY MUD |
| STEEL CASING | | 270 | | MUDDY SANDY GRAVEL |
| | | 275 | | SANDY GRAVEL |
| 21.01' of 4" CHANNEL | | | | |
| PACK SCREEN (10 SLOT) | | | | |
| COMPLETION SYMBOLS: | | | | |
| CEMENT GROUT | | | | |
| BENTONITE CRUMBLES | | | | |
| BENTONITE PELLETS | | | | |
| SILICA SAND | | | | |
| CASING JOINT | | | | |
| CASING CENTRALIZER | | | | |

A-1800-186 (3/87)

# WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, RO)

Specification No. WHC-5-014 Rev. No. 3
Project W-017
Location Single Shell Tanks
Drilling Co. Kaiser Engineering Hanford
Driller L. Watkins
Other (companies) n/a
Geologist(s) R Miller, I. KENNEDY, S. GOODWIN, S. AIRHART

Well No. 299-E27-12 Temp. Well No. n/a
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0.0'-270.0' H N/A
Drilling Fluid 200E Raw Water Supply
Other N/A

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| nat. gamma | 4.0 - 129.0' | 9/6/89 |
| nat. gamma | 3.1 - 267.0' | 9/18/89 |
| | - | |
| | - | |
| | - | |

## COMPLETION DATA

Drilled Depth 270.0' bls
Completed Depth 267.55
Date Started 8/28/89
Date Completed
Static Water Level/Date 252.12'

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method Visual
Acceptance Criteria Section 7.6

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | RDM | N/A | 8/27/89 |
| Temporary Materials | RDM | N/A | 8/27/89 |
| Permanent Materials | SPA | | 10/6/89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| CONTINUOUS WRAP STAINLESS | 21.03' | 10 |
| STEEL CHANNEL PACK | - | - |

Depth(s) 267.55' - 246.52'
— - —
Inspection Method Visual
Acceptance Criteria 4 Section 4.2.3
Accept SPA Reject Date 10/4/89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| TYPE 304, SCH. 5 | 4" | 246.52' - +1.8' |
| STAINLESS STEEL | — | — - — |

Inspection Method Visual
Acceptance Criteria Section 4.2.4
Accept SPA Reject Date 10/4/89

### MATERIAL STORAGE/PACKING

Inspection Method Visual
Acceptance Criteria Section 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SPA | | 10/4/89 |
| Material Packing | SPA | | 10/4/89 |

### LUBRICANTS/ADDITIVES

Inspection Method Visual
Acceptance Criteria Section 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | NONE | RDM | N/A | 8/27/89 |
| Lubricants | Food Grade Oil | RDM | N/A | 8/27/89 |

### STRAIGHTNESS TEST

Inspection Method 20 ft 6"ø Stainless Steel Casing
Acceptance Criteria Section 8.3
Accept RDM Reject N/A Date 9/15/89

### WELL PROTECTION

Inspection Method Visual
Acceptance Criteria Section 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method Measurement w/Steel Tape Acceptance Criteria Section 4.2.6 to 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 16-30 MESH SILICA SAND | 267.9' - 243.1' | 8.4 FT³ | SPA | | 10/5/89 |
| 1/4" VOLCLAY TABLETS | 243.1' - 239.9' | 1.24 FT³ | SPA | | 10/5/89 |
| 8-20 MESH BENTONITE CRUMBLES | 239.9' - 18.9' | 111.47 FT³ | SPA | | 10/6/89 |
| CEMENT GROUT | 18.9' - 2.0' | 9.9 FT³ | SPA | | 10/6/89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
N/A Downhole TV Inspection
Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable

PNL MA567 DO-1, Rev. 0

674

Reviewed by V. L. McElhaney 12-7-89

9112050676

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-12 Geologist R. Miller Page 1 of 3

Reviewed by [illegible] Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| temporary 10"Ø carbon steel casing w/ drive shoe from +1.0' to -127'2½" | | 5 | | Gravelly SAND |
| | | 10 | | " |
| | | 15 | | Gravelly SAND to. mud. |
| | | 20 | | Gravelly SAND |
| temporary 8"Ø carbon steel casing w/ drive shoe from +3½" to 268'7" | | 25 | | " |
| | | 30 | | " |
| | | 35 | | Sand |
| | | 40 | | " |
| 250.32' of 4" DIA. STAINLESS STEEL CASING | | 45 | | " |
| | | 50 | | " |
| | | 55 | | " |
| | | 60 | | " |
| | | 65 | | " |
| | | 70 | | |
| | | 75 | | Gravelly SAND |
| FACTORY WELDED CASING CENTRALIZER | | 80 | | " |
| | | 85 | | " |
| | | 90 | | " |
| | | 95 | | " |
| | | 100 | | " |
| | | 105 | | " |
| | | 110 | | " |
| | | 115 | | " |
| | | 120 | | SAND |
| | | 125 | | Gravelly SAND (cobbles) |
| | | 130 | | SAND (cemented) |

A-1800-186 (3/87)

PNL-MA 567, DO-1, Rev 0

675

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-12 Geologist R. Miller Page 2 of 3

Reviewed by V. L. McGhan Date 12-7-89

| Construction Data: Description | Construction Data: Diagram | Depth in Feet | Geologic/Hydrologic Data: Diagram Litho. | Geologic/Hydrologic Data: Lithologic Description |
|---|---|---|---|---|
| temporary 8"Ø carbon steel | | 135 | | SAND (sl. cemented) |
| casing w/ drive shoe from | | 140 | | sl. gravelly SAND |
| +3'6" to 268'7" (272'1") | | 145 | | " |
| | | 150 | | " |
| | | 155 | | " |
| | | 160 | | SANDY GRAVEL |
| | | 165 | | sl. gravelly SAND |
| 250.32' of 4" DIA. | | 170 | | SAND |
| STAINLESS STEEL CASING | | 175 | | " |
| | | 180 | | " |
| | | 185 | | " |
| | | 190 | | " |
| | | 195 | | " |
| | | 200 | | " |
| | | 205 | | " |
| | | 210 | | " |
| | | 215 | | " |
| | | 220 | | " |
| | | 225 | | " |
| | | 230 | | Gravelly Sandy MUD @ 228 - 10" thick<br>Muddy Sandy GRAVEL |
| | | 235 | | Sandy GRAVEL |
| | | 240 | | " |
| | | 245 | | " |
| 21.03' of 4" DIA CHANNEL | 252.1' | 250 | | Muddy Sandy GRAVEL |
| PACK SCREEN (10 SLOT) | 271.8 | 255 | | " (wet) |
| | | 260 | | Sandy GRAVEL |

A-1800-186 (3/87)

PNL-MA567, Do-1, Rev 0

676

9112050067 8

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-12 Geologist R. Miller Page 3 of 3

Reviewed by V.T. McGhan Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| temporary 8"ϕ carbon steel | | 265 | | Sandy GRAVEL |
| from +3'6" to 268'7" (272'1") | | 270 | | " |
| | | | | T.D. = 270.0' |
| 21.03' OF 4" DIA. STAINLESS | | | | COMPLETION DEPTH = 267.55' |
| STEEL CHANNEL PACK SCREEN | | | | |
| COMPLETION SYMBOLS: | | | | |
| CEMENT GROUT | | | | |
| GRANULAR BENTONITE | | | | |
| BENTONITE PELLETS | | | | |
| SILICA SAND | | | | |
| CASING CENTRALIZER | | | | |
| CASING JOINT | | | | |

A-1800-186 (3/87)

MA-567 Do-1, REV. 0

677

# WELL COMPLETION/INSPECTION REPORT(governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project W-017
Location Single Shell Tanks
Drilling Co. Kaiser Engineering Hanford
Driller [illegible]
Other (companies) n/a
Geologist(s) I. KENNEDY, R. MILLER, S GOODWIN

Well No. 299-E27-13 Temp. Well No. n/a
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-10', 20'-243' H 10'-20', 243'-275'
Drilling Fluid 200 E Raw Water Supply
Other N/A

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| NAT. GAMMA | 135.7 - 2.8 | 9-18-89 |
| NAT. GAMMA | 274.7 - 100' | 9-28-89 |
| | - | |
| | - | |
| | - | |

## COMPLETION DATA

Drilled Depth 275.9'
Completed Depth 274.68'
Date Started 9-1-89
Date Completed 10-12-89
Static Water Level/Date 260.73 10/12/89

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method Visual
Acceptance Criteria Section 7.4

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | SAR | | 9-1-89 |
| Temporary Materials | SAR | | 9-1-89 |
| Permanent Materials | | | |

### MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SAR | | 10/12/89 |
| Material Packing | SAR | | 10/12/89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| 4" DIA. CONTINUOUS WRAP | 21' | 10 |
| STAINLESS STEEL CHANNEL PACK | - | - |

Depth(s) 274.68' - 253.68'
— - —

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SPA Reject Date 10/9/89

### LUBRICANTS/ADDITIVES

Inspection Method Visual
Acceptance Criteria Section 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | NONE | SAR | | 9-27-89 |
| Lubricants | Food Grade Oil | SAR | | 9-27-89 |

### STRAIGHTNESS TEST

Inspection Method 20' OF 6" S.S CASING DOWN HOLE
Acceptance Criteria SECT. 8.3
Accept SAR Reject Date 9-27-89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| TYPE 304, SCH. 5 | 4" | 253.68' - +1.8' |
| STAINLESS STEEL | — | — - — |

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.4
Accept SPA Reject Date 10/9/89

### WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method MEASURE W/ STEEL TAPE Acceptance Criteria SECT. 4.2.6 - 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 16-30 MESH SILICA SAND | 275.56' - 250.6' | 7.7 FT³ | SPA | | 10/10/89 |
| 3/8" VOLCLAY TABLETS | 250.6' - 247.5' | 1.24 FT³ | SPA | | 10/10/89 |
| 8-20 MESH GRANULAR BENTONITE | 247.5' - 19.4' | 161.85 FT³ | SAR | | 10/12/89 |
| CEMENT GROUT | 19.4' - 2.05' | 7.92 FT³ | SAR | | 10/12/89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
N/A Downhole TV Inspection
WRM Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicabl

FNL MA567 DO-1, REV. 0

678

Reviewed by S. L. McClain 12-6-89

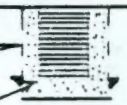
9112050106 10

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-12 Geologist R. Miller Page 3 of 3

Reviewed by W. L. McGhan Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| temporary 8" ϕ carbon steel |  | 265 | | Sandy GRAVEL |
| from +3'6" to 268'7" (272'1") | | 270 | | " |
| | | | | T.D. = 270.0' |
| 21.03' OF 4" DIA. STAINLESS | | | | COMPLETION DEPTH = 267.55' |
| STEEL CHANNEL PACK SCREEN | | | | |
| COMPLETION SYMBOLS: | | | | |
| CEMENT GROUT | | | | |
| GRANULAR BENTONITE | | | | |
| BENTONITE PELLETS | | | | |
| SILICA SAND | | | | |
| CASING CENTRALIZER | | | | |
| CASING JOINT | | | | |

A-1800-186 (3/87)

# WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project W-017
Location Single Shell Tanks
Drilling Co. Kuser Engineering Hanford
Driller [illegible]
Other (companies) n/a
Geologist(s) I. KENNEDY, R. MILLER, S. GOODWIN

Well No. 299-E27-13 Temp. Well No. n/a
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-10', 20'-243' H 10'-20', 243'-275'
Drilling Fluid 200 E Raw Water Supply
Other N/A

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| NAT. GAMMA | 135.7 - 2.3 | 9-18-89 |
| NAT. GAMMA | 274.7 - 100' | 9-28-89 |
| | - | |
| | - | |
| | - | |

## COMPLETION DATA

Drilled Depth 275.9'
Completed Depth 274.65'
Date Started 9-1-89
Date Completed 10-12-89
Static Water Level/Date 260.73 10/12/89

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method Visual
Acceptance Criteria Section 7.4

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | SAR | | 9-1-89 |
| Temporary Materials | JAK | | 9-1-89 |
| Permanent Materials | | | |

### MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SAR | | 10/12/89 |
| Material Packing | SAR | | 10/12/89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| 4" DIA. CONTINUOUS WRAP | 21' | 10 |
| STAINLESS STEEL CHANNEL PACK | - | - |

Depth(s) 274.65' - 253.65'
Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SPA Reject Date 10/9/89

### LUBRICANTS/ADDITIVES

Inspection Method Visual
Acceptance Criteria Section 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | NONE | SAR | | 9-27-89 |
| Lubricants | Food Grade Oil | JAK | | 9-27-89 |

### STRAIGHTNESS TEST

Inspection Method 20' OF 6" S.S CASING DOWN HOLE
Acceptance Criteria SECT. 8.3
Accept JAK Reject Date 9-27-89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| TYPE 304, SCH. 5 | 4" | 253.65' - +1.3' |
| STAINLESS STEEL | - | - - |

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.4
Accept SPA Reject Date 10/9/89

### WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method MEASURE W/ STEEL TAPE
Acceptance Criteria SECT. 4.2.6 - 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 16-30 MESH SILICA SAND | 275.56' - 250.6' | 7.7 FT³ | SPA | | 10/10/89 |
| 3/8" VOLCLAY TABLETS | 250.6' - 247.5' | 1.24 FT³ | SPA | | 10/10/89 |
| 8-20 MESH GRANULAR BENTONITE | 247.5' - 19.4' | 161.35 FT³ | SAR | | 10/12/89 |
| CEMENT GROUT | 19.4' - 2.05' | 7.92 FT³ | SAR | | 10/12/89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
N/A Downhole TV Inspection
JKM Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

PNL MA567 DO-1, Rev. 0 680 Reviewed by S.L. McKhan 12-6-89

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-13 Geologist Ian Kennedy Page 1 of 3

Reviewed by W.L. McShane Date 12-6-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 10" diameter temporary carbon steel casing with drive shoe from 0' to 138'-6½" | | 5 | | Sandy Gravel |
| | | 10 | | " |
| | | 15 | | Slightly gravelly muddy sand |
| | | 20 | | gravelly sand |
| 8" diameter temporary carbon steel casing with drive shoe from 138'-6½" to 277'-1⅛" | | 25 | | " |
| | | 30 | | Sandy gravel |
| | | 35 | | " |
| | | 40 | | Sand |
| | | 45 | | " |
| 255.48' of 4" DIA. STAINLESS STEEL CASING | | 50 | | " |
| | | 55 | | " |
| | | 60 | | " |
| | | 65 | | Slightly gravelly sand |
| | | 70 | | " " " |
| | | 75 | | " " " |
| | | 80 | | Sand |
| | | 85 | | Slightly gravelly sand |
| | | 90 | | " " " |
| | | 95 | | " " " |
| | | 100 | | Gravelly sand |
| | | 105 | | " " |
| | | 110 | | " " |
| | | 115 | | Slightly gravelly sand |
| | | 120 | | Sand |
| | | 125 | | " |
| | | 130 | | |

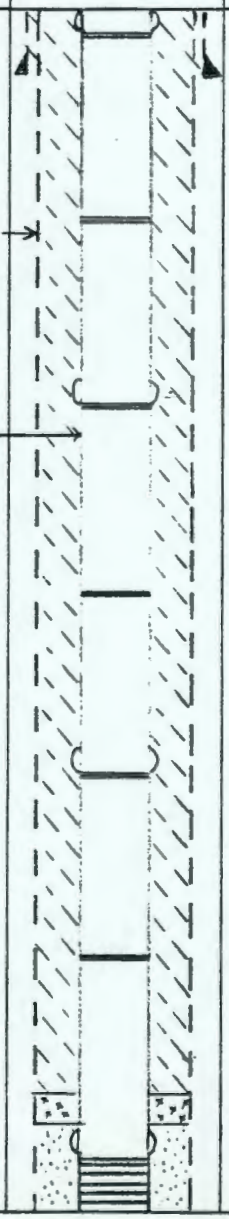
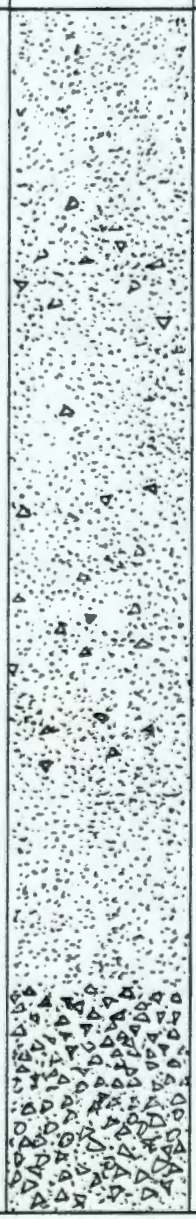
A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-13 Geologist Ian Kennedy Page 2 of 8

Reviewed by V.L. McGhan Date 12-6-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 138' 6 1/8" of 10" CARBON |  | 135' |  | Sand |
| STEEL CASING | | 140' | | " |
| | | 145' | | " |
| | | 150' | | " |
| 278' 8 1/8" of 8" CARBON | | 155' | | Slightly gravelly sand |
| STEEL CASING | | 160' | | Gravelly sand |
| | | 165' | | Slightly gravelly sand |
| | | 170' | | Sand |
| 255.48' of 4" STAINLESS | | 175' | | " |
| STEEL CASING | | 180' | | " |
| | | 185' | | Slightly gravelly sand |
| | | 190' | | Slightly gravelly sand |
| | | 195' | | " |
| | | 200' | | |
| | | 205' | | Sand |
| | | 210' | | Slightly gravelly sand |
| | | 215' | | Gravelly Sand |
| | | 220' | | " " |
| | | 225' | | Sand |
| | | 230' | | Sand |
| | | 235' | | Sand |
| | | 240' | | Sandy Gravel |
| | | 245' | | " " |
| | | 250' | | " " |
| | | 255' | | " " |
| | | 260' | | " " |

A-1800-186 (3/87)

PNL MA567 DO-1, REV.0

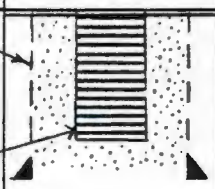
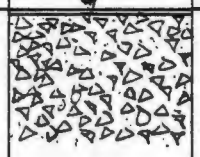
682

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-13 Geologist Ian Kennedy Page 3 of 3

Reviewed by K.L. McGhan Date 12-6-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description D/W = 260.73' 10/12/89 |
| 278'8 1/8" OF 8" CARBON STEEL CASING |  | 265 |  | Sandy Gravel |
| | | 270 | | Gravel |
| | | 275 | | GRAVEL |
| 21' OF 4" DIA. STAINLESS STEEL CHANNEL PACK SCREEN (10 SLOT) | | | | D/B = 275.56 10/9/89 |
| COMPLETION SYMBOLS: CEMENT GROUT; GRANULAR BENTONITE; BENTONITE PELLETS; SILICA SAND; CASING JOINT; CASING CENTRALIZER | | | | |

A-1800-188 (3/87)

PNL MAS67 DO-1, rev.0

# WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project N-017
Location Single Shell Tanks
Drilling Co. Kaiser Engineers, Hanford
Driller Lewis Watkins
Other (companies) N/A
Geologist(s) Ray Miller, S. Goodwin, Tom Bagen, S. Airhart, Michael Lugbeck

Well No. 200-E27-14 Temp. Well No. n/a
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary Air n/a Mud n/a
Cable Tool D 0.0'-266.8' H N/A
Drilling Fluid 200E-Raw Water Supply
Other n/a

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| NAT. GAMMA | 137' - 4' | 9-27-89 |
| NAT. GAMMA | 266' - 100' | 10-11-89 |

## COMPLETION DATA

Drilled Depth 266.8 (Cased to 267.1)
Completed Depth 266.83'
Date Started 9-19-89
Date Completed 10-17-89
Static Water Level/Date 249.81' 10-17-89

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method Visual
Acceptance Criteria Section 7.6

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | RDM | n/a | 9/19/89 |
| Temporary Materials | RDM | n/a | 9/19/89 |
| Permanent Materials | SMC | | 10/17/89 |

### MATERIAL STORAGE/PACKING

Inspection Method Visual
Acceptance Criteria Sec. 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | MDL | | 10/2/89 |
| Material Packing | MDL | | 10/2/89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| STAINLESS STEEL CONTINUOUS | 21.0' | 10 |
| WRAP CHANNEL PACK | — | — |

Depth(s) 266.83' - 245.83'

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SMC Reject Date 10/13/89

### LUBRICANTS/ADDITIVES

Inspection Method Visual
Acceptance Criteria Section 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | NONE | RDM | n/a | 9/19/89 |
| Lubricants | Food Grade Oil | RDM | n/a | 9/19/89 |

### STRAIGHTNESS TEST

Inspection Method 20' section of 6" SS casing down hole
Acceptance Criteria Section 8.3
Accept MDL Reject — Date 10/6/89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| TYPE 304, SCH. 5 | 4" | 245.83' - +0.65' |
| STAINLESS STEEL | — | — - — |

Inspection Method VISUAL
Acceptance Criteria SECTION 4.2.4
Accept SMC Reject Date 10/13/89

### WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method MEASURED w/ STEEL TAPE
Acceptance Criteria SECT. 4.2.6 - 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 20-40 MESH SILICA SAND | 265.83' - 242.7' | 8.12 FT³ | SMC | | 10/13/89 |
| 1/4" VOLCLAY TABLETS | 242.7' - 239.45' | 1.24 FT³ | SMC | | 10/13/89 |
| 8-20 BENTONITE CRUMBLES | 239.45' - 19.85' | 116.44 FT³ | SMC | | 10/17/89 |
| CEMENT GROUT | 19.85' - 2.85' | 7.92 FT³ | SMC | | 10/17/89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
N/A Downhole TV Inspection
Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by G.L. McClain 12-7-89

For all blanks mark N/A if not applicable.

