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WHC-MR-0209

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

A. W. Pearson
Pacific Northwest Laboratory

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WHC-MR-0209

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

A. W. Pearson

January 1990

Pacific Northwest Laboratory
Richland, Washington 99352

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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.

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SUMMARY

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Section B: Well Construction Information

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Section A

Geologic and Geophysical Logs of Twelve Wells for Single Shell Tanks

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

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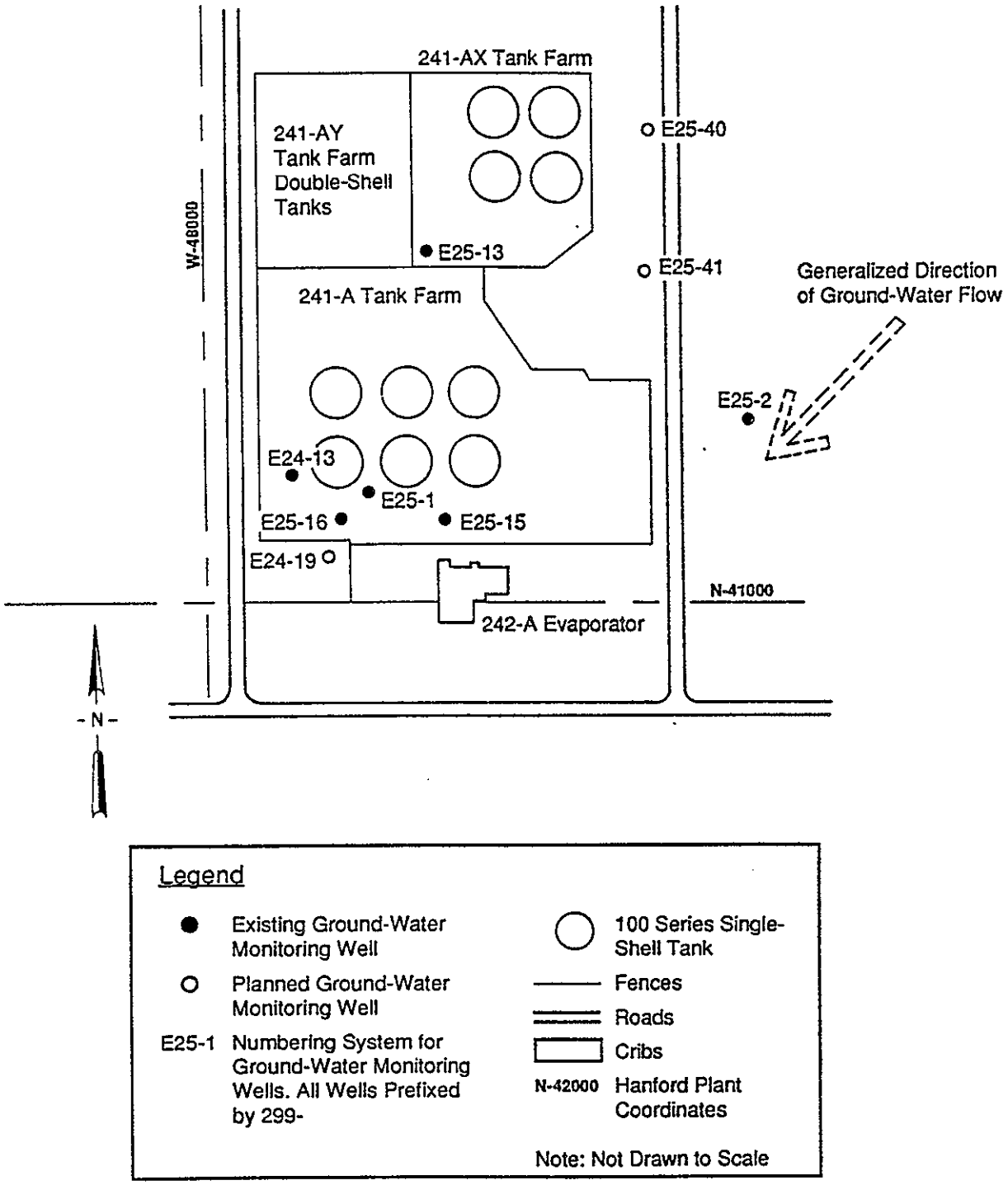
Waste Management Area A-AX



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.

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		
				INSPECTOR. 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.
				CS, 10% MS, 40% FS, 30% VFS, 20% MUD.		LITHOLOGIC &
				MODERATELY SORTED. TOO FINE FOR MINERALOGY.		1 MOISTURE STRIPE
				WET COLOR IS 10YR 4/3 (BROWN). RX. TO	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:

FNL-MA-567 DO-1, REV. 0 Reviewed by [signature] 12-8-89 [signature] 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 HR-14102	Well Number: 299-E24-19	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 9 August 1989		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.T. McGhan 12-8-89 [illegible] 8/9/89

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

WHC-MR-0209

9 1 1 0 5 7 7 0 1 5

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	#22-14102	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. McKhan 12-8-89 [signature] 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

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9 1 1 2 0 5 7 0 0 1 6

DRILL LOG	By: S.M. Goodwin	Rig: BE 22	Well Number: 299-E24-19	Computer Number: N/A	Project or Work Order No.: W-017-55T
	Date: 10 August 1989	#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. Mathison 12-8-89 [illegible] 8/10/89

D - Drive Barrel H - Hard Tool L - Lance M - [illegible]

WHC-MR-0209

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DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
AIRHART	BE 22W 14102 Mel. Thoresen	299-E24-19	N/A	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, 10% MP, 15% FP, 20% VFP, 80% 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 rxn. w/ 10%		
				HCl : unconsolidated. NOTE: Increase in gravel.		
	35'	D		SANDY GRAVEL. same sand & gravel fractions -	0920	Took (2) pint lith
				No A 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)

WHC-MR-0209

9 1 1 2 3 5 7 0 0 1 3 97"

DRILL LOG	By: AIRHART	Rig: BE 22 W 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% MP, 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% si-rich 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 StP [signature] 8-11-89

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

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0 1 1 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) point 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 A color.		
				unconsolidated.		
	55'	D	SM	SANDY GRAVEL: 60% gravel, 38% sand, 2% mud:	1425	Took (2) point 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 A lithology: sand: No A lithology.		detected.
				No A 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

REMARKS:

52'10" + 10'2¼" = 63'1/4"

15:00 No welding

15:10 Shut Down

Reviewed by

PNL MA-567 DO-1 REV. 0 D.L. McClean 8-8-89 S.L.P. 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)

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9 1 1 2 9 5 1 0 0 0 0

1 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: 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 MEL 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 [signature] 12-8-89 [signature] 8/14/89

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

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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	#22-14/102	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, 2PT.
				MUD. 2% MP, 5% FP, 5% VFP, 35% VCS,		LITH & 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 D.C. McGlam 12-8-89 Sherlene 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)

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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: 14 August 1995	#22-14102	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. #SST081487)
				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. McGlam 12-8-89 Alan M. Marks 8/14/87

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

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: 14 August 1989	# 22-14102	Depth: 80' To 87'		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'	D	SM	GRAVELLY SAND: 15% GRAVEL, 82% SAND, 3%	1435	SAMPLE; 2 PT.
				MUD. GRAVELS SAME; SANDS ARE 25%		LITH'd / 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 PPM 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

Signature: [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 ____ 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 15 AUGUST 1989	#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 [illegible] 12-8-89

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

[illegible] 8/15/89

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

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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 15 August 1989	#22-14	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. H55TOS1589)
				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. McClellan 12-8-89 MUD.

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

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

9 1 1 2 0 5 7 0 0 3 6

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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 Δ 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 CP, 5% MP, 10% FP, 10% VFP, 25%		LITH & 1 MOIST.
				VCS, 25% CS, 15% MS, 10% FS & VFS, 0%		SAMPLE
				MUD. POORLY SORTED. NO Δ 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. McGhan 12-8-89

PNL-MA-567 DO-1 REV. 0

[signature] 8/15/89

D - Drive Barrel H - Hard Tool L - Lance VI - [illegible]

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WHC-MR-0209

DRILL LOG	By: M. Lubrecht	Rig: BE-22W #22-14102 Mel Thoresen	Well Number: 299-E24-19	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.
				19% 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 V.L. McGhan 12-8-89

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

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)

9 1 1 2 0 5 1 0 0 2 3

SHT 1 of 3

DRILL LOG	By M. LUBRECHT / S. GOODWIN	Rig BE 22W # 22-14102 M. THORESEN	Well Number Z-99-E24-19	Computer Number N/A	Project or Work Order No. W-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.		
					0854	Prepare to add casing

REMARKS:
Reviewed by V. L. McBlain 12-8-89
PNL - 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

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WHC-MR-0209

DRILL LOG	By M. Lubrecht / S. Goodwin	Rig BE 22W #22-14102	Well Number 299-E24-19	Computer Number N/A	Project or Work Order No. W017 SST
	Date 16 AUGUST 89	M Thoreson	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'-6 3/4"					1047	Complete casing
+ 9'-8"						addition. Resume drilling
133'-2 3/4"						
	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'-2 1/2"					1113	STOP TO ADD CASING.
142'-5 1/4"					1200 - 1230	LUNCH
					1240	WELDING
				ADDED 9'2 1/2" OF 10" CASING; TOTAL 10" = 142'5 1/4"	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. McGlum 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)

DRILL LOG	By M. LUBRECHT / S. M. GOODWIN Date 8-16-89	Rig BE-22W #22-1402 M. Thorsen	Well Number 299-E24-19 Depth 140' To. 149'	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
	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 [illegible] 12-8-89
PNL-MA567-DO-1, REV. Ø

[illegible] 8/16/89

D - Drive Barrel H - Hard Tool

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 THORESEN.	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 V.L. McGhan 12-8-89

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

[signature] 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

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1 of 3

DRILL LOG	By EJ Jensen	Rig BE 22W	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" 20' 6 1/4"				Added 141' 4 5/8" of 8" diameter casing on 8/17/89	0900 1530	
20' 20' 1/4"						
20' 1/8" 20'						
20' 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 Castel #
9' 10"				Added 9' 10" of 8" dia. casing	1000	
167' 11 5/8"						

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

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

[signature] 8/18/89

D - Drill...

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WHC-MR-0209

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
EJ Jensen	BE 22h	299-E24-19	NA	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,	1120	2 pint jar samples
				5% vfs-mud, well sorted, 50% mafic, 50%		1 moisture sample
				felsic, color 10 YR 6/2 light grayish brown, slight		
				rxn in 10% HCl, unconsolidated.		
	170'	D	SM	SAND, 2% small pebbles, 3% VCS, 35% CS, 40% ms, 15% fs,	1140	2 pint jar sample
				5% vfs-mud, well sorted, 50% mafic, 50% felsic,		1 moisture sample
				color 10 YR 6/2 light grayish brown, slight		
				rxn in 10% HCl, unconsolidated.		
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,	1330	2 pint jar sample
				5% vfs-mud, well sorted, 50% mafic, 50% felsic,		1 moisture sample
				color 10 YR 6/2 light grayish brown, slight		
				rxn in 10% HCl, unconsolidated		

REMARKS:
Reviewed by V.L. McClam 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

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9 1 1 2 9 5 1 0 0 7 4

3 of 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 180' 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
	180'	D	SM	SAND, 2% small pebbles, 3% VCS, 35% CS, 40% MS, 15%	1400	2 pint jar samples
				fs, 5% vfs-mud, well sorted, 50% mafic, 50%		1 moisture sample
				felsic, color 10YR 6/2 light grayish brown,		2 special samples 125ml
				slight rxn in 10% HCl, unconsolidated.		081889 SST
	185'	D	SM	SAND, 5% VCS, 35% CS, 40% MS, 15% fs, 5% vfs-mud,	1420	2 pint jar samples
				well sorted, 50% mafic, 50% felsic, color 10YR		1 moisture sample
				6/2 light grayish brown, moderate rxn in		
				10% HCl, unconsolidated.		
				A section of casing will be measured		
				and welded on monday morning		

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

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

[signature] 8/18/89

D - Drive Barrel H - Hard Tool L - Lame M - Mach...

WHC-MR-0209

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9 1 1 2 5 7 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 187'	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. McKhan 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

9 1 1 2 0 5 7 0 0 3 6

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, &
				COLORED MATERIAL THAN 190' SAMPLE		2 125 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. McGehan 12-8-89

1500 DONE FOR DAY

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

[signature] 8/21/89

D - Drive Barrel H - Hard Tool L - Lance M - Mechanical S - Small VC - Vertical Core

WHC-MR-0209

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9 1 1 2 5 7 0 0 7 7

DRILL LOG	By: AIRHART/Jensen	Rig: BE 22W 14102 Mel Thorrson	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
192'10⅛"				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% qtz, 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.
207'10⅛" of 8" casing					1115	Adding 15' of casing
						192'10⅛" + 15' = 207'10⅛"
				Shut Down by RPT for lunch	1120	

REMARKS:
Reviewed by V.L. McClam 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 7 0 0 7 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, ~~70~~ 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.L. Merkhan 12-8-89
PNL-MA-567 DO-1, REV. 0

Eric [illegible] 8/22/89

D - Drive Barrel H - [illegible]

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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	#22-14102	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		(C. OF C. # SST
217'10 3/8				RX TO 10% HCL. NO CONSOLIDATION. Ø		082389)
+ 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 [signature] 12-8-89
PNL-MA-567 DO-1, REV. 0

[signature] 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

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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	#22-14102	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'. MOD. 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 & MOD.		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. McKlam 12-8-89
PNL-MA-567 DO-1, REV. 0

LITH SAMPLES

[signature] 8/23/89

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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 1959	N22-14102	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. # SST052389)
				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 V.L. McGhan 12-8-89
PNL-MA-567 DO-1, REV. 0

[signature] 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 W #22-14102	Well Number: 299-E24-19	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 24 AUGUST 1989		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 THORESEN	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 & 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

[signature] 8/24/89

WHC-MR-0209

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DRILL LOG	By S. M. Goodwin	Rig BE 22W	Well Number 299-E24-19	Computer Number N/A	Project or Work Order No. W-017-55T
	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,		& 2 500 ML 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. McElhaney 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

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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 255'; 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.	1300	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 2.5 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

[signature] 8/24/89

WHC-MR-0209

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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: 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.C. McGlean 12-8-89 2 1/2 gallons H_2O Added Today
PNL-MA-567 DO-1, Rev. 0 [signature] 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 1 5 1 0 0 1 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 set
						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 finds nothing
	277	D		Mud 0% Gravel and Sand, 100% mud (~30% silt, 70% clay)	0800	[illegible]
				TOP 10YR 2.5Y 5/4, lower: 5Y 5/1		Samples: (2) chemical Thickness 1.5ft
					0815	driller bailing additional
						cleaning, RPT checks sample
+ 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. Markham 12-8-89

PNL-MA-367 DO-1, rev. 0

Jan Kennedy 8-25-89

D - Drive Barrel H - Hard Tool

WHC-MR-0209

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DRILL LOG	By: Jan Kennedy Date: 8-25-89	Rig: BE-22W H22-1402	Well Number: 299-E24-19 Depth: 280 To 285	Computer Number: N/A	Project or Work Order No.: W017 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
	280	D		MUD, 100% mud 5Y5/3 with 10YR 4/4 mottles slight HCl rxn	1030	Samples (2) Chem
						(2) 1pt lith, (1) moist cu
	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 prepares
						to add casing
					1530	end of shift.

REMARKS:
Reviewed by V.L. Mathan 12-8-89
PNL MA 569 - 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

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9 1 1 2 1 5 1 0 0 1 8

1 OF 2

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	#22-1/1/02	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 280'. LOOKS		
				LIKE MIDDLE RINGOLD. Ø PIT W/ OVA &		

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

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

8/20/87

D - Drive Barrel H - Hard Tool

WHC-MR-0209

46

9 1 1 0 0 5 0 0 0 1 9

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	#22-14102	Depth: 285' To 295'		Subcontract No.: 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 10 YR 5/3 (BROWN). Ø		
				PPM W/ OVA & RAD = <DET.		
				D/WATER = 285.8' (PNL 5 TAPE # 10998);	1240	D/WATER
				DIFFICULT TO DETERMINE WHETHER D/W		
				IS ACCURATE - COULD BE TAGGING TOP		
				OF DRILLING MUD. WILL CONTINUE TO		
				BARREL 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. McGhan 12-8-89 ADDED 20 GALLONS OF H_2O 1530 END OF SHIFT

PNL-MA-567 DO-1, REV 0 [signature] 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

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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 THORSEN	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. Matthews 12-8-89
PNL-MA-567 DO-1, REV. 0

Shelley Moore 8/28/89

D - Drive Barrel H - Hard Tool L - Lance M - Mechanical

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 29 AUGUST 1989	# 22-1/1/02	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 8" AS DEPTH IS		BAILING HOLE
				MEASURED. BOTTOM OF 8" = 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 V.L. McGhan 12-8-89

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

S. 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 ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

6/7

9 1 1 2 0 5 7 0 0 5 2

3 of 3

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	#22-14/102	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. Mathews 12-8-89 ADDED 50 GALLONS H_2O

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

[signature] 8/29/89

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

WHC-MR-0209

50

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,		2500 ML CHEM.
				3% MUD. POORLY SORTED. GRAVELS ARE 45%		ANAL. (C.OF C. #
				MAFIC, 55% FELSIC, TRACE MUDSTONE &		SST083087)
				ALTERED ANDESITE; SA TO R. SANDS ARE 30%		
				MAFIC, 70% FELSIC, TRACE MICA; SA. WET		
				COLOR IS 10YR 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. Matthews 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

9 1 1 2 0 5 7 0 0 7 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 SST
	Date 30 August 1987	#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 INSPECTOR MIKE EVARTS 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. McGhan 12-8-89

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

[signature] 8/30/89

D - Drive Record

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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: 30 AUGUST 1989	#22-14103	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"					1420	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. McGlum 12-8-89 ADDED 200 GALLONS TOTAL H_2O TODAY

PNL-MA-567 DO-1, REV. 0 [signature] 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)

9 1 1 2 0 5 0 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: 31 August 1989	#22-14102	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 THORESEN	0700	SERVICING RIG
				D/BOTTOM = 299' (PNL 501' 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 MOSTLY QUARTZITE &		
				GRANITE (GNEISS), SOME CONGLOMERATE &		
				RED S.S.; UNBROKEN R TO WR. SANDS ARE		

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

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

[signature] 8/31/89

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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 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 10YR		
				3/3 (DARK BROWN). DRILLING SLOW; FM.		
				DOESN'T APPEAR CONTAMINATED - 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. McGhan 12-8-89 ADDED 75 GALLONS OF H_2O TODAY

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

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

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9 1 1 2 0 5 0 0 0 7 3

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

Logged by S.P. AIRHART St P A'-Lt Date 9-22-89
Reviewed by [signature] Date 12-8-89
Measuring Equip. S-TAPE - L500-? Procedure PNL-MA-567 Dcl 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'
										D/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.

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9 1 1 2 2 5 1 0 2 7 9

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

Logged by S. P. AIRHART [signature] Date 9-25-89
Reviewed by [signature] Date 12-8-89
Measuring Equip. S. TAPE 501' 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
	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'

WHC-MR-0209

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9 1 1 2 3 5 7 8 7 1 0

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 StPAirhart Date 9-25 89
Reviewed by L.C. McGhan Date 12-8-89
Measuring Equip. S-tape 500' 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
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'
			298'	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 Stapl # L300-07

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9 1 1 2 0 5 0 0 0 1

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. AIRHART [signature] Date 9-25-89
Reviewed by [signature] Date 12-8-89
Measuring Equip. S. TAPE 500' Procedure PNL-MA-567 DO-1 REV. 0

Drilling Contractor KEH
Driller Mel Thoresen
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

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9 1 1 2 3 5 0 0 0 3 2

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

Logged by S. P. Airhart StP Airhart Date 9-25-89
Reviewed by V. E. Mathews Date 12-8-89
Measuring Equip. S-tape L300-07 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
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

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9 1 1 2 1 5 1 0 0 1 3

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

Logged by S. P. AIRHART StP Airhart Date 9-26-89
Reviewed by V.D. McGlean Date 12-8-89
Measuring Equip. S-tape # L300-07 Procedure PNL-MA-567, Dal, 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

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9 1 1 2 1 5 1 0 0 0 4

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 [signature] Date 9-26-89
Reviewed by U.L. McGhan Date 12-8-89
Measuring Equip. S-tape - L300-07 Procedure PNL-MA-567 DO-1, REV 0

Drilling Contractor KEH
Driller
Rig/Equipment Pettibone 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'

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9 1 1 2 0 5 7 0 0 1 5

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 W.L. McKleen — Date 12-8-89 — Driller GENE THOMAS
Measuring Equip. L300-07 — Procedure PNL-MA-567 DI-1, REV. 0 — Rig/Equipment CRANE & JACKS

Time	Casing/Screen Type	Dia	Length	Stickup	Depth	Annular Fill Type	Quantity	Depth	Overlap	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 POWDER (BY VOLUME)						4.1	16.1	POURING GROUT; D/GROUT = 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' TOP = - 5.9' STICKUP

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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 SITE: L. Watkins
				prior to setup. FOOD GRADE OIL (CRISCO BRAND) WAS USED ON TOOL		still setting up Leftsite
				STRING FOR THREAD LUBE, ETC.	10:25	On site - Start drilling
	5'	D	D	SAND (trace Cobbles): 1% vfP, 2% vcS, 1% cS, 70% mS		sample.
				20% fS, 3% vfS, 3% mud, Sub-well-rounded, well-sorted. Tr. Coarse	10:54	Sample - 2 lith,
				pebbles, well rounded; 20% mafic, 80% felsic. Color = 10YR 5/6		1 moisture
				mod react to HCl, unconsolidated. 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 chem. sample

REMARKS:

M.H. Lubrecht 8/7/89

PNL-MA-567 DO-1, REV. 0 Reviewed by W.L. Markham 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)

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9 1 1 2 9 5 1 0 0 5 8

2 of 2

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	Began 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
						weld 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

WHC-MR-0209

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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 prepare
						to cut off excess 10"
						casing.
					0800	Begin to install 8" 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 SAND: Tr. Cobbles; 2% mf, 1% fP, 1% vf P; 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:

PNL-MASGT-001-REV Ø

Reviewed by D. L. McKhan 12-4-89

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

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9 1 1 2 0 5 7 0 0 7 0

Sht. 2 of 2

DRILL LOG	By M. Lubrecht	Rig BE GOL ZZ-14103 L. Wilkins	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"Ø)	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 < Ø; 0ppm on OVA.		
				∅ 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 < Ø; 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"				< Ø	1350	begin to add 10" casing
39'9½"					1500	welding complete - drive casing
					1515	Leave site

REMARKS:

PNL - MA567 - DO-1 - Rev Ø

Reviewed by D.L. McKhan 12-4-89

M.D. Lubrecht 8/8/89

D - Drive

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9 1 1 0 0 5 0 0 0 7 1

DRILL LOG	By: S. M. Goodwin	Rig: BE 60L #22-14103	Well Number: 299-E25-40	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 9 August 1989		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. 20% VFP, 30%	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.
				30% FP, 20% 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 12-4-89 [signature] 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	Well Number 299-E25-40	Computer Number N/A	Project or Work Order No. W-017 SST
	Date 9 August 1989	# 22-1/1-3	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. Mulchan 12-4-89 Stuart M. Mark 8/9/89

WHC-MR-0209

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9 1 1 2 2 5 0 9 0 7 3

DRILL LOG	By: S. M. Goodwin	Rig: BE 60C	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. McGlean 12-4-89 [signature] 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

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Sht 1 of 2

DRILL LOG	By M. D. LUBRECHT	Rig BE GOL #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" (87'7")						briefly to re-level rig.
	75'	D	SM	Sandy GRAVEL: 40% Gravel, 60% Sand - 5% small-large	0915	SAMPLE: 2-1 pint lith;
				Cobbles(est.); 5% c-vcP; 15% mP; 10% fP, 5% vfP, 25%		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. lith,
				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-MA 567 - DO-1, Rev. 0

Michael D. Lubrecht 8/10/89

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

D - Drive Barrel

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9 1 1 2 2 5 7 9 9 7 5

Sht. 2 of 2

DRILL LOG	By: M.D. Lubrecht	Rig: BE Cool #22-14103 L. Watkins	Well Number: 299-E25-40	Computer Number: N/A	Project or Work Order No.: CW-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"	84'					
	85'	D	SM	gravelly SAND: 20% Gravel, 80% SAND - Tr. vcP, 3% cP,	1158	SAMPLES: (2) 1 pt.
				5% mP, 5% fP, 7% vfP, 40% vcS, 30% mS, 10% fS, tr. vfS.		lith.; (1) moisture
				Poorly sorted. Gravel: 30% mafic / 70% felsic, SA-WR,		
				SAND: 20% mafic / 80% felsic, A-SA; sl. ≈HCl; 10YR 5/4;	1200	left for lunch
				Unconsolidated - sl. consolidated. Coarser sand than above.	1235	returned - resumed
						drilling
	90'	D	SM	gravelly SAND: same lithology & characteristics as 85'	1300	SAMPLES: (2) 1 pt. lit.
				sample. Slightly more vcP. (2%±), Tr. small cobbles.		(1) moisture.
87' 10½"						
+ 9' 9"				ADDED 9'9" OF 10" CASING; TOTAL 10" = 97' 7½"	1310	Prepared to add casing
= 97' 7½"					1435	Resume drilling

REMARKS:

PNL - 114567 - DO-1, Rev. 0

Reviewed by W.L. McGehee 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)

WHC-MR-0209

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SHT. 1 of 2

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 8/11/89		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; 10YR 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 081109
				85% felsic, A-SR; 10YR 5/4; V. Slight ⇌ w/HCl; not consd.		
				0 ppm (OVA); rad < ø		

REMARKS:

PNL-MA567 DO-1, Rev. 0

Michael D. Lubrecht 8/11/89

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

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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 SST.
	Date: 8/11/89		Depth: 101 To 117'		Subcontract No.: N/A

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. 0 ppm (OVA);		
				red < Ø		
	110'	D	SM	SAND: Similar to 105 ft. Sample. 0 ppm (OVA); red	1120	SAMPLES: (2) 1 pt.
				< Ø		Lith.; (1) moisture
+9'5"					1145	Stop to add casing
				113'-114' Mud (siltstone) interbed.	1200	Break for lunch.
116'8¼" (10" ø C.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. Ø Reviewed by V.L. McGlean 12-5-89 Mitch 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 ____ Standing Water

A-6000-021 (5-85)

WHC-MR-0209

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DRILL LOG	By M.D. Lubrecht	Rig BE-60L 22-14103	Well Number 299-E25-40	Computer Number N/A	Project or Work Order No. W-017 SST
	Date 8/14/89	L Watkins	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' 8¼"		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) chan. # 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' 2¼"	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"					1118	Resume drilling
					1200	LUNCH
					1230	Return

REMARKS:

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

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Sht 2 of 2

DRILL LOG	By: M.D. Lubrecht	Rig: BE-60L 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) 0ppm(OVA)/rad<Ø	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% mafic/80% felsic; 10YR 7/4; slightly consolidated w/ muddy matrix; slight ⇌ w/ HCL; 0ppm(OVA)/rad<Ø	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-MA567-DO-1, REV. Ø Reviewed by V.L. McGhan 12-5-89 Mark 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

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9 1 1 2 0 5 7 0 0 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 SST
	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	Drove 10" casing down in
						prep. for geophysical
						logging (nat α) 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, 36% 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. BRODERICK presiding.

REMARKS:

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

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

WHC-MR-0209

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 SST
	Date: 8/15/89		Depth: 150 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")	150				0820-1000	Geophysically-logged borehole w/ nat. gamma probe. (4-147.5 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. Ø 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)

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Sht. 1 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 SST
	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 pt. 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 J. Lubrecht 8/16/89

D - Drive Barrel H - Hard Tool

WHC-MR-0209

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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 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 Lith, (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 $CaCO_3$). 0 ppm OVA; rad < det.	1402	SAMPLES: (2), 1 pt. lith., (1) moisture.
+10'-2"						
174'-9½"					1413	Add 8" casing,
					1520	left site.

REMARKS:

PNL-MA567-00-1, REV. Ø

Reviewed by V.L. MacGlan

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

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Sht. 1 of 3

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 8/17/89		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
TH-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

D - Drive Barrel H - Hand Tool

WHC-MR-0209

DRILL LOG	By: M.D. Lubrecht	Rig: BEGOL 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'-11¾"	180	D	SM	SAND: similar to 175'. Tr. SC, Tr. vcP, otherwise same	1108	SAMPLES: (2), 1 pt.
				size gradation. Locally poorly indurated w/ $CaCO_3$,		lith., (2) chem. #SST-
				@ppm (OVA)/rad < det		081789, (1) moisture.
+ 10'-2½"					1115	Begin adding 8" casing
					1200 -	lunch
195'-2¼"					1230	
					1230	resume welding
					1240	Begin drilling
	185'	D	SM.	SAND: Tr. Gravel, 99% SAND, 1% MUD; Tr. fP, Tr. vfP, 8% vcS,	1334	SAMPLES: (2), 1 pt.
				15% cS, 65% mS, 9% fS, 2% vfS, 1% mud, well-sorted;		Lith., (1) moisture.
				20% mafic/80% felsic, SA-SR; 10 YR 6/4 pale yellowish brown;		
				slight ≡ w/ HCl, unconsolidated. 0 ppm OVA/rad < det.		
	190'	D	SM	SAND: Similar to 185 ft. sample. Same grain-size distribution	1356	SAMPLES. (2), 1 pt. lith,
				and lithology. 0 ppm (OVA), rad < det.		(1) moisture tin.
					1420	Samples drop from barrel -
						Driller thinks its gravel.

REMARKS:

PNL-MA 567-DO-1, Rev 0 Reviewed by V. L. McGhan 12-5-89 M.D. Lubr 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

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SHT. 3 OF 3

DRILL LOG	By: M.D. Lybrecht	Rig: BE-60L, ZZ-14103, L. Wilkins	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 < db		
					1433	Switching to hard tool -
						used food grade oil
						for thread lubrication.
					1503	Still working tool change -
						drilling finished for day

REMARKS:

PNL-MA567-DO-1, Rev. 0 Reviewed by V.L. McGhan 12-5-89 Michael D. Lybrecht 8/17/89

D - Drive Barrel H - Hard Tool L - Lance

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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 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)
					1042	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- MA 507 - DO-1, Rev. Ø

Reviewed [signature] 12-5-89 Mike 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 9 5 1 0 0 9 3

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 SST
	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'-5¾"					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'-7¾"					1410	Resume Drilling w/8" handful
215'-1½"						added 4 gal water
	205'	IFT	—	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:

PNL-MA567-DO-1, Rev 0 Reviewed by V. E. McGlaun 12-5-89 Mike H. Fuller 8/18/89

D - Drive Barrel H - Hard Tool

WHC-MR-0209

80

541.3.13

DRILL LOG	By: J Kennedy, M Latech	Rig: BE-60L, 22-1403, L. Watkins	Well Number: 299-E 2.5-40	Computer Number: N/A	Project or Work Order No.: W-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; 2% fP, 6% vfP,	15:15	SAMPLES: (2) 1 pt. Lith
				25% vcs, 25% cs, 20% ms, 12% fs, 6% vfs; 2% mud Gravel: 80% 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 V. 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

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DRILL LOG	By M.D. Lubrecht and J.A. 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'-1½"				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, 86% sand, 3% mud;	0915	Samples (2) 1pt. lith.
				Trace fP, 9% vfP, 22% vcs, 13% cs, 40% fs, 9% fs, 4% vfs, 3% mud		Driller starts to add
				Gravels: 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,		
+ 8'10⅝"				locally consolidated.		
223'-10¾"				added 8'-¾" & 8" temporary casing	1030	casing complete,
						resume drilling

REMARKS:

Michael A. Lubrecht for J.A. Kennedy 8/21/89

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

D - Drive Barrel H - Hand Tool

WHC-MR-0209

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DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
MD. Lubrecht and Tom Kennedy	CE 60L 22 14103 L. Watkins	299-E15-40	—	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% vfp,	1110	Samples (2) lith (1)
				35% vcs, 30% cs, 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) 1pt lith
				20% ms, 45% ms, 15% fs, 3% vfs, trace mud, ~~well~~ moderately 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
+10-2¾					1350	addition of casing complete
234 1½				SAND:		resume drilling
	230	D	sm	Similar to 225' except trace Gravel, 100% sand, trace mud	1430	Samples (2) 1pt 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) 1pt. lith
				moderate HCl rxn, other properties identical		(1) moisture

REMARKS:

1530 END OF SHIFT

PNL-MA-567 DO-1, Rev. 0 Reviewed by V.L. McGhan 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 9 5 1 0 7 7 2

1 of 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
234'-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. or C. # SST082259)
				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 locally		
				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 Co[illegible] C - Coarse F - Fine VF - Very Fine [illegible]

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WHC-MR-0209

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: 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% cs 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
					1200	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 casings
					1445	continue drilling
					1530	Quit

REMARKS:

PNL-MA-567 DO-1, rev. 0 Reviewed by [signature] 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

A-6000-021 (5-85)

WHC-MR-0209

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9 1 1 2 1 5 7 0 0 0 4

Sht. 1 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 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
~~234'-1½"~~ 264'-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 moisture; (2) chem.*
				poorly sorted: GRAVEL: 40% BASALT/60% FELSIC, VA-WR; SAND: 20%/80%,		SST 0823 89
				SA-SR; 10YR 5/4 mod. yellow brown; no reaction HCl; unconsolidated. - different		
264'-10¼" + 9'-4¼"				lithology than above. 0ppm (OVA); rad ≤ background	0850	STOP TO ADD 8" CASING
274'-2½"	265'	D	W	Sandy GRAVEL: 40% Gravel, 60% SAND, Tr. mud: Tr. large cobble, tr.	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;		
				10YR 5/4 moderate yellowish brown; no reaction to HCl; unconsolidated		
				0 ppm (OVA); rad ≤ back.		

REMARKS:

PNL-MA567-DO-1, Rev 0

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

Mill 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

WHC-MR-0209

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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 SST
	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
274'-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 VCP (10%), decrease in CS (10%)		(1) moisture
				and MS (5%) lithology similar to above - one large granodiorite cobble		
				(Mt. Stuart granodiorite?) 0 ppm (OVA); red ≤ back.		
					1200 -	
					1230	Lunch
+8'-9¼"					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, RSN. Ø

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

Michael H. 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)

9 1 1 2 9 5 7 0 7 9 6

Sht 1 of 1

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 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 3/4"				WATER (STATIC WATER LEVEL) @ 258'5" (M# 10178) 257'5" (M# 10998)	0700	ONSITE - MEASURE TD & H_2O
				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. Ø

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

Michael D. Lubrecht 8/24/89

D - Drive Panel H - Hard Tool L - Large M - Medium S - Small MC - Medium Cr

WHC-MR-0209

9 1 1 2 0 5 7 0 0 0 7

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

Logged by S.P AIRHART SPA Date 9-12-89
Reviewed by V.L. McGhee Date 12-6-89
Measuring Equip. S-tape 1300-07, 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

WHC-MR-0209

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9 1 1 2 7 5 7 0 0 0 3

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E25-40 Location SST	Date 9/13/89 Sheet No. 1 of 3 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-567 Rev 0

Drilling Contractor KEH
Driller Louis Watkins
Rig/Equipment Galion 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

[signature] 9/13/89

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9 1 1 2 ? 5 ? 0 ? ? 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 V.L. McAlian — Date 12-6-89
Measuring Equip. L300-07 — Procedure PNL MA567 ~~Do 1 Rev 0~~

Drilling Contractor KEH
Driller Louis Watkins
Rig/Equipment Galion Crane Jacks

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 = $\boxed{257.0}$ = D/W
										279.7' +.5 - 6.8 = $\boxed{273.4}$ = D/B 05 SS

[signature] 9/13/89

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9 1 1 2 7 5 3 0 1 9 0

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

Logged by EJ Jensen Date 9/13/89
Reviewed by D.L. McGhan Date 12-6-89
Measuring Equip. L300-07 Procedure PWL MF567 ~~Do-1 Rev 0.~~

Drilling Contractor KEH
Driller Louis Watkins
Rig/Equipment Galion Crane Jacks

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

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[signature] 9/13/89

9 1 1 2 1 5 3 0 1 0 1

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. P. AIRHART [signature] Date 9/14/89
Reviewed by V.L. McGlean Date 12-6-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-567 DD-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
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.	10 50 lb bags	215.5'	30'	222' + .3' - 6.8' = 215.5'
						Crumbles				
			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'

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9 1 1 2 1 5 2 0 1 0 2

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

Logged by S. P. AIRHART	Date 9-14-89	Drilling Contractor KEH
Reviewed by D. L. McGhan	Date 12-6-89	Driller LOUIS WATKINS
Measuring Equip. S-TAPE: L300-07	Procedure PNL-MA-567 SO-1, REV. 0	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
			169.6'	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

100

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9 1 1 2 ? 5 ? 0 1 ? 3

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 [signature] Date 9-15-89
Reviewed by [signature] Date 12-6-89
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	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

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9 1 1 2 0 5 7 0 4 0 4

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

Logged by S.P. AIRHART Date 9-15-89
Reviewed by D.E. McGhan Date 12-6-89
Measuring Equip. S-TAPE # L300-07 Procedure PNL-MA-567 DA-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
										Mixing cement for surface seal.
						Portland Type I & II Cement	13 94 lb. bags			
						Water	80 gals			This mixture = 2 batches
						Aluminum Powder	~ 2 cups.			
			20.8'	10.0'	10.8'			12.3'	-1.5'	19' - 6.7' = 12.3'
										Shut Down

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9 1 1 2 5 7 0 1 2 5

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 KEH
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 1ft 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
										1/2 of 2nd batch to bring
										surface seal to 2' bls.
										TOP OF CEMENT @ 2'
										TOTAL USED 22 bags
										= 14.52 ft³.

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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 1 5 0 0 1 0 7

DRILL LOG	By M.O. 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. MOL 8/8/89	0903 -	Continue set-up. Water (?)
						from nearby facility overflows
						tanks and flows past rig.
						Moved all logging equip.
						& 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% matrix, 80%	0950	Samples: 2 lith, 1 moist
				feldsic, SA - WR, well sorted - v. well sorted; Color = 7.5		no mud.
				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% matrix, 80% feldsic; SA - V/WR;		
				10YR 5/6; vigorous HCl reaction; unconsol. - rad < Ø; no cont.		

REMARKS:

PNL-MA567-001 - Rev Ø

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

Michael O. 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

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9 1 1 2 0 5 7 0 1 0 3

Sht 2 of 2

DRILL LOG	By: M.D. Librecht	Rig: BE 60 22-14101 Craig	Well Number: 299-E-25-41	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 8/8/89		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-D01 - REV Ø

Reviewed by [illegible] 12-5-89

M.D. Lib 8/8/89

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9 1 1 2 0 5 0 0 1 0 9

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 seds. - 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. McSlane 12-7-89 [signature] 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 W...

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9 1 1 2 1 5 1 0 1 1 0

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 <5% 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,		lithologic 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 [signature] 8/9/89

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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

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9 1 1 2 1 5 1 0 1 1 2

4 of 4

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-567 DO-1 REV-0 [signature] 12-7-89

9 1 1 2 1 5 7 0 1 1 3

DRILL LOG	By: Bleger / LUBRECHT	Rig: BE 22W 14101 Craig	Well Number: 299-E25-41	Computer Number: N/A	Project or Work Order No.: 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 D. L. McGlean 12-7-89 M.D. 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

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Sht. 2 of 3

DRILL LOG	By M.D. Lubrecht	Rig BE 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 10-1 Rev. 0

Reviewed by [illegible] 12-7-89

M.D. Lubrecht 8/10/89

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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%	1450	SAMPLE: (2) 1 pt.
				fP, 7% vfP, 15% vcS, 30% cS, 30% mS, 10% fS, tr. vfS.		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. 0 ppm (OVA)/<0 ml.		
					1517	- Starting next sample
						interval. Geologists
	end of shift		74'			left site to retrieve
						geo @ 200W

REMARKS:

PNL-MA 567 DO-1, Rev. 0 Reviewed by V.L. McGhan 12-7-89 Mike 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 W...

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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) chem
				SA-WR; SAND: 20% Basaltic / 80% felsic, A-SR; 10% CA,		# SST 081189
				Slight ⇌ w/HCl; slightly consolidated		
					1000	Resume drilling

REMARKS:

PNL-MA567-D01, Rev. Ø

Reviewed by [illegible] 12-7-89

Michael D. Lubrecht 8/11/89

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DRILL LOG	By: M.D. Lubrecht	Rig: BE-22W #22-141a 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 moderately cemented w/ caliche	1416	SAMPLES: (2) 1 pt. lith; (1) moisture (Note: Hard drilling in gravel.)

REMARKS:

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

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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. Wensley	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. Mashburn 12-7-89 Michael D. Lubrecht 8/11/89

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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 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. m.P, 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-DO-1, Rev. Ø

Reviewed by [illegible] 12-7-89

[illegible] 8/14/89

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

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DRILL LOG	By M. Lubrecht	Rig BE-22W 22-14101	Well Number 299-E25-41	Computer Number N/A	Project or Work Order No. W-017 SST
	Date 8/14/89	C Wensley	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	Interbedd 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)/rad < Ø		Chemical sample taken, busy
						at rig E-25-40

REMARKS:

PNL-MA567-DO-1, REV. Ø

Reviewed by V.L. [illegible] 12-7-89

Michael A. Lubrecht 8/14/89

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9 1 1 2 0 5 0 0 1 0 1

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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;		(1) moisture, (2) chemical.
				20% basalt/80% felsic moderately-sorted; A-SR; 10YR 6/4; slight-mod. ⇄ w/ HCl; slightly		
				consolidated.		
				muddy SAND: 75% vfS, 25% mod (~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% mod - 1% fP, 2% vfP,	0944	SAMPLES: (2), 1 pt. Lith;
9'-8"				7% vcS, 20% cS, 40% mS, 20% fS, 8% vfS, 2% mod; 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 interbeds!	1000-	Geophysically-logged
					1115	borehole w/ net. gamma
						probe.

REMARKS:

PNL - MA 567 - DO-1, Rev. 0 Reviewed by V. L. McGhan 12-7-89 Michael P. 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

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DRILL LOG	By M.D. Lubrecht	Rig B6-22W 22-141-1 C. Wensley	Well Number 299-E25-41	Computer Number N/A	Project or Work Order No. W017-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	Shumes: (2) 1 pt. Lith; (1) moistre
					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-DD-2, Rev. 0 Reviewed by V.L. McShan 12-7-89 Mitch 10 [illegible] 8/15/[illegible]

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9 1 1 2 9 5 0 0 1 0 3

DRILL LOG	By M.O. 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% mud — 1% CP, 2% vfP,	1330	SAMPLES: (2), 1 pt.
				7% vcS, 20% cS, 40% mS, 20% fS, 8% vfS, 2% mud; 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 O. 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)

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9 1 1 2 3 5 0 0 1 0 4

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DRILL LOG	By MD 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 8/17/89		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
159'-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 pl. 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/ $CaCO_3$ 0 ppm OVA/rad Cdl		
	155'	D	M	SAND: Same lithology and properties as 150 ft. sample. Locally	0920	SAMPLES: (2), 1 pl. lith.,
				slightly more indurated (still friable). 0 ppm OVA rad Cdl.		(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 pl.
				indurated. Contains some clasts (ripups?) of mud.		lith.; (1) moisture,
				0 ppm OVA/rad Cdl		(2) chemical #SST 031739

REMARKS:

PNL - MA567-DO-1, Rev. Ø

Reviewed by V.E. [illegible] 12-7-89

Michael D. Lubrecht 8/17/89

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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		SST 081489

REMARKS:

PNL - MA 567 - DO-1, Rev. 0 Reviewed by V.L. McGhan 12-7-89 Michael 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)

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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% F; 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 tommorrow

REMARKS:

PNL-MA567-DO-1, Rev 0 Reviewed by V.C. McGhan 12-7-89 Michael Luber 8/18/89

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9 1 1 2 0 5 0 0 1 7

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. Uzumky	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"					0913	Casing addition completed - resume drilling.
197'-11½"						
	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 hard tool. Using food-grade

REMARKS:

PNL-MA567-DO-1, Rev. Ø

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

Michael 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

WHC-MR-0209

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9 1 1 2 1 5 0 1 0 3

Sht. 2 of 2

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 18 August 1989		Depth 196 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
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
						fells 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% cP,	1457	SAMPLE: (2) 1 pt. lith.
				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 clasts more basalt) A-WR;		
				SAND: 30% Basaltic / 70% felsic, A-WR; 5Y 5/2 olive gray;		
				no reach w/ HCl; sl-mod consolidated.	1522	STOP DRILLING.

REMARKS:

ADDED 3 GALLONS OF DRILL WATER

PNL-MA567-DO-1, Rev. Ø

Reviewed by [illegible] 12-7-89

Michael D. Lubrecht 8/18/89

WHC-MR-0209

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9 1 1 2 0 5 0 0 1 0 9

SHT. 1 of 2

DRILL LOG	By MD Lubrecht and I.A 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 CABLE. (5'
						INCREMENTS)
					0748	START DRILLING
	205'	HT	WET	Sandy GRAVEL: 70% GRAVEL, 27% SAND, 3% mud - 5% cP,	0835	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; 2.5Y6/2 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-MA 567-DO-1, Rev. 0 Reviewed by V.L. McGlean 12-7-89 Michael 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 Wat

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9 1 1 2 9 5 2 0 1 7 0

Sht. 2 of 2

DRILL LOG	By M.D. Lubrecht	Rig BE 22W	Well Number 299-E25-41	Computer Number	Project or Work Order No. W-017 SST
	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		(flat 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 [signature] 11-7-89

[signature] 8/21/89

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SHT. 1 of 2

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. W-017 SST
	Date 22 AUG 1989		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,	1000	SAMPLES: (2), 1 pt. Lith,
				6% fP, 9% vfP, 15% vcS, 25% cS, 20% mS, 15% fS, 8% vfS, 2% mud,		(2) 125 ml glass, (1) mastic
				poorly sorted; GRAVEL: 70% mafic (some vesicular basalt)/30% felsic, VA-SR,		(C. OF C. # 082289)
				SAND: SA-SR, 30% mafic/70% felsic; 10YR 5/4 mod. yellow brown;		
				Slight ⇌ w/ HCl, slightly consolidated. 0 ppm (OVA)/rad. c back.		
				- 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 D. L. Markham 12-7-89

Michael D. Lubr 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

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9 1 1 2 0 5 0 0 1 3 2

SHT. 2 of 2

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.: W-017 SSD
	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, uA-WR; SAND: 30% Basalt/70% felsic		
				SA-SR; 2.5Y 4/2 dark grayish brown; v. slight ≠ w/HCl; slightly consolidated,		
				coarser than above sample.	1198	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 Ø

Michael D. Lubrecht 8/22/89

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WHC-MR-0209

9 1 1 0 0 5 0 0 1 3 Sht. 1 of 2

DRILL LOG	By M.D. Lubrecht	Rig BE-22W #22-14102 C. Wemsley	Well Number 299-E25-41	Computer Number N/A	Project or Work Order No. W-017 SST
	Date 23 AUG. 1989		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 -
+10'-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; v. slight HCl ⇌;		
				slightly consolidated. 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 3/4,		
				mod. yellow brown; Unconsolidated, no HCl ⇌ 0 ppm (OVA)/		
				rad. ≤ background		
	240	HT	–	gravelly SAND: similar to 235 ft sample (c. of c. # SST	0950	SAMPLES: (2), 1 pt. Lith.,
				082389) 0 ppm (OVA)/rad. ≤ back.		(2), 125 ml. Chem.
					0955	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)/rad ≤ back.		
					1045	ADD 8" casing

REMARKS:

PNL - MA 567 - DO-1, Res Ø

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

Mark 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

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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% vfS, 75% MUD;		
				mottled - 2.5Y 6/6 olive yellow and 5B 5/1 bluish gray, no ≈ 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 - MA567 - DO-1, Rev. Ø

Michael D. Lubrecht 8/23/89

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Sur. 1 of 2

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
M.D. Lubrecht	BE 22W	299-E25-41	N/A	W-017 SST
Date	# 22-14101	Depth		Subcontract No.
24 Aug 1989	C. Wamsley	260 To 270		N/A

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
258'-5" +10'11" 269'-4"				Recalculated casing length after review of driller notes & discussion w/ driller. Note revised depth.	0700	ON SITE - MEASURE STATIC LEVEL @ 262'10" (might be influenced by drill water.) - BEGIN ADDING 8" CASING
269'-4" +10'11"					0830	Finish welding - begin driving casing - drove entire length!
	265'	HT	WET	Sandy MUD: similar to 255' sample. Based on drilling characteristics, zone is ≈ 253' to 262' (G.W.S. at base of silty aquitard unit?) 0 ppm OVA/rad ≤ back.	0902	SAMPLES: (2), 1 pt. Lith - retrieved from bailer (flat bottom).
	270'	HT	WET	muddy sandy GRAVEL: 45% GRAVEL 45% SAND 10% Mud; 5% vcP, 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.	0917	SAMPLES: (2), 1 pt. Lith.
280'-3"					0943	Add casing

REMARKS:

PNL - MA567 - DO-1, Rev 0

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

[signature] 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

9 1 1 2 0 5 7 0 1 3 6

SHT 2 of 2

DRILL LOG	By: M.D. Lubrecht Date: 24 Aug 1989	Rig: BE 22W #22-14101 C Wensley	Well Number: 299-E25-41 Depth: 270 To 276	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
	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.		
				monzonites). A-WR; SAND: 15% Basaltic / 85% felsic (fsp, qtz, muscovite,		
				A-WR, ~~sa~~ 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	PAL-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 III straightness test.
						Tested OK. Left site.