PNL-MA567, DO-1, Rev 0

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-14 Geologist R. Miller Page 1 of 3

Reviewed by V. E. Buckham Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| temporary 10" dia carbon steel casing from to 137'-7" | | 5 | | Muddy SAND |
| | | 10 | | " |
| | | 15 | | Gravelly SAND |
| | | 20 | | Sandy GRAVEL |
| | | 25 | | " |
| 8" carbon steel temp casing installed to 267.1' | | 30 | | " |
| | | 35 | | " |
| | | 40 | | " |
| | | 45 | | SAND |
| | | 50 | | 48-49' Slightly Muddy SAND - wet<br>SAND |
| | | 55 | | " |
| | | 60 | | " |
| | | 65 | | " |
| | | 70 | | Sandy GRAVEL |
| | | 75 | | " " |
| | | 80 | | " " |
| | | 85 | | " " |
| | | 90 | | GRAVELLY SAND |
| | | 95 | | SAND (CLAY LENSE 94' to 94.5') |
| | | 100 | | Slightly Muddy SAND |
| | | 105 | | SAND |
| | | 110 | | SAND |
| | | 115 | | SAND |
| | | 120 | | SAND |
| | | 125 | | SAND |
| | | 130 | | SAND |

PNL-MA-567 DO-1, REV. 0

A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-14 Geologist M. Lubrecht Page 2 of 3

Reviewed by V.T. Mcclelan Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| | | 135 | | SAND |
| End 10" @ 137'-7" | | 140 | | slightly gravelly SAND |
| | | 145 | | Gravelly SAND |
| | | 150 | | SAND |
| | | 155 | | " |
| | | 160 | | slightly gravelly SAND |
| | | 165 | | SAND |
| | | 170 | | gravelly SAND |
| | | 175 | | " " |
| | | 180 | | " " |
| 8" carbon steel temp | | 185 | | " " |
| casing. | | 190 | | " " |
| | | 195 | | " " |
| 246.48' of 4" Type 304, | | 200 | | sl. gravelly SAND |
| SCH.5 Stainless Steel | | 205 | | SAND |
| Casing | | 210 | | SAND |
| | | 215 | | SAND |
| | | 220 | | " |
| | | 225 | | " |
| | | 230 | | Muddy Sandy GRAVEL |
| | | 235 | | Sandy GRAVEL |
| | | 240 | | " " |
| | | 245 | | Muddy Sandy GRAVEL D/W = 249.81' (10/11/8 |
| | | 250 | | Sandy GRAVEL |
| | | 255 | | " " |
| | | 260 | | Gravelly SAND |

A-1800-186 (3/87)

9112050063

PNL-MA567, DO-1, Rev 6

686

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-14 Geologist M.D. Lubrecht Page 3 of 3

Reviewed by [illegible] Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| End 3" casing @ 267.1' | | 265' | | Sand - |
| TD @ 266.05' | | | | |
| | | | | T.D. = 266.8' |
| 21' OF 4" DIA. 10 SLOT | | | | COMPLETION DEPTH = 266.83' |
| CHANNEL PACK SCREEN | | | | |
| (STAINLESS STEEL) | | | | |
| COMPLETION SYMBOLS: | | | | |
| CEMENT GROUT | | | | |
| GRANULAR BENTONITE | | | | |
| BENTONITE PELLETS | | | | |
| SILICA SAND | | | | |
| CASING JOINT | | | | |
| CASING CENTRALIZER | | | | |

A-1800-186 (3/87)

9112050319



NL-MA-567 DO-1, REV.0

# WELL COMPLETION/INSPECTION REPORT(governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project W-017
Location Single Shell Tanks
Drilling Co. Kaiser Engineering Hanford
Driller C. Clemson
Other (companies) NONE
Geologist(s) Kennedy, Miller, Goodwin

Well No. 299-E27-15 Temp. Well No. N/A
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0-251' H 251-262.5'
Drilling Fluid 200E Raw Water Supply
Other N/A

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| natural gamma | 4.0 - 127.7' | 9/6/89 |
| natural gamma | 100' - 262' | 9/18/89 |
| | - | |
| | - | |
| | - | |

## COMPLETION DATA

Drilled Depth 262.5A' bls
Completed Depth 259.03'
Date Started 8-25-89
Date Completed 10-3-89
Static Water Level/Date 244.77 (10/3/89)

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method Visual
Acceptance Criteria Section 7.6

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | EDM | N/A | 8/28/89 |
| Temporary Materials | EDM | N/A | 8/28/89 |
| Permanent Materials | SMG | | 10/3/89 |

### MATERIAL STORAGE/PACKING

Inspection Method Visual
Acceptance Criteria Section 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SMG | | 10/3/89 |
| Material Packing | SMG | | 10/3/89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| TYPE 304 SCH. 5 STAINLESS | 21' | 10 |
| STEEL CHANNEL PACK | — | — |

Depth(s) 259.03' - 238.03'
— - —

Inspection Method Visual
Acceptance Criteria Section 4.2.3
Accept SMG Reject Date 9/20/89

### LUBRICANTS/ADDITIVES

Inspection Method Visual
Acceptance Criteria Section 4.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | NONE | EDM | N/A | 8/28/89 |
| Lubricants | Food Grade Oil | EDM | N/A | 8/28/89 |

### STRAIGHTNESS TEST

Inspection Method 20'-6" SS Casing
Acceptance Criteria Section 4.3
Accept EDM Reject N/A Date 9/18/89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| TYPE 304 SCH. 5 | 4" | 238.03' - +2.45' |
| STAINLESS STEEL | — | — - — |

Inspection Method Visual
Acceptance Criteria Section 4.2.4
Accept SMG Reject Date 9/25/89

### WELL PROTECTION

Inspection Method Visual
Acceptance Criteria Section 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method Measured with Steel Tape
Acceptance Criteria Section 4.2.6 to 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 16-30 MESH SILICA SAND | 259.03' - 234.75' | 8.52 FT³ | SMG | | 10/2/89 |
| 1/4" BENTONITE PELLETS | 234.75' - 231.25' | 1.24 FT³ | SMG | | 10/2/89 |
| 8-20 MESH BENTONITE CHIPPINGS | 231.25' - 18.2' | 117.15 FT³ | SMG | | 10/3/89 |
| CEMENT GROUT | 18.2' - 1.8' | 15.84 FT³ | SMG | | 10/3/89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
VDM Downhole TV Inspection
VDM Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

PNL MA567 DO-1, Rev. 0

688

Reviewed by V.L. Merkelan 12-7-89

9112050620

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-15 Geologist Jan Kennedy / Miller Page 1 of 2

Reviewed by D.L. McElhaney Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| temporary 10" carbon steel temporary casing w/drive shoe from +1'1" to 128'4½" (129'5½") | | 5 | | SAND |
| | | 10 | | " |
| | | 15 | | Sandy gravel |
| | | 20 | | sand |
| | | 25 | | " |
| temporary 8"ø carbon steel casing w/drive shoe from +2.25' to 261.87' bls (264.12') | | 30 | | " |
| | | 35 | | Gravelly sand |
| | | 40 | | slightly gravelly sand |
| | | 45 | | Sand |
| 240.48' of 4" STAINLESS STEEL CASING | | 50 | | Slightly gravelly sand |
| | | 55 | | " |
| | | 60 | | Sand (tr gravel) |
| | | 65 | | " |
| | | 70 | | " |
| | | 75 | | " |
| | | 80 | | " |
| | | 85 | | " |
| | | 90 | | " |
| | | 95 | | " |
| | | 100 | | " |
| | | 105 | | Gravelly SAND |
| | | 110 | | " |
| | | 115 | | " |
| | | 120 | | " |
| | | 125 | | " |
| | | 130 | | " |

A-1800-186 (3/87)

PNL MA-567 DO-1, rev 0

689

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E27-15 Geologist Kennedy / Miller Page 2 of 2

Reviewed by V.L. McGhan Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| temporary 8" carbonsteel casing with drive shoe | | 135 | | Sandy Gravel |
| | | 140 | | Sand |
| | | 145 | | Slightly Gravelly Sand |
| 240.45' of 4" | | 150 | | " |
| STAINLESS STEEL CASING | | 155 | | Sand |
| | | 160 | | Slightly gravelly sand |
| | | 165 | | " |
| | | 170 | | Sandy GRAVEL |
| | | 175 | | Gravelly SAND |
| | | 180 | | SAND |
| | | 185 | | " |
| | | 190 | | " |
| | | 195 | | " |
| | | 200 | | " |
| Cement Grout | | 205 | | " |
| 8-20 mesh Bentonite Crumbles | | 210 | | " |
| 1/4" bentonite Pellets | | 215 | | " |
| 16-30 mesh Silica Sand | | 220 | | " |
| | | 225 | | " |
| volclay pellets (1/4") | | 230 | | Sandy GRAVEL |
| | | 235 | | " |
| | | 240 | | " |
| Colorado Silica Sand | 245.05' 5/18 | 245 | | Muddy Sandy GRAVEL |
| 4" stainless steel | | 250 | | " |
| 10 slot channel pack | | 255 | | " |
| (21') | | 260 | | " |

TD. 262.54'

A-1800-186 (3/87)

9112050062

PNL-MA-567-DO-1-rev-0

690

# WELL COMPLETION/INSPECTION REPORT

WHC-S-014

Specification No. W-017 Rev. No. 3
Project W-017
Location SINGLE SHELL TANKS
Drilling Co. KAISER ENG. HANFORD
Driller MEL THORESEN
Other (companies) NONE
Geologist(s) AIRHART, GOODWIN, LANIGAN, JENSEN, BLEGEN, LUBRECHT, BRANDENBERGER

Well No. 299-E33-31 Temp. Well No. —
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary - Air N/A Mud N/A
Cable Tool D 0' - 210' H 210' - 255'
Drilling Fluid 200 E DRILL SUPPLY WATER (53 gallons added)
Other NONE

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| NAT. GAMMA | 253' - 3' | 8/9/89 |
| | - | |
| | - | |
| | - | |
| | - | |

## COMPLETION DATA

Drilled Depth 255.6'
Completed Depth 255.9'
Date Started 7-11-89
Date Completed 9-11-89
Static Water Level/Date 239.2/9/6/89

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method VISUAL
Acceptance Criteria SECT. 7.6

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | SPA | | 7/11/89 |
| Temporary Materials | SPA | | 7/11/89 |
| Permanent Materials | SPA | | 9/6/89 |

### MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SPA | | 9/6/89 |
| Material Packing | SPA | | 9/6/89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| CONTINUOUS WIRE-WRAP CHANNEL PACK W/ BOTTOM CAP, STAIN. STEEL | 21' | 10 |

Depth(s) 234.9' - 255.9'
Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SPA Reject Date 9/6/89

### LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria SECT. 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | NONE | SPA | | 7/11/89 |
| Lubricants | FOOD GRADE OIL | SPA | | 7/11/89 |

### STRAIGHTNESS TEST

Inspection Method 20' OF 6" S.S. DOWN BOREHOLE
Acceptance Criteria SECT 8.3
Accept RPB Reject Date 8/7/89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| SCH. 5, TYPE 304, STAINLESS STEEL | 4" | +0.66 ~~+0.65~~ - 234.9' |
| | | AWP - |

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.4
Accept SPA Reject Date 9/6/89

### WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method MEASURED W/ STEEL TAPE
Acceptance Criteria SECT. 4.2.6 - 4.2.9

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 20-40 COLORADO SILICA SAND | 231.2' - 256' | 11.2 $ft^3$ | SML | | 9-7-89 |
| 1/4" BENTONITE PELLETS | 226' - 231.2' | 1.2 $ft^3$ | SML | | 9-7-89 |
| 8-20 MESH BENTONITE CRUMBLES | 19.7' - 226' | 121.4 $ft^3$ | EJS | | 9-8-89 |
| CEMENT GROUT | 2' - 19.7' | ~ 8 $ft^3$ | EJS | | 9-8-89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
~~VLM~~ N/A Downhole TV Inspection
~~VLM~~ Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by V L McGlam 12-14-89

For all blanks mark N/A if not applicable.

ANL MA567 RO-1, Rev. 0

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E33-31 Geologist AIRHART, GOODWIN, LANIGAN, BLEGEN, BRANDENBERGER Page 1 of 2

Reviewed by V.E. McGhan Date 12-14-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 154' 1/4" of 10" CARBON | | 5 | | MUDDY SANDY GRAVEL |
| STEEL CASING (REMOVED) | | 10 | | SANDY GRAVEL |
| CEMENT GROUT | | 15 | | MUDDY SANDY GRAVEL |
| 257' 3 1/4" OF 8" CARBON | | 20 | | " " " |
| STEEL CASING (REMOVED) | | 25 | | SANDY GRAVEL |
| | | 30 | | GRAVELLY SAND |
| | | 35 | | " " |
| | | 40 | | " " |
| | | 45 | | SANDY GRAVEL |
| | | 50 | | " " |
| | | 55 | | SAND |
| | | 60 | | SLIGHTLY GRAVELLY SAND |
| 8-20 MESH BENTONITE CRUMBLES | | 65 | | GRAVELLY SAND |
| | | 70 | | SLIGHTLY GRAVELLY SAND |
| 235.56' | | 75 | | SAND (FS-VFS) |
| 4" DIA STAINLESS STEEL CASING | | 80 | | " " |
| | | 85 | | MUDDY SAND |
| | | 90 | | SAND |
| | | 95 | | SLIGHTLY GRAVELLY SAND |
| | | 100 | | " " " |
| | | 105 | | SAND |
| | | 110 | | " |
| | | 115 | | " |
| | | 120 | | " |
| | | 125 | | SLIGHTLY GRAVELLY SAND |
| | | 130 | | " " " |

A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E33-31 Geologist AIRHART, GOODWIN, LANIGAN, BLEGEN, BRANDENBERGER Page 2 of 2

Reviewed by W.E. McElhan Date 12-14-89

| Construction Data: Description | Construction Data: Diagram | Depth in Feet | Geologic/Hydrologic Data: Diagram Litho. | Geologic/Hydrologic Data: Lithologic Description |
|---|---|---|---|---|
| 154' 1/4" of 10" CARBON | | 135 | | SAND |
| STEEL CASING WITH | | 140 | | " |
| DRIVE SHOE (REMOVED) | | 145 | | SLIGHTLY GRAVELLY SAND |
| | | 150 | | " " |
| 257' 3 1/4" OF 8" CARBON | | 155 | | GRAVELLY SAND |
| STEEL CASING WITH | | 160 | | SAND |
| DRIVE SHOE (REMOVED) | | 165 | | SAND |
| | | 170 | | GRAVELLY SAND |
| 8-20 MESH BENTONITE CRUMBLES | | 175 | | SANDY GRAVEL |
| | | 180 | | SAND |
| | | 185 | | " |
| | | 190 | | " |
| FACTORY-WELDED CENTRALIZERS | | 195 | | " |
| | | 200 | | " (CLAY LENSE @ 202') |
| 235.56' 4" DIA. STAINLESS STEEL CASING | | 205 | | SANDY GRAVEL |
| | | 210 | | " " |
| | | 215 | | MUDDY SANDY GRAVEL |
| | | 220 | | SANDY GRAVEL |
| | | 225 | | " " |
| 1/4" BENTONITE PELLETS | | 230 | | " " |
| 4" STAINLESS STEEL SCREEN (10-SLOT CHANNEL-PACK) | | 235 | | " " |
| 20-40 MESH COLORADO SILICA SAND | | 240 | | " " |
| | | 245 | | " " |
| BOTTOM OF 8" CASING (REMOVED) AT 255.6' | | 250 | | SANDY GRAVEL |
| BELOW GROUND LEVEL (RESTING ON BASALT) | | 255 | | " " |
| | | | | BASALT @ 255.6' |

A-1800-186 (3/87)

# WELL COMPLETION/INSPECTION REPORT

Specification No. WHC-S-014 Rev. No. 3
Project W-017
Location SINGLE SHELL TANKS
Drilling Co. KAISER ENG. HANFORD
Driller LOUIS WATKINS
Other (companies) NONE
Geologist(s) AIRHART, LANIGAN, LUBRECHT, BRANDENBERGER, GOODWIN

Well No. 299-E33-32 Temp. Well No. —
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary - Air N/A Mud N/A
Cable Tool D 0'-250' H 250'-270'
Drilling Fluid $H_2O$ (86 gallons added)
Other NONE

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| NAT. GAMMA | 2.5' - 83.5' | 7-21-89 |
| NAT. GAMMA | 50' - 264' | 8-9-89 |

## COMPLETION DATA

Drilled Depth 270.3'
Completed Depth 267'
Date Started 7-11-89
Date Completed 9-5-89
Static Water Level/Date 251.65/8-30-89

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | SPA | | 7-11-89 |
| Temporary Materials | SPA | | 7-11-89 |
| Permanent Materials | SPA | | 8-30-89 |

### MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SECT. 7.3

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SPA | | 7-11-89 |
| Material Packing | SPA | | 7-11-89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| SS 10-SLOT CHANNEL-PACK | 21' | 10 |

Depth(s) 246.4' - 267.4'
Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.3
Accept SPA Reject Date 8-30-89

### LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria SECT. 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | $H_2O$ | SPA | | 7-11-89 |
| Lubricants | Crisco Oil | SPA | | 7-11-89 |

### STRAIGHTNESS TEST

Inspection Method 20' of 6" S.S. CASING DOWN H
Acceptance Criteria Sect. 8.3
Accept ✓ Reject Date 8/4/89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| STAINLESS STEEL | 4" | +0.57 - 246.4' |

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.4
Accept SPA Reject Date 8-30-89

### WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method MEASURED W/ STEEL TAPE
Acceptance Criteria SECT. 4.2.6 - 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 20-40 COLORADO SILICA SAND | 243.2' - 267' | 10.4 $ft^3$ | SPA | | 8-31-89 |
| 1/4" & 3/8" BENTONITE PELLETS | 239.6' - 243.2' | 1.24 $ft^3$ | SPA | | 8-31-89 |
| 8-20 BENTONITE CRUMBLES | 20.5' - 239.6' | 130 $ft^3$ | SPA | | 9-5-89 |
| CEMENT GROUT | 2' - 20.5' | ~10 $ft^3$ | SPA | | 9-5-89 |

### OTHER (initial if performed)

____ Well Abandonment
____ Well Development
TOM Downhole TV Inspection
Complete As-Built Diagram, Driller's/Geologist's Logs

Reviewed by D.L. McGlam 12-14-89
PNL MA 567 DO-1, Rev. 0

For all blanks mark N/A if not applicable

694

9112050096

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E33-32 Geologist AIRHART, LANIGAN, LUBRECHT, BRANDENBERGER, GOODWIN Page 1 of 3

Reviewed by W. E. McKhann Date 12-14-89

| Construction Data: Description | Construction Data: Diagram | Depth in Feet | Geologic/Hydrologic Data: Diagram Litho. | Geologic/Hydrologic Data: Lithologic Description |
|---|---|---|---|---|
| 75' 1/4" of 10" CARBON | | 5 | | MUDDY SANDY GRAVEL |
| STEEL CASING (REMOVED) | | 10 | | " " " |
| CEMENT GROUT | | 15 | | SANDY GRAVEL |
| 271' 1/4" OF 5" CARBON | | 20 | | GRAVELLY SAND |
| STEEL CASING (REMOVED) | | 25 | | SANDY GRAVEL |
| | | 30 | | GRAVEL |
| | | 35 | | GRAVELLY SAND |
| | | 40 | | " " |
| | | 45 | | " " |
| 8-20 BENTONITE | | 50 | | " " |
| | | 55 | | " " |
| | | 60 | | " " |
| | | 65 | | SLIGHTLY GRAVELLY SAND |
| | | 70 | | MUD @ 68' (~9" thick) SAND |
| | | 75 | | SANDY GRAVELLY MUD |
| | | 80 | | SLIGHTLY GRAVELLY SAND |
| FACTORY WELDED CENTRALIZERS | | 85 | | " " " |
| | | 90 | | SAND |
| | | 95 | | SLIGHTLY GRAVELLY SAND |
| | | 100 | | SAND |
| | | 105 | | SLIGHTLY GRAVELLY SAND |
| | | 110 | | SAND |
| | | 115 | | " |
| | | 120 | | 118': SANDY MUD SAND |
| | | 125 | | SLIGHTLY MUDDY SAND |
| | | 130 | | SAND |

A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E33-32 Geologist AIRHART, GOODWIN, LANIGAN, LUBRECHT, BRANGENBERGER Page 2 of 3

Reviewed by [illegible] Date 12-14-89

| Construction Data: Description | Construction Data: Diagram | Depth in Feet | Geologic/Hydrologic Data: Diagram Litho. | Geologic/Hydrologic Data: Lithologic Description |
|---|---|---|---|---|
| 271' 1 1/4" of 8" CARBON STEEL CASING (REMOVED) | | 135 | | SAND |
| | | 140 | | " |
| | | 145 | | SLIGHTLY MUDDY SAND |
| | | 150 | | " " " |
| | | 155 | | " " " |
| B-20 BENTONITE | | 160 | | SAND |
| | | 165 | | " |
| | | 170 | | " |
| | | 175 | | GRAVELLY MUDDY SAND |
| 246.97' 4" DIA. STAINLESS STEEL CASING | | 180 | | SL. GRAVELLY SL. MUDDY SAND |
| | | 185 | | GRAVELLY SAND |
| | | 190 | | " " |
| | | 195 | | SLIGHTLY GRAVELLY SAND |
| | | 200 | | " " " |
| FACTORY WELDED CENTRALIZERS | | 205 | | Slightly Gravelly SAND |
| | | 210 | | Slightly Gravelly SAND |
| | | 215 | | SAND |
| | | 220 | | SAND (mottled - 223') |
| | | 225 | | SAND |
| | | 230 | | Gravelly SAND |
| | | 235 | | Gravelly SAND |
| 1/4" & 3/8" BENTONITE PELLETS | | 240 | | Gravelly SAND |
| | | 245 | | Sandy GRAVEL |
| GWS = 252.14 (8/4/89-0740) | | 250 | | Sandy GRAVEL |
| 10-SLOT CHANNEL-PACK STAINLESS STEEL SCREEN | | 255 | | Gravelly SAND |
| 20-40 MESH COL SILICA SAND | | 260 | | SAND |

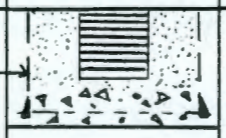
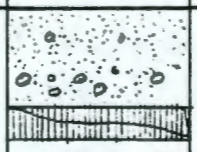
A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E33-32 Geologist LUBRECHT, GOODWIN, AIRHART, LANIGAN, BRANDENBERGER Page 3 of 3

Reviewed by [illegible] Date 12-14-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 271' 1 1/4" OF 5" CARBON STEEL CASING WITH DRIVE SHOE (REMOVED) |  | 265 |  | slightly Gravelly SAND |
| | | 270 | | GRAVELLY SAND |
| | | | | BASALT @ 271' |

A-1800-186 (3/87)

# WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, RO)

Specification No. WHC-S-014 Rev. No. 3
Project W-017
Location SINGLE SHELL TANKS
Drilling Co. KAISER ENGINEERING HANFORD
Driller CRAIG WAMSLEY
Other (companies) NONE
Geologist(s) GOODWIN, JENSEN, BRANDENBURGER, BJORNSTAD, TEEL

Well No. 241-E33-33 Temp. Well No. N/A
Coordinates
Casing Elev. Ground Elev.

## DRILLING METHOD

Rotary Air N/A Mud N/A
Cable Tool D 0'-216' H 216'-252'
Drilling Fluid $H_2O$ (332 gallons added)
Other NONE

## GEOPHYSICAL LOGGING

| Sondes | Interval | Date |
|---|---|---|
| NAT. GAMMA | 3' - 247' | 8-9-89 |
| | - | |
| | - | |
| | - | |
| | - | |

## COMPLETION DATA

Drilled Depth 252'
Completed Depth 248.3'
Date Started 7-17-89
Date Completed 8-29-89
Static Water Level/Date 232.8/8-14-89

## AQUIFER TESTING

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

### CLEANING

Inspection Method VISUAL
Acceptance Criteria SELT. 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | SMW | | 7-17-89 |
| Temporary Materials | SST | | 8-7-89 |
| Permanent Materials | SST | | 8-25-89 |

### MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SELT. 7.3

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SST | | 8-25-89 |
| Material Packing | SST | | 8-25-89 |

### SCREEN

| Type | Length | Slot Size |
|---|---|---|
| STAINLESS STEEL CHANNEL-PACK | 21' | 10 |

Depth(s) 227.3' - 248.3'
Inspection Method VISUAL
Acceptance Criteria SELT. 4.2.3
Accept SST Reject Date 8-25-89

### LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria SELT. 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | NONE | SMW | | 8-7-89 |
| Lubricants | CRISCO OIL | SMW | | 8-7-89 |

### STRAIGHTNESS TEST

Inspection Method VISUAL/20' OF 6" S.S. DOWN HOLE
Acceptance Criteria SELT. 8.3
Accept SMW Reject Date 8-7-89

### CASING (permanent)

| Type | Size | Placement |
|---|---|---|
| STAINLESS STEEL | 4" DIA. | +0.4' - 227.3' |
| | | AWP - |

Inspection Method VISUA
Acceptance Criteria ~~VISU~~ SELT 4.2.4
Accept SST Reject Date 8-25-89

### WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SELT 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

### ANNULAR SEAL

Inspection Method VISUAL/STEEL TAPE Acceptance Criteria SELT. 4.2.6 - 4.2.7.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 20-40 COL. SILICA SAND | 224.2' - 246.8' | 90 ft³ | SST | | 8-28-89 |
| 1/4" Volclay PELLETS | 220.2 - 224.2' | 1.2 ft³ | SST | | 8-28-89 |
| 8-20 BENTONITE | 18.7' - 220.2' | 110.8 ft³ | EJJ | | 8-29-89 |
| CEMENT GROUT | 2' - 18.7' | 10.6 ft³ | EJJ | | 8-29-89 |

### OTHER (initial if performed)

N/A Well Abandonment
Well Development
N/A Downhole TV Inspection
~~SMW~~ Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

PNL MA567 DO-1 Rev. Ø
Reviewed by V.L. McGhan 12-19-89

698

9112050070

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E33-33 Geologist GOODWIN JENSEN, BRANDEN BERGER Page 1 of 2

Reviewed by W.L. McLehan Date 12-19-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| | | 5 | | MUDDY SANDY GRAVEL |
| 154' 1/4" OF 10" CARBON | | 10 | | SANDY GRAVEL |
| STEEL CASING (REMOVED) | | 15 | | " " |
| CEMENT GROUT | | 20 | | " " |
| | | 25 | | " " |
| 253' 7 3/4" OF 8" CARBON | | 30 | | " " |
| STEEL CASING (REMOVED) | | 35 | | GRAVELLY SAND |
| | | 40 | | SAND |
| | | 45 | | " |
| 227.77' | | 50 | | " |
| 4" DIA. STAINLESS STEEL CASING | | 55 | | " |
| | | 60 | | " |
| | | 65 | | SLIGHTLY GRAVELLY SAND |
| | | 70 | | " " " |
| | | 75 | | SAND |
| | | 80 | | SLIGHTLY GRAVELLY SAND |
| | | 85 | | GRAVELLY SAND |
| | | 90 | | SLIGHTLY GRAVELLY SAND |
| | | 95 | | SLIGHTLY MUDDY SAND |
| | | 100 | | SAND |
| | | 105 | | " |
| FACTORY INSTALLED CENTRALIZERS | | 110 | | " |
| | | 115 | | SLIGHTLY MUDDY SAND |
| | | 120 | | SAND |
| | | 125 | | " |
| | | 130 | | " |

A-1800-186 (3/87)

9 1 1 2 1 0 5 0 0 7 0 1 6

PNL-MA-567 DO-1, REV. 0

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-E33-33 Geologist GOODWIN, JENSEN, BRANDENBERGER Page 2 of 2

Reviewed by D.L. McGhan Date 12-19-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 154' 1/2" OF 10" CARBON STEEL CASING WITH DRIVE SHOE (REMOVED) | | 135 | | SLIGHTLY GRAVELLY SAND |
| | | 140 | | " " " |
| | | 145 | | " " " |
| | | 150 | | SAND |
| 227.77' | | 155 | | SLIGHTLY GRAVELLY SAND 157: MUD 3" THICK |
| 4" DIA. STAINLESS STEEL CASING | | 160 | | " " " |
| | | 165 | | " " " |
| | | 170 | | SL. GRAVELLY MUDDY SAND |
| | | 175 | | SLIGHTLY MUDDY SAND |
| | | 180 | | " " " |
| FACTORY INSTALLED CENTRALIZERS | | 185 | | MUDDY SAND |
| | | 190 | | SL GRAVELLY MUDDY SAND |
| | | 195 | | " " " " |
| 8-20 BENTONITE CRUMBLES | | 200 | | GRAVELLY MUDDY SAND |
| | | 205 | | SAND |
| | | 210 | | MUDDY SAND |
| | | 215 | | SAND |
| | | 220 | | MUDDY SANDY GRAVEL |
| 1/4" VOLCLAY PELLETS | | 225 | | " " " |
| | | 230 | | " " " |
| | | 235 | ▽ 12/89 | " " " |
| 20-40 COL. SILICA SAND | | 240 | | " " " |
| | | 245 | | " " " |
| 21'-STAINLESS STEEL, 4" 10-SLOT CHANNEL PACK | | 250 | | " " " |
| | | 252' | | HIT BASALT @ 252' |

A-1800-186 (3/87)

# WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, R0)

Specification No. WHC-S-~~0~~1014 Rev. No. 3
Project W-017
Location Single Shell Tanks
Drilling Co. Kaiser Engineers Hanford
Driller Craig Wamsley
Other (companies) N/A
Geologist(s) Bruce Bjornstad, Tyler Gilmore, Steve Teel, Seth Brandenberger, Jack Kennedy, Steve Airhart, Eric Jensen, M. Chamness S. Goodwin, Ron Bloxen

Well No. 299-W10-15 Temp. Well No. N/A
Coordinates
Casing Elev. Ground Elev.

**DRILLING METHOD**

Rotary Air N/A Mud N/A
Cable Tool D 0'-96' H 96'-~~227.9'~~ 222.34' (Jt 11-02-89)
Drilling Fluid 200 E Raw Water Supply
Other N/A

**GEOPHYSICAL LOGGING**

| Sondes | Interval | Date |
|---|---|---|
| Nat Gamma | 139' - 3' | 10-~~2~~4-89 |
| Nat Gamma | 221' - 110' | 10-16-89 |
| | - | |
| | - | |
| | - | |

**COMPLETION DATA**

Drilled Depth 222.34'
Completed Depth 221.95'
Date Started 9-20-89
Date Completed 11-7-89
Static Water Level/Date 206.2' 11/7/89

**AQUIFER TESTING**

Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

**CLEANING**

Inspection Method Visual
Acceptance Criteria Section 7.6

| | Accept | Reject | Date |
|---|---|---|---|
| Drilling Tools/Rig | BNB | | 9-20-89 |
| Temporary Materials | BNB | | 9-20-89 |
| Permanent Materials | | | |

**SCREEN**

| Type | Length | Slot Size |
|---|---|---|
| Continuous Wrap Stainless Steel Channel Pack | 21' | 10 |

Depth(s) 200.95' - 221.95'
-

Inspection Method Visual
Acceptance Criteria Section 4.2.7
Accept SPA Reject Date 10/27/89

**CASING (permanent)**

| Type | Size | Placement |
|---|---|---|
| Johnson Division type 304 stainless steel casing | 4" | +2.3' - 200.95' |
| | | - |

Inspection Method Visual
Acceptance Criteria Section 4.2.4
Accept SPA Reject Date 10/27/89

**MATERIAL STORAGE/PACKING**

Inspection Method Visual
Acceptance Criteria Section 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | | | |
| Material Packing | | | |

**LUBRICANTS/ADDITIVES**

Inspection Method Visual
Acceptance Criteria Section 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | None | | | 10-16-89 |
| Lubricants | Food Grade Oil | BNB | | 10-16-89 |

**STRAIGHTNESS TEST**

Inspection Method 20' Section of 6" SS casing down hole
Acceptance Criteria Section 8.3
Accept MAC Reject Date 10-16-89

**WELL PROTECTION**

Inspection Method Visual
Acceptance Criteria Section 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

**ANNULAR SEAL**

Inspection Method Measured With Steel tape
Acceptance Criteria Section 4.2.6 to 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 20-40 ~~16-30~~ mesh Cola Silica Sand | 197.1' - 222.3' | 17.9 $ft^3$ | SPA | | 10-27-89 |
| ~~1/8~~ 3/8 Volclay Pellets | 193.3' - 197.1' | 1.9 $ft^3$ | SPA | | 10-30-89 |
| 8-20 Bentonite Crumbles | 140.5' ~~143.1'~~ SPA - 193.3' | 25.6 $ft^3$ | SPA | | 10-30-89 |
| Volclay Pure Gold Slurry | 72.3' - 140.8' | 52.8 $ft^3$ | SPA | | 11-6-89 |

**OTHER (initial if performed)**

N/A Well Abandonment
Well Development
~~DRM~~ N/A Downhole TV Inspection
~~DRM~~ Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

PNL MA567 DO-1, rev.0

Reviewed by D. L. McGhan 12-7-89 701

 **WELL COMPLETION/INSPECTION REPORT**(governing procedure DO-1, R0

Well 299-W10-15 continued...

**ANNULAR SEAL**

Inspection Method Measured with Steel Tape Acceptance Criteria Sec. 4.2.6 to 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 8-20 Bentonite Crumbles | 19.6' - 72.3' | 35.5 ft³ | SPA | | 11-6-89 |
| Cement Grout | 2' - 19.6' | 9.2 ft³ | SPA | | 11-7-89 |
| | - | | | | |
| | - | | | | |

Reference NCR & PNL-89-071 for more details on this completion.

for all blanks mark N/A if not applicable.

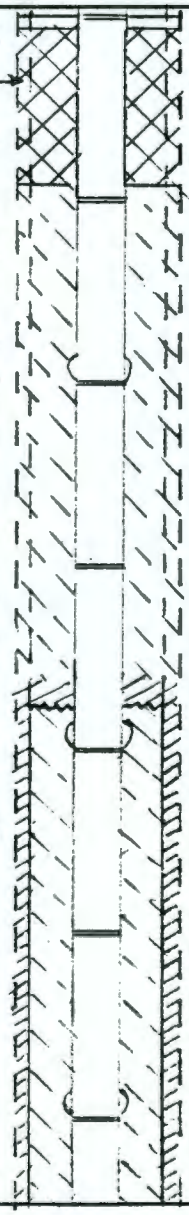
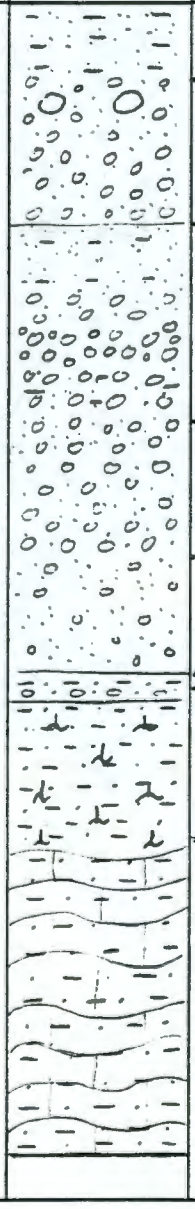
Reviewed by [illegible] 12-7-89

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-W 10-15 Geologist BJORNSTAD, GILMORE, TEEL, AIRHART, GOODWIN, ETC. Page 1 of 2

Reviewed by [illegible] Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 10" temporary carbon-steel casing to -140' |  | 5 |  | Muddy sand DB drilling |
| | | 10 | | |
| | | 15 | | |
| | | 20 | | Sandy gravel |
| | | 25 | | |
| | | 30 | | Sand w/mud layers |
| | | 35 | | Sandy gravel |
| | | 40 | | Gravel |
| | | 45 | | Muddy sandy gravel |
| | | 50 | | |
| | | 55 | | Sandy gravel |
| | | 60 | | |
| | | 65 | | |
| | | 70 | | Gravelly sand |
| | | 75 | | Silty fn sand, laminated |
| | | 80 | | |
| | | 85 | | Muddy sand, calcareous dark brown |
| | | 90 | | |
| | | 95 | | 96' switch to HT |
| | | 100 | | Caliche - calcareous cemented muddy sand |
| | | 105 | | |
| | | 110 | | |
| | | 115 | | |
| | | 120 | | |
| | | 125 | | |

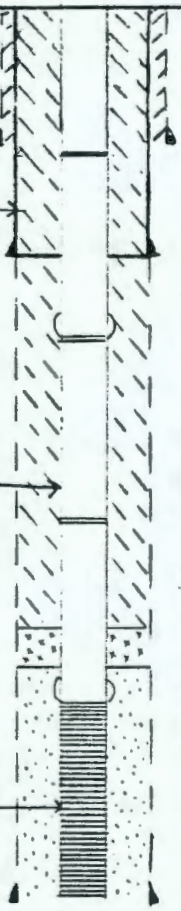
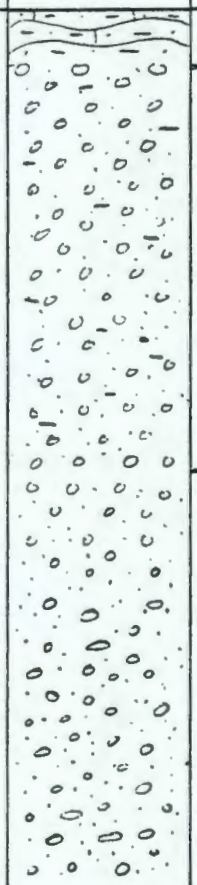
A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-W10-15 Geologist BJORNSTAD, GILMORE, TEEL, AIRHART, GOODWIN, ETC. Page 2 of 2

Reviewed by V.L. McGhan Date 12-7-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| |  | 130 |  | Caliche |
| | | | | A gravels @ 132' |
| 8" temporary carbon-steel casing to 222' | | 150 | | Muddy Sandy Gravel |
| 203.25' of type 304 4" stainless steel casing | | 175 | | Sandy GRAVELLY SAND SANDY GRAVEL |
| | | 200 | | |
| 21' of 10 SLOT CONTINUOUS WRAP STAINLESS STEEL CHANNEL PACK SCREEN | | 220 | | DRILL DEPTH = 222.34' COMPLETION DEPTH = 221.95' |
| 16-20 Mesh Col Silica Sand | | | | |
| Volclay Pellets | | | | |
| 8-20 bentonite Crumbles | | | | |
| Volclay Pure Gold Slurry | | | | |
| Cement | | | | |

A-1800-186 (3/87)

## WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, R0)

pecification No. WHC-S-014 Rev. No. 3
roject W-017
ocation 200 West Single Shell Tanks
rilling Co. Kaiser Engineers Hanford
riller Dave Garcia, Gary Lydia
ther (companies) N/A
eologist(s) Ron Bergen, Mark Birch, Bruce Bjornstad, Tyler Gilmore, Steve Teel, Steve Airhart, Eric Jensen, Shannon Godwin, M. Chamness

Well No. 299-W10-16 Temp. Well No. N/A
Coordinates
Casing Elev. Ground Elev.

**DRILLING METHOD**
Rotary Air N/A Mud N/A
Cable Tool D 0.0'-43', 50'-120 H 43'-50', 120-219.04'
Drilling Fluid 200 E Raw Water Supply ~ 141 gal.
Other N/A

**GEOPHYSICAL LOGGING**

| Sondes | Interval | Date |
|---|---|---|
| Nat. Gamma | 130.8'-3.8' | 9-22-89 |
| NAT. GAMMA | 219'-100' | 10-11-89 |
| | - | |
| | - | |
| | - | |

**COMPLETION DATA**
Drilled Depth 219.04'
Completed Depth 219.8'
Date Started 9-7-89
Date Completed 10-25-89
Static Water Level/Date 202.9'

**AQUIFER TESTING**
Type
Length of Test
Volume Pumped
Drawdown
Date of Test

## INSPECTION RESULTS

**CLEANING**
Inspection Method Visual
Acceptance Criteria Section 7.6

| | Accept | Reject | Date |
|---|---|---|---|
| rilling Tools/Rig | BNB | | 9-7-89 |
| emporary Materials | BNB | | 9-7-89 |
| ermanent Materials | | | |

**SCREEN**

| Type | Length | Slot Size |
|---|---|---|
| Odyssey Johnson Division wrap | 21.0' | 10 |
| channel pack 4" | | |

epth(s) 198.3' - 219.3'
-

Inspection Method Visual
cceptance Criteria Section 4.2.3
Accept SWB Reject Date 10/25/89

**CASING (permanent)**

| Type | Size | Placement |
|---|---|---|
| 304 SCH.5 Stainless Steel | 4" | +1.6' - 198.3' |
| casing | | - |

Inspection Method Visual
cceptance Criteria Section 4.2.4
Accept SWB Reject Date 10/25/89

**MATERIAL STORAGE/PACKING**
Inspection Method Visual
Acceptance Criteria Section 4.2.2

| | Accept | Reject | Date |
|---|---|---|---|
| Mtl. Handling/Storage | SWB | | 10/25/89 |
| Material Packing | SWB | | 10/25/89 |

**LUBRICANTS/ADDITIVES**
Inspection Method Visual
Acceptance Criteria Section 7.2

| | Identify | Accept | Reject | Date |
|---|---|---|---|---|
| Additives | None | BNB | | 10-9-89 |
| Lubricants | Food Grade Oil | BNB | | 10-9-89 |

**STRAIGHTNESS TEST**
Inspection Method 20' section of 6" SS casing downhole
Acceptance Criteria Section 8.3
Accept MAC Reject Date 10-9-89

**WELL PROTECTION**
Inspection Method Visual
Acceptance Criteria Section 4.2.10

| | Accept | Reject | Date |
|---|---|---|---|
| Protective Posts | | | |
| Locks | | | |

**ANNULAR SEAL**
Inspection Method Measured with Steel tape Acceptance Criteria Section 4.2.6 to 4.2.9.1

| Type | Interval | Volume | Accept | Reject | Date |
|---|---|---|---|---|---|
| 20-40 mesh Colorado Silica Sand | 195.45'-219.8' | 16 bags = 17.9 ft³ | SWB | | 10/24/89 |
| 3/8" - bentonite pellets | 191.35'-195.45' | 2 buck. = 1.24 ft³ | SWB | | 10/24/89 |
| 8-20 granular bentonite crumbles | 18.1'-191.35' | 155 bags = 110.05 ft³ | SWB | | 10/25/89 |
| Portland Cement grout | 2.1'-18.1' | 11.08 ft³ | SWB | | 10/25/89 |

**OTHER (initial if performed)**
___ Well Abandonment
___ Well Development
DLM Downhole TV Inspection
~~DLM~~ Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

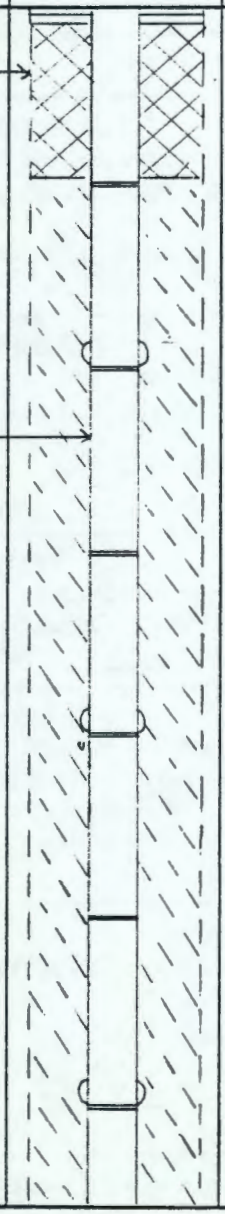
HL MA567 DO-1, rev. 0
Reviewed by D.L. McKhan 12-4-89

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-W10-16 Geologist BLEGEN, BIRCH, TEEL, BJORNSTAD, GILMORE, GOODWIN. Page 1 of 2