REMARKS:

PAL-MA567-DO-1, Rev. Ø

Michael D. Lubrecht 8/24/89

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9 1 1 2 3 5 7 0 1 7

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DRILL LOG	By: S. M. Goodwin	Rig: BE 22W #22-14101	Well Number: 299-E25-41	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 25 August 1989		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 # 10998). 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 HAS 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 V.C. McGhan 12-7-89 [signature] 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

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9 1 1 2 5 0 0 1 7 3

DRILL LOG	By: AIRHART	Rig: NO RIG	Well Number: 299-E25-41	Computer Number: N/A	Project or Work Order No.: W-017 SST
	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. McGhan 12-7-89

[signature] 9/12/89

WHC-MR-0209

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9 1 1 2 0 5 0 0 1 9

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

Logged by S. P. AIRHART [signature] Date 9-18-89
Reviewed by [signature] Date 12-7-89
Measuring Equip. STAPE 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	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 section.
	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)						

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9 1 1 2 3 5 3 0 1 0

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

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9 1 1 2 3 5 0 0 1 1 1

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

Logged by S.P. AIRHART S.P. Airhart Date 9-19-89
Reviewed by D.L. McGhan Date 12-7-89
Measuring Equip. S-TAPE - L300-07 Procedure PNL-MA-567 DO-1, QEV-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	½ 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 (PNL)
										to RL 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.

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9 1 1 2 8 5 0 0 1 1 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-Tapee L300-07 — Procedure ANUM-7 887 Rev-1 8870

Drilling Contractor KEH
Driller Craig Wamsley
Rig/Equipment Gardner Cranes/Hyd. Jacks

Time	Casing/Screen Type	Dia	Length	Stickup	Depth	Annular Fill Type	Quantity	Depth	Overlap	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

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9 1 1 2 0 5 0 0 1 3

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

Logged by EJ Jensen Date 9/20/89
Reviewed by D.C. Markham Date 12-7-89
Measuring Equip. S tape L300-07 Procedure PD-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'
						10-30 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 S.S = 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

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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. S-Tape: L300-07 Procedure DO-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	Over lap	Comments
			248.1'	6.5'	241.6'				4.1'	243.7' + .3' − 6.5' = 237.5'

Tim [illegible] 9/20/89

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9 1 1 2 2 5 7 0 1 1 5

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

Logged by S. P. AIRHART SLPAirhart Date 9-21-89
Reviewed by V. G. McGlean 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'

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9 1 1 2 1 5 1 0 1 4 6

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

Logged by S. P. AIRHART Date 9-21-89
Reviewed by T.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

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9 1 1 2 ? 5 ? 0 1 ? 7

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

Logged by S.P. AIRHART [signature] Date 9-22-89
Reviewed by V.G. Mathan 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	35 gals			
						Al. powder	1 cup			
			26.6'	14.5'	12.1'			4'	8.1'	18.5' - 14.5' = 4'
					12.1'	2nd batch as		+8'	20.1'	Poured ~ 1/4 batch cement
						above				

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9 1 1 2 7 5 7 0 4 1 3

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

Logged by S. P. AIRHART [signature] Date 9-22-89
Reviewed by [signature] Date 12-7-89
Measuring Equip. S-tape # L300-07 Procedure PNL-MA-567 00-1, 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
				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

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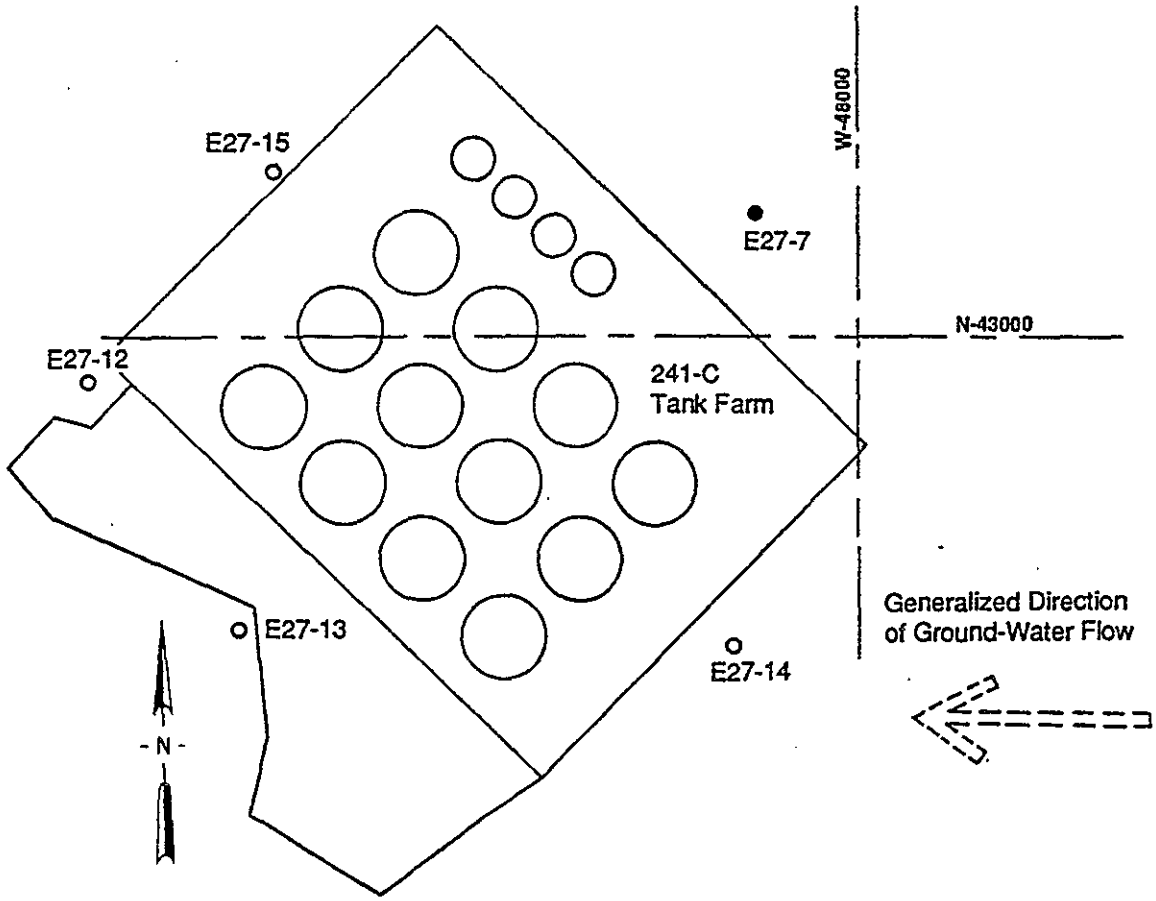
Waste Management Area C



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	Well Number 299-E27-12	Computer Number N/A	Project or Work Order No. W-017-SST
	Date 8/28/89	#22-14103 Louis W.	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.
					0830	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" ø 15'0"						install 10" ø casing w/ stoc 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 ø

Reviewed by K.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)

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9 1 1 2 ? 5 ? 0 1 ? ?

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. McGhan 12-7-89

8/28/89

Rand H. Miller

D - Drive Barrel

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sht 1 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 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" ø 24'1"	12.5' bls				0713	Ar site - prepare to drill
					0720	H₂S scan - OVA = < 1 ppm.
						LEL = < detect. / no RPT.
						must wait for RPT to
						begin drilling —
					0930	H₂S scan - OVA = < 1 ppm
					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.		H₂S scan = < 1 ppm.
				gravels are 50% mafic 50% felsic sands are 40% mafic 60% felsic		
				subrnd to well rnded, very dark brown, (10YR 2/2), slight	1100	RPT scan = < detect.
				reaction to HCL, slightly consolidated (2pt lith, 1 mud)		H₂S scan - OVA = < 1 ppm.
	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" ø
				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 [illegible] 12-7-89

[illegible] 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

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9 1 1 2 1 5 0 0 1 7 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
						H&S scan - OVA = <1ppm
					1330	finish welding -
						resume drilling - H&S scan.
					1350	RPT-scan - <det.
	25.0'	DB	sl. 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. 1md)	moder. reaction to HCL	
	30.0'	DB	sl. moist.	mod. 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 [signature] 12-7-89

8/29/89 [signature]

D - Drive Barrel H - Hard Tool L - Lance M - [illegible]

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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 8/30/89		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"Ø 43'8"	33'				0710	Ar site-prepare to drill
						resume welding 10" casing
					0730	H&S 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	[illegible] SAND, (2% Gravel 98% Sand), 2% vfp [illegible]	0822	H&S scan-OVA < 1ppm.
				[illegible], 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	[illegible], SAND, (1% Gravel 99% Sand) 1% vfp [illegible], 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"Ø 52'8"	41'					9'0" and weld.

REMARKS:

PNL-MA 567, DO-1, Rev Ø

Reviewed by V.L. McGlohan 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)

WHC-MR-0209

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9 1 1 2 2 5 7 0 1 7 6

sht 2 of 3

DRILL LOG	By RD. 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 8/30/89		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
10"Ø 43'8"	45.'	DB	dry	SAND, (1% Gravel 99% Sand) 1% vfp	0900	to 45.0' - sample
				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, AO-1, Rev Ø

Reviewed by [signature] 12-8-89

8/30/89 [signature]

D - Drive Barrel H - Hard Tool L - [illegible]

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DRILL LOG	By R.D. Miller	Rig BE-60L & #22-14103	Well Number 299-E27-12	Computer Number N/A	Project or Work Order No. W017-55T
	Date 8/30/89	Louis W.	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 (5-85)

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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	Ar site prepare to drill
				30% vcs 40% cs 10% ms 10% fs 9% vfs. moder. sorted	0715	H&S scan-OVA= <1ppm.
				same as above (2pt lith 1 moist dens.)	0730	resume drilling
					0810	H&S scan-OVA= <1ppm.
	70.0'	DB	dry	SAND, (2% Gravel, 98% SAND) 2% fp, v 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	H&S 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, DO-1, Rev Ø

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

8/31/89 Ronald D. Miller

D - Drive

WHC-MR-0209

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DRILL LOG	By R.D.Miller	Rig BE-60L 2 #22-14103 Louis W.	Well Number 299-E27-12	Computer Number N/A	Project or Work Order No. W017-SST
	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	Dr site - still shut dn.
						air bottles on way out.
						upgrade to lev. B

REMARKS:

PNL-MA567, DO-1, Rev 0

Reviewed by D.L. McSchan 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 (5-85)

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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	Air 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 90 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 Ø

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

[signature]

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sht 2 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 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" 99'6¾"					1511	resume drilling
					1516	shut down.

REMARKS:

PNL-MA567, DO-1, Rev Ø

Reviewed by V.L. McKhan 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)

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9 1 1 2 0 5 0 0 1 2

sht 1 of 2

DRILL LOG	By R. Miller	Rig BE-60L #22-14103	Well Number 299-E27-12	Computer Number	Project or Work Order No. W-017-SST
	Date 9/5/89	Louis W.	Depth 90.0' To 105.0'	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 99'6¾"					0730	Ar site - welding
					0756	begin drilling -
					0810	H&S 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, 7% 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 - H&S scan OVA = <1ppm
				similar to 95.0' sample (2pt lith, 2125ml enviro, 1 moist)		
					1050	resume drilling
					1126	H&S 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)		
				moder. reaction to HCL, unconsolidated. (2pt. lith, 1 moist)		
					1201	Stop for lunch.

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by [illegible] 12-8-89 [signature] 9/5/89

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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' - H_2S scan
				4% vfp, 35% vcs, 35% cs, 10% ms, 5% fs, 5% vfs, mod.		OVA = 1ppm 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	H_2S scan OVA = <1ppm.
	115.0'	DB	dry	will log tomorrow.	1521	to 115.0'
					1528	stop for day.

REMARKS:

PNL-MA567, DO-1, Rev 0

Reviewed by W. G. McGhan 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

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9 1 1 2 5 7 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	Av site - prepare to drill
				35% vcs 35% cs 10% ms 5% fs 5% vfs, mod sorted, 50/50%	0715	H&S scan - OVA = <1ppm.
				felsic/mafic, sub ang - sub rnd, 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
				sub ang - sub rnd, 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. H&S 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. McGhan 12-8-89

[signature] 9/6/89

WHC-MR-0209

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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 Cagliano - 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
						Groub 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 V.L. McGahan 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)

WHC-MR-0209

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9 1 1 2 7 5 7 0 1 3 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 41'6¼"					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

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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 61'5¼"					0705	Ar site - prep casing 8"
					0715	H&S scan - OVA = <1ppm.
81'2¼"					0720	add 8"ø casing 19'9" &
						weld
8"ø 97'6½"					0815	add 16'4¼" 8"ø & weld
					0817	H&S scan - OVA = <1ppm
					0830	shut down to repair cable gd
					0900	resume welding
8"ø 114'11¾"					0938	add 17'5¼" - 8"ø & weld
					0941	H&S scan - OVA = <1 ppm.
8"ø 132'5¾"					1032	add 17'6" - 8"ø & weld
					1127	8"ø casing to depth - add
8"ø 141' 7"						9'1¼" 8"ø and weld.
					1200	shut down for lunch
					1230	resume welding
					1240	H&S 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

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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	H&S 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. McGhan 12-8-89

9/7/89

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DRILL LOG	By: Jan Kennedy / Goodwin	Rig: BE GOL #14-103 Louis	Well Number: 299-E27-12	Computer Number: N/A	Project or Work Order No.: W017-55T
	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 CP 5% vfp, 15% cs,	0840	Samples: (2) 1pt. lith
				20% ms, 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'-3 3/4" (8") 159'-7 3/4"					0850	preparing to weld casing,
					0925	finish welding - 9'-3 3/4" 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:

PNL MA 569 DD-1 1993.0 Reviewed by [illegible] 12-8-89 Shuster, 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

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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: 9/8/89		Depth: 155' To 168'		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 PPM w/ OVA & RAD.	1040	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-MA-567 DO-1 REV 0 Reviewed by D.L. McGlinn 12-8-89 S.P. [signature] 9-8-89

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9 1 1 2 5 2 0 1 7 1

DRILL LOG	By: AIRHART/Kennedy	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 lith
				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 vfp, 4% vfp, 10% vcs	1330	Samples: (2) 1pt. lith
				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.L. Mathews 12-8-89 [signature] 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

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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) print
				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 30-1 REV-0 [illegible]

SLD 1 1

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9 1 1 2 0 5 0 0 1 7 3

sht 1 of 2

DRILL LOG	By R. Miller	Rig BE-600 #22-14103 Louis W.	Well Number 299-E27-12 1	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' 1/4"					0730	add 9' 1 1/4" 8"Ø & weld
					0840	begin to drill
	180.0'	DB	dry	SAND (3% Gravel, 97% Sand, trace mud) 1% fg 2% vfg.	0855	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, yellowish brn.		RPT-cleaned
				(10YR 5/4) slight rx to 10% HCl, unconsol. (2pt. lith, 2 envirо		
				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% vfg, 15% vcs	1020	to 185.0' - sample
				20% cs 30% ms, 20% fs, 11% vfs, trace mud, mod-poorly sorted,		RPT-cleaned.
				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' 9" - 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

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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&S 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 (10YR 5/4)	1235	resume activity
				slight to moderate rx to 10% HCL, unconsolidated, trace	1246	H&S 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 206' 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&S 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&S 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&S scan - OVA = <1ppm.
	205.0	DB	SM.		1453	to 205.0' - sample.
					1458	stop for day.

REMARKS:

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

9/11/89

D - Drive Ba... H - Hard Too...

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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. McGhan 12-8-89 9/12/89 Rand W. Miller

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)

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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"Ø 225' 1/4"					1230	resume drilling
2 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%		H&S scan - OVA = <1 ppm.
				felsic/mafic, A-SR, lt. yel brn (10YR 6/4) moderate rx		PPT - cleared.
				to 10% HCL, unconsolidated, traces of vdk brn (2.5Y 3/2)		
				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,		H&S scan - OVA = <1 ppm.
				40/60% felsic/mafic, lt yel brn (10YR 6/4) moder. rx to		PPT - cleared.
8"Ø 233 2¾				10% HCL, unconsolidated, trace concretions. (2pt lith	1320	add 8' 2½" - 8" & weld
				1 moist)	1415	resume drilling
				(.5 1/4)	1440	H&S scan OVA = <1 ppm.
	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
						c of c 091289

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by V.L. McMahan 12-8-89 9/12/89 [signature]

D - Drive Barrel H - Hard Tool L - L[illegible] V - [illegible]

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WHC-MR-0209

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 9/13/89		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" @ 233'2¾"	228.0'	DB	SM.	GRAVELLY SANDY MUD (20% Gravel 39% Sand 41% MUD)	0715	Ar site - H₂S scan
	228.8'			5% cp, 5% mp, 5% fp, 5% vfp, 5% vcs 5% cs 5% ms 10% fs 14% vfs,		OVA: <1 ppm, 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 2 gal 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" @ 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	H₂S scan - OVA = <1 ppm
				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	H₂S scan - OVA = <1 ppm.
8" @ 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 0 Reviewed by V.L. McGlam 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)

WHC-MR-0209

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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 9/13/89		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"Ø 246' 8½"					1238	resume drilling
	245.0'	DB	SM	SANDY GRAVEL (50% Sand, 50% Gravel, trace Mud) 2% scobble	1256	to 245.0' - sample
				3% vcp, 5% cp. 10% mp 15% fp 15% vfp, 15% vcs 10% cs 10% ms		H&S scan = OVA = <1 ppm
				10% fs, 5% vfs, trace mud, very poorly sorted, 60/40% f/m,		RPT - cleared.
8"Ø 254' 10¾"				SA-WR, ol. 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&S scan - OVA = <1 ppm
				5% vfs, 15% mud, very poorly sorted, 60/40% f/m, SA-WR,		RPT - cleared
				ol. 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&S scan - OVA = <1 ppm
					1530	Shut down for day
						samples on C of C 091389

REMARKS:

PNL-MA 567, DO-1, Rev Ø Reviewed by V.L. McGhan 12-8-89 9/15/89 [signature]

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

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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 9/14/89		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, ol 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 ol 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 [signature]

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

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9 1 1 2 5 0 1 0

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 9/14/89		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	H&S scan-OVA = <1ppm WH
						spails = 5.5ppm.
						RPT-cleared.
8"Ø 269' 7"					1100	add 6'0" -8" & weld
					1200	stop for lunch
					1230	resume activity
					1240	take w/L - 261.91' btc
				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	H&S scan OVA = <1ppm
				5% vfs, trace mud, poorly sorted, 60/40% f/m, SA-WR		RPT - cleared.
8"Ø 269' 7"	261' 7"			ol. brn. (2.5Y 4/4) wet, slight rx to 10% HCL, Unconsol.	1500	casing plugged. - clean
				(2pt lith.)		out
					1515	tape L300-08 tag hole - 266.10' bls
					1520	shut down.

REMARKS:

samples on cofc 091489

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 - Med... S - Small VC - Very Coa... C - Coa... F - Fine VF - Very Fine

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9 1 1 2 5 7 0 1 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
8"Ø 269'7"	267'7"				0710	Av site - H&S scan
						OVA: <1ppm LEL=<det.
					0715	w/c 254.30'btc - SU1.97'=252.33' bls
						TD 268.06btc - SU1.97'= 266.09' bls
					0735	H&S 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&S 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 267.66' bls
						S.U. 3.40' - prep for
						straightness test.

REMARKS:

PNL-MA567, DO-1, Rev0 Reviewed by V.L. McGhan 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

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9 1 1 2 9 5 7 0 1 0 2

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 9/15/89		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
					1035	begin straightness test
				straightness test witnessed by Curtis Hoover (WHC) and passed		w/ 20' of 6" stainless steel
						casing
8'9" 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. McMillan 12-8-89

9/15/89

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9 1 1 2 5 0 1 3

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	w/c. 254.19' btc - 2.09' sw =
						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. McGahan 12-8-89

9/15/89

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

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9 1 1 2 5 1 0 4 1 4

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. AYRHART S.P. Ayrhart Date 10-4-89
Reviewed by W.E. McGlynn Date 12-8-89
Measuring Equip. S-TAPE #4 Procedure PNL-MA-567 PO-1, REV. 0

Drilling Contractor KEH
Driller LOUIS WATKINS
Rig/Equipment DETTIBONE 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 are 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'							

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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 [signature] Date 10-4-89
Reviewed by [signature] 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'					

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9 1 1 2 3 5 7 0 1 3 6

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 St P Airhart Date 10-5-89
Reviewed by V.L. McGlaun Date 12-8-89
Measuring Equip. S-tape #4 Procedure PNL-MA-567 DU-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'
0905										Waiting for KEH pump rig

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9 1 1 2 7 5 9 0 1 7

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 St P Airhart Date 10-5-89
Reviewed by V. L. McGlean 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
	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'	54.9'	167.9' + 2.2' - 7.1' = 163'

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9 1 1 2 9 5 1 0 1 3

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 [signature] Date 10-5-89
Reviewed by [signature] 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
	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'

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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 V. L. McGhan Date 12-8-89
Measuring Equip. S-tape #4 Procedure PNL-MA-567 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	69.8'	73.7'	74.5' + 2.2' - 6.9' = 69.8'
										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'	-4'	24.6' + 2.2' - 7.9' = 18.9'

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

Logged by S. D. AIRHART [signature] Date 10-6-89 Reviewed by [signature] Date 12-8-89 Measuring Equip. S-tape #4 Procedure PNL-MA-567 QU-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

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9 1 1 2 0 5 1 0 1 2 1

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

Logged by S.P. AIRHART SPAirhart Date 10-9-89
Reviewed by D.L. McGhan 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 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.

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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.

9 1 1 2 0 5 0 0 1 0 3

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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.: W017-GST
	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 7/8"					1310	begin to drill -
	5'	D		SANDY GRAVEL: 50% Gravel, 70% Sand, trace mud: 1% VCP, 3% CF 5% CMP	1330	Samples: (2) 1 pt. 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 V.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

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9 1 1 2 2 5 9 0 1 2 4

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DRILL LOG	By Ian Kennedy / Goodwin	Rig BE 22W #22-1410X 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 hole
					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 D01, rev 0

Reviewed by V.L. McGhan 12-6-89 [signature] 9/6/89

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

WHC-MR-0209

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9 1 1 2 [illegible] 5 7 0 1 [illegible] 5

sht 1 of 1

DRILL LOG	By K. 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	Drillers enters site or
						supplied air - wind direct.
					1015	begin drilling
	5.0'	D	Dry	SANDY GRAVEL: Same as 5' sample from first hole, but strong HCl rxn	1100	Samples: (2) int. lith
					1200	break for lunch
					1230	Air 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, DO-1, Rev Ø

Reviewed by V. L. McGraw 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

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WHC-MR-0209

9 1 1 2 5 7 0 1 9 5

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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: 9-7-89		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'-4 3/8", but because of high wind conditions	7:10	arrive on site - driller
				The top 9'-4 3/8" of this casing was 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 straighten
						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% vcg, 5% cg, 4% mg, 4% fg,	0842	Samples: (2) 1qt. lith
				7% vfg, 5% vcs, 10% cs, 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 10YR6/4		cleaned by H&S and by RPT
				(light yellowish brown) slight HCl rxn unconsolidated, finer sands are closer		with β/γ and α.
				to 25% mafic/75% felsic and accounts for the lighter color	0845	driller preparing to add casing

REMARKS:

PNL MA 567 DO 1 rev0

Reviewed by [illegible] 12-6-89

Ian Kennedy

WHC-MR-0209

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9 1 1 2 ^ 5 ^ 0 1 ^ 7

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DRILL LOG	By: Ian Kennedy	Rig: BE22W 22-14101	Well Number: 299-E27-13	Computer Number: N/A	Project or Work Order No.: W017SST
	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 and α - ok
						drive barrel is delivered to site
				Decision made to drill with hard tool. Hard object could be concrete vault	1040	H&S check - ok
						begin change to hard 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 of

REMARKS:

Ian Kennedy

PNL MA 563 DD-1, rev. 0

Reviewed by V.L. McShane 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

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WHC-MR-0209

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DRILL LOG	By Tom Kennedy	Rig BE22W # 22-14101	Well Number 299-E27-13	Computer Number N/A	Project or Work Order No. W017 SST
	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 of water -3 gal.
					13:10	site evacuated on account of [illegible]
					13:20	return to site driller
						adds another bucket (3 gal) H_2O
					1325	H&S Check - ok
					13:30	RPT Check - no signing contam
					13:33	driller adds another bucket
						(3 gal) of water)
					1340	driller adds another bucket
						(3 gal) of drill water)
					1350	RPT check - ok
					1355	driller adds water (1 bckt - 3 gal)
					1400	RPT check - ok
					1402	driller add another bucket of H_2O
					1405	RPT check - ok
					1408	H&S check - ok
					14:09	driller adds another bucket of H_2O

REMARKS:

Tom Kennedy 9-7-89

PNL MASF7D01SC10

Reviewed by [illegible] 12-6-89

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WHC-MR-0209

9 1 1 2 5 2 0 1 2 9

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DRILL LOG	By: Jon Kennedy	Rig: BE 22W #22-14101	Well Number: 299-E27-13	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 9-7-89		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
(6) 20' 4 7/8					1413	RPT check - ok
					1416	adds another bucket of water (3 gal)
	15'	HT	—	SLIGHTLY GRAVELLY MUDDY SAND: 5% gravel, 80% sand 15% mud	1420	Samples (2) 1pt. lith
				(moderate sorting)		
				trans fp, 5% vfp, 5% vcs, 40% cs, 15% ms, 10% fs, 10% vfs, 15% mud:		cleaned by RPT
				gravel 75% mafic/25% felsic SA-SR Sand: 90% mafic / 10% felsic		
				SA-SR 2.5Y 6/4 light yellowish brown nolt (1 xn unconsolidated.		
					14:45	switching back to DB
					15:30	leave site for day.

REMARKS: 24 GALLONS OF H_2O TODAY

Jon Kennedy 9-7-89

PNL MA367 DO-1, rev.0 Reviewed by V.L. McKhan 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

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WHC-MR-0209

9 1 1 2 1 5 1 0 2 1 0

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DRILL LOG	By: Ian Kennedy Date: 9-8-89	Rig: BE 22W #22-14101 Mel	Well Number: 299-E27-15 Depth: 19' To 20'	Computer Number: N/A	Project or Work Order No.: N-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
					0715	arrive on site driller
						performing rig maintenance
					0730	driller continues switch
	20'	D	M	gravelly SAND: 10% gravel, 70% sand; trace mud; trace fp, 10% vfp, 10% vcs, 30% cs		back to Drive Barrel
				30% ms, 15% fs, 5% vfs, trace mud (moderate sorting) gravel: 50% mafic/50%	0845	Samples (2) 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 Spaniel
				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 after thunderstorm)

REMARKS:

Ian Kennedy 9-8-89

PNL MA-567 DO-1, rev. 0

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

WHC-MR-0209

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9 1 1 2 0 5 7 0 2 0 1

p. 1 of 2

DRILL LOG	By: Ian Kennedy	Rig: BE 22W 422-1401 Mel	Well Number: 299-E27-13	Computer Number: N/A	Project or Work Order No.: 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 rig maintenance
					0720	Driller continues addition of 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% cs, 20% ms	0915	Samples (2) 1pt lith
				20% fs, 10% vfs, 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 Hard tool drilling		
					10 00	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,	10 15	Samples (2) 1pt. lith
				25% vcs, 10% cs, 2% ms 2% fs, trace vfs, 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. McKhan 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

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9 1 1 2 7 5 7 0 2 7 2

p. 2 of 2

DRILL LOG	By Ian Kennedy	Rig BE22W #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") 29'-7 1/8"					10 25	begins to weld net casing
					11 35	resum drilling - 9'-5 1/2" of
(10") 29'-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, 2% 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		(2) 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 olive brown		driller begins welding
				slight HCl rxn unconsolidated		new casing
(10") +10'-1 1/4"					14:50	resum drilling - added
49'-1 7/8"						10'-1 1/4" of 10" casing
					15:15	Quit (no RPT to screen 50' sample)

REMARKS:

PNL MA567 V0.1, rev.0

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

Ian Kennedy 9-11-89

WHC-MR-0209

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9 1 1 2 0 5 0 0 0 0 3 P1 of 3

DRILL LOG	By Jan Kennedy	Rig BE22 W #14-101 Bret Strate	Well Number 299-E27-17	Computer Number N/A	Project or Work Order No. 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 7/8"	50'	D	SM	SAND: 3% gravel, 97% sand, trace mud: trace fp, 5% vfp	0940	Arrive on site - Sample
				30% vcs, 60% cs, 5% ms, 2% fs, trace vfs, trace mud (well sorted)		waiting Sample: (2) 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	Mel returns to take over
				Air monitoring is not being carried out continuously		drilling, but Bret 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 7/8"				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. McGhan 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

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9 1 1 2 0 5 1 0 2 0 1

P2 of 2

DRILL LOG	By: Ian Kennedy Date: 9-12-89	Rig: BE 22 W 22-14101 Mel T.	Well Number: 299-E27-13 Depth: 55 To 60	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
(10") 56'-1 7/8"	55'	D	SM	SAND: 3% gravel, 97% sand, trace mud: trace fp, 3% vfp, 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 H & S 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 H & S 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, 18% 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 (need to weld casing)

REMARKS:

PNL MA 567 DO-1, rev. 0 Reviewed by V.L. McGhan 12-6-89

[signature] 9-12-89

WHC-MR-0209

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9 1 1 2 0 5 0 2 0 5

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" steel) 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 mudcaving
				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 vcs, trace fg,	0835	Samples: (2) 1pt. lith
				5% vfg, 30% vcs, 45% cs, 15% ms, 5% fs, trace vfs, trace mud (well sorted)		(1) moist-m RPT cleaned
				gravel: 85% mafic / 15% felsic SA-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 vcs, 1% fg, 7% vfg,	0855	Samples: (2) 1pt. lith
				30% vcs, 48% cs, 15% ms, 3% fs, trace vfs, (well sorted) Gravel: 60% mafic /		(1) moist-m
				40% felsic SA-SR; sand: 10% mafic / 90% felsic SA-SR 10YR 5/4 (yellowish		RPT cleaned
				brown) no HCl rxn unconsolidated		
					0905	driller begin adding casing
						H&S check - ok
(10") 79'-3 3/4"					1010	H&S check - ok; welding
(4") 83'-1 1/2"						finished mudcaving 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

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9 1 1 2 5 1 0 2 9 5

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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-SST
	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	10 40	H&S Check - ok
				10% ms, trace fs, trace 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)
						Rad Cleared
	85'	D	SM	SLIGHTLY GRAVELLY SAND: 9% gravel, 91% sand, trace mud: trace mp, 2% fp,	11 00	RPT leaves for lunch
				7% vfp, 45% vcs, 40% cs, 5% ms, 1% fs, trace vfs trace mud (well sorted)	11 15	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		driller begins to add casing
				moist as samples from above.	1200 1230	lunch.
+9'-4⅜"					12 55	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,	14 05	Samples: (2) 1pt lith,
				10% ms, 1% fs, trace vfs, trace mud (well sorted) Gravel: 50% mafic/50% felsic		(1) moisture RPT Cleared
				SA-SR; sand: 15% mafic/85% felsic SA-SR; 10YR 5/3 (brown)		85' sample RPT cleared
				slight HCl rxn unconsolidated		
					14:35	driller adds ~2 gal water

REMARKS:

Ian Kennedy
9-13-89

PNL MA 567 DO-1, rev. 0

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

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9. 1 1 2 1 5 0 0 3 7

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DRILL LOG	By Ian Kennedy Date 9-13-89	Rig BE 22W #22-14101 Mel T	Well Number 279-E27-13 Depth 90 To 95'	Computer Number N/A	Project or Work Order No. W01755T 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 mp	1510	Samples (2) lpt. lith
				1% fp, 7% vfp, 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:

PNL MA 567 DO-1, rev.0

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

Ian Kennedy 9/13/89

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

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9 1 1 2 [illegible] 5 1 0 2 [illegible] 3

P 1 of 3

DRILL LOG	By: Ian Kennedy Date: 9-14-89	Rig: BE 22W #22-14101	Well Number: 299-E27-13 Depth: 95' To 100'	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
(10") 92'-5 5/8"					0730	Arrive on site after minor delays
						H&S check performed - ok; driller
						working on drive 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 mp, 8% fp, 12% vfp, 10% [illegible]	0954	Samples: (2) 1pt. lifts
				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 (C of C # 091489)
				slight HCl rxn unconsolidated. Driller says the sands seem to be packed		RPT checked and cleared.
				better here than higher up		
				5ppm is probably due to spray paint on cable	10 10	H&S check - ~5 ppm

REMARKS:

PNL MA567 DO-1, rev.0

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

Ian Kennedy
9-14-89

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9 1 1 2 1 5 0 2 0 9

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DRILL LOG	By: Jan 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: 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" diameter) 101'-5 5/8"				agreed that previous reading was due to point on the cable	10 30	H&S Check - ok (<1 ppm)
					10 55	RPT check (B/T) of driller
						and Geologist - ok H&S check ok
					11:00	RPT leaves driller adds 2 gal 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" dia) +9'-5 3/4				added 9'-5 3/4 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, 10% vfp, 10% vcs	13 35	Sample: (2) 1 pt. lith
				35% cs, 20% ms, 10% fs, 5% vfs, 1% mud (moderate sorting) Gravel: 50% mafic/		(1) moisture; RPT and H&S
				50% 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		
					14 15	H&S Check - ok

REMARKS:

Jan Kennedy
9-14-89

PNL MA 567 DO-1, rev.0

Reviewed by V.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

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9 1 1 2 0 5 0 0 2 1 0

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DRILL LOG	By: Ian Kennedy	Rig: BE22W #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 3/8"	108'			Several very coarse Pebbles come up, but quickly dissappear		
	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&S
				Gravel: 55% mafic/45% felsic SA-SR; sand: 15% mafic/85% felsic SA-SR		checked and ok'd
				10YR 6/3 (pale brown) slight HCl rxn unconsolidated, moisture like at 110'		driller begins to add
						casing
					15:00	quit for day

REMARKS:

PNL MA 567, DO-1, rev.0 ADDED 2 GALLONS OF H_2O Reviewed [signature] 12-6-89

Ian Kennedy 9-14-89

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9 1 1 2 1 5 7 0 2 1

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DRILL LOG	By: Ian Kennedy	Rig: BE 22W #22-14101 MelT	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 shale - 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 own
						site H&S officer, Deb. 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% vcs,	0910	Samples: (2) 1 pt. lith
				90% cs, 30% ms, 6% fs, trace vfs, trace mdd (well sorted) Gravel: 40% mafic/60% felsic		(1) Moisture, (2) Chem. (C of CH 091589)
				SA-SR; sand: 10% mafic/90% felsic SA-SR 10YR 5/4 (yellowish brown) no HCl rxn		RPT cleaned
				unconsolidated		H&S Check - ok
					0950	H&S check - ok
					1000	driller preparing to weld casing

REMARKS:

PNL MA 567 DO-1, rev. 0

Reviewed by V.L. McGlean 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 - Very Fine Standing Water

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9 1 1 2 9 5 0 0 2 1 2

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DRILL LOG	By: Ian Kennedy Date: 9-15-89	Rig: BE 22 W # 22-14101 Mel Thorensen	Well Number: 299-E27-13 Depth: 124 To 134	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
(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% vfs, 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 1/4"				added 9'-6" of 10" diameter Carbon steel temporary casing	1455	finish welding

REMARKS:

PNL MA567 DO-1, rev 0

Reviewed by D.L. Mackey . 12-6-89

Ian Kennedy
9-15-89

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9 1 1 2 0 5 0 0 1 3

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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 9-15-89		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'-6 1/8"	135'	D	Almost Dry	SAND: 3% gravel; 97% sand, trace mud; trace fp, 3% vfr 15% vcs, 35% cs,	15:10	Samples (2) 1pt lith
				45% ms, 2% fs, trace mud (Well sorted): Gravel: 50% mafic/50% felsic		(1) moisture
				SA-SR, sand 10% mafic/90% felsic SA-SR · 10YR 5/4 (yellowish brown)		
				slight HCl rxn unconsolidated		
					15:30	quitting

REMARKS:

PNL MA567 DO-1, rev 0 Reviewed by V.L. McGhan 12-6-89

Ian Kennedy 9-15-89

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

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9 1 1 2 0 5 0 0 2 1 4

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DRILL LOG	By R. Miller/I. 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" diameter) 138' 6⅛"	135'			Total 10" diameter casing is 138'-6⅛" in length	0700	Arsite - H&S 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	H&S scan OVA=<1ppm.

REMARKS:

PNL MA 567 DO-1, rev 0 Reviewed by V.L. McGhan 12-6-89

Ian Kennedy 9-18-89

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9 1 1 2 1 5 1 0 2 1 5

p. 2 of 2

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: 9-18-89		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
(8" dia) 22'-1"				up to this time lengths of 8" casing measuring	1400	arrive on site
20'-6 7/8"				22'-1", 20'-6 7/8", 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 3/4"						21'-6" section of 8" casing
+ 21'-6"					1455	finish adding section
106'-5 3/4"						driller prepares next section
						(21'-10 7/8") for tomorrow
						(the final section of 8' casing
						measures 20'-4 3/4", and will
						also be added tomorrow
					1500	H & S check - ok

REMARKS:

PHL MA 567 D01, rev. 0 Reviewed by V.L. Markham 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

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9 1 1 2 ? 5 ? 0 2 1 6

p. 1 of 2

DRILL LOG	By: Ian Kennedy Date: 9-19-89	Rig: BE22W #22-14101 Mel T.	Well Number: 299-E27-13 Depth: 135' To 142	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" 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 3/4" section
						of 8" diameter temporary carbon
						steel casing; driller works
						on drive barrel
					0915	begin drilling
					0955	H&S check - ck
						driller adds 1.25 gal of water
	140'	D	Dry	SAND: 4% gravel, 95% sand, 1% mud; trace fp, 4% vfp, 5% vcs, 15% cs, 25% ms	1100	Samples: (2) 1 pt. lith
				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 6/3 (pale brown) strong HCl rxn		(cofc # 091989)
				unconsolidated		H&S 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

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014

9 1 1 2 0 5 0 0 2 1 7

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DRILL LOG	By: Ian Kennedy	Rig: 6E22W #22-14101 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 3/8	145'	D	Dry	SAND. 4% gravel, 95% sand, 1% mud: trace fp, 4% vfp, 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
				felsics 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&S (nothing detected)	1320	Sample checked by RPT
(10" diameter) 138-6 1/8					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 3/8"	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&S Cleared
				unconsolidated; Moisture may be due to drill water added above, but		
				since that is not definate, a moisture sample was taken	1400	H&S check - PID with
						10.6eV lamp reads ~1 ppm,
					1410	driller prepares to add Casing
					1505	Quit

REMARKS:

PNL MA 567 DO-1, rev. 0 ADDED 2 GALLONS H_2O Reviewed by [signature] 12-6-89

Ian Kennedy 9-17-89

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

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9 1 1 2 5 1 0 2 1 3

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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 3/8" (8" dia)					0700	H&S check - nothing arrive - driller continues welding
+8'-3/4"				added 8'-0 3/4" 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% fp, 4% vfp, 15% vcs, 45% cs	0835	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% vfp, 10% vfp, 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, rev.0

Reviewed by D.L. Wartham 12-6-89

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DRILL LOG	By Jan Kennedy	Rig BE22-W 22-1401 Mol 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% fg	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 1330	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. G. 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

017

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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" (cement) 183'-11 1/4"	180'	D	almost dry	SAND: 3% gravel, 97% sand, trace mud: trace fp, 3% vfp, 5% vcs, 45% cs,	1440	Samples: (2) lpt. lith
				45% 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 (brown)		(2) chemical (cofc 092089)
				no HCl rxn unconsolidated		RPT cleared
	185'	D	almost Dry	SLIGHTLY GRAVELLY SAND: 7% gravel, 93% sand, trace mud: trace fp,	15:05	Samples: (2) lpt. lith
				7% vfp, 15% vcs, 43% cs, 23% ms, 10% fs, 2% vfs trace mud		(1) moisture
				Gravel: 85% mafic/15% felsic SA-SR; sand: 15% mafic/85% felsic SA-SR		RPT cleared
				10YR 5/3 (brown) no HCl rxn unconsolidated		

REMARKS:

PNL MA567 DO-1, rev. 0

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

Ian Kennedy
9-20-89

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9 1 1 2 ? 5 ? 0 2 ? 1

sht 1 of 2

DRILL LOG	By R. Miller / Date 9/21/89	Rig BE 22W #22-14101 M. Thomsen	Well Number 2991 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"Ø 183' 11¼"					0658	Ar site H&S scan.
						PID= <1ppm, LEL= <det.
					0700	begin drilling
					0730	stop - need to repair
						level wind.
					0835	resume drilling
8"Ø 194' 5½"					0915	add 10' 3¾" - 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 H&S
				slight to moderate rx to 10% HCL, unconsolidated.		PID= <1ppm LEL= <det.
				(2pt lith, 1 moist)	1047	H&S scan - PID= <1ppm.
	195.0	DB	dry	SLIGHTLY GRAVELLY SAND (6% Gravel, 94% Sand, trace Mud)	1056	to 195.0' - sample.
				2% fp, 4% vfp, 15% vcs 20% cs, 20% ms 20% fs 19% vfs, trace		H&S 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 MA 567 DD-1 rev. 0

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

[signature] 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

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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% cs,	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: 2% gravel, 97% sand, trace mud: 3% vfp, 3% vcs, 82% cs, 10% ms, 2% fs,	1410	samples: (2) 1pt. lith (1) moist.
				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:

PNL MASGT DO-1, rev. 0 ADDED 1 GALLON H_2O Reviewed by V.L. Wickham 12-6-89

Ian Kennedy 9-21-89

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DRILL LOG	By: Ian Kennedy	Rig: BE 221N #2214101 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 mobilizing
						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% fs, 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, trace vfp	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:

PNL MA 567 DO-1, rev. 0

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

Ian Kennedy
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

WHC-MR-0209

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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 mp, 1% fp, 9% vfp,	10 00	Samples: (2) lpt. lith
				10% vcs, 45% cs, 30% ms, 4% fs, 1% vfs, trace mud (well sorted): gravel 90% mafic/		(1) moisture, (3) Chem (092789)
				10% felsic SA-SR Sand: 10% mafic/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% cs,	1055	Samples: (2) lpt. lith
				40% ms, 50% fs, trace vfs, trace mud (well sorted) Gravel: 60% mafic/		(1) moisture
				140% felsic (11 pebbles) SA; sand 10% mafic/90% felsic SA-SR 10YR 5/3 (brown)		H&S and RPT Cleared
				slight HCl rxn unconsolidated		Previous samples also RPT Cleared
+10'-1"					1130	John Keller stops to talk to Mel
233'-10"					40	resume drilling
					1150 to 1235	lunch
					1240	H&S Check w/ PID and
						combustion gas - nothing
	230'	D	almost Dry	SAND: (exactly the same as 225'): tr. gravel, 100% sand, tr mud: tr. fp, tr. vcs, 10% cs,	1315	Samples: (2) lpt lith
				40% ms, 50% fs, tr. vfs, tr. mud (well sorted) Gravel: 60% mafic/40% felsic (12 pebbles) SA		(1) moisture
				sand: 10% mafic/90% felsic SA-SR 10YR 5/3 (brown) slight HCl rxn unconsolidated		RPT Cleared.
				concretions with moderate HCl rxn		

REMARKS:

PNL MA 567 DO-1, rev 0

Reviewed by D.L. Mathan 12-6-89

Ian Kennedy
9-22-89

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9 1 1 2 5 0 2 5

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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" diameter) 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-Sand: 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
+10'-2 5/8"					1340	H&S check - ok
244'-0 5/8"	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: 15% mafic/85% felsic SA-SR 10YR 5/3		
				(brown) moderate HCl rxn, some concretions, unconsolidated		

REMARKS:

PNL MA567 DO-1, rev.0

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

Ian Kennedy 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

WHC-MR-0209

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p. 1 of 2

DRILL LOG	By Ian Kennedy	Rig BE22W #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" l.a.) 244'-5/8"			watercolled		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 mark 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 Carbon steel casing.	1305	H&S check - ok, resume drilling
	245'	HT	W	SANDY GRAVEL 45% gravel, 50% sand, 5% mud: , 1% mp, 14% fp, 30% vfp, , 8% vcs,	1355	Samples (2) 1pt lith
				30% cs, 8% ms, 4% fs, 5% mud: (poorly sorted) Gravel: 85% mafic/15% felsic		RPT Cleared
				A-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, PO-1 rev. 0

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

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DRILL LOG	By Jan Kennedy	Rig BE22W #22-14101 Mel T.	Well Number 299-E27-13	Computer Number N/A	Project or Work Order No. 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
(18" dia) 252'6 5/8"	250	H	W	SANDY GRAVEL 65% gravel, 27% sand, 8% mud: 1% mp, 19% fp, 43% vfp,	1505	Sample: (2) 1pt. lith
				3% vcs, 4% cs, 10% ms, 5% fs, 5% vfs, 8% mud 1 (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. McGhan 12-6-89

Added 17 Grains of Hg today

Ian Kennedy

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

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9 1 1 2 [illegible] 5 0 0 2 0 3

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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% 26% sand, 1% mud: 1% mp, 22% fp, 50% vfp, 16% vcs, 10% cs, trace ms	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% fp, 30% vfp, 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,		(Schem) (092689)
				sand: 25% mafic/75% felsic SA-R 2.5Y 5/2 (grayish brown) no HCl rxn (wet)		Haw Scheduled - nothing; RPT Cleaned
				unconsolidated	1135	Water delivery
					1200 to 1230	lunch

REMARKS:

Ian Kennedy

PNL MA567 D0-1 rev.0

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

9-26-89

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9 1 1 2 2 5 7 0 2 7 9

DRILL LOG	By: Ian Kennedy	Rig: BE22W # 22-14101 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" dia) 260'-10¼"				depth to bottom 265.5' + 0.7' - 1.4 stickup = 259.8' ; D/W 260.8-1.4 = 259.4	1240	measure D/B and D/W
+7'-11¼				added 7'-1¼" of 8" diameter carbon steel temporary casing	1250	driller begins to add casing
268'-9½"					13:25	finished welding
					13:35	H&S check - ok
	265	HT	—		1455	Samples: (2) 1 pt. lith
				CANDY GRAVEL: 74% gravel, 25% sand, 1% mud: 8% lp, 12% mp, 29% fp,		RPT Cleared
				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 total for day

REMARKS:

Ian Kennedy 9-26-89

PNL MA 567 DO-1 rev. 0 67 GALLONS H_2O TODAY Reviewed by V.L. McGhan 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

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9 1 1 2 3 5 1 0 2 0

p. 1 of 2

DRILL LOG	By: Ian Kennedy	Rig: BE 22W #22-14101 M. Thoresen	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" diameter) 268'-9½"				stickup: 3'-2" d/w: 164'-3" - 3'-2" = 161'-1" (or about 161.1')	0715	Arrive 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 prepares to add casing
276'-1⅜"				added 7'-4⅛" of 8" diameter carbon steel temporary casing	0840	resume drilling
					0920	H&S check - ok
					0955	John Keller, KEH stops to talk to
						driller. Harold Litz, DOE-RL
						visits site
	270'	HT	Wet	GRAVEL: 75% gravel, 24% sand, 1% mud: 2% vcp, 18% cp, 30% mp, 15% fp,	1015	Samples: (2) 1pt. lith
				10% vfp. 7% vcs, 9% cs, 4% ms, 2% fs, 2% vfs, 1% mud (poorly sorted)		Cleaned by RPT
				Gravel: 60% mafic/40% felsic R-UR; sand: 40% mafic/60% felsic SA-SR,		nothing detected by PID
				10YR-5/3 (brown) no HCl rxn (wet) unconsolidated		
+4'-7¾"					1035	Driller prepares 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:

PNL MA 567 DO-1, rev. 0

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

Ian Kennedy
9-27-89

228

DRILL LOG	By: Ian Kennedy	Rig: BE 22W #22-14101 Mcl	Well Number: 299-E27-13	Computer Number: N/A	Project or Work Order No.: 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) lgl. 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 Evans arrives to
				test pipe shows 16' of water.		inspect straightness test
278'-8 5/8"					1430	driller cutting 2'-1" off top
						of 8" casing

REMARKS: PNL MA 567 DO-1 rev. 0

Ian Kennedy 9-27-89

Reviewed by W.L. McGlean 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

A-6000-021 (5-85)

WHC-MR-0209

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DRILL LOG	By: S. M. Goodwin	Rig: No Rig	Well Number: 299-E27-13	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 28 Sept. 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
				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.H. McGhan 12-6-89 [illegible] 9/27/89

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DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E27-13 Location West of C Tank Farm	Date 10-9-89 Sheet No. 1 of 1 Project W-017 SST

Logged by S. P. AIRHART StP Airhart Date 10-9-89
Reviewed by V.L. McGlohan Date 12-6-89
Measuring Equip. S-tape #4 Procedure PNL-MA-567 DO-1, RFV.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 8" 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'							

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DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E27-13 Location West of C Tank Farm	Date 10-10-89 Sheet No. 1 of 2 Project W-017 SST

Logged by S. P. AIRHART [signature] Date 10-10-89
Reviewed by [signature] Date 12-6-89
Measuring Equip. S-tape #4 Procedure PNL-MA-567 DO-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'

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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 S P A Date 10-10-89
Reviewed by V.L. McKhan 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
	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'	8.4'	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'	259.6' + 2.2' - 6.2' = $\boxed{250.6'}$ Top of Sand
1200-1230										Lunch
1230-										Shut down due to wind
1414					250.5	3/8" Volclay Tablets	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 = $\boxed{247.5}$ 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

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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 Date 10/11/89
Reviewed by [illegible] 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

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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 Date 10/11/89
Reviewed by W.E. McGhan Date 12-6-89
Measuring Equip. C300-04 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

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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 [signature] Date 10/12/89
Reviewed by D.L. McGhan 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

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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.

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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	Air 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, V.L. Mathews 12-7-89 Randall L. Miller 9/19/89

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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 - H2S
						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	H2S scan PID = 27.0 ppm
						LEL = <det. in soils
						Rd. Yb = <det.
	5.0	DB	slightly moist	Slightly MUDDY SAND (85% Sand 15% Mud) 5% cs, 10% ms 30% fs	0920	to 5.0' - H2S = PID = 28 ppm
				40% vfs, 15% Mud, well sorted, 50/50 f/m, A-SR, dk gray brn,		LEL = <det, RPT Yb = <det.
				(2.5Y 4/2), strong rx to 10% HCL, unconsolidated, PID = 28 ppm		sample = 28 ppm.
				w/ 11.8 lamp (2pt lith 2 125ml enviro, 1 moist)	0930	H2S = 18 ppm. @ 7.0'
	10.0	DB	slightly moist	MUDDY SAND (85% Sand 15% Mud) trace vfp, trace silt pockets	0940	to 10.0' - H2S = PID = 28 ppm
				28 ppm., similar to 5.0' sample (2pt lith, 1 moist)		LEL = <det, RPT = <det.
				samples on COC 092089		

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by D.L. Markham 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

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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.l. H_2O.
						Ammonia tube = < det
						NO-NOX tube = < det.
					1200	Stdp - 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:

PNL-MA 567, DQ-1 Rev Ø Reviewed by [signature] - 12-9-89

9/20/89 [signature]

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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		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"& weld
					1510	stop for day - can't
						weld up - fire watch.

REMARKS:

PNL-MA 567, DO-1, Rev Ø Reviewed by V.L. McGhan 12-7-89 9/20/89 [signature]

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)

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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% vfp, 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, 1 moist)		
	25.0	DB	SM	SANDY GRAVEL (35% Gravel 65% Sand, trace Mud)	0951	to 25.0 - sample.
				similar to 20.0' (2pt lith, 1 moist).		H&S - PID = <1ppm
						RPT <det, LEL <det.
10"Ø 37' 7"					1004	add 9'9"-10" & weld

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by [illegible] 12-7-89 9/21/89 [signature]

WHC-MR-0209

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9 1 1 2 2 5 0 0 2 1 5

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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
BTP 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 47' 4"					1345	add 9'9"-10"-½ weld

REMARKS:

PNL-MA567, DO-1, Rev 0 Reviewed by W.L. McGlew 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 86)

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9 1 1 2 0 5 7 0 2 1 6

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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 47' 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 - PID = <1ppm
				sorted, 40/60 f/m, SA-WR, ltyel brn (2.5Y 6/4)		OVA = <1ppm LEL = <det
				slight rx to 10% HCL, unconsolidated (2pt lith, 2125		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 [signature] 12-7-89 [signature] 9/21/89

WHC-MR-0209

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9 1 1 2 5 0 0 7

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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
4' 1'						H&S 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&S - PID = 2.5 ppm, LEL = <det
				slight rx to 10% HCL, unconsolidated. PID = 2.5 ppm w/11.8 lamp		RPT - cleared <det.
				(2pt 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&S - 2.5 ppm w/PID.
				15% Mud, very well sorted, 50/50 f/m, SA-SR, lt ol brn (2.5Y 5/4		RPT = <det
10"ø 56' 5½'				wet) - lt yel brn (2.5Y 6/4 dry), slt to mod 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
				(2pt lith, 2125 ml enviro, 1 moist) ~ 1.0' thick to 149.0'		from Tank Farm. H&S
						scan w/ NH_3 tube - no det.
					0925	resume drilling
					0935	H&S - PID = <1 ppm

REMARKS:

PNL-MA567, DO-1, Rev ø Reviewed by D. L. McGlam 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

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9 1 1 2 2 5 1 0 2 1 8

10 1/1

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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_2S - 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" ½ 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 - eyc. hzd
					1240	Ar site - resume.
	60.0'	DB	SM	SAND (2% Gravel, 98% Sand) 1% fp 1% vfp, 15% vcs 30% cs	1255	to 60.0' - sample
				25% ms 25% fs 13% vfs, moder. sorted, 50/50 f/m, SA-SR,		H_2S - 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_2S - PID = < 1 ppm
						RPT = < det.

REMARKS:

PNL-MA567, DO-1, Rev 0

Reviewed by D.L. McGlam 12-7-89

9/22/89

WHC-MR-0209

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9 1 1 2 5 0 0 2 9

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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 66' 9½'	65.0	DB	SM-M	SAND (4% Gravel 96% Sand) 1% fp 3% vfp, 35% vcs	1330	add 10' ¼"-10"-& weld
76' 9¾'				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)	1428	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		H&S scan-PID=<1ppm
				poorly sorted, 30/70 f/m, SA-WR, lt yel brn (2.5Y 6/4)		RPT=<det
				slight rx to 10% HCL, unconsoldated. (2pt. lith, 1 moist)		
					1510	stop for day
						samples on C of C
						092289-SST.

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by D. T. McGlum 12-7-89 9/22/89 Rand D. Miller

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)

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9 1 1 2 7 5 1 0 2 7 0

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DRILL LOG	By: Ian Kennedy / Ron Blegen Date: 9-25-89	Rig: BE 60 L #22-14103 L. Watkins	Well Number: 299-E27-14 Depth: 73 To 85'	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
(10" diameter) 76'-9¾"					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 mp, 5% fp, 35% vfp	0750	Samples: (2) 1 pt. lith
				55% cs, 4% ms, 1% fs, trace vfs, trace mud (well sorted) Gravel: 90% mafic		(1) moisture
				10% felsic SA-R, sand: 50% mafic / 50% felsic SA-SR; 2.5Y 5/4 (light		(no RPT)
				olive brown) slight HCl rxn unconsolidated.	0755	driller preparing to add casing
78'-9½"					0820	RPT arrives and cleans sample
85'-7¼"					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) 1 Moisture
				Moderately Sorted GRAVEL: 75% Basalt, 10% Quartzite, 15% Felsic + seds.		2-125 ml Enviro. - Reference Chain of Custody #092589 SST
				VA-SR, SAND: 30% Basalt, 40% Qtz & Felds, 30% Frags. SA-SR.		PID < 1 RPT - Background
				Wet Color (of fines): 2.5Y 6/4 Light Yellowish Brown. No rxn w/10% HCl,		
				Unconsolidated. [Δ Sorting. Less Basalt]		Resume Drilling

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

Reviewed by [signature] 12-7-89

9-25-89

Ronald P. Blegen

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DRILL LOG	By: Ron Blegen	Rig: DE 60 L #22-44103 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.
				30% MS, 10% FS, 2% VFS. Moderately Sorted.		1 Moisture
				GRAVEL: 70% Basalt, 30% Felsic & seds. SA-SR. SAND: 30% Basalt,		PID <1, RPT - Back.
				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 lith.
				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. McKellar 12-7-89

Ronald P. Blegen 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

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9 1 1 2 0 5 0 0 2 7 2

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DRILL LOG	By: R. Blegen	Rig: BE 606 #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. [Δ grain 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. Watkins 12-7-89 Ronald P. Blegen 9-25-89

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9 1 1 2 [illegible] 3

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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) 125ml 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 - <1
						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 12-7-89

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

WHC-MR-0209

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9 1 1 2 3 5 1 0 2 3 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: 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 PICKING 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.L. Matthews 10-7-89 Ronald P. [illegible] 9-26-89

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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 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% MISC. 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 RPT - BACKGROUND
120'2"						SAMPLED AND STARTED WELDING CASING.

REMARKS:

PNL MA 567, DO-1, Rev. 0 Reviewed by D.L. McAlum 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

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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 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 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 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

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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 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 - <1
						RPT - Background
					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

Ronald 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

9 1 1 2 9 5 0 0 2 5 8

p. 1 of 1

DRILL LOG	By: Ian Kennedy	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: 9-27-89		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 fp	0750	samples: (2) 1 pt. lith
				8% vfp, 22% vcs, 65% cs, 5% ms trace vfs, trace vfs, trace mud		(1) moisture
				(Well sorted) Gravel: 80% mafic/30% felsic (SA-SR) Sand: 10% mafic/90% felsic		3 Chem (092789)
				SA-SR 2659 6/6 (olive yellow) no HCl rxn unconsolidated. PID w/10.6eV		(inc. 1 VOA)
				lamp reads ~5ppm		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:

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

Reviewed by [illegible] 12-7-89

Ian Kennedy
9-27-89

WHC-MR-0209

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9 1 1 2 3 5 3 0 2 7 9

p. 1 of 1

DRILL LOG	By: Ian Kennedy	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: 9-28-89		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"				cut off 2¼", then added 20'-6" yesterday		continue welding 8" casing
=39'-0¼"					1335	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% mps	1425	Samples: (2) 1 pt. lith
79'-9¾"				5% fp, 7% vfp; 35% vcs, 25% cs, 10% ms, 4% fs, 1% vfs, trace mud (poorly		(1) moisture
+20'-1½"				sorted) 10YR5/4 (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"						NH3 at grout plant
=143'-3¼"					15:15	Samples: (2) 1 pt lith
+10'-11"						(1) moisture
=154'-2¼"						to be described tomorrow
					15:20	go home

REMARKS:

PNL MA 567, DO-1, Rev. 0

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

Ian Kennedy 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

WHC-MR-0209

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9 1 1 2 4 5 3 0 7 1 0

S. Goodwin /

DRILL LOG	By: Ian Kennedy	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'-2½"	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'-7½"					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. # SST092989)

PNL MA 567, DO-1, REV. 0 Reviewed by [illegible] 12-7-89 [illegible] 9-29-89

WHC-MR-0209

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9 1 1 2 0 5 7 0 2 1

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
S. GOODWIN	BE 60L #22-14103 L. WATKINS	299-E27-14	N/A	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 10 YR 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 10 YR 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. Wathen 12-7-89 Alistair Stalker 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

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9 1 1 2 0 5 7 0 2 5 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% vcs, 40% cs,	1110	Samples: (2) 1pt. lith
				8% cms, 2% fs, trace vfs, trace mud (well sorted); Gravel: 60% mafic/40% felsic		(1) moist
				A-SA - Sand: 5% mafic/95% felsic SA-SR; 10YR 5/4 (yel'ish brown) (wet)		
				no HCl rxn unconsolidated		
	175'	D	SM	GRAVELLY SAND: 25% gravel, 75% sand, trace mud: 3% vfp, 22% vfp, 30% vcs,	1150	Samples: (2) 1pt lith
				25% ccs, 15% cms, 5% fs, trace mud; Gravel: 90% mafic 10% felsic SA-SR		(1) moist
				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 T.L. Walton, 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 D.L. McElhaney 12-7-89

WHC-MR-0209

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DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
Ian Kennedy	BE GOL #22-14103 Louis Watkins	299-E27-14	N/A	N-017 SST
Date 9-29-89		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) 1pt. 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 # SST092989)
				10YR 5/3 (brown) slight HCl rxn unconsolidated		RPT Cleared, PID - nothing
	185'	D	SM	GRAVELLY SAND: 25% gravel, 75% sand: trace mud; 1% vcp, 1% cp,	1435	Samples: (2) 1pt. lith
				1% 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 Cleared
				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) 1pt. lith
				25% 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 Cleared
				slight HCl rxn unconsolidated		

REMARKS:

PNL MA567 DO-1, rev.0

Reviewed by D. L. McGhan 12-7-89

Ian Kennedy 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

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9 1 1 2 0 5 1 0 2 3 4

SW 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 10/2/89		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.
201'11¾"					(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,		# 100289 SST
				A-SR; mod. yell. brown, 10YR 5/4; sl. ⇌ w/ HCl unconsolidated.		
201'11¾"					11:12	Driller adding 8" casing.
+10'7"					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:

PNL MA567 DO-1, rev. 0

Reviewed by [signature] 17-7-89

[signature] 10/2/89

WHC-MR-0209

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9 1 1 2 3 5 0 0 2 1 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% mafic A-SR; SAND: 20% mafic / 80% felsic, SA-R;		
				No ⇄ w/HCl; mod. 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:

PHL MA 567 DO-1, rev. 0

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

Mikel D. Lubrecht 10/2/89

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

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9 1 1 2 7 5 7 0 2 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
223'1¾"	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
+ 8' 11"					0805	Adding 8" casing
232'0¾"					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.	mudly 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 - A.; Sand: 30% mafic / 70% felsic		
				SA-R; consolidated, 10YR 5/6 Dusky yell. brn., sl. ⇌ w/HCl		
				H&S noted 7ppm VOC in borehole screen / NO RAD	1105	Begin to add casing.
					1200	Lunch
					1231	Return

REMARKS:

PNL MA567 DO-1, rev.0 Reviewed by [signature] 12-7-89

[signature] 10/3/89

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DRILL LOG	By M.D. Lubrecht	Rig BEGOL #22-14103 L. Watkins	Well Number 299-627-14	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 0¾"					1248	Casing Installation completed
8'2½"	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'-3¼"				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 # 100389SST,
						1 moist.
					1300	Left Site

REMARKS:

PNL MA 567 DO-1, rev.0 Reviewed by V.L. Mathan 12-7-89 Mark H. Lu 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

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9 1 1 2 0 5 7 0 2 5 8

Sht. 1 of 1

DRILL LOG	By: M.D. Lubrecht Date: 10/4/89	Rig: BE GOL # 22-14103 L Watkins	Well Number: 299-E27-14 Depth: 240 To 245	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
240'3¼"					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 5T5/2, slight rxn w/		
				10% HCl - unconsolidated.		
					0945	Driller left for
						United Way mtg.
					1100	Lubrecht returns from
+ 8'-9¼"					1113	SCBA training. - Add casing.
257'2¼"					1200-1230	Lunch -
					1230	Continue welding casing.

REMARKS:

Michael D Lubrecht 10-4-89

PNL MA 567 DO-1, rev 0

Reviewed by M T Walker 12-7-89

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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'-2 1/4"	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
				10YR 5/6; sl. consolidated. no rad/no VOC.	1330	driller notes water ≈ 251
						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:

PNL MA 567, DO-1, rev. 0 Reviewed by V.L. McGhan 12-7-89 Mike D. Lub 10-4-89

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

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9 1 1 2 0 5 9 0 2 7 0

Sht 1 of 2

DRILL LOG	By M.D. Lubrecht	Rig RE. 60L 22-14103	Well Number 299-E27-14	Computer Number N/A	Project or Work Order No. W-017 SST
	Date 10-5-89	L. Watkins	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)-1 pt. 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) # 100589SST
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"	1200-1230	Lunch - driller to safety
					1315	mtg. - resume drilling, water [illegible]
	265	HT	Wet.	SAND: 20% vcS, 15% cS, 20% mS, 20% fS, 20% vfS, 5% mud;	1448	SAMPLES: (2), 1 pt. Lith.
				20% mafic/80% felsic, SA-SR; no ≇ w/ HCl; unconsol. 10YR 5/6 dusky		
				yellow brown. rad < back./no VOC.		

REMARKS:

Michael D. Lubrecht
10-5-89

PNL MASS DO-1 [illegible]

Received by M.D. Mathews 12-7-89

WHC-MR-0209

[illegible]

9 1 1 2 3 5 7 0 2 7 1

SHT. 2 of 2

DRILL LOG	By: M.D. Lubrecht Date: 10-5-89	Rig: BE-60L #22-14103 L. Watkins	Well Number: 299-E27-14 Depth: 265 To	Computer Number: N/A	Project or Work Order No.: W-017 SST Subcontract No.: NA

Total Casing	Depth	Drill Method	Wet/Dry Sample	LITHOLOGIC DESCRIPTION % Each Grain Size, Color, Roundness, Caliche, Etc.	Time	Drilling Comments
269'-6¼"					1428	Hole cleanout completed.
						Start clearing 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. Markham 12-7-89

Mike 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

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9 1 1 2 0 5 1 0 2 7 2

SHEET 1 of 1

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 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'-6¼"					0702	Arrive on site.
2.4' stickup						check TD (264.5)
267.1' to bottom						WD (253.6)
						E-TAPE 12176 ST. PNL#4
					0720	Driller on site w/ safety mn
					0749	Commence drilling
				GWS = 258' TD = 267 + 2.2(-2.4) = 266.8	0830	Remeasured bottom.
				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 10/4/89
				SAME AS ABOVE GWS = 250.8 TD = 266.05 CASING = 267.1	0945	Measured TD & GWS
						Begin to demob

266.05
250.80
15.25

REMARKS:

BPNL MA567 DO-1, Rev. Ø

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

Mike D. Lubrecht 10-6-89

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9 1 1 2 5 0 0 7 3

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 [signature] Date 10/12/89
Reviewed by [signature] 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
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

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9 1 1 2 1 5 0 0 2 7 4

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 [signature] Date 10/13/89
Reviewed by [signature] 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/D 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

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9 1 1 2 9 5 1 0 9 7 5

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E27-14	Date 10/13/89	Sheet No. 2 of 3
	Location SINGLE SHELL TANKS	Project W-017	

Logged by S.M. GOODWIN [signature] Date 10/13/89
Reviewed by V.C. McAllan 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
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/ 3 1/2" DART
										BAILER (VOLUME = ~5 GALLONS)

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9 1 1 2 1 5 1 0 2 7 6

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 V.L. Markham 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.

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9 1 1 2 5 0 2 7 7

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 [signature] Date 10-16-89
Reviewed by [signature] Date 12-7-89
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
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'

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9 1 1 2 1 5 0 0 2 7 0

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 [signature] Date 10-16-89
Reviewed by [signature] Date 12-7-89
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
1415	Carbon Steel	10"	110.2'	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

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9 1 1 2 0 5 1 0 2 7 9

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E27-14 Location SINGLE SHELL TANKS	Date 10/17/89 Sheet No. 1 of 1 Project W-017

Logged by S.M. GOODWIN Date 10/17/89
Reviewed by V.L. Mahlum 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'

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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 5 0 0 1

sht 1 of 2

DRILL LOG	By RD. Miller	Rig # BE-COOL 22-14100 Craig W.	Well Number 299-E27-15	Computer Number N/A	Project or Work Order No. W-017-SST
	Date 8/28/89		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	Air site - set-up still
						in progress - H&S screen
					0930	Safty meeting - concern
						releasees 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 fp, Trace vfP, Trace vcs, 1% cs,	1300	to 5.0' - H&S scan
				19% ms 30% fs, 60% vfs, trace mud. Sand: 5% mafic / 95% felsic SA-SR		
				10YR 4/3 brown - dark brown slight HCl rxn unconsolidated		OVA = N/D. Samples (2), ptl. in (1) moist an

REMARKS:

PNL MA567 DO-1, rev. 0 Reviewed by V.L. McGhan 12-7-89

Jan Kiernad 8-28-89

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

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DRILL LOG	By Ian Kennedy	Rig BE 60L #2214100 Graig 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: 9% gravel, 91% sand, trace mud: 2% cp, 5% mp,	1317	to 10.0'-1 ft S screen
				1% fp 2% vfp 3% vcs 5% cs, 7% ms, 30% fs, 40% vfs, trace mud		OVA=N/D. RPT-<1 ton
				medium sorted Gravel: 65% mafic/35% felsic SA-SR; Sand: 10% mafic/		dete.
				90% felsic SA-SR moderate HCl rxn locally consolidated 10YR; 4/3		Samples: (1) moisture
						(2) 1pt lith.
					1330	Welding 10" casing to shoe
15'-6"				15'-0" casing + 6" shoe	1440	finish welding - begin
						driving and straightning
						10" casing
					1530	END OF SHIFT

REMARKS:

PNL 1HA569 DO-1, rev.0

Reviewed by H. L. McGhan 12-7-89

Ian Kennedy 8-28-89

D - Driv

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DRILL LOG	By: Ian Kennedy	Rig: BE 60L #27-14100 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 sleds
						rig, begins rig maintenance
						H&S checks hole & site.
					0735	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

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DRILL LOG	By: Ian Kennedy Date: 8-29-89	Rig: BE 60L #22-14100 C. Wamsley	Well Number: 299-E27-15 Depth: 20 To 20	Computer Number: N/A	Project or Work Order No.: WOIT SSR 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 ffp, trace vcs,		(2) Chemical, 125ml
				10% cs, 35% ms 50% fs, 5% vfs, trace mud, well sorted 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

D - Driv

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DRILL LOG	By: Ian Kennedy Date: 8-30-89	Rig: BE 60L #22-14100 C. Wamsley	Well Number: 299-E27-15 Depth: 20 To 30	Computer Number: N/A	Project or Work Order No.: W017 S57 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 welding 9'-6"
						of 10" carbon steel casing added
	25'	D		SAND: 3% Gravel, 97% sand, trace mud; trace mp, trace fp, 3% vf p,	0840	Samples: (2) 1pt. lith
				10% vcs, 25% cs, 35% ms, 22% fs, 5% vfs; moderate sorting gravel: 70% mafic/30% felsic SA-SR,		(1) moisture
				sand: 10% mafic/90% felsic SA-SR; 10YR 4/3 brown to dark brown no HCl rxn		
				unconsolidated		
	30'			SAND: 3% gravel; 95% sand, 2% mud; trace fp, 5% vfp, 5% vcs, 10% cs,	0855	Samples (2) 1pt lith
				10% ms, 30% fs, 40% vfs, 2% mud moderate sorting gravel: 50% mafic/50% felsic SA-SR		(1) moisture
				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

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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% cs, 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, (2) chemical
				gravel: 65% mafic/35% felsic A-SR; Sand: 35% mafic/65% felsic		#083089
				SA-SR 10YR 4/3 brown No HCl rxn unconsolidated		
					1135	Driller prepares to add
						more casing
					1200	lunch
48'-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 cleaned by
				HCl rxn unconsolidated		H&S

REMARKS:

PNL MAS67 DO-1, rev.0

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

Ian Kennedy 8-30-89

D - Drive

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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-SST
	Date: 8-30-89		Depth: 45 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
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% vcs, 35% cs,		(1) moisture
				9% fs, 1% vfs, well sorted gravel. 70% mafic/30% felsic SA-SR; sand:		checked and cleared by
				30% mafic/70% felsic SA-SR. 10YR 5/3 brown slight HCl rxn		H&S. This and previous
				unconsolidated		sample checked and
						cleared 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:

PNL MA567 DO-1, rev. 0

Reviewed by D.L. McGhan 12-7-89

Ian Kennedy 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

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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 fp, 5% vfp,	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% vfp, 27% vcs	0805	Samples: (2) 1 pt. lith
				all other properties identical except for the absence of concretions.		(1) moisture, 1500 ml chem.
						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" carbonated temporary casing added.	0930	resume drilling
	65'	D		SAND: Same as 60' sample, but no fp observed:	0950	Samples (2) 1 pt. lith
						(1) moisture
					1020	driller begins adding casing
					1050	Area evacuated on
						account of wind direction

REMARKS:

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

Ian Kennedy 9/1/89

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DRILL LOG	By Ian Kennedy	Rig BE 60 L + 22 14 14 Craig W.	Well Number 299-E27-15	Computer Number N/A	Project or Work Order No. MO17 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% vf p, 20% vcs, 30% cs, 35% cms, 13% fs	0855	Samples (2) 1 pt. lith
				trace fs, trace mud; gravel: 50% mafic/50% felsic SA-SR; sand 25% mafic/		(1) moisture
				75% felsic SA-SR 10YR 5/3 brown; slight HCl rxn unconsolidated		
				medium sorted		
	75'	D		SAND: Same as 70' sample, but trace mp, trace fp.	0910	Samples (2) 1 pt. lith
						(1) moisture
					0915	evacuated
					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:

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

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

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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% vfp, 2% UCS otherwise	1245	return from lunch
				same as 75' sample. Some concretions w/strong HCl rxn		Samples: (2) 1pt. lith
						(1) moisture
						(2) Chemical (SST 090189)
	85.0'	D	dry	SAND (1% Gravel, 99% Sand) same as above	1315	to 85.0' -
				moderate HCL reaction unconsolidated. (2pt lith, 1 moist)		
					1335	add 8'1" 10"Ø casing
10"Ø 97'6"					1442	resume drilling
					1450	H_2S scan - OVA = <1 ppm.
	90.0'		damp.	SAND (1% Gravel 99% Sand) same as 85'	1452	to 90.0'
				(2pt lith, 1 moist.)		
	95.0'		damp	SAND (1% Gravel 99% Sand) same as 90'	1506	to 95.0'
				2pt lith, 1 moist)	1516	shut down.

REMARKS:

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

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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
					0740	CUTTING 10' CASING SECTION
					0750	begin drilling -
					0803	H&S 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, moder. sorted, 50% fels/mafic,		add 10"Ø casing 8'5½"
				ang 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 Vol 1, rev 0 Reviewed by V.L. McGhan 12-7-89 Shirley Goodwin 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 W...

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DRILL LOG	By: Goodwin/Kennedy	Rig: BE 60L	Well Number: 299-E27-15	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 5 September 1989	#22-11/101	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
122'-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, 15% cs, 15% ms, 45% fs, 10% vfs, trace mud (moderate sorting)		(1) moisture
				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&S		
	115'	Dr	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) moisture
				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&S.		
					1530	Quit for days

REMARKS:

PNL 11A 567 DO-1, rev. 0 Reviewed by V.L. Mathew 12-7-89

Ian Kennedy 9-5-89

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DRILL LOG	By Ian Kennedy	Rig BE 60L #22-14100	Well Number 299-E27-15	Computer Number N/A	Project or Work Order No. W-017 SST
	Date 9-6-89	Craig W.	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
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	Sampler (2) 1 pt. 1.14
				50% cs, 16% ms, 5% fs, trace vfs, trace mud wellsorted; GRAVEL: 55% mafic/		(1) moisture, (2) chemical 890889
				45% felsic SA-SR; sand: 10% mafic/90% felsic SA-SR 10YR6/3 (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
					1000	drilling again
	126.0'	DB		GRAVELLY SAND: 15% gravel, 85% sand, trace mud, 1% mp, 3% fp, 11% vfp, 5% vcs,	1005	Sampler (2) 1 pt. 1.14
				50% cs, 20% ms, 10% fs, trace vfs, trace mud, wellsorted. Gravel: 55% mafic/		(1) moisture
				45% felsic SA-R, sand 10% mafic/90% felsic SA-SR 10YR6/3 (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

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DRILL LOG	By Ian Kennedy	Rig BE 60L #22-14100 C Wamsley	Well Number 299-E27-15	Computer Number N/A	Project or Work Order No. 4017 SST
	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" 129'5½"	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 geophysicaly 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:

PNL MF 569 DD-1, rev.0 Reviewed by W.L. Mathan 12-7-89 9/6/89

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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
8"Ø 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.
17.9					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-MA567, DO-1, Rev Ø

Reviewed by V.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

A-6000-021 (5-85)

WHC-MR-0209

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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 V.L. McKellar 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

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DRILL LOG	By: Ian Kennedy	Rig: BE 60L #22-14100 Craig Wamsley	Well Number: 299E27.15	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	Dry	(from previous day): SANDY GRAVEL: 30% gravel 70% sand: trace mud: trace MP,	0715	arrive on site - driller
				12% fp, 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		H&S Check - ok
					0810	resume drilling
					0830	H&S 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: (2) 1 pt. lith
				2% mud (well sorted) gravel: 40% mafic/60% felsic SA-SR (what there is of it)		(1) moisture
				sand: 10% mafic/90% felsic SA-SR 2.5Y 5/2 Grayish brown strong HCl rxn		(2) chemical: 090889
				unconsolidated		screened and cleaned by H&S and RPT
	145	D	SM	Slightly GRAVELLY SAND: 8% gravel, 92% sand, trace mud: 1% vfp, 7% vfp	0900	Sampler 2.1 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 and cleaned by RPT		
					0915	driller preparing to weld
8" 19'-5½"					0955	finish adding 9'-5½"
16'-2½"						8" carbon steel casing
						resume drilling

REMARKS:

8NE NA-567 DO-1, rev. 0 Reviewed by V.L. Meathan 12-7-89

Ian Kennedy

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)

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DRILL LOG	By Jan Kennedy	Rig BE GOL #22-14100 C. Wamsley	Well Number 299-E27-15	Computer Number N/A	Project or Work Order No. W017 SST
	Date 9-8-89		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
	150	D	SM	SLIGHTLY GRAVELLY SAND - 8% gravel, 92% sand; trace mud: 1% fp, 7% vfp,	1005	Samples: (2) 1pt lith
				30% vcs, 30% cs, 15% ms, 15% fs, 2% vfs trace mud (well sorted), Gravel 45%		(1) moisture
				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 Cleared		
				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% vcs, 30% ms	11:00	Samples: (2) 1pt. lith
				30% fs, 10% vfs, trace mud (well sorted) Gravel: 65% mafic/35% felsic SA SR		(1) moisture
				Sand 10% mafic/90% felsic SA-SR 10YR 5/3 brown slight HCl rxn unconsolidated		Preparing to weld
158.2½				cleared by RPT.		
+9'.5"					1200	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. McGhan 12-7-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - [illegible]

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DRILL LOG	By: Ian Kennedy	Rig: BE 60L #22-14100 C. Wamsley	Well Number: 299-E27-15	Computer Number: N/A	Project or Work Order No.: W-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% ms, 47% ms, 10% fs, 5% vfs, trace mud, moderate sorting, Gravel: 70% mafic		(1) moisture,
				30% felsic SA-SR, Sand: 15% mafic/85% felsic SA-SR, 2.5Y 6/2 light		(2) Chemical (0908.89)
				brownish gray, moderate HCl rxn unconsolidated		cleared by RPT
	165'	D	SM	GRAVELLY SAND: 10% gravel, 90% sand, trace mud, trace fp, 10% rfp	1510	Samples: (2) 1pt lith
				10% rcs, 20% cs, 40% ms, 15% fs, 5% vfs, trace mud moderate sorting,		(1) moisture
				gravel: 70% mafic/30% felsic SA-SR, Sand 30% mafic/70% felsic SA-SR		
				2.5Y 5/2 ~~Kro~~ grayish brown, slight HCl rxn unconsolidated		

REMARKS:

PNL MA567 DO-1, rev. 0 Reviewed by D. L. Mathison 12-7-89

Ian 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)

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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	Ar silt - H&S scan.
						OVA=<1ppm, 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	H&S scan-OVA=<1ppm.
				poorly sorted, 60/40% felsic/mafic, SA-SR., lt. yel brn.		RPT-cleared
				(10YR 6/4) slight rx to 10% HCL, unconsol. (2pt lith. 1moist)		
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		H&S scan-OVA=<1ppm.
				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, 1moist)		
					1145	to 180.0'-sample
	180.0'	DB	SM.	see sht 2		H&S scan-OVA=<1ppm.
					1158	stop for lunch.

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by V.L. McGhan 12-7-89 [signature] 7/11/89

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

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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
50 185'11"	180.0'	DB	sm	GRAVELLY SAND (15% Gravel 85% Sand trace mud) 15%	1235	At site - resume.
50 195'10"				vfp, 30% vcs 30% cs 15% ms 5% fs 5% vfs, trace mud,		add 9'11"-8" ¼ weld
				moderately sorted, 50/50% felsic/mafic, SA-SR, yell.	1245	H₂S 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. # SST 091189)	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	H₂S 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	H₂S 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. Meghan 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"

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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 (11") 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 [signature] 12-7-89 [signature] 9/12/89

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

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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 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"ø 213.5"	210.0	DB	sm.	SAND (2% Gravel, 98% Sand, trace Mud) 2% vfp, 20% vcs	1320	to 210.0' - sample
T 10				20% cs 20% ms 20% fs 18% vfs, trace mud, mod. sorted.		H&S scan-OVA = <1ppm
				40/60% felsic/mafic, A-SR, lt. yel. brn (10YR 6/4)		RPT cleared
8"ø 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&S scan-OVA <1ppm
						RPT-cleared.
	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-MA567, DO-1, Rev ø Reviewed by V. L. McSharon 12-7-89 [signature] 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)

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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 221' 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		cleaned 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 - cleaned.
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.C. Markham 12-7-89

9/13/89

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

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30.0

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% Scobb	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 8'9"-8" & 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 enviro, 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 V.L. McGhan 12-7-89 [signature] 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)

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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	Ar site - H&S 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	H&S 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, ol. 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	H&S 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
						H&S scan - OVA = <1 ppm w/H
						spoils = 1.5 ppm.
					1050	casing plugged - weld
						ears
					1107	resume drilling

REMARKS:

PNL-MA 567, DO-1, Rev Ø Reviewed by V. L. McGhan 9/14/89 [signature]

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

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9 1 1 2 5 0 0 7 7

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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 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"Ø 254' 11"					1110	H&S 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' btc (+.09?)
						-5.12' = 240.86' bls
						(possible plug? in casing)
					1430	resume drilling
					1519	shut-down.
						samples on cofc 091489

REMARKS: Total 25 gal. H_2O added Today

PNL-MA 567, DO-1, Rev Ø

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

9/14/89 [signature]

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)

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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"Ø 254' 11"					0710	Ar. site - H&S scan
						OVA: <1ppm, LEL=<det.
					0730	w/c 245.80' btc - 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.
263' 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 249.69' btc - 245.25' bls

REMARKS:

FNL-MA567, DO-1, Rev Ø Reviewed by V.L. Markham 12-7-89 9/15/89

D - Dri rrel H - Hard Tool L - Lance M - Mi S - Sand MD - Mud P - P

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9 1 1 2 0 5 0 0 3 0 9

sht 2 of 2

DRILL LOG	By R. Miller	Rig BE-602 #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"Ø 263'2½"					1308	w/c 249.58' btc = 245.14' bls
"						water is rising - slow.
					1326	w/c 249.51' btc = 245.07' bls
						will bail hole and check
					1340	stop bailing
					1344	w/c 249.60' - 245.16' bls
					1350	sound hole to - 257.83' bls
					1400	w/c 249.55' btc - 245.11' bls
						will drill down another
						5.' - assume that 240.87' bls
						previous w/c's were
						influenced by a plug.
				target TD. 260.11' ±	1405	resume drilling.
269' 1½					1422	add 5'11"-8" & weld
					1503	stop for day.

REMARKS: Total 30 gal. H_2O added Today

PNL-MA567, DO-1, Rev Ø Reviewed by V.L. Markham 12-7-89

9/15/89 [signature]

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

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9 1 1 2 9 5 1 0 7 1 0

Sht 1 of 2

DRILL LOG	By R. Miller	Rig BE-60L #22-14100 Louis 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 269'1½"				9/18/89 w/c - 245.11' bls	0710	Ar site - H&S scan
						OVA = <1ppm
						resume welding -
					0725	w/c 253.79' btc - 8.74' su =
						245.05' bls
					0740	TD 265.57 + 2.44 = 268.01' btc
						- 8.74' su = 259.27' bls
					0800	H&S scan OVA = <1ppm
					0805	resume drilling
	260.0'	HT	wet	MUDDY SANDY GRAVEL (60% Gravel, 25% Sand, 15% Mud)	0840	to 260.0' - H&S scan
				5% mp 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 dl brn		
				2.5Y (4/4) wet, slight rx to HCL, Unconsolidated (2pt lith,		
				2 125m enviro.)	0915	H&S scan = OVA = 27-29ppm
					0945	sound hole 263.35' + 2.44' btc
						s.u. 7.25' = 262.54' bls
					0946	H&S scan OVA = 28ppm
						LEL = < det

REMARKS:

PNL-MA567, DO-1, Rev Ø Reviewed by V.L. Matthews 12-7-89

[signature] 9/18/89

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9 1 1 2 0 5 1 0 3 1 1

sht 2 of 2

DRILL LOG	By R. Miller	Rig BE-60L #22-14100 Louis W.	Well Number 299-E27-15	Computer Number N/A	Project or Work Order No. W-017-55T
	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 269'1½"	261.87'			TD. 262.54' bls	1002	H2S scan OVA: <1 ppm.
269'1½"	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

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9 1 1 2 9 5 1 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 [signature] Date 9/28/87
Reviewed by V.L. McGhan Date 12-7-89
Measuring Equip. L300-07 / E. TAPE 12176 Procedure PNL-MA-567 DD-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 BACKPULL						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	14.55	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

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9 1 1 2 5 1 0 7 3

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E27-15 Location SINGLE SHELL TANKS / C FARM	Date 9/28/89 Sheet No. 2 of 2 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 DD-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	Overlap	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. TAPE MUST BE GETTING CAUGHT ON SCREEN JOINT.
1310							1/2 BAG 1/2 BAG			WILL ADD SAND UNTIL WE GET 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.

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9 1 1 2 [illegible] 5 1 0 [illegible] 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 [signature] Date 9/29/89
Reviewed by [signature] Date 12-7-89
Measuring Equip. L300-04 / E TAPE 12176 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
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
0955										D/BOTTOM = 262.6 + 2.2 − 6.8 = 258
1017										" 263.1 + 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. 14.08'
										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 9/28 & 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			" " " " "

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9 1 1 2 9 5 0 0 3 1 5

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 [signature] Date 9-29-89
Reviewed by V. L. McGlean 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
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	245.2	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

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9 1 1 2 9 5 1 0 3 1 6

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 [signature] Date 9/29/89
Reviewed by V.L. McGhan 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
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

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9 1 1 2 5 0 9 7 1 7

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 LW-017	

Logged by S. M. Gorelick / Date 10/2/89
Reviewed by V. L. McGhan / Date 12-7-89
Measuring Equip. 1300-04 Procedure PNL MA-567 Rev 1 Rev 0

Drilling Contractor KEH
Driller GENE THOMAS
Rig/Equipment CPACK 1 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			WATER 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 (VOLCLAY TABLETS)	2 BUCKETS	234.85	5.25	D/PELLETS = 229.6'

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9 1 1 2 0 5 1 0 3 1 3

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 [signature] Date 10/2/89
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
1040	CARBON STEEL	8"	238.9	6.5	232.4	1/4" PELLETS		231.0	1.4	D/PELLETS = 231.0
1047	"	"		7.05	231.65	"		231.25	0.6	D/PELLETS = 231.25 (FINAL D/PELLETS)
1051						8-20 CRUMBLES	15 BAGS			ADDING CRUMBLES;
										50 LB. BAGS OF ACC CRUMBLES
1058	"	"	238.9	7.05	231.65	"	"	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

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9 1 1 2 5 0 0 7 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
1005	"	"	53	6.9	46.1	"		46.5	-0.4	D/CRUMBLES = 46.5; 0.4' OF
1025	"	"	"	"	"	"	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
1055	"	"	"	"	"	"	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

9 1 1 2 5 0 0 7 0

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 [signature] Date 10/3/89
Reviewed by [signature] Date 12-7-89
Measuring Equip. L300-04, E. TAPE # 12176 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
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
1420										REMOVING CASING JACKS
										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)

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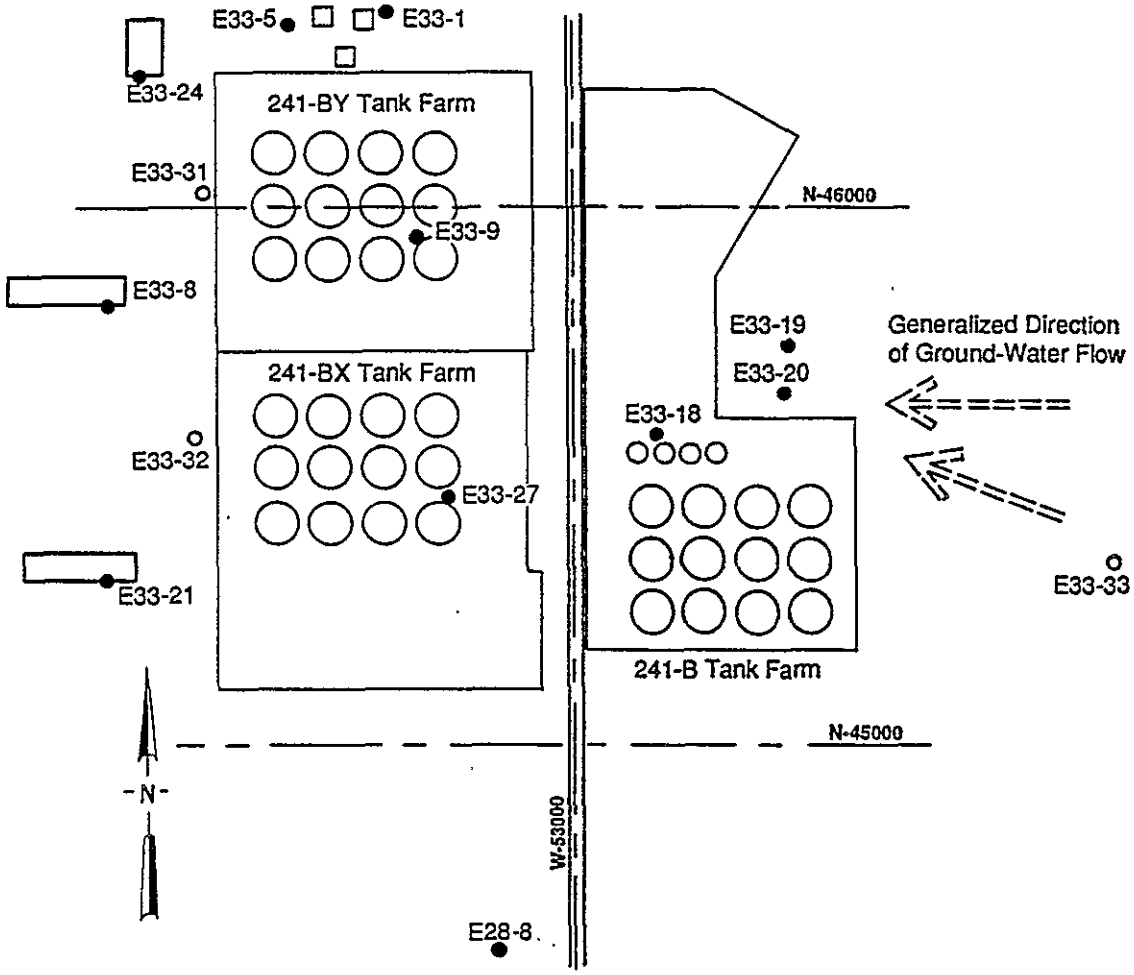
Waste Management Area B-BX-BY



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 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)

WHC-MR-0209

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DRILL LOG	By AIRHART	Rig BE 22W 14102 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 - 50% 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% qtz-rich &		sample.
				rock frags. - strong rxn. w/ 10% HCl -		No contamination
				unconsolidated -		detected.
				Note: sediment becoming dryer &		
				coarser		

REMARKS:
Reviewed by V.L. Dreckman 12-14-89

PNL-MA-567 . DD-1 . REV-0

STP [signature]
7/11/89

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

WHC-MR-0209

322

9 1 1 2 2 5 1 0 3 2 5

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: 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

9 1 1 2 0 5 0 0 7 7 5

DRILL LOG	By AIRHART	Rig 14102 BE 22W Mel	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

S.E.D. 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

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DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
AIRHART	1410 2 BE 22W Mel	299-E33-31	NA	W-027
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. McKlam 12-14-89 USED 3 GALLONS OF H_2O

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

S.L.P. 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

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9 1 1 2 9 5 9 0 3 2 3

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. McGhan 12-14-89
PNL-MA-567 DO-1, REV-0

SLP [signature] 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

WHC-MR-0209

326

9 1 1 2 3 5 0 0 7 7 9

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: 7-14-89		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.L. McKlean 12-14-89
PNL-MA-567 DO-1, REV-0

SLP. [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)

WHC-MR-0209

327

9 1 1 2 7 5 0 0 3 7 0

DRILL LOG	By: AIRHART	Rig: BE 22W 14102	Well Number: 299-E33-31	Computer Number: NA	Project or Work Order No.: W-017
	Date: 7-14-89		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 #
						SST71489.
					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. McGhan 12-14-89 Added 3 Gallons of H_2O

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

St P. [signature] 7-14-89

D - Drive Barrel H - Hard Tool L - Large M - Medium S - Small VC - Very Coarse P - Pressure R - Rock W - Water

WHC-MR-0209

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DRILL LOG	By AIRHART	Rig BE 22W 1410 2 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

Stop. [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

326

9 1 1 2 0 5 1 0 3 7 2

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 V.L. McGlum 12-14-89
PNL MA-567 DO-1, REV. 0

SGP [signature] 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

10-021 (5-85)

WHC-MR-0209

330

9 1 1 2 0 5 1 0 3 7 3

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.L. McGhan 12-14-89

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

St P. [signature] 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)

331

WHC-MR-0209

9 1 1 2 0 5 0 0 3 3 4

4 of 4

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
						# SST71789.
						No contamination
						detected.
				Thin silt (~1/2") lense @ ~62'	1525	

REMARKS:
Reviewed by V.L. McGlean 12-14-89 ADDED 1/2 GALLON H_2O
PNL-MA-567 DO-1, REV.0

SEP [signature] 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 Shaped Water

WHC-MR-0209

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9 1 1 2 0 5 0 0 3 7 5

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 7-18-89		Depth 61' 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
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 reading		

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)

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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 valves were fixed		
				in order to determine if these were source		
				of contamination - Valves 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 V. L. Matthews 12-14-89
PNL-MA-567 DO-1, REV. 0

Step. 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 ____ Standing Water

WHC-MR-0209

34

0 1 1 2 5 0 0 3 7 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 $CaCO_3$ 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. McGhan 12-14-89
PNL-MA-567 DO-1, REV. 0

STP [signature] 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

335

9 1 1 2 9 5 1 0 3 7 8

1 of 1

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. McGhan 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 C C - Co

336

WHC-MR-0209

0 1 1 2 5 0 0 3 7 9

DRILL LOG	By: AIRHART	Rig: BE 22W 14102 Mcl. 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, 45% 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 [signature] 12-14-89

PNL-MA-567 DO-1 REV. 0

St. P. [signature] 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

9 1 1 2 0 5 7 0 3 1 0

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. McGhan 12-14-89

PNL-MA-567 DO-1 REV.6

[signature] 7/20/89

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

338

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 7-20-89		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 T.L. McClure 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 1 5 0 0 3 1 2

DRILL LOG	By: AIRHART/LANIGAN	Rig: BE 22W 14102 Mel. Thoresen	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. McGhan 12-14-89

PNL-MA-567 DO-1 REV. 0

STP [signature] 7/21/89

D - Drive Barrel H - Hard Tool L - Lance M - Vac [illegible]

340

WHC-MR-0209

9 1 1 2 0 5 7 0 3 1 3

2 of 2

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 7-21-89		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 [illegible] 12-14-89

PNL-MA-567 DO-1 REV. 0

STP [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)

WHC-MR-0209

341

9 1 1 2 9 5 9 0 3 1 4

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
103'8 1/4"						
				Hole stayed open over weekend -		
				~ 20' open hole		
				Preparing to add casing	0745	
124'4" of 8" casing					0905	Added 20'7 3/4" of 10"
						103'8 1/4" + 20'7 3/4" = 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. Markham 12-14-89

PNL-MA-567 DO-1 REV. 0

S.H.P. 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

WHC-MR-0209

246

9 1 1 2 0 5 0 0 3 1 5

DRILL LOG	By LANIGAN/ Airhart	Rig BE 22W 14102 M. Thorensen	Well Number 299-E33-31	Computer Number NA	Project or Work Order No. 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 V. L. Markham 12-14-89

PNL-MA-567 Do-1 REV. 0

[signature] 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

343

9 1 1 2 0 5 0 0 3 4 6

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: 7-25-89		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

StP Airhart 7/25/89

344

WHC-MR-0209

9 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: 7-25-89		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 V L McShane 12-14-89

PNL-MA-567 DO-1 REV. 0

S.L.P. [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 Water

A-6000-021 (5-85)

WHC-MR-0209

345

DRILL LOG	By: Goodwin	Rig: #14102 BE-22W	Well Number: 299-E33-31	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 25 July 1989		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 & EARS	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/ DVA & RAD = <DET. SAMPLE COARSER		
				THAN PREVIOUS.		