Reviewed by [illegible] Date 12-4-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 132'11" OF 10" CARBON STEEL CASING |  | 5 | | SAND |
| | | 10 | | MUDDY SAND |
| | | 15 | | MUDDY SANDY GRAVEL |
| | | 20 | | " " " |
| | | 25 | | GRAVEL |
| | | 30 | | MUDDY SANDY GRAVEL |
| | | 35 | | GRAVEL |
| | | 40 | | " |
| 200.4' OF 4" STAINLESS STEEL CASING | | 45 | | " |
| | | 50 | | MUDDY SANDY GRAVEL |
| | | 55 | | SLIGHTLY GRAVELLY SAND |
| | | 60 | | GRAVELLY MUDDY SAND |
| | | 65 | | SLIGHTLY GRAVELLY SAND |
| | | 70 | | SAND |
| | | 75 | | " |
| | | 80 | | SLIGHTLY GRAVELLY SAND |
| | | 85 | | MUDDY SAND |
| | | 90 | | SANDY MUD |
| | | 95 | | SLIGHTLY GRAVELLY MUDDY SAND |
| | | 100 | | GRAVELLY MUDDY SAND |
| | | 105 | | " " " |
| | | 110 | | SANDY MUD |
| | | 115 | | " " |
| | | 120 | | " " |
| | | 125 | | SLIGHTLY MUDDY SAND |
| | | 130 | | SANDY GRAVEL |

A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

# AS-BUILT DIAGRAM

Well Number 299-W10-16 Geologist BLEGEN, BIRCH, TEEL, BJORNSTAD, GILMORE, GOODWIN Page 2 of 2

Reviewed by D.L. McGhan Date 12-4-89

| Construction Data | | Depth in Feet | Geologic/Hydrologic Data | |
|---|---|---|---|---|
| Description | Diagram | | Diagram Litho. | Lithologic Description |
| 132' 11" OF 10" CARBON STEEL CASING | | 135 | | MUDDY SANDY GRAVEL |
| | | 140 | | SANDY GRAVEL |
| | | 145 | | MUDDY SANDY GRAVEL |
| 223' 0" OF 8" CARBON STEEL CASING | | 150 | | " " " |
| | | 155 | | " " " |
| | | 160 | | SANDY GRAVEL |
| 200.4' OF 4" STAINLESS STEEL CASING | | 165 | | " " |
| | | 170 | | MUDDY SANDY GRAVEL |
| | | 175 | | SANDY GRAVEL |
| | | 180 | | " " |
| | | 185 | | " " |
| | | 190 | | MUDDY SANDY GRAVEL |
| | | 195 | | " " " |
| | | 200 | | SANDY GRAVEL |
| 21' OF 10 SLOT CONTINUOUS WRAP STAINLESS STEEL CHANNEL PACK SCREEN | | 205 | | D/W = 202.9' 10/25/89 " |
| | | 210 | | " " |
| | | 215 | | " " |
| | | 219 | | " " |
| COMPLETION SYMBOLS: | | | | DRILLED DEPTH = 219.4' |
| CEMENT GROUT | | | | COMPLETION DEPTH = 219.8' |
| GRANULAR BENTONITE | | | | |
| BENTONITE PELLETS | | | | |
| SILICA SAND | | | | |
| CASING JOINT | | | | |
| CASING CENTRALIZER | | | | |

A-1800-186 (3/87)

9 1 1 2 0 5 0 0 7 1 0

# Section C

## Sediment Analyses from Twelve Wells for Single Shell Tanks

* Sediment Chemistry Data
* Soil Moisture Data
* Sieve Analysis Data
* Chain of Custody Forms

9 1 1 2 0 5 0 0 7 1 2

## Sediment Sample Analysis During Drilling

Sediment samples were collected approximately every 20 ft for determining the vertical distribution of any contaminants that may be present near the SST. These samples are placed in refrigerated storage until the well has been drill to its final depth. When the total depth has been reached, five samples are chósen from each well for analysis. These five samples are chosen to obtain a representative view of the vertical distribution of contaminants. The criteria for selecting samples to be analyzed are listed in order: 1) zones in which field instruments detected contamination, 2) areas of high moisture content, 3) just above and just below the water table (one each), 4) low permeability zones, and 5) changes in lithology. If five samples are not chosen by the first set of criteria, the remaining samples are chosen to fill in the gaps between the samples that were chosen for analysis. The sediments were analyzed for total alpha, total beta, TOC, anions, and in some cases for volatile organics. After the analysis were recieved from the various laboratories, additional samples were selected as need based on these results.

Well Numbers and Depths of Samples Initially
Analyzed for Total Alpha and Beta, TOC, and Anions

| WELL NUMBER | 299-E24-19 | 299-E25-40 | 299-E25-41 | 299-E27-12 |
|---|---|---|---|---|
| Depths in feet below ground | 56 | 80 | 60 | 120 |
| | 180 | 120 | 125 | 228 |
| | 220 | 220 | 180 | 240 |
| | 260 | 250 | 220 | 258 |
| | 298 | 260 | 240 | 260 |

| WELL NUMBER | 299-E27-13 | 299-E27-14 | 299-E27-15 | 299-E33-31 |
|---|---|---|---|---|
| Depths in feet below ground | 160 | 48 | 120 | 91 |
| | 200 | 220 | 230 | 140 |
| | 240 | 240 | 240 | 180 |
| | 260 | 250 | 245 | 202 |
| | 275 | 260 | 260 | 240 |

| WELL NUMBER | 299-E33-32 | 299-E33-33 | 299-W10-15 | 299-E10-16 |
|---|---|---|---|---|
| Depths in feet below ground | 68 | 120 | 20 | 80 |
| | 118 | 157 | 60 | 100 |
| | 180 | 203 | 80 | 120 |
| | 240 | 220 | 200 | 140 |
| | 260 | 240 | 220 | 200 |

Additional Samples Analyzed for Total Alpha and Beta, TOC, and Anions

| WELL NUMBER | 299-E33-32 |
|---|---|
| Depths in feet below ground | 40<br>65 |

Samples Analyzed for Volatile Organics

| WELL NUMBER | 299-E27-13 | 299-E27-14 |
|---|---|---|
| Depths in feet below ground | 200<br>240<br>260<br>275 | 110<br>115<br>260 |

CHEMICAL ANALYSES OF SEDIMENTS SAMPLED DURING DRILLING NEAR THE SINGLE SHELL TANKS

| WELL NUMBER | DEPTH (ft) | IC NITRATE (micrograms/g) | IC SULFATE (micrograms/g) | IC FLUORIDE (micrograms/g) | IC CHLORIDE (micrograms/g) | IC PHOSPHATE (micrograms/g) | IC BROMIDE (micrograms/g) | IC NITRITE (micrograms/g) | TOC (micrograms/g) | VOA CHCl3 (ppb/g) | VOA CH2Cl2 (ppb/g) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 299-E24-19 | 56 | 7.4 | 72.7 | < 1.0 | 30.9 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E24-19 | 180 | < 1.0 | 6.83 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E24-19 | 220 | 1.92 | 16.24 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E24-19 | 260 | 3.06 | 9.64 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E24-19 | 298 | < 1.0 | 1.6 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-40 | 80 | 5.32 | 12.75 | < 1.0 | 1.03 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-40 | 120 | 4.58 | 24.84 | < 1.0 | 3.44 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-40 | 220 | 12.96 | 46.80 | < 1.0 | 4.05 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-40 | 250 | 27.20 | 156.8 | < 1.0 | 18.2 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-40 | 260 | < 1.0 | 7.38 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-41 | 60 | < 1.0 | 10.27 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-41 | 125 | 3.13 | 11.10 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-41 | 180 | 1.75 | 8.13 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-41 | 220 | 1.06 | 30.75 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E25-41 | 240 | < 1.0 | 32.75 | < 1.0 | 2.75 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E27-12 | 120 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-12 | 228 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-12 | 240 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-12 | 258 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-12 | 260 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-13 | 180 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-13 | 200 | NA | NA | NA | NA | NA | NA | NA | < 20 | < 1.6 | NA |
| 299-E27-13 | 240 | NA | NA | NA | NA | NA | NA | NA | < 20 | < 1.6 | NA |
| 299-E27-13* | 260 | NA | NA | NA | NA | NA | NA | NA | < 20 | 1.5 | NA |
| 299-E27-13* | 275 | NA | NA | NA | NA | NA | NA | NA | < 20 | < 0.78 | NA |
| 299-E27-14 | 48 | NA | NA | NA | NA | NA | NA | NA | 46 | NA | NA |
| 299-E27-14 | 110 | NA | NA | NA | NA | NA | NA | NA | NA | < 2.5 | < 43 |
| 299-E27-14 | 115 | NA | NA | NA | NA | NA | NA | NA | NA | < 4.0 | < 53 |
| 299-E27-14 | 220 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-14 | 240 | NA | NA | NA | NA | NA | NA | NA | 30 | NA | NA |
| 299-E27-14 | 250 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-14 | 260 | NA | NA | NA | NA | NA | NA | NA | < 20 | < 1.6 | < 28 |
| 299-E27-15 | 120 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-15 | 230 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-15 | 240 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-15 | 245 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-E27-15 | 260 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |

713

CHEMICAL ANALYSES OF SEDIMENTS SAMPLED DURING DRILLING NEAR THE SINGLE SHELL TANKS

| WELL NUMBER | DEPTH (ft) | VOA 1,1,1-TCA (ppb/g) | VOA CCl4 (ppb/g) | VOA TCE (ppb/g) | VOA TOLUENE (ppb/g) | VOA PCE (ppb/g) | VOA BENZENE (ppb/g) | BETA (PCI/G) | SIGMA BETA (PCI/G) | LO-ALPHA (PCI/G) | SIGMA LO-ALPHA (PCI/G) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 299-E24-19 | 56 | NA | NA | NA | NA | NA | NA | 18.5 | 3.45 | 4.43 | 2.58 |
| 299-E24-19 | 180 | NA | NA | NA | NA | NA | NA | 17.5 | 3.35 | 5.44 | 2.57 |
| 299-E24-19 | 220 | NA | NA | NA | NA | NA | NA | 20.4 | 3.68 | 1.67 | 1.55 |
| 299-E24-19 | 260 | NA | NA | NA | NA | NA | NA | 19.1 | 3.55 | < 1.93 | 2.19 |
| 299-E24-19 | 298 | NA | NA | NA | NA | NA | NA | 18.4 | 3.46 | < 1.50 | 1.96 |
| 299-E25-40 | 80 | NA | NA | NA | NA | NA | NA | 11.0 | 2.60 | 2.84 | 2.23 |
| 299-E25-40 | 120 | NA | NA | NA | NA | NA | NA | 18.3 | 3.42 | 3.83 | 2.48 |
| 299-E25-40 | 220 | NA | NA | NA | NA | NA | NA | 19.9 | 3.61 | 2.45 | 2.00 |
| 299-E25-40 | 250 | NA | NA | NA | NA | NA | NA | 20.7 | 3.71 | 5.58 | 2.58 |
| 299-E25-40 | 260 | NA | NA | NA | NA | NA | NA | 16.0 | 3.42 | 3.51 | 2.46 |
| 299-E25-41 | 60 | NA | NA | NA | NA | NA | NA | 19.5 | 3.59 | < 1.76 | 1.94 |
| 299-E25-41 | 125 | NA | NA | NA | NA | NA | NA | 23.8 | 4.07 | 4.20 | 2.10 |
| 299-E25-41 | 180 | NA | NA | NA | NA | NA | NA | 21.6 | 3.83 | 2.73 | 2.34 |
| 299-E25-41 | 220 | NA | NA | NA | NA | NA | NA | 23.1 | 3.99 | 3.11 | 2.29 |
| 299-E25-41 | 240 | NA | NA | NA | NA | NA | NA | 15.5 | 3.12 | 4.07 | 2.47 |
| 299-E27-12 | 120 | NA | NA | NA | NA | NA | NA | 21.2 | 3.78 | 3.78 | 2.04 |
| 299-E27-12 | 228 | NA | NA | NA | NA | NA | NA | 22.8 | 3.96 | 8.02 | 3.01 |
| 299-E27-12 | 240 | NA | NA | NA | NA | NA | NA | 15.4 | 3.12 | 2.52 | 2.39 |
| 299-E27-12 | 258 | NA | NA | NA | NA | NA | NA | 18.1 | 3.45 | 3.10 | 1.97 |
| 299-E27-12 | 260 | NA | NA | NA | NA | NA | NA | 13.5 | 2.90 | 4.18 | 2.59 |
| 299-E27-13 | 180 | NA | NA | NA | NA | NA | NA | 21.3 | 3.79 | 4.41 | 2.63 |
| 299-E27-13 | 200 | < 3.0 | < 0.08 | < 1.1 | < 10 | < 2.1 | NA | 16.0 | 3.23 | 3.17 | 2.28 |
| 299-E27-13 | 240 | < 2.9 | < 0.07 | < 1.1 | < 10 | < 2.0 | NA | 20.1 | 3.69 | 10.80 | 3.42 |
| 299-E27-13* | 260 | 11 | 0.50 | 1.0 | 700 | < 0.85 | NA | 15.2 | 3.11 | 3.47 | 2.17 |
| 299-E27-13* | 275 | < 1.4 | < 0.04 | < 0.52 | < 4.6 | < 0.97 | NA | 18.2 | 3.49 | 2.21 | 2.00 |
| 299-E27-14 | 48 | NA | | | | | NA | 21.0 | 3.79 | 23.0 | 5.02 |
| 299-E27-14 | 110 | < 1.6 | < 0.1 | < 0.7 | < 7.4 | NA | < 3.3 | NA | NA | NA | NA |
| 299-E27-14 | 115 | < 1.9 | < 0.1 | < 0.9 | < 9.1 | NA | < 4.1 | NA | NA | NA | NA |
| 299-E27-14 | 220 | NA | NA | NA | NA | NA | NA | 19.0 | 3.58 | 11.9 | 3.82 |
| 299-E27-14 | 240 | NA | NA | NA | NA | NA | NA | 20.7 | 3.76 | 8.59 | 3.15 |
| 299-E27-14 | 250 | NA | NA | NA | NA | NA | NA | 19.2 | 3.59 | 8.51 | 3.29 |
| 299-E27-14 | 260 | < 1.0 | < 0.1 | < 0.5 | < 4.6 | NA | < 2.1 | 16.8 | 3.33 | 12.8 | 3.89 |
| 299-E27-15 | 120 | NA | NA | NA | NA | NA | NA | 20.2 | 3.69 | 1.67 | 1.90 |
| 299-E27-15 | 230 | NA | NA | NA | NA | NA | NA | 19.7 | 3.61 | 2.72 | 2.43 |
| 299-E27-15 | 240 | NA | NA | NA | NA | NA | NA | 18.2 | 3.46 | 4.51 | 2.27 |
| 299-E27-15 | 245 | NA | NA | NA | NA | NA | NA | 20.9 | 3.75 | 3.15 | 2.40 |
| 299-E27-15 | 260 | NA | NA | NA | NA | NA | NA | 17.8 | 3.41 | 3.87 | 2.35 |

714

CHEMICAL ANALYSES OF SEDIMENTS SAMPLED DURING DRILLING NEAR THE SINGLE SHELL TANKS

| WELL NUMBER | DEPTH (ft) | IC NITRATE (micrograms/g) | IC SULFATE (micrograms/g) | IC FLUORIDE (micrograms/g) | IC CHLORIDE (micrograms/g) | IC PHOSPHATE (micrograms/g) | IC BROMIDE (micrograms/g) | IC NITRITE (micrograms/g) | TOC (micrograms/g) | VOA CHCl3 (ppb/g) | VOA CH2Cl2 (ppb/g) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 299-E33-31 | 91 | 33 | 68 | < 1.0 | 10.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-31 | 140 | 18.4 | 28.3 | < 1.0 | 8 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-31 | 180 | 9.2 | 15.7 | < 1.0 | 3.2 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-31 | 202 | 48 | 102 | < 1.0 | 28 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-31 | 240 | < 1.0 | 30 | < 1.0 | 3.9 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-32 | 68 | 4800 | 146 | < 10.0 | 110 | < 2.0 | < 10.0 | < 10.0 | < 20 | NA | NA |
| 299-E33-32 | 118 | 26.5 | 28.2 | < 1.0 | 2.2 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-32 | 180 | 2.4 | 26.3 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-32 | 240 | < 1.0 | 5.1 | < 1.0 | < 1.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-32 | 260 | < 1.0 | 13.8 | < 1.0 | 2.0 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-33 | 120 | 5.0 | 45.0 | < 1.0 | 1.4 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-33 | 157 | 47 | 400 | 1.1 | 7.5 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-33 | 203 | 2.6 | 39 | < 1.0 | 3.9 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-33 | 220 | < 1.0 | 16.3 | < 1.0 | 1.4 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-E33-33 | 240 | < 1.0 | 20.6 | < 1.0 | 2.1 | < 2.0 | < 1.0 | < 1.0 | < 20 | NA | NA |
| 299-W10-15 | 20 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-15 | 60 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-15 | 80 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-15 | 200 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-15 | 220 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-16 | 80 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-W10-16 | 100 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-W10-16 | 120 | NA | NA | NA | NA | NA | NA | NA | 26 | NA | NA |
| 299-W10-16 | 140 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |
| 299-W10-16 | 200 | NA | NA | NA | NA | NA | NA | NA | < 20 | NA | NA |

CHEMICAL ANALYSES OF SEDIMENTS SAMPLED DURING DRILLING NEAR THE SINGLE SHELL TANKS

| WELL NUMBER | DEPTH (ft) | VOA 1,1,1-TCA (ppb/g) | VOA CCl4 (ppb/g) | VOA TCE (ppb/g) | VOA TOLUENE (ppb/g) | VOA PCE (ppb/g) | VOA BENZENE (ppb/g) | BETA (PCI/G) | SIGMA BETA (PCI/G) | LO-ALPHA (PCI/G) | SIGMA LO-ALPHA (PCI/G) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 299-E33-31 | 91 | NA | NA | NA | NA | NA | NA | 164 [a] | 26.5 | 4.33 | 2.36 |
| 299-E33-31 | 140 | NA | NA | NA | NA | NA | NA | 114 | 21.1 | 2.71 | 2.09 |
| 299-E33-31 | 180 | NA | NA | NA | NA | NA | NA | 108 | 20.7 | 2.81 | 2.31 |
| 299-E33-31 | 202 | NA | NA | NA | NA | NA | NA | 149 | 24.9 | 5.02 | 2.64 |
| 299-E33-31 | 240 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-E33-32 | 68 | NA | NA | NA | NA | NA | NA | 25.5 | 4.28 | 7.22 | 2.99 |
| 299-E33-32 | 118 | NA | NA | NA | NA | NA | NA | 22.7 | 3.95 | 5.19 | 2.66 |
| 299-E33-32 | 180 | NA | NA | NA | NA | NA | NA | 18.3 | 3.49 | 3.03 | 2.26 |
| 299-E33-32 | 240 | NA | NA | NA | NA | NA | NA | 21.0 | 3.80 | 4.21 | 2.63 |
| 299-E33-32 | 260 | NA | NA | NA | NA | NA | NA | 18.5 | 3.50 | 4.15 | 2.22 |
| 299-E33-33 | 120 | NA | NA | NA | NA | NA | NA | 22.1 | 3.90 | < 1.37 | 1.90 |
| 299-E33-33 | 157 | NA | NA | NA | NA | NA | NA | 20.0 | 3.66 | 4.46 | 2.53 |
| 299-E33-33 | 203 | NA | NA | NA | NA | NA | NA | 20.7 | 3.75 | 4.59 | 2.69 |
| 299-E33-33 | 220 | NA | NA | NA | NA | NA | NA | 19.2 | 3.58 | 4.70 | 2.32 |
| 299-E33-33 | 240 | NA | NA | NA | NA | NA | NA | 19.9 | 3.63 | 5.05 | 2.75 |
| 299-W10-15 | 20 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-15 | 60 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-15 | 80 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-15 | 200 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-15 | 220 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 299-W10-16 | 80 | NA | NA | NA | NA | NA | NA | 25.5 | 4.27 | 14.2 | 3.99 |
| 299-W10-16 | 100 | NA | NA | NA | NA | NA | NA | 17.4 | 3.38 | 17.1 | 4.41 |
| 299-W10-16 | 120 | NA | NA | NA | NA | NA | NA | 28.2 | 4.54 | 39.6 | 7.5 |
| 299-W10-16 | 140 | NA | NA | NA | NA | NA | NA | 14.7 | 3.09 | 8.02 | 3.24 |
| 299-W10-16 | 200 | NA | NA | NA | NA | NA | NA | 17.7 | 3.44 | 1.12 | 3.33 |

(a) We believe the beta values for well 299-E33-31 are in error and should be an order of magnitude lower than currently listed. A Request for Data Review at United States Testing Company, Inc., is currently pending.