REMARKS: Reviewed by U.L. Markham 12-14-89 ADDED 2 1/2 GALLONS of H_2O TODAY

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 Water

WHC-MR-0209

346

9 1 1 2 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 H.L. McGhan 12-14-89
PNL-MA-567 DO-1, REV. 0

[signature] 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

9 1 1 2 9 5 1 0 3 7 0

DRILL LOG	By: BRANDENBERGER	Rig: BE 22W 14102 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
						# SST072789
	165	D	M	SAND: SAME AS 160'. SAME ~~AS~~ GRAIN SIZE	1330	TOOK (2) PINT
				DISTRIBUTION.		LITHOLOGIC SAMPLES,
						(1) MOISTURE SAMPLE.
						NO CONTAMINATES DETECTED.

REMARKS:
Reviewed by [signature] 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

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WHC-MR-0209

9 1 1 2 0 5 0 0 3 7 1

DRILL LOG	By: BRANDENBERGER	Rig: BE 22W 14102 MEL THORESON	Well Number: 299-E33-31	Computer Number: N/A	Project or Work Order No.: W-017
	Date: 7/27/89		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
	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. McGhan 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)

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WHC-MR-0209

9 1 1 2 7 5 1 0 3 3 2

3 OF 3

DRILL LOG	By: BRANDENBERGER	Rig: BE22W 1410Z 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. Matchan 12-14-89

PNL-MA-567 DO-1 REV-0

[illegible] 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

9 1 1 2 2 5 0 0 3 3 3

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 V. 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

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9 1 1 2 0 5 0 0 3 : 4

page 2 of 4

DRILL LOG	By LANIGAN	Rig BE 22W 14102	Well Number 299-E33-31	Computer Number N/A	Project or Work Order No. W-017
	Date 7-28-89	M. Thoresen	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. 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 Spoon Wiper

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WHC-MR-0209

9 1 1 2 9 5 2 0 3 7 5

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
	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) ENVIROMENTAL SAMPLES, SJB 1309 7/28/89

REMARKS:
Reviewed by V.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)

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WHC-MR-0209

9 1 1 2 3 5 0 0 3 7 6

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 MSA 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 V.L. McGhan 12-14-89

DNL-MA-567 DO-1 REV.0

[signature] 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

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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. McBlain 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)

335

WHC-MR-0209

9 1 1 2 1 5 0 0 3 [illegible] 3

1 of 1

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 [illegible] 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

356

WHC-MR-0209

GOODWIN / 0 1 1 2 0 5 0 0 3 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
10'3½"						B PPE.
207'9½"					0930	PREPARING TO WELD
				ADDED 10'3½" of 8" CARBON STEEL CASING;	1015	FINISHED WELDING
				TOTAL 8" : 207'9½"	1030	DRILLING
				HIT GRAVELS @ 206' - INCREASING THROUGH	1050	FM. CHANGE
				208'		
	210	D	DRY	WILL DESCRIBE LATER; NO SMALL PPE FOR	1110	SAMPLE; NO
				GEOLOGIST. DRILLER & KEH SAFETY ARE		MOISTURE SAMPLE
				IN LEVEL B & 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. McKhan 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)

WHC-MR-0209

357

9 1 1 2 9 5 1 0 3 0

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DRILL LOG	By EJ Jensen	Rig BE 22W 14102 M. Thorenson	Well Number 299-E33-31	Computer Number NA	Project or Work Order No. W017 SST
	Date 8/2/89		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	1110	2 pint jar sample
				pebbles are smaller than medium pebbles and		no moisture sample
				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.		
				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

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

9 1 1 2 0 5 0 0 3 1

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: 8-3-89		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, ~~10%~~ 5% VCS, 5% MS, 20% FS		No moisture sample (RPB)
				Gravel: 50% Basalt, 50% Granitic, etc. SA-SR; Sand: 70% Basalt ~~SR~~ 70% 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. McKellar 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: Blegen	Rig: BE 22W 14102 M. Thomson	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) 250ml CHEMISTRY SAMPLES -
				5% MP (Possibly broken pieces of cobbles), 25% FP, 30% VFP		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. Nebham 12-14-89 ADDED 15 GALLONS of H_2O TODAY

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

Ronald P. Blegen

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

WHC-MR-0209

30

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
Elegan	BE 22W 14102 M. Thoresen	299-E33-31	N/A	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 (silts & muds)	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.
				Gravel: 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. Elegan

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

9 1 1 2 9 5 0 3 5 4

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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 ~5 gal 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 ~5 gal H_2O	1259	
	240				1310	Stop drilling for sample

REMARKS:
Reviewed by D.L. McGlum 12-14-89
PNL-MA-567 DO-1, Rev. 0

Ronald P. Blegen

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

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DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
Bergen/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; Sand: 40% basalt, 60% felsic + seds — SA-SA		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. Bergen

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

283

9 1 1 2 9 5 0 0 3 5 6

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DRILL LOG	By: Blegen / Lubrecht Date: 8-4-89	Rig: BE 22W 14102 M. Thoresen	Well Number: 299-E33-31 Depth: 245' To 245'	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
	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. Nickham 12-14-89 ADDED 15 GALLONS OF H_2O TODAY

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

Ronald P. Blegen

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WHC-MR-0209

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
Bleger	BE 22W 14102 A. 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. Hagen

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

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9 1 1 2 0 5 0 0 3 1 0

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' stickup]		
				[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

Ron P. Blegen

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

3606

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DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
Bkyer	BE 22W 14102 M. Thoresen	299-E33-31	N/A	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. Methan 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)

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9 1 1 2 0 5 9 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 # 10998).		
				D/BOTTOM = 253.63' + 2' TAPE - 1.65' STICKUP	1355	D/BOTTOM
				= 253.98' (PNL 300' # 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. McSham 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

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9112 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 WELL
				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

[signature] 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

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9 1 1 2 3 5 0 3 7 2

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 # 10993)		

REMARKS:
Reviewed by D.L. McGehan 12-14-89

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

Stanley 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

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9 1 1 2 0 5 0 0 3 7 3

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-31 Location B-BX-BY Tank Farms	Date SEPT 5, 1989 Sheet No. 1 of 1 Project W-017 SST

Logged by S.P. AIRHART [signature] Date 9-5-89
Reviewed by [signature] Date 12-14-89
Measuring Equip. S-tape #L300-07 Procedure PNL-MA-567 Do-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'
1515										Bailed ~ 60-70 gallons H_2O
										Shut Down
										Note: Put bailed water in 55
										gallon drums.

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DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-31 Location B-BX-BY Tank Farms	Date SEPT. 6, 1989 Sheet No. 1 of 2 Project W-017 SST

Logged by S.P. AIRHART Date 9/6/89
Reviewed by [illegible] 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'							

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9 1 1 2 0 5 0 0 3 7 5

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-31 Location B-BX-BY Tank Farms	Date SEPT. 6, 1989 Sheet No. 2 of 2 Project W-017 SST

Logged by S.P AIRHART SEPA ( ) Date 9-6-89
Reviewed by V.L. McGhan Date 12-14-89
Measuring Equip. steel tape # L300-07 Procedure PNL-MA-567 Sec. 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
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.

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9 1 1 2 9 5 0 0 3 7 6

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 [signature] Date 9/7/89
Reviewed by [signature] Date 12-14-89
Measuring Equip. 300' L300-07 Procedure FNL-MA-567 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
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'

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9 1 1 2 0 5 0 7 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 Date 9/7/89
Reviewed by [illegible] 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.

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9 1 1 2 7 5 9 0 3 7 8

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 [signature] Date 9/7/89
Reviewed by [signature] 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	550 LB. 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.

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9 1 1 2 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 [signature] Date 9/8/89
Reviewed by [signature] 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

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WHC-MR-0209

9 1 1 2 0 5 0 0 3 0

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-31 Location SINGLE SHELL TANKS	Date 9/6/89 Project W-017 SST	Sheet No. 1 of 1

Logged by EJ Jensen — Date 9/11/89
Reviewed by V.C. Mathan — Date 12-14-89
Measuring Equip. L300-08 — Procedure PNL-MA-567 DI-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' O/crumbles
	carbon steel	10"	73.4'	6.9'	66.5'			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.

[signature] 9/11/89

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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.

9 1 1 2 3 5 9 0 3 9 2

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 and Safety Plan - led by Randy (KEH)	0900-	0950
				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. McGlean 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 _____ Sieve or Wiper

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WHC-MR-0209

9 1 1 2 0 5 0 0 3 0 3

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: 7-12-89		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 V.L. Markham 12-14-89

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

St P[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)

WHC-MR-0209

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9 1 1 2 0 5 7 0 3 3 4

2 of 2

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: 7/12/89		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 H. L. McGhan 12-14-89

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

St P. A[illegible]
7/12/89

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

WHC-MR-0209

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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: 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 Δ color ; weak rxn. w/ 10% HCl ; unconsolidated		# SST 71389.

REMARKS:
Reviewed by D.L. Markham 12-14-89

No moisture sample
No contamination detected

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

S.L.P. [signature] 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)

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WHC-MR-0209

9 1 1 2 0 5 9 0 3 9 6

2 of 2

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 V. L. McGhan 12-14-89 Added 4 gallons of H_2O today. St. P. [signature] 7-13-89

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

WHC-MR-0209

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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 (KEH) 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.K. McGhan 12-14-89

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

St 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)

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WHC-MR-0209

9 1 1 2 9 5 9 0 3 9 8

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.C. McGhan 12-14-89
PNL-MA-567 DO-1, REV-0

St 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

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WHC-MR-0209

DRILL LOG	By AIRHART	Rig BE 60L 14103	Well Number 299-E33-32	Computer Number NA	Project or Work Order No. NN-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

St 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

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9 1 1 2 0 5 9 0 3 9 0

1 of 1

DRILL LOG	By: AIRHART	Rig: BE 606 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 V.L. McGhan 12-14-89

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

S.E.P. [signature]
7-17-89

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

388

WHC-MR-0209

9 1 1 2 2 5 0 0 3 0 1

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 2.5Y 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. McKhan 12-14-89

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

St P [signature] 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)

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WHC-MR-0209

9 1 1 2 9 5 1 0 3 7 2

2 of 2

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.F. McKhan 12-14-89

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

STP. [signature] 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

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WHC-MR-0209

3 11/2

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 # SST071889
						No contam. detected

REMARKS:
Reviewed by [signature] 12-14-89
PNL-MA-567 DO-1, REV. 0

[signature] 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

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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 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.T.P. 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

WHC-MR-0209

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9 1 1 2 0 5 0 0 3 2 5

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. McShan 12-14-89
PNL-MA-567 DO-1 REV. 0

St P [signature] 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)

393

WHC-MR-0209

9 1 1 2 0 5 0 0 3 7 6

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. Mahlum 12-14-89

PNL-MA-567 DO-1 REV.0

[signature] 7-20-89

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

394

WHC-MR-0209

2 of 2

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 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. McClam 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 D.L. McKlam 12-14-89

D.C. Lanigan
7-20-89

PNL-MA-567 DO-1 REV.0

D - Drive Barrel H - Hard Tool

396

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 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.C. 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)

WHC-MR-0209

391

9 1 1 2 0 5 7 0 1 7 0

1 of 1

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 D.L. McGhan 12-14-89

PNL-MA-567 DO-1 REV. 0

S.P. [illegible] 7-21-89

D - Drive Barrel H - Hard Tool L - Lance M - Medium S - Small MC - Major C...

398

WHC-MR-0209

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: 7-24-89		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. [illegible] 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

399

9 1 1 2 3 5 0 0 1 9 2

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. CS & VFS) 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		SST 072589. 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 -		

REMARKS:
Reviewed by V. L. McGlam 12-14-89 unconsolidated

PNL-MA-567 DO-1 REV. 0

7/25/89

St. P. [signature]

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. McGhan 12-14-89

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 Water

A-6000-021 (5-85)

WHC-MR-0209

401

DRILL LOG	By AIRHART	Rig BE LOL 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

407

WHC-MR-0209

9 1 1 2 0 5 0 0 2 5

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
AIRHART	BE 60L 14103	299-E33-32	NA	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

S.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

9 1 1 2 ? 5 0 0 4 0 6

DRILL LOG	By: S M. Goodwin	Rig: BE-60L #22-14103	Well Number: 299-E33-32	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 26 July 1989		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
				10 YR 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.L. McGhan 12-14-89 & RAD = <DET.
PNL-MA-567, DO-1, REV. 0.

[signature] 7/26/89

404

WHC-MR-0209

0 1 1 2 0 5 0 0 4 0 7

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 10 YR 4/3 (BROWN).		
				MODERATE RX. TO 10% HCL. NO CONSOLIDATION.		
				MORE FINES & SLIGHT DECREASE IN GRAVEL.		
				Ø PPM W/ OVA & RAD = <DET.		
					1200-1230	lunch
					1300	Added 10'2¾" of 8"
						167'5¾" + 10'2¾" = 177'8½"
	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. McGlan 12-14-89

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

[signature] 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

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. McKlam 12-14-89

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

7/27/89

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

LOH

WHC-MR-0209

9 1 1 2 7 5 7 0 1 1 0

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 = 1	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 Pt. Lith. & 1 moisture sample - No rad.
				4-5% 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, sandy & thin above Ø above background w/ radiation. Oppm on OVA		
	200'	D	(Sl)M)	SLIGHTLY GRAVELLY SAND: 10% Gravel, 85% SAND, 5% mud.	1353	SAMPLE; 2 Pt. Lithologic,
				TR. ~~MFe~~ 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 mod. yellow brown. Rad <detect. Ø% PPM on OVA		

REMARKS:
Reviewed by V. L. McGhan 12-14-89 no consolidation. Similar to above

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

[signature] 7/27/89

D - Drive

408

WHC-MR-0209

DRILL LOG	By: M.D. Lubrecht	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: 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 10'4 3/4" Carbon steel casing; Total casing string	1400	1400 - Start to add
+ 10'4 3/4"				length = 188'4 1/2"		casing.
208'9 3/4"						
					1520	Shut Down

REMARKS:
Reviewed by V.L. McGlean 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

409

WHC-MR-0209

9 1 1 2 0 5 0 0 1 1 2

DRILL LOG	By M.D. Lubrecht / S.J. Brady	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 3/4"	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 consolidat		
				0ppm = OVA / Rad < Det. Similar to 200-fine 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		
				0ppm = OVA Rad < det. similar to 205 sample.		
					0900	Begin to add casing

REMARKS:
Reviewed by V.L. McGhan 12-14-89

PNL-MA-567 DO-1 REV. 0

Mikel D. Lubrecht 7/28/89

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

WHC-MR-0209

410

9 1 1 2 0 5 0 2 1 3

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
MDLubrecht/SJBrandah	BE-COL 22-14103 L. Wetkins	299-E 35-32	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
208'9¾" + 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, vl. 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.C. 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)

WHC-MR-0209

4111

9 1 1 2 3 5 7 0 4 1 4

DRILL LOG	By: MD Lubrecht	Rig: BE-60L 22-14103 L. Wetters	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
219'3 3/4"				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
						beveling casing in prep
219'3 3/4"						for adding new section,
+ 10'5 1/2"				ADDED 10'5 1/2" OF 8" CARBON STEEL CASING,	1445	FINISHED WELD
= 229'9 1/4"				TOTAL 8" = 229'9 1/4"	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. McGhan 12-14-89

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

Mill D. Lube 7/28/89

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

WHC-MR-0209

42

DRILL LOG	By LANIGAN	Rig BE 68L 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 ultrasmall 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. Mitchell 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

413

9 1 1 2 0 5 7 0 4 1 6

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
229'9¼"	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. Lubrecht 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 drilling

REMARKS:
Reviewed by V.L. Markham 12-14-89
PNL-MA-567 DO-1, Rev. Ø

D. C. Lanigan 7-31-89
M. R. Luber 7/31/89

D - Drive Barrel H - Hard Tool

4/4

WHC-MR-0209

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: 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	Caving continues - hard
						to retrieve barrel. Added
						2 gal. H_2O.
					1332	PROGRESS SLOW IN GRAVELLY
						SAND; DROP CASING DOWN
					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. lithological,
				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% lithic; mod. sphericity,		chain of custody #
				ang, sub-rounded, mod. reaction to HCl; 10YR 5/4 mod. yell. brown		073189 SST
				vad < Ø detect.; no contaminants on OVA. Unconsolidated.		

REMARKS:
Reviewed by V.L. McGhan 12-14-89
PNL-MA-567, DO-1, Rev. Ø

M. L. 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

9 1 1 2 9 5 0 0 4 1 8

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. McGhan 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

WHC-MR-0209

416

DRILL LOG	By CANIGAN	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. Nicholson 12-14-89
PNL-MA-567, DO-1, Rev Ø

D.C. Canigan
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

9 1 1 2 5 1 0 1 0 0

3 of 4

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 V.L. McGhan 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

418

WHC-MR-0209

DRILL LOG	By LANIGAN	Rig BE 60L 22-14103 C. 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. Mathan 12-14-89
PNL-MA-567, DO-1, Rw. ∅

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

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. McKhan 12-14-89
PNL-MA-567, DO-1, Rev. 0

D.C. Lanigan 8-2-89

D - Drive Barrel H - Hand Tool

WHC-MR-0209

020

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. McGhan 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

A-6000-021 (5-85)

WHC-MR-0209

421

9 1 1 2 0 5 0 0 1 2 4

3 of 3

DRILL LOG	By LANIGAN	Rig BE 60L 22-14103 C. 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' 1 3/4"					1345	Finished welding.
						Driving casing.
					1358	Resumed drilling.
	260'	H	W	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 #080289 SST
						no contamination
					1530	end of shift

REMARKS:
Reviewed by V. C. McGlinn 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

422

DRILL LOG	By: 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: 8-3-89		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/ HARD TOOL
					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
				& mm; Sand; 30% mafic, 70% felsic; Both SA-R; 10YR 6/2 (H.		is heaving up casing, accord
						to driller.
271' 1¾"				brownish gray) no HCl Rx; no contamination. unconsolidated red < Ø background	0952-	Added 40 gallons H_2O
						continue drilling & bailing.
+ 10' 5¾"					1054-	Add casing (10' 5¾")
281' 7½"					1200	Break for lunch -
					1235	Return. Driller works
						1"x4"x6" metal plate onto
						HT to help in chopping fm.
					1328	Drive casing & resume
						Drilling.
					1409	269' - Drilling hard. backload up
						extension on bit - make cuttings.
						Basalt?

REMARKS: Reviewed by D.L. Metham 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

4/23

9 1 1 2 1 5 1 0 1 1 6

2 of 2

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% gravell, 70% SAND; 5% mud	1430	Sample: 2 pt. lithological
	270	HT	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 - perform
						minor tasks on rig.
						Driven casing.

REMARKS: Reviewed by J.L. Mathan 12-14-89
PNL-MA-567, DØ
ADDED 40 GALLONS OF H_2O

M.A. Lu 8-3-89

D - Drive Barrel H - Hard Tool

484

WHC-MR-0209

DRILL LOG	By M.D. 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 8/4/89		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 14/12' Sinco E-tape # 10998		of 8" casing.
				Depth to Bottom - 270 33/12' Lufkin tape # L-300-4	0740	Measured depth and
				Temp (ambient) ≈ 65°		w.t.
					0810	Performed straightness
						test Hole OK. witnessed
						by M. Everetts (Trlk 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

435

9 1 1 2 9 5 0 0 1 2 8

1 of 1

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

[signature] 8/9/89

WHC-MR-0209

426

9 1 1 2 0 5 0 9 4 0 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

[signature] 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

427

9 1 1 2 9 5 0 0 1 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. McGhan Date 12-14-89
Measuring Equip. S-tape L300-07/E-tape 10998 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

9 1 1 2 9 5 0 0 4 3 1

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 StP Airhart 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

BOLD

Time	Casing/Screen Type	Dia	Length	Stickup	Depth	Annular Fill Type	Quantity	Depth	Over lap	Comments
										D/B inside 4" = 267.4' bls
										273.15 - 6.3' = 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

429

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9 1 1 2 9 5 0 0 4 7 2

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-32 Location SST	Date AUG. 31, 1989 Sheet No. 1 of 3 Project W-017 SST

Logged by S. P. AIRHART [signature] Date 8-31-89
Reviewed by V. C. 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/HYDRAULIC JACKS

BOLD

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'

430

WHC-MR-0209

9 1 1 2 0 5 0 0 4 7 3

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-32 Location SST	Date AUG. 31, 1989 Sheet No. 2 of 3 Project W-017 SST

Logged by S.P. AIRHART SPA Date 8-31-89
Reviewed by J.L. McElhaney Date 12-14-89
Measuring Equip. STAPE 1300-07/E-tape 10998 Procedure PNL-MA-567 ~~Rev 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 (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' ~ 30 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

Old

431

WHC-MR-0209

9 1 1 2 ? 5 ? 0 4 7 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 St P A L I Date 8-31-89
Reviewed by [signature] Date 12-14-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-564 PO-1 REV-0

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

BLD

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 takes over 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
						"	4 bags			171.6 + .3 - 6.85 = 165.05
										Exposed 177' weld
										Ran out of O_2
1515										End of Day

1.24 ft

Top of Pellets

432

WHC-MR-0209

9 1 1 2 0 5 0 0 4 7 5

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-32 Location SST B-BX-BY TANK FARMS	Date SEPT. 1, 1989 Sheet No. 1 of 2 Project W-017

Logged by S.D. AIRHART Date 9-1-89
Reviewed by V.L. Mathan Date 12-14-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-567 DV-1 REV. 0

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

BOLD

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	

[illegible] 9/1/89

433

WHC-MR-0209

9 1 1 2 9 5 7 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-BT Tank Farm 200 East	Project	

Logged by T Gilmore Date 9/1/89
Reviewed by T.L. McGhan 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 / Jacks

BOLD

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
										T Gilmore 9/1/89

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WHC-MR-0209

9 1 1 2 0 5 0 0 4 3 7

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-32 Location B-BX-BY TANK FARMS	Date SEPT. 5, 1989 Sheet No. 1 of 2 Project W-017 SST

Logged by S. P. AIRHART Date 9-5-89
Reviewed by D. L. Markham 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	Over lap	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.E. McElhaney Date 12-14-89
Measuring Equip. S-TAPE L300-07 Procedure PNL-MA-567 FO-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						1/2 batch slurry mixture as per previous.	3 bags 20 gals 1/2 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

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9 1 1 2 0 5 0 0 4 1 1

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 V. L. McGlam 12-19-89
PNL-MA-567 DO-1, REV. 0

[signature] 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

9 1 1 2 0 5 1 0 4 1 2

3 of 3

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	# 22-14101	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 V.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

[signature] 7/17/89

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

440

WHC-MR-0209

9 1 1 2 0 5 1 0 [illegible] 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: 18 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:
Reviewed by V.L. McShane 12-19-89
< DET. RADIATION.

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

Shirley Mark 7/15/89

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

1447

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: 13 July 1989	#22-14101	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 V.L. McSham 12-19-89

PNL-MA-567 DO-1 REV. 0

Anneth. Mark 7/15/89

WHC-MR-0209

7442

9 1 1 2 9 5 0 0 4 4 5

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: 18 July 1989		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 TO TODAY

Reviewed by [signature] 12-19-89
PNL-MA-567 DO-1, REV. 0

[signature] 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

9 1 1 2 9 5 1 0 4 1 6

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

[signature] 7/18/89

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WHC-MR-0209

9 1 1 2 5 1 0 4 1 7

DRILL LOG	By: S.M. GOODWIN	Rig: BE 22W #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 H2O 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.C. McShane

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

[signature] 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

445

WHC-MR-0209

9 1 1 2 7 5 7 0 4 1 8

3 of 4

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: 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, 8% 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 V.L. McGhan 12-19-89
PNL-MA-567 DO-1, REV. 0

[signature] 7/19/89

446

WHC-MR-0209

9 1 1 2 0 5 0 4 1 9

DRILL LOG	By: S. M. Goodwin	BE 22	299-E33-33	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 19 July 1989	#22-14101	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 @ 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" OF 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. McGhan 12-19-89

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

[signature] 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

447

WHC-MR-0209

9 1 1 2 6 5 0 0 4 7 0

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: 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" of 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 V. L. McGhan 12-19-89

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

S. M. Goodwin 7/20/89

WHC-MR-0209

448

9 1 1 2 0 5 7 0 4 5 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: 20 July 1989	#22-14101	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 V.L. McGhan 12-19-89

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

[signature] 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

449

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: 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 [illegible] 12-19-89

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

[illegible] 7/20/89

257

WHC-MR-0209

9 1 1 2 ? 5 ? 0 ? ? 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		
				$CaCO_3$ 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. McKlean 12-19-89

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

[signature] 7/21/89

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

451

WHC-MR-0209

9 1 1 2 0 5 7 0 4 5 4

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	#22-14/101	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. McAllen 12-19-89
PNL-MA-567 DO-1, REV. 0

[illegible] 7/7/89

452

WHC-MR-0209

9 1 1 2 0 5 7 0 4 7 5

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	150	PREPARING TO WELD
				& RAD = < DET.	1530	END OF SHIFT

REMARKS:
Reviewed by W. L. McLean 12-19-89 46 GALLONS OF H_2O USED TODAY
PNL-MA-567 DO-1, REV. 0

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

453

WHC-MR-0209

9 1 1 2 0 5 7 0 4 5 6

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

Smith-Mood 7/24/89

454

WHC-MR-0209

9 1 1 2 5 0 7

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: 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, &
				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		# SST072489)
				(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 3/4"		
	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 J. L. McGlean 12-19-89
PNL-MA-567 DO-1, REV. 0

[signature] 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 22w #22-14101	Well Number 299-E33-33	Computer Number N/A	Project or Work Order No. W-017 SST
	Date 24 July 1989		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: 34 GALLONS OF H_2O ADDED TODAY

Reviewed by W. L. McGhan 12-19-89

PNL-MA-567 TO-1 REV. 0

Arlen M. Hunt

WHC-MR-0209

456

9 1 1 2 0 5 9 0 4 7 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 8% GRAVEL,	0920	SAMPLE; 2 PT.
				87% SAND, 5% MUD. TRACE MP, 4% FP, 4%		LITHOLOGIC 1 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, 1 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. McGlynn 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.T. 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 DPM 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.		MOISTURE SAMPLE

REMARKS:
Reviewed by D.L. McBean 12-19-89

DNL-MA-517 DO-1 REV. 0

WHC-MR-0209

458

9 1 1 2 0 5 0 0 4 5 1

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: 25 JULY 1989		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 1/2 GALLONS OF H2O TODAY
PNL-MA-567 DO-1, REV. 0 Smith Good 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

459

9 1 1 2 3 5 1 0 4 1 2

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: 26 July 1989	#22-11/101	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	0720	
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

[illegible]

460

WHC-MR-0209

9 1 1 2 9 5 1 0 [illegible] 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: 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

[signature]

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

461

WHC-MR-0209

9 1 1 2 0 5 1 0 4 3 4

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: 28 July 1989		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"						
+ 11'3"				5% VFS, 8% MUD. POORLY SORTED. GRAVELS	1200-1230	LUNCH
= 158'11"				ARE 50% MAFIC, 50% FELSIC; SA TO SR.	1240	DRILLING
				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 (20% 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

[illegible signature]

462

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 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.) OR 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 KEH
				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. McKhan

NO WATER ADDED TODAY

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

[signature] 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

463

WHC-MR-0209

9 1 1 2 0 5 9 0 1 1 6

1 of 2

DRILL LOG	By EJ Jensen	Rig BE 22W	Well Number 299-E33-33	Computer Number	Project or Work Order No. W017 SST
	Date 7/31/89	#22-14101	Depth 170' To 175'	NA	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%	0900	2 pint jar samples
				sand, 15% mud, gravel is mostly small Basaltic		1 moisture sample
				pebbles; poor sorting, Subrounded pebbles,		
				Moderate Rxn in 10% HCl, wet color 10YR 5/3		
				Brown, unconsolidated,		
				SLIGHTLY MUDDY,		
	175'	D	Dry	SAND, 5% small pebbles, 10% VCS, 15% CS, 15% MS	0930	2 pint jar samples
				20% FS, 25% VFS, 10% mud, poor sorting, mostly		1 moisture sample
				unconsolidated (some round compacted balls		
				were noticed) moderate rxn in 10% HCl, wet		
				color 10YR 5/3 Brown.		
10'				Added 10' of 8" diameter casing	1000	
188'10"						

REMARKS:
Reviewed by V.L. McGehan 12-19-89
PNL-MA-567, DO-1, REV. 0

E. J. 7/31/89

WHC-MR-0209

9 1 1 2 0 5 0 0 6 7

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 sample
				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 sample
				cause some compaction of the sediments.		
10'6"				Added 10'6" of 8" diameter casing	1300	
199'4"				MUDDY		
	190'	D	dry	SLIGHTLY GRAVELY 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.L. 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

465

WHC-MR-0209

9 1 1 2 0 5 1 0 4 6 8

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: 1 August 1989	#22-14101	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. # 55T0801
						89).

REMARKS:
Reviewed by D.L. McKhan 12-19-89
PNL-MA-567 DO-1 REV. 0

[illegible] 8/1/00

WHC-MR-0209

DRILL LOG	By S. M Goldwin	Rig BE 22 w	Well Number 299-E33-33	Computer Number N/A	Project or Work Order No. W-017 SST
	Date 1 August 1999	#22-14101	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 #SST080159)
				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. McGlum 12-19-89

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

S. M. Goldwin 8/1/99

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

467

WHC-MR-0209

9 1 1 2 1 5 1 0 4 7 0

3 OF 4

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: 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; Δ IN BASALT CONTENT. ∅ PPM		
				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)

(SANDS ARE MOSTLY VF w/ SOME F. ~60% SAND, 40% MUD)

REMARKS:

Reviewed by V.L. McGhan 12-19-89

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

[signature] 8/1/89

WHC-MR-0209

464

9.1 1 2 7 5 7 0 4 7 1

4 of 4

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 PPM 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 Δ BACK TO DARK BROWN;		
				SIMILAR TO ALTERNATING GRAVELLY MUD		
				& SANDS AT 203'.		

REMARKS:
Reviewed by V.L. McGhan 12-19-89 ADDED 10 GALLONS OF H_2O TODAY.
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 Standing Water

WHC-MR-0209

469

9 1 1 2 0 5 0 0 4 7 2

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_2O) 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". ∅ PER w/ DUA.		
	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 D.L. Markham 12-19-89

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

8/2/89

470

WHC-MR-0209

9 1 1 2 5 0 3

2 OF 2

DRILL LOG	By GOODWIN / S.J. BRANDENBERGER	Rig BE22W #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. Makhum 12-19-89 ADDED 10 GALLONS OF H_2O TODAY

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

[signature] 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

9 1 1 2 3 5 0 0 4 7 4

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: 3 AUGUST 1989	#22-14101	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 8/2/89		WELD 8"
				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 & 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-		#SST050387)
				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. L. McGhan 12-19-89 IN BASALT. SAMPLED w/ SAND PUMP.

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

Sandy Mook 8/3/89

472

WHC-MR-0209

9 1 1 2 0 5 9 0 4 7 5

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: 3 August 1989	#22-14101	Depth: 220' 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
	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 changes	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 (Drk.		
				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. McGhan 12-19-89 Ø ppm w/ OVA & RAD = <Det.

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

Sheila Gool 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

473

WHC-MR-0209

9 1 1 2 0 5 0 0 4 7 6

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: 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.G. Mahlum 12-19-89 ADDED 38 GALLONS of H_2O TODAY
PNL-MA-567 DO-1 REV. 0

Linda Mark 8/3/89

474

WHC-MR-0209

9 1 1 2 0 5 7 0 4 7 7

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: 4 AUGUST 1989	#22-14101	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.		
				∅ PPM W/ OVA. & RAD ~ <DET.		

REMARKS:
Reviewed by V. G. McGlohn 12-19-89
PNL-MA-567 DO-1, REV. 0

Sheila Gal 8/4/89

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

475

WHC-MR-0209

DRILL LOG	By: S. M. Goodwin	Rig: BE 22W #22-1/101	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, & 2 500
				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

WHC-MR-0209

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9 1 1 2 5 1 0 0 7 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 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. TAPE # 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. C. McCallum 12-19-89

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

[illegible] 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

9 1 1 2 9 5 7 0 4 3 0

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: 4 AUGUST 1989	# 22-14101	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. McGhan 12-19-89
PNL-MA-567 DO-1 REV. 0

[signature] 8/4/89

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9 1 1 2 0 5 9 0 4 2 1

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: 7 August 1989		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 EVARTS 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 # 10995)		

REMARKS:
Reviewed by V.L. McGhan 12-19-89
PNL-MA-567 DO-1, REV. 0

Shuck Good 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

WHC-MR-0209

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9 1 1 2 0 5 0 0 4 3 2

1 of 1

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

[signature] 8/9/89

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9 1 1 2 9 5 0 0 4 3

1 of 1

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. McGlean 12-19-89
PNL-MA-567 DO-1, Rev. 0

[signature] 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)

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9 1 1 2 0 5 0 0 4 2 4

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 [illegible] 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

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9 1 1 2 0 5 0 4 1 5

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-33 Location Single Shell Tanks	Date 8/25/89 Sheet No. 1 of 3 Project SST W-017

Logged by S.S. Teel S.S. Teel Date 8/25/89
Reviewed by V.L. McGlum 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
	10slot 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

BLD

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DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-33	Date 8/25/89	Sheet No. 2 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 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

1.8

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9 1 1 2 7 5 0 0 4 7

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 ≈ 25 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

WHC-MR-0209

485

9 1 1 2 0 5 1 0 4 1 8

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E25-33 Location Single Shell Tanks	Date 8/28/89 Sheet No. 1 of 2 Project SST W-017

Logged by S.S. Teel S.S Teel Date 8/28/89
Reviewed by Y.B. McGlam Date 12-19-89
Measuring Equip. PNL steel tape # 4300-08 Procedure PNL MA-567 ~~DO-1 Rev 0~~

Drilling Contractor K&H
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 + 0.48 − 6.4 = 225.18
							½ 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
						¼" 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	149.82 + 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

9 1 1 2 9 5 0 4 9

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-E33-33 Location SINGLE SHELL TANKS	Date 8-28-89 Project W-017 SST	Sheet No. 2 of 2

Logged by S.S. Teel S.S. Teel Date 8-28-89
Reviewed by V.G. McGlean 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

BOLD

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

487

WHC-MR-0209

9 1 1 2 7 5 1 0 0 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

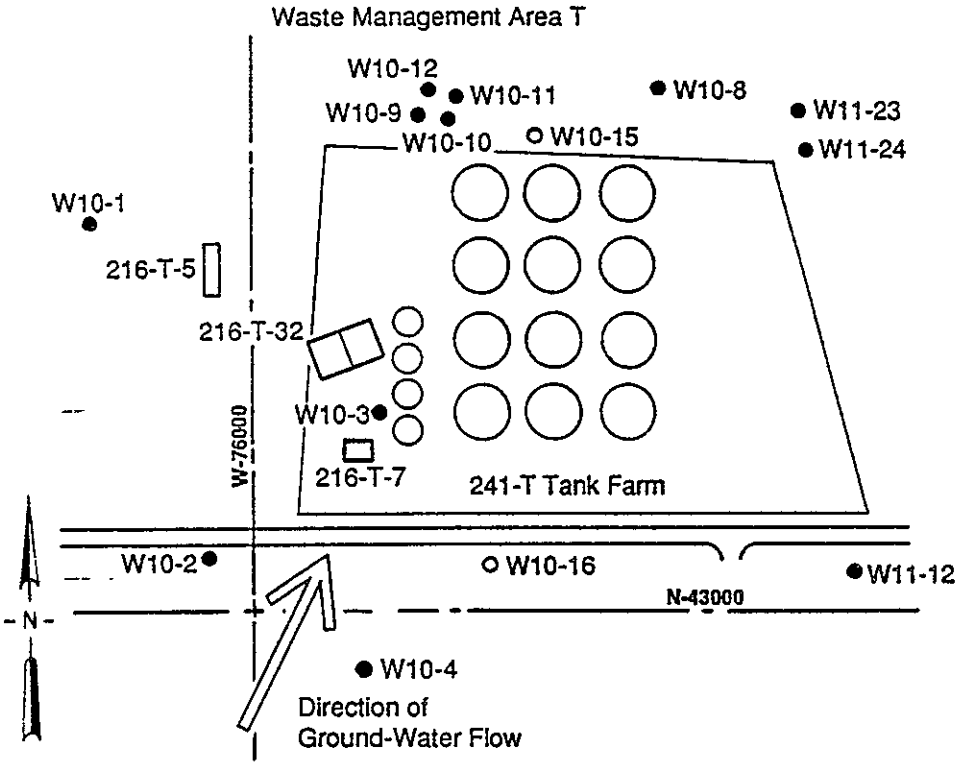
Logged by EJ Jensen — Date 8/29/89
Reviewed by J.E. McClam — Date 12-19-89
Measuring Equip. PNL steel tape #L300-08 Procedure PNL MA SST 00-1 Rev 0

Drilling Contractor KEH
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 4 0 3

DRILL LOG	By B.N. Bjornstad	Rig 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 Bjornstad 9/20/89

PNL-MA567, 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

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9 1 1 2 1 5 0 0 1 2 4

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Page 2 of 2

DRILL LOG

By	B.N. Bjornsted
Date	9/20/89
Rig	BE-22W
	Craig Wansley
Depth	

Computer Number	N/A
Project or Work Order No.	W-017 SST
Subcontract No.	N/A

ber 299-W10-15

10 To 10

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

WHC-MR-0209

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9 1 1 2 0 5 7 0 4 7 5

1 of 2

DRILL LOG	By: T Gilmore	Rig: BE 60 L	Well Number: 279 W10 15	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 7/21/89	Craig Wawsley	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,		Øppm OVA
				round - Subround, 10YR 3/2, No rxn in HCl, No consol,		
				Water added so no moisture sample taken, 2 LHh		
				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% Mafic		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:

T Gilmore 9/21/89

PNL-MA567, DO-1, Rev Ø

Reviewed by V.L. McGlean 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

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DRILL LOG	By T Gilmore	Rig BE 60L Craig Wheeler	Well Number 299 W10 15	Computer Number N/A	Project or Work Order No. W-Ø17
	Date 9/21/89		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 Sat, 60% Mafic, 40% Felsic, round-Subrd,		Ø ppm OVA
				(Sands 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:

T Gilmore 9/21/89

PNL-MA567, DO-1, Rev. Ø

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

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9 1 1 2 3 5 3 0 4 3 7

DRILL LOG	By: S.S. Teel	Rig: BE 60L Craig Wamsley	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
24'1" of 10"						
+9'3'				Added 9'3" of 10"	0800	Adding Casing
38'4"					0850	Drilling
	36'	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. Uncons. 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. Mahlum 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

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9 1 1 2 0 5 0 0 4 9 8

DRILL LOG	By: S S. Teel	Rig: BE 60L Craig Namsley	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) -		
				- 25% 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. Markham 12-7-89

PNL-MA-567 DD-1 Rev 0

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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 V.L. McSchan 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

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9 1 1 2 7 5 7 0 5 9 0

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 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.]

PNL-MA-567 00-1 Rev.0.