SOIL MOISTURE DATA

| SAMPLE | %H20 | SAMPLE | %H20 | SAMPLE | %H20 |
|---|---|---|---|---|---|
| 299-E24-19 | | 299-E25-40 | | 299-E25-41 | |
| 5' | 7.63 | 5' | 7.26 | 5' | 6.23 |
| 10' | 3.72 | 10' | 8.15 | 10' | 12.38 |
| 15' | 4.45 | 15' | 18.93 | 25' | 3.38 |
| 20' | 4.17 | 20' | 7.23 | 30' | 5.48 |
| 25' | 3.78 | 25' | 4.74 | 35' | 11.00 |
| 30' | 3.44 | 30' | 2.76 | 45' | 3.31 |
| 35' | 3.15 | 35' | 4.93 | 50' | 4.04 |
| 40' | 3.09 | 40' | 2.72 | 55' | 4.84 |
| 45' | 3.59 | 45' | 2.88 | 60' | 4.12 |
| 50' | 2.76 | 50' | 3.00 | 65' | 6.22 |
| 55' | 3.13 | 55' | 3.07 | 70' | 5.29 |
| 56' | 20.75 | 60' | 2.97 | 75' | 4.27 |
| 60' | 4.16 | 65' | 3.43 | 80' | 4.69 |
| 65' | 4.02 | 70' | 3.16 | 85'a | 2.87 |
| 70' | 2.66 | 75' | 2.83 | 85'b | 4.10 |
| 75' | 3.60 | 80' | 2.81 | 90'a | 3.44 |
| 80' | 3.23 | 95' | 3.25 | 90'b | 4.24 |
| 85' | 2.70 | 100' | 3.53 | 95' | 3.95 |
| 90' | 3.10 | 105' | 4.43 | 100' | 4.73 |
| 95' | 4.20 | 110' | 3.92 | 105' | 5.31 |
| 100' | 3.84 | 120' | 3.62 | 110' | 5.89 |
| 105' | 4.94 | 125' | 3.27 | 115' | 5.78 |
| 110' | 3.16 | 130' | 3.21 | 120' | 9.54 |
| 115' | 4.00 | 135' | 2.92 | 125' | 10.57 |
| 120' | 2.93 | 140' | 5.08 | 130' | 4.15 |
| 125' | 5.29 | 145' | 2.74 | 135' | 5.66 |
| 130' | 9.44 | 150' | 4.36 | 140' | 7.15 |
| 135' | 2.50 | 155' | 3.58 | 145' | 5.02 |
| 140' | 2.46 | 160' | 4.04 | 150' | 4.45 |
| 145' | 2.62 | 165' | 2.81 | 155' | 4.07 |
| 150' | 3.23 | 170' | 2.60 | 160' | 7.18 |
| 155' | 4.58 | 175' | 2.94 | 165' | 5.96 |
| 160' | 4.03 | 180' | 3.28 | 170' | 5.64 |
| 165' | 3.11 | 185' | 4.31 | 175' | 3.78 |
| 170' | 3.55 | 190' | 3.89 | 180' | 3.70 |
| 175' | 2.34 | 195' | 2.67 | 185' | 4.50 |
| 180' | 2.83 | 220' | 2.93 | 190' | 6.52 |
| 185' | 3.10 | 225' | 3.16 | 195' | 5.32 |
| 210' | 3.95 | 230' | 2.92 | 220' | 3.13 |
| 215' | 3.84 | 235' | 3.16 | | |
| 220' | 3.27 | 240' | 4.40 | | |
| 225' | 3.34 | 245' | 3.37 | | |
| 230' | 3.07 | 250'silt | 26.25 | | |
| 240' | 3.38 | 250' | 5.64 | | |
| 245' | 3.49 | 255' | 24.27 | | |
| 250' | 3.43 | 260' | 12.07 | | |
| 255' | 4.63 | 265' | 14.10 | | |
| 260' | 5.26 | 270' | 7.74 | | |
| 265' | 4.53 | | | | |

SOIL MOISTURE DATA

| SAMPLE | %H2O | SAMPLE | %H2O | SAMPLE | %H2O |
|---|---|---|---|---|---|
| 299-E27-12 | | 299-E27-12 cont. | | 299-E27-14 | |
| 5' | 5.51 | 245' | 1.99 | 5' | 13.49 |
| 10' | 13.47 | 250' | 2.33 | 10' | 17.86 |
| 15' | 8.29 | 255' | 6.38 | 15' | 6.02 |
| 20' | 3.89 | 258' | 6.07 | 20' | 2.86 |
| 25' | 2.92 | | | 25' | 2.79 |
| 30' | 2.42 | 299-E27-13 | | 30' | 2.75 |
| 35' | 2.14 | 5' | 2.86 | 35' | 2.63 |
| 40' | 2.21 | 10' | 3.01 | 40' | 2.85 |
| 45' | 2.17 | 30' | 2.34 | 45' | 3.50 |
| 50' | 1.69 | 35' | 2.59 | 48' | 23.60 |
| 55' | 1.61 | 40' | 2.31 | 50' | 3.62 |
| 60' | 1.94 | 45' | 2.25 | 55' | 3.66 |
| 65' | 1.54 | 50' | 2.29 | 60' | 5.24 |
| 70' | 1.56 | 55' | 2.26 | 65' | 3.20 |
| 75' | 1.77 | 60' | 2.54 | 70' | 4.44 |
| 80' | 1.48 | 65' | 2.37 | 75' | 3.38 |
| 85' | 1.67 | 70' | 2.93 | 80' | 3.35 |
| 90' | 2.16 | 75' | 3.06 | 85' | 3.89 |
| 95' | 1.86 | 80' | 2.76 | 90' | 3.95 |
| 100' | 2.00 | 85' | 1.69 | 95' | 2.91 |
| 105' | 1.86 | 90' | 1.97 | 100' | 8.83 |
| 110' | 1.83 | 95' | 2.51 | 105' | 2.86 |
| 115' | 1.92 | 100' | 2.41 | 110' | 4.11 |
| 120' | 2.00 | 105' | 1.45 | 115' | 3.51 |
| 125' | 2.22 | 110' | 2.18 | 120' | 3.37 |
| 130' | 2.69 | 115' | 1.47 | 125' | 3.75 |
| 135' | 1.52 | 120' | 2.47 | 130' | 2.81 |
| 140' | 1.74 | 125' | 1.90 | 135' | 3.27 |
| 145' | 1.95 | 130' | 2.37 | 140' | 3.97 |
| 150' | 1.93 | 135' | 2.02 | 145' | 3.56 |
| 155' | 1.94 | 140' | 1.54 | 150' | 4.05 |
| 160' | 1.99 | 150' | 1.74 | 155' | 3.33 |
| 165' | 2.14 | 155' | 3.34 | 160' | 3.27 |
| 170' | 1.89 | 160' | 15.74 | 165' | 3.75 |
| 175' | 1.74 | 165' | 1.72 | 170' | 3.44 |
| 180' | 1.84 | 170' | 2.83 | 175' | 3.58 |
| 185' | 1.92 | 175' | 1.85 | 180' | 3.55 |
| 190' | 2.02 | 180' | 2.03 | 185' | 3.63 |
| 195' | 1.92 | 185' | 2.17 | 190' | 3.50 |
| 200' | 1.84 | 190' | 1.92 | 195' | 3.31 |
| 205' | 1.76 | 195' | 2.26 | 200' | 3.37 |
| 210' | 1.92 | 200' | 2.22 | 205' | 3.32 |
| 215' | 2.14 | 205' | 2.15 | 210' | 3.45 |
| 220' | 2.40 | 210' | 1.66 | 220' | 3.34 |
| 225' | 2.31 | 215' | 2.10 | 235' | 3.35 |
| 228' | 6.77 | 220' | 2.19 | 240' | 1.98 |
| 230' | 2.18 | 230' | 2.03 | | |
| 235' | 2.51 | 235' | 1.94 | | |
| 240' | 2.55 | 240' | 4.04 | | |

SOIL MOISTURE DATA

| SAMPLE | %H20 | SAMPLE | %H20 | SAMPLE | %H20 |
|---|---|---|---|---|---|
| 299-E27-15 | | 299-E33-31 | | 299-E33-32 | |
| 5' | 4.71 | 6' | 3.66 | 5' | 4.42 |
| 10' | 5.47 | 10' | 2.13 | 10' | 2.77 |
| 15' | 2.73 | 25' | 2.95 | 25' | 2.57 |
| 25' | 4.20 | 30' | 3.53 | 35' | 3.07 |
| 30' | 6.24 | 36' | 3.81 | 40' | 3.01 |
| 35' | 2.93 | 40' | 3.79 | 45' | 3.20 |
| 40' | 2.93 | 45' | 3.57 | 50' | 3.21 |
| 45' | 2.85 | 50' | 4.40 | 55' | 2.91 |
| 50' | 2.40 | 55' | 4.09 | 60' | 2.89 |
| 55' | 2.32 | 60' | 3.43 | 65' | 2.91 |
| 60' | 2.06 | 65' | 2.69 | 68' | 21.05 |
| 65' | 2.21 | 70' | 2.74 | 70' | 5.56 |
| 70' | 1.99 | 75' | 5.79 | 75' | 13.68 |
| 75' | 2.43 | 80' | 5.22 | 80' | 2.63 |
| 80' | 2.62 | 85' | 13.53 | 85' | 2.70 |
| 85' | 2.23 | 90' | 2.79 | 90' | 2.87 |
| 90' | 2.25 | 95' | 4.51 | 95' | 2.66 |
| 95' | 2.79 | 100' | 4.48 | 100' | 2.49 |
| 100' | 2.06 | 105' | 4.86 | 105' | 3.25 |
| 105' | 2.30 | 110' | 4.14 | 110' | 3.05 |
| 110' | 2.34 | 115' | 4.05 | 115' | 2.50 |
| 115' | 2.51 | 120' | 3.14 | 118' | 13.20 |
| 120' | 2.35 | 125' | 3.62 | 120' | 2.60 |
| 125' | 2.57 | 130' | 3.93 | 125' | 3.61 |
| 130' | 2.35 | 135' | 3.84 | 130' | 2.85 |
| 135' | 8.71 | 140' | 3.84 | 135' | 3.00 |
| 140' | 2.78 | 145' | 3.81 | 140' | 2.99 |
| 145' | 2.28 | 150' | 3.12 | 145' | 2.80 |
| 150' | 2.07 | 155' | 3.68 | 150' | 2.48 |
| 155' | 2.93 | 160' | 3.07 | 155' | 2.58 |
| 160' | 2.69 | 165' | 3.36 | 160' | 2.34 |
| 165' | 2.58 | 170' | 3.63 | 165' | 2.00 |
| 170' | 2.79 | 175' | 3.31 | 170' | 2.15 |
| 175' | 2.81 | 180' | 3.45 | 175' | 1.85 |
| 180' | 2.68 | 185' | 3.65 | 180' | 1.58 |
| 185' | 2.68 | 190' | 3.77 | 185' | 2.17 |
| 190' | 2.64 | 195' | 4.06 | 190' | 2.12 |
| 195' | 2.90 | 200' | 5.17 | 195' | 2.53 |
| 200' | 3.10 | 205' | 2.23 | 200'a | 3.17 |
| 205' | 2.95 | | | 200'b | 2.45 |
| 210' | 2.93 | | | 205' | 2.09 |
| 215' | 3.07 | | | 210' | 2.45 |
| 220' | 3.13 | | | 215' | 2.27 |
| 225' | 3.02 | | | 225' | 17.20 |
| 230' | 2.78 | | | 230' | 2.49 |
| 235' | 1.97 | | | 235' | 2.55 |
| 240' | 2.28 | | | 240' | 2.73 |
| 245' | 7.96 | | | 245' | 2.23 |

SOIL MOISTURE DATA

| SAMPLE | %H2O | SAMPLE | %H2O | SAMPLE | %H2O |
|---|---|---|---|---|---|
| 299-E33-33 | | 299-W10-15 | | 299-W10-16 | |
| 5' | 1.18 | 30' | 4.04 | 5' | 5.11 |
| 20' | 2.97 | 35' | 6.73 | 10' | 13.97 |
| 30' | 2.20 | 40' | 2.30 | 15' | 3.71 |
| 35' | 2.73 | 50' | 4.23 | 20' | 4.70 |
| 40' | 2.05 | 55' | 4.72 | 25' | 2.56 |
| 55' | 2.53 | 60' | 4.81 | 30' | 3.14 |
| 65' | 2.49 | 65' | 4.67 | 55' | 5.94 |
| 70' | 1.95 | 70' | 3.67 | 60' | 12.40 |
| 85' | 2.23 | 73' | 23.57 | 65' | 4.76 |
| 90' | 3.07 | 75' | 3.86 | 70' | 4.16 |
| 95' | 1.99 | 80' | 13.17 | 75' | 5.69 |
| 105' | 3.55 | 90' | 7.14 | 80' | 4.90 |
| 110' | 2.63 | 95' | 9.84 | 85' | 4.84 |
| 115' | 2.63 | | | 90' | 22.12 |
| 120' | 2.10 | | | 95' | 14.25 |
| 125' | 2.57 | | | | |
| 130' | 2.08 | | | | |
| 135' | 2.38 | | | | |
| 140' | 1.93 | | | | |
| 150' | 2.28 | | | | |
| 155' | 1.78 | | | | |
| 160' | 2.82 | | | | |
| 165' | 2.32 | | | | |
| 170' | 2.23 | | | | |
| 175' | 1.97 | | | | |
| 180' | 2.30 | | | | |
| 190' | 2.33 | | | | |
| 195' | 2.26 | | | | |
| 200' | 2.27 | | | | |
| 205' | 2.89 | | | | |

# SIEVE ANALYSIS

The following sieve analyses were performed on samples chosen from proposed screened intervals, so that the best possible screen and filter pack combinations could be chosen for each well. Sieve analysis was discontinued after the first few wells were drilled because the best possible screen and filter packs were no longer being chosen. Channel pack screens were used as a substitute for screens that matched the formations.

SIEVE ANALYSIS

| SAMPLE & TOTAL Wt. | MESH SIZE | PERCENT LESS THAN | SAMPLE & TOTAL Wt. | MESH SIZE | PERCENT LESS THAN |
|---|---|---|---|---|---|
| 299-E24-19 | 4.000 | 82.29 | 299-E24-19 | 4.000 | 45.24 |
| 285' | 2.000 | 73.55 | 303' | 2.000 | 33.14 |
| 629.61 | 1.000 | 63.04 | 692.27 | 1.000 | 22.22 |
| | 0.500 | 39.86 | | 0.500 | 12.04 |
| | 0.250 | 29.16 | | 0.250 | 4.48 |
| | 0.125 | 22.64 | | 0.125 | 1.22 |
| | 0.063 | 15.42 | | 0.063 | 0.23 |
| | 0.045 | 11.59 | | 0.045 | 0.07 |
| | PAN | 0.05 | | PAN | -0.17 |
| 299-E24-19 | 4.000 | 86.40 | 299-E25-40 | 4.000 | 90.31 |
| 290' | 2.000 | 69.98 | 265' | 2.000 | 83.17 |
| 616.80 | 1.000 | 52.79 | 634.85 | 1.000 | 60.46 |
| | 0.500 | 35.08 | | 0.500 | 23.40 |
| | 0.250 | 24.45 | | 0.250 | 10.44 |
| | 0.125 | 16.30 | | 0.125 | 6.40 |
| | 0.063 | 10.24 | | 0.063 | 3.49 |
| | 0.045 | 7.79 | | 0.045 | 2.69 |
| | PAN | -0.26 | | PAN | 0.63 |
| 299-E24-19 | 4.000 | 100.00 | 299-E25-40 | 4.000 | 62.95 |
| 295' | 2.000 | 99.82 | 270' | 2.000 | 57.54 |
| 580.52 | 1.000 | 97.86 | 671.62 | 1.000 | 45.39 |
| | 0.500 | 81.43 | | 0.500 | 22.03 |
| | 0.250 | 42.50 | | 0.250 | 11.08 |
| | 0.125 | 16.75 | | 0.125 | 6.51 |
| | 0.063 | 8.15 | | 0.063 | 3.99 |
| | 0.045 | 6.04 | | 0.045 | 3.11 |
| | PAN | -0.15 | | PAN | -0.13 |
| 299-E24-19 | 4.000 | 87.95 | 299-E25-41 | 4.000 | 99.35 |
| 298' | 2.000 | 71.73 | 265' | 2.000 | 95.90 |
| 635.36 | 1.000 | 50.86 | 429.64 | 1.000 | 81.04 |
| | 0.500 | 23.47 | | 0.500 | 48.48 |
| | 0.250 | 10.39 | | 0.250 | 28.95 |
| | 0.125 | 5.20 | | 0.125 | 15.04 |
| | 0.063 | 2.14 | | 0.063 | 8.81 |
| | 0.045 | 1.27 | | 0.045 | 6.76 |
| | PAN | 0.03 | | PAN | -0.07 |

SIEVE ANALYSIS

| SAMPLE & TOTAL Wt. | MESH SIZE | PERCENT LESS THAN | SAMPLE & TOTAL Wt. | MESH SIZE | PERCENT LESS THAN |
|---|---|---|---|---|---|
| 299-E25-41 | 4.000 | 93.13 | 299-W10-15 | 4.000 | 88.20 |
| 270' | 2.000 | 88.72 | 220' | 2.000 | 78.34 |
| 530.17 | 1.000 | 76.02 | 560.36 | 1.000 | 71.13 |
| | 0.500 | 53.79 | | 0.500 | 55.79 |
| | 0.250 | 43.47 | | 0.250 | 25.18 |
| | 0.125 | 36.52 | | 0.125 | 13.43 |
| | 0.063 | 18.54 | | 0.063 | 7.10 |
| | 0.045 | 14.72 | | 0.045 | 5.11 |
| | PAN | 0.07 | | PAN | -0.09 |
| 299-E25-41 | 4.000 | 76.43 | 299-W10-16 | 4.000 | 86.69 |
| 275' | 2.000 | 66.60 | 205' | 2.000 | 71.34 |
| 555.77 | 1.000 | 51.96 | 696.46 | 1.000 | 62.06 |
| | 0.500 | 28.59 | | 0.500 | 47.06 |
| | 0.250 | 20.76 | | 0.250 | 26.97 |
| | 0.125 | 16.14 | | 0.125 | 13.97 |
| | 0.063 | 8.56 | | 0.063 | 6.92 |
| | 0.045 | 6.51 | | 0.045 | 4.86 |
| | PAN | -0.18 | | PAN | -0.34 |
| 299-W10-15 | 4.000 | 79.86 | 299-W10-16 | 4.000 | 67.55 |
| 210' | 2.000 | 63.96 | 210' | 2.000 | 50.48 |
| 708.20 | 1.000 | 50.23 | 587.01 | 1.000 | 40.98 |
| | 0.500 | 37.06 | | 0.500 | 29.40 |
| | 0.250 | 23.93 | | 0.250 | 18.13 |
| | 0.125 | 13.84 | | 0.125 | 9.98 |
| | 0.063 | 7.74 | | 0.063 | 5.41 |
| | 0.045 | 5.86 | | 0.045 | 3.86 |
| | PAN | 0.11 | | PAN | -0.46 |
| 299-W10-15 | 4.000 | 89.20 | 299-W10-16 | 4.000 | 85.59 |
| 215' | 2.000 | 75.24 | 215' | 2.000 | 70.13 |
| 593.00 | 1.000 | 62.66 | 564.52 | 1.000 | 59.80 |
| | 0.500 | 43.39 | | 0.500 | 46.91 |
| | 0.250 | 26.32 | | 0.250 | 29.83 |
| | 0.125 | 15.29 | | 0.125 | 14.17 |
| | 0.063 | 8.54 | | 0.063 | 7.17 |
| | 0.045 | 6.28 | | 0.045 | 5.13 |
| | PAN | -0.16 | | PAN | -0.13 |

SIEVE ANALYSIS

| SAMPLE & TOTAL Wt. | MESH SIZE | PERCENT LESS THAN | SAMPLE & TOTAL Wt. | MESH SIZE | PERCENT LESS THAN |
|---|---|---|---|---|---|
| 299-E27-13 | 4.000 | 51.47 | 299-E33-31 | 4.000 | 75.57 |
| 260' | 2.000 | 36.70 | 240' | 2.000 | 56.10 |
| 827.86 | 1.000 | 28.85 | 617.28 | 1.000 | 42.63 |
| | 0.500 | 18.39 | | 0.500 | 33.63 |
| | 0.250 | 10.58 | | 0.250 | 25.12 |
| | 0.125 | 5.38 | | 0.125 | 18.17 |
| | 0.063 | 2.03 | | 0.063 | 11.92 |
| | 0.045 | 1.22 | | 0.045 | 9.44 |
| | PAN | -0.13 | | PAN | -0.02 |
| 299-E27-13 | 4.000 | 41.57 | 299-E33-31 | 4.000 | 97.47 |
| 265' | 2.000 | 25.22 | 245' | 2.000 | 73.90 |
| 792.63 | 1.000 | 12.56 | 698.40 | 1.000 | 41.67 |
| | 0.500 | 4.39 | | 0.500 | 26.01 |
| | 0.250 | 1.69 | | 0.250 | 18.04 |
| | 0.125 | 0.76 | | 0.125 | 11.63 |
| | 0.063 | 0.36 | | 0.063 | 7.51 |
| | 0.045 | 0.25 | | 0.045 | 5.88 |
| | PAN | -0.07 | | PAN | -0.09 |
| 299-E27-13 | 4.000 | 26.93 | 299-E33-31 | 4.000 | 93.27 |
| 270' | 2.000 | 17.64 | 250' | 2.000 | 64.16 |
| 786.60 | 1.000 | 10.29 | 753.83 | 1.000 | 41.40 |
| | 0.500 | 5.18 | | 0.500 | 27.55 |
| | 0.250 | 3.21 | | 0.250 | 19.93 |
| | 0.125 | 2.38 | | 0.125 | 13.99 |
| | 0.063 | 1.58 | | 0.063 | 8.88 |
| | 0.045 | 1.28 | | 0.045 | 6.80 |
| | PAN | 0.18 | | PAN | -0.05 |
| 299-E27-13 | 4.000 | 55.37 | 299-E33-31 | 4.000 | 83.86 |
| 275' | 2.000 | 43.84 | 255' | 2.000 | 69.63 |
| 837.89 | 1.000 | 28.22 | 812.75 | 1.000 | 54.34 |
| | 0.500 | 11.86 | | 0.500 | 38.27 |
| | 0.250 | 5.99 | | 0.250 | 23.47 |
| | 0.125 | 2.67 | | 0.125 | 11.61 |
| | 0.063 | 1.03 | | 0.063 | 6.42 |
| | 0.045 | 0.63 | | 0.045 | 5.08 |
| | PAN | -0.15 | | PAN | -0.10 |

SIEVE ANALYSIS

| SAMPLE & TOTAL Wt. | MESH SIZE | PERCENT LESS THAN | SAMPLE & TOTAL Wt. | MESH SIZE | PERCENT LESS THAN |
|---|---|---|---|---|---|
| 299-33-32 | 4.000 | 98.68 | 299-E33-33 | 4.000 | 73.47 |
| 255' | 2.000 | 91.04 | 240' | 2.000 | 51.80 |
| 716.88 | 1.000 | 70.11 | 725.40 | 1.000 | 36.26 |
| | 0.500 | 37.12 | | 0.500 | 23.85 |
| | 0.250 | 20.93 | | 0.250 | 15.91 |
| | 0.125 | 14.19 | | 0.125 | 10.03 |
| | 0.063 | 9.22 | | 0.063 | 6.04 |
| | 0.045 | 7.16 | | 0.045 | 4.34 |
| | PAN | 0.03 | | PAN | -0.15 |
| 299-E33-32 | 4.000 | 98.42 | 299-E33-33 | 4.000 | 72.63 |
| 260' | 2.000 | 94.63 | 245' | 2.000 | 51.73 |
| 649.47 | 1.000 | 88.26 | 757.25 | 1.000 | 34.95 |
| | 0.500 | 79.84 | | 0.500 | 24.40 |
| | 0.250 | 67.64 | | 0.250 | 17.76 |
| | 0.125 | 44.73 | | 0.125 | 12.41 |
| | 0.063 | 13.84 | | 0.063 | 8.26 |
| | 0.045 | 8.63 | | 0.045 | 6.56 |
| | PAN | -0.10 | | PAN | 0.11 |
| 299-E33-32 | 4.000 | 99.15 | 299-E33-33 | 4.000 | 82.90 |
| 265' | 2.000 | 98.06 | 250' | 2.000 | 59.10 |
| 558.74 | 1.000 | 96.28 | 729.80 | 1.000 | 41.60 |
| | 0.500 | 89.98 | | 0.500 | 27.75 |
| | 0.250 | 67.14 | | 0.250 | 17.67 |
| | 0.125 | 26.55 | | 0.125 | 10.72 |
| | 0.063 | 8.53 | | 0.063 | 6.59 |
| | 0.045 | 5.46 | | 0.045 | 5.04 |
| | PAN | -0.10 | | PAN | -0.07 |
| 299-E33-33 | 4.000 | 64.10 | | | |
| 235' | 2.000 | 48.85 | | | |
| 755.48 | 1.000 | 36.65 | | | |
| | 0.500 | 25.17 | | | |
| | 0.250 | 17.62 | | | |
| | 0.125 | 12.33 | | | |
| | 0.063 | 8.38 | | | |
| | 0.045 | 6.36 | | | |
| | PAN | 0.28 | | | |

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E24-19 SST

Company Contact: K.B. OLSON Telephone: 376-4114

Samples Collected by: E.J JENSEN Date: 9-8-89 Time:

Sample Location: 299-E24-19

Ice Chest No.: CHARGE TO M54081 PNL Field Logbook Page No.:

Remarks:

Method of Shipment:

Sample Identification

1- 125 ml gl. 56' 111,112
1- " ml gl. 56' C69,742
1- 125 ml gl. 180' 111,112
1- " " " 180' C69,742
1- 500 ml. gl. 220' 111,112
1- " " " 220' C69,742
1- " " " 260' 111,112
1- " " " 260' C69,742
1- " " " 298' 111,112
1- " " " 298' C69,742

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | MRKeen | 9-15-89 0908 |
| MRKeen | Rec'd By K. [illegible] | 9-15-89 0945 |
| | | |
| | | |

BC-1200-345 (7-8

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E25-40 SST

Company Contact: K.B. OLSON Telephone: 376-4114

Samples Collected by: E.J. JENSEN Date: 9-8-89 Time:

Sample Location: 299-E25-40

Ice Chest No.: DNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

1- 500 ml. gl. 80' 111,112
1- " " " 80' C69,742
1- 500 ml. gl. 120' 111,112
1- " " " 120' C69,742
1- 500 ml. gl. 220' 111,112
1- 500 ml gl. 220' C69,742
1- 125 ml gl. 250' 111,112
1- " " " 250' C69,742
1- " " " 260' 111,112
1- " " " 260' C69,742

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | MRKeim | 9-15-89 0900 |
| MRKeim | [signature] | 9-15-89 0945 |
| | | |
| | | |



BC-1200-345 (7-85)

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E25-41 SST

Company Contact: K.B. OLSON Telephone: 376-4114

Samples Collected by: E.J. JENSEN Date: 9-8-89 Time:

Sample Location: 299-E25-41

Ice Chest No.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

1- 125 ml. gl. 60' 111,112
1- " " " 60' C69,742
1- 125 ml gl. 125' 111,112
1- " " " 125' C69,742
1- 125 ml gl. 180' 111,112
1- 125 ml gl. 180' C69,742
1- " " " 220' 111,112
1- " " " 220' C69,742
1- " " " 240' 111,112
1- " " " 240' C69,742

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | MR Kern | 9-15-89 0900 |
| MR Kern | UST By K. Ottenberg | 9-15-89 0945 |
| | | |
| | | |

9112050070

728

BC-1200-345 (7-8

ES

**Battelle**
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

## CHAIN OF CUSTODY

E27-1 SST

Company Contact: K. B. OLSON Telephone: 376-4114

Samples Collected by: E. J. JENSEN Date: 9-27-89 Time:

Sample Location: 299-E27-1 SST

Ice Chest No.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

(1)- 125 ml gl 120' 111,112
(1) " " " 120' C69,742
(1) " " " 228' 111,112
(1) " " " 228' C69,742
(1) " " " 240' 111,112
(1) " " " 240' C69,742
(1) " " " 258 111,112
(1) " " " 258 C69,742
(1) " " " 260 111,112
(1) " " " 260 C69,742

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 9/28/89 1510 |
| [signature] | UST [signature] | 9/29/89 1520 |
| | | |
| | | |

BC-1200-345 (7-85)

**Battelle**
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E27-13 SST

Company Contact: K. B. OLSEN Telephone: 6-4114

Samples Collected by: E. J. JENSEN Date: 10-2-89 Time:

Sample Location: 299-E27-13

Ice Chest No.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

(1) 125 ml gl 160' 111,112
(1) " " " 160' C69,742
(1) " " " 200' C69,742
(1) " " " 200' 111,112
KBO ~~(1) 40 " " 200'~~
(1) 125 " " 240' 111,112
(1) " " " 240' C69,742
KBO ~~(1) 40 " " 240'~~
(1) 125 " " 260' 111,112
(1) " " " 260' C69,742
KBO ~~(1) 40 " " 260'~~

(1) 125 ml gl 275' 111,112
(1) " ml gl 275' C69,742
KBO ~~(1) 40 ml gl 275'~~

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 10/2/89 / 0900 |
| Relinquished by: | Received by: | Date/Time: |
| [signature] | [signature] | 10/5/89 1455 |
| Relinquished by: | Received by: | Date/Time: |
| | | |
| Relinquished by: | Received by: | Date/Time |
| | | |

BC-1200-345 (7-

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

SST
100589

Company Contact: K. B. OLSEN Telephone: 6-4114

Samples Collected by: E. J. JENSEN Date: 10/05/89 Time:

Sample Location: 299-E27-13

Ice Chest No.: Field Logbook Page No.:

Remarks: CHARGE TO M5 4081

Method of Shipment:

Sample Identification

40 ml G 200' VOA
40 ml G 240' VOA
40 ml G 260' VOA
40 ml G 275' VOA

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [illegible] | [illegible] | 10/6/89 0855 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time |



BC-1200-345 (7-85)

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E27-14 SST

Company Contact: K. B. OLSON Telephone: 6-4114

Samples Collected by: E. J. JENSEN Date: 10-11-89 Time: 11:00

Sample Location: 299-E27-14

Ice Chest No.: Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

(1) 40 ml gl 110' VOA
(1) 40 ml gl 115' VOA
(1) 40 ml gl 260' VOA

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 10/11/89/1100 |
| Relinquished by: | Received by: | Date/Time: |
| [signature] | [signature] | 10/13/89 1425 |
| Relinquished by: | Received by: | Date/Time: |
| | | |
| Relinquished by: | Received by: | Date/Time |
| | | |

BC-1200-345 (7-

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E27-14 SST

Company Contact: L.B. OLSON Telephone: 6-4114

Samples Collected by: E.J. JENSEN Date: 10-11-89 Time: 11:00

Sample Location: 299-E27-14

Ice Chest No.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

(1) - 125 ml gl. 48' 111,112
(1) - 125 ml gl. 48' C69,742
(1) - 125 ml gl. 220' 111,112
(1) - 125 ml gl 220' C69,742
(1) - 125 ml gl 240' 111,112
(1) - 125 ml gl. 240' C69,742
(1) - 125 ml gl. 250' 111,112
(1) - 125 ml gl. 250' C69,742
(1) - 125 ml gl. 260' 111,112
(1) - 125 ml gl. 260' C69,742

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 10/11/89/1100 |
| Relinquished by: | Received by: | Date/Time: |
| [signature] | UST By K. Cottenley | 10/13/89 1430 |
| Relinquished by: | Received by: | Date/Time: |
| | | |
| Relinquished by: | Received by: | Date/Time |



BC-1200-345 (7-85)

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E27-1Z SST

Company Contact: K. B. OLSON Telephone: 376-4114

Samples Collected by: E. J. JENSEN Date: 9-27-89 Time:

Sample Location: 299-E27-1Z5 EST

Ice Chest No.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

(1) 125 ml gl 120' 111,112
(1) " " " 120' C69,742
(1) " " " 230' 111,112
(1) " " " 230' C69,742
(1) " " " 240' 111,112
(1) " " " 240' C69,742
(1) " " " 245' 111,112
(1) " " " 245' C69,742
(1) " " " 260' 111,112
(1) " " " 260' C69,742

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 9/28/89 1510 |
| Relinquished by: | Received by: | Date/Time: |
| [signature] | UST J. Reyes | 9/29/89 1520 |
| Relinquished by: | Received by: | Date/Time: |
| | | |
| Relinquished by: | Received by: | Date/Time |



BC-1200-345

9112050736

**Battelle**
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E33-31 SST

Company Contact: K.B. OLSEN Telephone: 376-4114

Samples Collected by: E.J. JENSEN Date: 8-17-89 Time:

Sample Location: 299-E33-31

Ice Chest No.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

| | |
|---|---|
| 1 - 250 ml gl 91' 111,112 | |
| 1 - 250 ml gl 91' C69,742 | NOTE: THIS JAR BROKEN IN TRANSPORT- |
| 1 - 250 ml gl 140' 111,112 | MOST OF SED. WAS CONTAINED IN |
| 1 - 250 ml gl 140' C69,742 | PLASTIC BAG W/ JAR - USE BROKEN |
| 1 - 250 ml gl 180' 111,112 | JAR SAMPLE FOR 111,112 ANALYSIS - |
| 1 - " " " 180' C69,742 | USE UNBROKEN JAR FOR C69,742 |
| 1 - " " " 202' 111,112 | OR DIVIDE UNBROKEN JAR FOR |
| 1 - " " " 202' C69,742 | BOTH ANALYSES. |
| 1 - " " " 240' 111,112 | |
| 1 - " " " 240' C69,742 | |

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 8/18/89 1400 |
| Relinquished by: | Received by: By UST CO. | Date/Time: |
| [signature] | [signature] | 8/24/89 1300 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time |



BC-1200-345 (7-85)

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E33-32 SST

Company Contact: K.B. OLSEN Telephone: 376-4114

Samples Collected by: E.J. JENSEN Date: 8-17-89 Time:

Sample Location: 299-E33-32

Ice Chest No.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

| | |
|---|---|
| 1 - 500 ml gl 68' 111,112 | |
| 1 - " " " 68' C69,742 | |
| 1 - 250 ml gl 118' 111,112 | |
| 1 - " " " 118' C69,742 | |
| 1 - " " " 180' 111,112 | |
| 1 - " " " 180' C69,742 | |
| 1 - 500 ml gl 240' 111,112 | |
| 1 - " " " 240' C69,742 | |
| 1 - " " " 260' 111,112 | |
| 1 - " " " 260' C69,742 | |

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 8/18/89 1400 |
| Relinquished by: | Received by: | Date/Time: |
| [signature] | [signature] | 8/18/89 1540 |
| Relinquished by: | Received by: | Date/Time: |
| | | |
| Relinquished by: | Received by: | Date/Time |
| | | |

BC-1200-345 (7-8

736

9112050073 8

WHC-MR-0209

Kathy EAT 71
375-3131

**Battelle**
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E33-32 SST No. 2

Company Contact: K. B OLSON Telephone: 376-4114

Samples Collected by: E. J JENSEN Date: 12-5-89 Time:

Sample Location: 299-E33-32

Ice Chest No.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment: GOV'T VEHICLE

Sample Identification

1- 500 ml. gl. 40', 742
1- 500 ml gl. 65', 742

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 1430 12/5/89 |
| Relinquished by: | Received by: | Date/Time: |
| [signature] | Sandra K Lewis | 12-5-89 1530 |
| Relinquished by: | Received by: | Date/Time: |
| | | |
| Relinquished by: | Received by: | Date/Time |
| | | |

737

BC-1200-345 (7-85)

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

E33-33 SST

Company Contact: K.B. OLSEN Telephone: 376-4114

Samples Collected by: E.J. JENSEN Date: 8-17-89 Time:

Sample Location: 299-E33-33

Ice Chest No.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

Method of Shipment:

Sample Identification

| | |
|---|---|
| 1 - 500 ml gl 120' | 111, 112 |
| 1 - " " " 120' | C69, 742 |
| 1 - " " " 157' | 111, 112 |
| 1 - " " " 157' | C69, 742 |
| 1 - " " " 203' | 111, 112 |
| 1 - " " " 203' | C69, 742 |
| 1 - " " " 220' | 111, 112 |
| 1 - " " " 220' | C69, 742 |
| 1 - " " " 240' | 111, 112 |
| 1 - " " " 240' | C69, 742 |

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 8/18/89 1400 |
| Relinquished by: | Received by: | Date/Time: |
| [signature] | UST. By K. Ashtenley | 8/18/89 1540 |
| Relinquished by: | Received by: | Date/Time: |
| | | |
| Relinquished by: | Received by: | Date/Time |
| | | |

BC-1200-345 (7-85)



9112050074 0

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

W1015 SST

Company Contact: K. B. OLSEN Telephone: 376-4114

Samples Collected by: E. J. JENSEN Date: 11/6/89 Time:

Sample Location: 299 - W10 - 15

Ice Chest No.: PNL Field Logbook Page No.: N/A

Remarks: CHARGE TO M54081

Method of Shipment: GOV'T VEHICLE

Sample Identification

1 - 250 ML GL. 20' : 111, 112
1 - " " " " : C69, 742
1 - 250 ML. GL 60' : 111, 112
1 - " " " " : C69, 742
1 - 250 ML. GL 80' : 111, 112
1 - " " " " : C69, 742
1 - 125 ML. GL 200' : 111, 112
1 - " " " " : C69, 742
1 - 125 ML GL. 220' : 111, 112
1 - " " " " : C69, 742

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | Janet A. Schramke | 11/6/89 / 0830 |
| Janet A. Schramke | LEFT. By K. Schmelzing | 11/7/89 10:00am |
| | | |
| | | |



BC-1200-345 (7-85)

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington 99352

# CHAIN OF CUSTODY

W10-16 SST

Company Contact: K.B. OLSON Telephone: 6-4114

Samples Collected by: E.J JENSEN Date: 10-11-89 Time: 11:00

Sample Location: ~~299-E27-14~~ SPA 299-W10-16

Ice Chest No.: DNL Field Logbook Page No.:

Remarks: CHARGE TO MS4081

Method of Shipment:

Sample Identification

(1) 500 ml. gl. 80' 111,112
(1) 500 ml. gl. 80' C69,742
(1) 250 ml gl. 100' 111,112
(1) 250 ml gl. 100' C69,742
(1) 250 ml gl. 120' 111,112
(1) 250 ml gl. 120' C69,742
(1) 250 ml gl. 140' 111,112
(1) 250 ml gl. 140' C69,742
(1) 125 ml gl. 200' 111,112
(1) 125 ml gl. 200' C69,742

CHAIN OF POSSESSION

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| [signature] | [signature] | 10/11/89/1100 |
| Relinquished by: | Received by: | Date/Time: |
| [signature] | ~~rec'd by~~ K. Ottenberg | 10/13/89 1430 |
| Relinquished by: | Received by: | Date/Time: |
| | | |
| Relinquished by: | Received by: | Date/Time |
| | | |

9112050074 2



BC-1200-345 (7-85)

# Section D

## Well Development Information of Twelve Wells for Single Shell Tanks

* Well Development Summary Table
* Well Development Logs

9 1 1 2 0 5 0 0 7 1 3

9 1 1 2 0 5 0 0 7 4 4

# WELL DEVELOPMENT INFORMATION

| WELL NUMBER | TOTAL VOLUME PUMPED, gal. | DURATION min. | FLOW RATE gpm | FINAL TURB. NTU |
|---|---|---|---|---|
| 299-E24-19 | 1069 | 122 | 5-9 | 3.5 |
| 299-E25-40 | 478 | 80 | 5-8 | 4.0 |
| 299-E25-41 | 1068 | 105 | 8.8-10 | 3.6 |
| 299-E27-12 | 509 | 76 | 4-10 | <1 |
| 299-E27-13 | 547 | 80 | 5-10 | 1.1 |
| 299-E27-14 | 489 | 63 | 6-9 | 3.1 |
| 299-E27-15 | 542 | 75 | 4-9 | 1.0 |
| 299-E33-31 | 892 | 99 | 5.7-12.3 | 1.0 |
| 299-E33-32 | 679 | 117 | 5.1-9.9 | 2.8 |
| 299-E33-33 | 1080 | 126 | 6.6-9.9 | 1.6 |
| 299-W10-15 | 944 | 115 | 6.5-10.5 | 2.7 |
| 299-W10-16 | 341 | 34 | 10-11 | 4.3 |

# WELL DEVELOPMENT LOG

Well Number 299-E24-19
Location 200 East, A Tank Farm
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 10/5/89 1001 hrs.
End Date/Time 10/5/89 1223 hrs.
Page 1 of 1

Well Depth 300.9' Pump Depth (Intake) 298.1' Initial Water Level ~285.4' below ground surface

All depth measurements referenced to ground surface

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 10/5 | 1010 | ~~10~~ 5.0 DRN 15 | 10 | DRN | DRN | Calibrated turbidimeter on 0-100 NTU range with 89 NTU standard |
| ↓ | 1030 | 5 | 2.5 | DRN | DRN | 0-100 NTU range |
| ↓ | 1030 | 5 | 1.4 | DRN | DRN | Recalibrated turbidimeter on 0-10 NTU range with 10 NTU standard |
| ↓ | 1045 | 8.5 | 3.5 | DRN | DRN | 0-10 NTU scale |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | Darrell Newcomer 10/5/89 |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880903409

9112050007416

# WELL DEVELOPMENT LOG

Well Number 299-E25-40
Location 200 E 4 TANK FARM
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 10/4/89 1355
End Date/Time 10/4/89 1515
Page 1 of 1

Well Depth 273 Land Surface  Pump Depth (Intake) 271 Land  Initial Water Level 258.12 TOC

Standpipe

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 10/4/89 | 1245 | | | | | standardized meter 0-89 NTU |
| | 1405 | 5 | 12 | JVB | → | |
| | 1420 | 5 | 7.3 | | | standardized meter 0-10 NTU |
| | 1430 | 6 | 6.2 | | | |
| | 1448 | 5 | 4.8 | | | |
| | 1501 | 8 | 5.5 | | | |
| | 1510 | ~8 | 4.0 | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment:
Make: HACH
Model: 16800
Serial #: 880903409

9112050074.7

# WELL DEVELOPMENT LOG

Well Number 299-E25-41
Location 200E A TANK FARM
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 10/4/89 0908
End Date/Time 10/4/89 1048
Page 1 of 1

Well Depth ~276 from top of casing  Pump Depth (Intake) ~275 from top of casing  Initial Water Level 264.5 from top of casing

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 10/4 | 0750 | | | | | standardized meter 0-10 NTU |
| | 0920 | ~10 | 20 | JVB | — | Standardized meter 0-39 NTU |
| | 0935 | ~8.8 | 14 | | | |
| | 0950 | ~8.8 | 8.30 | | | standardized meter 0-10 NTU |
| | 1010 | | 6.4 | | | |
| | 1030 | | 4.0 | | | |
| | 1040 | | 3.6 | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment:
Make: HACH
Model: 16800
Serial #: 880903409



9112050074 8

# WELL DEVELOPMENT LOG

Well Number 2-E27-12
Location C Tank Farm
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 10/23/89 1058
End Date/Time 10/23/89 1214
Page 1 of 1

Well Depth 268' Below ground surface  Pump Depth (Intake) 264.5'  Initial Water Level — Could not get E-tape down.

| Date | Time | Flow Rate | NTU Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 10/23 | 1101 | 5gpm | | JPM | JAM | |
| | 1103 | | 39 | | | Sample. Standardized 0-91 range with 91 NTU standard. |
| | 1112 | 4gpm | JPM 10/23/89 11 | | | JPM 10/23/89 |
| | 1118 | | 11 | | | Sample. Standardized 0-91 range. |
| | 1126 | 4 | | | | |
| | 1133 | | 4 | | | Sample. Standardized 0-91 range. |
| | 1139 | 4 | | | | Note: Cannot effectively use the 0-10 range on the turbidimeter - Standards are 0-91, 0-13, + 0-.5. |
| | 1141 | 10 | | | | |
| | 1148 | | 4 | | | Sample. Standardized 0-91 range |
| | 1159 | 10 | | | | |
| | 1203 | | 0-4 range: 1.1<br>0-91 range: 2 | | | Standardized 0-4 range using previous sample for a relative comparison to this sample. Restandardized 0-91 range. Sample |
| | 1210 | 10 | | | | |
| | 1212 | | <1 | | | Sample |
| | 1214 | | <1 JPM 10/23/89 | | | Pump off. |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment:
Make: Hach Turbidimeter
Model: 16300
Serial #: 330903404

10/23/89

# WELL DEVELOPMENT LOG

Well Number 299-E27-1213 DRN 10/24/89
Location 200 East, C Tank Farm
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 10/24/89 1007 hrs.
End Date/Time 10/24/89 1135 hrs.
Page 1 of 1

Well Depth 276.17' below TOC Pump Depth (Intake) 272.4' below TOC Initial Water Level Could not get measurement water level is roughly 262' below TOC

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 10/24 | 1011 | 7 | 53 | DRN | DRN | Calibrated Turbidimeter with 89 NTU Standard on 0-100 scale |
| | 1045 | 5 | 8 | DRN | DRN | 0-100 NTU scale |
| | 1045 | 5 | 6.6 | DRN | DRN | Calibrated Turbimeter with 10 NTU standard on 0-10 NTU scale. |
| | 1105 | 5 | 1.2 | | | 0-10 NTU scale |
| | 1115 | 10 | 1.1 | | | 0-10 NTU scale |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | Darrell Neuroney 10/24/89 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880903409

PNL TECHNICAL PROCEDURE

WELL DEVELOPMENT LOG

Well Number 299-E27-14
Location 200 East, C Tank Farm
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 10/25/89 0807 hrs.
End Date/Time 10/25/89 0910 hrs.
Page 1 of 1

Well Depth 266.2' below TOC Pump Depth (Intake) 262.6 below TOC Initial Water Level Could not get measurement - roughly 250' below TOC

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 10/25 | 0815 | 6 | 22 | DRN | DRN | Calibrated turbidimeter with 89 NTU standard on 0-100 NTU scale |
| | 0835 | 6 | 7 | | | 0-100 NTU scale |
| | " | " | 5.3 | | | Calibrated Turbidimeter with 10 NTU standard on 0-10 NTU scale |
| | 0855 | " | 2.3 | | | 0-10 NTU scale |
| | 0905 | 9 | 3.1 | | | 0-10 NTU scale |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880903409

Darrell Newcomer 10/25/89

FIGURE 1. Well Development Log Form

# WELL DEVELOPMENT LOG

Well Number Z-E27-15
Location C Tank farm
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 10/23/89 0846
End Date/Time 10/23/89 1001
Page 1 of 1

Well Depth 259' Below ground surface  Pump Depth (Intake) 256'  Initial Water Level —
Unable to get initial water level - well not straight.

| Date | Time | Flow Rate | NTU Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 10/23 | 0849 | 4gpm | | SPM | SAM | Standardized meter to 0-91 NTU range |
| | 0851 | | 52 | | | Sample used Hach turbidimeter (S.N: 880903404) |
| | 0908 | | 5 | | | Sample |
| | 0906 | 4gpm | | | | |
| | 0921 | | 0-91 range 2 | | | Sample |
| | 0931 | 9gpm | | | | |
| | 0934 | 9gpm | | | | |
| | 0937 | | 0-91 range 3 | | | Sample |
| | 0949 | 9gpm | 3 SPM 10/23/89 | | | |
| | 0953 | | 0-4 range: 4<br>0-91 range: 3 | | | Standardized meter to 0-3 range using previous sample<br>Sample |
| | 1000 | | 0-91 range 1 | | | Sample |
| | 1001 | | | | | Turned pump off |
| | | | | | | |
| | | | | | | |

Note: Could not standardize turbidimeter to 0-9 range - standards are 0-91, 0-13, + 0-.5.