Reviewed by D. [illegible] 12-7-89

Bruce Bjornstad 9/25/89

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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 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-v.crs sand and more basalt (~10%)		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. McElhaney 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 9 5 7 0 5 9 2

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 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		
				[Samples: 2 lith, 1 moisture]		

REMARKS:

PNL-MA-567 DO-1 Rev. 0

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

Bruce Bjornstad 9/25/89

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 moistime]		
	75'	D	SM	Gravelly SAND (85% Sand, 15% gravel);	1430	Sample-drive barrel
				15% v. fine pebbles, 25% vcrs sand, 25%	1440	Propane 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 (2.5Y4/2-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

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9 1 1 2 0 5 1 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' 0" 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 srt, ~50% Mafic, ~50% Felsic,		Background Radiation
				(difficult to distinguish), Subrd-subang, Wet color		
				10YR 3/3 dk brn, Strng rxn in HCl, no consol,		
				no apparent clay; not ductile or cohesive		
				(2) Lith Smpls; (2) 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 ductibility, v-well sort, 50%		
				Mafic, 50% Felsic, Subrd-subang, Wet color		
				10YR 3/3 dk brn, Strng rxn in HCl, Slight		
				Consolidation incr in clay content from last		
				sample, (2) Lith Smpls, no moisture Smpl Sat for		
				~20min while at other Rig		Ø ppm OVA
					12-1230	Lunch

REMARKS:

PNL MA 567
DO-1 Rev 0

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

T Gilmore 9/26/89

WHC-MR-0209

502

9 1 1 2 7 5 7 0 5 7 5

252

DRILL LOG	By: T Gilmore	Rig: 3E 60L Craig Wansley	Well Number: 299 W12 15	Computer Number: N/A	Project or Work Order No.: W-217 SST
	Date: 9/26/89		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 percent,		
				well sort, 50% Felsic, 5% 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	Øppm VVA
				Repair core barrel	1300	Welding
				@ 93' Caliche layer ~1' Thick	1310	Drilling
102'Ø"				Add 8'5" of 10" 102'Ø" of 10" Total	1340	Welding
					1510	Drilling
					1530	End of Day

REMARKS:

PNL - MA 567, DO-1, Rev. Ø

Reviewed by D.C. McGehan 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 Sand - Silt

503

WHC-MR-0209

9 1 1 2 0 5 7 0 5 0 6

DRILL LOG	By: S. BRANDENBERGER	Rig: BE 60L	Well Number: 299 W10 15	Computer Number: N/A	Project or Work Order No.: W-017 55T
	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
				96' CALICHE - SWITCHED TO HARD TOOL. Grounded	0815	ON RIG, 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 -	1445	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

9 1 1 2 0 5 1 0 5 0 7

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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 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

505

9 1 1 2 9 5 7 0 5 7 3

p. 1 of 2

DRILL LOG	By: Ian Kennedy Date: 9-28-89	Rig: BE 60L #82-14100 Craig Wamsley	Well Number: 299-W10-15 Depth: 100' To 115	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
(10" dia) 102'-0"					0740	Arrive onsite - driller drilling
	105'	HT	Wet	SLIGHTLY MUDDY SAND: trace gravel, 80% sand, 15% mud: trace vfp, trace vcs 6% cs, 15% ms,	0755	Samples (2) 1pt lith
				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 lith
				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. lith
	115'	HT		SLIGHTLY MUDDY SAND: 90% sand, 10% mud; trace fp, 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 welding

REMARKS:

PNL MA567 DO-1 rev 0

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

Ian Kennedy 9-28-89

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
				unconsolidated; 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. Matthews 12-7-89 Bence 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		
				10TR 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&S check w/ OVA
						no detectables

REMARKS:

PNL-MA567-DO-1, Rev Ø

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

SLPA 1 9-29-89

508

WHC-MR-0209

9 1 1 2 7 5 0 0 5 1 1

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-MA567-DO-1, Rev. 0

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

[signature] 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

509

WHC-MR-0209

9 1 1 2 1 5 1 0 5 1 2

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 10/2/89		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% ztite, 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 DO-1 Rev. 0

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

Bruce Bjornstad 10/2/89

5/10

WHC-MR-0209

9 1 1 2 1 5 0 0 5 1 3

1 of 1

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

9 1 1 2 0 5 0 0 5 1 4

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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/hard 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. FRAGS. 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/hard tool
	150'	H	W	Muddy Sandy GRAVEL (50% gravel, 40% sand, 10%	1450	Sample-hard tool
				mud; pulverized; Gravel = 40% basalt,		
				20% qtzite, 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 10/4/89

PNL MA 567 DO-1 Rev. 0 Reviewed by V.L. McGhan 12-7-89

512

WHC-MR-0209

9 1 1 2 1 5 1 0 3 1 5

1 of 1

DRILL LOG	By EJ Jensen MA Chauvenet	Rig BE 60L 14100	Well Number 299-W10-15	Computer Number	Project or Work Order No. W-017 SST
	Date 10/5/89	Craig Wansley	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% ign/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

[signature] 10/5/89

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

A 6000-021 (5 85)

573

WHC-MR-0209

9 1 1 2 0 5 7 0 5 1 6

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		100689)
				COLOR IS 2.5Y 4/2 (DARK GRAYISH BROWN).	0800	DRILLING
				NO RX. TO 10% HCL. FM. APPEARS CONSOLIDATED;	0810	PREPARING TO WELD
~~152'9½"~~	162'9½"	SPL	10/20/89	SLOW DRILLING. SLIGHT Δ IN COLOR.	0905	FINISHED WELDING
+ 8'5½"				ADDED 8'5½" 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-517 DO-1, REV. 0 Reviewed by D.L. McGhan 12-7-89 [signature] 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

9 1 1 2 7 5 1 0 5 1 7

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: 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 W. L. McGhan

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)

WHC-MR-0209

515

9 1 1 2 0 5 3 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
18'4"					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 - 30% 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, 30% 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 V.L. McClain 12-7-89

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

MA Chamness

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

516

WHC-MR-0209

9 1 1 2 0 5 1 0 5 1 9

1 of 1

DRILL LOG	By: EJ Jensen	Rig: BE 102 14100 Craig Namsly	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

[signature] 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

517

9 1 1 2 0 5 0 0 0 0

DRILL LOG	By B.N. Bjornstad	Rig BE-60L 14100 Craig Wansley	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 N. Bjornstad 10/11/89

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 - Vertical

516

WHC-MR-0209

9 1 1 2 0 5 0 0 5 2 1

1651

DRILL LOG	By: EJ Jensen	Rig: BE-60L 14100 Craig Wardy	Well Number: 299-W10-15	Computer Number: NA	Project or Work Order No.: 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		10/28/89 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 H2O Today
Added 40 gallons H2O on 10/10/89

PNL-MA-567 DO-1, REV 0

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

10/12/89

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)

519

WHC-MR-0209

9 1 1 2 9 5 0 0 5 2 2

Page 1 of 2

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/hard 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 = 2.5Y4/4 (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 Björnstad 10/13/89

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

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

WHC-MR-0209

520

9 1 1 2 0 5 0 0 5 2 3

DRILL LOG	By: R.P. BLEGEN	Rig: GE-GOL 14100	Well Number: 299-W10-15	Computer Number: N/A	Project or Work Order No.: W-017 SST
	Date: 10-13-89		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. FRAGS		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. McGlean 12-7-89 Ronald P. Blegen 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)

WHC-MR-0209

521

9 1 1 2 0 5 1 0 5 2 4

Page 1 of 1

DRILL LOG	By: MA Chamness	Rig: BE-60L 14100 Craig Wansley	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
226'4 3/4" of 8"				DW = 211'11" from top of casing, casing stickup 5'4 1/2" = 206.5' bgs	735	
				DB = 219.8 + 2.44 (tape) = 222.04' − 5.3' (stickup) = 216.74' bgs	740	
				Bottom of casing at 221' 1/4"	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 ~206'.	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. McGhan 12-7-89 MA Chamness 10/16/89

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

WHC-MR-0209

522

9 1 1 2 7 5 7 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 AST W-017	

Logged by S.P. AIRHART SAP Date 10-25-89
Reviewed by [illegible] Date 12-7-89
Measuring Equip. S-TAPE 1300-08 E-TAPE 10997 Procedure PNL-MA-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'

525

WHC-MR-0209

9 1 1 2 1 5 0 0 5 2 6

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 V. L. McAlum Date 12-7-89
Measuring Equip. S-tape L300-08 E-tape 10997 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
										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/B = 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
0848					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

WHC-MR-0209

9 1 1 2 9 5 7 0 5 2 7

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number Z99-W10-15	Date 10-27-89	Sheet No. 2 of 3
	Location 200 West	Project W-017 SST	

Logged by S. P. AIRHART S+P [signature] Date 10-27-89
Reviewed by [signature] 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 PETTBONE / 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'	219.9' + 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	193.5'	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	195.8'	2.6'	201.3' + 2.44' - 7.9' = 195.8'
					197.1'			198.1'	-1'	204.9' + 2.44' - 9.2' = 198.1

525

WHC-MR-0209

9 1 1 2 9 5 1 0 5 2 8

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 [signature] Date 10-27-89
Reviewed by [signature] Date 12-7-89
Measuring Equip. L300-08 Procedure PNL-MA-567 BO.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
1120	Carbon Steel	8"			197.1'	20-90 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" dart 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',
										16 bags used = 17.9 ft³
					196'	5/8" 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

9 1 1 2 7 5 1 0 5 7 9

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 [signature] Date 10-30-89
Reviewed by [signature] Date 12-7-89
Measuring Equip. S-TAPE · L300-08 Procedure PNL-MA-567 DO-1 RO

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
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"	177.6'	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										D/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

527

WHC-MR-0209

9 1 1 2 9 5 0 0 5 3 0

14L 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 St P Airhart Date 11-1-89
Reviewed by V.C. McGlinn Date 12-7-89
Measuring Equip. S-TAPE 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
0700										Decided to procede 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.

528

WHC-MR-0209

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)	17. Disposition, Justification, & Instructions.
	See attached Construction Nonconformance Report (KEH form).	See attached Construction Nonconformance Report.
	Originator: Complete Blocks Inside Heavy Border.	Impact Level II IR/UOR Required? No

Originator's Signature: Airhart (signature attached) Date: 10-30-89	See Reverse Side Of Page One For Disposition Instructions.
Supervisor's/Manager's Signature: N/A Date:	
18. Design Document Change Required? ☐ Yes, Doc. No. ☒ No	19. Corrective Action Required? ☐ Yes, CAR No. ☒ No

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:	

OUT

☒ 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

Page 1 Of 1

(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.

~~[illegible]~~ 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

(1F) Tag No.	(1G) Originator, Company and Date,	(1H) Supervisors Review
	[signature], 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. [signature] 10/31/89	Design C.E. Hodge 10/30/89	Safety N/A.	Engr. C.E. Hodge 10/30/89	AI (ASME) [signature] 10/31/89
QA [signature] 10/31/89	QA W.R. Thackaberry 10-30-89	PE C.E. Hodge 10/30/89	QA W.R. Thackaberry 10-30-89	DGE N/A.

(3A)
- [X] Disposition Effected As Directed. NCR Closed
- [ ] Other (Specify)

[signature] Originator or Representative — 11-7-89 Date

(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: JC 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

Westinghouse Hanford Company

C. E. Hodge R3-43
R. L. Jackson H4-56
L. C. Swanson H4-56

Kaiser Engineers Hanford Company

J. F. Keller Trl. 6/200E

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

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, MIRHALF, 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 DS drilling
steel casing to 140'		0		
				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

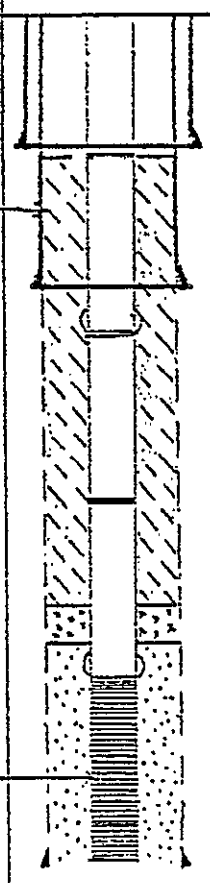
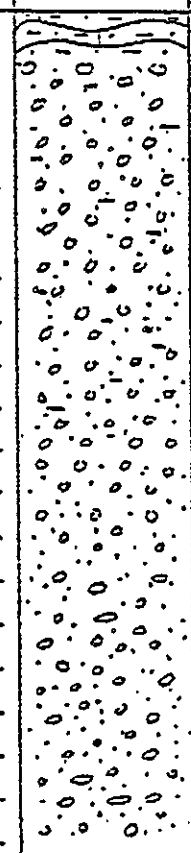
A-1320-155(3/87)

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
				Caliche
				Δ 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-1500-188 (2/87)

9 1 1 2 5 1 0 3 7 6

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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

CCH/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. CCH - 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	CGE N/A.

☒ Disposition Effected As Directed. CNCR Closed
☐ Other (Specify)

Originator or Representative ____ Date 11-7-89

List of Documents Affected

(4B) Documents Revised
By ____ Date ____

9 1 1 2 9 5 1 0 5 7 8

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. AIRHART [signature] Date 11-1-89
Reviewed by [signature] Date 12-7-89
Measuring Equip. STAPE · L300-08 Procedure PNL-MA-567 00-1 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:
						Volclay Grout	1 batch →			2 50 lb bags Volclay Pure Gold
										25 gallons H_2O = Density = 10.4 lbs/gal
						" "	1 batch →			2 bags Volclay Pure Gold
										27 gallons H_2O = Density = 10.2 lbs/gal
						" "	1 batch →			2 bags Volclay 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.

WHC-MR-0209

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9 1 1 2 0 5 1 0 5 3 9

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-W10-15 Location 200 W	Date 11-2-89 Sheet No. 1 of 1 Project W-017 SST

Logged by S. P AIRHART SPA Date 11-2-89
Reviewed by W. L. McGlean Date 12-7-89
Measuring Equip. S-TAPE L300-08 Procedure PNL-MA-567 DO-1 R-0

Drilling Contractor KEY
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 D/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

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9 1 1 2 0 5 1 0 7 1 0

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-W10-15 Location 200 W	Date 11-6-89 Sheet No. 1 of 2 Project W-017 SST

Logged by S. P. AIRHART [signature] Date 11-6-89
Reviewed by [signature] 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 end ∴ 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'	74'	68.9'			59.6'	9.3'	
1344					68.9'		15 bags	33.7'	35.2'	

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[illegible]LY BOREHOLE/WELL COMPLETION LOG

Boring or Well Number: 299-W10-15
Location: 200 West
Date: 11-6-89
Sheet No. 2 of 2
Project: W-017 SST

Logged by: S. P. AIRHART SIPA
Date: 11-6-89
Reviewed by: [illegible]
Date: 12-7-89
Measuring Equip.: STAPE L300-08
Procedure: PNL-MA-567 [illegible]

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'

9 1 1 2 7 5 7 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. D. AIRHART — Date 11-7-89
Reviewed by [illegible] — Date 12-7-89
Measuring Equip. 1-TAPE L300-08 — Procedure PNL-MA-567 DOC-1, R.0

Drilling Contractor KEH
Driller C. Wamsley
Rig/Equipment Deltaborne 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

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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 back-pulled 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.

9 1 1 2 7 5 1 0 5 1 4

DAILY BOREHOLE LOG	Boring or Well Number 299-W10-16 Location 200-W	Date 9-7-89 Sheet No. 1 of 3 Project W-017 SST

Logged by R.P. BLEGEN Date 9-7-89
Reviewed by V.L. McArthur Date 12-4-89
Lith. Class. Scheme FOLK Procedure DO-1 Rev. 0

Drilling Contractor KAISER
Driller D GARCIA
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			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			
								BROWN. NO RXN W/10% HCl. UNCONSOLIDATED.			
								[SURFICIAL 1' CONTAINED SEVERL SUBROUNDED COBBLES AND			
								LARGE GRAVEL]			
10'	GR	BKK	M	LITH	2			MUDDY SAND: TRACE GRAVEL, 80% SAND, 20% MUD		0935	DRIVE BARREL SAMPLE
	OVA	21		MOIST	1			(TRACE GRAVEL IS SR-R, MP), 25% VCS, 30% CS, 10% MS			
								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 BARREL			
								[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

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WHC-MR-0209

9 1 1 2 0 5 0 0 5 1 5

DAILY BOREHOLE LOG	Boring or Well Number 299-W10-16 Location 200-W (T-FARM)	Date 9-7-89 Sheet No. 2 of 3 Project W-017 SST

Logged by R.P. BLEGEN	Date 9-7-89	Drilling Contractor KAISER
Reviewed by W.L. McGlam	Date 12-4-89	Driller D. GARCIA
Lith. Class. Scheme FOLK	Procedure DO-1, R. 0	Rig/Method DE 22 W #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
15'	GR	BACK		LITH	2			MUDDY SANDY GRAVEL: 60% GRAVEL, 57% SAND, 3% MUD		1032	DRIVE BARREL SAMPLE
	DVA	"		MOIST	1			3% SC, 5% VCP, 8% CP, 12% MP, 10% FP, 22% VFP			DRILLER SAID MATERIAL IS
								5% VCS, 2% CS, 14% MS, 10% FS, 6% VFS, 5% MUD			EASY TO DRILL THROUGH, BUT
								VERY POORLY SORTED. GRAVEL: 60% BASALT, 40% FELSK,			THE BOREHOLE DOEN'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 4% HCl UNCONSOLIDATED.			
								Δ TEXTURE, Δ SORTING, Δ COLOR, Δ MINERALOGY		1039	WELDING CASING
								Δ CONSOLIDATION]			ADDING 7'6" OF 10" CASING
											TOTAL 10" = 19'11"
										1113	WELDING COMPLETE
										1115-1139	DIFFICULTY DRIVING CASING
										1150	SHUT DOWN FOR LUNCH
										1245	BACK ON SITE
											RESUME DRILLING

Ronald P. Blegen
9-7-89

5743

WHC-MR-0209

9 1 1 2 1 5 1 0 5 1 6

DAILY BOREHOLE LOG	Boring or Well Number 299-W10-16 Location 200W (T-FARM)	Date 9-7-89 Project W-017 SST	Sheet No. 3 of 3

Logged by R.P. BLEGEN Date 9-7-89
Reviewed by [illegible] Date 12-4-89
Lith. Class. Scheme FOLK Procedure PO-1 Rev. 0

Drilling Contractor KAISER
Driller D. GARCIA
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% VCS			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

Ronald P. [illegible]

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9 1 1 2 0 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 D.L. Maclean — 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			
								(sands), 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	Drilling 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

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9 1 1 2 3 5 0 0 5 1 3

DAILY BOREHOLE LOG	Boring or Well Number 299-W10-16 Location 200 West Area	Date 9-8-89 Project W-017	Sheet No. 2 of 2

Logged by M. Birch — Date 9-8-89
Reviewed by [illegible] — Date 12-4-89
Lith. Class. Scheme Folk — Procedure DO-1

Drilling Contractor Kaiser
Driller Dave Garcia
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'	OVA (FID)	<1ppm	M	Moist	1		msG	MUDDY SANDY GRAVEL 60% Gravel 25%		1305	D Sample
				Lith	2			Sand 15% mud, 15% SC, 9% VCP			
								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

[illegible]

546

WHC-MR-0209

9 1 1 2 9 5 1 0 5 1 9

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 [illegible] Date 12-4-89
Lith. Class. Scheme Folk Procedure DO-1

Drilling Contractor Kaiser
Driller Gary 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
										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% SC, 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% Qtzite			
								& Frags SA-R Sands: 70% Basalt 30% Felsic & Frag SA-SR			
								Wet Color 10YR 3/2 Very dark greyish			
								Brown Strong Reat 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 7 5 7 0 3 0

DAILY BOREHOLE LOG	Boring or Well Number 299-W10-16	Date 9-11-89	Sheet No. 2 of 3
	Location 200 West area	Project W-017 SST	

Logged by M. Birch — Date 9-11-89
Reviewed by D.L. McGhan — Date 12-4-89
Lith. Class. Scheme Folk — Procedure DO-1

Drilling Contractor Kaiser
Driller G. 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)
										0900	Driving casing
										0905	Drilling w-D. Barrel
							35	8'2" + 10" casing welded; Total = 37'7" + 8'2" = 45'9"		0940	Welding casing
										1052	Drilling w-D. Barrel
35-40'	OVA (FID)	<1ppm	N/A	Lith	2	G		GRAVEL: 70% gravel, 10% Sand,		1107	Drive Barrel Sample
				500ml Alc	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 patin at 30-35')		1130	Shut down for Lunch
										1300	Drilling w-D. Barrel

9-11-89

518

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9 1 1 2 7 5 0 0 5 1

DAILY BOREHOLE LOG	Boring or Well Number 299-W10-16 Location 200 West area	Date 9-11-89 Project W-017 SST	Sheet No. 3 of 3

Logged by M. Birch Date 9-11-89
Reviewed by V.L. McGhan Date 12-4-89
Lith. Class. Scheme Folk Procedure DC-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

[signature] 9-11-89

549

WHC-MR-0209

9 1 1 2 1 5 0 0 5 7 2

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 from 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 [illegible] 10-1-89

WHC-MR-0209

550

9 1 1 2 1 5 7 0 5 7 3

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 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. Mathan 12-4-89 [signature] 9-12-89

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

557

WHC-MR-0209

9 1 1 2 0 5 7 0 5 7 4

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
M. Birch	B.E 22-W Hard Tool	299-W10-16		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 D.L. McGhan 12-4-89

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

USED 12 GALLONS OF H_2O

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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, 10% 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. McGlam 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

9 1 1 2 0 5 0 0 5 7 6

2 of 3

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-Ø17 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% Seds, 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 gravels 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% FS		
				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. Mathis 12-4-89 [signature] 10.00

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9 1 1 2 0 5 0 0 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 V. L. Wathen 12-4-89 Mark [illegible] 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

335

WHC-MR-0209

9 1 1 2 1 5 7 0 5 5 8

DRILL LOG	By M. Birch	Rig 13E 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 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 CS 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
					0855	Finished welding
					0900	Driving casing

REMARKS:

PNL-MA-567 DO-1, REV. 0 Reviewed by V. L. Matthews 12-4-89 M. J. B. Vo[illegible]

WHC-MR-0209

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9 1 1 2 0 5 0 0 5 9

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-317 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% VPP, 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 7.5YR 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 Standard Water

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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 & Feldspar frags, trace micas 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 [signature] 12-4-89 [signature] 9-14-89

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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		
				occurred ~ 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) Moderately 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. Markham 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

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9 1 1 2 9 5 1 0 5 3 2

Pg 1 of 1

DRILL LOG	By M. Birch	Rig BE 22-W	Well Number 299-W10-16	Computer Number	Project or Work Order No. W-017 SST
	Date 9-15-89	Drive Barrel	Depth 95' To 95'	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
				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 [signature] 12-4-89 [signature] 9-15-89

560

WHC-MR-0209

9 1 1 2 9 5 0 5 1 3

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 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
					0902	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 grey) 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 [illegible] 12-4-89 [illegible] 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

321

WHC-MR-0209

9 1 1 2 9 5 1 0 5 1 4

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:

[signature] 12-1-89

[signature]

562

WHC-MR-0209

9 1 1 2 1 5 3 0 5 5 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;	758	Sample - drive barrel
				70% silt; appear to be layers several centi-	800	No detectable con-
				meters thick of alternating sandy silt		tamination in
				and silty fn sand; individual layers are		well or of samples
				well sorted; wet color (10YR 5/6 - yellowish		with OVA.
				brown); v.strng rxn w/ HCl; moderately	835	Prepare to weld
				consolidated; abundant $CaCO_3$ stringers		casing
				and nodules [Samples: 2 lith., 1 Moisture]		" "
115'3½"				Add on 6'10½" of 10" casing, Total = 108'5"	850	Weld on casing
				+ 6'10½" = 115'3½"	950	Begin drilling with
						drive barrel
	115'	D	M	Sandy MUD; same as previous sample but	1015	Sample - drive barrel
				without $CaCO_3$ stringers and nodules;		
				still v.strng rxn w/ HCl; breaks apart in		
				plates meaning it's finely laminated		

REMARKS: [samples: 2 lith, 1 moisture]

Bruce Bjornstad 9/20/89

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

523

WHC-MR-0209

9 1 1 2 9 5 0 0 5 5 6

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 $CaCO_3$		
				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

[illegible] 12-4-89

504

WHC-MR-0209

9 1 1 2 7 5 0 0 5 3 7

1 of 2

DRILL LOG	By: T Gilmore	Rig: BE22W	Well Number: 299 W10 16	Computer Number: N/A	Project or Work Order No.: 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 Hard Tool
				Switch to Hard 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, Mod 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 V.L. McGlam 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

9 1 1 2 9 5 0 5 3

2 of 2

DRILL LOG	By T Gilmore	Rig BE22W	Well Number 299 W10 16	Computer Number N/A	Project or Work Order No. W-017 SST
	Date 9/21/89	Gary Lydin Driller	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 T Gilmore 9/21/89

PNL-MA-567 DO-1 REV. 0 7/ [illegible] 12-4-89

566

WHC-MR-0209

DRILL LOG	By S.S. Teel	Rig CE22W	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: 2.5 Y 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 Water

567

WHC-MR-0209

9 1 1 2 9 5 1 0 3 7 0

2 of 2

DRILL LOG	By S.S. Teel	Rig BE22W	Well Number 279-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:

PUL-MA-507 D01 - Rev 0 Reviewed by V.L. Mathan 12-4-89

S.S Teel
9-22-89

568

WHC-MR-0209

9 1 1 2 0 5 7 0 5 7 1

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 V.L. McGlew 12-4-89

Bern 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

9 1 1 2 1 5 1 0 5 7 2

1/1

DRILL LOG	By T Gilmore	Rig BE22W Gary Hylin	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 dkgy, 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

Drilled 1x1 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. Bleyen	Rig BE 22W 422-14102 G. Lydia	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 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

571

WHC-MR-0209

9 1 1 2 2 5 1 0 5 7 4

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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/hard tool
	145'	H	N/A	Muddy Sandy GRAVEL (30% gravel, 60% sand, 10%	905	Sample-hard tool
				mud); Gravel = 70% basalt, 10% quartzite,	910	Drill w/hard 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/hard tool
	150'	H	Wet	Muddy Sandy GRAVEL (60% gravel, 30% sand,	1300	Sample-hard 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:

Bruce Bjornstad 9/28/89

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

BWC-MR-567, DO-1, Rev. 0

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WHC-MR-0209

DRILL LOG	By AIRHART	Rig BE 22W 14102 GARY LYDIN	Well Number 299-W10-16	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
					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 [illegible] 12-4-89

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

50 GALLONS of H_2O

[illegible] 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

573

WHC-MR-0209

9 1 1 2 0 5 1 0 5 7 6

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% qtzite, 20% other;	0930	Bail w/dual
				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% qtzite, 30% other; Sand =		
				20% basalt, 30% qtzite 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 [signature] 12-1-89

574

WHC-MR-0209

9 1 1 2 5 9 0 5 7

DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
B.N. Bjornstad	BE-22W 14102 Gary Lydin	299-W1C-16	N/A.	W-017 SST
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

Reviewed by W.L. Malahan 12-4-89

Bruce Bjornstad 10/2/89

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

575

WHC-MR-0209

9 1 1 2 1 5 1 0 6 7 3

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DRILL LOG	By EJ Jensen	Rig BE-22W 14102 Gary Lydin	Well Number 299-W10-16	Computer Number NA	Project or Work Order No. WD17 55T
	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:

5Y 4/2

Reviewed by [illegible] 12-1-89

10/3/89

576

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9 1 1 2 5 7 0 5 7 9

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DRILL LOG

By	Rig	Well Number	Computer Number	Project or Work Order No.
B.N. Bjornstad	BE-22W 14102 Gary Lydin	299-W10-16	N/A	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% qtzite, 30% other;		gravels are drilling
				Sand = 20% mafic, 80% felsic; wet color =	0820	easier Sample - 180'
				2.5Y5/2 (grayish brn); no rxn to HCl;		Driller thinks
				unconsolidated [samples: 2 lith, 2 special		he hit water
				chemical]		@ 179' - will barrel cuttings
						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

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9 1 1 2 0 5 0 0 5 0

DRILL LOG	By EJ Jensen MA Chamness	Rig BE 22W 14102 Gary Lydia	Well Number 299-W10-16	Computer Number NA	Project or Work Order No. W-017 SST
	Date 10/5/89		Depth 185 To		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:

[signature] 10/5/89

Reviewed by V.L. McGhan 10-6-89

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9 1 1 2 1 5 0 0 5 1

DRILL LOG	By: S. M. Goodwin	Rig: BC 22 W #22-14/102	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% VFD, 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'.		
~~197'9"~~	206'1"	SDA 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: 20% MAFIC, 80% 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 [signature] 12-4-89 [signature] 10/6/89

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

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9 1 1 2 0 5 3 0 5 2

DRILL LOG	By: S. M. Goodwin	Rig: BE 22w	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 - remark able.
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 35 gal. H_2O added Today

PNL-MA-567 DO-1, REV. 0 Reviewed by [signature] 12-4-89 [signature] 10/6/89

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DRILL LOG	By: MA Chamness	Rig: REZZW 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 V.L. McGhee 12-4-89 MA Chamness

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

9 1 1 2 5 0 0 5 4

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 [illegible] Date 12-4-89
Measuring Equip. L300-04 E.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
										~ 201'.
0800	STAINLESS STEEL	4"	21.0	(1) 10 SLOT CHANNEL PACK SCREEN						SETTING 4" S.S. CASING &
		4"	20.04	(5) TYPE 304		SCH. 5 CASING				SCREEN.
		4"	20.04	(5) "	"	" " "	w/ CENTRALIZERS			
	TOTAL CASING									
	& SCREW =		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

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9 1 1 2 1 5 7 0 5 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 [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. 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; TAPE 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.

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9 1 1 2 0 5 0 0 5 3 6

DAILY BOREHOLE/WELL COMPLETION LOG	Boring or Well Number 299-W10-16 Location 200 WEST SINGLE SHELL TANKS	Date 10/23/89 Project W-017	Sheet No. 3 of 3

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 STRODE
Rig/Equipment CRANE & 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

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9 1 1 2 0 5 1 0 5 2 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. LS00-13 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
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	101.65	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

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9 1 1 2 1 5 1 0 5 2 8

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 [signature] Date 10/24/89
Reviewed by [signature] 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

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9 1 1 2 5 0 0 5 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 Date 10/25/89
Reviewed by [illegible] Date 12-4-89
Measuring Equip. L300-13 Procedure DO-1, REV. 0

Drilling Contractor KGH
Driller BRETT STRODE
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	79.8	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 = 58.9
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.

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9 1 1 2 3 5 1 0 5 0 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 [signature] Date 12-4-89
Measuring Equip. L300-13 E-TAPE 10998 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
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.

588

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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 -5.7' 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 well is dry. Depth Return Error less than 0.5 inch.

9 1 1 [illegible] 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 8.53×10^{-2} ell $\frac{PPM}{cps}$

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 ell P/m FS = 5000 cps POSITION 2 ~95%, 51 ell 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 ell P/m FS = 5000 POSITION 2 ~21%, 60 ell P/m FS = 5000 BACKGROUND ~70%, 345 c/s FS = 500

PERCENT CHANGE: POSITION 1 ~1% 1.4% POSITION 2 ~11% 15%

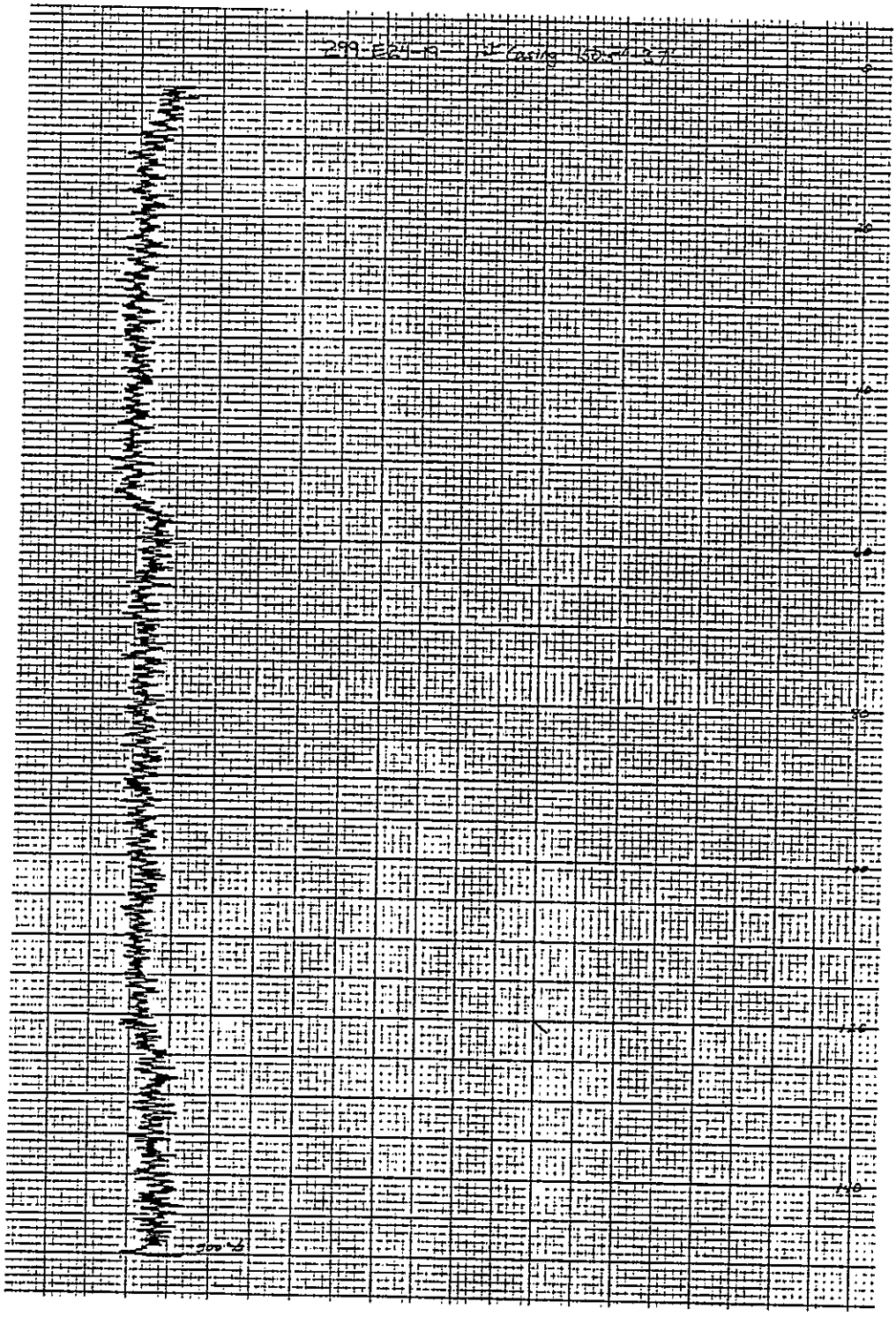
COMMENTS: High Bkgd, due to "Shine" from A-Tank Farm

Change in Pos 2 Reading is indication, Log should be used as Indicator Only

WITNESSED AND VERIFIED BY: [signature] 8/17/89

WHC-MR-0209

591



9112150524

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 N/A
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"

9 1 1 2 0 5 0 0 5 0 6

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 8.53×10^{-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 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

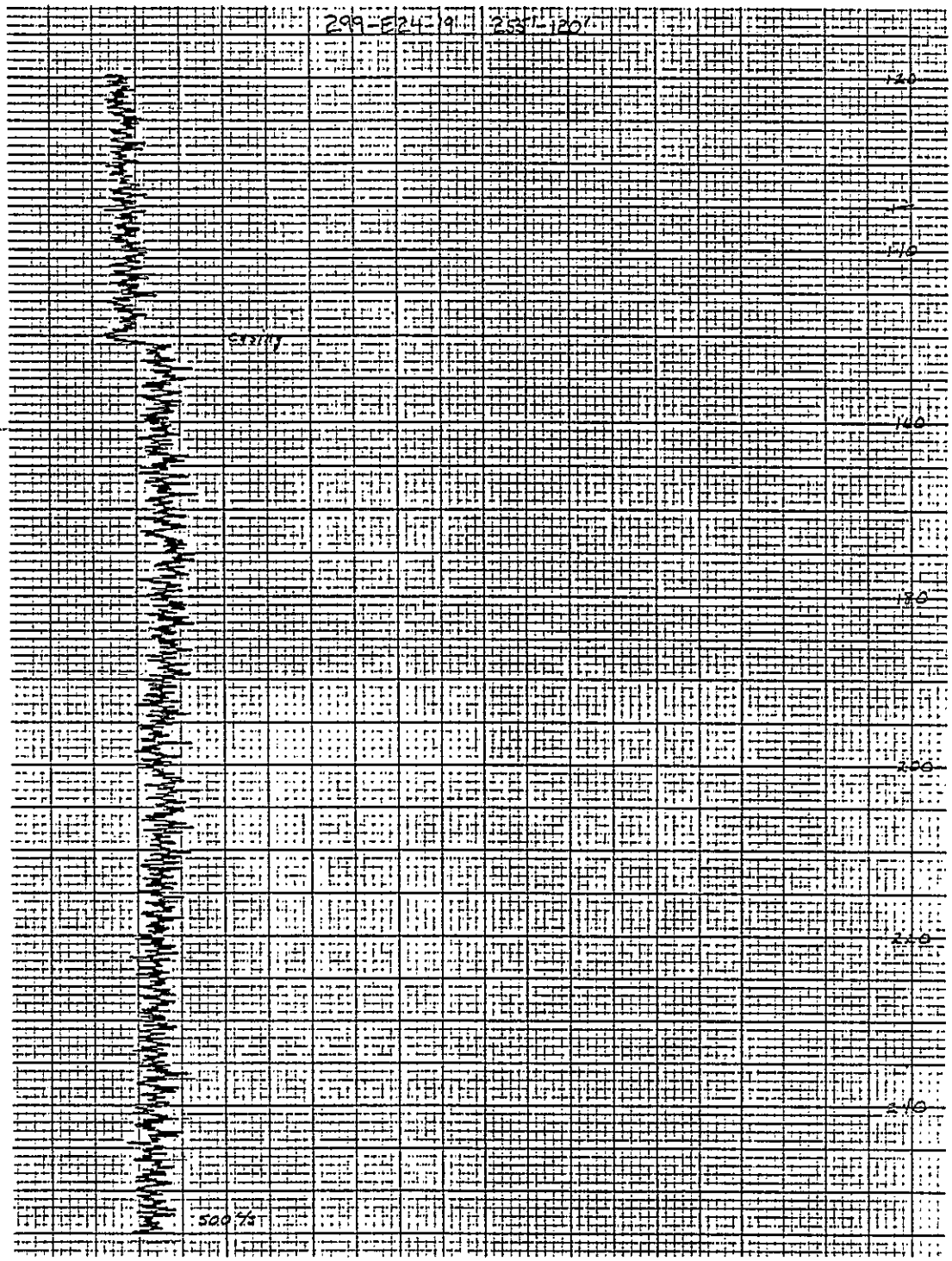
PERCENT CHANGE: POSITION 1 2.1% POSITION 2 16%

COMMENTS:

WITNESSED AND VERIFIED BY: J. R. Broadeur 8/24/89

594

WHC-MR-0209


299-E24-19
255'-120'
120
110
140
180
200
220
240
500 c/s

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:

EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGlean

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 8.53×10^{-2} cll p/m/c/s

DEAD TIME 7.4 μ sec — WARM UP TIME Cont. Running from well E34-8

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

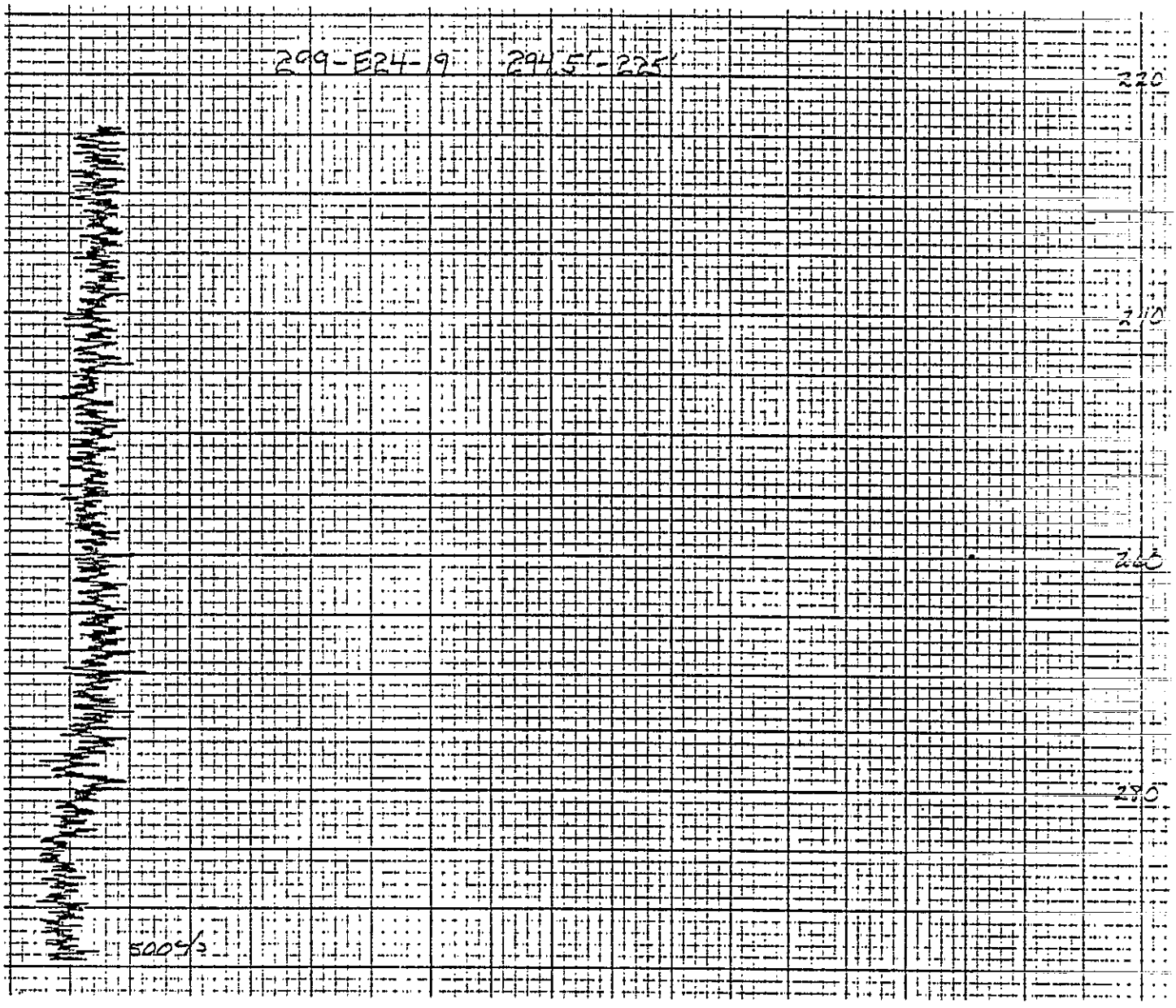
PERCENT CHANGE: POSITION 1 0 % POSITION 2 1.8 %

COMMENTS:

Δ's are Acceptable; Log OK for Analysis. JG

WITNESSED AND VERIFIED BY: J.L. Gould 8/29/88

597


299-E24-19 294.5'-225'
220
210
200
190
500 c/s

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-TM~~ 0-144.5'
TYPE	INTERVAL
TYPE	INTERVAL
TYPE	INTERVAL

WELL SCREEN INTERVAL:

COMMENTS: DETURN ERROR 2"

9 1 1 2 9 5 7 0 6 9 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. CG-27A97 CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR 8.53×10^{2} eu 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 ~~307 eu~~ 297 vfm P/M 3600 c/s POSITION 2 ~~72 eu~~ 61 vfm P/m 840 c/s BACKGROUND 10 eu P/m 120 c/s

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 ~~303 eu~~ 241 vfm P/m 3550 c/s POSITION 2 ~~67 eu~~ 55 vfm P/m 780 c/s BACKGROUND 12 eu P/m 135 c/s

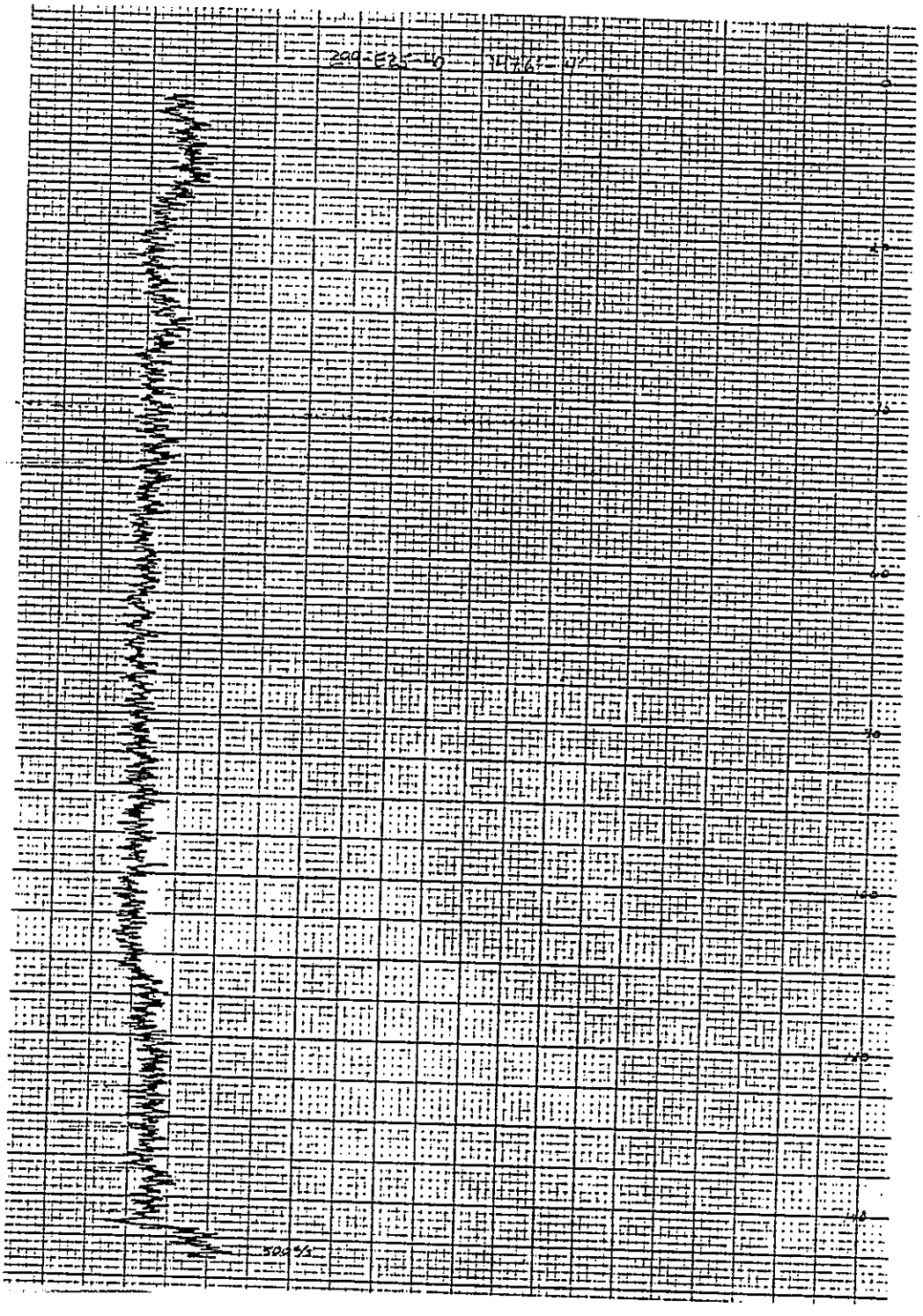
PERCENT CHANGE: POSITION 1 2.0% POSITION 2 10.0%

COMMENTS:

WITNESSED AND VERIFIED BY: J. R. Broden 8-15-89

600

WHC-MR-0209



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

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 8.53×10^{-2} eU ppm / 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

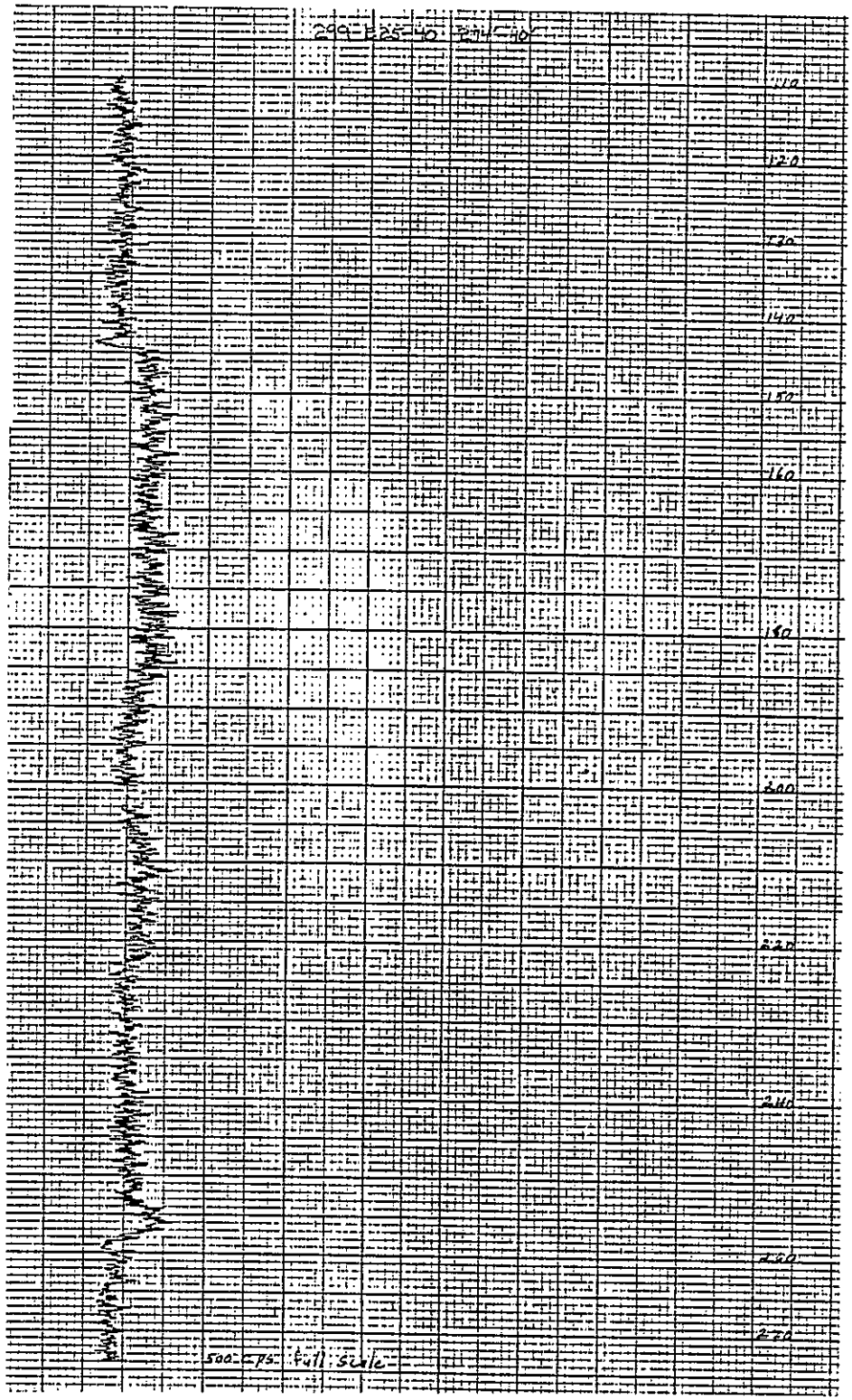
PERCENT CHANGE: POSITION 1 1.4% POSITION 2 3.2%

COMMENTS:

WITNESSED AND VERIFIED BY: J. R. Anderson 8/24/89

603

WHC-MR-0209


110
120
130
140
150
160
180
200
220
240
260
270
500 cps full scale

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

9 1 1 2 0 5 0 0 0 0

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. CG-27A97 — CALIBRATION REFERENCE WHC-EP-0246

CALIBRATION / PROBE FACTOR 8.53 X 10^{-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 nCM ~~307~~ eu P/m 3600 c/s — POSITION 2 54 nCM ~~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 nCM ~~303~~ eu P/m 3550 c/s — POSITION 2 54 nCM ~~69~~ eu P/m 810 c/s — BACKGROUND 15 eu P/m 175 c/s

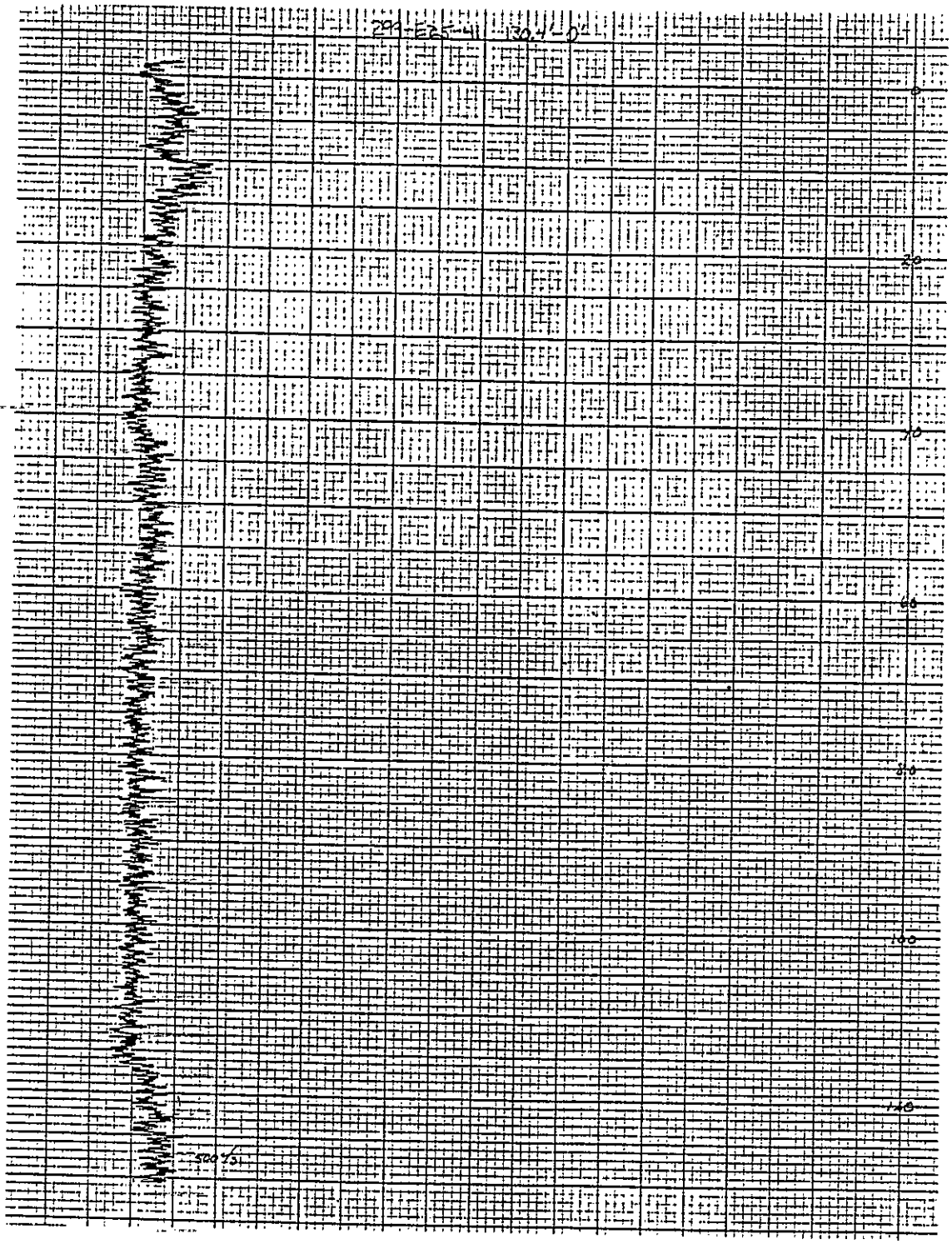
PERCENT CHANGE: POSITION 1 1.4% — POSITION 2 0%

COMMENTS:

WITNESSED AND VERIFIED BY: John R. Broder 8-15-89

606

WHC-MR-0209


299-E25-41 130.4'-0"
0
20
40
60
80
100
120
500 c/s

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 139' / 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

608

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 8.53×10^{-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

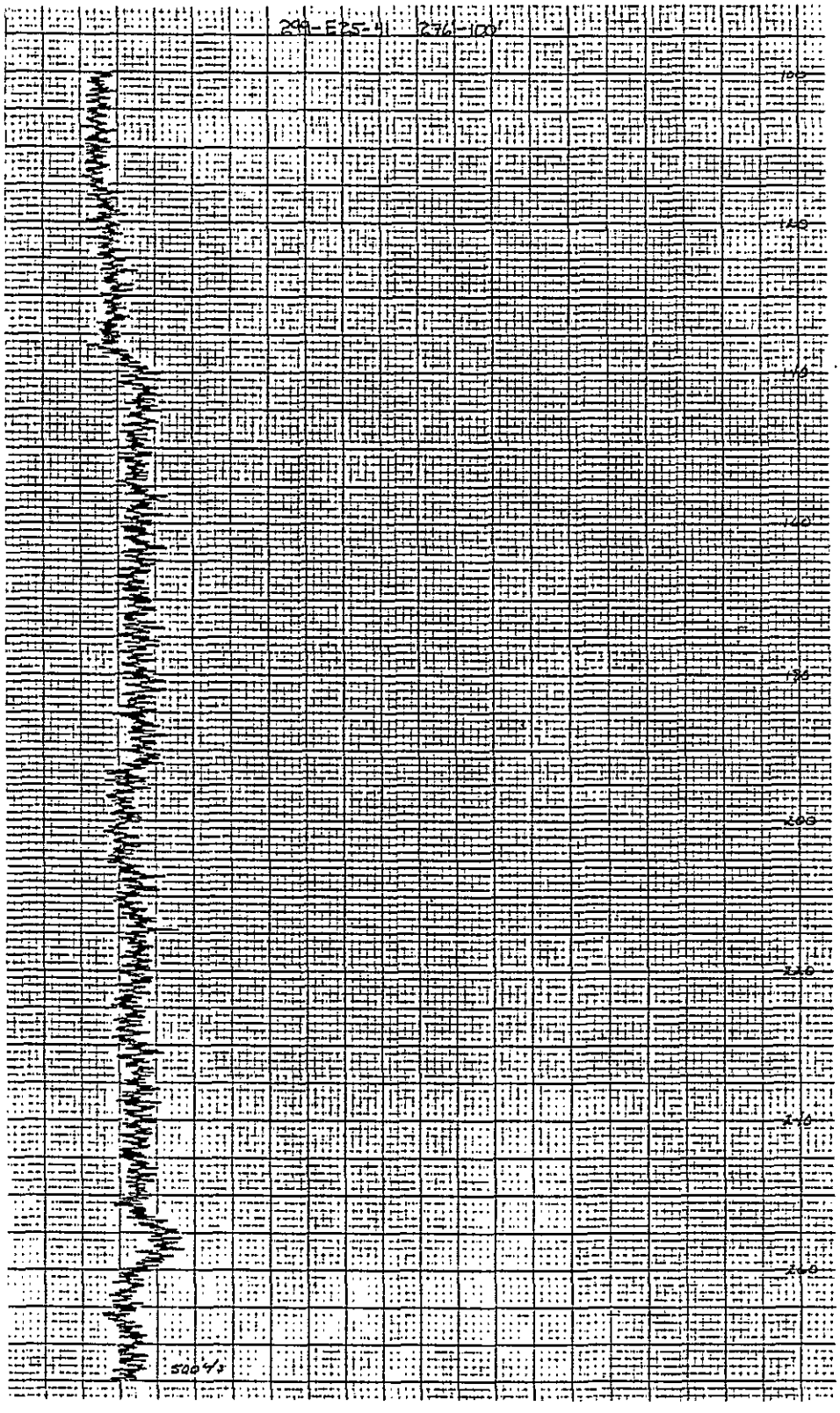
PERCENT CHANGE: POSITION 1 4.8% POSITION 2 5.1%

COMMENTS:

WITNESSED AND VERIFIED BY: J.R. Broderick 8/24/89

609

WHC-MR-0209


299-E25-41 276'-100'
100
120
140
160
180
200
220
240
260
500 c/s

WESTINGHOUSE HANFORD COMPANY

WELL NUMBER 299-E27-12 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 27.5°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:

9 1 1 2 3 5 3 0 6 1 4

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 8.53×10^{-2} ell 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 ell p/m POSITION 2 65 ell 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 ell p/m POSITION 2 65 ell p/m BACKGROUND 185 c/s

PERCENT CHANGE: POSITION 1 3.5% POSITION 2 0

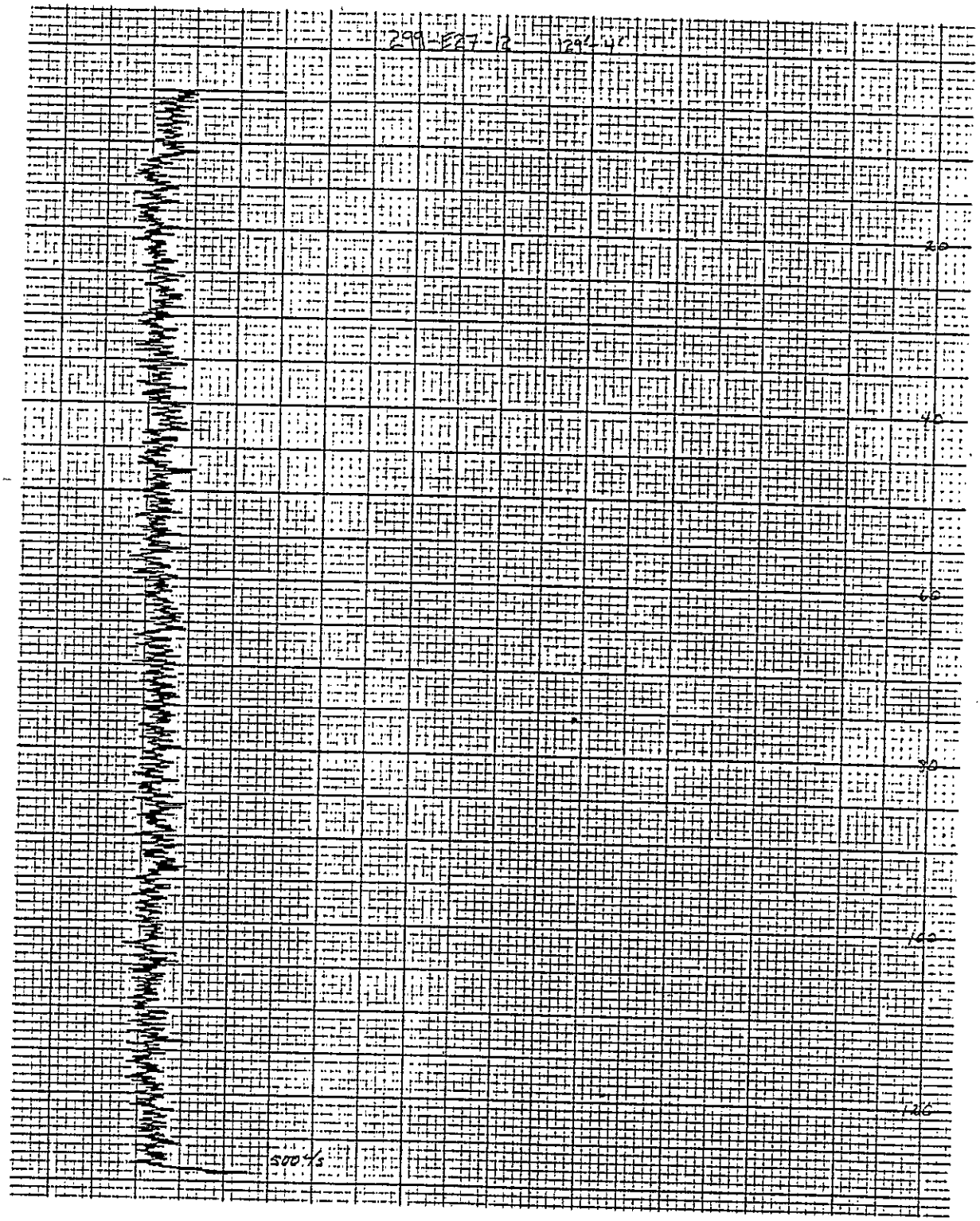
COMMENTS:

Log OK. for Analysis

WITNESSED AND VERIFIED BY: [signature] 9/6/89

WHC-MR-0209

612


299-E27-12
129'-4"
20
40
60
80
100
120
500 c/s

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

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 8.53×10^{-2} ell p/m/c/s

DEAD TIME 7.4 μ SEC. — WARM UP TIME CONT. FROM WELL E 27-13

LOGGING INFORMATION

LOG INTERVAL FROM 267' TO 100'

RERUN(S) 267' – 235'

PRE SURVEY CALIBRATION: POSITION 1 282 ell p/m POSITION 2 55 ell 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.

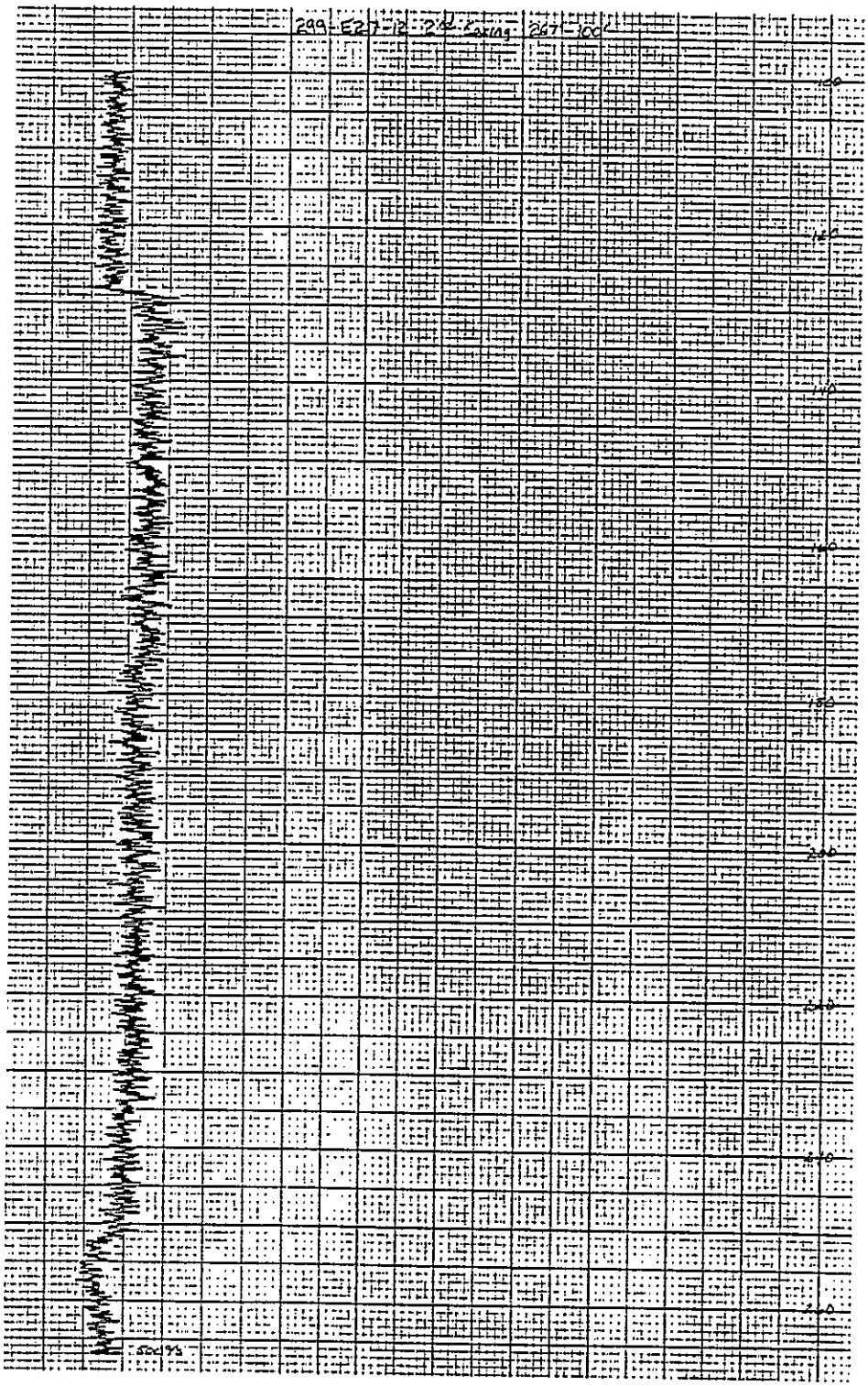
POST SURVEY CALIBRATION: POSITION 1 282 ell p/m POSITION 2 56 ell p/m BACKGROUND 190 c/s

PERCENT CHANGE: POSITION 1 0 POSITION 2 1.8 %

COMMENTS:

WITNESSED AND VERIFIED BY: J.A. Gould — Log is Acceptable for Analysis KY 9-18-89

615


299-E27-12 2nd Casing 267'-100'

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)

9 1 1 2 5 0 0 5 0

EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGhan

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~~ 7.7 μ Sec 8.53×10^{-2} ell 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 ell p/m POSITION 2 55 ell 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.

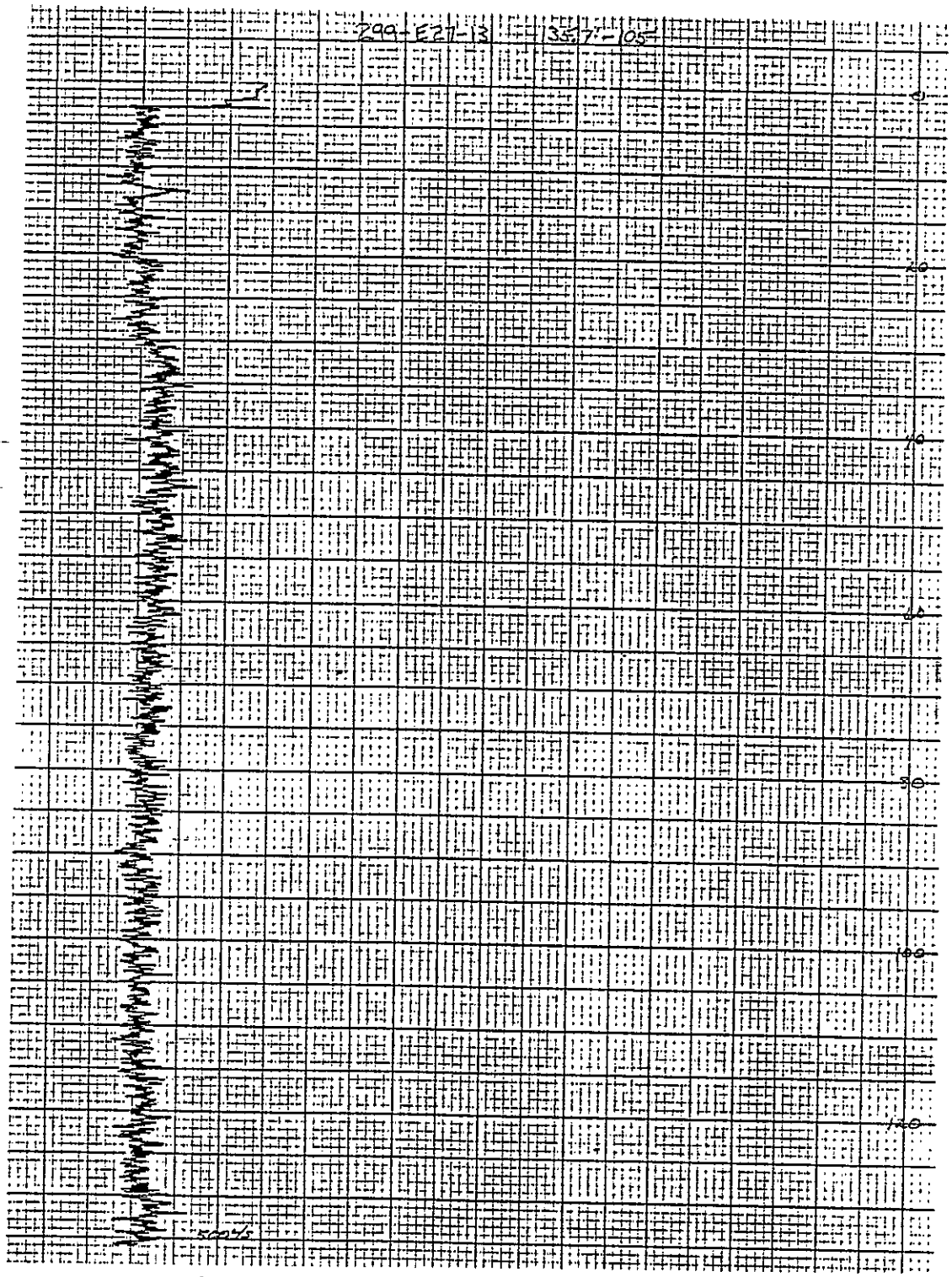
POST SURVEY CALIBRATION: POSITION 1 285 ell p/m POSITION 2 61 ell p/m BACKGROUND 160 c/s

PERCENT CHANGE: POSITION 1 1.8% POSITION 2 10%

COMMENTS:

WITNESSED AND VERIFIED BY: J. J. Gould, Log is acceptable for lithologic Correlation (9/18/89)

618


299-E27-13
0
20
40
60
80
100
120
500%

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/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

9 1 1 2 1 5 0 0 9 3

EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGlean

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 8.53×10^{-2} eU 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 eU p/m/c/s POSITION 2 57 eU 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 eU p/m/c/s POSITION 2 57 eU p/m/c/s BACKGROUND 155 c/s

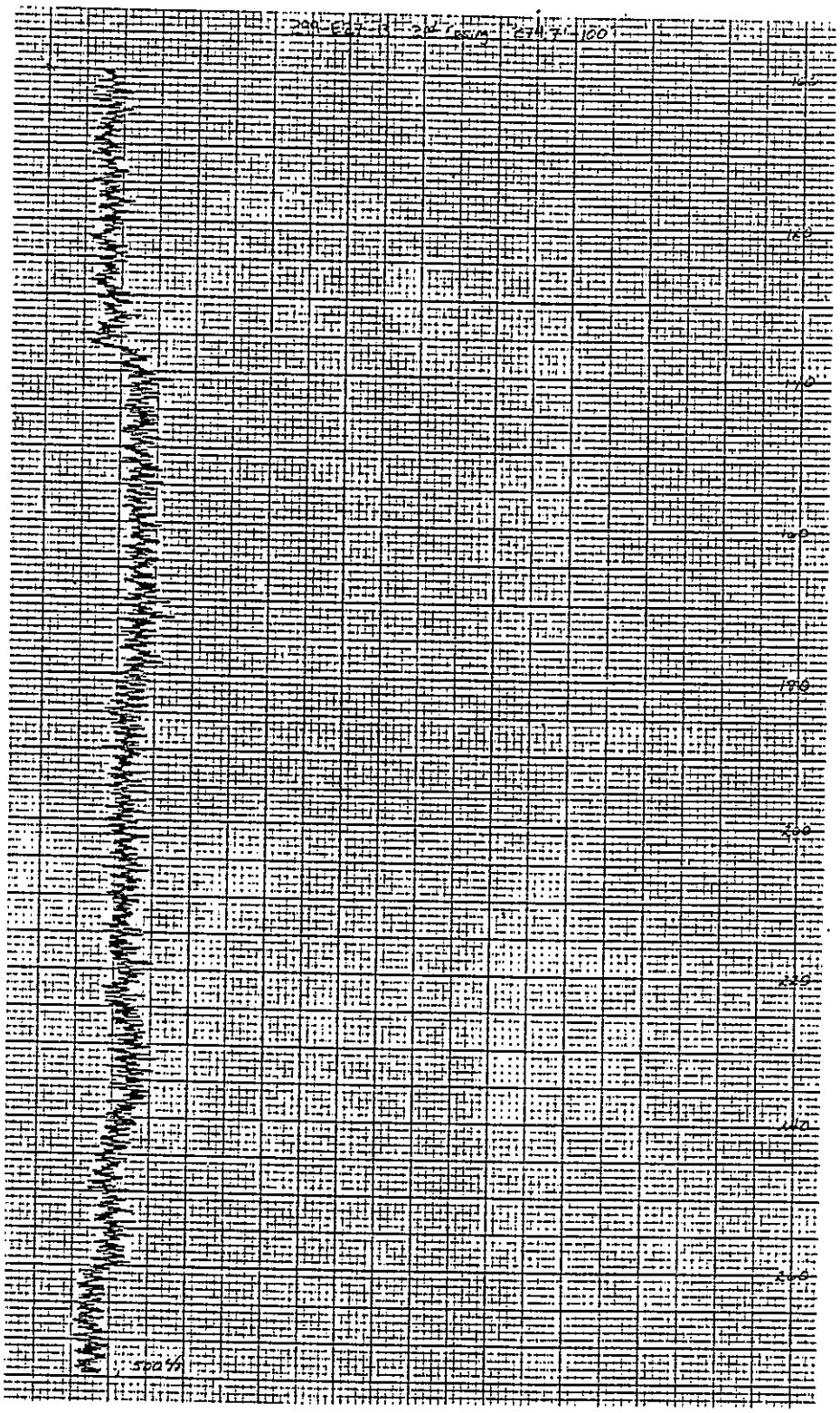
PERCENT CHANGE: POSITION 1 1.4 % POSITION 2 0 %

COMMENTS: Probe is sidewalked w/ Bowspring

WITNESSED AND VERIFIED BY: J. J. Gould — Log is ACCEPTABLE for Analysis - JG 9/28/89

WHC-MR-0209

621



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)

9 1 1 2 0 5 0 0 6 2 6

EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McKlam

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 8.53×10^{-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

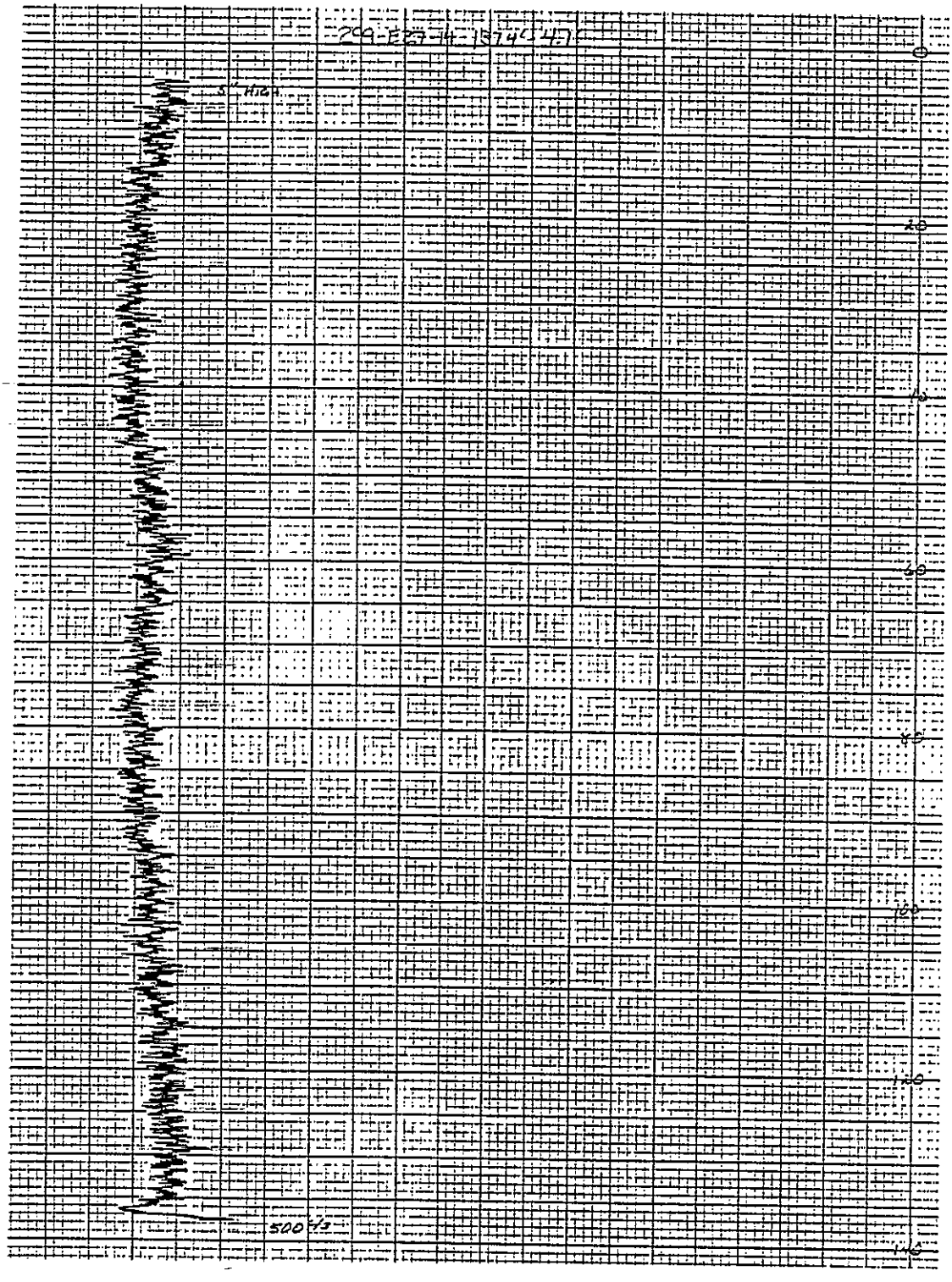
PERCENT CHANGE: POSITION 1 3.2% POSITION 2 20%

COMMENTS:

WITNESSED AND VERIFIED BY: [signature] Well log is acceptable for Lithologic Correlation [signature] 7/27/89

684

WHC-MR-0209


0
20
40
60
80
100
120
140
500 c/s

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' STICKUP
TYPE	INTERVAL
TYPE	INTERVAL

WELL SCREEN INTERVAL: NA

COMMENTS: DEPTH RETURN ERROR 2"

626

9 1 1 2 0 5 0 0 6 2 9

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 8.53×10^{-2} ell 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 ell ppm/c/s POSITION 2 61 ell 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 ell ppm/c/s POSITION 2 61 ell ppm/c/s BACKGROUND 260 c/s

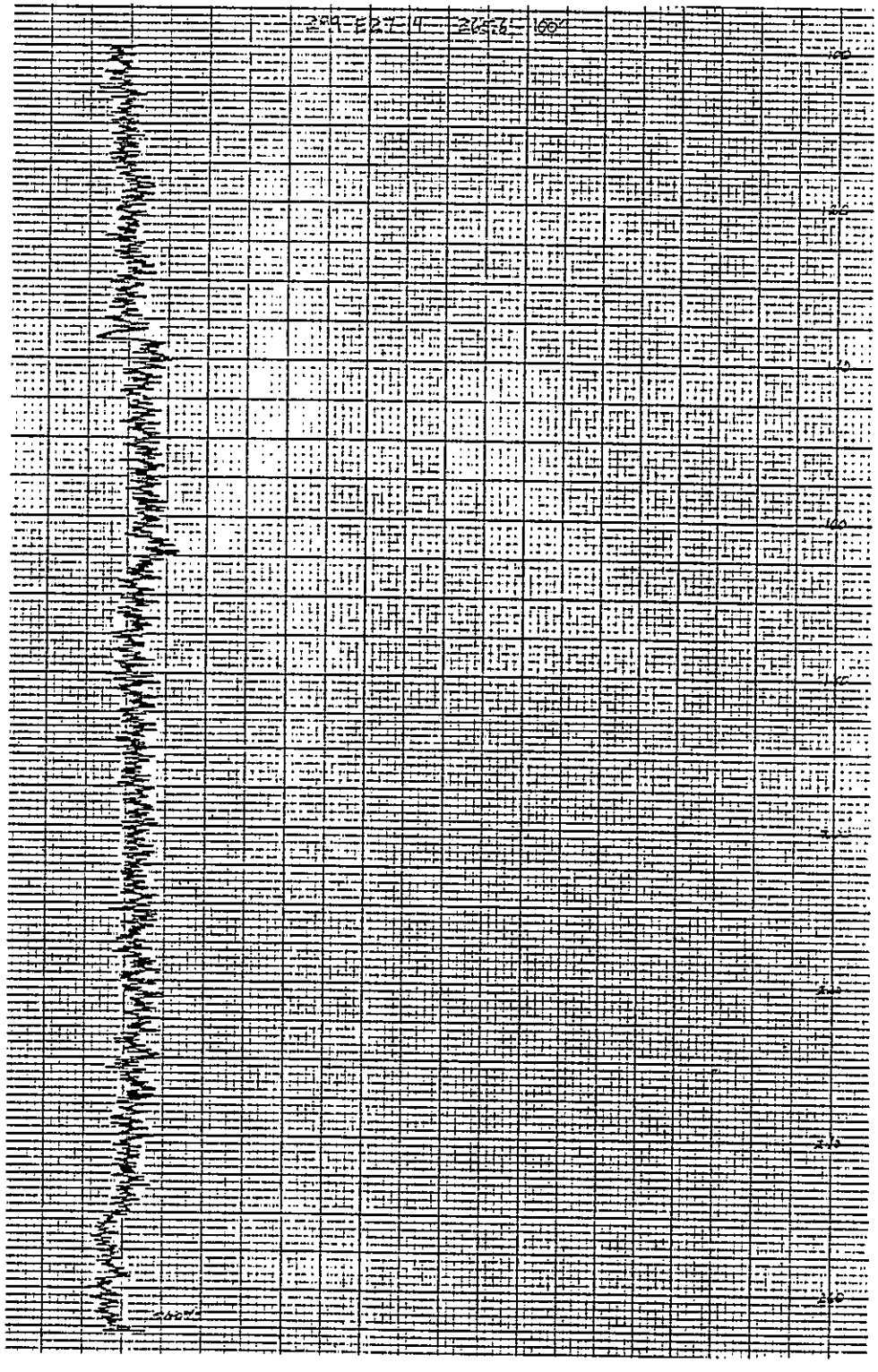
PERCENT CHANGE: POSITION 1 10.7% POSITION 2 0 %

COMMENTS:

WITNESSED AND VERIFIED BY: J. R. Broder 10-11-89

WHC-MR-0209

627



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:

9 1 1 2 1 5 3 0 5 7 2

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 8.53×10^{-2} ell 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 ell p/m POSITION 2 61 ell 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 ell p/m POSITION 2 56 ell p/m BACKGROUND 120 c/s

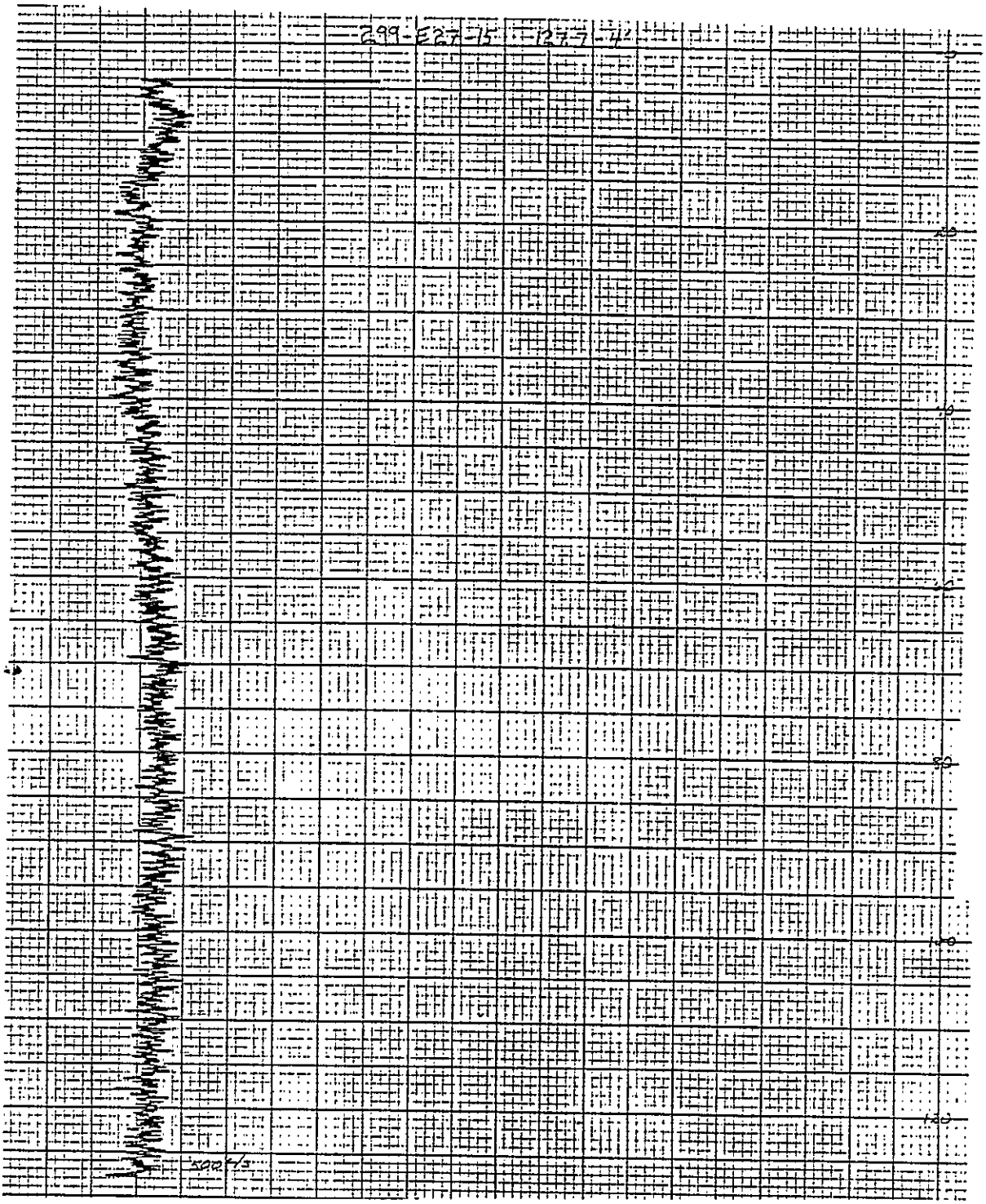
PERCENT CHANGE: POSITION 1 1% POSITION 2 8.2%

COMMENTS:

WITNESSED AND VERIFIED BY: Log is acceptable for qualitative indicator of lithology - J.L. Gould 9-6-89

630

WHC-MR-0209


299-E27-15
127.7
20
40
60
80
100
120

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)

9 1 1 2 1 5 0 0 4 7 5

EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.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 8.53×10^{-2} ell g/m/c/s

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 ell g/m POSITION 2 59 ell 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

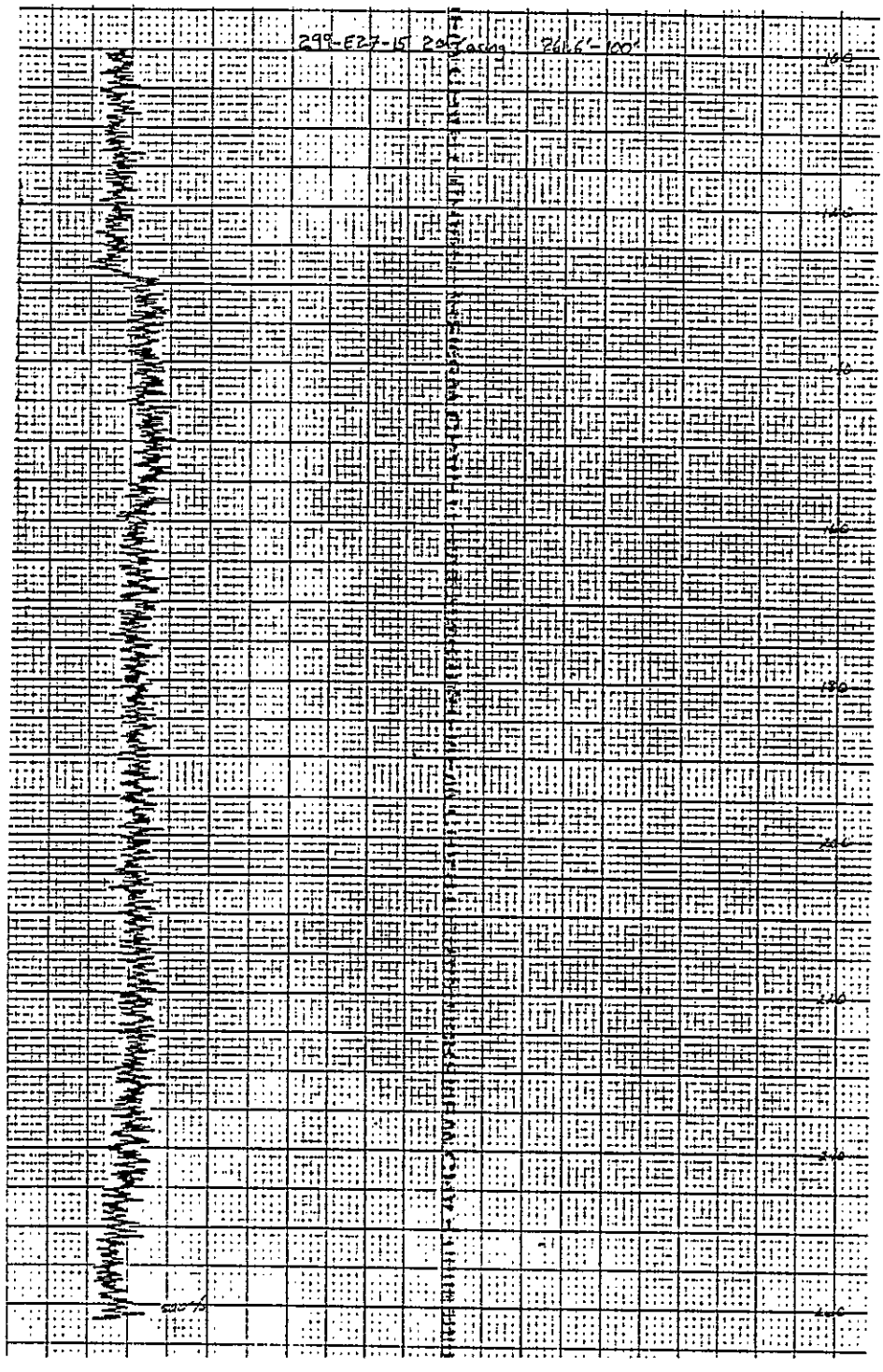
POST SURVEY CALIBRATION: POSITION 1 284 ell g/m POSITION 2 65 ell g/m BACKGROUND 115 c/s

PERCENT CHANGE: POSITION 1 0 POSITION 2 9%

COMMENTS:

WITNESSED AND VERIFIED BY: J. Gould — Log is Acceptable for Lithologic Correlation. JG 9-18-89

633


299-E27-15 20" casing 261.6'-100'

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)

9 1 1 2 0 5 0 0 6 7 0

EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGHAN

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 8.53×10^{-2} ell 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 ell p/m) POSITION 2 ~34%, FS=5000 (136 ell 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 ell p/m) POSITION 2 ~31.5%, FS=5000 (128 ell p/m) BACKGROUND ~20.5% FS=5000 (105 c/s)

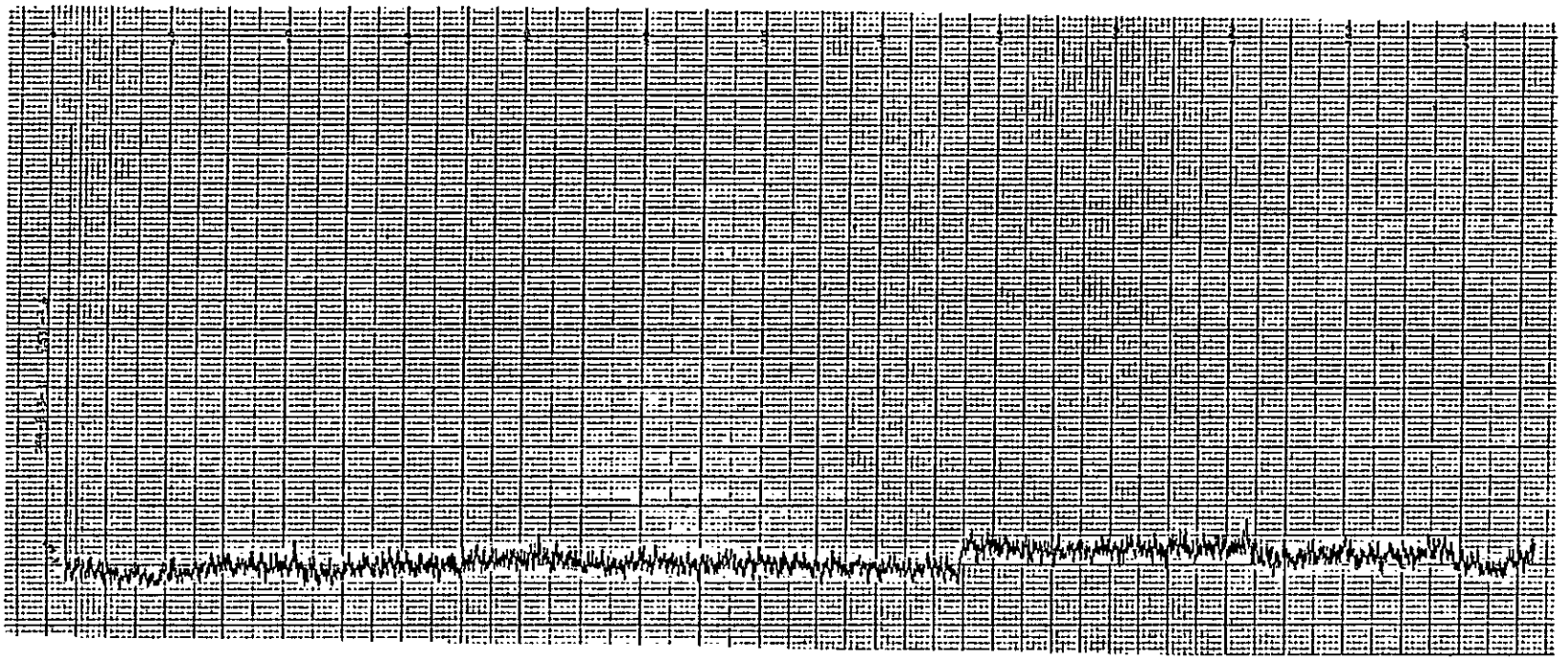
PERCENT CHANGE: POSITION 1 -0- 0% POSITION 2 ~10% 5.9%

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. Gould 8/9/89

636

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

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		

9 1 1 2 3 5 0 0 6 1 1

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 8.53×10^{-2} ell (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 ~51 260 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. 50 (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% 265 c/s

PERCENT CHANGE: POSITION 1 +1% 0% POSITION 2 +2% 0% OK!