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment:
Make: Hach turbidimeter
Model: 16800
Serial #: 880903404

10/23/89

PNL TECHNICAL PROCEDURE

WELL DEVELOPMENT LOG

Well Number 2-E33-31
Location 200-East
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 9/27/89 0759 hrs.
End Date/Time 9/27/89 0938 hrs.
Page 1 of 1

Well Depth ~256' below surface Pump Depth (Intake) ~252' below surface Initial Water Level 242.55' below TOC

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 9/27 | 0800 | 6.6 | 26 | DRN | DRN | Calibrated Turbidimeter with 0-90 standard |
| 9/27 | 0830 | 6.3 | 3 | DRN | DRN | 100 NTU scale |
| 9/27 | 0830 | " | 1.1×2 2.2 | ↓ | ↓ | 0-10 NTU scale - Values are ½ for standardized at 0-6.5 NTU range and double readings |
| ~~9/27~~ | ~~0852~~ | DRN 9/27/89 | | | | |
| 9/27 | 0852 | 5.7 | — | | | Sample was collected, but no measurement was taken |
| 9/27 | 0715 | 12.3 | 2 | | | 0-100 NTU scale |
| 9/27 | 0915 | " | 0.5×2 =1.0 | | | 0-10 NTU scale 0-6.5 standard |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | Darrell Newcomer 9/27/89 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880903407

FIGURE 1. Well Development Log Form

PNL TECHNICAL PROCEDURE

WELL DEVELOPMENT LOG

Well Number 2-E 33-32
Location 200-East
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 9/27/89 0810 hrs.
End Date/Time 9/27/89 1007 hrs.
Page 1 of 1

Well Depth ~267' below surface  Pump Depth (Intake) DRN 9/27/89 263 ~~~245'~~ below top of casing surface  Initial Water Level 255.26' below TOC

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 9/27 | 0815 | 5.3 | 15 | DRN | DRN | Calibrated Turbidimeter with 0-90 NTU standard |
| | 0850 | 5.4 | 7 | DRN | DRN | 100 NTU scale |
| | 0850 | " | 3.1x2 = 6.2 | DRN | DRN | 10 NTU scale, Standard is 13 NTU range So standardize at 6.5 NTU scale and double NTU reading |
| | 0915 | 5.1 | 4 | WEC | WEC | 100 NTU scale |
| | 0915 | " | 3.1x2 6.2 | WEC | WEC | 10 scale standardized to 6.5 scale |
| | 0945 | " | 3 | DRN | DRN | 0-100 NTU range |
| | 0945 | " | 1.1x2 2.2 | DRN | DRN | 0-10 NTU range standardized to 6.5 scale |
| | 1000 | 9.6 | 4 | DRN | DRN | 0-100 NTU range |
| | 1000 | " | 1.4x2 2.8 | DRN | DRN | 0-10 NTU range |
| | | | | | | |
| | | | | | | |
| | | | | | | Darrell Newcomer 9/27/89 |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880903404

FIGURE 1. Well Development Log Form

PNL TECHNICAL PROCEDURE

WELL DEVELOPMENT LOG

Well Number 2-E33-33
Location 200-East Area, B Tank Farm
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 9/28/89 1117 hrs
End Date/Time 9/28/89 1325 hrs.
Page 1 of 1

Well Depth 248.8' Pump Depth (Intake) 245' Initial Water Level ~232.5'
All measurements below ground surface (top of cement pad)

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 9/28 | 1123 | 6.6 | 20 | DRN | DRN | Calibrated Turbidimeter with 0-91 Standard |
| | 1145 | 6.6 | 3 | DRN | DRN | Calibrated Turbidimeter with 0-91 Standard |
| | 1145 | 6.6 | 1.2x2=2.4 | DRN | DRN | Calibrated Turbidimeter with 0-13 standard (Standardized @ 0-6.5 NTU) |
| | 1200 | 9.9 | 2 | DRN | DRN | Calibrated with 0-91 Standard |
| | 1200 | 9.9 | 0.8x2 = 1.6 | DRN | DRN | Calibrated with 0-13 Standard (Standardized @ 6.5 NTU) |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | Darrell Newcomer 9/28/89 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880903404

FIGURE 1. Well Development Log Form

PNL TECHNICAL PROCEDURE

WELL DEVELOPMENT LOG

Well Number 299-W10-15
Location 200 West T Farm
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 11/13/89 1040 hrs.
End Date/Time 11/13/89 1235 hrs.
Page 1 of 1

Well Depth 285.55 from top of 6" casing  Pump Depth (Intake) ~224.1 (btc)  Initial Water Level ~ ~~225.6 btc~~ AWP 209.5 below Top of 6" casing

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 11/13 | 1045 | 7 | >100 | DRN | DRN | Calibrated Turbidimeter with 89 NTU standard on 0-100 NTU scale. Water is visibly dirty |
| | 1105 | 6.5 | 25 | | | 0-100 scale |
| | 1125 | " | 13 | | | 0-100 scale |
| | 1145 | 7 | 6 | | | 0-100 scale |
| | " | " | 4.8 | | | Calibrated turbidimeter with 10 NTU standard on 0-10 NTU scale |
| | 1152 | 10.5 | >10 | | | 0-10 NTU scale |
| | " | " | 28 | | | Recalibrated turbidimeter with 89 NTU standard on 100 NTU scale |
| | 1215 | " | 12 | | | 0-100 scale |
| | 1230 | " | 4 | | | 0-100 scale |
| | " | " | 2.7 | | | Calibrated meter with 10 NTU standard on 10 scale |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment: Turbidimeter
Make: Hach
Model: 16800
Serial #: 880903409

Darrell Vanromer 11/13/89

FIGURE 1. Well Development Log Form

# WELL DEVELOPMENT LOG

Well Number 299-W10-16
Location T-tank farm
Procedure PNL-MA-567, GC-7, Rev. 0

Start Date/Time 11/01 1417
End Date/Time 11/01 1451
Page 1 of 1

Well Depth ~221 Pump Depth (Intake) ~220 Initial Water Level 203.6
Top of 4" casing ~~TOC~~

| Date | Time | Flow Rate | Turbidity | Person Meas. | Person Rec. | Comments |
|---|---|---|---|---|---|---|
| 11/01 | 1425 | 10 | >100 | JVB | | standard dig-1 0-249 NTU |
| 11/01 ~~10~~ | 1430 | 11 | 12 | | | |
| | 1439 | 10 | 7.1 | | | standardized 0-10NTU |
| | 1445 | 10 | 4.3 | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Note: Unless otherwise noted, the following units are assumed:
Flow rate - gpm
Turbidity - NTU
Water Level - ft

Equipment:
Make: Hach
Model: 16800
Serial #: 880903409

J.V. Borghese 11/02/89

9 1 1 2 0 5 0 0 7 5 8

# Section E

## Pump Installation Information of Twelve Wells for Single Shell Tanks

* Pump Installation Summary Table
* Pump Installation Documentation

9112050074 0

PUMP INSTALLATION INFORMATION

| WELL NUMBER | INSTALLATION DATE | DEPTH OF SUBMERSIBLE INTAKE DURING DEVELOPMENT (est. b.t.c.) | DEPTH OF HYDROSTAR INTAKE (b.t.c.) | DEPTH OF SATURATED SCREEN (b.t.c.) |
|---|---|---|---|---|
| 299-E24-19 | 10/23/89 | 301.3 | 297.2 | 288.6 - 304.0 |
| 299-E25-40 | 10/19/89 | 273.5 | 269.3 | 260.5 - 276.7 |
| 299-E25-41 | 10/25/89 | 277.8 | 272.3 | 265.9 - 280.0 |
| 299-E27-12 | 10/24/89 | 268.1 | 264.3 | 256.1 - 271.6 |
| 299-E27-13 | 11/08/89 | 275.8 | 270.3 | 264.2 - 278.0 |
| 299-E27-14 | 11/07/89 | 268.2 | 262.3 | 253.5 - 270.2 |
| 299-E27-15 | 10/25/89 | 259.3 | 255.3 | 248.0 - 262.3 |
| 299-E33-31 | 10/17/89 | 255.5 | 252.3 | 242.7 - 259.3 |
| 299-E33-32 | 10/17/89 | 266.5 | 262.3 | 255.3 - 269.0 |
| 299-E33-33 | 10/18/89 | 248.0 | 244.3 | 235.4 - 251.7 |
| 299-W10-15 | 11/20/89 | 224.1 | 217.2 | 209.5 - 225.6 |
| 299-W10-16 | 11/09/89 | 220.5 | 214.2 | 206.4 - 222.7 |

# SAMPLING PUMP INSTALLATION FORM

Project: W017 SST Well Number: 299-E24-19

Pump Type: Pos. Displacement Piston Pump Model: Hydrostar 8001

Date Installed: Oct 23 1989 Installed by: D.L. Ludtke (KEH)

Depth-to-Water: 288.56' TOC Depth-to-Bottom: 303.96' TOC

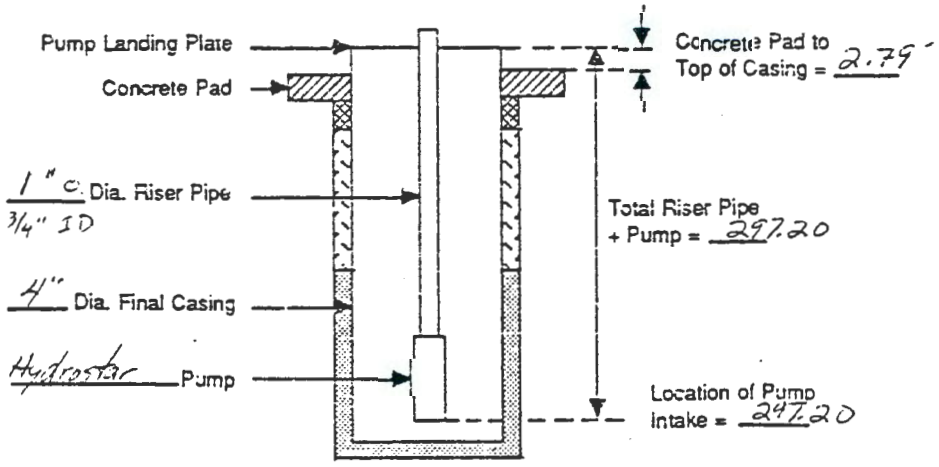
Reported Depth-to-Bottom: 300.68' LS Date: 8/9/89

Screened Interval: 279.65'-300.68 LS Saturated Screened Interval: 300.68 - 293

Pump Riser Pipe Description:
29 total 10' lengths of pipe
1 5' length of pipe

Additional Comments:
all coupling joints were taped with Teflon tape
pump, pipe and couplings delivered to site in manufacturer's wrappings. Landing plate installed, D.L. Ludtke will return to install packing gland. Gland installed 10/26/89

Sketch of Pump Installation:




Completed By: Jane V. Boghese Date: Oct. 23, 1989

PNL MA-567 DO-3 Rev 0



A-1850-008 (4
S8902066.1

# SAMPLING PUMP INSTALLATION FORM

Project: W-Ø17, Single Shell Tanks Well Number: 299-E25-40

Pump Type: Positive Displacement Piston Pump Model: Hydrostar HS-8001

Date Installed: 10/18/89 - 10/19/89 Installed by: Darrell Ludke, KEH driller

Depth-to-Water: 260.50' (Steel tape #L306-14) 260.50' below TOC Depth-to-Bottom: 276.65' below TOC

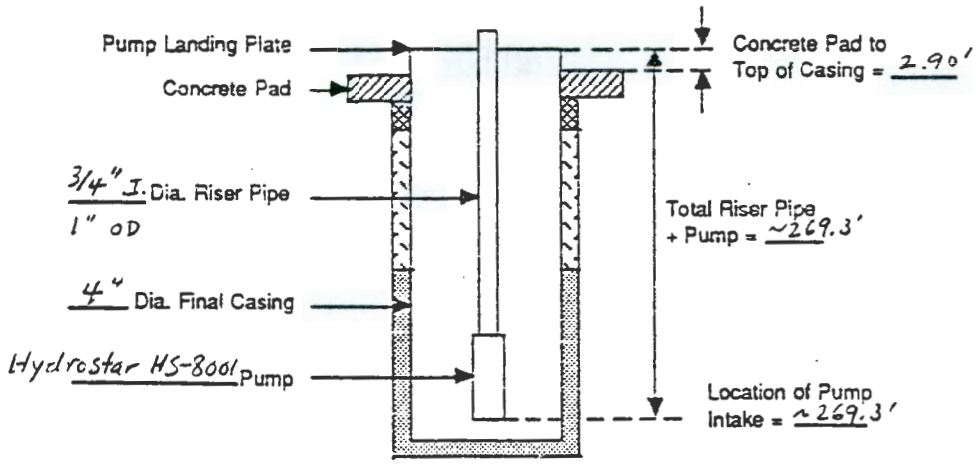
Reported Depth-to-Bottom: 273' below land surface Date: 8-7-89
252' to 273' below ground surface (Driller's logs)

Screened Interval: 255.40' to 276.40' below TOC Saturated Screened Interval: 260.50' to 276.40' below TOC

Pump Riser Pipe Description: Pump (2.25' in length), 26 lengths of riser pipe, one 2' length of riser pipe, and 1 5' length of riser pipe installed. Driller acturated piston on pump to ensure it moved freely.

Additional Comments: All threads wrapped with teflon tape. All new couplings. Driller wore clean cotton gloves during installation. Pump head assembly attached to riser pipe and placed on top of casing. Packing gland installed and piston rod cut and threaded on 10/25/89. Pump, pipe, couplings, and pump head assembly delivered to site in manufacturer's packaged containers.

Sketch of Pump Installation:




Completed By: Darrell Newcomer Date: 10/19/89

# SAMPLING PUMP INSTALLATION FORM

Project: W017, SST Well Number: 299-E25-41

Pump Type: Positive displacement Piston Pump Model: Hydrostar HS-8001

Date Installed: 10/23/89 10/25/89 Installed by: Darrell Ludke, KEH driller

Depth-to-Water: 265.94' TOC Depth-to-Bottom: 280.02' TOC

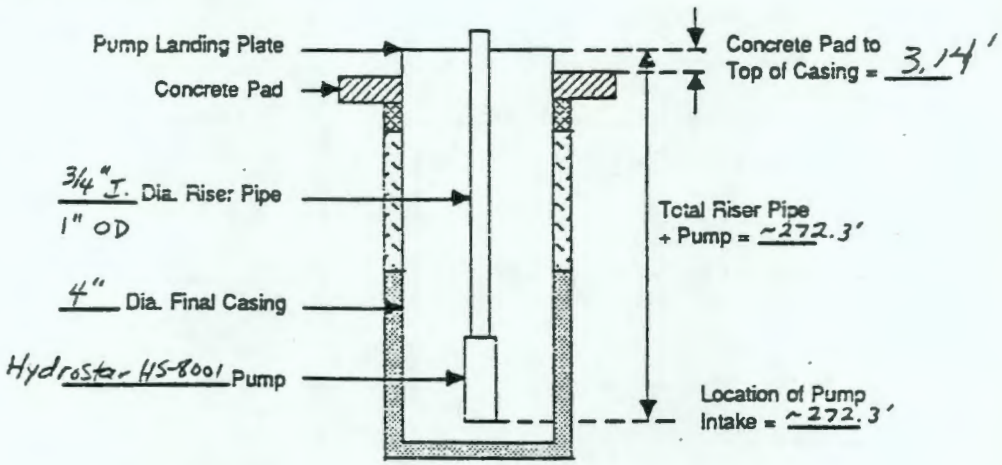
Reported Depth-to-Bottom: 276.34' LS (Drillers logs) Date: 8-8-89

Screened Interval: 255.33 - 276.34 LS Saturated Screened Interval: 276.34 - 262 b.l.s.

Pump Riser Pipe Description: 2.25' length pump, 27 lengths of 10' riser pipe installed. Pump head assembly attached to riser pipe and placed on top of casing. Packing gland installed. Piston rod is 3¾" from top of packing gland. It was not necessary to cut and thread piston rod — it is already threaded.

Additional Comments: All threads wrapped with teflon tape and all couplings are new. Driller wore clean cotton gloves during installation. Pump, pipe, couplings, and wellhead pump assembly delivered to site in manufacturer's containers. Driller actuated piston and it moved freely.

Sketch of Pump Installation:




Completed By: Darrell Newcomer Date: 10/25/89

Jane V Borghese

PNL-MA-567 DO-3 Rev Ø

762

A-1850-008 (4
S8902066.1

9112050074

# SAMPLING PUMP INSTALLATION FORM

Project: W-017, Single Shell Tanks Well Number: 299-E27-12

Pump Type: Positive Displacement Piston Pump Model: Hydrostar HS-8001

Date Installed: 10/24/89 Installed by: Darrell Ludke, S.M. Mathisen Jr., KEH Drillers.

Depth-to-Water: 256.08', 256.08' below TOC (Steel Tape #L500-03) Depth-to-Bottom: 271.56' below TOC

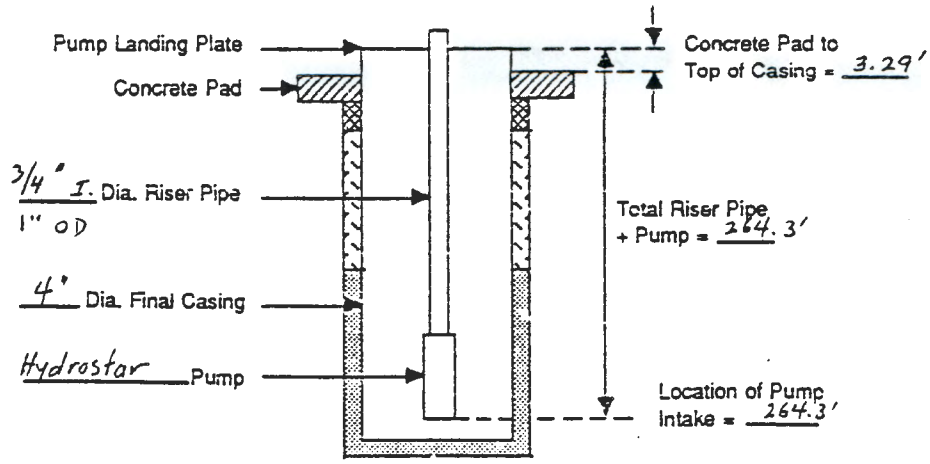
Reported Depth-to-Bottom: 267.55' below land surface Date: 8-28-89

Screened Interval: 246.52' to 267.55' b.l.s. (250.31' to 271.34' below TOC) Saturated Screened Interval: 256.08' to 271.34' below TOC

Pump Riser Pipe Description: 2.25' length pump, 26 lengths of 10' riser pipe, and 1 2' length of riser pipe installed. Pump head assembly placed on top of 6" casing and packing gland installed. Piston rod cut and threaded. The 2-foot riser pipe was placed before the last 10-foot section of riser pipe.

Additional Comments: All threads wrapped with teflon tape and all couplings are new. Drillers wore clean cotton gloves during installation. ~~Pump~~ Pump, pipe, ~~and~~ couplings, and wellhead assembly delivered to site in packaged containers.

Sketch of Pump Installation:




Completed By: Darrell Newcomer Date: 10/24/89

# SAMPLING PUMP INSTALLATION FORM

Project: W-017, SST Well Number: 299-E27-13

Pump Type: Positive Displacement Piston Pump Model: 8001 HydroStar

Date Installed: 11/8/89 Installed by: Darrel Ludke (KEH)

Depth-to-Water: 264.15', 264.15' below TOC (Steel Tape #L500-03) Depth-to-Bottom: ~277.96' below TOC (DRN)

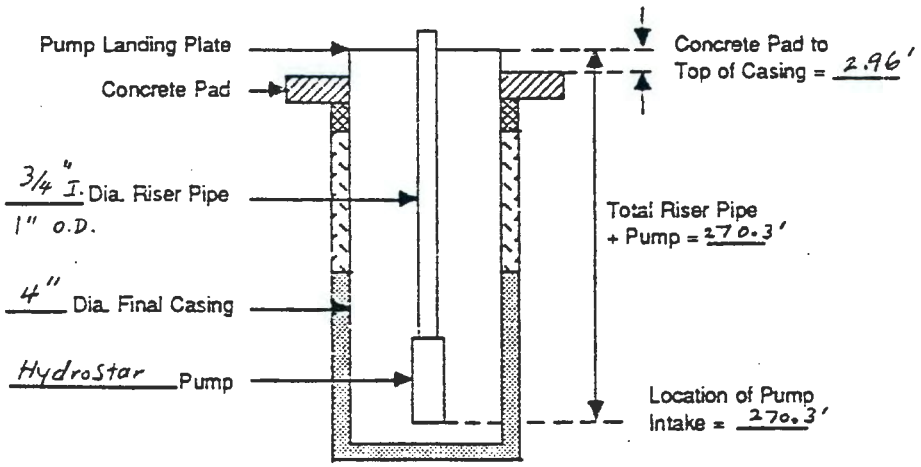
Reported Depth-to-Bottom: 275.56' DIS (completion log) Date: 10-9-89

Screened Interval: 274.68'-253.68' DIS Saturated Screened Interval: 264.15' to 277.96' below TOC

Pump Riser Pipe Description: 2.25' length pump, 26 lengths of 10' riser pipe, 1 length of 5' riser pipe, and 1 length of 3' riser pipe installed. The short lengths of pipe were installed last before attaching the pump head assembly, the 3' length of pipe before the 5' length. The pump head assembly was attached to the 5' length of pipe and set on the top of the casing.

Additional Comments: All threads are wrapped with teflon tape. All couplings are new. Pump, pipe, couplings, and pump head assembly were delivered to site in manufacturer's containers. Driller wore clean cotton gloves during installation. Packing gland was installed and piston rod cut and threaded. Driller actuated piston on pump to ensure it moved freely before installation.

Sketch of Pump Installation:




Completed By: Darrell Newcomer Date: 11/8/89

# SAMPLING PUMP INSTALLATION FORM

Project: W-017, Single Shell Tanks Well Number: 299-E27-14

Pump Type: Positive Displacement Piston Pump Model: 8001 HydroStar

Date Installed: 11/7/89 Installed by: Darrel Ludke (KEH)

Depth-to-Water: 253.48', 253.48' below TOC Depth-to-Bottom: 267.77'+2.47' = 270.24' below TO

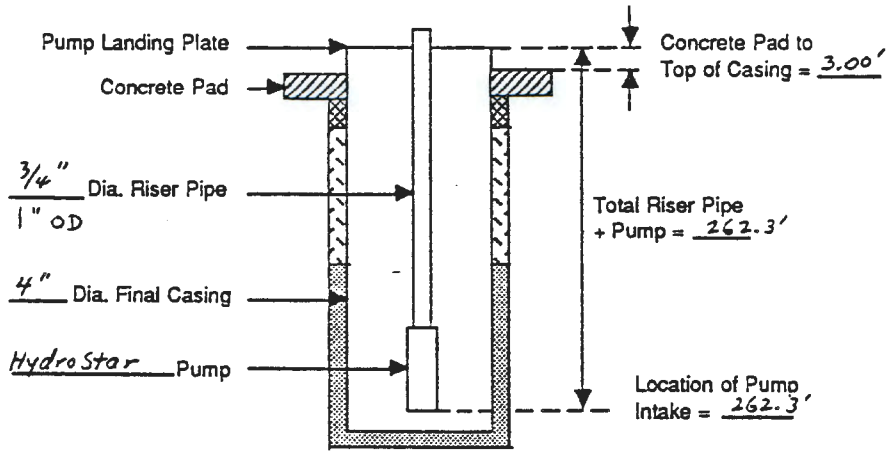
Reported Depth-to-Bottom: 266.83' bls. Date: 10-17-89

Screened Interval: ~~271.68' – 253.68'~~ 266.83' – 245.83' bls. Saturated Screened Interval: 253.48' to 270.24' below TOC

Pump Riser Pipe Description: 2.25' length pump and 26 lengths of 10' riser pipe installed. Pump head assembly attached to last 10' length of riser pipe and placed on top of 6" casing. Packing gland ~~and~~ DRN installed and piston rod cut and threaded.

Additional Comments: All threads wrapped with teflon tape. All couplings new. Driller wore clean cotton gloves during installation. Pump, pipe, couplings, and pump head assembly delivered to site in manufacturer's containers.

Sketch of Pump Installation:




Completed By: Darrell Newcomer Date: 11/7/89

A-1850-008 (4/89)
S8902066.1

# SAMPLING PUMP INSTALLATION FORM

Project: W-Ø17, Single Shell Tanks Well Number: 299-E27-15

Pump Type: Positive Displacement Piston Pump Model: Hydrostar HS-8001

Date Installed: 10/24/89 to 10/25/89 Installed by: Darrell Ludke, KEH driller

Depth-to-Water: 248.04', 248.04' below TOC (Steel Tape # L500-03) Depth-to-Bottom: 262.27' below TOC

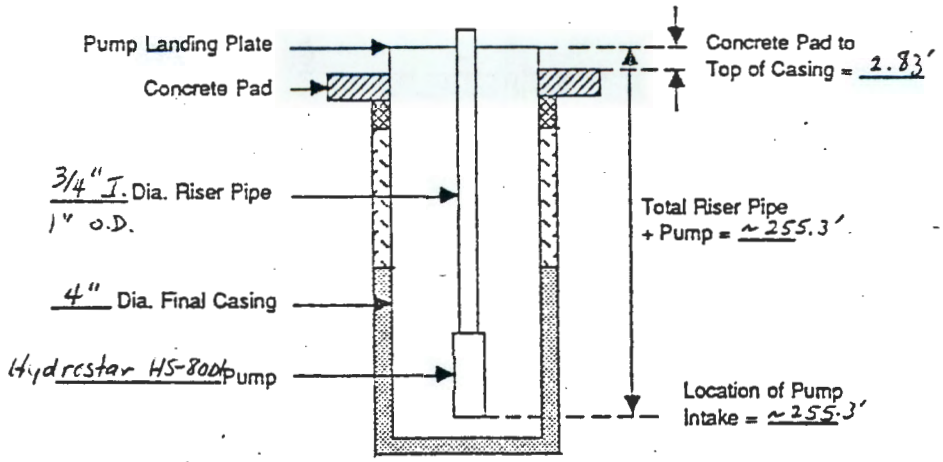
Reported Depth-to-Bottom: 259.03' below land surface (241.36' to 262.36' below TOC) Date: 8-28-89 (Drillers logs)

Screened Interval: 238.03' to 259.03' bls. Saturated Screened Interval: 248.04' to 262.36' below TOC

Pump Riser Pipe Description: 2.25' length pump, 25 lengths of 10' riser pipe, and 1 length of 3' riser pipe installed. The 3' length of pipe installed before the last 10' length of riser pipe. Pump head assembly installed on top of casing. Piston rod cut and threaded. Packing gland installed.

Additional Comments: All threads wrapped with teflon tape and all couplings are new. Driller wore clean cotton gloves during installation. ~~Pump head~~ DRW 10/25/89 Pump, pipe, couplings, and well head pump assembly delivered to site in manufacturer's packaged containers.

Sketch of Pump Installation:




Completed By: Darrell Newcomer Date: 10/25/89

A-1850-008 (4/89)
S8902066.1

766

# SAMPLING PUMP INSTALLATION FORM

Project: W-017 Single Shell Tanks Well Number: 299-E33-31

Pump Type: Positive Displacement Piston Pump Model: Hydrostar HS-8001

Date Installed: 10/17/89 Installed by: Darrell Ludke, KEH driller

Steel tape # L300-9514 DRL 10/17/89

Depth-to-Water: 242.74', 242.68', 242.68' below TOC Depth-to-Bottom: 259.34' below TOC

Reported Depth-to-Bottom: 255.9' below land surface Date: 7-11-89

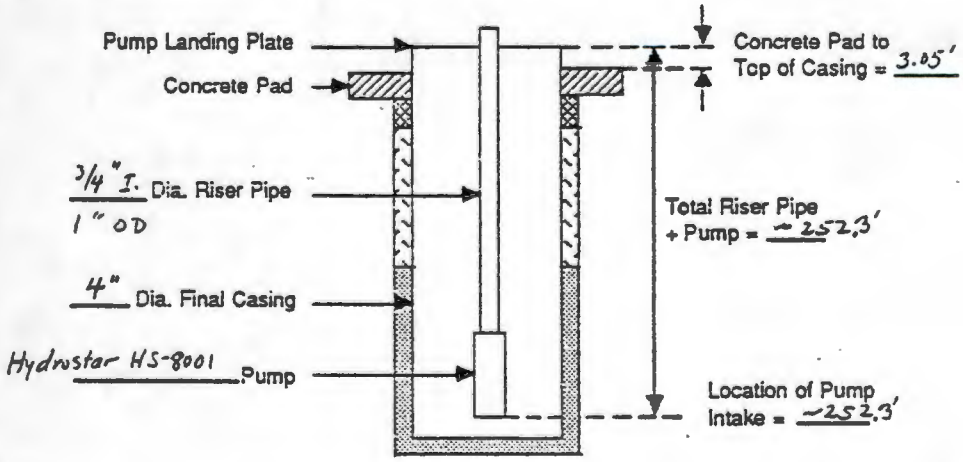
232.45' to 259.45' below TOC (Driller's logs) 242.68' to 259.45' below TOC

Screened Interval: 234.9' to 255.9' below ground Saturated Screened Interval: _____

Pump Riser Pipe Description: 25 lengths of 10' riser pipe + pump (2.25').
Pump head assembly attached to riser pipe and placed on top of casing.
Piston rod cut and threaded 3" from top of assembly. Packing gland installed.

Additional Comments: All threads wrapped with teflon tape. All new couplings. Driller wore clean cotton gloves during installation. Pump, pipe, couplings, and pump head assembly delivered to site in manufacturer's packaged containers. Driller actuated piston on pump to make sure it moved freely.

Sketch of Pump Installation:




Completed By: Darrell Newcomer Date: 10/17/89





9112050069

# SAMPLING PUMP INSTALLATION FORM

Project: W-Ø17 Single Shell Tanks Well Number: 299-E33-32

Pump Type: Positive Displacement Piston Pump Model: Hydrostar HS-8001

Date Installed: 10/17/89 Installed by: Darrell Ludke, KEH driller

Depth-to-Water: 255.28', 255.28' below TOC (Steel tape # L300-14) Depth-to-Bottom: 269.02' below TOC

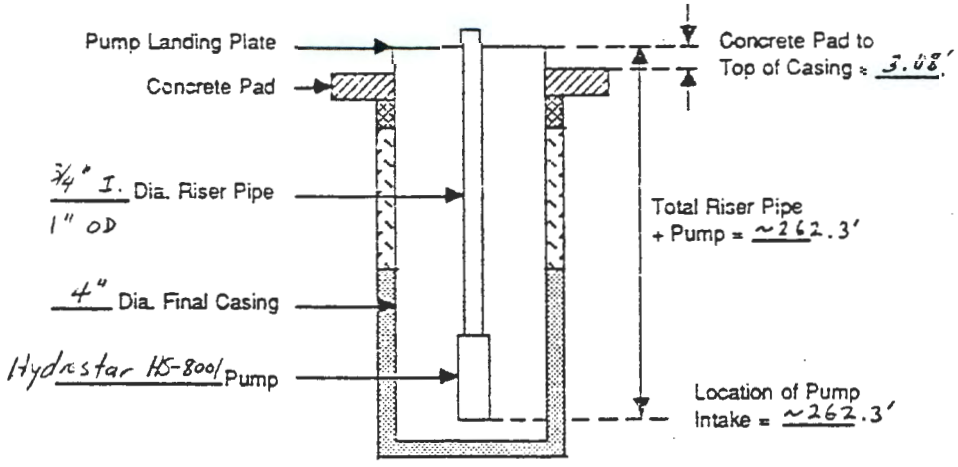
Reported Depth-to-Bottom: 267' below land surface Date: 7-11-89

Screened Interval: 246.4' to 267.4' below ground (249.98' to 270.98' below TOC (Driller's logs)) Saturated Screened Interval: 255.28' to 270.98' below TOC

Pump Riser Pipe Description: 26 lengths of 10' riser pipe + pump (2.25') installed. Pump head assembly attached to riser pipe and placed on top of casing. Piston rod cut and threaded 3" from top of assembly. Packing gland installed.

Additional Comments: All threads wrapped with teflon tape. All new couplings. Driller wore white clean cotton gloves during installation. Pump, pipe, couplings, and pump head assembly delivered to site in manufacturer's packaged containers. Driller actuated piston on pump to ensure it moved freely.

Sketch of Pump Installation:




Completed By: Darrell Newcomer Date: 10/17/89

# SAMPLING PUMP INSTALLATION FORM

Project: W-Ø17, Single Shell Tank Well Number: 299-E33-33

Pump Type: Positive Displacement Piston Pump Model: Hydrostar HS-8001

Date Installed: 10/18/89 Installed by: Darrell Ludke, KEH driller

Depth-to-Water: 235.36', 235.37' below TOC (steel Tape #L300-14) Depth-to-Bottom: 251.67' below TOC

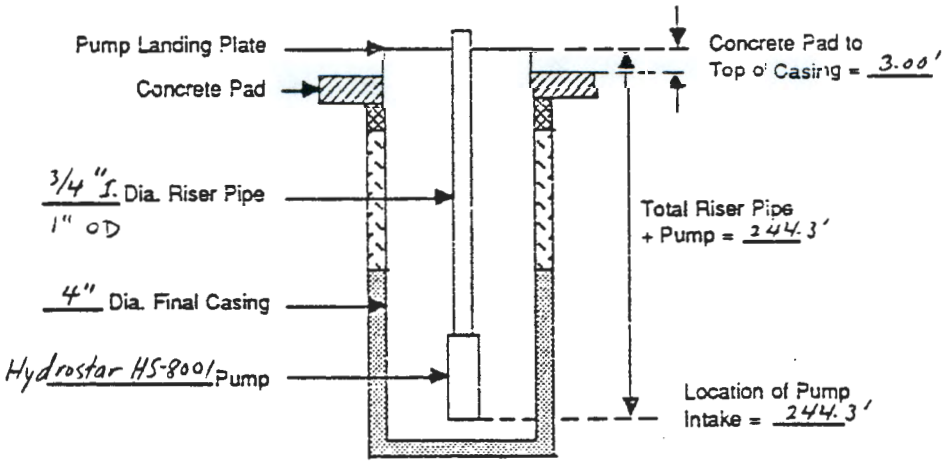
Reported Depth-to-Bottom: 248.3' below land surface Date: 7-17-89

Screened Interval: 230.8' to 251.8' below TOC (227.3' to 248.3' below ground) Saturated Screened Interval: 235.36' to 251.8' below TOC

Pump Riser Pipe Description: 24 lengths of 10' riser pipe, 1 length of 2' riser pipe (placed before the last 10' length near the top of casing), and 2.25' length pump installed.

Additional Comments: All threads wrapped with teflon tape. All new couplings. Driller wore clean cotton gloves during installation. Pump head assembly attached to riser pipe and placed on top of casing. Packing gland installed. Piston rod cut and threaded on 10/26/89. Pump, pipe, couplings, and pump head assembly delivered to site in manufacturer's packaged containers.

Sketch of Pump Installation:




Completed By: Darrell Newcomer Date: 10/18/89



A-1850-008 (4/89)
S8902066.1

# SAMPLING PUMP INSTALLATION FORM

Project: N017 Single Shelled Tanks Well Number: 299 - W10 - 15

Pump Type: Pos. displacement Piston Pump Model: Hydrostar HS-8000.1

Date Installed: 11/20/89 Installed by: D. Ladtke, B. Strode

Depth-to-Water: 209.5' from Top of 6" casing Depth-to-Bottom: 225.55 from top of 6" casing

Reported Depth-to-Bottom: ~222' below land Date: Nov 3, 1989

Screened Interval: 205.55 to 225.55 ft below Top of 6" casing Saturated Screened Interval: 209.5 - 225.55 ft below Top of 6" casing

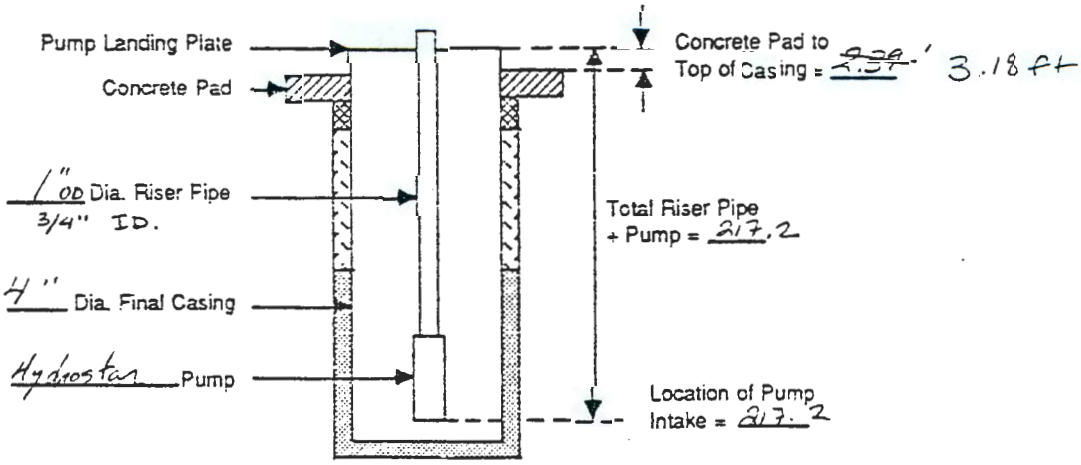
Pump Riser Pipe Description:

21 10' lengths
1 5' length
pump 2.2' length

pump head assembly and packing gland installed on top of 6" casing. Did not have to cut rod

Additional Comments: Pumps, couplings and pipe came to site in manufacturers' packaging. Drillers wore clean cotton gloves while placing pump + riser pipes. Pump inspected, action checked all OK. All coupling and pipe threads wrapped w/ teflon tape.

Sketch of Pump Installation:




Completed By: Jane V. Borghese Date: 11/20/89

PNL-MA-567, DO-3 Rev 0

770

# SAMPLING PUMP INSTALLATION FORM

Project: W-017 Single Shell Tanks Well Number: 299-W10-16

Pump Type: Positive displacement piston Pump Model: Hydrostar HS-8001

Date Installed: 11/9/89 Installed by: Darrell Ludke, REH

Depth-to-Water: 206.44' from toc / L300-11 Depth-to-Bottom: 222.66' below toc / L500-03

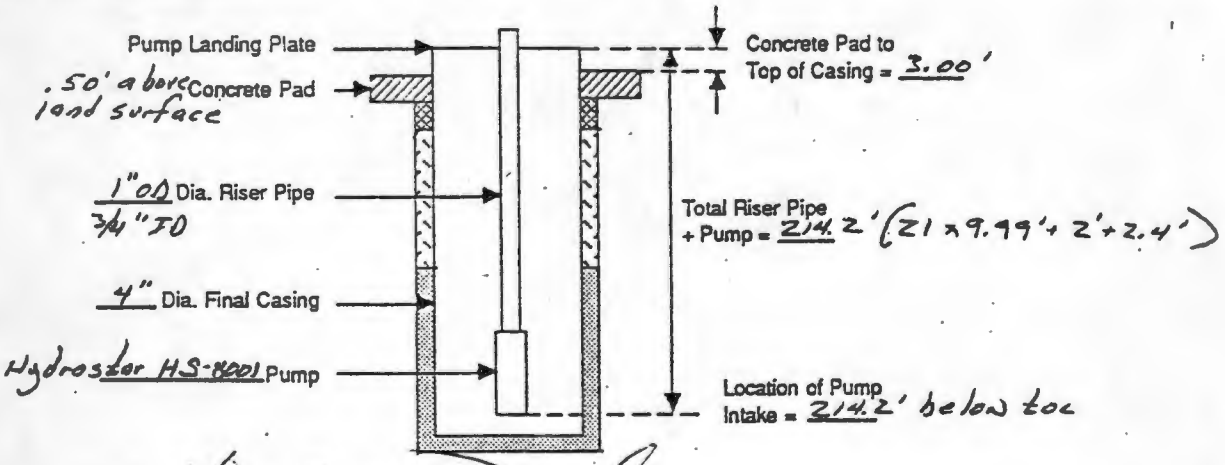
Reported Depth-to-Bottom: 219' below land surface Date: 10/25/89

Screened Interval: 219'-198' below land surface Saturated Screened Interval: 222.66'-206.44' below toc.

Pump Riser Pipe Description: 21 sections of 10' riser pipe, 1 section of 2' riser pipe, and 1 pump 2.4' in length. 2' section was installed 10' below the landing plate to prevent the operating rod joint from hitting the bottom of the plate during pump operation.

Additional Comments: The sampling pump, riser pipes, operating rods and couplings were wrapped in plastic and stored in cardboard cartons, and were kept above ground on the pump setting rig during installation. Driller wore cotton gloves throughout this process. Each joint on the riser pipe was wrapped with teflon tape to prevent leakage. Unable to lock well - needs brackets on the lid and casing.

Sketch of Pump Installation:




Completed By: [signature] Date: 11/9/89

A-1850-008 (4/89)
S8902066.1



9112050073

THIS PAGE
INTENTIONALLY
LEFT BLANK

9112050774

# DISTRIBUTION

| Copies | | |
|---|---|---|
| 5 | Westinghouse Hanford Company | |
| | R. L. Jackson (3) | H4-56 |
| | N. Solis | H4-17 |
| | EDMC | H4-22 |

9 1 1 2 0 5 0 0 7 7 5

THIS PAGE INTENTIONALLY
LEFT BLANK