COMMENTS: Repeat Section -83 to 50 prior to full run

Depth return error >1', due to slack in line at start.

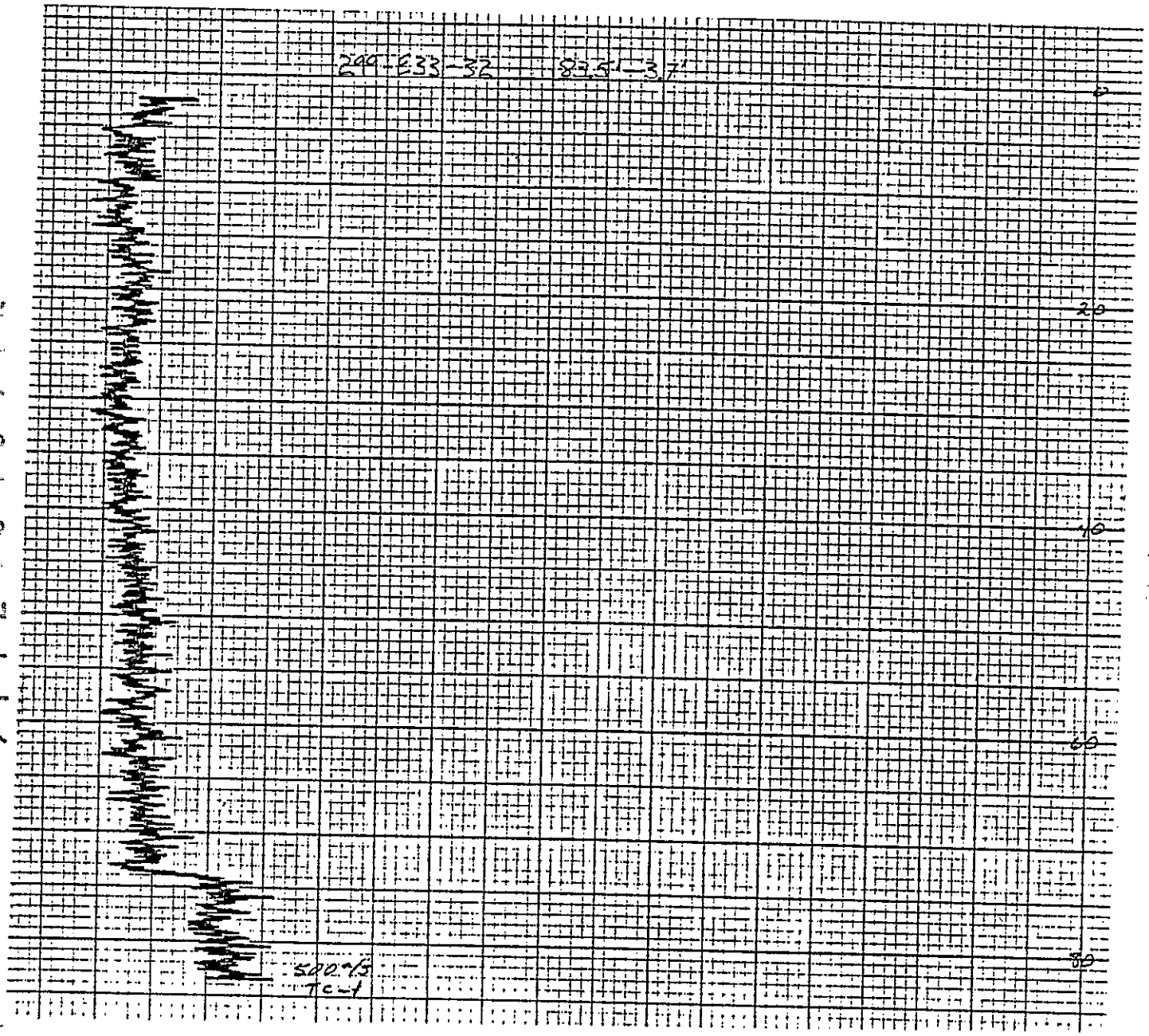
Rate meter not acting very stable, 5Khz pulser shows ~1.5% decrease.

WITNESSED AND VERIFIED BY: J.L. Gould 7/21/89

High Background may be due to "shine" from tank Farm.

639

WHC-MR-0209


299-E33-32
83.5'-3.7'
0
20
40
60
80
500 m/s
TC-1

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

9 1 1 2 0 5 7 0 6 1 4

EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) V.L. McGHAN

EQUIPMENT BRAND MLS (GEARHARDT-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 8.53×10^{-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 8:30 AM COMPLETION 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 27 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)

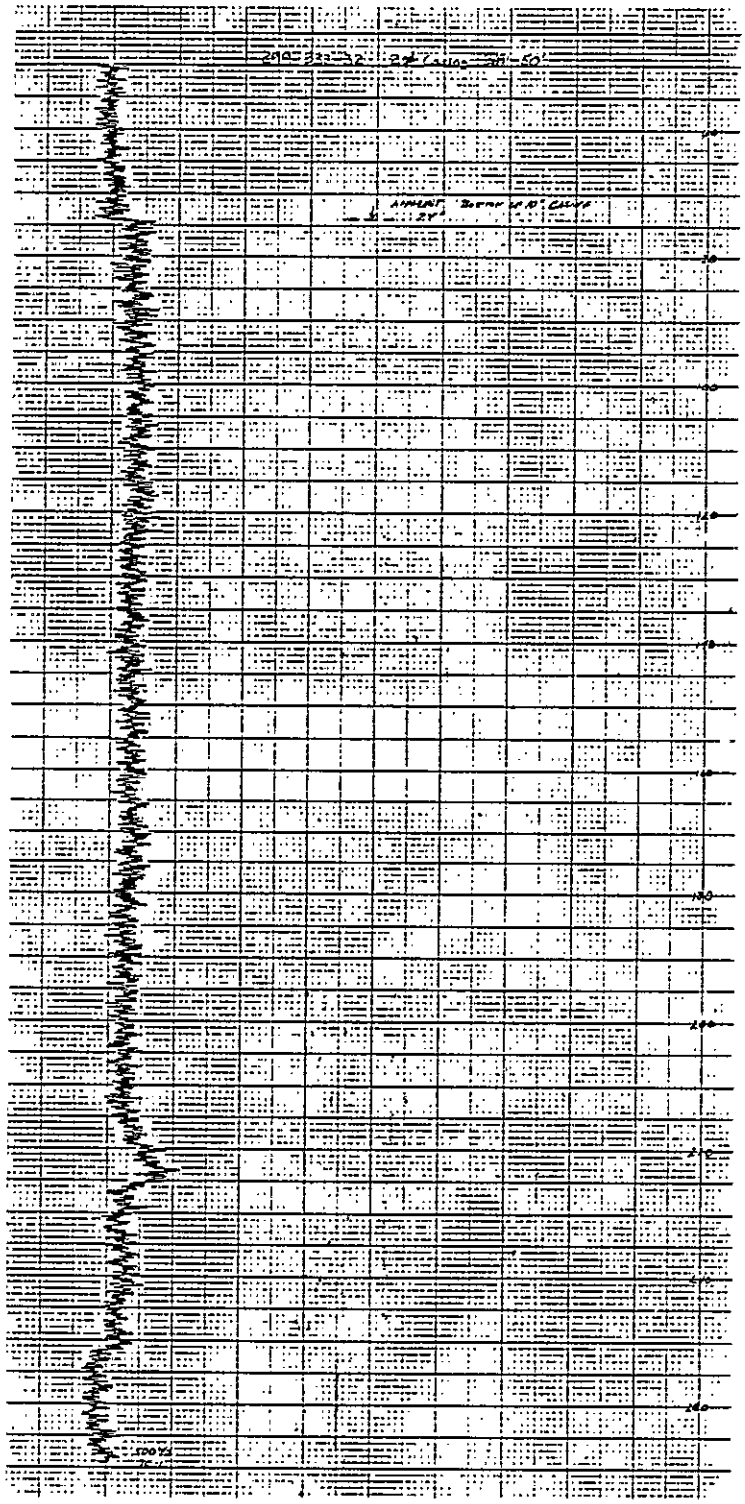
OUTER (10") CASING SEEN AT ~74'

PRE & POST SURVEY CHECK, ELECTRONICS SHIFT SEEN, BUT OVERALL IS ACCEPTABLE

WITNESSED AND VERIFIED BY: J.L. Gould 8-9-89

WHC-MR-0209

642



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: Drillers Departed
Probe Sidewalled
Depth Return Error, +4" (high)

644

9 1 1 0 1 5 0 0 6 1 7

EQUIPMENT DATA

LOGGING COMPANY: PNL

OPERATOR(S): VL McGHAN

EQUIPMENT BRAND: MLS (GEARHARDT-OWEN INC) EQUIPMENT TYPE: ANALOG

TOOL TYPE: NaI (NAT. GAMMA) BASE CALIBRATION DATE: 12-88

SERIAL NO.: CG27A97 CALIBRATION REFERENCE: WAC-EP-0246

CALIBRATION / PROBE FACTOR: 8.53×10^{-2} cell 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% (276 cell p/m), FS=5000 POSITION 2 ~81% (60 cell p/m), FS=1000 BACKGROUND ~23% (115 c/s), FS=500

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% (289 cell p/m), FS=5000 POSITION 2 ~80% (58 cell p/m), FS=1000 BACKGROUND ~23% (115 c/s), FS=500

PERCENT CHANGE: POSITION 1 ~4% 4.5% POSITION 2 ~1% 3.3%

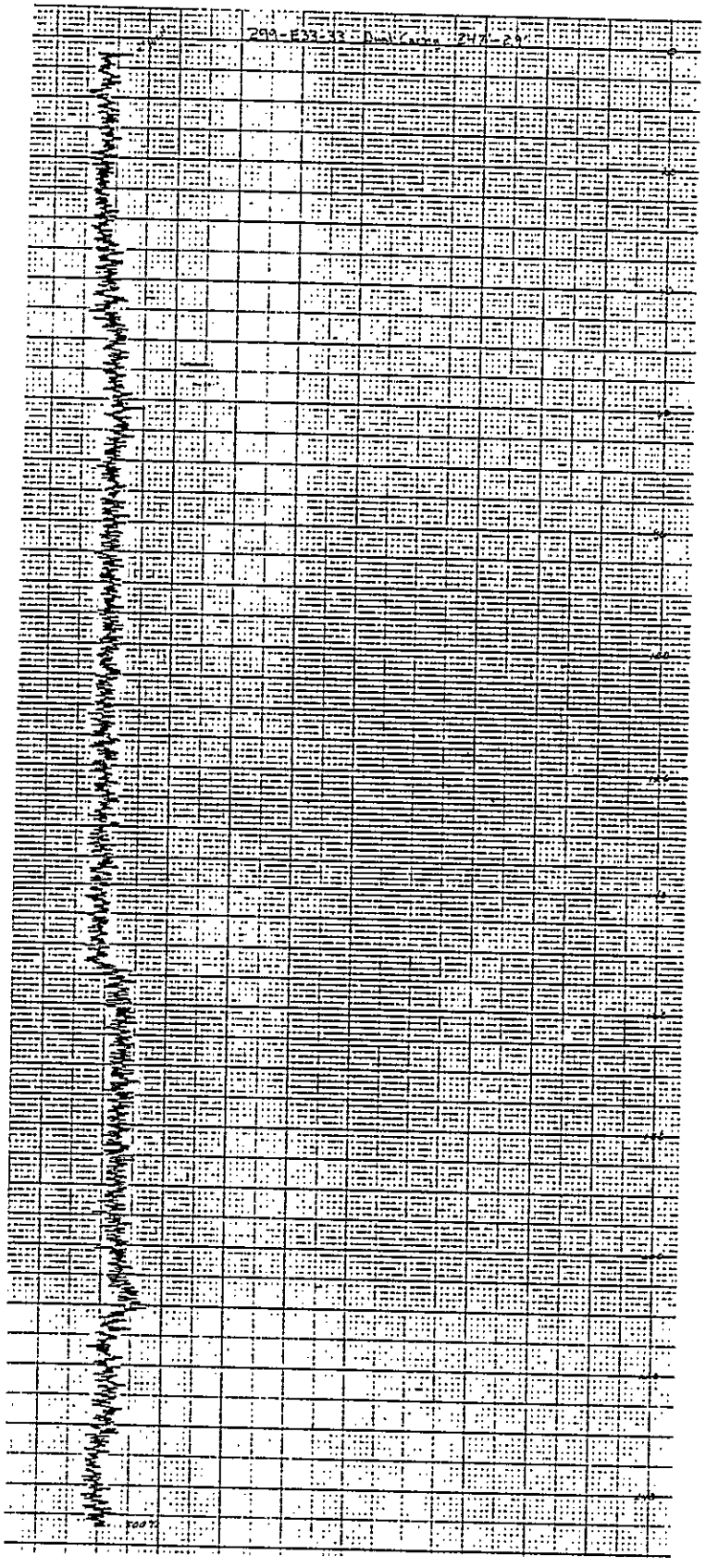
COMMENTS: RERUN SECTION TAKEN FIRST, TO EXPEDITE TIME OF STAMP

Pre & Post Survey field checks are acceptable.

WITNESSED AND VERIFIED BY: J.J. Torff 8/9/89

645

WHC-MR-0209


299-E33-33 Dual Carrier 247'-29'

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

9 1 1 2 9 5 0 0 5 0

EQUIPMENT DATA

LOGGING COMPANY PNL

OPERATOR(S) D. L. McGhan

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 8.53×10^{-2} ell p/m/c/m

DEAD TIME 74 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 ell p/m/c/s POSITION 2 55 ell 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. 50 c/s/IN.

RERUN SCALES, CPS/IN. 50 c/s/IN.

TIME CONSTANT(S) 1 SEC.

POST SURVEY CALIBRATION: POSITION 1 292 ell p/m/c/s POSITION 2 55 ell p/m/c/s BACKGROUND 80

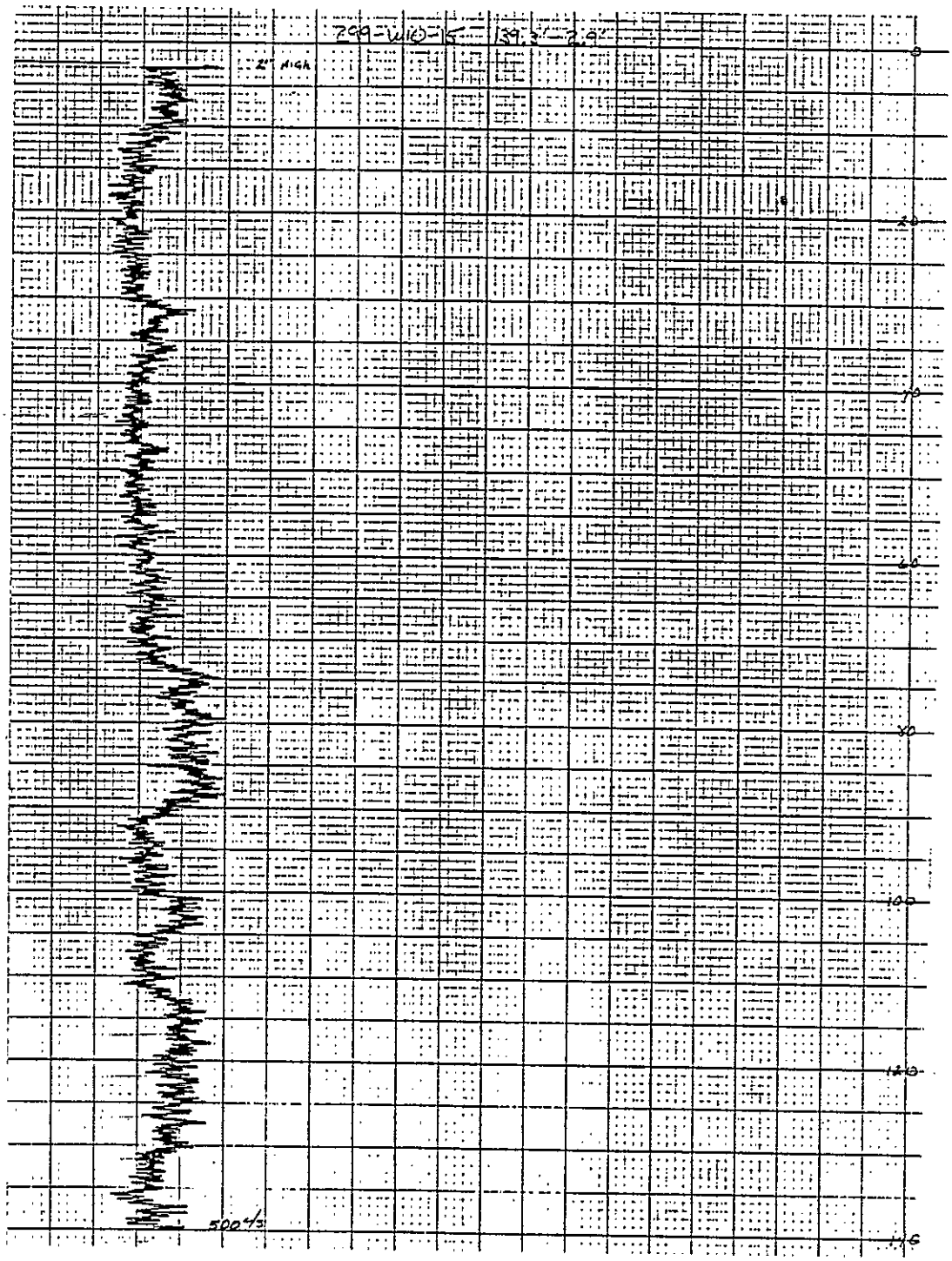
PERCENT CHANGE: POSITION 1 1.8 % POSITION 2 0 %

COMMENTS:

WITNESSED AND VERIFIED BY: J. I. Gould Log is SUITABLE for Analysis - JG 10/2/89

WHC-MR-0209

648


299-W10-15
2" HIGH
0
20
40
60
80
100
120
140
500 4/3

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

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 8.53×10^{-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

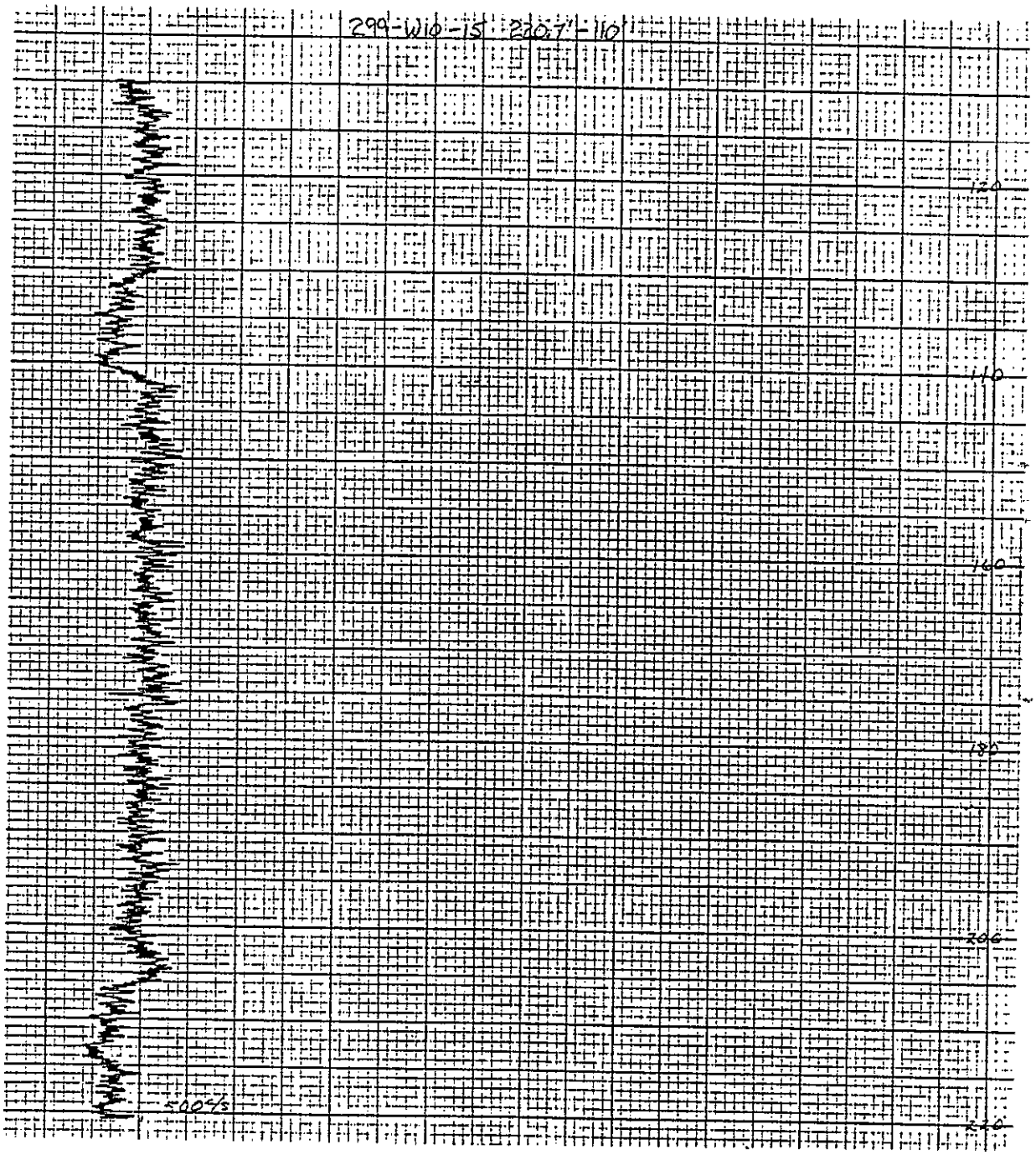
PERCENT CHANGE: POSITION 1 1.4 % POSITION 2 6.8 %

COMMENTS:

WITNESSED AND VERIFIED BY: John R. Broden 10-16-89

WHC-MR-0209

657


299-W10-15 220.7'-110'
120
110
160
180
200
220
500 c/s

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" ~~CLEW~~ 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 DZW 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)

9 1 1 2 9 5 0 0 5 6

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 8.53×10^{-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

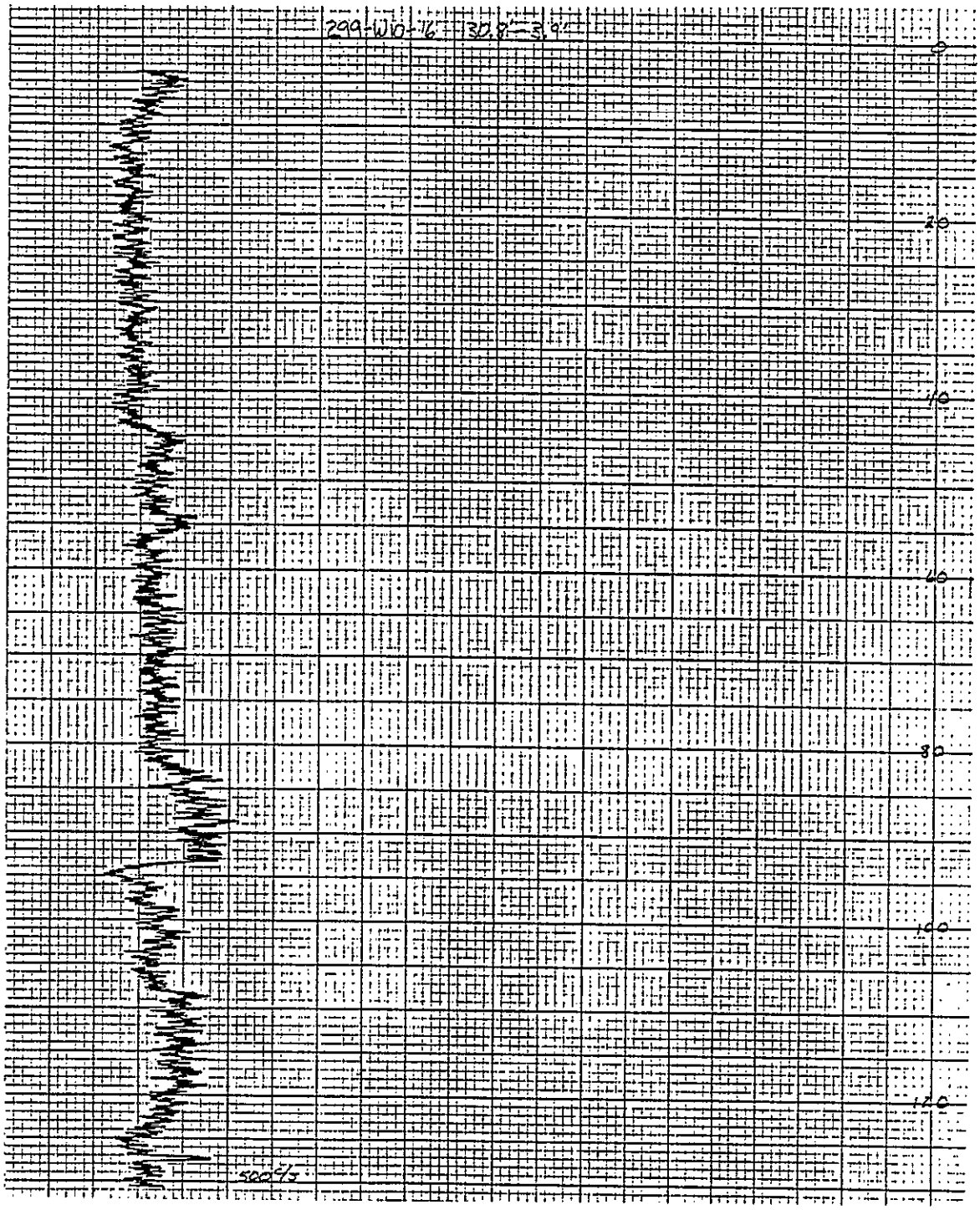
PERCENT CHANGE: POSITION 1 1.7 % POSITION 2 18 %

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


299-W10-76 30.8'-3.9'
0
20
40
60
80
100
120
500 c/s

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"

656

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 8.53×10^{-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.

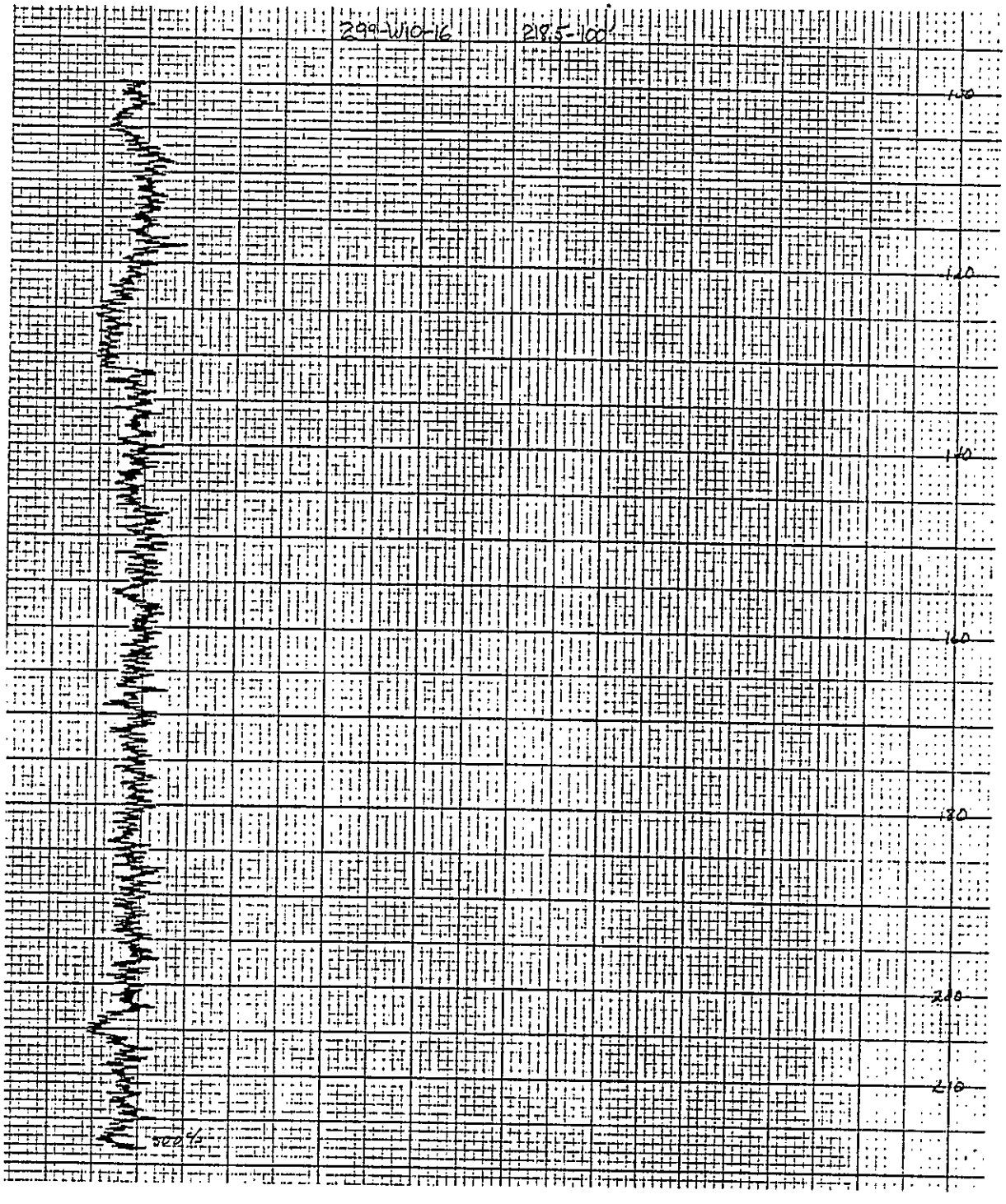
POST SURVEY CALIBRATION: POSITION 1 292 eU ppm/c/s POSITION 2 55 eU ppm/c/s BACKGROUND 80 c/s

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. Broderick 10-11-89

657


299-W10-16
218.5-100'
100
120
140
160
180
200
210
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 1 5 0 0 6 1 2

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, RO)

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	SM		8/9/89
Temporary Materials	SM		8/31/89
Permanent Materials	SM		9/27/89

MATERIAL STORAGE/PACKING

Inspection Method VISUAL
Acceptance Criteria SECT. 4.2.2

	Accept	Reject	Date
Mtl. Handling/Storage	SM		9/27/89
Material Packing	SM		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	SM		9/27/89
Lubricants	FOOD GRADE OIL	SM		9/27/89

STRAIGHTNESS TEST

Inspection Method 20' OF 6" S.S. CASING DOWN HOLE
Acceptance Criteria SECT. 8.3
Accept SM 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	SM		9/27/89
CEMENT GROUT	20.0' - 1.95'	9.9 FT³	SM		9/27/89

OTHER (initial if performed)

N/A Well Abandonment
___ Well Development
VLM Downhole TV Inspection
~~VLM~~ Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

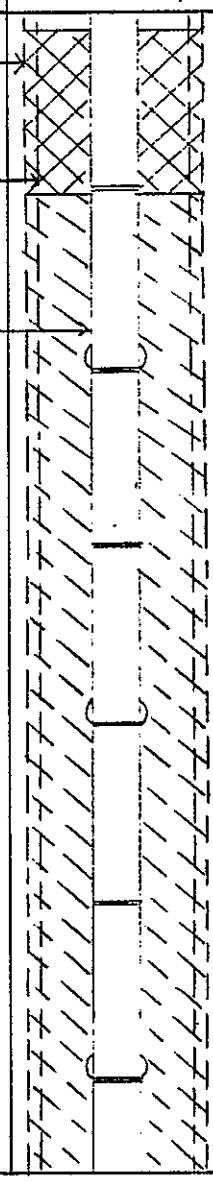
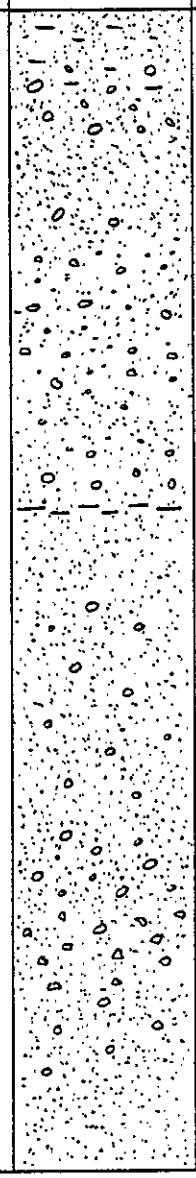
PNL MA567 DO-1, Rev. 0 662
Reviewed by V.L. McGhan 12-8-89

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E24-19 Geologist GOODWIN, AIRHART, LUBRECHT, KENNEDY Page 1 of 3

Reviewed by V.L. McGlean Date 12-8-89

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: Lithologic Description
151'10" OF 10" CARBON		5'		MUDDY SAND
STEEL CASING		10'		GRAVELLY MUDDY SAND
		15'		GRAVELLY SAND
302'6" OF 8" CARBON		20'		SAND
STEEL CASING		25'		SLIGHTLY GRAVELLY SAND
		30'		SANDY GRAVEL
290.57' OF 4" STAINLESS		35'		" "
STEEL CASING		40'		" "
		45'		GRAVELLY SAND
		50'		SANDY GRAVEL
		55'		" "
				MUDDY SAND @ 56'
		60'		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)

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AS-BUILT DIAGRAM

Well Number 299-E24-19 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'		"
		205'		NO CONTAM. DETECTED @ 200' "
		210'		"
		215'		"
		220'		"
		225'		"
		230'		"
		235'		"
		240'		"
		245'		"
		250'		SLIGHTLY GRAVELLY SAND
		255'		GRAVELLY SAND
		260'		SAND

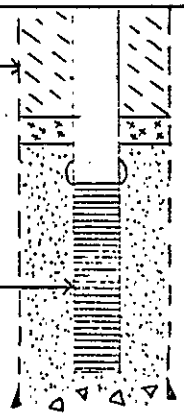
A-1800-186 (3/87)

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 = 300.66'
COMPLETION SYMBOLS:				
CEMENT GROUT				
BENTONITE CRUMBLES				
BENTONITE PELLETS				
SILICA SAND				
CASING JOINTS				
CASING CENTRALIZER				

A-1800-188 (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 ENG. HANFORD
Driller LOUIS WATKINS
Other (companies) NONE
Geologist(s) M. LUBRECHT, I. 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~~ SPA 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	MDL		8-7-89
Temporary Materials	MDL		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	MDL		8-24-89
Lubricants	CRISCO OIL	MDL		8-24-89

STRAIGHTNESS TEST

Inspection Method 20' of 6" S.S. CASING DOWN HOLE
Acceptance Criteria SECT 8.3
Accept MDL 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~~ SPA 20.3'	14.52 ft^3	SPA		9-18-89

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

For all blanks mark N/A if not applicable.

PNL MA567 DO-1, Rev. 0 666 Reviewed by V.L. McGlian 12-4-89

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)

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Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E25-40 Geologist M.O Lubrecht, 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

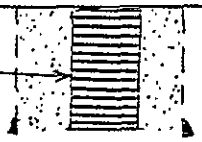
A-1800-186 (3/87)

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E25-40 Geologist LUBRECHT, GOODWIN Page 3 of 3

Reviewed by [illegible] 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 -210'		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, Bleyen, 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	MDL		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	MDL		8/9/89
Material Packing	MDL		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	MDL		8-9-89
Lubricants	FOOD OIL	MDL		8-9-89

STRAIGHTNESS TEST

Inspection Method 20 FEET OF 6 INCH STAINLESS CASING DOWN BOREHOLE
Acceptance Criteria Sec. 8.3
Accept MDL 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
MDL Downhole TV Inspection
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. McMahan 12-7-89 670

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AS-BUILT DIAGRAM

Well Number 299-E25-41 Geologist M Lubrecht 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
10" CARBON STEEL CASING 0-138'7 1/2" (TEMPORARY)		5		SAND
		10		SAND
		15		Sl. Muddy SAND
		20		Sandy GRAVEL
280'3" of 8" CARBON STEEL CASING		25		Sandy GRAVEL
		30		SAND
		35		SAND
		40		Muddy Sandy GRAVEL
257.46' 4" STAINLESS STEEL CASING		45		Sl. Gravelly SAND
		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

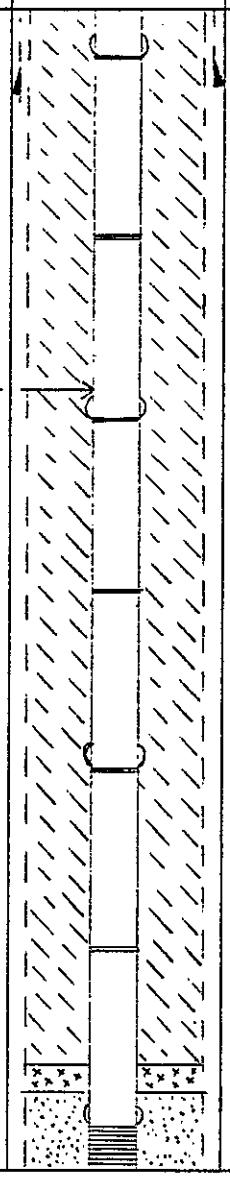
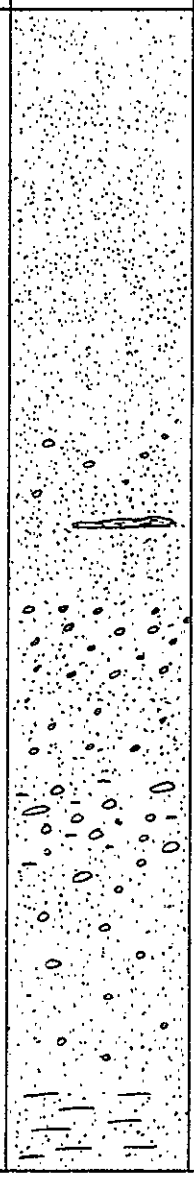
A-1800-186 (3/87)

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 STEEL CASING		135		SAND
		140		"
		145		"
280' 3" OF 8" CARBON STEEL CASING		150		"
		155		"
		160		"
		165		"
257.43' OF 4" STAINLESS STEEL CASING		170		
		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)

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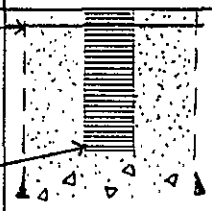
AS-BUILT DIAGRAM

Well Number 299-E25-41 Geologist M. LUBRECHT Page 3 of 3

Reviewed by V. C. McGlinn 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-S-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" d 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 ~~N/A~~ Downhole TV Inspection ~~SPA~~ Complete As-Built Diagram, Driller's/Geologist's Logs
Well Development

For all blanks mark N/A if not applicable

PNL MA567 DO-1, Rev. 0 674 Reviewed by V. L. McGhan 12-7-89

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"ϕ 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"ϕ 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-1800-198 (3/87)

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E27-12 Geologist R. Miller Page 2 of 3

Reviewed by D. L. McGhan Date 12-7-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	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 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

Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E27-12 Geologist R. Miller Page 3 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
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 D0-1, REV. 0

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 [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 7.6

	Accept	Reject	Date
Drilling Tools/Rig	SAR		9-1-89
Temporary Materials	JHK		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	JHK		9-27-89

STRAIGHTNESS TEST

Inspection Method 20' of 6" S.S CASING DOWN HOLE
Acceptance Criteria SECT 8.3
Accept SAK 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'	161.88 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
VRM Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicab

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

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"ø carbon steel from +3'6" to 268'7" (272'1")		265		Sandy GRAVEL
		270		"
				T.D. = 270.0'
21.03' OF 4" DIA. STAINLESS STEEL CHANNEL PACK SCREEN				COMPLETION DEPTH = 267.55'
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. 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 - 2.5	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 7.6

	Accept	Reject	Date
Drilling Tools/Rig	JAK		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	[illegible]		10/12/89
Material Packing	[illegible]		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	JAK		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"	253.68' - +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
8-30 MESH GRANULAR BENTONITE	247.5' - 19.4'	161.35 FT³	[illegible]		10/12/89
CEMENT GROUT	19.4' - 2.05'	7.92 FT³	[illegible]		10/12/89

OTHER (initial if performed)

N/A Well Abandonment
___ Well Development
N/A Downhole TV Inspection
VRM Complete As-Built Diagram, Driller's/Geologist's Logs

For all blanks mark N/A if not applicable.

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

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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'-6⅛"		5		Sandy Gravel
		10		"
		15		Slightly gravelly muddy sand
		20		gravelly sand
8" diameter temporary carbon steel casing with drive shoe from 138'-6⅛" to 277'-1¾"		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		

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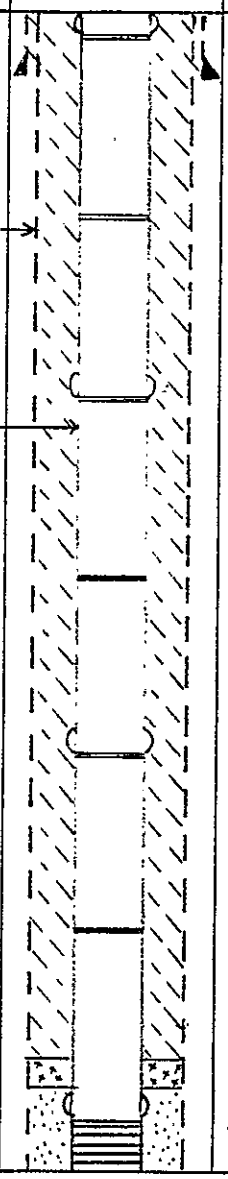
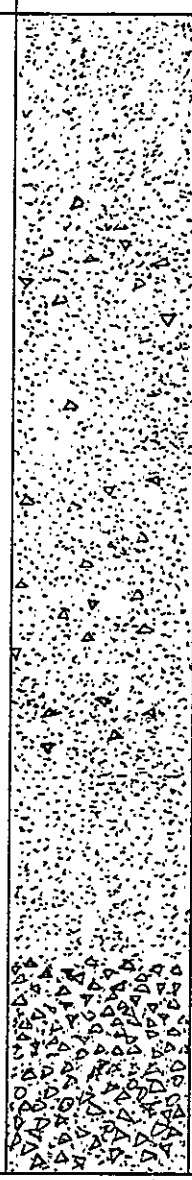
Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E27-13 Geologist Ian Kennedy Page 2 of 3

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'		" "

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Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E27-13 Geologist Ian Kennedy Page 3 of 3

Reviewed by V.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		265		Sandy Gravel
STEEL CASING		270		Gravel
		275		GRAVEL
21' OF 4" DIA. STAINLESS				
STEEL CHANNEL PACK				D/B = 275.56 10/9/89
SCREEN (10 SLOT)				
COMPLETION SYMBOLS:				
CEMENT GROUT				
GRANULAR BENTONITE				
BENTONITE PELLETS				
SILICA SAND				
CASING JOINT				
CASING CENTRALIZER				

A-1800-186 (3/87)

PHL MAS67 DO-1, rev.0

WELL COMPLETION/INSPECTION REPORT (governing procedure DO-1, RO)

Specification No. WHC-5-014 Rev. No. 3
Project N-017
Location Single Shell Tanks
Drilling Co. Kaiser Engineers, Hanford
Driller Lewis Watkins
Other (companies) N/A
Geologist(s) Rand Miller, S. Goodwin, Ron Bergen, S. Airhart, Michael Lubrecht

Well No. 299-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	SML		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 SML 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 SML 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	265.88' - 242.7'	8.12 FT³	SML		10/13/89
1/4" VOLCLAY TABLETS	242.7' - 239.45'	1.24 FT³	SML		10/13/89
8-20 BENTONITE CRUMBLES	239.45' - 19.85'	116.44 FT³	SML		10/17/89
CEMENT GROUT	19.85' - 2.85'	7.92 FT³	SML		10/17/89

OTHER (initial if performed)

N/A Well Abandonment
___ Well Development
VR N/A Downhole TV Inspection
~~[illegible]~~ Complete As-Built Diagram, Driller's/Geologist's Logs

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

For all blanks mark N/A if not applicable.

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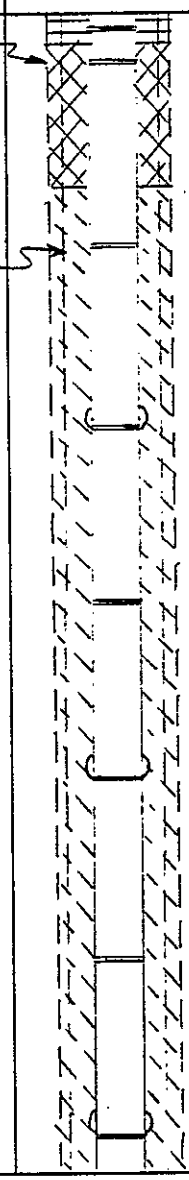
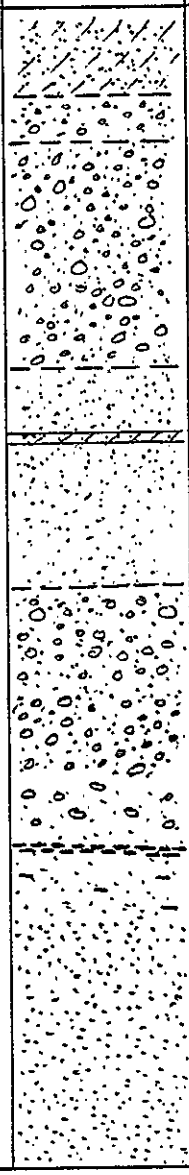
Battelle
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E27-14 Geologist R. Miller Page 1 of 3

Reviewed by V. L. Markham Date 12-7-89

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: 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. 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

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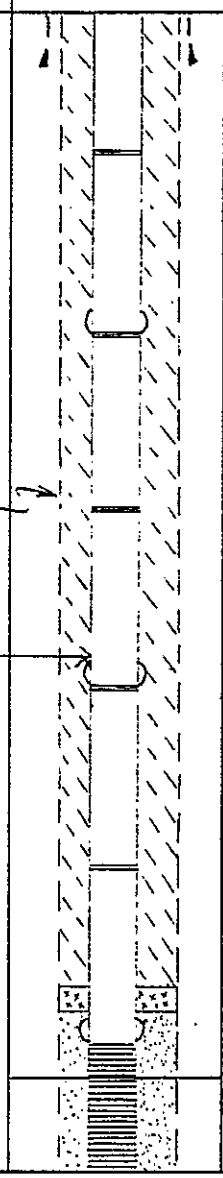
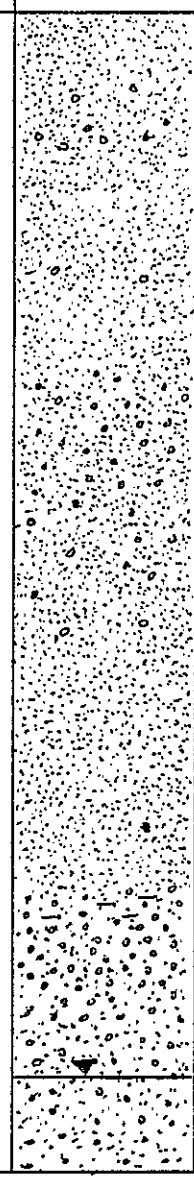
Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E27-14 Geologist M. Lubrecht Page 2 of 3

Reviewed by V.L. Mulkhan 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)

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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 8" 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)

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 Engineers 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 262.54' bls
Completed Depth 259.03'
Date Started 8-29-89
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

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 9/28/89

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 9/28/89

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

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 4.2.3
Accept EDM Reject N/A Date 9/18/89

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 CHIPS	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
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. Markham 12-7-89

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Pacific Northwest Laboratories

AS-BUILT DIAGRAM

Well Number 299-E27-15 Geologist Jan Kennedy / Miller Page 1 of 2

Reviewed by D.L. McGleam Date 12-7-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	Lithologic Description
temporary 16" 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

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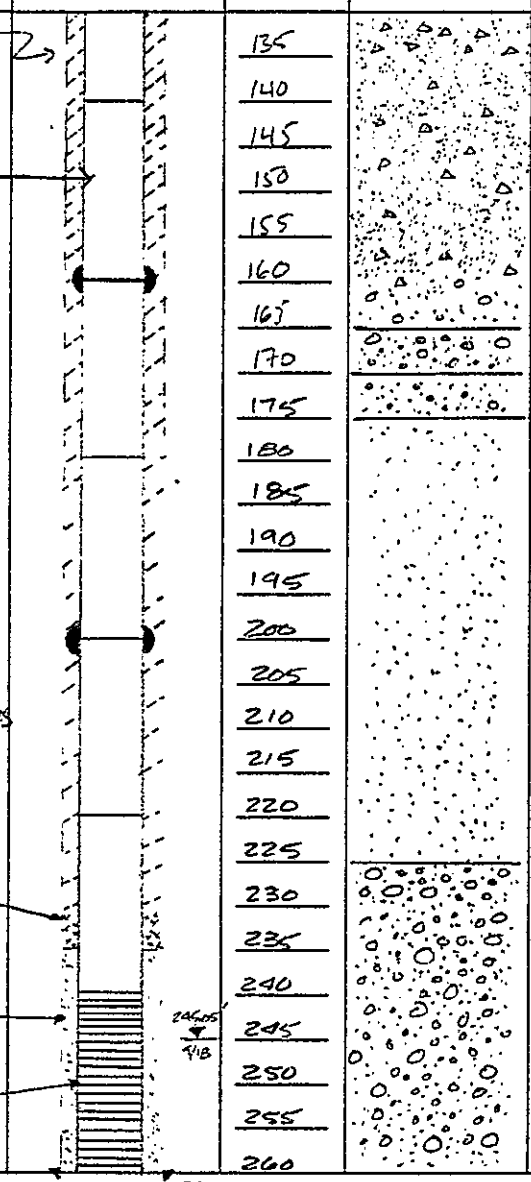
Battelle
Pacific Northwest Laboratories

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: Description	Depth in Feet	Geologic/Hydrologic Data: Lithologic Description
temporary 8" carbon steel casing with drive shoe	135	Sandy Gravel
	140	Sand
	145	Slightly Gravelly Sand
240.48' of 4" STAINLESS STEEL CASING	150	"
	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	Muddy Sandy GRAVEL
4" stainless steel	250	"
10 slot channel pack	255	"
(21')	260	"



A-1800-186 (3/87)

FNL-MA-567-DO-1-rev-0

WELL COMPLETION/INSPECTION REPORT

WHC-S-014

pecification No. W-017 Rev. No. 3
roject W-017
ocation SINGLE SHELL TANKS
rilling Co. KAISER ENG. HANFORD
riller MEL THORESEN
ther (companies) NONE
eologist(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

nspection Method VISUAL
cceptance Criteria SECT. 7.6

	Accept	Reject	Date
rilling Tools/Rig	SPA		7/11/89
emporary Materials	SPA		7/11/89
ermanent 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

epth(s) 234.9' - 255.9'
-

nspection Method VISUAL
cceptance 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 ~~+3.05~~ - 234.9' AWP -

nspection Method VISUAL
cceptance 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 ft³	SML		9-7-89
1/4" BENTONITE PELLETS	226' - 231.2'	1.2 ft³	SML		9-7-89
8-20 MESH BENTONITE CRUMBLES	19.7' - 226'	121.4 ft³	EJJ		9-8-89
CEMENT GROUT	2' - 19.7'	~8 ft³	EJJ		9-8-89

OTHER (initial if performed)

N/A Well Abandonment ~~VLM~~ Downhole TV Inspection ~~VLM~~ Complete As-Built Diagram, Well Development Driller's/Geologist's Logs

Reviewed by V.L. McGlinn 12-14-89

For all blanks mark N/A if not applicable.

PNL MA567 CO-1, Rev.0

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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' 3/4" 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
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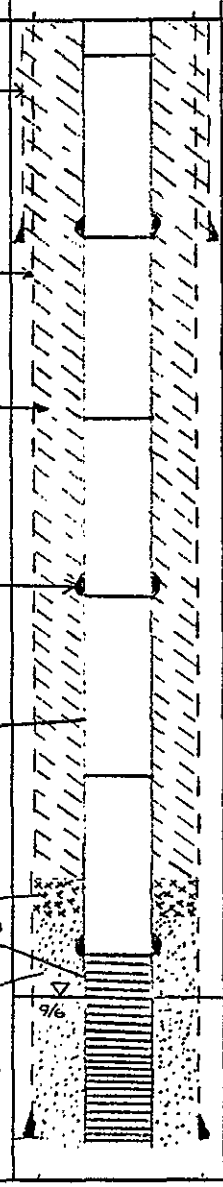
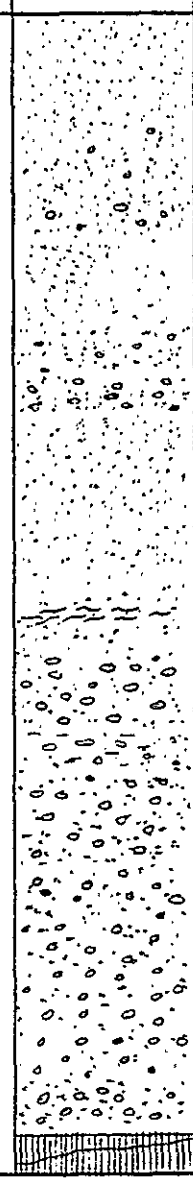
AS-BUILT DIAGRAM

Well Number 299-E33-31 Geologist AIRHART, GOODWIN, LANIGAN, BLEGEN, BRANDENBERGER Page 2 of 2

Reviewed by [signature] Date 12-14-89

Construction Data: Description	Depth in Feet	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	175	SANDY GRAVEL
CRUMBLES	180	SAND
	185	"
	190	"
FACTORY-WELDED	195	"
CENTRALIZERS	200	" (CLAY LENSE @ 202')
235.56'	205	SANDY GRAVEL
4" DIA. STAINLESS STEEL CASING	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	240	" "
SILICA SAND	245	" "
BOTTOM OF 8" (REMOVED) CASING AT 255.6'	250	SANDY GRAVEL
BELOW GROUND LEVEL (RESTING ON	255	" "
BASALT)		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

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

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

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

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 HOLE
Acceptance Criteria Sect. 8.3
Accept ✓ Reject Date 8/4/89

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 [illegible] 12-14-89
PNL MA 567 DO-1, Rev. 0

For all blanks mark N/A if not applicable.

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AS-BUILT DIAGRAM

Well Number 299-E33-32 Geologist AIRHART, LANIGAN, LUBRECHT, BRANDENBERGER, GOODWIN Page 1 of 3

Reviewed by V.E. Markham Date 12-14-89

Construction Data		Depth in Feet	Geologic/Hydrologic Data	
Description	Diagram		Diagram Litho.	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)

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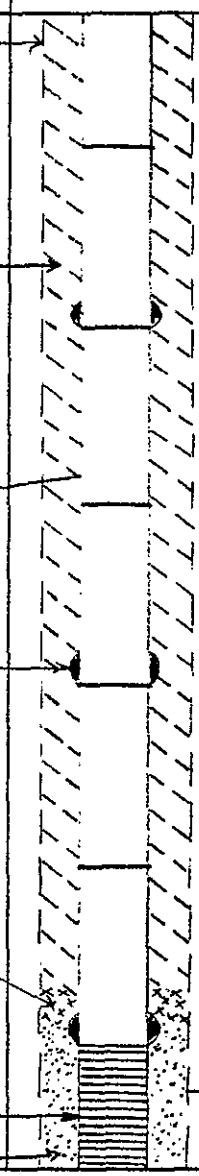
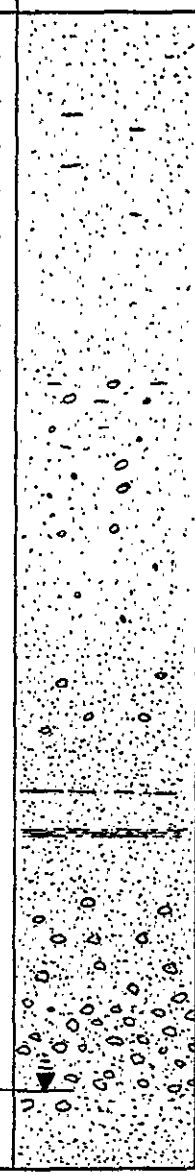
AS-BUILT DIAGRAM

Well Number 299-E33-32 Geologist AIRHART, GOODWIN, LANIGAN, LUBRECHT, BRANGENBERGER Page 2 of 3

Reviewed by V. L. Mathan 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"		135		SAND
CARBON STEEL CASING (REMOVED)		140		"
		145		SLIGHTLY MUDDY SAND
		150		" " "
		155		" " "
8-20 BENTONITE		160		SAND
		165		"
		170		"
		175		GRAVELLY MUDDY SAND
246.97'		180		SL. GRAVELLY SL. MUDDY SAND
4" DIA. STAINLESS STEEL CASING		185		GRAVELLY SAND
		190		" "
		195		SLIGHTLY GRAVELLY SAND
		200		" " "
FACTORY WELDED CENTRALIZERS		205		Slightly Gravelly SAND
		210		Slightly Gravelly SAND
		215		SAND
		220		SAND (mudstone - 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

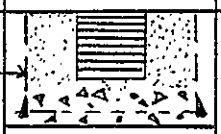
A-1800-186 (3/87)

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" or 9" 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. 299-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 SECT. 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 SECT. 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 SECT. 4.2.3
Accept SST Reject _____ Date 8-25-89

LUBRICANTS/ADDITIVES

Inspection Method VISUAL
Acceptance Criteria SECT. 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" SS DOWN HOLE
Acceptance Criteria SECT. 8.3
Accept SMW Reject _____ Date 8-7-89

CASING (permanent)

Type	Size	Placement
STAINLESS STEEL	4" DIA.	+0.47 ~~+2.9'~~ - 227.3'
		AWP -

Inspection Method VISUA
Acceptance Criteria ~~VISU~~ SECT 4.2.4
Accept SST Reject _____ Date 8-25-89

WELL PROTECTION

Inspection Method VISUAL
Acceptance Criteria SECT 4.2.10

	Accept	Reject	Date
Protective Posts			
Locks			

ANNULAR SEAL

Inspection Method VISUAL/STEEL TAPE Acceptance Criteria SECT. 4.2.6 - 4.2.9.1

Type	Interval	Volume	Accept	Reject	Date
20-40 COL. SILICA SAND	224.2' - 246.8'	9.0 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	EJT		8-29-89
CEMENT GROUT	2' - 18.7'	10.6 ft³	EJT		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

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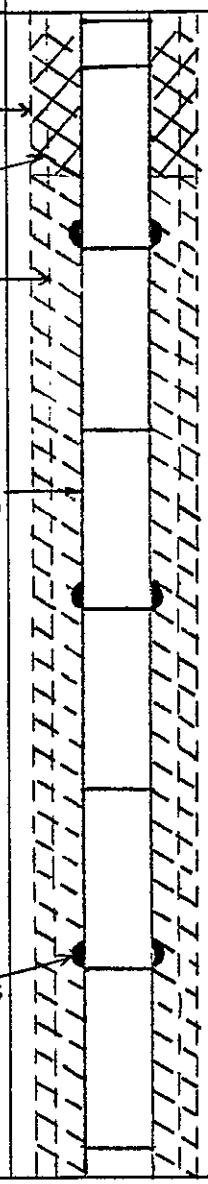
Battelle
Pacific Northwest Laboratories

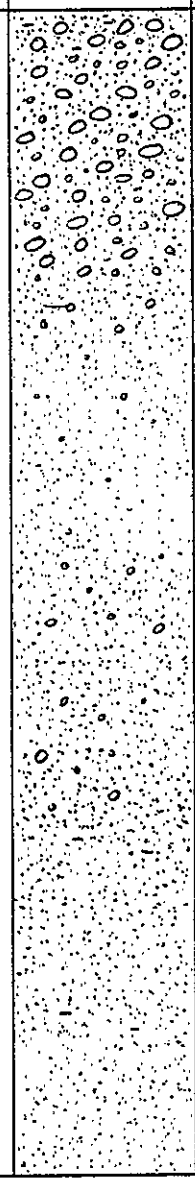
AS-BUILT DIAGRAM

Well Number 299-E33-33 Geologist GOODWIN, JENSEN, BRANDENBERGER Page 1 of 2

Reviewed by V.L. McGhan Date 12-19-89

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: 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)

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 V.L. McGhan Date 12-19-89

Construction Data: Description	Construction Data: Diagram	Depth in Feet	Geologic/Hydrologic Data: Diagram Litho.	Geologic/Hydrologic Data: 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
4" DIA. STAINLESS STEEL CASING		160		157: MUD 3" THICK " " "
		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	▽ 12/17/89	" " "
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, Jean Kennedy, Steve Airhart, Eric Jensen, M. Chamness S. Goodwin, Ron Bloyen

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' 11-02-89
Drilling Fluid 200 E Raw Water Supply
Other N/A

GEOPHYSICAL LOGGING

Sondes	Interval	Date
Gamma	139' - 3'	10-~~2~~4-89
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			

MATERIAL STORAGE/PACKING

Inspection Method Visual
Acceptance Criteria Section 4.2.2

	Accept	Reject	Date
Mtl. Handling/Storage			
Material Packing			

SCREEN

Type	Length	Slot Size
Continuous-Wrap Stainless Steel	21'	10
Channel Pack		

Depth(s) 200.95' - 221.95'
-

Inspection Method Visual
Acceptance Criteria Section 4.2.8
Accept SPA Reject Date 10/27/89

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

CASING (permanent)

Type	Size	Placement
Johnson Division type 304	4"	+2.3' - 200.95'
Stainless steel casing		-

Inspection Method Visual
Acceptance Criteria Section 4.2.4
Accept SPA Reject Date 10/27/89

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 Colo. Silica Sand	197.1' - 222.3'	17.9 ft³	SPA		10-27-89
~~1/2~~ 3/8 Volclay Pellets	193.3' - 197.1'	1.9 ft³	SPA		10-30-89
8-20 Bentonite Crumbles	140.5' ~~143.1'~~ SPA - 193.3'	25.6 ft³	SPA		10-30-89
Volclay Pure Gold Slurry	72.3' - 140.8'	52.8 ft³	SPA		11-6-89

OTHER (initial if performed)

N/A Well Abandonment
Well Development
~~DKM~~ N/A Downhole TV Inspection
~~DKM~~ 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, RC

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.

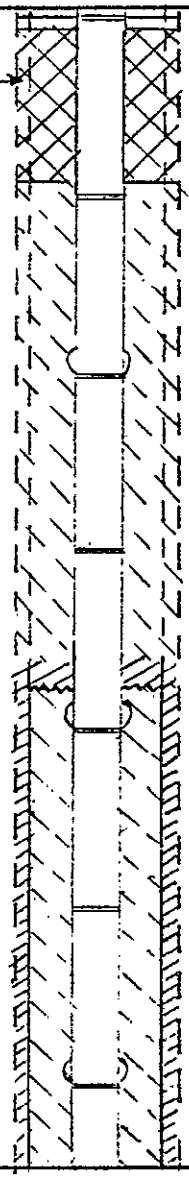
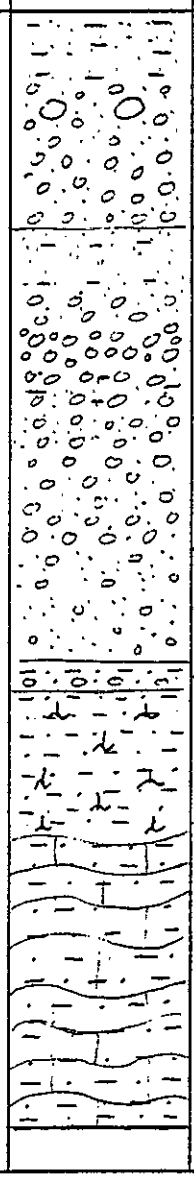
Reviewed by [illegible] 12-7-89

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
		105		cemented muddy
		110		sand
		115		
		120		
		125		

A-1800-186 (3/87)

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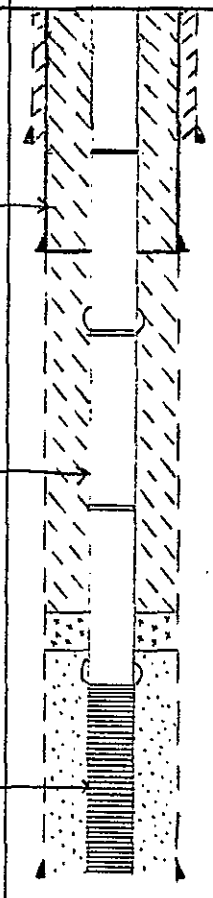
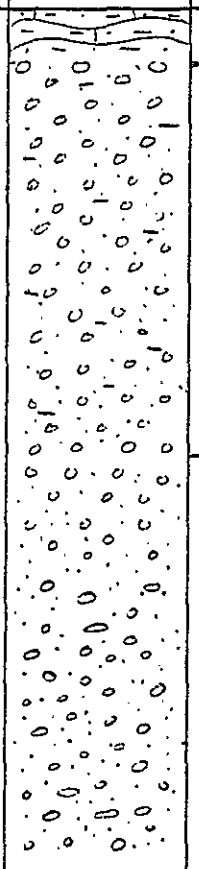
Pacific Northwest Laboratories

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
				gravels @ 132'
8" temporary carbon-steel casing to 222'				
		150		Muddy Sandy Gravel
203.25' of type 304 4" stainless steel casing		175		
				Sandy [illegible] 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)

ecification No. WHC-S-014 Rev. No. 3
oject W-017
ocation 200 West Single Shell Tanks
illing Co. Kaiser Engineers Hanford
iller Dave Garcia, Gary Lydin
her (companies) N/A
ologist(s) Ron Bleyen, Mark Birch, Bruce Bjornstad, Tyler Gilmore, Steve Teel, Steve Archart, Eric Jensen, Shannon Goodwin, 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
ut- Gamma	130.8'-3.8'	9-22-89
'AT. 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
ispection Method Visual
ceptance Criteria Section 7.6

	Accept	Reject	Date
rilling Tools/Rig	BNB		9-7-89
mporary Materials	BNB		9-7-89
ermanent Materials			

MATERIAL STORAGE/PACKING
Inspection Method Visual
Acceptance Criteria Section 4.2.2

	Accept	Reject	Date
Mtl. Handling/Storage	SMW		10/25/89
Material Packing	SMW		10/25/89

SCREEN

Type	Length	Slot Size
Johnson Division wrap	21.0'	10
hanel pack 4"		

epth(s) 198.3' - 219.3'
-

nspection Method Visual
ceptance Criteria Section 4.2.3
Accept SMW Reject Date 10/23/89

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

CASING (permanent)

Type	Size	Placement
304 SCH.5 Stainless Steel	4"	+1.6' - 198.3'
casing		-

nspection Method Visual
ceptance Criteria Section 4.2.4
Accept SMW Reject Date 10/23/89

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	SMW		10/24/89
3/8" - bentonite pellets	191.35'-195.45'	2 bulk. = 1.24 ft³	SMW		10/24/89
8-20 granular bentonite crumbles	18.1'-191.35'	155 bags = 110.05 ft³	SMW		10/25/89
Portland Cement grout	2.1'-18.1'	11.08 ft³	SMW		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.

IL MA567 DO-1, rev. 0
Reviewed by D.L. Mathan 12-4-89

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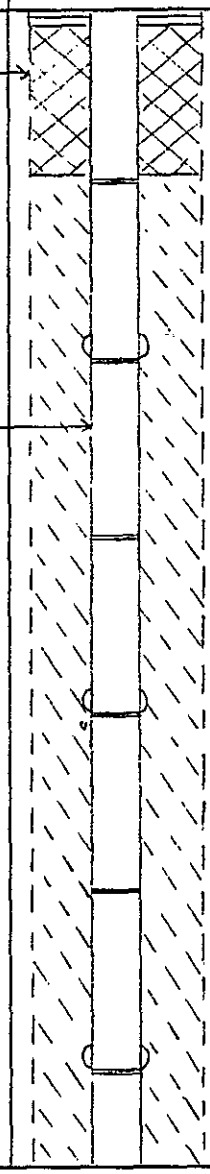
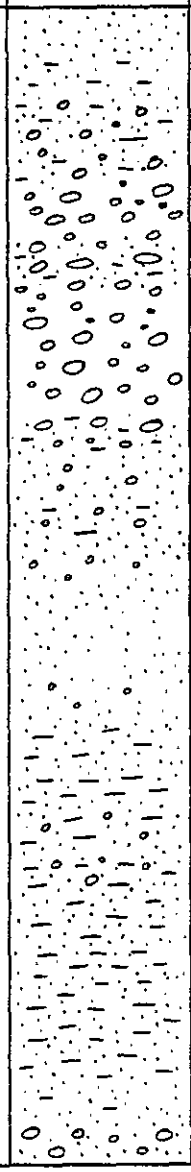
AS-BUILT DIAGRAM

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

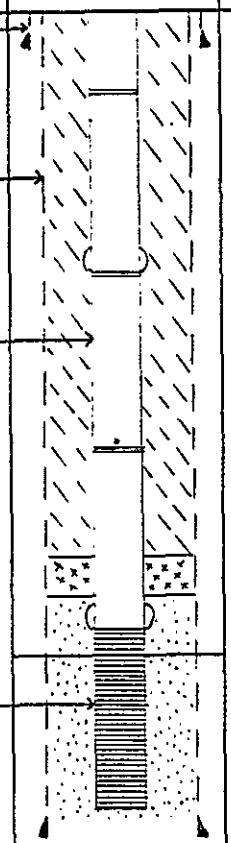
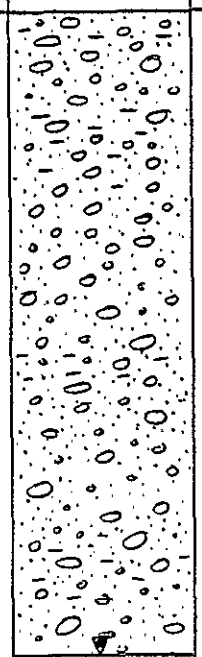
A-1800-186 (3/87)

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 D/W = 202.9' 10/25/89
21' OF 10 SLOT CONTINUOUS WRAP STAINLESS STEEL CHANNEL PACK SCREEN		205		" "
		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 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 5 3 0 7 1 0

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 65

Samples Analyzed for Volatile Organics

WELL NUMBER	299-E27-13	299-E27-14
Depths in feet below ground	200 240 260 275	110 115 260

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	3.08	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	16.2	< 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	160	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	48	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

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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	18.0	3.42	3.51	2.46
299-E25-41	60	NA	NA	NA	NA	NA	NA	19.5	3.59	< 1.78	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	3.98	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	3.16	1.97
299-E27-12	260	NA	NA	NA	NA	NA	NA	13.5	2.90	4.18	2.59
299-E27-13	160	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	< 4.8	< 0.97	NA	18.2	3.49	2.21	2.00
299-E27-14	48	NA					NA	21.0	3.79	23.6	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	< 1.6	< 0.1	< 0.5	< 4.8	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

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	26.6	< 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	%H2O	SAMPLE	%H2O	SAMPLE	%H2O
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'	4.68	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	%H2O	SAMPLE	%H2O	SAMPLE	%H2O
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	%H20	SAMPLE	%H20	SAMPLE	%H20
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.

9 1 1 1 5 0 7 7 3

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			

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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	Test. By K. Ochtenberg	9-15-89 0945

BC-1200-345 (7-8

726

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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.: PNL 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]	MRKern	9-15-89 0900
MRKerns	Use by K. Ottenburg	9-15-89 0945

BC-1200-345 (7-85)

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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 0908
MR Kern	UST By K. Ackenberg	9-15-89 0945

728

BC-1200-345 (7-

EJ

Battelle Pacific Northwest Laboratories P.O. Box 999 Richland, Washington 99352	CHAIN OF CUSTODY	E27-1~~5~~2 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~~5~~2 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
Relinquished by:	Received by:	Date/Time:
[signature]	UST J. Royer	9/29/89 1520
Relinquished by:	Received by:	Date/Time

BC-1200-345 (7-85)

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Richland, Washington 99352

CHAIN OF CUSTODY

E27-13 SS1

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

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Richland, Washington 99352

CHAIN OF CUSTODY

SST
100589

Company Contact: K. B. OLSEN Telephone: 6-4114

Samples Collected by: E. J. JENSEN Date: ~~9/~~ 10/05/89 Time:

Sample Location: 299-E27-13

Ice Chest No.: Field Logbook Page No.:

Remarks: CHARGE To M54081

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)

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Richland, Washington 99352

CHAIN OF CUSTODY

E27-14 SST

Company Contact: K. B. OLSON Telephone: 6-4114

Samples Collected by: E. S. 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

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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.: 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]	K.B. Olson	10/11/89/1100
K.B. Olson	WAT. By K. [signature]	10/13/89 1430

733

BC-1200-345 (7-85)

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CHAIN OF CUSTODY

E27-1/5 SST

Company Contact: K. B. OLSON Telephone: 376-4114

Samples Collected by: E. J. JENSEN Date: 9-27-89 Time:

Sample Location: 299-E27-1/5 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 (

9112150716

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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)

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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 (7-85

736

Kanea EXT 71
375-3131

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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
[signature]	Sandra K Lewis	12-5-89 1530

737

BC-1200-345 (7-85)

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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
[signature]	UST. BY K. Ashtenberg	8/18/89 1540

BC-1200-345 (7-85)

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. [illegible]	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.: PNL Field Logbook Page No.:

Remarks: CHARGE TO M54081

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
[signature]	[signature] By K. [signature]	10/13/89 1430

740

BC-1200-345 (7-85)

Section D

Well Development Information of Twelve Wells for Single Shell Tanks

* Well Development Summary Table
* Well Development Logs

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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 10/5/89	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

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 standpipe TOC

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

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	~8.0	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

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		JAM	JAM	
	1103		39			Sample. Standardized 0-91 range with 91 ntu standard.
	1112	4gpm	JAM 10/23/89 11			JAM 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, + 0-15.
	1141	10				
	1148		4			Sample. Standardized 0-91 range
	1159	10				
	1203		0-4 range: 1.1 0-91 range: 2			Standardized 0-4 range using previous sample for relative comparison. Sample to this sample. Restandardized 0-91 range.
	1210	10				
	1212		<1			Sample
	1214		<1 JAM 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 #: 380903404

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 Newcomer 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

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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

7/19

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	SPM	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		0-91 range: 4 0-91 range: 3			Standardized meter to 0-3 range using previous sample 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

750

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 x 2 2.2			0-10 NTU scale - values are ½ for standardization
~~9/27~~	~~0852~~	DRN 9/27/89				Standardized at 0-6.5 NTU range and double readings
9/27	0852	5.7	—			Sample was collected, but no measurement was taken
9/27	0915	12.3	2			0-100 NTU scale
9/27	0915	"	0.5 x 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 ~~~245'~~ 263' 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	WLC	WLC	10.0 NTU scale
	0915	"	3.1x2 6.2	WLC	WLC	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 Vercomer 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 225.55 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 Newcomer 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 1457
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		standardized C - 89 NTU
11/01	1430	11	12			
	1439	10	7.1			standardized 0-10 NTU
	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 5 0 7 3

Section E

Pump Installation Information of Twelve Wells for Single Shell Tanks

* Pump Installation Summary Table
* Pump Installation Documentation

9 1 1 2 5 1 0 0 7 1 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

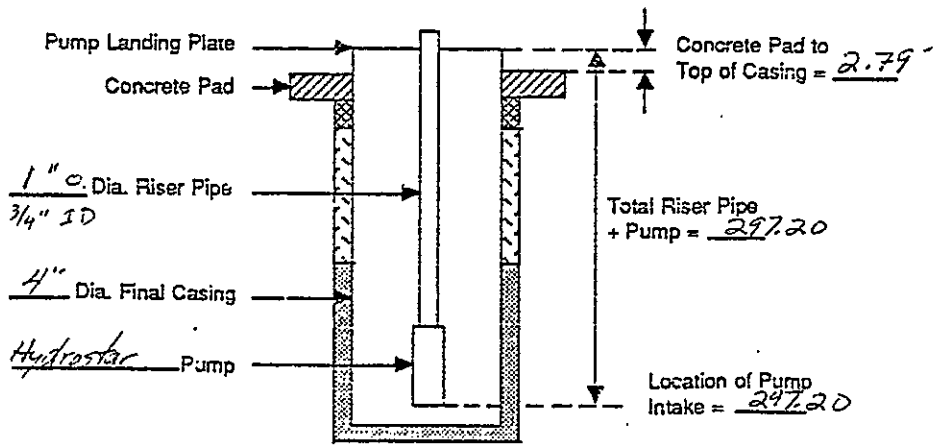
Screened Interval: 279.65'-300.68 LS Saturated Screened Interval: 300.68 -293

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-017, 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', 260.50' below TOC (Steel tape # L306-14) Depth-to-Bottom: 276.65' below TOC

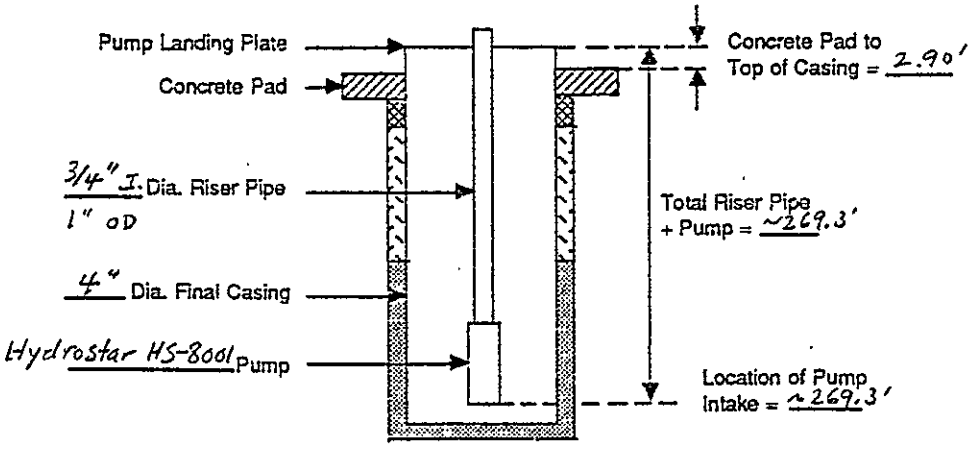
Reported Depth-to-Bottom: 273' below land surface (252' to 273' below ground surface) Date: 8-7-89 (Driller's logs)

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: W 017, 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

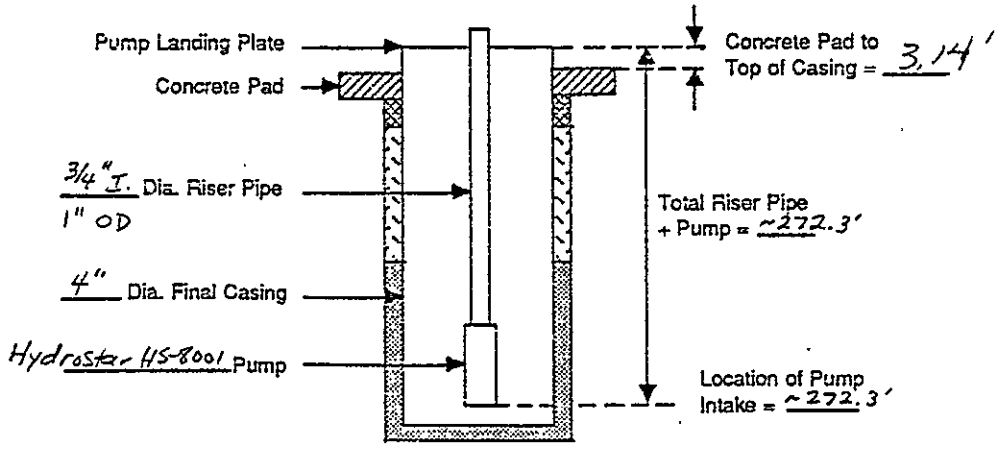
Reported Depth-to-Bottom: 276.34' LS (Drillers logs) Date: 8-8-89

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 3 3/4" 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 manufacturers 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 (
S8902066.1

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

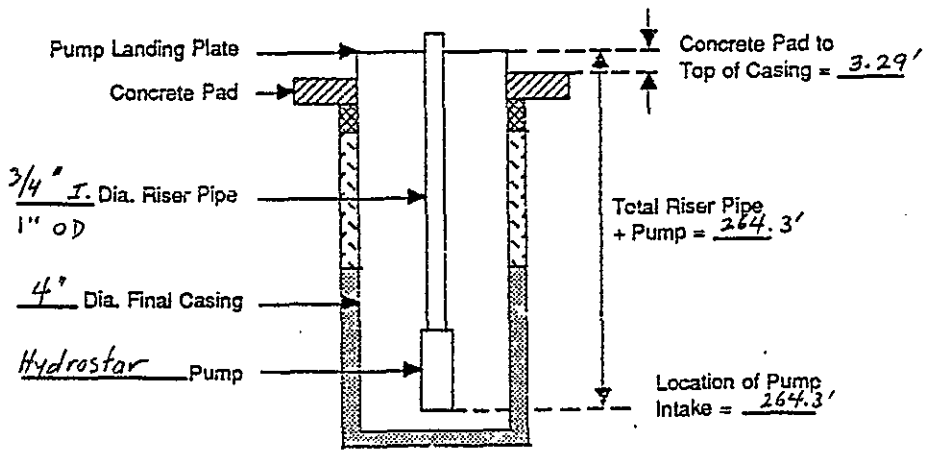
Reported Depth-to-Bottom: 267.55' below land surface Date: 8-28-89

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)

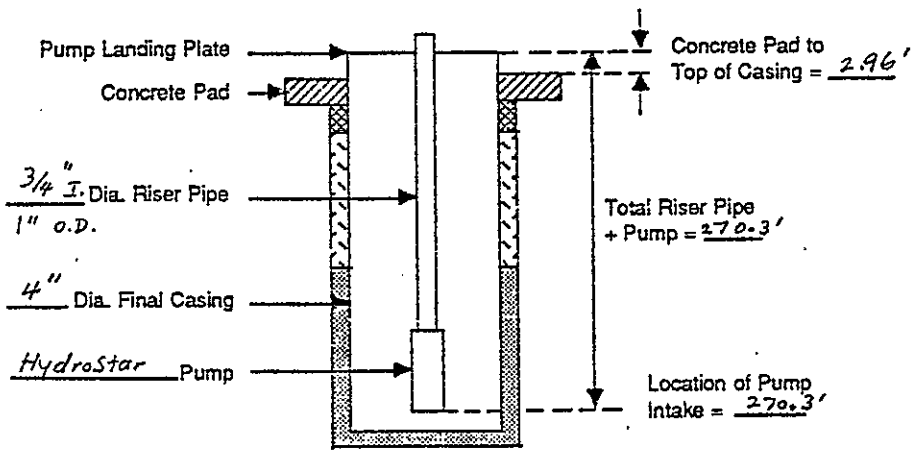
Reported Depth-to-Bottom: 275.56' DIS (completion log) Date: 10-9-89

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 TOC

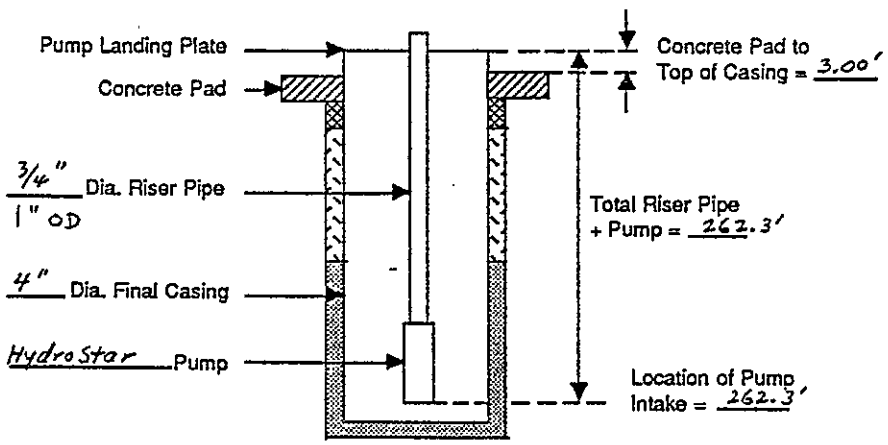
Reported Depth-to-Bottom: 266.83' bls. Date: 10-17-89

Screened Interval: ~~274.68' – 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

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SAMPLING PUMP INSTALLATION FORM

Project: W-017, 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

Steel Tape # L500-03

Depth-to-Water: 248.04', 248.04' below TOC - Depth-to-Bottom: 262.27' below TOC

Reported Depth-to-Bottom: 259.03' below land surface Date: 8-28-89

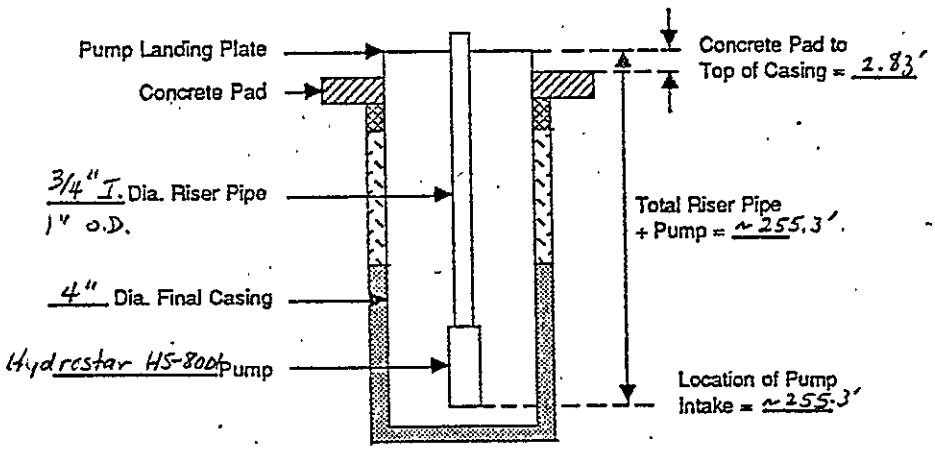
241.36' to 262.36' below TOC (Drillers logs)

Screened Interval: 238.03' to 259.03' b.l.s. 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

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SAMPLING PUMP INSTALLATION FORM

Project: W-Ø17 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 DRN 10/12/89

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

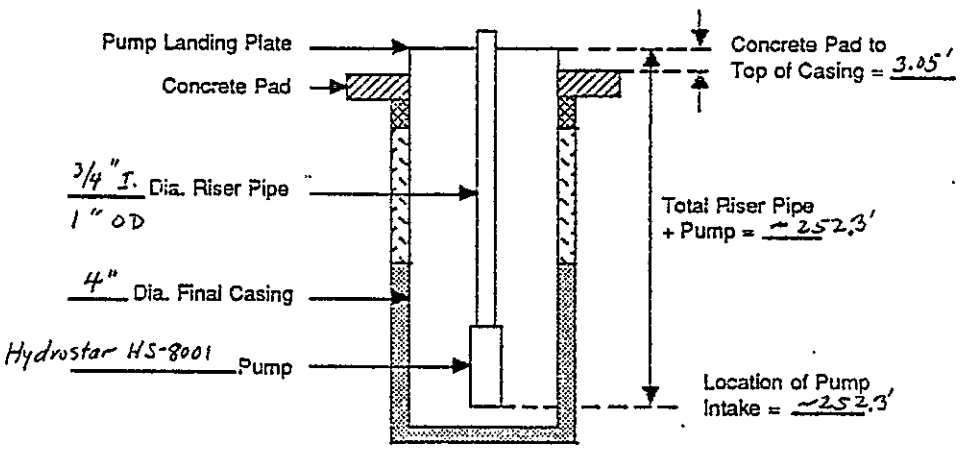
232.45' to 259.45' below TOC (Driller's logs) 242.68' to 259.45' below TOC

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

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

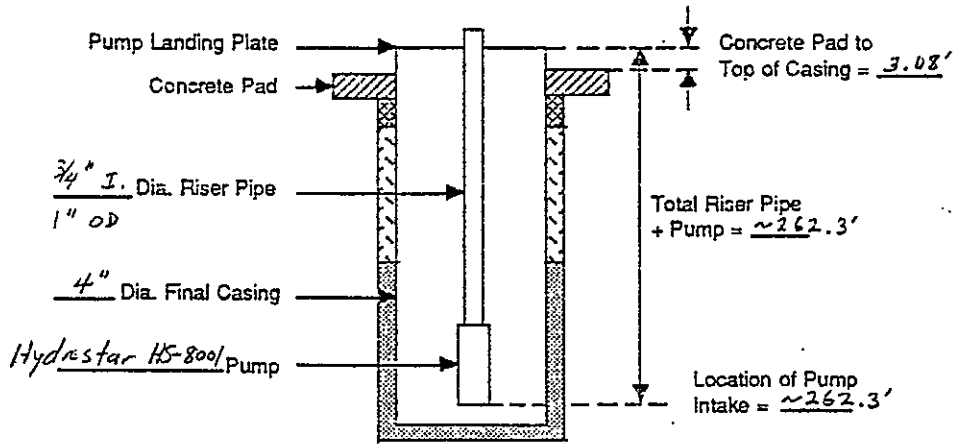
Reported Depth-to-Bottom: 267' below land surface (249.98' to 270.98' below TOC (Driller's logs)) Date: 7-11-89

Screened Interval: 246.4' to 267.4' below ground 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

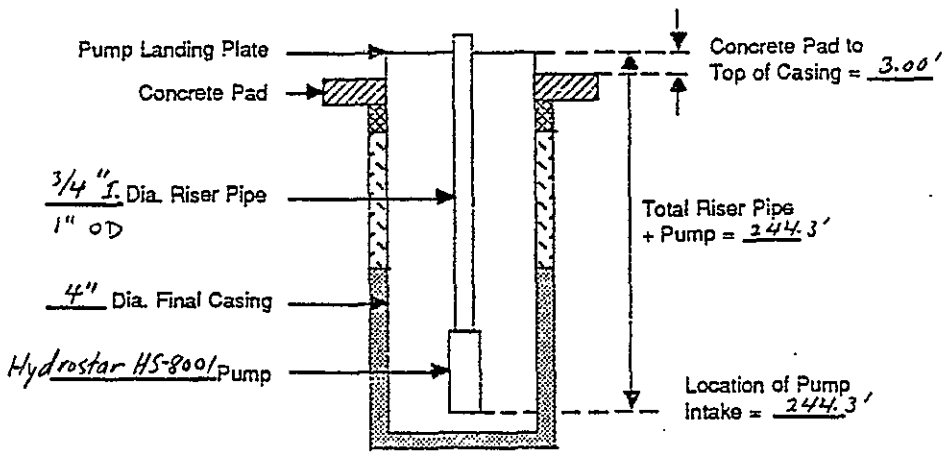
Reported Depth-to-Bottom: 248.3' below land surface Date: 7-17-89

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

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SAMPLING PUMP INSTALLATION FORM

Project: W017 Single Shelled Tanks Well Number: 299 - W10 - 15

Pump Type: Pos. displacement Piston Pump Model: Hydrostar HS-8001

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" casing

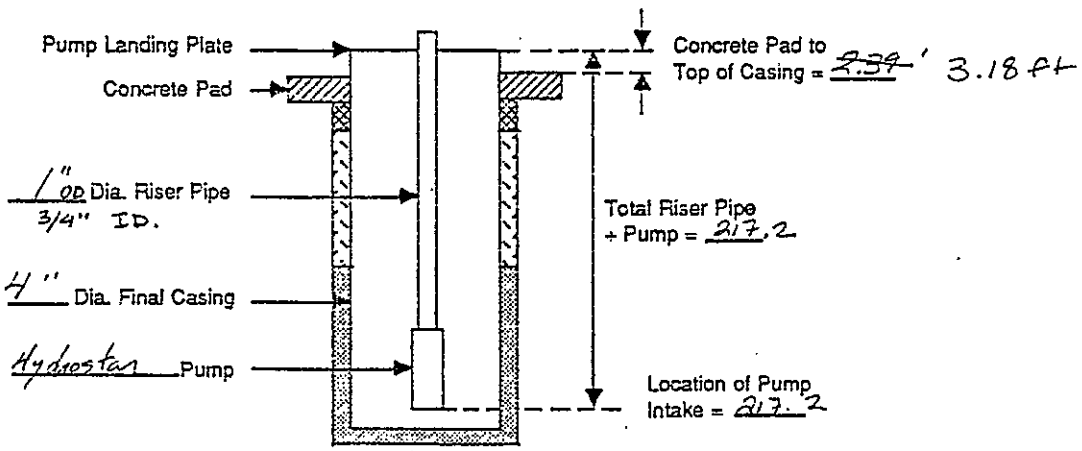
Pump Riser Pipe Description:

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: Pump, couplings and well head assembly 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

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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

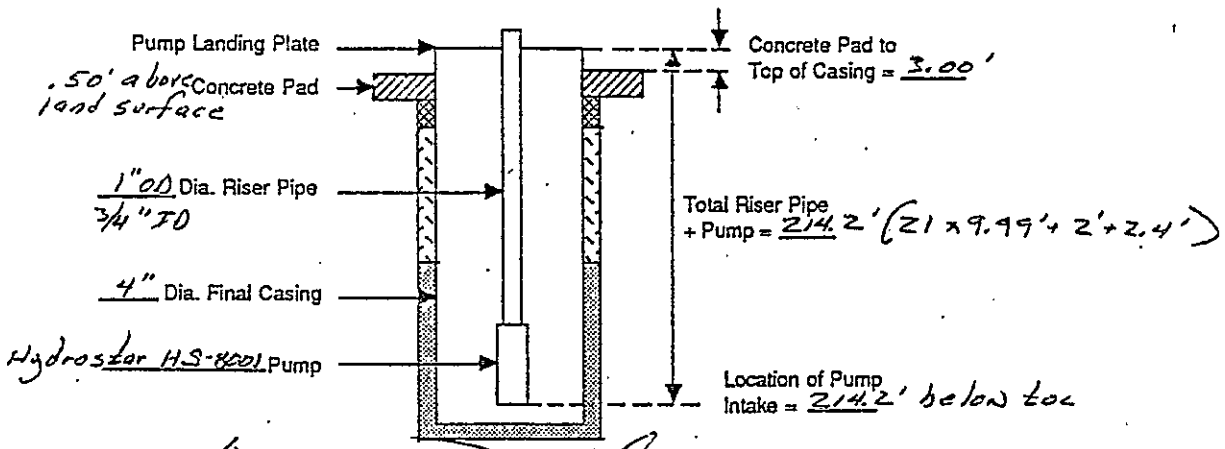
Reported Depth-to-Bottom: 219' below land surface Date: 10/25/89

Screened Interval: 219'-195' 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

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